Waller County, Texas
Invitation for Bid

Reconstruction of Double Culvert Road Segments 1&2 and Cedar Creek Road
for Waller County Engineering
BID 26-013

SUBMIT BIDS TO:

Waller County
County Judge's Office
836 Austin Street, Suite 4300
Hempstead, TX 77445

SUBMIT NO LATER THAN:

Thursday, August 27, 2026
1:00 PM (CST)

ENVELOPE TO BE LABELED:

Bid 26-013
Double Culvert and Cedar Creek Roads

ALL BIDS MUST BE RECEIVED AND TIME/DATE STAMPED BY THE COUNTY JUDGE'S OFICE OF WALLER COUNTY ON OR BEFORE THE SPECIFIED TIME/DATE STATED ABOVE.
BIDS RECEIVED AS REQUIRED WILL BE OPENED AND PUBLICLY READ AFTER DUE DATE.
BIDS RECEIVED AFTER THE SPECIFIED TIME WILL BE RETURNED UNOPENED.

Results will not be given by phone. Results will be provided to bidder in writing after Commissioners Court award. Requests for information must be in writing and directed to Jaime Kovar, Purchasing Director, j.kovar@wallercounty.us

Vendor Responsibilities:

- Download and complete any addendums posted on the Waller County website.
- Submit response in accordance with requirements stated in the document.
- DO NOT submit responses via email, as they will not be accepted.

Invitation for Bids

SECTION 1. GENERAL REQUIREMENTS

1.1 Entire Document: Read this entire document carefully. Follow all instructions. You are responsible for fulfilling all requirements and specifications. Be sure you understand them.

1.2 Applicability: General Requirements apply to all advertised Invitations for Bid; however, these may be superseded, in whole or in part, by the scope, special requirements, specifications, special specifications or other data contained herein.

1.3 Governing Law: Bidder is advised that these requirements shall be fully governed by the laws of the State of Texas and that Waller County may request and rely on advice, decisions and opinions of the Attorney General of Texas and the Waller County District Attorney concerning any portion of these requirements.

1.4 Bid Form Completion: Complete one (1) bid form, sign, and return with completed submittal to County Judge's Office of Waller County. An authorized representative of the Bidder must sign the Contract Sheet. The contract will be binding only when approved by the Waller County Commissioners Court, signed by the County Judge of Waller County and a purchase order authorizing the item(s) desired has been issued. The use of corrective fluid is not acceptable and may result in the disqualification of bid. If an error is made, the bidder must draw a line through the error and initial each change.

If an Excel pricing form is included and/or posted on the County's website amongst this Invitation for Bid, the vendor must download, complete, and save the Excel file (not a PDF of the Excel file) of the pricing form on a flash drive. The Excel file on the flash drive must be downloadable by the Purchasing Director in order to copy and paste the Bidder's pricing to the County's tabulation. The flash drive must be labeled and included in the same sealed envelope with the respondent's completed Bid along with a printed copy of the pricing form completed by the vendor.

1.5 Bid Returns: Bidders must return a completed Bid Package in a sealed envelope to the County Judge's Office of Waller County, 836 Austin Street, Suite 4300, Hempstead, TX 77445, no later than 1:00 P.M. (CST) on the date specified. The Bid Package is the set of documents outlining the requirements and details of the Project that is provided by the County to potential Bidders, and the complete, properly signed Bid. Late bids will not be accepted.

1.6 Addenda: No interpretation of the meaning of the drawings, specifications or other bid documents will be made to any bidder orally. All requests for such interpretations must be made in writing addressed to Jaime Kovar, Procurement Director by email at: J.Kovar@wallercounty.us. Any and all interpretations and any supplemental instructions will be in the form of written addenda to the contract documents which will be posted on Waller County's website. Addenda will ONLY be issued by the Waller County Procurement Director. It is the sole responsibility of each bidder to insure receipt of any and all addenda. All addenda issued will become part of the Contract Documents. Bidders must sign and include any and all issued addenda in the returned bid package. **The deadline for submission of questions and/or clarification is no later than August 19, 2026, at 10:00 AM (CST).** Requests received after the deadline will not be responded to due to the time constraints of this bid process.

1.7 References: All Bidders must submit, WITH BID, at least three (3) references from clients for whom a project similar to that specified herein has been successfully accomplished. References must include clients' name, contact person, and telephone number.

1.8 Bid Bond: All Bidders must submit, WITH BID, a cashier's check or certified check for at least five percent (5%) of the total bid price, payable to the order of Waller County, or a Bid Bond in the same amount issued by a surety, acceptable to Waller County, authorized to do business in the State of Texas, as a guarantee that the Bidder will do the work described herein at the rates stated herein. The cashier's check or certified check submitted by an unsuccessful Bidder will be returned only after a written request to do so has been received by the Procurement Director.

1.9 Material Safety Data Sheets: Under the "Hazardous Communication Act", commonly known as the "Texas Right to Know Act", a Bidder must provide to Waller County and using departments, with each delivery, material safety data sheets, which are, applicable to hazardous substances defined in the Act. Bidders are obligated to maintain a current, updated file in Waller County. Failure of the Bidder to maintain such a file will be cause to reject any bid applying thereto.

1.10 Pricing: Prices for all goods and/or services shall be firm for the duration of the Contract and shall be stated on the bid sheet. The Bid submitted to the County shall be inclusive of all costs necessary to complete the Project. No price changes, additions, or subsequent qualifications will be honored during the course of the Contract, unless made in accordance with the Contract's General Terms and Conditions. All prices must be written in ink or typewritten.

1.11 Term Contracts: If the Contract is intended to cover a specific time period, said time will be given in the specifications under Scope.

1.12 Recycled Materials: Pursuant to Texas Health and Safety Code § 361.426, Waller County encourages the use of products made of recycled materials and shall give preference in purchasing to products made of recycled materials if the products meet applicable specifications as to quantity and quality. Waller County will be the sole judge in determining product preference application.

1.13 Evaluation: Evaluation shall be used as a determinant as to which bid items or services are the most efficient and/or most economical for Waller County. It shall be based on all factors which have a bearing on price and performance of the items in the user environment. All Bids are subject to tabulation by the Procurement Director and recommendation to Waller County Commissioners Court. Compliance with all bid requirements, delivery, and needs of the using department are considerations in evaluating bids. Pricing is NOT the only criteria in determining the lowest responsible bidder, or for making a recommendation. The Waller County Procurement Director reserves the right to contact any Bidder, at any time, to clarify, verify, or request information with regard to any Bid.

1.14 Disqualification of Bidder: Upon signing the Contract Sheet, a Bidder offering to provide supplies, materials, services, or equipment to Waller County certifies that the Bidder has not violated the antitrust laws of this state codified in section 15.01, et seq., Business & Commerce Code, or the federal antitrust laws, and has not communicated directly or indirectly the bid made to any competitor or any other person engaged in such line of

business. Any and all Bids may be rejected if Waller County believes that collusion exists among the Bidders. Bids in which the prices appear to be unbalanced may be rejected. If multiple Bids are submitted by a Bidder and after the Bids are opened, one of the Bids is withdrawn, the result will be that all of the Bids submitted by that Bidder will be withdrawn; however, nothing herein prohibits a vendor from submitting multiple Bids for different products or services.

1.15 Awards: Waller County reserves the right to award the Contract to the lowest responsible bidder in accordance with the laws of the State of Texas, to waive any formality or irregularity, to make awards to more than one Bidder, and to reject any or all Bids.

1.16 Contract Obligation: A Bid does not become binding upon the Bidder until it is accepted by official action of the Waller County Commissioners Court, and a Contract does not become binding on the County of the Bidders until it is approved by official action of the Waller County Commissioners Court and executed by the County Judge or another person authorized by the Waller County Commissioners Court. Department heads are not authorized to sign agreements for Waller County. Binding agreements shall remain in effect until all products and/or services covered by this purchase have been satisfactorily delivered and accepted.

SECTION 2. PRE-BID CONFERENCE

2.1 Pre-Bid Conference: A pre-bid conference will be conducted on **Thursday, August 13, 2026 at 10:00 AM** (CST). The pre-bid conference will be held at the Waller County Judge's Office located in the County Courthouse at 836 Austin Street, Suite 4300, Hempstead, Texas 77445. All bidders are encouraged to attend.

SECTION 3. SCOPE

3.1 Scope: It is the intent of Waller County to contract with one (1) vendor for all materials, supplies, equipment, tools, services, labor, and supervision necessary to complete the reconstruction of Double Culvert Roads Segments 1 & 2 and Cedar Creek Road.

3.1.1 Double Culver Road Segment 1

The scope of work includes the reconstruction and widening of Double Culvert Road from FM 1748 to the railroad crossing for a total length of approximately two (2) miles in Waller County.

Proposed scope improvements include, but not limited to, reconstructing the existing asphalt roadway and widening from approximately 20 feet to 26 feet to provide a two-lane roadway with 11-foot travel lanes and 2-foot shoulders. It is proposed to maintain the existing roadway classification as a local road and the design speed in accordance with County guidelines.

Proposed typical sections include a 26' wide roadway with 11' travel lanes and 2' shoulders.

The scope of work includes regrading of existing roadside ditches and driveway reconstruction throughout the corridor.

Traffic control, pavement markings and striping, erosion control measures, and storm water pollution prevention are also included as part of the scope of this project.

All appurtenant and incidental items necessary to complete the project in accordance with the plans, specifications, and County standards are also included.

3.1.2 Double Culvert Road Segment 2 and Cedar Creek Road

The scope of work includes the reconstruction of an asphalt roadway along Double Culvert Road and Cedar Creek Road in Waller County. The limits of the Double Culvert Road Segment 2 begin approximately 200' north of the Union Pacific Railroad crossing and end at Cedar Creek Road, approximately 1.27 miles in length. Cedar Creek Road limits begin at Double Culvert Road and end at SH6, a length of 0.91 miles.

Proposed scope improvements include, but not limited to, reconstructing the existing two-lane roadway with open ditch drainage within the existing right-of-way (ROW) which varies from 34' to 60' on Double Culvert Road and varies from 54' to 70' on Cedar Creek Road. At several locations along the east side of Double Culvert Road, fence lines are set back from the prescribed ROW line. Ditch and driveway work is proposed within the limits of the fenced area. It is proposed to reconstruct with 3-inch asphalt pavement, 8-inch black base course, 8-inch lime stabilized subgrade with black base shoulders in accordance with Waller County guidelines. The roadway classification is local road and is being designed for 35mph.

Proposed typical sections include a 24' wide roadway for the sec□on of Double Culvert Road south of Donahoe Creek and a 22' wide roadway north of Donahoe Creek. Cedar Creek Road width will be 26'. For both roadways, travel lanes will be 11'. Shoulders will be constructed of black base. The existing bridge on Double Culvert Road over Donahoe Creek will remain, with no work planned for the bridge. Proposed work on the approaches to the bridge include milling and replacing 3" of asphalt.

The scope of work also includes evaluation of exiting drainage conditions and maintaining or improving storm water conveyance. The open ditch is to be maintained, and regrading of exiting ditches are proposed for both roadways. Double Culvert Road shares a common drainage ditch with Union Pacific Railroad for the greater part of the length of the roadway, and no work will be performed within railroad ROW.

Traffic control, permanent signing and striping, and storm water pollution prevention are also included as part of the scope for this project. The ornamental mailbox located at 40681 Cedar Creek Road (belonging to Charles Williams) will be relocated by others and not included in the proposed work. All other mailboxes will be relocated as part of the project.

SECTION 4. ESTIMATED BUDGET AND PROJECT COMPLETION DATE

4.1 Estimated Budget: $9.4 million

4.2 Estimated Completion Date: Three hundred thirty (330) calendar days, beginning on the issuance date of the Notice to Proceed.

SECTION 5. ENCLOSURE

5.1 Enclosure #1: Specifications and Plans

SECTION 6. PRICING

6.1 Excel Bid Pricing Form: Bidders are required to obtain and complete the Excel Bid Pricing Form on the Waller County website and return to County Judge's Office, as stated in

Section 1.4 and 1.5.

SECTION 7. PERFORMANCE AND PAYMENT BONDS

7.1 Bonds Required: The Bidder must provide to the County a payment bond and performance bond, each in the amount of 100% of the total Contract Price. Bonds must be submitted to the Procurement Director within ten (10) calendar days after receipt of notification of bid award. Such bonds shall be executed by a solvent surety company duly authorized to do business and licensed in the State of Texas to issue surety bonds with a Best Rating of A/VII or better. Waller County reserves the right to accept or reject any surety company proposed by the Contractor. In the event Waller County rejects the proposed surety company, the Contractor will be afforded five (5) additional days to submit the required bonds issued by a surety company acceptable to Waller County.

An attorney-in-fact or agent who signs a bid bond, performance bond, or payment bond must file with each bond a certified and effectively dated copy of his or her power of attorney or authority to act.

SECTION 8. REQUIRED FORMS

8.1 Required Forms: All Bidders are required to complete and return with their Bids the following forms:

a. Electronic Excel file of Pricing Form on flash drive and printed hard copy

b. Bidder's Business Information Sheet

c. Contract Special Terms & Conditions

d. Contract Sheet

e. W-9 Form

f. Texas Ethics Commission Form 1295:

i. Effective January 1, 2016 all contracts executed by Commissioners Court, regardless of the dollar amount, will require completion of Form 1295 "Certificate of Interested Parties", as required by Texas Government Code §2252.908. All vendors submitting a response to a formal Bid, RFP, SOQ or any contracts, contract amendments, renewals or change orders are required to complete the Form 1295 online through the State of Texas Ethics Commission website. Please visit: https://www.ethics.state.tx.us/filinginfo/1295/.

ii. On-line instructions:

a. Name of governmental entity is to read: Waller County, Texas.

b. Identification number used by the governmental entity is: B26-013.

c. Description is the title of the solicitation: Double Culvert Roads Segments 1&2 and Cedar Creek Road.

SECTION 9. AWARD

9.1 Award: The contract will be awarded to the overall lowest responsible bidder.

Bidder's Business Information Sheet

By submitting a Bid, Bidder is seeking to enter into a legal contract with the County. As such, a Bidder must be an individual or a legal business entity capable of entering into a binding contract. Bidders must completely and accurately provide the information requested below or your Bid may be deemed non-responsive.

Name of Company:

_____

Type of Business (please check one):

☐ Individual/Sole Proprietor

☐ Corporation

☐ Limited Liability Company

☐ Partnership

☐ Other

If other, please specify _____

State of Incorporation (if applicable): _____

Federal Employer Identification Number: _____

Principal Place of Business Address: _____

_____.

Name and Address for Notices to be Sent Under Contract General Terms and Conditions Section 18.19:

_____

_____.

List any other names the Company uses, or is known by (dba, aka, etc.):

_____

_____.

_____ _____

Company Name Date

_____ _____

Signature of Authorized Company Official Printed Name

_____

Email address

Contract General Terms and Conditions

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SECTION 1. DEFINTIONS

1.1 Addendum: Written instruments issued by Waller County which clarify, correct, or change the bidding requirements or the Contract Documents prior to the Due Date.

1.2 Authorized Representative: The Waller County Engineer.

1.3 Bid: A complete, properly signed response to an Invitation for Bid that, if accepted, would bind the Bidder to perform the resultant contract.

1.4 Bidder: A person, firm, or entity that submits a Bid in response to an Invitation for Bid.

1.5 Bid Documents: The advertisement or Invitation for Bids, Bid form, the Price Sheet, the Contract Sheet, Specifications and Plans, Geotechnical Data, the Special Terms and Conditions Form, the Contract General Terms and Conditions, Bidder's Business Information Sheet, Form, and Addenda.

1.6 Calendar Day: Any day of the week, no days being excepted.

1.7 Construction Site: The area designated by the County where construction work on the Project is carried out.

1.8 Contract: The binding legal agreement between the County and the Contractor. The Contract represents the entire and integrated agreement between the County and the Contractor for performance of the Work, as evidenced by the Contract Documents.

1.9 Contract Price: the moneys payable by the County to the Contractor for completion of the Work in accordance with the Contract Documents.

1.10 Contract Sheet: the form provided in the Bid Documents.

1.11 Contract Time: The number of days allowed for completion of the Work as defined by the Contract Sheet. When any period is referred to in days, it will be computed to exclude the first and last day of such period. A day of twenty-four hours measured from midnight to the next midnight will constitute a day.

1.12 Contractor: The individual, firm, corporation, or other business entity with whom the County has entered into the Contract for the performance of the Work.

1.13 County: Waller County, Texas, a political subdivision of the State of Texas.

1.14 Design Engineer: Firm: LJA Engineering
Houston, Texas

1.15 Design Engineer Representative: The authorized representative of the Design Engineer who may be assigned to the site or any part thereof.

1.16 Drawings: Those portions of the Contract Documents which are graphic representations of the scope, extent and character of the Work to be furnished and performed by Contractor, and which have been approved by the County. Drawings may include plans, elevations, sections, details, schedules, and diagrams. Shop Drawings are not included in the definitions of Drawings.

1.17 Due Date: The date and time specified for receipt of Bids.

1.18 Final Completion: The point in time when the County determines that all Work has been completed and final payment to Contractor will be made in accordance with the Contract Documents.

1.19 Invitation for Bid ("IFB"): A solicitation requesting pricing for a specified good or service which has been advertised for Bid in a newspaper.

1.20 Minor Change: A written change in the Work that is ordered by the Authorized Representative, that does not change the Contract Price or Contract Time, and is consistent with the scope of the Contract.

1.21 Notice to Proceed: A written notice given by the Authorized Representative of the County to Contractor identifying the date on which the Work will commence, and on which Contractor shall start to perform Contractor's obligations under the Contract Documents.

1.22 Project: the Reconstruction of Double Culvert Road & Cedar Creek Road as specified in the Contract Documents.

1.23 Schedule of Values: an itemized list of each activity and all materials and labor required to complete the Project, and the corresponding values of each. When summed up, the Schedule of Values shall equal the total Contract Price.

1.24 Shop Drawings: All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor as required by the Contract Documents.

1.25 Specifications and Plans: Those portions of the Contract Documents consisting of written technical descriptions as applied to the Work, which set forth to Contractor, in detail, the requirements which must be met by all materials, equipment, construction systems, standards, workmanship, equipment, and services in order to render a completed and useful project.

1.26 Subcontractor: An individual, firm, corporation, or other business entity having a direct contract with Contractor for the performance of a portion of the Work under the Contract.

1.27 Substantial Completion: The stage in the progress of the Work when the Work, or designated portion thereof, is sufficiently complete in accordance with the Contract Documents so that the County can occupy or utilize the Work for its intended use, as evidenced by a Certificate of Substantial Completion approved by the County.

1.28 Superintendent: The representative of Contractor authorized in writing to receive and fulfill instructions from the Authorized Representative, and who shall supervise and direct construction of the Work.

1.29 Supplier: An individual or entity that furnishes materials or equipment to be incorporated in the Work by the Contractor or any Subcontractor.

1.30 Transfer Date: the date on which the care, custody, and control of the Project passes to Waller County.

1.31 Work: The entire completed construction, or the various separately identifiable parts thereof, required to be furnished under the Contract Documents. It includes the procurement, delivery, and proper construction and/or installation of all materials, facilities, and associated appurtenances necessary to fulfill the winning Bidder's

obligations under the Contract, including the coordination and administration of all services necessary for the Contractor, its agents, and/or subcontractors to fulfill Contractor's obligations under the Contract.

SECTION 2. CONTRACT DOCUMENTS

2.1 The Contract Documents: The Contract Documents are composed of the following:

a. Contract Sheet
b. Invitation for Bid
c. Bid Form
d. Specifications and Plans
e. Contract Special Terms and Conditions, if any
f. Contract General Terms and Conditions
g. Bidder's Business Information Sheet
h. Forms

2.2 Intent: The purpose of the Contract Documents is to include all information necessary for the proper execution and timely completion of the Work by Contractor. The Contractor will execute the Work described in and reasonably inferable from the Contract Documents as necessary to produce the results indicated by the Contract Documents. The Contract Documents are complimentary, and what is required by one shall be as binding as if required by all.

2.3 Exclusion of Professional Services: Contractor shall neither perform nor provide professional services as defined by Texas Government Code Chapter 2254 under this Contract.

2.4 Order of Precedence: In the event of a conflict between any of the Contract Documents, they shall be given precedence in the order provided in Section 2.1.

2.5 Interpretation: In the event of any dispute concerning the terms of the Contract Documents, the County's interpretation shall govern.

SECTION 3. PROJECT DURATION

3.1 Project Timeline: Bidder agrees to complete all work required by the Contract Documents as indicated on the Contract Sheet after issuance of a purchase order by the County, and issuance of a Notice to Proceed by the Authorized Representative. The Contract Time will begin to run on the date the Notice to Proceed is issued.

3.2 Liquidated Damages: The Contractor or its surety shall be liable for liquidated damages for the failure of the Contractor to timely complete the Work or any portion thereof within the Contract Time. The Contractor shall pay the County one thousand five hundred dollars ($1,500) per day for each calendar day beyond the scheduled completion date specified herein, unless the contract time has been adjusted by a Change Order. If the Contractor pays liquidated damages to the County, the County will place the Contractor on one (1) year probation. The County will issue written notice to the Contractor of the probation, and the one (1) year probation period will begin to run on the date of issuance of the written

notice. If the Contractor becomes responsible for liquidated damages on any other project during the probation period, the Contractor will be disqualified from any County work for a period of two (2) years, beginning on the issuance date of the written notice of the one (1) year probation period.

SECTION 4. CONTRACTOR'S RESPONSIBILITY FOR WORK

4.1 Preconstruction Work: Contractor shall perform the following preconstruction work upon written request from the County:

a. Cause Contractor's personnel to meet with the County and the Design Engineer to discuss the status of the Project;

b. Review drawings and specifications with the Design Engineer to determine the Project's compliance with applicable codes; and

c. Submit to the Road & Bridge Department a Schedule of Values for all of the Work, subdivided into component parts in sufficient detail to serve as the basis for progress payments during construction. At a minimum, the Schedule of Values must be broken out by trade and split between materials and labor. Prices will be deemed to include an appropriate amount of overhead and profit applicable to each item of Work. The Schedule of Values must be prepared in such form and supported by such data to substantiate its accuracy as the Road & Bridge Department may require.

4.2 Construction Work: Contractor shall perform the following construction work:

a. All preparatory work at the Construction Site identified herein, including but not limited to: soil and concrete testing, demolition of improvements existing at the construction site, and any other actions necessary for construction to begin in compliance with all laws and regulations pertaining to the Project, including those related to archaeological and environmental requirements.

b. Construct and install the Project on the construction site in accordance with the Contract Documents.

c. Furnish all materials, supplies, equipment, tools, labor, supervision, utilities, transportation, and other materials and services necessary to complete the Project.

4.3 Reporting and Resolving Discrepancies: If, during the performance of the Work, the Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents or between the Contract Documents and any provisions of any such law or regulation applicable to the performance of the Work or of any such standard, specification, manual or code, or instructions of any Supplier, Contractor shall not proceed with the Work affected thereby until an amendment or supplement to the Contract Documents has been issued. The Contractor shall be liable to the County for failure to report any such conflict, error, ambiguity, or discrepancy of which Contractor knew or reasonable should have known.

4.4 Reporting Design Defects: The Contractor shall provide written disclosure to the County if the Contractor learns of a defect, inaccuracy, inadequacy, or insufficiency in the Contract Documents, plans, specifications, or other design documents that the Contractor discovers, or reasonably should have discovered by the use of ordinary diligence. The Contractor shall

provide written disclosure within a reasonable time of learning of the defect, but not later than two (2) days after the discovery. Contractor shall not proceed with the Work affected thereby until instructed in writing by the Authorized Representative. If the Contractor fails to disclose a defect under this section of which the Contractor knew or reasonably should have known, the Contractor shall be liable to the County for the consequences of the defect(s) that result from the failure to disclose.

4.5 Minor Changes in the Work: Waller County acknowledges that in order to accomplish the efficient completion of the Project within the Contract Time, the Contractor may submit requests for Minor Changes in writing to the Authorized Representative in stages for approval or consent. Upon any request for a Minor Change submitted by the Contractor for review and approval, the Authorized Representative shall review the same, and shall diligently and promptly give the Contractor written notice of the Authorized Representative's approval or disapproval. The written approval or disapproval will be provided to the Contractor no later than fourteen (14) calendar days after receipt of the written request for Minor Change . If disapproved, the Authorized Representative's written decision shall set forth in detail all reasons for the disapproval. The Authorized Representative's right to disapprove any Minor Change shall be limited to the elements that: (a) do not conform substantially to matters previously approved, (b) have not been previously presented and approved, and that the Contractor fails to demonstrate is reasonably necessary for completion of the Project, or (c) are violations of this Contract or applicable laws and regulations.

4.6 Change Orders: A Change Order is required for all changes in the Project that require (a) an adjustment in the Contract Price, (b) an adjustment in the Contract Time, or (c) a material change in the overall scope or function of the Project. Change Orders may only be approved by the Waller County Commissioners Court. A Change Order must be approved before Contractor commences such change. Such procedure shall be the exclusive means to effect such changes in the Project.

a. If at any time Waller County desires to make any change in the Project requiring the issuance of a Change Order, Waller County will provide the Contractor with a written notice describing the change. Within a reasonable period of time after receiving such notice, the Contractor shall provide Waller County with a Change Order that describes the proposed change, and proposes changes, if any, to the Contract Price, the Schedule of Values, and the final completion date. Once the Contractor has provided a Change Order, the County will provide a written approval or disapproval of the Change Order not later than the 28th calendar day after receipt of the proposed Change Order. Upon approval of the Change Order, the Contractor shall perform the work in accordance with such Change Order. All work performed pursuant to a Change Order shall be performed in accordance with the terms of this Contract.

b. No action, acquiescence, or inaction by Waller County or any representative of Waller County shall be construed to be a waiver of requirements set forth in this Contract in regard to Change Orders, or as a ratification of a violation of such requirements. All acts in violation of this provision shall be considered void.

c. A Change Order is only effective if it is approved by the Waller County Commissioners Court, and signed by an authorized representative of both the County and the Contractor.

d. The Contract Price and the Schedule of Values shall be adjusted only as a result of a Change Order requiring such adjustment. Any extra work performed without a proper Change Order shall be considered voluntary and not subject to additional compensation.

4.7 Review and Approval of Changes: If the County disapproves of a Minor Change or Change Order, the Contractor shall have the right to alter such Minor Change or proposed Change Order to the satisfaction of the County, and resubmit the matter for evaluation. Any resubmission shall be subject to review and approval by the County.

a. The County and the Contractor shall attempt in good faith to resolve any disputes concerning a Minor Change or Change Order expeditiously, so as not to delay the completion of the Project in accordance with this Contract.

b. Waller County recognizes the importance of expeditious action upon all matters submitted to the County for review and approval, and of expeditious response to those aspects of the Project which require approval of governmental authorities having jurisdiction thereover. Waller County shall exercise its rights of review and approval hereunder with due diligence, reasonableness, and good faith. The County shall use its reasonable efforts to expedite any required review of the Project or other matters by any governmental authority.

4.8 Site Access: Prior to the Transfer Date, the County and the Contractor shall have uninterrupted access to the construction site. Subsequent to the Transfer Date, Waller County will permit the Contractor, the Design Engineer, and their representatives and subcontractors to enter upon the Project at times reasonably necessary to complete the punch list items.

4.9 Applicable Laws and Regulations: Contractor shall perform its obligations pursuant to this Contract in accordance with all applicable federal, state, and local statutes, ordinances laws, regulations, and executive, administrative and judicial orders. The Contractor may be entitled to an extension of time if changes in said applicable laws and regulations cause any delay in the performance of the Contractor's obligations under this Contract.

4.10 Environmental Regulations: Contractor shall plan and execute its operations in compliance with all applicable Federal, state, and local laws and regulations concerning control and abatement of water pollution and prevention and control of air pollution.

4.11 Material Safety Data Sheets: Contractor shall be responsible for providing and coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the site in accordance with laws and regulations.

4.12 Permits: Contractor shall obtain, possess, and pay for all permits, licenses, and fees required to complete the Project. The permits shall be in the name of Waller County.

4.13 Familiarity with Project: The Contractor represents and agrees that it is thoroughly familiar with all phases of the Project, all matters and conditions that may affect the construction

and successful completion of the Project, and had the opportunity to conduct any and all additional inquiry, tests, and investigations that it deemed necessary and proper. Contractor further certifies that it has: (a) visited and examined the construction site, the obstacles thereon, if any, and observed all conditions that may affect the Project (b) determined the nature and location of the Project, (c) understands the general and local conditions which affect the Project, and (d) investigated the labor and materials market as they are relevant to the Project. Contractor represents and agrees that it is able to successfully complete the Project for the Contract Price.

4.14 Contractor: Contractor specifically represents that is has carefully examined the plans, the geotechnical report, if any, and the site of the proposed Work and is thoroughly familiar with all of the conditions surrounding construction of the Project, having had the opportunity to conduct any and all additional inquiry, tests, and investigation that he or she deems necessary and proper. The Contractor acknowledges the receipt of the geotechnical report, if any, and agrees that the report, while it is an accurate record of the geotechnical conditions at the boring locations, is not a guarantee of specific site conditions which may vary between boring locations.

4.15 Duty to Notify of Unforeseen Conditions: The Contractor must notify the County in writing as soon as reasonably possible, but no later than three (3) calendar days, if unforeseen conditions are encountered at the site which are i) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents, or ii) unknown physical conditions of an unusual nature, that differ materially from those normally encountered in the type of work being performed under this Contract. Contractor may not disturb the conditions until the County conducts an investigation. The Authorized Representative and the Design Engineer will promptly investigate such conditions. If it is determined that such conditions differ materially and cause an increase or decrease in the Contractor's cost of or time required for performance of any part of the Work, the Authorized Representative will recommend an equitable adjustment in the Contract Price, Contract Time, or both. If it determined that such conditions are not materially different from those indicated in the Contract Documents, the Authorized Representative will notify the Contractor in writing of such findings, and the Contract will not be adjusted.

4.16 Contractor's General Warranty: The Contractor warrants and guarantees to the County that all work performed on the Project will conform to the Contract Documents, be performed in a good and workmanlike manner in accordance with the Contract Documents, and will not be defective. The Contractor shall promptly correct defective work and damage that results from the Contractor's failure to exercise reasonable care in performing the Work, or from the Contractor's failure to perform the Work in a good and workmanlike manner. The Contractor shall use qualified, careful, and efficient contractors, subcontractors, employees, and workers in conformity with the provisions of this Contract. This Section 4.16 shall survive the termination or expiration of the Contract.

4.17 Contractor's Guarantee: The Contractor warrants and guarantees to the County that: (a) the Contractor possesses the skill and knowledge ordinarily possessed by well-informed members of its trade or profession, (b) the Contractor will use its best efforts to ensure that the services provided under this Contract are performed, delivered, and conducted in accordance with the best professional standards and in accordance with industry standards, and (c) the Contractor is fully experienced and properly qualified, equipped, organized and

financed to successfully complete the Project. The services and materials provided by the Contractor to Waller County will conform to the representations contained in this Contract, including all attachments, schedules, and exhibits.

4.18 No Limitation on Implied Warranties: The Contractor shall not limit or exclude any implied warranties, and shall extend such warranties for the goods or services provided under this Contract.

4.19 Work Performed Contrary to Law or Regulations: If Contractor performs any Work knowing or having reason to know that it is contrary to laws or regulations, the Contractor shall bear all claims, costs, losses, and damages arising therefrom.

4.20 Warranties and Guarantees Cumulative: The Contractor's warranties and guarantees shall be cumulative, deemed consistent and not in conflict, are intended to be given full force and effect, and are to be interpreted expansively to give the County the broadest warranty protection. The Contractor's obligation to perform and complete the Work in a good and workmanlike manner in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:

a. Observations by County or the Design Engineer, or any of their officials, officers, representatives, employees, or agents;

b. Recommendation of any payment by County, or any of its officials, officers, representatives, employees, or agents;

c. The issuance of a certificate of Substantial Completion or any payment by the County to the Contractor under the Contract Documents;

d. Use or occupancy of the Project or any part thereof by the County or the public;

e. Any acceptance by the County, or failure to do so;

f. Any review of a Shop Drawing or sample submittal;

g. Any inspection, test, or approval by other; or

h. Any correction by the County of defective work.

4.21 Contractor's Personnel. Contractor shall maintain a work force adequate to accomplish the Work within the Contract Time. Contractor shall employ only competent, orderly, personnel for the Project that are skilled in the performance of the type of Work required under this Contract.

4.22 Contractor's Supervision: Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. The Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall be responsible to see that the completed Work complies accurately with the Contract Documents.

4.23 Contractor's Superintendent: Beginning on the execution of the Contract, and continuing until Final Completion, the Contractor shall identify and maintain a competent and

qualified superintendent who shall be authorized to act on behalf of the Contractor and with whom Waller County may consult at all reasonable times. The superintendent must be an employee of the Contractor, unless such requirement is waived in writing by the Authorized Representative. The superintendent shall not be transferred from the Project without the County's consent, which shall not be unreasonably withheld or delayed. Notwithstanding the foregoing, the superintendent is not required to be assigned solely to the Project, and shall be entitled to spend reasonable time working on matters unrelated to the Project, so long as such work on other matters does not render the superintendent unavailable to the Project or to Waller County. If the superintendent is transferred from the Project, Waller County shall have the right to approve the replacement superintendent. The County's approval shall not be unreasonably withheld or delayed. The Contractor shall replace the superintendent upon the County's request in the event that the superintendent is unable to perform to the County's satisfaction.

4.24 Effect of Obligation: The obligation to maintain the superintendent and work force shall not be construed to: (a) preclude the promotion of any of Contractor's employees assigned to the Project, or (b) give rise to any liability of the Contractor in the event an employee assigned to the Project leaves the Contractor's employment, or (c) imply that the County has an employer/employee relationship with Contractor, or any of its employees .

4.25 Wages: Contractor shall pay workers on the Project in accordance with Section 15, and not less than the wage rates, including fringe benefits, as published by the Department of Labor for Building Construction and Heavy and Highway Trades, as applicable.

4.26 Subcontractors: The Contractor shall not employ any Subcontractor, Supplier, or other person or organization, whether initially or as a substitute, against whom the County may have a reasonable objection. Contractor shall not substitute any Subcontractor, person, or organization that has been accepted by the County, unless the substitute has been accepted in writing by the County. No acceptance by the County of any Subcontractor, Supplier, or other person or organization shall constitute a waiver of any right of the County to reject defective work. Contractor shall provide County with a complete list of any Subcontractors it intends to use on the Project. In the event that Subcontractors are used on the Project, the Subcontractor must agree to be bound by the terms of this Contract.

4.27 Responsibility for Subcontractors: The Contractor shall be fully responsible to the County for all acts and omissions of the Subcontractors, Suppliers, and other persons and organizations performing or furnishing any of the Work under a direct or indirect contract with Contractor just as Contractor is responsible for the Contractor's own acts and omissions. Nothing in the Contract Documents shall create for the benefit of any such Subcontractor, Supplier, or other person or organization any contractual relationship between the County and any such Subcontractor, Supplier, or other person or organization, nor shall it create any obligation on the part of the County to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other person or organization except as may otherwise be required by laws and regulations.

4.28 Construction Site Order: The Contractor shall at all times maintain good discipline and order on the construction site. If Contractor becomes aware that any employee, subcontractor, or subcontractor's employee is incompetent, disorderly, abusive, disobedient, has knowingly violated safety regulations, has possessed any firearm in

contravention of applicable Texas law, has possessed or was under the influence of alcohol or drugs on the job, or has violated any federal, state, or local law, rule, or ordinance. Contractor shall immediately remove such worker or representative, including an officer or owner of Contractor or any Subcontractor from performing work on the Project, and may not subsequently allow such worker or representative at the construction site without the County's written consent. Contractor, the Design Engineer, Subcontractors, and workers or employees shall comply with all applicable health, safety, and loss prevention rules of applicable governmental authorities. The Contractor shall at all times enforce strict discipline and good order among its employees and workers, and shall not employ on the Project any unfit person or anyone not skilled in the work assigned to him. Waller County may, upon thirty (30) days written notice to the Contractor and without cause, require the removal of any individual from performing work on the Project.

4.29 Construction Site Conditions: Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the site and land and areas identified by the Designated Representative, and other land and areas permitted by laws and regulations, right-of-way, permits, and easements. Contractor shall not unreasonably encumber the premises with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas, resulting from the performance of the Work. During the progress of the Work, and on a daily basis, Contractor shall keep the premises free from accumulations of waste materials, rubbish, and other debris resulting from the Work. At the completion of the Work, Contractor shall remove all waste materials, rubbish, and debris from and about the premises, as well as all tools, appliances, construction equipment and machinery, and surplus materials. Contractor shall leave the site clean and ready for use by County at Substantial Completion of the Work. Contractor shall restore to original condition all property not designated for alteration by the Contract Documents. If the Contractor fails to clean up at the completion of the Work, the County may do so, and charge the cost thereof to the Contractor.

4.30 Inspection: The Project and all parts thereof shall be subject to inspection from time to time by inspectors designated by Waller County. No such inspections shall relieve the Contractor of any of its obligations hereunder. Neither failure to inspect, nor failure to discover defects or reject any of the work as not in accordance with the Contract Documents shall be construed to imply an acceptance of such work or to relieve the Contractor of any of its obligations hereunder. Waller County agrees that its right of inspection shall be used reasonably and in a timely manner so as not to delay orderly completion of the Project.

4.31 Safety: The Contractor shall be responsible for initiating, maintain, and supervising all safety precautions and programs in connection with performing work on the Project. The Contractor shall comply with all applicable laws and regulations of any public body having jurisdiction for the safety of persons or property, or to protect them from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. The Contractor shall comply with all federal, state, and local occupational hazard and safety standards, codes and regulations applicable in the jurisdiction where the Project is located. The Contractor shall include the substance of this clause in its entirety in all subcontracts for any work to be performed at the construction site.

4.32 Responsibility for Property: Contractor shall notify owners of adjacent property and of underground facilities, and utility owners when performance of work on the Project may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property. All damage, injury, or loss to any materials or equipment used in furtherance of the Project, whether stored on or off site, and to any other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and underground facilities not designated for removal, relocation, or replacement in the course of construction that is caused, directly or indirectly, in whole or in part, by the Contractor, Subcontractor, or any personal or entity directly or indirectly employed by them shall be remedied by Contractor. Contractor is solely responsible for the location and protection of any and all public utility lines and utility customer service lines in the Work area. "Public utility lines" means the utility distribution and supply system, and "utility customer service lines" means the utility lines connecting customers to the utility distribution and collection system. Generally, existing utility customer service line connections are not shown on the Drawings. The Contractor shall exercise due care to locate, mark, uncover, and otherwise protect all such lines in the construction zone and any of Contractor's work or storage areas, and to notify appropriate authorities of relevant activity in the construction zone. Contractor's responsibility for the location and protection of utilities is primary and nondelegable.

4.33 Protection Against Risks: The Contractor shall take all necessary and adequate precautions to protect against conditions created during the progress of the Project which involve a risk of bodily harm or death to persons, or a risk of damage or loss to any property. The Contractor shall regularly inspect all work, materials, and equipment to discover and determine any such conditions, and shall be responsible for discovery, determination, and correction of any such conditions.

4.34 Hazardous Materials: Contractor shall be responsible for any hazardous materials brought to the site by the Contractor, Subcontractor, Suppliers, or anyone else for whom Contract is responsible, and shall be responsible for the use, storage, and remediation of any such hazardous materials. The Contractor shall immediately notify the County of any hazardous material uncovered or revealed at the Construction Site which was not shown, indicated, or identified in the Contract Documents to be within the scope of the Work and which may present a substantial danger to persons or property exposed thereto in connection with the Work at the site. The Contractor shall immediately notify the Authorized Representative of any suspected hazardous materials encountered before or during the performance of the Work, and shall take all necessary precautions to avoid further disturbance of the materials.

4.35 Contractor's Duties Continue Until Final Acceptance: Contractor's duties and responsibilities for safety and protection of the Work and property shall continue until such time as the Project is completed, and the County has issued a written notice indicating final acceptance of the completed Project.

4.36 No Excessive Loading: Contractor shall no load, nor permit any part of any structure to be loaded in any manner that will endanger the structure. The Contractor shall not subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

4.37 Texas Department of Transportation: the Contractor shall perform the Work in accordance with any applicable rules, regulations, and standards adopted by the Texas Department of Transportation.

4.38 Meetings and Cooperation: Contractor shall meet with the County or its Authorized Representative on an as needed basis to ensure the Work is performed satisfactorily. The Contractor shall cooperate at all times with the County, and other contractors providing services to the County to maintain maximum security and efficiency.

4.39 Equipment and Materials: Except as expressly provided otherwise, the Contractor shall furnish and pay for all construction, transportation, installation, materials, labor, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and any other equipment, facilities, and incidentals required for the furnishing, performance, testing, start-up, and completion of the Project within the time specified, except for professional services as defined by Texas Government Code Chapter 2254. Such equipment and facilities shall be of good quality and new (including new products made of recycled materials, pursuant to Texas Health and Safety Code § 361.426), and fit for the uses intended. Defective items shall be removed from the construction site promptly and at the Contractor's expense. If requested by the Authorized Representative, Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment used for the Project. All materials and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, unless otherwise provided in the Contract Documents. Any Supplier or manufacturer furnishing these items shall be experienced in the design and construction of such materials, and shall be an established supplier of the items and materials. The Contractor shall schedule its other operations so as not to interfere with its duty to timely furnish the necessary equipment, materials facilities, and personnel to operate the same at the times necessary for the orderly and timely completion of the Project. Title to materials delivered to the Construction Site or a staging area will pass to the County upon delivery without the necessity for further documentation. Risk of loss will not pass to the County until Final Acceptance.

4.40 Defective Work: The County and the Design Engineer may disapprove or reject Work with either believes to be defective, or believes will not produce a completed Project that conforms to the Contract Documents, or will jeopardize the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. The Contract shall bear all losses, damages, costs, and claims related to remedying defective work.

4.41 Uncovering Work: The Contractor shall uncover the Work in the following circumstances:

a. If any Work, including the work of Subcontractors or others, that is to be inspected, tested, or approved is covered by the Contractor or Subcontractor without written concurrence of the Authorized Representative, or if any Work is covered contrary to the written request of the Authorized Representative, it must, if requested by the Authorized Representative, be uncovered and recovered at the Contractor’s expense.

b. If the Authorized Representative considers it necessary or advisable that covered Work be observed, inspected, or tested, the Contractor shall uncover, expose, or

otherwise mark available for observation, inspection, or testing that portion of the Work in question, furnishing all necessary labor, material, and equipment. If it is found that such Work is defective, the Contractor shall pay all claims, costs, losses, and damages caused by, arising out of, or resulting from such uncovering, exposure, observation, inspection, and testing and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and the County shall be entitled to an appropriate decrease in the Contract Amount, and may make claim therefore. If such Work is not found to be defective, the Contractor may be allowed an increase in the Contract Price, or an extension of the Contract Time, or both, which is directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction.

4.42 Contractor's Remedy for Delay, Disruption, or Hindrance. Contractor and County contemplate that Contractor's performance may be delayed, disrupted, or interfered with by unanticipated causes including but not limited to the following:

a. Severe and unavoidable natural disasters such as fires, floods, epidemics and earthquakes;

b. Abnormal weather conditions;

c. Acts or failures to act of the County, third party utility owners, or other third party entities; and

d. Acts of war or terrorism.

Contractor and the County agree Contractor's sole remedy for delays in performance of the Work, whether or not such delays are foreseeable, is an extension of the Contract Time, except as provided in Section 4.43. Contractor shall receive no compensation or damages of any kind for delays, disruptions, or hindrances to the Work. The County's exercise of any of its rights or remedies under the Contract including, without limitation, ordering changes in the Work or directing suspension, rescheduling, or correction of the Work, regardless of the extent or frequency of the County's exercise of such rights or remedies, shall not be construed as intentional interference with Contractor's performance of the Work. The sole remedy of Contractor for any delay, disruption, or hindrance caused by the County's exercise of any of its rights or remedies under the Contract Documents shall be strictly limited to an extension of the Contract Time, except as expressly provided in Section 4.43.

In no event shall the Contractor be entitled to any compensation or recovery of any special damages in connection with any delays, disruptions, or hindrances, including without limitation: consequential damages, lost opportunity costs, impact damages, indirect damages, exemplary damages, compensation for unjust enrichment, attorney's fees or other similar damages or costs.

4.43 Direct and Unavoidable Costs: In the event the County is the sole cause of a delay, disruption, or hindrance by acts or omissions that constitute fraud, intentional misrepresentation, gross negligence, or intentional interference with Contractor's performance of the Work, Contractor may receive compensation for direct and unavoidable

extra costs only to the extent such acts continue after Contractor notifies the County in writing of such conduct. The direct and unavoidable costs must be specifically proved, and caused solely by the proven wrong. When such extra compensation is claimed, a written statement thereof shall be presented by Contractor to the County, and if found by the County to be correct, shall be approved.

4.44 No Authority to Act of Behalf of County: The Contractor agrees and understands that neither it, nor any of its agents, employees, or Subcontractors may act in the name of the County unless specifically authorized in writing by the County.

SECTION 5. PREVAILING WAGES

5.1 Required Compliance with Texas Government Code Chapter 2258: This Project is subject to the prevailing wage rate requirements of Chapter 2258 of the Texas Government Code, and the Davis-Bacon Act Wage Determination # TX20260299 provided below. All persons employed by Contractor shall be compensated at not less than the rates shown below. Contractor shall keep records of each worker employed by the Contractor or a subcontractor in the construction of the Project, including each worker's name, occupation, and the actual per diem wage paid to each worker. Said records shall be open at all reasonable hours to inspection by the County and its officers and agents. If Contractor pays any worker less than the below stated rates at any time, the Contractor shall pay Waller County sixty dollars ($60.00) per day for each worker employed by the Contractor for the provision of services described herein for each calendar day or part of the day that the worker is paid less than the below stated rates. Contractors may also visit www.wdol.gov/dba.aspx.

General Decision Number: TX20260299 05/18/2026

Superseded General Decision Number: TX20250299

State: Texas

Construction Type: Highway

Counties: Austin, Brazoria, Chambers, Fort Bend, Galveston, Hardin, Harris, Jefferson, Liberty, Montgomery, Orange, San Jacinto and Waller Counties in Texas.

Modification Number	Publication Date
0	01/02/2026
1	05/18/2026

SATX2025-013 11/15/2023

	Rates	Fringes
Asphalt Distributor Operator	$23.26	0.00
Asphalt Paving Machine Operator	$22.67	0.00
Asphalt Raker	$20.41	0.00
Broom or Sweeper Operator	$17.63	0.00
Concrete Finisher, Paving and Structures	$20.79	0.00
Concrete Pavement Finishing Machine Operator	$22.18	0.00
Concrete Paving, Curing, Float Texturing Machine		

Operator	$22.62	0.00
Concrete Saw Operator	$21.57	0.00
Crane Operator, Hydraulic 80 tons or less	$24.75	0.00
Crane Operator, Lattice Boom 80 tons or less	$25.74	0.00
Crane Operator, Lattice Boom over 80 tons	$23.85	0.00
Crawler Tractor Operator	$20.33	0.00
Electrician	$31.46	0.00
Excavator Operator, 50,000 pounds or less	$21.53	0.00
Excavator Operator, Over 50,000 pounds	$22.24	0.00
Flagger	$16.63	0.00
Form Builder/Setter, Structures	$19.93	0.00
Form Setter, Paving & Curb	$19.32	0.00
Foundation Drill Operator, Crawler Mounted	$22.25	0.00
Foundation Drill Operator, Truck Mounted	$26.04	0.00
Front End Loader Operator, 3CY or less	$19.72	0.00
Front End Loader Operator, Over 3CY	$20.34	0.00
Laborer, Common	$17.12	0.00
Laborer, Utility	$19.11	0.00
Loader/Backhoe Operator	$21.37	0.00
Mechanic	$23.38	0.00
Milling Machine Operator	$21.65	0.00
Motor Grader Operator, Fine Grade	$23.91	0.00
Motor Grader Operator, Rough	$21.20	0.00
Off Road Hauler	$17.12	0.00
Painter, Structures	$26.40	0.00
Pavement Marking Machine Operator	$17.12	0.00
Piledriver	$21.48	0.00
Pipelayer	$20.03	0.00
Reinforcing Steel Worker	$22.34	0.00
Roller Operator, Asphalt	$19.79	0.00
Roller Operator, Other	$18.93	0.00
Servicer	$20.33	0.00
Spreader Box Operator	$17.84	0.00
Structural Steel Worker	$22.64	0.00
Truck Driver Lowboy Float	$25.94	0.00
Truck Driver, Single Axle	$21.93	0.00
Truck Driver, Single or Tandem Axle Dump Truck	$18.60	0.00
Truck Driver, Tandem Axle Tractor with Semi Trailer	$20.17	0.00
Welder	$20.97	0.00
Work Zone Barricade Servicer	$17.37	0.00

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/agencies/whd/government-contracts.

Note: Executive Order 13658 generally applies to contracts subject to the Davis-Bacon Act that were awarded on or between January 1, 2015 and January 29, 2022, and that have not been renewed or extended on or after January 30, 2022. Executive Order 13658 does not apply to contracts subject only to the Davis-Bacon Related Acts regardless of when they were awarded. If a contract is subject to Executive Order 13658, the contractor must pay all covered workers at least $13.65 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract from May 11, 2026 through December 31, 2026. The applicable Executive Order minimum wage rate will be adjusted annually. Additional information on contractor requirements and worder protections under Executive Order 13658 is available at www.dol.gov/whd/gov-contracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the type(s) of construction and geographic area covered by the wage determination. The classifications are listed in alphabetical order under rate identifiers indicating whether the particular rate is a union rate (current union negotiated rate), a survey rate, a weighted union average rate, a state adopted rate, or a supplemental classification rate.

Union Rate Identifiers

A four-letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2024. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2024, in the example, is the effective date of the most current negotiated rate.

Union prevailing wage rates are updated to reflect all changes over time that are reported to WHD in the rates in the collective bargaining agreement (CBA) governing this classification and rate.

Union Average Rate Identifiers

Thes UAVG identifier indicates that no single majority rate prevailed for those classifications; but that, 100% of the data reported for the classifications reflected union rates. EXAMPLE: UAVG-OH-0010 01/01/2024. UAVG indicates that the rate is a weighted union average rate. OH indicates the State of Ohio. The next number, 0010 in the example, is an internal number used in producing the wage determination. The date 01/01/2024 in the example, indicates the date the wage determination was updated to reflect the most current union average rate.

A UAVG rate will be updated once a year, usually in January, to reflect a weighted average of the current rates in the collective bargaining agreements on which the rate is based.

Survey Rate Identifiers

The "SU" identifier indicates that either a single non-union rate prevailed (as defined in 29 CFR 1.2) for this classification in the survey or that the rate was derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As a weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SUFLA2022-007 6/27/2024. SU indicates that the rate is a single non-union prevailing rate or a weighted average of survey data for that classification. FL indicates the State of Florida. 2022 is the year of the survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 6/27/2024 in the example, indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates typically remain in effect until a new survey is conducted. However, the Wage and Hour Division (WHD) has the discretion to update such rates under 29 CFR 1.6 (c) (1).

State Adopted Rate Identifiers

The "SA" identifier indicates that the classifications and prevailing wage rates set by a state (or local) government were adopted under 29 C.F.R 1.3(g)-(h). Example: SAME2023-007 01/03/2024. SA reflects that the rates are state adopted. ME refers to the State of Main. 2023 is the year during which the state completed the survey on which the listed classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 01/03/2024 in the example, reflects the date on which the classifications and rates under the SA identifier took effect under state law in the state from which the rates were adopted.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* a survey underlying a wage determination
* an existing published wage determination
* an initial WHD letter setting forth a position on a wage determination matter
* an initial conformance (additional classification and rate) determination

On survey related matters, initial contact, including requests for summaries of surveys, should be directed to the WHD Branch of Wage Surveys. Requests can be submitted via email to da-visbaconinfo@dol.gov or by mail to:

Branch of Wage Surveys
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

Regarding any other wage determination matter such as conformance decisions, requests for initial decisions should be directed to the WHD Branch of Construction Wage Determinations. Requests can be submitted via email to BCWD-Office@dol.gov or by mail to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If an initial decision has been issued, then any interested party (those affected by the action) that disagrees with the decision can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Requests for review and reconsideration can be submitted via email to dba.reconsideration@dol.gov or by mail to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

SECTION 6. PAYMENT

6.1 Payment: Waller County shall pay the Contractor according to the contract in current funds for the Contractor's performance, as stated herein, after issuance of a Notice to Proceed and a purchase order issued by the Waller County Procurement Director. In no event will Contractor be paid the entire contract price prior to beginning work, or prior to completion of the work.

6.2 Retainage: The County shall withhold a ten percent (10%) retainage from each Application for Payment, which shall be paid subject to Sections 6.6 and 6.7.

6.3 Applications for Payment: Waller County shall make progress payments to the Contractor as provided below.

a. The Contractor shall submit Applications for Payment to the Waller County Treasurer's Office, 836 Austin Street, Suite 2200, Hempstead, Texas 77445 in a form acceptable to the County. Each Application for Payment must be filled out and signed by the Contractor, and cover the Work that is completed as of the date of the Application and be accompanied by sufficient supporting documentation.

b. With each Application for Payment, the Contractor must submit an affidavit certifying that Contractor has paid in full any bills submitted to the Contractor for labor, material and expendable equipment that Contractor used in the performance of Work or the provision of services under the Contract. The certifying affidavit must be provided to the County before the applicable Application for Payment will be approved for payment.

c. Applications for Payment shall not include requests for payment related to changes in the Work which have not been authorized through a Change Order.

d. Applications for Payment shall not include requests for payment of amounts that the Contractor does not intend to pay to a Subcontractor or Supplier because of a dispute or other reason.

e. The period covered by each Application for Payment shall be one calendar month beginning on the first day of the month, and ending on the last day of the month. A complete and accurate Application for Payment must be submitted to the County Treasurer not later than the 15th day of the month following the month in which the work was performed.

f. The Application for Payment shall indicate the percentage of completion of each portion of the Project as of the end of the period covered by the application for payment.

g. Subject to the provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

i. Take that portion of the contract sum properly allocable to the completed Project less retainage of ten percent (10%).

ii. Add that portion of the contract sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction (or, if approved by Waller County, suitably stored off the site at a location agreed upon in writing), less retainage of ten percent (10%).

iii. Subtract the aggregate of previous payments made by Waller County.

h. Payment will be made by the County in accordance with Texas Government Code, Chapter 2251.

6.4 Final Payment: If, upon Final Completion and on the basis of observation of the Work during construction, final inspection, and review of the final Application for Payment and accompanying documentation as required by the Contract Documents, the Authorized Representative is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, there are no outstanding claims, and punch list items have been completed, the Authorized Representative will recommend the final Application for Payment for approval to the Waller County Commissioners Court. Final payment shall constitute the entire unpaid, undisputed balance of the Contract Price. The Contractor may make application for final payment following the procedure for progress payments after the Contractor has complied with the requirements of Section 6.3 to the County's satisfaction, and delivered the following documents:

a. Affidavit by Contractor certifying the payment of all debts and claims;

b. The Record Documents identified in Section 13;

c. Consent to surety, if any, to final payment. If surety is not provided, complete and legally effective releases or waivers that are satisfactory to the County of all claims arising out of or filed in connection with the Work;

d. Certificate evidencing that any applicable requirement for insurance will remain in force after final payment and through the warranty period;

e. Proof of performance bond extension through warranty period, if a performance bond was required; and

f. Any other documentation called for in the Contract Documents.

Final payment is considered to have taken place when the Contractor, or any of its representatives negotiates the County's final payment check, whether labeled final or not, for cash or deposits check in any financial institution for its monetary return.

6.5 Review of Applications for Payment and Payment: The Authorized Representative will, within seven (7) calendar days after receipt of each Application for Payment, either indicate a recommendation for payment and forward the Application for processing by the County, or return the Application to the Contractor indicating the Authorized Representative's reasons for not recommending payment. If the Authorized Representative does not recommend payment, the Contractor shall make the necessary corrections and resubmit the Application.

a. By recommending payment, the Authorized Representative does not represent that:

i. Exhaustive or continuous on-site inspections have been made to check the quality or quantity of the Work;

ii. Examination has been made to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Price; or

iii. Contractor's construction means, methods, techniques, sequences, or procedures have been reviewed.

6.6 County's Right to Withhold Payment: The County may withhold or nullify the whole or part of any payment to such extent as the County deems necessary in the event that:

a. Defective work is not remedied as required by the County and in the time frame required by the County;

b. A third party files a claim or there is reasonable evidence indicating probable filing of such claims;

c. Contractor fails to make payments properly to Subcontractors for labor, materials, or equipment;

d. There is reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Amount;

e. There is damage to the County or another contractor;

f. There is reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay;

g. The Contractor fails to submit a schedule of values in accordance with the Contract Documents;

h. The Contractor fails to maintain a record of changes on drawings and documents;

i. The Contractor fails to maintain weekly payroll reports and, as applicable, provide copies of reports in a timely manner upon request of the County;

j. The Contractor fails to submit monthly subcontractor reports;

k. Contractor neglects or unsatisfactorily prosecutes of the Work, including fails to clean up; or

l. The Contractor fails to comply with any provision of the Contract Documents.

6.7 Reason for Withholding Payment Removed: When the above reasons for withholding payment are removed, the Contractor shall resubmit an Application for Payment for the value of the Work performed. Payment will be made in accordance with Texas Government Code Chapter 2251.

6.8 Payment to Subcontractors when Payment Withheld: Subcontractors may request Partial Payment when the County withholds payment of an invoice to the Contractor for any reason listed in Section 6.6. If the payment is withheld by the County, the Contractor shall notify all affected Subcontractors within two (2) working days of notice that payment is being withheld. Upon notification, Subcontractors may submit a formal written request for Partial Payment to the Contractor and the County. If directed by the County, the Contractor shall within three (3) working days resubmit to the County an invoice for the same period that includes only work performed by the requesting Subcontractors during this period. The County will review this resubmitted invoice. Upon receipt of payment for the resubmitted invoice, the Contractor shall pay the Subcontractor within ten (10) calendar days.

SECTION 7. COMPLETION, TRANSER, AND ACCEPTANCE

7.1 Substantial Completion: When the Contractor considers that the Work, or a portion thereof which the County agrees to accept separately, is substantially complete, the Contractor shall notify the Authorized Representative, and request a determination as to whether the Work, or a designated portion thereof is substantially complete. If the Authorized Representative does not consider the Work to be substantially complete, the Authorized Representative will notify Contractor in writing, and give the reasons therefor. If Owner's Representative considers the Work to be substantially complete, the Authorized Representative will prepare and deliver a Certificate of Substantial Completion, which shall establish the date of Substantial Completion, shall include a punch list of items to be completed or corrected before final payment, and shall establish the time within which the Contractor shall finish the punch list. Failure to include an item on the punch list does not alter the Contractor's responsibility to complete all Work in accordance with the Contract Documents. If an inspection is required by public authorities having jurisdiction over the Work, such inspection must be made and passed before the Work, or any portion thereof will be considered substantially complete.

7.2 Final Inspection: Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, the County will make a final inspection with Contractor, and provide written notice of all the particulars in which inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

7.3 Punch List: Upon the occurrence of Substantial Completion, the punch list items shall be promptly commenced and thereafter completed within thirty (30) days after final completion.

SECTION 8. TERM, SUSPENTION OF WORK, AND TERMINATION

8.1 Agreement Term: The term of this Agreement shall begin on the date of execution, and shall continue until the complete performance of the terms and conditions of this Contract by the parties unless either party terminates this Contract in accordance with its terms.

8.2 Suspension by County for Convenience: The County may, in its sole discretion and without cause, order the Contractor in writing to suspend or interrupt the Project in whole or in part for such period of time as the County may determine. In the event the County suspends or interrupts the Work, an adjustment may be made to account for any change in the actual cost of performance of the Work caused by the suspension, or interruption. No adjustment shall be made for an increase in the Contract Price if the performance of the work is, was, or would have been so suspended, delayed, or interrupted by another cause for which the Contractor is responsible, or when an equitable adjustment is made or denied under another provision of this Contract.

8.3 Automatic Termination: This Agreement shall automatically terminate upon complete performance of the terms and conditions of the Agreement by each Party, or otherwise in accordance with its terms.

8.4 Termination for Insolvency and Bankruptcy: The County, in its sole discretion, may immediately terminate this Agreement without notice or the opportunity to cure if Contractor becomes insolvent or files any petition for bankruptcy.

8.5 Termination for Cause: Upon seven (7) calendar days' notice to Contractor, the County may terminate the Contract for cause if the Contractor:

a. Persistently or repeatedly refuses or fails to supply enough properly skilled workers or proper materials;

b. Fails to make payment to Subcontractors for materials or labor in accordance with respective agreements between the Contractor and the Subcontractor;

c. Disregards laws, ordinances, rules, regulations, or orders of public authority having jurisdiction concerning the Project: or

d. Otherwise commits substantial breach of a provision of the Contract Documents.

8.6 Termination for Convenience: Upon seven (7) calendar days' written notice to Contractor, the County may, in its sole discretion and without penalty or prejudice to any right or remedy of County, terminate this Contract for convenience and without cause at any time. The written notice must be provided in accordance with Section 18.19. The notice must state the reasons for such termination, and provide an effective date of the termination. The notice may also contain instructions necessary to protect, store, or decommission any incomplete work or systems, and/or for safety. Upon receipt of such notice, Contractor shall immediately proceed with the following obligations regardless of whether a dispute regarding the Contract exists:

a. Stop all work;

b. Comply with any instructions contained in the termination notice;

c. Place no further subcontracts or order for materials or services;

d. Terminate all subcontracts for convenience;

e. Cancel all materials and equipment orders as applicable; and

f. Take appropriate action to protect and preserve all property related to the Contract which is in the possession of Contractor.

8.7 Notice of Termination: The terminating Party shall provide seven (7) days written notice of termination to the other Party as provided in Section 18.19.

8.8 Discretionary Opportunity to Cure: A Party receiving notice of termination for failure to perform in accordance with the terms of this Agreement shall have the opportunity to cure its failure to perform beginning on the day of its receipt of the written notice, and continuing for thirty (30) calendar days thereafter. The cure, if made, shall be to the terminating Party's satisfaction. If no cure is made, the Agreement will terminate on the date specified in the written termination notice, or if no date is specified, on the thirtieth (30th) calendar day after the date of receipt of the notice, unless otherwise agreed by the Parties.

8.9 County's Rights After Termination: In the event of termination, the County may immediately take possession of the site, and of all materials, equipment, tools, and construction equipment and machinery thereon. The County may finish the Project by whatever reasonable method it deems expedient.

8.10 Duty to Mitigate: In the event of termination or suspension under this Contract, the

Contractor shall take all reasonable actions to mitigate its damages and any and all claims which may be asserted against the County.

8.11 Responsibility During Demobilization: While demobilizing, the Contractor shall take all necessary and reasonable actions to preserve and protect the Work, the site, and other property of the County or others at the site.

8.12 Payment After Termination: In the event the County terminates the Contract, the County shall pay the Contractor only for work performed prior to the date of termination, and that is satisfactory to County. Contractor shall not be entitled to lost or anticipated profits should the County choose to exercise its option to terminate. Not later than 30 days after the date of termination, the Contractor shall submit to County a final termination settlement proposal to the County for Work already performed. It any of the Work contained in the settlement proposal is not satisfactory to the County, the County shall provide written notice to the Contractor. The County shall only pay for the portion of the Work that it determines in good faith to be satisfactory. If Contractor fails to submit the settlement proposal within the time specified, the County may unilaterally determine the amount owed to Contractor. Payment of the amount determined by the County shall be full satisfaction of any claim or debt due by County to Contractor under the Contract.

SECTION 9. RIGHT TO ASSURANCE

9.1 Right to Assurance: In the event that the county has a reason to question the Contractor's intent or ability to perform its obligations under the Contract, the County may demand that the Contractor give written assurance of its intent to perform, its plan to properly continue performance, and a detailed timeline for completion of the Project. The Contractor shall provide a written response to County that addresses the County's demand for written assurance within five (5) business days. If Contractor fails to provide the written response, the County may treat the failure as an anticipatory repudiation of the Contract.

SECTION 10. INSURANCE

10.1 Insurance Coverages: Contractor shall carry insurance in the types and amounts indicated below, which shall include items owned by the County in the care, custody, and control of the Contractor prior to and during construction and warranty period. It is intended that policies required by this Contract covering both the County and the Contractor shall be considered primary coverages as applicable. Contractor shall provide the County with certificates of insurance evidencing compliance with the requirements of this Section. The certificates shall indicate the name of the Contractor, the name of the insurance company, the policy number, and the term and limits of coverage. The insurance coverage must be with a company having Best's rating of A/VII or better, authorized to do business in the State of Texas at the time the policies are issued and in force, and shall be of the following types and limits:

a. Workers Compensation insurance in accordance with applicable law. Substitutes to genuine Workers' Compensation Insurance will not be allowed.

b. Employers' Liability insurance with limits of not less than $1,000,000 per injury by accident, $1,000,000 per injury by disease, and $1,000,000 per bodily injury by disease.

c. Comprehensive general liability insurance with a limit of not less than $1,000,000

each occurrence and $2,000,000 in the annual aggregate. Policy shall cover liability for bodily injury, personal injury, and property damage and products/completed operations arising out of the business operations of the policy holder.

d. Business Automobile Liability coverage for owned, non-owned, and hired vehicles, with a combined Bodily Injury/Property Damage with minimum limits of not less than $1,000,000 each accident. The policy shall cover liability arising from the operation of licensed vehicles by policyholder.

e. Builder's Risk Insurance or Installation Insurance on an all risk physical loss form in the Contract Amount. Coverage shall continue until the Work is accepted by the County. The County shall be a loss payee on the policy. If off-site storage is permitted, coverage shall include transit and storage in an amount sufficient to protect property being transported or stored.

10.2 Additional Insured: Contractor's insurance policies that cover performance under this Contract shall name the County an additional insured, except for Workers' Compensation and Professional Liability, if required. All endorsements naming the County as additional insured, waivers, and notices of cancellation of endorsements, as well as the Certificates of Insurance shall indicate: Waller County, Texas, 836 Austin Street, Suite 4300, Hempstead, Texas 77445.

10.3 Certificates of Insurance: Contractor shall provide the County with properly executed certificates of such insurance before the Contract is executed as verification of the coverage required in Section 10.1. The certificates shall indicate that all required insurance coverages are effective as of the Effective Date, and that such insurance shall not be canceled, except on thirty (30) days prior written notice to the County. The Contract shall not commence Work until the required insurance is obtained and until such insurance has been reviewed by the County. The Contractor must also provide Certificates of Insurance when a previously identified policy period has expired as verification of continuing coverage.

10.4 Certified Copies of Insurance Policies: The Contractor shall provide the County with certified copies of the required insurance policies and endorsements thereto upon request and without expense to the County.

10.5 Responsibility for Insurance: The Contractor shall be responsible for premiums, deductibles, and self-insured retentions, if any, state in the policies. All deductibles or self-insurance retentions shall be disclosed on the Certificates of Insurance.

10.6 No Decrease in Liability: The County's acceptance or approval of the certificates of insurance or certified copies of insurance policies shall not relieve, decrease, or limit Contractor's liability. The insurance coverages required under this Contract are required minimum and are not intended to limit the responsibility of liability of the Contractor.

10.7 No Cancellation or Modification: The Contractor shall continuously maintain the required insurance coverages during the Contract Term. Contractor shall not cancel or modify the insurance coverages required by this Agreement without providing thirty (30) days written notice to the County. Contractor shall not allow a lapse in the insurance coverage specified in this Contract for the duration of the Contract.

10.8 Workers Compensation Certification: By signing this Contract or providing or causing to be provided a certificate of coverage, the Contractor is representing to the County that all employees of the Contractor who will provided services on the Project will be covered by workers' compensation coverage for the duration of the Project, that the coverage will be based on proper reporting of classification codes and payroll amounts, and that all coverage agreements will be filed with the appropriate insurance carrier or, in the case of self-insured, with the Texas Worker's Compensation Commission's Division of Self-Insurance Regulation. Providing false or misleading information may subject Contractor to administrative penalties, criminal penalties, civil penalties, or other civil actions.

10.9 County Occupancy: All insurance shall provide for the County to take occupancy of the Work or any part thereof during the term of said insurance.

10.10 Failure to Comply: Contractor's failure to comply with any of these provisions is a breach of Contract by Contractor which entitles the County to declare the Contract void if Contractor does not remedy the breach within ten (10) days after receipt of notice of breach from the County.

SECTION 11. BONDS

11.1 Bonds Required: The Contractor must furnish the County with both a Performance Bond and a Payment Bond. Bonds shall be executed on forms acceptable to the County. Performance Bonds and Payment Bonds must be issued in an amount of one hundred percent (100%) of the Contract Amount as security for the faithful performance and/or payment of all of Contractor's obligations under the Contract Documents. Performance Bonds and Payment Bonds shall be issued by a solvent surety company duly authorized to do business in the State of Texas, and licensed in the State of Texas to issue surety bonds with a Best Rating of A/VII or better, and shall meet any other requirements established by law or by the County pursuant to applicable law.

11.2 Surety Acceptable to County: The surety company must be acceptable to the County. If the County rejects the Contractor's proposed surety company, the Contractor must obtain the required bonds from a surety acceptable to the County within five (5) days of the County's rejection.

11.3 Extension Through Warranty Period: The required Performance Bond must extend through any applicable warranty period.

11.4 Bond Signed by Agent: All bonds signed by an agent must be accompanied by a certified copy of such agent's authority to act.

11.5 Surety Declares Bankruptcy: If the surety on any bond furnished by the Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in the State of Texas, or it ceases to meet the requirements of the preceding paragraph, Contractor shall within ten (10) days thereafter substitute another bond and surety, both of which must be acceptable to the County.

SECTION 12. INDEMNIFICATION

12.1 **INDEMNITY FOR BODILY INJURY OR DEATH CLAIMS: TO THE FULLEST EXTENT PERMITTING BY LAW, CONTRACTOR SHALL INDEMNIFY, DEFEND, AND HOLD HARMLESS THE COUNTY AND ITS OFFICERS,**

DIRECTORS, CONTRACTORS, EMPLOYEES, REPRESENTATIVES, AND AGENTS FROM AND AGAINST ALL CLAIMS, LOSSES, EXPENSES, COSTS, DEMANDS, SUITS, CAUSES OF ACTION, AND DAMAGES, INCLUDING WITHOUT LIMITATION, ATTORNEYS' FEES AND EXPENSES, FOR BODILY INJURY OR DEATH OF ANY EMPLOYEE OF CONTRACTOR, ITS AGENTS, OR ITS SUBCONTRACTORS OF EVERY TIER, EVEN IF THE BODILY INJURY OR DEATH IS CAUSED BY OR ALLEDGED TO HAVE BEEN CAUSED BY THE SOLE OR PARTIAL NEGLIGENCE, FAULT, OR STRICT LIABILITY OF ANY INDEMNITEE

12.2 **GENERAL INDEMNITY: CONTRACTOR, ITS OFFICERS, DIRECTORS, PARTNERS, CONTRACTORS, EMPLOYEES, REPRESENTATIVES, AGENTS, SUCCESSORS, ASSIGNS, VENDORS, GRANTEES, AND/OR TRUSTEES (COLLECTIVELY REFERRED TO AS "CONTRACTOR" FOR PURPOSES OF THIS SECTION), AGREE TO RELEASE, DEFEND, INDEMNIFY, AND HOLD HARMLESS THE COUNTY AND ITS OFFICERS, OFFICIALS, DEPARTMENT HEADS, REPRESENTATIVES, AGENTS, AND EMPLOYEES (COLLECTIVELY REFERRED TO AS "COUNTY" FOR PUPOSES OF THIS SECTION) FROM ANY AND ALL CLAIMS, DEMANDS, DAMAGES, INJURIES – INCLUDING DEATH AND BODILY INJURY – LIABILITIES, AND EXPENSES (INCLUDING ATTORNEY'S FEES AND COSTS OF DEFENSE) ARISING DIRECTLY OUT OF OR RESULTING FROM THE OPERATION OR PERFORMANCE OF CONTRACTOR UNDER THIS AGREEMENT. THE COUNTY WILL NOT ACCEPT LIABILITY FOR INJURIES THAT ARE THE RESULT OF THE NEGLIGENCE, MALFEASANCE, ACTION, OR OMMISION OF CONTRACTOR. CONTRACTOR AGREES TO ACCEPT LIABILITY FOR INJURIES TO ITSELF OR OTHERS CAUSED BY ITS OWN NEGLIGENCE, MALFEASANCE, ACTION, OR OMMISSION. THIS INDEMNIFICATION PROVISION IS ALSO SPECIFICALLY INTENDED TO APPLY TO, BUT NOT BE LIMITED TO, ANY AND ALL CLAIMS, WHETHER CIVIL OR CRIMINAL, BROUGHT AGAINST COUNTY BY ANY GOVERNMENT AUTHORITY OR AGENCY RELATED TO ANY PERSON PROVIDING SERVICES UNDER THIS AGREEMENT THAT ARE BASED ON ANY FEDERAL IMMIGATION LAW AND ANY AND ALL CLAIMS, DEMANDS, DAMAGES, ACTIONS, AND CAUSES OF ACTION OF EVERY KIND AND NATURE, KNOWN AND UNKNOWN, EXISTING OR CLAIMED TO EXIST, RELATING TO OR ARISING OUT OF ANY EMPLOYMENT RELATIONSHIP BETWEEN CONTRACTOR AND ITS EMPLOYEES OR SUBCONTRACTORS AS A RESULT OF THAT SUBCONTRACTOR'S OR EMPLOYEE'S EMPLOYMENT AND/OR SEPARATION FROM EMPLOYMENT WITH THE CONTRACTOR, INCLUDING BUT NOT LIMITED TO ANY DISCRIMINATION CLAIM BASED ON SEX, SEXUAL ORIENTATION OR PREFERENCE, RACE, RELIGION, COLOR, NATIONAL ORIGIN, AGE OR DISABILITY UNDER FEDERAL, STATE OR LOCAL LAW, RULE OR REGULATION, AND/OR ANY CLAIM FOR WRONGFUL TERMINATION, BACK PAY, FUTURE WAGE LOSS, OVERTIME PAY, EMPLOYEE BENEFITS, INJURY SUBJECT TO RELIEF UNDER THE WORKERS' COMPENSATION ACT OR WOULD BE SUBJECT TO RELIEF**

UNDER ANY POLICY FOR WORKERS COMPENSATION INSURANCE, AND ANY OTHER CLAIM, WHETHER IN TORT, AGREEMENT, OR OTHERWISE.

COUNTY SHALL HAVE THE RIGHT TO APPROVE DEFENSE COUNSEL TO BE RETAINED BY CONTRACTOR IN FULFILLING ITS OBLIGATION TO DEFEND AND INDEMNIFY COUNTY HEREUNDER, UNLESS SUCH RIGHT IS EXPRESSLY WAIVED BY COUNTY IN WRITING. COUNTY RESERVES THE RIGHT TO PROVIDE A PORTION OR ALL OF ITS OWN DEFENSE; HOWEVER, COUNTY IS UNDER NO OBLIGATION TO DO SO. ANY SUCH ACTION BY COUNTY IS NOT TO BE CONSTRUED AS A WAIVER OF CONTRACTOR'S OBLIGATION TO DEFEND COUNTY OR AS A WAIVER OF CONTRACTOR'S OBLIGATION TO INDEMNIFY COUNTY PURSUANT TO THIS AGREEMENT. IF CONTRACTOR FAILS TO RETAIN COUNTY APPROVED DEFENSE COUNSEL WITHIN TEN (10) BUSINESS DAYS OF COUNTY'S WRITTEN NOTICE THAT COUNTY IS INVOKING ITS RIGHT TO INDEMNIFICATION UNDER THIS AGREEMENT, COUNTY SHALL HAVE THE RIGHT TO RETAIN DEFENSE COUNSEL ON ITS OWN BEHALF, AND CONTRACTOR SHALL BE LIABLE FOR ALL REASONABLE ATTORNEY FEES AND COSTS INCURRED BY COUNTY. CONTRACTOR AND COUNTY AGREE TO FURNISH TIMELY WRITTEN NOTICE TO EACH OTHER OF ANY SUCH CLAIM.

THIS SECTION SHALL SURVIVE THE TERMINATION OF THIS AGREEMENT.

SECTION 13. RECORDS AND AUDITS

13.1 Record Copy: Contractor shall maintain a record copy of all Drawings, Specifications, Addenda, Change Orders, and written interpretations and clarifications in good order and annotated to show all changes made during construction. These documents, together with all final samples and all final Shop Drawings shall be available to the County and the Design Engineer during performance of the Work. Upon Substantial Completion of the Work, these records and documents, samples, and Shop Drawings shall be promptly delivered to the Authorized Representative.

13.2 Document Ownership: The County shall be the absolute and unqualified owner of all drawings, preliminary layouts, record drawings, sketches, as-built drawings and other documents, including those identified in Section 13.1, prepared by the Contractor pursuant to this Contract. The Contractor shall deliver all such documents to the County prior to submitting the final Application for Payment. Neither the Contractor nor any Subcontractor shall reuse any such documents or copies on any other project without the written consent of both the County and the Design Engineer.

13.3 Record Preservation and Maintenance: The Contractor shall maintain and preserve accurate and complete records relating to the Project for a period of five (5) years measured from the expiration of the defects period, termination of this Contract, until all audit and litigation matters that the County has brought to the attention of the Contractor are resolved, or as otherwise required by law, whichever is longer. Upon request, the Contractor shall provide the County with such records. This Section 13.3 shall survive termination of the Contract.

13.4 Right to Inspect, Examine, Reproduce, and Audit: Waller County, and any of its duly authorized employees or agents, shall have the right to inspect, examine, reproduce, and audit the books and records of the Contractor generated by or on behalf of Contractor, whether paper, electronic, or other media, which are in any way related to performance of or compliance with this Contract, including, but not limited to:

a. Accounting records;

b. Written policies and procedures;

c. Subcontract files (including proposals of successful and unsuccessful bidders, and other related documents);

d. Original estimates and estimating work sheets;

e. Correspondence;

f. Change Order files;

g. Back charge logs and supporting documentation;

h. General ledger entries detailing cash and trade discounts earned, insurance rates, and dividends;

i. Lump sum agreements between Contractor and any Subcontractor or Supplier;

j. Records necessary to evaluate Contract compliance, Change Order pricing, and any Claim submitted by Contractor or any of its payees; and

k. Any other Contractor record that may substantiate any charge related to this Contract.

13.5 Survival of Terms: Waller County's right to inspect, examine, reproduce, and audit under this section for the same period of years that Contractor is required to maintain and preserve records under Section 13.3.

SECTION 14. SILENCE OF SPECIFICATIONS

14.1 Silence of Specifications: The apparent silence of specifications as to any detail, or the apparent omission of a detailed description concerning any point, shall be regarded as meaning that only the best commercial practice is to prevail, and that only material and workmanship of the finest quality are to be used. All interpretations of specifications shall be made on the basis of this statement. The items furnished under this contract shall be new, unused of the latest product in production for commercial trade. The materials used and workmanship provided shall be of the highest quality.

SECTION 15. INDEPENDENT CONTRACTOR

15.1 Independent Contractor: The Contractor and its employees are independent contractors. Contractor shall exercise independent judgment in performing its duties under this Contract, and is solely responsible for setting working hours, scheduling or prioritizing its work flow, and determining how the work is to be performed. No term or provision of this Contract shall be construed as creating an employer/employee relationship, partnership, or a joint venture. Contractor agrees and understands that the Contract does not grant any rights or privileges established for employees of the County.

SECTION 16. LIMIT OF APPROPRIATIONS

16.1 Limit of Appropriations: Funds for payment of this Contract have been provided through the County budget approved by Commissioners Court for this fiscal year only. The State of Texas law prohibits the obligation and expenditure of public funds beyond the current fiscal year. The fiscal year for the County extends from January 1 of each calendar year until December 31 of the same calendar year. It is the expectation of the County that funding will be available to pay for the expenditures related to this Contract. Notwithstanding anything to the contrary in this Contract, if at any time during the term of this Contract the Commissioners Court of the County fails to provide funding for this Contract during the County's following fiscal year, does not adopt a budget for expenditures, or is only able to partially fund the expenditures required by this Contract, the County may, upon giving Contractor written notice of such failure, terminate this Contract, or a part hereof without any further liability to Contractor. Neither County, its elected officials, employees, agents, insurers, attorneys, nor any other individual acting on behalf of County may make any representation or warranty as to whether any appropriation will, from time to time, be made by the Waller County Commissioners Court. The failure of County to appropriate sufficient funds will not cause the County to be in default under this Agreement, and Contractor's sole and exclusive remedy shall be to terminate this Agreement. The County shall pay Contractor for any services already rendered under this Contract prior to the effective date of the termination.

SECTION 17. TEXAS REQUIRED CERTIFICATIONS

17.1 No Boycotting Israel: By signature affixed hereto, Contractor certifies that it does not currently boycott Israel, and will not boycott Israel during the term of this Contract.

17.2 Texas Comptroller's List of Prohibited Companies: By signature affixed hereto, Contractor certifies that it is not listed on the website of the Texas Comptroller concerning the listing of companies that are identified under Texas Government Code §§ 806.051, 807.051, or 2253.153.

17.3 No Energy Company Boycott: By signature affixed hereto, Contractor certifies that it does not currently boycott energy companies, and will not boycott energy companies during the term of this Contract.

17.4 No Discrimination Against Firearm and Ammunition Industries: By signature affixed hereto, Contractor certifies that it does not currently discriminate against firearm and ammunition industries, and that it will not during the term of this Contract.

SECTION 18. MISCELLANEOUS PROVISIONS

18.1 Jurisdiction and Venue: This Contract is made in and shall be construed according to the laws of the State of Texas, without regard to its conflict of laws provisions. Venue of any court action(s) brought directly or indirectly by reason of this Contract shall be in a court of competent jurisdiction in Waller County, Texas. This Contract is made and is to be performed in Waller County, Texas.

18.2 Right of Review: The County may review any and all of the goods and services performed by Contractor under this Agreement. The County is granted the right to audit, at the County's election, all of Contractor's records and billings related to the performance of this Contract as may be reasonably necessary. Any payment, settlement, satisfaction, or

release made or provided during the course of performance of this Contract shall be subject to County's rights as may be disclosed by a review under this Section.

18.3 No Waiver: No claim or right arising out of a breach of this Contract can be discharged in whole or in part by a waiver or renunciation of the claim or right unless the waiver or renunciation is supported by consideration and is in writing signed by the aggrieved Party. The County's failure to require strict performance of any provision of this Contract does not waive or diminish the County's right thereafter to demand strict compliance with that or any other provision. The County's waiver or failure to exercise in any respect any right provided for in this Contract shall not be deemed a waiver of any further right under this Contract. The County does not waive, modify, or alter to any extent any of its defenses, immunities, or remedies.

18.4 No Personal Liability: Nothing herein shall be construed as creating any personal liability for any officer, agent, or employee of the County.

18.5 Severability: If any provision of this agreement is invalid, illegal, or unenforceable under any applicable statute, court decision, or rule of law, it is to that extent deemed to be omitted. In such event, there shall be substituted for such deleted provision a provision as similar as possible in terms and in effect to such deleted provision that is valid, legal, or enforceable. The remainder of the agreement shall be valid and enforceable to the maximum extent possible.

18.6 Entire Agreement: This Contract, together with all of its appendices, embodies the complete agreement of the Parties hereto, superseding all oral or written previous and contemporary agreements between the Parties and relating to matters in this Contract. By entering into this Contract, the Parties do not intend to create any obligations, express or implied, other than those specifically set out in this Contract.

18.7 Modification: The Contract may not be modified, altered, or amended except by written instrument duly authorized by the Waller County Commissioners Court and executed by both Parties.

18.8 Titles Not Restrictive: The titles assigned to the various sections and paragraphs of this Contract are for convenience only. Titles shall not be considered restrictive of the subject matter of any part of this Contract.

18.9 Tax Exempt: The County is a tax-exempt entity under Texas Tax Code § 151.039, and will not pay a tax from which it is exempt. Tax exempt paperwork will be provided upon written request for the purchase of any items qualifying for exemption under this Contract. In accordance with applicable laws and regulations, Contractor shall issue its Texas Resale Certificate to vendors and subcontractors for items that qualify for exemption. The Contractor shall be responsible for paying any and all taxes assessed, in whole or in part, on the Project or the Work. The County will not pay for, or reimburse Contractor for any tax from which it is exempt.

18.10 No Arbitration: A dispute arising under this Contract shall not be subject to arbitration.

18.11 Waiver of Subrogation: Contractor, Subcontractor's, and their insurance carriers waive any and all rights whatsoever with regard to subrogation against County as indirect parties to any suit arising out of personal or property damages resulting from Contractor's or Subcontractor's, or their employees' performance under this Contract.

18.12 Successors and Assigns: Waller County and the Contractor bind themselves, and their permitted successors executors, administrators, and assigns to this Contract. Neither Party shall assign, sublet, or transfer its interest, in whole or in part, in this Contract without the prior written consent of the other Party. The following conditions must be met before any permitted assignment becomes effective: a) Contractor must give written notice of a proposed assignment to the County at least thirty (30) days prior to the effective date of the assignment; b) the assignee must explicitly accept all of Contractor's obligations under this Contract; c) Contractor must retain its obligations to the County under this Contract until the assignment is effective; d) the assignment must be executed by both Contractor and the assignee; e) Contractor must provide the County a fully executed assignment agreement not later than five (5) business days after the assignment is signed, and f) the County provides a signed, written consent to the assignment.

18.13 Illegal Price Fixing: Contractor agrees to assign to the County any rights it may have to bring antitrust suits against its Suppliers for overcharges on materials incorporated in the Project growing out of illegal price fixing agreements. Contractor further agrees to cooperate with the County should the County which to prosecute suits against Suppliers for illegal price fixing.

18.14 Right to Offset: No money shall be paid by the County upon any claim, debt, demand, or account to any person, firm, corporation, or entity who owes taxes or any other debt to the County. The County shall be entitled to offset any such debt, claims, demand, or account by deducting the amount of taxes due to the County from any payment due to the Contractor. No assignment, or transfer of any such debt, claim, demand, or account after said taxes are due or other debt accrues shall affect the right of the County to so offset said taxes or other debt against the Contractor.

18.15 No Third-Party Beneficiaries: This Contract does not inure to the benefit of any third party, except permitted successor or assigns.

18.16 Authority to Sign: Signatories to this Contract represent and warrant that they have the authority to bind the respective parties.

18.17 Public Communications: Contractor shall not, under any circumstance, release any material or information developed in the performance of its services hereunder without the express written permission of the County, except where required by law to do so. If required by law to release any material or information, Contractor shall notify the County before the release. County shall be solely responsible for communicating with and providing information to the news media, citizens of Waller County, and other governmental agencies.

18.18 Confidentiality: The County is bound by Texas Government Code Chapter 552, the Public Information Act, and other laws concerning government records. Contractor shall clearly and noticeably mark all confidential information and documents it provides to the County pursuant to this Contract. The County will make good faith efforts to promptly notify Contractor if any such information is requested in a public information request, subpoena, or other method so Contractor may argue against the release of such information. Contractor recognizes and understands that the final decision as to what information must be disclosed pursuant to the PIA lies with the Texas Attorney General. Contractor further agrees that the County may furnish information acquired through or pursuant to this

Contract and that is requested through the PIA to the Texas Attorney General for a determination of whether the information must be disclosed. Neither the County, nor any of its officers, or employees shall have any liability or obligation to any party for the disclosure to the public, or to any person or persons, of any items or data furnished to the County by Contractor in reliance on any statute, court opinion, court order, or the advice, decision, or opinion of the Texas Attorney General.

18.19 Notices: Notices delivered hereunder shall be in writing and shall be delivered by personal delivery or certified mail, return receipt requested. Mailed notices shall be deemed received three (3) business days after the notice is placed in the mail with proper postage paid. Any notice or certification to be provided pursuant to this Agreement shall be delivered to the following persons, unless a substitute representative is designated in writing:

To the County	To Contractor:
Attn: County Judge 836 Austin Street, Suite 4300 Hempstead, Texas 77445	As indicated on Bidder's Business Information Sheet

With a copy to:

Waller County Road & Bridge Dept.
Attn: Ross McCall
775 Bus 290 East
Hempstead, Texas 77445

END

Contract Special Terms and Conditions

Bidder must clearly identify on this form whether it requests any Special Terms and Conditions that deviate from the Bid Documents, including the Contract Documents, or any other requirements contained in the IFB. Complete and detailed information regarding deviations must be clearly identified on this form. The County will consider any Special Terms and Conditions in its Contract award decision, and reserves the right to accept or reject a Bid based upon any submitted deviation.

In the absence of the identification on this form of requested deviations, Bidder must fully comply with the Bid Documents and Contract Documents and all other requirements associated with this IFB if awarded a Contract under this IFB. A deviation will not be effective unless it is accepted by the County. The County may, in its sole discretion, seek clarification from and/or communicate with Bidder(s) regarding any submitted deviation, consistent with general procurement principles of fair competition. The County reserves the right to accept or reject a Bid based upon any submitted deviation.

Please mark one of the following:

☐ Bidder requests NO deviations.

☐ Bidder requests deviations.

Specifically identify the language and location or section of the Bid Documents and/or Contract Documents that Bidder is requesting a deviation from, and provide the specific language to be substituted as Special Terms and Conditions. **Attach the sheet(s) containing the requested deviations to his form.**

Company Name	Date
Signature of Authorized Company Official	Printed Name

Contract Sheet

Contract Sheet
Bid 26-013

THE STATE OF TEXAS
COUNTY OF WALLER

This Contract is made and entered into on the _____ day of _____, 2025, by and between Waller County, Texas, a political subdivision of the State of Texas ("County"), acting through County Judge Carbett "Trey" Duhon, III by virtue of an order of Waller County Commissioners Court, and _____, of the City of _____, County of _____, and State of _____ ("Contractor") (referred to individually as "Party," and collectively as "Parties").

In consideration of the promises, performances, payments, and agreements set forth herein, Contractor hereby agrees to commence and complete the following Project: **Reconstruction of Double Culvert Road and Cedar Creek Road for Waller County**, and all Work in accordance with the Contract Documents, which are incorporated herein by reference and made a part hereof for all purposes as if each were set out at length, word for word, and the County agrees to pay the Contractor the total amount of:

$	
(Figures)	(Words)

The Contractor hereby agrees to commence work on the date specified in the written Notice to Proceed to be issued by the County, and to finally complete construction of the improvements, as required by the Contract Documents within _____ calendar days. Waiver of any breach of this Contract shall not constitute waiver of any subsequent breach.

In consideration of the award and execution of this Contract, and in consideration of the waiver of its right to attorney's fees by the County, the Contractor knowingly and intentionally waives its right to attorney's fees under Texas Local Government Code Section 271.153 in any administrative proceeding, alternative dispute resolution proceeding, or litigation arising out of or connected to this Contract.

The County agrees to pay the Contractor from available funds for performance of the Contract in accordance with the Bind and provisions of the Contract Documents, subject to additions and deductions, as provided therein.

The County's payment obligations are payable only and solely from funds available for the purposes of this Contract.

It is further agreed that this contract shall not become binding or effective until signed by the parties hereto and a purchase order authorizing the items desired has been issued.

Although drafted by the County, the Contract, in the event of any disputes over its meaning or application, shall be interpreted fairly and reasonably, and neither more strongly for nor against either Party.

This Contract is executed to be effective upon the date of the last signature affixed hereto.

The undersigned, by their signature, represents that they are authorized to bind the Contractor to fully comply with the Contract. The Contractor, by signing below, acknowledges that they have read the entire Contract, and agree to be bound by the terms contained therein.

Approved this _____day of _____20_____.

Waller County, Texas

_____
County Judge, Carbett "Trey" Duhon, III

_____
Date

_____
By: Signature of Contractor

_____
Date

_____
Printed Name and Title of Signatory

ATTEST

_____
Debbie Hollan, County Clerk

DEBARMENT CERTIFICATION

Neither my company nor an owner or principal of my company has been debarred, suspended, or otherwise made ineligible for participation in Federal Assistance programs under Executive Order 12549, "Debarment and Suspension," as described in the Federal Register and Rules and Regulations. Neither my company nor an owner or principal of my company is currently listed on the government-wide exclusions in SAM, debarred, suspended, or otherwise excluded by agencies or declared ineligible under any statutory or regulatory authority. My company agrees to immediately notify Waller County if my company or an owner or principal is later listed on the government-wide exclusions in SAM, or is debarred, suspended, or otherwise excluded by agencies or declared ineligible under any statutory or regulatory authority.

By signature below, I certify that the above is true, complete, and accurate, and that I am authorized by my company to make this certification.

Company Name	Date
Signature of Authorized Company Official	Printed Name

NO ISRAEL BOYCOTT CERTIFICATION

Effective September 1, 2017, as amended effective May 7, 2019 (H.B. 793), a Texas governmental entity may not enter into a contract with a value of $100,000 or more that is to be paid wholly or partly from public funds with a company (excluding a sole proprietorship) that has 10 or more full-time employees for goods or services unless the contract contains a written verification from the company that it: (1) does not boycott Israel; and (2) will not boycott Israel during the term of the Contract. (Tex. Gov't Code Ch. 2270). Accordingly, this certification form is included to the extent required by law.

"Boycott Israel" means refusing to deal with, terminating business activities with, or otherwise taking any action that is intended to penalize, inflict economic harm on, or limit commercial relations specifically with Israel, or with a person or entity doing business in Israel or in an Israeli-controlled territory, but does not include an action made for ordinary business purposes. Tex. Gov't Code §808.001(1).

By signature below, I certify and verify that Vendor does not boycott Israel and will not boycott Israel during the term of any contract awarded under this RFP, that this certification is true, complete, and accurate; and that I am authorized by my company to make this certification.

Company Name	
Signature of Authorized Company Official	Printed Name

NO ENERGY COMPANY BOYCOTT CERTIFICATION

Effective September 1, 2021, a Texas governmental entity may not enter into a contract with a value of $100,000 or more that is to be paid wholly or partly from public funds with a company (excluding a sole proprietorship) that has 10 or more full-time employees for goods or services unless the contract contains a written verification from the company that it: (1) does not boycott energy companies currently; and (2) will not boycott energy companies during the term of the Contract. (Tex. Gov't Code Ch. 2274). Accordingly, this certification form is included to the extent required by law.

"Boycott Energy Companies" means without an ordinary business purpose, refusing to deal with, terminating business activities with, or otherwise taking any action that is intended to penalize, inflict economic harm on, or limit commercial relations with a company because the company:

(a) engages in the exploration, production, utilization, transportation, sale, or manufacturing of fossil fuel-based energy and does not commit or pledge to meet environmental standards beyond applicable federal and state law; or

(b) does business with a company described by Paragraph (a) above. Tex. Gov't Code §809.001(1).

"Company" means a for-profit sole proprietorship, organization, association, corporation, partnership, joint venture, limited partnership, limited liability partnership, or any limited liability company, including a wholly owned subsidiary, majority-owned subsidiary, parent company or affiliate of those entities or business associations that exist to make a profit. (Tex. Gov't Code Ch. 2274.001(2)).

By signature below, I certify and verify that Vendor does not boycott energy companies and will not boycott energy companies during the term of any contract awarded under this RFP, that this certification is true, complete, and accurate; and that I am authorized by my company to make this certification.

_____	_____
Company Name	Date
_____	_____
Signature of Authorized Company Official	Printed Name

NO DISCRIMINATION AGAINST FIREARM AND AMMUNITION INDUSTRIES CERTIFICATION

Effective September 1, 2021, Chapter 2274 of the Texas Government Code provides that a Texas governmental entity may not enter into a contract with a company (excluding a sole proprietorship) for the purchase of goods or services unless the contract contains a written verification from the company that it (1) does not have a practice, policy, guidance, or directive that discriminates against a firearm entity or firearm trade association, and (2) will not discriminate during the term of the contract against a firearm entity or firearm trade association. (Tex. Gov't Code §2274). Accordingly, this certification form is included to the extent required by law.

"Discriminate against a firearm entity or firearm trade association" means, with respect to the entity or association, to (1) refuse to engage in the trade of any goods or services with the entity or association based solely on its status as a firearm entity or firearm trade association; (2) refrain from continuing an existing business relationship with the entity or association based solely on its status as a firearm entity or firearm trade association; or (3) terminate an existing business relationship with the entity or association based solely on its status as a firearm entity or firearm trade association. The phrase does not include (1) the established policies of a merchant, retail seller, or platform that restrict or prohibit the listing or selling of ammunition, firearms, or firearm accessories; and (2) a company's refusal to engage in the trade of any goods or services, decision to refrain from continuing an existing business relationship, or decision to terminate an existing business relationship:

(a) to comply with federal, state, or local law, policy, or regulations or a directive by a regulatory agency; or

(b) for any traditional business reason that is specific to the customer or potential customer and not based solely on an entity's or association's status as a firearm entity or firearm trade association.

"Company" means a for-profit organization, association, corporation, partnership, joint venture, limited partnership, limited liability partnership, or limited liability company, including a wholly owned subsidiary, majority-owned subsidiary, parent company, or affiliate of those entities or associations that exists to make a profit.

By signature below, I certify and verify that Vendor does not discriminate against firearm and ammunition industries; that this certification is true, complete, and accurate; and that I am authorized by my company to make this certification.

_____	_____
Company Name	Date
_____	_____
Signature of Authorized Company Official	Printed Name

Form **W-9**
(Rev. March 2024)
Department of the Treasury
Internal Revenue Service

Request for Taxpayer Identification Number and Certification

Go to *www.irs.gov/FormW9* for instructions and the latest information.

Give form to the requester. Do not send to the IRS.

Before you begin. For guidance related to the purpose of Form W-9, see *Purpose of Form*, below.

Print or type. See ***Specific Instructions*** on page 3.

1 Name of entity/individual. An entry is required. (For a sole proprietor or disregarded entity, enter the owner's name on line 1, and enter the business/disregarded entity's name on line 2.)

2 Business name/disregarded entity name, if different from above.

3a Check the appropriate box for federal tax classification of the entity/individual whose name is entered on line 1. Check only **one** of the following seven boxes.

☐ Individual/sole proprietor ☐ C corporation ☐ S corporation ☐ Partnership ☐ Trust/estate

☐ LLC. Enter the tax classification (C = C corporation, S = S corporation, P = Partnership) . . . . .

Note: Check the "LLC" box above and, in the entry space, enter the appropriate code (C, S, or P) for the tax classification of the LLC, unless it is a disregarded entity. A disregarded entity should instead check the appropriate box for the tax classification of its owner.

☐ Other (see instructions)

3b If on line 3a you checked "Partnership" or "Trust/estate," or checked "LLC" and entered "P" as its tax classification, and you are providing this form to a partnership, trust, or estate in which you have an ownership interest, check this box if you have any foreign partners, owners, or beneficiaries. See instructions . . . . . ☐

4 Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3):

Exempt payee code (if any)

Exemption from Foreign Account Tax Compliance Act (FATCA) reporting code (if any)

(Applies to accounts maintained outside the United States.)

5 Address (number, street, and apt. or suite no.). See instructions.

Requester's name and address (optional)

6 City, state, and ZIP code

7 List account number(s) here (optional)

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the instructions for Part I, later. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN*, later.

Note: If the account is in more than one name, see the instructions for line 1. See also *What Name and Number To Give the Requester* for guidelines on whose number to enter.

Social security number

			–		–				

or

Employer identification number

		–							

Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
2. I am not subject to backup withholding because (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
3. I am a U.S. citizen or other U.S. person (defined below); and
4. The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and, generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions for Part II, later.

Sign Here	**Signature of U.S. person**	**Date**

General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Future developments. For the latest information about developments related to Form W-9 and its instructions, such as legislation enacted after they were published, go to *www.irs.gov/FormW9*.

What's New

Line 3a has been modified to clarify how a disregarded entity completes this line. An LLC that is a disregarded entity should check the appropriate box for the tax classification of its owner. Otherwise, it should check the "LLC" box and enter its appropriate tax classification.

New line 3b has been added to this form. A flow-through entity is required to complete this line to indicate that it has direct or indirect foreign partners, owners, or beneficiaries when it provides the Form W-9 to another flow-through entity in which it has an ownership interest. This change is intended to provide a flow-through entity with information regarding the status of its indirect foreign partners, owners, or beneficiaries, so that it can satisfy any applicable reporting requirements. For example, a partnership that has any indirect foreign partners may be required to complete Schedules K-2 and K-3. See the Partnership Instructions for Schedules K-2 and K-3 (Form 1065).

Purpose of Form

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS is giving you this form because they

Double Culvert Road Segments 1 & 2
and Cedar Creek Road

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II. Double Culvert Road Segment 1

1. Summary of Work

2. Utility Adjustment Summary

3. Geotechnical Report

III. Double Culvert Road Segment 2 and Cedar Creek Road

1. Summary of Work

2. Utility Adjustment Summary

3. Geotechnical Report

WALLER COUNTY

Engineering Department

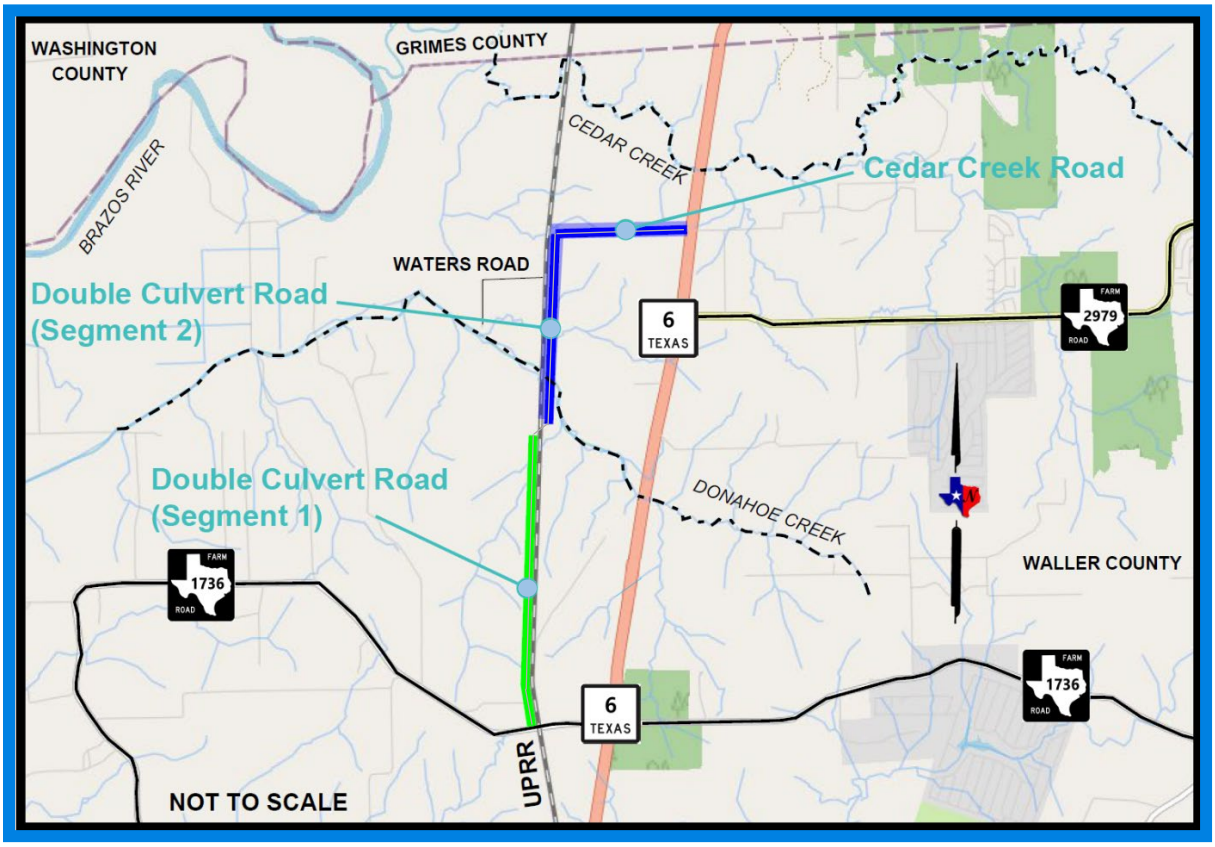
Hempstead, Texas

PROJECT MANUAL

Double Culvert Road Segments 1 & 2

And

Cedar Creek Road



Prepared By

Double Culvert Road Segment 1:

Kimley»Horn

Texas Registered Engineering Firm #F-928
11700 Katy Freeway, Suite 800
Houston, TX 77079

Double Culvert Road Segment 2 and Cedar Creek Road:

CivilCorp an ESP COMPANY

Texas P.E. Board Firm Registration No. 17252
29255 FM 1093, Suite 7A
Fulshear, TX 77441

Index of Technical Specifications

Harris County Specifications (2023 Revision)

No.	Spec. No.	Harris County Specification Title
1	100	Preparing Right-of-Way
2	104	Removing Old Concrete
3	105	Removing Base and Asphalt Pavement
4	106	Salvaging, Hauling & Stockpiling Reclaimable Asphalt Pavement (2" to 4" Depth)
5	108	Removing Structures
6	110	Excavation
7	*130*	*Borrow*
8	*132*	*Embankment*
9	140	Eliminating Existing Pavement Markings & Markers
10	*160*	*Topsoil*
11	164	Seeding for Erosion Control
12	*166*	*Fertilizer*
13	*216*	*Subgrade*
14	260	Lime Treatment (Road-Mixed)
15	292	Dense-Graded Hot-Mix Asphalt Base Course
16	312	Tack Coat
17	314	Emulsified Asphalt (Prime Coat)
18	*340*	*Dense-Graded Hot Mix Asphalt*
19	341	Dense-Graded Hot Mix Asphalt Surface Course
20	*400*	*Excavation and Backfill for Structures*
21	402	Trench Excavation Protection
22	*420*	*Concrete Structures*
23	*421*	*Hydraulic Cement Concrete*
24	*424*	*Precast Concrete Members (Fabrication)*
25	432	Riprap
26	*438*	*Joint Sealants*
27	*440*	*Reinforcement for Concrete*
28	*442*	*Metal for Structures*
29	*448*	*Structural Field Welding*
30	462	Reinforced Concrete Box Culverts
31	464	Reinforced Concrete Pipe
32	467	Safety End Treatment
33	*476*	*Jacking, Boring, or Tunneling Pipe or Box*
34	*501*	*Tree Protection and Trimming*
35	502	Traffic Signs, Roadside Signs, and Mailboxes
36	*520*	*Weighing and Measurement Equipment*
37	540	Metal Beam Guard Fence
38	*560*	*Project Site Cleanup and Maintenance*
39	561	Project Site Documentation
40	591	Temporary Erosion, Sedimentation & Environmental Controls
41	636	Signs
42	*658*	*Delineators and Object Markers*
43	*662*	*Work Zone Pavement Markings*
44	666	Retroreflectorized Pavement Markings
45	668	Prefabricated Pavement Markings
46	*678*	*Pavement Surface Preparation for Markings*
47	694	Temporary Traffic Control
48	*696*	*Barricades*
49	697	Constructing Detours
50	*800*	*Hydraulic Cement*
51	*801*	*Fly Ash*
52	*802*	*Membrane Curing*
53	*820*	*Lime and Lime Slurry*
54	*860*	*Sign Face Materials*
55	*861*	*Traffic Paint (Solvent Based)*
56	*862*	*Glass Reflective Spheres for Traffic Paint*
	XXX	*Indicates Reference Item*

Texas Department of Transportation Standard Specifications (2024 Revision)

No.	Spec. No.	TxDOT Specification Title
57	*7*	*Legal Relations and Responsibilities*
58	*9*	*Measurement and Payment*
59	*132*	*Embankment*
60	*204*	*Sprinkling*
61	*210*	*Rolling*
62	*216*	*Proof Rolling*
63	*292*	*Asphalt Treatment (Plant-Mixed)*
64	*300*	*Asphalts, Oils and Emulsions*
65	*301*	*Asphalt Antistripping Agents*
66	*320*	*Equipment for Asphalt Concrete Pavement*
67	400	Excavation and Backfill for Structures
68	*420*	*Concrete Substructures*
69	*421*	*Hydraulic Cement Concrete*
70	*440*	*Reinforcement for Concrete*
71	*445*	*Galvanizing*
72	466	Headwalls and Wingwalls
73	*520*	*Weighing and Measuring Equipment*
74	540	Metal Beam Guard Fence
75	658	Delineator and Object Marker Assemblies
76	662	Work Zone Pavement Markings
	XXX	*Indicates Reference Item*

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With Corresponding Bid Items

Harris County Specifications (2023 Revision)

Bid Item No.	Spec No.	Harris County Specification Title
1	100	Preparing Right-of-Way
3	104	Removing Old Concrete
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5	106	Salvaging, Hauling and Stockpiling Reclaimable Asphalt Pavement (2" to 4" Depth)
6	108	Removing Structures
10	110	Excavation
	130	Borrow
	132	Embankment
7	140	Eliminating Existing Pavement Markings & Markers
	160	Topsoil
43	164	Seeding for Erosion Control
	166	Fertilizer
	216	Subgrade
11,12	260	Lime Treatment (Road-Mixed)
13	292	Dense-Graded Hot-Mix Asphalt Base Course
14	312	Tack Coat
15	314	Emulsified Asphalt (Prime Coat)
	340	Dense-Graded Hot Mix Asphalt
16	341	Dense-Graded Hot Mix Asphalt Surface Course
	400	Excavation and Backfill for Structures
21	402	Trench Excavation Protection
	420	Concrete Structures
	421	Hydraulic Cement Concrete
	424	Precast Concrete Members (Fabrication)
22	432	Riprap (5”)
	438	Joint Sealants
	440	Reinforcement for Concrete
	442	Metal for Structures
	448	Structural Field Welding
23	462	Reinforced Concrete Box Culverts
24, 25	464	Reinforced Concrete Pipe
26	467	Safety End Treatment
	476	Jacking, Boring, or Tunneling Pipe or Box
	501	Tree Protection and Trimming
8,9	502	Traffic Signs, Roadside Signs, and Mailboxes
	520	Weighing and Measurement Equipment
17,19	540	Metal Beam Guard Fence
	560	Project Site Cleanup and Maintenance
48	561	Project Site Documentation
43-47	591	Temporary Erosion, Sedimentation & Environmental Controls
30	636	Signs
	658	Delineators and Object Markers
	662	Work Zone Pavement Markings
33-36	666	Retroreflectorized Pavement Markings
37	668	Prefabricated Pavement Markers
	678	Pavement Surface Preparation for Markings
39	694	Temporary Traffic Control
	696	Barricades
40, 41	697	Constructing Detours

Bid Item No.	Spec No.	Harris County Specification Title
	800	Hydraulic Cement
	801	Fly Ash
	802	Membrane Curing
	820	Lime and Lime Slurry
	860	Sign Face Materials
	861	Traffic Paint (Solvent Based)
	862	Glass Reflective Spheres for Traffic Paint

Texas Department of Transportation (2024 Revision)

Bid Item No.	Spec No.	TxDOT Specification Title
	7	Legal Relations and Responsibilities
	9	Measurement and Payment
	132	Embankment
	204	Sprinkling
	210	Rolling
	216	Proof Rolling
	292	Asphalt Treatment (Plant-Mixed)
	300	Asphalts, Oils and Emulsions
	301	Asphalt Antistripping Agents
	320	Equipment for Asphalt Concrete Pavement
20	400	Excavation and Backfill for Structures
	420	Concrete Substructures
	421	Hydraulic Cement Concrete
	440	Reinforcement for Concrete
	445	Galvanizing
27-29	466	Headwalls and Wingwalls
	520	Weighing and Measuring Equipment
18	540	Metal Beam Guard Fence
31, 32	658	Delineator and Object Marker Assemblies
38	662	Work Zone Pavement Markings

Specifications listed that do not have a corresponding bid item number are referenced in bid items.

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WALLER COUNTY
Engineering Department
Hempstead, Texas

PROJECT MANUAL



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Double Culvert Road Segment 1

Summary of Work

The scope of work includes the reconstruction and widening of Double Culvert Road from FM 1748 to the railroad crossing for a total length of approximately 2 miles in Waller County.

Proposed scope improvements include reconstructing the existing asphalt roadway and widening from approximately 20 feet to 26 feet to provide a two-lane roadway with 11-foot travel lanes and 2-foot shoulders. It is proposed to maintain the existing roadway classification as a Local Road and the design speed in accordance with County guidelines.

Proposed typical sections include a 26’ wide roadway with 11’ travel lanes and 2’ shoulders.

The scope of work includes regrading of existing roadside ditches and driveway reconstruction throughout the corridor.

Traffic control, pavement markings and striping, erosion control measures, and storm water pollution prevention are also included as part of the scope for this project.

All appurtenant and incidental items necessary to complete the project in accordance with the plans, specifications, and County standards are also included.

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Double Culvert Road Segment 1

Utility Conflict Summary

1. AT&T Communications Line: An existing communications line runs generally parallel to and throughout the length of the project corridor. Conflicts are anticipated where the proposed roadway widening extends beyond the existing pavement limits. In addition, several communications structures are anticipated to require adjustment or relocation to accommodate the proposed pavement improvements. Coordination with AT&T will be required during final design and construction.
2. Enterprise Pipeline – Natural Gas: An existing Enterprise natural gas pipeline crosses the project corridor. No conflicts are anticipated as the proposed roadway improvements terminate short of the pipeline crossing location.
3. GW WSC – Water Line: An existing GW WSC water line crosses the project corridor. No conflicts are anticipated as the proposed roadway improvements terminate short of the water line crossing location.

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Double Culvert Road Segment 1

Geotechnical Report

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DESKTOP GEOLOGICAL FAULT STUDY
GEOTECHNICAL STUDY
DOUBLE CULVERT ROAD SEGMENT 1 & PAVEMENT IMPROVEMENTS
FROM FM 1736 TO 200-FT EAST OF RAILROAD CROSSING
WALLER COUNTY PROJECT NO. 23102
WALLER COUNTY, TEXAS

PROJECT NO. 24-996E



TO

KIMLEY-HORN
HOUSTON, TEXAS

BY

GEOTECH ENGINEERING AND TESTING

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TEXAS, LOUISIANA, NEW MEXICO, OKLAHOMA

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JUNE 2025

TEXAS BOARD OF PROFESSIONAL ENGINEERS
REGISTRATION NUMBER F-001183

Kimley-Horn
11700 Katy Freeway, Suite 800
Houston, Texas 77079

Project No. 24-996E
Report No: 1
Project Type: 24H/9
June 30, 2025

Attention: Mr. Sonny Smoak, P.E.

DESKTOP GEOLOGICAL FAULT STUDY
GEOTECHNICAL STUDY
DOUBLE CULVERT ROAD SEGMENT 1 & PAVEMENT IMPROVEMENTS
FROM FM 1736 TO 200-FT EAST OF RAILROAD CROSSING
WALLER COUNTY PROJECT NO. 23102
WALLER COUNTY, TEXAS

Gentlemen:

Submitted here is Geotech Engineering and Testing (GET) geotechnical study for the above referenced project. The planned paving improvements were discussed in detail with Mr. Sonny Smoak, P.E. This study that would provide the necessary rehabilitation/reconstruction recommendations. This study was conducted in general accordance with GET Proposal No. P24-438, dated February 5, 2025. Authorization to proceed with this study was received and was signed by Ms. Stephen Kelly, on January 14, 2025.

This report presents the results of our observations during field visit, geotechnical field exploration and laboratory testing together with reconstruction at Double Culvert road in Waller County, Texas.

We appreciate the opportunity to be of service. Should you have any questions or need additional assistance, please call.

Very truly yours,

GEOTECH ENGINEERING AND TESTING
TBPE Registration Number F-001183

Nikolas Darehshoori, M.S.C.E.
Project Manager

Daniel Seong, Ph.D.
Project Manager

Shailesh "James" Namekar
06/30/2025

Shailesh "James" Namekar, PhD., P.E.
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Copies Submitted: (1) PDF Copy Email – Kimley-Horn – Mr. Sonny Smoak, P.E.
(1) PDF Copy Email – Kimley-Horn – Ms. Stephen Kelly

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Appendix A – Site Vicinity Map, Plan of Borings, stratigraphy profile, Logs of Borings, Key to Log Terms and Symbols, Geological Map , Active Hockley Fault System in the Harris County Area
Appendix B – Sieve Analysis Results
Appendix C – Pictures of Field Explorations
Appendix D – Results of Slope Stability Analysis
Appendix E – Pavement Design Computations
Appendix F – OSHA Soil Classification and Trench Safety Recommendations

1.0 EXECUTIVE SUMMARY

It is planned to improve approximately 10,900- feet from FM 1736 to 200-ft East of Railroad Crossing in Waller County, Texas. Asphalt pavement reconstruction recommendations are also included in this report. A site vicinity map of the project site is presented on Plate 1.

A field visit was conducted by Mr. Nikolas Darehshoori and Daniel Seong, Project Managers at GET on April 29, 2025. The purpose of our study was to explore the subsurface conditions at the project site. The information obtained was used to develop recommendations and to guide design and reconstruction/rehabilitation of existing asphalt pavement.

During our field visit to the project alignments, we observed asphalt pavement cracks at multiple locations of the asphalt roads.

The subsoils and groundwater conditions of the project site were explored by conducting nine (9) soil test borings (B-1 through B-9) at the request of client. The number and depths of borings were specified by the client. Results of our field investigation and engineering analyses are summarized below:

1. In general, based on our field exploration and laboratory test data, the soils along the project alignments appear to be variable. The soils stratigraphy along the project alignments is summarized as follows:

Stratum No.	Range of Depth, ft.	Soil Description*
–	0.17 – 0.25	ASPHALT PAVEMENT (2-inch to 3-inch in thickness)
–	0.33 – 0.67	BASE COURSE (4-inch to 8-inch in thickness)
I	0.5 – 2	SILTY SAND (SM), light brown to dark brown, reddish brown, gray, dark gray, with root fibers to 2', ferrous nodules, gravels
II	0.92 – 20	LEAN CLAY (CL), stiff to very stiff, light brown to dark brown, brownish yellow, light to dark gray, ferrous nodules, gravels, sand seams and layers
III	0.84 – 13/ 18 – 20	FAT CLAY (CH), firm to hard, light brown to dark brown, reddish brown, light to dark gray, ferrous nodules, gravels

*Classification in accordance with the Unified Soil Classification System (ASTM D 2487)

2. Water level observations were made during and 0.33-hour after drilling. Our short-term field exploration indicates that groundwater was not encountered during and after drilling. However, the groundwater may rise during the wet season.

3. In order to recommend pavement component thickness for asphalt pavement reconstruction, the proposed pavement was designed on the basis of 1993 AASHTO Guide for Design of Pavement Structures. In absence of traffic data, the estimated design ESALs of 0.2×10^6 were considered to calculate thicknesses of the flexible pavements for this project over a design life period of 20 years. The recommended pavement component thicknesses during full depth reconstruction are summarized as follows:

Design, ESAL Local Streets	Asphalt Pavement Minimum Thickness	Crushed Limestone Base Thickness, inch(es)	Subgrade Stabilization Thickness, inch(es)
0.2×10^6	2.0	8.0	10.0

The pavement component thicknesses provided here generally match with the Waller County Engineering Design Standard 2023. (Ref. 2).

Since, the existing pavement layers do not meet the Waller County Engineering Design Standard 2023, we recommend pavement reconstruction.

Our field and laboratory tests indicate that the surficial soils consist of silty sand, fat clay and lean clay soils. The subgrade preparation in pavement areas should specify compaction of the upper six-inch to 100% of maximum standard Proctor density (ASTM D 698) at a moisture content between optimum and ±2% of optimum moisture content for surficial cohesionless soils and +3% of optimum moisture content for surficial cohesive soils.

Instead of crushed limestone base course, black base can also be considered along with Hot mix hot-laid asphaltic concrete with subgrade stabilization as shown below:

Design, ESAL	Asphalt Pavement Thickness, inch(es)	Black Base Course Thickness, inch(es)	Subgrade Stabilization Thickness, inch(es)
0.2×10^6	3.0	8.0	8.0

Depending on the type of soils encountered along the project alignments, lime stabilization/ lime-fly Ash of the subgrade soils should most likely be performed. The subgrade cohesive soils should be stabilized, using lime based on TxDOT Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges, Items No. 260 and 263 (Ref. 8). Use 5% lime by dry weight to stabilize the subgrade soils. This results in application rates of 23 pounds of lime, per square yard per six-inch of compacted thickness. TxDOT Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges, Items No. 260 and 263, can be used as procedural guides for placing, mixing and compacting the lime stabilizer and the soils.

The on-site silty sand soils should be treated with lime-fly Ash in accordance with TxDOT 2014 Standard Specifications Item 265. Based on the classification test results, we recommend about 2 percent lime and 8 percent fly Ash by dry weight be used for estimating and planning. The percentages are given as application by dry weight and are typically equivalent to about 10 pounds of lime and 40 pounds of fly Ash per square yard per 6-inch depth. Lime-fly Ash is also available pre-mixed, typically in percentages of 20 percent lime and 80 percent fly Ash. These pre-mixed products may be used if preferred at a rate of 50 pounds per square yard per 6-inch depth. The actual quantity of the lime and fly Ash should be determined at the time of construction once the pavement subgrade is exposed. The subgrade should be treated in accordance with TxDOT Standard Specification Item 265 for lime-fly Ash treated subgrade. The subgrade should be compacted to at least 95 percent of the Standard Effort (ASTM D 698) maximum dry density at a moisture content within ±2 percent of the optimum moisture content.

4. We recommend that the side slopes of the proposed the proposed slope of 3(H):1(V) can be used for the design of the slope for the proposed roadside ditch side.

2.0 INTRODUCTION

It is planned to improve approximately 10,900-linear feet, from FM 1736 to 200-ft east of railroad crossing in Waller County, Texas. The Existing 18-ft wide asphalt pavement shall be converted into 22-ft wide asphalt pavement. The project vicinity map is presented in Plates 1 and A-1. The plan of borings for the project alignments is presented on Plates 2 and A-2.

The purpose of our study was to explore the subsurface conditions at the project site. The information obtained was used to develop recommendations and to guide design and reconstruction/rehabilitation of existing asphalt pavement based on AASHTO 1993 Guide of Design of Pavement Structure (Ref. 3).

This report presents the results of our observations during site visit, geotechnical field exploration and laboratory testing together with the reconstruction/rehabilitation of existing asphalt pavement at Double Culvert Road in Waller County, Texas. The pavement design in this study is generally in accordance with AASHTO 1993 Guide of Design of Pavement Structure (Ref. 3). Furthermore, our site preparation and soil stabilization recommendations are generally developed on the basis of the "Regulations of Harris County, Texas for the Approval and Acceptance of Infrastructure" dated October 10, 2023 (Ref. 4).

3.0 FIELD EXPLORATION

3.1 General

The soil conditions were explored by conducting nine (9) borings (B-1, B-3 through B-5 and, B-7 through B-9) to a depth of 10-ft, and B-2 and B-6 to a depth of 20-ft from the existing grade along the project alignment. The results of pavement drilling show that the existing pavements generally consist of asphalt with a flexible base between B-1 through B-9. The pavement component thicknesses at the boring locations, shown on Plate 4. The pavement borehole locations were grouted after the completion of the fieldwork.

3.2 Drilling and Sampling

The soil conditions were explored by conducting nine (9) borings (B-1 through B-9) along the project alignments. The plan of borings is presented on Plates 2 and A-2. The schedule of borings is as follows:

Facility	Borings [1]	Depth, ft [2]
Paving, Pipeline Crossing/ Box Culvert	B-1, B-3 through B-5, and B-7 through B-9	10
	B-2 and B-6	20

Notes 1 & 2: The number of borings and depths were specified by the client.

Soil samples were obtained continuously at each boring location from the pavement surface to the completion depth of 10-ft and at five-ft intervals thereafter to the completion depth of the borings at 20-ft. The cohesive soils were sampled in general accordance with ASTM D 1587, using a Shelby Tube sampler.

Soil samples were examined and classified in the field, and cohesive soil strengths were estimated using a calibrated hand penetrometer. This data, together with a classification of the soils encountered and strata limits, is presented on the soil stratigraphy profile on Plates 3 and A-3. The logs of borings are presented on Plates A-4 through A-12 in Appendix A. A key to log terms and symbols is shown on Plate A-13 in Appendix A.

Borings were drilled dry, without the aid of drilling fluids, to more accurately estimate the depth to groundwater. Water level observations made during and after drilling are indicated at the bottom portion of the individual logs. The boreholes were grouted with non-shrink grout, using Tremie Method, after the completion of the field work.

Pictures of the project site were taken during our field explorations. These pictures are presented on cover page and Appendix C.

4.0 LABORATORY TESTING

4.1 General

Soil classifications and shear strengths were further evaluated by laboratory tests on representative samples of the major strata. The laboratory tests were performed in general accordance with ASTM Standards. Specifically, ASTM D 2487 is used for classification of soils for engineering purposes.

4.2 Classification Tests

As an aid to visual soil classifications, physical properties of the soils were evaluated by classification tests. The tests were conducted in general accordance with ASTM Standards. These tests consisted of natural moisture content tests (ASTM D 4643), percent finer than the No. 200 sieve tests (ASTM D 1140), Atterberg limit determinations (ASTM D 4318, Method A) and dry unit weights. Similarity of these properties is indicative of uniform strength and compressibility characteristics for soils of essentially the same geological origin. Results of these tests are tabulated on the boring logs at respective sample depths.

4.3 Particle Size Analysis Tests

This test was conducted in general accordance with ASTM D 7928, the Standard Test Method for Particle-Size Distribution of Fine-Grained Soils Using the Sedimentation Analysis. A sieve analysis was performed on the soil samples retained on the No. 200 sieve if any were obtained. The test results are presented on plates B-1 through B-4 in Appendix B.

4.4 Strength Tests

Undrained shear strengths of the cohesive soils, measured in the field, were verified by calibrated hand penetrometer tests, unconfined compressive strength tests (ASTM D 2166) and torvane tests. Natural water content and dry unit weight were determined routinely for each unconfined compressive strength test. These test results are also presented on the boring logs.

4.5 Soil Sample Storage

Soil samples tested or not tested in the laboratory will be stored for a period of three months subsequent to submittal of the final report. The samples will be discarded after this period, unless we are instructed otherwise.

5.0 DESKTOP GEOLOGIC FAULT STUDY

5.1 Site Conditions

The project alignment exhibits a topographic variation of about 80-ft for Double Culvert Road. Currently, the project alignment is covered with asphalt pavement. In general, the area along the project alignment consists of residential facility. Project site alignment pictures were taken during our site visit. These pictures are presented on the cover page and in Appendix B.

5.2 Site Geology

A review of the Geologic Map of Texas indicates that the project site is geologically located on Willis Formation. The geologic character of Willis Formation (Ref. 5) is described below:

The Willis Formation (QWC), mapped on the Beaumont Sheet of the Geologic Atlas of Texas, is a sedimentary rock unit of Late Pliocene to Early Pleistocene age. It is predominantly composed of reddish-brown to yellowish-brown sands and gravels that are coarse to fine-grained, often ferruginous due to iron oxide staining, and moderately to poorly consolidated. The formation also contains clayey lenses, occasional gravel beds of quartz and chert, and in some places, ironstone layers. It was deposited in high-energy fluvial and deltaic environments, resembling braided river systems, with little to no marine influence. Fossils are generally absent, and where present, are rare and limited to plant fragments. Stratigraphically, the Willis Formation lies above the Miocene Fleming Formation and may be overlain by younger Quaternary deposits (Ref. 5).

In some regions of southeastern Texas, the formation is subdivided into three informal members: the Hockley Mound Sand (approximately 20–25 feet thick), the Willis Ferruginous Sand (about 30–60 feet thick), and the Willis Gravelly Sand (roughly 30–40 feet thick). The total thickness of the formation can locally exceed 100 feet. Geographically, it outcrops in a 15–20-mile-wide belt stretching across southeastern Texas into southwestern Louisiana, commonly in upland terrains inland from the Gulf Coast. Hydrogeologically, the Willis Formation has limited aquifer potential; it may act as a minor aquifer in sandy zones or serve as a confining unit where dominated by clay or cemented materials. Water quality is variable and often high in iron and manganese, making it unsuitable as a major source of potable water. This unit is thoroughly documented in the Geologic Atlas of Texas, the USGS National Geologic Map Database, and groundwater reports by the Texas Water Development Board. The geology map of the area is presented on Plate A-14.

5.3 Desktop Geologic Fault Study

Many faults have been observed within the Gulf Coast Region of Texas. In general, faults are caused by groundwater and oil removal from the underlying surface. Faults originate several thousand feet below the ground surface and can often cause displacement of the ground surface, causing broken pavement, ruptured utility lines, and damage to residential and commercial structures. The geologic fault maps of the area are presented on Plates A-15 through A-17.

Our review of the fault maps indicates that there are no major active faults located along the project alignments. However, faults may be present that are absent from the published maps. The closest known fault to the project alignment is Hockley-Conroe Fault system located approximately 6.0-miles to the east of the project alignment. No special study of movement rates for any of these faults was attempted. Therefore, it is our opinion that there is a relatively low risk of surface faulting at the project site.

6.0 SUBSURFACE SOIL AND GROUNDWATER CONDITIONS

6.1 Site Conditions

The project alignments exhibit a topographic variation of about 80-ft. Currently, the project alignments is covered with asphalt pavement. In general, the area along the project alignments consists of residential facilities. Project site alignments pictures were taken during our site visit. These pictures are presented on the cover page and in Appendix B. A field visit was conducted by Mr. Nikolas Darehshoori and Daniel Seong, Project Managers, at GET on April 25, 2025. During our field visit, we observed asphalt pavement cracking at multiple locations of the asphalt roads.

6.2 Soil Stratigraphy

Subsurface soils appear to be relatively variable across the site. Details of subsurface conditions at each boring location are presented on the boring logs. In general, the soils can be grouped into three (3) major strata with depth limits and characteristics as follows:

Stratum No.	Range of Depth, ft.	Soil Description*
–	0.17 – 0.25	ASPHALT PAVEMENT (2-inch to 3-inch in thickness)
–	0.33 – 0.67	BASE COURSE (4-inch to 8-inch in thickness)
I	0.5 – 2	SILTY SAND (SM), light brown to dark brown, reddish brown, gray, dark gray, with root fibers to 2', ferrous nodules, gravels
II	0.92 – 20	LEAN CLAY (CL), stiff to very stiff, light brown to dark brown, brownish yellow, light to dark gray, ferrous nodules, gravels, sand seams and layers
III	0.84 – 13/ 18 – 20	FAT CLAY (CH), firm to hard, light brown to dark brown, reddish brown, light to dark gray, ferrous nodules, gravels

*Classification in accordance with the Unified Soil Classification System (ASTM D 2487)

6.3 Soil Properties

Based on results of soil laboratory testing, the engineering properties soils and how they relate to the pavement design along the project alignments are summarized below:

Stratum No.	Soil Type	PI (s)	Soil Expansivity	Soil Shear Strength, tsf	Remarks
I	Silty Sand (SM)	–	Non- Expansive	–	Moisture Sensitive
II	Lean Clay (CL)	16 – 30	Non to- Moderative Expansive	0.93 – 1.50	–
III	Fat Clay (CH)	35 – 56	Expansive to Highly Expansive	0.31 – 2.35	–

Legend: PI = Plasticity Index

6.4 Water-Level Measurements

The soil borings were dry augered to evaluate the presence of perched or free-water conditions. The levels where free water was encountered in the open boreholes during our field exploration and about 0.33 hours after drilling are shown on the boring logs. Our groundwater measurements are as follows:

Boring No.	Groundwater Depth, ft. at the Time of Drilling	Groundwater Depth, ft. at 0.33 Hour Later
B-1 through B-9	Dry	Dry

Fluctuations in groundwater generally occur as a function of seasonal moisture variation, temperature, groundwater withdrawal, water level and future construction activities that may alter the surface drainage and subdrainage characteristics of this site.

An accurate evaluation of the hydrostatic water table in the relatively impermeable clays and low permeable silts/sands requires long term observation of monitoring wells and/or piezometers. It is not possible to accurately predict the pressure and/or level of groundwater that might occur based upon short-term site exploration. The installation of piezometers/monitoring wells was beyond the scope of our study. We recommend that the groundwater level be verified just before construction if any excavations such as construction of underground utilities, etc. are planned.

We recommend that GET be immediately notified if a noticeable change in groundwater occurs from that mentioned in our report. We would be pleased to evaluate the effect of any groundwater changes on our design and construction sections of this report.

7.0 GEOTECHNICAL ENGINEERING RECOMMENDATIONS

7.1 Underground Utilities

7.1.1 General

We understand that the underground utility installations will include water lines. The installation depth of the proposed pipeline is assumed to require a cover depth ranging from 8 to 10 feet.

We understand that the proposed underground utilities will be constructed in accordance with the City of Houston Specifications, Section 02447 – Augering Pipe and Conduit (Ref. 1)

7.1.2 Open-Trench Method

The bedding and backfill for the proposed waterlines should be constructed in accordance with the City of Houston Specifications, Section 02317 – Excavation and Backfill for Utilities – Section 02447 – Dry and Slurry Augering of Pipe and Conduit. Trenches for the proposed waterlines must have a width below the top of the pipe of not less than the outside diameter of the pipe plus 36-inches and shall be wide enough to permit making up the joints. Sufficient space should be provided between shoring cross braces to permit equipment operations and handling of forms, pipe embedment and backfill, and other materials.

The results of our field exploration and laboratory testing indicate that unsatisfactory soils for excavation, such as silty sand (SM) and soft lean (CL), encountered in the borings. A summary of the unsatisfactory soils locations and depths are as follows:

Boring(s)	Depth, ft.
B-2	4 to 6
B-4 and B-6 through B-9	0 to 2
B-5	0 to 1

If these conditions are encountered during the time of construction, suitable groundwater control measures should be implemented. Furthermore, the contractor may have to over excavate an additional 1-ft and remove unstable or unsuitable materials with approval by geotechnical engineer, then place an equal depth of cement stabilization sand.

Due to potential variability of the on-site soils, unstable trench conditions may still exist in the areas where we did not conduct our borings. If these conditions are encountered during the time of construction, a stable trench should be provided to allow proper bedding and installation.

Sand backfill used in the cement-stabilized sand and sand backfill sections should be free of clay lumps, organic materials, or other deleterious substances, and should have a PI less than 4 for the cement-stabilized sand and less than 7 for the sand backfill section, and not more than 15% passing the No. 200 sieve. Cement stabilized sand should conform to the City of Houston Specifications, Section 02321 – Cement Stabilized Sand.

Our recommendation on trench safety at the project site does not address the effects of excavations on existing buildings/facilities at the project site. This study was outside the scope of our work.

7.1.3 Trenchless Method (Augering)

We understand that Augering may be used for the underground utility installations along the proposed alignments in waller County, Texas. The augering should be conducted in accordance with the City of Houston Specifications, Section 02447 – Dry and Slurry Augering of Pipe and Conduit. Augering should be started from approved pit locations. Excavation for pits and shoring installation should conform to the City of Houston Specifications, Section 02317 – Excavation and Backfill for Utilities. If the augering zone is within the cohesionless soils or collapsible soils, install casings as required by the City of Houston Specifications, Section 02447 – Dry and Slurry Augering of Pipe and Conduit. The augering near existing structures or utility lines should be conducted in accordance with the City of Houston Specifications, Section 02233 – Clearing and Grubbing.

Diameter of auger hole should not exceed pipe bell diameter plus 2-inches. The receiving pit distance should conform to the aforementioned the City of Houston Specifications. A minimum spacing of 6-inch should be provided between the pipe and walls of bore pit. The maximum allowable width of pit shall be 5-ft unless approved by waller County Engineers. Width of pit at surface shall not be less than the pit width at the bottom.

7.1.4 Trenchless Method (Horizontal Directional Drilling)

The horizontal directional drilling method, if used, shall be in accordance by City of Houston Specifications. The pipe used in horizontal directional drilling method shall be determined by design calculations. The drilling fluids must be prevented from entering the manholes, sanitary and storm sewers, or other drainage systems, and any Waters of the United States including creeks and streams. A strict minimum bending radius guideline shall be imposed to avoid an excessively sharp bending radius and prevent damages to the pipe. Drilling mud shall be used during drilling and back-reaming operations. Drilling mud pressure in the borehole shall not exceed that which can be supported by the overburden to prevent heaving or hydraulic fracturing of the soil.

The sections of pipe must be assembled and joined on the job site above ground. If High Density Polyethylene Pipe is used, joining must be accomplished by the butt-fusion method by qualified fusion technicians in strict conformance with the manufacturer's printed instructions. The joints must have a smooth, uniform, double rolled back bead made while supplying the proper melt, pressure and alignment. If PVC Pipe is used, joining must be accomplished by the butt-fusion method in strict conformance with the manufacturer's printed instructions.

Excess drilling mud slurry must be contained in a lined pit or container pound at exit and entry points until recycled or removed from the site. Entrance and exit pits must be large enough to contain the expected return of drilling mud and spoils. Precautions must be taken to keep drilling fluids out of the streets, manholes, sanitary and storm sewers, and other drainage systems including streams and rivers.

7.1.5 Loads Imposed on Buried Pipes

7.1.5.1 General

The loads on an underground pipe depend principally upon the weight of overburden soils, roadway and loads due to surcharges. For design of concrete pressure pipe, linear load due to overburden can be determined based on the design tables and charts presented in the "AWWA Manual of Water Supply Practices Concrete Pressure Pipe (AWWA M9)" developed by the American Concrete Pipe Association. Overburden pressure for the buried pipes at the project alignments are estimated by using the soil density (γ) and the height of the soil over the pipe (H). We assumed that the depth of the pipeline at road crossing be about 8- to 10-ft.

7.1.5.2 Loads Due to Overburden Pressure

Overburden or prism load for buried pipes is given by the following equation:

$$P = \gamma H$$

Where: P = Load due to weight of soils at depth, psf
γ = Total Unit weight of soil, 125 pcf
H = Height of the soil over the pipe, ft

Loadings per linear foot of pipe:

$$W_e = C_d \gamma (B_d)^2 \text{ (Marston Equation)}$$

$$C_d = \frac{1 - e^{-2ku'\left(\frac{H}{B_d}\right)}}{2ku'}$$

Where: W_e = Load, pounds per linear foot (lb/ft)
B_d = Trench width (ft)
C_d = Load Coefficient
k = Friction angle between backfill and soil
u' = Coefficient of friction between fill material and sides of trench
ku' = for sand = 0.165
for clay = 0.130
for saturated clay = 0.110

7.1.5.3 Piping System Thrust Restraint

Fittings on underground pipes are subject to thrust forces inherited from the fluid pressure in the pipe and are directly proportional to the fluid pressure. Unbalance thrust forces will be developed in pressure pipelines due to changes in direction, cross-sectional areas, or when the pipe is terminated. These forces may cause joints to disengage if not adequately restrained. There will be a slight loss of head due to turbulence friction in bends of the pipes. This loss will cause a pressure change across the bend, but it is usually small enough to be neglected.

The thrust force may require more reaction than is available just from the pipe bearing against the backfill. In order to prevent intolerable movement and overstressing of the pipe, suitable buttressing should be provided. In general, thrust blocks, restrained joints and tie rods are common methods of providing reaction for the thrust restraint design. The thrust restraint design provisions described in this section are based on the American Water Works Association Manual M9 (1996)-Concrete Pressure Pipe.

The force diagram shown on Plate 5 illustrates the thrust force generated by flow at a bend in the pipe. The equations for computing this thrust force are also given on this plate. The values of thrust force for a surge pressure of 50 psi were computed for a bend angle of 90 degrees. Results are presented on Plate 5. Once the size of the thrust is determined, a thrust block size can be calculated based on the bearing capacity of the soil. The area of block required is equal to the thrust force (lb) divided by the safe bearing value of the soil (psf). In cohesive soils, the safe bearing value is equal to 2/3 of the average shear strength of the soil adjacent to the block which includes a factor of safety of 3. We believe that a factor of safety of 3 is appropriate in order to limit deflections required to mobilize the passive resistance within tolerable values.

For granular soil encountered at this site, a safe bearing value for thrust blocks can be taken as 90% of the effective overburden pressure at the mid height of the thrust block which includes a factor of safety of 3. The effective overburden pressure can be calculated based on the effective unit weight of the soil above the mid-height of the thrust block.

Geotechnical design parameters for designing the necessary buttressing are as follows:

γ : = Wet unit weight of soil − above water level : 125 pcf
Submerged unit weight of soil − below water level : 60 pcf
c : = Cohesion = 1000 psf (for clay)
ϕ : = Angle of internal friction = 30 degrees (for sand)

7.1.6 Groundwater Control

7.1.6.1 General

Our short-term field exploration indicates that groundwater was not encountered during and after 0.33-hour of drilling. Hence, groundwater dewatering system may not be required. Fluctuations in groundwater can occur as a function of seasonal moisture variation. Groundwater control recommendations are presented in the following report sections.

7.1.6.2 Dewatering Technique

In the event that groundwater is encountered during construction, it is our opinion that groundwater should be lowered to a depth of at least three-ft below the deepest excavation grade in order to provide dry working conditions and firm bedding. Any minor water inflow in cohesive soil layers can probably be removed using a sump-pump or trench sump-pump. Wellpoint system can be used in the area where sandy lean clay and silty sand soils are present. **Due to the presence of silty sand soils and the hydrostatic pressures, blow up may occur in some areas if an effective dewatering system is not in place at the time of construction.**

Piezometers may be installed near the excavation area to evaluate groundwater levels in the area prior to construction. The piezometers should be left in place during construction to monitor groundwater levels and effectiveness of the dewatering system.

Design of a wellpoint system should consider the amount of groundwater to be lowered and the permeability of the affected soils. The selection and proper implementation of an effective groundwater control system is the responsibility of the contractor. The design of groundwater and surface water should be in accordance with the City of Houston Specifications, Section 01578 − Control of Ground Water and Surface Water.

7.1.7 Backfilling

Sand backfill used in the cement-stabilized sand and sand backfill sections should be free of clay lumps, organic materials, or other deleterious substances, and should have a PI less than 4 for cement-stabilized sand and less than 7 for the sand backfill section, and not more than 15% passing the No. 200 sieve. Cement stabilized sand should conform to the City of Houston Specifications, Section 02321 – Cement Stabilized Sand.

Random fill for zones above pipe bedding should be placed in loose lifts not exceeding eight-inches and compacted to 100% of the natural soil density. This value will be on the order of 95% of standard density (ASTM D 698) at a moisture content between optimum and +3% of optimum. These values should be verified by testing during construction. Off-site borrow, if used, should be limited to lean clays with a liquid limit less than 40 and plasticity index (PI) between 12 and 20 and at least 50% of soil particles passing No. 200 sieve.

Utility embedment depths may be greater than 5-ft below existing grades. Trench backfill in excess of about 5-ft in thickness is prone to post-construction settlements due to compression of the soils from self-weight, even if these fills are properly placed and compacted. This settlement could be about 1- to 2-percent of the thickness of the fill. The potential for this settlement should be considered when designing pavements over deep utility lines. To reduce (but not eliminate) the risk of fill settlement, the portion of the fill below a depth of 5-ft below final grade should be compacted to a minimum of 100 percent of the material's maximum standard Proctor dry density (ASTM D-698).

7.1.8 OSHA Soil Classifications

The subsoils can be classified in accordance with Occupational Safety and Health Administration (OSHA) Standards, dated October 31, 1989 of the Federal Register. OSHA classification system categorizes the soil and rock in four types based on shear strength and stability. The description of four (4) types in classification system is summarized in the Appendix F.

Based on our geotechnical exploration and laboratory test results, details of soil classifications at each boring are summarized in the Trench Safety Report, presented in Appendix F.

7.1.9 Excavations

Each side of an excavation or trench which is five-foot or deeper must be protected by sheeting/bracing shoring or sloped. Based on soil strength data, temporary (less than 24 hours) open-trenched, non-surcharged, and unsupported excavations should be made on slopes of flatter than 1.5 (h):1 (v). Vertical cuts can be constructed, provided shoring and bracing are used for the excavation wall stability. Benched excavation can also be used with average slopes of about 1(h):1(v) and steps should not be higher than five-foot. In all cases, excavations should conform to OSHA guidelines. Flatter slopes may have to be used if large amounts of sand need to be excavated for deep utility installations. Specifications should require that no water be allowed to pond in the excavations. The surface slopes should be protected from deterioration and weathering if they are to be left open for more than 24 hours.

Excavations should be performed with equipment capable of providing a relatively clean bearing area. Excavation equipment should not disturb the soil beneath the design excavation bottom and should not leave large amounts of loose soil in the excavation.

The bearing surface should be protected against disturbance and deterioration by completing the backfilling operations as quickly as possible. The excavation bottom should be properly sloped to allow any water infiltrating into the excavation to pond at a convenient location along the edge of the excavation. This water should be pumped out as soon as possible. Water should not be allowed to stand on the bearing area.

7.1.10 Backfilling Around Manholes

Backfilling around manholes should be at 100% maximum of standard proctor dry density (ASTM D 698), due to potential settlement problems.

7.1.11 Lateral Earth Pressures

In the event that open excavations are not used, the proposed waterlines can be installed using trench sheeting. The sheeting can be constructed in the form of cantilever sheeting or with bracing. Lateral earth pressures for each method used are summarized in appendix F. The trenching and shoring operations should follow OSHA Standards. We recommend that a geotechnical engineer monitor all phases of trench excavation and bracing to assure trench safety.

Lateral earth pressures for each method used are summarized on Plate F-1 through F-5 in appendix F. The trenching and shoring operations should follow OSHA Standards. We recommend a geotechnical engineer monitor all phases of trench excavation and bracing to assure trench safety. Furthermore, a letter for trench safety recommendation is provided separately.

8.0 SLOPE STABILITY ANALYSIS OF ROADSIDE DITCH

8.1 General

We understand that the roadside ditch exists on both sides constructed and may be improved at the project site. Depth of the ditch varies from 3- to 6-ft.

8.2 Slope Stability Analysis

8.2.1 General

Slope stability analyses of the roadside ditch side slopes were performed using Slope/W computer program (Ref. 9) for the furnished cross section for the three following conditions: (a) Short term (ST), (b) Rapid Drawdown (RDD) conditions and (c) Long-term (LT) conditions. The Short term (ST) parameters represent the end of construction loading conditions.

The rapid drawdown (RDD) represents a flooded condition where the water rises to the top of the slope, then recedes fast enough leaving an unbalanced piezometric head behind the slope. Long-term (LT) design values are applicable to soil gravity loads and continuously applied live loads (maintenance vehicle loads, dozer loads, etc.). The long term represents a steady-state soil parameter condition. The results of slope stability analysis for the proposed roadside ditch side slopes are provided in the following sections.

8.3 Design Soil Parameters

Short-terms strengths (Ref. 10) were estimated from undrained test data including hand penetrometer, torvane, and unconfined compression. Soil strength for the long-term and rapid draw-down conditions (Ref. 9 and Ref. 10 were estimated from correlations between the soil index properties, residual and soften secant friction angles (Ref. 10) and previous work experience with similar soils of the same geologic origin. In general, the residual shear strengths parameters are used for the slope stability analyses, instead of the peak shear strengths obtained in the laboratory tests.

The design soil parameters used in the analysis for the assumed cross-section based on Boring B-6 are as follows:

Soil Conditions				Design Strength Parameters					
				Short Term		Rapid Draw Down		Long Term	
Depth Range, ft	Symbol	Description	γ_t, pcf	c^0, psf	ϕ^0	C', psf	ϕ'	C", psf	ϕ''
0 – 2	SM	SILTY SAND (SM)	125	0	30	0	30	0	30
2 – 6	CH	Fat Clay (CH)	105	400	–	370	11	350	13
6 – 18	CL	Lean Clay (CL)	115	700	–	330	11	320	13
18 – 20	CH	Fat Clay (CH)	105	400	–	390	11	370	13

Where:

γ_t = Total unit weight of soils, pcf

c^o, c', c" = Undrained, consolidated undrained and consolidated drained, cohesion, psf

ϕ^o, ϕ', ϕ'' = Undrained, consolidated undrained and consolidated drained, angle of internal friction, degrees

8.4 Slope Stability Analysis

Slope stability analyses were performed on the furnished cross section using the computer program "Slope/W". The Morgenstern-Price method of analysis was used for the slope stability analysis. In the Morgenstern-Price analysis method, slope stability is evaluated along a circular arc. The degree of safety is measured by comparison of the driving forces (soil gravity loading, surcharge, etc.) causing movement with the soil friction and cohesive forces resisting failure. The ratio of resisting forces to driving forces defines the factor of safety. During construction, a dozer or other construction equipment are expected to be operated at the project site area. A load of 250 psf was used for both road traffic and live load on top of the bank in our slope stability analysis to represent the unit surcharge load applied to the road surface by the traffic, dozer, construction equipment, or maintenance vehicles.

The slope stability was evaluated for numerous radii representing trial circles originating from a grid system of trial circle centers selected to incorporate the failure. The failure planes with critical factor of safety for each condition are illustrated in Appendix D. The factors of safety for all the conditions for the global stability are shown below:

Design Conditions	Factor of Safety 3(H):1(V)
Short Term Condition (ST)	2.873
Long Term Condition (LT)	2.746
Rapid Drawdown Condition (RDD)	2.716

For a stable slope, we recommend minimum safety factors of 1.3 for the Short Term (ST) condition, 1.25 for the Rapid Drawdown (RDD) condition, and 1.5 for the Long Term (LT) condition. Based on the above-estimated factors of safety, it is our opinion that the proposed slope for the roadside ditches is stable.

8.5 Recommended Slope Ratios

Based on the above-mentioned factors of safety, the proposed slope of 3(H):1(V) can be used for the design of the slope for the proposed roadside ditch side.

9.0 BOX CULVERT RECOMMENDATIONS

9.1 General

We understand that the proposed improvement will include construction of box culverts. We assume that the bottom of the box culvert be about 10-ft from the existing grade. Excavation and groundwater control for construction of these structures should be in accordance with our recommendations provided in construction consideration section of this report. The proposed box culverts may be designed in accordance with the parameters presented on Plate 10. Furthermore, the proposed box culvert will be constructed in accordance with City of Houston "Standard Construction Specifications for wastewater Collection Systems, water Lines, Storm Drainage, Street Paving and Traffic, City of Houston 2019 Standard Specification (Ref. 1).

9.2 Bedding and Backfilling

The proposed box culvert structures should be placed on a well prepared, properly compacted working surface. Cast-in-place culverts can be supported on the natural soils or compacted structural fill provided subgrade is protected from construction disturbances and surface water is not allowed to pond within the excavation. We recommend the exposed subgrade be uniformly proofrolled to at least 95 percent of Standard Proctor (ASTM D 698) maximum dry density at a moisture content between optimum and +3% of optimum.

Sand used in the cement-stabilized sand backfill sections should be free of clay lumps, organic materials, or other deleterious substances, and should have a PI less than 4 for the cement-stabilized sand, and not more than 15% passing the No. 200 sieve.

9.3 Buoyancy

The proposed box culvert structures may experience uplift loads from the groundwater during flood conditions. The box culverts should perform satisfactorily if a design factor of safety against uplift loads of 1.5 is used. In general, the hydrostatic pressure will be resisted by the dead weight of the structure, weight of the overburden soils above the top of the box culverts and the friction or adhesion between the walls and natural soils or fill. A submerged unit weight of 60 pounds per cubic foot (pcf) and 85 pcf can be used for soils and concrete, respectively, to compute the resistance to uplift loads. An adhesion value of 200 psf can be used between the backfill and the box culverts to resist the uplift loads. A factor of safety of 2.0 is included in the adhesion value.

10.0 PAVEMENT DESIGN

10.1 General

It is planned to improve approximately 10,900-linear feet, from FM 1736 to 200-ft east of railroad crossing in Waller County, Texas. The Existing 18-ft wide asphalt pavement shall be converted into 22-ft wide asphalt pavement. The pavement design in this study is generally in accordance with AASHTO 1993 Guide of Design of Pavement Structures (Ref. 2) and TxDOT Pavement Manual (Ref. 7).

10.2 Traffic Information

In absence of traffic data, the estimated design ESALs of 0.2×10^6 were used to calculate thicknesses of the flexible pavements for this project over a design life period of 20 years.

10.3 Recommended Subgrade Design Values

Our reviews for laboratory test results indicate that subgrade soils are silty sand (SM), lean clay (CL), fat clay (CH) soils based on unified soils classification system (ASTM D 2487). The recommended design parameters for California Bearing Ratio (CBR) and Resilient Modulus (M_R) values are 4 and 6,000 psi, respectively.

10.4 Design Parameters and Pavement Recommendations

The following design parameters (based on ASSHTO 1993 Guide of Design of Pavement Structure (Ref. 2) were used for the proposed pavement project.

AASHTO Design Parameter	Design Value
ESAL × 10^6 for 20-year design life	0.2
Reliability, R	95%
Overall Standard Deviation, S_0	0.45
Drainage Coefficient, m_i	1.0
Design Serviceability Loss, Δ psi	1.7
California Bearing ratio (CBR)	4
Subgrade Resilient Modulus (M_R) in psi	6,000
Structural Layer Coefficients	
Hot-Mixed Hot-Laid Asphalt Surface Material	0.44
Crush Limestone Base	0.14
Lime-Stabilized or Lime-Fly Ash Stabilized Earth	0.11

The recommended pavement component thicknesses during reconstruction are summarized as follows:

10.4.1 Full Depth Reconstruction

Based on the above design parameters, the recommendations for the minimum asphalt pavement section thickness are as follows:

Design, ESAL Local Streets	Asphalt Pavement Minimum Thickness inch(es)	Crushed Limestone Base Thickness, inch(es)	Subgrade Stabilization Thickness, inch(es)
0.2× 10^6	2.0	8.0	10.0

Our field and laboratory tests indicate that the surficial soils consist of lean clay, fat clay, and silty sand soils. The type of subgrade stabilization for the rigid pavement areas will depend on the final grade elevation. The subgrade preparation in pavement areas should specify compaction of the upper six-inch to 100% of maximum standard Proctor density (ASTM D 698) at a moisture content between optimum and +3% of optimum moisture content.

Instead of crushed limestone base course, black base can also be considered along with Hot mix hot-laid asphaltic concrete with subgrade stabilization as shown below:

Design, ESAL	Asphalt Pavement Thickness, inch(es)	Black Base Course Thickness, inch(es)	Subgrade Stabilization Thickness, inch(es)
0.2× 10^6	3.0	8.0	8.0

Depending on the type of soils encountered along the project alignments, lime stabilization/ lime-fly Ash of the subgrade soils should most likely be performed. The subgrade cohesive soils should be stabilized, using lime based on TxDOT Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges, Items No. 260 and 263 (Ref. 2). Use 5% lime by dry weight to stabilize the subgrade soils. This results in application rates of 23 pounds of lime, per square yard per six-inch of compacted thickness. TxDOT Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges, Items No. 260 and 263, can be used as procedural guides for placing, mixing and compacting the lime stabilizer and the soils.

The on-site silty sand soils should be treated with lime-fly Ash in accordance with TxDOT 2014 Standard Specifications Item 265. Based on the classification test results, we recommend about 2 percent lime and 8 percent fly Ash by dry weight be used for estimating and planning. The percentages are given as application by dry weight and are typically equivalent to about 10 pounds of lime and 40 pounds of fly Ash per square yard per 6-inch depth. Lime-fly Ash is also available pre-mixed, typically in percentages of 20 percent lime and 80 percent fly Ash. These pre-mixed products may be used if preferred at a rate of 50 pounds per square yard per 6-inch depth. The actual quantity of the lime and fly Ash should be determined at the time of construction once the pavement subgrade is exposed. The subgrade should be treated in accordance with TxDOT Standard Specification Item 265 for lime-fly Ash treated subgrade. The subgrade should be compacted to at least 95 percent of the Standard Effort (ASTM D 698) maximum dry density at a moisture content within ±2 percent of the optimum moisture content.

The subcontractor who will be doing the subgrade stabilization should be experienced with stabilization procedures and methods. Furthermore, all of the earthwork at this project should be monitored by our geotechnician to assure compliance with the project specifications.

Once the subgrade is constructed, the soils at the top of subgrade should be slicked and the subgrade needs to be crowned such that the all-surface water would drain away. No low areas should be left within the subgrade areas since these areas would hold water and destroy the subgrade structure.

Our recommendations on subgrade stabilization are preliminary. The actual depth and type of stabilization should be determined in the field at the time of construction just after site stripping and proofrolling. Furthermore, the type and amount of the stabilizer may vary depending on the final grade elevation and the soil type encountered.

11.0 CONSTRUCTION CONSIDERATIONS

11.1 Surface Water Drainage

In order to minimize ponding of surface water, site drainage should be established early in the project construction so that this condition will be controlled.

11.2 Site Preparation

Portions of project site has the potential for construction problems related to the surficial layer of cohesionless soils (Borings B-4 through B-9). These permeable surficial soils are underlain by relatively impermeable clay soils. Thus, due to poor site drainage, wet season or site geohydrology, water ponds on the clays soils and creates a "perched water table condition". The surficial cohesionless soils could become extremely soft when wet, and must be stabilized, aerated, or replaced. In the event that these surficial soils become wet, they will experience rutting and pumping. Therefore, these soils may have to be improved. Our recommendations on subgrade improvements are presented in the earthwork section of this report. Our site preparation recommendations are presented below:

1. If reconstruction is selected, the requirement for removal of any existing paving, and subsoil materials will depend on final grades and other alignments information. In general, remove all vegetation, tree roots, organic topsoil, existing foundations, paved areas and any undesirable materials from the construction area. Tree trunks under the construction areas should be removed to a root size of less than 0.5-inch. We recommend that the stripping depth be evaluated at the time of construction by a soil technician.

2. The subgrade areas should then be proofrolled with a loaded dump truck or similar pneumatic-tired equipment with loads ranging from 25- to 50-tons. The proofrolling serves to compact surficial soils and to detect any soft or loose zones. The proofrolling should be conducted in accordance with TxDOT Standard Specification Item 216. Any soils deflecting excessively under moving loads should be undercut to firm soils and recompacted. Any subgrade stabilization should be conducted after site proofrolling is completed and approved by the geotechnical engineer. The proofrolling operations should be observed by an experienced geotechnician.

3. Off-site borrow for embankment fill should consist of lean clays with a liquid limit (Tex-104-E) not exceeding 40 and a plasticity index (Tex-106-E) between 12 and 20 (Texas Department of Transportation Specification, Item No. 132, 134, and 152). These soils should be placed in loose lifts not exceeding eight-inch and compacted to at least 95% of maximum standard density (ASTM D 698) at a moisture content between optimum and 3%. Fat clays should not be used as fill for embankment construction. Bank sands should not be used as select structural fill. On-site soils, free of organics (with the exception of sands and silts) are also suitable for use as structural fill.

4. In cut areas, the soil should be excavated to grade and the surficial soil proofrolled and scarified to a minimum depth of six-inch and recompacted to the previously mentioned density and moisture content.

5. Positive site drainage should be developed at the beginning of the project to limit construction difficulties with wet surface soils.

11.3 Suitability of On-Site Soils for Use as Fill

11.3.1 General

The on-site soils can be used as fill. There are typically three types of fill at a site. These fills can be classified as described in the following report sections.

11.3.2 Select Structural Fill

This is the type of fill that can be used under the paving, etc. These soils should consist of lean clays, free of root organics, with liquid limit of less than 40 and plasticity indices between 12 and 20 and at least 50% of soil particles passing No. 200 sieve.

11.3.3 Structural Fill

This type does not meet the Atterberg limit requirements for select structural fill. This fill should consist of lean clays or fat clays. They can be used under paving. Sands can be used as structural fill. However, these soils may pump when they are wet.

11.3.4 General Fill

This type of fill consists of sands and silts. These soils are moisture sensitive and are difficult to compact in a wet condition (they may pump). These soils can be used as structural fill on areas with the understating that they can erode easily and if they get wet, they are difficult to compact (they may pump). These soils can result in a perched water table. The owner and the civil engineer must be aware of these potential issues.

110.3.5 On-Site Fill Soil Classification

The on-site soils can be used as fill materials as described below:

Stratum No.[1]	Soil Type	Use as Fill: Select Structural Fill	Use as Fill: Structural Fill	Use as Fill: General Fill	Notes
I	Silty sand (SM)	–	–	✓	2, 3
II	Lean Clay (CL)	–	✓	✓	2, 4
III	Fat Clay (CH)	–	✓	✓	2, 5

Notes:

1. See soil stratigraphy and design conditions sections of this report for strata description.
2. All fill soils should be free of organics, roots, etc.
3. The on-site cohesionless soils are moisture sensitive and erode easily. These soils will pump when they get wet. Compaction difficulties will occur in these soils in a wet condition.
4. These soils, once lime modified (4% by dry weight), can be used as select structural fill.
5. These soils, once lime modified (5% by dry weight), can be used as select structural fill.

11.4 Earthwork

11.4.1 General

Difficult access and workability problems can occur in the surficial soils due to poor site drainage, wet season, or site geohydrology. Based on the laboratory test results, the surficial soils at the project site consist of fat clay (CH), lean clay (CL), and silty sand (SM) soils. Considering the soils stratigraphy, the construction of this project should be conducted during the dry season to avoid major earthwork problems. Our recommendations for earthwork activity for areas with cohesive and cohesionless soils are provided separately in the following sections.

11.4.2 Earthwork for Cohesive Soils

Difficult access and workability problems can occur in the surficial cohesive soils due to poor site drainage, wet season, or site geohydrology. Should this condition develop, drying of the soils for support of pavement may be improved by the addition of 5% lime by dry weight. The application rate corresponding to this additive amount would be approximately 23 pounds per square yard for each eight-inch of compacted thickness.

Texas Department of Transportation (TxDOT) Specifications, Items 260 and 263, shall be used as procedural guides for placing, mixing, and compacting lime stabilizer and the soils.

Our recommendations on subgrade stabilization are preliminary. The actual depth and type of stabilization should be determined in the field at the time of construction just after site stripping and proofrolling. The required amount of lime for stabilization should be determined by ASTM C 977 Method. Furthermore, the type and amount of the stabilizer may vary depending on the final grade elevation and the soil type encountered.

Provided the site work is performed during dry weather and/or project schedules permit aeration of wet soils, the subgrade will be suitable for pavement support.

11.4.3 Earthwork for Cohesionless Soils

Difficult access and workability problems will most likely occur in the surficial cohesionless fill soils due to poor site drainage, wet season, or site geohydrology. Considering the soils stratigraphy, the construction of this project should be conducted during the dry season to avoid major earthwork problems. In the event the subgrade soils become wet and experience pumping problems, they can be (a) improved with drainage, (b) improved with soil mixing, (c) opened up to dry up, (d) removed and replaced with dry cohesive soils or (e) chemically modified or stabilized. These alternatives are discussed in the following report sections.

11.4.3.1 Improving Drainage

The project site drainage in the pumping soils can be accomplished by placing several shallow bleeder ditches (about 18-inches ±) in the surficial cohesionless soils. These bleeder ditches should be directed to a low area, such as a hole (detention pond) or another ditch in the lowest elevation area of the site. This will allow the surficial soils to drain the water and make the drying process faster. The hole/low area should not be under the building areas. The excess water can be pumped out of the hole and moved off-site.

11.4.3.2 Soil Mixing

The on-site cohesionless soils can be mixed with on-site cohesive soils to reduce subgrade pumping. GET can do a mix design to come up with soil mix percentages, if this option is considered.

11.4.3.3 Subgrade Drying

The on-site wet soils can be opened up so that it would dry up. However, opening up the surficial cohesionless soils for drying purposes may not be practical, due to cyclic rainfall in the Gulf-Coast area.

11.4.3.4 Removal and Replacement

The surficial cohesionless soils can be removed and replaced with select structural fill. The actual depth of removal and replacement should be evaluated in the field, but it can be the whole thickness of surficial cohesionless soils. This procedure will include removal of the surficial cohesionless soils, proofrolling and compacting the subgrade cohesive soils to a minimum of 95 percent standard proctor density (ASTM D 698). The site can then be backfilled with select structural fill, compacted to a minimum of 95 percent of standard Proctor density. The proofrolling should be in accordance with the site preparation section of this report. All of the fill soils should be placed and tested in accordance with the site preparation section of this report.

11.4.3.5 Modification/Stabilization

It is recommended that the on-site cohesionless soils be modified (to dry up), using 5 to 10 percent fly ash by dry weight in accordance with City of Houston Specifications, Section 02337. The estimated amounts of fly ash per depth of modification are as follows:

Modification Depth, in.	Fly Ash Weight Range, lbs. per Square Yard	
	5%	10%
6	23	45
12	46	90
18	69	135
24	92	180

We recommend that five percent fly ash be used if the surficial soils are relatively moist at the time of application. Higher levels (10 percent) of fly ash should be used if wet and soggy subgrade soils are encountered.

The subgrade soils should be removed to a depth of 24-inches (or more) below existing grade. These soils should be stockpiled. The soils below a depth of 24-inches should be modified to a depth of 12-inches. These soils should be compacted to a minimum of 95 percent of standard Proctor density (ASTM D 698). The stockpiled soils should then be modified and replaced in six-inch lifts and compacted to 95 percent of maximum dry density as determined by ASTM D 698 at moisture contents within ±2 percent of optimum.

Due to poor drainage and the depth of the cohesionless soils, the depth of stabilization may be as deep as depth of cohesionless soils. A test section can be implemented for this purpose. The subgrade soils should be modified in six-inch lifts and compacted within four hours of mixing and placement. All of the subgrade soils should be compacted to a minimum of 95 percent of the standard Proctor density at the moisture content of ±2 percent of optimum. The degree of compaction for the lifts, below a depth of 24-inches can be relaxed to 90 percent of maximum dry density to ease the construction procedures.

The subcontractor who will be doing the subgrade modification or stabilization should be experienced with stabilization procedures and methods. Furthermore, all of the earthwork at this project should be monitored by our geotechnician to assure compliance with the project specifications.

Once the subgrade is constructed, the soils at the top of subgrade should be slicked and the subgrade needs to be crowned such that the all-surface water would drain away. No low areas should be left within the subgrade areas, since these areas would hold water and destroy the subgrade structure.

Our recommendations on subgrade stabilization are preliminary. The actual depth and type of stabilization should be determined in the field at the time of construction just after site stripping and proofrolling. Furthermore, the type and amount of the stabilizer may vary depending on the final grade elevation and the soil type encountered.

11.5 Construction Surveillance

Construction surveillance and quality control tests should be planned to verify materials and placement in accordance with the specifications. The recommendations presented in this report were based on a discrete number of soil test borings. Soil type and properties may vary across the site. As a part of quality control, if this condition is noted during the construction, we can then evaluate and revise the design and construction to minimize construction delays and cost overruns. We recommend the following quality control procedures be followed by a qualified engineer or technician during the construction of the facilities:

- Observe the site stripping and proofrolling.
- Verify the type, depth and amount of stabilizer.
- Verify the compaction of subgrade soils.
- Evaluate the quality of fill and monitor the fill compaction for all lifts.

It is the responsibility of the client to notify GET when each phase of the construction is taking place so that proper quality control and procedures are implemented.

12.0 RECOMMENDED ADDITIONAL STUDIES

This report has been based on assumed conditions/characteristics of the proposed project area where specific information was not available. It is recommended that the civil engineer and structural engineer along with any other design professionals involved in this project carefully review these assumptions to ensure they are consistent with the actual planned development. When discrepancies exist, they should be brought to our attention to ensure they do not affect the conclusions and recommendations provided herein. It is recommended that GET be retained to review the plans and specifications to ensure that the geotechnical related conclusions and recommendations provided herein have been correctly interpreted as intended.

13.0 STANDARD OF CARE

The recommendations described herein were conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the geotechnical engineering profession practicing contemporaneously under similar conditions in the locality of the project. No other warranty or guarantee, expressed or implied, is made other than the work was performed in a proper and workmanlike manner.

14.0 REPORT DISTRIBUTION

This report was prepared for use by our client, based on specific and limited objectives. GET assumes no responsibility or obligation for the unauthorized use of this report by other parties and for purposes beyond the stated project objectives and work limitations.

15.0 REFERENCES

1. "Standard Construction Specifications for wastewater Collection Systems, water Lines, Storm Drainage, Street Paving and Traffic, City of Houston 2019 Standard Specification"

2. https://www.co.waller.tx.us/page/Regulations

3. AASHTO Specifications, "Guide for Design of Pavement Structures", American Association of State Highway and Transportation Officials, 1993.

4. Harris County Engineering Department, "Regulations for the Approval and Acceptance of Infrastructure", Harris County, TX, Oct. 2023.

5. U.S. Geological Survey. (2025) Pocket Texas Geology. Retrieved May 9, 2025. https://txpub.usgs.gov/txgeology/

6. Geologic Atlas of Texas, Beaumont sheet (revised 1992) https://store.beg.utexas.edu/publications/geologic-atlas-of-texas/ga0004?utm_source=chatgpt.com

7. Texas Department of Transportation (TxDOT)," Pavement Manual", June 2021.

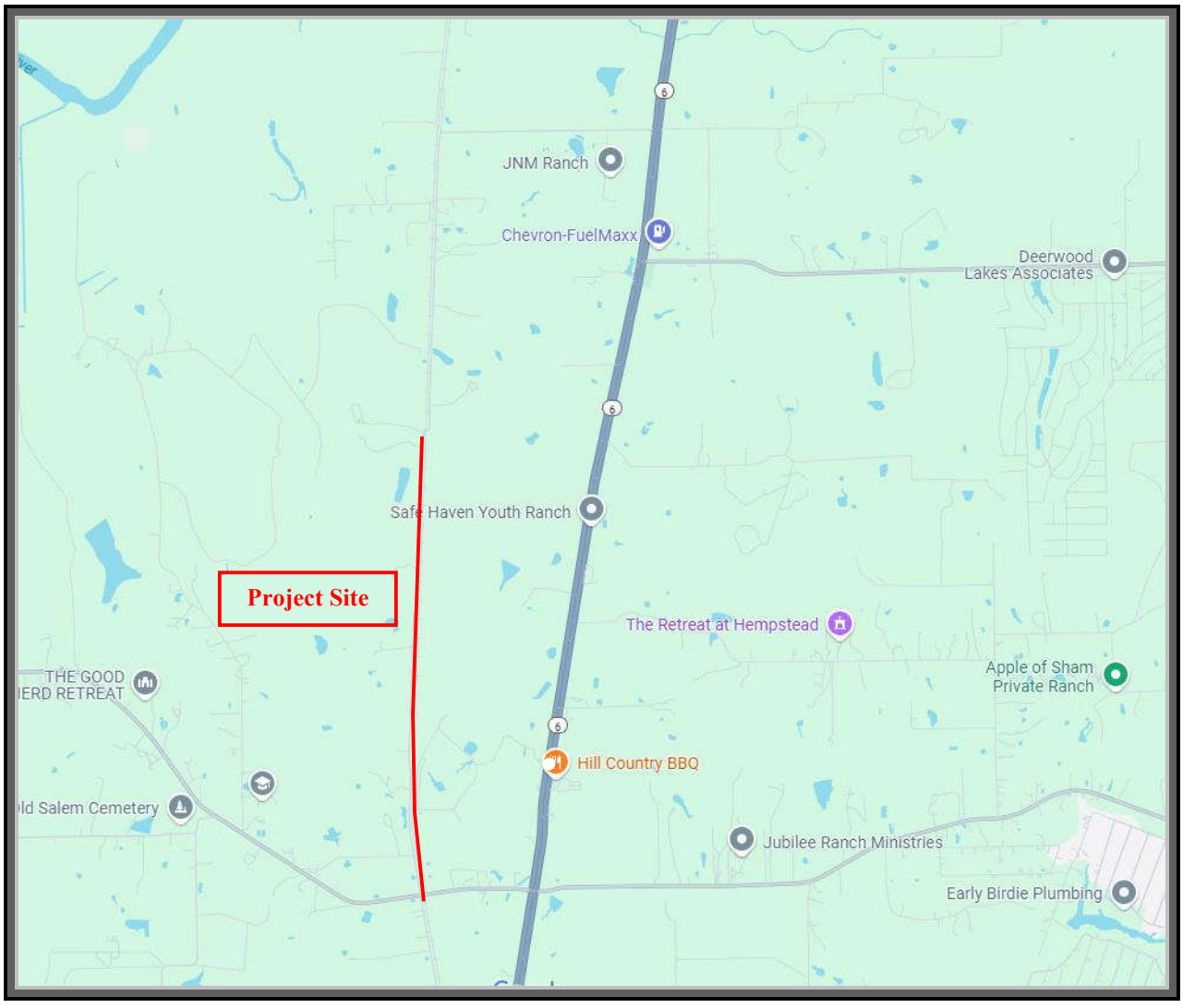
8. Texas Department of Transportation (TxDOT) "Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges", November 2014.

9. "SLOPE/W User's Guide", by GEO-SLOPE International Ltd, 1997.

10. "An Engineering Manual for Slope Stability Studies", by J.M. Duncan and A.L. Buchigwani, University of California at Berkley, Department of Engineering, 1975.

11. "Cohesion Intercept in Effective Stress-Stability Analysis", by G. Mesri, and M.E.M. Abdel-Ghaffar, Journal of Geotechnical Engineering, Vol. 119, No. 8, August 1993, pp. 1229-1249.

12. "Shear Strength Correlations and Remedial Measure Guidelines for Long-Term Stability of Slopes Constructed of Highly Plastic Clay Soils", by A. A. Saleh and Stephen G. Wright, Center for Transportation Research Bureau of Engineering Research, The University of Texas at Austin, October 1997.



SITE VICINITY MAP

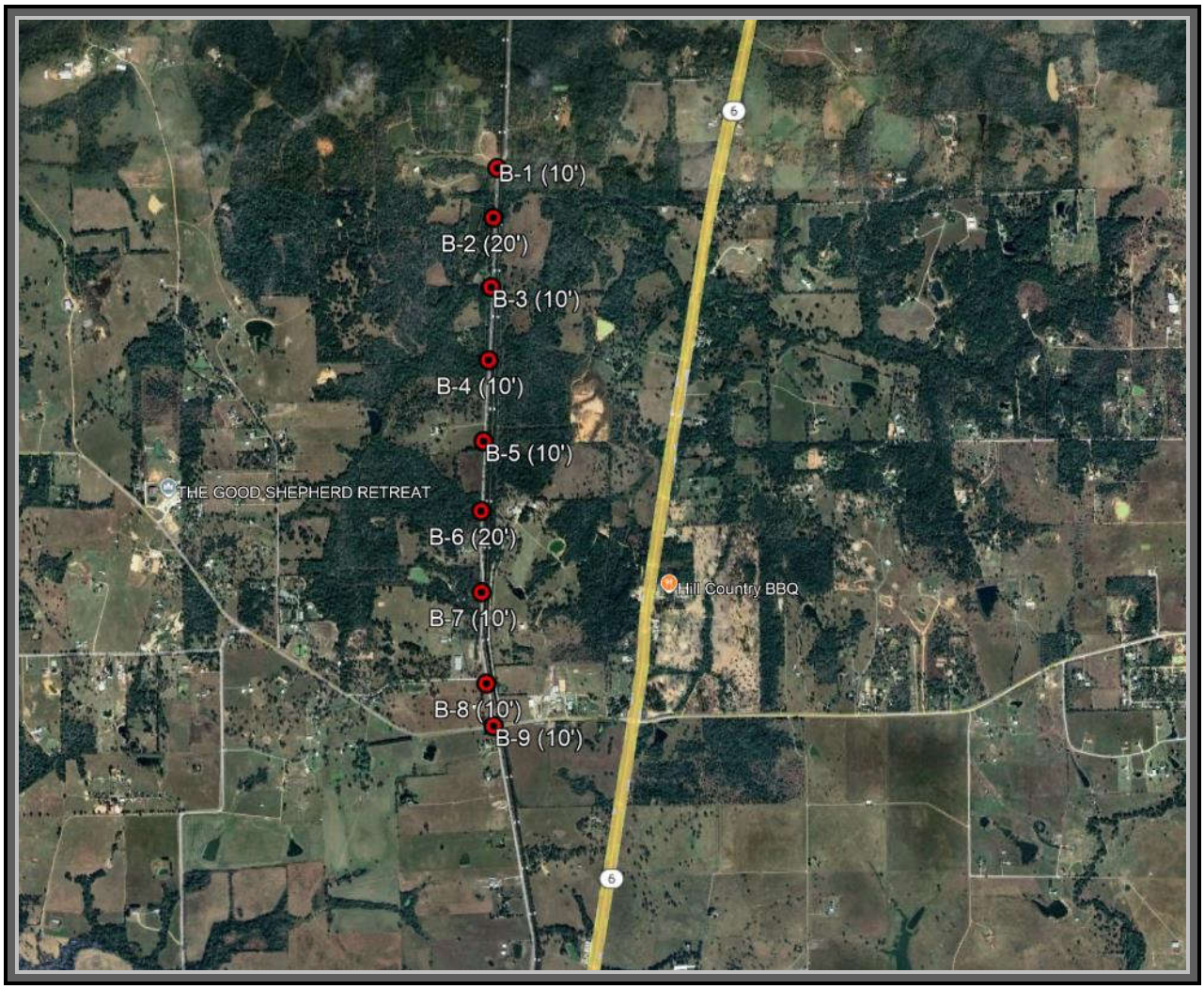
NORTH

PROJECT: Desktop Geologic Fault Study and G/S for Double Culvert Road Segment 1 Pavement Improvements From FM 1736 to 200- Ft East of Railroad Crossing Waller County, Project No.23102 Waller County, Texas

SCALE: NOT TO SCALE	DATE: JUNE 2025	PROJECT NO.: 24-996E

GEOTECH ENGINEERING AND TESTING

PLATE 1

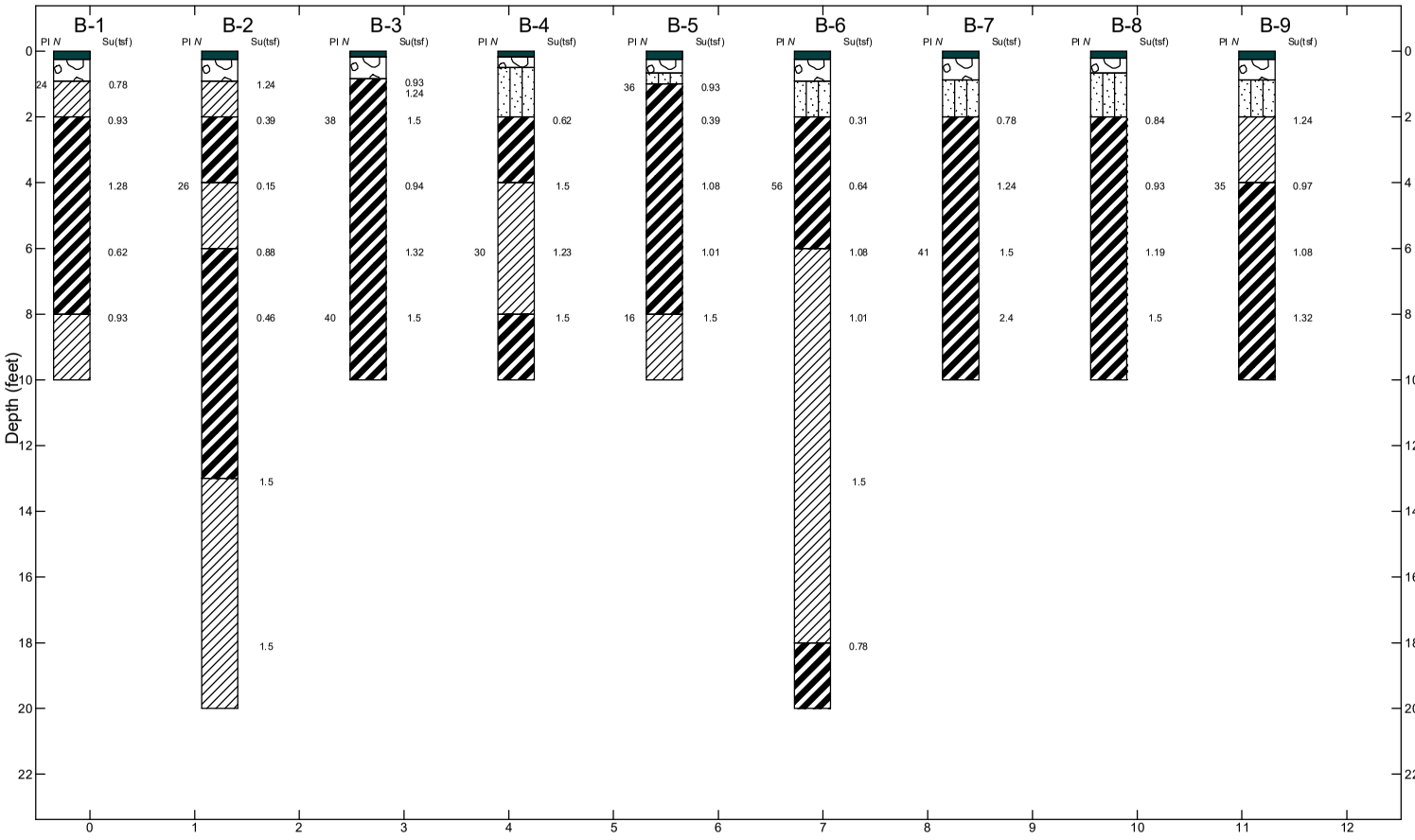


PLAN OF BORINGS (Boring locations are approximate)

PROJECT: Desktop Geologic Fault Study and G/S for Double Culvert Road Segment 1 Pavement Improvements From FM 1736 to 200- Ft East of Railroad Crossing Waller County, Project No.23102 Waller County, Texas

NORTH

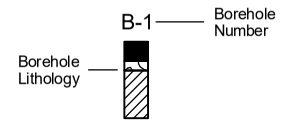
SCALE: NOT TO SCALE	DATE: JUNE 2025	PROJECT NO.: 24-996E



Lithology Graphics

- Asphalt
- USCS Poorly-graded Gravel
- Lean Clay (CL)
- Fat Clay (CH)
- Silty Sand (SM)

Explanation



- Water Level Reading at time of drilling.
- Water Level Reading after drilling.

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17407 US Highway 59
Houston, Texas 77396

Desktop Geologic Fault Study and G/S for Double Culvert Road Segment 1 Pavement Improvements From FM1736 to 200-ft East of Railroad Crossing Waller County Project No.23102 Waller County, Texas

GET GEOTECH ENGINEERING & TESTING

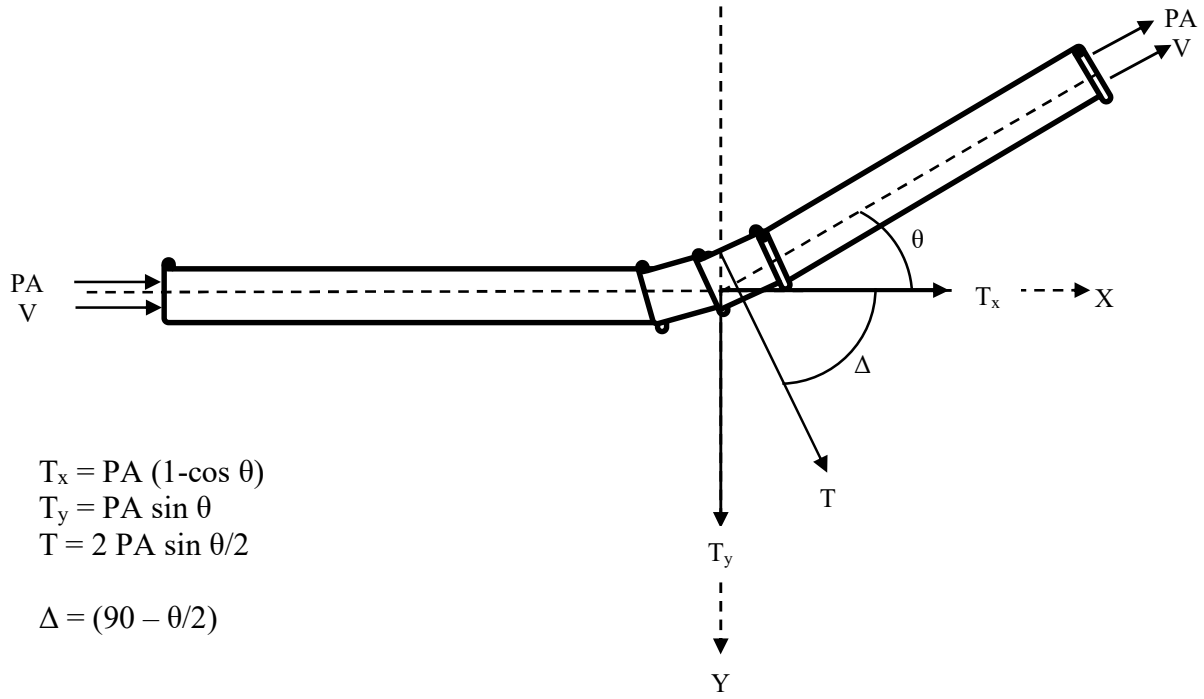
Waller County, Texas

JOB NUMBER	PLATE NUMBER
24-996E	Plate 3

EXISTING PAVEMENT THICKNESS

Boring Locations	Asphalt Pavement Thickness (inches)	Flexible Base Thickness (inches)	Subgrade Stabilization	Road Name
B-1	3	8	None	Double Culvert Road
B-2	3	8	None	Double Culvert Road
B-3	2	8	None	Double Culvert Road
B-4	2	4	None	Double Culvert Road
B-5	3	5	None	Double Culvert Road
B-6	3	8	None	Double Culvert Road
B-7	2.5	8	None	Double Culvert Road
B-8	2.5	5.5	None	Double Culvert Road
B-9	3	7.5	None	Double Culvert Road

THRUST FORCES ACTING ON BEND



$T_x = PA\ (1\text{-}\cos\ \theta)$
$T_y = PA \sin \theta$
$T = 2\ PA \sin \theta/2$

$\Delta = (90 - \theta/2)$

Where:

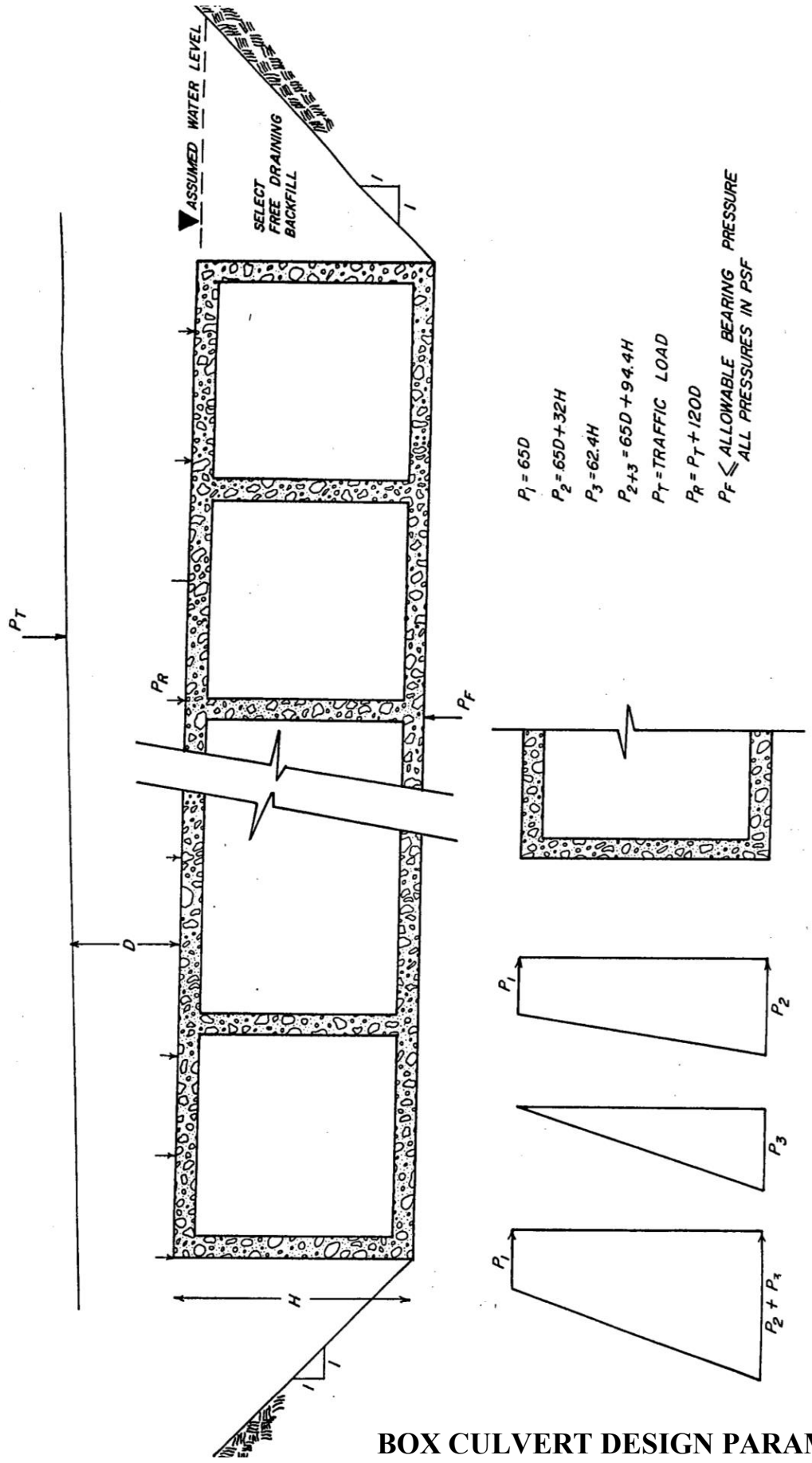
T = Resultant Thrust Force on the Bend
T_x = Component of Thrust Force in X-Direction
T_y = Component of Thrust Force in Y-Direction
P = Maximum Sustained Pressure
A = Pipe Cross Sectional Area
θ = Bend Deflection Angle
V = Fluid Velocity

Δ = Angle between T and X-axis
D = Inside Diameter of the Pipe

Sample Calculation:

Given P = 50 psi, D = 12-inch
$A = \pi d^2/4 = 113.1\ in^2$

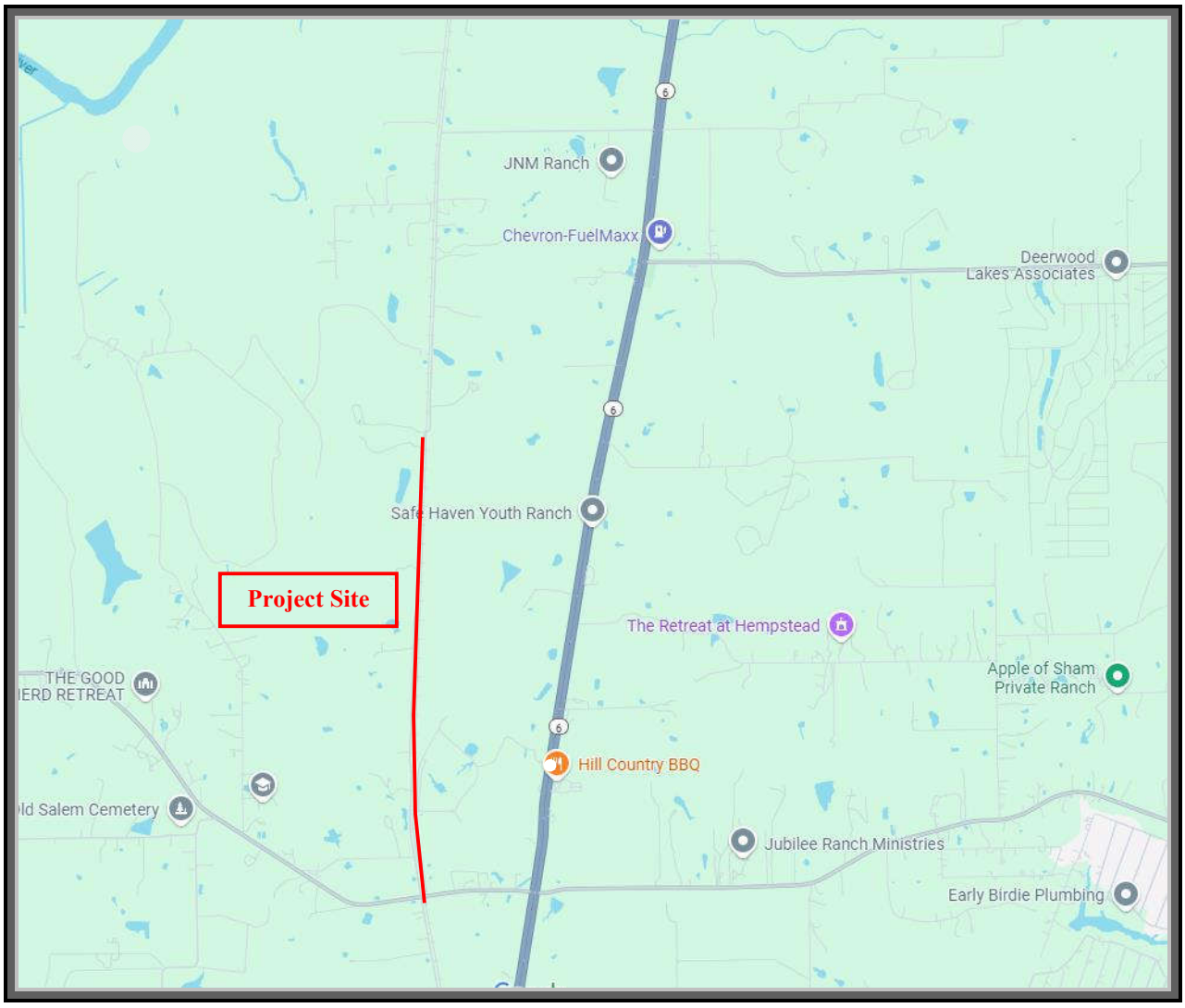
For θ = 90°
$T = 2\ PA \sin \theta/2 = 2 * 50 * 113.1 * \sin (90/2) = 7997.4$ lb = 7.99 kips
$Tx = PA\ (1 - \cos \theta) = 50 * 113.1 * (1 - \cos 90°) = 5.66$ kips
$Ty = PA \sin \theta = 50 * 113.1 * \sin 90° = 5.66$ kips



BOX CULVERT DESIGN PARAMETERS

APPENDIX A

- **Site Vicinity Map**
- **Plan of Borings**
- **Borings Locations Summary of Existing Pavement Thickness**
- **Stratigraphy profile and Logs of Borings**
- **Key to Log Terms and Symbols**
- **Geological Map**
- **Faults in Northwest Aera of Harris County**
- **Active Hockley Fault System in Houston Area**

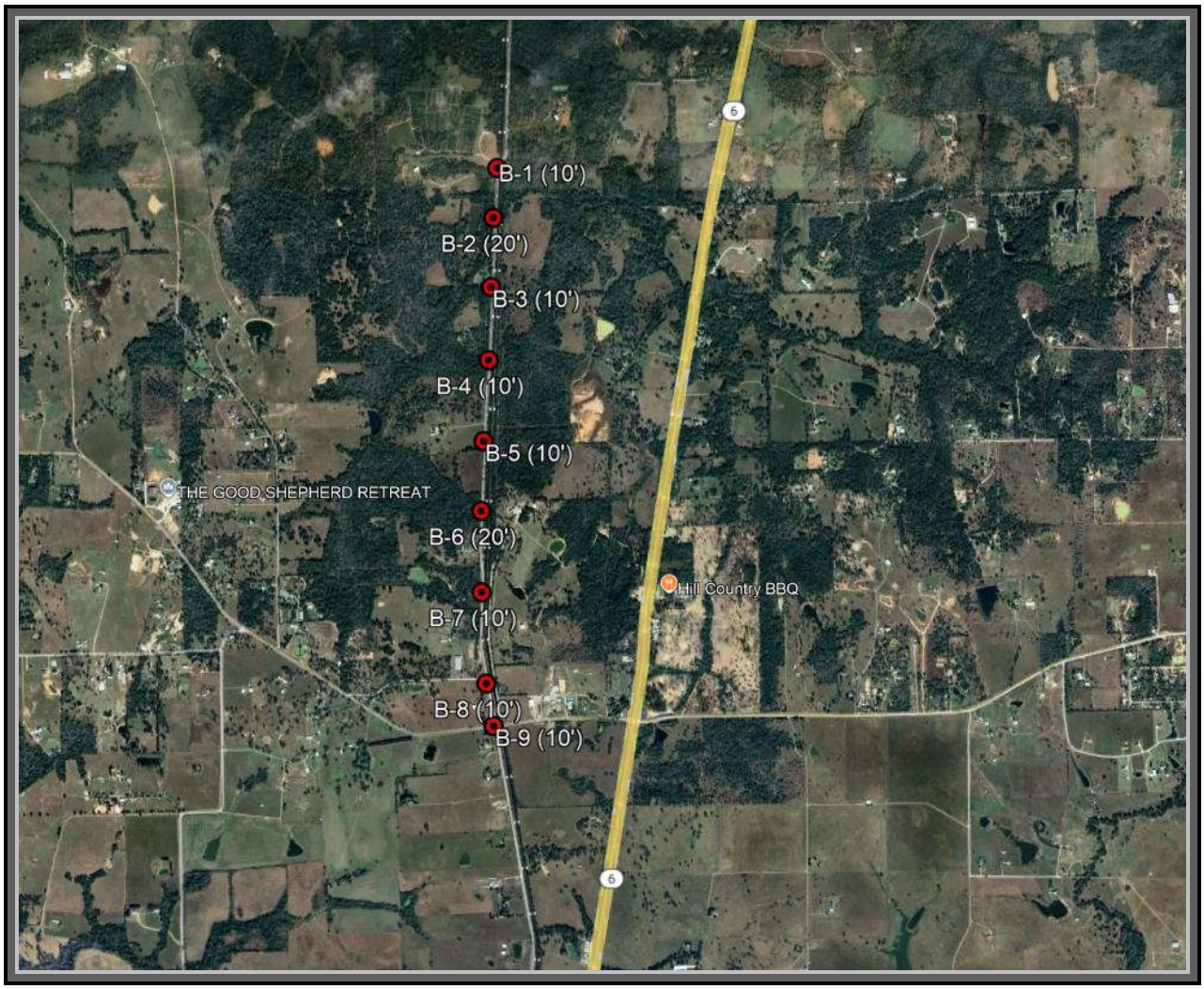


SITE VICINITY MAP

PROJECT: Desktop Geologic Fault Study and G/S for Double Culvert Road Segment 1 Pavement Improvements
From FM 1736 to 200- Ft East of Railroad Crossing Waller County, Project No.23102
Waller County, Texas

SCALE: NOT TO SCALE	DATE: JUNE 2025	PROJECT NO.: 24-996E

NORTH



PLAN OF BORINGS (Boring locations are approximate)

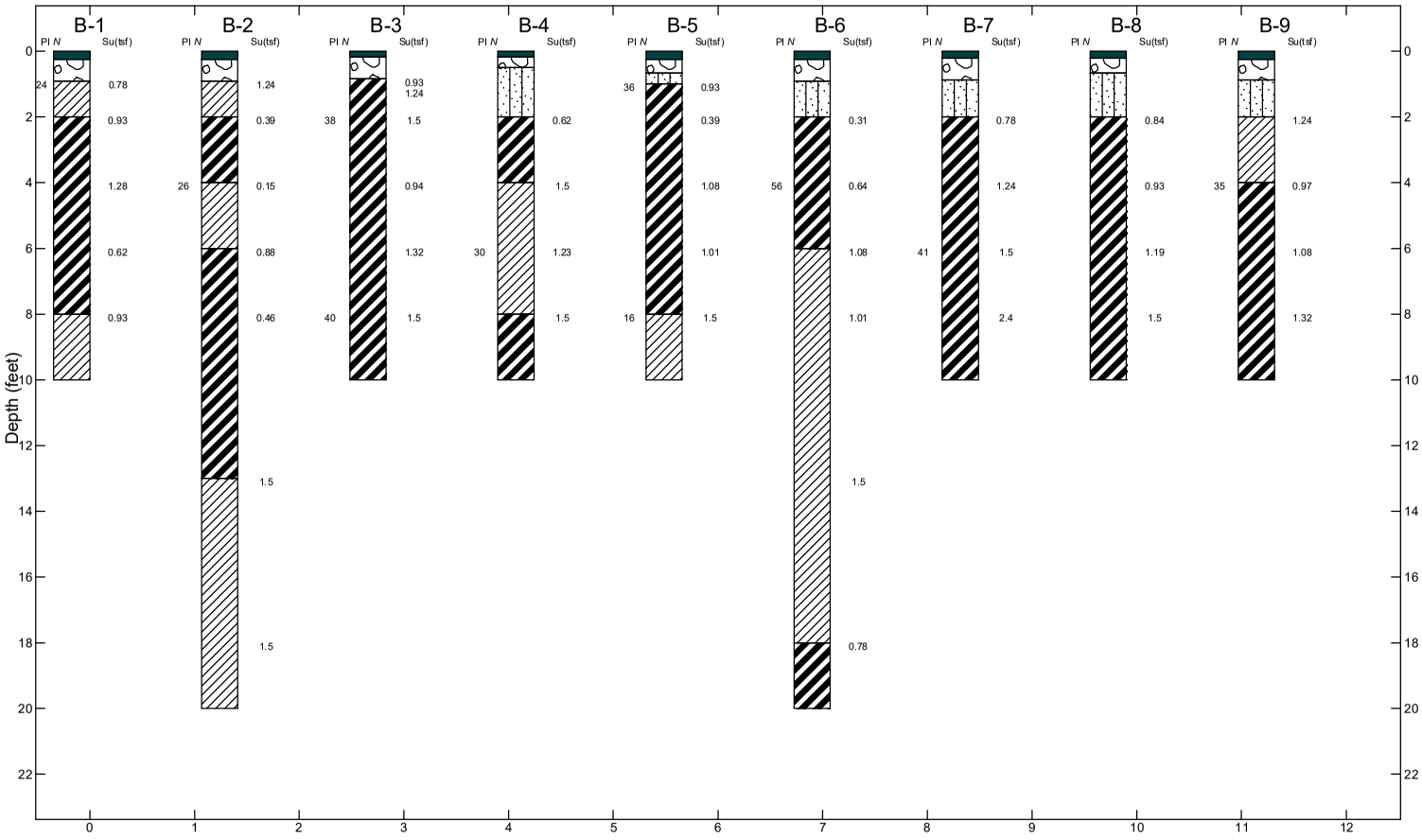
PROJECT: Desktop Geologic Fault Study and G/S for Double Culvert Road Segment 1 Pavement Improvements From FM 1736 to 200- Ft East of Railroad Crossing Waller County, Project No.23102 Waller County, Texas

NORTH

SCALE: NOT TO SCALE	DATE: JUNE 2025	PROJECT NO.: 24-996E

EXISTING PAVEMENT THICKNESS

Boring Locations	Asphalt Pavement Thickness (inches)	Flexible Base Thickness (inches)	Subgrade Stabilization	Road Name
B-1	3	8	None	Double Culvert Road
B-2	3	8	None	Double Culvert Road
B-3	2	8	None	Double Culvert Road
B-4	2	4	None	Double Culvert Road
B-5	3	5	None	Double Culvert Road
B-6	3	8	None	Double Culvert Road
B-7	2.5	8	None	Double Culvert Road
B-8	2.5	5.5	None	Double Culvert Road
B-9	3	7.5	None	Double Culvert Road



Lithology Graphics

Asphalt

USCS Poorly-graded Gravel

Lean Clay (CL)

Fat Clay (CH)

Silty Sand (SM)

Explanation

B-1 — Borehole Number

Borehole Lithology

Water Level Reading at time of drilling.

Water Level Reading after drilling.

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Desktop Geologic Fault Study and G/S for Double Culvert Road Segment 1 Pavement Improvements From FM1736 to 200-ft East of Railroad Crossing Waller County Project No.23102 Waller County, Texas

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Waller County, Texas

JOB NUMBER	PLATE NUMBER
24-996E	Plate A-3

LOG OF BORING NO. B-1

Geotech Engineering and Testing
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Houston, Texas 77396
Phone: 713-699-4000 Fax: 713-699-9200

PROJECT: Desktop Geologic Fault Study and G/S for Double Culvert Road Segment 1 Pavement Improvements From FM1736 to 200-ft East of Railroad Crossing Waller County Project No.23102, Waller County, Texas
LOCATION: Waller County, Texas
PROJECT NO.: 24-996E STATION NO.:
DATE: 5-13-25 COMPLETION DEPTH: 10.0 ft.

LATITUDE: 30.193531°
LONGITUDE: -96.074863°

DEPTH, ft	DESCRIPTION	NATURAL MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	PERCENT PASSING NO. 200 SIEVE	SUCTION (pF)	DRY UNIT WEIGHT, pcf	PERCENT COMPACTION	PASSING/FAILING (P/F)
0	ASPHALT PAVEMENT (3 inches in thickness)									
	BASE COURSE (8 inches in thickness)									
	LEAN CLAY CLAY (CL), stiff, dark gray, gray, ferrous nodules, gravels, sand seams and layers	18	42	18	24					
	FAT CLAY CLAY (CH), stiff, dark gray, gray, ferrous nodules, gravels - reddish brown 2' to 6'	29								
	- very stiff 4' to 6'									
5		28						95		
	- brown 6' to 8'									
		26								
	LEAN CLAY (CL), stiff, brownish yellow, gray, ferrous nodules, gravels, sand seams and layers									
		21								
10										

SPT N-VALUE blows per foot | OVM, ppm | SYMBOL | SAMPLES

UNDRAINED SHEAR STRENGTH, tsf
- ▲ HAND PENETROMETER
- ▮ TORVANE
- ● UNCONFINED COMPRESSION
- ○ UNCONSOLIDATED-UNDRAINED TRIAXIAL

0.5 1.0 1.5 2.0 2.5

WATER OBSERVATIONS:
NO FREE WATER ENCOUNTERED DURING DRILLING

DRY AUGER: 0 TO 10 ft.
WET ROTARY: ____ TO ____ ft.

DRILLED BY: Andrew (T)
LOGGED BY: Dyllan

OVM2 24-996E - NIKOLAS.GPJ OVM.GDT 6/23/25

LOG OF BORING NO. B-2

Geotech Engineering and Testing
17407 US Highway 59
Houston, Texas 77396
Phone: 713-699-4000 Fax: 713-699-9200

PROJECT: Desktop Geologic Fault Study and G/S for Double Culvert Road Segment 1 Pavement Improvements From FM1736 to 200-ft East of Railroad Crossing Waller County Project No.23102, Waller County, Texas
LOCATION: Waller County, Texas
PROJECT NO.: 24-996E STATION NO.:
DATE: 5-13-25 COMPLETION DEPTH: 20.0 ft.

LATITUDE: 30.190976°
LONGITUDE: -96.075098°

DEPTH, ft	DESCRIPTION	NATURAL MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	PERCENT PASSING NO. 200 SIEVE	SUCTION (pF)	DRY UNIT WEIGHT, pcf	PERCENT COMPACTION	PASSING/FAILING (P/F)
0	ASPHALT PAVEMENT (3 inches in thickness)									
	BASE COURSE (8 inches in thickness)	11								
	LEAN CLAY (CL), very stiff, gray, reddish brown, ferrous nodules, gravels, sand seams and layers	30				67		98		
	FAT CLAY CLAY (CH), firm, gray, reddish brown, ferrous nodules, gravels	22	44	18	26					
5	LEAN CLAY (CL), soft, gray, reddish brown, ferrous nodules, gravels, sand seams and layers									
	FAT CLAY CLAY (CH), stiff, gray, reddish brown, ferrous nodules, gravels, sand seams and layers - firm 8' to 10'	26						98		
		23								
10										
	LEAN CLAY (CL), very stiff, light gray, brownish yellow, ferrous nodules, gravels, sand seams and layers	10								
15										
		14								
20										
25										

UNDRAINED SHEAR STRENGTH, tsf
▲ HAND PENETROMETER
▮ TORVANE
● UNCONFINED COMPRESSION
○ UNCONSOLIDATED-UNDRAINED TRIAXIAL
0.5 1.0 1.5 2.0 2.5

WATER OBSERVATIONS:
NO FREE WATER ENCOUNTERED DURING DRILLING

DRY AUGER: 0 TO 20 ft.
WET ROTARY: ____ TO ____ ft.

DRILLED BY: Andrew (T)
LOGGED BY: Dyllan

OVM2 24-996E - NIKOLAS.GPJ OVM.GDT 6/23/25

LOG OF BORING NO. B-3

Geotech Engineering and Testing
17407 US Highway 59
Houston, Texas 77396
Phone: 713-699-4000 Fax: 713-699-9200

PROJECT: Desktop Geologic Fault Study and G/S for Double Culvert Road Segment 1 Pavement Improvements From FM1736 to 200-ft East of Railroad Crossing Waller County Project No.23102, Waller County, Texas
LOCATION: Waller County, Texas
PROJECT NO.: 24-996E STATION NO.:
DATE: 5-13-25 COMPLETION DEPTH: 10.0 ft.

LATITUDE: 30.187407°
LONGITUDE: -96.075231°

DEPTH, ft	SPT N-VALUE blows per foot	OVM, ppm	SYMBOL	SAMPLES	DESCRIPTION	NATURAL MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	PERCENT PASSING NO. 200 SIEVE	SUCTION (pF)	DRY UNIT WEIGHT, pcf	PERCENT COMPACTION	PASSING/FAILING (P/F)
0					ASPHALT PAVEMENT (2 inches in thickness)									
					BASE COURSE (8 inches in thickness)									
					FAT CLAY (CH), stiff, gray, brown, with root fibers to 1', ferrous nodules, gravels	20								
					- very stiff 1' to 4', dark gray, reddish brown 1' to 2'	27								
						20	58	20	38					
5					- brownish yellow, gray, calcareous nodules 2' to 8'	23				99		100		
					- very stiff 6' to 10'									
						24								
						21	60	20	40					
10														

UNDRAINED SHEAR STRENGTH, tsf
▲ HAND PENETROMETER
■ TORVANE
● UNCONFINED COMPRESSION
○ UNCONSOLIDATED-UNDRAINED TRIAXIAL
0.5 1.0 1.5 2.0 2.5

WATER OBSERVATIONS:
NO FREE WATER ENCOUNTERED DURING DRILLING

DRY AUGER: 0 TO 10 ft.
WET ROTARY: ____ TO ____ ft.

DRILLED BY: Andrew (T)
LOGGED BY: Dyllan

OVM2 24-996E - NIKOLAS.GPJ OVM.GDT 6/23/25

LOG OF BORING NO. B-4

Geotech Engineering and Testing
17407 US Highway 59
Houston, Texas 77396
Phone: 713-699-4000 Fax: 713-699-9200

PROJECT: Desktop Geologic Fault Study and G/S for Double Culvert Road Segment 1 Pavement Improvements From FM1736 to 200-ft East of Railroad Crossing Waller County Project No.23102, Waller County, Texas
LOCATION: Waller County, Texas
PROJECT NO.: 24-996E STATION NO.:
DATE: 5-13-25 COMPLETION DEPTH: 10.0 ft.

LATITUDE: 30.183645°
LONGITUDE: -96.075361°

DEPTH, ft	DESCRIPTION	NATURAL MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	PERCENT PASSING NO. 200 SIEVE	SUCTION (pF)	DRY UNIT WEIGHT, pcf	PERCENT COMPACTION	PASSING/FAILING (P/F)
0	ASPHALT PAVEMENT (3 inches in thickness)									
	BASE COURSE (7 inches in thickness)	12				33				
	SILTY SAND (SM), brown, reddish brown, ferrous nodules, gravels, with root fibers to 2'	14								
	FAT CLAY (CH), stiff, gray, reddish brown, ferrous nodules, gravels	21								
5	LEAN CLAY (CL), very stiff, gray, reddish brown, ferrous noduels, grabels, sand seams and layers	10								
	- brownish yellow 6' to 8'	20	49	19	30			108		
	FAT CLAY (CH), very stiff, brownish yellow, light gray, ferrous and calcareous nodules	26								
10										

UNDRAINED SHEAR STRENGTH, tsf
0.5 1.0 1.5 2.0 2.5
▲ HAND PENETROMETER
■ TORVANE
● UNCONFINED COMPRESSION
○ UNCONSOLIDATED-UNDRAINED TRIAXIAL

WATER OBSERVATIONS:
NO FREE WATER ENCOUNTERED DURING DRILLING

DRY AUGER: 0 TO 10 ft.
WET ROTARY: ____ TO ____ ft.

DRILLED BY: Andrew (T)
LOGGED BY: Dyllan

OVM2 24-996E - NIKOLAS.GPJ OVM.GDT 6/23/25

LOG OF BORING NO. B-5

Geotech Engineering and Testing
17407 US Highway 59
Houston, Texas 77396
Phone: 713-699-4000 Fax: 713-699-9200

PROJECT: Desktop Geologic Fault Study and G/S for Double Culvert Road Segment 1 Pavement Improvements From FM1736 to 200-ft East of Railroad Crossing Waller County Project No.23102, Waller County, Texas
LOCATION: Waller County, Texas
PROJECT NO.: 24-996E STATION NO.:
DATE: 5-13-25 COMPLETION DEPTH: 10.0 ft.

LATITUDE:30.179480°
LONGITUDE: -96.075651°

DEPTH, ft	SPT N-VALUE blows per foot	OVM, ppm	SYMBOL	SAMPLES	DESCRIPTION	NATURAL MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	PERCENT PASSING NO. 200 SIEVE	SUCTION (pF)	DRY UNIT WEIGHT, pcf	PERCENT COMPACTION	PASSING/FAILING (P/F)
0					ASPHALT PAVEMENT (3 inches in thickness)									
					BASE COURSE (5 inches in thickness)									
					SILTY SAND (SM), brown, light brown, with root fibers to 1', gravels	8								
					FAT CLAY (CH), stiff, gray, reddish brown, ferrous nodules, gravels	22	56	20	36					
					- firm 2' to 4'									
						23								
					- very stiff, light gay 4' to 8'									
5						18								
						16								
					LEAN CLAY (CL), very stiff, brownish yellow, gray, ferrous nodules, gravels, sand seams and layers										
						14	32	16	16	42		121		
10														

UNDRAINED SHEAR STRENGTH, tsf
▲ HAND PENETROMETER
■ TORVANE
● UNCONFINED COMPRESSION
○ UNCONSOLIDATED-UNDRAINED TRIAXIAL
0.5 1.0 1.5 2.0 2.5

WATER OBSERVATIONS:
NO FREE WATER ENCOUNTERED DURING DRILLING

DRY AUGER: 0 TO 10 ft.
WET ROTARY: ____ TO ____ ft.

DRILLED BY: Andrew (T)
LOGGED BY: Dyllan

OVM2 24-996E - NIKOLAS.GPJ OVM.GDT 6/23/25

LOG OF BORING NO. B-6

Geotech Engineering and Testing
17407 US Highway 59
Houston, Texas 77396
Phone: 713-699-4000 Fax: 713-699-9200

PROJECT: Desktop Geologic Fault Study and G/S for Double Culvert Road Segment 1 Pavement Improvements From FM1736 to 200-ft East of Railroad Crossing Waller County Project No.23102, Waller County, Texas
LOCATION: Waller County, Texas
PROJECT NO.: 24-996E STATION NO.:
DATE: 5-13-25 COMPLETION DEPTH: 20.0 ft.

LATITUDE:30.175900°
LONGITUDE: -96.075798°

DEPTH, ft	DESCRIPTION	NATURAL MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	PERCENT PASSING NO. 200 SIEVE	SUCTION (pF)	DRY UNIT WEIGHT, pcf	PERCENT COMPACTION	PASSING/FAILING (P/F)
0	ASPHALT PAVEMENT (3 inches in thickness)									
	BASE COURSE (8 inches in thickness)	10				25				
	SILTY SAND (SM), brown, light brown, with root fibers to 2', ferrous nodules, gravels	29								
5	FAT CLAY (CH), firm, light gray, reddish brown, ferrous nodules, gravels - stiff, gray 4' to 6'	22	80	24	56			103		
	LEAN CLAY (CL), very stiff, brownish yellow, gray, ferrous nodules, gravels, sand seams and layers	21								
		18								
10										
	- light gray 13' to 15'	16								
15										
	FAT CLAY (CH), stiff, reddish brown, light gray, ferrous and calcareous nodules	30								
20										
25										

UNDRAINED SHEAR STRENGTH, tsf
▲ HAND PENETROMETER
▮ TORVANE
● UNCONFINED COMPRESSION
○ UNCONSOLIDATED-UNDRAINED TRIAXIAL
0.5 1.0 1.5 2.0 2.5

WATER OBSERVATIONS:
NO FREE WATER ENCOUNTERED DURING DRILLING

DRY AUGER: 0 TO 20 ft.
WET ROTARY: ____ TO ____ ft.

DRILLED BY: Andrew (T)
LOGGED BY: Dyllan

OVM2 24-996E - NIKOLAS.GPJ OVM.GDT 6/23/25

LOG OF BORING NO. B-7

Geotech Engineering and Testing
17407 US Highway 59
Houston, Texas 77396
Phone: 713-699-4000 Fax: 713-699-9200

PROJECT: Desktop Geologic Fault Study and G/S for Double Culvert Road Segment 1 Pavement Improvements From FM1736 to 200-ft East of Railroad Crossing Waller County Project No.23102, Waller County, Texas
LOCATION: Waller County, Texas
PROJECT NO.: 24-996E STATION NO.:
DATE: 5-13-25 COMPLETION DEPTH: 10.0 ft.

LATITUDE: 30.171726°
LONGITUDE: -96.075772°

DEPTH, ft	DESCRIPTION	NATURAL MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	PERCENT PASSING NO. 200 SIEVE	SUCTION (pF)	DRY UNIT WEIGHT, pcf	PERCENT COMPACTION	PASSING/FAILING (P/F)
0	ASPHALT PAVEMENT (2.5 inches in thickness)									
	BASE COURSE (8 inches in thickness)									
	SILTY SAND (SM), dark brown, brown, with root fibers to 2', gravels	9 9								
	FAT CLAY (CH), stiff, reddish brown, brown, with root fibers to 4', ferrous nodules, gravels	19				61				
	- very stiff 4' to 8', light gray 4' to 10'									
5		16								
	- brownish yellow 6' to 10'									
		15	62	21	41					
	- hard 8' to 10'									
		19						105		
10										

UNDRAINED SHEAR STRENGTH, tsf
▲ HAND PENETROMETER
■ TORVANE
● UNCONFINED COMPRESSION
○ UNCONSOLIDATED-UNDRAINED TRIAXIAL
0.5 1.0 1.5 2.0 2.5

WATER OBSERVATIONS:
NO FREE WATER ENCOUNTERED DURING DRILLING

DRY AUGER: 0 TO 10 ft.
WET ROTARY: ____ TO ____ ft.

DRILLED BY: Andrew (T)
LOGGED BY: Dyllan

OVM2 24-996E - NIKOLAS.GPJ OVM.GDT 6/23/25

LOG OF BORING NO. B-8

Geotech Engineering and Testing
17407 US Highway 59
Houston, Texas 77396
Phone: 713-699-4000 Fax: 713-699-9200

PROJECT: Desktop Geologic Fault Study and G/S for Double Culvert Road Segment 1 Pavement Improvements From FM1736 to 200-ft East of Railroad Crossing Waller County Project No.23102, Waller County, Texas
LOCATION: Waller County, Texas
PROJECT NO.: 24-996E STATION NO.:
DATE: 5-13-25 COMPLETION DEPTH: 10.0 ft.

LATITUDE:30.167047°
LONGITUDE: -96.075482°

DEPTH, ft	SPT N-VALUE blows per foot	OVM, ppm	SYMBOL	SAMPLES	DESCRIPTION	NATURAL MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	PERCENT PASSING NO. 200 SIEVE	SUCTION (pF)	DRY UNIT WEIGHT, pcf	PERCENT COMPACTION	PASSING/FAILING (P/F)
0					ASPHALT PAVEMENT (2.5 inches in thickness)									
					BASE COURSE (5.5 inches in thickness)									
					SILTY SAND (SM), dark brown, brown, with root fibers to 2', gravels	10								
						11				46				
					FAT CLAY (CH), stiff, reddish brown, brown, with root fibers to 6', gravels									
						23				60		100		
					- brownish yellow, light gray 4' to 10'									
5						17								
					- very stiff 6' to 10'									
						16						107		
						18								
10														

UNDRAINED SHEAR STRENGTH, tsf
▲ HAND PENETROMETER
▮ TORVANE
● UNCONFINED COMPRESSION
○ UNCONSOLIDATED-UNDRAINED TRIAXIAL
0.5 1.0 1.5 2.0 2.5

WATER OBSERVATIONS:
NO FREE WATER ENCOUNTERED DURING DRILLING

DRY AUGER: 0 TO 10 ft.
WET ROTARY: ____ TO ____ ft.

DRILLED BY: Andrew (T)
LOGGED BY: Dyllan

OVM2 24-996E - NIKOLAS.GPJ OVM.GDT 6/23/25

LOG OF BORING NO. B-9

Geotech Engineering and Testing
17407 US Highway 59
Houston, Texas 77396
Phone: 713-699-4000 Fax: 713-699-9200

PROJECT: Desktop Geologic Fault Study and G/S for Double Culvert Road Segment 1 Pavement Improvements From FM1736 to 200-ft East of Railroad Crossing Waller County Project No.23102, Waller County, Texas
LOCATION: Waller County, Texas
PROJECT NO.: 24-996E STATION NO.:
DATE: 5-13-25 COMPLETION DEPTH: 10.0 ft.

DEPTH, ft	SPT N-VALUE blows per foot	OVM, ppm	SYMBOL	SAMPLES	DESCRIPTION	NATURAL MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	PERCENT PASSING NO. 200 SIEVE	SUCTION (pF)	DRY UNIT WEIGHT, pcf	PERCENT COMPACTION	PASSING/FAILING (P/F)
0					LATITUDE:30.164867° LONGITUDE: -96.075054°									
					ASPHALT PAVEMENT (3 inches in thickness)									
					BASE COURSE (7.5 inches in thickness)									
					SILTY SAND (SM), dark brown, brown, with root fibers to 2', gravels	8 7				31				
					LEAN CLAY (CL), very stiff, dark brown, brown, with root fibers to 4', gravels	17								
					FAT CLAY (CH), stiff, dark brown, brown, gravels									
5						23	54	19	35			104		
					- very stiff 6' to 10'									
						17								
					- reddish brown 8' to 10'									
						21								
10														

UNDRAINED SHEAR STRENGTH, tsf
▲ HAND PENETROMETER
■ TORVANE
● UNCONFINED COMPRESSION
○ UNCONSOLIDATED-UNDRAINED TRIAXIAL
0.5 1.0 1.5 2.0 2.5

WATER OBSERVATIONS:
NO FREE WATER ENCOUNTERED DURING DRILLING

DRY AUGER: 0 TO 10 ft.
WET ROTARY: ____ TO ____ ft.

DRILLED BY: Andrew (T)
LOGGED BY: Dyllan

OVM2 24-996E - NIKOLAS.GPJ OVM.GDT 6/23/25

KEY TO LOG TERMS AND SYMBOLS

UNIFIED SOIL CLASSIFICATIONS

Symbol		Material Descriptions
GW		WELL GRADED-GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
GP		POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
GM		SILTY GRAVELS, GRAVEL-SAND SILT MIXTURES
GC		CLAY GRAVELS, GRAVEL-SAND CLAY MIXTURES
SW		WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
SP		POORLY GRADED SANDS, OR GRAVELLY SANDS, LITTLE OR NO FINES
SM		SILTY SANDS, SAND-SILT MIXTURES a
SC		CLAYEY SANDS, SAND-SILT MIXTURES b
ML		INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
CL		INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, LEAN CLAYS
OL		ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MH		INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
CH		INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
OH		ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
PT		PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENT
		FILL SOILS

TERMS CHARACTERIZING SOIL STRUCTURE

Slickensided	-	Having incline planes of weakness that are slick and glossy in appearance.
Fissured	-	Containing shrinkage cracks frequently filled with fine sand or silt: usually vertical.
Laminated	-	Composed of thin layers of varying colors and soil sample texture.
Interbedded	-	Composed of alternate layers of different soil types.
Calcareous	-	Containing appreciable quantities of calcium carbonate.
Well Graded	-	Having wide range in grain sizes and substantial amounts of all intermediate particle sizes.
Poorly Graded	-	Predominantly of one grain size, or having a range of sizes with some intermediate sizes missing.
Pocket	-	Inclusion of material of different texture that is smaller than the diameter of the sample.
Parting	-	Inclusion less than $\frac{1}{16}$-inch thick extending through the sample.
Seam	-	Inclusion $\frac{1}{16}$- to 3-inch thick extending through the sample.
Layer	-	Inclusion greater than 3-inch thick extending through the sample.
Interlayered	-	Soils sample composed of alternating layers of different soil types.
Intermixed	-	Soil samples composed of pockets of different soil type and layered or laminated structure is not evident.

COARSE GRAINED SOILS (major portion retained on No. 200 Sieve): Includes (1) clean gravels and sands, and (2) silty or clayey gravels and sands. Conditions rated according to standard penetration test (SPT)* as performed in the field.

Descriptive Terms	Blows Per Foot*
Very Loose	0 – 4
Loose	5 – 10
Medium Dense	11 – 30
Dense	31 – 50
Very Dense	over 50

* 140 pound weight having a free fall of 30-inch

SOIL SAMPLERS

- SHELBY TUBE SAMPLER
- STANDARD PENETRATION TEST
- AUGER SAMPLING

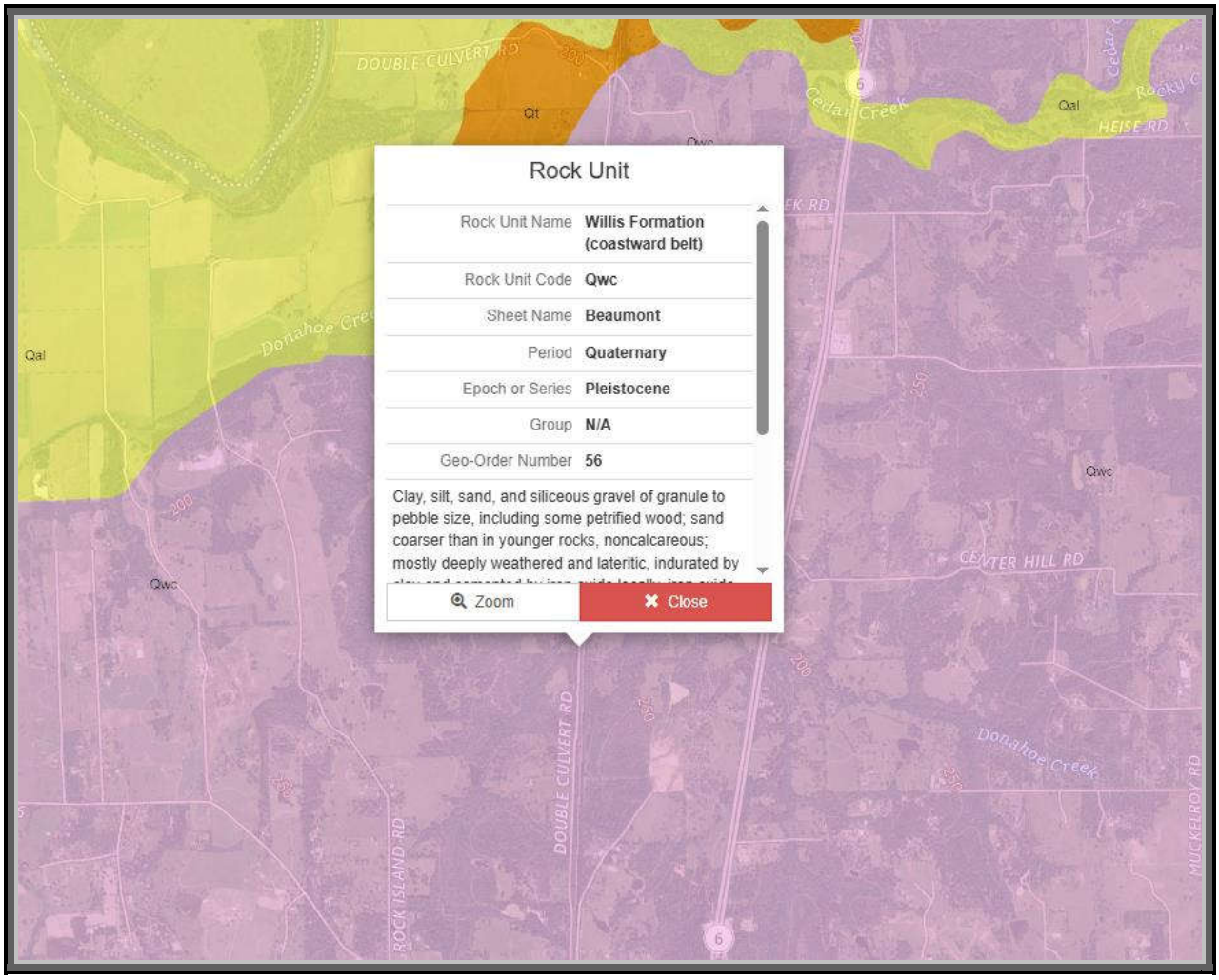
FINE GRAINED SOILS (major portion passing No. 200 Sieve): Include (1) inorganic or organic silts and clays, (2) gravelly, sandy, or silty clays, and (3) clayey silts. Consistency is rated according to shearing strength as indicated by hand penetrometer readings or by unconfined compression tests.

Descriptive Term	Undrained Shear Strength Ton/Sq. Ft.
Very Soft	Less than 0.13
Soft	0.13 to 0.25
Firm	0.25 to 0.50
Stiff	0.50 to 1.00
Very Stiff	1.00 to 2.00
Hard	2.00 or higher

NOTE: Slickensided and fissured clays may have lower unconfined compressive strengths than shown above because of weakness or cracks in the soil. The consistency ratings of such soils are based on hand penetrometer readings.

TERMS CHARACTERIZING ROCK PROPERTIES

VERY SOFT OR PLASTIC	Can be remolded in hand: corresponds in consistency up to very stiff in soils.
SOFT	Can be scratched with fingernail.
MODERATELY HARD	Can be scratched easily with knife; cannot be scratched with fingernail. Difficult to scratch with knife.
VERY HARD	Cannot be scratched with knife.
POORLY CEMENTED OR FRIABLE	Easily crumbled.
CEMENTED	Bounded Together by chemically precipitated materials.
UNWEATHERED	Rock in its natural state before being exposed to atmospheric agents.
SLIGHTLY WEATHERED	Noted predominantly by color change with no disintegrated zones.
WEATHERED	Complete color change with zones of slightly decomposed rock.
EXTREMELY WEATHERED	Complete color change with consistency, texture, and general appearance or soil.



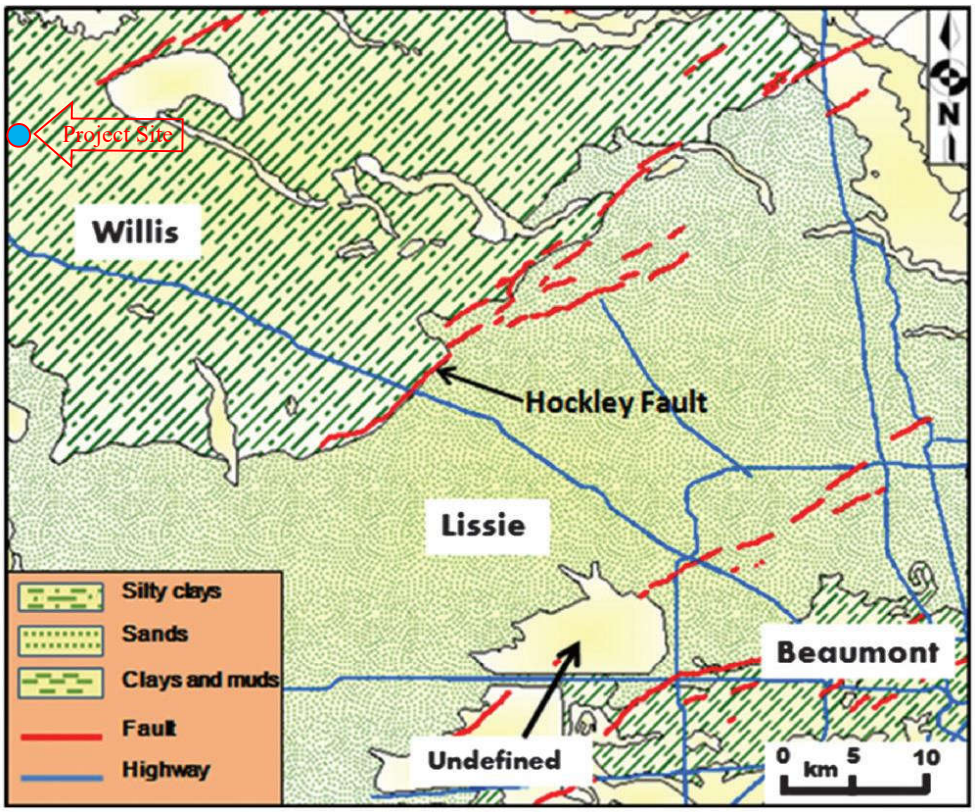
GEOLOGY MAP

PROJECT: Desktop Geologic Fault Study and G/S for Double Culvert Road Segment 1 Pavement Improvements From FM 1736 to 200- Ft East of Railroad Crossing Waller County, Project No.23102 Waller County, Texas

SCALE: NOT TO SCALE	DATE: JUNE 2025	PROJECT NO.: 24-996E

NORTH

a)



b)

System	Series	Stratigraphic units
Quaternary	Holocene	Alluvium
	Pleistocene	Beaumont clay
		Lissie formation
		Willis sand

(a) A geologic map of Harris County showing the three major formations: the Willis, the Lissie, and the Beaumont (modified from Bureau of Economic Geology, 1992). (b) Stratigraphic column for Quaternary formations in Harris County. (Khan et al., 2013)

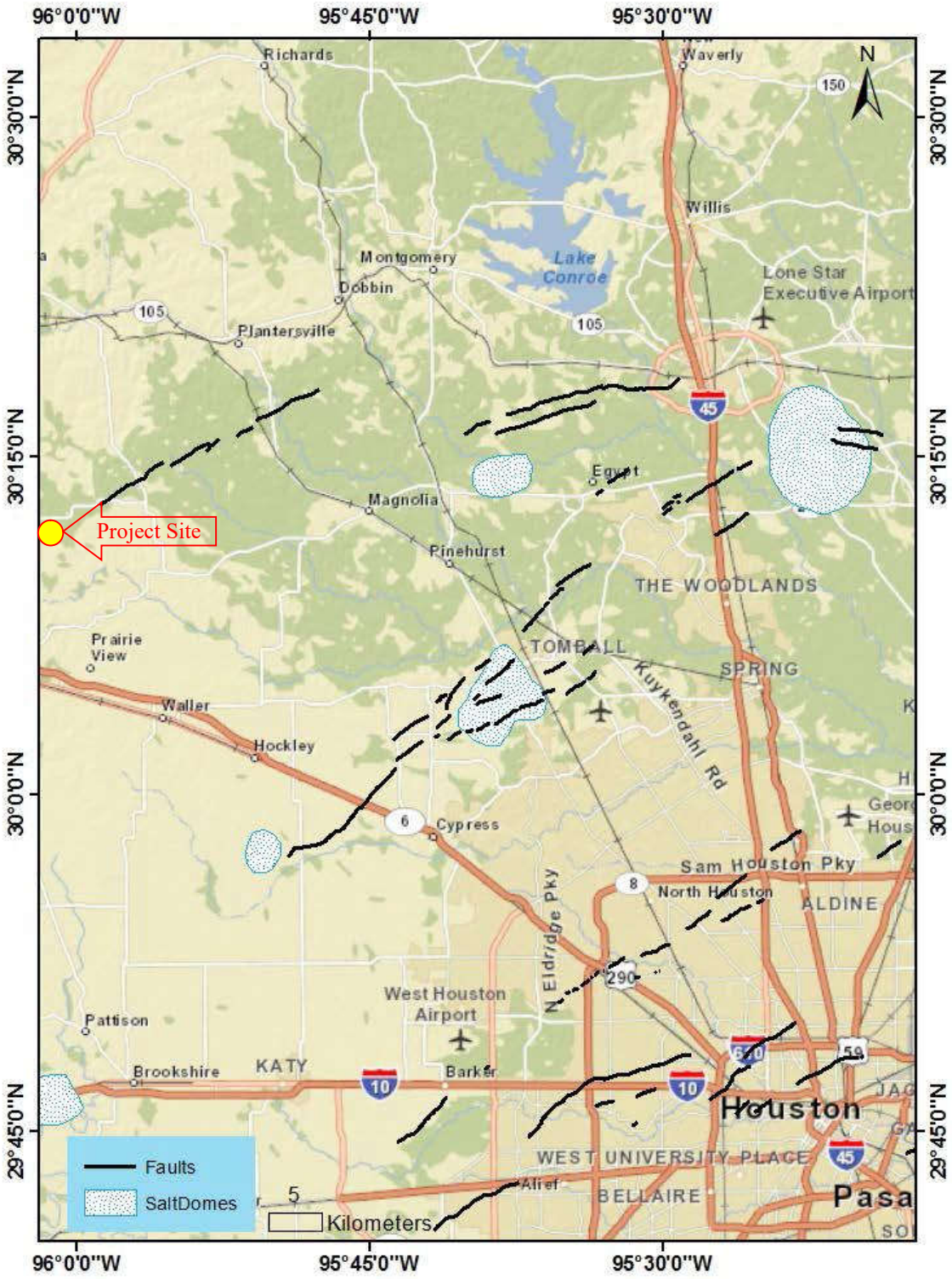
ACTIVE HOCKLEY FAULT SYSTEM IN HARRIS COUNTY (Project Site is approximate)

PROJECT: Desktop Geologic Fault Study and G/S for Double Culvert Road Segment 1 Pavement Improvements From FM 1736 to 200- Ft East of Railroad Crossing Waller County, Project No.23102 Waller County, Texas

NORTH

SCALE: NOT TO SCALE	DATE: JUNE 2025	PROJECT NO.: 24-996E

PLATE A-15



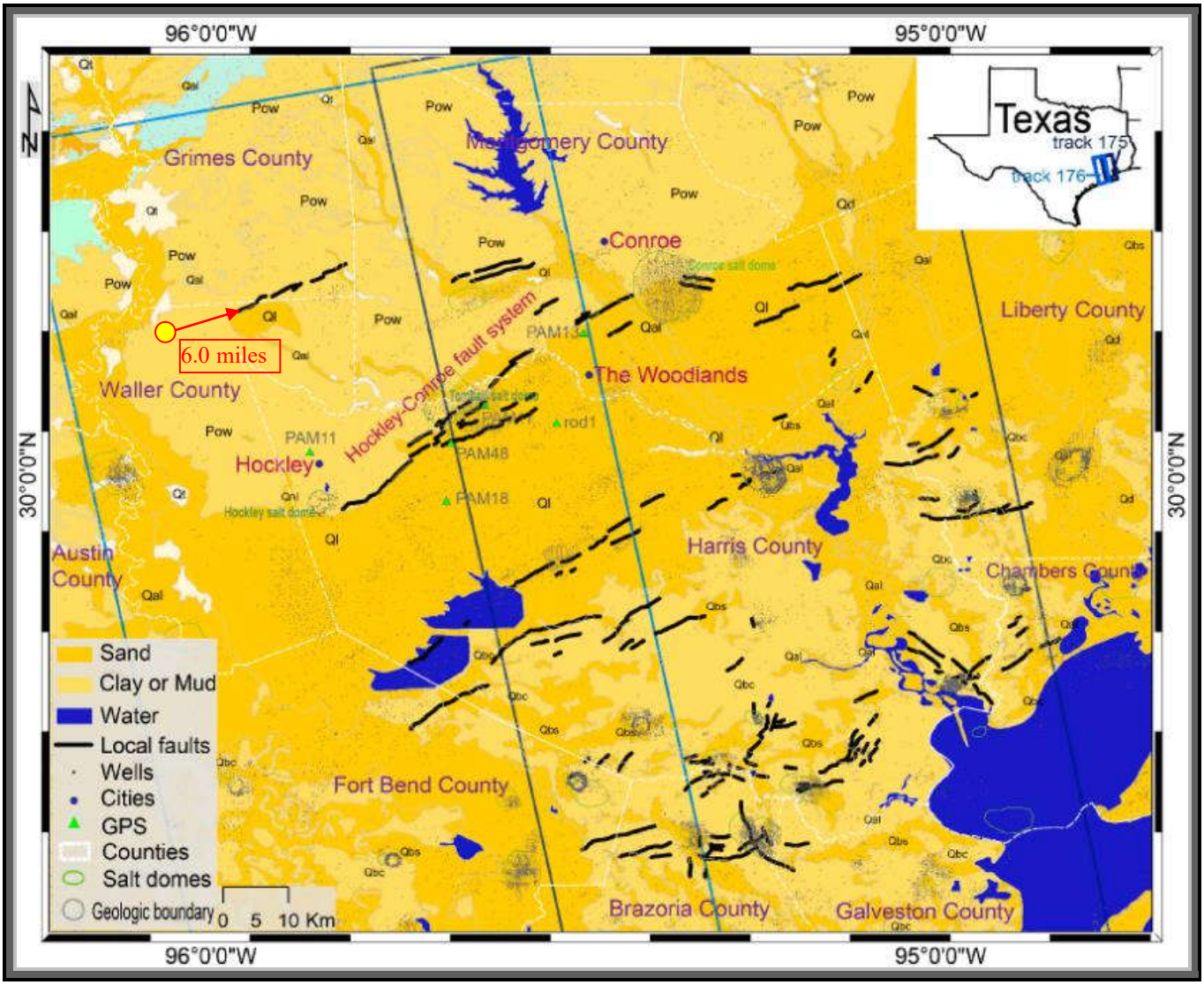
FAULTS IN NORTHWEST AREA OF HARRIS COUNTY (Project location is approximate)

NORTH

PROJECT: Desktop Geologic Fault Study and G/S for Double Culvert Road Segment 1 Pavement Improvements
From FM 1736 to 200- Ft East of Railroad Crossing Waller County, Project No.23102
Waller County, Texas

SCALE: NOT TO SCALE	DATE: JUNE 2025	PROJECT NO.: 24-996E

PLATE A-16



PRINCIPAL ACTIVE FAULTS IN HOUSTON AREA (Project Site location is approximate)

NORTH

PROJECT: Desktop Geologic Fault Study and G/S for Double Culvert Road Segment 1 Pavement Improvements From FM 1736 to 200- Ft East of Railroad Crossing Waller County, Project No.23102 Waller County, Texas

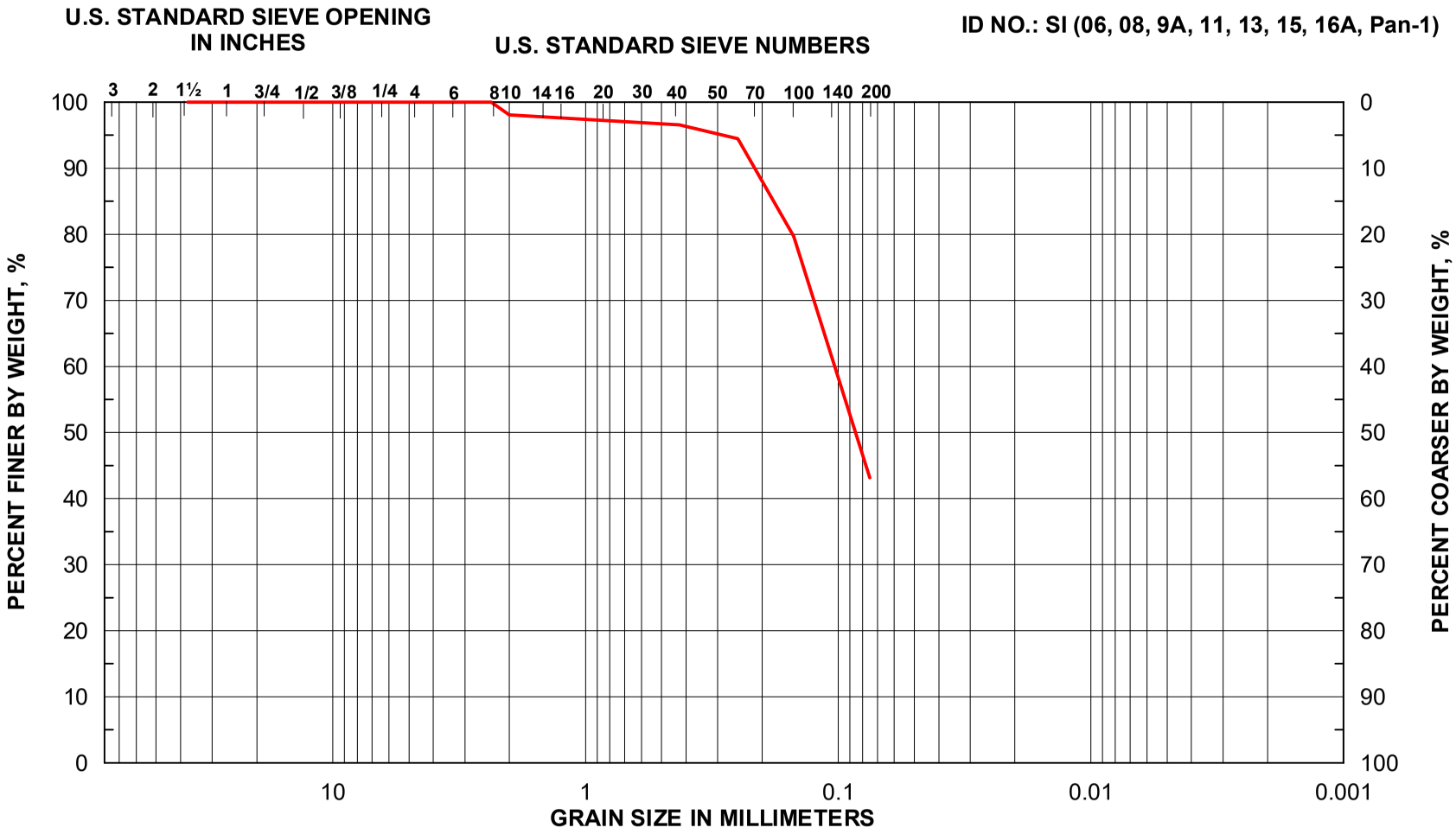
SCALE: NOT TO SCALE	DATE: JUNE 2025	PROJECT NO.: 24-996E

PLATE A-17

APPENDIX B

Sieve Analysis Testing Results

GEOTECH ENGINEERING AND TESTING



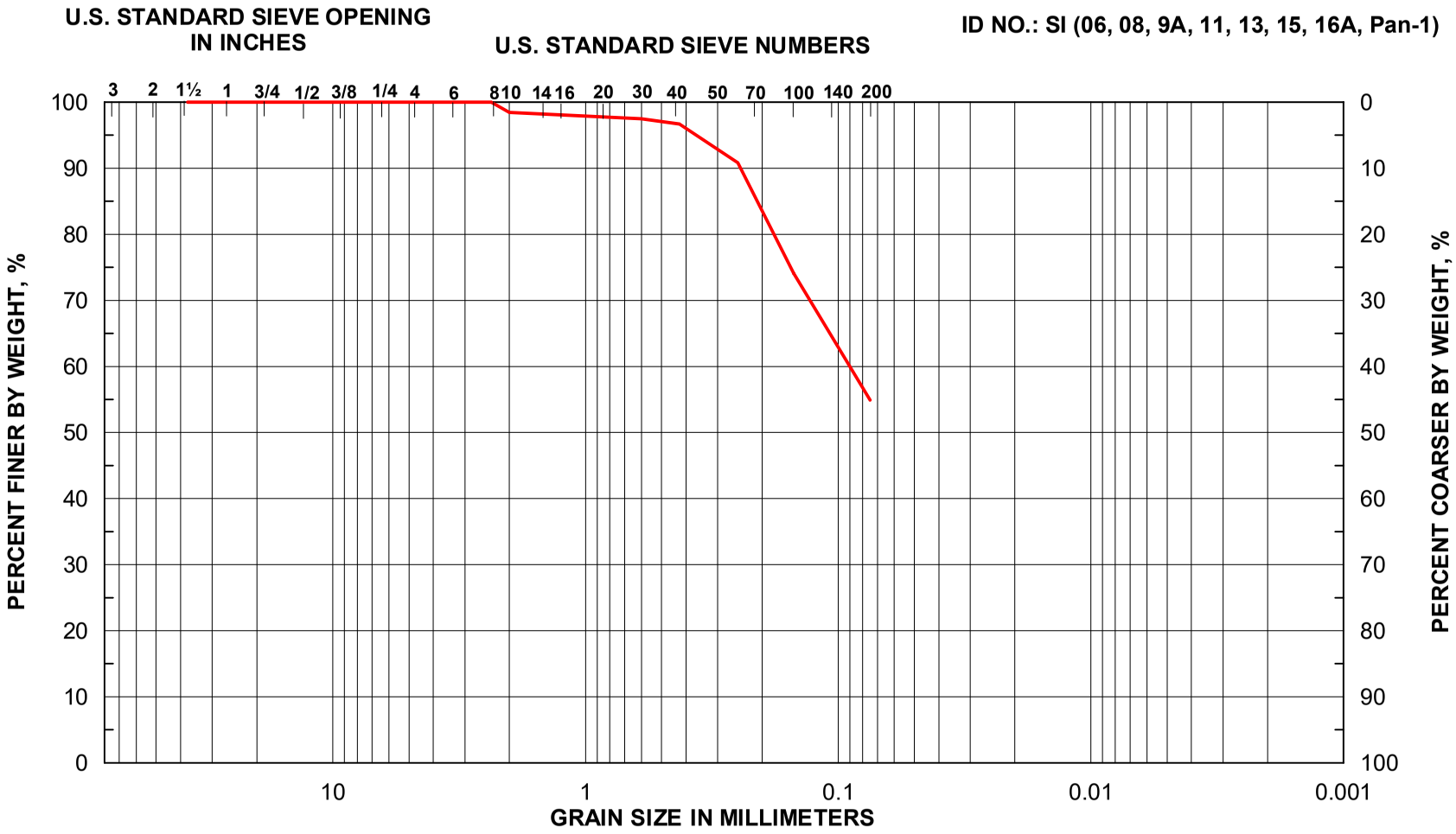
GRAVEL		SAND			SILT	CLAY
Coarse	Fine	Coarse	Medium	Fine		

USCS Soil Classification: LEAN CLAY (CL)
Percent Passing #200 Sieve: 43.23%
PARTICLE SIZE DISTRIBUTION CURVES FOR B-2 (4' TO 6')

Project No. 24-996E

PLATE B-1

GEOTECH ENGINEERING AND TESTING



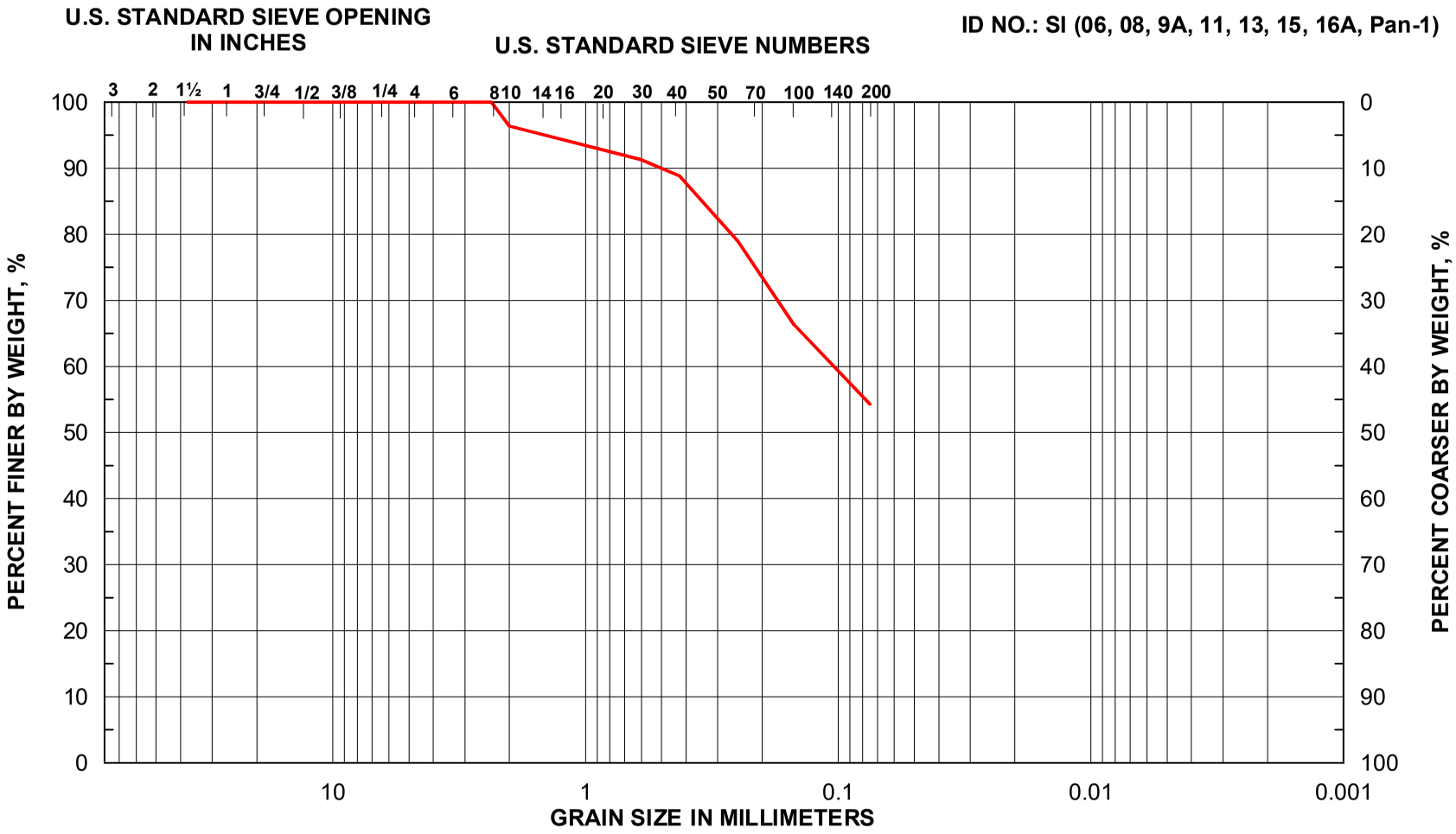
GRAVEL		SAND			SILT	CLAY
Coarse	Fine	Coarse	Medium	Fine		

USCS Soil Classification: FAT CLAY (CH)
Percent Passing #200 Sieve: 54.98%
PARTICLE SIZE DISTRIBUTION CURVES FOR B-6 (4' TO 6')

Project No. 24-996E

PLATE B-2

GEOTECH ENGINEERING AND TESTING



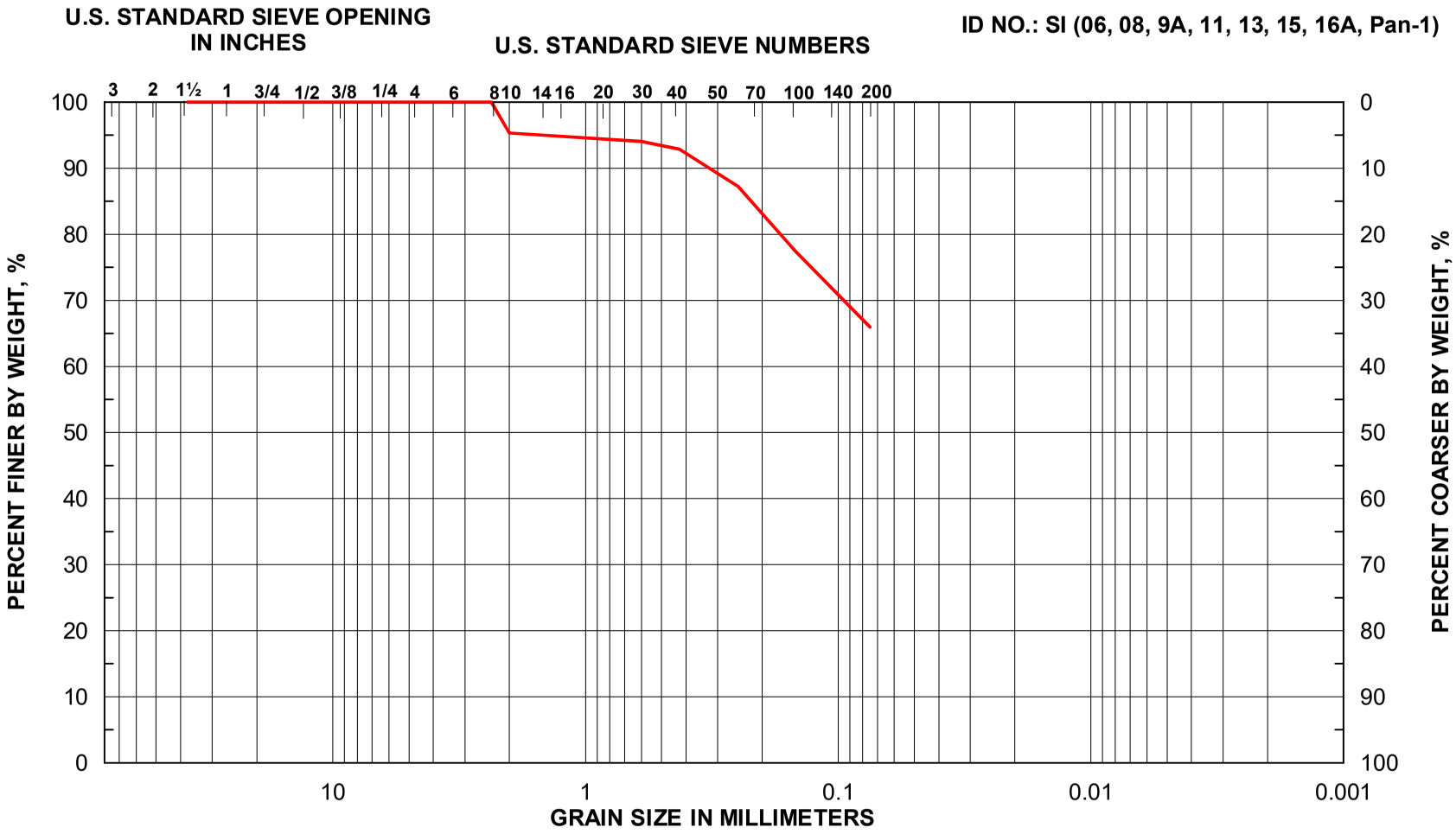
GRAVEL		SAND			SILT	CLAY
Coarse	Fine	Coarse	Medium	Fine		

USCS Soil Classification: FAT CLAY (CH)
Percent Passing #200 Sieve: 54.36%
PARTICLE SIZE DISTRIBUTION CURVES FOR B-8 (6' TO 8')

Project No. 24-996E

PLATE B-3

GEOTECH ENGINEERING AND TESTING



GRAVEL		SAND			SILT	CLAY
Coarse	Fine	Coarse	Medium	Fine		

USCS Soil Classification: LEAN CLAY (CL)
Percent Passing #200 Sieve: 65.99%
PARTICLE SIZE DISTRIBUTION CURVES FOR B-9 (2' TO 4')

Project No. 24-996E

PLATE B-4

APPENDIX C

Project Alignments Pictures

PROJECT PICTURES

Project No. 24-996E





Note: The above picture(s) indicate a snapshot of the project and the surroundings. We request that the client review the picture(s) and make sure that they represent the project area. We must be contacted immediately if any discrepancy exists.

PROJECT PICTURES

Project No. 24-996E





Note: The above picture(s) indicate a snapshot of the project and the surroundings. We request that the client review the picture(s) and make sure that they represent the project area. We must be contacted immediately if any discrepancy exists.

PROJECT PICTURES

Project No. 24-996E





Note: The above picture(s) indicate a snapshot of the project and the surroundings. We request that the client review the picture(s) and make sure that they represent the project area. We must be contacted immediately if any discrepancy exists.

PROJECT PICTURES

Project No. 24-996E





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PROJECT PICTURES

Project No. 24-996E





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PROJECT PICTURES

Project No. 24-996E





Note: The above picture(s) indicate a snapshot of the project and the surroundings. We request that the client review the picture(s) and make sure that they represent the project area. We must be contacted immediately if any discrepancy exists.

PROJECT PICTURES

Project No. 24-996





Note: The above picture(s) indicate a snapshot of the project and the surroundings. We request that the client review the picture(s) and make sure that they represent the project area. We must be contacted immediately if any discrepancy exists.

PROJECT PICTURES

Project No. 24-996E





Note: The above picture(s) indicate a snapshot of the project and the surroundings. We request that the client review the picture(s) and make sure that they represent the project area. We must be contacted immediately if any discrepancy exists.

PROJECT PICTURES

Project No. 24-996E





Note: The above picture(s) indicate a snapshot of the project and the surroundings. We request that the client review the picture(s) and make sure that they represent the project area. We must be contacted immediately if any discrepancy exists.

PROJECT PICTURES

Project No. 24-996E





Note: The above picture(s) indicate a snapshot of the project and the surroundings. We request that the client review the picture(s) and make sure that they represent the project area. We must be contacted immediately if any discrepancy exists.

PROJECT PICTURES

Project No. 24-996E





Note: The above picture(s) indicate a snapshot of the project and the surroundings. We request that the client review the picture(s) and make sure that they represent the project area. We must be contacted immediately if any discrepancy exists.

PROJECT PICTURES

Project No. 24-996E





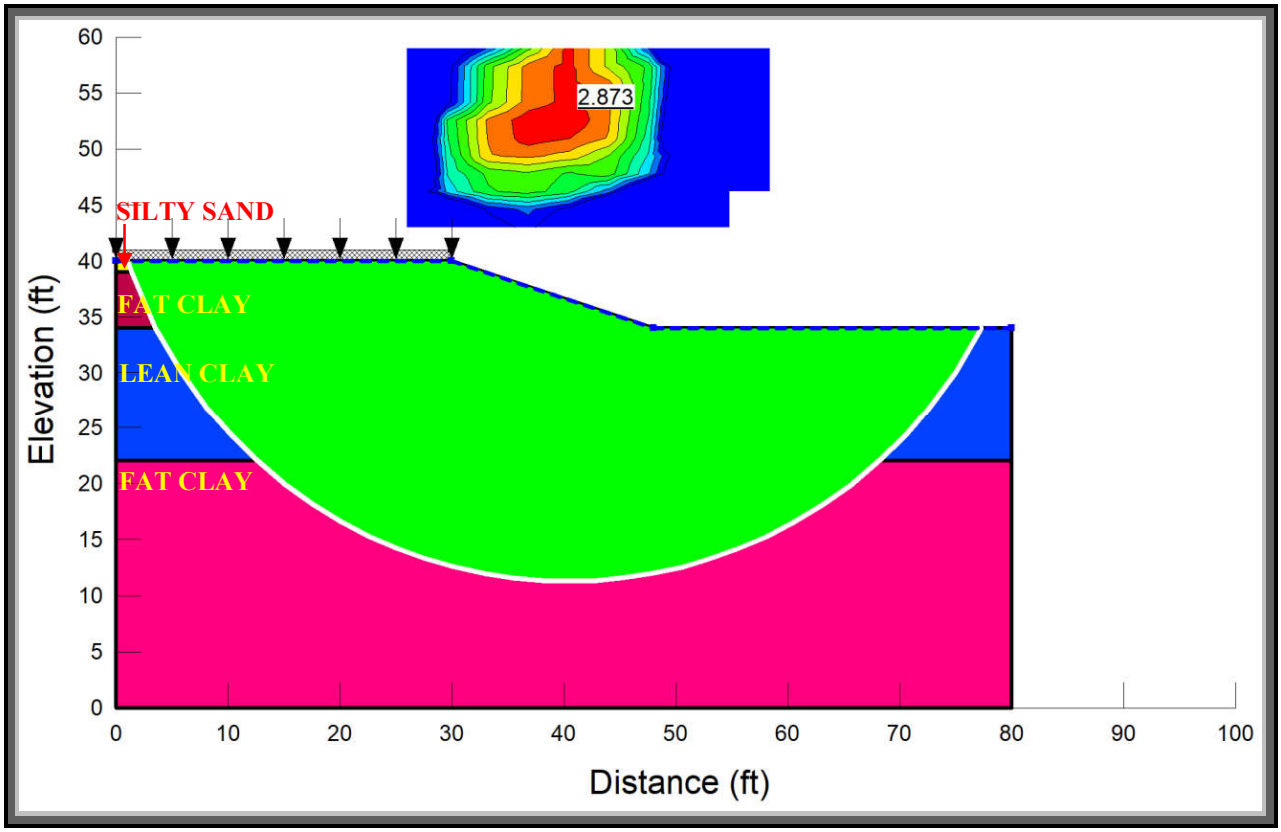
Note: The above picture(s) indicate a snapshot of the project and the surroundings. We request that the client review the picture(s) and make sure that they represent the project area. We must be contacted immediately if any discrepancy exists.

APPENDIX D

RESULTS OF SLOPE STABILITY ANALYSIS FOR ROADSIDE DITCH

SLOPE STABILITY ANALYSIS RESULTS OF ROADSIDE DITCH

Proposed Slope 3(H):1(V) – Short Term Stability Analysis; FS = 2.873



Design Soil Parameters

Soil Conditions			Design Strength Parameters					
			Short Term		Rapid Drawdown		Long Term	
Depth Range, ft	Description	γ_t, pcf	c^0, psf	ϕ^0	C', psf	ϕ'	C", psf	ϕ''
0 – 1	Silty Sand (SM)	125	–	30	–	30	–	30
1 – 6	Fat Clay (CH)	105	400	–	370	11	350	13
6 – 18	Lean Clay (CL)	115	700	–	330	11	320	13
18 – 20	Fat Clay (CH)	105	400	–	390	11	370	13

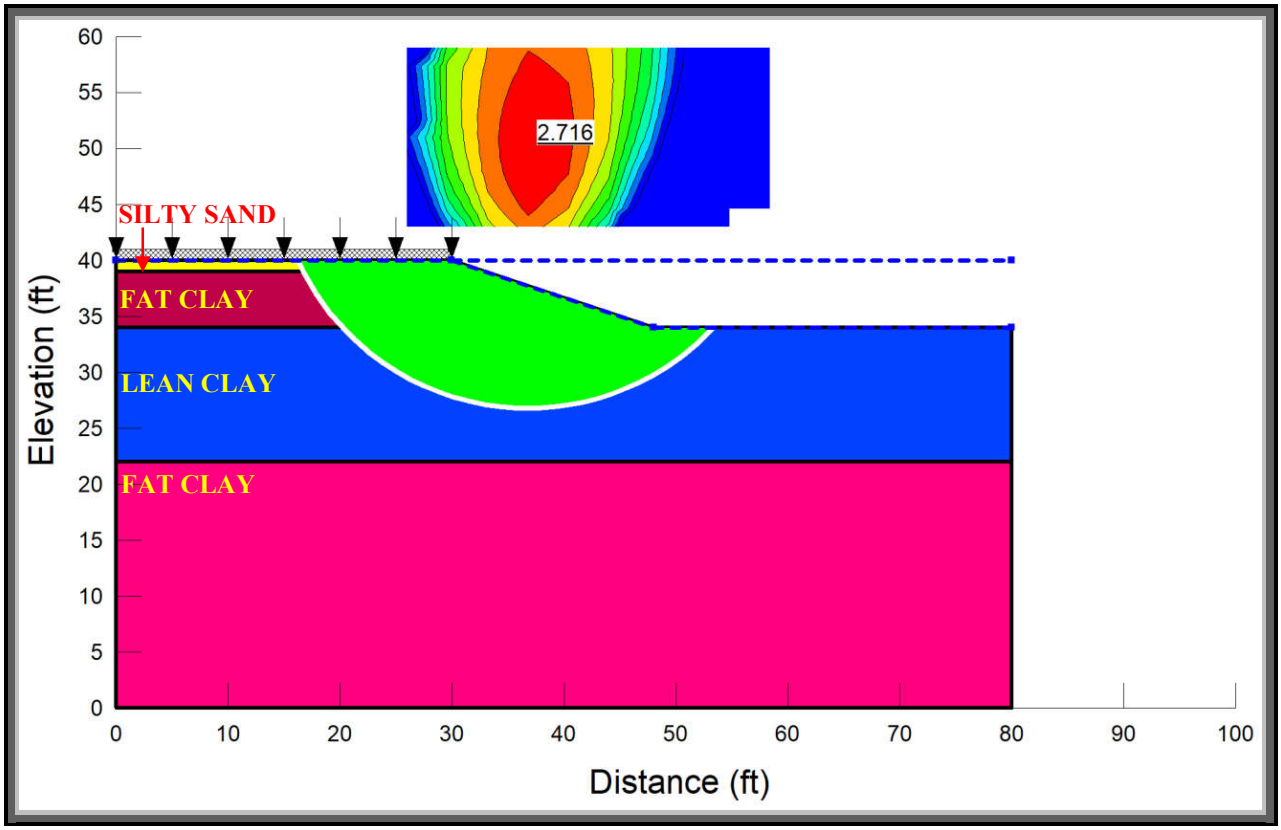
Where:

γ_t = Total unit weight of soils, pcf
c^0, c', c" = Undrained, consolidated undrained and consolidated drained, cohesion, psf
ϕ^0, ϕ', ϕ'' = Undrained, consolidated undrained and consolidated drained, angle of internal friction, degrees

Note: The soil profile below Depth 20-ft assumed is the same as Depth 18- to 20-ft for the global slope stability analysis.

SLOPE STABILITY ANALYSIS RESULTS OF ROADSIDE DITCH

Proposed Slope 3(H):1(V) – Rapid Drawdown Stability Analysis; FS = 2.716



Design Soil Parameters

Soil Conditions			Design Strength Parameters					
			Short Term		Rapid Drawdown		Long Term	
Depth Range, ft	Description	γ_t, pcf	c^0, psf	ϕ^0	C', psf	ϕ'	C", psf	ϕ''
0 – 1	Silty Sand (SM)	125	–	30	–	30	–	30
1 – 6	Fat Clay (CH)	105	400	–	370	11	350	13
6 – 18	Lean Clay (CL)	115	700	–	330	11	320	13
18 – 20	Fat Clay (CH)	105	400	–	390	11	370	13

Where:

γ_t = Total unit weight of soils, pcf

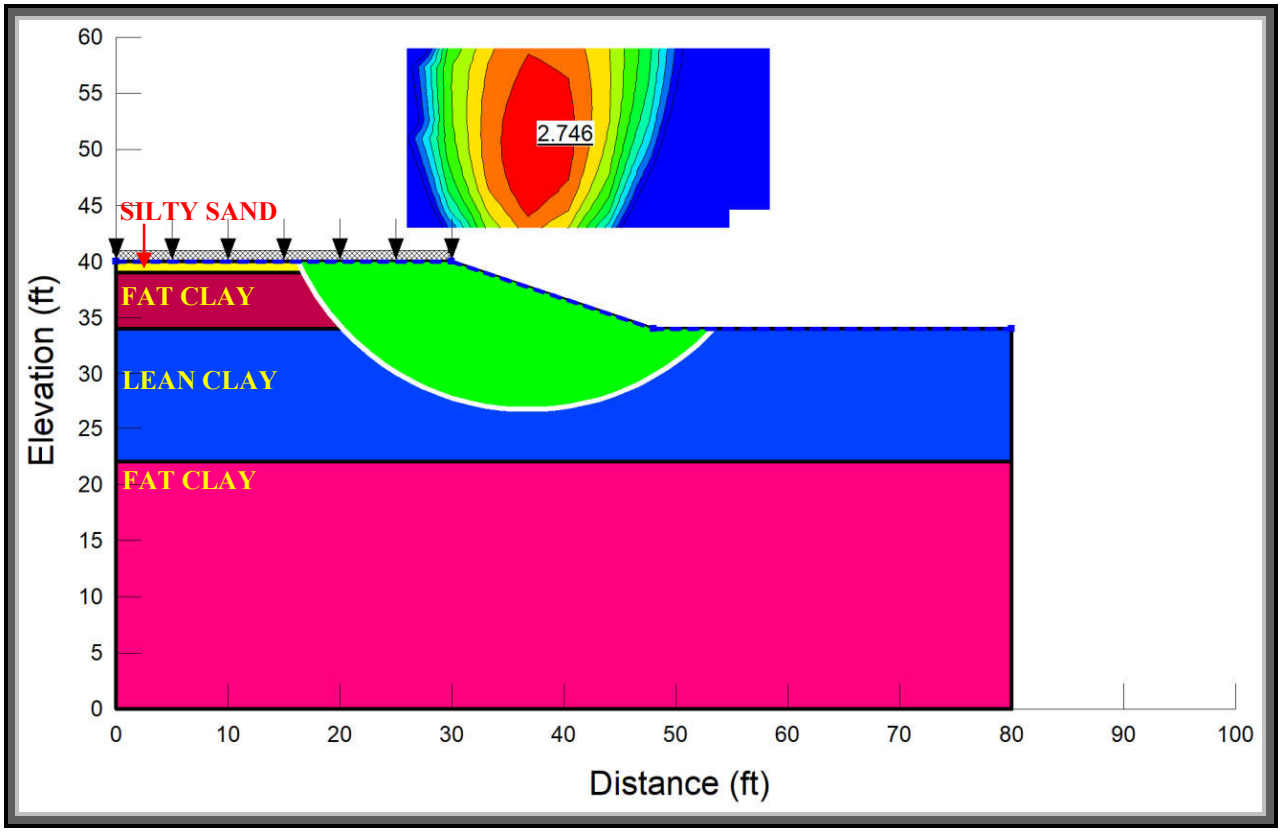
c^0, c', c" = Undrained, consolidated undrained and consolidated drained, cohesion, psf

ϕ^0, ϕ', ϕ'' = Undrained, consolidated undrained and consolidated drained, angle of internal friction, degrees

Note: The soil profile below Depth 20-ft assumed is the same as Depth 18- to 20-ft for the global slope stability analysis.

SLOPE STABILITY ANALYSIS RESULTS OF ROADSIDE DITCH

Proposed Slope 3(H):1(V) – Long Term Stability Analysis; FS = 2.746



Design Soil Parameters

Soil Conditions			Design Strength Parameters					
			Short Term		Rapid Drawdown		Long Term	
Depth Range, ft	Description	γ_t, pcf	c^0, psf	ϕ^0	C', psf	ϕ'	C", psf	ϕ''
0 – 1	Silty Sand (SM)	125	–	30	–	30	–	30
1 – 6	Fat Clay (CH)	105	400	–	370	11	350	13
6 – 18	Lean Clay (CL)	115	700	–	330	11	320	13
18 – 20	Fat Clay (CH)	105	400	–	390	11	370	13

Where:

γ_t = Total unit weight of soils, pcf

c^0, c', c" = Undrained, consolidated undrained and consolidated drained, cohesion, psf

ϕ^0, ϕ', ϕ'' = Undrained, consolidated undrained and consolidated drained, angle of internal friction, degrees

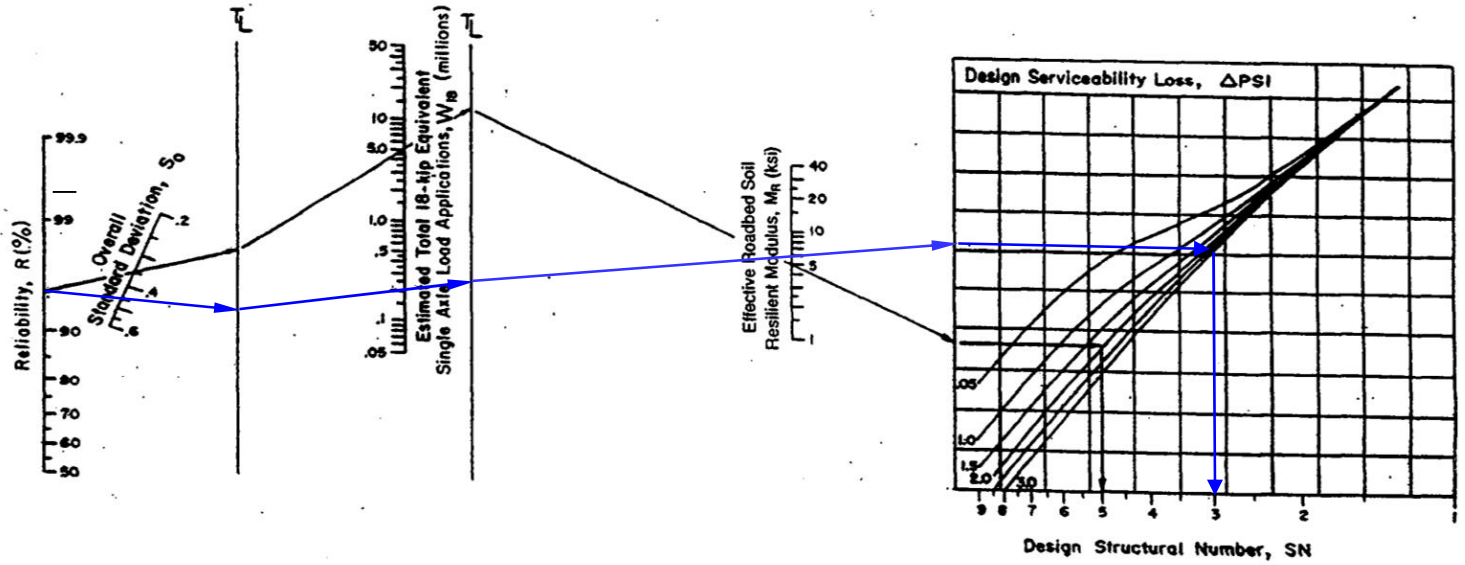
Note: The soil profile below Depth 20-ft assumed is the same as Depth 18- to 20-ft for the global slope stability analysis.

APPENDIX E

Pavement Design Computations

NOMOGRAPH SOLVES:

$$\log_{10} W_{18} = Z_R * S_o + 9.36 * \log_{10}(SN+1) - 0.20 + \frac{\log_{10}\left[\frac{\Delta PSI}{4.2 - 1.5}\right]}{0.40 + \frac{1094}{(SN+1)^{5.19}}} + 2.32 * \log_{10} M_R - 8.07$$



Calculation:

$W_{18} = 0.2 \times 10^6$

R = 95%

$S_0 = 0.45$

M_R = 6,000 psi

ΔPSI = 4.2 - 2.5 = 1.7

Solution:

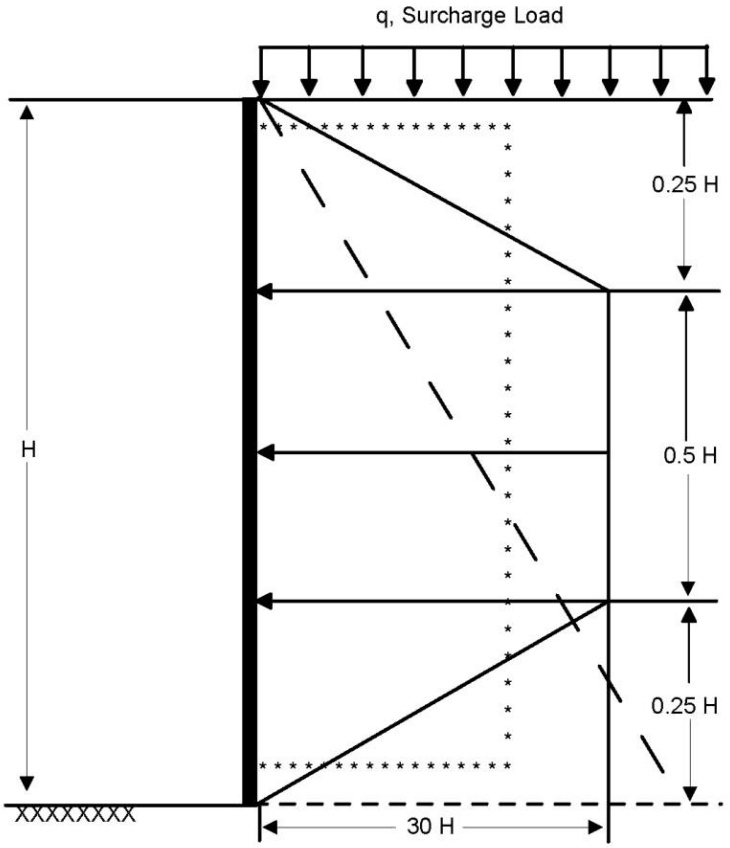
W_{18} (18kip ESAL x 10^6)	Design Structural Number
0.2	3.0

Design Chart for Flexible Pavement

APPENDIX F

OSHA Soil Classification and Trench Safety Recommendations

LATERAL EARTH PRESSURE DIAGRAM



Legend:

———————— Braced Excavation (stiff clays)
* * * * * * * * * * * * * Braced Excavation (sands)
- - - - - - - - - - - - - - - Cantilevered sheeting

Active Pressure:

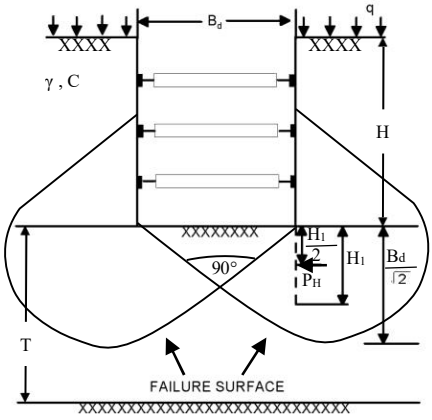
(a) Braced Excavation (stiff clays) = 0.5q + 30H + 62.4H
(b) Braced Excavation (sands) = 0.4q + 18H + 62.4H
(c) Cantilevered sheeting = 0.7q + 42H + 62.4H

where: q = surcharge load, psf: A value of 250 psf can be assumed.
H = wall height, ft.

Notes:

1. The above Active Pressure Equations account for the groundwater at the surface.
2. The final lateral pressures should be reviewed prior to construction.
3. Trench excavation and construction should be observed by a geotechnical engineer.
4. The means and methods for a safe excavation is the responsibility of the contractor.
5. In case of layered soils, active pressure should be calculated based on the dominant or more critical soil conditions.

CUT IN COHESIVE SOIL,
DEPTH OF COHESIVE SOIL UNLIMITED (T > 0.7 B_d)
L= LENGTH OF CUT



If sheeting terminates at base of cut:

Safety Factor, $F_s = \dfrac{N_c c}{\gamma H + q}$

N_c = Bearing capacity factor, which depends on dimensions of the excavation: B_d, L and H (use N_c from graph below)

c = Undrained shear strength of clay in failure zone beneath and surrounding base of cut

γ = Wet unit weight of soil

q = Surcharge (assumed q = 250psf)

If safety factor is less than 1.5, sheeting or soldier piles must be carried below the base of cut to insure stability – (see note)

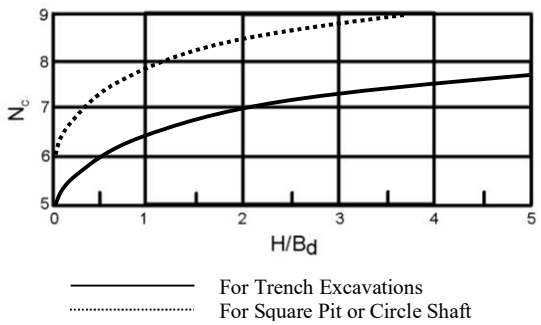
H_1 = Buried length = $\dfrac{B_d}{2} \geq 5$ feet

Note: If soldier piles are used, the center to center spacing should not exceed 3 times the width or diameter of soldier pile.

Force on buried length, P_H:

If $H_1 > \dfrac{2}{3}\dfrac{B_d}{\sqrt{2}}$, $P_H = 0.7\ (\gamma H B_d - 1.4CH - \pi c B_d)$ in lbs/linear foot

If $H_1 < \dfrac{2}{3}\dfrac{B_d}{\sqrt{2}}$, $P_H = 1.5 H_1\ (\gamma H - \dfrac{1.4CH}{B_d} - \pi c)$ in lbs/linear foot



STABILITY OF BOTTOM FOR BRACED CUT

SOIL DESIGN PARAMETERS

(BASED ON BORING B-1)

Soil Type	Depth Range, ft.	γ, pcf	c, psf	ϕ
LEAN CLAY (CL)	0 – 1	115	1,560	–
FAT CLAY (CH)	1 – 2	105	1,560	–
FAT CLAY (CH)	2 – 4	105	1,860	–
FAT CLAY (CH)	4 – 6	105	2,000	–
FAT CLAY (CH)	6 – 8	105	1,240	–
FAT CLAY (CH)	8 – 10	105	1,860	–

(BASED ON BORING B-2)

Soil Type	Depth Range, ft.	γ, pcf	c, psf	ϕ
LEAN CLAY (CL)	0 – 1	115	2,000	–
FAT CLAY (CH)	1 – 2	105	1,240	–
FAT CLAY (CH)	2 – 4	105	780	–
LEAN CLAY (CL)	4 – 6	115	300	–
FAT CLAY (CH)	6 – 8	105	1,760	–
FAT CLAY (CH)	8 – 13	105	920	–
FAT CLAY (CH)	13 – 20	105	2,000	–

(BASED ON BORING B-3)

Soil Type	Depth Range, ft.	γ, pcf	c, psf	ϕ
FAT CLAY (CH)	0 – 1	105	1,860	–
FAT CLAY (CH)	1 – 4	105	2,000	–
FAT CLAY (CH)	4 – 6	105	1,880	–
FAT CLAY (CH)	6 – 10	105	2,000	–

SOIL DESIGN PARAMETERS
(BASED ON BORING B-4)

Soil Type	Depth Range, ft.	γ, pcf	c, psf	ϕ
SILTY SAND (SM)	0 – 2	125	–	30
FAT CLAY (CH)	2 – 4	105	1,240	–
LEAN CLAY (CL)	4 – 8	115	2,000	–
FAT CLAY (CH)	8 – 10	105	2,000	–

(BASED ON BORING B-5)

Soil Type	Depth Range, ft.	γ, pcf	c, psf	ϕ
SILTY SAND (SM)	0 – 1	125	–	30
FAT CLAY (CH)	1 – 2	105	1,860	–
FAT CLAY (CH)	2 – 4	105	780	–
FAT CLAY (CH)	4 – 8	105	2,000	–
LEAN CLAY (CL)	8 – 10	115	2,000	–

(BASED ON BORING B-6)

Soil Type	Depth Range, ft.	γ, pcf	c, psf	ϕ
SILTY SAND (SM)	0 – 2	125	–	30
FAT CLAY (CH)	2 – 4	105	620	–
FAT CLAY (CH)	4 – 6	105	1,280	–
LEAN CLAY (CL)	6 – 18	115	2,000	–
FAT CLAY (CH)	18 – 20	105	1,560	–

(BASED ON BORING B-7)

Soil Type	Depth Range, ft.	γ, pcf	c, psf	ϕ
SILTY SAND (SM)	0 – 2	125	–	30
FAT CLAY (CH)	2 – 4	105	1,560	–
FAT CLAY (CH)	4 – 10	105	2,000	–

(BASED ON BORING B-8)

Soil Type	Depth Range, ft.	γ, pcf	c, psf	ϕ
SILTY SAND (SM)	0 – 2	125	–	30
FAT CLAY (CH)	2 – 4	105	1,680	–
FAT CLAY (CH)	4 – 6	105	1,860	–
FAT CLAY (CH)	6 – 10	105	2,000	–

(BASED ON BORING B-9)

Soil Type	Depth Range, ft.	γ, pcf	c, psf	ϕ
SILTY SAND (SM)	0 – 2	125	–	30
LEAN CLAY (CL)	2 – 4	115	2,000	–
FAT CLAY (CH)	4 – 6	105	1,940	–
FAT CLAY (CH)	6 – 10	105	2,000	–

OSHA SOIL CLASSIFICATION AND TRENCH SAFETY RECOMMENDATIONS

General

Occupational Safety and Health Administration (OSHA) requires a trench protective system for trenches deeper than five-ft. Trenches that are deeper than five-ft, should be shored, sheeted, braced or laid back to a stable slope, or some other appropriate means of protection should be provided where workers might be exposed to moving ground or caving. OSHA developed a soil classification system to be used as a guideline in determining protective requirements for trench excavations.

OSHA classification system categorizes the soil and rock in four types based on shear strength and stability. These classifications are summarized in the following report sections.

Stable Rock

means natural solid mineral matter that can be excavated with vertical sides and remain intact while exposed.

Type A Soil

means cohesive soils with an unconfined compressive strength of 1.5-ton per square foot (tsf) or greater. Examples of cohesive soils are: clay, silty clay, sandy clay, clay loam, silty clay loam, sandy clay loam, caliche and hardpan. No soil is Type A if:

- The soil is fissured; or
- The soil is subject to vibration from heavy traffic, pile driving or similar effects; or
- The soil has been previously disturbed; or
- The soil is part of a slope, layered system where the layers dip into the excavation on a slope of 4(h): 1(v) or greater; or
- The material is subject to other factors that would require it to be classified as a less stable material.

Type B Soil

- Cohesive soil with an unconfined compressive strength greater than 0.5 tsf but less than 1.5 tsf; or
- Granular cohesionless soils including: angular gravel, silt, silt loam, sandy loam, and in some case, silty clay loam and sandy clay loam; or

- Previously disturbed soils except those which would otherwise be classified as Type C soil; or
- Soil that meets the unconfined compressive strength or cementation requirements for Type A, but is fissured or subject to vibration; or
- Dry rock that is not stable; or
- Material that is part of a sloped, layered system where the layers dip into the excavation on a slope less steep than 4(h): 1(v), but only if the material would otherwise be classified as Type B.

Type C Soil

- Cohesive soil with an unconfined compressive strength of 0.5 tsf or less; or
- Granular soils including gravel, sand, and loamy sand; or
- Submerged soil or soil from which water is freely seeping; or
- Submerged rock that is not stable; or
- Materials in a sloped, layered system where the layers dip into the excavation on a slope 4 (h): 1(v) or steeper.

Under the assumption that appropriate groundwater control measures are carried out, and the groundwater table, if present, is lowered and maintained at least 3-ft below the excavation depths, the stable cohesive soils (CL) and (CH), with unconfined compressive strength greater than 0.5 tsf, are classified as OSHA soil Type "B". The granular soils, which are less stable, are classified as OSHA soil Type "C".

Based on our geotechnical exploration and laboratory test results, details of soil classifications at the boring locations are summarized below:

Boring No.	Depth Range [(1)], ft	Soil Type	OSHA Soil Classification
B-1	0 – 1	Lean Clay (CL)	B
	1 – 8	Fat Clay (CH)	B
	8 – 10	Lean Clay (CL)	B
B-2	0 – 1	Lean Clay (CL)	B
	1 – 4	Fat Clay (CH)	B
	4 – 6	Lean Clay (CL)	C
	6 – 13	Fat Clay (CH)	B
	13 – 20	Lean Clay (CL)	B
B-3	0 – 10	Fat Clay (CH)	B

Boring No.	Depth Range [1], ft	Soil Type	OSHA Soil Classification
B-4	0 – 2	Silty Sand (SM)	C
	2 – 4	Fat Clay (CH)	B
	4 – 8	Lean Clay (CL)	B
	8 – 10	Fat Clay (CH)	B
B-5	0 – 1	Silty Sand (SM)	C
	1 – 8	Fat Clay (CH)	B
	8 – 10	Lean Clay (CL)	B
B-6	0 – 2	Silty Sand (SM)	C
	2 – 6	Fat Clay (CH)	B
	6 – 18	Lean Clay (CL)	B
	18 – 20	Fat Clay (CH)	B
B-7	0 – 2	Silty Sand (SM)	C
	2 – 10	Fat Clay (CH)	B
B-8	0 – 2	Silty Sand (SM)	C
	2 – 10	Fat Clay (CH)	B
B-9	0 – 2	Silty Sand (SM)	C
	2 – 4	Lean Clay (CL)	B
	4 – 10	Fat Clay (CH)	B

Note: 1. Refer to each boring log of soils stratigraphy

Stockpiling of excavated materials may not be allowed near the banks of excavated areas. Generally, a distance of one-half the excavation depth on both sides of the trench should be kept clear of any excavated material.

Underground utility trenches should be provided with proper trench support system. The trench should be provided with a temporary shoring system on excavations deeper than five-ft. The trenches can be made using shored, sheeted and braced, laid back stable slope or other means of appropriate protection system should be provided where workers are exposed to moving ground or caving. The slopes may be constructed in accordance with Table B-1 and shoring may be constructed in accordance with Table C-1.1, Table C-1.2 and Table C-1.3 of 29 CFR Part 1926 of OSHA.

In the event that trench sheeting is used, the sheeting can be constructed in the form of cantilever sheeting or with bracing. Lateral earth pressures for each method used are summarized on Plate F-1. The trenching and shoring operations should follow OSHA Standards. We recommend that a geotechnical engineer monitor all phases of trench excavation and bracing to assure trench safety.

Timber shoring as outlined in 29 CFR Part 1926 of OSHA recommendation may be used in the construction of trench supporting system.
For trench excavation, it is necessary to maintain the stability of the sides and base and not to disturb the soil below the excavation grade. In braced cuts, if the sheeting is terminated at the base of the cut, the bottom of the excavation can become unstable under certain conditions. The stability of the trench bottom is governed by the shear strength of the soils and the differential hydrostatic head. For cuts in cohesive soils (such as fat clay and lean clay), stability of the bottom can be evaluated in accordance with the procedure outlined on Plate F-2. However, if cohesionless soils are encountered, dewatering will be required to prevent bottom blowup if the groundwater is encountered during construction. Design soil parameters presented on Plate F-3 through F-5 can be used for design.

Groundwater Control

Our short-term field exploration indicates that groundwater was not encountered during and after 0.33-hour of drilling. Hence, groundwater dewatering may not be required. However, fluctuations in groundwater can occur as a function of seasonal moisture variation. Groundwater control recommendations are presented in the following report sections.

In the event that groundwater is encountered during construction, it is our opinion that groundwater should be lowered to a depth of at least three-ft below the deepest excavation grade in order to provide dry working conditions and firm bedding. Any minor water inflow in cohesive soil layers can probably be removed using a sump-pump or trench sump-pump. Wellpoint system can be used in the area where sandy lean clay soils are present. **Due to the presence of cohesionless soils, blow up may occur if an effective dewatering system is not in place at the time of construction.**

Piezometers should be installed near the excavation area to further evaluate groundwater levels in the area prior to construction. The piezometers should be left in place during construction to monitor groundwater levels and effectiveness of the dewatering system.

Design of a dewatering system should consider the amount of groundwater to be lowered and the permeability of the affected soils. The selection and proper implementation of an effective groundwater control system is the responsibility of the contractor. The design of groundwater and surface water should be in accordance with the Waller County Specifications.

The results of our field exploration and laboratory testing indicate that unsatisfactory soils for excavation, such as silty sand and soft lean (CL) and fat clay (CH), encountered in the borings. A summary of the unsatisfactory soils locations and depths are as follows:

Boring(s)	Depth, ft.
B-2	4 to 6
B-4 and B-6 through B-9	0 to 2
B-5	0 to 1

If these conditions are encountered during the time of construction, suitable groundwater control measures should be implemented in accordance with the Waller County Specifications. Furthermore, the contractor may have to over excavate an additional 6 inches and remove unstable or unsuitable materials with approval by geotechnical engineer, then place an equal depth of cement stabilization sand.

Due to potential variability of the on-site soils, unstable trench conditions may still exist in the areas where we did not conduct borings. If these conditions are encountered during the time of construction, a stable trench should be provided to allow proper bedding and installation.

Our recommendation on trench safety at the project site does not address the effects of excavations on existing buildings/facilities at the project site. This study was outside the scope of our work.

WALLER COUNTY
Engineering Department
Hempstead, Texas

PROJECT MANUAL



CivilCorp
an ESP COMPANY

Texas P.E. Board Firm Registration No. 17252
29255 FM 1093, Suite 7A
Fulshear, TX 77441

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Double Culvert Road Segment 2 and Cedar Creek Road

Summary of Work

The scope of work includes the reconstruction of an asphalt roadway along Double Culvert Road and Cedar Creek Road in Waller County. The limits of the Double Culvert Road Segment 2 begin approximately 200’ north of the Union Pacific Railroad crossing and end at Cedar Creek Road, approximately 1.27 miles in length. Cedar Creek Road limits begin at Double Culvert Road and end at SH 6, a length of 0.91 miles.

Proposed scope improvements include reconstructing the existing two-lane roadway with open ditch drainage within the existing right-of-way (ROW) which varies from 34’ to 60’ on Double Culvert Road and varies from 54’ to 70’ on Cedar Creek Road. At several locations along the east side of Double Culvert Road, fence lines are set back from the prescribed ROW line. Ditch and driveway work is proposed within the limits of the fenced area. It is proposed to reconstruct with 3-inch asphalt pavement, 8-inch black base course, 8-inch lime stabilized subgrade with black base shoulders in accordance with Waller County guidelines. The roadway classification is Local Road and is being designed for 35 mph.

Proposed typical sections include a 24’ wide roadway for the section of Double Culvert Road south of Donahoe Creek and a 22’ wide roadway north of Donahoe Creek. Cedar Creek Road width will be 26’. For both roadways, travel lanes will be 11’. Shoulders will be constructed of black base. The existing bridge on Double Culvert Road over Donahoe Creek will remain, with no work planned for the bridge. Proposed work on the approaches to the bridge include milling and replacing 3” of asphalt.

The scope of work also includes evaluation of existing drainage conditions and maintaining or improving storm water conveyance. The open ditch is to be maintained, and regrading of existing ditches are proposed for both roadways. Double Culvert Road shares a common drainage ditch with Union Pacific Railroad for the greater part of the length of the roadway, and no work will be performed within railroad ROW.

Traffic control, permanent signing and striping, and storm water pollution prevention are also included as part of the scope for this project. The ornamental mailbox located at 40681 Cedar Creek Road (belonging to Charles Williams) will be relocated by others and not included in the proposed work. All other mailboxes will be relocated as part of the project.

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Double Culvert Road Segment 2 and Cedar Creek Road

Utility Conflict Summary

1. **AT&T** has communication lines parallel to Double Culvert Road that are in conflict with the proposed roadway pavement. Also, several locations along Double Culvert Road and Cedar Creek Road may conflict with the construction of driveways.

2. **Energy Transfer** has a 6" gas line crossing under Cedar Creek Road at Sta 3+96. There are no conflicts anticipated as the required cover of 4 feet under the roadway surface and ditch lines are satisfied.

3. **GW Water Supply Corp** has a ¾" water line crossing under Cedar Creek Road at Sta 47 +64 that does not have the required 36" of cover below the ditch and is not encased. This line will need to be lowered and encased (by others).

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Double Culvert Road Segment 2 and Cedar Creek Road

Geotechnical Report

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DESKTOP GEOLOGICAL FAULT STUDY
GEOTECHNICAL STUDY
DOUBLE CULVERT ROAD SEGMENT 2 & CEDAR RD PAVEMENT IMPROVEMENTS FROM 200-FT EAST OF RAILROAD CROSSING TO THE INTERSECTION OF CEDAR CREEK ROAD AND HWY 6
WALLER COUNTY PROJECT NO. 23103
WALLER COUNTY, TEXAS

PROJECT NO. 24-997E



TO

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JUNE 2025

TEXAS BOARD OF PROFESSIONAL ENGINEERS
REGISTRATION NUMBER F-001183

CivilCorp
29255 FM 1093, Suite 7#
Houston, Texas 77441

Project No. 24-997E
Report No: 1
Project Type: 24H/9
July 02, 2025

Attention: Mr. Roy Dill, P.E.
Senior Project Manager

DESKTOP GEOLOGICAL FAULT STUDY
GEOTECHNICAL STUDY
DOUBLE CULVERT ROAD SEGMENT 2 & CEDAR RD PAVEMENT IMPROVEMENTS FROM 200-FT EAST OF RAILROAD CROSSING TO THE INTERSECTION OF CEDAR CREEK ROAD AND HWY 6
WALLER COUNTY PROJECT NO. 23103
WALLER COUNTY, TEXAS

Gentlemen:

Submitted here is Geotech Engineering and Testing (GET) geotechnical study for the above referenced project. The planned paving improvements were discussed in detail with Mr. Roy Dill, P.E. This study that would provide the necessary rehabilitation/reconstruction recommendations. This study was conducted in general accordance with GET Proposal No. P24-442, dated February 7, 2025. Authorization to proceed with this study was received and was signed by Mr. Thomas C. Kuykendall, Jr, on April 3, 2025.

This report presents the results of our observations during field visit, geotechnical field exploration and laboratory testing together with reconstruction at Double Culvert Road and Cedar Creek road. in Waller County, Texas.

We appreciate the opportunity to be of service. Should you have any questions or need additional assistance, please call.

Very truly yours,

GEOTECH ENGINEERING AND TESTING
TBPE Registration Number F-001183



Nikolas Darehshoori, M.S.C.E.
Project Manager



Shailesh "James" Namekar
07/02/2025



Daniel Seong, Ph.D.
Project Manager



Shailesh "James" Namekar, PhD., P.E.
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ND/DS/JN/DAE/nd/ds

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(1) PDF Copy Email – CivilCorp – Mr. Thomas C. Kuykendall, Jr

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APPENDICES

Appendix A – Site Vicinity Map, Plan of Borings, Summary of Borings Locations, stratigraphy profile, Logs of Borings, Key to Log Terms and Symbols, Geological Map, Active Hockley Fault System in the Harris County Area

Appendix B – Sieve Analysis Results

Appendix C – Pictures of Field Explorations

Appendix D – Results of Slope Stability Analysis

Appendix E – Pavement Design Computations

Appendix F – OSHA Soil Classification and Trench Safety Recommendations

1.0 EXECUTIVE SUMMARY

It is planned to improve approximately 11,500- feet from 200-ft East of Railroad Crossing to the intersection of Cedar Creek Road and Highway 6 in Waller County, Texas. Asphalt pavement reconstruction recommendations are also included in this report. A site vicinity map of the project site is presented on Plate 1.

A field visit was conducted by Mr. Nikolas Darehshoori and Daniel Seong, Project Managers at GET on April 25, 2025. The purpose of our study was to explore the subsurface conditions at the project site. The information obtained was used to develop recommendations and to guide design and reconstruction/rehabilitation of existing asphalt pavement.

During our field visit to the project alignments, we observed asphalt pavement cracks at multiple locations of the asphalt roads.

The subsoils and groundwater conditions of the project site were explored by conducting ten (10) soil test borings (B-1 through B-10) at the request of client. The number and depths of borings were specified by the client. Results of our field investigation and engineering analyses are summarized below:

1. In general, based on our field exploration and laboratory test data, the soils along the project alignments appear to be variable. The soils stratigraphy along the project alignments is summarized as follows:

Stratum No.	Range of Depth, ft.	Soil Description*
–	0.08 – 0.25	ASPHALT PAVEMENT (1-inch to 3-inch in thickness)
–	0.38 – 0.71	BASE COURSE (4.5-inch to 8.5-inch in thickness)
I	0.63 – 20	SILTY SAND (SM), loose to dense, light brown to dark brown, reddish brown, gray, dark gray, with root fibers to 2', ferrous nodules, gravels
II	0.63 – 20	LEAN CLAY (CL), soft to hard, light brown to dark brown, gray, dark gray, with root fibers to 20', ferrous nodules, gravels
III	0.83 – 10	FAT CLAY (CH), soft to very stiff, light brown to dark brown, reddish brown, gray, dark gray, with root fibers to 6', ferrous nodules, gravels

*Classification in accordance with the Unified Soil Classification System (ASTM D 2487)

2. Water level observations were made during and 0.33-hour after drilling. Our short-term field exploration indicates that groundwater was not encountered during and after drilling. However, the groundwater may rise during the wet season.

3. In order to recommend pavement component thickness for asphalt pavement reconstruction, the proposed pavement was designed on the basis of 1993 AASHTO Guide for Design of Pavement Structures. In absence of traffic data, the estimated design ESALs of 0.2×10^6 were considered to calculate thicknesses of the flexible pavements for this project over a design life period of 20 years. The recommended pavement component thicknesses during full depth reconstruction are summarized as follows:

Design, ESAL Local Streets	Asphalt Pavement Minimum Thickness inch(es)	Crushed Limestone Base Thickness, inch(es)	Subgrade Stabilization Thickness, inch(es)
0.2×10^6	2.0	8.0	10.0

The pavement component thicknesses provided here generally match with the Waller County Engineering Design Standard 2023. (Ref. 2).

Since, the existing pavement layers do not meet the Waller County Engineering Design Standard 2023, we recommend pavement reconstruction.

Our field and laboratory tests indicate that the surficial soils consist of silty sand, fat clay and lean clay soils. The subgrade preparation in pavement areas should specify compaction of the upper six-inch to 100% of maximum standard Proctor density (ASTM D 698) at a moisture content between optimum and ±2% of optimum moisture content for surficial cohesionless soils and +3% of optimum moisture content for surficial cohesive soils.

Instead of crushed limestone base course, black base can also be considered along with Hot mix hot-laid asphaltic concrete with subgrade stabilization as shown below:

Design, ESAL	Asphalt Pavement Thickness, inch(es)	Black Base Course Thickness, inch(es)	Subgrade Stabilization Thickness, inch(es)
0.2×10^6	3.0	8.0	8.0

Depending on the type of soils encountered along the project alignments, lime stabilization/ lime-fly Ash of the subgrade soils should most likely be performed. The subgrade cohesive soils should be stabilized, using lime based on TxDOT Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges, Items No. 260 and 263 (Ref. 8). Use 6% lime by dry weight to stabilize the subgrade soils. This results in application rates of 27 pounds of lime, per square yard per six-inch of compacted thickness. TxDOT Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges, Items No. 260 and 263, can be used as procedural guides for placing, mixing and compacting the lime stabilizer and the soils.

The on-site silty sand soils should be treated with lime-fly Ash in accordance with TxDOT 2014 Standard Specifications Item 265. Based on the classification test results, we recommend about 2 percent lime and 8 percent fly Ash by dry weight be used for estimating and planning. The percentages are given as application by dry weight and are typically equivalent to about 10 pounds of lime and 40 pounds of fly Ash per square yard per 6-inch depth. Lime-fly Ash is also available pre-mixed, typically in percentages of 20 percent lime and 80 percent fly Ash. These pre-mixed products may be used if preferred at a rate of 50 pounds per square yard per 6-inch depth. The actual quantity of the lime and fly Ash should be determined at the time of construction once the pavement subgrade is exposed. The subgrade should be treated in accordance with TxDOT Standard Specification Item 265 for lime-fly Ash treated subgrade. The subgrade should be compacted to at least 95 percent of the Standard Effort (ASTM D 698) maximum dry density at a moisture content within ±2 percent of the optimum moisture content.

4. We recommend that the side slopes of the proposed the proposed slope of 3(H):1(V) can be used for the design of the slope for the proposed roadside ditch side.

2.0 INTRODUCTION

It is planned to improve approximately 11,500-linear feet, from 200-ft east of railroad crossing to the intersection of Cedar Creek Road and Highway 6 in Waller County, Texas. The Existing 18-ft wide asphalt pavement shall be converted into 22-ft wide asphalt pavement. The project vicinity map is presented in Plates 1 and A-1. The plan of borings for the project alignments is presented on Plates 2 and A-2.

The purpose of our study was to explore the subsurface conditions at the project site. The information obtained was used to develop recommendations and to guide design and reconstruction/rehabilitation of existing asphalt pavement based on AASHTO 1993 Guide of Design of Pavement Structure (Ref. 3).

This report presents the results of our observations during site visit, geotechnical field exploration and laboratory testing together with the reconstruction/rehabilitation of existing asphalt pavement at Double Culvert Road and Cedar Creek Road in Waller County, Texas. The pavement design in this study is generally in accordance with AASHTO 1993 Guide of Design of Pavement Structure (Ref. 3). Furthermore, our site preparation and soil stabilization recommendations are generally developed on the basis of the "Regulations of Waller County, Texas for the Approval and Acceptance of Infrastructure" dated December 6, 2023 (Ref. 2).

3.0 FIELD EXPLORATION

3.1 General

The soil conditions were explored by conducting ten (10) borings (B-1 through B-3, B-5, and B-7 through B-10) to a depth of 10-ft, and B-4 and B-6 to a depth of 20-ft from the existing grade along the project alignment. The results of pavement drilling show that the existing pavements generally consist of asphalt with a flexible base between B-1 through B-10. The pavement component thicknesses at the boring locations, shown on Plates 4 and A-2-1, and the Summary of Boring Locations on Plate A-2-2, are listed in Appendix A. The pavement borehole locations were grouted after the completion of the fieldwork.

3.2 Drilling and Sampling

The soil conditions were explored by conducting ten (10) borings (B-1 through B-10) along the project alignments. The plan of borings is presented on Plates 2 and A-2. The schedule of borings is as follows:

Facility	Borings [1]	Depth, ft [2]
Paving, Pipeline Crossing/ Box Culvert	B-1 through B-3, B-5, and B-7 through B-10	10
	B-4 and B-6	20

Notes 1 & 2: The number of borings and depths were specified by the client.

Soil samples were obtained continuously at each boring location from the pavement surface to the completion depth of 10-ft and at five-ft intervals thereafter to the completion depth of the borings at 20-ft. The cohesive soils were sampled in general accordance with ASTM D 1587, using a Shelby Tube sampler.

Cohesionless and some of cohesive soils were generally sampled with a split-spoon sampler driven in general accordance with the Standard Penetration Test (SPT), ASTM D 1586. This test is conducted by recording the number of blows required for a 140-pound weight falling 30 inches to drive the sampler 12 inches into the soil. Driving resistance for the SPT, expressed as blows per foot of sampler resistance (N), is tabulated on the boring logs.

Soil samples were examined and classified in the field, and cohesive soil strengths were estimated using a calibrated hand penetrometer. This data, together with a classification of the soils encountered and strata limits, is presented on the soil stratigraphy profile on Plate 3 and A-3. The logs of borings are presented on Plates A-4 through A-13 in Appendix A. A key to log terms and symbols is shown on Plate A-14 in Appendix A.

Borings were drilled dry, without the aid of drilling fluids, to more accurately estimate the depth to groundwater. Water level observations made during and after drilling are indicated at the bottom portion of the individual logs. The boreholes were grouted with non-shrink grout, using Tremie Method, after the completion of the field work.

Pictures of the project site were taken during our field explorations. These pictures are presented on cover page and Appendix C.

4.0 LABORATORY TESTING

4.1 General

Soil classifications and shear strengths were further evaluated by laboratory tests on representative samples of the major strata. The laboratory tests were performed in general accordance with ASTM Standards. Specifically, ASTM D 2487 is used for classification of soils for engineering purposes.

4.2 Classification Tests

As an aid to visual soil classifications, physical properties of the soils were evaluated by classification tests. The tests were conducted in general accordance with ASTM Standards. These tests consisted of natural moisture content tests (ASTM D 4643), percent finer than the No. 200 sieve tests (ASTM D 1140), Atterberg limit determinations (ASTM D 4318, Method A) and dry unit weights. Similarity of these properties is indicative of uniform strength and compressibility characteristics for soils of essentially the same geological origin. Results of these tests are tabulated on the boring logs at respective sample depths.

4.3 Particle Size Analysis Tests

This test was conducted in general accordance with ASTM D 7928, the Standard Test Method for Particle-Size Distribution of Fine-Grained Soils Using the Sedimentation Analysis. A sieve analysis was performed on the soil samples retained on the No. 200 sieve if any were obtained. The test results are presented on plates B-1 through B-4 in Appendix B.

4.4 Strength Tests

Undrained shear strengths of the cohesive soils, measured in the field, were verified by calibrated hand penetrometer tests, unconfined compressive strength tests (ASTM D 2166) and torvane tests. Natural water content and dry unit weight were determined routinely for each unconfined compressive strength test. These test results are also presented on the boring logs.

4.5 Soil Sample Storage

Soil samples tested or not tested in the laboratory will be stored for a period of three months subsequent to submittal of the final report. The samples will be discarded after this period, unless we are instructed otherwise.

5.0 DESKTOP GEOLOGIC FAULT STUDY

5.1 Site Conditions

The project alignment exhibits a topographic variation of about 36-ft for Double Culvert Road and 53-ft for Cedar Creek Road. Currently, the project alignment is covered with asphalt pavement. In general, the area along the project alignment consists of residential facility. Project site alignment pictures were taken during our site visit. These pictures are presented on the cover page and in Appendix C.

5.2 Site Geology

A review of the Geologic Map of Texas indicates that the project site is geologically located on Willis Formation. The geologic character of Willis Formation (Ref. 5) is described below:

The Willis Formation (QWC), mapped on the Beaumont Sheet of the Geologic Atlas of Texas, is a sedimentary rock unit of Late Pliocene to Early Pleistocene age. It is predominantly composed of reddish-brown to yellowish-brown sands and gravels that are coarse to fine-grained, often ferruginous due to iron oxide staining, and moderately to poorly consolidated. The formation also contains clayey lenses, occasional gravel beds of quartz and chert, and in some places, ironstone layers. It was deposited in high-energy fluvial and deltaic environments, resembling braided river systems, with little to no marine influence. Fossils are generally absent, and where present, are rare and limited to plant fragments. Stratigraphically, the Willis Formation lies above the Miocene Fleming Formation and may be overlain by younger Quaternary deposits (Ref. 5).

In some regions of southeastern Texas, the formation is subdivided into three informal members: the Hockley Mound Sand (approximately 20–25 feet thick), the Willis Ferruginous Sand (about 30–60 feet thick), and the Willis Gravelly Sand (roughly 30–40 feet thick). The total thickness of the formation can locally exceed 100 feet. Geographically, it outcrops in a 15–20-mile-wide belt stretching across southeastern Texas into southwestern Louisiana, commonly in upland terrains inland from the Gulf Coast. Hydrogeologically, the Willis Formation has limited aquifer potential; it may act as a minor aquifer in sandy zones or serve as a confining unit where dominated by clay or cemented materials. Water quality is variable and often high in iron and manganese, making it unsuitable as a major source of potable water. This unit is thoroughly documented in the Geologic Atlas of Texas, the USGS National Geologic Map Database, and groundwater reports by the Texas Water Development Board. The geology map of the area is presented on Plate A-15.

5.3 Desktop Geologic Fault Study

Many faults have been observed within the Gulf Coast Region of Texas. In general, faults are caused by groundwater and oil removal from the underlying surface. Faults originate several thousand feet below the ground surface and can often cause displacement of the ground surface, causing broken pavement, ruptured utility lines, and damage to residential and commercial structures. The geologic fault maps of the area are presented on Plates A-16 through A-18.

Our review of the fault maps indicates that there are no major active faults located along the project alignments. However, faults may be present that are absent from the published maps. The closest known fault to the project alignment is Hockley-Conroe Fault system located approximately 6.0-miles to the east of the project alignment. No special study of movement rates for any of these faults was attempted. Therefore, it is our opinion that there is a relatively low risk of surface faulting at the project site.

6.0 SUBSURFACE SOIL AND GROUNDWATER CONDITIONS

6.1 Site Conditions

The project alignments exhibit a topographic variation of about 83-ft. Currently, the project alignments are covered with asphalt pavement. In general, the area along the project alignments consists of residential facilities. Project site alignments pictures were taken during our site visit. These pictures are presented on the cover page and in Appendix C. A field visit was conducted by Mr. Nikolas Darehshoori and Daniel Seong, Project Managers, at GET on April 25, 2025. During our field visit, we observed asphalt pavement cracking at multiple locations of the asphalt roads.

6.2 Soil Stratigraphy

Subsurface soils appear to be relatively variable across the site. Details of subsurface conditions at each boring location are presented on the boring logs. In general, the soils can be grouped into three (3) major strata with depth limits and characteristics as follows:

Stratum No.	Range of Depth, ft.	Soil Description*
–	0.08 – 0.25	ASPHALT PAVEMENT (1.0-inch to 3-inch in thickness)
–	0.38 – 0.71	BASE COURSE (4.5-inch to 8.5-inch in thickness)
I	0.63 – 20	SILTY SAND (SM), loose to dense, light brown to dark brown, reddish brown, gray, dark gray, with root fibers to 2', ferrous nodules, gravels
II	0.63 – 20	LEAN CLAY (CL), soft to hard, light brown to dark brown, gray, dark gray, with root fibers to 20', ferrous nodules, gravels
III	0.83 – 10	FAT CLAY (CH), soft to very stiff, light brown to dark brown, reddish brown, gray, dark gray, with root fibers to 6', ferrous nodules, gravels

*Classification in accordance with the Unified Soil Classification System (ASTM D 2487)

6.3 Soil Properties

Based on results of soil laboratory testing, the engineering properties soils and how they relate to the pavement design along the project alignments are summarized below:

Stratum No.	Soil Type	SPT	PI (s)	Soil Expansivity	Soil Shear Strength, tsf	Remarks
I	Silty Sand (SM)	9 – 20	–	Non- Expansive	–	Moisture Sensitive
II	Lean Clay (CL)	17 – 20	7 – 29	Non- Expansive	0.23 – 2.5	Moisture Sensitive
III	Fat Clay (CH)	–	35 – 46	Expansive	0.23 – 1.86	–

Legend: PI = Plasticity Index
SPT = Standard Penetration Test

6.4 Water-Level Measurements

The soil borings were dry augered to evaluate the presence of perched or free-water conditions. The levels where free water was encountered in the open boreholes during our field exploration and about 0.33 hours after drilling are shown on the boring logs. Our groundwater measurements are as follows:

Boring No.	Groundwater Depth, ft. at the Time of Drilling	Groundwater Depth, ft. at 0.33 Hour Later
B-1 through B-10	Dry	Dry

Fluctuations in groundwater generally occur as a function of seasonal moisture variation, temperature, groundwater withdrawal, water level and future construction activities that may alter the surface drainage and subdrainage characteristics of this site.

An accurate evaluation of the hydrostatic water table in the relatively impermeable clays and low permeable silts/sands requires long term observation of monitoring wells and/or piezometers. It is not possible to accurately predict the pressure and/or level of groundwater that might occur based upon short-term site exploration. The installation of piezometers/monitoring wells was beyond the scope of our study. We recommend that the groundwater level be verified just before construction if any excavations such as construction of underground utilities, etc. are planned.

We recommend that GET be immediately notified if a noticeable change in groundwater occurs from that mentioned in our report. We would be pleased to evaluate the effect of any groundwater changes on our design and construction sections of this report.

7.0 GEOTECHNICAL ENGINEERING RECOMMENDATIONS

7.1 Underground Utilities

7.1.1 General

We understand that the underground utility installations will include water lines. The installation depth of the proposed pipeline is assumed to require a cover depth ranging from 8 to 10 feet.

We understand that the proposed underground utilities will be constructed in accordance with the City of Houston Specifications, Section 02447 – Augering Pipe and Conduit (Ref. 1)

7.1.2 Open-Trench Method

The bedding and backfill for the proposed waterlines should be constructed in accordance with the City of Houston Specifications, Section 02317 – Excavation and Backfill for Utilities – Section 02447 – Dry and Slurry Augering of Pipe and Conduit. Trenches for the proposed waterlines must have a width below the top of the pipe of not less than the outside diameter of the pipe plus 36-inches and shall be wide enough to permit making up the joints. Sufficient space should be provided between shoring cross braces to permit equipment operations and handling of forms, pipe embedment and backfill, and other materials.

The results of our field exploration and laboratory testing indicate that unsatisfactory soils for excavation, such as silty sand (SM), soft lean (CL) and fat clay (CH), encountered in the borings. A summary of the unsatisfactory soils locations and depths are as follows:

Boring(s)	Depth, ft.
B-1 and B-2	0 to 1
B-3	0 to 4
B-4	0 to 6/ 13 to 20
B-5	0 to 4/ 8 to 10
B-6	0 to 6
B-9	8 to 10
B-10	0 to 2

If these conditions are encountered during the time of construction, suitable groundwater control measures should be implemented. Furthermore, the contractor may have to over excavate an additional 1-ft and remove unstable or unsuitable materials with approval by geotechnical engineer, then place an equal depth of cement stabilization sand.

Due to potential variability of the on-site soils, unstable trench conditions may still exist in the areas where we did not conduct our borings. If these conditions are encountered during the time of construction, a stable trench should be provided to allow proper bedding and installation.

Sand backfill used in the cement-stabilized sand and sand backfill sections should be free of clay lumps, organic materials, or other deleterious substances, and should have a PI less than 4 for the cement-stabilized sand and less than 7 for the sand backfill section, and not more than 15% passing the No. 200 sieve. Cement stabilized sand should conform to the City of Houston Specifications, Section 02321 – Cement Stabilized Sand.

Our recommendation on trench safety at the project site does not address the effects of excavations on existing buildings/facilities at the project site. This study was outside the scope of our work.

7.1.3 Trenchless Method (Augering)

We understand that Augering may be used for the underground utility installations along the proposed alignments in waller County, Texas. The augering should be conducted in accordance with the City of Houston Specifications, Section 02447 – Dry and Slurry Augering of Pipe and Conduit. Augering should be started from approved pit locations. Excavation for pits and shoring installation should conform to the City of Houston Specifications, Section 02317 – Excavation and Backfill for Utilities. If the augering zone is within the cohesionless soils or collapsible soils, install casings as required by the City of Houston Specifications, Section 02447 – Dry and Slurry Augering of Pipe and Conduit. The augering near existing structures or utility lines should be conducted in accordance with the City of Houston Specifications, Section 02233 – Clearing and Grubbing.

Diameter of auger hole should not exceed pipe bell diameter plus 2-inches. The receiving pit distance should conform to the aforementioned the City of Houston Specifications. A minimum spacing of 6-inch should be provided between the pipe and walls of bore pit. The maximum allowable width of pit shall be 5-ft unless approved by waller County Engineers. Width of pit at surface shall not be less than the pit width at the bottom.

7.1.4 Trenchless Method (Horizontal Directional Drilling)

The horizontal directional drilling method, if used, shall be in accordance by City of Houston Specifications. The pipe used in horizontal directional drilling method shall be determined by design calculations. The drilling fluids must be prevented from entering the manholes, sanitary and storm sewers, or other drainage systems, and any Waters of the United States including creeks and streams. A strict minimum bending radius guideline shall be imposed to avoid an excessively sharp bending radius and prevent damages to the pipe. Drilling mud shall be used during drilling and back-reaming operations. Drilling mud pressure in the borehole shall not exceed that which can be supported by the overburden to prevent heaving or hydraulic fracturing of the soil.

The sections of pipe must be assembled and joined on the job site above ground. If High Density Polyethylene Pipe is used, joining must be accomplished by the butt-fusion method by qualified fusion technicians in strict conformance with the manufacturer's printed instructions. The joints must have a smooth, uniform, double rolled back bead made while supplying the proper melt, pressure and alignment. If PVC Pipe is used, joining must be accomplished by the butt-fusion method in strict conformance with the manufacturer's printed instructions.

Excess drilling mud slurry must be contained in a lined pit or container pound at exit and entry points until recycled or removed from the site. Entrance and exit pits must be large enough to contain the expected return of drilling mud and spoils. Precautions must be taken to keep drilling fluids out of the streets, manholes, sanitary and storm sewers, and other drainage systems including streams and rivers.

7.1.5 Loads Imposed on Buried Pipes

7.1.5.1 General

The loads on an underground pipe depend principally upon the weight of overburden soils, roadway and loads due to surcharges. For design of concrete pressure pipe, linear load due to overburden can be determined based on the design tables and charts presented in the "AWWA Manual of Water Supply Practices Concrete Pressure Pipe (AWWA M9)" developed by the American Concrete Pipe Association. Overburden pressure for the buried pipes at the project alignments are estimated by using the soil density (γ) and the height of the soil over the pipe (H). We assumed that the depth of the pipeline at road crossing be about 8- to 10-ft.

7.1.5.2 Loads Due to Overburden Pressure

Overburden or prism load for buried pipes is given by the following equation:

$$P = \gamma H$$

Where: P = Load due to weight of soils at depth, psf
γ = Total Unit weight of soil, 125 pcf
H = Height of the soil over the pipe, ft

Loadings per linear foot of pipe:

$$W_e = C_d \gamma (B_d)^2 \text{ (Marston Equation)}$$

$$C_d = \frac{1 - e^{-2ku'\left(\frac{H}{B_d}\right)}}{2ku'}$$

Where: W_e = Load, pounds per linear foot (lb/ft)
B_d = Trench width (ft)
C_d = Load Coefficient
k = Friction angle between backfill and soil
u' = Coefficient of friction between fill material and sides of trench
ku' = for sand = 0.165
for clay = 0.130
for saturated clay = 0.110

7.1.5.3 Piping System Thrust Restraint

Fittings on underground pipes are subject to thrust forces inherited from the fluid pressure in the pipe and are directly proportional to the fluid pressure. Unbalance thrust forces will be developed in pressure pipelines due to changes in direction, cross-sectional areas, or when the pipe is terminated. These forces may cause joints to disengage if not adequately restrained. There will be a slight loss of head due to turbulence friction in bends of the pipes. This loss will cause a pressure change across the bend, but it is usually small enough to be neglected.

The thrust force may require more reaction than is available just from the pipe bearing against the backfill. In order to prevent intolerable movement and overstressing of the pipe, suitable buttressing should be provided. In general, thrust blocks, restrained joints and tie rods are common methods of providing reaction for the thrust restraint design. The thrust restraint design provisions described in this section are based on the American Water Works Association Manual M9 (1996)-Concrete Pressure Pipe.

The force diagram shown on Plate 5 illustrates the thrust force generated by flow at a bend in the pipe. The equations for computing this thrust force are also given on this plate. The values of thrust force for a surge pressure of 50 psi were computed for a bend angle of 90 degrees. Results are presented on Plate 5. Once the size of the thrust is determined, a thrust block size can be calculated based on the bearing capacity of the soil. The area of block required is equal to the thrust force (lb) divided by the safe bearing value of the soil (psf). In cohesive soils, the safe bearing value is equal to 2/3 of the average shear strength of the soil adjacent to the block which includes a factor of safety of 3. We believe that a factor of safety of 3 is appropriate in order to limit deflections required to mobilize the passive resistance within tolerable values.

For granular soil encountered at this site, a safe bearing value for thrust blocks can be taken as 90% of the effective overburden pressure at the mid height of the thrust block which includes a factor of safety of 3. The effective overburden pressure can be calculated based on the effective unit weight of the soil above the mid-height of the thrust block.

Geotechnical design parameters for designing the necessary buttressing are as follows:

γ : = Wet unit weight of soil − above water level : 125 pcf
Submerged unit weight of soil − below water level : 60 pcf
c : = Cohesion = 1000 psf (for clay)
ϕ : = Angle of internal friction = 30 degrees (for sand)

7.1.6 Groundwater Control

7.1.6.1 General

Our short-term field exploration indicates that groundwater was not encountered during and after 0.33-hour of drilling. Hence, groundwater dewatering system may not be required. Fluctuations in groundwater can occur as a function of seasonal moisture variation. Groundwater control recommendations are presented in the following report sections.

7.1.6.2 Dewatering Technique

In the event that groundwater is encountered during construction, it is our opinion that groundwater should be lowered to a depth of at least three-ft below the deepest excavation grade in order to provide dry working conditions and firm bedding. Any minor water inflow in cohesive soil layers can probably be removed using a sump-pump or trench sump-pump. Wellpoint system can be used in the area where sandy lean clay and silty sand soils are present. **Due to the presence of sandy lean clay and silty sand soils and the hydrostatic pressures, blow up may occur in some areas if an effective dewatering system is not in place at the time of construction.**

Piezometers may be installed near the excavation area to evaluate groundwater levels in the area prior to construction. The piezometers should be left in place during construction to monitor groundwater levels and effectiveness of the dewatering system.

Design of a wellpoint system should consider the amount of groundwater to be lowered and the permeability of the affected soils. The selection and proper implementation of an effective groundwater control system is the responsibility of the contractor. The design of groundwater and surface water should be in accordance with the City of Houston Specifications, Section 01578 − Control of Ground Water and Surface Water.

7.1.7 Backfilling

Sand backfill used in the cement-stabilized sand and sand backfill sections should be free of clay lumps, organic materials, or other deleterious substances, and should have a PI less than 4 for cement-stabilized sand and less than 7 for the sand backfill section, and not more than 15% passing the No. 200 sieve. Cement stabilized sand should conform to the City of Houston Specifications, Section 02321 – Cement Stabilized Sand.

Random fill for zones above pipe bedding should be placed in loose lifts not exceeding eight-inches and compacted to 100% of the natural soil density. This value will be on the order of 95% of standard density (ASTM D 698) at a moisture content between optimum and +3% of optimum. These values should be verified by testing during construction. Off-site borrow, if used, should be limited to lean clays with a liquid limit less than 40 and plasticity index (PI) between 12 and 20 and at least 50% of soil particles passing No. 200 sieve.

Utility embedment depths may be greater than 5-ft below existing grades. Trench backfill in excess of about 5-ft in thickness is prone to post-construction settlements due to compression of the soils from self-weight, even if these fills are properly placed and compacted. This settlement could be about 1- to 2-percent of the thickness of the fill. The potential for this settlement should be considered when designing pavements over deep utility lines. To reduce (but not eliminate) the risk of fill settlement, the portion of the fill below a depth of 5-ft below final grade should be compacted to a minimum of 100 percent of the material's maximum standard Proctor dry density (ASTM D-698).

7.1.8 OSHA Soil Classifications

The subsoils can be classified in accordance with Occupational Safety and Health Administration (OSHA) Standards, dated October 31, 1989 of the Federal Register. OSHA classification system categorizes the soil and rock in four types based on shear strength and stability. The description of four (4) types in classification system is summarized in the Appendix F.

Based on our geotechnical exploration and laboratory test results, details of soil classifications at each boring are summarized in the Trench Safety Report, presented in Appendix F.

7.1.9 Excavations

Each side of an excavation or trench which is five-foot or deeper must be protected by sheeting/bracing shoring or sloped. Based on soil strength data, temporary (less than 24 hours) open-trenched, non-surcharged, and unsupported excavations should be made on slopes of flatter than 1.5 (h):1 (v). Vertical cuts can be constructed, provided shoring and bracing are used for the excavation wall stability. Benched excavation can also be used with average slopes of about 1(h):1(v) and steps should not be higher than five-foot. In all cases, excavations should conform to OSHA guidelines. Flatter slopes may have to be used if large amounts of sand need to be excavated for deep utility installations. Specifications should require that no water be allowed to pond in the excavations. The surface slopes should be protected from deterioration and weathering if they are to be left open for more than 24 hours.

Excavations should be performed with equipment capable of providing a relatively clean bearing area. Excavation equipment should not disturb the soil beneath the design excavation bottom and should not leave large amounts of loose soil in the excavation.

The bearing surface should be protected against disturbance and deterioration by completing the backfilling operations as quickly as possible. The excavation bottom should be properly sloped to allow any water infiltrating into the excavation to pond at a convenient location along the edge of the excavation. This water should be pumped out as soon as possible. Water should not be allowed to stand on the bearing area.

7.1.10 Backfilling Around Manholes

Backfilling around manholes should be at 100% maximum of standard proctor dry density (ASTM D 698), due to potential settlement problems.

7.1.11 Lateral Earth Pressures

In the event that open excavations are not used, the proposed waterlines can be installed using trench sheeting. The sheeting can be constructed in the form of cantilever sheeting or with bracing. Lateral earth pressures for each method used are summarized in appendix F. The trenching and shoring operations should follow OSHA Standards. We recommend that a geotechnical engineer monitor all phases of trench excavation and bracing to assure trench safety.

Lateral earth pressures for each method used are summarized on Plate F-1 through F-5 in appendix F. The trenching and shoring operations should follow OSHA Standards. We recommend a geotechnical engineer monitor all phases of trench excavation and bracing to assure trench safety. Furthermore, a letter for trench safety recommendation is provided separately.

8.0 SLOPE STABILITY ANALYSIS OF ROADSIDE DITCH

8.1 General

We understand that the roadside ditch exists on both sides constructed and may be improved at the project site. Depth of the ditch varies from 3- to 6-ft.

8.2 Slope Stability Analysis

8.2.1 General

Slope stability analyses of the roadside ditch side slopes were performed using Slope/W computer program (Ref. 9) for the furnished cross section for the three following conditions: (a) Short term (ST), (b) Rapid Drawdown (RDD) conditions and (c) Long-term (LT) conditions. The Short term (ST) parameters represent the end of construction loading conditions.

The rapid drawdown (RDD) represents a flooded condition where the water rises to the top of the slope, then recedes fast enough leaving an unbalanced piezometric head behind the slope. Long-term (LT) design values are applicable to soil gravity loads and continuously applied live loads (maintenance vehicle loads, dozer loads, etc.). The long term represents a steady-state soil parameter condition. The results of slope stability analysis for the proposed roadside ditch side slopes are provided in the following sections.

8.3 Design Soil Parameters

Short-terms strengths (Ref. 10) were estimated from undrained test data including hand penetrometer, torvane, and unconfined compression. Soil strength for the long-term and rapid draw-down conditions (Ref. 9 and Ref. 10 were estimated from correlations between the soil index properties, residual and soften secant friction angles (Ref. 10) and previous work experience with similar soils of the same geologic origin. In general, the residual shear strengths parameters are used for the slope stability analyses, instead of the peak shear strengths obtained in the laboratory tests.

The design soil parameters used in the analysis for the assumed cross-section based on Boring B-4 are as follows:

Soil Conditions				Design Strength Parameters					
				Short Term		Rapid Draw Down		Long Term	
Depth Range, ft	Symbol	Description	γ_t, pcf	c^0, psf	ϕ^0	C', psf	ϕ'	C'', psf	ϕ''
0 – 6	SM	Silty Sand (SM)	125	0	30	0	30	0	30
6 – 10	CL	Lean Clay (CL)	115	500	–	310	10	300	12
10 – 20	SM	Silty Sand (SM)	125	0	30	0	30	0	30

Where:

γ_t = Total unit weight of soils, pcf

c^o, c', c" = Undrained, consolidated undrained and consolidated drained, cohesion, psf

ϕ^o, ϕ', ϕ'' = Undrained, consolidated undrained and consolidated drained, angle of internal friction, degrees

8.4 Slope Stability Analysis

Slope stability analyses were performed on the furnished cross section using the computer program "Slope/W". The Morgenstern-Price method of analysis was used for the slope stability analysis. In the Morgenstern-Price analysis method, slope stability is evaluated along a circular arc. The degree of safety is measured by comparison of the driving forces (soil gravity loading, surcharge, etc.) causing movement with the soil friction and cohesive forces resisting failure. The ratio of resisting forces to driving forces defines the factor of safety. During construction, a dozer or other construction equipment are expected to be operated at the project site area. A load of 250 psf was used for both road traffic and live load on top of the bank in our slope stability analysis to represent the unit surcharge load applied to the road surface by the traffic, dozer, construction equipment, or maintenance vehicles.

The slope stability was evaluated for numerous radii representing trial circles originating from a grid system of trial circle centers selected to incorporate the failure. The failure planes with critical factor of safety for each condition are illustrated in Appendix D. The factors of safety for all the conditions for the global stability are shown below:

Design Conditions	Factor of Safety 3(H):1(V)
Short Term Condition (ST)	2.126
Long Term Condition (LT)	1.912
Rapid Drawdown Condition (RDD)	1.905

For a stable slope, we recommend minimum safety factors of 1.3 for the Short Term (ST) condition, 1.25 for the Rapid Drawdown (RDD) condition, and 1.5 for the Long Term (LT) condition. Based on the above-estimated factors of safety, it is our opinion that the proposed slope for the roadside ditches is stable.

8.5 Recommended Slope Ratios

Based on the above-mentioned factors of safety, the proposed slope of 3(H):1(V) can be used for the design of the slope for the proposed roadside ditch side.

9.0 BOX CULVERT RECOMMENDATIONS

9.1 General

We understand that the proposed improvement will include construction of box culverts. We assume that the bottom of the box culvert be about 10-ft from the existing grade. Excavation and groundwater control for construction of these structures should be in accordance with our recommendations provided in construction consideration section of this report. The proposed box culverts may be designed in accordance with the parameters presented on Plate 6. Furthermore, the proposed box culvert will be constructed in accordance with City of Houston "Standard Construction Specifications for wastewater Collection Systems, water Lines, Storm Drainage, Street Paving and Traffic, City of Houston 2019 Standard Specification (Ref. 1).

9.2 Bedding and Backfilling

The proposed box culvert structures should be placed on a well prepared, properly compacted working surface. Cast-in-place culverts can be supported on the natural soils or compacted structural fill provided subgrade is protected from construction disturbances and surface water is not allowed to pond within the excavation. We recommend the exposed subgrade be uniformly proofrolled to at least 95 percent of Standard Proctor (ASTM D 698) maximum dry density at a moisture content between optimum and +3% of optimum.

Sand used in the cement-stabilized sand backfill sections should be free of clay lumps, organic materials, or other deleterious substances, and should have a PI less than 4 for the cement-stabilized sand, and not more than 15% passing the No. 200 sieve.

9.3 Buoyancy

The proposed box culvert structures may experience uplift loads from the groundwater during flood conditions. The box culverts should perform satisfactorily if a design factor of safety against uplift loads of 1.5 is used. In general, the hydrostatic pressure will be resisted by the dead weight of the structure, weight of the overburden soils above the top of the box culverts and the friction or adhesion between the walls and natural soils or fill. A submerged unit weight of 60 pounds per cubic foot (pcf) and 85 pcf can be used for soils and concrete, respectively, to compute the resistance to uplift loads. An adhesion value of 200 psf can be used between the backfill and the box culverts to resist the uplift loads. A factor of safety of 2.0 is included in the adhesion value.

10.0 PAVEMENT DESIGN

10.1 General

It is planned to improve approximately 11,500- feet from 200-ft East of Railroad Crossing to the intersection of Cedar Creek Road and Highway 6 in Waller County, Texas. The Existing 18-ft wide asphalt pavement shall be converted into 22-ft wide asphalt pavement. The pavement design in this study is generally in accordance with AASHTO 1993 Guide of Design of Pavement Structures (Ref. 2) and Waller County Engineering Design Standard 2023 (Ref. 4).

10.2 Traffic Information

In absence of traffic data, the estimated design ESALs of 0.2×10^6 were used to calculate thicknesses of the flexible pavements for this project over a design life period of 20 years.

10.3 Recommended Subgrade Design Values

Our reviews for laboratory test results indicate that subgrade soils are silty sand (SM), lean clay (CL), fat clay (CH) soils based on unified soils classification system (ASTM D 2487). The recommended design parameters for California Bearing Ratio (CBR) and Resilient Modulus (M_R) values are 4 and 6,000 psi, respectively.

10.4 Design Parameters and Pavement Recommendations

The following design parameters (based on ASSHTO 1993 Guide of Design of Pavement Structure (Ref. 2) were used for the proposed pavement project.

AASHTO Design Parameter	Design Value
ESAL × 10^6 for 20-year design life	0.2
Reliability, R	95%
Overall Standard Deviation, S_0	0.45
Drainage Coefficient, m_i	1.0
Design Serviceability Loss, Δ psi	1.7
California Bearing ratio (CBR)	4
Subgrade Resilient Modulus (M_R) in psi	6,000
Structural Layer Coefficients	
Hot-Mixed Hot-Laid Asphalt Surface Material	0.44
Crush Limestone Base	0.14
Lime-Stabilized or Lime-Fly Ash Stabilized Earth	0.11

The recommended pavement component thicknesses during reconstruction are summarized as follows:

10.4.1 Full Depth Reconstruction

Based on the above design parameters, the recommendations for the minimum asphalt pavement section thickness are as follows:

Design, ESAL Local Streets	Asphalt Pavement Minimum Thickness inch(es)	Crushed Limestone Base Thickness, inch(es)	Subgrade Stabilization Thickness, inch(es)
0.2×10^6	2.0	8.0	10.0

Our field and laboratory tests indicate that the surficial soils consist of lean clay, fat clay, and silty sand soils. The type of subgrade stabilization for the rigid pavement areas will depend on the final grade elevation. The subgrade preparation in pavement areas should specify compaction of the upper six-inch to 100% of maximum standard Proctor density (ASTM D 698) at a moisture content between optimum and +3% of optimum moisture content.

Instead of crushed limestone base course, black base can also be considered along with Hot mix hot-laid asphaltic concrete with subgrade stabilization as shown below:

Design, ESAL	Asphalt Pavement Thickness, inch(es)	Black Base Course Thickness, inch(es)	Subgrade Stabilization Thickness, inch(es)
0.2×10^6	3.0	8.0	8.0

Detailed design computation is presented on Appendix E. Our design recommendations also consider good drainage is provided near the pavement structures, assuming the pavement are exposed to moisture levels approaching saturation from 1 to 5 percent of the time.

Depending on the type of soils encountered along the project alignments, lime stabilization/ lime-fly Ash of the subgrade soils should most likely be performed. The subgrade cohesive soils should be stabilized, using lime based on TxDOT Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges, Items No. 260 and 263 (Ref. 2). Use 6% lime by dry weight to stabilize the subgrade soils. This results in application rates of 27 pounds of lime, per square yard per six-inch of compacted thickness. TxDOT Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges, Items No. 260 and 263, can be used as procedural guides for placing, mixing and compacting the lime stabilizer and the soils.

The on-site silty sand soils should be treated with lime-fly Ash in accordance with TxDOT 2014 Standard Specifications Item 265. Based on the classification test results, we recommend about 2 percent lime and 8 percent fly Ash by dry weight be used for estimating and planning. The percentages are given as application by dry weight and are typically equivalent to about 10 pounds of lime and 40 pounds of fly Ash per square yard per 6-inch depth. Lime-fly Ash is also available pre-mixed, typically in percentages of 20 percent lime and 80 percent fly Ash. These pre-mixed products may be used if preferred at a rate of 50 pounds per square yard per 6-inch depth. The actual quantity of the lime and fly Ash should be determined at the time of construction once the pavement subgrade is exposed. The subgrade should be treated in accordance with TxDOT Standard Specification Item 265 for lime-fly Ash treated subgrade. The subgrade should be compacted to at least 95 percent of the Standard Effort (ASTM D 698) maximum dry density at a moisture content within ±2 percent of the optimum moisture content.

The subcontractor who will be doing the subgrade stabilization should be experienced with stabilization procedures and methods. Furthermore, all of the earthwork at this project should be monitored by our geotechnician to assure compliance with the project specifications.

Once the subgrade is constructed, the soils at the top of subgrade should be slicked and the subgrade needs to be crowned such that the all-surface water would drain away. No low areas should be left within the subgrade areas since these areas would hold water and destroy the subgrade structure.

Our recommendations on subgrade stabilization are preliminary. The actual depth and type of stabilization should be determined in the field at the time of construction just after site stripping and proofrolling. Furthermore, the type and amount of the stabilizer may vary depending on the final grade elevation and the soil type encountered.

11.0 CONSTRUCTION CONSIDERATIONS

11.1 Surface Water Drainage

In order to minimize ponding of surface water, site drainage should be established early in the project construction so that this condition will be controlled.

11.2 Site Preparation

Portions of project site has the potential for construction problems related to the surficial layer of cohesionless soils (Borings B-1 through B-6, and B-10). These permeable surficial soils are underlain by relatively impermeable clay soils. Thus, due to poor site drainage, wet season or site geohydrology, water ponds on the clays soils and creates a "perched water table condition". The surficial cohesionless soils could become extremely soft when wet, and must be stabilized, aerated, or replaced. In the event that these surficial soils become wet, they will experience rutting and pumping. Therefore, these soils may have to be improved. Our recommendations on subgrade improvements are presented in the earthwork section of this report. Our site preparation recommendations are presented below:

1. If reconstruction is selected, the requirement for removal of any existing paving, and subsoil materials will depend on final grades and other alignments information. In general, remove all vegetation, tree roots, organic topsoil, existing foundations, paved areas and any undesirable materials from the construction area. Tree trunks under the construction areas should be removed to a root size of less than 0.5-inch. We recommend that the stripping depth be evaluated at the time of construction by a soil technician.

2. The subgrade areas should then be proofrolled with a loaded dump truck or similar pneumatic-tired equipment with loads ranging from 25- to 50-tons. The proofrolling serves to compact surficial soils and to detect any soft or loose zones. The proofrolling should be conducted in accordance with TxDOT Standard Specification Item 216. Any soils deflecting excessively under moving loads should be undercut to firm soils and recompacted. Any subgrade stabilization should be conducted after site proofrolling is completed and approved by the geotechnical engineer. The proofrolling operations should be observed by an experienced geotechnician.

3. Off-site borrow for embankment fill should consist of lean clays with a liquid limit (Tex-104-E) not exceeding 40 and a plasticity index (Tex-106-E) between 12 and 20 (Texas Department of Transportation Specification, Item No. 132, 134, and 152). These soils should be placed in loose lifts not exceeding eight-inch and compacted to at least 95% of maximum standard density (ASTM D 698) at a moisture content between optimum and 3%. Fat clays should not be used as fill for embankment construction. Bank sands should not be used as select structural fill. On-site soils, free of organics (with the exception of sands and silts) are also suitable for use as structural fill.

4. In cut areas, the soil should be excavated to grade and the surficial soil proofrolled and scarified to a minimum depth of six-inch and recompacted to the previously mentioned density and moisture content.

5. Positive site drainage should be developed at the beginning of the project to limit construction difficulties with wet surface soils density and moisture content.

11.3 Suitability of On-Site Soils for Use as Fill

11.3.1 General

The on-site soils can be used as fill. There are typically three types of fill at a site. These fills can be classified as described in the following report sections.

11.3.2 Select Structural Fill

This is the type of fill that can be used under the paving, etc. These soils should consist of lean clays, free of root organics, with liquid limit of less than 40 and plasticity indices between 12 and 20 and at least 50% of soil particles passing No. 200 sieve.

11.3.3 Structural Fill

This type does not meet the Atterberg limit requirements for select structural fill. This fill should consist of lean clays or fat clays. They can be used under paving. Sands can be used as structural fill. However, these soils may pump when they are wet.

11.3.4 General Fill

This type of fill consists of sands and silts. These soils are moisture sensitive and are difficult to compact in a wet condition (they may pump). These soils can be used as structural fill on areas with the understating that they can erode easily and if they get wet, they are difficult to compact (they may pump). These soils can result in a perched water table. The owner and the civil engineer must be aware of these potential issues.

11.3.5 On-Site Fill Soil Classification

The on-site soils can be used as fill materials as described below:

Stratum No.[1]	Soil Type	Use as Fill			Notes
		Select Structural Fill	Structural Fill	General Fill	
I	Silty sand (SM)	–	–	✓	2, 3
II	Lean Clay (CL)	–	✓	✓	2, 4
III	Fat Clay (CH)	–	✓	✓	2, 5

Notes:

1. See soil stratigraphy and design conditions sections of this report for strata description.
2. All fill soils should be free of organics, roots, etc.
3. The on-site cohesionless soils are moisture sensitive and erode easily. These soils will pump when they get wet. Compaction difficulties will occur in these soils in a wet condition.
4. These soils, once lime modified (4% by dry weight), can be used as select structural fill.
5. These soils, once lime modified (6% by dry weight), can be used as select structural fill.

11.4 Earthwork

11.4.1 General

Difficult access and workability problems can occur in the surficial soils due to poor site drainage, wet season, or site geohydrology. Based on the laboratory test results, the surficial soils at the project site consist of silty sand (SM), sandy lean clay, lean clay (CL) and fat clay (CH) soils. Considering the soils stratigraphy, the construction of this project should be conducted during the dry season to avoid major earthwork problems. Our recommendations for earthwork activity for areas with cohesive and cohesionless soils are provided separately in the following sections.

11.4.2 Earthwork for Cohesive Soils

Difficult access and workability problems can occur in the surficial cohesive soils due to poor site drainage, wet season, or site geohydrology. Should this condition develop, drying of the soils for support of pavement may be improved by the addition of 6% lime by dry weight. The application rate corresponding to this additive amount would be approximately 27 pounds per square yard for each eight-inch of compacted thickness.

Texas Department of Transportation (TxDOT) Specifications, Items 260 and 263, shall be used as procedural guides for placing, mixing, and compacting lime stabilizer and the soils.

Our recommendations on subgrade stabilization are preliminary. The actual depth and type of stabilization should be determined in the field at the time of construction just after site stripping and proofrolling. The required amount of lime for stabilization should be determined by ASTM C 977 Method. Furthermore, the type and amount of the stabilizer may vary depending on the final grade elevation and the soil type encountered.

Provided the site work is performed during dry weather and/or project schedules permit aeration of wet soils, the subgrade will be suitable for pavement support.

11.4.3 Earthwork for Cohesionless Soils

Difficult access and workability problems will most likely occur in the surficial cohesionless fill soils due to poor site drainage, wet season, or site geohydrology. Considering the soils stratigraphy, the construction of this project should be conducted during the dry season to avoid major earthwork problems. In the event the subgrade soils become wet and experience pumping problems, they can be (a) improved with drainage, (b) improved with soil mixing, (c) opened up to dry up, (d) removed and replaced with dry cohesive soils or (e) chemically modified or stabilized. These alternatives are discussed in the following report sections.

11.4.3.1 Improving Drainage

The project site drainage in the pumping soils can be accomplished by placing several shallow bleeder ditches (about 18-inches ±) in the surficial cohesionless soils. These bleeder ditches should be directed to a low area, such as a hole (detention pond) or another ditch in the lowest elevation area of the site. This will allow the surficial soils to drain the water and make the drying process faster. The hole/low area should not be under the building areas. The excess water can be pumped out of the hole and moved off-site.

11.4.3.2 Soil Mixing

The on-site cohesionless soils can be mixed with on-site cohesive soils, ft clay (stratum III) to reduce subgrade pumping. GET can do a mix design to come up with soil mix percentages, if this option is considered.

11.4.3.3 Subgrade Drying

The on-site wet soils can be opened up so that it would dry up. However, opening up the surficial cohesionless soils for drying purposes may not be practical, due to cyclic rainfall in the Gulf-Coast area.

11.4.3.4 Removal and Replacement

The surficial cohesionless soils can be removed and replaced with select structural fill. The actual depth of removal and replacement should be evaluated in the field, but it can be the whole thickness of surficial cohesionless soils. This procedure will include removal of the surficial cohesionless soils, proofrolling and compacting the subgrade cohesive soils to a minimum of 95 percent standard proctor density (ASTM D 698). The site can then be backfilled with select structural fill, compacted to a minimum of 95 percent of standard Proctor density. The proofrolling should be in accordance with the site preparation section of this report. All of the fill soils should be placed and tested in accordance with the site preparation section of this report.

11.4.3.5 Modification/Stabilization

It is recommended that the on-site cohesionless soils be modified (to dry up), using 5 to 10 percent fly ash by dry weight in accordance with City of Houston Specifications, Section 02337. The estimated amounts of fly ash per depth of modification are as follows:

Modification Depth, in.	Fly Ash Weight Range, lbs. per Square Yard	
	5%	10%
6	23	45
12	46	90
18	69	135
24	92	180

We recommend that five percent fly ash be used if the surficial soils are relatively moist at the time of application. Higher levels (10 percent) of fly ash should be used if wet and soggy subgrade soils are encountered.

The subgrade soils should be removed to a depth of 24-inches (or more) below existing grade. These soils should be stockpiled. The soils below a depth of 24-inches should be modified to a depth of 12-inches. These soils should be compacted to a minimum of 95 percent of standard Proctor density (ASTM D 698). The stockpiled soils should then be modified and replaced in six-inch lifts and compacted to 95 percent of maximum dry density as determined by ASTM D 698 at moisture contents within ±2 percent of optimum.

Due to poor drainage and the depth of the cohesionless soils, the depth of stabilization may be as deep as depth of cohesionless soils. A test section can be implemented for this purpose. The subgrade soils should be modified in six-inch lifts and compacted within four hours of mixing and placement. All of the subgrade soils should be compacted to a minimum of 95 percent of the standard Proctor density at the moisture content of ±2 percent of optimum. The degree of compaction for the lifts, below a depth of 24-inches can be relaxed to 90 percent of maximum dry density to ease the construction procedures.

The subcontractor who will be doing the subgrade modification or stabilization should be experienced with stabilization procedures and methods. Furthermore, all of the earthwork at this project should be monitored by our geotechnician to assure compliance with the project specifications.

Once the subgrade is constructed, the soils at the top of subgrade should be slicked and the subgrade needs to be crowned such that the all-surface water would drain away. No low areas should be left within the subgrade areas, since these areas would hold water and destroy the subgrade structure.

Our recommendations on subgrade stabilization are preliminary. The actual depth and type of stabilization should be determined in the field at the time of construction just after site stripping and proofrolling. Furthermore, the type and amount of the stabilizer may vary depending on the final grade elevation and the soil type encountered.

11.5 Construction Surveillance

Construction surveillance and quality control tests should be planned to verify materials and placement in accordance with the specifications. The recommendations presented in this report were based on a discrete number of soil test borings. Soil type and properties may vary across the site. As a part of quality control, if this condition is noted during the construction, we can then evaluate and revise the design and construction to minimize construction delays and cost overruns. We recommend the following quality control procedures be followed by a qualified engineer or technician during the construction of the facilities:

- Observe the site stripping and proofrolling.
- Verify the type, depth and amount of stabilizer.
- Verify the compaction of subgrade soils.
- Evaluate the quality of fill and monitor the fill compaction for all lifts.

It is the responsibility of the client to notify GET when each phase of the construction is taking place so that proper quality control and procedures are implemented.

12.0 RECOMMENDED ADDITIONAL STUDIES

This report has been based on assumed conditions/characteristics of the proposed project area where specific information was not available. It is recommended that the civil engineer and structural engineer along with any other design professionals involved in this project carefully review these assumptions to ensure they are consistent with the actual planned development. When discrepancies exist, they should be brought to our attention to ensure they do not affect the conclusions and recommendations provided herein. It is recommended that GET be retained to review the plans and specifications to ensure that the geotechnical related conclusions and recommendations provided herein have been correctly interpreted as intended.

13.0 STANDARD OF CARE

The recommendations described herein were conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the geotechnical engineering profession practicing contemporaneously under similar conditions in the locality of the project. No other warranty or guarantee, expressed or implied, is made other than the work was performed in a proper and workmanlike manner.

14.0 REPORT DISTRIBUTION

This report was prepared for use by our client, based on specific and limited objectives. GET assumes no responsibility or obligation for the unauthorized use of this report by other parties and for purposes beyond the stated project objectives and work limitations.

15.0 REFERENCES

1. "Standard Construction Specifications for wastewater Collection Systems, water Lines, Storm Drainage, Street Paving and Traffic, City of Houston 2019 Standard Specification"

2. https://www.co.waller.tx.us/page/Regulations

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6. Geologic Atlas of Texas, Beaumont sheet (revised 1992) https://store.beg.utexas.edu/publications/geologic-atlas-of-texas/ga0004?utm_source=chatgpt.com

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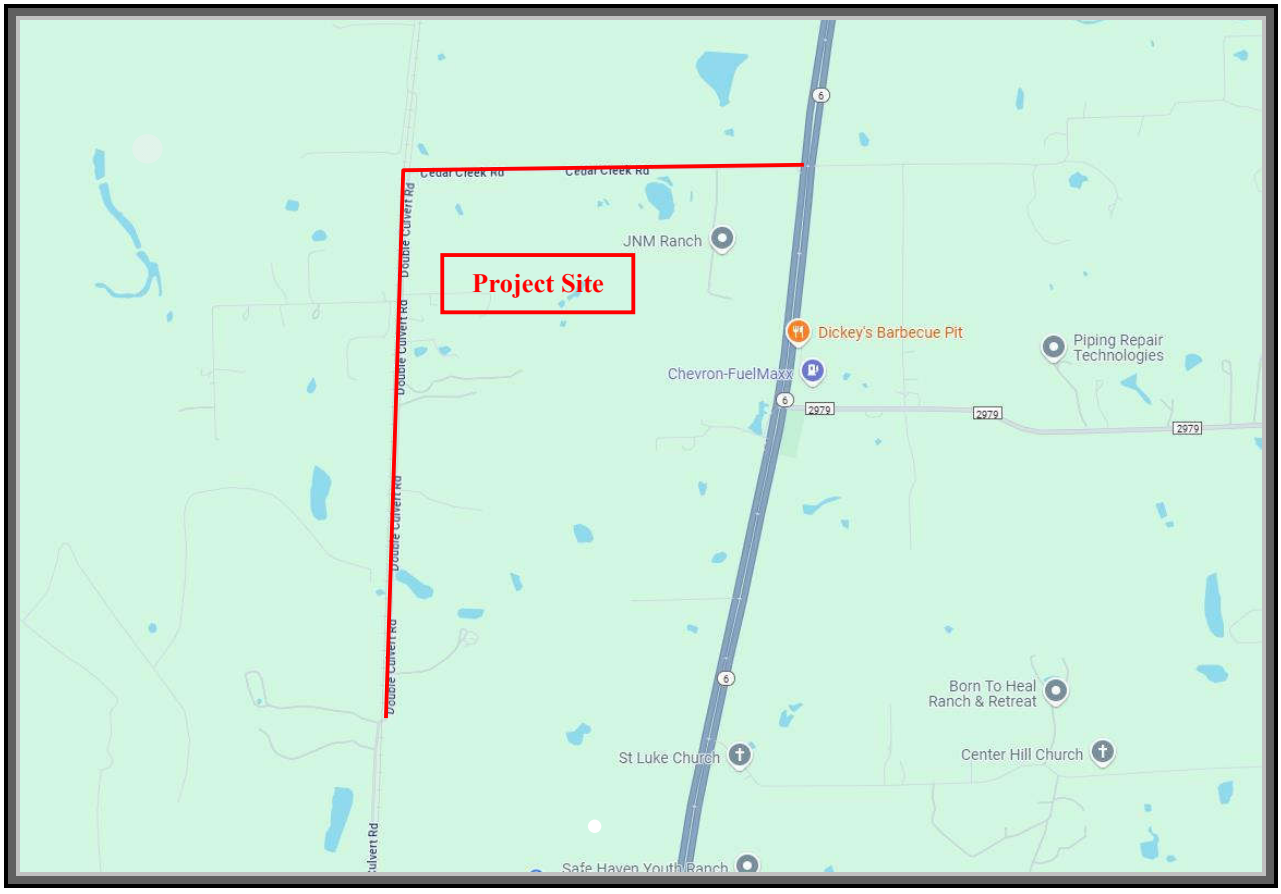
8. Texas Department of Transportation (TxDOT) "Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges", November 2014.

9. "SLOPE/W User's Guide", by GEO-SLOPE International Ltd, 1997.

10. "An Engineering Manual for Slope Stability Studies", by J.M. Duncan and A.L. Buchigwani, University of California at Berkley, Department of Engineering, 1975.

11. "Cohesion Intercept in Effective Stress-Stability Analysis", by G. Mesri, and M.E.M. Abdel-Ghaffar, Journal of Geotechnical Engineering, Vol. 119, No. 8, August 1993, pp. 1229-1249.

12. "Shear Strength Correlations and Remedial Measure Guidelines for Long-Term Stability of Slopes Constructed of Highly Plastic Clay Soils", by A. A. Saleh and Stephen G. Wright, Center for Transportation Research Bureau of Engineering Research, The University of Texas at Austin, October 1997.

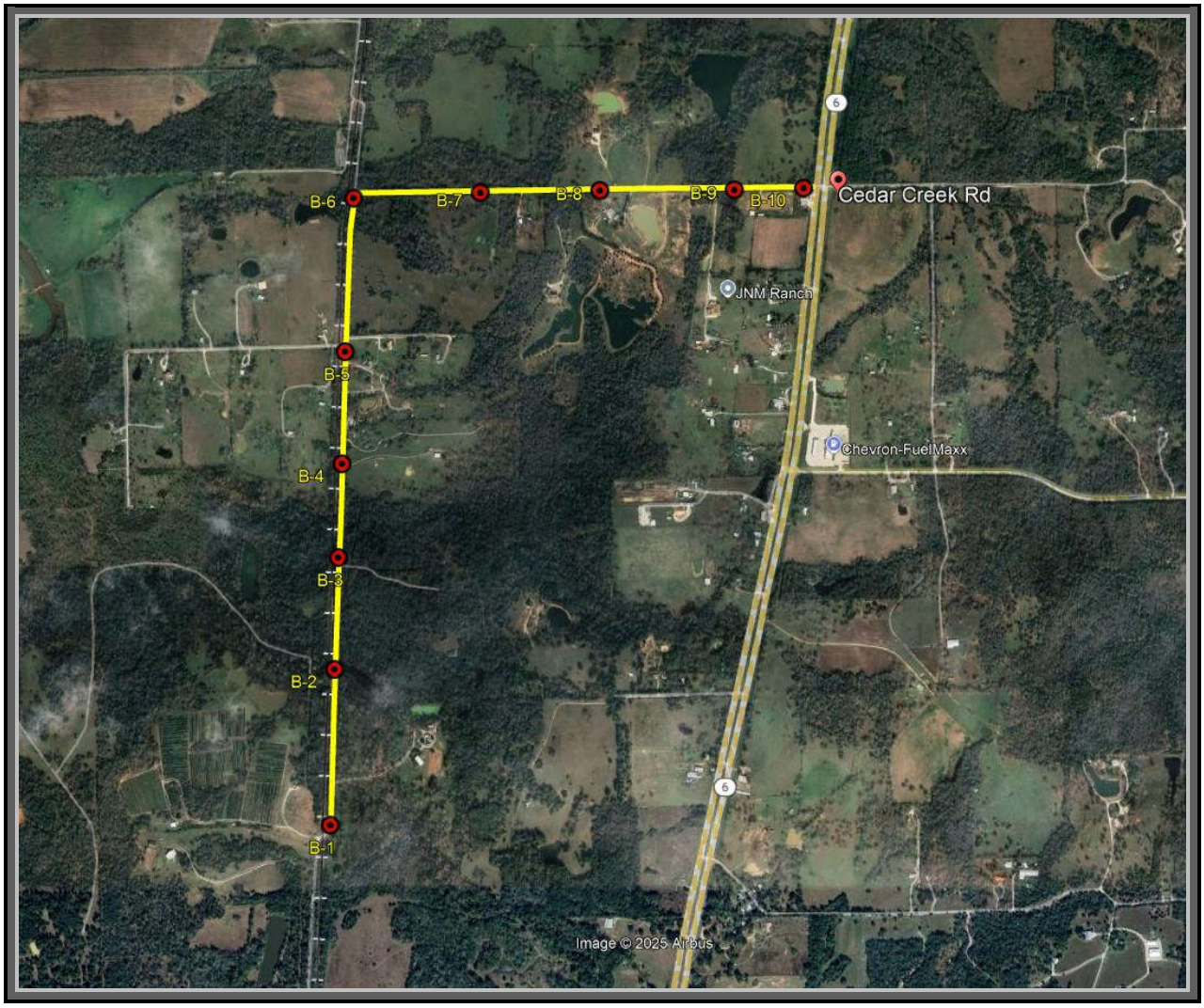


SITE VICINITY MAP

NORTH

PROJECT: Desktop Geologic Fault Study and G/S for Double Culvert Road Segment 2 & Cedar Creek Rd
Pavement Improvements From 200- Ft East of Railroad Crossing to Tha Intersection of Cedar Creek Rd and HWY6
Waller County Project No.23103, Waller County, Texas

SCALE: NOT TO SCALE	DATE: JUNE 2025	PROJECT NO.: 24-997E

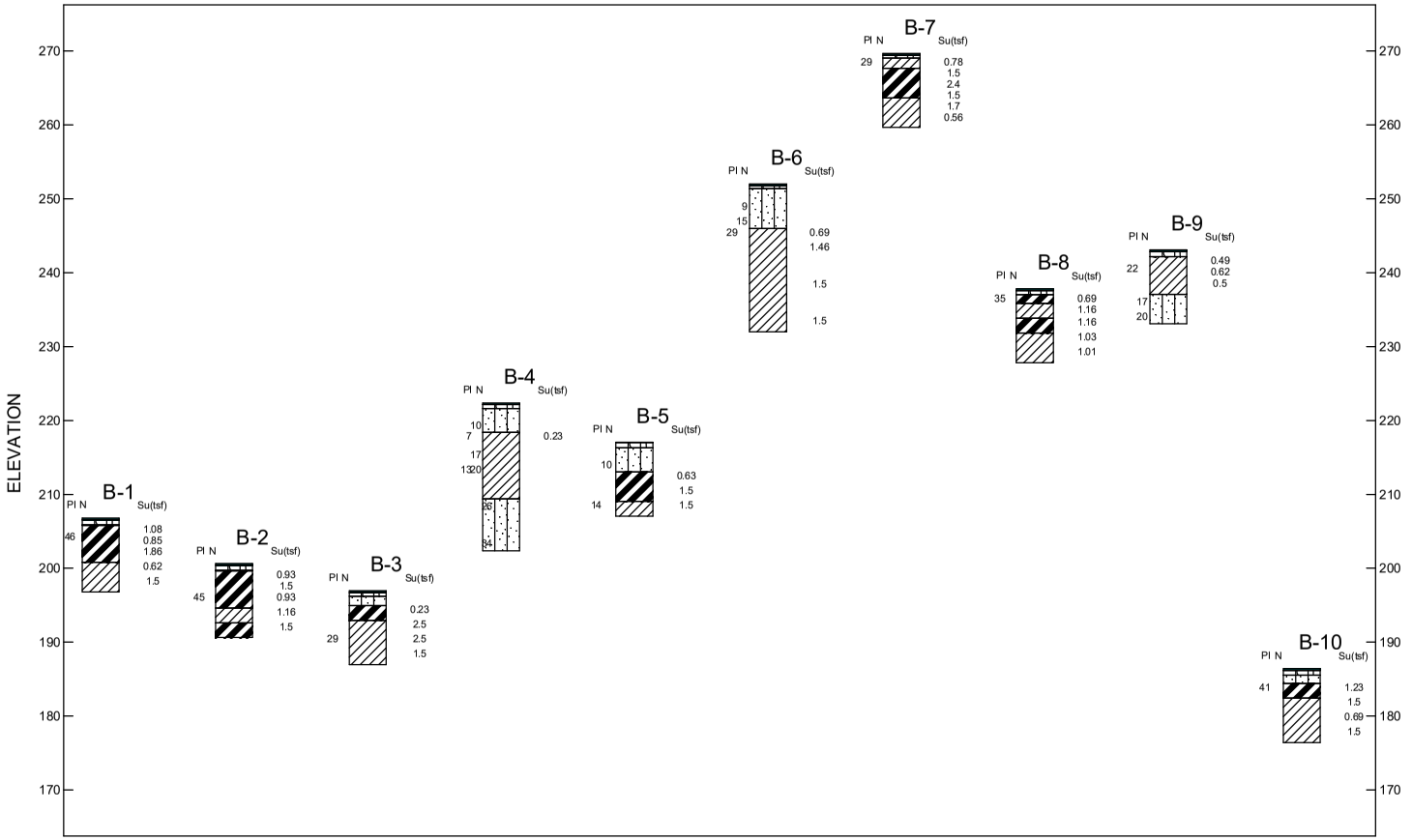


PLAN OF BORINGS (Boring locations are approximate)

PROJECT: Desktop Geologic Fault Study and G/S for Double Culvert Road Segment 2 & Cedar Creek Rd
Pavement Improvements From 200- Ft East of Railroad Crossing to Tha Intersection of Cedar Creek Rd and HWY6
Waller County Project No.23103, Waller County, Texas

SCALE: NOT TO SCALE	DATE: JUNE 2025	PROJECT NO.: 24-997E

NORTH



Lithology Graphics

- Asphalt
- USCS Silty Gravel
- Silty Sand (SM)
- Fat Clay (CH)
- Lean Clay (CL)

N

Site Map Scale 1 inch equals 5 feet

Explanation

B-1 — Borehole Number

Borehole Lithology

Water Level Reading at time of drilling.

Water Level Reading after drilling.

0 2

Horizontal Scale

Vertical Exaggeration: 0x

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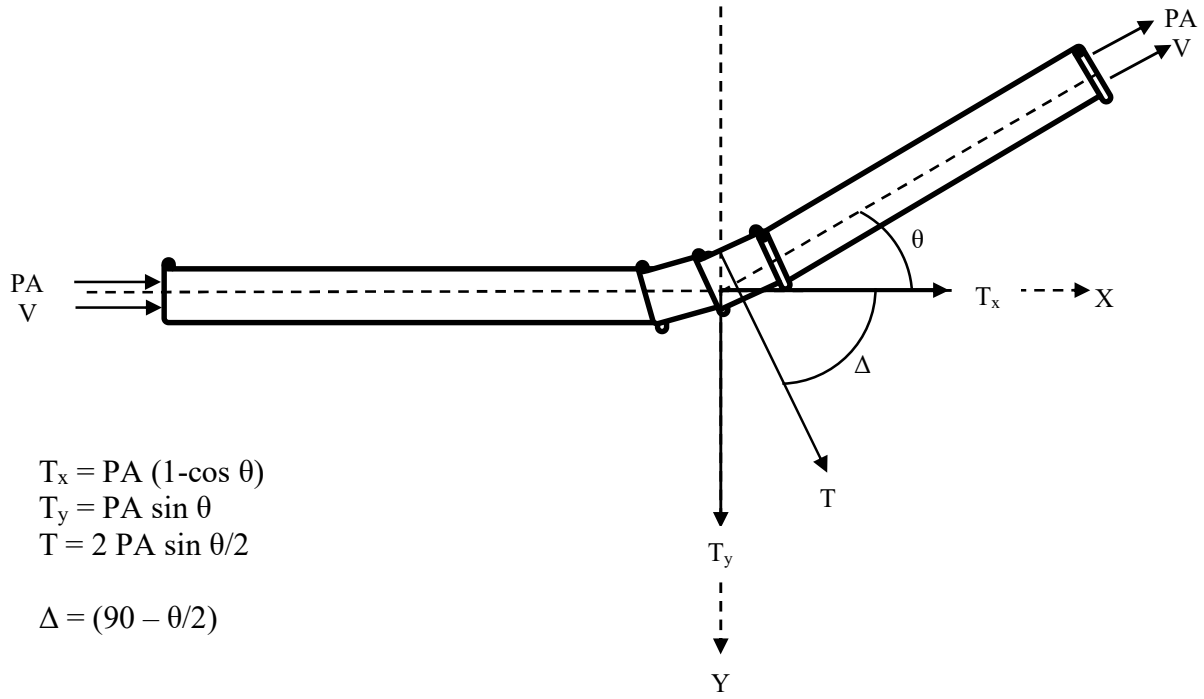
Desktop Geologic Fault Study and G/S for Double Culvert Rd Segment 2 & Cedar Creek Rd Pavement Improvements to the Intersection of Cedar Creek Road and HWY 6, Waller County
Project No. 23103 Waller County, Texas

JOB NUMBER	PLATE NUMBER
24-997E	Plate 3

EXISTING PAVEMENT THICKNESS

Boring Locations	Asphalt Pavement Thickness (inches)	Flexible Base Thickness (inches)	Subgrade Stabilization	Road Name
B-1	3	8	None	Double Culvert Road
B-2	3	8.5	None	Double Culvert Road
B-3	3	6	None	Double Culvert Road
B-4	2.5	6.5	None	Double Culvert Road
B-5	1	8.0	None	Double Culvert Road
B-6	3	4.5	None	Double Culvert Road
B-7	3	4.5	None	Cedar Creek Road
B-8	3	7	None	Cedar Creek Road
B-9	3	8.5	None	Cedar Creek Road
B-10	3	7.5	None	Cedar Creek Road

THRUST FORCES ACTING ON BEND



$T_x = PA\ (1\text{-}\cos\ \theta)$
$T_y = PA \sin \theta$
$T = 2\ PA \sin \theta/2$

$\Delta = (90 - \theta/2)$

Where:

T = Resultant Thrust Force on the Bend
T_x = Component of Thrust Force in X-Direction
T_y = Component of Thrust Force in Y-Direction
P = Maximum Sustained Pressure
A = Pipe Cross Sectional Area
θ = Bend Deflection Angle
V = Fluid Velocity

Δ = Angle between T and X-axis
D = Inside Diameter of the Pipe

Sample Calculation:

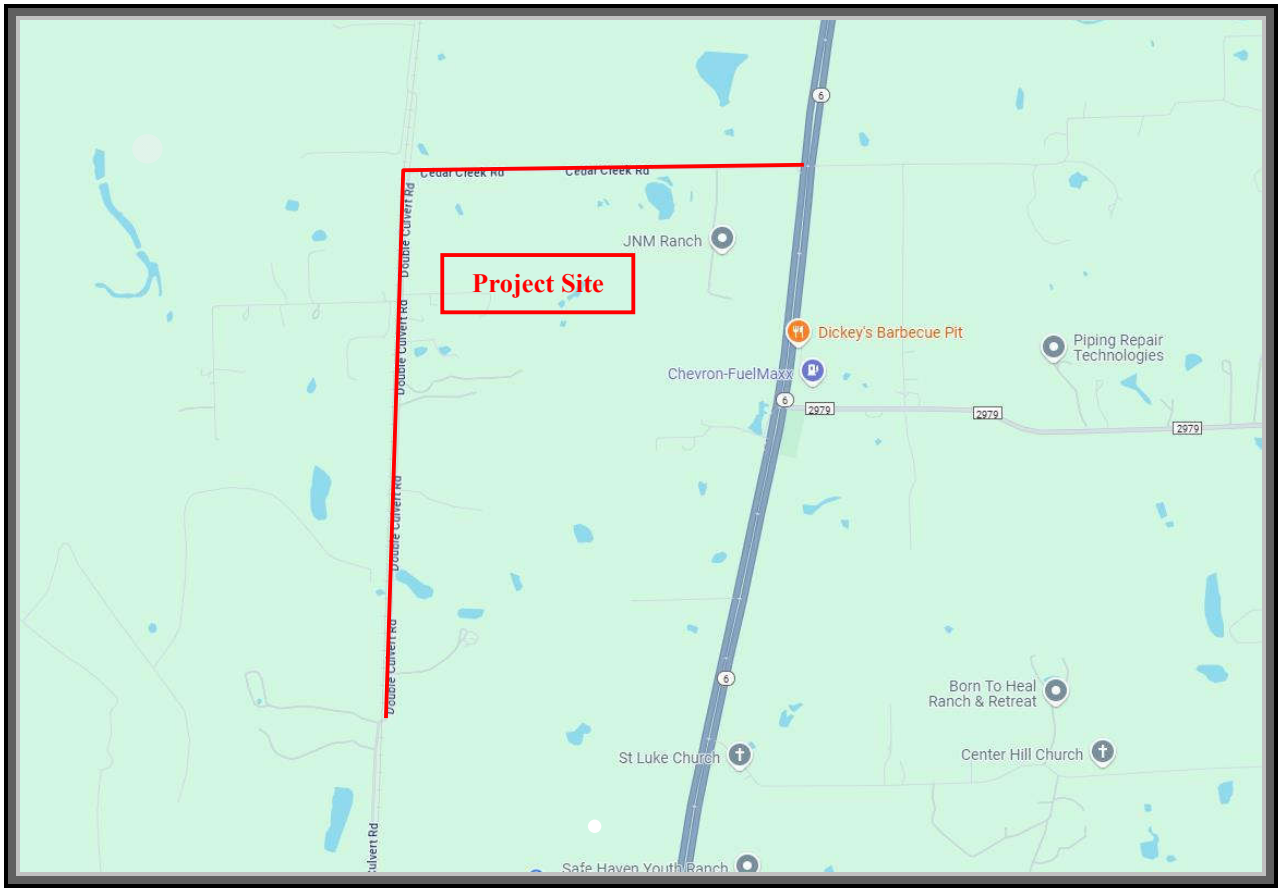
Given P = 50 psi, D = 12-inch
$A = \pi d^2/4 = 113.1\ in^2$

For θ = 90°
$T = 2\ PA \sin \theta/2 = 2 * 50 * 113.1 * \sin (90/2) = 7997.4$ lb = 7.99 kips
$Tx = PA\ (1 - \cos \theta) = 50 * 113.1 * (1 - \cos 90°) = 5.66$ kips
$Ty = PA \sin \theta = 50 * 113.1 * \sin 90° = 5.66$ kips

North

APPENDIX A

- **Site Vicinity Map**
- **Plan of Borings**
- **Borings Locations Summary of Existing Pavement Thickness and Boring Locations**
- **Stratigraphy profile and Logs of Borings**
- **Key to Log Terms and Symbols**
- **Geological Map**
- **Faults in Northwest Aera of Harris County**
- **Active Hockley Fault System in Houston Area**

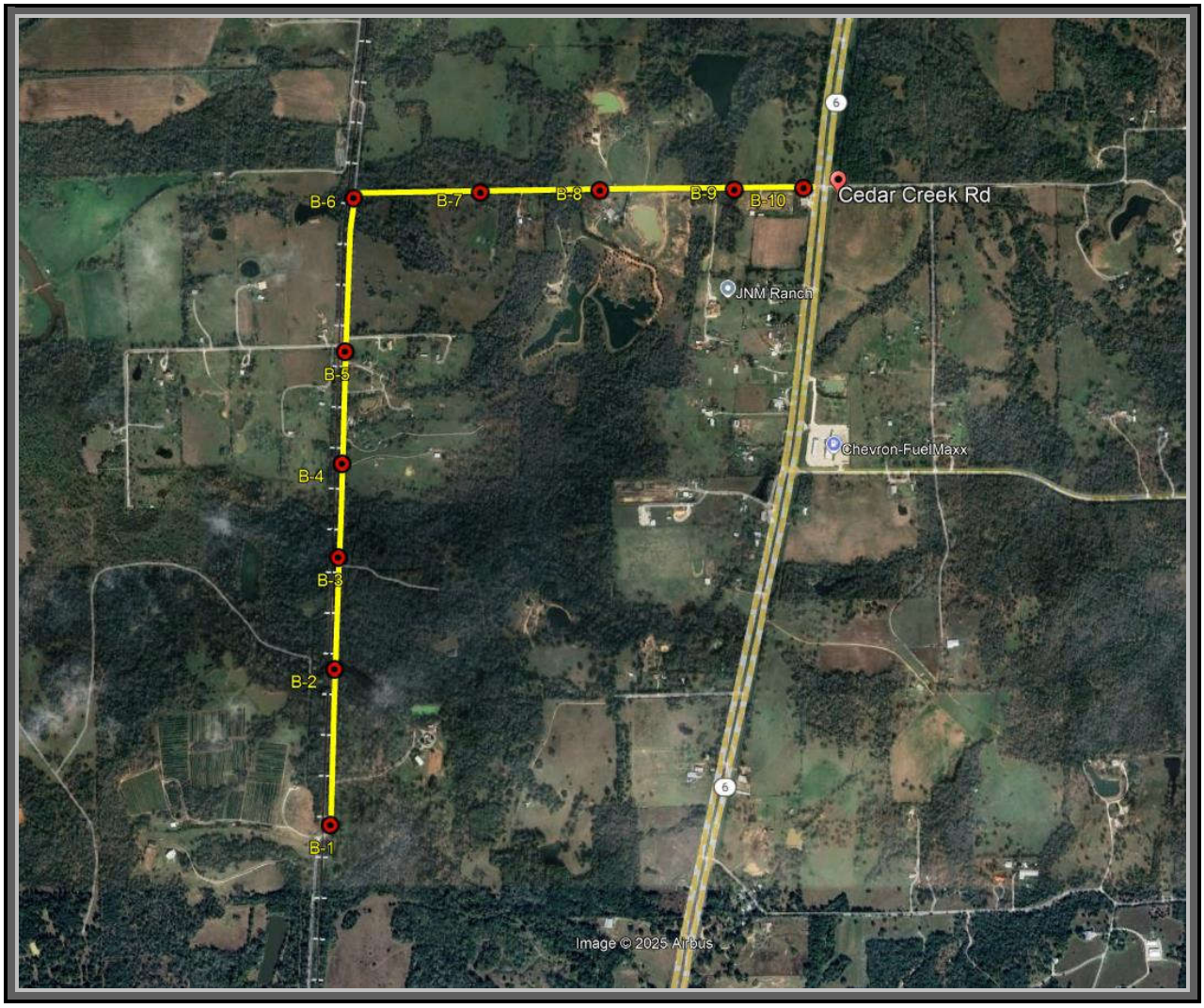


SITE VICINITY MAP

NORTH

PROJECT: Desktop Geologic Fault Study and G/S for Double Culvert Road Segment 2 & Cedar Creek Rd Pavement Improvements From 200- Ft East of Railroad Crossing to Tha Intersection of Cedar Creek Rd and HWY6 Waller County Project No.23103, Waller County, Texas

SCALE: NOT TO SCALE	DATE: JUNE 2025	PROJECT NO.: 24-997E



PLAN OF BORINGS (Boring locations are approximate)

PROJECT: Desktop Geologic Fault Study and G/S for Double Culvert Road Segment 2 & Cedar Creek Rd
Pavement Improvements From 200- Ft East of Railroad Crossing to Tha Intersection of Cedar Creek Rd and HWY6
Waller County Project No.23103, Waller County, Texas

SCALE: NOT TO SCALE	DATE: JUNE 2025	PROJECT NO.: 24-997E

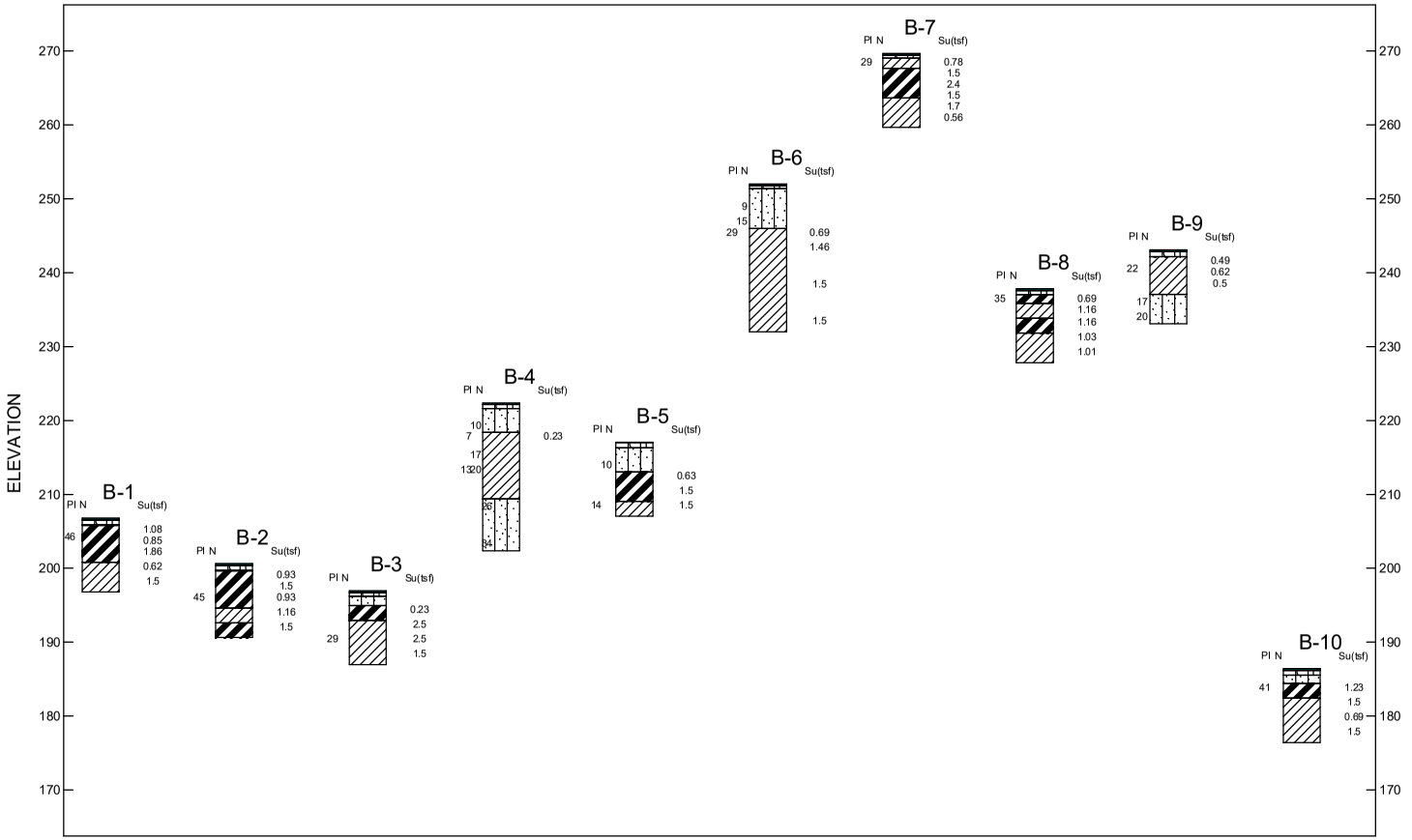
NORTH

EXISTING PAVEMENT THICKNESS

Boring Locations	Asphalt Pavement Thickness (inches)	Flexible Base Thickness (inches)	Subgrade Stabilization	Road Name
B-1	3	8	None	Double Culvert Road
B-2	3	8.5	None	Double Culvert Road
B-3	3	6	None	Double Culvert Road
B-4	2.5	6.5	None	Double Culvert Road
B-5	1	8.0	None	Double Culvert Road
B-6	3	4.5	None	Double Culvert Road
B-7	3	4.5	None	Cedar Creek Road
B-8	3	7	None	Cedar Creek Road
B-9	3	8.5	None	Cedar Creek Road
B-10	3	7.5	None	Cedar Creek Road

SUMMARY OF BORING LOCATIONS

BORING NO.	LATITUDE	LONGITUDE	ELEVATION
B-1	30.19422251 N	96.07440122 W	206.80
B-2	30.19877843 N	96.07423590 W	186.41
B-3	30.20207867 N	96.07409450 W	200.62
B-4	30.20472648 N	96.07397910 W	196.94
B-5	30.20800938 N	96.07386239 W	222.36
B-6	30.21242683 N	96.07358306 W	217.06
B-7	30.21263973 N	96.06933753 W	252.02
B-8	30.21268369 N	96.06526752 W	269.68
B-9	30.21273379 N	96.06078483 W	237.84
B-10	30.21276235 N	96.05842618 W	243.10



Lithology Graphics

Asphalt

USCS Silty Gravel

Silty Sand (SM)

Fat Clay (CH)

Lean Clay (CL)

N

Site Map Scale 1 inch equals 5 feet

Explanation

B-1 — Borehole Number

Borehole Lithology

Water Level Reading at time of drilling.

Water Level Reading after drilling.

0 2

Horizontal Scale

Vertical Exaggeration: 0x

Geotech Engineering & Testing

GET GEOTECH ENGINEERING & TESTING

Desktop Geologic Fault Study and G/S for Double Culvert Rd Segment 2 & Cedar Creek Rd Pavement Improvements to the Intersection of Cedar Creek Road and HWY 6, Waller County
Project No. 23103 Waller County, Texas

JOB NUMBER	PLATE NUMBER
24-997E	Plate A-3

LOG OF BORING NO. B-1

Geotech Engineering and Testing
17407 US Highway 59
Houston, Texas 77396
Phone: 713-699-4000 Fax: 713-699-9200

PROJECT: Desktop Geologic Fault Study and
G/S for Double Culvert Road Segment 2 & Cedar Creek Road Pavement Improvements to the Intersection of Cedar Creek Road and HWY 6 Waller County Project No. 23103
LOCATION: Waller County, Texas
PROJECT NO.: 24-997E STATION NO.:
DATE: 5-8-25 COMPLETION DEPTH: 10.0 ft.

NORTHING: 13993350.9
EASTING: 2892686.33
ELEVATION: 206.8

DEPTH, ft	SPT N-VALUE blows per foot	OVM, ppm	SYMBOL	SAMPLES	DESCRIPTION	NATURAL MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	PERCENT PASSING NO. 200 SIEVE	SUCTION (pF)	DRY UNIT WEIGHT, pcf	PERCENT COMPACTION	PASSING/FAILING (P/F)
0					ASPHALT PAVEMENT (3 inches in thickness)									
					BASE COURSE (8 inches in thickness)									
					SILTY SAND (SM), dark brown, brown, with root fibers to 1', gravels	7				17				
					FAT CLAY CLAY (CH), very stiff, light brown, brown, with root fibers to 6', ferrous nodules, gravels - stiff 2' to 4'	31								
						27	67	21	46					
5						21						107		
					LEAN CLAY (CL), stiff, brownish yellow, dark gray, with root fibers to 10', calcareous nodules, gravels, sand seams and layers	23								
					- very stiff, reddish brown 8' to 10'	16								
10														

UNDRAINED SHEAR STRENGTH, tsf
▲ HAND PENETROMETER
■ TORVANE
● UNCONFINED COMPRESSION
○ UNCONSOLIDATED-UNDRAINED TRIAXIAL
0.5 1.0 1.5 2.0 2.5

WATER OBSERVATIONS:
NO FREE WATER ENCOUNTERED DURING DRILLING

DRY AUGER: 0 TO 10 ft.
WET ROTARY: ____ TO ____ ft.

DRILLED BY: Andrew (T)
LOGGED BY: Dyllan

OVM2 24-997E - NEW.GPJ OVM.GDT 6/21/25

LOG OF BORING NO. B-2

Geotech Engineering and Testing
17407 US Highway 59
Houston, Texas 77396
Phone: 713-699-4000 Fax: 713-699-9200

PROJECT: Desktop Geologic Fault Study and
G/S for Double Culvert Road Segment 2 & Cedar Creek Road Pavement Improvements to the Intersection of Cedar Creek Road and HWY 6 Waller County Project No. 23103
LOCATION: Waller County, Texas
PROJECT NO.: 24-997E STATION NO.:
DATE: 5-8-25 COMPLETION DEPTH: 10.0 ft.

DEPTH, ft	SPT N-VALUE blows per foot	OVM, ppm	SYMBOL	SAMPLES	DESCRIPTION	NATURAL MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	PERCENT PASSING NO. 200 SIEVE	SUCTION (pF)	DRY UNIT WEIGHT, pcf	PERCENT COMPACTION	PASSING/FAILING (P/F)
0					NORTHING: 13995008.64 EASTING: 2892697.09 ELEVATION: 186.41									
					ASPHALT PAVEMENT (3 inches in thickness)									
					BASE COURSE (8.5 inches in thickness)									
					SILTY SAND (SM), dark gray, brown, with root fibers to 1', ferrous nodules, gravels	7								
					FAT CLAY CLAY (CH), stiff, light brown, brown, with root fibers to 6', ferrous nodules, gravels - very stiff 2' to 4'	24								
						22						104		
5						20	66	21	45					
					LEAN CLAY (CL), very stiff, reddish brown, ligh gray, with calcareous nodules, gravels, sand seams and layers	18								
					FAT CLAY CLAY (CH), very stiff, reddish brown, ligh gray, with gravels	16								
10														

UNDRAINED SHEAR STRENGTH, tsf
0.5 1.0 1.5 2.0 2.5
▲ HAND PENETROMETER
■ TORVANE
● UNCONFINED COMPRESSION
○ UNCONSOLIDATED-UNDRAINED TRIAXIAL

WATER OBSERVATIONS:
NO FREE WATER ENCOUNTERED DURING DRILLING

DRY AUGER: 0 TO 10 ft.
WET ROTARY: ____ TO ____ ft.

DRILLED BY: Andrew (T)
LOGGED BY: Dyllan

OVM2 24-997E - NEW.GPJ OVM.GDT 6/21/25

LOG OF BORING NO. B-3

Geotech Engineering and Testing
17407 US Highway 59
Houston, Texas 77396
Phone: 713-699-4000 Fax: 713-699-9200

PROJECT: Desktop Geologic Fault Study and
G/S for Double Culvert Road Segment 2 & Cedar Creek Road Pavement Improvements to the Intersection of Cedar Creek Road and HWY 6 Waller County Project No. 23103
LOCATION: Waller County, Texas
PROJECT NO.: 24-997E STATION NO.:
DATE: 5-8-25 COMPLETION DEPTH: 10.0 ft.

NORTHING: 13996209.65
EASTING: 2892711.72
ELEVATION: 200.62

DEPTH, ft	SPT N-VALUE blows per foot	OVM, ppm	SYMBOL	SAMPLES	DESCRIPTION	NATURAL MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	PERCENT PASSING NO. 200 SIEVE	SUCTION (pF)	DRY UNIT WEIGHT, pcf	PERCENT COMPACTION	PASSING/FAILING (P/F)
0					ASPHALT PAVEMENT (3 inches in thickness)									
					BASE COURSE (6 inches in thickness)									
					SILTY SAND (SM), dark gray, brown, with root fibers to 1', ferrous nodules, gravels	12								
						11								
					FAT CLAY CLAY (CH), soft, light brown, brown, with ferrous nodules, gravels									
						25								
5					LEAN CLAY (CL), hard, reddish brown, ligh gray, with calcareous nodules, ferrous nodules, gravels, sand seams and layers	21						107		
						13	47	18	29			124		
					- very stiff 8' to 10'									
						13								
10														

UNDRAINED SHEAR STRENGTH, tsf

- ▲ HAND PENETROMETER
- ▮ TORVANE
- ● UNCONFINED COMPRESSION
- ○ UNCONSOLIDATED-UNDRAINED TRIAXIAL

0.5 1.0 1.5 2.0 2.5

WATER OBSERVATIONS:
NO FREE WATER ENCOUNTERED DURING DRILLING

DRY AUGER: 0 TO 10 ft.
WET ROTARY: ____ TO ____ ft.

DRILLED BY: Andrew (T)
LOGGED BY: Dyllan

OVM2 24-997E - NEW.GPJ OVM.GDT 6/21/25

LOG OF BORING NO. B-4

Geotech Engineering and Testing
17407 US Highway 59
Houston, Texas 77396
Phone: 713-699-4000 Fax: 713-699-9200

PROJECT: Desktop Geologic Fault Study and
G/S for Double Culvert Road Segment 2 & Cedar Creek Road Pavement Improvements to the Intersection of Cedar Creek Road and HWY 6 Waller County Project No. 23103
LOCATION: Waller County, Texas
PROJECT NO.: 24-997E STATION NO.:
DATE: 5-8-25 COMPLETION DEPTH: 20.0 ft.

NORTHING: 13997173.24
EASTING: 2892724.08
ELEVATION: 196.94

DEPTH, ft	SPT N-VALUE blows per foot	OVM, ppm	SYMBOL	SAMPLES	DESCRIPTION	NATURAL MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	PERCENT PASSING NO. 200 SIEVE	SUCTION (pF)	DRY UNIT WEIGHT, pcf	PERCENT COMPACTION	PASSING/FAILING (P/F)
0					ASPHALT PAVEMENT (2.5 inches in thickness)									
					BASE COURSE (6.5 inches in thickness)									
	10				SILTY SAND (SM), dark gray, reddish brown, with gravels - loose 2' to 4'	10				24				
5					LEAN CLAY (CL), soft, reddish brown, ligh gray, with calcareous nodules, gravels, sand seams and layers	16	21	14	7					
	17				-very stiff 6' to 8'	15								
	20					14	28	15	13					
10														
15	26				SILTY SAND (SM), medium dense, brownish yellow, light brown, with gravels	11								
					- dense 18' to 20'									
	34					19								
20														
25														

UNDRAINED SHEAR STRENGTH, tsf
▲ HAND PENETROMETER
■ TORVANE
● UNCONFINED COMPRESSION
○ UNCONSOLIDATED-UNDRAINED TRIAXIAL
0.5 1.0 1.5 2.0 2.5

WATER OBSERVATIONS:
NO FREE WATER ENCOUNTERED DURING DRILLING

DRY AUGER: 0 TO 20 ft.
WET ROTARY: ____ TO ____ ft.

DRILLED BY: Andrew (T)
LOGGED BY: Dyllan

OVM2 24-997E - NEW.GPJ OVM.GDT 6/21/25

LOG OF BORING NO. B-5

Geotech Engineering and Testing
17407 US Highway 59
Houston, Texas 77396
Phone: 713-699-4000 Fax: 713-699-9200

PROJECT: Desktop Geologic Fault Study and
G/S for Double Culvert Road Segment 2 & Cedar Creek Road Pavement Improvements to the Intersection of Cedar Creek Road and HWY 6 Waller County Project No. 23103
LOCATION: Waller County, Texas
PROJECT NO.: 24-997E STATION NO.:
DATE: 5-8-25 COMPLETION DEPTH: 10.0 ft.

NORTHING: 13998367.75
EASTING: 2892731.06
ELEVATION: 222.36

DEPTH, ft	SPT N-VALUE blows per foot	OVM, ppm	SYMBOL	SAMPLES	DESCRIPTION	NATURAL MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	PERCENT PASSING NO. 200 SIEVE	SUCTION (pF)	DRY UNIT WEIGHT, pcf	PERCENT COMPACTION	PASSING/FAILING (P/F)
0					ASPHALT PAVEMENT (1 inches in thickness)									
					BASE COURSE (8 inches in thickness)									
					SILTY SAND (SM), light brown, brown, with root fibers to 1', ferrous nodules, gravels	7								
					- loose 2' to 4'	10								
	10					13								
					FAT CLAY CLAY (CH), stiff, gray, brownish yellow, with root fibers to 6', ferrous nodules, gravels									
5						27						98		
					- very stiff 6' to 8'									
						16								
					LEAN CLAY (CL), very stiff, reddish brown, ligh gray, with calcareous nodules, gravels, sand seams and layers									
						15	30	16	14					
10														

UNDRAINED SHEAR STRENGTH, tsf
0.5 1.0 1.5 2.0 2.5
▲ HAND PENETROMETER
■ TORVANE
● UNCONFINED COMPRESSION
○ UNCONSOLIDATED-UNDRAINED TRIAXIAL

WATER OBSERVATIONS:
NO FREE WATER ENCOUNTERED DURING DRILLING

DRY AUGER: 0 TO 10 ft.
WET ROTARY: ____ TO ____ ft.

DRILLED BY: Andrew (T)
LOGGED BY: Dyllan

OVM2 24-997E - NEW.GPJ OVM.GDT 6/21/25

LOG OF BORING NO. B-6

Geotech Engineering and Testing
17407 US Highway 59
Houston, Texas 77396
Phone: 713-699-4000 Fax: 713-699-9200

PROJECT: Desktop Geologic Fault Study and
G/S for Double Culvert Road Segment 2 & Cedar Creek Road Pavement Improvements to the Intersection of Cedar Creek Road and HWY 6 Waller County Project No. 23103
LOCATION: Waller County, Texas
PROJECT NO.: 24-997E STATION NO.:
DATE: 5-8-25 COMPLETION DEPTH: 20.0 ft.

DESCRIPTION

NORTHING: 13999976.05
EASTING: 2892779.07
ELEVATION: 217.06

DEPTH, ft	SPT N-VALUE blows per foot	OVM, ppm	SYMBOL	SAMPLES	DESCRIPTION	NATURAL MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	PERCENT PASSING NO. 200 SIEVE	SUCTION (pF)	DRY UNIT WEIGHT, pcf	PERCENT COMPACTION	PASSING/FAILING (P/F)
0					ASPHALT PAVEMENT (3 inches in thickness)									
					BASE COURSE (4.5 inches in thickness)					21				
					SILTY SAND (SM), light brown, brown, with root fibers to 1', ferrous nodules, gravels									
	9				- loose 2' to 4'	5								
5	15				- medium dense 4' to 6'	16								
					LEAN CLAY (CL), stiff, reddish brown, ligh gray, with calcareous nodules, gravels, sand seams and layers	17	47	18	29					
					- very stiff 8' to 20'	14						120		
10														
						14								
15														
						14								
20														
25														

UNDRAINED SHEAR STRENGTH, tsf
▲ HAND PENETROMETER
▮ TORVANE
● UNCONFINED COMPRESSION
○ UNCONSOLIDATED-UNDRAINED TRIAXIAL
0.5 1.0 1.5 2.0 2.5

WATER OBSERVATIONS:
NO FREE WATER ENCOUNTERED DURING DRILLING

DRY AUGER: 0 TO 20 ft.
WET ROTARY: ____ TO ____ ft.

DRILLED BY: Andrew (T)
LOGGED BY: Dyllan

OVM2 24-997E - NEW.GPJ OVM.GDT 6/21/25

LOG OF BORING NO. B-7

Geotech Engineering and Testing
17407 US Highway 59
Houston, Texas 77396
Phone: 713-699-4000 Fax: 713-699-9200

PROJECT: Desktop Geologic Fault Study and
G/S for Double Culvert Road Segment 2 & Cedar Creek Road Pavement Improvements to the Intersection of Cedar Creek Road and HWY 6 Waller County Project No. 23103
LOCATION: Waller County, Texas
PROJECT NO.: 24-997E STATION NO.:
DATE: 5-8-25 COMPLETION DEPTH: 10.0 ft.

DESCRIPTION

NORTHING: 14000087.04
EASTING: 2894117.76
ELEVATION: 252.02

DEPTH, ft	SPT N-VALUE blows per foot	OVM, ppm	SYMBOL	SAMPLES	DESCRIPTION	NATURAL MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	PERCENT PASSING NO. 200 SIEVE	SUCTION (pF)	DRY UNIT WEIGHT, pcf	PERCENT COMPACTION	PASSING/FAILING (P/F)
0					ASPHALT PAVEMENT (3 inches in thickness)									
					BASE COURSE (4.5 inches in thickness)									
					LEAN CLAY (CL), stiff, reddish brown, ligh gray, with calcareous nodules, gravels, sand seams and layers - very stiff 1' to 2'	20	47	18	29					
						19								
					FAT CLAY CLAY (CH), hard, gray, brownish yellow, with root fibers to 6', ferrous nodules, gravels									
						21						104		
					- very stiff 4' to 6'									
5						20				83				
					LEAN CLAY (CL), very stiff, reddish brown, ligh gray, with calcareous nodules, gravels, sand seams and layers									
						15						118		
					- stiff 8' to 10'									
						17								
10														

UNDRAINED SHEAR STRENGTH, tsf
0.5 1.0 1.5 2.0 2.5
▲ HAND PENETROMETER
■ TORVANE
● UNCONFINED COMPRESSION
○ UNCONSOLIDATED-UNDRAINED TRIAXIAL

WATER OBSERVATIONS:
NO FREE WATER ENCOUNTERED DURING DRILLING

DRY AUGER: 0 TO 10 ft.
WET ROTARY: ____ TO ____ ft.

DRILLED BY: Andrew (T)
LOGGED BY: Dyllan

OVM2 24-997E - NEW.GPJ OVM.GDT 6/21/25

LOG OF BORING NO. B-8

Geotech Engineering and Testing
17407 US Highway 59
Houston, Texas 77396
Phone: 713-699-4000 Fax: 713-699-9200

PROJECT: Desktop Geologic Fault Study and
G/S for Double Culvert Road Segment 2 & Cedar Creek Road Pavement Improvements to the Intersection of Cedar Creek Road and HWY 6 Waller County Project No. 23103
LOCATION: Waller County, Texas
PROJECT NO.: 24-997E STATION NO.:
DATE: 5-8-25 COMPLETION DEPTH: 10.0 ft.

NORTHING: 14000135.25
EASTING: 2895402.56
ELEVATION: 269.68

DEPTH, ft	SPT N-VALUE blows per foot	OVM, ppm	SYMBOL	SAMPLES	DESCRIPTION	NATURAL MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	PERCENT PASSING NO. 200 SIEVE	SUCTION (pF)	DRY UNIT WEIGHT, pcf	PERCENT COMPACTION	PASSING/FAILING (P/F)
0					ASPHALT PAVEMENT (3 inches in thickness)									
					BASE COURSE (7 inches in thickness)									
					FAT CLAY CLAY (CH), stiff, gray, brownish yellow, with root fibers to 2', ferrous nodules, gravels	26	55	20	35					
					LEAN CLAY (CL), very stiff, reddish brown, ligh gray, with calcareous nodules, gravels, sand seams and layers	14								
5					FAT CLAY (CH), very stiff, gray, brownish yellow, with ferrous nodules, gravels	21								
					LEAN CLAY (CL), very stiff, reddish brown, ligh gray, with calcareous nodules, gravels, sand seams and layers	19						108		
						20								
10														

UNDRAINED SHEAR STRENGTH, tsf
- ▲ HAND PENETROMETER
- ▮ TORVANE
- ● UNCONFINED COMPRESSION
- ○ UNCONSOLIDATED-UNDRAINED TRIAXIAL

0.5 1.0 1.5 2.0 2.5

WATER OBSERVATIONS:
NO FREE WATER ENCOUNTERED DURING DRILLING

DRY AUGER: 0 TO 10 ft.
WET ROTARY: ____ TO ____ ft.

DRILLED BY: Andrew (T)
LOGGED BY: Dyllan

OVM2 24-997E - NEW.GPJ OVM.GDT 6/21/25

LOG OF BORING NO. B-9

Geotech Engineering and Testing
17407 US Highway 59
Houston, Texas 77396
Phone: 713-699-4000 Fax: 713-699-9200

PROJECT: Desktop Geologic Fault Study and
G/S for Double Culvert Road Segment 2 & Cedar Creek Road Pavement Improvements to the Intersection of Cedar Creek Road and HWY 6 Waller County Project No. 23103
LOCATION: Waller County, Texas
PROJECT NO.: 24-997E STATION NO.:
DATE: 5-8-25 COMPLETION DEPTH: 10.0 ft.

NORTHING: 14000189.03
EASTING: 2896817.61
ELEVATION: 237.84

DEPTH, ft	SPT N-VALUE blows per foot	OVM, ppm	SYMBOL	SAMPLES	DESCRIPTION	NATURAL MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	PERCENT PASSING NO. 200 SIEVE	SUCTION (pF)	DRY UNIT WEIGHT, pcf	PERCENT COMPACTION	PASSING/FAILING (P/F)
0					ASPHALT PAVEMENT (3 inches in thickness)									
					BASE COURSE (8.5 inches in thickness)									
					LEAN CLAY CLAY (CL), firm, gray, reddish brown, with root fibers to 2', gravels, sand seams and layers									
					- stiff 2' to 6'	15						138		
						18	39	17	22					
5						18						127		
					SILTY SAND (SM), medium dense, reddish brown, ligh gray, with calcareous nodules, ferrous nodules, gravels, sand seams and layers									
	17					9								
	20					8				23				
10														

UNDRAINED SHEAR STRENGTH, tsf
▲ HAND PENETROMETER
■ TORVANE
● UNCONFINED COMPRESSION
○ UNCONSOLIDATED-UNDRAINED TRIAXIAL
0.5 1.0 1.5 2.0 2.5

WATER OBSERVATIONS:
NO FREE WATER ENCOUNTERED DURING DRILLING

DRY AUGER: 0 TO 10 ft.
WET ROTARY: ____ TO ____ ft.

DRILLED BY: Andrew (T)
LOGGED BY: Dyllan

OVM2 24-997E - NEW.GPJ OVM.GDT 6/21/25

LOG OF BORING NO. B-10

Geotech Engineering and Testing
17407 US Highway 59
Houston, Texas 77396
Phone: 713-699-4000 Fax: 713-699-9200

PROJECT: Desktop Geologic Fault Study and
G/S for Double Culvert Road Segment 2 & Cedar Creek Road Pavement Improvements to the Intersection of Cedar Creek Road and HWY 6 Waller County Project No. 23103
LOCATION: Waller County, Texas
PROJECT NO.: 24-997E STATION NO.:
DATE: 5-8-25 COMPLETION DEPTH: 10.0 ft.

DESCRIPTION

NORTHING: 14000218.14
EASTING: 2897562.15
ELEVATION: 243.1

DEPTH, ft	SPT N-VALUE blows per foot	OVM, ppm	SYMBOL	SAMPLES	DESCRIPTION	NATURAL MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	PERCENT PASSING NO. 200 SIEVE	SUCTION (pF)	DRY UNIT WEIGHT, pcf	PERCENT COMPACTION	PASSING/FAILING (P/F)
0					ASPHALT PAVEMENT (3 inches in thickness)									
					BASE COURSE (7.5 inches in thickness)									
					SILTY SAND (SM), gray, reddish brown, with root fibers to 2', gravels	7				13				
					FAT CLAY (CH), very stiff, gray, reddish brown, with root fibers to 2', gravels	19	62	21	41			127		
5					LEAN CLAY CLAY (CL), very stiff, gray, reddish brown, with root fibers to 8', gravels, sand seams and layers	20								
					- stiff 6' to 8'	17				23				
					- very stiff 8' to 10'	15								
10														

UNDRAINED SHEAR STRENGTH, tsf
- HAND PENETROMETER
- TORVANE
- UNCONFINED COMPRESSION
- UNCONSOLIDATED-UNDRAINED TRIAXIAL

0.5 1.0 1.5 2.0 2.5

WATER OBSERVATIONS:
NO FREE WATER ENCOUNTERED DURING DRILLING

DRY AUGER: 0 TO 10 ft.
WET ROTARY: ____ TO ____ ft.

DRILLED BY: Andrew (T)
LOGGED BY: Dyllan

OVM2 24-997E - NEW.GPJ OVM.GDT 6/21/25

KEY TO LOG TERMS AND SYMBOLS

UNIFIED SOIL CLASSIFICATIONS

Symbol		Material Descriptions
GW		WELL GRADED-GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
GP		POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
GM		SILTY GRAVELS, GRAVEL-SAND SILT MIXTURES
GC		CLAY GRAVELS, GRAVEL-SAND CLAY MIXTURES
SW		WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
SP		POORLY GRADED SANDS, OR GRAVELLY SANDS, LITTLE OR NO FINES
SM		SILTY SANDS, SAND-SILT MIXTURES a
SC		CLAYEY SANDS, SAND-SILT MIXTURES b
ML		INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
CL		INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, LEAN CLAYS
OL		ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MH		INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
CH		INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
OH		ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
PT		PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENT
		FILL SOILS

TERMS CHARACTERIZING SOIL STRUCTURE

Slickensided	-	Having incline planes of weakness that are slick and glossy in appearance.
Fissured	-	Containing shrinkage cracks frequently filled with fine sand or silt: usually vertical.
Laminated	-	Composed of thin layers of varying colors and soil sample texture.
Interbedded	-	Composed of alternate layers of different soil types.
Calcareous	-	Containing appreciable quantities of calcium carbonate.
Well Graded	-	Having wide range in grain sizes and substantial amounts of all intermediate particle sizes.
Poorly Graded	-	Predominantly of one grain size, or having a range of sizes with some intermediate sizes missing.
Pocket	-	Inclusion of material of different texture that is smaller than the diameter of the sample.
Parting	-	Inclusion less than $\frac{1}{16}$-inch thick extending through the sample.
Seam	-	Inclusion $\frac{1}{16}$- to 3-inch thick extending through the sample.
Layer	-	Inclusion greater than 3-inch thick extending through the sample.
Interlayered	-	Soils sample composed of alternating layers of different soil types.
Intermixed	-	Soil samples composed of pockets of different soil type and layered or laminated structure is not evident.

COARSE GRAINED SOILS (major portion retained on No. 200 Sieve): Includes (1) clean gravels and sands, and (2) silty or clayey gravels and sands. Conditions rated according to standard penetration test (SPT)* as performed in the field.

Descriptive Terms	Blows Per Foot*
Very Loose	0 – 4
Loose	5 – 10
Medium Dense	11 – 30
Dense	31 – 50
Very Dense	over 50

* 140 pound weight having a free fall of 30-inch

FINE GRAINED SOILS (major portion passing No. 200 Sieve): Include (1) inorganic or organic silts and clays, (2) gravelly, sandy, or silty clays, and (3) clayey silts. Consistency is rated according to shearing strength as indicated by hand penetrometer readings or by unconfined compression tests.

Descriptive Term	Undrained Shear Strength Ton/Sq. Ft.
Very Soft	Less than 0.13
Soft	0.13 to 0.25
Firm	0.25 to 0.50
Stiff	0.50 to 1.00
Very Stiff	1.00 to 2.00
Hard	2.00 or higher

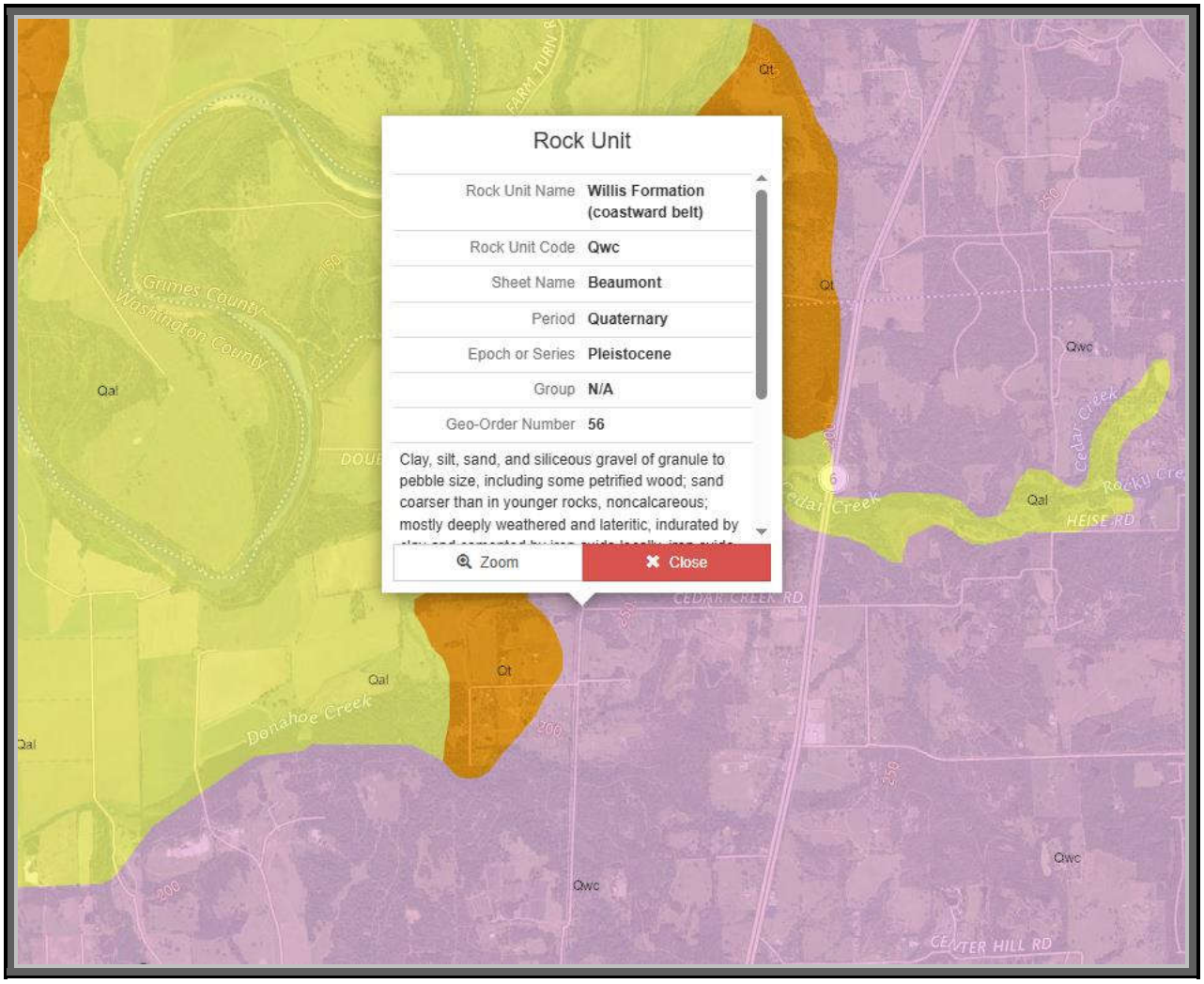
NOTE: Slickensided and fissured clays may have lower unconfined compressive strengths than shown above because of weakness or cracks in the soil. The consistency ratings of such soils are based on hand penetrometer readings.

SOIL SAMPLERS

- SHELBY TUBE SAMPLER
- STANDARD PENETRATION TEST
- AUGER SAMPLING

TERMS CHARACTERIZING ROCK PROPERTIES

VERY SOFT OR PLASTIC	Can be remolded in hand: corresponds in consistency up to very stiff in soils.
SOFT	Can be scratched with fingernail.
MODERATELY HARD	Can be scratched easily with knife; cannot be scratched with fingernail. Difficult to scratch with knife.
VERY HARD	Cannot be scratched with knife.
POORLY CEMENTED OR FRIABLE	Easily crumbled.
CEMENTED	Bounded Together by chemically precipitated materials.
UNWEATHERED	Rock in its natural state before being exposed to atmospheric agents.
SLIGHTLY WEATHERED	Noted predominantly by color change with no disintegrated zones.
WEATHERED	Complete color change with zones of slightly decomposed rock.
EXTREMELY WEATHERED	Complete color change with consistency, texture, and general appearance or soil.



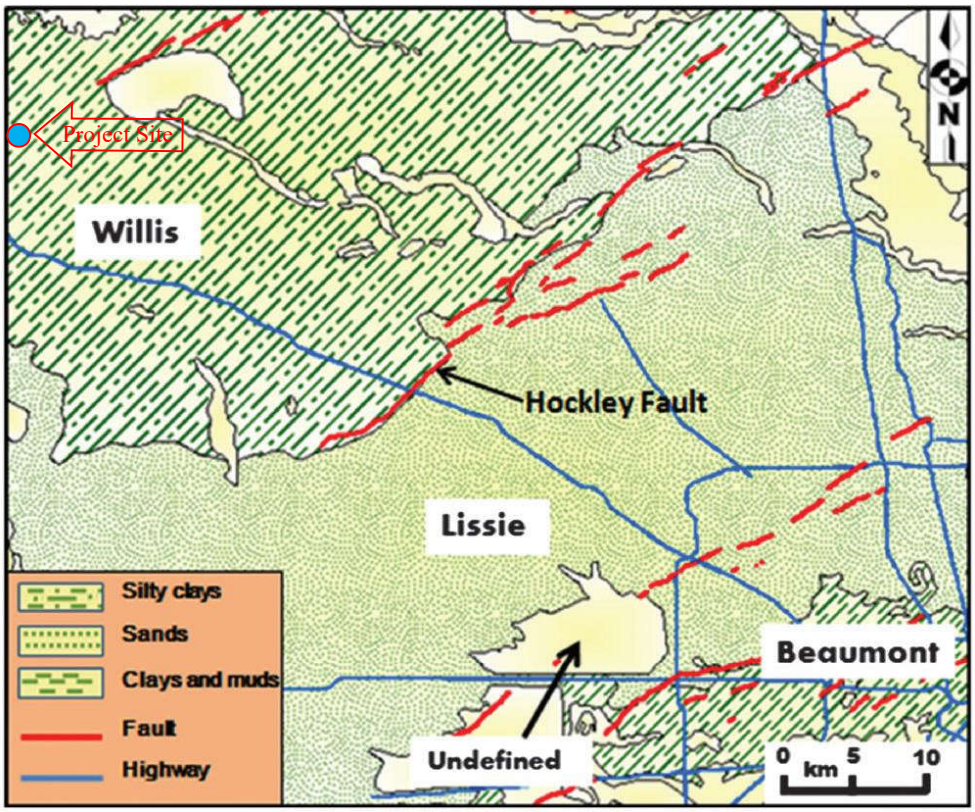
GEOLOGY MAP

PROJECT: Desktop Geologic Fault Study and G/S for Double Culvert Road Segment 2 & Cedar Creek Rd Pavement Improvements From 200- Ft East of Railroad Crossing to Tha Intersection of Cedar Creek Rd and HWY6 Waller County Project No.23103, Waller County, Texas

SCALE: NOT TO SCALE	DATE: JUNE 2025	PROJECT NO.: 24-997E

NORTH

a)



b)

System	Series	Stratigraphic units
Quaternary	Holocene	Alluvium
	Pleistocene	Beaumont clay
		Lissie formation
		Willis sand

(a) A geologic map of Harris County showing the three major formations: the Willis, the Lissie, and the Beaumont (modified from Bureau of Economic Geology, 1992). (b) Stratigraphic column for Quaternary formations in Harris County. (Khan et al., 2013)

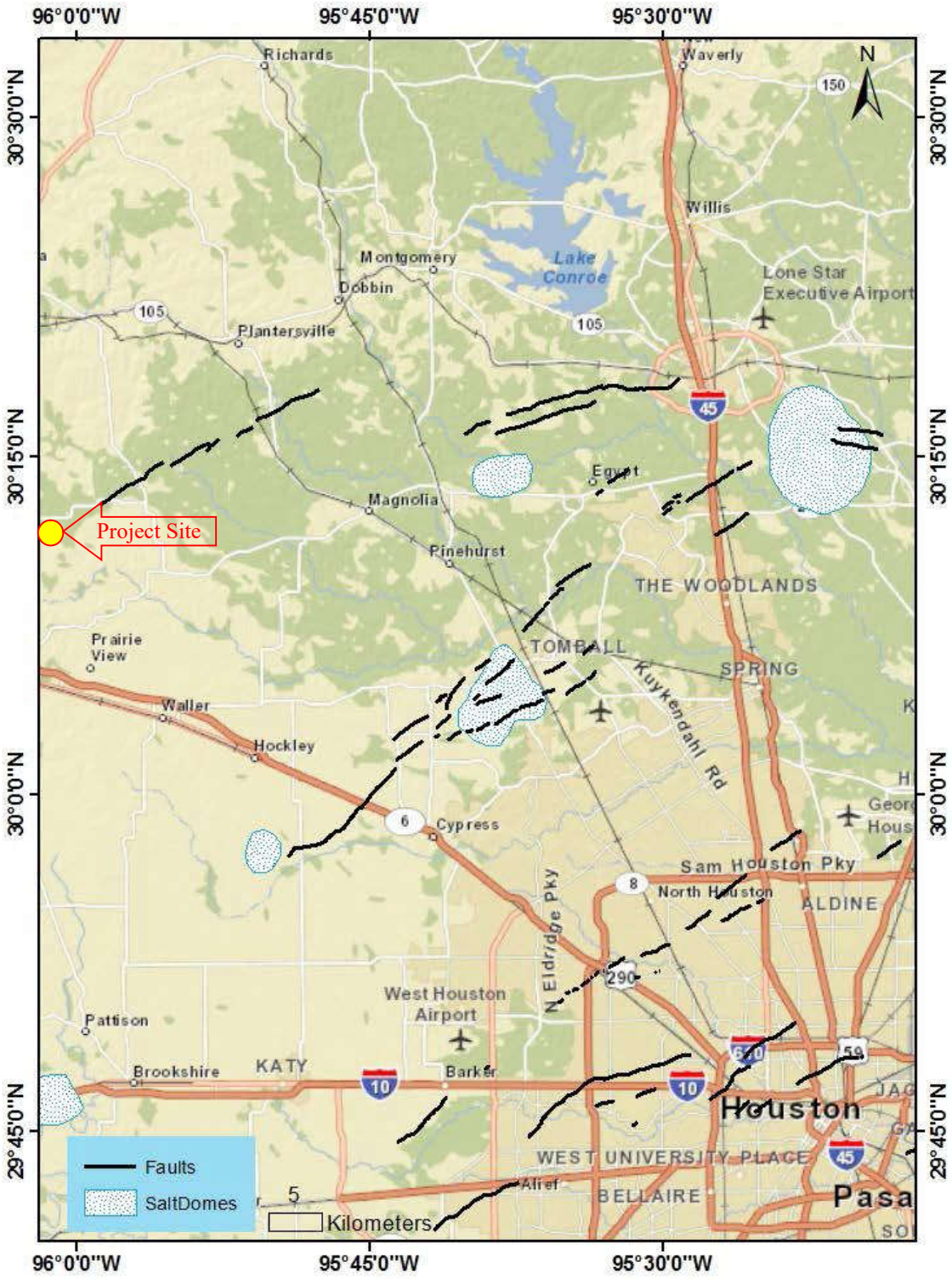
ACTIVE HOCKLEY FAULT SYSTEM IN HARRIS COUNTY (Project Site is approximate)

PROJECT: Desktop Geologic Fault Study and G/S for Double Culvert Road Segment 2 & Cedar Creek Rd Pavement Improvements From 200- Ft East of Railroad Crossing to Tha Intersection of Cedar Creek Rd and HWY6 Waller County Project No.23103, Waller County, Texas

NORTH

SCALE: NOT TO SCALE	DATE: JUNE 2025	PROJECT NO.: 24-997E

PLATE A-16



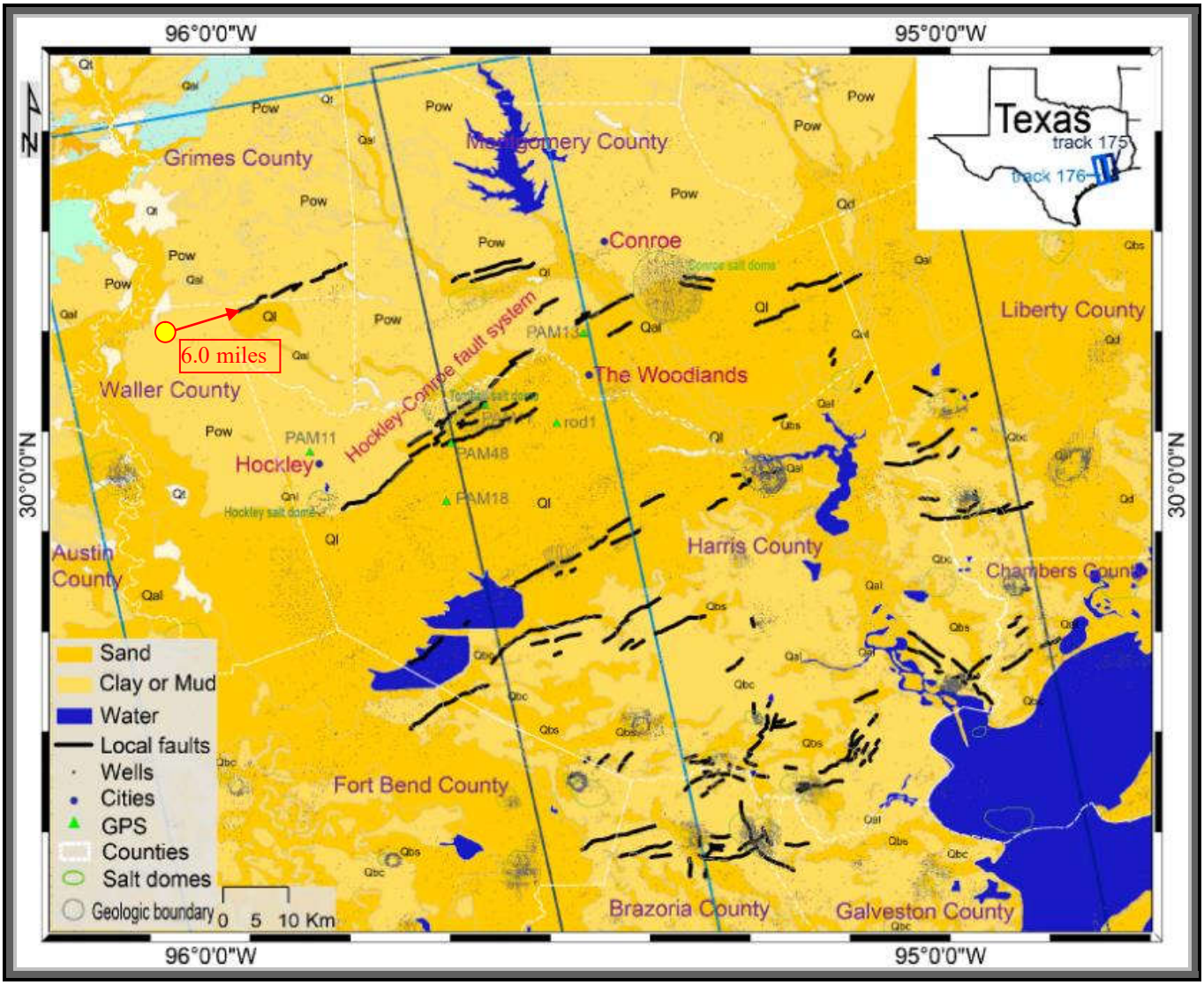
FAULTS IN NORTHWEST AREA OF HARRIS COUNTY (Project location is approximate)

NORTH

PROJECT: Desktop Geologic Fault Study and G/S for Double Culvert Road Segment 2 & Cedar Creek Rd
Pavement Improvements From 200- Ft East of Railroad Crossing to Tha Intersection of Cedar Creek Rd and HWY6
Waller County Project No.23103, Waller County, Texas

SCALE: NOT TO SCALE	DATE: JUNE 2025	PROJECT NO.: 24-997E

PLATE A-17



PRINCIPAL ACTIVE FAULTS IN HOUSTON AREA (Project Site location is approximate)

NORTH

PROJECT: Desktop Geologic Fault Study and G/S for Double Culvert Road Segment 2 & Cedar Creek Rd Pavement Improvements From 200- Ft East of Railroad Crossing to Tha Intersection of Cedar Creek Rd and HWY6 Waller County Project No.23103, Waller County, Texas

SCALE: NOT TO SCALE	DATE: JUNE 2025	PROJECT NO.: 24-997E

PLATE A-18

APPENDIX B

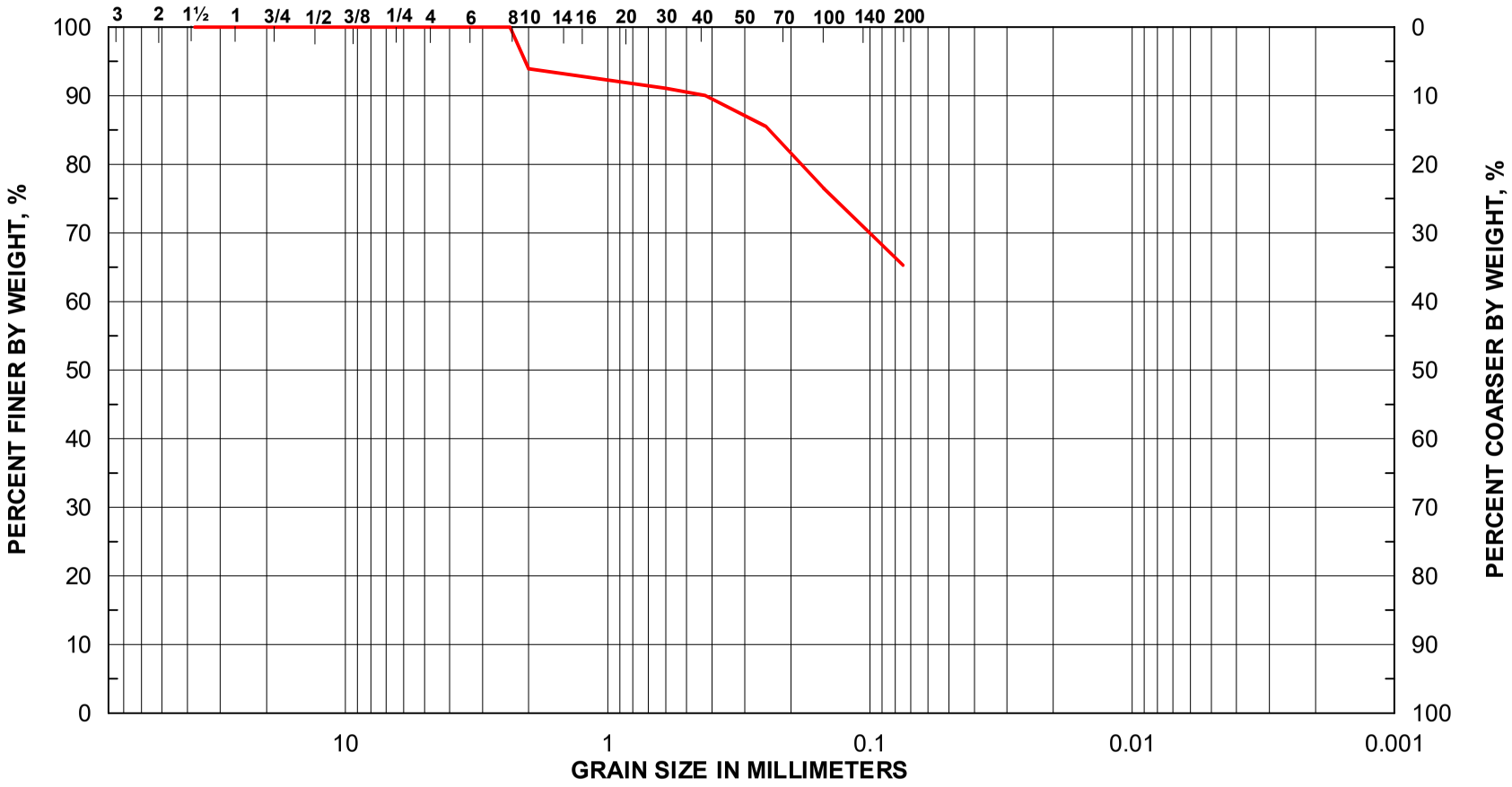
Sieve Analysis Testing Results

GEOTECH ENGINEERING AND TESTING

U.S. STANDARD SIEVE OPENING IN INCHES

U.S. STANDARD SIEVE NUMBERS

ID NO.: SI (06, 08, 9A, 11, 13, 15, 16A, Pan-1)



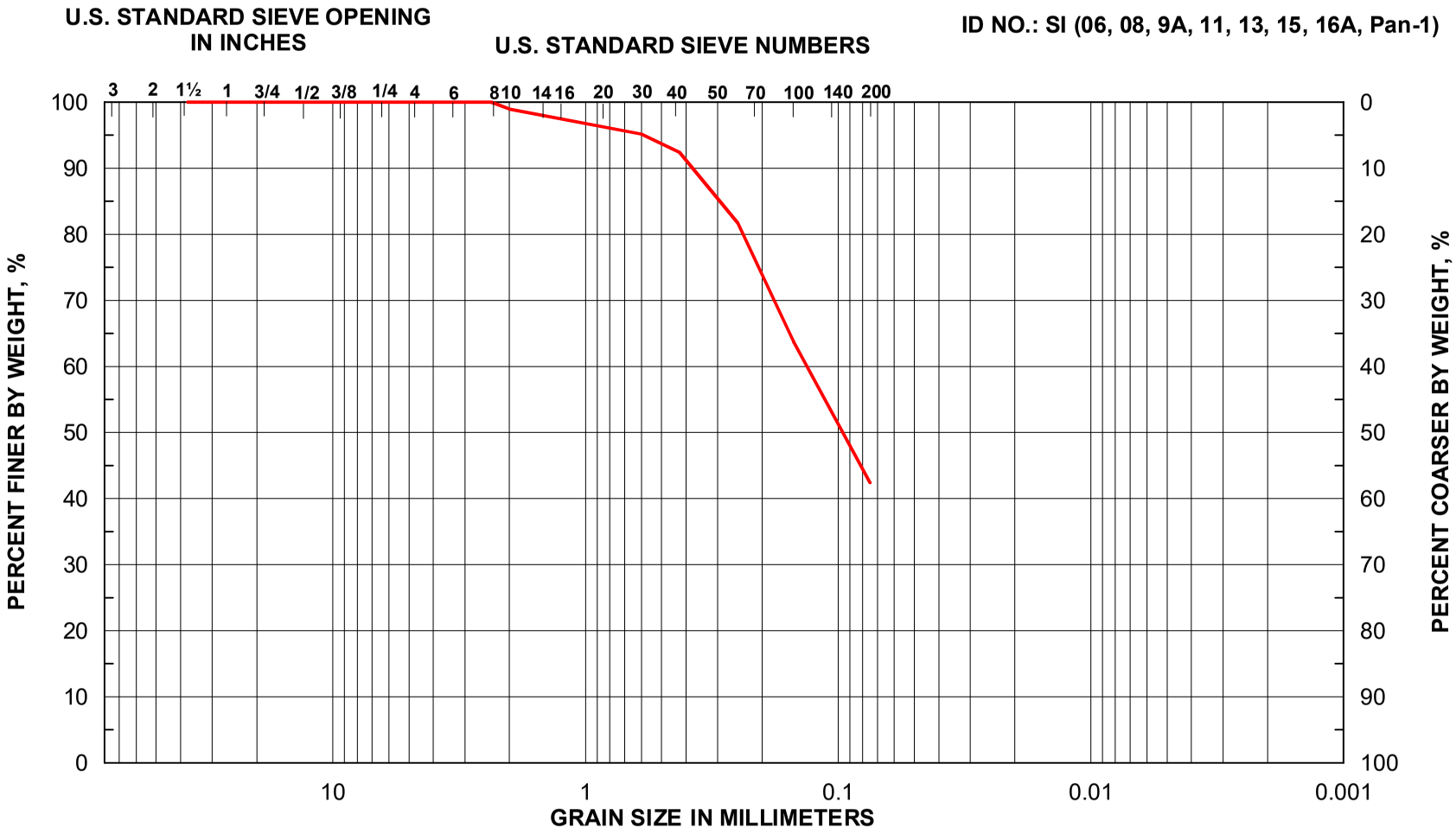
GRAVEL		SAND			SILT	CLAY
Coarse	Fine	Coarse	Medium	Fine		

USCS Soil Classification: LEAN CLAY (CL)
Percent Passing #200 Sieve: 65.33%
PARTICLE SIZE DISTRIBUTION CURVES FOR B-3 (4' TO 6')

Project No. 24-997E

PLATE B-1

GEOTECH ENGINEERING AND TESTING



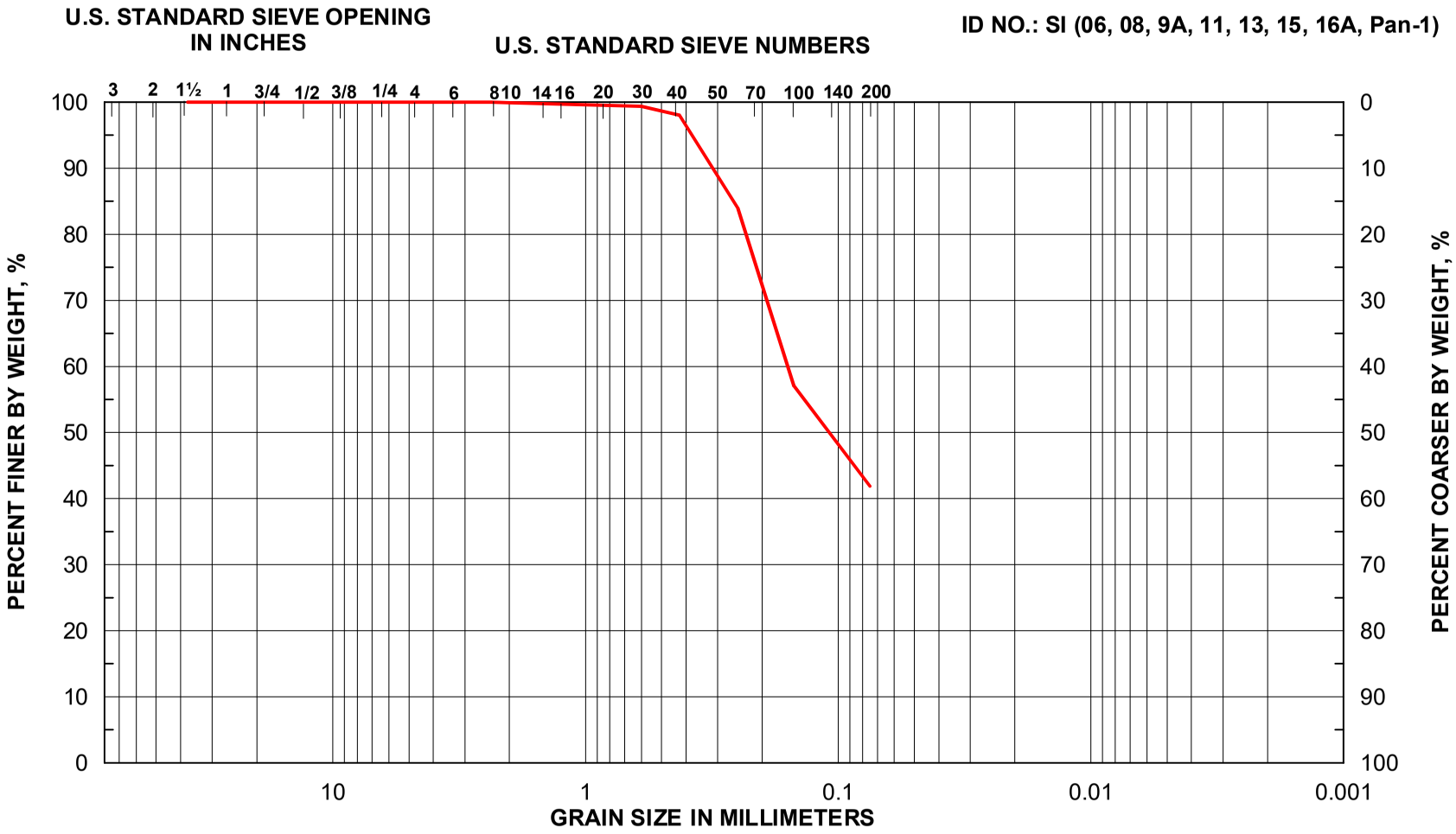
GRAVEL		SAND			SILT	CLAY
Coarse	Fine	Coarse	Medium	Fine		

USCS Soil Classification: LEAN CLAY (CL)
Percent Passing #200 Sieve: 42.47%
PARTICLE SIZE DISTRIBUTION CURVES FOR B-4 (4' TO 6')

Project No. 24-997E

PLATE B-2

GEOTECH ENGINEERING AND TESTING



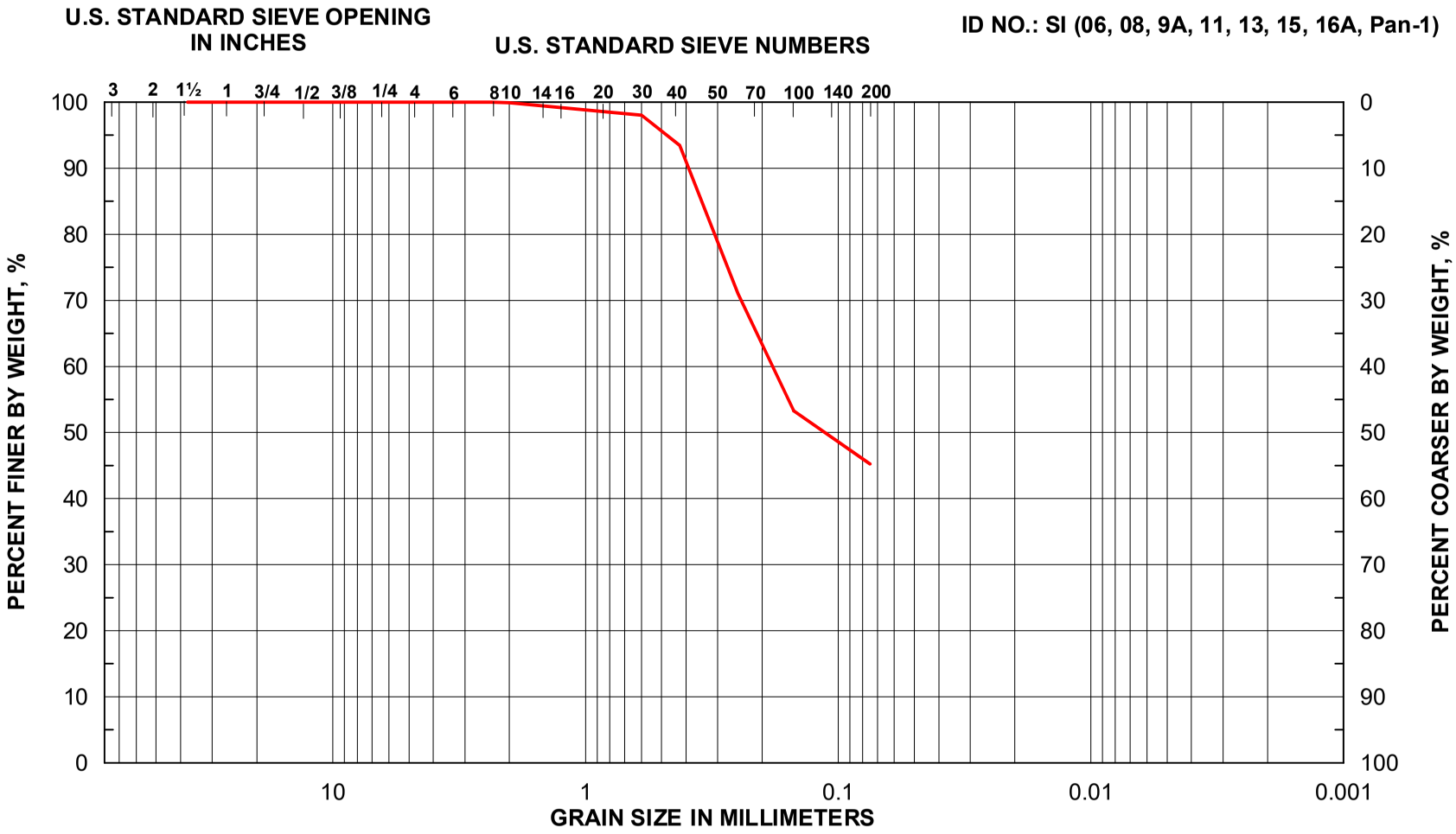
GRAVEL		SAND			SILT	CLAY
Coarse	Fine	Coarse	Medium	Fine		

USCS Soil Classification: LEAN CLAY (CL)
Percent Passing #200 Sieve: 41.91%
PARTICLE SIZE DISTRIBUTION CURVES FOR B-9 (2' TO 4')

Project No. 24-997E

PLATE B-3

GEOTECH ENGINEERING AND TESTING



GRAVEL		SAND			SILT	CLAY
Coarse	Fine	Coarse	Medium	Fine		

USCS Soil Classification: LEAN CLAY (CL)
Percent Passing #200 Sieve: 45.28%
PARTICLE SIZE DISTRIBUTION CURVES FOR B-10 (4' TO 6')

Project No. 24-997E

PLATE B-4

APPENDIX C

Project Alignments Pictures

PROJECT PICTURES

Project No. 24-997E





Note: The above picture(s) indicate a snapshot of the project and the surroundings. We request that the client review the picture(s) and make sure that they represent the project area. We must be contacted immediately if any discrepancy exists.

PROJECT PICTURES

Project No. 24-997E





Note: The above picture(s) indicate a snapshot of the project and the surroundings. We request that the client review the picture(s) and make sure that they represent the project area. We must be contacted immediately if any discrepancy exists.

PROJECT PICTURES

Project No. 24-997E





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Project No. 24-997E





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Project No. 24-997E





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PROJECT PICTURES

Project No. 24-997





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PROJECT PICTURES

Project No. 24-997E





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Project No. 24-997E





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Project No. 24-997E





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PROJECT PICTURES

Project No. 24-997E





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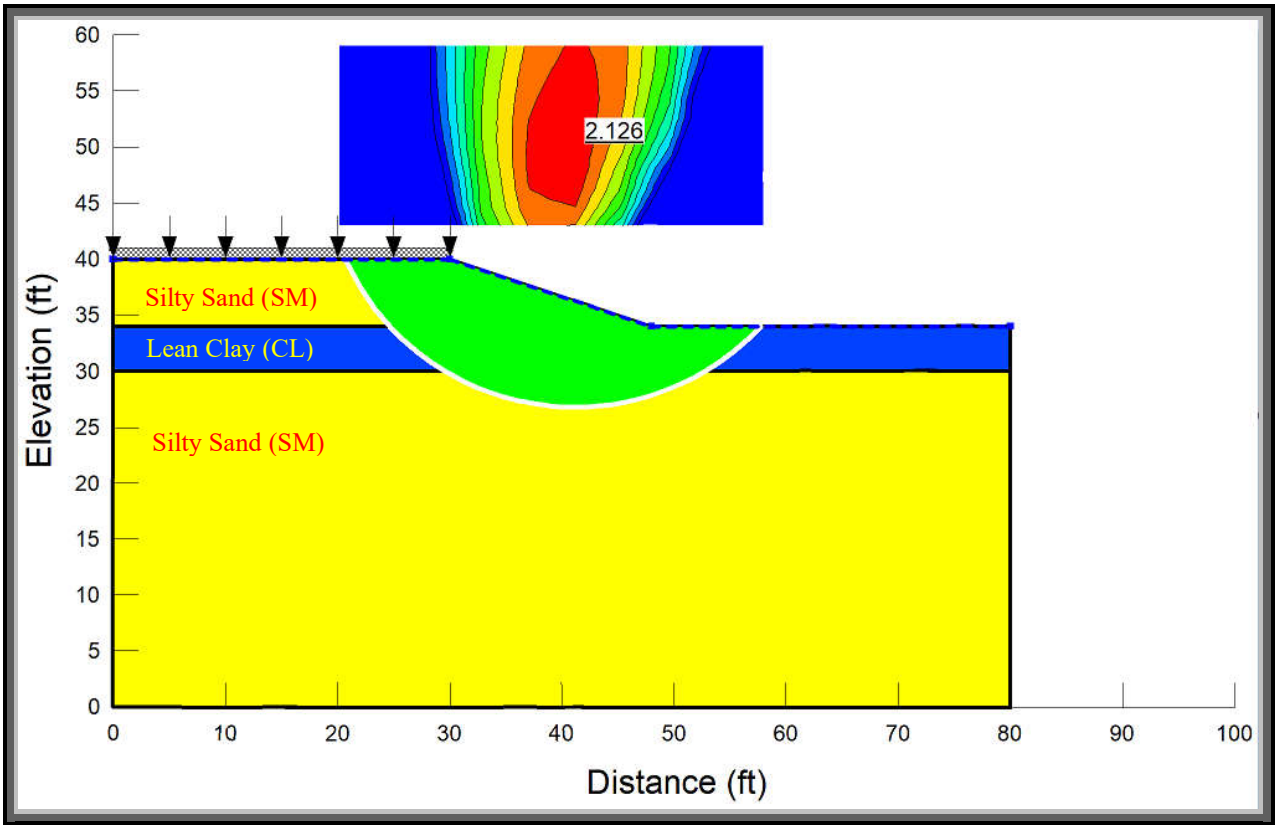
APPENDIX D

RESULTS OF SLOPE STABILITY ANALYSIS FOR ROADSIDE DITCH

SLOPE STABILITY ANALYSIS RESULTS OF ROADSIDE DITCH

Proposed Slope 3(H):1(V) – Short Term Stability Analysis; FS = 2.126



Design Soil Parameters

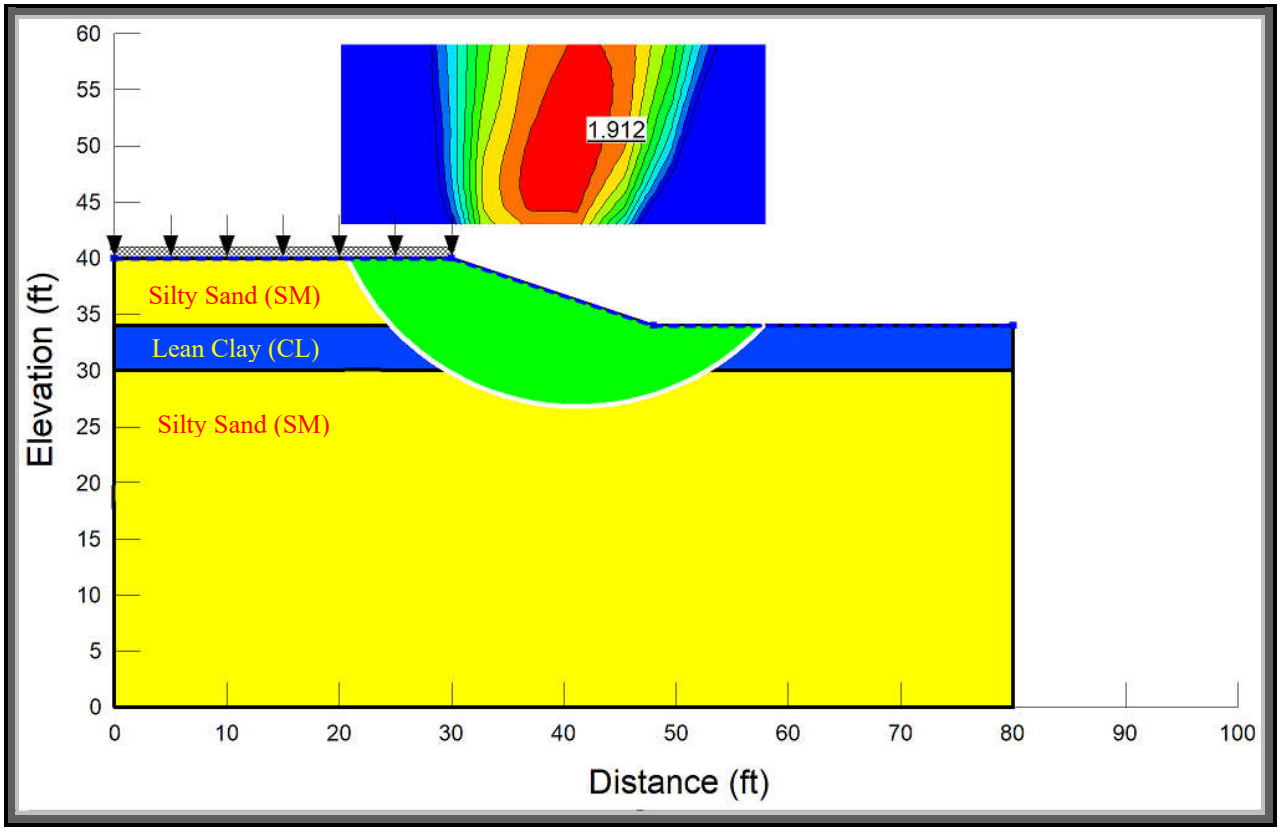
Soil Conditions				Design Strength Parameters					
				Short Term		Rapid Draw Down		Long Term	
Depth Range, ft	Symbol	Description	γ_t, pcf	c^0, psf	ϕ^0	C', psf	ϕ'	C", psf	ϕ"
0 – 6	SM	Silty Sand (SM)	125	0	30	0	30	0	30
6 – 10	CL	Lean Clay (CL)	115	500	0	310	10	300	12
10 – 20	SM	Silty Sand (SM)	125	0	30	0	30	0	30

Where:

γ_t = Total unit weight of soils, pcf
c^0, c', c" = Undrained, consolidated undrained and consolidated drained, cohesion, psf
ϕ^0, ϕ', ϕ" = Undrained, consolidated undrained and consolidated drained, angle of internal friction, degrees

SLOPE STABILITY ANALYSIS RESULTS OF ROADSIDE DITCH

Proposed Slope 3(H):1(V) – Long Term Stability Analysis; FS = 1.912



Design Soil Parameters

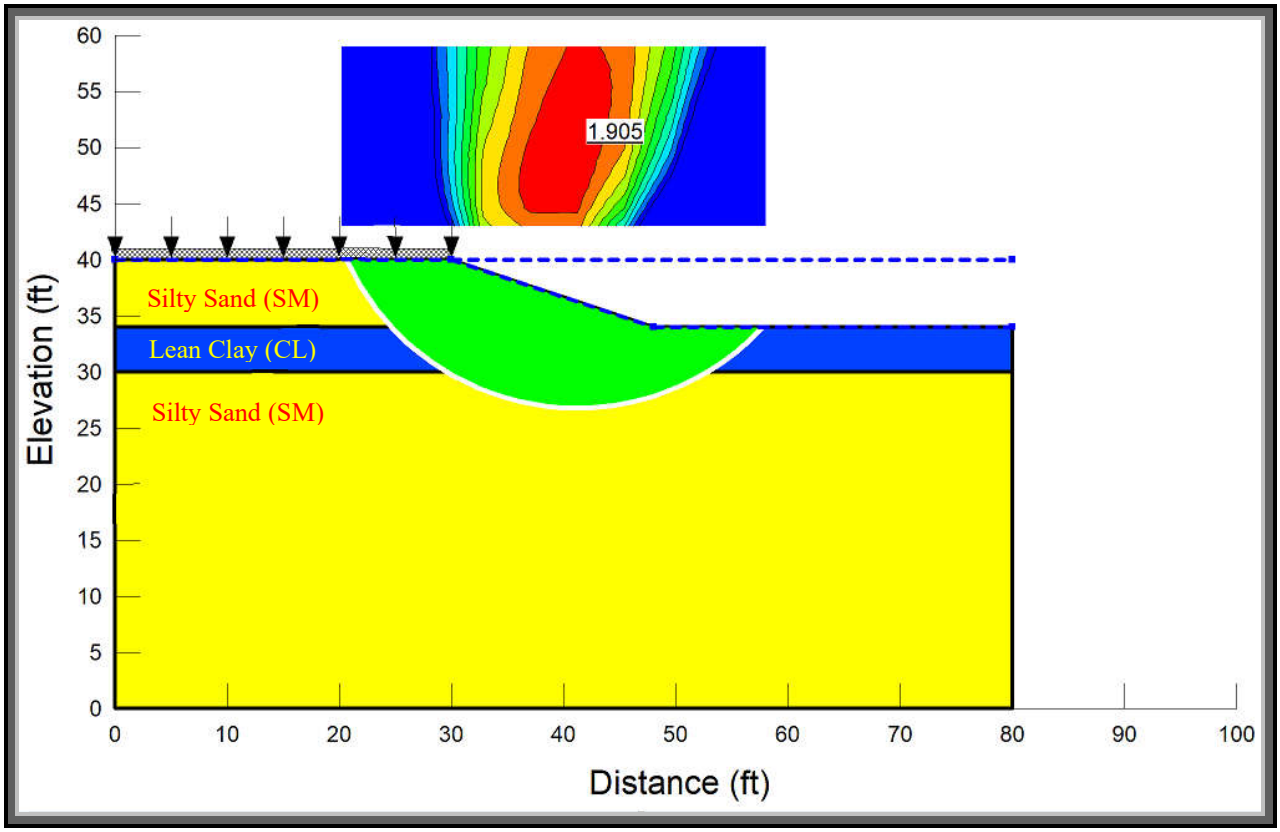
Soil Conditions				Design Strength Parameters					
				Short Term		Rapid Draw Down		Long Term	
Depth Range, ft	Symbol	Description	γ_t, pcf	c^0, psf	ϕ^0	C', psf	ϕ'	C", psf	ϕ"
0 – 6	SM	Silty Sand (SM)	125	0	30	0	30	0	30
6 – 10	CL	Lean Clay (CL)	115	500	0	310	10	300	12
10 – 20	SM	Silty Sand (SM)	125	0	30	0	30	0	30

Where:

γ_t = Total unit weight of soils, pcf
c^0, c', c" = Undrained, consolidated undrained and consolidated drained, cohesion, psf
ϕ^0, ϕ', ϕ" = Undrained, consolidated undrained and consolidated drained, angle of internal friction, degrees

SLOPE STABILITY ANALYSIS RESULTS OF ROADSIDE DITCH

Proposed Slope 3(H):1(V) – Rapid Drawdown Stability Analysis; FS = 1.905



Design Soil Parameters

Soil Conditions				Design Strength Parameters					
				Short Term		Rapid Draw Down		Long Term	
Depth Range, ft	Symbol	Description	γ_t, pcf	c^0, psf	ϕ^0	C', psf	ϕ'	C'', psf	ϕ''
0 – 6	SM	Silty Sand (SM)	125	0	30	0	30	0	30
6 – 10	CL	Lean Clay (CL)	115	500	0	310	10	300	12
10 – 20	SM	Silty Sand (SM)	125	0	30	0	30	0	30

Where:

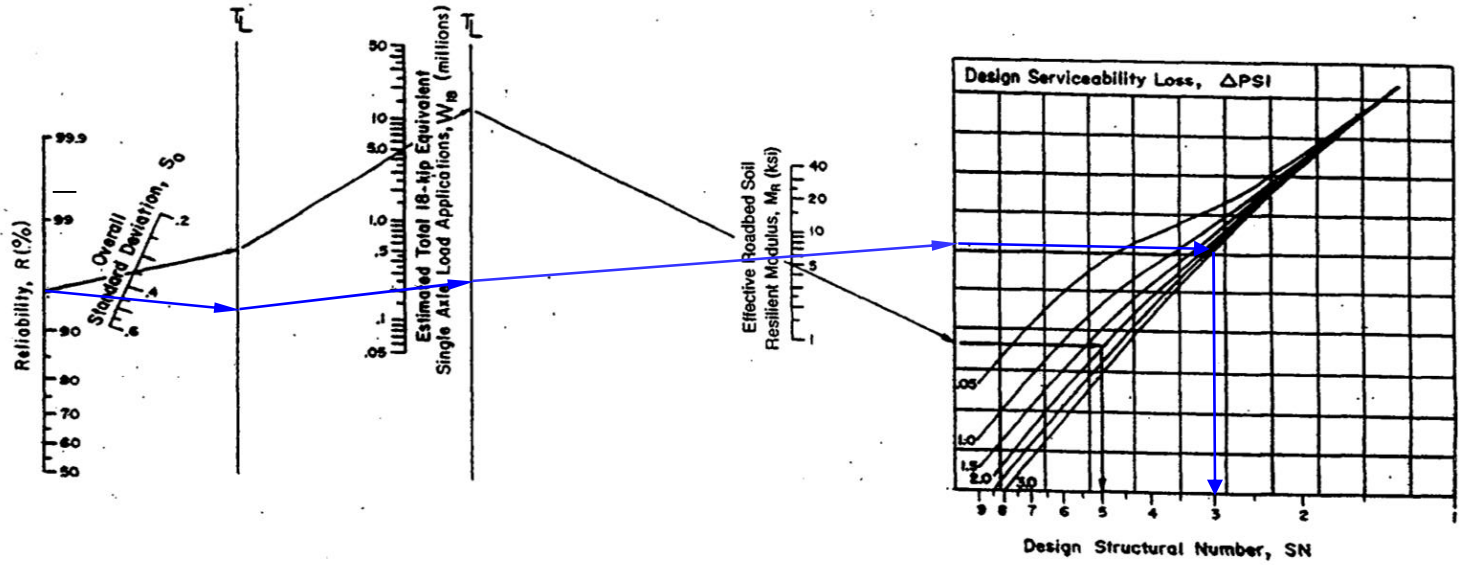
γ_t = Total unit weight of soils, pcf
c^0, c', c" = Undrained, consolidated undrained and consolidated drained, cohesion, psf
ϕ^0, ϕ', ϕ'' = Undrained, consolidated undrained and consolidated drained, angle of internal friction, degrees

APPENDIX E

Pavement Design Computations

NOMOGRAPH SOLVES:

$$\log_{10} W_{18} = Z_R * S_o + 9.36 * \log_{10}(SN+1) - 0.20 + \frac{\log_{10}\left[\frac{\Delta PSI}{4.2 - 1.5}\right]}{0.40 + \frac{1094}{(SN+1)^{5.19}}} + 2.32 * \log_{10} M_R - 8.07$$



Calculation:

$W_{18} = 0.2 \times 10^6$

R = 95%

$S_0 = 0.45$

M_R = 6,000 psi

ΔPSI = 4.2 - 2.5 = 1.7

Solution:

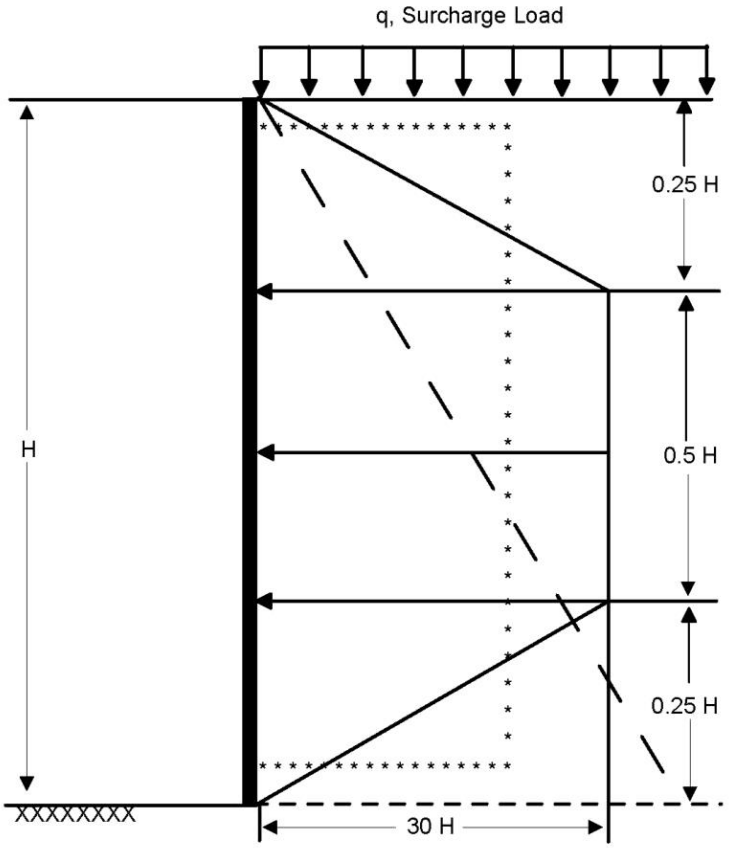
W_{18} (18kip ESAL x 10^6)	Design Structural Number
0.2	3.0

Design Chart for Flexible Pavement

APPENDIX F

OSHA Soil Classification and Trench Safety Recommendations

LATERAL EARTH PRESSURE DIAGRAM



Legend:

———————— Braced Excavation (stiff clays)
* * * * * * * * * * * * * Braced Excavation (sands)
- - - - - - - - - - - - - - - Cantilevered sheeting

Active Pressure:

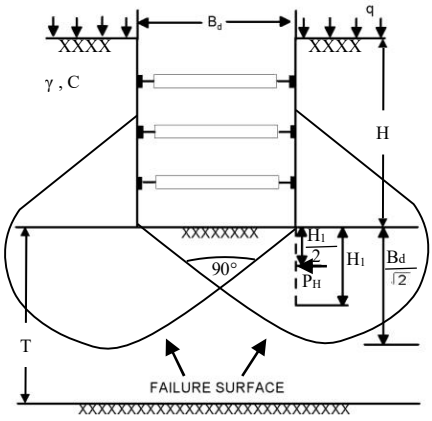
(a) Braced Excavation (stiff clays) = 0.5q + 30H + 62.4H
(b) Braced Excavation (sands) = 0.4q + 18H + 62.4H
(c) Cantilevered sheeting = 0.7q + 42H + 62.4H

where: q = surcharge load, psf: A value of 250 psf can be assumed.
H = wall height, ft.

Notes:

1. The above Active Pressure Equations account for the groundwater at the surface.
2. The final lateral pressures should be reviewed prior to construction.
3. Trench excavation and construction should be observed by a geotechnical engineer.
4. The means and methods for a safe excavation is the responsibility of the contractor.
5. In case of layered soils, active pressure should be calculated based on the dominant or more critical soil conditions.

CUT IN COHESIVE SOIL,
DEPTH OF COHESIVE SOIL UNLIMITED (T > 0.7 B_d)
L= LENGTH OF CUT



If sheeting terminates at base of cut:

Safety Factor, $F_s = \dfrac{N_c c}{\gamma H + q}$

N_c = Bearing capacity factor, which depends on dimensions of the excavation: B_d, L and H (use N_c from graph below)

c = Undrained shear strength of clay in failure zone beneath and surrounding base of cut

γ = Wet unit weight of soil

q = Surcharge (assumed q = 250psf)

If safety factor is less than 1.5, sheeting or soldier piles must be carried below the base of cut to insure stability – (see note)

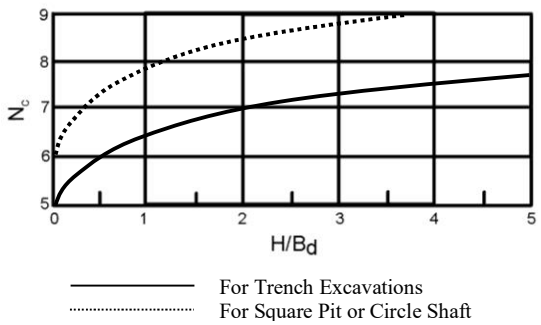
H_1 = Buried length = $\dfrac{B_d}{2} \geq 5$ feet

Note: If soldier piles are used, the center to center spacing should not exceed 3 times the width or diameter of soldier pile.

Force on buried length, P_H:

If $H_1 > \dfrac{2}{3}\dfrac{B_d}{\sqrt{2}}$, $P_H = 0.7\ (\gamma H B_d - 1.4CH - \pi c B_d)$ in lbs/linear foot

If $H_1 < \dfrac{2}{3}\dfrac{B_d}{\sqrt{2}}$, $P_H = 1.5 H_1\ (\gamma H - \dfrac{1.4CH}{B_d} - \pi c)$ in lbs/linear foot



STABILITY OF BOTTOM FOR BRACED CUT

SOIL DESIGN PARAMETERS

(BASED ON BORING B-1)

Soil Type	Depth Range, ft.	γ, pcf	c, psf	ϕ
SILTY SAND (SM)	0 – 1	125	–	30
FAT CLAY (CH)	1 – 2	105	2,000	–
FAT CLAY (CH)	2 – 4	105	1,700	–
FAT CLAY (CH)	4 – 6	105	2,000	–
LEAN CLAY (CL)	6 – 8	115	1,240	–
LEAN CLAY (CL)	8 – 10	115	2,000	–

(BASED ON BORING B-2)

Soil Type	Depth Range, ft.	γ, pcf	c, psf	ϕ
SILTY SAND (SM)	0 – 1	125	–	30
FAT CLAY (CH)	1 – 2	105	1,860	–
FAT CLAY (CH)	2 – 4	105	2,000	–
FAT CLAY (CH)	4 – 6	105	1,860	–
LEAN CLAY (CL)	6 – 8	115	2,000	–
FAT CLAY (CH)	8 – 10	105	2,000	–

(BASED ON BORING B-3)

Soil Type	Depth Range, ft.	γ, pcf	c, psf	ϕ
SILTY SAND (SM)	0 – 2	125	–	30
FAT CLAY (CH)	2 – 4	105	460	–
LEAN CLAY (CL)	4 – 10	115	2,000	–

SOIL DESIGN PARAMETERS
(BASED ON BORING B-4)

Soil Type	Depth Range, ft.	γ, pcf	c, psf	ϕ
SILTY SAND (SM)	0 – 4	125	–	30
LEAN CLAY (CL)	4 – 6	115	460	–
LEAN CLAY (CL)	6 – 8	115	1,560	–
LEAN CLAY (CL)	8 – 13	115	1,700	–
SILTY SAND (SM)	13 – 20	125	–	30

(BASED ON BORING B-5)

Soil Type	Depth Range, ft.	γ, pcf	c, psf	ϕ
SILTY SAND (SM)	0 – 4	125	–	30
FAT CLAY (CH)	4 – 6	105	1,260	–
FAT CLAY (CH)	6 – 8	105	2,000	–
LEAN CLAY (CL)	8 – 10	115	2,000	–

(BASED ON BORING B-6)

Soil Type	Depth Range, ft.	γ, pcf	c, psf	ϕ
SILTY SAND (SM)	0 – 6	125	–	30
LEAN CLAY (CL)	6 – 8	115	1,380	–
LEAN CLAY (CL)	8 – 20	115	2,000	–

(BASED ON BORING B-7)

Soil Type	Depth Range, ft.	γ, pcf	c, psf	ϕ
LEAN CLAY (CL)	0 – 1	115	1,560	–
LEAN CLAY (CL)	1 – 2	115	2,000	–
FAT CLAY (CH)	2 – 6	105	2,000	–
LEAN CLAY (CL)	6 – 8	115	2,000	–
LEAN CLAY (CL)	8 – 10	115	1,120	–

(BASED ON BORING B-8)

Soil Type	Depth Range, ft.	γ, pcf	c, psf	ϕ
FAT CLAY (CH)	0 – 2	105	1,380	–
LEAN CLAY (CL)	2 – 4	115	2,000	–
FAT CLAY (CH)	4 – 6	105	2,000	–
LEAN CLAY (CL)	6 – 10	115	2,000	–

(BASED ON BORING B-9)

Soil Type	Depth Range, ft.	γ, pcf	c, psf	ϕ
LEAN CLAY (CL)	0 – 2	115	980	–
LEAN CLAY (CL)	2 – 4	115	1,240	–
LEAN CLAY (CL)	4 – 6	115	1,000	–
SILTY SAND (SM)	6 – 10	105	–	30

(BASED ON BORING B-10)

Soil Type	Depth Range, ft.	γ, pcf	c, psf	ϕ
SILTY SAND (SM)	0 – 2	125	–	30
FAT CLAY (CH)	2 – 4	105	2,000	–
LEAN CLAY (CL)	4 – 6	115	2,000	–
LEAN CLAY (CL)	6 – 8	115	1,380	–
LEAN CLAY (CL)	8 – 10	105	2,000	–

OSHA SOIL CLASSIFICATION AND TRENCH SAFETY RECOMMENDATIONS

General

Occupational Safety and Health Administration (OSHA) requires a trench protective system for trenches deeper than five-ft. Trenches that are deeper than five-ft, should be shored, sheeted, braced or laid back to a stable slope, or some other appropriate means of protection should be provided where workers might be exposed to moving ground or caving. OSHA developed a soil classification system to be used as a guideline in determining protective requirements for trench excavations.

OSHA classification system categorizes the soil and rock in four types based on shear strength and stability. These classifications are summarized in the following report sections.

Stable Rock

means natural solid mineral matter that can be excavated with vertical sides and remain intact while exposed.

Type A Soil

means cohesive soils with an unconfined compressive strength of 1.5-ton per square foot (tsf) or greater. Examples of cohesive soils are: clay, silty clay, sandy clay, clay loam, silty clay loam, sandy clay loam, caliche and hardpan. No soil is Type A if:

- The soil is fissured; or
- The soil is subject to vibration from heavy traffic, pile driving or similar effects; or
- The soil has been previously disturbed; or
- The soil is part of a slope, layered system where the layers dip into the excavation on a slope of 4(h): 1(v) or greater; or
- The material is subject to other factors that would require it to be classified as a less stable material.

Type B Soil

- Cohesive soil with an unconfined compressive strength greater than 0.5 tsf but less than 1.5 tsf; or
- Granular cohesionless soils including: angular gravel, silt, silt loam, sandy loam, and in some case, silty clay loam and sandy clay loam; or

- Previously disturbed soils except those which would otherwise be classified as Type C soil; or
- Soil that meets the unconfined compressive strength or cementation requirements for Type A, but is fissured or subject to vibration; or
- Dry rock that is not stable; or
- Material that is part of a sloped, layered system where the layers dip into the excavation on a slope less steep than 4(h): 1(v), but only if the material would otherwise be classified as Type B.

Type C Soil

- Cohesive soil with an unconfined compressive strength of 0.5 tsf or less; or
- Granular soils including gravel, sand, and loamy sand; or
- Submerged soil or soil from which water is freely seeping; or
- Submerged rock that is not stable; or
- Materials in a sloped, layered system where the layers dip into the excavation on a slope 4 (h): 1(v) or steeper.

Under the assumption that appropriate groundwater control measures are carried out, and the groundwater table, if present, is lowered and maintained at least 3-ft below the excavation depths, the stable cohesive soils (CL) and (CH), with unconfined compressive strength greater than 0.5 tsf, are classified as OSHA soil Type "B". The granular soils, which are less stable, are classified as OSHA soil Type "C".

Based on our geotechnical exploration and laboratory test results, details of soil classifications at the boring locations are summarized below:

Boring No.	Depth Range [(1)], ft	Soil Type	OSHA Soil Classification
B-1	0 – 1	Silty Sand (SM)	C
	1 – 6	Fat Clay (CH)	B
	6 – 10	Lean Clay (CL)	B
B-2	0 – 1	Silty Sand (SM)	C
	1 – 6	Fat Clay (CH)	B
	6 – 8	Lean Clay (CL)	B
	8 – 10	Fat Clay (CH)	B
B-3	0 – 2	Silty Sand (SM)	C
	2 – 4	Fat Clay (CH)	C
	4 – 10	Lean Clay (CL)	B

Boring No.	Depth Range [1], ft	Soil Type	OSHA Soil Classification
B-4	0 – 4	Silty Sand (SM)	C
	4 – 6	Lean Clay (CL)	C
	6 – 13	Lean Clay (CL)	B
	13 – 20	Silty Sand (SM)	C
B-5	0 – 4	Silty Sand (SM)	C
	4 – 8	Fat Clay (CH)	B
	8 – 10	Lean Clay (CL)	C
B-6	0 – 6	Silty Sand (SM)	C
	6 – 20	Lean Clay (CL)	B
B-7	0 – 2	Lean Clay (CL)	B
	2 – 6	Fat Clay (CH)	B
	6 – 10	Lean Clay (CL)	B
B-8	0 – 2	Fat Clay (CH)	B
	2 – 4	Lean Clay (CL)	B
	4 – 6	Fat Clay (CH)	B
	6 – 10	Lean Clay (CL)	B
B-9	0 – 6	Lean Clay (CL)	B
	8 – 10	Silty Sand (SM)	C
B-10	0 – 2	Silty Sand (SM)	C
	2 – 4	Fat Clay (CH)	B
	4 – 10	Lean Clay (CL)	B

Note: 1. Refer to each boring log of soils stratigraphy

Stockpiling of excavated materials may not be allowed near the banks of excavated areas. Generally, a distance of one-half the excavation depth on both sides of the trench should be kept clear of any excavated material.

Underground utility trenches should be provided with proper trench support system. The trench should be provided with a temporary shoring system on excavations deeper than five-ft. The trenches can be

made using shored, sheeted and braced, laid back stable slope or other means of appropriate protection system should be provided where workers are exposed to moving ground or caving. The slopes may be constructed in accordance with Table B-1 and shoring may be constructed in accordance with Table C-1.1, Table C-1.2 and Table C-1.3 of 29 CFR Part 1926 of OSHA.

In the event that trench sheeting is used, the sheeting can be constructed in the form of cantilever sheeting or with bracing. Lateral earth pressures for each method used are summarized on Plate F-1. The trenching and shoring operations should follow OSHA Standards. We recommend that a geotechnical engineer monitor all phases of trench excavation and bracing to assure trench safety.

Timber shoring as outlined in 29 CFR Part 1926 of OSHA recommendation may be used in the construction of trench supporting system.

For trench excavation, it is necessary to maintain the stability of the sides and base and not to disturb the soil below the excavation grade. In braced cuts, if the sheeting is terminated at the base of the cut, the bottom of the excavation can become unstable under certain conditions. The stability of the trench bottom is governed by the shear strength of the soils and the differential hydrostatic head. For cuts in cohesive soils (such as fat clay and lean clay), stability of the bottom can be evaluated in accordance with the procedure outlined on Plate F-2. However, if cohesionless soils are encountered, dewatering will be required to prevent bottom blowup if the groundwater is encountered during construction. Design soil parameters presented on Plate F-3 through F-5 can be used for design.

Groundwater Control

Our short-term field exploration indicates that groundwater was not encountered during and after 0.33-hour of drilling. Hence, groundwater dewatering may not be required. However, fluctuations in groundwater can occur as a function of seasonal moisture variation. Groundwater control recommendations are presented in the following report sections.

In the event that groundwater is encountered during construction, it is our opinion that groundwater should be lowered to a depth of at least three-ft below the deepest excavation grade in order to provide dry working conditions and firm bedding. Any minor water inflow in cohesive soil layers can probably be removed using a sump-pump or trench sump-pump. Wellpoint system can be used in the area where sandy lean clay soils are present. **Due to the presence of cohesionless soils, blow up may occur if an effective dewatering system is not in place at the time of construction.**

Piezometers should be installed near the excavation area to further evaluate groundwater levels in the area prior to construction. The piezometers should be left in place during construction to monitor groundwater levels and effectiveness of the dewatering system.

Design of a dewatering system should consider the amount of groundwater to be lowered and the permeability of the affected soils. The selection and proper implementation of an effective groundwater control system is the responsibility of the contractor. The design of groundwater and surface water should be in accordance with the Waller County Specifications.

The results of our field exploration and laboratory testing indicate that unsatisfactory soils for excavation, such as silty sand (SM), soft lean (CL) and fat clay (CH), encountered in the borings. A summary of the unsatisfactory soils locations and depths are as follows:

Boring(s)	Depth, ft.
B-1 and B-2	0 to 1
B-3	0 to 4
B-4	0 to 6/13 to 20
B-5	0 to 4/8 to 10
B-6	0 to 6
B-9	8 to 10
B-10	0 to 2

If these conditions are encountered during the time of construction, suitable groundwater control measures should be implemented in accordance with the Waller County Specifications. Furthermore, the contractor may have to over excavate an additional 6 inches and remove unstable or unsuitable materials with approval by geotechnical engineer, then place an equal depth of cement stabilization sand.

Due to potential variability of the on-site soils, unstable trench conditions may still exist in the areas where we did not conduct borings. If these conditions are encountered during the time of construction, a stable trench should be provided to allow proper bedding and installation.

Our recommendation on trench safety at the project site does not address the effects of excavations on existing buildings/facilities at the project site. This study was outside the scope of our work.

100% SUBMITTAL

WALLER COUNTY ENGINEERING DEPARTMENT

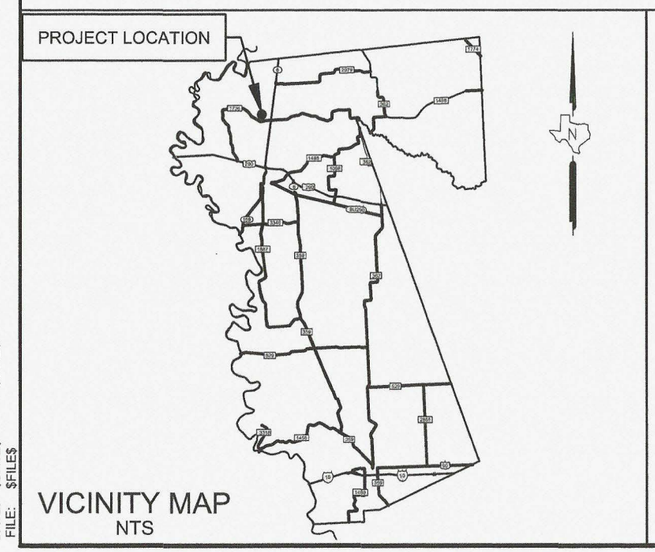
DOUBLE CULVERT ROAD SEGMENTS 1 & 2 AND CEDAR CREEK ROAD

BOND PROJECT NO. 23102 & 23103

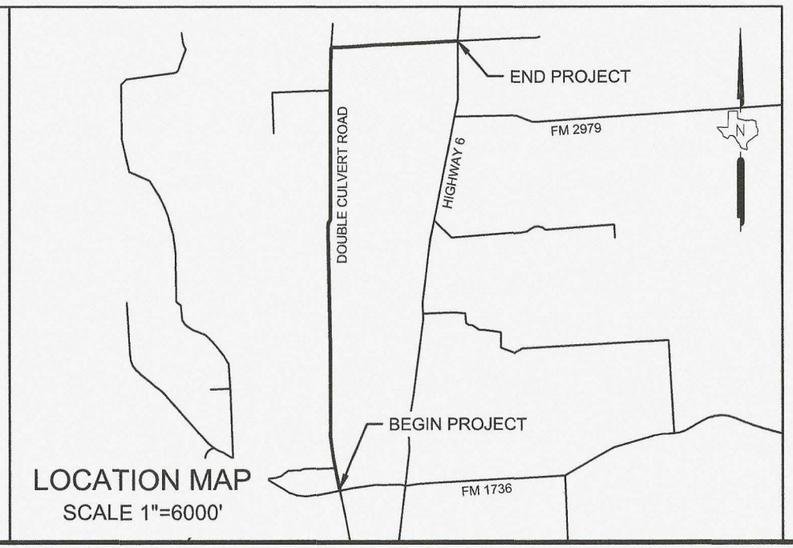
PRECINCT 1

WALLER COUNTY ROAD BOND

JOHN A. AMSLER COMISSIONER — PRECINCT 1	CARBETT J. DUHON III COUNTY JUDGE	KENDRIC D. JONES COMISSIONER — PRECINCT 3
WALTER E. SMITH, P.E., RPLS COMISSIONER — PRECINCT 2		JUSTIN BECKENDORFF COMISSIONER — PRECINCT 4



VICINITY MAP
NTS



LOCATION MAP
SCALE 1"=6000'

J. ROSS MCCALL, P.E. — 7-29-26 — DATE

07/28/2026
ABBY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abby Polzin

07/17/2026
ROY M. DILL
94626
LICENSED
PROFESSIONAL ENGINEER
R. M. Dill, P.E.

DESIGN ENGINEER, P.E. — DATE

THE STATE OF TEXAS
WALLER COUNTY

AUGUST 2026

Kimley»Horn
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PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM
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TEXAS REGISTERED ENGINEERING FIRM #F-928

CivilCorp
an ESP COMPANY
Texas P.E. Board Firm Registration No. 17252
29255 FM 1093, Suite 7A
Fulshear, TX 77441

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

100% SUBMITTAL

WALLER COUNTY ENGINEERING DEPARTMENT

DOUBLE CULVERT ROAD SEGMENT 1

WALLER COUNTY ROAD BOND

BOND PROJECT NO. 23102

PRECINCT 1

FULL DEPTH RECONSTRUCTION FOR THE LIMITS OF THE PROJECT

LIMITS: FM 1736 TO 200 LF EAST OF RAILROAD CROSSING

PROJECT LENGTH = 10,900 FT. = 2.06 MI.

DESIGN SPEED = 30 MPH

INDEX OF SHEETS

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1	OVERALL COVER
2	SEGMENT 1 COVER
3	GENERAL NOTES
4	PROJECT LAYOUT
5	EXISTING TYPICAL SECTIONS
6	PROPOSED TYPICAL SECTIONS
7-10	SURVEY CONTROL
11-15	PROJECT CONTROL
16	HORIZONTAL ALIGNMENT DATA
17-25	DEMOLITION PLAN
26-27	DRAINAGE AREA MAPS
28-31	EXISTING DITCH CALCULATIONS
32-35	PROPOSED DITCH CALCULATIONS
36-37	CULVERT SUMMARY TABLES
38-55	PAVING PLAN AND PROFILE
56	DRIVEWAY SUMMARY SHEET
57-58	PAVING POINT TABLES
59-66	PAVING AND DRAINAGE STANDARD DETAILS
67-75	PAVEMENT MARKING AND SIGNING
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121-139	TRAFFIC CONTROL STANDARD DETAILS
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149	EROSION CONTROL STANDARD DETAILS
150-161	CROSS SECTIONS
162	EARTHWORK TABLES

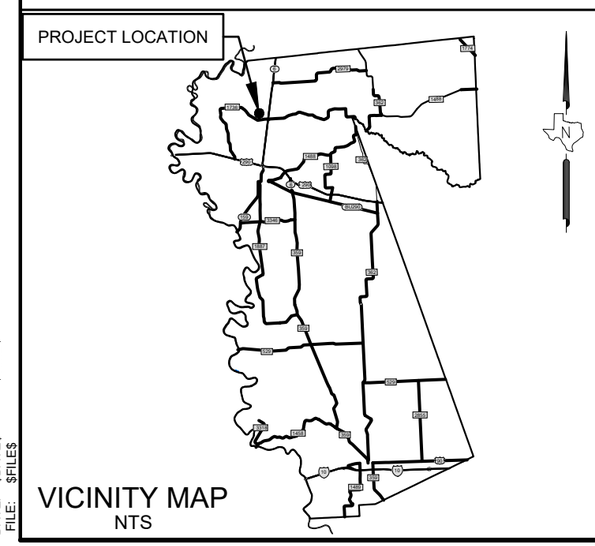
JOHN A. AMSLER
COMISSIONER — PRECINCT 1

CARBETT J. DUHON III
COUNTY JUDGE

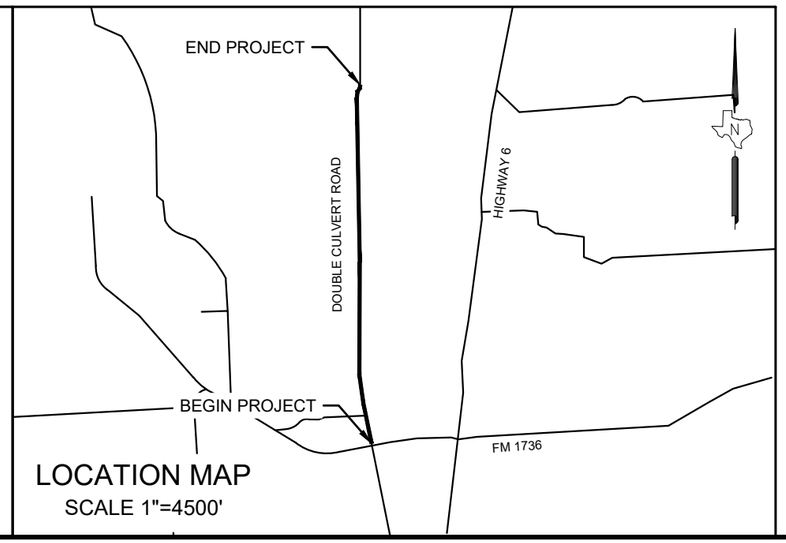
KENDRIC D. JONES
COMISSIONER — PRECINCT 3

WALTER E. SMITH, P.E., RPLS
COMISSIONER — PRECINCT 2

JUSTIN BECKENDORFF
COMISSIONER — PRECINCT 4



VICINITY MAP
NTS



LOCATION MAP
SCALE 1"=4500'

THE STATE OF TEXAS
WALLER COUNTY

AUGUST 2026

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

DESIGN ENGINEER, P.E. — DATE

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TEXAS REGISTERED ENGINEERING FIRM #F-928

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

100% SUBMITTAL

GENERAL NOTES

1. THE CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS BEFORE BEGINNING CONSTRUCTION.
2. NOTIFY THE COUNTY ENGINEER IMMEDIATELY IF DISCREPANCIES ARE DISCOVERED IN THE HORIZONTAL CONTROL OR BENCHMARK DATA.
3. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING SECURITY TO PROTECT THE PROJECT SITE, CONTRACTOR PROPERTY, EQUIPMENT, AND WORK.
4. THE CONTRACTOR IS RESPONSIBLE FOR CLEANING STREETS OF CONSTRUCTION DIRT AND DEBRIS AT CLOSE OF EACH WORK DAY.
5. THE CONDITION OF THE ROAD AND/OR RIGHT-OF-WAY, UPON COMPLETION OF THE PROJECT SHALL BE AS GOOD OR BETTER THAN PRIOR TO STARTING WORK
6. PRIOR TO CONSTRUCTION, THE CONTRACTOR, ALONG WITH CONCURRENCE FROM THE ENGINEER, SHALL AGREE TO LAY-DOWN AND/OR STAGING AREA LOCATIONS.
7. THE CONTRACTOR SHALL NOTIFY ALL PROPERTY OWNERS A MINIMUM OF 24 HOURS PRIOR TO BLOCKING DRIVEWAYS OR ENTERING UTILITY EASEMENTS. ACCESS TO DRIVEWAYS SHALL BE MAINTAINED AT ALL TIMES.
8. TRAFFIC INGRESS AND EGRESS FOR DRIVEWAYS AND PEDESTRIAN ACCESS FACILITIES SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION WITH ALL WEATHER SURFACES.
9. THE CONTRACTOR SHALL REMOVE ANY FENCES, POSTS, MAILBOXES, PLANTERS, PERMANENT TRASH CONTAINERS, CULVERTS, ETC. OR SECTIONS THEREOF, THAT ENCROACH WITHIN THE COUNTY'S RIGHT-OF-WAY. MAILBOXES SHALL BE REPLACED IN ACCORDANCE WITH THE PLANS. ANY DAMAGE CAUSED BY THE CONTRACTOR TO SUCH ITEMS LOCATED OUTSIDE OF THE COUNTY'S RIGHT-OF-WAY, SHALL BE REPLACED WITH LIKE-KIND OR BETTER AT THE CONTRACTOR'S EXPENSE. ALSO, IF THESE ITEMS ARE LOCATED WITHIN THE PROJECT RIGHT-OF-WAY AND ARE DESIGNATED TO REMAIN, ANY DAMAGE CAUSED BY THE CONTRACTOR TO SUCH ITEMS, SHALL BE REPLACED WITH LIKE-KIND OR BETTER AT THE CONTRACTOR'S EXPENSE. TREES, BUSHES, SHRUBBERY AND OTHER DAMAGED PLANTINGS DESIGNATED TO REMAIN SHALL BE REPLACED WITHIN 72 HOURS OF REMOVAL AND ARE TO BE THOROUGHLY WATERED-IN. PAY IS SUBSIDIARY TO THE PROJECT.
10. PAVED SURFACES, PAVEMENT MARKERS AND MARKINGS SHALL BE PROTECTED FROM DAMAGE BY TRACKED EQUIPMENT.
11. IRON RODS DISTURBED DURING CONSTRUCTION ARE TO BE REPLACED BY A REGISTERED PROFESSIONAL LAND SURVEYOR FOR THE ORIGINAL PROPERTY OWNER. COST IS SUBSIDIARY TO THE PROJECT.
12. CONSTRUCTION STAKING WILL BE PROVIDED BY THE CONTRACTOR. TWO COPIES OF STAKING NOTES TO BE PROVIDED TO THE ENGINEER PRIOR TO CONSTRUCTION.
13. THE CONTRACTOR SHALL MAINTAIN UPDATED RED-LINED RECORD DRAWINGS ON SITE FOR INSPECTION BY THE ENGINEER. RECORD DRAWING SHALL BE SUBMITTED AT COMPLETION OF THE PROJECT.
14. MOWING, MAINTENANCE, AND CLEAN-UP IS REQUIRED FOR THE PROJECT LIMITS AND DURATION, REGARDLESS OF THE CONTRACTOR'S SCOPE OF ACTIVITIES WITHIN THE PROJECT LIMITS.
15. THE REMOVAL OF ANY ABANDONED UTILITIES REQUIRED TO COMPLETE THE WORK SHALL BE INCIDENTAL AND COST SHALL BE SUBSIDIARY TO THE PREOJCT.
16. IT IS THE CONTRACTOR'S RESPONSIBILITY TO STOCKPILE NECESSARY MATERIAL ON-SITE OR AT A SECURED OFF-SITE LOCATION AT NO ADDITIONAL EXPENSE TO WALLER COUNTY. ANY SUITABLE EXCAVATED MATERIAL ON THE PROJECT WHICH IS AVAILABLE AT THE TIME OF NEED; WHETHER FROM STORM SEWER, ROADWAY, AND/OR CHANNEL EXCAVATION, SHALL BE USED BEFORE BORROW IS BROUGHT ON-SITE.
17. MILLINGS COLLECTED FROM PROJECT SITE ARE TO BE TRANSPORTED AND DEPOSITTED AT THE LOCATION OF KLOECKER ROAD AND HEISE ROAD.
18. MANHOLES, JUNCTION BOXES, INLETS, AND RISERS ARE TO BE PRE-CAST OR CAST IN PLACE.
19. POP UP DRAINS ARE NOT ALLOWED IN WALLER COUNTY RIGHT OF WAY.
20. CONTRACTOR IS RESPONSIBLE FOR CONTACTING UTILITY COMPANIES IN ORDER TO PREVENT DAMAGE TO PIPELINES FROM CONSTRUCTION EQUIPMENT.
21. BIDDERS ARE REQUESTED TO VISIT THE VICINITY OF THE PROJECT SITE AND EVALUATE THE EXISTING SITE CONDITIONS.
22. IN THOSE INSTANCES WHERE FIXED FEATURES REQUIRE, THE GOVERNING SLOPES INDICATED HEREIN MAY BE VARIED BETWEEN THE LIMITS SHOWN AND TO THE EXTENT DETERMINED BY THE ENGINEER.
23. CONTRACTOR SHALL ESTABLISH GRADE STREET INTERSECTIONS AND MEDIAN OPENINGS FOR ADEQUATE SURFACE DRAINAGE.
24. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MARKING STATIONS EVERY 100 FEET AND SHALL MAINTAIN THE MARKINGS FOR THE DURATION OF THE PROJECT.
25. THE APPROXIMATE LOCATIONS OF KNOWN UNDERGROUND UTILITIES HAVE BEEN SHOWN ON THE PLAN SHEETS. PRIOR TO BEGINNING ANY EXCAVATION WORK INTHE AREA OF EXISTING UTILITIES, THE CONTRACTOR SHALL CONTACT THE UTILITY COMPANIES OR THE UTILITY COORDINATING COMMITTEE FOR EXACT LOCATIONS TO PREVENT ANY DAMAGE OR INTERFERENCE WITH PRESENT FACILITIES. THE UTILITY COORDINATING COMMITTEE AND THE TEXAS ONE CALL SYSTEM SHALL BE NOTIFIED AT THE FOLLOWING NUMBER: OUTSIDE HMA, TOLL FREE 1-800-245-4545
THIS ACTION, HOWEVER, SHALL IN NO WAY BE INTERPRETED AS RELIEVING THE CONTRACTOR OF THEIR RESPONSIBILITIES UNDER THE TERMS OF THE CONTRACT AS SET OUT IN THE PLANS AND SPECIFICATIONS. THE CONTRACTOR SHALL REPAIR ANY DAMAGE CAUSED BY THEIR OPERATIONS AT THE CONTRACTOR'S EXPENSE AND SHALL RESTORE FACILITIES TO SERVICE IN A TIMELY MANNER.
IF ANY OVERHEAD OR UNDERGROUND POWER LINES NEED TO BE DE-ENERGIZED, THE CONTRACTOR SHALL CALL THE POWER COMPANY TO DO THIS WORK. ANY COST ASSOCIATED WITH DE-ENERGIZING THE POWER LINE AND/OR ANY OTHER PROTECTIVE MEASURES REQUIRED SHALL BE AT THE CONTRACTOR'S EXPENSE.
WHEN THE CONTRACTOR IS WORKING NEAR ANY POWER LINES, IT IS THEIR RESPONSIBILITY TO COMPLY WITH THE APPROPRIATE SECTIONS OF TEXAS STATE LAW AND FEDERAL REGULATIONS RELATING TO THE TYPE OF WORK INVOLVED.
DO NOT MIX OR STORE MATERIALS, OR STORE OR REPAIR EQUIPMENT, ON BRIDGE DECKS UNLESS AUTHORIZED BY THE COUNTY ENGINEER.
26. PERSONAL VEHICLES OF EMPLOYEES ARE NOT PERMITTED TO PARK WITHIN THE RIGHT OF WAY. EMPLOYEES MAY PARK AT THE CONTRACTOR'S OFFICE, EQUIPMENT, AND MATERIALS STORAGE YARD SITES.
27. CONTRACTOR SHALL ASSUME OWNERSHIP OF DEBRIS AND DISPOSE OF AT APPROVED LOCATION. DO NOT DISPOSE OF DEBRIS ON PRIVATE PROPERTY UNLESS APPROVED IN WRITING BY COUNTY ENGINEER.
28. THE CONTRACTOR SHALL FIELD VERIFY ALL EXISTING ELEVATIONS AT LOCATIONS WHERE A PROPOSED TO EXISTING TIE-IN IS LOCATED. LIMITS OF WORK MAY BE ADJUSTED AS DIRECTED BY THE ENGINEER IN ORDER TO MATCH EXISTING ROADWAY ELEVATIONS, EXISTING CHANNEL BANKS AND OUTFALLS.
29. CONTRACTOR SHALL SEQUENCE WORK TO MIMINZE IMPACTS TO THE TRAVELLING PUBLIC AND ADJACENT PROPERTY OWNERS.
30. SCHEDULE WORK SO THAT IT LIMITS IMPACTS TO THE PUBLIC AND ADJACENT PROPERTY OWNERS.
IF THE CONTRACTOR DAMAGES OR CAUSE DAMAGE (BREAKS, LEAKS, NICKS, DENTS, GOUGES, ETC.) TO THE UTILITY, CONTACT THE UTILITY FACILITY OWNER OR OPERATOR IMMEDIATELY.
NOTIFY THE ENGINEER AT LEAST 48 HOURS BEFORE CONSTRUCTING JUNCTION BOXES AT STORM DRAIN AND UTILITY INTERSECTIONS.
INSTALL OR REMOVE POLES AND LUMINAIRES LOCATED NEAR OVERHEAD OR UNDERGROUND ELECTRICAL LINES USING ESTABLISHED INDUSTRY AND UTILITY SAFETY PRACTICES. CONSULT THE APPROPRIATE UTILITY COMPANY BEFORE BEGINNING SUCH WORK.
IF OVERHEAD OR UNDERGROUND POWER LINES NEED TO BE DE-ENERGIZED, CONTACT THE ELECTRICAL SERVICE PROVIDER TO PERFORM THIS WORK. COSTS ASSOCIATED WITH DE-ENERGIZING THE POWER LINES OR OTHER PROTECTIVE MEASURES REQUIRED ARE AT NO EXPENSE TO THE COUNTY.
IF WORKING NEAR POWER LINES, COMPLY WITH THE APPROPRIATE SECTIONS OF TEXAS STATE LAW AND FEDERAL REGULATIONS RELATING TO THE TYPE OF WORK INVOLVED.
PERFORM ELECTRICAL WORK IN CONFORMANCE WITH THE NATIONAL ELECTRICAL CODE (NEC) AND STANDARD SHEETS.
31. BEFORE COMMENCING CONSTRUCTION, PREPARE AND SUBMIT A SCHEDULE BASED ON THE SEQUENCE OF WORK AND TRAFFIC CONTROL PLAN SHOWN IN THE CONTRACT. INCLUDE ALL PLANNED WORK ACTIVITIES AND SEQUENCES AND SHOW COMPLETION WITHIN THE NUMBER OF CALENDAR DAYS SPECIFIED. INCORPORATE MAJOR MATERIAL PROCUREMENTS, KNOWN UTILITY RELOCATIONS, AND OTHER ACTIVITIES THAT MAY AFFECT THE COMPLETION OF THE CONTRACT IN THE SCHEDULE. INCLUDE ALL MILESTONES INCLUDING BEGINNING DATE, ENDING DATE, AND DURATION IN NUMBER OF CALENDAR DAYS FOR EACH ACTIVITY. DO NOT USE ACTIVITIES EXCEEDING 30 CALENDAR DAYS, EXCEPT FOR AGREED UPON ACTIVITIES. SHOW AN ESTIMATED PRODUCTION RATE PER CALENDAR DAY FOR EACH WORK ACTIVITY.
SUBMIT AN UPDATED PROGRESS SCHEDULE MONTHLY, UNLESS OTHERWISE SHOWN IN THE CONTRACT OR AS DIRECTED. UPDATE THE PROGRESS SCHEDULE BY ADDING ACTUAL PROGRESS MADE DURING THE PREVIOUS UPDATE PERIOD, INCLUDING APPROVED CHANGES TO THE SEQUENCE OF WORK AND THE TRAFFIC CONTROL PLAN. IF AN UPDATED PROGRESS SCHEDULE INDICATES THE CONTRACT WILL NOT BE COMPLETED WITHIN THE NUMBER OF CALENDAR DAYS SPECIFIED, NOTIFY THE ENGINEER IN WRITING WHETHER THE CONTRACTOR WILL REVISE THE PROGRESS SCHEDULE TO MEET THE NUMBER OF CALENDAR DAYS SPECIFIED OR EXCEED THE NUMBER OF CALENDAR DAYS SPECIFIED.
NO DIRECT COMPENSATION WILL BE MADE FOR FULFILLING THESE REQUIREMENTS, AS THIS WORK IS CONSIDERED SUBSIDIARY TO THE ITEMS OF THE CONTRACT.
CALENDAR DAYS WILL BE CHARGED SUNDAY THROUGH SATURDAY, INCLUDING ALL HOLIDAYS, REGARDLESS OF WEATHER CONDITIONS, MATERIAL AVAILABILITY, OR OTHER CONDITIONS NOT UNDER THE CONTROL OF THE CONTRACTOR. WORK DAYS EQUAL CALENDAR DAYS.
32. ANY GROUNDWATER ELEVATION INFORMATION PROVIDED IS REPRESENTATIVE OF CONDITIONS EXISTING ON THE DAY WHEN AND FOR THE SPECIFIC LOCATION WHERE THIS INFORMATION WAS COLLECTED. THE ACTUAL GROUNDWATER ELEVATION MAY FLUCTUATE WITH TIME, CLIMATIC CONDITIONS, AND CONSTRUCTION ACTIVITY.
33. UTILITY CONTRACTORS MAY BE RELOCATING UTILITY LINES IN TEMPORARY LOCATIONS AND PERMANENT LOCATIONS IN CONJUNCTION WITH PHASED CONSTRUCTION. THE CONTRACTOR WILL PROVIDE AND COORDINATE ACCESS FOR THE VARIOUS UTILITY CONTRACTOR'S CREWS THROUGHOUT THE DURATION OF THE PROJECT.
34. MAINTAIN THE ROADWAY SLOPE STABILITY. MAINTAINING SLOPE STABILITY IS SUBSIDIARY TO THE VARIOUS BID ITEMS.

TRAFFIC CONTROL NOTES

1. THE CONTRACTOR SHALL PROVIDE AND INSTALL TRAFFIC CONTROL DEVICES IN CONFORMANCE WITH PART VI OF THE MOST RECENT EDITION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES AND THE APPROVED TRAFFIC CONTROL PLAN.
2. UNIFORMED PEACE OFFICERS OR FLAGGERS IN RADIO CONTACT ARE REQUIRED TO DIRECT TRAFFIC DURING LANE CLOSURES AS INDICATED ON THE PLANS.
3. DETOURS REQUIRE PRIOR APPROVAL OF THE ENGINEER. DETOUR PLANS, IF ALLOWED, MUST INCLUDE APPROPRIATE DETOUR SIGNAGE, PUBLIC NOTICE VIA SIGNAGE TWO WEEKS IN ADVANCE STATING THE DATES OF THE AGREED UPON DATE OF CLOSURE AND DATE THE ROAD WILL RE-OPEN TO TRAFFIC. CONTRACTOR TO USE (WITH PRIOR APPROVAL OF THE ENGINEER) VARIOUS CONSTRUCTION METHODS TO MINIMIZE THE DURATION OF THE DETOUR AND TO ENSURE THAT THE ROADWAY IS OPEN ON, OR PRIOR TO, THE AGREED UPON DATE.
4. ONE DAY PRIOR TO THE IMPLEMENTATION OF A TRAFFIC CONTROL PLAN PHASE OR STEP, OR THE IMPLEMENTATION OF AN ADDITIONAL, REVISED, OR NEW TRAFFIC CONTROL ELEMENT, THE CONTRACTOR SHALL MEET WITH THE ENGINEER TO GIVE A DETAILED DESCRIPTION OF THE CONTRACTOR'S PLAN AND PREPARATIONS. THE CONTRACTOR SHALL OBTAIN WRITTEN CONCURRENCE FROM THE ENGINEER THAT ADEQUATE PROJECT PROGRESS HAS BEEN ACHIEVED AND THAT ADEQUATE PREPARATIONS ARE IN PLACE PRIOR TO SWITCHING TRAFFIC. IF, IN THE OPINION OF THE ENGINEER, REQUIRED PROGRESS AND ADEQUATE PREPARATIONS ARE NOT COMPLETE, THE CONTRACTOR SHALL NOT IMPLEMENT THE NEXT PHASE, STEP, OR ELEMENT OF TRAFFIC CONTROL UNTIL INCOMPLETE CONSTRUCTION ITEMS OR PREPARATIONS ARE COMPLETED. TIME EXTENSIONS WILL NOT BE GRANTED FOR DELAYS CAUSED BY THE INCOMPLETE CONSTRUCTION ITEMS OR INADEQUATE CONTRACTOR PREPARATIONS REQUIRED TO IMPLEMENT TRAFFIC CONTROL.
5. TRAFFIC CONTROL PER THE CONTRACT IS REQUIRED FOR THE ENTIRE DURATION OF THE PROJECT, INCLUDING THE PUNCHLIST PERIOD. PAYMENT FOR TRAFFIC CONTROL THAT IS PROPERLY INSTALLED FOR LESS THAN A FULL MONTH SHALL BE BASED ON A PERCENTAGE BASIS OF THE TIME INSTALLED. TRAFFIC CONTROL PAYMENTS TO THE CONTRACTOR SHALL END 10 DAYS AFTER SUBSTANTIAL COMPLETION, ALTHOUGH PROPER TRAFFIC CONTROL MUST BE MAINTAINED UNTIL PUNCHLIST COMPLETION.
6. THE PURPOSE OF THE CONSTRUCTION SEQUENCE AND TRAFFIC HANDLING OUTLINED HEREIN IS TO DOCUMENT A VIABLE TCP THAT CAN BE UTILIZED TO CONSTRUCT THE PROJECT. IT IS THE BASIS OF ESTIMATION FOR THE TRAFFIC CONTROL BID ITEMS, AND IS TO BE UTILIZED AND IMPLEMENTED, UNLESS OTHERWISE DIRECTED BY THE ENGINEER. IF THE CONTRACTOR CHOOSES TO USE A DIFFERENT TCP, THE ALTERNATIVE TCP SHALL BE SUBMITTED TO THE COUNTY FOR APPROVAL NO LESS THAN 10 WORKING DAYS PRIOR TO THE PROPOSED IMPLEMENTATION DATE. THE TCP SHALL BE DRAWN TO SCALE AND SIGNED & SEALED BY A PROFESSIONAL ENGINEER LICENSED TO PRACTICE IN THE STATE OF TEXAS. UPON APPROVAL BY WALLER COUNTY, THE ALTERNATIVE PLAN SHALL BECOME THE BASIS FOR A "CHANGE IN CONTRACT" TO REVISE THE TRAFFIC CONTROL BID ITEMS ACCORDINGLY AND BECOME PART OF THE CONTRACT DOCUMENTS.
7. ALL TEMPORARY PAVEMENT MARKINGS ON PERMANENT PAVEMENT SHOULD BE TABS.
8. TRAFFIC PATTERN CHANGES REQUIRE CHANGEABLE MESSAGE BOARDS PLACED AT LEAST 2 WEEKS IN ADVANCE OF PROPOSED CHANGE. QUANTITY, PLACEMENT AND WORDING TBD BY WALLER COUNTY.

CONSTRUCTION NOTES

1. CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL PERMITS REQUIRED FROM WALLER COUNTY PRIOR TO COMMENCING CONSTRUCTION OF ANY IMPROVEMENTS WITHIN COUNTY ROAD RIGHTS OF WAY. THE ATTENTION OF PROSPECTIVE BIDDERS IS DIRECTED TO ORDINANCES AND REGULATIONS OF LOCAL MUNICIPAL AND COUNTY GOVERNMENTS AND THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY WHICH MAY BE APPLICABLE ON THIS PROJECT.
2. ALL PAVING IMPROVEMENTS SHALL BE CONSTRUCTED IN ACCORDANCE WITH "WALLER COUNTY SUBDIVISION & DEVELOPMENT REGULATIONS" RELATING TO THE APPROVAL AND ACCEPTANCE OF IMPROVEMENTS IN SUBDIVISIONS AS CURRENTLY AMENDED.
3. ALL WEATHER ACCESS TO EXISTING STREETS AND DRIVEWAYS SHALL BE MAINTAINED AT ALL TIMES.
4. GUIDELINES ARE SET FORTH IN THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES", AS CURRENTLY AMENDED, SHALL BE OBSERVED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ADEQUATE FLAGMEN, SIGNING, STRIPING, AND WARNING DEVICES, ETC., DURING CONSTRUCTION – BOTH DAY AND NIGHT.
5. ALL R1-1 STOP SIGNS SHALL BE A MINIMUM OF 36"X36" WITH DIAMOND GRADE SHEETING PER "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES".
6. SIGN POSTS AND SIGNS ARE TO BE INSTALLED PER WALLER COUNTY APPROVED SIGNAGE DESIGN DRAWINGS.
7. STREET NAME SIGNAGE SHALL BE ON A 9" HIGH SIGN FLAT BLADE W/ REFLECTIVE GREEN BACKGROUND. STREET NAMES SHALL BE UPPER AND LOWERCASE LETTERING WITH UPPERCASE LETTERS OF 6" MINIMUM AND LOWERCASE LETTERS OF 4.5" MINIMUM. THE LETTERS SHALL BE REFLECTIVE WHITE. STREET NAME SIGNS SHALL BE MOUNTED ON STOP SIGN POST.
8. THE PROJECT AND ALL PARTS THEREOF SHALL BE SUBJECT TO INSPECTION FROM TIME TO TIME BY INSPECTORS DESIGNATED BY WALLER COUNTY. NO SUCH INSPECTIONS SHALL RELIEVE THE CONTRACTOR OF ANY OF ITS OBLIGATIONS HEREUNDER. NEITHER FAILURE TO INSPECT NOR FAILURE TO DISCOVER OR REJECT ANY OF THE WORK AS NOT IN ACCORDANCE WITH THE DRAWINGS AND SPECIFICATIONS. REQUIREMENTS AND SPECIFICATIONS OF WALLER COUNTY OR ANY PROVISION OF THIS PROJECT SHALL BE CONSTRUED TO IMPLY AN ACCEPTANCE OF SUCH WORK OR TO RELIEVE THE CONTRACTOR OF ANY OF ITS OBLIGATIONS HEREUNDER.
9. STABILIZED SUBGRADE: DETERMINE THE THICKNESS OF THE STABILIZED SUBGRADE AFTER CURING AND COMPACTION. IF THE SUBGRADE DEPTH IS GREATER THAN THE PROPOSED THICKNESS BY 20% OR MORE. THE CMT LAB MUST PROVIDE VERIFICATION THE PERCENTAGE OF MATERIAL BEING USED TO STABILIZE THE SUBGRADE MEETS OR EXCEEDS PROJECT REQUIREMENTS. TEST RESULTS REQUIRED.

NOTE: WALLER COUNTY NOTES SUPERSEDE ANY CONFLICTING NOTES.

UTILITY NOTES

AT&T TEXAS/SWBT FACILITIES

1. THE LOCATIONS OF AT&T TEXAS/SWBT FACILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION BEFORE COMMENCING WORK. HE AGREES TO BE FULLY RESPONSIBLE FOR ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THIS FAILURE TO EXACTLY LOCATE AND PRESERVE THESE UNDERGROUND UTILITIES.
2. THE CONTRACTOR SHALL CALL 1-800-344-8377 (TEXAS 811) A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION TO HAVE UNDERGROUND LINES FIELD LOCATED.
3. WHEN EXCAVATING WITHIN EIGHTEEN INCHES (18") OF THE INDICATED LOCATION OF AT&T TEXAS/SWBT FACILITIES, ALL EXCAVATIONS MUST BE ACCOMPLISHED USING NON-MECHANIZED EVACUATION PROCEDURES. WHEN BORING, THE CONTRACTOR SHALL EXPOSE THE AT&T TEXAS/SWBT FACILITIES.
4. WHEN AT&T TEXAS/SWBT FACILITIES ARE EXPOSED, THE CONTRACTOR WILL PROVIDE SUPPORT TO PREVENT DAMAGE TO THE CONDUIT DUCTS OR CABLES. WHEN EXCAVATING NEAR TELEPHONE POLES THE CONTRACTOR SHALL BRACE THE POLE FOR SUPPORT.
5. THE PRESENCE OR ABSENCE OF AT&T TEXAS/SWBT UNDERGROUND CONDUIT FACILITIES OR BURIED CABLES OR OTHER CABLES IN CONDUIT IN THE AREA.
6. PLEASE CONTACT THE AT&T TEXAS DAMAGE PREVENTION MANAGER KEVIN RAY AT (713) 614-1983 OR E-MAIL HIM AT kr7896@ATT.COM IF CABLE LOCATE REQUESTS ARE NOT COMPLETED FOR OUR AT&T TEXAS/SWBT FACILITIES.

ENERGY TRANFER CO. – PIPELINE

1. REVIEW PIPELINE OWNER GUIDELINES AND EXECUTED LETTER OF NO OBJECTION (LONO).
2. NO EXCAVATION SHALL OCCUR IN VICINITY OF ET'S PIPELINE FACILITIES UNTIL:
   1) IN ACCORDANCE WITH THE STATE APPROVED NOTIFICATION CENTERS, ET SHALL BE NOTIFIED AT LEAST 48 HOURS IN ADVANCE OF ANY CONSTRUCTION OR MAINTENANCE ACTIVITY. YOU MUST CONTACT THE STATE APPROVED NOTIFICATION CENTER AT 811. BEFORE COMMENCING ANY CROSSING AT OR NEAR ET'S FIELD REPRESENTATIVE(S)
      DANNY CHAUVIN 832-370-3176 DANNY.CHAUVIN@ENERGYTRANSFER.COM
   2) AN ET REPRESENTATIVE WILL BE ON SITE TO MONITOR EXCAVATION ACTIVITIES.

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL
ENGINEER
Abbey Polzin

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM
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TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
GENERAL NOTES

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		3

DATE: 7/28/2026 8:15:16 PM
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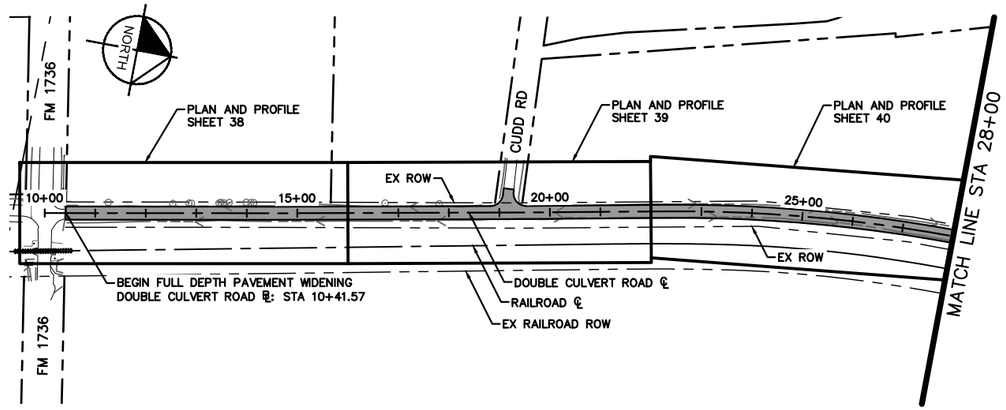

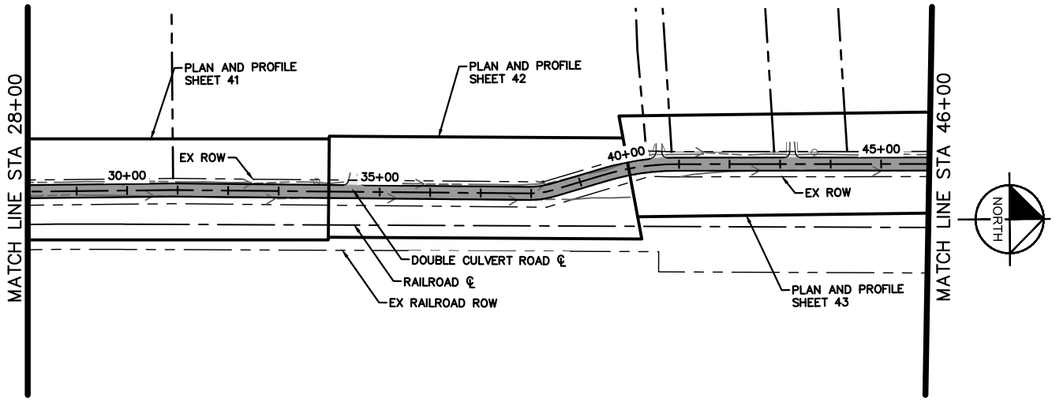

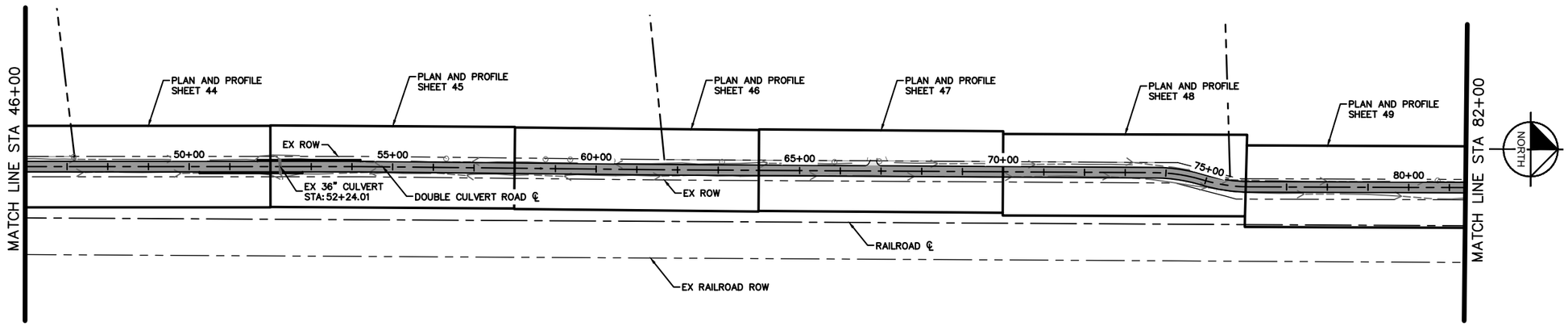

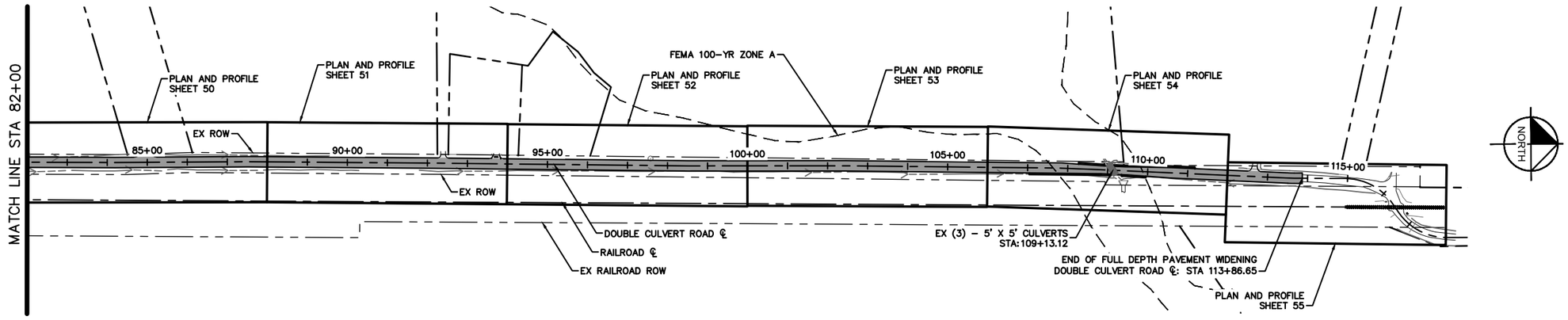

GRAPHIC SCALE IN FEET
0 150 300 600

NOTES

1. REFER TO HORIZONTAL ALIGNMENT DATA SHEET FOR CURVE DATA AND ALIGNMENT INFORMATION.

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abby Polzin

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REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
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TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
PROJECT LAYOUT

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		4

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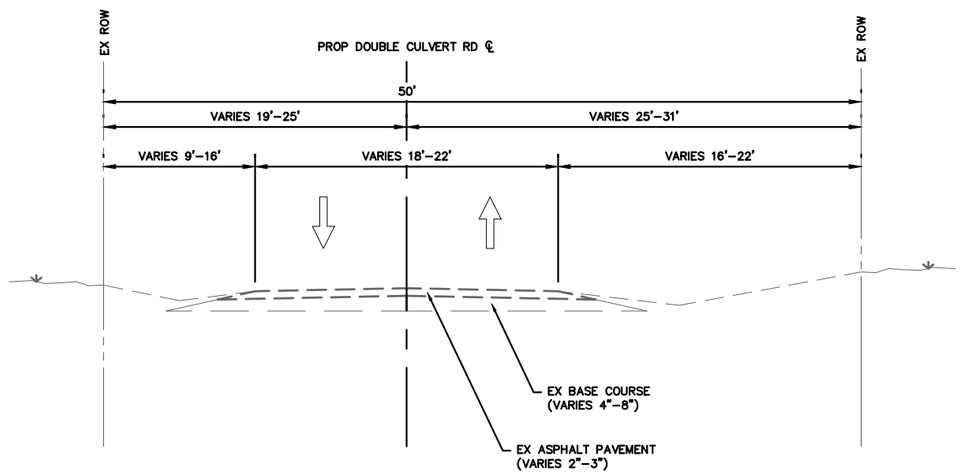

EXISTING DOUBLE CULVERT ROAD TYPICAL SECTION

STA 10+65 TO STA 113+87

SCALE: 1" = 10'

NOTES:

1. REFER TO GEOTECH REPORT PREPARED BY GEOTECH ENGINEERING AND TESTING SERVICES (REPORT NO. 24–996E) DATED JUNE 2025

07/28/2026

STATE OF TEXAS
ABBEY M. POLZIN
151558
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PROFESSIONAL ENGINEER

Abbey Polzin

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REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

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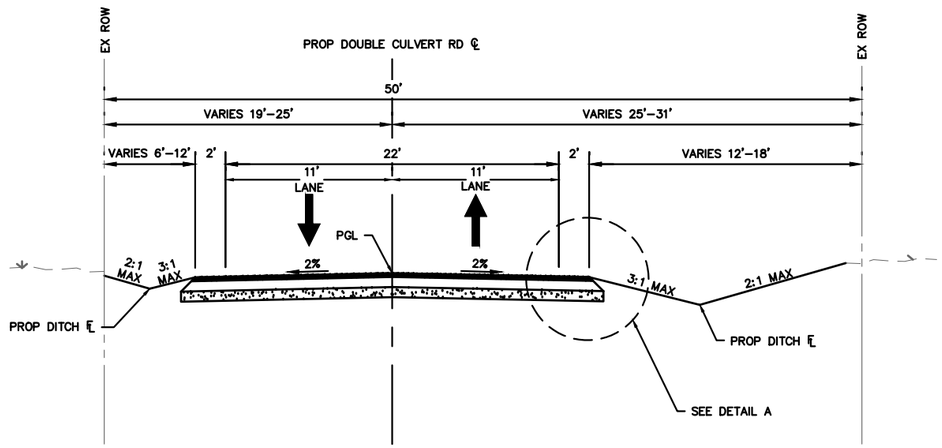
DOUBLE CULVERT ROAD
SEGMENT 1
EXISTING TYPICAL SECTIONS

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		5

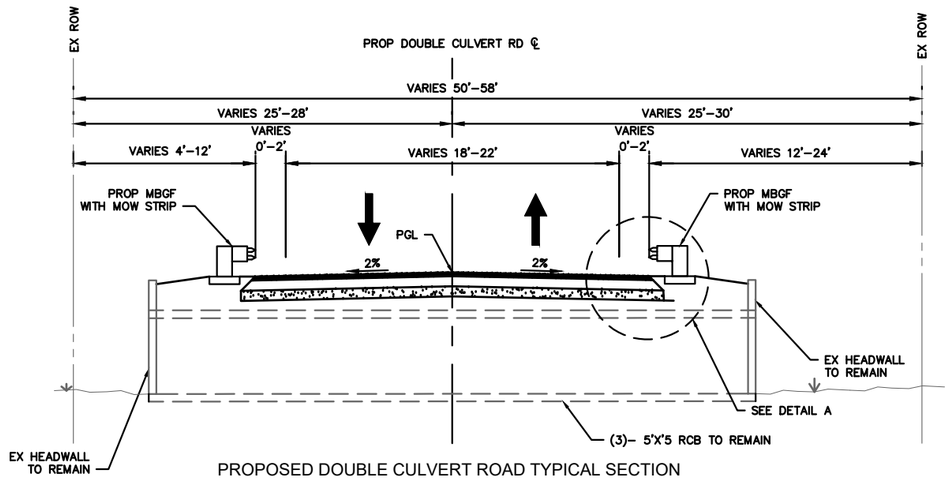
100% SUBMITTAL



PROPOSED DOUBLE CULVERT ROAD TYPICAL SECTION

STA 10+41 TO STA 107+85

SCALE: 1" = 10'



PROPOSED DOUBLE CULVERT ROAD TYPICAL SECTION

STA 107+85 TO STA 111+18

SCALE: 1" = 10'

LEGEND:

(A) 3" TYPE D HOT MIX ASPHALT CONCRETE

(B) TACK COAT

(C) 8" BLACK BASE

(D) PRIME COAT

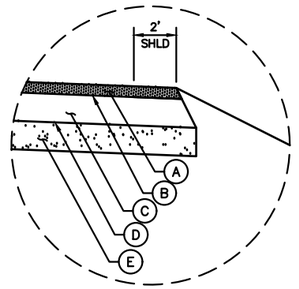
(E) 8" STABILIZED SUBGRADE (5% LIME AT 30.6 LB/SY)

LISTING OF ABBREVIATIONS:

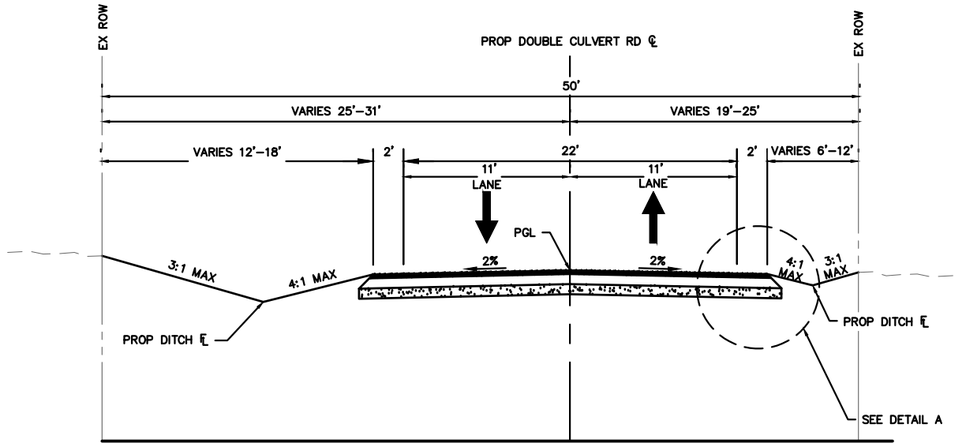
MBGF = METAL BEAM GUARD FENCE
PGL = PROPOSED GRADE LINE
ROW = RIGHT–OF–WAY
℄ = CENTER LINE

NOTES:

1. REFER TO GEOTECH REPORT PREPARED BY GEOTECH ENGINEERING AND TESTING SERVICES (REPORT NO. 24–996E) DATED JUNE 2025



DETAIL A



PROPOSED DOUBLE CULVERT ROAD TYPICAL SECTION

STA 111+18 TO 113+87

SCALE: 1" = 10'

07/28/2026

STATE OF TEXAS
ABBEY N. POLZIN
151558
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PROFESSIONAL ENGINEER

Abbey Polzin

DATE: 7/28/2026 8:15:41 PM
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REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

THE STATE OF TEXAS
WALLER COUNTY

Kimley»Horn

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DOUBLE CULVERT ROAD
SEGMENT 1
PROPOSED TYPICAL SECTIONS

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		6

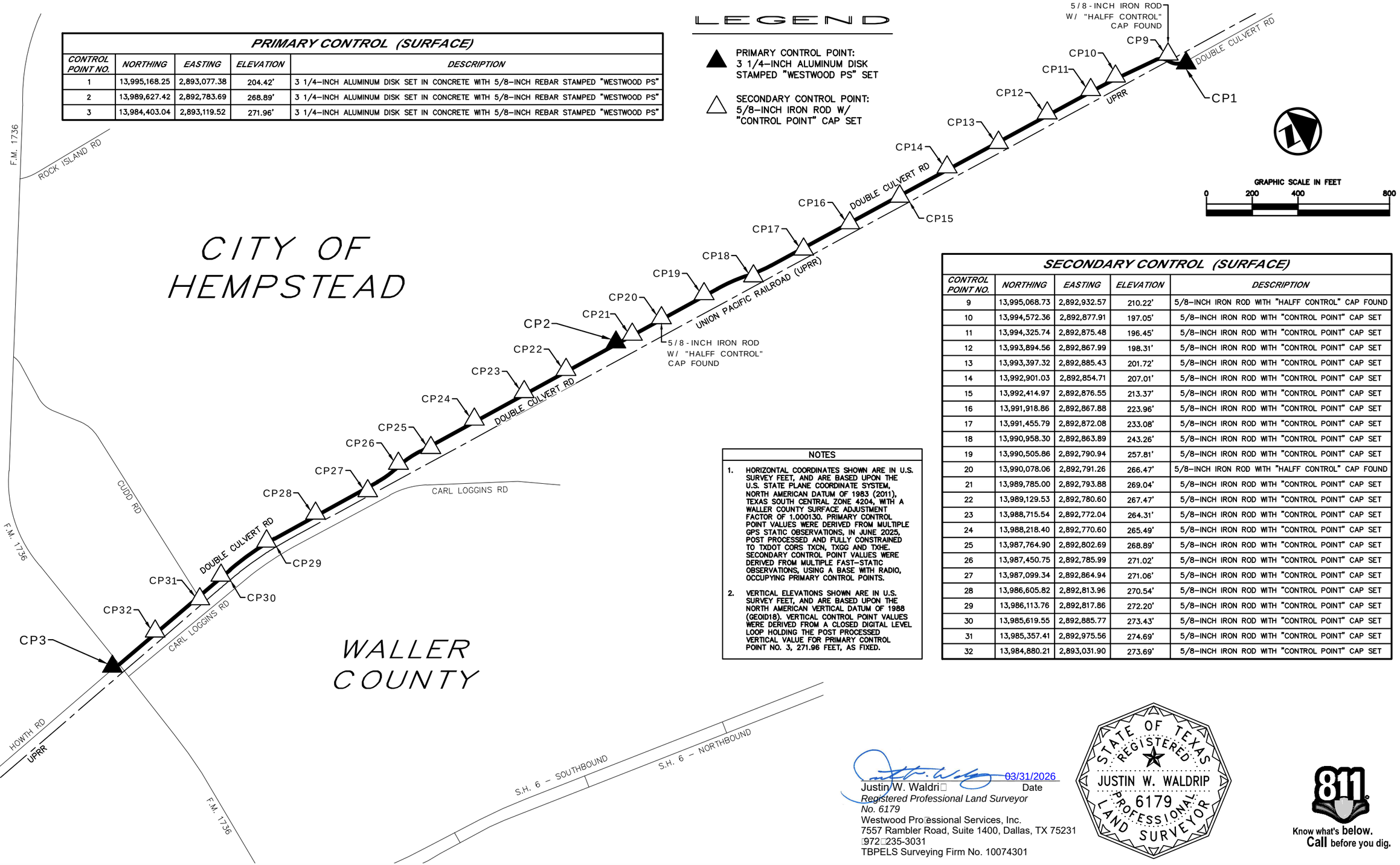
70% SUBMITTAL

PRIMARY CONTROL (SURFACE)

CONTROL POINT NO.	NORTHING	EASTING	ELEVATION	DESCRIPTION
1	13,995,168.25	2,893,077.38	204.42'	3 1/4–INCH ALUMINUM DISK SET IN CONCRETE WITH 5/8–INCH REBAR STAMPED "WESTWOOD PS"
2	13,989,627.42	2,892,783.69	268.89'	3 1/4–INCH ALUMINUM DISK SET IN CONCRETE WITH 5/8–INCH REBAR STAMPED "WESTWOOD PS"
3	13,984,403.04	2,893,119.52	271.96'	3 1/4–INCH ALUMINUM DISK SET IN CONCRETE WITH 5/8–INCH REBAR STAMPED "WESTWOOD PS"

LEGEND

- ▲ PRIMARY CONTROL POINT: 3 1/4–INCH ALUMINUM DISK STAMPED "WESTWOOD PS" SET
- △ SECONDARY CONTROL POINT: 5/8–INCH IRON ROD W/ "CONTROL POINT" CAP SET



CITY OF HEMPSTEAD

WALLER COUNTY

NOTES

1. HORIZONTAL COORDINATES SHOWN ARE IN U.S. SURVEY FEET, AND ARE BASED UPON THE U.S. STATE PLANE COORDINATE SYSTEM, NORTH AMERICAN DATUM OF 1983 (2011), TEXAS SOUTH CENTRAL ZONE 4204, WITH A WALLER COUNTY SURFACE ADJUSTMENT FACTOR OF 1.000130. PRIMARY CONTROL POINT VALUES WERE DERIVED FROM MULTIPLE GPS STATIC OBSERVATIONS, IN JUNE 2025, POST PROCESSED AND FULLY CONSTRAINED TO TXDOT CORS TXCN, TXGG AND TXHE. SECONDARY CONTROL POINT VALUES WERE DERIVED FROM MULTIPLE FAST–STATIC OBSERVATIONS, USING A BASE WITH RADIO, OCCUPYING PRIMARY CONTROL POINTS.
2. VERTICAL ELEVATIONS SHOWN ARE IN U.S. SURVEY FEET, AND ARE BASED UPON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (GEOID18). VERTICAL CONTROL POINT VALUES WERE DERIVED FROM A CLOSED DIGITAL LEVEL LOOP HOLDING THE POST PROCESSED VERTICAL VALUE FOR PRIMARY CONTROL POINT NO. 3, 271.96 FEET, AS FIXED.

SECONDARY CONTROL (SURFACE)

CONTROL POINT NO.	NORTHING	EASTING	ELEVATION	DESCRIPTION
9	13,995,068.73	2,892,932.57	210.22'	5/8–INCH IRON ROD WITH "HALFF CONTROL" CAP FOUND
10	13,994,572.36	2,892,877.91	197.05'	5/8–INCH IRON ROD WITH "CONTROL POINT" CAP SET
11	13,994,325.74	2,892,875.48	196.45'	5/8–INCH IRON ROD WITH "CONTROL POINT" CAP SET
12	13,993,894.56	2,892,867.99	198.31'	5/8–INCH IRON ROD WITH "CONTROL POINT" CAP SET
13	13,993,397.32	2,892,885.43	201.72'	5/8–INCH IRON ROD WITH "CONTROL POINT" CAP SET
14	13,992,901.03	2,892,854.71	207.01'	5/8–INCH IRON ROD WITH "CONTROL POINT" CAP SET
15	13,992,414.97	2,892,876.55	213.37'	5/8–INCH IRON ROD WITH "CONTROL POINT" CAP SET
16	13,991,918.86	2,892,867.88	223.96'	5/8–INCH IRON ROD WITH "CONTROL POINT" CAP SET
17	13,991,455.79	2,892,872.08	233.08'	5/8–INCH IRON ROD WITH "CONTROL POINT" CAP SET
18	13,990,958.30	2,892,863.89	243.26'	5/8–INCH IRON ROD WITH "CONTROL POINT" CAP SET
19	13,990,505.86	2,892,790.94	257.81'	5/8–INCH IRON ROD WITH "CONTROL POINT" CAP SET
20	13,990,078.06	2,892,791.26	266.47'	5/8–INCH IRON ROD WITH "HALFF CONTROL" CAP FOUND
21	13,989,785.00	2,892,793.88	269.04'	5/8–INCH IRON ROD WITH "CONTROL POINT" CAP SET
22	13,989,129.53	2,892,780.60	267.47'	5/8–INCH IRON ROD WITH "CONTROL POINT" CAP SET
23	13,988,715.54	2,892,772.04	264.31'	5/8–INCH IRON ROD WITH "CONTROL POINT" CAP SET
24	13,988,218.40	2,892,770.60	265.49'	5/8–INCH IRON ROD WITH "CONTROL POINT" CAP SET
25	13,987,764.90	2,892,802.69	268.89'	5/8–INCH IRON ROD WITH "CONTROL POINT" CAP SET
26	13,987,450.75	2,892,785.99	271.02'	5/8–INCH IRON ROD WITH "CONTROL POINT" CAP SET
27	13,987,099.34	2,892,864.94	271.06'	5/8–INCH IRON ROD WITH "CONTROL POINT" CAP SET
28	13,986,605.82	2,892,813.96	270.54'	5/8–INCH IRON ROD WITH "CONTROL POINT" CAP SET
29	13,986,113.76	2,892,817.86	272.20'	5/8–INCH IRON ROD WITH "CONTROL POINT" CAP SET
30	13,985,619.55	2,892,885.77	273.43'	5/8–INCH IRON ROD WITH "CONTROL POINT" CAP SET
31	13,985,357.41	2,892,975.56	274.69'	5/8–INCH IRON ROD WITH "CONTROL POINT" CAP SET
32	13,984,880.21	2,893,031.90	273.69'	5/8–INCH IRON ROD WITH "CONTROL POINT" CAP SET

03/31/2026

Justin W. Waldrip Date
Registered Professional Land Surveyor
No. 6179
Westwood Professional Services, Inc.
7557 Rambler Road, Suite 1400, Dallas, TX 75231
972 235-3031
TBPELS Surveying Firm No. 10074301

STATE OF TEXAS
REGISTERED
JUSTIN W. WALDRIP
6179
PROFESSIONAL
LAND SURVEYOR

811 Know what's below. Call before you dig.

REV. NO.	DATE	DESCRIPTION	BY

DATE: 3/31/2026 5:33:17 PM
FILE: N:\0059997.00\06 CAD\DWG\Survey C3D\Base\0059997.00_Cover Sheet_Control Sheets.dwg

WALLER COUNTY ENGINEERING DEPARTMENT

WALLER COUNTY ROAD BOND

Kimley»Horn
2201 WEST ROYAL LANE, SUITE 275, IRVING, TX 75063
PHONE: 214-420-5600
WWW.KIMLEY-HORN.COM

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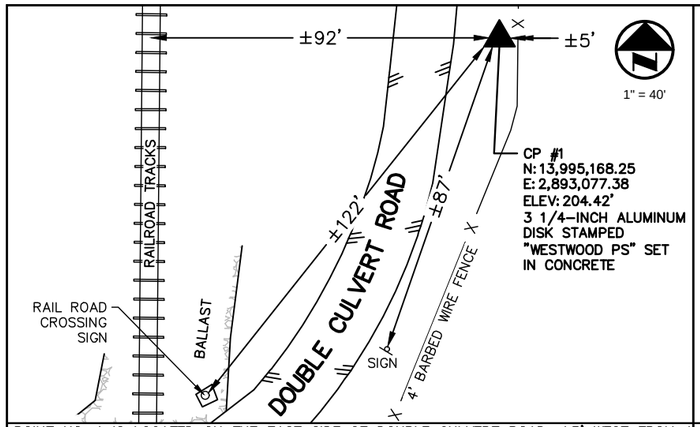
TEXAS REGISTERED ENGINEERING FIRM #F-928

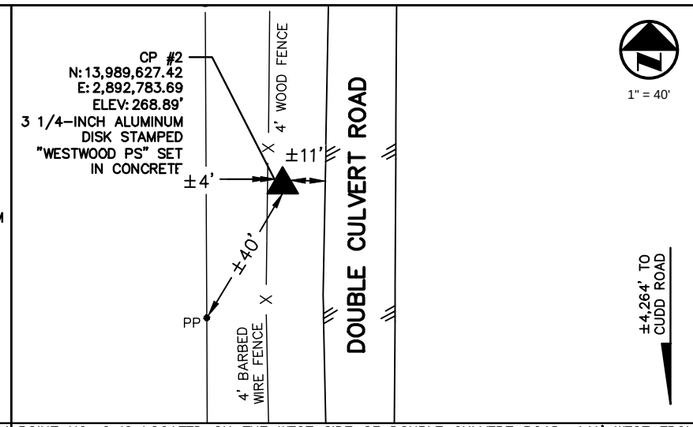
PRIMARY AND SECONDARY CONTROL SHEET
DOUBLE CULVERT ROAD
SEGMENT 1
FM 1736 TO UPRR

DN:	CONT	SECT	JOB	HIGHWAY
CK DN:			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER COUNTY		7

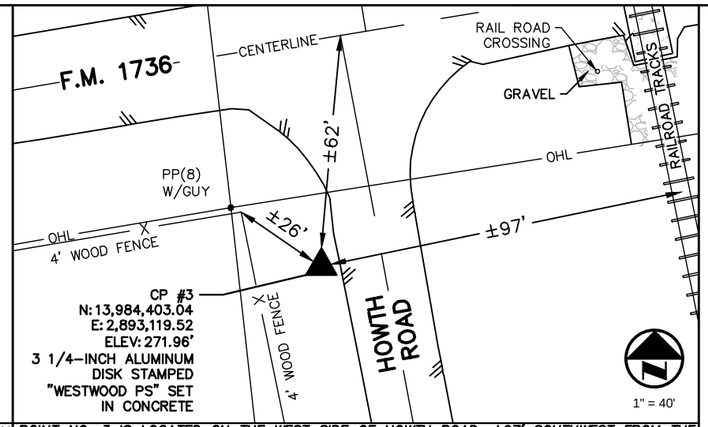
70% SUBMITTAL



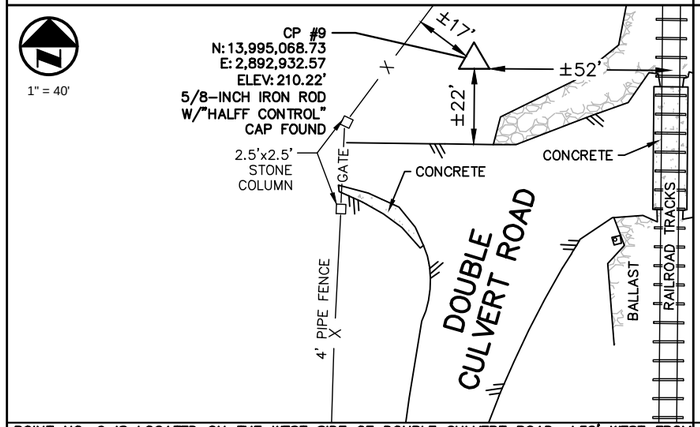
POINT NO. 1 IS LOCATED ON THE EAST SIDE OF DOUBLE CULVERT ROAD. ±5' WEST FROM A 4' BARBED WIRE FENCE, ±87' NORTHEAST FROM A ROAD SIGN, ±122' FROM A RAILROAD SIGN AND ±92' EAST FROM THE APPROXIMATE CENTERLINE OF RAILROAD TRACKS



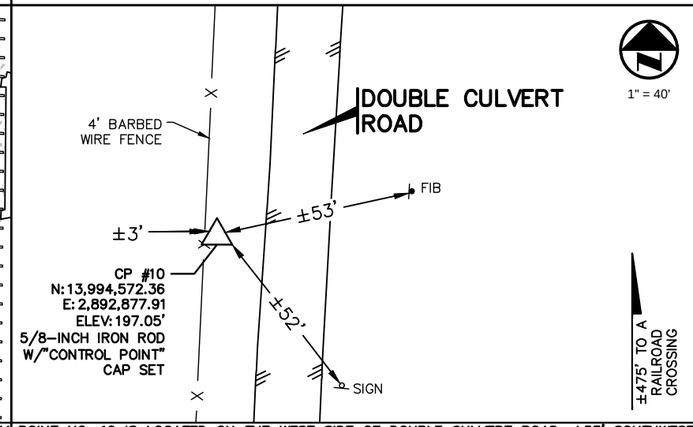
POINT NO. 2 IS LOCATED ON THE WEST SIDE OF DOUBLE CULVERT ROAD. ±11' WEST FROM THE EDGE OF ASPHALT PAVEMENT, ±40' NORTHEAST FROM A POWER POLE AND ±4' EAST FROM A 4' WOOD FENCE



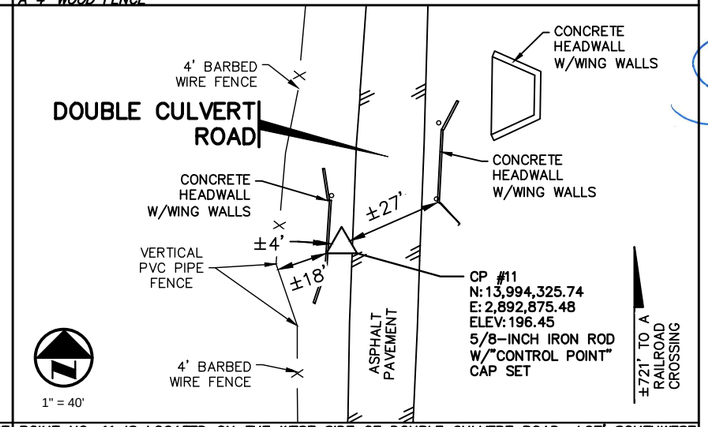
POINT NO. 3 IS LOCATED ON THE WEST SIDE OF HOWTH ROAD. ±97' SOUTHWEST FROM THE APPROXIMATE CENTERLINE OF RAILROAD TRACKS, ±62' FROM THE APPROXIMATE CENTERLINE INTERSECTIONS OF HOWTH ROAD AND F.M. 1736 AND ±26' SOUTHEAST FROM THE CORNER OF A 4' WOOD FENCE



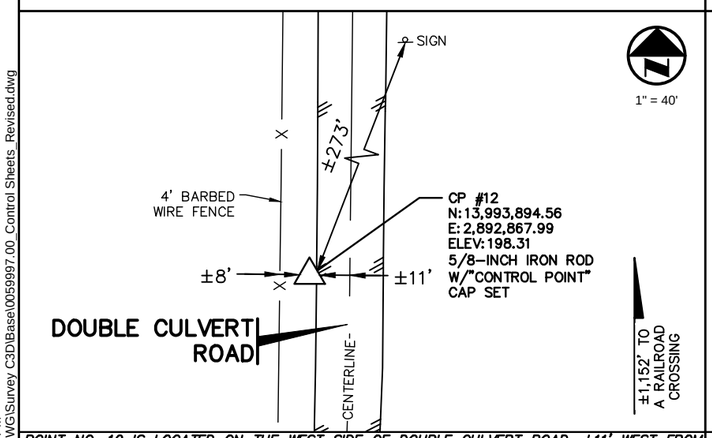
POINT NO. 9 IS LOCATED ON THE WEST SIDE OF DOUBLE CULVERT ROAD. ±52' WEST FROM THE APPROXIMATE CENTERLINE OF RAILROAD TRACKS, ±22' NORTH FROM THE EDGE OF ASPHALT PAVEMENT AND ±17' SOUTHEAST FROM A 4' PIPE FENCE



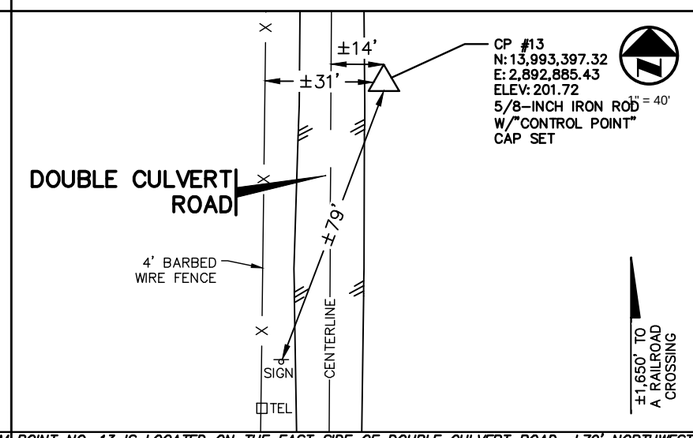
POINT NO. 10 IS LOCATED ON THE WEST SIDE OF DOUBLE CULVERT ROAD. ±53' SOUTHWEST FROM A FIBER OPTIC MARKER, ±52' NORTHWEST FROM A ROAD SIGN AND ±3' EAST FROM A 4' BARBED WIRE FENCE



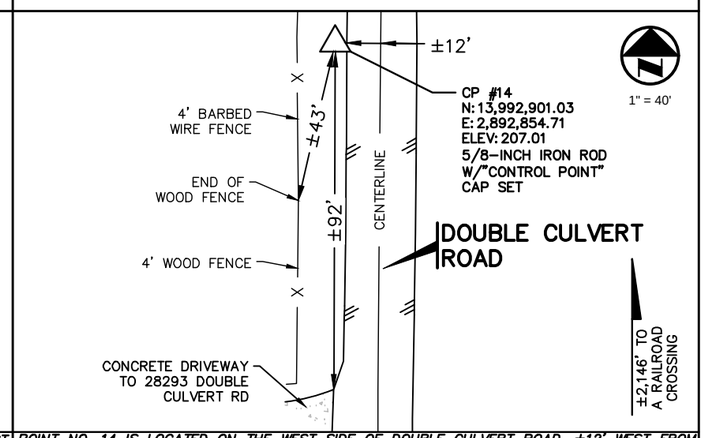
POINT NO. 11 IS LOCATED ON THE WEST SIDE OF DOUBLE CULVERT ROAD. ±27' SOUTHWEST FROM THE SOUTHWEST CORNER OF A CONCRETE HEADWALL, ±18' NORTHWEST FROM A VERTICAL PVC PIPE FENCE AND ±4' EAST FROM A CONCRETE HEADWALL



POINT NO. 12 IS LOCATED ON THE WEST SIDE OF DOUBLE CULVERT ROAD. ±11' WEST FROM THE APPROXIMATE CENTERLINE OF DOUBLE CULVERT ROAD, ±8' EAST FROM A 4' BARBED WIRE FENCE AND ±273' SOUTHWEST FROM A ROAD SIGN



POINT NO. 13 IS LOCATED ON THE EAST SIDE OF DOUBLE CULVERT ROAD. ±79' NORTHWEST FROM A ROAD SIGN, ±31' EAST FROM A 4' BARBED WIRE FENCE AND ±14' EAST OF THE APPROXIMATE CENTERLINE OF DOUBLE CULVERT ROAD



POINT NO. 14 IS LOCATED ON THE WEST SIDE OF DOUBLE CULVERT ROAD. ±12' WEST FROM THE APPROXIMATE CENTERLINE OF DOUBLE CULVERT ROAD, ±92' NORTH FROM THE EDGE OF A CONCRETE DRIVEWAY AND ±43' NORTHWEST FROM THE END OF A 4' WOOD FENCE

LEGEND

- ▲ PRIMARY CONTROL POINT: 3 1/4-INCH ALUMINUM DISK STAMPED "WESTWOOD PS" SET
- △ SECONDARY CONTROL POINT: 5/8-INCH IRON ROD W/ "CONTROL POINT" CAP SET (UNLESS OTHERWISE NOTED)

STATE OF TEXAS
REGISTERED
JUSTIN W. WALDRIP
6179
PROFESSIONAL LAND SURVEYOR

03/31/2026

Justin W. Waldrip — Date
Registered Professional Land Surveyor No. 6179
Westwood Professional Services, Inc.
7557 Rambler Road, Suite 1400, Dallas, TX 75231
(972) 235-3031
TBPELS Surveying Firm No. 10074301

NOTES

1. HORIZONTAL COORDINATES SHOWN ARE IN U.S. SURVEY FEET, AND ARE BASED UPON THE U.S. STATE PLANE COORDINATE SYSTEM, NORTH AMERICAN DATUM OF 1983 (2011), TEXAS SOUTH CENTRAL ZONE 4204, WITH A WALLER COUNTY SURFACE ADJUSTMENT FACTOR OF 1.000130. PRIMARY CONTROL POINT VALUES WERE DERIVED FROM MULTIPLE GPS STATIC OBSERVATIONS, IN JUNE 2025, POST PROCESSED AND FULLY CONSTRAINED TO TXDOT CORS TXCN, TXGG AND TXHE. SECONDARY CONTROL POINT VALUES WERE DERIVED FROM MULTIPLE FAST-STATIC OBSERVATIONS, USING A BASE WITH RADIO, OCCUPYING PRIMARY CONTROL POINTS.
2. VERTICAL ELEVATIONS SHOWN ARE IN U.S. SURVEY FEET, AND ARE BASED UPON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (GEOID18). VERTICAL CONTROL POINT VALUES WERE DERIVED FROM A CLOSED DIGITAL LEVEL LOOP HOLDING THE POST PROCESSED VERTICAL VALUE FOR PRIMARY CONTROL POINT NO. 3, 271.96 FEET, AS FIXED.

811 Know what's **below.** **Call** before you dig.

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REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY ENGINEERING DEPARTMENT

WALLER COUNTY ROAD BOND

Kimley»Horn
2201 WEST ROYAL LANE, SUITE 275, IRVING, TX 75063
PHONE: 214-420-5600
WWW.KIMLEY-HORN.COM

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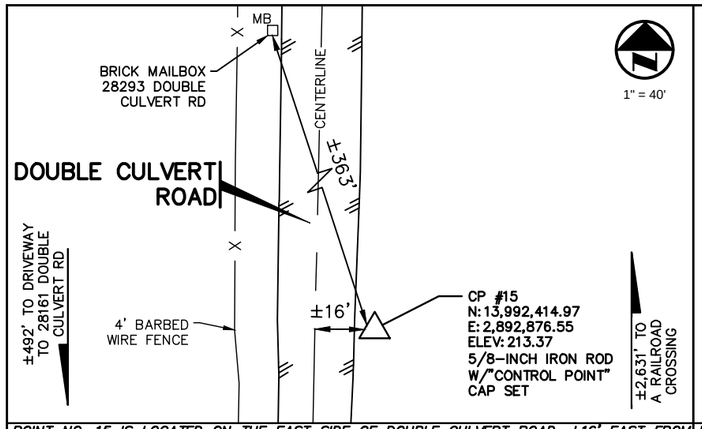
TEXAS REGISTERED ENGINEERING FIRM #F-928

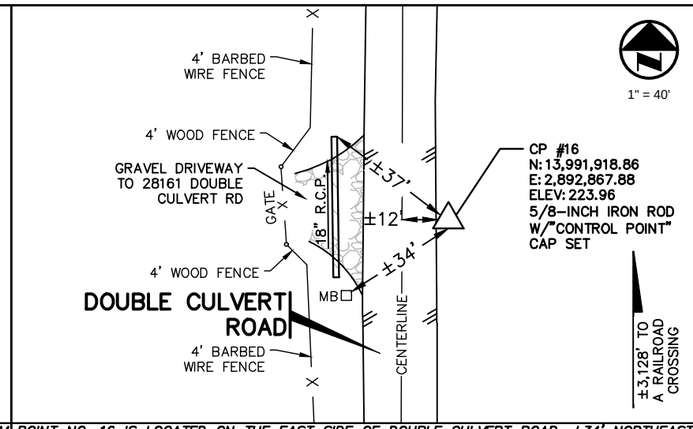
PRIMARY AND SECONDARY CONTROL SHEET
DOUBLE CULVERT ROAD
SEGMENT 1
FM 1736 TO UPRR

DN:	CONT	SECT	JOB	HIGHWAY
CK DN:			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER COUNTY		8

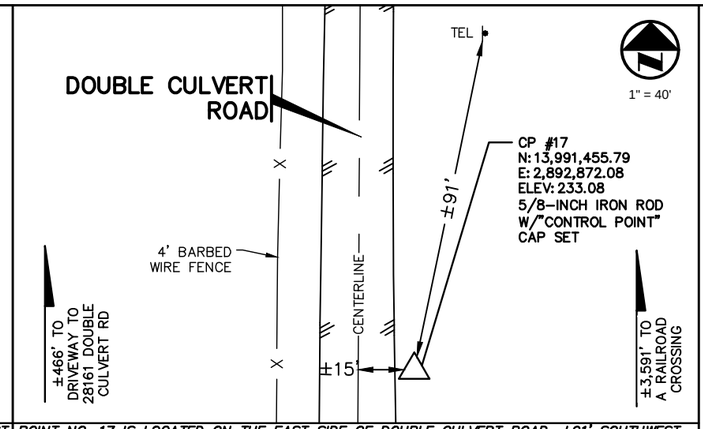
70% SUBMITTAL



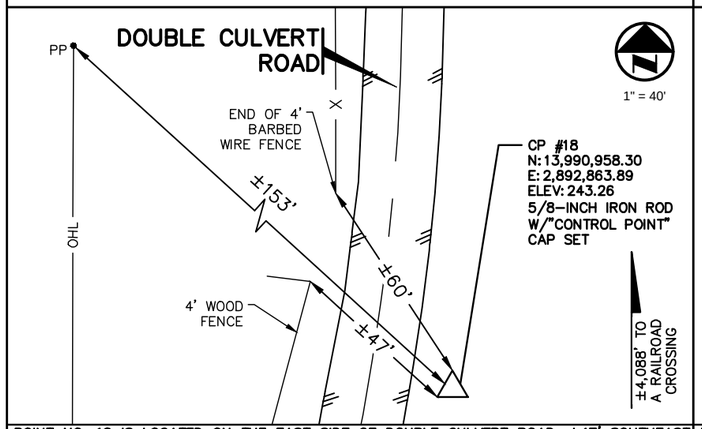
POINT NO. 15 IS LOCATED ON THE EAST SIDE OF DOUBLE CULVERT ROAD. ±16' EAST FROM THE APPROXIMATE CENTERLINE OF DOUBLE CULVERT ROAD AND ±363' SOUTHEAST FROM A BRICK MAILBOX



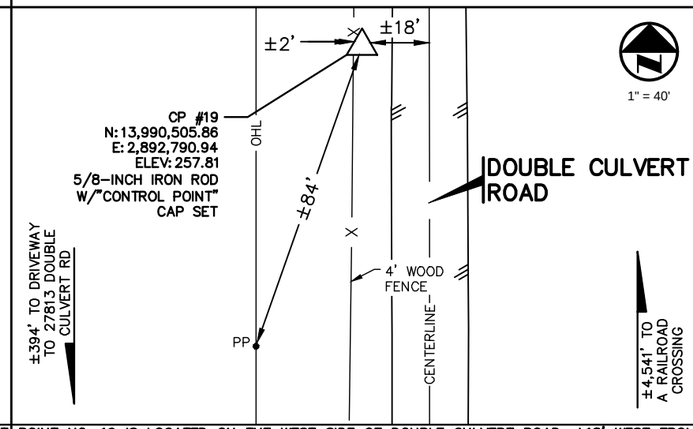
POINT NO. 16 IS LOCATED ON THE EAST SIDE OF DOUBLE CULVERT ROAD. ±34' NORTHEAST FROM A MAILBOX, ±12' EAST FROM THE APPROXIMATE CENTERLINE OF DOUBLE CULVERT ROAD AND ±37' SOUTHEAST FROM THE NORTHEAST CRONER OF AN 18" R.C.P.



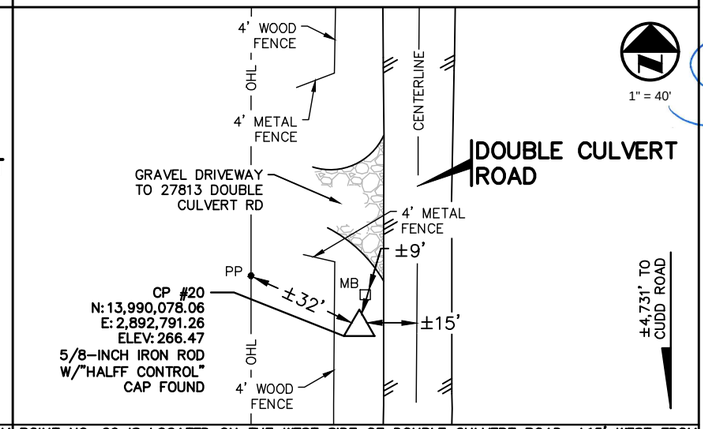
POINT NO. 17 IS LOCATED ON THE EAST SIDE OF DOUBLE CULVERT ROAD. ±91' SOUTHWEST FROM A TELECOMMUNICATION MARKER AND ±15' EAST FROM THE APPROXIMATE CENTERLINE OF DOUBLE CULVERT ROAD



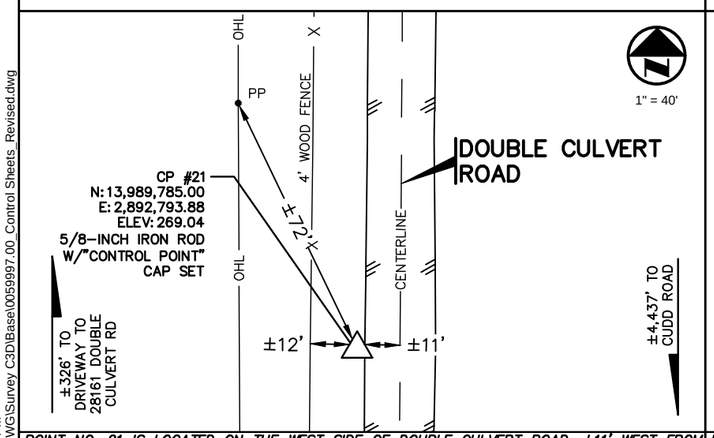
POINT NO. 18 IS LOCATED ON THE EAST SIDE OF DOUBLE CULVERT ROAD. ±47' SOUTHEAST FROM THE CORNER OF A 4' WOOD FENCE, ±153' SOUTHEAST FROM A POWER POLE AND ±60' SOUTHEAST FROM THE END OF A 4' BARBED WIRE FENCE



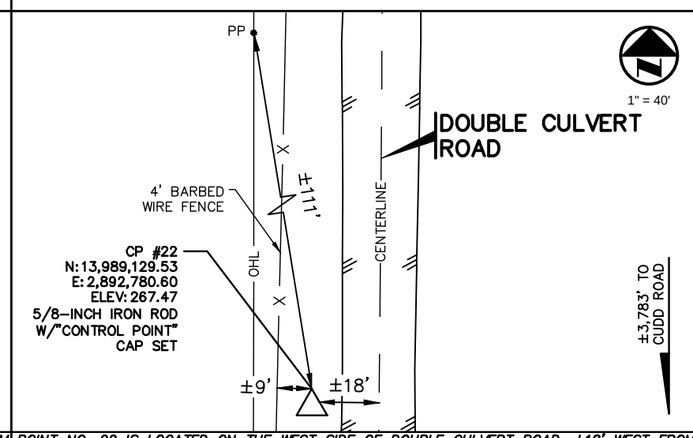
POINT NO. 19 IS LOCATED ON THE WEST SIDE OF DOUBLE CULVERT ROAD. ±18' WEST FROM THE APPROXIMATE CENTERLINE OF DOUBLE CULVERT ROAD, ±84' NORTHEAST FROM A POWER POLE AND ±2' EAST FROM A 4' WOOD FENCE



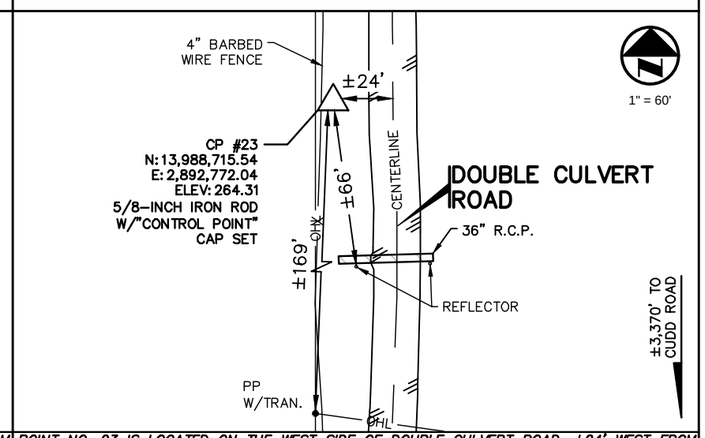
POINT NO. 20 IS LOCATED ON THE WEST SIDE OF DOUBLE CULVERT ROAD. ±15' WEST FROM THE APPROXIMATE CENTER LINE OF DOUBLE CULVERT ROAD, ±32' SOUTHEAST FROM A POWER POLE AND ±9' SOUTHWEST FROM A MAILBOX



POINT NO. 21 IS LOCATED ON THE WEST SIDE OF DOUBLE CULVERT ROAD. ±11' WEST FROM THE APPROXIMATE CENTERLINE OF DOUBLE CULVERT ROAD, ±12' EAST FROM A 4' WOOD FENCE AND ±72' SOUTHEAST FROM A POWER POLE



POINT NO. 22 IS LOCATED ON THE WEST SIDE OF DOUBLE CULVERT ROAD. ±18' WEST FROM THE APPROXIMATE CENTERLINE OF DOUBLE CULVERT ROAD, ±9' EAST FROM A 4' BARBED WIRE FENCE AND ±111' SOUTHEAST FROM A POWER POLE



POINT NO. 23 IS LOCATED ON THE WEST SIDE OF DOUBLE CULVERT ROAD. ±24' WEST FROM THE APPROXIMATE CENTERLINE OF DOUBLE CULVERT ROAD, ±66' NORTHWEST FROM A REFLECTOR AND ±169' NORTHEAST FROM A POWER POLE WITH TRANSFORMER

LEGEND

- ▲ PRIMARY CONTROL POINT: 3 1/4–INCH ALUMINUM DISK STAMPED "WESTWOOD PS" SET
- △ SECONDARY CONTROL POINT: 5/8–INCH IRON ROD W/ "CONTROL POINT" CAP SET (UNLESS OTHERWISE NOTED)

STATE OF TEXAS
REGISTERED
JUSTIN W. WALDRIP
6179
PROFESSIONAL
LAND SURVEYOR

03/31/2026

Justin W. Waldrip — Date
Registered Professional Land Surveyor No. 6179
Westwood Professional Services, Inc.
7557 Rambler Road, Suite 1400, Dallas, TX 75231
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REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY ENGINEERING DEPARTMENT

WALLER COUNTY ROAD BOND

Kimley»Horn
2201 WEST ROYAL LANE, SUITE 275, IRVING, TX 75063
PHONE: 214-420-5600
WWW.KIMLEY-HORN.COM

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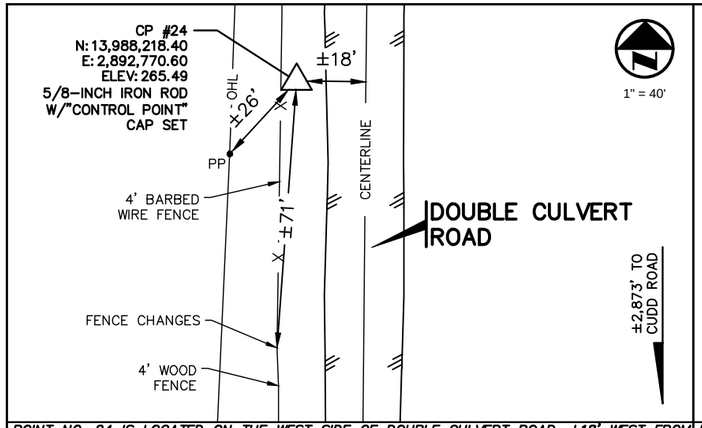
TEXAS REGISTERED ENGINEERING FIRM #F-928

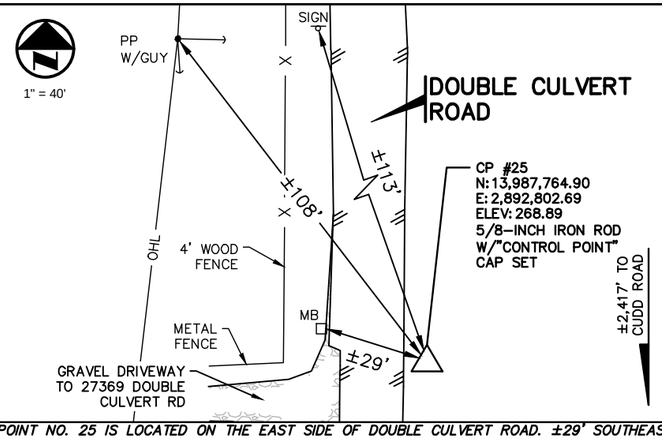
PRIMARY AND SECONDARY CONTROL SHEET
DOUBLE CULVERT ROAD
SEGMENT 1
FM 1736 TO UPRR

DN:	CONT	SECT	JOB	HIGHWAY
CK DN:			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER COUNTY		9

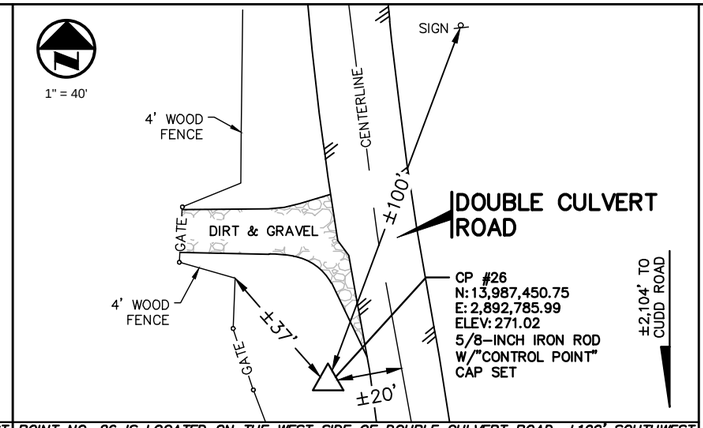
70% SUBMITTAL



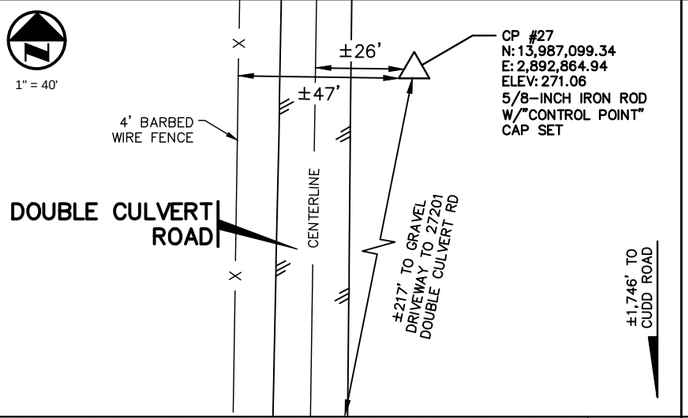
POINT NO. 24 IS LOCATED ON THE WEST SIDE OF DOUBLE CULVERT ROAD. ±18' WEST FROM THE APPROXIMATE CENTERLINE OF DOUBLE CULVERT ROAD, ±71' NORTHEAST FROM A FENCE CHANGE AND ±26' NORTHEAST FROM A POWER POLE



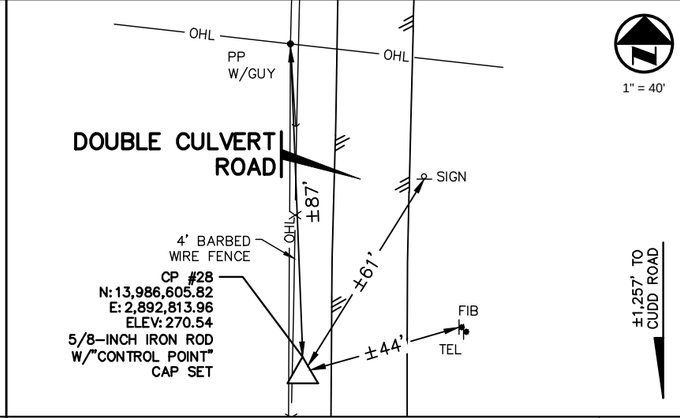
POINT NO. 25 IS LOCATED ON THE EAST SIDE OF DOUBLE CULVERT ROAD. ±29' SOUTHEAST FROM A MAILBOX, ±108' SOUTHEAST FROM A POWER POLE WITH GUY ANCHORS AND ±113' SOUTHEAST FROM A ROAD SIGN



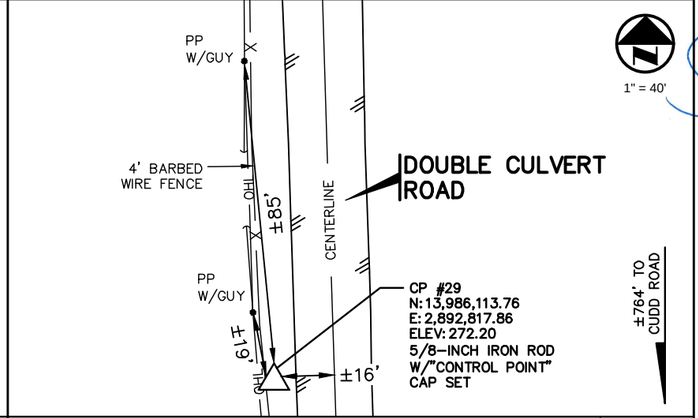
POINT NO. 26 IS LOCATED ON THE WEST SIDE OF DOUBLE CULVERT ROAD. ±100' SOUTHWEST FROM A ROAD SIGN, ±20' SOUTHWEST FROM THE APPROXIMATE CENTERLINE OF DOUBLE CULVERT ROAD AND ±37' SOUTHEAST FROM A CORNER OF A 4' WOOD FENCE



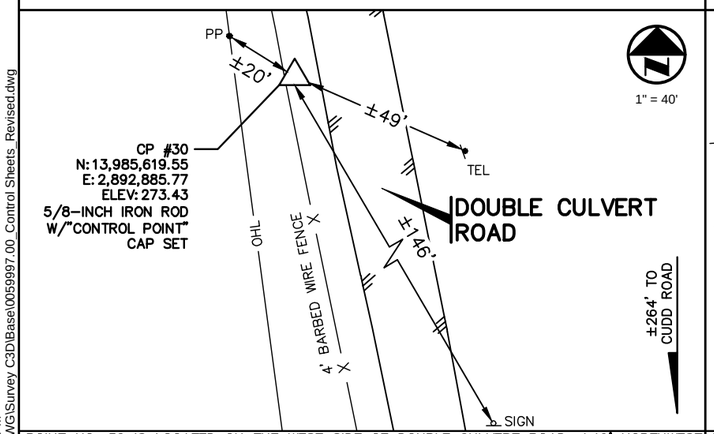
POINT NO. 27 IS LOCATED ON THE EAST SIDE OF DOUBLE CULVERT ROAD. ±217' NORTHEAST FROM GRAVEL DRIVEWAY, ±47' EAST FROM A 4' BARBED WIRE FENCE AND ±26' EAST FROM THE APPROXIMATE CENTERLINE OF DOUBLE CULVERT ROAD



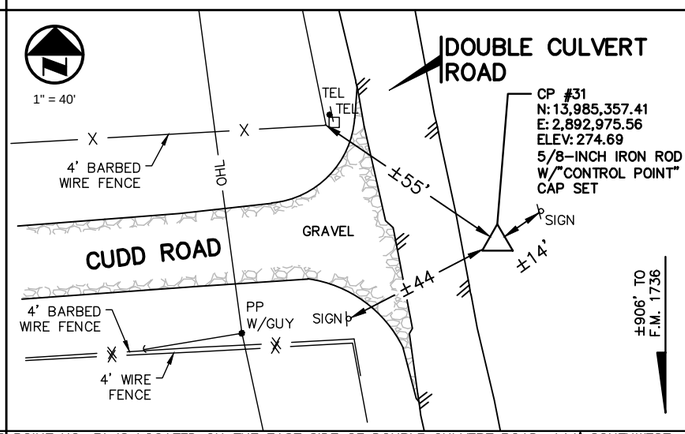
POINT NO. 28 IS LOCATED ON THE WEST SIDE OF DOUBLE CULVERT ROAD. ±87' SOUTHEAST FROM A POWER POLE WITH A GUY ANCHOR, ±61' SOUTHWEST FROM A ROAD SIGN AND ±44' SOUTHWEST FROM A FIBER OPTIC MARKER



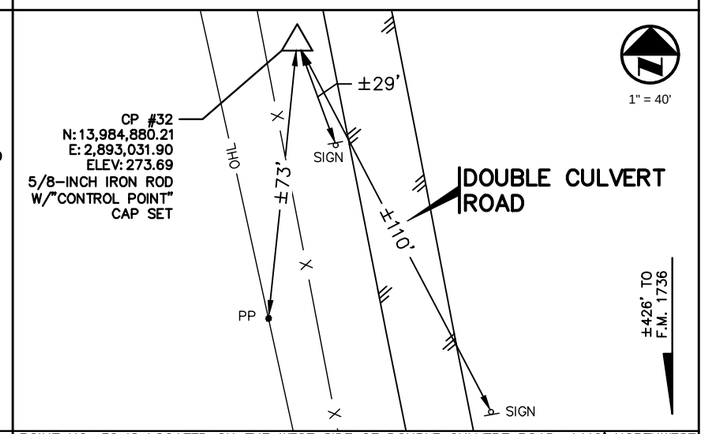
POINT NO. 29 IS LOCATED ON THE WEST SIDE OF DOUBLE CULVERT ROAD. ±16' WEST FROM THE APPROXIMATE CENTERLINE OF DOUBLE CULVERT ROAD, ±19' SOUTHEAST FROM A POWER POLE WITH GUY ANCHOR AND ±85' SOUTHEAST FROM A POWER POLE WITH GUY ANCHOR



POINT NO. 30 IS LOCATED ON THE WEST SIDE OF DOUBLE CULVERT ROAD. ±49' NORTHWEST FROM A TELECOMMUNICATION SIGN, ±146' NORTHWEST FROM A ROAD SIGN AND ±20' SOUTHEAST FROM A POWER POLE



POINT NO. 31 IS LOCATED ON THE EAST SIDE OF DOUBLE CULVERT ROAD. ±14' SOUTHWEST FROM A ROAD SIGN, ±44' NORTHEAST FROM A ROAD SIGN AND ±55' SOUTHEAST FROM A CORNER OF A 4' BARBED WIRE FENCE



POINT NO. 32 IS LOCATED ON THE WEST SIDE OF DOUBLE CULVERT ROAD. ±110' NORTHWEST FROM A ROAD SIGN, ±29' NORTHWEST FROM A ROAD SIGN AND ±73' NORTHEAST FROM A POWER POLE

LEGEND

- ▲ PRIMARY CONTROL POINT: 3 1/4–INCH ALUMINUM DISK STAMPED "WESTWOOD PS" SET
- △ SECONDARY CONTROL POINT: 5/8–INCH IRON ROD W/ "CONTROL POINT" CAP SET (UNLESS OTHERWISE NOTED)

STATE OF TEXAS
REGISTERED
JUSTIN W. WALDRIP
6179
PROFESSIONAL
LAND SURVEYOR

03/31/2026

Justin W. Waldrip — Date
Registered Professional Land Surveyor
No. 6179
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DOUBLE CULVERT ROAD
SEGMENT 1
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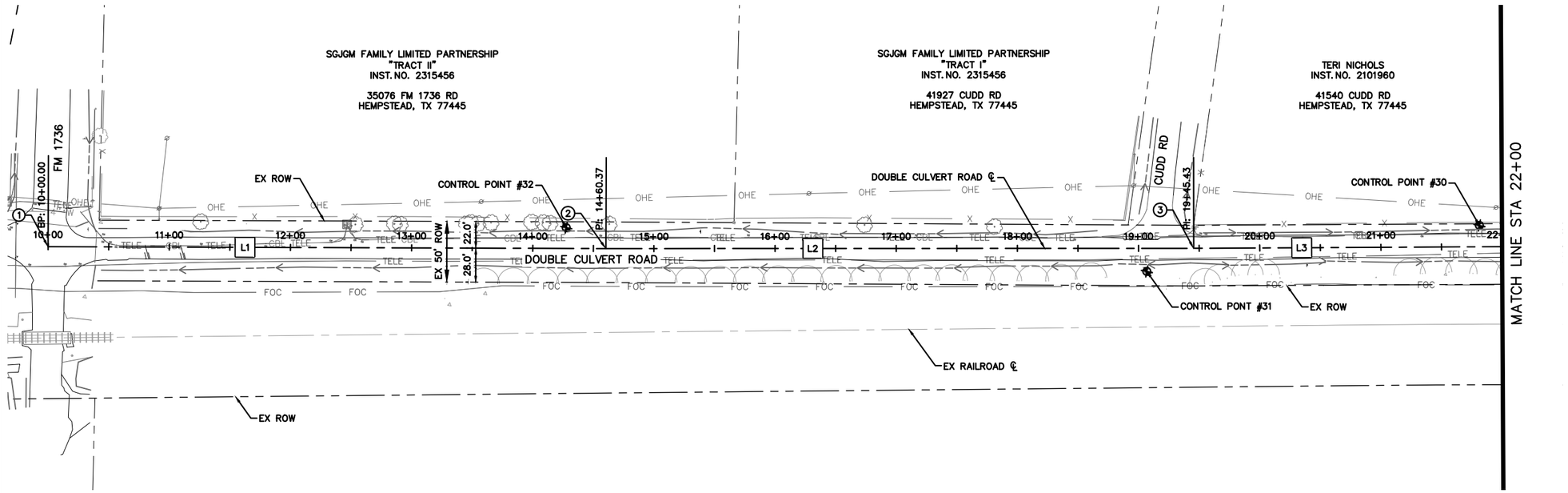
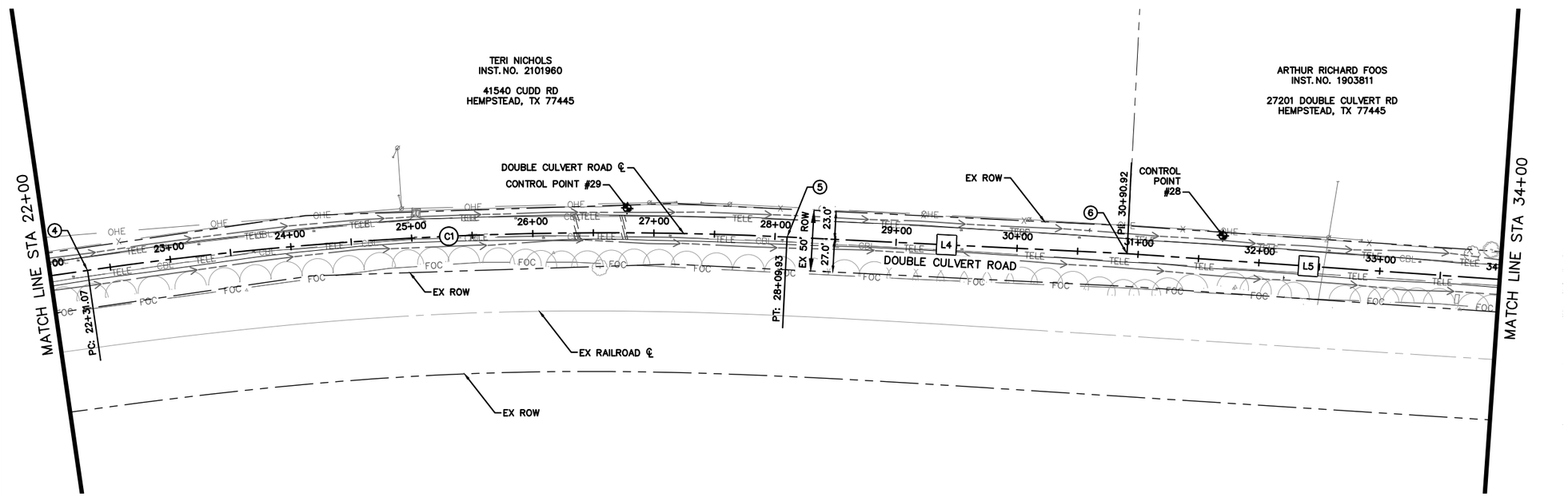
CK DW:		WALLER COUNTY		10

100% SUBMITTAL





GRAPHIC SCALE IN FEET
0 50 100

NOTES

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ANY EXISTING IRON RODS DURING THE COURSE OF CONSTRUCTION. ANY IRON RODS DISTURBED DURING CONSTRUCTION SHALL BE REPLACED BY THE CONTRACTOR PER CITY REQUIREMENTS (NON PAY ITEM)
2. HORIZONTAL CONTROL – CENTRAL ZONE OF THE TEXAS STATE PLANE COORDINATE SYSTEM (NAD83)
3. VERTICAL CONTROL IS NAVD 88
4. SEE ALIGNMENT DATA TABLES ON SHEET 16 FOR ALIGNMENT INFORMATION

Know what's below. Call before you dig.

07/28/2026

ABBEY M. POLZIN 151558 LICENSED PROFESSIONAL ENGINEER STATE OF TEXAS

Abbey Polzin

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM

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TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
PROJECT CONTROL
BEGIN TO STA 34 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		11

DATE: 7/28/2026 8:19:42 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Project Control - 10_00.00 TO 118_00.00.dwg

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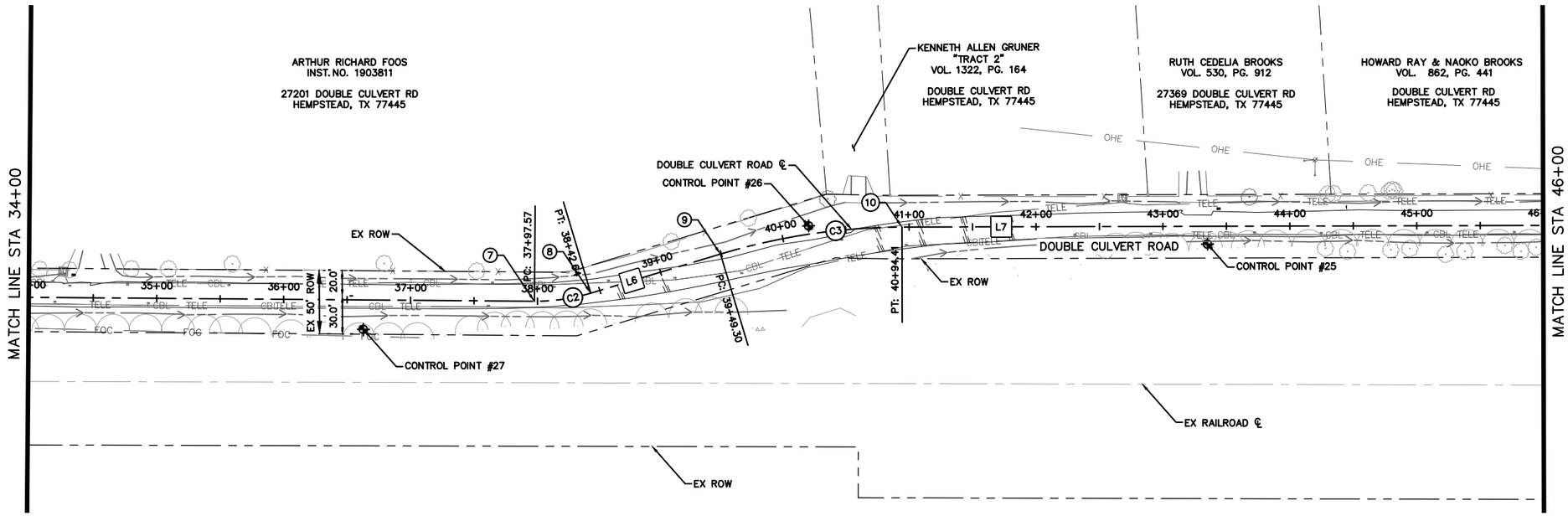

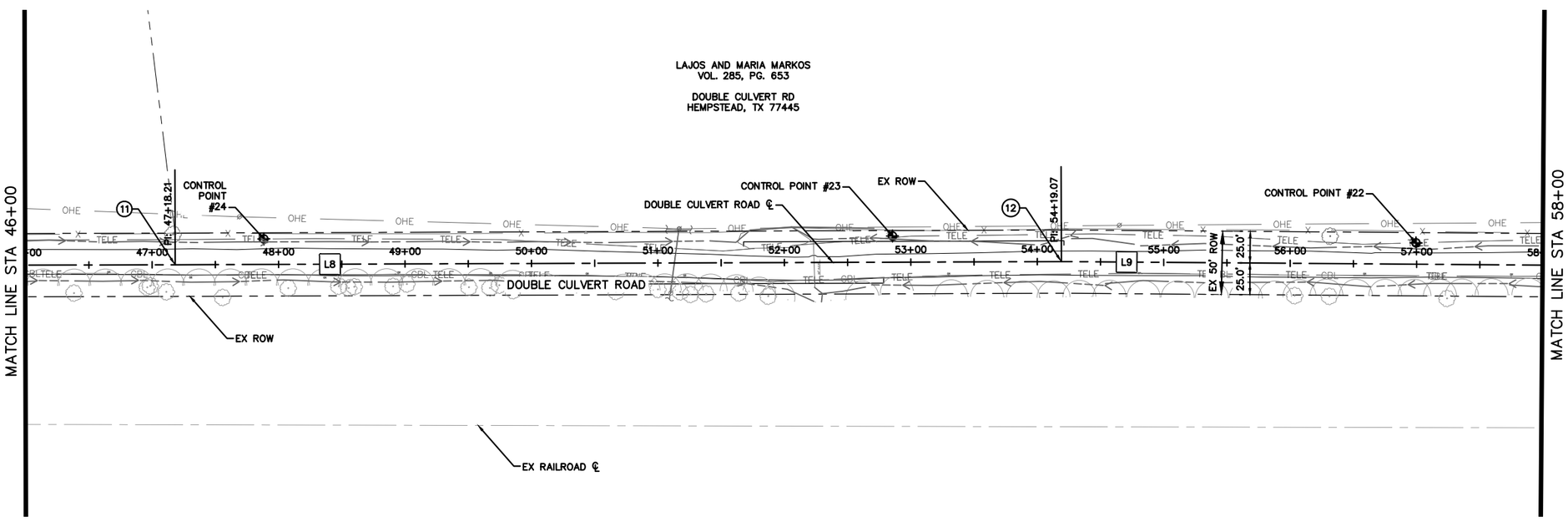

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07/28/2026

ABBEY M. POLZIN 151558 LICENSED PROFESSIONAL ENGINEER

Abbey Polzin

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REV. NO.	DATE	DESCRIPTION	BY

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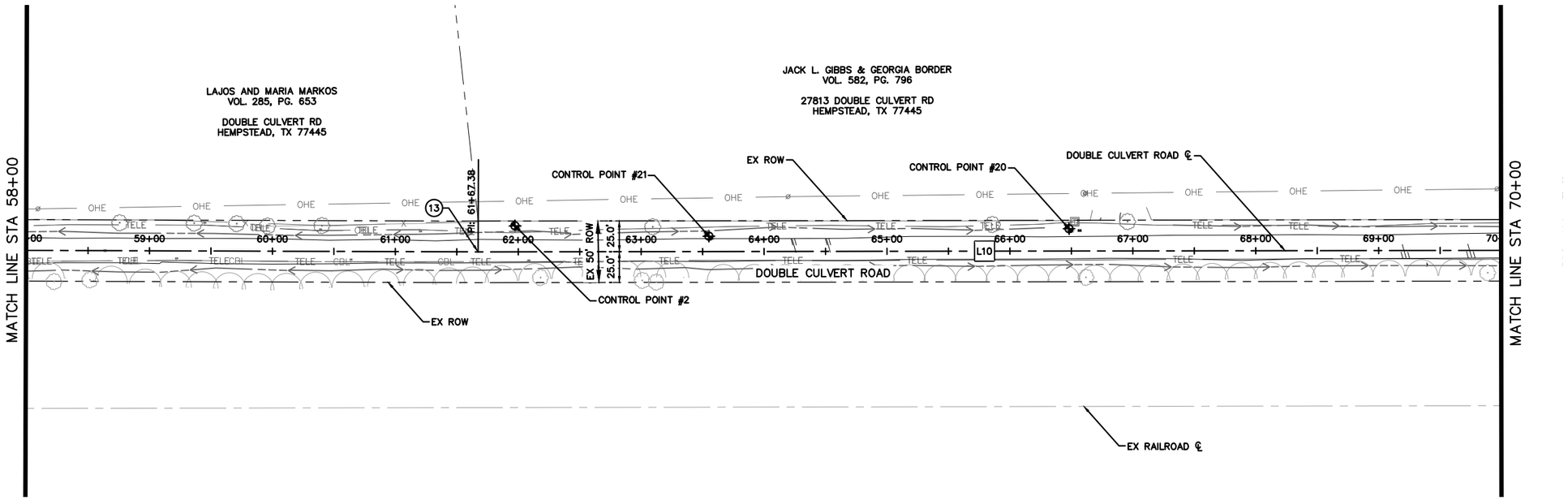
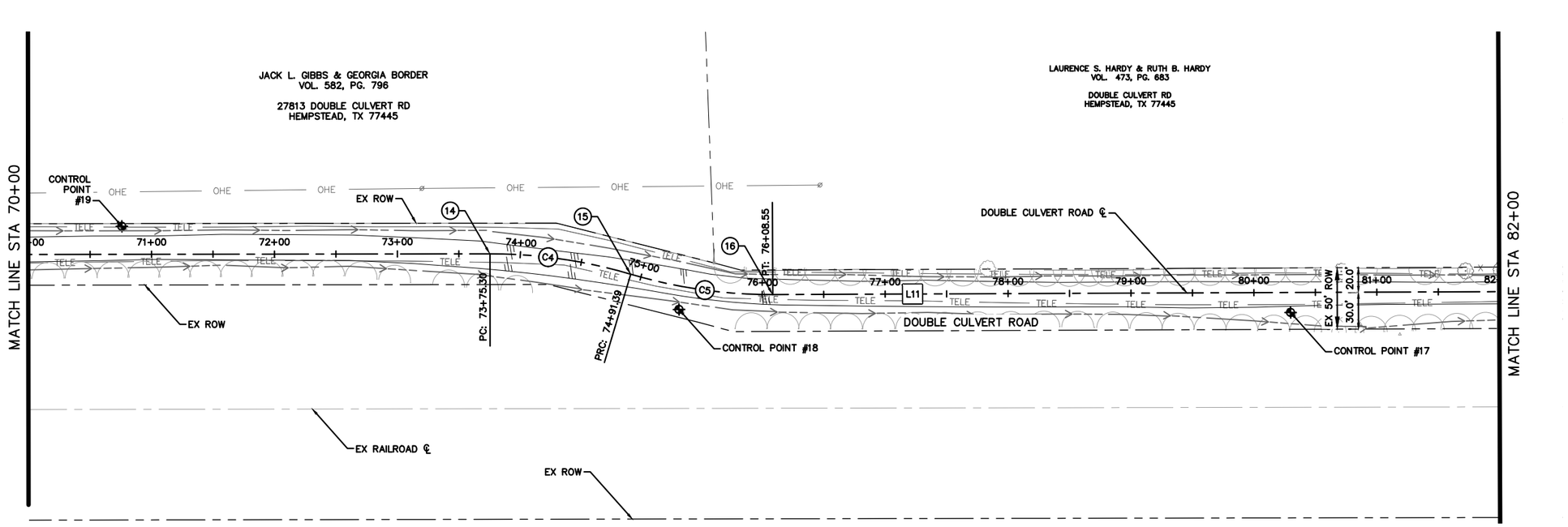
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
PROJECT CONTROL
STA 34 00.00 TO STA 58 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		12

100% SUBMITTAL





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Abbey Polzin

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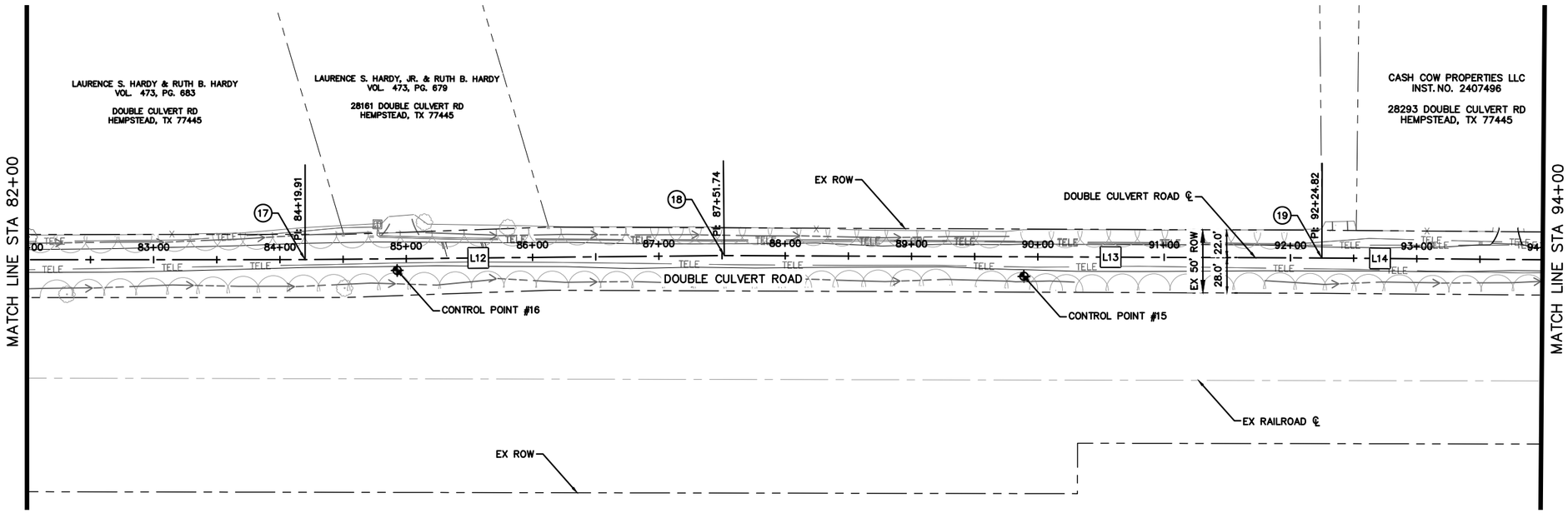
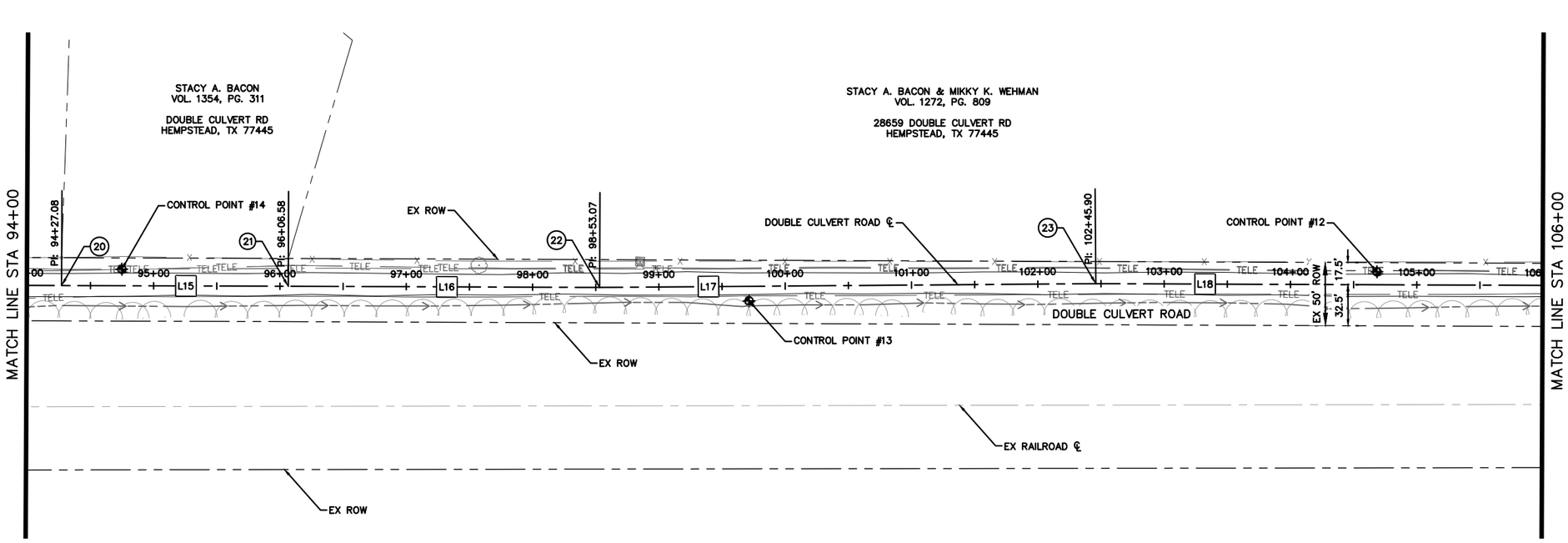
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
PROJECT CONTROL
STA 58 00.00 TO STA 82 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		13

100% SUBMITTAL





NORTH

GRAPHIC SCALE IN FEET
0 50 100

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ABBEY M. POLZIN 151558 LICENSED PROFESSIONAL ENGINEER STATE OF TEXAS

Abbey Polzin

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REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
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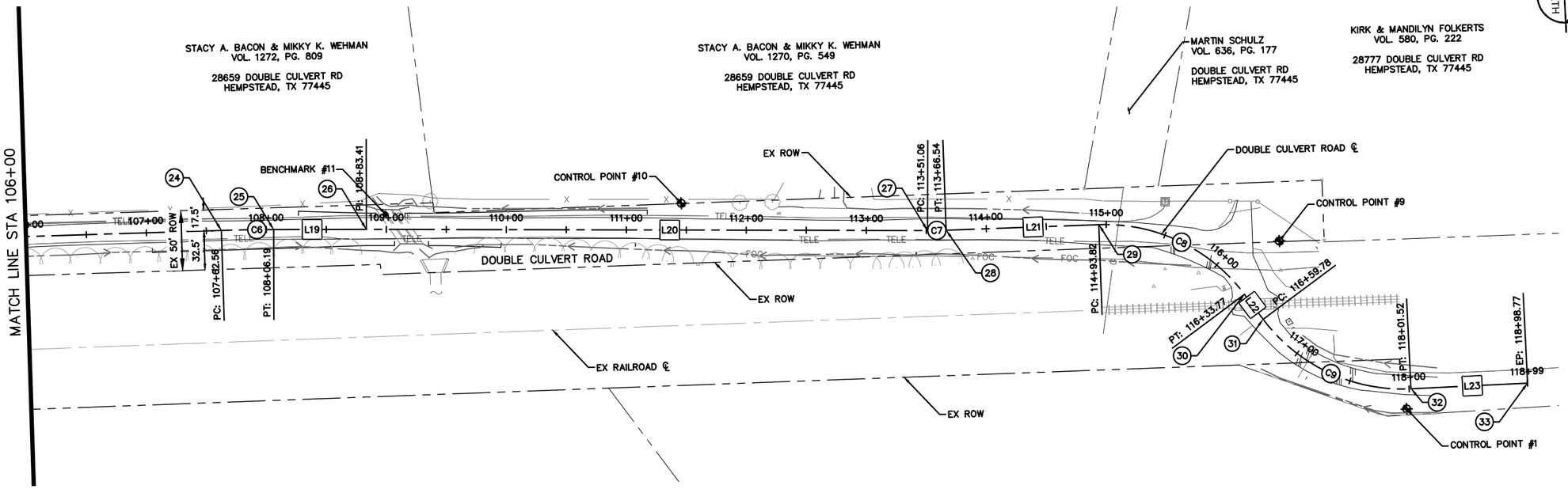
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
PROJECT CONTROL
STA 82 00.00 TO STA 106 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		14

100% SUBMITTAL



GRAPHIC SCALE IN FEET
0 50 100

NORTH

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07/28/2026

ABBEY M. POLZIN 151558 LICENSED PROFESSIONAL ENGINEER STATE OF TEXAS

Abbey Polzin

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REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

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TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
PROJECT CONTROL
STA 106 00.00 TO END

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		15

100% SUBMITTAL

DOUBLE CULVERT ROAD ℄ POINTS TABLE

POINT	DESC.	STATION CONTROL	NORTHING	EASTING
1	BEGIN PROJECT	10+00.00	N 13984463.52	E 2893129.19
2	PI	14+60.37	N 13984915.67	E 2893042.54
3	PI	19+45.43	N 13985391.70	E 2892949.44
4	PC	22+31.07	N 13985671.76	E 2892893.21
5	PT	28+09.93	N 13986246.73	E 2892834.57
6	PI	30+90.92	N 13986527.72	E 2892833.12
7	PC	37+97.57	N 13987234.29	E 2892843.78
8	PT	38+42.64	N 13987278.78	E 2892837.73
9	PC	39+49.30	N 13987381.13	E 2892807.70
10	PT	40+94.41	N 13987524.31	E 2892787.48
11	PI	47+18.21	N 13988148.10	E 2892790.48
12	PI	54+19.07	N 13988848.96	E 2892793.27
13	PI	61+67.38	N 13989597.18	E 2892804.48
14	PC	73+75.30	N 13990805.04	E 2892816.83
15	PRC	74+91.39	N 13990919.33	E 2892834.73
16	PT	76+08.55	N 13991034.69	E 2892852.64
17	PI	84+19.91	N 13991846.02	E 2892858.78
18	PI	87+51.74	N 13992177.86	E 2892858.19
19	PI	92+24.82	N 13992650.90	E 2892863.84
20	PI	94+27.08	N 13992853.13	E 2892867.07
21	PI	96+06.58	N 13993032.62	E 2892869.66
22	PI	98+53.07	N 13993279.08	E 2892873.40
23	PI	102+45.90	N 13993671.90	E 2892874.86
24	PC	107+62.56	N 13994188.51	E 2892882.70
25	PT	108+06.19	N 13994232.11	E 2892883.99
26	PI	108+83.41	N 13994309.26	E 2892887.41
27	PC	113+51.06	N 13994776.36	E 2892910.19
28	PT	113+66.54	N 13994791.83	E 2892910.65
29	PC	114+93.82	N 13994919.10	E 2892911.93
30	PT	116+33.77	N 13995037.68	E 2892975.58
31	PC	116+59.78	N 13995052.27	E 2892997.11
32	PT	118+01.52	N 13995172.63	E 2893060.77
33	END PROJECT	118+98.77	N 13995269.88	E 2893060.56

DOUBLE CULVERT ROAD ℄ CURVE TABLE

CURVE	RADIUS	LENGTH	CHORD BEARING	CHORD	DELTA	TANGENT
C1	3000.00'	578.85'	N5°49'26"W	577.96'	11°03'19"	290.33'
C2	150.00'	45.07'	N7°44'37"W	44.90'	17°13'01"	22.71'
C3	500.00'	145.10'	N8°02'18"W	144.59'	16°37'39"	73.07'
C4	400.00'	116.10'	N8°54'02"E	115.69'	16°37'46"	58.46'
C5	400.00'	117.16'	N8°49'28"E	116.74'	16°46'55"	59.00'
C6	1500.00'	43.63'	N1°42'09"E	43.62'	1°39'59"	21.81'
C7	400.00'	15.48'	N1°41'02"E	15.48'	2°13'01"	7.74'
C8	145.00'	139.95'	N28°13'34"E	134.58'	55°18'06"	75.97'
C9	145.00'	141.73'	N27°52'28"E	136.16'	56°00'19"	77.11'

DOUBLE CULVERT ROAD ℄ LINE TABLE

LINE	LENGTH	BEARING
L1	460.37	N10°50'55.26"W
L2	485.05	N11°04'00.28"W
L3	285.65	N11°21'05.32"W
L4	280.99	N0°17'46.32"W
L5	706.65	N0°51'53.28"E
L6	106.66	N16°21'07.68"W
L7	623.80	N0°16'31.74"E
L8	700.86	N0°13'41.46"E
L9	748.31	N0°51'30.15"E
L10	1207.92	N0°35'08.92"E
L11	811.35	N0°26'00.77"E
L12	331.83	N0°06'08.46"W
L13	473.08	N0°41'05.77"E
L14	202.26	N0°54'50.57"E
L15	179.50	N0°49'35.56"E
L16	246.49	N0°52'09.55"E
L17	392.83	N0°12'46.64"E
L18	516.67	N0°52'09.55"E
L19	77.22	N2°32'08.52"E
L20	467.65	N2°47'32.74"E
L21	127.28	N0°34'31.68"E
L22	26.01	N55°52'37.25"E
L23	97.25	N0°07'42.22"W

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811 Know what's below. Call before you dig.

07/28/2026

STATE OF TEXAS — ABBEY L. MAYER — 151558 — LICENSED — PROFESSIONAL ENGINEER

Abbey Mayer

DATE: 7/28/2026 8:21:28 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Pro ect Control - 10_00.00 TO 118_00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM
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TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD SEGMENT 1
PROJECT CONTROL
HORI ONTAL ALIGNMENT DATA

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		16

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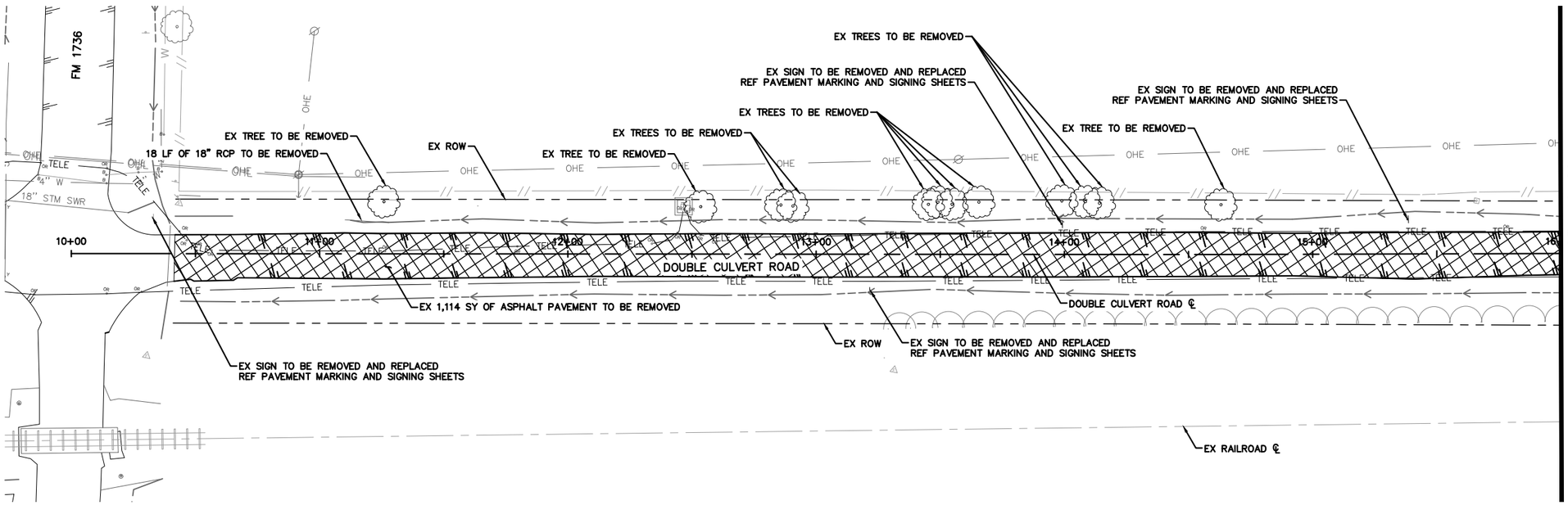

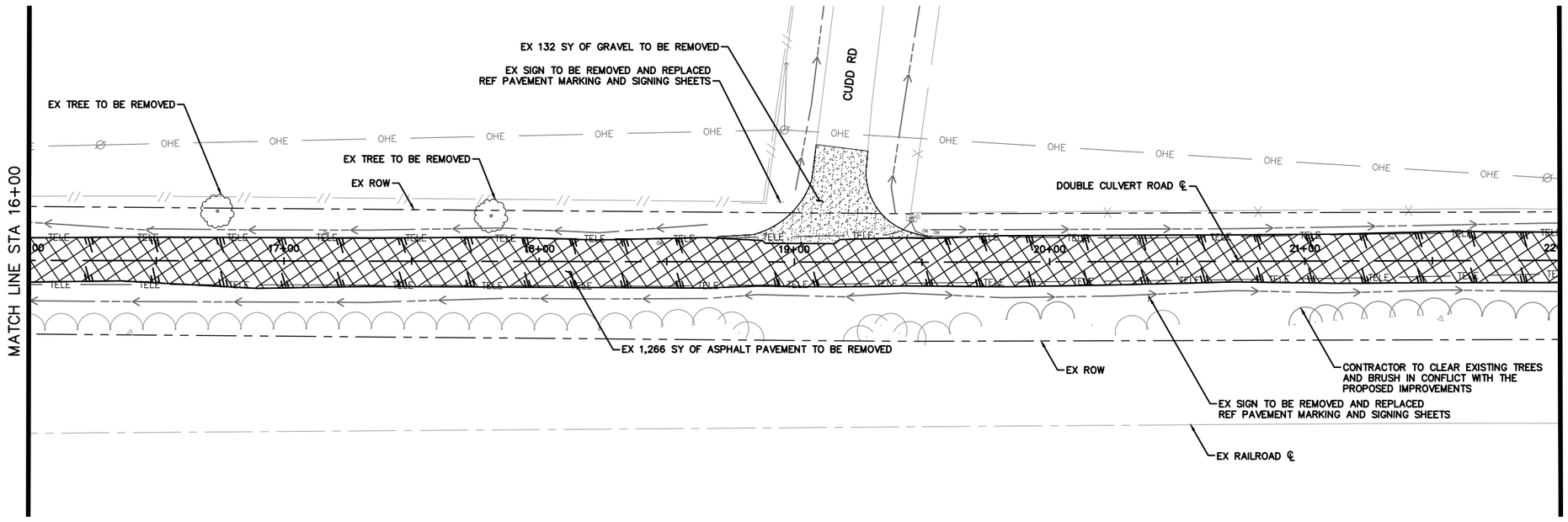

NORTH

GRAPHIC SCALE IN FEET
0 25 50

LEGEND

- EX ASPHALT PAVEMENT TO BE REMOVED
- EX GRAVEL DRIVEWAY TO BE REMOVED
- OHE — EX OVERHEAD ELECTRIC
- TELE — EX TELECOM LINE
- G — EX GAS LINE
- FOC — EX FIBER OPTIC LINE

NOTES

1. CONTRACTOR SHALL REMOVE ALL THE SURPLUS MATERIAL FROM THE PROJECT AREA. THE WORK SHALL BE SUBSIDIARY TO THE CONTRACT AND IS NOT A SEPARATE PAY ITEM.
2. ALL EXISTING PAVEMENT MARKINGS IN CONFLICT WITH PROPOSED PAVEMENT MARKINGS SHALL BE REMOVED. NO SEPARATE PAY ITEM.
3. THE EXISTENCE AND LOCATIONS OF ALL UNDERGROUND UTILITIES SHOWN ON THE DRAWINGS WERE OBTAINED FROM AVAILABLE RECORDS AND ARE APPROXIMATE. NEITHER THE OWNER NOR THE ENGINEER ASSUMES ANY RESPONSIBILITY FOR UTILITIES NOT SHOWN OR NOT IN THE LOCATION SHOWN. THE CONTRACTOR SHALL DETERMINE THE DEPTH AND LOCATION OF EXISTING UNDERGROUND UTILITIES PRIOR TO EXCAVATION AND SHALL BE REQUIRED TO TAKE ANY PRECAUTIONARY MEASURES TO PROTECT ALL LINES AND/OR ANY OTHER UNDERGROUND UTILITIES NOT OF RECORD SHOWN ON THE PLANS. CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING ALL FRANCHISE AND TOWN UTILITIES PRIOR TO CONSTRUCTION.
4. CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL IRRIGATION FACILITIES WITHIN LIMITS OF CONSTRUCTION. .

07/28/2026
STATE OF TEXAS
ABBEY M. MAYER
151558
LICENSED
PROFESSIONAL
ENGINEER
Abby Mayer

DATE: 7/28/2026 8:22:14 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Demolition Plan - 10_00.00 TO 58_00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
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TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
DEMOLITION PLAN
BEGIN TO STA 22 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		17

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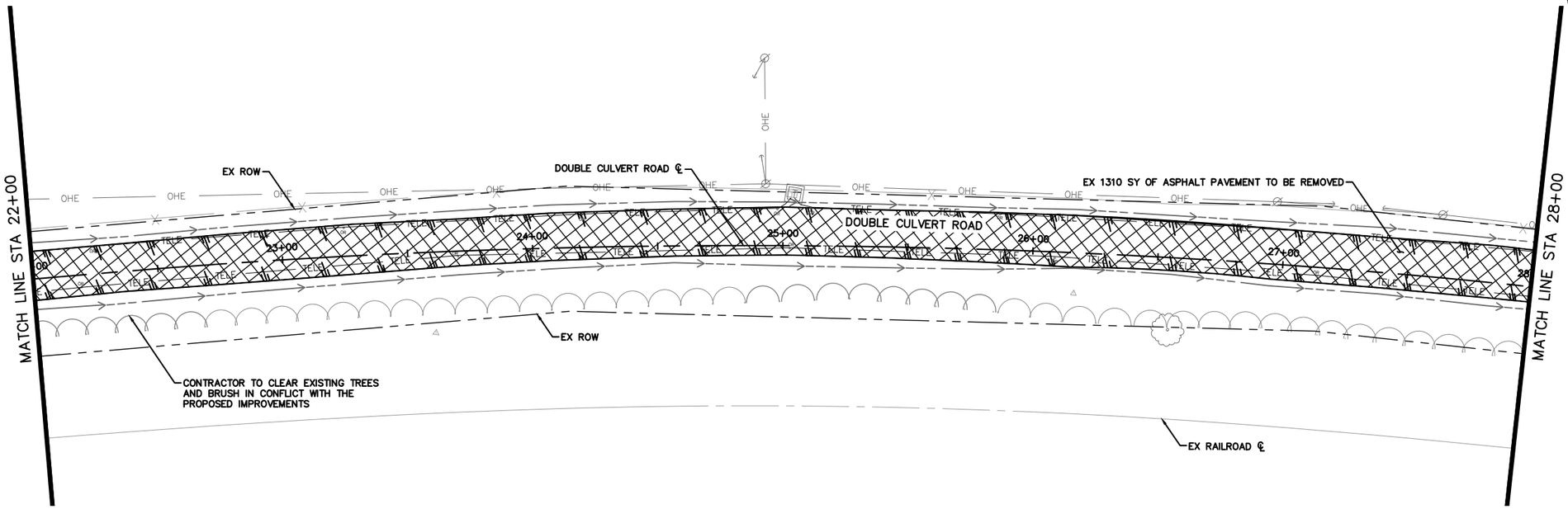

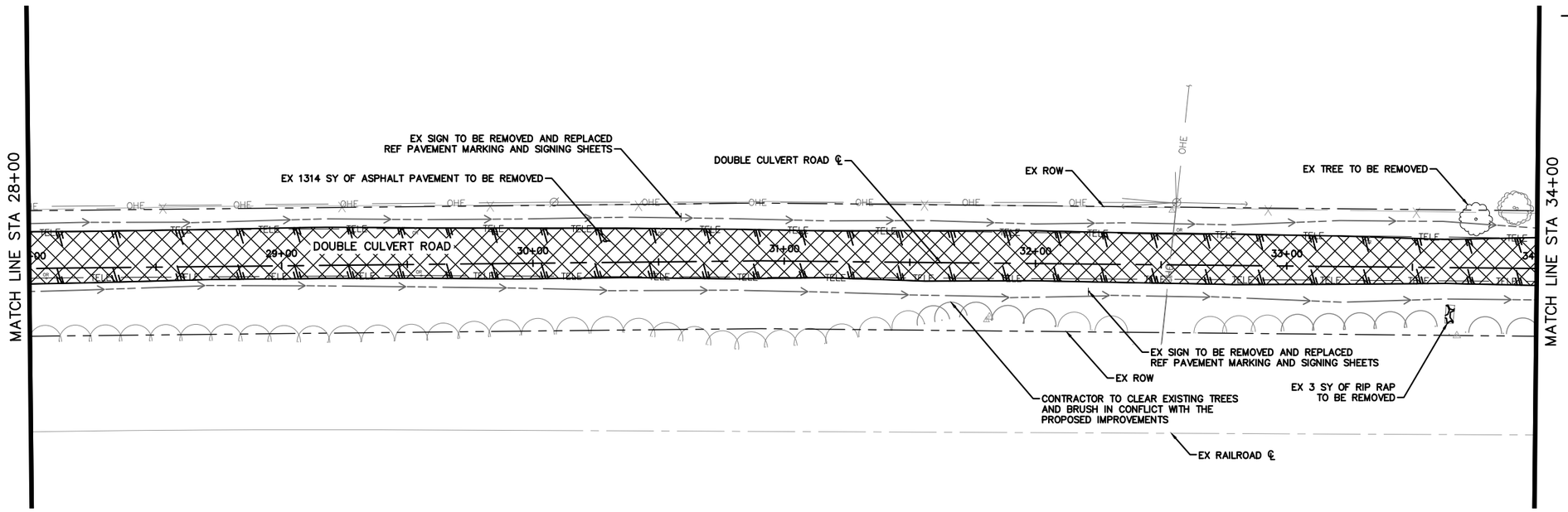

NORTH

GRAPHIC SCALE IN FEET
0 25 50

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STATE OF TEXAS
ABBEY M. MAYER
151558
LICENSED
PROFESSIONAL
ENGINEER
Abby Mayer

DATE: 7/28/2026 8:22:20 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Demolition Plan - 10_00.00 TO 58_00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

THE STATE OF TEXAS WALLER COUNTY

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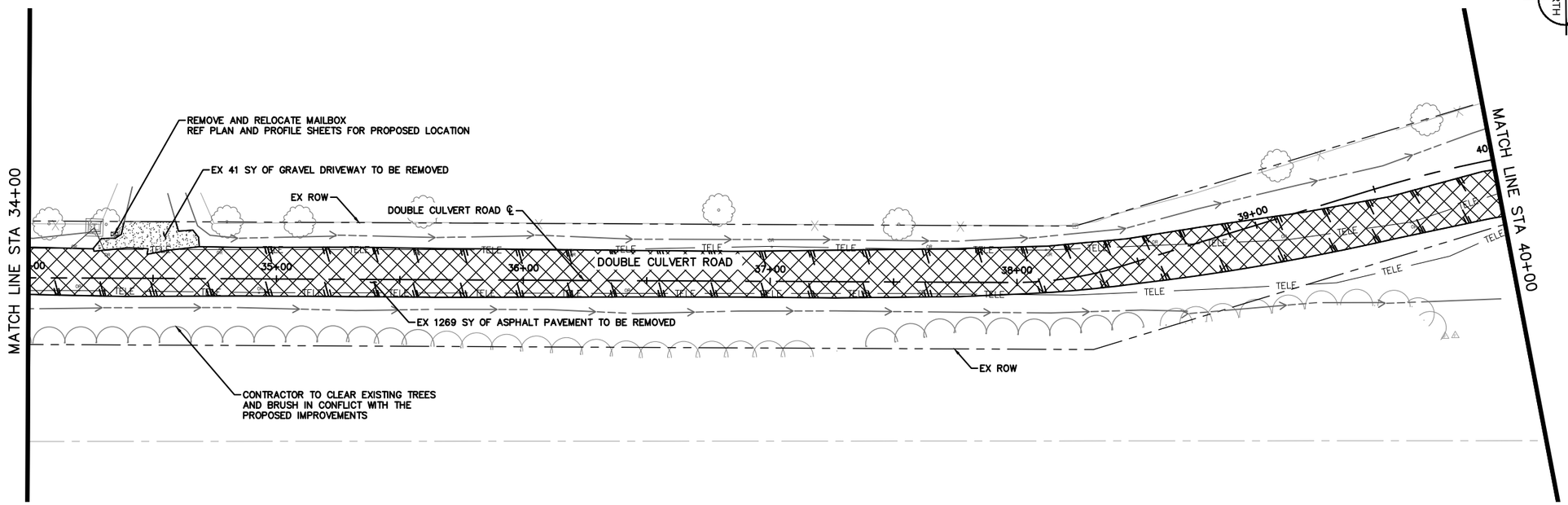
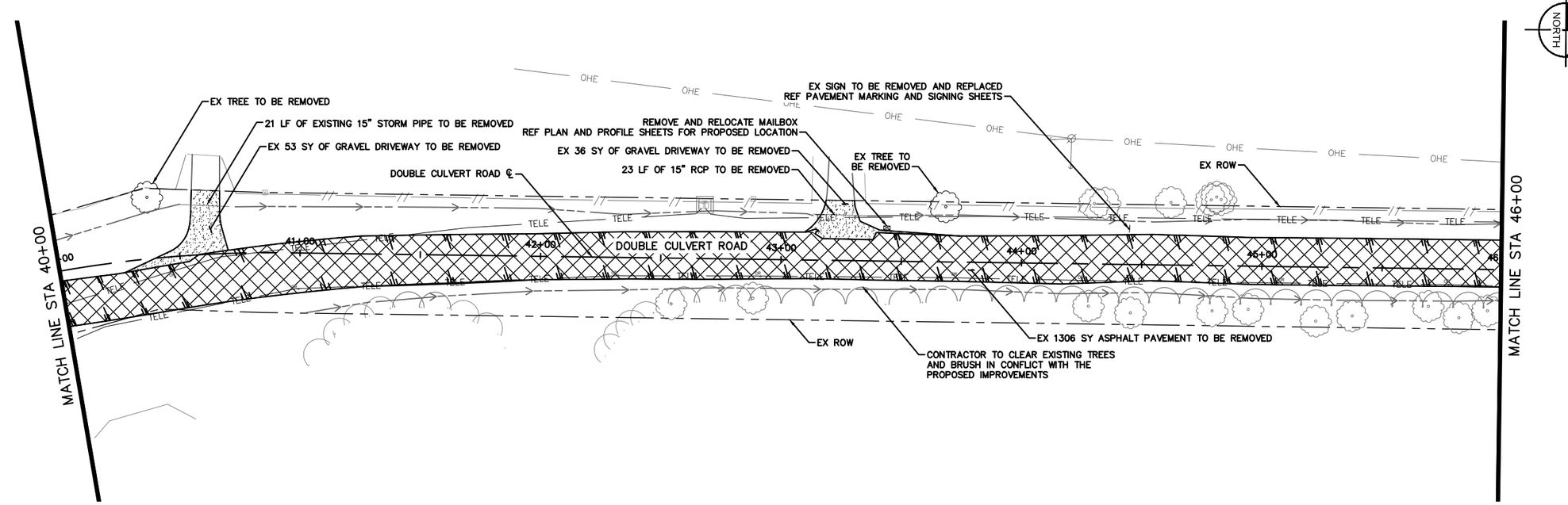
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
DEMOLITION PLAN
STA 22 00.00 TO STA 34 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		18

100% SUBMITTAL





NORTH

GRAPHIC SCALE IN FEET
0 25 50

LEGEND

- EX ASPHALT PAVEMENT TO BE REMOVED
- EX GRAVEL DRIVEWAY TO BE REMOVED
- OHE — EX OVERHEAD ELECTRIC
- TELE — EX TELECOM LINE
- G — EX GAS LINE
- FOC — EX FIBER OPTIC LINE

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07/28/2026
STATE OF TEXAS
ABBEY M. MAYER
151558
LICENSED
PROFESSIONAL
ENGINEER
Abbey Mayer

DATE: 7/28/2026 8:22:26 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Demolition Plan - 10_00.00 TO 58_00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM

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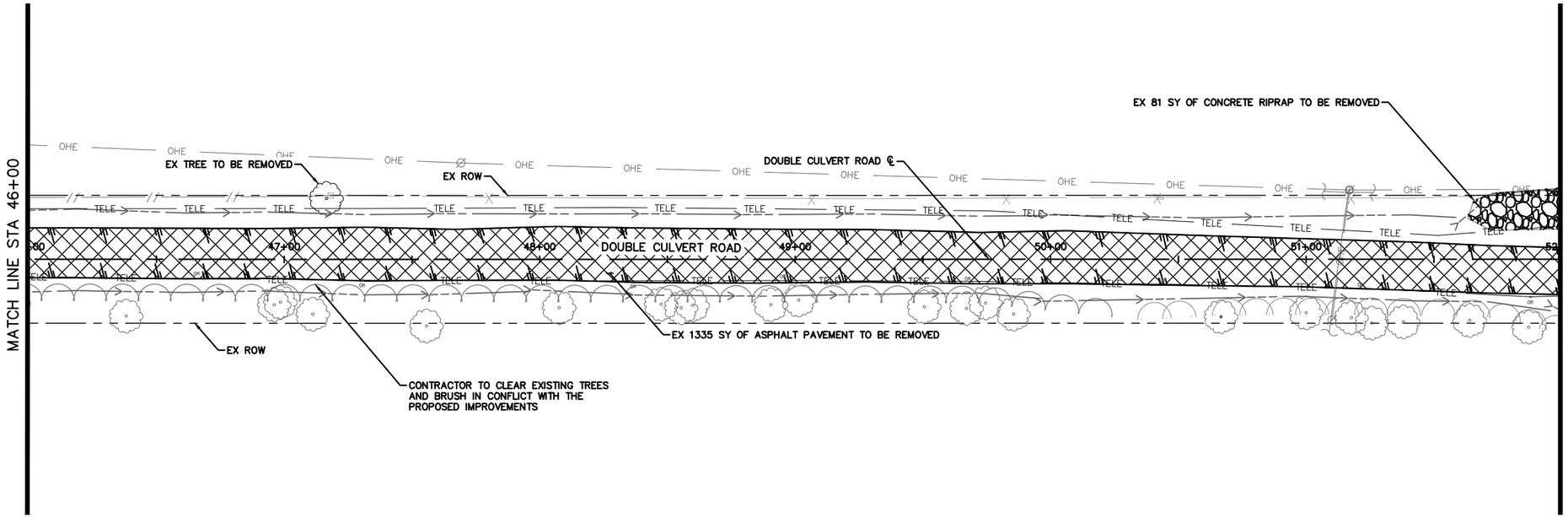
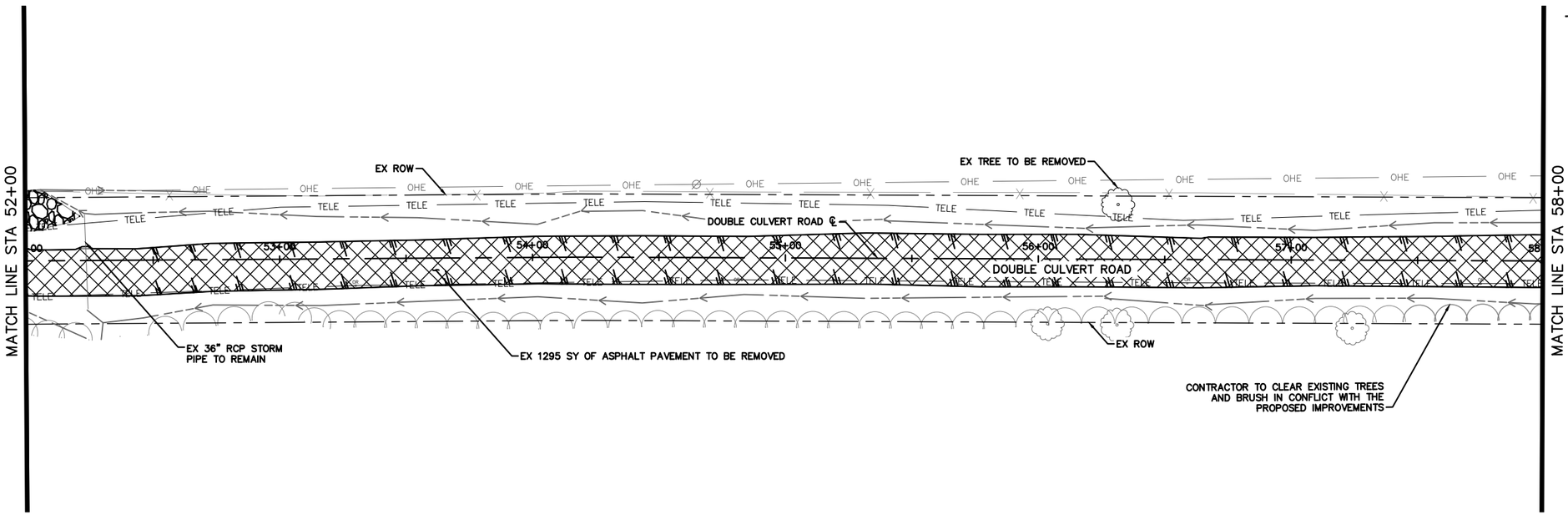
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
DEMOLITION PLAN
STA 34 00.00 TO STA 46 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		19

100% SUBMITTAL





NORTH

GRAPHIC SCALE IN FEET
0 25 50

LEGEND

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07/28/2026

STATE OF TEXAS
ABBEY M. MAYER
151558
LICENSED
PROFESSIONAL
ENGINEER

Abby Mayer

DATE: 7/28/2026 9:30:15 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Demolition Plan - 10_00.00 TO 58_00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

THE STATE OF TEXAS
WALLER COUNTY

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM

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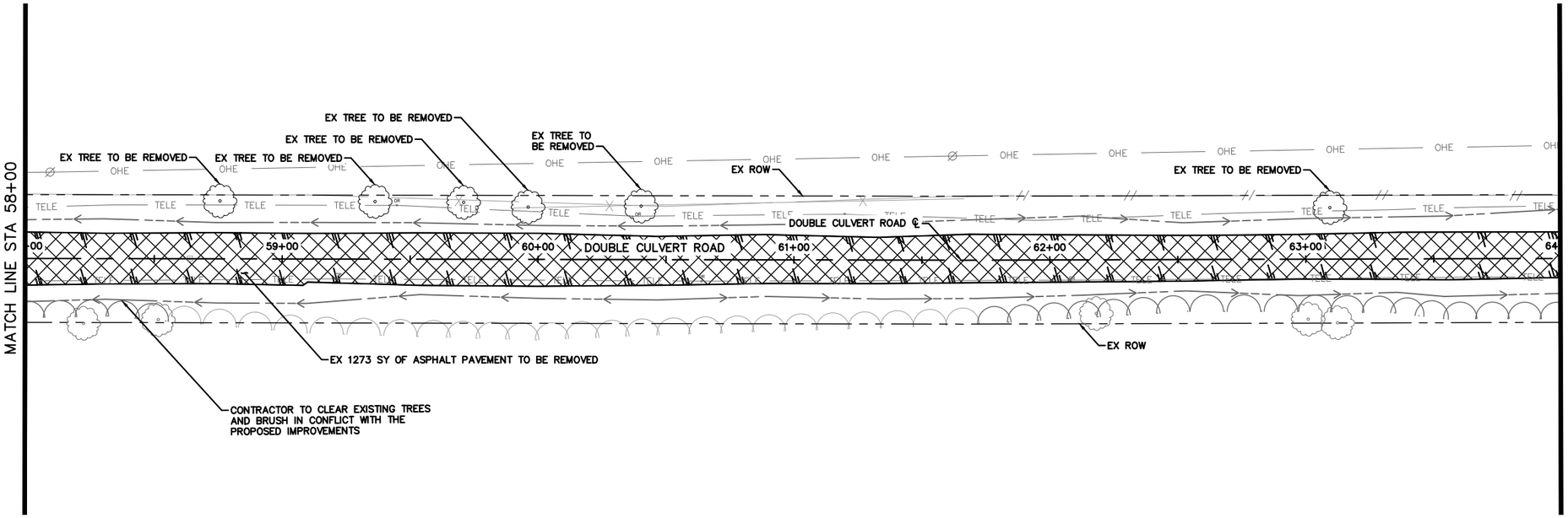
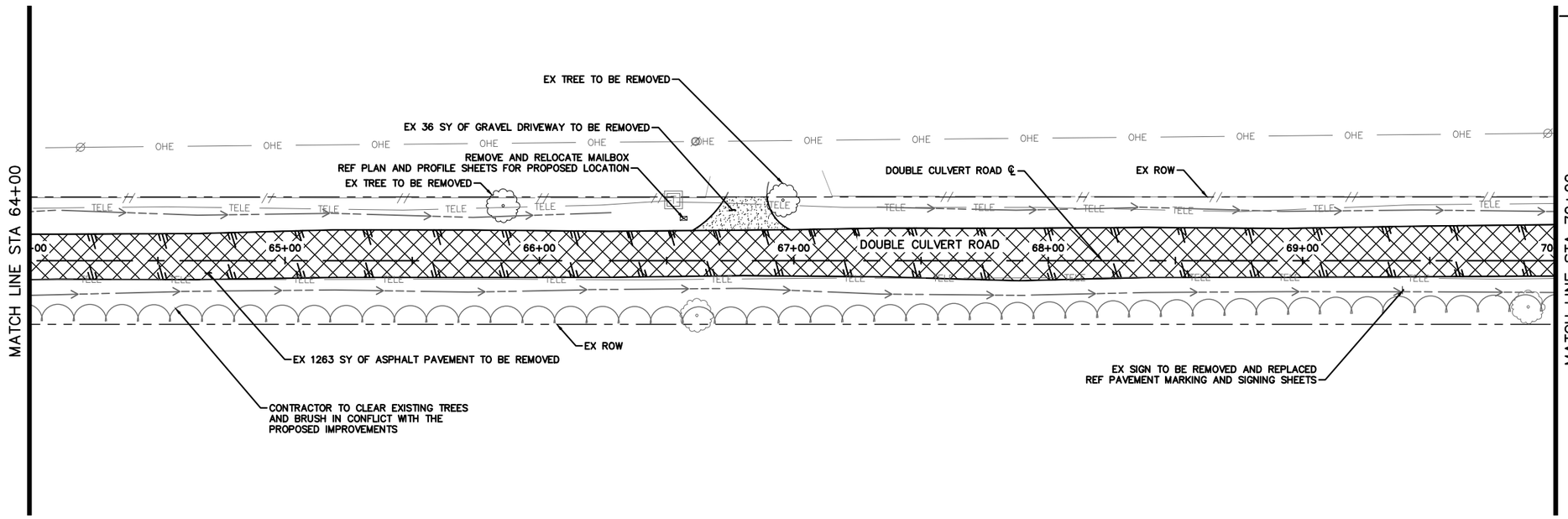
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
DEMOLITION PLAN
STA 46 00.00 TO STA 58 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		20

100% SUBMITTAL





NORTH

GRAPHIC SCALE IN FEET
0 25 50

LEGEND

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07/28/2026
STATE OF TEXAS
ABBEY M. FORZEN
151558
LICENSED
PROFESSIONAL
ENGINEER
Abbey Forzen

DATE: 7/28/2026 8:22:58 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Demolition Plan -58 00.00 TO 106 00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

THE STATE OF TEXAS
WALLER COUNTY

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM

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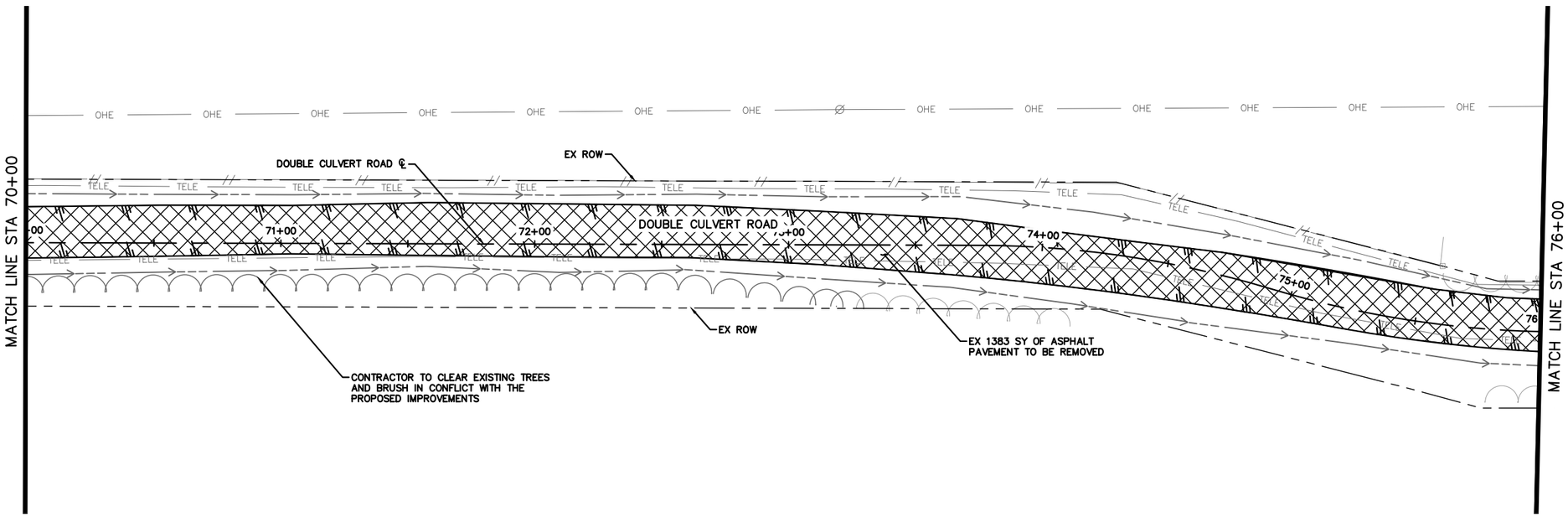
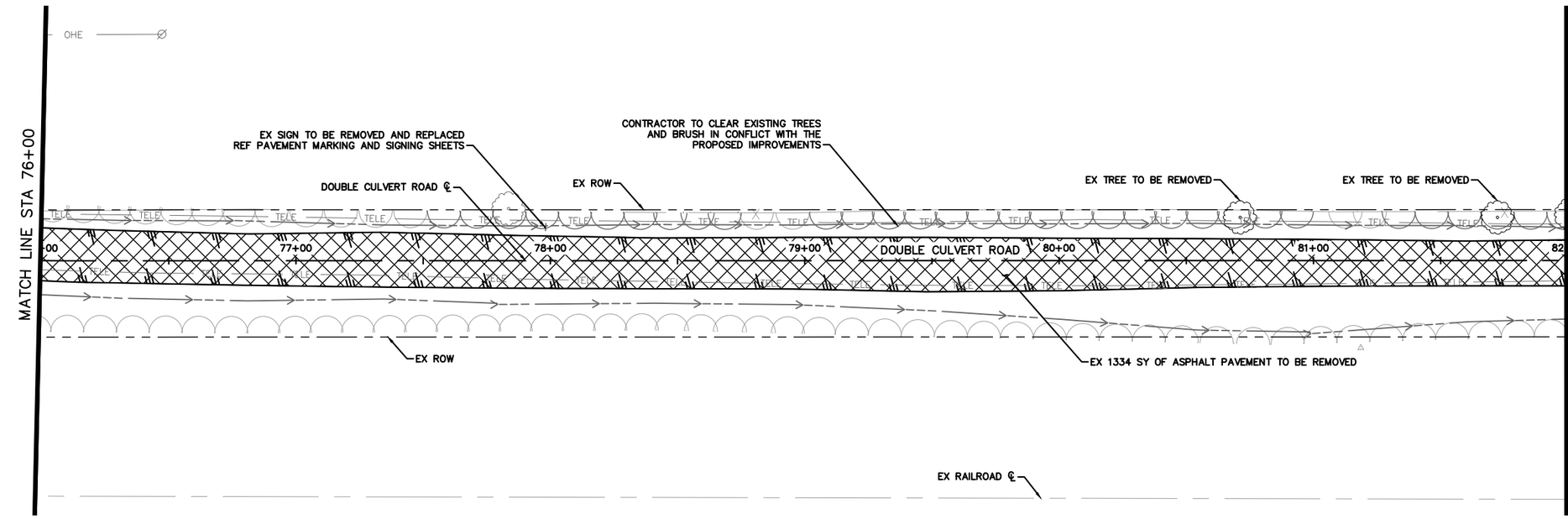
DOUBLE CULVERT ROAD
SEGMENT 1
DEMOLITION PLAN
STA 58 00.00 TO STA 70 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		21

100% SUBMITTAL





GRAPHIC SCALE IN FEET
0 25 50

NORTH

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07/28/2026
STATE OF TEXAS
ABBEY M. FORZEN
151558
LICENSED
PROFESSIONAL
ENGINEER
Abbey Forzen

DATE: 7/28/2026 8:23:04 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Demolition Plan -58_00.00 TO 106_00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM

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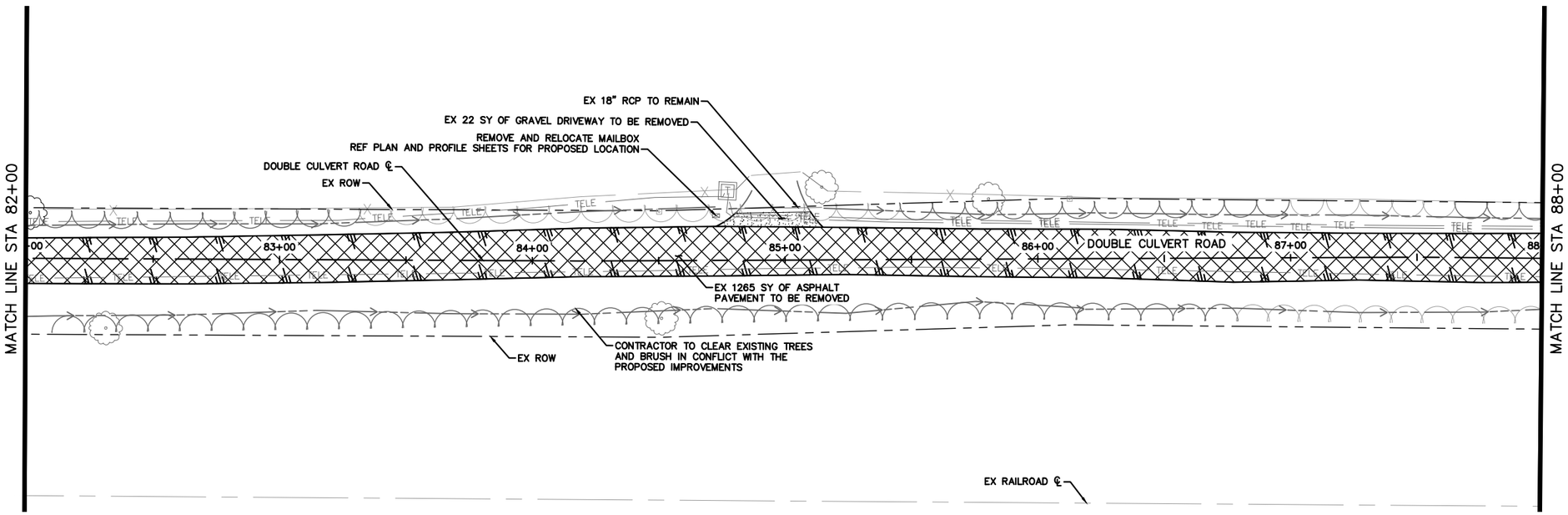
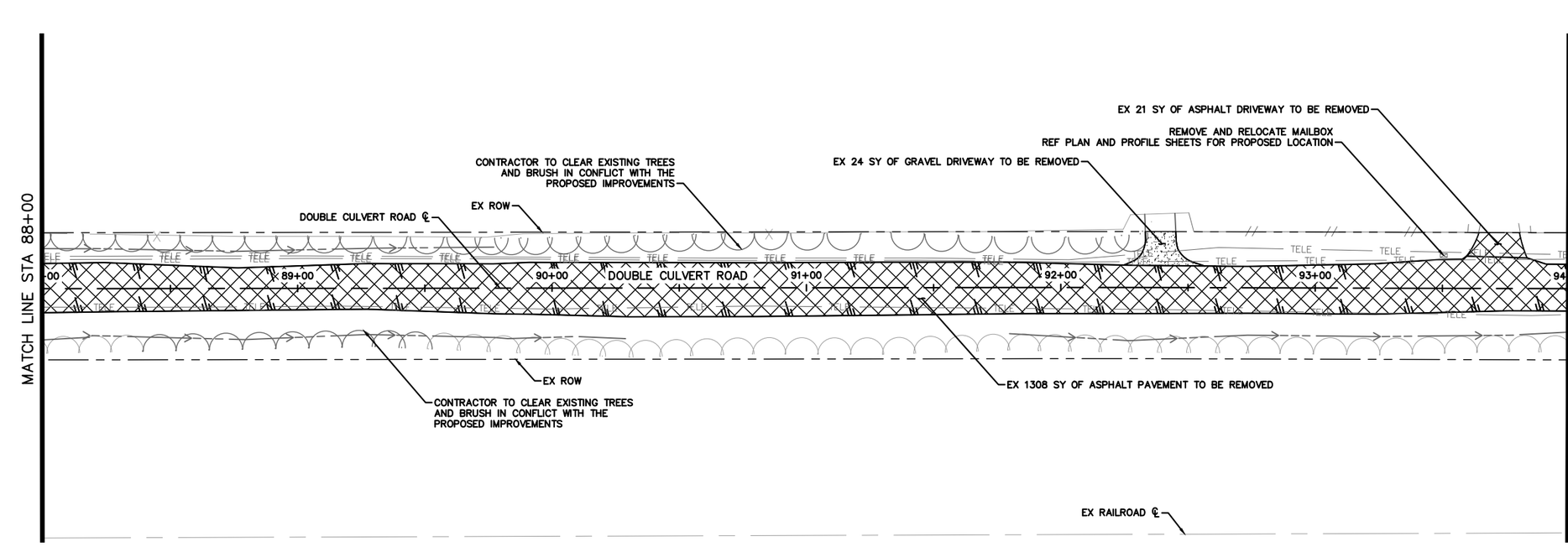
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
DEMOLITION PLAN
STA 70 00.00 TO STA 82 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		22

100% SUBMITTAL





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07/28/2026

STATE OF TEXAS
ABBEY M. FORZEN
151558
LICENSED
PROFESSIONAL
ENGINEER

Abby Forzen

DATE: 7/28/2026 8:23:10 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Demolition Plan -58_00.00 TO 106_00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

THE STATE OF TEXAS
WALLER COUNTY

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM

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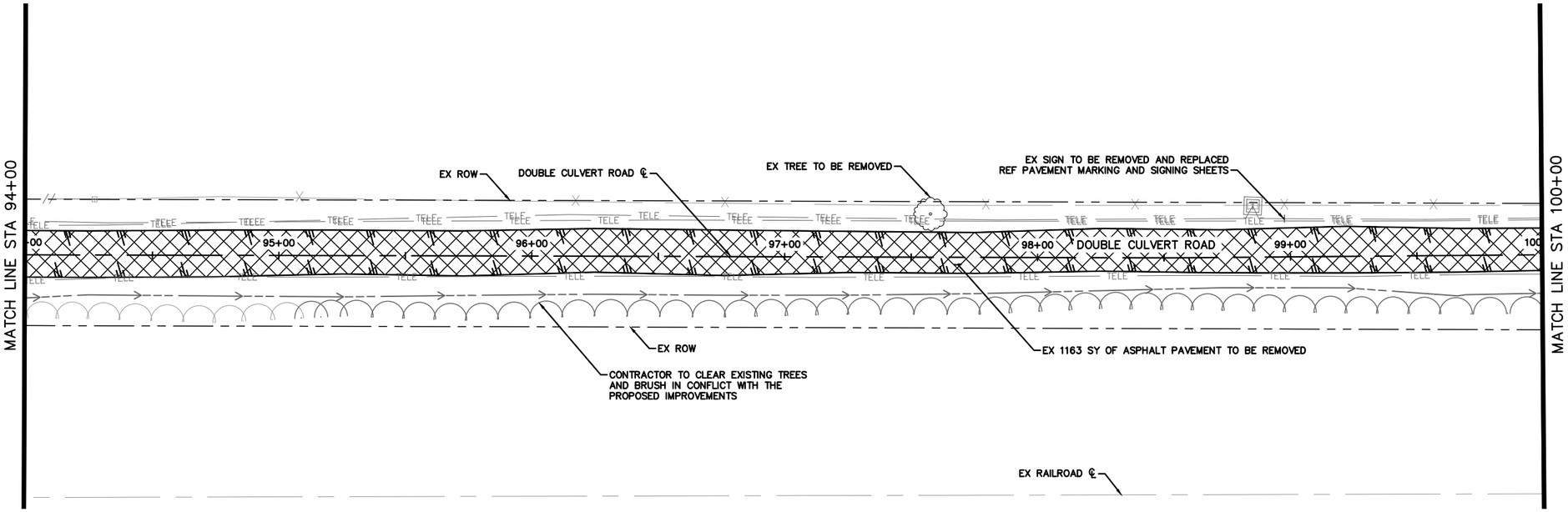
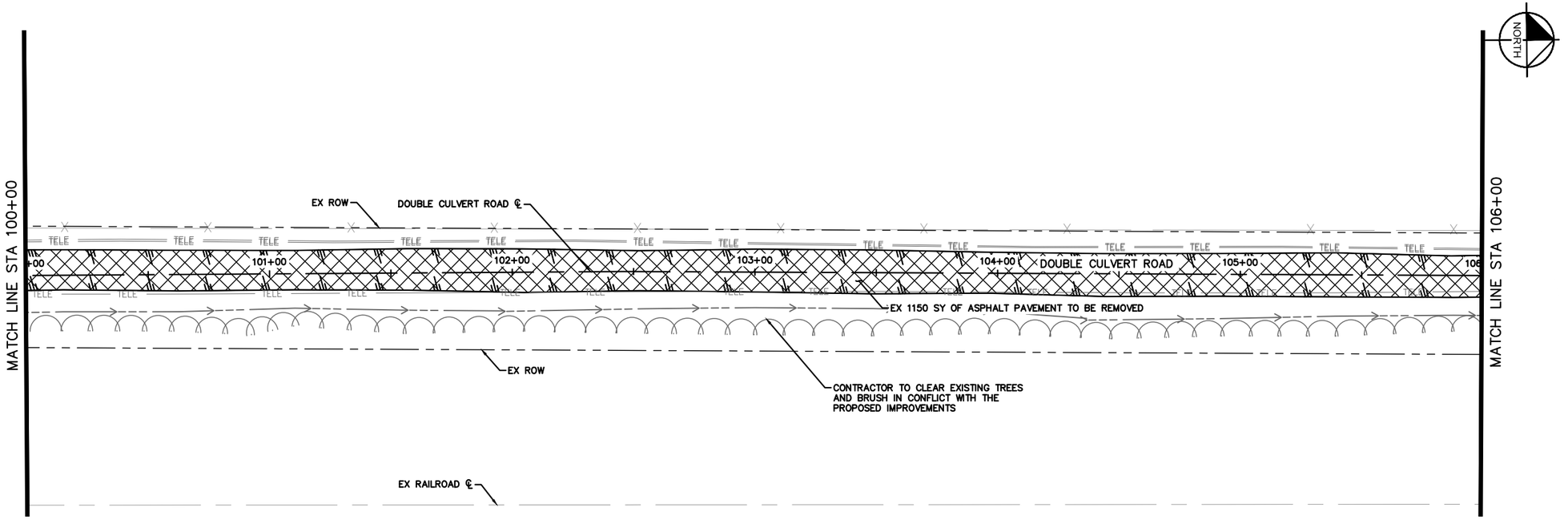
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
DEMOLITION PLAN
STA 82 00.00 TO STA 94 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		23

100% SUBMITTAL





NORTH

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0 25 50

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STATE OF TEXAS
ABBEY M. MAYER
151558
LICENSED
PROFESSIONAL
ENGINEER
Abbey Mayer

DATE: 7/28/2026 8:23:17 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Demolition Plan -58_00.00 TO 106_00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM

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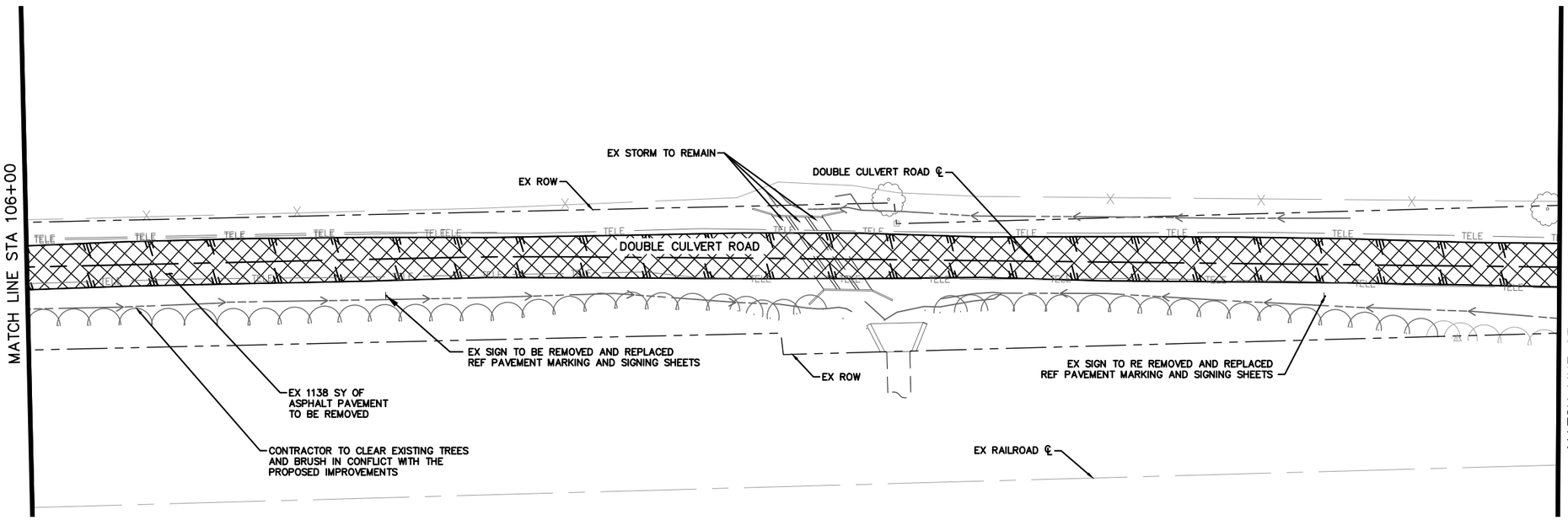
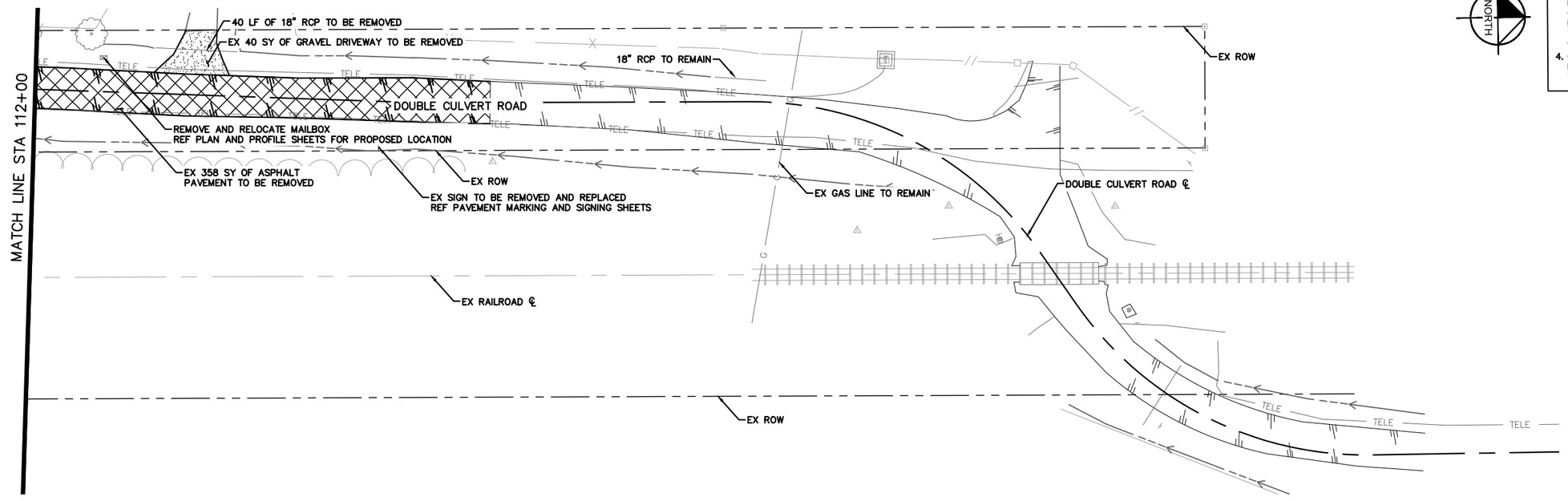
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
DEMOLITION PLAN
STA 94 00.00 TO STA 106 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		24

100% SUBMITTAL





NORTH

GRAPHIC SCALE IN FEET
0 25 50

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STATE OF TEXAS
ABBEY M. FORZEN
151558
LICENSED
PROFESSIONAL
ENGINEER
Abbey Forzen

DATE: 7/28/2026 8:23:41 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Demolition Plan - 106_00.00 TO 119_99.66.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

THE STATE OF TEXAS
WALLER COUNTY

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM
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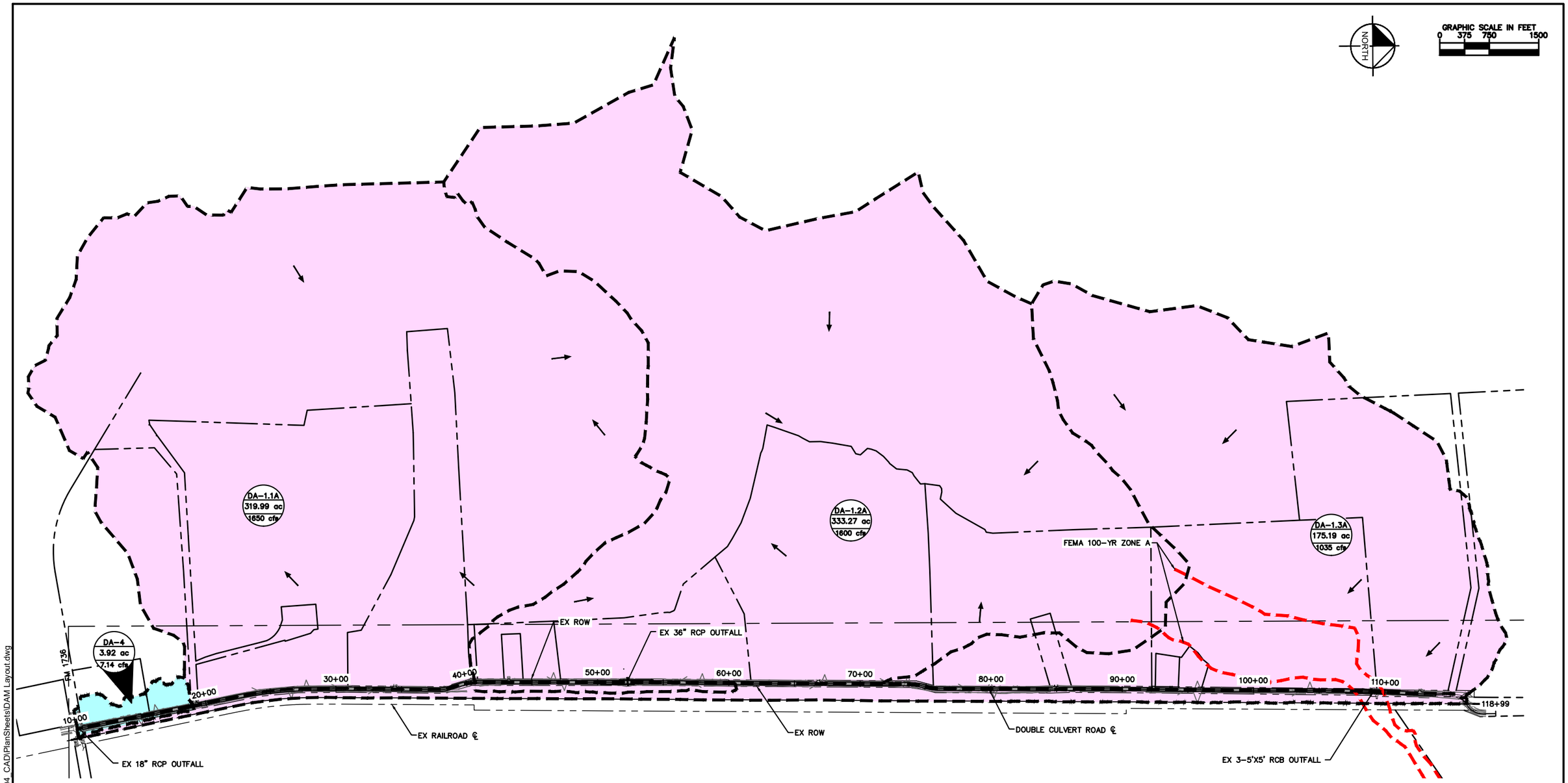
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
DEMOLITION PLAN
STA 106 00.00 TO END

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		25

100% SUBMITTAL



FLOOD PLAIN EARTHWORK CALCULATIONS								
BEGIN STATION	END STATION	LENGTH	CUT			FILL		
			A1 (ST)	A2 (ST)	V (CF)	A1 (ST)	A2 (ST)	V (CF)
107+63.90	108+00.00	36	72	71	2590	1	2	53
108+00.00	108+50.00	50	71	77	3697	2	5	163
108+50.00	109+00.00	50	77	54	3273	5	10	362
109+00.00	109+50.00	50	54	36	2264	10	55	1618
109+50.00	109+87.46	37	36	79	2169	55	8	1185
TOTAL VOLUME (CF)					13992			3380
TOTAL PAVEMENT TO BE REMOVED (CY)					105			0
TOTAL VOLUME CY					413			125
TOTAL EARTHWORK					288	CY of CUT		

DRAINAGE AREA NARRATIVE

- PROPOSED AREA 1 GOES TO EXISTING 5'X5' RCB OUTFALL AT DONAHOE CREEK
- PROPOSED AREA 2 GOES TO 18" RCP OUTFALL

PROPOSED AREAS

AREA 1

AREA 2

LEGEND

A-# / AC / CFS — DRAINAGE AREA NUMBER (SYSTEM-SUB AREA); DRAINAGE AREA SIZE (ACRES); 100-YEAR RUNOFF FROM (CUBIC FEET PER SECOND)

FLOW DIRECTION

DRAINAGE BASIN BOUNDARY

EX FEMA 100-YEAR ZONE A

07/28/2026

STATE OF TEXAS — ABBEY M. POLZIN — 151558 — LICENSED PROFESSIONAL ENGINEER

Abbey Polzin

REV. NO.	DATE	DESCRIPTION	BY

DATE: 7/28/2026 8:24:51 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\DAM Layout.dwg

WALLER COUNTY ENGINEERING DEPARTMENT

THE STATE OF TEXAS — WALLER COUNTY

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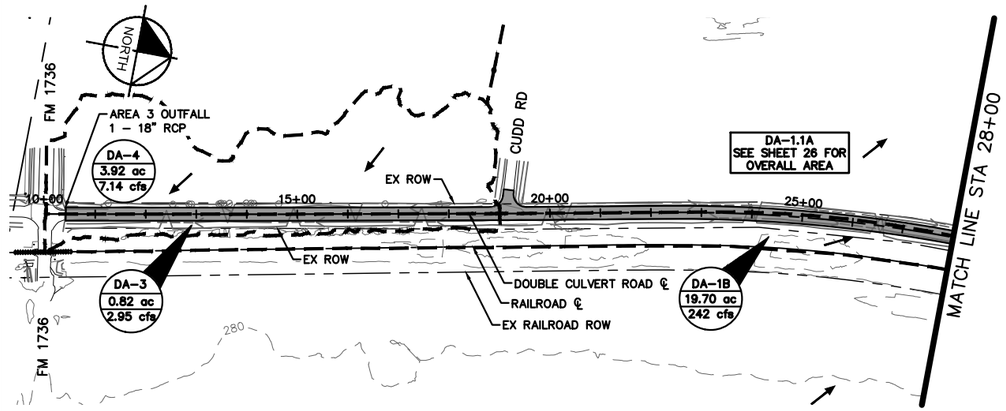
TEXAS REGISTERED ENGINEERING FIRM #F-928

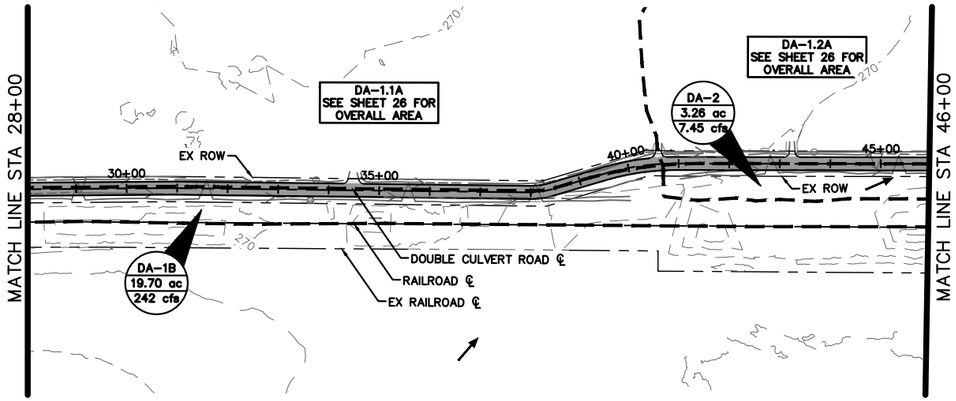
DOUBLE CULVERT ROAD SEGMENT 1

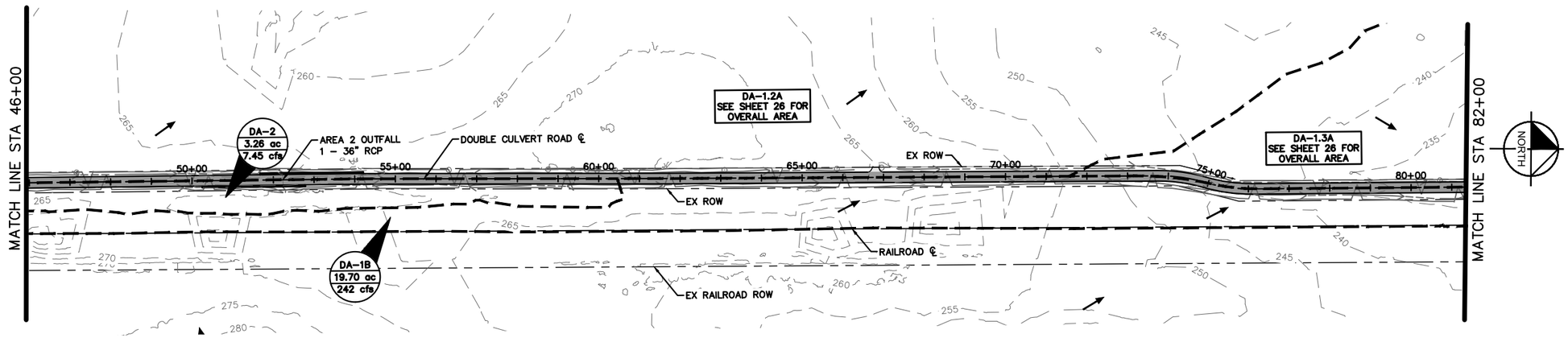
OVERALL DRAINAGE AREA MAP

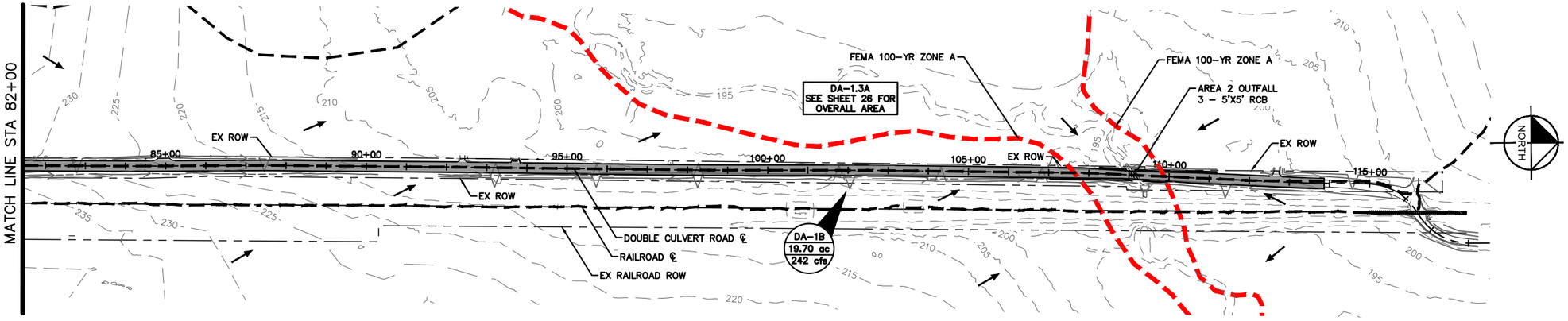
DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		26

100% SUBMITTAL









GRAPHIC SCALE IN FEET
0 75 150 300

LEGEND

- A–# / AC / CFS — DRAINAGE AREA NUMBER (SYSTEM–SUB AREA); DRAINAGE AREA SIZE (ACRES); 100–YEAR RUNOFF FROM (CUBIC FEET PER SECOND)
- FLOW DIRECTION
- DRAINAGE BASIN BOUNDARY
- EX FEMA 100–YEAR ZONE A

DRAINAGE AREA NARRATIVE

- PROPOSED AREA 1 GOES TO EXISTING 5'X5' RCB OUTFALL AT DONAHOE CREEK
- PROPOSED AREA 2 GOES TO 18" RCP OUTFALL

NOTES:

1. REFER TO SHEET 26 FOR OVERALL DRAINAGE AREA MAP

07/28/2026
STATE OF TEXAS
ABBY M. POLZIN
151558
LICENSED
PROFESSIONAL
ENGINEER
Abby Polzin

DATE: 7/28/2026 8:25:40 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Minor DAM.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
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TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1

DRAINAGE AREA MAP

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		27

100% SUBMITTAL

EXISTING EAST DITCH CALCULATIONS (5 YEAR)

STATION	FLOW LINE ELEVATION	CONTROLLING TOP DITCH ELEVATION	DITCH GRADE	LINING	FLAT BOTTOM WIDTH	DITCH DEPTH (FT)	NORMAL DEPTH (FT)	FRONT SLOPE (X:1)	BACK SLOPE (X:1)	CHANNEL n	HYDRAULIC AREA (SF)	NORMAL HA (SF)	PERIMETER P (FT)	NORMAL PERIMETER (FT)	HYD RADIUS R (FT)	NORMAL HR (FT)	DITCH CAPACITY (CFS)	NORMAL CAPACITY (CFS)	DESIGN VELOCITY (FPS)	DESIGN Q(5) (CFS)	DELTA CAPACITY CAP - DES (CFS)	ALLOW SHEAR STRESS	DESIGN SHEAR STRESS	DELTA SHEAR ALLOW - DES
10+00	271.00	0.00																						
11+00	271.81	273.18	0.81%	CLASS D	0.0	1.36	0.35	6	6	0.027	10.89	0.71	16.23	4.15	0.67	0.17	41.44	1.09	1.53	1.31	40.14	0.60	0.18	0.42
12+00	272.24	273.28	0.43%	CLASS D	0.0	1.04	0.39	8	4	0.027	6.65	0.92	12.96	4.82	0.51	0.19	15.33	1.09	1.19	1.31	14.03	0.60	0.10	0.50
13+00	272.56	273.53	0.32%	CLASS D	0.0	0.97	0.39	8	5	0.027	6.34	1.04	13.25	5.38	0.48	0.19	12.12	1.09	1.05	1.31	10.81	0.60	0.08	0.52
14+00	273.07	274.09	0.50%	CLASS D	0.0	1.03	0.37	7	6	0.027	6.93	0.88	13.64	4.85	0.51	0.18	17.22	1.09	1.25	1.31	15.92	0.60	0.11	0.49
15+00	272.98	273.96	-0.09%	CLASS D	0.0	0.98	0.52	8	5	0.027	6.07	1.70	12.55	6.64	0.48	0.26	6.07	1.11	0.65	1.31	4.76	0.60	-0.03	0.63
16+00	273.08	274.12	0.11%	CLASS D	0.0	1.04	0.48	8	6	0.027	7.35	1.59	14.32	6.66	0.51	0.24	8.41	1.09	0.69	1.31	7.10	0.60	0.03	0.57
17+00	273.47	274.16	0.38%	CLASS D	0.0	0.69	0.35	11	6	0.027	4.06	1.03	11.80	5.95	0.34	0.17	6.80	1.09	1.06	1.31	5.50	0.60	0.08	0.52
18+00	273.89	274.43	0.42%	CLASS D	0.0	0.54	0.34	10	8	0.027	2.56	1.01	9.62	6.05	0.27	0.17	3.78	1.09	1.08	1.31	2.47	0.60	0.09	0.51
19+00	274.09	274.56	0.20%	CLASS D	0.0	0.48	0.36	9	13	0.027	2.43	1.40	10.23	7.78	0.24	0.18	2.27	1.09	0.78	1.31	0.96	0.60	0.04	0.56
19+43																				1.31				
20+00	273.83	274.24	0.26%	CLASS D	0.0	0.42	0.37	11	6	0.027	1.52	1.19	7.34	6.49	0.21	0.18	1.48	1.07	0.90	1.36	0.12	0.60	0.06	0.54
21+00	273.13	274.16	0.70%	CLASS D	0.0	1.03	0.35	5	7	0.027	6.43	0.74	12.62	4.29	0.51	0.17	18.92	1.07	1.43	1.36	17.56	0.60	0.15	0.45
22+00	272.59	273.01	0.54%	CLASS D	0.0	0.42	0.33	9	8	0.027	1.41	0.88	6.79	5.38	0.21	0.16	1.99	1.07	1.21	1.36	0.63	0.60	0.11	0.49
23+00	272.19	272.60	0.40%	CLASS D	0.0	0.42	0.32	11	9	0.027	1.71	1.04	8.30	6.46	0.21	0.16	2.09	1.07	1.03	1.36	0.73	0.60	0.08	0.52
24+00	271.81	272.28	0.38%	CLASS D	0.0	0.47	0.36	9	7	0.027	1.73	0.99	7.38	5.59	0.24	0.18	2.24	1.07	1.07	1.36	0.89	0.60	0.09	0.51
25+00	271.78	272.22	0.03%	CLASS D	0.0	0.43	0.56	12	6	0.027	1.69	2.82	7.82	10.12	0.22	0.28	0.54	1.07	0.38	1.36	-0.82	0.60	0.01	0.59
26+00	271.66	271.77	0.13%	CLASS D	1.0	0.11	0.32	20	7	0.027	0.29	1.74	4.12	9.82	0.07	0.18	0.10	1.07	0.61	1.36	-1.26	0.60	0.03	0.57
27+00	271.22	271.46	0.44%	CLASS D	0.0	0.24	0.31	14	7	0.027	0.62	1.02	5.15	6.62	0.12	0.15	0.55	1.07	1.05	1.36	-0.81	0.60	0.08	0.52
28+00	270.91	271.28	0.31%	CLASS D	0.0	0.38	0.35	11	7	0.027	1.28	1.11	6.85	6.40	0.19	0.17	1.28	1.07	0.96	1.36	-0.07	0.60	0.07	0.53
29+00	270.72	271.16	0.19%	CLASS D	0.0	0.44	0.38	9	10	0.027	1.79	1.36	8.24	7.18	0.22	0.19	1.54	1.07	0.78	1.36	0.18	0.60	0.04	0.56
30+00	270.38	270.96	0.34%	CLASS D	0.0	0.58	0.36	9	8	0.027	2.74	1.05	9.52	5.87	0.29	0.18	3.87	1.07	1.02	1.36	2.51	0.60	0.08	0.52
31+00	270.35	271.28	0.02%	CLASS D	0.0	0.93	0.61	6	9	0.027	6.70	2.90	14.56	9.58	0.46	0.30	3.26	1.07	0.37	1.36	1.90	0.60	0.01	0.59
32+00	270.16	271.28	0.20%	CLASS D	0.0	1.13	0.44	5	7	0.027	7.80	1.21	14.05	5.52	0.56	0.22	12.86	1.07	0.89	1.36	11.51	0.60	0.05	0.55
33+00	270.15	270.81	0.01%	CLASS D	0.0	0.66	0.79	6	9	0.027	3.25	4.66	9.88	11.85	0.33	0.39	0.66	1.07	0.23	1.36	-0.70	0.60	0.00	0.60
33+67																				1.36				
34+00	270.28	270.47	0.13%	CLASS D	0.0	0.19	0.28	6	21	0.027	0.49	1.08	5.19	7.74	0.09	0.14	0.20	0.58	0.54	0.06	0.14	0.60	0.02	0.58
34+01																				0.06				
35+00	270.09	271.00	0.19%	CLASS D	0.0	0.90	0.35	6	8	0.027	5.45	0.82	12.23	4.73	0.45	0.17	7.57	0.60	0.74	0.68	6.89	0.60	0.04	0.56
36+00	270.00	270.75	0.09%	CLASS D	0.0	0.75	0.39	7	7	0.027	3.93	1.07	10.59	5.52	0.37	0.19	3.43	0.60	0.56	0.68	2.75	0.60	0.02	0.58
37+00	269.82	270.66	0.18%	CLASS D	0.0	0.84	0.33	5	11	0.027	5.58	0.86	13.46	5.28	0.41	0.16	7.29	0.60	0.70	0.68	6.61	0.60	0.04	0.56
38+00	269.34	270.03	0.47%	CLASS D	0.0	0.69	0.30	4	9	0.027	3.10	0.57	9.15	3.93	0.34	0.15	5.72	0.60	1.05	0.68	5.04	0.60	0.09	0.51
39+00																								
39+48																								
40+00																								
41+00																								
42+00																								
42+06																								
43+00	268.84	269.12	0.10%	CLASS D	0.0	0.28	0.31	13	19	0.027	1.21	1.49	8.80	9.77	0.14	0.15	0.56	0.74	0.50	0.90	-0.34	0.60	0.02	0.58
44+00	267.78	268.10	1.06%	CLASS D	0.0	0.32	0.21	10	17	0.027	1.41	0.59	8.80	5.70	0.16	0.10	2.37	0.74	1.25	0.90	1.47	0.60	0.14	0.46
45+00	266.94	267.58	0.84%	CLASS D	0.0	0.64	0.25	10	8	0.027	3.74	0.58	11.69	4.62	0.32	0.13	8.82	0.74	1.27	0.90	7.92	0.60	0.13	0.47
46+00	266.41	266.78	0.53%	CLASS D	0.0	0.38	0.24	12	16	0.027	1.95	0.77	10.45	6.57	0.19	0.12	2.56	0.74	0.96	0.90	1.66	0.60	0.08	0.52
47+00	266.00	266.47	0.41%	CLASS D	0.0	0.47	0.24	11	21	0.027	3.52	0.88	15.03	7.54	0.23	0.12	4.68	0.74	0.84	0.90	3.78	0.60	0.06	0.54
48+00	265.63	266.03	0.38%	CLASS D	0.0	0.41	0.25	10	18	0.027	2.28	0.88	11.25	6.99	0.20	0.13	2.65	0.74	0.85	0.90	1.74	0.60	0.06	0.54
49+00	265.31	265.86	0.31%	CLASS D	1.0	0.55	0.24	11	10	0.027	3.85	0.89	13.04	6.33	0.30	0.14	5.26	0.74	0.83	0.90	4.36	0.60	0.05	0.55
50+00	265.06	265.50	0.25%	CLASS D	0.0	0.44	0.29	16	8	0.027	2.32	0.99	10.67	6.97	0.22	0.14	2.31	0.74	0.75	0.90	1.41	0.60	0.04	0.56
51+00	264.72	265.16	0.34%	CLASS D	1.0	0.44	0.26	10	7	0.027	2.06	0.81	8.48	5.38	0.24	0.15	2.59	0.74	0.92	0.90	1.69	0.60	0.05	0.55
52+00	263.81	264.38	0.91%	CLASS D	0.0	0.56	0.28	6	7	0.027	2.13	0.53	7.66	3.82	0.28	0.14	4.77	0.74	1.40	0.90	3.87	0.60	0.16	0.44
52+24																				0.90				
53+00	264.19	264.81	0.38%	CLASS D	0.0	0.63	0.29	11	8	0.027	3.74	0.81	12.03	5.59	0.31	0.14	5.78	0.75	0.93	0.88	4.90	0.60	0.07	0.53
54+00	264.34	264.91	0.16%	CLASS A	0.0	0.56	0.36	8	16	0.04	3.85	1.60	13.74	8.86	0.28	0.18	2.42	0.75	0.47	0.88	1.54	3.70	0.04	3.66
55+00	265.22	265.64	0.88%	CLASS A	0.0	0.42	0.28	12	9	0.04	1.86	0.81	8.90	5.86	0.21	0.14	2.29	0.75	0.93	0.88	1.41	3.70	0.15	3.55
56+00	266.31	266.81	1.09%	CLASS A	0.0	0.50	0.30	9	7	0.04	1.97	0.69	7.98	4.74	0.25	0.15	3.00	0.75	1.08	0.88	2.12	3.70	0.20	3.50
57+00	267.06	267.76	0.75%	CLASS A	0.0	0.70	0.29	9	11	0.04	4.91	0.85	14.15	5.87	0.35	0.14	7.81	0.75	0.88	0.88	6.93	3.70	0.14	3.56
58+00	267.38	268.00	0.31%	CLASS A	0.0	0.63	0.34	11	9	0.04	3.89	1.17	12.52	6.87	0.31	0.17	3.71	0.75	0.64	0.88	2.83	3.70	0.07	3.63
59+00	267.97	268.38	0.59%	CLASS A	0.0	0.41	0.25	18	15	0.04	2.73	1.04	13.46	8.33	0.20	0.13	2.69	0.75	0.72	0.88	1.81	3.70	0.09	3.61
60+00	268.44	268.87	0.47%	CLASS A	0.0	0.43	0.27	13	19	0.04	2.97	1.13	13.78	8.50	0.22	0.13	2.72	0.75	0.66	0.88	1.84	3.70	0.08	3.62
60+14																				0.88				
61+00																								
62+00																								
63+00																								
64+00	268.34	268.97	0.02%	CLASS A	0.0	0.63	1.05	11	9	0.04	4.01	11.36	12.89	21.70	0.31	0.52	1.05	4.20	0.37		1.05	3.70	0.02	3.68
64+24																								

07/28/2026

STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL
ENGINEER

Abby Polzin

DATE: 7/28/2026 8:26:02 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\E_isting Drainage Calculations.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
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TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1

EXISTING EAST DITCH CALCULATIONS
1 OF 2

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		28

100% SUBMITTAL

EXISTING EAST DITCH CALCULATIONS (5 YEAR)

STATION	FLOW LINE ELEVATION	CONTROLLING TOP DITCH ELEVATION	DITCH GRADE	LINING	FLAT BOTTOM WIDTH	DITCH DEPTH (FT)	NORMAL DEPTH (FT)	FRONT SLOPE (X:1)	BACK SLOPE (X:1)	CHANNEL n	HYDRAULIC AREA (SF)	NORMAL HA (SF)	PERIMETER P (FT)	NORMAL PERIMETER (FT)	HYD RADIUS R (FT)	NORMAL HR (FT)	DITCH CAPACITY (CFS)	NORMAL CAPACITY (CFS)	DESIGN VELOCITY (FPS)	DESIGN Q(5) (CFS)	DELTA CAPACITY CAP - DES (CFS)	ALLOW SHEAR STRESS	DESIGN SHEAR STRESS	DELTA SHEAR ALLOW - DES
65+00	268.31	268.59	0.03%	CLASS A	1.0	0.28	0.86	21	5	0.04	1.31	10.55	8.37	23.65	0.16	0.45	0.26	4.22	0.40	6.21	-5.95	3.70	0.02	3.68
66+00	267.08	267.53	1.23%	CLASS A	0.0	0.45	0.50	13	8	0.04	2.14	2.59	9.50	10.46	0.23	0.25	3.27	4.22	1.63	6.21	-2.94	3.70	0.38	3.32
67+00	265.53	266.00	1.55%	CLASS A	0.0	0.47	0.43	15	13	0.04	3.02	2.55	12.93	11.87	0.23	0.21	5.30	4.22	1.66	6.21	-0.91	3.70	0.42	3.28
68+00	264.47	265.16	1.06%	CLASS C	0.0	0.69	0.51	9	7	0.03	3.74	2.07	10.99	8.16	0.34	0.25	9.32	4.22	2.04	6.21	3.11	1.00	0.34	0.66
69+00	262.58	264.03	1.89%	CLASS C	0.0	1.45	0.54	4	6	0.03	10.86	1.50	15.23	5.67	0.71	0.27	58.99	4.22	2.81	6.21	52.78	1.00	0.64	0.36
70+00	259.56	261.47	3.01%	CLASS C	0.0	1.90	0.51	4	6	0.03	16.89	1.23	18.16	4.91	0.93	0.25	138.39	4.22	3.42	6.21	132.18	1.00	0.97	0.03
71+00	256.36	256.88	3.21%	CLASS C	0.0	0.52	0.32	5	26	0.03	4.15	1.61	15.98	9.95	0.26	0.16	14.96	4.22	2.63	6.21	8.75	1.00	0.65	0.35
72+00	251.97	253.17	4.39%	CLASS C	0.0	1.20	0.45	5	6	0.03	8.11	1.12	13.72	5.09	0.59	0.22	59.27	4.22	3.78	6.21	53.05	1.00	1.22	-0.22
73+00	248.67	249.56	3.30%	CLASS C	0.0	0.89	0.40	5	12	0.03	6.71	1.37	15.21	6.88	0.44	0.20	34.96	4.22	3.07	6.21	28.74	1.00	0.83	0.17
74+00	246.34	246.55	2.33%	CLASS C	0.0	0.21	0.38	5	19	0.03	0.50	1.70	4.90	8.99	0.10	0.19	0.84	4.22	2.49	6.21	-5.37	1.00	0.55	0.45
75+00	243.18	244.58	3.17%	CLASS C	0.0	1.40	0.49	5	6	0.03	10.36	1.24	15.03	5.21	0.69	0.24	71.24	4.22	3.39	6.21	65.03	1.00	0.96	0.04
76+00	240.47	241.96	2.71%	CLASS C	0.0	1.49	0.50	4	7	0.03	11.81	1.32	16.14	5.40	0.73	0.24	78.13	4.22	3.19	6.21	71.92	1.00	0.84	0.16
77+00	238.54	239.06	1.93%	CLASS C	0.0	0.52	0.40	11	11	0.03	3.05	1.79	11.65	8.94	0.26	0.20	8.57	4.22	2.36	6.21	2.36	1.00	0.48	0.52
78+00	236.23	237.14	2.31%	CLASS C	0.0	0.90	0.44	8	8	0.03	6.55	1.55	14.60	7.10	0.45	0.22	28.87	4.22	2.73	6.21	22.66	1.00	0.63	0.37
79+00	234.22	235.35	2.01%	CLASS C	0.0	1.14	0.49	6	7	0.03	8.22	1.54	14.65	6.35	0.56	0.24	39.25	4.22	2.74	6.21	33.04	1.00	0.62	0.38
80+00	232.03	233.70	2.19%	CLASS C	1.0	1.67	0.43	7	4	0.03	16.71	1.45	19.32	5.75	0.86	0.25	111.23	4.22	2.92	6.21	105.02	1.00	0.59	0.41
81+00	230.56	231.11	1.46%	CLASS C	0.0	0.55	0.49	11	4	0.03	2.22	1.81	8.22	7.42	0.27	0.24	5.55	4.22	2.34	6.21	-0.66	1.00	0.45	0.55
82+00	227.26	230.00	3.30%	CLASS C	0.0	2.74	0.56	5	3	0.03	27.25	1.13	20.71	4.22	1.32	0.27	294.50	4.22	3.74	6.21	288.29	1.00	1.15	-0.15
83+00	225.29	228.23	1.97%	CLASS C	0.0	2.94	0.64	4	3	0.03	28.66	1.34	20.41	4.42	1.40	0.30	249.80	4.22	3.14	6.21	243.59	1.00	0.78	0.22
84+00	222.80	225.50	2.50%	CLASS D	0.0	2.70	0.57	4	3	0.027	26.10	1.15	20.07	4.22	1.30	0.27	270.47	4.22	3.66	6.21	264.25	0.60	0.89	-0.29
85+00	220.51	222.29	2.29%	CLASS D	0.0	1.78	0.54	4	4	0.027	13.57	1.24	15.66	4.73	0.87	0.26	102.61	4.22	3.41	6.21	96.40	0.60	0.77	-0.17
86+00	218.48	221.94	2.03%	CLASS D	0.0	3.46	0.66	3	2	0.027	31.98	1.18	19.80	3.79	1.62	0.31	345.60	4.22	3.59	6.21	339.38	0.60	0.84	-0.24
87+00	216.44	218.03	2.04%	CLASS D	0.0	1.60	0.58	4	4	0.027	9.54	1.26	12.37	4.49	0.77	0.28	62.98	4.22	3.36	6.21	56.77	0.60	0.74	-0.14
88+00	215.19	216.38	1.25%	CLASS D	0.0	1.19	0.56	4	6	0.027	7.29	1.62	12.52	5.91	0.58	0.27	31.31	4.22	2.60	6.21	25.10	0.60	0.44	0.16
89+00	213.14	215.07	2.05%	CLASS D	0.0	1.93	0.56	5	4	0.027	15.22	1.28	16.22	4.70	0.94	0.27	114.87	4.22	3.30	6.21	108.66	0.60	0.72	-0.12
90+00	211.94	213.81	1.20%	CLASS D	0.0	1.88	0.60	6	3	0.027	15.54	1.59	17.03	5.45	0.91	0.29	88.27	4.22	2.66	6.21	82.06	0.60	0.45	0.15
91+00	211.81	212.50	0.13%	CLASS D	0.0	0.68	0.69	11	7	0.027	4.28	4.41	12.60	12.79	0.34	0.34	4.06	4.22	0.96	6.21	-2.15	0.60	0.05	0.55
92+00	210.00	211.22	1.81%	CLASS D	0.0	1.22	0.48	7	7	0.027	9.79	1.49	16.24	6.35	0.60	0.24	51.75	4.22	2.83	6.21	45.54	0.60	0.54	0.06
93+00	208.96	210.04	1.04%	CLASS D	1.0	1.09	0.44	8	7	0.027	10.03	1.91	17.62	7.73	0.57	0.25	38.76	4.22	2.21	6.21	32.55	0.60	0.29	0.31
94+00	206.67	208.42	2.28%	CLASS D	0.0	1.75	0.54	5	3	0.027	12.71	1.23	14.99	4.67	0.85	0.26	94.61	4.22	3.42	6.21	88.40	0.60	0.77	-0.17
95+00	205.02	207.01	1.66%	CLASS D	2.0	2.00	0.38	6	4	0.027	22.97	1.48	21.44	5.75	1.07	0.26	170.37	4.22	2.86	6.21	164.16	0.60	0.40	0.20
96+00	203.78	205.44	1.24%	CLASS D	0.0	1.66	0.60	5	4	0.027	11.83	1.56	14.67	5.33	0.81	0.29	62.74	4.22	2.70	6.21	56.53	0.60	0.46	0.14
97+00	202.72	204.78	1.06%	CLASS D	0.0	2.06	0.62	4	4	0.027	18.25	1.65	18.18	5.47	1.00	0.30	103.80	4.22	2.55	6.21	97.58	0.60	0.41	0.19
98+00	201.97	203.70	0.75%	CLASS D	1.0	1.73	0.55	5	4	0.027	15.48	1.92	17.25	6.14	0.90	0.31	68.64	4.22	2.20	6.21	62.42	0.60	0.26	0.34
99+00	201.66	202.78	0.31%	CLASS D	4.0	1.12	0.45	8	4	0.027	11.60	2.96	16.99	9.24	0.68	0.32	27.35	4.22	1.42	6.21	21.13	0.60	0.09	0.51
100+00	200.84	202.16	0.82%	CLASS D	0.0	1.31	0.58	8	4	0.027	9.87	1.95	15.29	6.80	0.65	0.29	36.71	4.22	2.17	6.21	30.50	0.60	0.30	0.30
101+00	200.41	201.47	0.44%	CLASS D	2.0	1.06	0.48	10	4	0.027	10.14	2.62	17.27	8.94	0.59	0.29	25.91	4.22	1.61	6.21	19.70	0.60	0.13	0.47
102+00	199.72	201.03	0.69%	CLASS D	3.0	1.31	0.42	7	2	0.027	11.58	2.07	15.09	6.90	0.77	0.30	44.27	4.22	2.04	6.21	38.06	0.60	0.18	0.42
103+00	198.46	200.50	1.26%	CLASS D	3.0	2.04	0.38	4	2	0.027	18.25	1.55	15.58	5.33	1.17	0.29	125.48	4.22	2.72	6.21	119.26	0.60	0.30	0.30
104+00	196.91	199.39	1.55%	CLASS D	3.0	2.48	0.36	4	2	0.027	23.94	1.43	17.29	5.08	1.38	0.28	203.68	4.22	2.95	6.21	197.47	0.60	0.35	0.25
105+00	196.78	197.70	0.13%	CLASS D	1.0	0.92	0.75	10	1	0.027	5.87	3.99	12.08	9.97	0.49	0.40	7.06	4.22	1.06	6.21	0.85	0.60	0.06	0.54
106+00	196.44	196.78	0.34%	CLASS D	5.0	0.34	0.37	17	2	0.027	2.82	3.19	11.56	12.15	0.24	0.26	3.56	4.22	1.32	6.21	-2.65	0.60	0.08	0.52
107+00	195.78	196.50	0.66%	CLASS D	0.0	0.72	0.60	10	2	0.027	3.09	2.15	8.80	7.33	0.35	0.29	6.88	4.22	1.97	6.21	0.66	0.60	0.25	0.35
108+00	195.44	196.18	0.34%	CLASS D	0.0	0.75	0.66	10	2	0.027	3.53	2.77	9.63	8.53	0.37	0.32	5.84	4.22	1.53	6.21	-0.38	0.60	0.14	0.46
109+00	191.96	196.53	3.48%	CLASS D	0.0	4.57	0.61	3	3	0.027	54.32	0.95	25.46	3.38	2.13	0.28	923.84	4.22	4.42	6.21	917.63	0.60	1.32	-0.72
109+12																				6.21				
110+00	194.74	196.22	2.79%	CLASS D	0.0	1.48	0.39	4	4	0.027	8.47	0.59	11.85	3.12	0.71	0.19	62.17	1.77	3.01	2.05	60.12	0.60	0.67	-0.07
111+00	195.59	196.72	0.85%	CLASS D	0.0	1.13	0.40	8	4	0.027	8.01	1.02	14.40	5.15	0.56	0.20	27.47	1.77	1.73	2.05	25.42	0.60	0.21	0.39
112+00	196.26	196.75	0.66%	CLASS D	0.0	0.49	0.37	8	10	0.027	2.20	1.22	8.97	6.69	0.24	0.18	3.85	1.77	1.44	2.05	1.81	0.60	0.15	0.45
113+00	197.43	197.48	1.18%	CLASS D	2.0	0.05	0.23	7	18	0.027	0.13	1.09	3.21	7.70	0.04	0.14	0.09	1.77	1.62	2.05	-1.96	0.60	0.17	0.43
114+00	199.99	200.40	2.56%	CLASS D	1.0	0.40	0.21	14	14	0.027	2.64	0.82	12.12	6.80	0.22	0.12	8.44	1.77	2.15	2.05	6.39	0.60	0.34	0.26
115+00	202.59	202.91	2.60%	CLASS D	0.0	0.31	0.25	21	3	0.027	1.20	0.79	7.71	6.26	0.16	0.13	3.09	1.77	2.23	2.05	1.04	0.60	0.41	0.19
116+00	207.53	207.89	4.94%	CLASS D	0.0	0.35	0.21	20	10	0.027	1.84	0.63	10.47	6.14	0.18	0.10	7.05	1.70	2.69	2.05	5.00	0.60	0.64	-0.04
116+36																				2.05				

07/28/2026

STATE OF TEXAS
ABBEY W. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER

Abbey Polzin

DATE: 7/28/2026 8:26:06 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\E isting Drainage Calculations.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY ENGINEERING DEPARTMENT

THE STATE OF TEXAS WALLER COUNTY

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM
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TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD SEGMENT 1

EXISTING EAST DITCH CALCULATIONS
2 OF 2

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		29

100% SUBMITTAL

EXISTING WEST DITCH CALCULATIONS (5 YEAR)

STATION	FLOW LINE ELEVATION	CONTROLLING TOP DITCH ELEVATION	DITCH GRADE	LINING	FLAT BOTTOM WIDTH	DITCH DEPTH (FT)	NORMAL DEPTH (FT)	FRONT SLOPE (X:1)	BACK SLOPE (X:1)	CHANNEL n	HYDRAULIC AREA (SF)	NORMAL HA (SF)	PERIMETER P (FT)	NORMAL PERIMETER (FT)	HYD RADIUS R (FT)	NORMAL HR (FT)	DITCH CAPACITY (CFS)	NORMAL CAPACITY (CFS)	DESIGN VELOCITY (FPS)	DESIGN Q(5) (CFS)	DELTA CAPACITY CAP - DES (CFS)	ALLOW SHEAR STRESS	DESIGN SHEAR STRESS	DELTA SHEAR ALLOW - DES
10+00	271.00	0.00																						
11+00	272.38	272.56	1.38%	CLASS D	0.0	0.18	0.24	10	12	0.027	0.33	0.62	3.84	5.23	0.09	0.12	0.43	0.97	1.56	0.99	-0.56	0.60	0.21	0.39
11+17																				0.99				
12+00	272.10	272.97	-0.28%	CLASS D	0.0	0.86	0.59	5	7	0.027	4.45	2.07	10.44	7.12	0.43	0.29	7.30	2.63	1.27	2.97	4.33	0.60	-0.10	0.70
13+00	272.78	273.54	0.67%	CLASS D	0.0	0.76	0.48	8	6	0.027	3.87	1.52	10.26	6.43	0.38	0.24	9.14	2.63	1.73	2.97	6.17	0.60	0.20	0.40
14+00	273.07	273.76	0.30%	CLASS D	0.0	0.69	0.56	7	6	0.027	3.06	2.06	9.01	7.38	0.34	0.28	4.47	2.63	1.28	2.97	1.50	0.60	0.10	0.50
15+00	273.23	273.72	0.16%	CLASS D	1.0	0.49	0.48	7	15	0.027	3.05	2.96	11.58	11.41	0.26	0.26	2.74	2.63	0.89	2.97	-0.23	0.60	0.05	0.55
16+00	273.25	273.51	0.02%	CLASS D	0.0	0.26	0.69	7	24	0.027	1.03	7.28	7.97	21.19	0.13	0.34	0.19	2.63	0.36	2.97	-2.77	0.60	0.01	0.59
17+00	273.89	274.44	0.64%	CLASS D	0.0	0.55	0.43	6	13	0.027	2.83	1.69	10.32	7.97	0.27	0.21	5.24	2.63	1.56	2.97	2.27	0.60	0.17	0.43
18+00	274.15	274.53	0.26%	CLASS D	0.0	0.38	0.55	11	4	0.027	1.07	2.22	5.71	8.23	0.19	0.27	0.99	2.63	1.18	2.97	-1.98	0.60	0.09	0.51
19+00	0.00	0.00	0.00%	CLASS D																				
20+00	274.02	274.34	0.06%	CLASS D	0.0	0.32	0.49	9	8	0.027	0.91	2.08	5.70	8.61	0.16	0.24	0.38	1.13	0.54	1.40	-1.03	0.60	0.02	0.58
21+00	273.41	273.81	0.62%	CLASS D	0.0	0.41	0.30	6	15	0.027	1.75	0.93	8.66	6.32	0.20	0.15	2.61	1.13	1.21	1.40	1.21	0.60	0.11	0.49
22+00	272.87	273.23	0.54%	CLASS D	0.0	0.36	0.34	9	7	0.027	1.03	0.92	5.77	5.45	0.18	0.17	1.31	1.13	1.23	1.40	-0.09	0.60	0.11	0.49
23+00	272.34	273.15	0.53%	CLASS D	0.0	0.80	0.30	15	6	0.027	6.88	0.99	17.24	6.55	0.40	0.15	14.88	1.13	1.13	1.40	13.48	0.60	0.10	0.50
24+00	272.13	272.41	0.22%	CLASS D	0.0	0.28	0.33	18	8	0.027	1.05	1.45	7.43	8.74	0.14	0.17	0.73	1.13	0.78	1.40	-0.67	0.60	0.05	0.55
25+00	272.13	272.34	0.01%	CLASS D	0.0	0.22	0.51	28	11	0.027	0.92	5.06	8.41	19.74	0.11	0.26	0.12	1.13	0.22	1.40	-1.29	0.60	0.00	0.60
26+00	271.75	271.97	0.37%	CLASS D	0.0	0.21	0.27	28	6	0.027	0.79	1.27	7.40	9.37	0.11	0.14	0.60	1.13	0.89	1.40	-0.80	0.60	0.06	0.54
27+00	271.74	271.81	0.01%	CLASS D	1.0	0.07	0.39	15	47	0.027	0.22	5.04	5.28	25.02	0.04	0.20	0.02	1.13	0.22	1.40	-1.39	0.60	0.00	0.60
28+00	271.09	271.41	0.65%	CLASS D	0.0	0.31	0.29	13	8	0.027	1.03	0.92	6.63	6.26	0.16	0.15	1.32	1.13	1.23	1.40	-0.09	0.60	0.12	0.48
29+00	271.13	271.44	-0.03%	CLASS D	0.0	0.31	0.47	16	12	0.027	1.37	3.07	8.79	13.15	0.16	0.23	0.39	1.13	0.37	1.40	-1.02	0.60	-0.01	0.61
30+00	271.09	271.22	0.03%	CLASS D	0.0	0.13	0.44	16	16	0.027	0.25	3.17	4.01	14.28	0.06	0.22	0.04	1.13	0.36	1.40	-1.37	0.60	0.01	0.59
31+00	270.88	271.16	0.22%	CLASS D	2.0	0.28	0.26	14	14	0.027	1.69	1.50	10.02	9.46	0.17	0.16	1.32	1.13	0.75	1.40	-0.08	0.60	0.04	0.56
31+76																				1.40				
32+00	270.79	271.03	0.09%	CLASS D	1.0	0.24	0.15	4	18	0.027	0.89	0.38	6.37	4.21	0.14	0.09	0.39	0.12	0.33	0.28	0.12	0.60	0.01	0.59
33+00	270.88	271.16	0.09%	CLASS D	0.0	0.28	0.22	10	12	0.027	0.87	0.55	6.22	4.94	0.14	0.11	0.38	0.21	0.38	0.28	0.11	0.60	0.01	0.59
34+00	271.34	271.13	0.47%	CLASS D	1.0	-0.22	0.09	19	64	0.027	1.77	0.41	-17.22	8.31	-0.10	0.05	1.47	0.21	0.51	0.28	1.19	0.60	0.03	0.57
34+46																				0.28				
35+00	270.94	271.22	0.41%	CLASS D	0.0	0.28	0.13	14	26	0.027	1.59	0.34	11.33	5.22	0.14	0.06	1.51	0.19	0.57	0.22	1.29	0.60	0.03	0.57
36+00	270.70	270.75	0.24%	CLASS D	0.0	0.05	0.10	15	77	0.027	0.12	0.51	4.77	9.63	0.03	0.05	0.03	0.19	0.38	0.22	-0.19	0.60	0.02	0.58
36+27																				0.22				
37+00																								
37+88																				1.13				
38+00	270.75	270.84	0.03%	CLASS D	0.0	0.09	0.07	13	49	0.027	0.24	0.13	5.47	4.07	0.04	0.03	0.03	0.01	0.09	1.13	-1.10	0.60	0.00	0.60
39+00	269.97	270.94	-0.78%	CLASS D	0.0	0.97	0.37	6	5	0.027	5.45	0.80	11.42	4.38	0.48	0.18	16.20	1.26	1.57	1.13	15.07	0.60	-0.18	0.78
40+00	270.44	270.97	0.47%	CLASS D	1.0	0.53	0.24	17	19	0.027	5.64	1.28	20.28	9.71	0.28	0.13	9.07	1.26	0.98	1.13	7.94	0.60	0.07	0.53
40+60																				1.13				
41+00	269.81	270.74	0.63%	CLASS D	1.0	0.93	0.37	14	5	0.027	9.16	1.67	18.92	8.12	0.48	0.21	24.56	2.53	1.51	2.76	21.80	0.60	0.14	0.46
42+00	267.16	269.66	2.65%	CLASS D	0.0	2.50	0.53	4	2	0.027	16.07	0.72	13.94	2.95	1.15	0.24	158.22	2.53	3.50	2.76	155.46	0.60	0.88	-0.28
43+00	268.19	269.03	1.03%	CLASS D	0.0	0.84	0.48	5	5	0.027	3.55	1.18	8.63	4.97	0.41	0.24	10.96	2.53	2.14	2.76	8.20	0.60	0.31	0.29
43+21																				2.76				
44+00	267.31	267.94	0.88%	CLASS D	0.0	0.63	0.45	9	6	0.027	2.97	1.51	9.53	6.80	0.31	0.22	7.05	2.86	1.89	2.79	4.27	0.60	0.25	0.35
45+00	266.81	267.24	0.50%	CLASS D	0.0	0.43	0.44	15	6	0.027	1.92	2.03	9.03	9.29	0.21	0.22	2.66	2.86	1.41	2.79	-0.13	0.60	0.14	0.46
46+00	266.06	266.50	0.75%	CLASS D	0.0	0.44	0.38	14	11	0.027	2.33	1.81	10.71	9.43	0.22	0.19	4.02	2.86	1.58	2.79	1.24	0.60	0.18	0.42
47+00	265.47	266.17	0.59%	CLASS D	0.0	0.70	0.46	10	7	0.027	4.10	1.80	11.87	7.87	0.35	0.23	8.57	2.86	1.59	2.79	5.78	0.60	0.17	0.43
48+00	265.19	265.53	0.28%	CLASS D	0.0	0.34	0.52	11	7	0.027	1.07	2.43	6.26	9.44	0.17	0.26	0.96	2.86	1.18	2.79	-1.83	0.60	0.09	0.51
49+00	264.88	265.19	0.31%	CLASS D	0.0	0.31	0.55	10	5	0.027	0.72	2.22	4.67	8.18	0.15	0.27	0.64	2.86	1.29	2.79	-2.14	0.60	0.11	0.49
50+00	264.63	264.88	0.25%	CLASS D	0.0	0.25	0.52	12	7	0.027	0.58	2.55	4.67	9.79	0.12	0.26	0.40	2.86	1.12	2.79	-2.39	0.60	0.08	0.52
51+00	263.28	264.35	1.34%	CLASS D	0.0	1.07	0.45	8	4	0.027	6.83	1.22	13.00	5.50	0.53	0.22	28.39	2.86	2.34	2.79	25.61	0.60	0.38	0.22
52+00	256.97	257.16	6.31%	CLASS D	3.0	0.19	0.16	3	32	0.027	1.18	0.92	9.68	8.66	0.12	0.11	4.03	2.86	3.11	2.79	1.24	0.60	0.62	-0.02
52+24																				2.79				
53+00	263.40	264.06	6.43%	CLASS D	0.0	0.66	0.20	9	8	0.027	3.49	0.34	10.73	3.34	0.33	0.10	23.08	1.02	3.03	1.82	21.25	0.60	0.82	-0.22
54+00	264.34	264.65	0.94%	CLASS A	0.0	0.30	0.26	14	19	0.04	1.51	1.11	10.02	8.61	0.15	0.13	1.53	1.02	0.92	1.82	-0.29	3.70	0.15	3.55
55+00	265.25	265.41	0.90%	CLASS A	0.0	0.16	0.28	19	8	0.04	0.35	1.08	4.40	7.71	0.08	0.14	0.23	1.02	0.95	1.82	-1.59	3.70	0.16	3.54
56+00	266.31	266.38	1.07%	CLASS A	1.0	0.06	0.22	32	4	0.04	0.13	1.09	3.27	9.01	0.04	0.12	0.06	1.02	0.94	1.82	-1.77	3.70	0.15	3.55
57+00	267.34	267.46	1.03%	CLASS A	1.0	0.12	0.25	16	7	0.04	0.27	0.98	3.65	6.78	0.07	0.14	0.18	1.02	1.04	1.82	-1.65	3.70	0.16	3.54
58+00	267.66	267.92	0.31%	CLASS A	0.0	0.26	0.38	16	5	0.04	0.71	1.49	5.45	7.88	0.13	0.19	0.38	1.02	0.69	1.82	-1.44	3.70	0.07	3.63
59+00	268.09	268.25	0.44%	CLASS A	1.0	0.16	0.30	19	4	0.04	0.44	1.36	4.67	8.09	0.09	0.17	0.22	1.02	0.75	1.82	-1.60	3.70	0.08	3.62
60+00	268.41	268.53	0.31%	CLASS A	0.0	0.12	0.38	16	4	0.04	0.15	1.49	2.51	7.80	0.06	0.19	0.05	1.02	0.69	1.82	-1.77	3.70	0.07	3.63
61+00	268.41	268.61	0.00%	CLASS A	0.0	0.20	0.52	16	8	0.04	0.49	3.15	4.78	12.17	0.10	0.26	0.00	0.00	0.00	1.82	-1.82	3.70	0.00	3.70
62+00	268.18	268.43	-0.23%	CLASS A	0.0	0.26	0.42	20	7	0.04	0.91	2.40	7.10	11.56	0.13	0.21	0.41	1.50	0.63	1.82	-1.41	3.70	-0.06	3.76
63+00	269.23	269.34	1.06%	CLASS A	3.0	0.11	0.25	9	8	0.04	0.41	1.26	4.82	7.25	0.09	0.17	0.31	1.50	1.19	1.82	-1.52	3.70	0.16	3.54
63+14																				1.82				
64+00	268.66	268.91	0.58%	CLASS A	0.0	0.25	0.35	20	8	0.04	0.88	1.71	7.02	9.82	0.12	0.17	0.62	1.50	0.88	0.41	0.21	3.70	0.13	3.57
64+75																				0.41				

07/28/2026

STATE OF TEXAS
ABBEY M. MAYER
151558
LICENSED
PROFESSIONAL ENGINEER

Abby Mayer

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TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD SEGMENT 1

EXISTING WEST DITCH CALCULATIONS 1 OF 2

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		30

100% SUBMITTAL

EXISTING WEST DITCH CALCULATIONS (5 YEAR)

STATION	FLOW LINE ELEVATION	CONTROLLING TOP DITCH ELEVATION	DITCH GRADE	LINING	FLAT BOTTOM WIDTH	DITCH DEPTH (FT)	NORMAL DEPTH (FT)	FRONT SLOPE (X:1)	BACK SLOPE (X:1)	CHANNEL n	HYDRAULIC AREA (SF)	NORMAL HA (SF)	PERIMETER P (FT)	NORMAL PERIMETER (FT)	HYD RADIUS R (FT)	NORMAL HR (FT)	DITCH CAPACITY (CFS)	NORMAL CAPACITY (CFS)	DESIGN VELOCITY (FPS)	DESIGN Q(5) (CFS)	DELTA CAPACITY CAP - DES (CFS)	ALLOW SHEAR STRESS	DESIGN SHEAR STRESS	DELTA SHEAR ALLOW - DES
65+00																								
65+08																				0.22				
66+00	266.97	267.44	-266.97%	CLASS A	0.0	0.47	0.35	9	13	0.04	2.44	1.40	10.47	7.95	0.23	0.18	55.90	26.79	19.10	0.22	55.69	3.70	-59.04	62.74
66+80																				0.22				
67+00																								
68+00																								
68+34																				1.50				
69+00	261.25	262.75	1.91%	CLASS C	0.0	1.50	0.45	4	1	0.03	5.21	0.47	7.95	2.39	0.66	0.20	26.91	1.09	2.32	1.50	25.41	1.00	0.54	0.46
70+00	257.35	260.53	3.91%	CLASS C	0.0	3.18	0.48	1	2	0.03	14.66	0.33	11.31	1.70	1.30	0.20	170.55	1.09	3.29	1.50	169.06	1.00	1.17	-0.17
71+00	254.35	256.06	3.00%	CLASS C	0.0	1.72	0.44	1	3	0.03	5.83	0.38	7.74	1.98	0.75	0.19	41.41	1.09	2.86	1.50	39.91	1.00	0.82	0.18
72+00	251.63	251.88	2.71%	CLASS C	0.0	0.24	0.34	4	4	0.03	0.23	0.45	1.95	2.72	0.12	0.16	0.45	1.09	2.45	1.50	-1.04	1.00	0.58	0.42
73+00	248.63	249.01	3.01%	CLASS C	0.0	0.38	0.33	5	3	0.03	0.56	0.43	3.04	2.67	0.18	0.16	1.54	1.09	2.54	1.50	0.05	1.00	0.63	0.37
74+00	246.42	246.50	2.20%	CLASS C	1.0	0.08	0.18	7	26	0.03	0.18	0.69	3.60	6.85	0.05	0.10	0.18	1.09	1.59	1.50	-1.32	1.00	0.24	0.76
75+00	243.97	244.11	2.45%	CLASS C	0.0	0.14	0.23	7	14	0.03	0.22	0.59	3.09	5.07	0.07	0.12	0.29	1.09	1.85	1.50	-1.20	1.00	0.36	0.64
76+00	241.56	242.05	2.41%	CLASS C	0.0	0.49	0.32	6	3	0.03	1.10	0.49	4.63	3.08	0.24	0.16	3.24	1.09	2.25	1.50	1.74	1.00	0.49	0.51
77+00	239.22	239.49	2.34%	CLASS C	1.0	0.26	0.20	15	4	0.03	0.92	0.59	6.00	4.84	0.15	0.12	1.99	1.09	1.86	1.50	0.50	1.00	0.30	0.70
78+00	237.16	237.38	2.06%	CLASS C	0.0	0.22	0.25	14	7	0.03	0.49	0.62	4.54	5.10	0.11	0.12	0.80	1.09	1.75	1.50	-0.69	1.00	0.32	0.68
79+00	234.85	235.56	2.31%	CLASS C	0.0	0.71	0.29	6	7	0.03	3.30	0.53	9.34	3.76	0.35	0.14	12.43	1.09	2.05	1.50	10.93	1.00	0.42	0.58
80+00	232.88	233.53	1.97%	CLASS C	0.0	0.66	0.29	6	8	0.03	2.91	0.57	8.98	3.98	0.32	0.14	9.57	1.09	1.91	1.50	8.08	1.00	0.36	0.64
81+00	230.94	231.22	1.93%	CLASS C	0.0	0.28	0.24	9	14	0.03	0.90	0.65	6.42	5.48	0.14	0.12	1.67	1.09	1.67	1.50	0.17	1.00	0.29	0.71
82+00	229.16	229.47	1.78%	CLASS C	0.0	0.31	0.25	6	16	0.03	1.08	0.67	6.95	5.48	0.16	0.12	2.06	1.09	1.63	1.50	0.56	1.00	0.27	0.73
83+00	227.25	227.75	1.91%	CLASS C	0.0	0.50	0.28	6	10	0.03	1.98	0.60	7.92	4.36	0.25	0.14	5.37	1.09	1.82	1.50	3.87	1.00	0.33	0.67
84+00	225.20	225.66	2.05%	CLASS D	0.0	0.46	0.26	6	11	0.027	1.73	0.55	7.65	4.30	0.23	0.13	5.08	1.09	2.00	1.50	3.58	0.60	0.33	0.27
84+86																				1.50				
85+00																								
86+00	220.92	221.64	2.14%	CLASS D	0.0	0.72	0.20	5	8	0.027	3.45	0.26	9.71	2.67	0.36	0.10	13.94	0.44	1.71	0.45	13.49	0.60	0.26	0.34
87+00	218.88	219.16	2.03%	CLASS D	0.0	0.27	0.15	9	18	0.027	1.01	0.32	7.44	4.17	0.14	0.08	2.09	0.44	1.41	0.45	1.64	0.60	0.19	0.41
88+00	216.53	216.88	2.35%	CLASS D	0.0	0.34	0.16	6	15	0.027	1.22	0.28	7.16	3.42	0.17	0.08	3.18	0.44	1.59	0.45	2.74	0.60	0.24	0.36
88+58																				0.45				
89+00																								
90+00																								
91+00																								
92+00																								
93+00																								
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109+00	188.70	192.89	1.33%	CLASS D	0.0	4.19	0.54	1	2	0.027	23.64	0.40	14.08	1.83	1.68	0.22	211.56	0.91	2.29		211.56	0.60	0.45	0.15
109+12																				0.90				
110+00	194.63	195.29	5.93%	CLASS D	0.0	0.66	0.23	5	6	0.027	2.38	0.29	7.30	2.55	0.33	0.11	15.11	0.91	3.15	0.90	14.21	0.60	0.86	-0.26
111+00	195.78	196.13	1.15%	CLASS D	0.0	0.35	0.27	9	8	0.027	1.04	0.60	5.95	4.52	0.17	0.13	1.91	0.91	1.53	0.90	1.01	0.60	0.19	0.41
112+00	197.28	197.69	1.50%	CLASS D	0.0	0.41	0.29	7	5	0.027	1.01	0.50	5.03	3.54	0.20	0.14	2.33	0.91	1.83	0.90	1.44	0.60	0.27	0.33
112+57																				0.90				
113+00	197.95	199.09	0.66%	CLASS D	0.0	1.14	0.85	5	6	0.027	7.69	4.21	13.64	10.10	0.56	0.42	23.51	10.53	2.50	10.79	12.73	0.60	0.35	0.25
114+00	200.63	201.19	2.68%	CLASS D	0.0	0.56	0.56	12	5	0.027	2.80	2.76	10.06	9.98	0.28	0.28	10.77	10.53	3.82	10.79	-0.01	0.60	0.93	-0.33
114+87																				10.79				
115+00	202.41	203.09	1.78%	CLASS D	0.0	0.69	0.87	4	2	0.027	1.62	2.58	4.92	6.21	0.33	0.42	5.66	10.53	4.08	2.90	2.76	0.60	0.96	-0.36
115+83																				2.90				
116+00																								
116+36																				0.37				
117+00	206.53	207.12	2.06%	CLASS D	0.0	0.60	0.17	5	15	0.027	3.58	0.29	12.11	3.45	0.30	0.08	12.57	0.44	1.52	0.37	12.20	0.60	0.22	0.38
117+14																				0.37				
118+00	206.41	206.44	0.12%	CLASS D	4.0	0.03	0.11	31	7	0.027	0.15	0.67	5.23	8.20	0.03	0.08	0.03	0.24	0.36	0.37	-0.34	0.60	0.01	0.59
119+00	207.03	207.28	0.63%	CLASS D	0.0	0.25	0.17	13	7	0.027	0.62	0.29	5.05	3.45	0.12	0.08	0.66	0.24	0.83	0.37	0.29	0.60	0.07	0.53
119+45																				0.37				
120+00	206.80	207.25	0.23%	CLASS D	0.0	0.45	0.28	7	5	0.027	1.24	0.46	5.56	3.39	0.22	0.14	1.22	0.33	0.71	0.35	0.87	0.60	0.04	0.56

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

DATE: 7/28/2026 8:26:13 PM
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REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
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TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD SEGMENT 1

EXISTING WEST DITCH CALCULATIONS
2 OF 2

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		31

100% SUBMITTAL

PROPOSED EAST DITCH CALCULATIONS (5 YEAR)

STATION	FLOW LINE ELEVATION	CONTROLLING TOP DITCH ELEVATION	DITCH GRADE	LINING	FLAT BOTTOM WIDTH	DITCH DEPTH (FT)	NORMAL DEPTH (FT)	FRONT SLOPE (X:1)	BACK SLOPE (X:1)	CHANNEL n	HYDRAULIC AREA (SF)	NORMAL HA (SF)	PERIMETER P (FT)	NORMAL PERIMETER (FT)	HYD RADIUS R (FT)	NORMAL HR (FT)	DITCH CAPACITY (CFS)	NORMAL CAPACITY (CFS)	DESIGN VELOCITY (FPS)	DESIGN Q(5) (CFS)	DELTA CAPACITY CAP - DES (CFS)	ALLOW SHEAR STRESS	DESIGN SHEAR STRESS	DELTA SHEAR ALLOW - DES
10+00	271.00	0.00																						
11+00	271.82	273.16	0.82%	CLASS D	0.0	1.34	0.39	4	6	0.027	9.20	0.80	14.01	4.13	0.66	0.19	34.66	1.33	1.67	1.33	33.33	0.60	0.20	0.40
12+00	272.14	273.33	0.32%	CLASS D	0.0	1.19	0.54	4	3	0.027	5.09	1.05	8.88	4.03	0.57	0.26	10.92	1.33	1.27	1.33	9.59	0.60	0.11	0.49
13+00	272.49	273.58	0.35%	CLASS D	0.0	1.09	0.51	4	4	0.027	4.76	1.04	9.01	4.21	0.53	0.25	10.14	1.33	1.28	1.33	8.82	0.60	0.11	0.49
14+00	272.84	273.83	0.35%	CLASS D	0.0	0.99	0.51	4	4	0.027	3.91	1.04	8.14	4.19	0.48	0.25	7.80	1.33	1.28	1.33	6.47	0.60	0.11	0.49
15+00	273.04	274.03	0.20%	CLASS D	0.0	0.99	0.56	4	4	0.027	3.94	1.28	8.21	4.67	0.48	0.27	5.95	1.32	1.04	1.33	4.62	0.60	0.07	0.53
16+00	273.24	274.21	0.20%	CLASS D	0.0	0.97	0.53	4	5	0.027	4.45	1.34	9.39	5.15	0.47	0.26	6.67	1.35	1.00	1.33	5.34	0.60	0.07	0.53
17+00	273.45	274.35	0.21%	CLASS D	0.0	0.90	0.53	4	5	0.027	3.80	1.34	8.65	5.12	0.44	0.26	5.55	1.38	1.03	1.33	4.22	0.60	0.07	0.53
18+00	273.67	274.50	0.22%	CLASS D	0.0	0.83	0.53	4	5	0.027	3.22	1.32	7.94	5.09	0.41	0.26	4.56	1.39	1.05	1.33	3.23	0.60	0.07	0.53
19+00	273.88	274.65	0.21%	CLASS D	0.0	0.77	0.52	4	6	0.027	3.06	1.40	8.11	5.49	0.38	0.26	4.04	1.42	1.02	1.33	2.71	0.60	0.07	0.53
20+00	273.36	274.19	0.52%	CLASS D	0.0	0.83	0.52	4	5	0.027	3.03	1.20	7.48	4.71	0.40	0.25	6.57	1.91	1.59	1.80	4.77	0.60	0.17	0.43
21+00	272.84	273.73	0.52%	CLASS D	0.0	0.89	0.52	4	5	0.027	3.38	1.16	7.80	4.58	0.43	0.25	7.67	1.85	1.59	1.80	5.87	0.60	0.17	0.43
22+00	272.33	273.27	0.51%	CLASS D	0.0	0.94	0.51	4	5	0.027	3.88	1.16	8.47	4.64	0.46	0.25	9.06	1.82	1.56	1.80	7.26	0.60	0.16	0.44
23+00	271.81	272.82	0.52%	CLASS D	0.0	1.01	0.51	4	5	0.027	4.56	1.14	9.26	4.63	0.49	0.25	11.29	1.78	1.56	1.80	9.49	0.60	0.16	0.44
24+00	271.41	272.44	0.40%	CLASS D	0.0	1.03	0.55	4	3	0.027	4.06	1.16	8.14	4.36	0.50	0.27	8.87	1.68	1.44	1.80	7.07	0.60	0.14	0.46
25+00	271.20	272.20	0.21%	CLASS D	0.0	1.00	0.58	4	5	0.027	4.41	1.50	9.04	5.27	0.49	0.28	6.89	1.63	1.09	1.80	5.09	0.60	0.08	0.52
26+00	270.98	271.95	0.22%	CLASS D	0.0	0.97	0.59	4	5	0.027	4.17	1.53	8.82	5.34	0.47	0.29	6.54	1.72	1.12	1.80	4.74	0.60	0.08	0.52
27+00	270.77	271.70	0.21%	CLASS D	0.0	0.93	0.61	4	3	0.027	3.29	1.43	7.33	4.83	0.45	0.30	4.87	1.60	1.12	1.80	3.07	0.60	0.08	0.52
28+00	270.56	271.46	0.21%	CLASS D	0.0	0.90	0.60	4	5	0.027	3.61	1.63	8.23	5.52	0.44	0.29	5.26	1.82	1.12	1.80	3.46	0.60	0.08	0.52
29+00	270.36	271.26	0.20%	CLASS D	0.0	0.90	0.60	4	5	0.027	3.84	1.70	8.72	5.80	0.44	0.29	5.47	1.84	1.09	1.80	3.67	0.60	0.07	0.53
30+00	270.26	271.36	0.10%	CLASS D	0.0	1.10	0.71	4	5	0.027	5.47	2.27	10.19	6.57	0.54	0.35	6.29	1.95	0.86	1.80	4.49	0.60	0.04	0.56
31+00	270.16	271.43	0.10%	CLASS D	0.0	1.27	0.65	4	4	0.027	6.84	1.80	11.07	5.68	0.62	0.32	8.64	1.46	0.81	1.80	6.84	0.60	0.04	0.56
32+00	270.06	271.06	0.10%	CLASS D	0.0	1.00	0.71	4	6	0.027	4.90	2.44	10.01	7.06	0.49	0.35	5.30	2.09	0.86	1.80	3.50	0.60	0.04	0.56
33+00	269.96	270.83	0.10%	CLASS D	0.0	0.87	0.67	4	7	0.027	4.16	2.45	9.72	7.46	0.43	0.33	4.11	2.03	0.83	1.80	2.30	0.60	0.04	0.56
34+00	269.86	269.92	0.10%	CLASS D	0.0	0.06	0.55	4	102	0.027	0.19	16.20	6.36	58.63	0.03	0.28	0.03	11.96	0.74	1.80	-1.77	0.60	0.03	0.57
35+00	269.76	271.00	0.10%	CLASS D	0.0	1.24	0.74	4	5	0.027	6.97	2.50	11.51	6.90	0.61	0.36	8.68	2.22	0.89	1.80	6.88	0.60	0.05	0.55
36+00	269.66	270.91	0.10%	CLASS D	0.0	1.25	0.81	4	5	0.027	7.02	2.92	11.51	7.43	0.61	0.39	8.79	2.73	0.93	1.80	6.99	0.60	0.05	0.55
37+00	269.56	269.80	0.10%	CLASS D	0.0	0.24	0.75	4	26	0.027	0.86	8.35	7.24	22.50	0.12	0.37	0.37	7.51	0.90	1.80	-1.44	0.60	0.05	0.55
38+00	269.46	270.08	0.10%	CLASS D	0.0	0.62	0.65	4	7	0.027	2.21	2.42	7.23	7.57	0.31	0.32	1.74	1.96	0.81	1.80	-0.06	0.60	0.04	0.56
39+00	269.36	269.89	0.10%	CLASS D	0.0	0.53	0.18	4	16	0.027	2.87	0.34	10.92	3.77	0.26	0.09	2.05	0.12	0.35	0.14	1.91	0.60	0.01	0.59
40+00	269.26	270.96	0.10%	CLASS D	0.0	1.70	0.66	4	3	0.027	10.86	1.66	13.23	5.17	0.82	0.32	16.58	1.35	0.82	1.28	15.30	0.60	0.04	0.56
41+00	269.05	270.65	0.21%	CLASS D	0.0	1.60	0.45	4	3	0.027	8.73	0.69	11.40	3.21	0.77	0.22	18.44	0.63	0.91	1.28	17.16	0.60	0.06	0.54
42+00	268.50	269.61	0.55%	CLASS D	0.0	1.11	0.47	4	3	0.027	4.71	0.83	8.77	3.68	0.54	0.23	12.68	1.25	1.51	1.28	11.41	0.60	0.16	0.44
43+00	267.95	269.03	0.55%	CLASS D	0.0	1.08	0.44	4	4	0.027	5.10	0.83	9.68	3.92	0.53	0.21	13.57	1.21	1.46	1.28	12.29	0.60	0.15	0.45
44+00	267.33	267.83	0.62%	CLASS D	0.0	0.50	0.35	4	11	0.027	1.90	0.92	7.67	5.33	0.25	0.17	3.24	1.23	1.34	1.28	1.96	0.60	0.13	0.47
45+00	266.71	267.41	0.62%	CLASS D	0.0	0.70	0.37	4	9	0.027	3.12	0.89	9.03	4.81	0.35	0.18	6.64	1.24	1.40	1.28	5.36	0.60	0.14	0.46
46+00	266.09	266.75	0.62%	CLASS D	0.0	0.66	0.37	4	10	0.027	3.06	0.95	9.38	5.22	0.33	0.18	6.28	1.32	1.39	1.28	5.00	0.60	0.14	0.46
47+00	265.47	266.18	0.62%	CLASS D	0.0	0.71	0.37	4	10	0.027	3.52	0.97	10.05	5.28	0.35	0.18	7.59	1.36	1.40	1.28	6.32	0.60	0.14	0.46
48+00	264.98	265.97	0.49%	CLASS D	0.0	0.99	0.42	4	8	0.027	5.65	1.04	11.61	4.98	0.49	0.21	13.48	1.41	1.36	1.28	12.21	0.60	0.13	0.47
49+00	264.78	265.74	0.20%	CLASS D	0.0	0.96	0.50	4	7	0.027	4.94	1.33	10.47	5.44	0.47	0.24	7.36	1.28	0.96	1.28	6.08	0.60	0.06	0.54
50+00	264.58	265.51	0.20%	CLASS D	0.0	0.93	0.56	4	5	0.027	3.82	1.39	8.43	5.08	0.45	0.27	5.56	1.44	1.04	1.28	4.28	0.60	0.07	0.53
51+00	264.38	265.29	0.20%	CLASS D	0.0	0.91	0.62	4	3	0.027	2.80	1.28	6.44	4.35	0.44	0.29	3.97	1.40	1.09	1.28	2.69	0.60	0.08	0.52
52+00	261.35	264.44	3.03%	CLASS D	0.0	3.09	0.43	2	2	0.027	16.89	0.33	12.56	1.75	1.34	0.19	197.06	1.04	3.14	1.28	195.79	0.60	0.82	-0.22
53+00	263.00	264.93	1.01%	CLASS D	0.0	1.93	0.24	3	3	0.027	11.21	0.17	12.25	1.51	0.92	0.11	58.46	0.22	1.29	0.26	58.20	0.60	0.15	0.45
54+00	264.01	264.50	1.01%	CLASS A	0.0	0.49	0.16	4	12	0.04	1.87	0.19	7.72	2.47	0.24	0.08	2.72	0.13	0.68	0.26	2.46	3.70	0.10	3.60
54+08																				0.26				
55+00	264.59	265.89	0.58%	CLASS A	0.0	1.30	0.39	4	4	0.04	6.70	0.60	10.63	3.19	0.63	0.19	13.94	0.56	0.93	0.81	13.13	3.70	0.14	3.56
56+00	265.27	266.61	0.68%	CLASS A	0.0	1.34	0.45	4	3	0.04	5.93	0.68	9.27	3.13	0.64	0.22	13.50	0.75	1.10	0.81	12.69	3.70	0.19	3.51
57+00	265.94	267.33	0.67%	CLASS A	0.0	1.39	0.40	4	3	0.04	7.27	0.61	10.83	3.14	0.67	0.19	16.95	0.62	1.02	0.81	16.15	3.70	0.17	3.53
58+00	266.62	267.77	0.68%	CLASS A	0.0	1.15	0.37	4	5	0.04	5.86	0.59	10.44	3.32	0.56	0.18	12.20	0.57	0.97	0.81	11.39	3.70	0.15	3.55
59+00	267.29	268.27	0.67%	CLASS A	0.0	0.98	0.38	4	6	0.04	4.66	0.72	9.71	3.81	0.48	0.19	8.68	0.72	1.00	0.81	7.87	3.70	0.16	3.54
60+00	267.57	268.87	0.28%	CLASS A	0.0	1.30	0.53	4	5	0.04	7.54	1.25	11.89	4.84	0.63	0.26	10.94	1.00	0.80	0.81	10.13	3.70	0.09	3.61
61+00	267.61	268.61	0.04%	CLASS A	0.0	1.00	0.50	4	6	0.04	5.22	1.30	10.64	5.31	0.49	0.24	2.41	0.38	0.29	0.81	1.61	3.70	0.01	3.69
62+00	267.64	268.00	0.03%	CLASS A	0.0	0.36	0.21	4	18	0.04	1.45	0.49	8.08	4.71	0.18	0.10	0.30	0.07	0.14	0.10	0.20	3.70	0.00	3.70
62+41																				0.10				
63+00	267.55	267.89	0.09%	CLASS A	0.0	0.34	0.28	4	19	0.04	1.32	0.92	7.81	6.52	0.17	0.14	0.45	0.28	0.30	0.12	0.33	3.70	0.02	3.68
63+36																								

07/28/2026

STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER

Abbey Polzin

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

THE STATE OF TEXAS
WALLER COUNTY

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM
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TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1

EAST DITCH CALCULATIONS 1 OF 2

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		32

DATE: 7/28/2026 8:26:33 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Drainage Calculations.dwg

100% SUBMITTAL

PROPOSED EAST DITCH CALCULATIONS (5 YEAR)

STATION	FLOW LINE ELEVATION	CONTROLLING TOP DITCH ELEVATION	DITCH GRADE	LINING	FLAT BOTTOM WIDTH	DITCH DEPTH (FT)	NORMAL DEPTH (FT)	FRONT SLOPE (X:1)	BACK SLOPE (X:1)	CHANNEL n	HYDRAULIC AREA (SF)	NORMAL HA (SF)	PERIMETER P (FT)	NORMAL PERIMETER (FT)	HYD RADIUS R (FT)	NORMAL HR (FT)	DITCH CAPACITY (CFS)	NORMAL CAPACITY (CFS)	DESIGN VELOCITY (FPS)	DESIGN Q(5) (CFS)	DELTA CAPACITY CAP - DES (CFS)	ALLOW SHEAR STRESS	DESIGN SHEAR STRESS	DELTA SHEAR ALLOW - DES
64+00	267.45	268.73	0.10%	CLASS A	0.0	1.28	1.48	4	5	0.04	7.24	9.74	11.61	13.46	0.62	0.72	6.22	9.22	0.95	6.56	-0.34	3.70	0.09	3.61
65+00	267.35	268.75	0.10%	CLASS A	0.0	1.40	1.55	3	2	0.04	5.39	6.58	8.20	9.06	0.66	0.73	4.78	6.25	0.95	6.56	-1.77	3.70	0.10	3.60
66+00	266.29	267.37	1.06%	CLASS A	0.0	1.08	0.89	4	4	0.04	4.40	2.97	8.43	6.93	0.52	0.43	10.91	6.45	2.17	6.56	4.36	3.70	0.59	3.11
67+00	265.05	265.82	1.24%	CLASS A	0.0	0.77	0.73	4	9	0.04	3.93	3.51	10.36	9.79	0.38	0.36	8.54	7.34	2.09	6.56	1.98	3.70	0.56	3.14
68+00	263.82	264.76	1.23%	CLASS C	0.0	0.94	0.75	4	9	0.03	5.57	3.53	12.01	9.57	0.46	0.37	18.31	9.98	2.83	6.56	11.75	1.00	0.57	0.43
69+00	262.59	262.96	1.23%	CLASS C	0.0	0.37	0.67	4	20	0.03	1.62	5.35	8.83	16.03	0.18	0.33	2.88	14.15	2.64	6.56	-3.67	1.00	0.52	0.48
70+00	259.94	260.68	2.65%	CLASS C	0.0	0.74	0.56	4	11	0.03	4.02	2.34	10.98	8.37	0.37	0.28	16.56	8.05	3.44	6.56	10.00	1.00	0.93	0.07
71+00	256.24	256.69	3.70%	CLASS C	0.0	0.45	0.44	4	19	0.03	2.36	2.27	10.56	10.35	0.22	0.22	8.29	7.85	3.46	6.56	1.73	1.00	1.02	-0.02
72+00	252.54	253.17	3.70%	CLASS C	0.0	0.63	0.46	4	15	0.03	3.78	1.99	12.11	8.77	0.31	0.23	16.60	7.03	3.54	6.56	10.04	1.00	1.05	-0.05
73+00	249.02	249.51	3.52%	CLASS C	0.0	0.49	0.42	4	19	0.03	2.81	2.05	11.56	9.88	0.24	0.21	10.19	6.70	3.26	6.56	3.64	1.00	0.92	0.08
74+00	246.06	246.54	2.96%	CLASS C	0.0	0.48	0.46	4	15	0.03	2.24	2.08	9.40	9.06	0.24	0.23	7.33	6.63	3.19	6.56	0.77	1.00	0.85	0.15
75+00	243.09	244.48	2.97%	CLASS C	0.0	1.39	0.65	4	4	0.03	7.37	1.63	10.97	5.16	0.67	0.32	48.31	6.46	3.96	6.56	41.75	1.00	1.21	-0.21
76+00	240.22	241.92	2.87%	CLASS C	0.0	1.70	0.82	4	4	0.03	10.85	2.51	13.21	6.36	0.82	0.40	79.87	11.35	4.52	6.56	73.31	1.00	1.46	-0.46
77+00	237.76	239.36	2.46%	CLASS C	0.0	1.60	0.71	4	4	0.03	9.98	1.95	12.88	5.70	0.77	0.34	65.44	7.44	3.81	6.56	58.88	1.00	1.09	-0.09
78+00	235.31	236.80	2.45%	CLASS C	0.0	1.49	0.70	4	4	0.03	8.45	1.89	11.73	5.54	0.72	0.34	52.66	7.13	3.78	6.56	46.11	1.00	1.08	-0.08
79+00	233.21	234.77	2.10%	CLASS C	0.0	1.56	0.75	4	3	0.03	8.42	1.95	11.25	5.41	0.75	0.36	49.84	7.08	3.63	6.56	43.28	1.00	0.98	0.02
80+00	231.26	232.95	1.95%	CLASS C	0.0	1.69	0.67	4	4	0.03	11.06	1.73	13.52	5.35	0.82	0.32	66.91	5.64	3.26	6.56	60.35	1.00	0.81	0.19
81+00	229.31	230.89	1.95%	CLASS C	0.0	1.58	0.76	4	4	0.03	9.77	2.24	12.77	6.11	0.77	0.37	56.57	7.92	3.54	6.56	50.01	1.00	0.92	0.08
82+00	227.35	229.31	1.96%	CLASS C	0.0	1.96	0.59	4	3	0.03	13.97	1.28	14.79	4.47	0.94	0.29	93.30	3.83	3.01	6.56	86.75	1.00	0.72	0.28
83+00	225.31	226.97	2.04%	CLASS C	0.0	1.66	0.72	4	3	0.03	9.72	1.82	12.18	5.27	0.80	0.35	59.17	6.35	3.48	6.56	52.62	1.00	0.91	0.09
84+00	223.27	224.26	2.04%	CLASS D	0.0	0.99	0.62	4	6	0.027	4.79	1.85	9.88	6.15	0.48	0.30	23.23	6.56	3.53	6.56	16.68	0.60	0.78	-0.18
85+00	221.22	221.88	2.05%	CLASS D	0.0	0.66	0.61	4	6	0.027	2.22	1.87	6.87	6.30	0.32	0.30	8.26	6.56	3.51	6.56	1.70	0.60	0.77	-0.17
86+00	219.20	220.49	2.02%	CLASS D	0.0	1.29	0.74	4	2	0.027	5.18	1.69	8.45	4.82	0.61	0.35	29.23	6.56	3.88	6.56	22.68	0.60	0.93	-0.33
87+00	217.46	218.13	1.74%	CLASS D	0.0	0.67	0.72	4	8	0.027	2.79	3.24	8.44	9.10	0.33	0.36	9.67	11.84	3.65	6.56	3.11	0.60	0.78	-0.18
88+00	215.53	216.60	1.93%	CLASS D	0.0	1.07	0.75	4	6	0.027	5.99	2.96	11.40	8.02	0.52	0.37	29.79	11.63	3.93	6.56	23.23	0.60	0.91	-0.31
89+00	213.60	214.97	1.93%	CLASS D	0.0	1.37	0.70	4	3	0.027	6.87	1.81	10.40	5.33	0.66	0.34	39.83	6.71	3.71	6.56	33.28	0.60	0.85	-0.25
90+00	212.07	213.62	1.53%	CLASS D	0.0	1.55	0.66	4	4	0.027	9.88	1.79	13.12	5.59	0.75	0.32	55.65	5.73	3.19	6.56	49.09	0.60	0.63	-0.03
91+00	210.70	211.90	1.37%	CLASS D	0.0	1.20	0.68	4	3	0.027	5.04	1.63	8.74	4.97	0.58	0.33	22.49	4.98	3.06	6.56	15.93	0.60	0.58	0.02
92+00	209.33	210.18	1.37%	CLASS D	0.0	0.85	0.71	4	4	0.027	2.94	2.05	7.13	5.96	0.41	0.34	10.50	6.51	3.17	6.56	3.95	0.60	0.61	-0.01
93+00	207.96	208.66	1.37%	CLASS D	0.0	0.70	0.69	4	5	0.027	2.11	2.03	6.18	6.06	0.34	0.33	6.62	6.28	3.10	6.56	0.06	0.60	0.59	0.01
94+00	206.59	207.36	1.37%	CLASS D	0.0	0.77	0.71	4	4	0.027	2.37	2.02	6.34	5.85	0.37	0.34	7.91	6.40	3.17	6.56	1.35	0.60	0.61	-0.01
95+00	205.22	206.31	1.37%	CLASS D	0.0	1.09	0.70	4	4	0.027	4.76	1.94	9.00	5.75	0.53	0.34	20.06	6.08	3.13	6.56	13.50	0.60	0.60	0.00
96+00	204.03	205.27	1.19%	CLASS D	0.0	1.24	0.73	4	4	0.027	6.65	2.30	11.01	6.47	0.60	0.36	28.52	6.93	3.01	6.56	21.97	0.60	0.54	0.06
97+00	203.17	204.27	0.86%	CLASS D	0.0	1.10	0.81	5	4	0.027	5.07	2.76	9.48	6.99	0.53	0.39	17.04	7.59	2.75	6.56	10.49	0.60	0.44	0.16
98+00	202.30	203.27	0.87%	CLASS D	0.0	0.97	0.83	5	4	0.027	4.17	3.06	8.81	7.56	0.47	0.41	12.98	8.62	2.81	6.56	6.43	0.60	0.45	0.15
99+00	201.44	202.27	0.86%	CLASS D	0.0	0.83	0.68	4	3	0.027	2.30	1.54	5.78	4.74	0.40	0.33	6.33	3.73	2.41	6.56	-0.23	0.60	0.37	0.23
100+00	200.74	201.57	0.70%	CLASS D	0.0	0.83	0.85	4	4	0.027	2.86	3.01	7.09	7.27	0.40	0.41	7.19	7.70	2.56	6.56	0.63	0.60	0.37	0.23
101+00	200.09	200.97	0.65%	CLASS D	0.0	0.88	0.84	4	7	0.027	4.06	3.74	9.40	9.02	0.43	0.41	10.28	9.21	2.47	6.56	3.73	0.60	0.34	0.26
102+00	199.44	200.37	0.65%	CLASS D	0.0	0.93	0.93	4	3	0.027	3.09	3.08	6.91	6.89	0.45	0.45	8.03	7.98	2.59	6.56	1.48	0.60	0.38	0.22
103+00	198.79	199.77	0.65%	CLASS D	0.0	0.98	0.91	4	4	0.027	3.81	3.29	8.01	7.45	0.48	0.44	10.29	8.46	2.57	6.56	3.73	0.60	0.37	0.23
104+00	197.88	198.88	0.91%	CLASS D	0.0	1.00	0.84	4	4	0.027	3.83	2.67	7.91	6.61	0.48	0.40	12.38	7.68	2.87	6.56	5.83	0.60	0.47	0.13
105+00	196.73	197.72	1.15%	CLASS D	0.0	0.99	0.84	4	3	0.027	3.31	2.39	6.99	5.93	0.47	0.40	11.89	7.68	3.22	6.56	5.33	0.60	0.60	0.00
106+00	195.75	196.75	0.98%	CLASS D	0.0	1.00	0.89	4	2	0.027	3.22	2.53	6.76	5.99	0.48	0.42	10.70	7.75	3.07	6.56	4.15	0.60	0.54	0.06
107+00	195.35	196.35	0.40%	CLASS D	0.0	1.00	1.05	4	2	0.027	3.09	3.39	6.53	6.83	0.47	0.50	6.54	7.39	2.18	6.56	-0.01	0.60	0.26	0.34
108+00	194.55	196.00	0.80%	CLASS D	0.0	1.45	1.06	2	2	0.027	3.89	2.08	6.10	4.46	0.64	0.47	14.16	6.15	2.96	6.56	7.61	0.60	0.53	0.07
109+00																								
109+12																				6.56				
110+00	194.01	196.19	0.27%	CLASS D	0.0	2.18	1.19	3	2	0.027	13.68	4.04	13.31	7.24	1.03	0.56	39.83	7.84	1.94	2.06	37.77	0.60	0.20	0.40
111+00	195.16	196.59	1.15%	CLASS D	0.0	1.43	0.76	4	3	0.027	6.69	1.89	9.80	5.22	0.68	0.36	30.60	5.69	3.00	2.06	28.54	0.60	0.55	0.05
112+00	195.46	196.30	0.30%	CLASS D	0.0	0.84	0.67	4	5	0.027	3.14	2.03	7.67	6.16	0.41	0.33	5.22	2.91	1.44	2.06	3.17	0.60	0.13	0.47
113+00	197.44	197.51	1.98%	CLASS D	0.0	0.07	0.62	4	72	0.027	0.19	14.58	5.35	47.25	0.03	0.31	0.15	51.56	3.54	2.06	-1.90	0.60	0.76	-0.16
114+00	199.44	200.16	2.00%	CLASS D	0.0	0.72	0.62	4	9	0.027	3.44	2.54	9.68	8.32	0.36	0.31	13.43	8.97	3.53	2.06	11.37	0.60	0.77	-0.17
115+00	202.19	203.08	2.75%	CLASS D	0.0	0.89	0.58	4	7	0.027	4.47	1.87	10.22	6.61	0.44	0.28	23.52	7.36	3.93	2.06	21.46	0.60	0.99	-0.39
116+00																								

07/28/2026

STATE OF TEXAS
ABBEY N. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER

Abbey Polzin

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM
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TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1

EAST DITCH CALCULATIONS 2 OF 2

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		33

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100% SUBMITTAL

PROPOSED WEST DITCH CALCULATIONS (5 YEAR)

STATION	FLOW LINE ELEVATION	CONTROLLING TOP DITCH ELEVATION	DITCH GRADE	LINING	FLAT BOTTOM WIDTH	DITCH DEPTH (FT)	NORMAL DEPTH (FT)	FRONT SLOPE (X:1)	BACK SLOPE (X:1)	CHANNEL n	HYDRAULIC AREA (SF)	NORMAL HA (SF)	PERIMETER P (FT)	NORMAL PERIMETER (FT)	HYD RADIUS R (FT)	NORMAL HR (FT)	DITCH CAPACITY (CFS)	NORMAL CAPACITY (CFS)	DESIGN VELOCITY (FPS)	DESIGN Q(5) (CFS)	DELTA CAPACITY CAP - DES (CFS)	ALLOW SHEAR STRESS	DESIGN SHEAR STRESS	DELTA SHEAR ALLOW - DES
10+00	271.00	0.00																						
11+00	271.90	272.43	0.90%	CLASS D	0.0	0.53	0.58	3	10	0.027	1.83	2.15	7.01	7.61	0.26	0.28	3.90	4.85	2.25	3.67	0.23	0.60	0.32	0.28
12+00	272.13	273.29	0.23%	CLASS D	0.0	1.16	0.85	3	4	0.027	5.03	2.68	9.00	6.57	0.56	0.41	9.02	3.90	1.45	3.67	5.35	0.60	0.12	0.48
13+00	272.29	273.58	0.16%	CLASS D	0.0	1.29	0.71	3	4	0.027	5.56	1.68	9.01	4.95	0.62	0.34	8.89	1.80	1.07	3.67	5.22	0.60	0.07	0.53
14+00	272.44	273.83	0.15%	CLASS D	0.0	1.39	0.76	3	2	0.027	4.79	1.42	7.46	4.05	0.64	0.35	7.61	1.50	1.06	3.67	3.94	0.60	0.07	0.53
15+00	272.55	273.75	0.11%	CLASS D	0.0	1.20	0.74	3	3	0.027	4.53	1.73	7.92	4.89	0.57	0.35	5.70	1.58	0.91	3.67	2.03	0.60	0.05	0.55
16+00	272.66	273.53	0.11%	CLASS D	0.0	0.87	0.28	3	4	0.027	2.54	0.26	6.09	1.94	0.42	0.13	2.59	0.12	0.48	3.67	-1.08	0.60	0.02	0.58
17+00	273.30	274.35	0.64%	CLASS D	0.0	1.05	0.69	3	3	0.027	3.58	1.52	7.13	4.65	0.50	0.33	9.94	3.19	2.09	3.67	6.27	0.60	0.27	0.33
18+00	273.54	274.50	0.24%	CLASS D	0.0	0.96	0.75	3	2	0.027	2.52	1.53	5.60	4.35	0.45	0.35	4.00	2.05	1.34	3.67	0.33	0.60	0.11	0.49
19+00	274.49	274.87	0.95%	CLASS D	0.0	0.38	0.65	4	7	0.027	0.82	2.41	4.37	7.50	0.19	0.32	1.43	6.04	2.51	3.67		0.60	0.39	0.21
19+01																								
19+45	274.26	274.64	0.51%	CLASS D	0.0	0.38	0.50	4	3	0.027	0.53	0.93	2.89	3.83	0.18	0.24	0.67	1.42	1.53	1.42	-0.75	0.60	0.16	0.44
20+00	273.44	274.19	1.50%	CLASS D	0.0	0.75	0.45	4	2	0.027	1.77	0.63	4.98	2.98	0.36	0.21	6.02	1.53	2.41	1.42	4.59	0.60	0.42	0.18
21+00	273.24	273.79	0.20%	CLASS D	0.0	0.55	0.36	5	7	0.027	1.87	0.80	6.90	4.52	0.27	0.18	1.93	0.62	0.78	1.42	0.51	0.60	0.04	0.56
22+00	272.83	273.50	0.41%	CLASS D	0.0	0.67	0.41	4	7	0.027	2.53	0.96	7.67	4.72	0.33	0.20	4.25	1.17	1.22	1.42	2.82	0.60	0.11	0.49
23+00	272.31	272.82	0.52%	CLASS D	0.0	0.51	0.45	5	5	0.027	1.18	0.91	4.74	4.15	0.25	0.22	1.85	1.30	1.44	1.42	0.43	0.60	0.15	0.45
24+00	271.93	272.44	0.38%	CLASS D	0.0	0.51	0.47	4	6	0.027	1.25	1.05	5.02	4.59	0.25	0.23	1.68	1.33	1.27	1.42	0.26	0.60	0.11	0.49
25+00	271.66	272.20	0.27%	CLASS D	0.0	0.54	0.65	4	7	0.027	1.67	2.44	6.30	7.60	0.27	0.32	1.98	3.26	1.34	1.42	0.56	0.60	0.11	0.49
26+00	271.48	272.02	0.18%	CLASS D	0.0	0.54	0.68	4	7	0.027	1.57	2.50	5.91	7.46	0.27	0.33	1.51	2.81	1.13	1.42	0.09	0.60	0.08	0.52
27+00	271.30	271.83	0.18%	CLASS D	0.0	0.53	0.53	4	6	0.027	1.45	1.44	5.58	5.56	0.26	0.26	1.38	1.37	0.95	1.42	-0.04	0.60	0.06	0.54
28+00	271.12	271.64	0.18%	CLASS D	0.0	0.52	0.46	4	12	0.027	2.13	1.69	8.27	7.37	0.26	0.23	2.01	1.48	0.88	1.42	0.59	0.60	0.05	0.55
29+00	270.99	271.45	0.13%	CLASS D	0.0	0.46	0.52	4	12	0.027	1.64	2.13	7.19	8.20	0.23	0.26	1.21	1.72	0.81	1.42	-0.21	0.60	0.04	0.56
30+00	270.82	271.38	0.17%	CLASS D	0.0	0.56	0.76	4	13	0.027	2.66	4.85	9.58	12.93	0.28	0.37	2.57	5.71	1.18	1.42	1.14	0.60	0.08	0.52
31+00	270.65	271.03	0.17%	CLASS D	0.0	0.38	0.60	4	17	0.027	1.55	3.83	8.20	12.90	0.19	0.30	1.15	3.87	1.01	1.42	-0.27	0.60	0.06	0.54
31+77																				1.42				
32+00	270.48	270.56	0.17%	CLASS D	0.0	0.08	0.31	4	69	0.027	0.23	3.61	5.83	22.95	0.04	0.16	0.06	2.38	0.66	0.31	-0.25	0.60	0.03	0.57
33+00	270.37	271.10	0.11%	CLASS D	0.0	0.73	0.42	3	8	0.027	2.82	0.93	7.90	4.54	0.36	0.21	2.59	0.59	0.64	0.31	2.28	0.60	0.03	0.57
34+00	270.27	271.63	0.10%	CLASS D	0.0	1.36	0.46	3	3	0.027	5.87	0.68	9.05	3.09	0.65	0.22	7.65	0.43	0.64	0.31	7.34	0.60	0.03	0.57
34+46																				0.31				
35+00	270.17	271.27	0.10%	CLASS D	0.0	1.10	0.86	3	4	0.027	4.55	2.75	8.57	6.67	0.53	0.41	5.20	2.66	0.97	1.81	3.38	0.60	0.05	0.55
36+00	270.07	270.74	0.10%	CLASS D	0.0	0.67	0.78	3	8	0.027	2.46	3.33	7.49	8.72	0.33	0.38	2.04	3.05	0.92	1.81	0.22	0.60	0.05	0.55
37+00	269.97	270.54	0.10%	CLASS D	0.0	0.57	0.73	3	9	0.027	2.05	3.33	7.33	9.32	0.28	0.36	1.53	2.91	0.88	1.81	-0.28	0.60	0.05	0.55
38+00	269.87	270.85	0.10%	CLASS D	0.0	0.98	0.85	3	6	0.027	4.20	3.13	8.81	7.61	0.48	0.41	4.46	3.02	0.96	1.81	2.65	0.60	0.05	0.55
39+00	269.77	270.94	0.10%	CLASS D	0.0	1.17	0.82	4	2	0.027	4.11	2.01	7.44	5.21	0.55	0.39	4.82	1.86	0.92	1.81	3.00	0.60	0.05	0.55
40+00	269.67	270.83	0.10%	CLASS D	0.0	1.16	0.77	3	5	0.027	5.80	2.54	10.29	6.81	0.56	0.37	6.90	2.29	0.90	1.81	5.08	0.60	0.05	0.55
40+61																								
41+00	269.39	270.68	0.28%	CLASS D	0.0	1.29	0.47	4	4	0.027	7.37	0.97	11.72	4.25	0.63	0.23	15.77	1.05	1.09	2.79	12.97	0.60	0.08	0.52
42+00	268.51	269.64	0.88%	CLASS D	0.0	1.13	0.48	4	4	0.027	5.32	0.95	9.69	4.09	0.55	0.23	18.43	1.85	1.95	2.79	15.64	0.60	0.26	0.34
43+00	267.63	269.05	0.88%	CLASS D	0.0	1.42	0.52	4	3	0.027	6.98	0.93	10.26	3.75	0.68	0.25	27.90	1.91	2.04	2.79	25.11	0.60	0.29	0.31
43+21																				2.79				
44+00	266.99	268.06	0.64%	CLASS D	0.0	1.07	0.53	4	4	0.027	4.70	1.16	9.04	4.49	0.52	0.26	13.37	2.08	1.79	2.78	10.59	0.60	0.21	0.39
45+00	266.46	267.52	0.53%	CLASS D	0.0	1.06	0.61	4	5	0.027	5.00	1.65	9.68	5.55	0.52	0.30	12.91	2.94	1.78	2.78	10.14	0.60	0.20	0.40
46+00	265.93	266.57	0.53%	CLASS D	0.0	0.64	0.54	4	10	0.027	2.80	1.96	8.87	7.43	0.32	0.26	5.21	3.24	1.65	2.78	2.43	0.60	0.18	0.42
47+00	265.40	266.50	0.53%	CLASS D	0.0	1.10	0.59	4	7	0.027	6.38	1.82	11.82	6.31	0.54	0.29	16.95	3.18	1.75	2.78	14.17	0.60	0.19	0.41
48+00	264.98	265.97	0.42%	CLASS D	0.0	0.99	0.61	4	6	0.027	5.11	1.92	10.52	6.45	0.49	0.30	11.26	3.06	1.59	2.78	8.48	0.60	0.16	0.44
49+00	264.78	265.74	0.20%	CLASS D	0.0	0.96	0.70	4	5	0.027	4.32	2.27	9.22	6.68	0.47	0.34	6.43	2.73	1.20	2.78	3.65	0.60	0.09	0.51
50+00	264.58	265.51	0.20%	CLASS D	0.0	0.93	0.68	4	6	0.027	4.41	2.33	9.68	7.03	0.46	0.33	6.44	2.74	1.18	2.78	3.66	0.60	0.08	0.52
51+00	264.38	265.25	0.20%	CLASS D	0.0	0.87	0.63	4	8	0.027	4.69	2.44	10.94	7.90	0.43	0.31	6.56	2.75	1.13	2.78	3.78	0.60	0.08	0.52
52+00	257.55	258.34	6.83%	CLASS D	0.0	0.79	1.34	1	6	0.027	2.09	6.04	5.73	9.74	0.37	0.62	15.37	63.19	10.46	2.78	12.60	0.60	5.72	-5.12
52+25																				2.78				
53+00	261.80	263.53	4.25%	CLASS D	0.0	1.73	0.37	2	3	0.027	7.32	0.33	9.20	1.97	0.80	0.17	71.25	1.16	3.48	1.61	69.65	0.60	0.98	-0.38
54+00	264.43	265.25	2.63%	CLASS A	0.0	0.82	0.40	7	4	0.04	3.73	0.89	9.26	4.52	0.40	0.20	12.25	1.81	2.04	1.61	10.65	3.70	0.66	3.04
55+00	265.16	265.89	0.73%	CLASS A	0.0	0.73	0.49	4	7	0.04	2.82	1.28	7.87	5.31	0.36	0.24	4.51	1.58	1.23	1.61	2.90	3.70	0.22	3.48
56+00	265.89	266.61	0.73%	CLASS A	0.0	0.72	0.57	4	4	0.04	1.89	1.20	5.45	4.34	0.35	0.28	2.97	1.61	1.35	1.61	1.36	3.70	0.26	3.44
57+00	266.62	267.33	0.73%	CLASS A	0.0	0.71	0.57	4	4	0.04	1.84	1.18	5.37	4.30	0.34	0.27	2.86	1.58	1.34	1.61	1.25	3.70	0.26	3.44
58+00	267.23	268.05	0.61%	CLASS A	0.0	0.82	0.55	3	4	0.04	2.23	0.99	5.68	3.78	0.39	0.26	3.47	1.17	1.19	1.61	1.86	3.70	0.21	3.49
59+00	267.79	268.77	0.56%	CLASS A	0.0	0.98	0.53	2	4	0.04	2.89	0.84	6.23	3.37	0.46	0.25	4.82	0.93	1.11	1.61	3.21	3.70	0.19	3.51
60+00	268.05	268.87	0.26%	CLASS A	0.0	0.82	0.71	4	3	0.04	2.40	1.81	6.08	5.28	0.39	0.34	2.45	1.68	0.93	1.61	0.84	3.70	0.12	3.58
61+00	268.32	268.97	0.27%	CLASS A	0.0	0.65	0.68	4	4	0.04	1.69	1.86	5.36	5.62	0.32	0.33	1.51	1.71	0.92	1.61	-0.10	3.70	0.11	3.59
62+00	268.27	269.03	0.05%	CLASS A	0.0	0.76	0.50	4	7	0.04	3.23	1.42	8.64	5.73	0.37	0.25	1.39	0.46	0.33	1.02	0.37	3.70	0.02	3.68
63+00	267.91	269.03	0.36%	CLASS A	0.0	1.12	0.56	4	4	0.04	5.20	1.29	9.56	4.76	0.54	0.27	7.73	1.20	0.93	1.02	6.71	3.70	0.13	3.57
64+00	267.56	268.90	0.35%	CLASS A	0.0	1.34	0.54	4	3	0.04	6.81	1.12	10.52	4.26	0.65	0.26	11.21	1.00	0.90	1.02	10.18	3.70	0.12	3.58
64+76																				1.02				

07/28/2026
STATE OF TEXAS
ABBEY N. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

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REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
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TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1

WEST DITCH CALCULATIONS 1 OF 2

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		34

100% SUBMITTAL

PROPOSED WEST DITCH CALCULATIONS (5 YEAR)

STATION	FLOW LINE ELEVATION	CONTROLLING TOP DITCH ELEVATION	DITCH GRADE	LINING	FLAT BOTTOM WIDTH	DITCH DEPTH (FT)	NORMAL DEPTH (FT)	FRONT SLOPE (X:1)	BACK SLOPE (X:1)	CHANNEL n	HYDRAULIC AREA (SF)	NORMAL HA (SF)	PERIMETER P (FT)	NORMAL PERIMETER (FT)	HYD RADIUS R (FT)	NORMAL HR (FT)	DITCH CAPACITY (CFS)	NORMAL CAPACITY (CFS)	DESIGN VELOCITY (FPS)	DESIGN Q(5) (CFS)	DELTA CAPACITY CAP - DES (CFS)	ALLOW SHEAR STRESS	DESIGN SHEAR STRESS	DELTA SHEAR ALLOW - DES
65+00	267.20	268.32	0.36%	CLASS A	0.0	1.12	0.18	4	5	0.04	5.41	0.15	9.92	1.63	0.55	0.09	8.06	0.07	0.45	0.22	7.83	3.70	0.04	3.66
65+04																				0.22				
66+00	265.64	267.45	1.56%	CLASS A	0.0	1.81	0.16	4	3	0.04	10.95	0.09	12.65	1.14	0.87	0.08	46.14	0.07	0.85	0.22	45.91	3.70	0.16	3.54
66+74																				0.22				
67+00	264.08	265.39	1.56%	CLASS A	0.0	1.31	0.50	1	8	0.04	7.01	1.00	11.53	4.36	0.61	0.23	23.33	1.75	1.74		23.33	3.70	0.48	3.22
67+90																				1.46				
68+00	263.14	264.21	0.94%	CLASS C	0.0	1.07	0.14	5	5	0.03	5.43	0.10	10.38	1.38	0.52	0.07	16.95	0.08	0.81	1.46	15.49	1.00	0.08	0.92
69+00	262.21	262.47	0.93%	CLASS C	0.0	0.26	0.20	4	21	0.03	0.86	0.53	6.62	5.22	0.13	0.10	1.05	0.55	1.04	1.46	-0.41	1.00	0.12	0.88
70+00	259.67	260.85	2.54%	CLASS C	0.0	1.18	0.32	4	6	0.03	6.77	0.51	11.72	3.21	0.58	0.16	37.06	1.17	2.31	1.46	35.61	1.00	0.51	0.49
71+00	255.83	256.57	3.84%	CLASS C	0.0	0.74	0.28	4	9	0.03	3.69	0.52	10.09	3.77	0.37	0.14	18.28	1.33	2.57	1.46	16.82	1.00	0.66	0.34
72+00	252.00	252.30	3.83%	CLASS C	0.0	0.30	0.21	4	24	0.03	1.27	0.61	8.54	5.93	0.15	0.10	3.48	1.31	2.14	1.46	2.02	1.00	0.50	0.50
73+00	248.51	249.16	3.49%	CLASS C	0.0	0.65	0.28	4	12	0.03	3.27	0.62	10.17	4.44	0.32	0.14	14.21	1.55	2.50	1.46	12.75	1.00	0.62	0.38
74+00	246.08	246.68	2.43%	CLASS C	0.0	0.60	0.28	4	14	0.03	3.31	0.74	11.13	5.25	0.30	0.14	11.39	1.53	2.08	1.46	9.93	1.00	0.43	0.57
75+00	243.64	244.44	2.44%	CLASS C	0.0	0.80	0.29	4	12	0.03	5.02	0.68	12.67	4.65	0.40	0.15	20.92	1.44	2.14	1.46	19.46	1.00	0.45	0.55
76+00	241.21	241.92	2.43%	CLASS C	0.0	0.71	0.40	4	3	0.03	1.71	0.55	5.02	2.85	0.34	0.19	6.42	1.42	2.58	1.46	4.96	1.00	0.61	0.39
77+00	238.77	239.36	2.44%	CLASS C	0.0	0.59	0.39	4	3	0.03	1.20	0.54	4.24	2.83	0.28	0.19	4.00	1.37	2.55	1.46	2.54	1.00	0.60	0.40
78+00	236.34	236.80	2.43%	CLASS C	0.0	0.46	0.39	4	3	0.03	0.70	0.51	3.18	2.73	0.22	0.19	1.97	1.30	2.54	1.46	0.51	1.00	0.60	0.40
79+00	234.24	234.77	2.10%	CLASS C	0.0	0.53	0.36	4	4	0.03	1.15	0.52	4.46	3.00	0.26	0.17	3.33	1.15	2.23	1.46	1.87	1.00	0.47	0.53
80+00	232.28	232.95	1.96%	CLASS C	0.0	0.67	0.40	4	3	0.03	1.61	0.56	5.00	2.95	0.32	0.19	5.26	1.29	2.30	1.46	3.80	1.00	0.48	0.52
81+00	230.33	231.13	1.95%	CLASS C	0.0	0.80	0.39	4	3	0.03	2.30	0.54	5.98	2.89	0.39	0.19	8.43	1.22	2.26	1.46	6.97	1.00	0.47	0.53
82+00	228.38	229.31	1.95%	CLASS C	0.0	0.93	0.41	4	2	0.03	2.76	0.53	6.24	2.75	0.44	0.19	11.11	1.24	2.32	1.46	9.65	1.00	0.50	0.50
83+00	226.54	227.49	1.84%	CLASS C	0.0	0.95	0.43	4	3	0.03	3.00	0.60	6.60	2.96	0.45	0.20	11.90	1.40	2.32	1.46	10.44	1.00	0.49	0.51
84+00	224.70	225.35	1.84%	CLASS D	0.0	0.65	0.37	4	5	0.027	1.86	0.62	5.86	3.38	0.32	0.18	6.44	1.48	2.40	1.46	4.98	0.60	0.43	0.17
84+87																				1.46				
85+00	222.48	223.12	2.22%	CLASS D	0.0	0.64	0.33	4	3	0.027	1.34	0.35	4.40	2.25	0.31	0.16	5.00	0.84	2.38	0.79	4.21	0.60	0.45	0.15
86+00	220.70	221.67	1.78%	CLASS D	0.0	0.97	0.27	4	7	0.027	4.99	0.39	10.47	2.91	0.48	0.13	22.32	0.73	1.91	0.79	21.53	0.60	0.30	0.30
87+00	218.69	219.18	2.01%	CLASS D	0.0	0.49	0.24	4	12	0.027	1.93	0.48	7.97	3.96	0.24	0.12	5.87	0.91	1.90	0.79	5.08	0.60	0.31	0.29
88+00	216.67	216.89	2.02%	CLASS D	0.0	0.22	0.21	4	24	0.027	0.68	0.61	6.21	5.87	0.11	0.10	1.22	1.05	1.72	0.79	0.42	0.60	0.26	0.34
89+00																								
90+00	212.70	213.33	1.99%	CLASS D	0.0	0.63	0.28	4	7	0.027	2.17	0.43	7.02	3.13	0.31	0.14	7.71	0.90	2.07	0.79	6.91	0.60	0.35	0.25
91+00	210.77	211.75	1.93%	CLASS D	0.0	0.98	0.26	4	4	0.027	3.76	0.27	7.92	2.12	0.47	0.13	17.48	0.52	1.93	0.79	16.69	0.60	0.32	0.28
92+00	208.84	210.21	1.93%	CLASS D	0.0	1.37	0.25	4	2	0.027	6.03	0.21	9.24	1.71	0.65	0.12	34.66	0.39	1.87	0.79	33.87	0.60	0.31	0.29
92+29																				0.79				
93+00																								
93+64																								
94+00																								
95+00																								
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108+00																								
109+00																								
109+12																								
110+00																								
111+00	195.66	195.99	195.66%	CLASS D	0.0	0.33	0.37	3	3	0.027	0.33	0.42	2.09	2.37	0.16	0.18	7.32	10.23	24.31	0.88	6.43	0.60	45.68	-45.08
112+00	196.09	197.49	0.43%	CLASS D	0.0	1.40	0.33	4	3	0.027	7.05	0.38	10.45	2.44	0.67	0.16	19.55	0.40	1.05	0.88	18.67	0.60	0.09	0.51
113+00	198.18	199.17	2.09%	CLASS D	0.0	0.99	0.86	4	6	0.027	5.03	3.83	10.37	9.05	0.49	0.42	24.73	17.19	4.49	12.90	11.83	0.60	1.13	-0.53
114+00	199.78	200.77	1.60%	CLASS D	0.0	0.99	0.89	4	3	0.027	3.35	2.71	7.05	6.35	0.47	0.43	14.17	10.70	3.95	12.90	1.27	0.60	0.89	-0.29
115+00	202.21	203.33	2.43%	CLASS D	0.0	1.12	0.89	4	2	0.027	3.70	2.33	7.02	5.57	0.53	0.42	20.69	11.16	4.80	12.90	7.79	0.60	1.35	-0.75
115+83																				12.90				

07/28/2026

STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER

Abbey Polzin

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REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

THE STATE OF TEXAS
WALLER COUNTY

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
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TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1

WEST DITCH CALCULATIONS 2 OF 2

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		35

100% SUBMITTAL

CULVERT SUMMARY TABLES

PROPOSED CROSS CULVERT HYDRAULLIC SUMMARY TABLE						
CROSS CULVERT #	DA NAME	STATION	FLOW DIRECTION	PROPOSED CULVERT LENGTH (FT)	PROPOSED NO. BARRELS	PROPOSED CULVERT SIZE/ TYPE
1A	DA-1A	109+9.57	NORTHEAST	34.69	3	5' X 5' RBC
1B	DA-1B*	109+9.57	EAST	97.17	1	9' X 8' HORSESHOE PIPE
2	DA-2	52+21.61	WEST	42.62	1	36" RCP
3	DA-3	10+39.23	SOUTHWEST	37.65	1	24" RCP

* This culvert is not located within County ROW and was analyzed to determine any downstream impacts to Donahoe Creek Tributary 2.

UNIT HYDROGRAPH CROSS CULVERT HYDROLOGIC CALCULATIONS SUMMARY												
CROSS CULVERT #	DA NAME	STATION	TOTAL BASIN AREA (AC)	TOTAL BASIN AREA (MI2)	CURVE NUMBER (CN)	Tc (MIN)	PEAK FLOW (CFS)					
							2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
1.1A	DA-1.1A	N/A	319.77	0.50	67.8	35.6	401.0	629.7	838.8	1132.6	1354.3	1582.7
1.2A	DA-1.2A	N/A	332.89	0.52	69.5	40.8	403.0	626.9	829.5	1112.9	1325.8	1545.2
1.3A	DA-1.3A	N/A	174.83	0.27	73.0	28.7	301.6	447.6	576.6	752.6	881.9	1014.3
1B	DA-1B**	109+9.57	19.69	0.03	71.6	114.9	81.7	114.8	143.5	182.7	210.9	241.9

* These areas represent the sudivided drainage areas for the culvert at station 109+9.57. Routing was performed in HEC-HMS using ModPuls methodology.

** This culvert is not located within County ROW and was analyzed to determine any downstream impacts to Donahoe Creek Tributary 2.

RATIONAL METHOD CROSS CULVERT HYDROLOGIC CALCULATIONS SUMMARY																		
CROSS CULVERT #	DA NAME	STATION	TOTAL BASIN AREA (AC)	TOTAL BASIN AREA (MI2)	RUNOFF COEFFICIENT (C)	Tc (MIN)	INTENSITY (IN/ HR)						PEAK FLOW (CFS)					
							I-2YR	I-5YR	I-10YR	I-25YR	I-50YR	I-100YR	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
2	DA-2	52+21.61	3.26	0.01	0.41	63.7	2.0	2.5	2.9	3.5	4.0	4.5	2.5	3.1	3.7	4.9	6.0	7.1
3	DA-3	10+39.23	0.82	0.00	0.51	39.8	2.7	3.4	3.9	4.7	5.3	5.9	1.1	1.3	1.5	2.0	2.5	2.9

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
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PROFESSIONAL
ENGINEER
Abby Polzin

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REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
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DOUBLE CULVERT ROAD
SEGMENT 1

CULVERT SUMMARY TABLES 1 OF 2

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		36

100% SUBMITTAL

DRIVEWAY NUMBER	SIZE (IN)	UPSTREAM STATION	UPSTREAM OFFSET	UPSTREAM FLOWLINE ELEVATION	DOWNSTREAM STATION	DOWNSTREAM OFFSET	DOWNSTREAM FLOWLINE ELEVATION	LENGTH (FT)	SLOPE (%)	5-YEAR FLOW (CFS)	CAPACITY (CFS)
DWY 1	24	34+28	17.78' LT	268.59'	34+69	17.87' LT	268.55'	41	0.10%	0.300	7.07
DWY 2	24	40+42	17.09' LT	268.07'	40+77	18.23' LT	268.06'	36	0.03%	1.710	3.77
DWY 3	24	43+09	19.81' LT	266.43'	43+40	19.84' LT	266.27'	32	0.50%	2.830	16.00
DWY 4	24	66+61	20.34' LT	263.11'	66+99	20.29' LT	262.64'	39	1.22%	1.190	24.83
DWY 6	24	92+25	18.85' LT	206.79'	92+54	18.89' LT	206.23'	29	1.95%	0.680	31.44
DWY 7	24	93+54	17.94' LT	205.56'	93+85	17.01' LT	205.25'	31	1.01%	0.270	22.62
DWY 8	24	112+83	19.07' LT	196.80'	112+50	17.98' LT	196.06'	33	2.24%	13.610	33.88

07/28/2026

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ABBEY M. POLZIN
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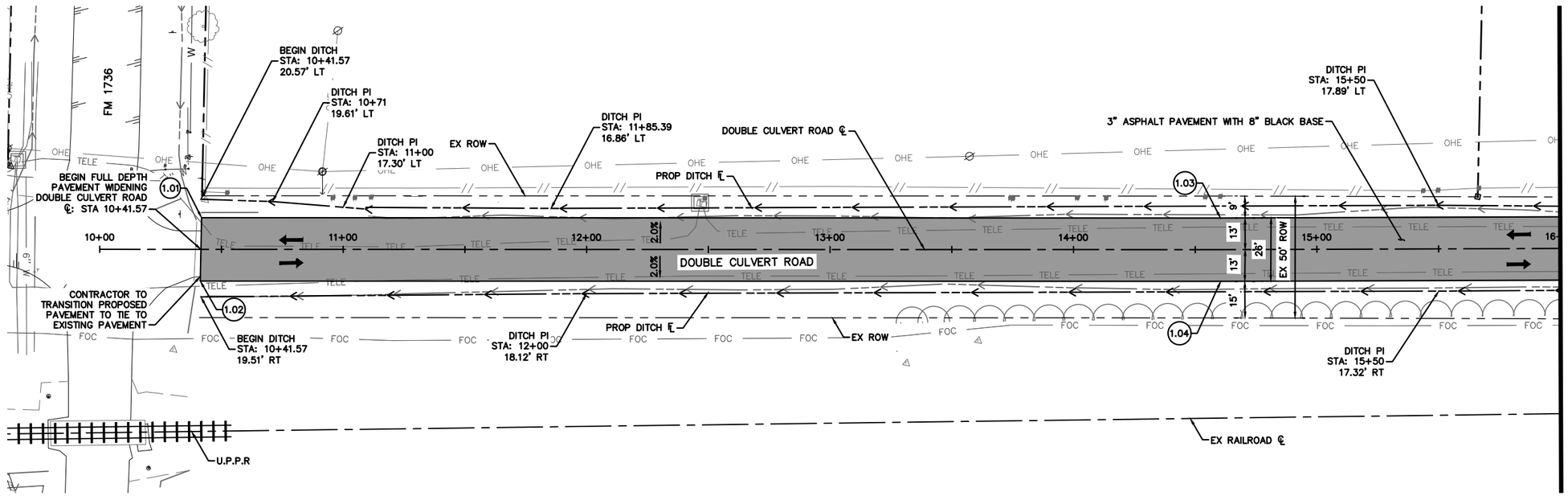
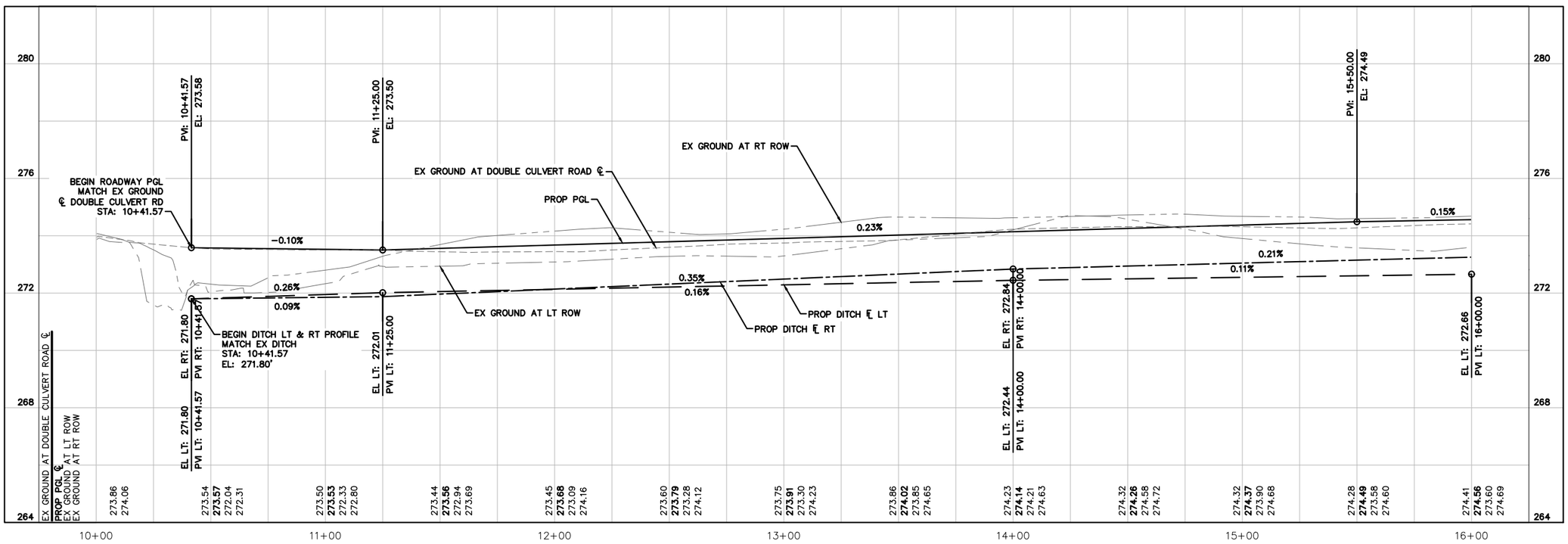
DOUBLE CULVERT ROAD
SEGMENT 1

CULVERT SUMMARY TABLES 2 OF 2

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		37

100% SUBMITTAL





GRAPHIC SCALE IN FEET
0 25 50
HORIZONTAL

NORTH

LEGEND

- EX ROW
- EX TREELINE
- TELE EX TELECOM LINE
- OHE EX OVERHEAD ELECTRIC LINE
- EX DITCH FLOW LINE
- PROP DITCH FLOW LINE
- PROP STORM SEWER
- PROP ASPHALT PAVEMENT
- PROP ASPHALT DRIVEWAY
- (XX.XX) PAVEMENT POINT SEE NOTE 5

NOTES

1. CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL IRRIGATION FACILITIES WITHIN LIMIT OF CONSTRUCTION.
2. THE EXISTENCE AND LOCATIONS OF ALL UNDERGROUND UTILITIES SHOWN ON THE DRAWINGS WERE OBTAINED FROM AVAILABLE RECORDS AND ARE APPROXIMATE. NEITHER THE OWNER NOR THE ENGINEER ASSUMES ANY RESPONSIBILITY FOR UTILITIES NOT SHOWN OR NOT IN THE LOCATION SHOWN. THE CONTRACTOR SHALL DETERMINE THE DEPTH AND LOCATION OF EXISTING UNDERGROUND UTILITIES PRIOR TO EXCAVATION AND SHALL BE REQUIRED TO TAKE ANY PRECAUTIONARY MEASURES TO PROTECT ALL LINES SHOWN AND/ OR ANY OTHER UNDERGROUND UTILITIES NOT OF RECORD OR NOT SHOWN ON THE PLANS. CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING ALL FRANCHISE AND CITY UTILITIES PRIOR TO CONSTRUCTION.
3. ELEV ARE TOP OF PAVEMENT ELEVATIONS UNLESS OTHERWISE NOTED.
4. REFER TO PAGE 57 AND 58 FOR PAVEMENT GEOMETRY POINTS.

EX	EXISTING
PROP	PROPOSED
STA	STATION
EL	ELEVATION
PI	POINT OF HORIZONTAL INFLECTION
PC	POINT OF HORIZONTAL CURVATURE
PT	POINT OF HORIZONTAL TANGENCY
PRC	POINT OF HORIZONTAL REVERSE CURVATURE
PVI	POINT OF VERTICAL INFLECTION
AD	ALGEBRAIC DIFFERENCE IN GRADES
VC	VERTICAL CURVE
BVCS/ EVCS	BEGIN/END VERTICAL CURVE STATION
BVCE/ EVCE	BEGIN/END VERTICAL CURVE ELEVATION
PGL	PROPOSED GRADE LINE AT TOP OF CURB
TCE	TEMPORARY CONSTRUCTION EASEMENT
TP	TOP OF PAVEMENT

VERTICAL 4 2 1 0

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
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REV. NO.	DATE	DESCRIPTION	BY

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TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
PAVING PLAN AND PROFILE
STA 10 00.00 TO STA 16 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		38

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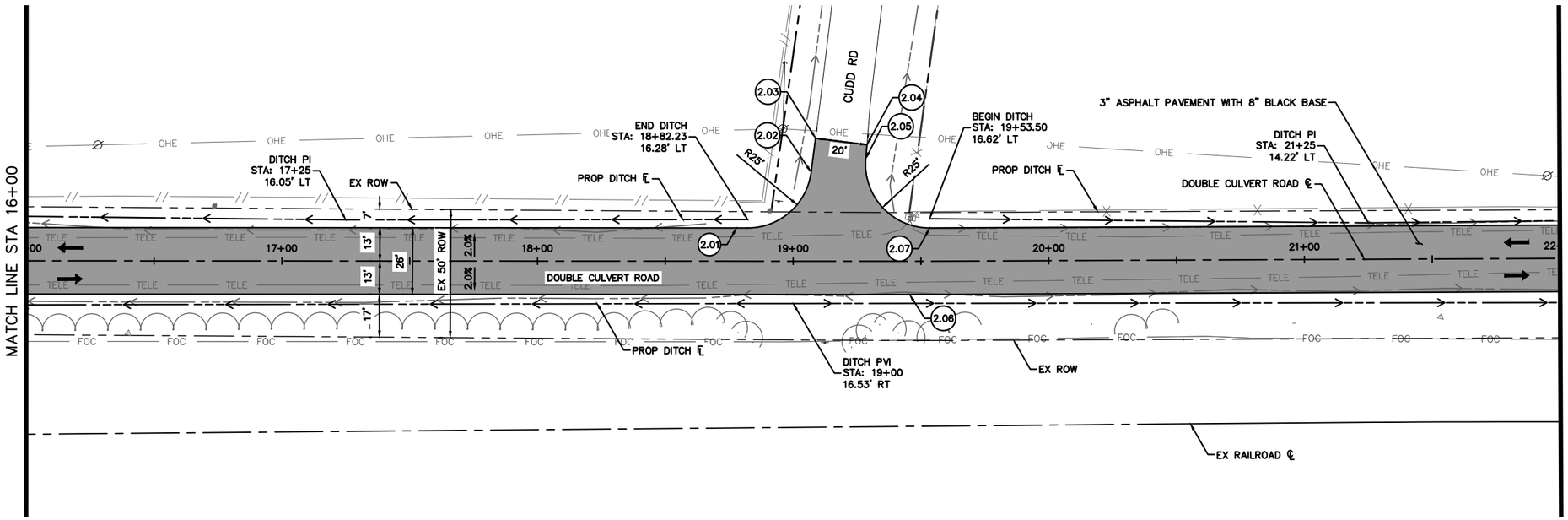

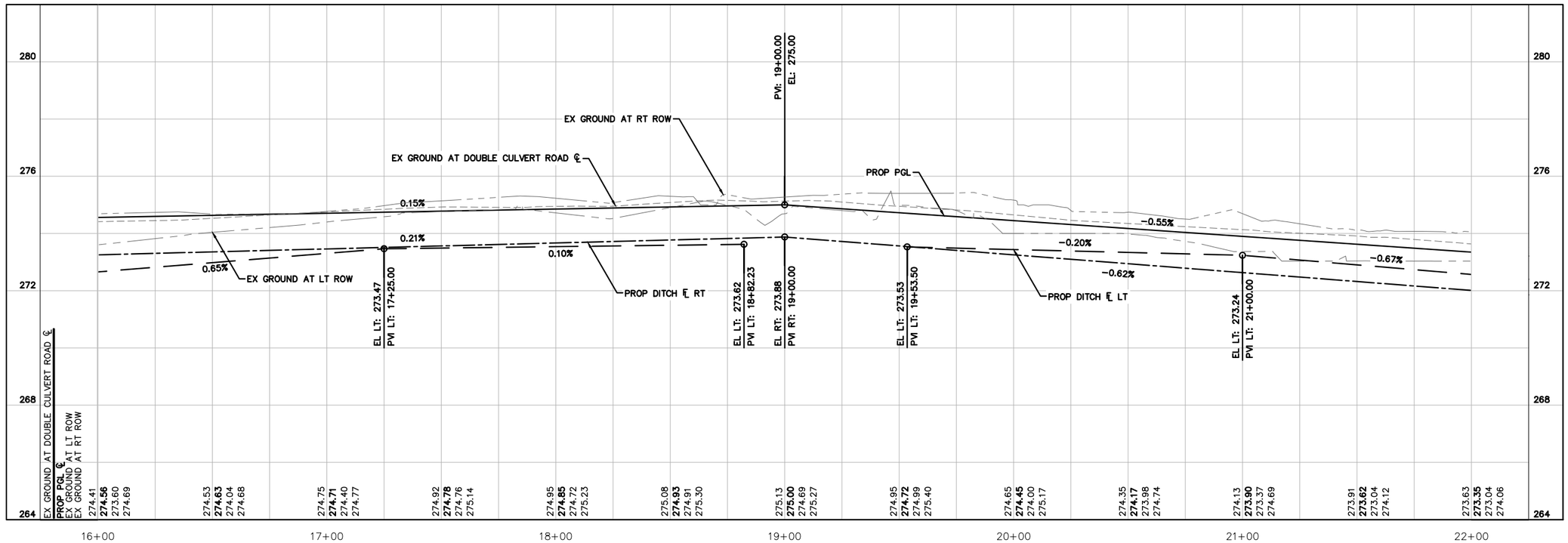

GRAPHIC SCALE IN FEET
0 25 50
HORIZONTAL

NORTH

LEGEND

- EX ROW
- EX TREELINE
- TELE — EX TELECOM LINE
- OHE — EX OVERHEAD ELECTRIC LINE
- EX DITCH FLOW LINE
- PROP DITCH FLOW LINE
- PROP STORM SEWER
- PROP ASPHALT PAVEMENT
- PROP ASPHALT DRIVEWAY
- (XX.XX) PAVEMENT POINT SEE NOTE 5

NOTES

1. CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL IRRIGATION FACILITIES WITHIN LIMIT OF CONSTRUCTION.
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3. ELEV ARE TOP OF PAVEMENT ELEVATIONS UNLESS OTHERWISE NOTED.
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EX	EXISTING
PROP	PROPOSED
STA	STATION
EL	ELEVATION
PI	POINT OF HORIZONTAL INFLECTION
PC	POINT OF HORIZONTAL CURVATURE
PT	POINT OF HORIZONTAL TANGENCY
PRC	POINT OF HORIZONTAL REVERSE CURVATURE
PVI	POINT OF VERTICAL INFLECTION
AD	ALGEBRAIC DIFFERENCE IN GRADES
VC	VERTICAL CURVE
BVCS/ EVCS	BEGIN/END VERTICAL CURVE STATION
BVCE/ EVCE	BEGIN/END VERTICAL CURVE ELEVATION
PGL	PROPOSED GRADE LINE AT TOP OF CURB
TCE	TEMPORARY CONSTRUCTION EASEMENT
TP	TOP OF PAVEMENT

VERTICAL 4 2 1 0

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

THE STATE OF TEXAS WALLER COUNTY

Kimley»Horn
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TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
PAVING PLAN AND PROFILE
STA 16 00.00 TO STA 22 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		39

DATE: 7/28/2026 8:29:54 PM
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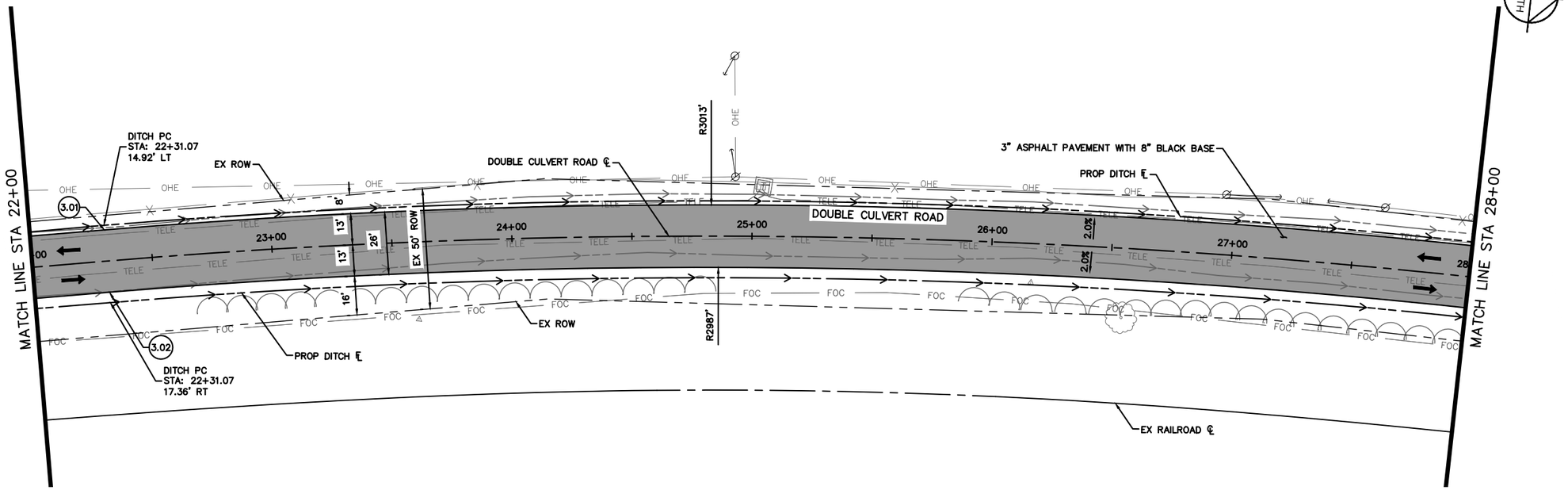

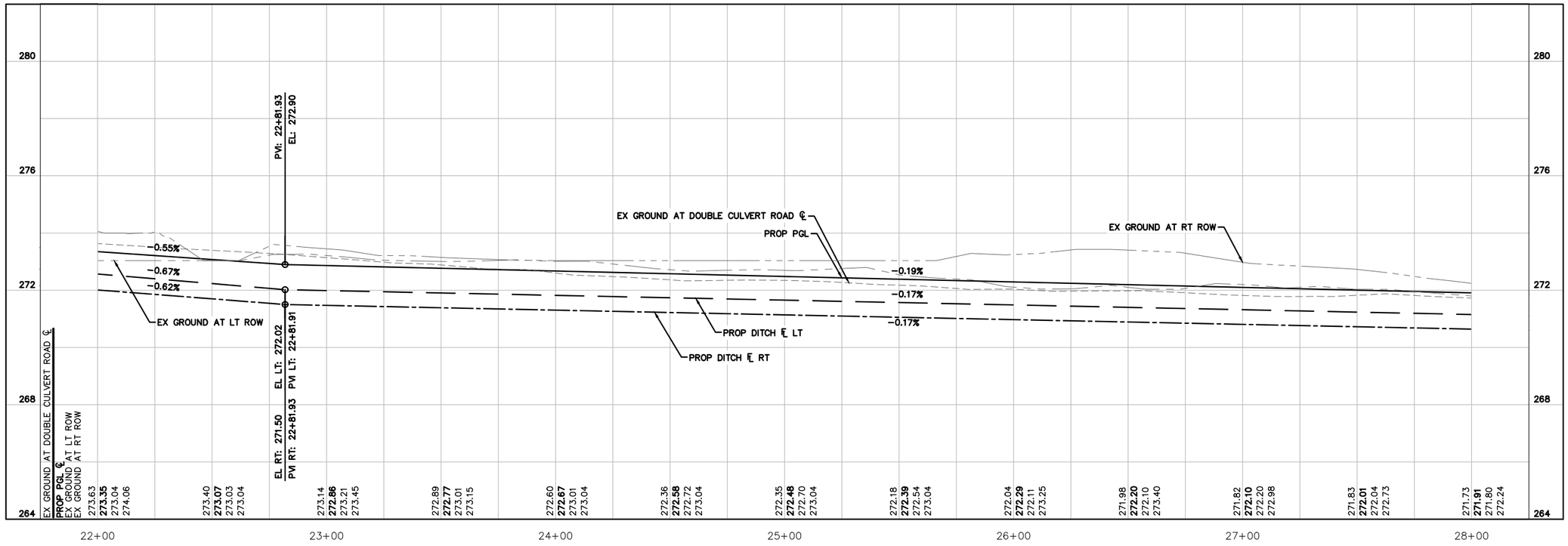

GRAPHIC SCALE IN FEET
0 25 50
HORIZONTAL

NORTH

LEGEND

- EX ROW
- EX TREELINE
- TELE — EX TELECOM LINE
- OHE — EX OVERHEAD ELECTRIC LINE
- EX DITCH FLOW LINE
- PROP DITCH FLOW LINE
- PROP STORM SEWER
- PROP ASPHALT PAVEMENT
- PROP ASPHALT DRIVEWAY
- (XX.XX) PAVEMENT POINT SEE NOTE 5

NOTES

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3. ELEV ARE TOP OF PAVEMENT ELEVATIONS UNLESS OTHERWISE NOTED.
4. REFER TO PAGE 57 AND 58 FOR PAVEMENT GEOMETRY POINTS.

EX	EXISTING
PROP	PROPOSED
STA	STATION
EL	ELEVATION
PI	POINT OF HORIZONTAL INFLECTION
PC	POINT OF HORIZONTAL CURVATURE
PT	POINT OF HORIZONTAL TANGENCY
PRC	POINT OF HORIZONTAL REVERSE CURVATURE
PVI	POINT OF VERTICAL INFLECTION
AD	ALGEBRAIC DIFFERENCE IN GRADES
VC	VERTICAL CURVE
BVCS/ EVCS	BEGIN/END VERTICAL CURVE STATION
BVCE/ EVCE	BEGIN/END VERTICAL CURVE ELEVATION
PGL	PROPOSED GRADE LINE AT TOP OF CURB
TCE	TEMPORARY CONSTRUCTION EASEMENT
TP	TOP OF PAVEMENT

VERTICAL 4 2 1 0

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL
ENGINEER

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM

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TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
PAVING PLAN AND PROFILE
STA 22 00.00 TO STA 28 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		40

DATE: 7/28/2026
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Paving Plan and Pro ile - 10 00.00 TO 34 00.00.dwg
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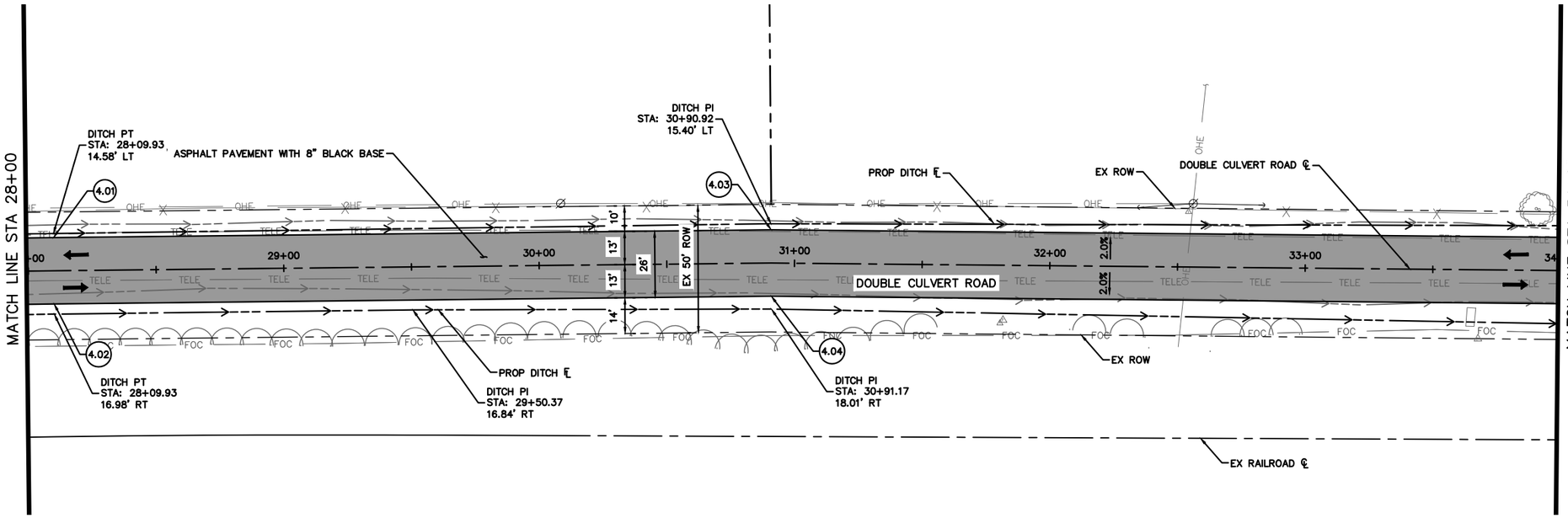

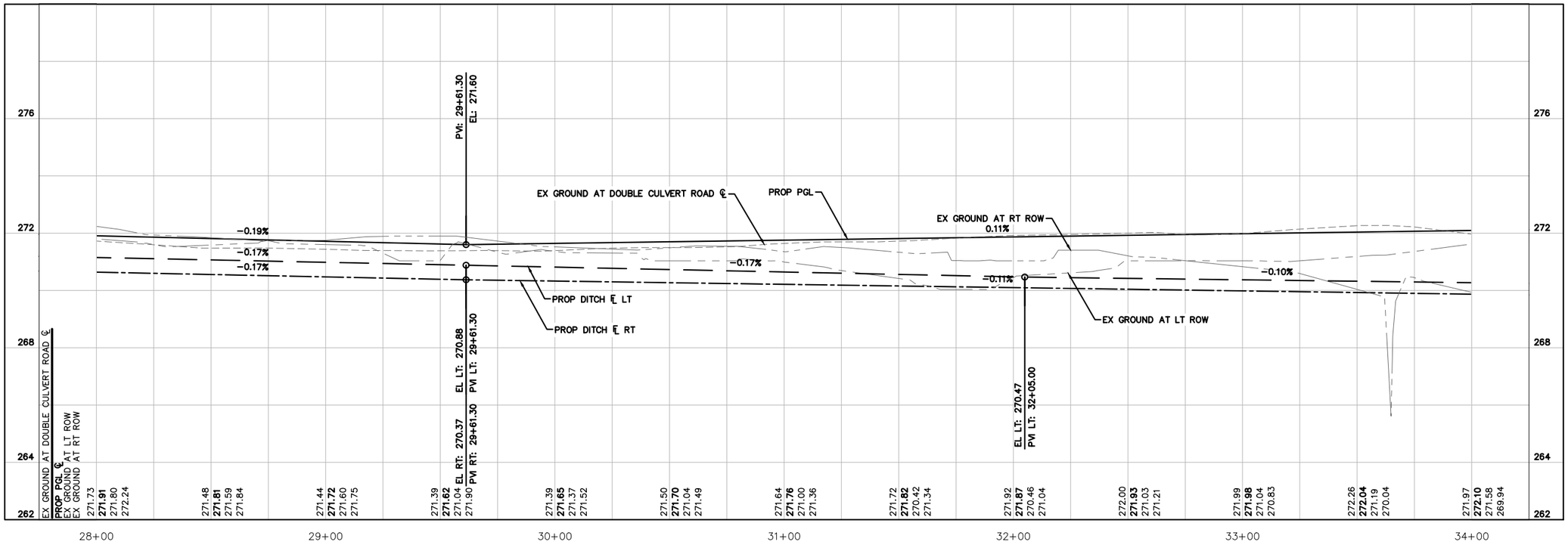

GRAPHIC SCALE IN FEET
0 25 50
HORIZONTAL

NORTH

LEGEND

- EX ROW
- EX TREELINE
- TELE — EX TELECOM LINE
- OHE — EX OVERHEAD ELECTRIC LINE
- EX DITCH FLOW LINE
- PROP DITCH FLOW LINE
- PROP STORM SEWER
- PROP ASPHALT PAVEMENT
- PROP ASPHALT DRIVEWAY
- (XX.XX) PAVEMENT POINT SEE NOTE 5

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EX	EXISTING
PROP	PROPOSED
STA	STATION
EL	ELEVATION
PI	POINT OF HORIZONTAL INFLECTION
PC	POINT OF HORIZONTAL CURVATURE
PT	POINT OF HORIZONTAL TANGENCY
PRC	POINT OF HORIZONTAL REVERSE CURVATURE
PVI	POINT OF VERTICAL INFLECTION
AD	ALGEBRAIC DIFFERENCE IN GRADES
VC	VERTICAL CURVE
BVCS/ EVCS	BEGIN/END VERTICAL CURVE STATION
BVCE/ EVCE	BEGIN/END VERTICAL CURVE ELEVATION
PGL	PROPOSED GRADE LINE AT TOP OF CURB
TCE	TEMPORARY CONSTRUCTION EASEMENT
TP	TOP OF PAVEMENT

VERTICAL 4 2 1 0

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL
ENGINEER
Abbey Polzin

DATE: 7/28/2026 8:30:30 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Paving Plan and Pro ile - 10 00.00 TO 34 00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM

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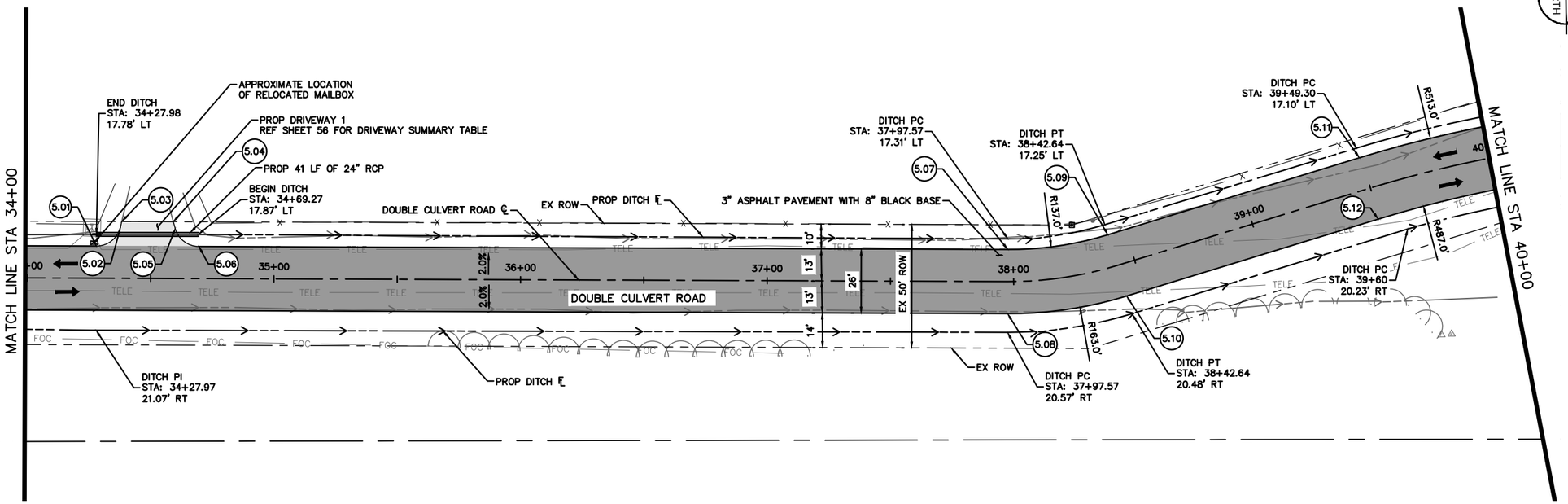
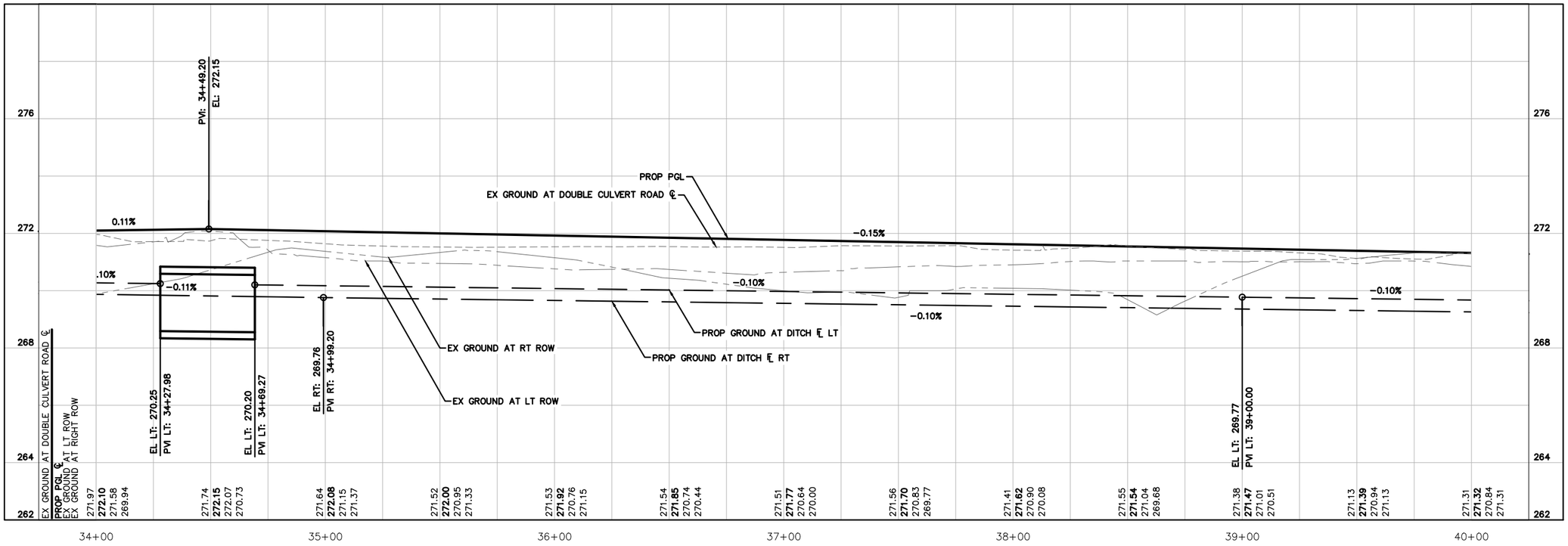
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
PAVING PLAN AND PROFILE
STA 28 00.00 TO STA 34 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		41

100% SUBMITTAL





NORTH

GRAPHIC SCALE IN FEET
0 25 50
HORIZONTAL

LEGEND

- EX ROW
- EX TREELINE
- TELE — EX TELECOM LINE
- OHE — EX OVERHEAD ELECTRIC LINE
- EX DITCH FLOW LINE
- PROP DITCH FLOW LINE
- PROP STORM SEWER
- PROP ASPHALT PAVEMENT
- PROP ASPHALT DRIVEWAY
- (XX.XX) PAVEMENT POINT SEE NOTE 5

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EX	EXISTING
PROP	PROPOSED
STA	STATION
EL	ELEVATION
PI	POINT OF HORIZONTAL INFLECTION
PC	POINT OF HORIZONTAL CURVATURE
PT	POINT OF HORIZONTAL TANGENCY
PRC	POINT OF HORIZONTAL REVERSE CURVATURE
PVI	POINT OF VERTICAL INFLECTION
AD	ALGEBRAIC DIFFERENCE IN GRADES
VC	VERTICAL CURVE
BVCS/ EVCS	BEGIN/END VERTICAL CURVE STATION
BVCE/ EVCE	BEGIN/END VERTICAL CURVE ELEVATION
PGL	PROPOSED GRADE LINE AT TOP OF CURB
TCE	TEMPORARY CONSTRUCTION EASEMENT
TP	TOP OF PAVEMENT

VERTICAL 4 2 1 0

07/28/2026
STATE OF TEXAS
ABBEY N. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM

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TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD SEGMENT 1
PAVING PLAN AND PROFILE
STA 34 00.00 TO STA 40 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		42

DATE: 7/28/2026 8:31:35 PM
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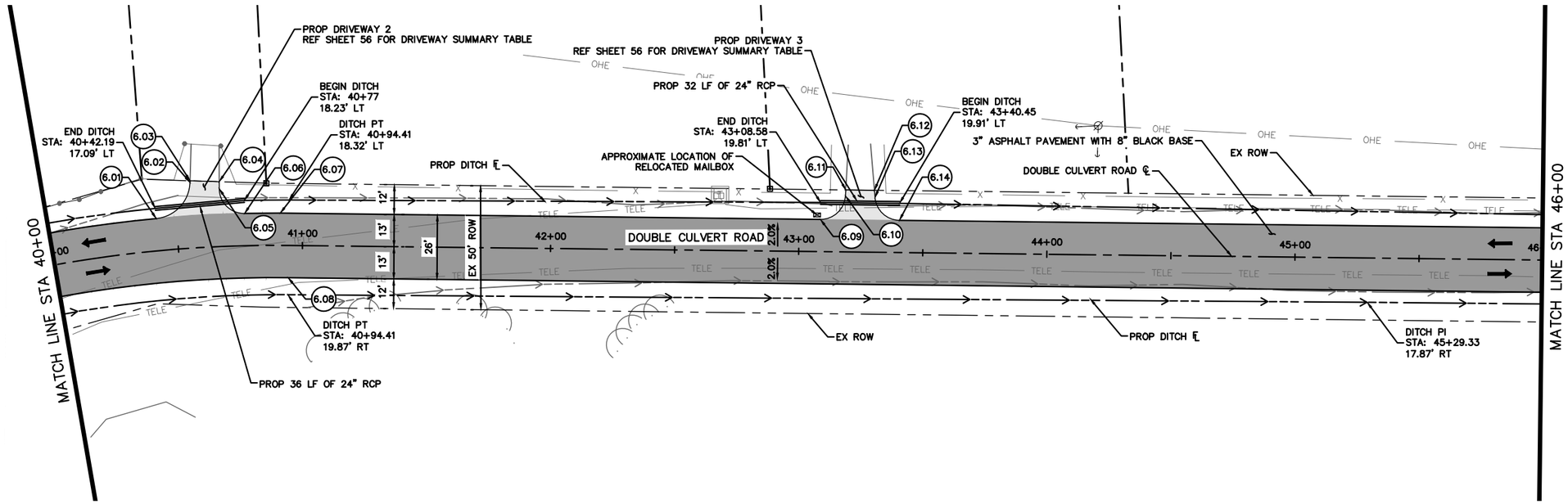

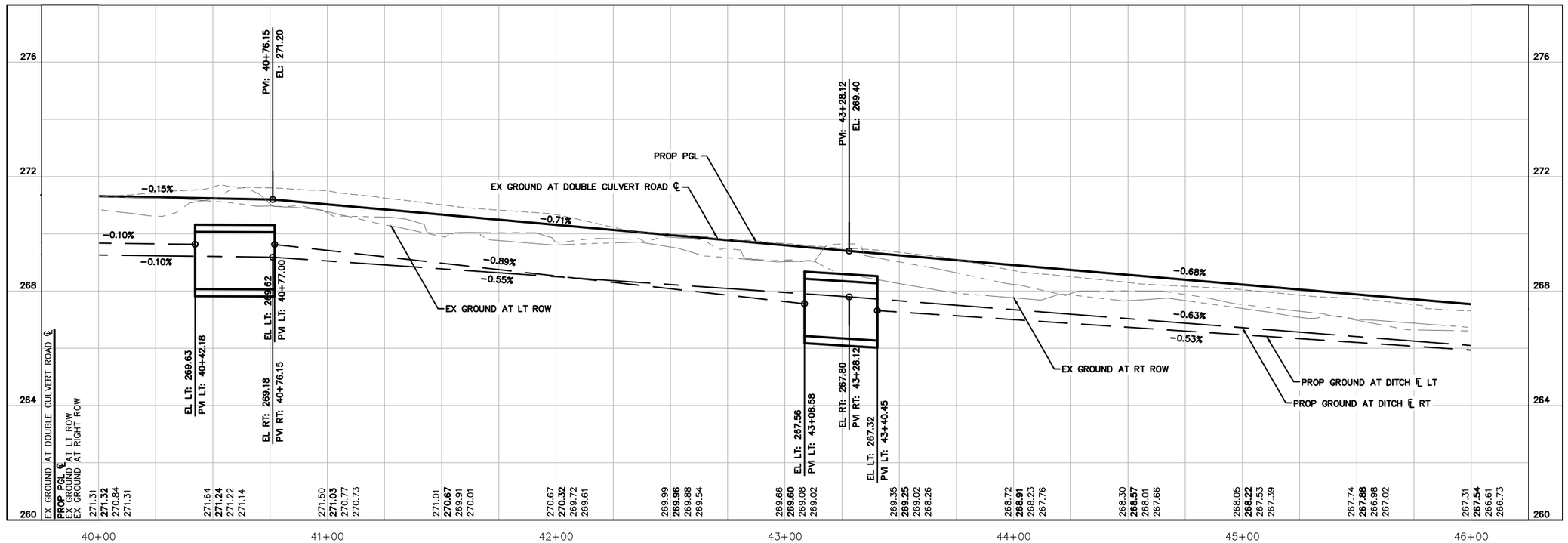

GRAPHIC SCALE IN FEET
0 25 50
HORIZONTAL

NORTH

LEGEND

- EX ROW
- EX TREELINE
- TELE — EX TELECOM LINE
- OHE — EX OVERHEAD ELECTRIC LINE
- EX DITCH FLOW LINE
- PROP DITCH FLOW LINE
- PROP STORM SEWER
- PROP ASPHALT PAVEMENT
- PROP ASPHALT DRIVEWAY
- (XX.XX) PAVEMENT POINT SEE NOTE 5

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EX	EXISTING
PROP	PROPOSED
STA	STATION
EL	ELEVATION
PI	POINT OF HORIZONTAL INFLECTION
PC	POINT OF HORIZONTAL CURVATURE
PT	POINT OF HORIZONTAL TANGENCY
PRC	POINT OF HORIZONTAL REVERSE CURVATURE
PVI	POINT OF VERTICAL INFLECTION
AD	ALGEBRAIC DIFFERENCE IN GRADES
VC	VERTICAL CURVE
BVCS/ EVCS	BEGIN/END VERTICAL CURVE STATION
BVCE/ EVCE	BEGIN/END VERTICAL CURVE ELEVATION
PGL	PROPOSED GRADE LINE AT TOP OF CURB
TCE	TEMPORARY CONSTRUCTION EASEMENT
TP	TOP OF PAVEMENT

VERTICAL 4 2 1 0

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

THE STATE OF TEXAS
WALLER COUNTY

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM

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TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
PAVING PLAN AND PROFILE
STA 40 00.00 TO STA 46 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		43

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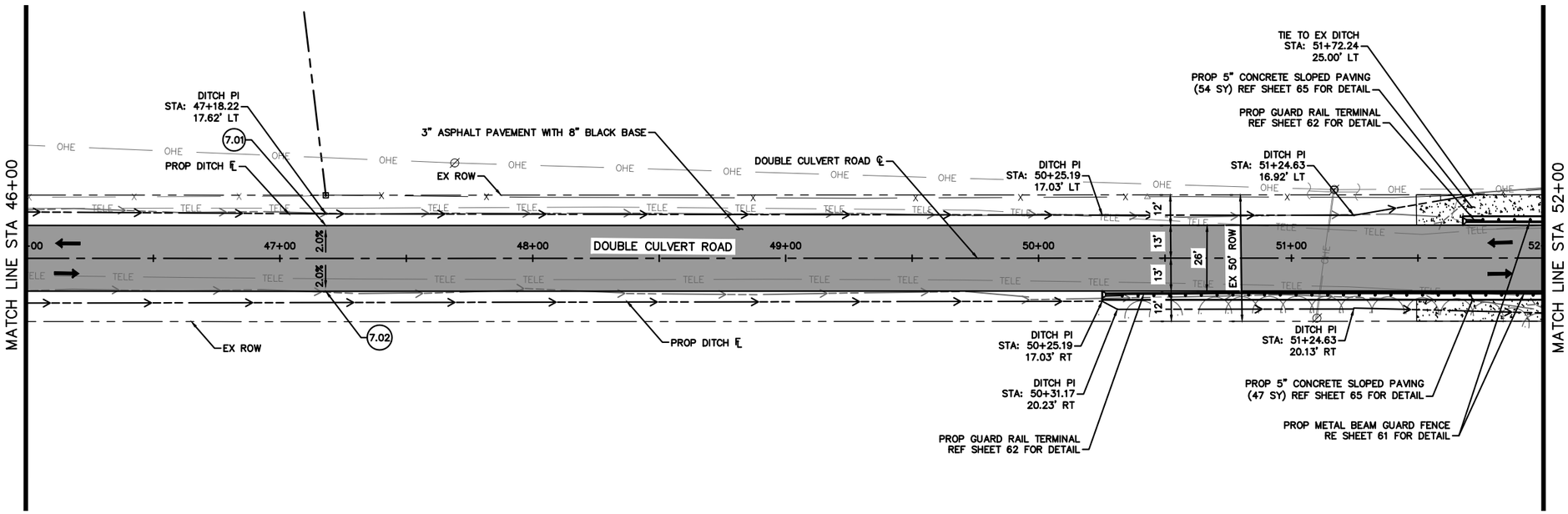

NORTH

GRAPHIC SCALE IN FEET
0 25 50
HORIZONTAL

LEGEND

- EX ROW
- EX TREELINE
- TELE — EX TELECOM LINE
- OHE — EX OVERHEAD ELECTRIC LINE
- EX DITCH FLOW LINE
- PROP DITCH FLOW LINE
- PROP STORM SEWER
- PROP ASPHALT PAVEMENT
- PROP ASPHALT DRIVEWAY
- (XX.XX) PAVEMENT POINT SEE NOTE 5

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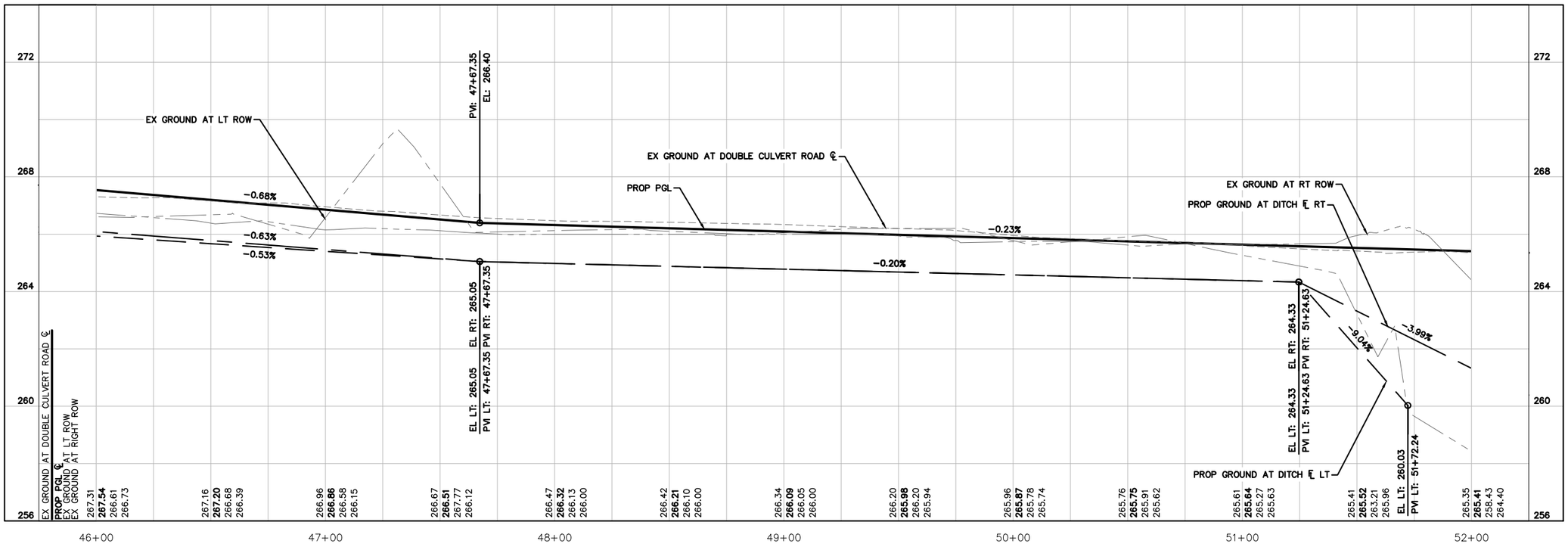

EX	EXISTING
PROP	PROPOSED
STA	STATION
EL	ELEVATION
PI	POINT OF HORIZONTAL INFLECTION
PC	POINT OF HORIZONTAL CURVATURE
PT	POINT OF HORIZONTAL TANGENCY
PRC	POINT OF HORIZONTAL REVERSE CURVATURE
PVI	POINT OF VERTICAL INFLECTION
AD	ALGEBRAIC DIFFERENCE IN GRADES
VC	VERTICAL CURVE
BVCS/ EVCS	BEGIN/END VERTICAL CURVE STATION
BVCE/ EVCE	BEGIN/END VERTICAL CURVE ELEVATION
PGL	PROPOSED GRADE LINE AT TOP OF CURB
TCE	TEMPORARY CONSTRUCTION EASEMENT
TP	TOP OF PAVEMENT

VERTICAL 4 2 1 0

07/28/2026
STATE OF TEXAS
ABBEY N. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

THE STATE OF TEXAS WALLER COUNTY

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM

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TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
PAVING PLAN AND PROFILE
STA 46 00.00 TO STA 52 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		44

DATE: 7/28/2026 8:32:15 PM
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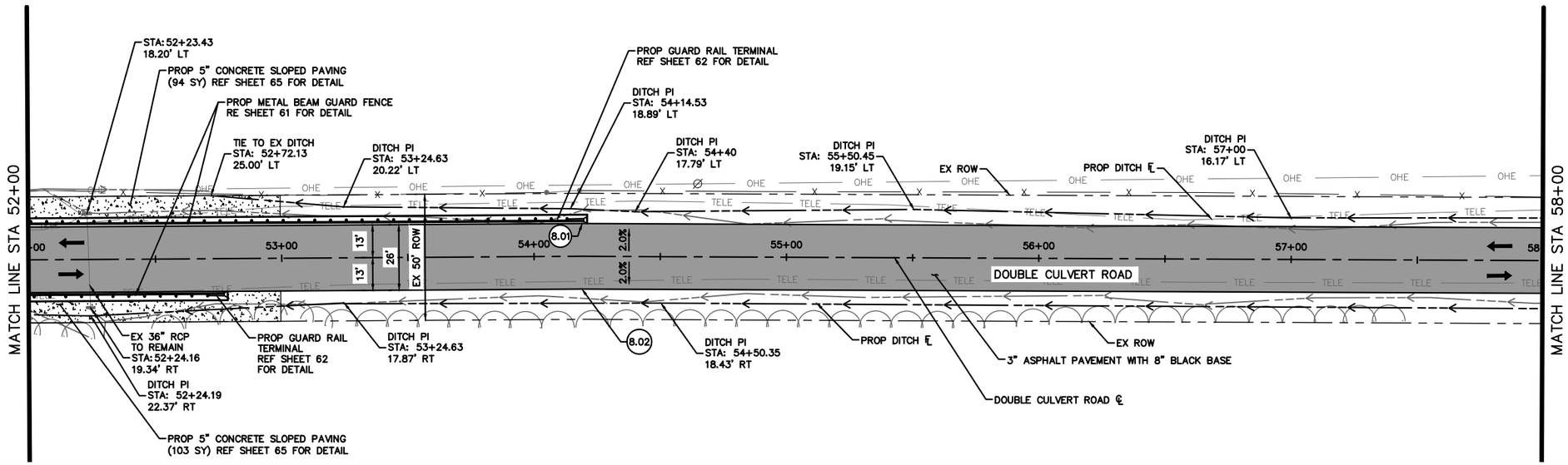

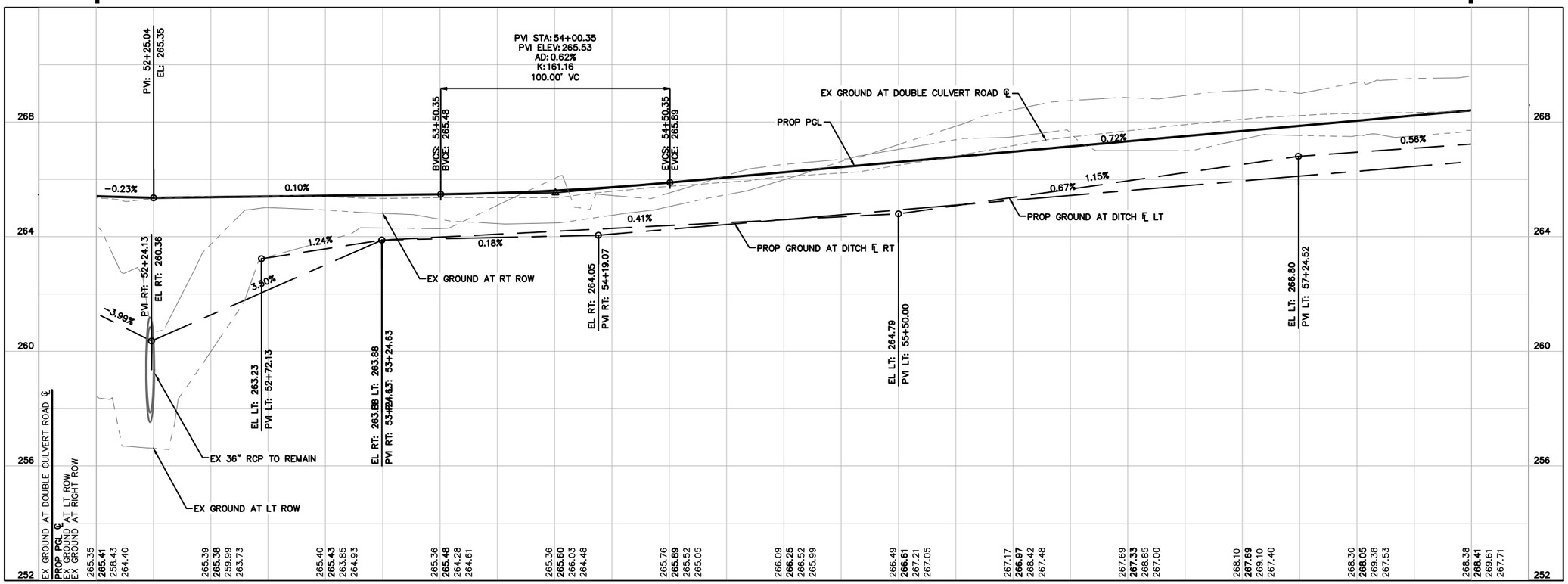



GRAPHIC SCALE IN FEET
0 25 50
HORIZONTAL

LEGEND

- EX ROW
- EX TREELINE
- TELE — EX TELECOM LINE
- OHE — EX OVERHEAD ELECTRIC LINE
- EX DITCH FLOW LINE
- PROP DITCH FLOW LINE
- PROP STORM SEWER
- PROP ASPHALT PAVEMENT
- PROP ASPHALT DRIVEWAY
- (XX.XX) PAVEMENT POINT SEE NOTE 5

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EX	EXISTING
PROP	PROPOSED
STA	STATION
EL	ELEVATION
PI	POINT OF HORIZONTAL INFLECTION
PC	POINT OF HORIZONTAL CURVATURE
PT	POINT OF HORIZONTAL TANGENCY
PRC	POINT OF HORIZONTAL REVERSE CURVATURE
PVI	POINT OF VERTICAL INFLECTION
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VC	VERTICAL CURVE
BVCS/ EVCS	BEGIN/END VERTICAL CURVE STATION
BVCE/ EVCE	BEGIN/END VERTICAL CURVE ELEVATION
PGL	PROPOSED GRADE LINE AT TOP OF CURB
TCE	TEMPORARY CONSTRUCTION EASEMENT
TP	TOP OF PAVEMENT

VERTICAL 4 2 1 0

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

DATE: 7/28/2026 8:32:34 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Paving Plan and Pro Ile - 34_00.00 TO 58_00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM
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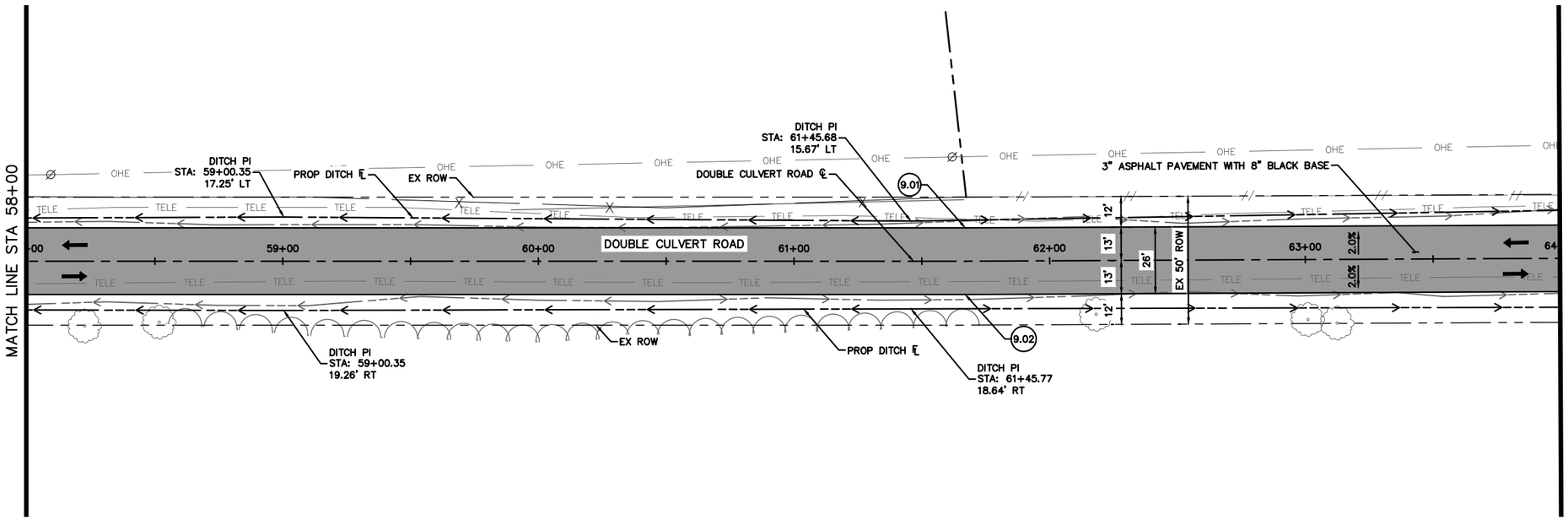
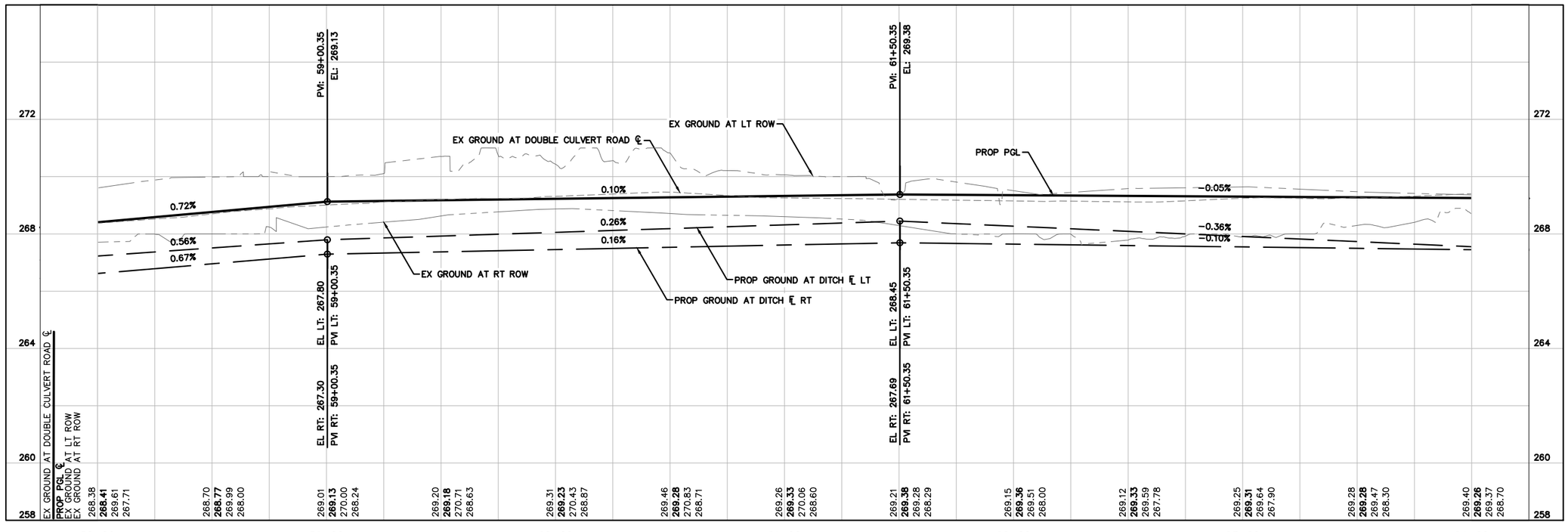
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
PAVING PLAN AND PROFILE
STA 52 00.00 TO STA 58 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		45

100% SUBMITTAL





NORTH

GRAPHIC SCALE IN FEET
0 25 50
HORIZONTAL

LEGEND

- EX ROW
- EX TREELINE
- TELE — EX TELECOM LINE
- OHE — EX OVERHEAD ELECTRIC LINE
- EX DITCH FLOW LINE
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PROP	PROPOSED
STA	STATION
EL	ELEVATION
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PT	POINT OF HORIZONTAL TANGENCY
PRC	POINT OF HORIZONTAL REVERSE CURVATURE
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BVCE/ EVCE	BEGIN/END VERTICAL CURVE ELEVATION
PGL	PROPOSED GRADE LINE AT TOP OF CURB
TCE	TEMPORARY CONSTRUCTION EASEMENT
TP	TOP OF PAVEMENT

VERTICAL 4 2 1 0

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL
ENGINEER
Abby Polzin

DATE: 7/28/2026 8:33:31 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Paving Plan and Pro ile - 58 00.00 TO 82 00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM
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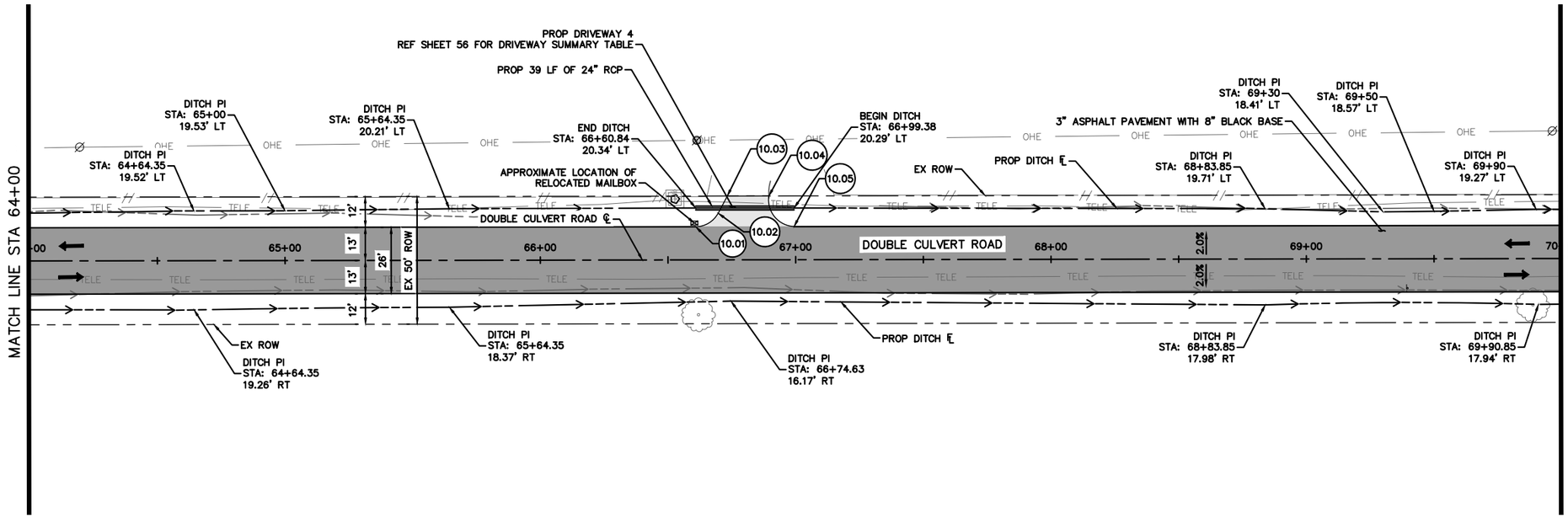
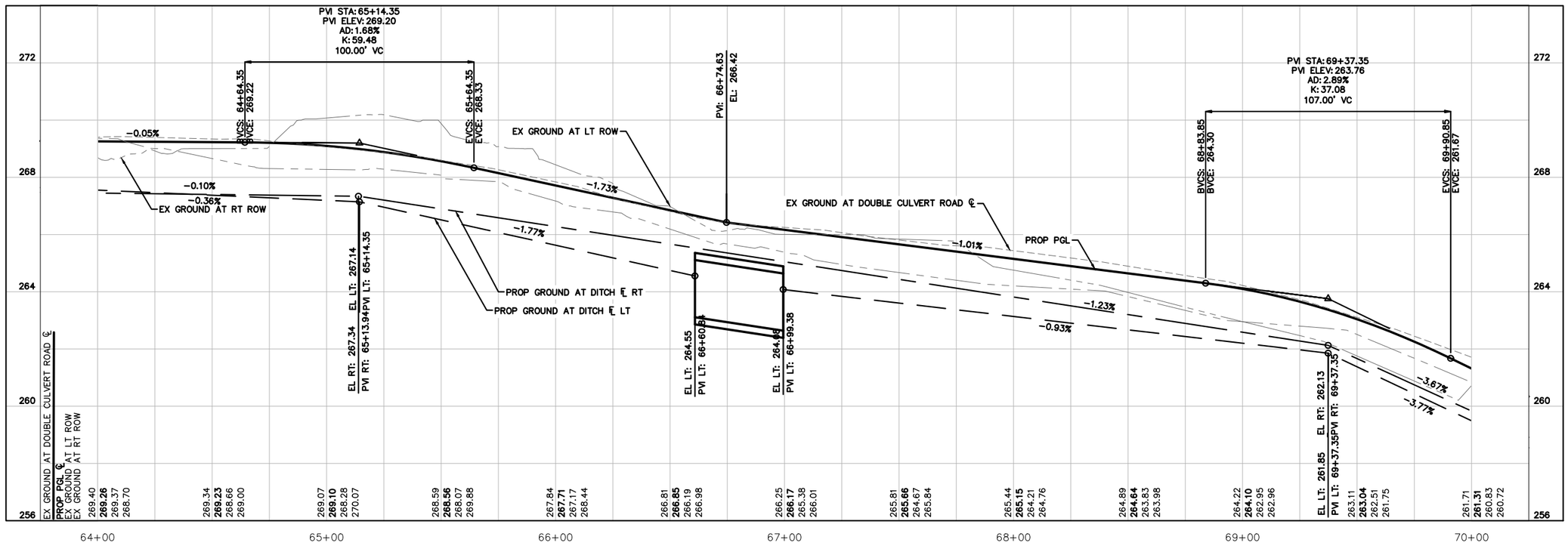
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
PAVING PLAN AND PROFILE
STA 58 00.00 TO STA 64 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		46

100% SUBMITTAL







GRAPHIC SCALE IN FEET
0 25 50
HORIZONTAL

LEGEND

- EX ROW
- EX TREELINE
- TELE — EX TELECOM LINE
- OHE — EX OVERHEAD ELECTRIC LINE
- EX DITCH FLOW LINE
- PROP DITCH FLOW LINE
- PROP STORM SEWER
- PROP ASPHALT PAVEMENT
- PROP ASPHALT DRIVEWAY
- (XX.XX) PAVEMENT POINT SEE NOTE 5

NOTES

1. CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL IRRIGATION FACILITIES WITHIN LIMIT OF CONSTRUCTION.
2. THE EXISTENCE AND LOCATIONS OF ALL UNDERGROUND UTILITIES SHOWN ON THE DRAWINGS WERE OBTAINED FROM AVAILABLE RECORDS AND ARE APPROXIMATE. NEITHER THE OWNER NOR THE ENGINEER ASSUMES ANY RESPONSIBILITY FOR UTILITIES NOT SHOWN OR NOT IN THE LOCATION SHOWN. THE CONTRACTOR SHALL DETERMINE THE DEPTH AND LOCATION OF EXISTING UNDERGROUND UTILITIES PRIOR TO EXCAVATION AND SHALL BE REQUIRED TO TAKE ANY PRECAUTIONARY MEASURES TO PROTECT ALL LINES SHOWN AND/ OR ANY OTHER UNDERGROUND UTILITIES NOT OF RECORD OR NOT SHOWN ON THE PLANS. CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING ALL FRANCHISE AND CITY UTILITIES PRIOR TO CONSTRUCTION.
3. ELEV ARE TOP OF PAVEMENT ELEVATIONS UNLESS OTHERWISE NOTED.
4. REFER TO PAGE 57 AND 58 FOR PAVEMENT GEOMETRY POINTS.

EX	EXISTING
PROP	PROPOSED
STA	STATION
EL	ELEVATION
PI	POINT OF HORIZONTAL INFLECTION
PC	POINT OF HORIZONTAL CURVATURE
PT	POINT OF HORIZONTAL TANGENCY
PRC	POINT OF HORIZONTAL REVERSE CURVATURE
PVI	POINT OF VERTICAL INFLECTION
AD	ALGEBRAIC DIFFERENCE IN GRADES
VC	VERTICAL CURVE
BVCS/ EVCS	BEGIN/END VERTICAL CURVE STATION
BVCE/ EVCE	BEGIN/END VERTICAL CURVE ELEVATION
PGL	PROPOSED GRADE LINE AT TOP OF CURB
TCE	TEMPORARY CONSTRUCTION EASEMENT
TP	TOP OF PAVEMENT

VERTICAL 4 2 1 0

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL
ENGINEER
Abbey Polzin

DATE: 7/28/2026 8:33:49 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Paving Plan and Pro ile - 58_00.00 TO 82_00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM
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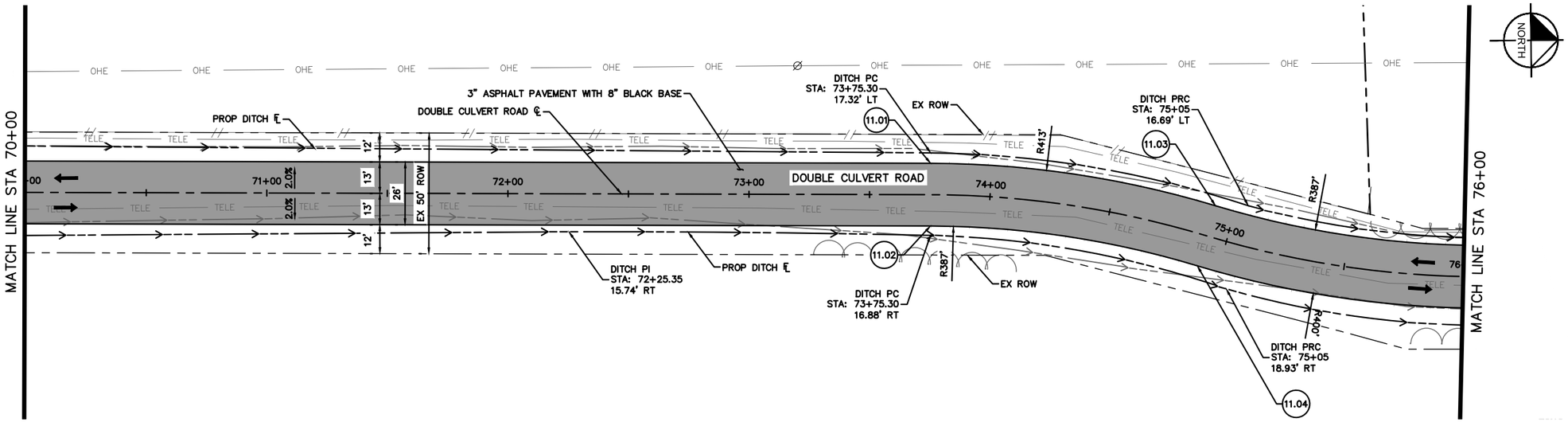
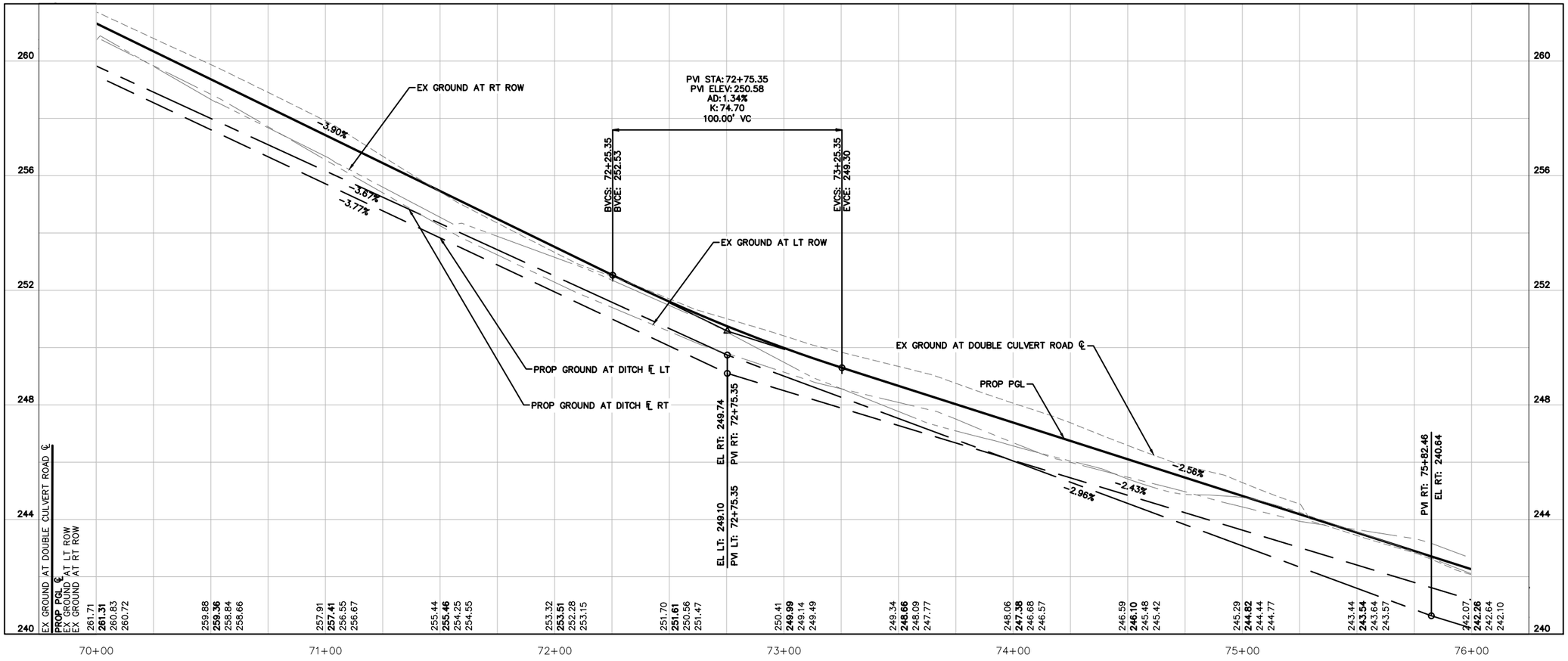
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
PAVING PLAN AND PROFILE
STA 64 00.00 TO STA 70 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		47

100% SUBMITTAL





EX GROUND AT DOUBLE CULVERT ROAD ℄	PROP PGL ℄	EX GROUND AT LT ROW	EX GROUND AT RT ROW
			261.71
			261.31
			260.83
			260.72
			259.88
			259.36
			258.84
			258.66
			257.91
			257.41
			256.55
			256.67
			255.44
			255.46
			254.25
			254.55
			253.32
			253.51
			252.28
			253.15
			251.70
			251.61
			250.56
			251.47
			250.41
			249.99
			249.14
			249.49
			249.34
			248.66
			248.09
			247.77
			248.06
			247.38
			246.68
			246.57
			246.59
			246.10
			245.48
			245.42
			245.29
			244.82
			244.44
			244.77
			243.44
			243.54
			243.64
			243.57
			242.07
			242.26
			242.64
			242.10

GRAPHIC SCALE IN FEET
0 25 50
HORIZONTAL

NORTH

LEGEND

- EX ROW
- EX TREELINE
- TELE — EX TELECOM LINE
- OHE — EX OVERHEAD ELECTRIC LINE
- EX DITCH FLOW LINE
- PROP DITCH FLOW LINE
- PROP STORM SEWER
- PROP ASPHALT PAVEMENT
- PROP ASPHALT DRIVEWAY
- (XX.XX) PAVEMENT POINT SEE NOTE 5

NOTES

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4. REFER TO PAGE 57 AND 58 FOR PAVEMENT GEOMETRY POINTS.

EX	EXISTING
PROP	PROPOSED
STA	STATION
EL	ELEVATION
PI	POINT OF HORIZONTAL INFLECTION
PC	POINT OF HORIZONTAL CURVATURE
PT	POINT OF HORIZONTAL TANGENCY
PRC	POINT OF HORIZONTAL REVERSE CURVATURE
PVI	POINT OF VERTICAL INFLECTION
AD	ALGEBRAIC DIFFERENCE IN GRADES
VC	VERTICAL CURVE
BVCS/ EVCS	BEGIN/END VERTICAL CURVE STATION
BVCE/ EVCE	BEGIN/END VERTICAL CURVE ELEVATION
PGL	PROPOSED GRADE LINE AT TOP OF CURB
TCE	TEMPORARY CONSTRUCTION EASEMENT
TP	TOP OF PAVEMENT

VERTICAL 4 2 1 0

STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
07/28/2026
Abbey Polzin

REV. NO.	DATE	DESCRIPTION	BY

DATE: 7/28/2026 8:34:08 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Paving Plan and Pro ile - 58_00.00 TO 82_00.00.dwg

WALLER COUNTY
ENGINEERING DEPARTMENT

THE STATE OF TEXAS WALLER COUNTY

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM
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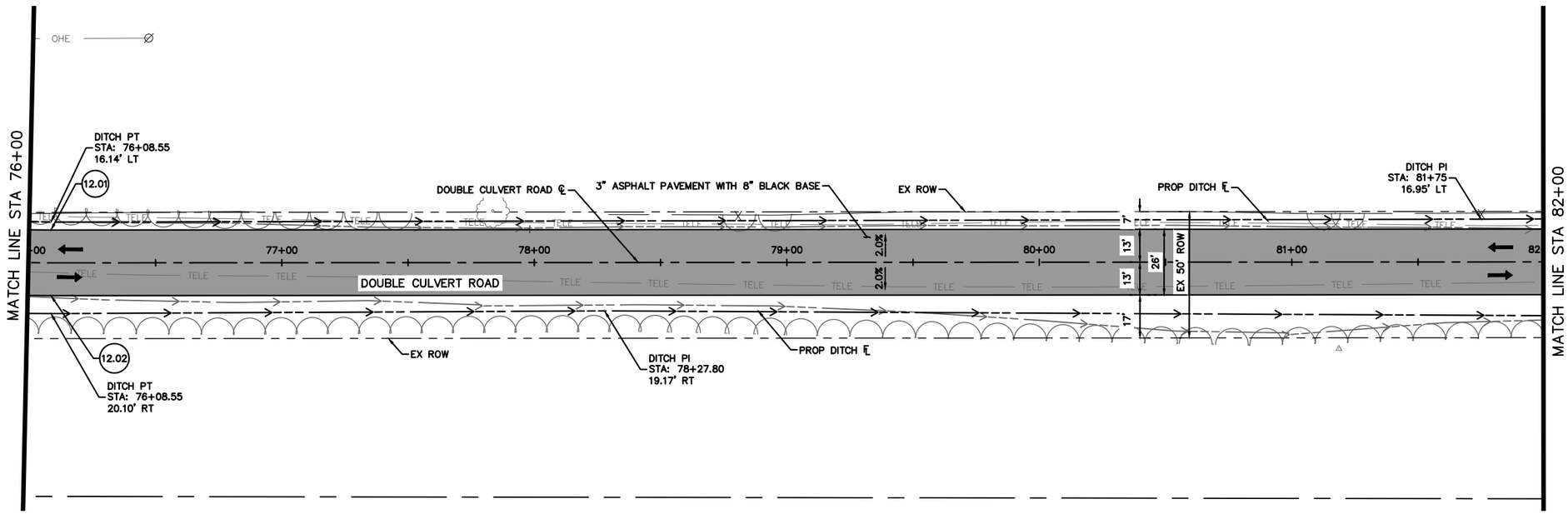
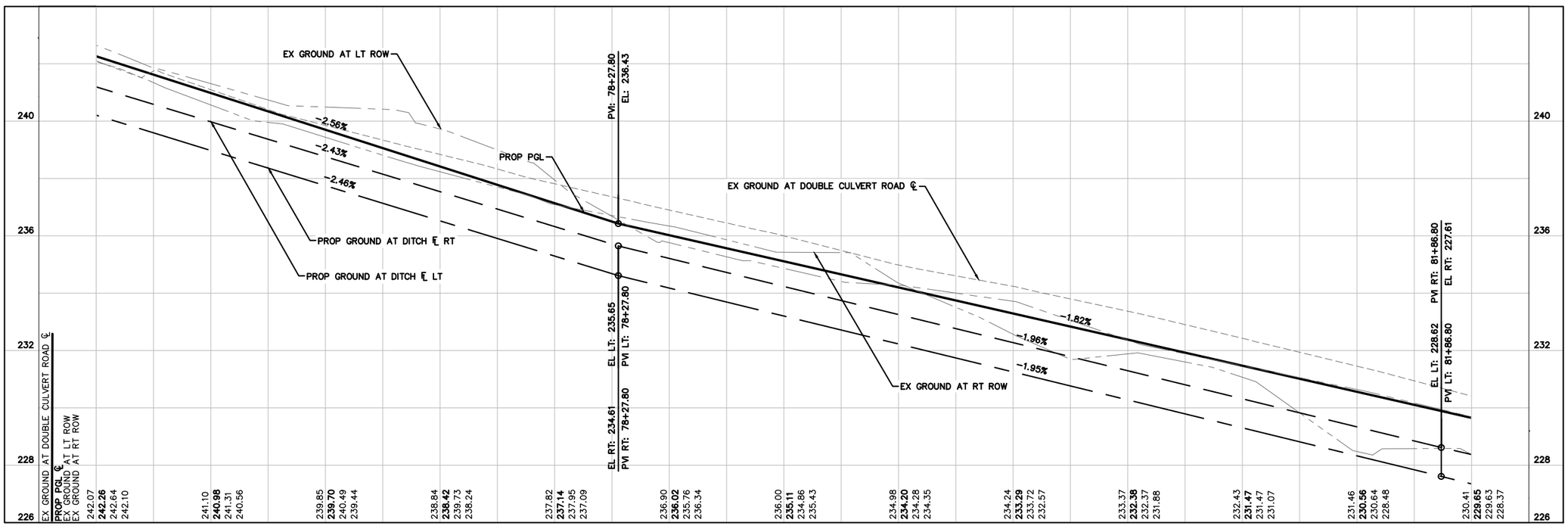
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
PAVING PLAN AND PROFILE
STA 70 00.00 TO STA 76 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		48

100% SUBMITTAL





GRAPHIC SCALE IN FEET
0 25 50
HORIZONTAL

NORTH

LEGEND

- EX ROW
- EX TREELINE
- TELE — EX TELECOM LINE
- OHE — EX OVERHEAD ELECTRIC LINE
- EX DITCH FLOW LINE
- PROP DITCH FLOW LINE
- PROP STORM SEWER
- PROP ASPHALT PAVEMENT
- PROP ASPHALT DRIVEWAY
- (XX.XX) PAVEMENT POINT SEE NOTE 5

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EX	EXISTING
PROP	PROPOSED
STA	STATION
EL	ELEVATION
PI	POINT OF HORIZONTAL INFLECTION
PC	POINT OF HORIZONTAL CURVATURE
PT	POINT OF HORIZONTAL TANGENCY
PRC	POINT OF HORIZONTAL REVERSE CURVATURE
PVI	POINT OF VERTICAL INFLECTION
AD	ALGEBRAIC DIFFERENCE IN GRADES
VC	VERTICAL CURVE
BVCS/ EVCS	BEGIN/END VERTICAL CURVE STATION
BVCE/ EVCE	BEGIN/END VERTICAL CURVE ELEVATION
PGL	PROPOSED GRADE LINE AT TOP OF CURB
TCE	TEMPORARY CONSTRUCTION EASEMENT
TP	TOP OF PAVEMENT

VERTICAL 4 2 1 0

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED PROFESSIONAL ENGINEER
Abbey Polzin

DATE: 7/28/2026 8:34:26 PM
FILE: K:\hou_roadway\066035800 - double culvert rd segment 1\04_CAD\PlanSheets\Paving Plan and Pro ile - 58 00.00 TO 82 00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM

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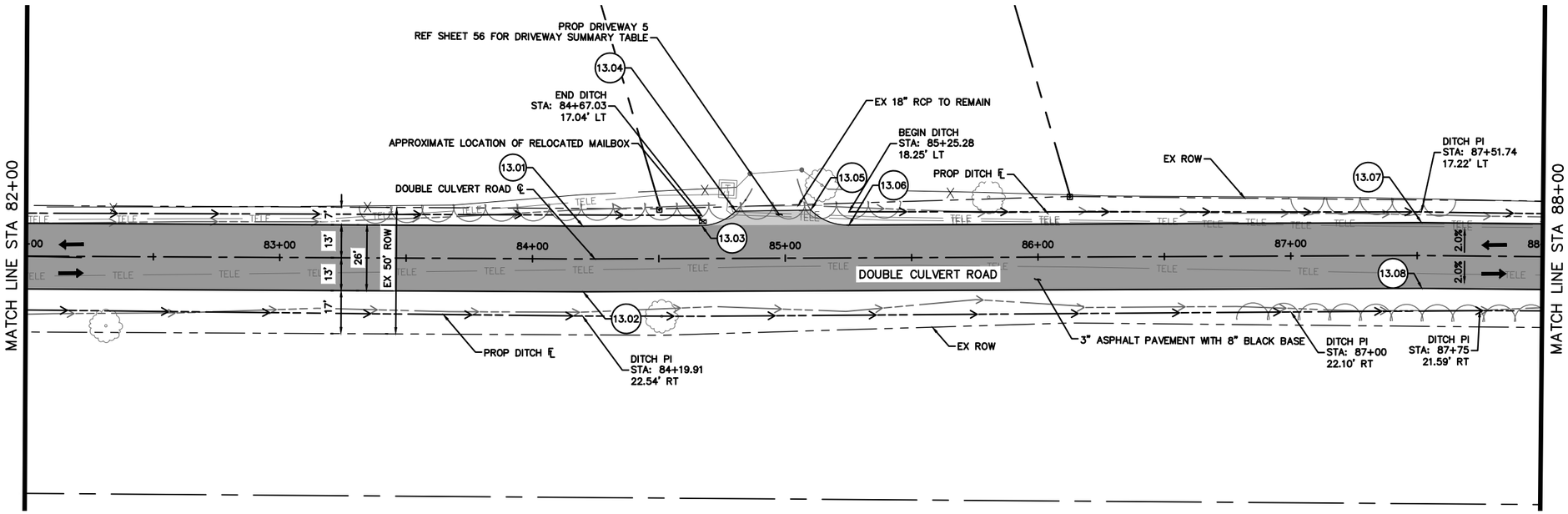
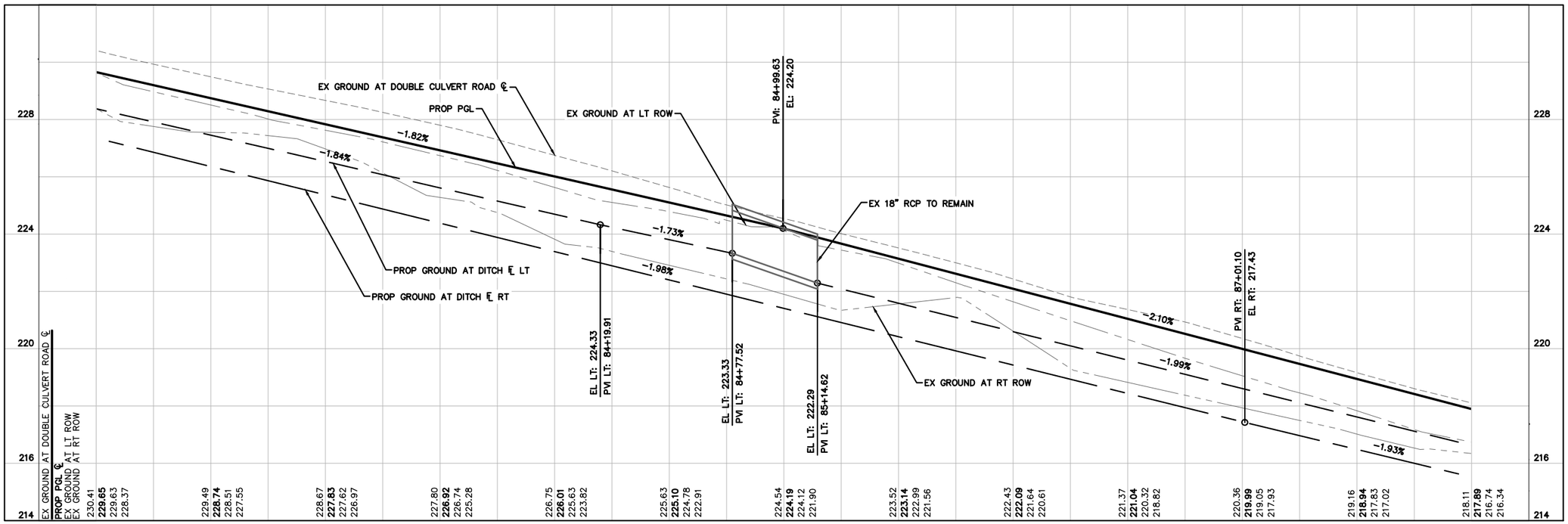
TEXAS REGISTERED ENGINEERING FIRM #F-928

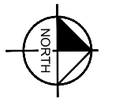
DOUBLE CULVERT ROAD
SEGMENT 1
PAVING PLAN AND PROFILE
STA 76 00.00 TO STA 82 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		49

100% SUBMITTAL







GRAPHIC SCALE IN FEET
0 25 50
HORIZONTAL

LEGEND

- EX ROW
- EX TREELINE
- TELE — EX TELECOM LINE
- OHE — EX OVERHEAD ELECTRIC LINE
- EX DITCH FLOW LINE
- PROP DITCH FLOW LINE
- PROP STORM SEWER
- PROP ASPHALT PAVEMENT
- PROP ASPHALT DRIVEWAY
- (XX.XX) PAVEMENT POINT SEE NOTE 5

NOTES

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EX	EXISTING
PROP	PROPOSED
STA	STATION
EL	ELEVATION
PI	POINT OF HORIZONTAL INFLECTION
PC	POINT OF HORIZONTAL CURVATURE
PT	POINT OF HORIZONTAL TANGENCY
PRC	POINT OF HORIZONTAL REVERSE CURVATURE
PVI	POINT OF VERTICAL INFLECTION
AD	ALGEBRAIC DIFFERENCE IN GRADES
VC	VERTICAL CURVE
BVCS/ EVCS	BEGIN/END VERTICAL CURVE STATION
BVCE/ EVCE	BEGIN/END VERTICAL CURVE ELEVATION
PGL	PROPOSED GRADE LINE AT TOP OF CURB
TCE	TEMPORARY CONSTRUCTION EASEMENT
TP	TOP OF PAVEMENT

VERTICAL 4 2 1 0

07/28/2026
STATE OF TEXAS
ABBEY N. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

THE STATE OF TEXAS WALLER COUNTY

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
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WWW.KIMLEY-HORN.COM
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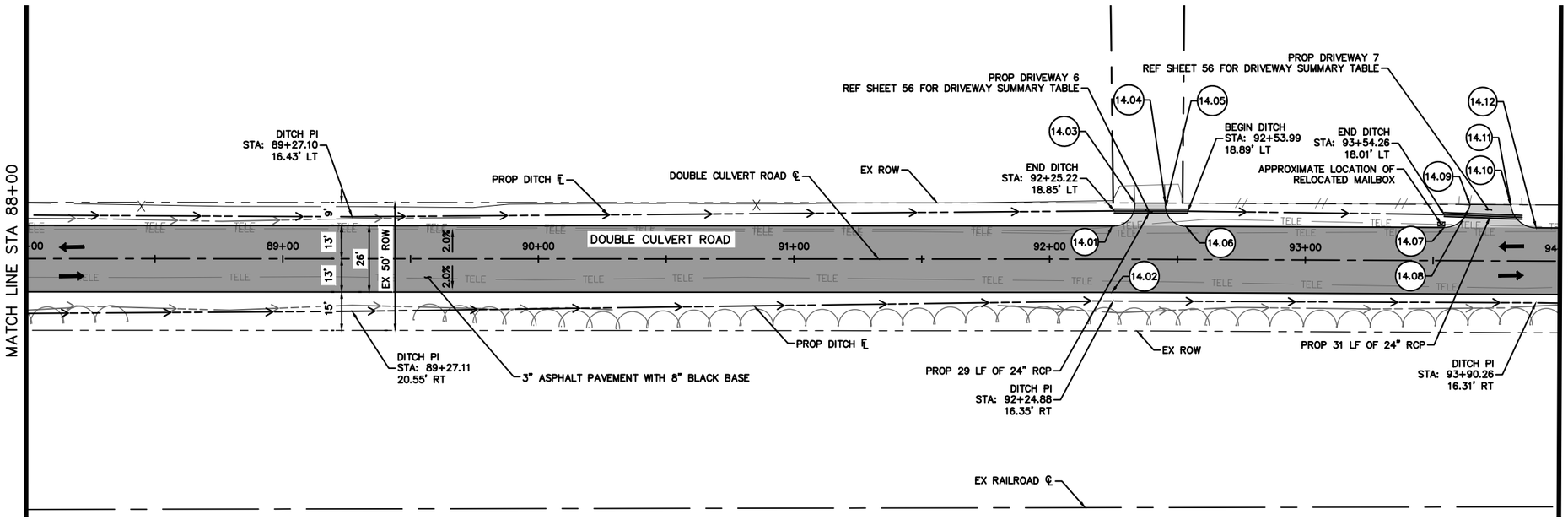
TEXAS REGISTERED ENGINEERING FIRM #F-928

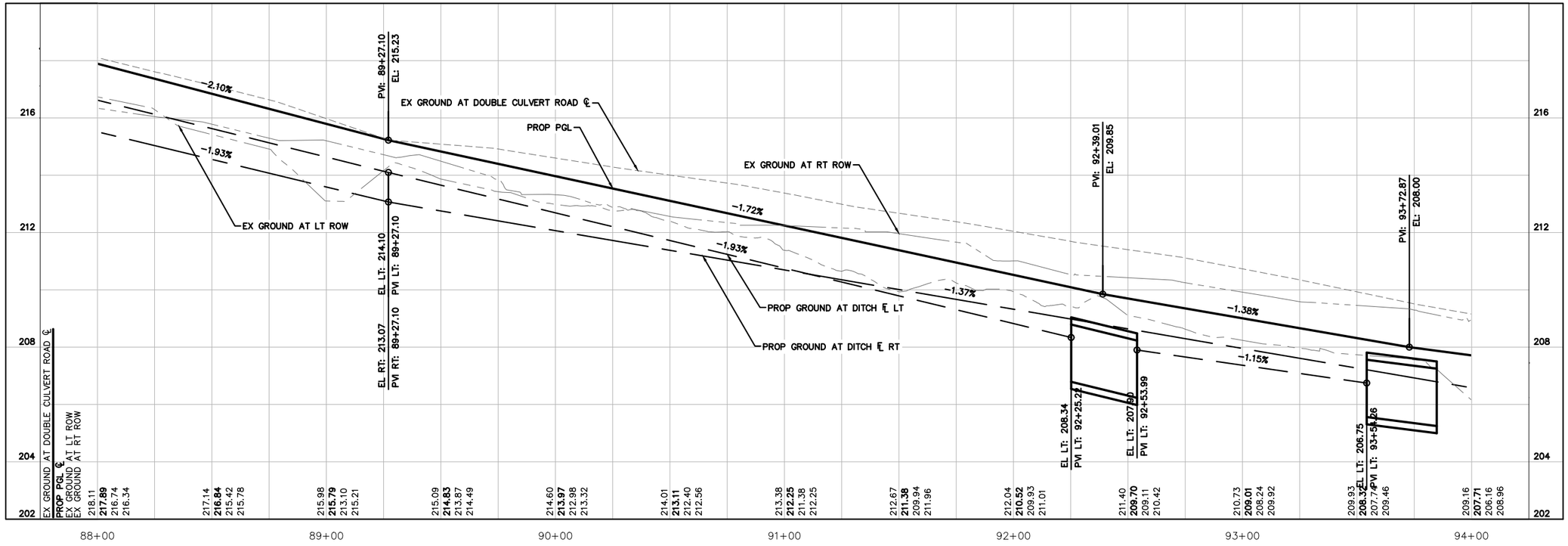
DOUBLE CULVERT ROAD
SEGMENT 1
PAVING PLAN AND PROFILE
STA 82 00.00 TO STA 88 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		50

DATE: 7/28/2026 8:35:23 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Paving Plan and Pro ile - 82 00.00 TO 106 00.00.dwg

100% SUBMITTAL





GRAPHIC SCALE IN FEET
0 25 50
HORIZONTAL

NORTH

LEGEND

- EX ROW
- EX TREELINE
- TELE — EX TELECOM LINE
- OHE — EX OVERHEAD ELECTRIC LINE
- EX DITCH FLOW LINE
- PROP DITCH FLOW LINE
- PROP STORM SEWER
- PROP ASPHALT PAVEMENT
- PROP ASPHALT DRIVEWAY
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EX	EXISTING
PROP	PROPOSED
STA	STATION
EL	ELEVATION
PI	POINT OF HORIZONTAL INFLECTION
PC	POINT OF HORIZONTAL CURVATURE
PT	POINT OF HORIZONTAL TANGENCY
PRC	POINT OF HORIZONTAL REVERSE CURVATURE
PVI	POINT OF VERTICAL INFLECTION
AD	ALGEBRAIC DIFFERENCE IN GRADES
VC	VERTICAL CURVE
BVCS/ EVCS	BEGIN/END VERTICAL CURVE STATION
BVCE/ EVCE	BEGIN/END VERTICAL CURVE ELEVATION
PGL	PROPOSED GRADE LINE AT TOP OF CURB
TCE	TEMPORARY CONSTRUCTION EASEMENT
TP	TOP OF PAVEMENT

VERTICAL 4 2 1 0

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

DATE: 7/28/2026 8:35:42 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Paving Plan and Pro Ile - 82_00.00 TO 106_00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
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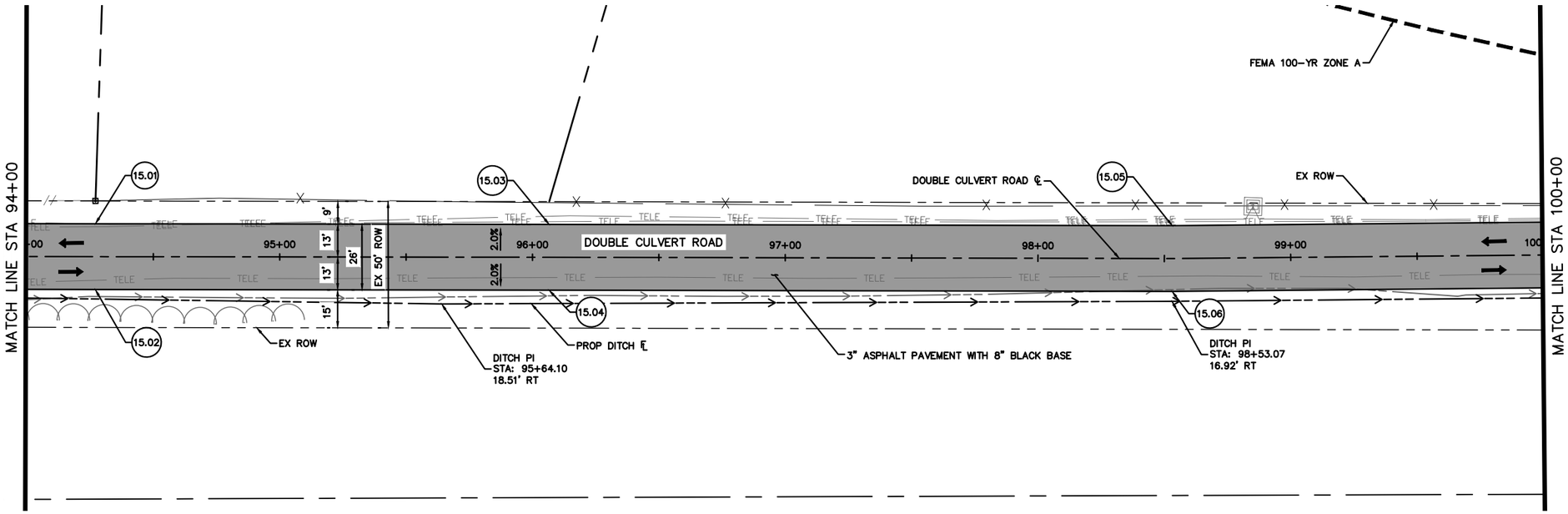
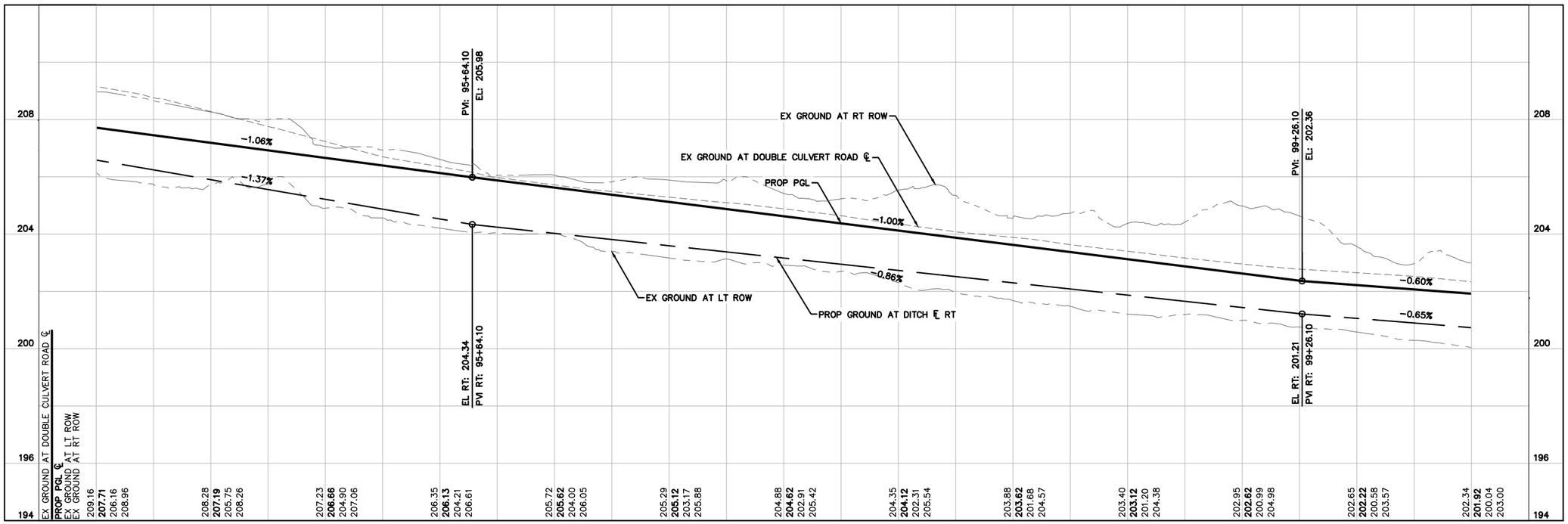
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
PAVING PLAN AND PROFILE
STA 88 00.00 TO STA 94 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		51

100% SUBMITTAL





GRAPHIC SCALE IN FEET
0 25 50
HORIZONTAL

NORTH

LEGEND

- EX ROW
- EX TREELINE
- TELE — EX TELECOM LINE
- OHE — EX OVERHEAD ELECTRIC LINE
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PROP	PROPOSED
STA	STATION
EL	ELEVATION
PI	POINT OF HORIZONTAL INFLECTION
PC	POINT OF HORIZONTAL CURVATURE
PT	POINT OF HORIZONTAL TANGENCY
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PVI	POINT OF VERTICAL INFLECTION
AD	ALGEBRAIC DIFFERENCE IN GRADES
VC	VERTICAL CURVE
BVCS/ EVCS	BEGIN/END VERTICAL CURVE STATION
BVCE/ EVCE	BEGIN/END VERTICAL CURVE ELEVATION
PGL	PROPOSED GRADE LINE AT TOP OF CURB
TCE	TEMPORARY CONSTRUCTION EASEMENT
TP	TOP OF PAVEMENT

VERTICAL 4 2 1 0

07/28/2026
STATE OF TEXAS
ABBEY N. POLZIN
151558
LICENSED PROFESSIONAL ENGINEER
Abbey Polzin

DATE: 7/28/2026 8:36:01 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04 CAD\PlanSheets\Paving Plan and Pro ile - 82 00.00 TO 106 00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

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11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM
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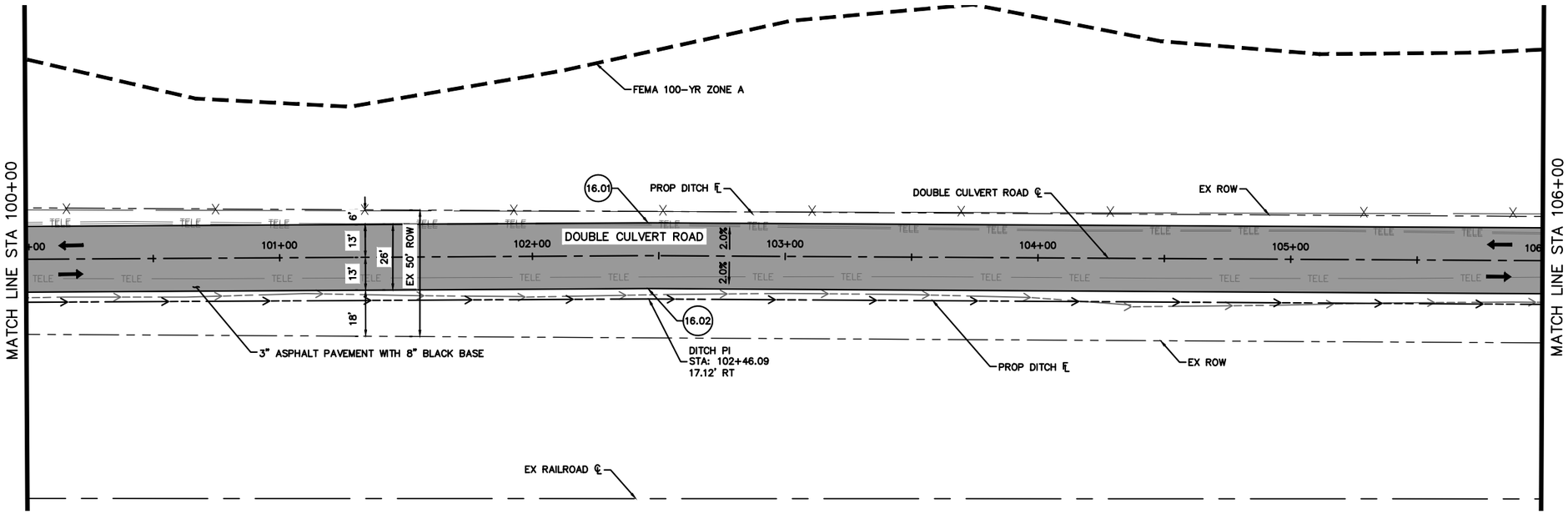
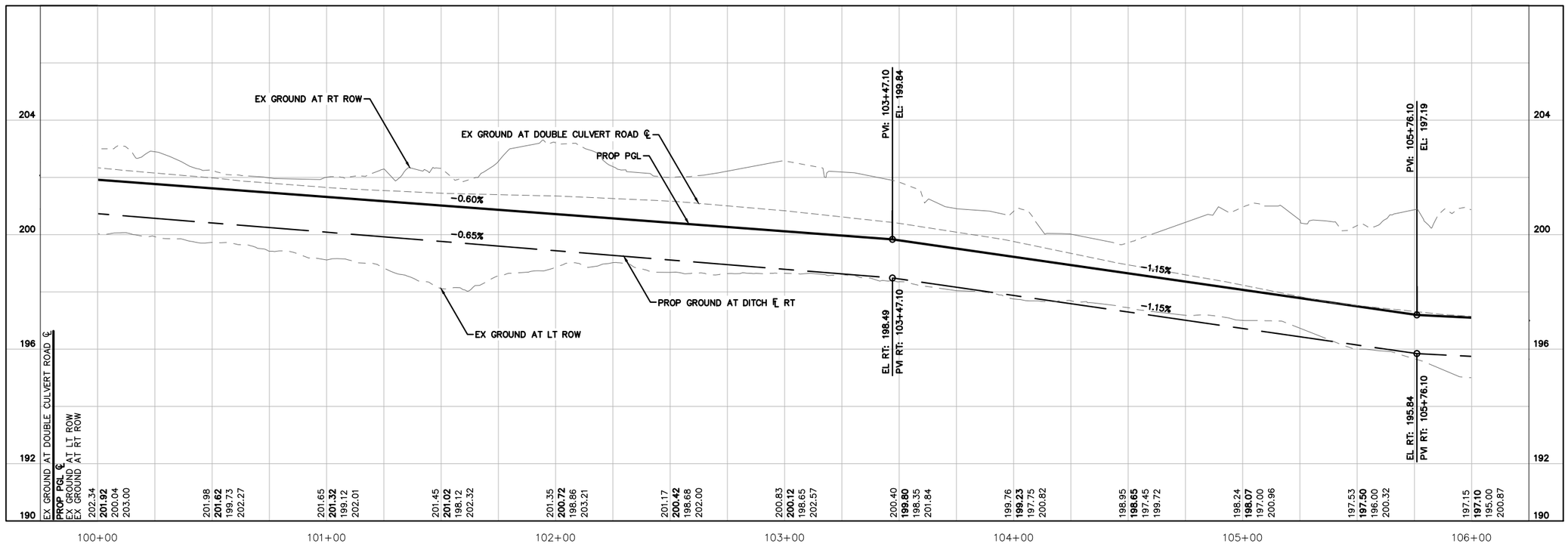
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
PAVING PLAN AND PROFILE
STA 94 00.00 TO STA 100 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		52

100% SUBMITTAL





GRAPHIC SCALE IN FEET
0 25 50
HORIZONTAL

NORTH

LEGEND

- EX ROW
- EX TREELINE
- TELE — EX TELECOM LINE
- OHE — EX OVERHEAD ELECTRIC LINE
- EX DITCH FLOW LINE
- PROP DITCH FLOW LINE
- PROP STORM SEWER
- PROP ASPHALT PAVEMENT
- PROP ASPHALT DRIVEWAY
- (XX.XX) PAVEMENT POINT SEE NOTE 5

NOTES

1. CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL IRRIGATION FACILITIES WITHIN LIMIT OF CONSTRUCTION.
2. THE EXISTENCE AND LOCATIONS OF ALL UNDERGROUND UTILITIES SHOWN ON THE DRAWINGS WERE OBTAINED FROM AVAILABLE RECORDS AND ARE APPROXIMATE. NEITHER THE OWNER NOR THE ENGINEER ASSUMES ANY RESPONSIBILITY FOR UTILITIES NOT SHOWN OR NOT IN THE LOCATION SHOWN. THE CONTRACTOR SHALL DETERMINE THE DEPTH AND LOCATION OF EXISTING UNDERGROUND UTILITIES PRIOR TO EXCAVATION AND SHALL BE REQUIRED TO TAKE ANY PRECAUTIONARY MEASURES TO PROTECT ALL LINES SHOWN AND/ OR ANY OTHER UNDERGROUND UTILITIES NOT OF RECORD OR NOT SHOWN ON THE PLANS. CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING ALL FRANCHISE AND CITY UTILITIES PRIOR TO CONSTRUCTION.
3. ELEV ARE TOP OF PAVEMENT ELEVATIONS UNLESS OTHERWISE NOTED.
4. REFER TO PAGE 57 AND 58 FOR PAVEMENT GEOMETRY POINTS.

EX	EXISTING
PROP	PROPOSED
STA	STATION
EL	ELEVATION
PI	POINT OF HORIZONTAL INFLECTION
PC	POINT OF HORIZONTAL CURVATURE
PT	POINT OF HORIZONTAL TANGENCY
PRC	POINT OF HORIZONTAL REVERSE CURVATURE
PVI	POINT OF VERTICAL INFLECTION
AD	ALGEBRAIC DIFFERENCE IN GRADES
VC	VERTICAL CURVE
BVCS/ EVCS	BEGIN/END VERTICAL CURVE STATION
BVCE/ EVCE	BEGIN/END VERTICAL CURVE ELEVATION
PGL	PROPOSED GRADE LINE AT TOP OF CURB
TCE	TEMPORARY CONSTRUCTION EASEMENT
TP	TOP OF PAVEMENT

VERTICAL 4 2 1 0

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
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TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD SEGMENT 1
PAVING PLAN AND PROFILE
STA 100 00.00 TO STA 106 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		53

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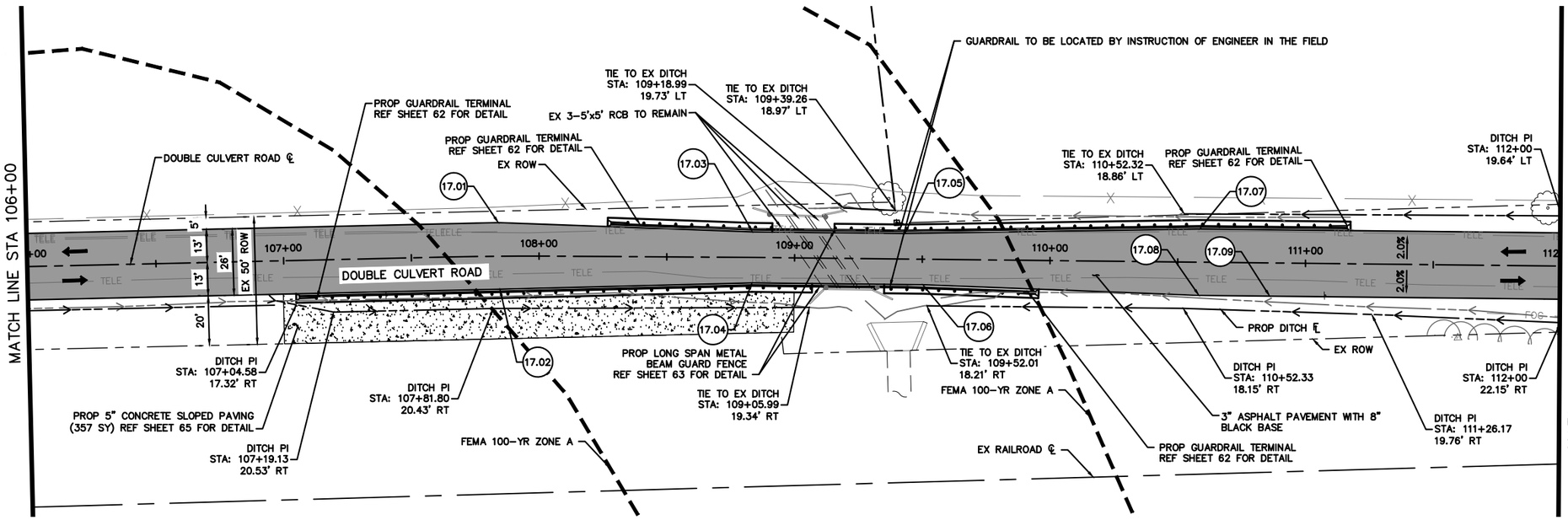
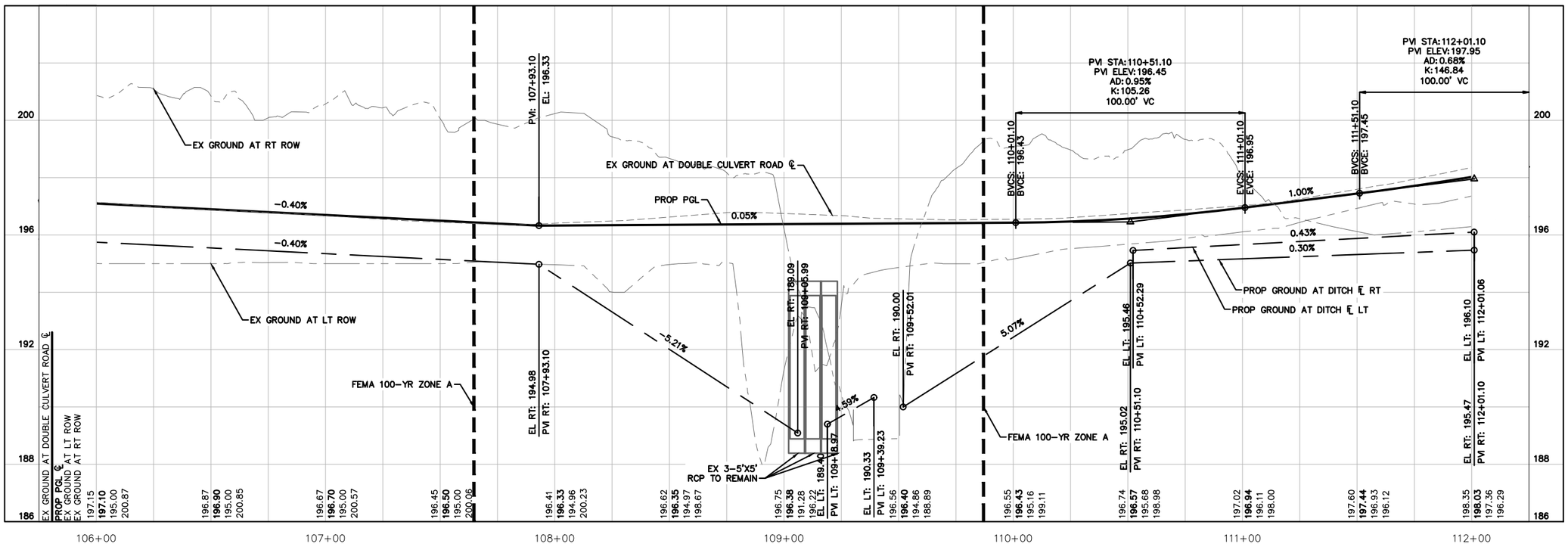
100% SUBMITTAL





LEGEND

- EX ROW
- EX TREELINE
- TELE — EX TELECOM LINE
- OHE — EX OVERHEAD ELECTRIC LINE
- EX DITCH FLOW LINE
- PROP DITCH FLOW LINE
- PROP STORM SEWER
- PROP ASPHALT PAVEMENT
- PROP ASPHALT DRIVEWAY
- (XX.XX) PAVEMENT POINT SEE NOTE 5

NOTES

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EX	EXISTING
PROP	PROPOSED
STA	STATION
EL	ELEVATION
PI	POINT OF HORIZONTAL INFLECTION
PC	POINT OF HORIZONTAL CURVATURE
PT	POINT OF HORIZONTAL TANGENCY
PRC	POINT OF HORIZONTAL REVERSE CURVATURE
PVI	POINT OF VERTICAL INFLECTION
AD	ALGEBRAIC DIFFERENCE IN GRADES
VC	VERTICAL CURVE
BVCS/ EVCS	BEGIN/END VERTICAL CURVE STATION
BVCE/ EVCE	BEGIN/END VERTICAL CURVE ELEVATION
PGL	PROPOSED GRADE LINE AT TOP OF CURB
TCE	TEMPORARY CONSTRUCTION EASEMENT
TP	TOP OF PAVEMENT

VERTICAL 4 2 1 0

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL
ENGINEER
Abbey Polzin

DATE: 7/28/2026 8:37:19 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Paving Plan and Pro ile - 106 00.00 TO 118 00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

THE STATE OF TEXAS WALLER COUNTY

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
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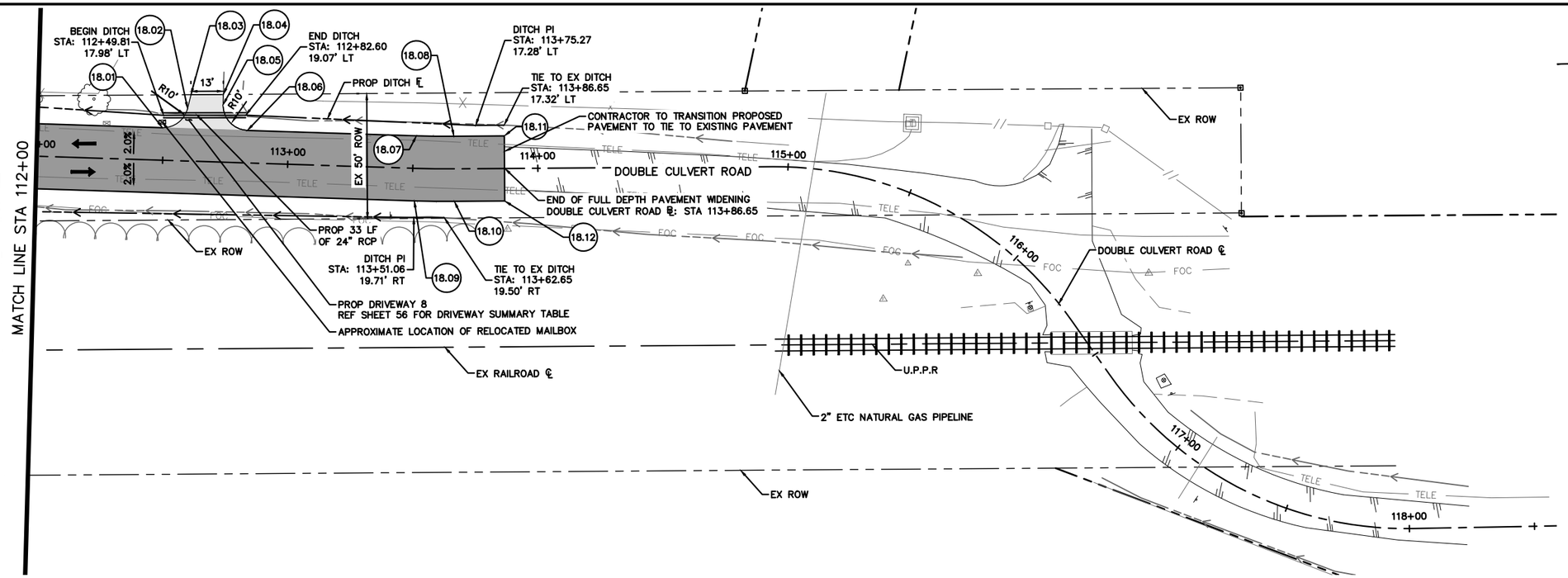
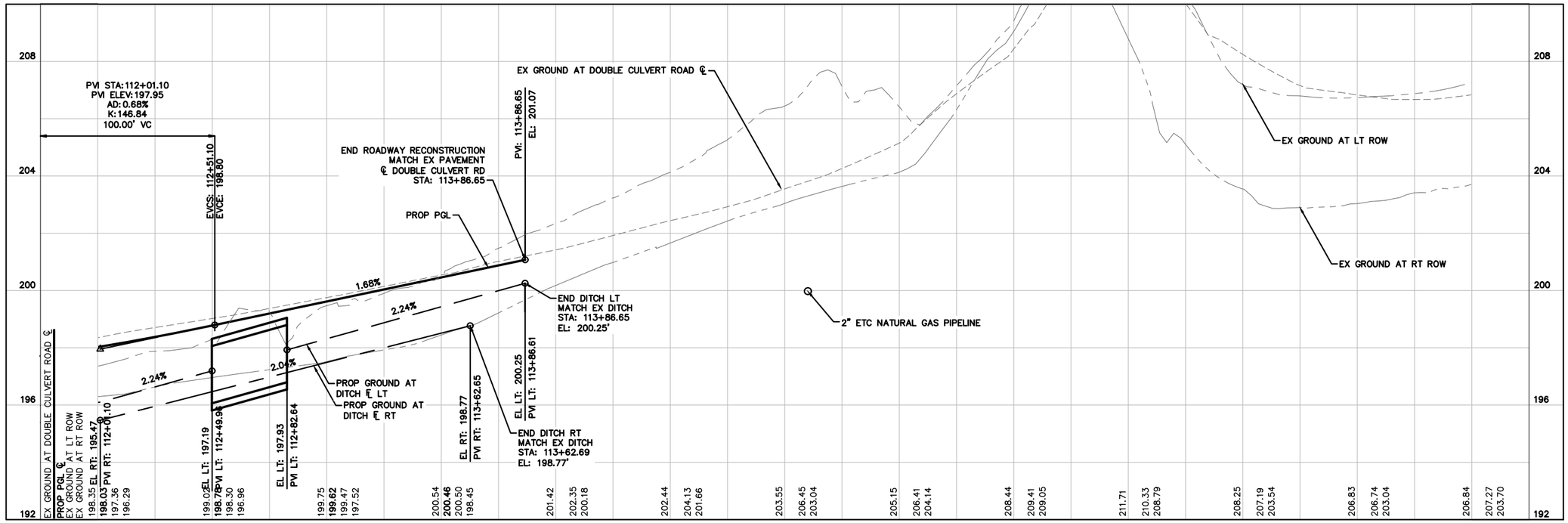
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
PAVING PLAN AND PROFILE
STA 106 00.00 TO STA 112 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		54

100% SUBMITTAL







GRAPHIC SCALE IN FEET
0 25 50
HORIZONTAL

LEGEND

- EX ROW
- EX TREELINE
- TELE — EX TELECOM LINE
- OHE — EX OVERHEAD ELECTRIC LINE
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REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY ENGINEERING DEPARTMENT

Kimley»Horn
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TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
PAVING PLAN AND PROFILE
STA 112 00.00 TO STA 118 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		55

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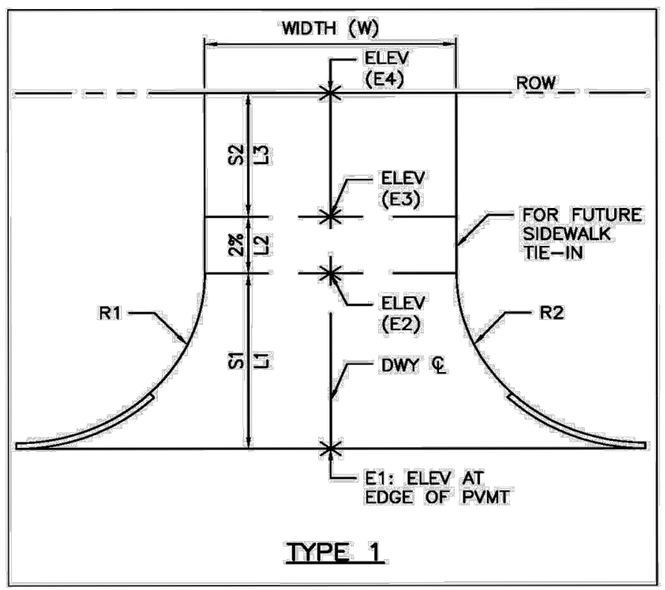
100% SUBMITTAL

DRIVEWAY SUMMARY

SHEET NO	DRIVEWAY NUMBER	CL STATION	LT/RT	DRIVEWAY TYPE	WIDTH W (FT)	LENGTH L1 (FT)	LENGTH L2 (FT)	LENGTH L3 (FT)	LENGTH L4 (FT)	RADIUS R1 (FT)	RADIUS R2 (FT)	ELEVATION E1 (FT)	ELEVATION E2 (FT)	ELEVATION E3 (FT)	ELEVATION E4 (FT)	SLOPE S1 (%)	SLOPE S2 (%)	DRIVEWAY AREA (SY)	Commercial Driveway TCE (FTxFT)
42	1	34+49.16	LT	TYPE 1	21.0	4.83	5.17	N/A	N/A	10	10	271.88	272.03	N/A	272.07	3.00	0.81	28.65	N/A
43	2	40+62.28	LT	TYPE 1	11.8	4.42	9.20	N/A	N/A	15	10	270.94	271.07	N/A	271.59	3.00	5.71	24.50	N/A
43	3	43+24.93	LT	TYPE 1	11.5	6.82	5.18	N/A	N/A	10	10	269.05	269.59	N/A	269.64	8.00	0.90	20.53	N/A
47	4	66+81.86	LT	TYPE 1	16.3	7.35	4.72	N/A	N/A	10	10	266.01	266.09	N/A	265.59	1.03	10.58	29.07	N/A
50	5	84+96.38	LT	TYPE 1	26.4	5.82	2.07	N/A	N/A	20	20	223.91	N/A	N/A	224.26	4.34	N/A	31.54	N/A
51	6	92+39.64	LT	TYPE 1	12.0	5.87	3.13	N/A	N/A	8	8	209.49	209.82	N/A	209.70	5.54	3.75	15.04	N/A
51	7	93+72.80	LT	TYPE 1	15.9	4.51	4.54	N/A	N/A	10	10	207.69	207.96	N/A	207.87	5.97	1.80	20.74	N/A
55	8	112+68.43	LT	TYPE 1	13.0	5.55	8.23	N/A	N/A	10	10	198.79	199.24	N/A	199.31	8.00	0.84	24.10	N/A



TYPE 1

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REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM

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TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
DRIVEWAY SUMMARY SHEET

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		56

100% SUBMITTAL

TABLE 1 (RE: SHEET 38)

#	DESC.	ALIGNMENT	STATION	OFFSET	ELEV	NORTHING	EASTING
1.01	ME	DOUBLE CULVERT RD	10+41.83	13.00' LT	–	13984502.16	2893108.55
1.02	ME	DOUBLE CULVERT RD	10+41.30	13.00' RT	–	13984506.53	2893134.19
1.03	PI	DOUBLE CULVERT RD	14+60.42	13.00' LT	274.01'	13984913.22	2893029.78
1.04	PI	DOUBLE CULVERT RD	14+60.42	13.00' RT	274.01'	13984918.21	2893055.29

TABLE 2 (RE: SHEET 39)

#	DESC.	ALIGNMENT	STATION	OFFSET	ELEV	NORTHING	EASTING
2.01	PC	DOUBLE CULVERT RD	18+77.84	13.00' LT	274.61'	13985322.88	2892949.65
2.02	PT	DOUBLE CULVERT RD	19+07.03	34.79' LT	274.68'	13985347.34	2892922.66
2.03	ME	DOUBLE CULVERT RD	19+08.74	48.07' LT	–	13985346.47	2892909.30
2.04	ME	DOUBLE CULVERT RD	19+28.84	45.53' LT	–	13985366.69	2892907.94
2.05	PC	DOUBLE CULVERT RD	19+28.40	40.09' LT	274.66'	13985367.29	2892913.36
2.06	PI	DOUBLE CULVERT RD	19+45.51	13.00' RT	274.48'	13985394.34	2892962.17
2.07	PT	DOUBLE CULVERT RD	19+53.50	13.00' LT	274.43'	13985397.06	2892935.10

TABLE 3 (RE: SHEET 40)

#	DESC.	ALIGNMENT	STATION	OFFSET	ELEV	NORTHING	EASTING
3.01	PC	DOUBLE CULVERT RD	22+31.07	13.00' LT	272.91'	13985669.20	2892880.47
3.02	PC	DOUBLE CULVERT RD	22+31.07	13.00' RT	272.91'	13985674.32	2892905.96

TABLE 4 (RE: SHEET 41)

#	DESC.	ALIGNMENT	STATION	OFFSET	ELEV	NORTHING	EASTING
4.01	PT	DOUBLE CULVERT RD	28+09.93	13.00' LT	271.62'	13986246.67	2892821.57
4.02	PT	DOUBLE CULVERT RD	28+09.93	13.00' RT	271.62'	13986246.80	2892847.57
4.03	PI	DOUBLE CULVERT RD	30+90.92	13.00' LT	271.48'	13986527.78	2892820.12
4.04	PI	DOUBLE CULVERT RD	30+90.79	13.00' RT	271.48'	13986527.66	2892846.12

TABLE 5 (RE: SHEET 42)

#	DESC.	ALIGNMENT	STATION	OFFSET	ELEV	NORTHING	EASTING
5.01	PC	DOUBLE CULVERT RD	34+27.98	13.00' LT	271.86'	13986864.94	2892825.21
5.02	PT	DOUBLE CULVERT RD	34+37.73	20.78' LT	271.98'	13986874.81	2892817.57
5.03	ME	DOUBLE CULVERT RD	34+38.24	23.00' LT	–	13986875.35	2892815.36
5.04	ME	DOUBLE CULVERT RD	34+59.12	23.00' LT	–	13986896.23	2892815.68
5.05	PC	DOUBLE CULVERT RD	34+59.93	20.21' LT	271.95'	13986897.00	2892818.48
5.06	PT	DOUBLE CULVERT RD	34+69.54	13.00' LT	271.85'	13986906.49	2892825.83
5.07	PC	DOUBLE CULVERT RD	37+97.57	13.00' LT	271.35'	13987234.49	2892830.78
5.08	PC	DOUBLE CULVERT RD	37+97.57	13.00' RT	271.35'	13987234.09	2892856.78
5.09	PT	DOUBLE CULVERT RD	38+42.64	13.00' LT	271.28'	13987275.12	2892825.26
5.10	PT	DOUBLE CULVERT RD	38+42.64	13.00' RT	271.28'	13987282.44	2892850.21
5.11	PC	DOUBLE CULVERT RD	39+49.30	13.00' LT	271.12'	13987377.47	2892795.23
5.12	PC	DOUBLE CULVERT RD	39+49.30	13.00' RT	271.12'	13987384.79	2892820.18

TABLE 6 (RE: SHEET 43)

#	DESC.	ALIGNMENT	STATION	OFFSET	ELEV	NORTHING	EASTING
6.01	PCC	DOUBLE CULVERT RD	40+42.23	13.00' LT	270.98'	13987470.92	2892777.02
6.02	PT	DOUBLE CULVERT RD	40+56.38	26.43' LT	271.51'	13987484.43	2892762.39
6.03	ME	DOUBLE CULVERT RD	40+56.44	27.13' LT	–	13987484.44	2892761.68
6.04	ME	DOUBLE CULVERT RD	40+67.56	26.13' LT	–	13987496.19	2892761.97
6.05	PC	DOUBLE CULVERT RD	40+67.45	23.30' LT	271.44'	13987496.21	2892764.80
6.06	PCC	DOUBLE CULVERT RD	40+76.99	13.00' LT	270.92'	13987506.51	2892774.71
6.07	PT	DOUBLE CULVERT RD	40+91.00	13.01' LT	270.82'	13987520.87	2892774.47
6.08	PT	DOUBLE CULVERT RD	40+94.41	13.00' RT	270.80'	13987524.24	2892800.48
6.09	PC	DOUBLE CULVERT RD	43+08.59	13.00' LT	269.15'	13987738.55	2892775.51
6.10	PT	DOUBLE CULVERT RD	43+18.58	22.57' LT	269.58'	13987748.59	2892765.99
6.11	ME	DOUBLE CULVERT RD	43+18.69	25.00' LT	–	13987748.71	2892763.56
6.12	ME	DOUBLE CULVERT RD	43+30.22	25.00' LT	–	13987760.23	2892763.62
6.13	PC	DOUBLE CULVERT RD	43+30.49	22.07' LT	269.63'	13987760.49	2892766.55
6.14	PT	DOUBLE CULVERT RD	43+40.45	13.00' LT	268.94'	13987770.41	2892775.67

TABLE 7 (RE: SHEET 44)

#	DESC.	ALIGNMENT	STATION	OFFSET	ELEV	NORTHING	EASTING
7.01	PI	DOUBLE CULVERT RD	47+18.20	13.00' LT	266.46'	13988148.15	2892777.48
7.02	PI	DOUBLE CULVERT RD	47+18.21	13.00' RT	266.46'	13988148.05	2892803.48

TABLE 8 (RE: SHEET 45)

#	DESC.	ALIGNMENT	STATION	OFFSET	ELEV	NORTHING	EASTING
8.01	PI	DOUBLE CULVERT RD	54+19.07	13.00' LT	265.42'	13988849.08	2892780.27
8.02	PI	DOUBLE CULVERT RD	54+18.86	13.00' RT	265.42'	13988848.69	2892806.27

TABLE 9 (RE: SHEET 46)

#	DESC.	ALIGNMENT	STATION	OFFSET	ELEV	NORTHING	EASTING
9.01	PI	DOUBLE CULVERT RD	61+66.98	13.00' LT	269.10'	13989596.98	2892791.48
9.02	PI	DOUBLE CULVERT RD	61+66.98	13.00' RT	269.10'	13989596.59	2892817.48

TABLE 10 (RE: SHEET 47)

#	DESC.	ALIGNMENT	STATION	OFFSET	ELEV	NORTHING	EASTING
10.01	PC	DOUBLE CULVERT RD	66+60.84	13.00' LT	266.31'	13990090.75	2892796.53
10.02	PT	DOUBLE CULVERT RD	66+69.67	18.29' LT	266.12'	13990099.63	2892791.33
10.03	ME	DOUBLE CULVERT RD	66+73.24	25.00' LT	–	13990103.28	2892784.66
10.04	ME	DOUBLE CULVERT RD	66+89.52	25.00' LT	–	13990119.56	2892784.82
10.05	PT	DOUBLE CULVERT RD	66+99.37	13.00' LT	265.82'	13990129.28	2892796.92

NOTES

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PROP	PROPOSED
STA	STATION
EL	ELEVATION
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TCE	TEMPORARY CONSTRUCTION EASEMENT
TP	TOP OF PAVEMENT

07/28/2026

STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER

Abbey Polzin

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REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

THE STATE OF TEXAS · WALLER COUNTY

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
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TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
PAVE POINT TABLES

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		57

100% SUBMITTAL

TABLE 11 (RE: SHEET 48)

#	DESC.	ALIGNMENT	STATION	OFFSET	ELEV	NORTHING	EASTING
11.01	PC	DOUBLE CULVERT RD	73+75.30	13.00' LT	247.75'	13990805.17	2892803.83
11.02	PC	DOUBLE CULVERT RD	73+75.30	13.00' RT	247.75'	13990804.90	2892829.83
11.03	PRC	DOUBLE CULVERT RD	74+91.39	13.00' LT	244.77'	13990923.18	2892822.32
11.04	PRC	DOUBLE CULVERT RD	74+91.39	13.00' RT	244.77'	13990915.49	2892847.15

TABLE 12 (RE: SHEET 49)

#	DESC.	ALIGNMENT	STATION	OFFSET	ELEV	NORTHING	EASTING
12.01	PT	DOUBLE CULVERT RD	76+08.55	13.00' LT	241.77'	13991034.79	2892839.64
12.02	PT	DOUBLE CULVERT RD	76+08.55	13.00' RT	241.77'	13991034.59	2892865.64

TABLE 13 (RE: SHEET 50)

#	DESC.	ALIGNMENT	STATION	OFFSET	ELEV	NORTHING	EASTING
13.01	PI	DOUBLE CULVERT RD	84+20.03	13.00' LT	225.38'	13991846.12	2892845.78
13.02	PI	DOUBLE CULVERT RD	84+20.03	13.00' RT	225.38'	13991846.17	2892871.78
13.03	PC	DOUBLE CULVERT RD	84+67.04	13.00' LT	224.52'	13991893.14	2892845.70
13.04	ME	DOUBLE CULVERT RD	84+80.50	18.64' LT	–	13991906.59	2892840.03
13.05	ME	DOUBLE CULVERT RD	85+10.19	18.98' LT	–	13991936.28	2892839.64
13.06	PT	DOUBLE CULVERT RD	85+25.27	13.00' LT	223.39'	13991951.36	2892845.59
13.07	PI	DOUBLE CULVERT RD	87+51.74	13.00' LT	218.63'	13992177.92	2892845.19
13.08	PI	DOUBLE CULVERT RD	87+52.01	13.00' RT	218.63'	13992177.97	2892871.19

TABLE 14 (RE: SHEET 51)

#	DESC.	ALIGNMENT	STATION	OFFSET	ELEV	NORTHING	EASTING
14.01	PI	DOUBLE CULVERT RD	92+24.42	13.00' LT	209.83'	13992650.65	2892850.84
14.02	PI	DOUBLE CULVERT RD	92+24.31	13.00' RT	209.83'	13992650.24	2892876.84
14.03	ME	DOUBLE CULVERT RD	92+33.17	22.00' LT	–	13992659.60	2892841.98
14.04	ME	DOUBLE CULVERT RD	92+45.14	22.00' LT	–	13992671.57	2892842.17
14.05	PC	DOUBLE CULVERT RD	92+45.21	20.60' LT	209.62'	13992671.62	2892843.57
14.06	PT	DOUBLE CULVERT RD	92+53.20	13.00' LT	209.38'	13992679.49	2892851.30
14.07	PC	DOUBLE CULVERT RD	93+54.27	13.00' LT	207.90'	13992780.55	2892852.91
14.08	PT	DOUBLE CULVERT RD	93+63.94	20.44' LT	207.94'	13992790.33	2892845.63
14.09	ME	DOUBLE CULVERT RD	93+64.35	22.00' LT	–	13992790.77	2892844.07
14.10	ME	DOUBLE CULVERT RD	93+80.34	21.69' LT	–	13992806.74	2892844.64
14.11	PC	DOUBLE CULVERT RD	93+80.39	21.38' LT	207.83'	13992806.79	2892844.95
14.12	PT	DOUBLE CULVERT RD	93+90.25	13.00' LT	207.55'	13992816.52	2892853.48

TABLE 15 (RE: SHEET 52)

#	DESC.	ALIGNMENT	STATION	OFFSET	ELEV	NORTHING	EASTING
15.01	PI	DOUBLE CULVERT RD	94+27.10	13.00' LT	207.16'	13992853.34	2892854.07
15.02	PI	DOUBLE CULVERT RD	94+27.08	13.00' RT	207.16'	13992852.93	2892880.07
15.03	PI	DOUBLE CULVERT RD	96+06.58	13.00' LT	205.29'	13993032.80	2892856.66
15.04	PI	DOUBLE CULVERT RD	96+06.56	13.00' RT	205.29'	13993032.41	2892882.66
15.05	PI	DOUBLE CULVERT RD	98+53.22	13.00' LT	202.82'	13993279.28	2892860.40
15.06	PI	DOUBLE CULVERT RD	98+53.07	13.00' RT	202.82'	13993278.88	2892886.40

TABLE 16 (RE: SHEET 53)

#	DESC.	ALIGNMENT	STATION	OFFSET	ELEV	NORTHING	EASTING
16.01	PI	DOUBLE CULVERT RD	102+45.90	13.00' LT	200.17'	13993671.95	2892861.86
16.02	PI	DOUBLE CULVERT RD	102+45.60	13.00' RT	200.18'	13993671.56	2892887.86

TABLE 17 (RE: SHEET 54)

#	DESC.	ALIGNMENT	STATION	OFFSET	ELEV	NORTHING	EASTING
17.01	PI	DOUBLE CULVERT RD	107+84.19	13.13' LT	196.08'	13994210.52	2892870.06
17.02	PI	DOUBLE CULVERT RD	107+84.57	12.93' RT	196.09'	13994210.12	2892896.12
17.03	PI	DOUBLE CULVERT RD	108+83.41	10.00' LT	196.16'	13994309.73	2892877.42
17.04	PI	DOUBLE CULVERT RD	108+83.37	10.00' RT	196.16'	13994308.78	2892897.40
17.05	PI	DOUBLE CULVERT RD	109+43.10	10.00' LT	196.19'	13994369.36	2892880.33
17.06	PI	DOUBLE CULVERT RD	109+50.30	10.00' RT	196.20'	13994375.58	2892900.66
17.07	PI	DOUBLE CULVERT RD	110+58.44	13.00' LT	196.34'	13994484.72	2892882.95
17.08	PI	DOUBLE CULVERT RD	110+58.44	13.00' RT	196.34'	13994483.45	2892908.92
17.09	PI	DOUBLE CULVERT RD	110+86.12	13.00' RT	196.55'	13994511.10	2892910.27

TABLE 18 (RE: SHEET 55)

#	DESC.	ALIGNMENT	STATION	OFFSET	ELEV	NORTHING	EASTING
18.01	PC	DOUBLE CULVERT RD	112+49.52	13.00' LT	198.50'	13994675.57	2892892.26
18.02	PT	DOUBLE CULVERT RD	112+59.31	20.95' LT	199.20'	13994685.74	2892884.80
18.03	ME	DOUBLE CULVERT RD	112+60.48	26.52' LT	–	13994687.17	2892879.29
18.04	ME	DOUBLE CULVERT RD	112+73.42	27.03' LT	–	13994700.12	2892879.42
18.05	PC	DOUBLE CULVERT RD	112+73.45	22.94' LT	199.32'	13994699.95	2892883.50
18.06	PT	DOUBLE CULVERT RD	112+83.45	13.00' LT	199.07'	13994709.46	2892893.92
18.07	PC	DOUBLE CULVERT RD	113+51.06	13.00' LT	200.20'	13994776.99	2892897.21
18.08	PT	DOUBLE CULVERT RD	113+66.54	13.00' LT	200.47'	13994791.96	2892897.65
18.09	PC	DOUBLE CULVERT RD	113+51.06	13.00' RT	200.21'	13994775.72	2892923.18
18.10	PT	DOUBLE CULVERT RD	113+66.54	13.00' RT	200.47'	13994791.69	2892923.65
18.11	ME	DOUBLE CULVERT RD	113+86.69	13.00' LT	–	13994812.11	2892897.85
18.12	ME	DOUBLE CULVERT RD	113+86.69	13.00' RT	–	13994811.85	2892923.85

NOTES

1. CONTRACTOR IS RESPONSIBLE FOR RELOCATION OF ANY SIGNS AND COORDINATION WITH THE CITY ON ANY NECESSARY MODIFICATIONS.
2. CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL IRRIGATION FACILITIES WITHIN LOC.
3. THE EXISTENCE AND LOCATIONS OF ALL UNDERGROUND UTILITIES SHOWN ON THE DRAWINGS WERE OBTAINED FROM AVAILABLE RECORDS AND ARE APPROXIMATE. NEITHER THE OWNER NOR THE ENGINEER ASSUMES ANY RESPONSIBILITY FOR UTILITIES NOT SHOWN OR NOT IN THE LOCATION SHOWN. THE CONTRACTOR SHALL DETERMINE THE DEPTH AND LOCATION OF EXISTING UNDERGROUND UTILITIES PRIOR TO EXCAVATION AND SHALL BE REQUIRED TO TAKE ANY PRECAUTIONARY MEASURES TO PROTECT ALL LINES SHOWN AND/ OR ANY OTHER UNDERGROUND UTILITIES NOT OF RECORD OR NOT SHOWN ON THE PLANS. CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING ALL FRANCHISE AND CITY UTILITIES PRIOR TO CONSTRUCTION.
4. ELEV ARE TOP OF PAVEMENT ELEVATIONS UNLESS OTHERWISE NOTED.

EX	EXISTING
PROP	PROPOSED
STA	STATION
EL	ELEVATION
PI	POINT OF HORIZONTAL INFLECTION
PC	POINT OF HORIZONTAL CURVATURE
PT	POINT OF HORIZONTAL TANGENCY
PRC	POINT OF HORIZONTAL REVERSE CURVATURE
PVI	POINT OF VERTICAL INFLECTION
AD	ALGEBRAIC DIFFERENCE IN GRADES
VC	VERTICAL CURVE
BVCS/ EVCS	BEGIN/END VERTICAL CURVE STATION
BVCE/ EVCE	BEGIN/END VERTICAL CURVE ELEVATION
PGL	PROPOSED GRADE LINE AT TOP OF CURB
TCE	TEMPORARY CONSTRUCTION EASEMENT
TP	TOP OF PAVEMENT

07/28/2026

STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER

Abbey Polzin

DATE: 7/28/2026 8:42:08 PM
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REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
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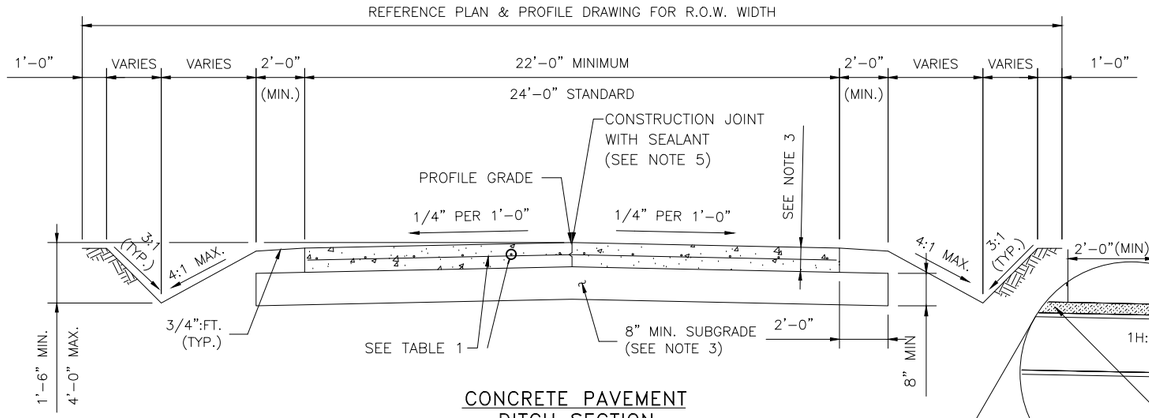
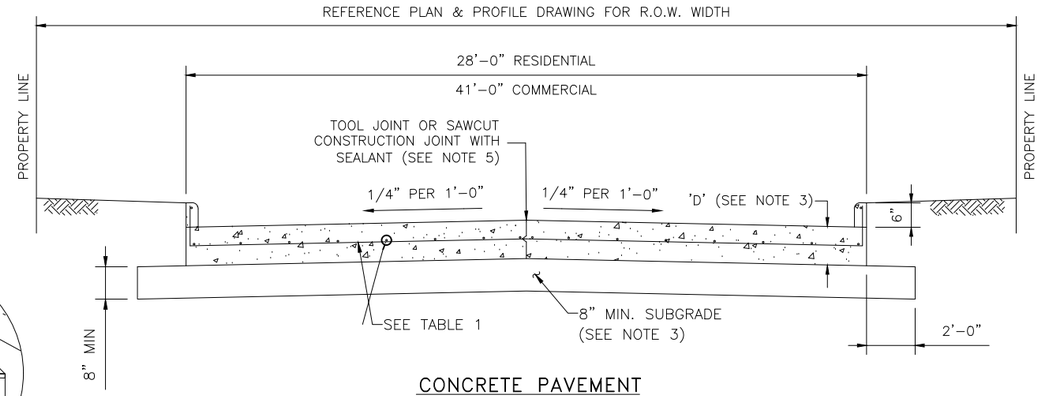
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
PAVE POINT TABLES

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		58

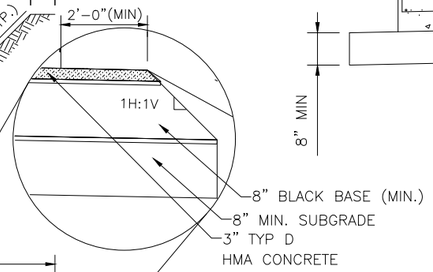


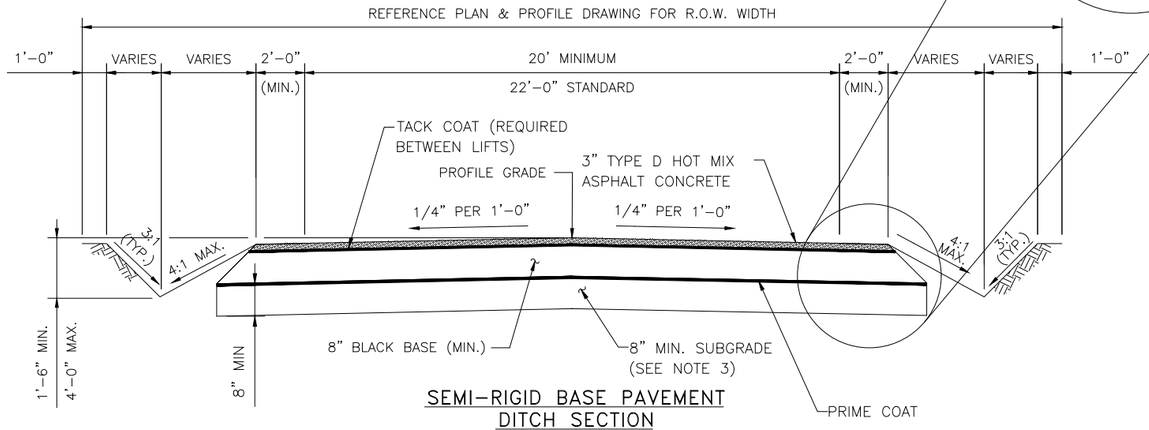
CONCRETE PAVEMENT DITCH SECTION



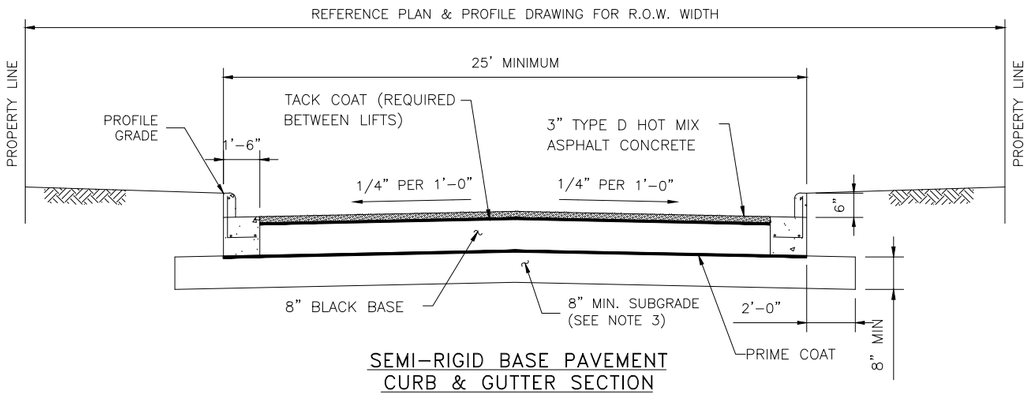
CONCRETE PAVEMENT CURB & GUTTER SECTION

(PARABOLIC CROWN IS AN ACCEPTABLE OPTION)

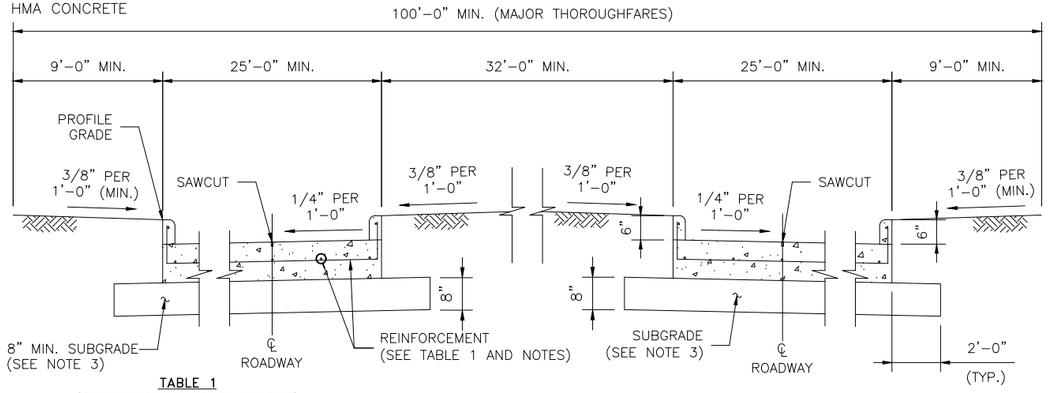




SEMI-RIGID BASE PAVEMENT DITCH SECTION



SEMI-RIGID BASE PAVEMENT CURB & GUTTER SECTION



TYPICAL SECTIONS FOR MAJOR THOROUGHFARES

HORIZONTAL SCALE: 1"=3'-0"
VERTICAL SCALE: 1"=1'-6"

TABLE 1
(CONSTRUCTION JOINT DOWELS)

DOWEL SIZE	PAVEMENT DEPTH
#4 BAR	< 6"
#5 BAR	6" ≤ D < 9"
#6 BAR	≥9"
DOWEL SHALL BE DRILLED INTO EXISTING PAVEMENT (MIN. 10", MAX. 12") AND EPOXIED. (SEE HC ITEM 361.3)	

NOTES:

1. PAVEMENT SECTIONS SHOWN ARE INTENDED FOR DEVELOPMENT PROJECTS AND NOT FOR PUBLIC PROJECTS, WHERE WIDTH OF R.O.W. MAY VARY.
2. PAVEMENT SECTIONS SHALL BE LOCATED IN CENTER OF R.O.W.
3. SUBGRADE TREATMENT AND PAVEMENT THICKNESS AS DESIGNATED IN PLANS
4. REFERENCE CONSTRUCTION JOINT DETAIL ON THE STANDARD CIVIL DRAWING "CONCRETE PAVEMENT DETAILS – SHEET 1 OF 2" FOR JOINT AND SEALANT REQUIREMENTS.
5. NO TRAFFIC ON CONCRETE PAVEMENT FOR 7 DAYS AND COMPRESSIVE STRENGTH OF 3,500 psi HAS BEEN REACHED.
6. ALL CONSTRUCTION JOINTS SHALL BE SEALED
7. MINIMUM DEPTH FOR BORES/UTILITIES SHALL BE AS FOLLOWS:
   OPEN DITCH – 3' MIN. BELOW FLOWLINE; 5' MIN. BELOW TOP OF PAVEMENT
   CURBED STREETS – 5' MIN. BELOW TOP OF PAVEMENT

SLAB AND REBAR NOTES:

1. TYPICAL SLAB THICKNESS D=8"
2. TYPICAL REBAR SIZE AND SPACING ARE:
   a. #4 BAR @ 18" C-C LONGITUDINAL
   b. #4 BAR @ 18" C-C TRANSVERSE
3. REBAR SIZE FOR PAVEMENT LESS THAN 8" THICK
   a. #4 BAR @ 24" C-C LONGITUDINAL
   b. #4 BAR @ 24" C-C TRANSVERSE
4. REBAR SHALL NOT BE PLACED WITHIN 3" FROM THE EDGE OF PAVEMENT.
5. TYPICAL STABILIZED SUBGRADE THICKNESS IS 8 INCHES.
6. FOR HEAVY INDUSTRIAL TRAFFIC, SLAB THICKNESS AND REBAR SIZE AND SPACING WILL BE AS PER GEOTECHNICAL RECOMMENDATION.
7. ALL BENT BARS SHALL BE GRADE 40 STEEL, ALL OTHER SHALL BE GRADE 60.
8. MINIMUM LAP SPLICE 16".
9. LAP SPLICES SHOULD BE ON ALTERNATING BARS, ADJACENT LAP SPLICES ARE NOT ACCEPTABLE.

NO.	REVISIONS	DATE	NAME
1			
2			
3			
4			
5			

WALLER COUNTY ENGINEERING DEPARTMENT

DOUBLE CULVERT ROAD SEGMENT 1

STANDARD DETAILS

PROJECT TITLE:

DRAWN BY:

CK'D BY:

SHEET DESCRIPTION: WC TYPICAL PAVEMENT SECTIONS FOR DEV PROJECTS

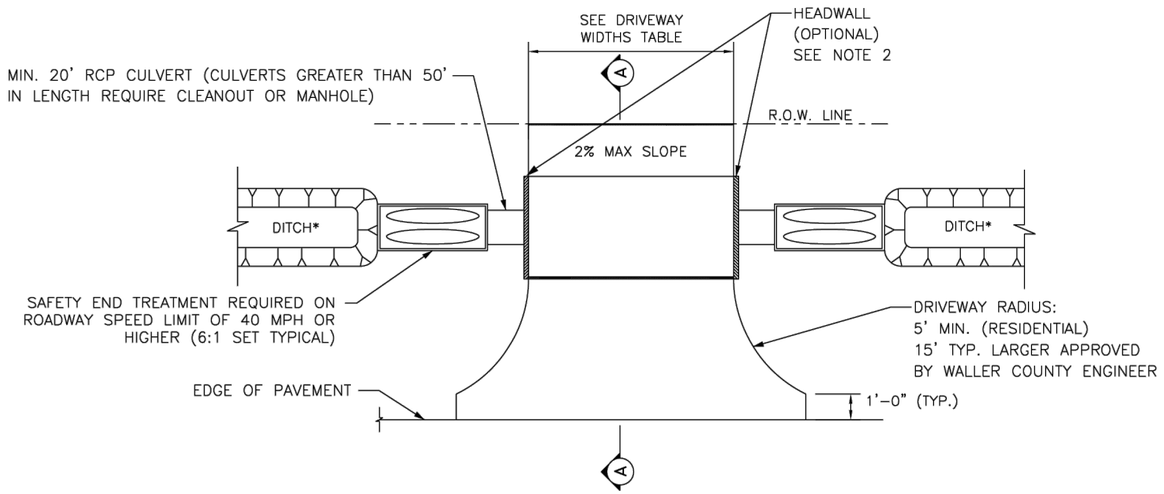
SCALE:

DATE:

APPROVED BY:

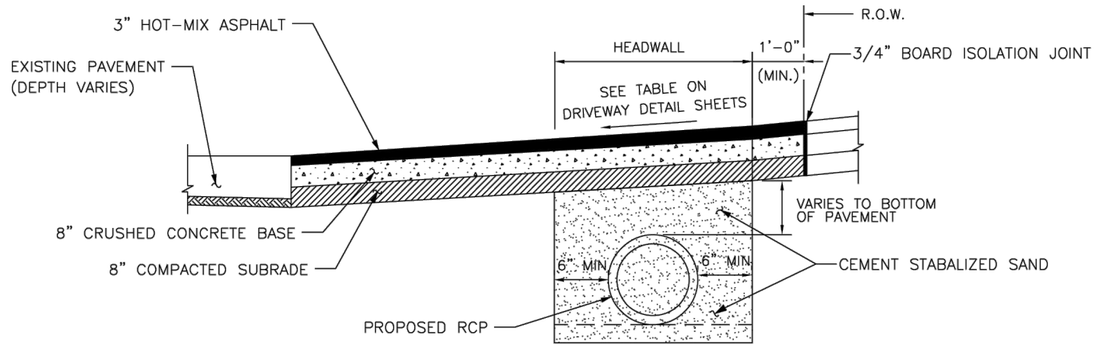
WCED STANDARD

SHEET NO: 59



OPEN DITCH DRIVEWAY

*DITCH IS TO HAVE 4:1 SLOPE



SECTION A-A FOR RESIDENTIAL DRIVEWAYS

MINIMUM RADII REQUIREMENTS – DRIVEWAYS

	LOCAL	COLLECTOR	MAJOR
RESIDENTIAL	5'	5'	–
COMMERCIAL	10'	10'	25'

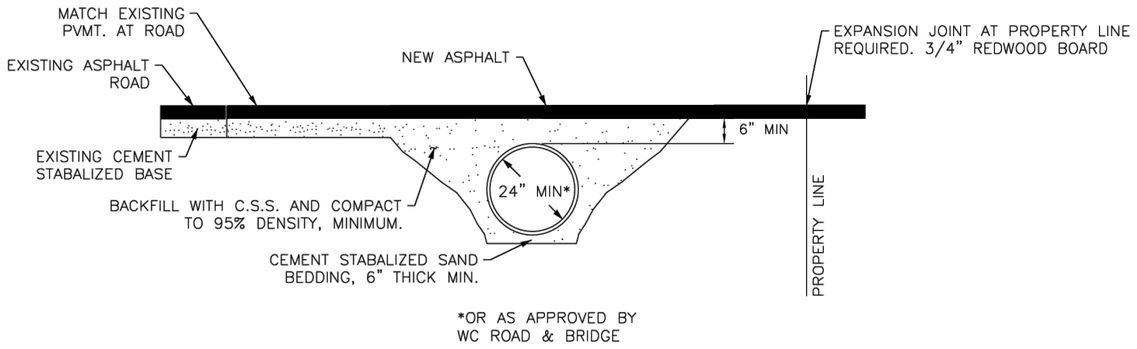
DRIVEWAY WIDTHS*

	MINIMUM	MAXIMUM
RESIDENTIAL	10'	25'
COMMERCIAL	20'	40'

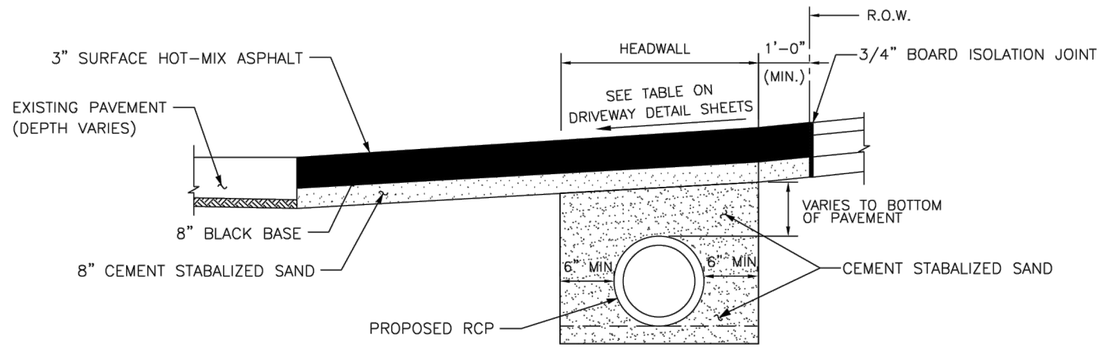
*DRIVEWAY WIDTHS ARE MEASURED AT THE ROW LINE

NOTES:

1. MAINTAIN A MIN. OF 6" BETWEEN DRIVEWAY AND CULVERT
2. HEADWALLS ARE ONLY ALLOWED ON ROADWAYS WITH POSTED SPEED LIMITS OF 35 MPH OR LESS
3. ALL DRIVEWAY CONNECTIONS SHALL HAVE THE SAME SURFACE AS THE EXISTING OR PROPOSED STREET.



ASPHALT APRON DETAIL – DRIVEWAY PROFILE FOR CULVERT DRAINAGE



SECTION A-A FOR COMMERCIAL DRIVEWAYS

NO.	REVISIONS	DATE	NAME
1			
2			
3			
4			
5			

WALLER COUNTY ENGINEERING DEPARTMENT

DOUBLE CULVERT ROAD SEGMENT 1

STANDARD DETAILS

PROJECT TITLE:

DRAWN BY:

CK'D BY:

SHEET DESCRIPTION: ASPHALT DRIVEWAY DETAILS

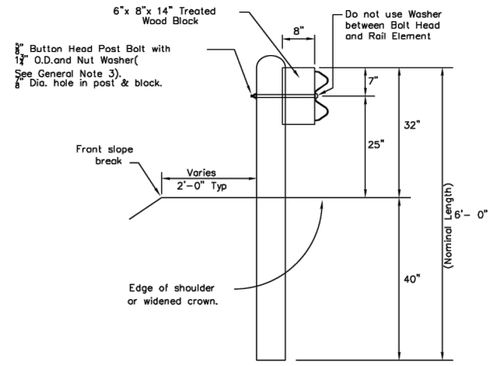
SCALE:

DATE:

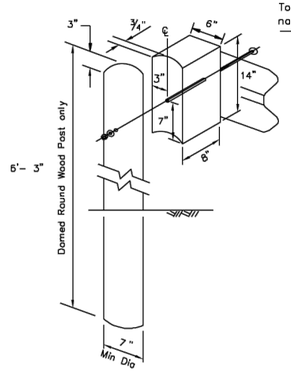
APPROVED BY:

WCED STANDARD

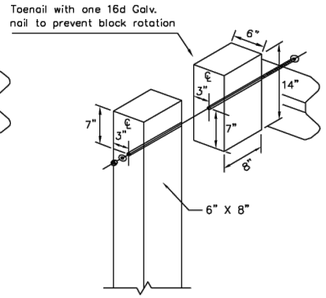
SHEET NO: 60



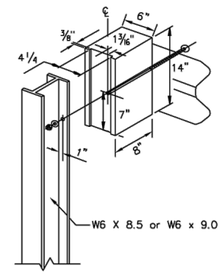
TYPICAL POST



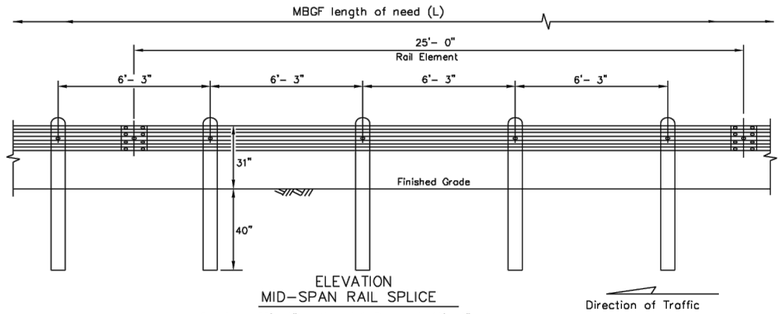
WOOD BLOCK TO ROUND WOOD POST



WOOD BLOCK TO RECTANGULAR WOOD POST



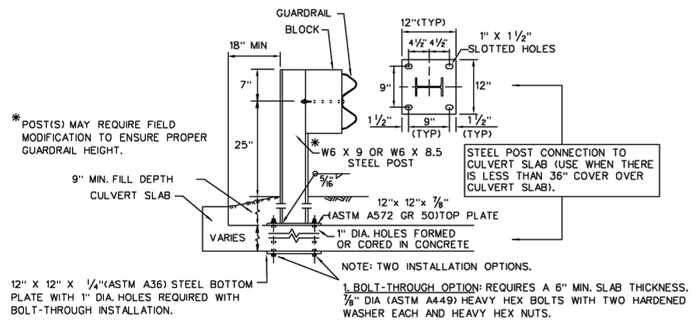
WOOD BLOCK TO STEEL POST



ELEVATION
MID-SPAN RAIL SPLICE

Direction of Traffic

Showing a 25'- 0" section of W-Beam rail, 12'- 6" rail sections may also be supplied (See General Note 2)



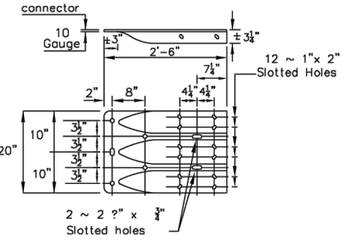
2. EPOXY ANCHOR OPTION: THIS OPTION MAY ONLY BE USED IF THE CULVERT SLAB IS 8" MIN. THICK. THREADED ANCHOR RODS MUST BE ⅞" DIA. ASTM A449 OR A193 GRADE B7 WITH HEAVY HEX NUT, AND ONE HARDENED WASHER EACH. EMBED ANCHOR RODS 6" WITH HILTI HIT RE 500 EPOXY ADHESIVE. OTHER TYPE III CLASS C EPOXY ADHESIVES MEETING THE REQUIREMENTS OF DMS-6100, "EPOXIES AND ADHESIVES", MAY BE USED IF IT CAN BE DEMONSTRATED THAT THEY MEET OR EXCEED THE STRENGTH OF HILTI HIT RE 500 WITH THE SAME EMBEDMENT DEPTH AND THREADED ROD DIA. FOLLOW THE MANUFACTURER'S REQUIREMENTS FOR INSTALLING EPOXIED THREADED RODS. EXTEND RODS ¼" MIN. BEYOND NUT.

LOW FILL CULVERT POST

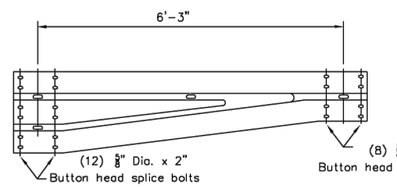
Culverts of 25 ft. or less, see TXDOT GF(31)LS standard for "Long Span" option.

GENERAL NOTES

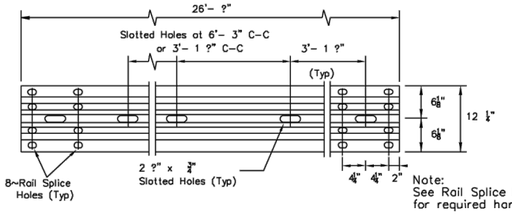
1. The type of post (round wood post, rectangular wood post, or steel post) will be as shown in the plans. The exact position of MBGF shall be shown in the plans or as directed by the Engineer. Steel posts to be galvanized in accordance with TxDOT Item 445, "Galvanizing."
2. Rail element shall meet the requirements of TxDOT Item 540,"Metal Beam Guard Fence" except as modified in the plans. The Contractor may furnish rail elements of 25'- 0", or 12'- 6" (nom.) lengths. Rail elements may have slotted holes at 3'-1?" C-C or 6'-3" C-C. A special length of rail may be manufactured to accommodate the downstream anchor terminal (DAT) and the transition sections of guardrail.
3. Button head "post" bolts (ASTM A307) shall be of sufficient length to extend through the full thickness of the nut (ASTM A563) and ⅝" washer and not more than 1" beyond it. Button head "splice" bolts (ASTM A307) are ⅝" x 1 ¼" (or 2" long at triple rail splices) with a ⅞" double recessed nut (ASTM A563). Thrie beam "connection" ⅞" dia. (ASTM A325) hex bolts shall be of sufficient length to extend through the full thickness of the rail, washers, and nuts.
4. Fittings (bolts, nuts, and washers) shall be galvanized in accordance with TxDOT Item 445, "Galvanizing." Fittings shall be subsidiary to the bid item.
5. Crown shall be widened to accommodate the Metal Beam Guard Fence.
6. The lateral approach to the guard fence, shall have a maximum slope of 1V:10H.
7. If shown elsewhere in the plans or as directed by the Engineer, the guard fence may be flared at a rate of 25:1 or flatter.
8. Unless otherwise shown in the plans, guard fence placed in the vicinity of curbs shall be positioned so that the face of curb is located directly below or behind the face of the rail. Rail placed over curbs shall be installed so that the post bolt is located approximately 25 inches above the gutter pan or edge of shoulder.
9. If solid rock is encountered within 0 to 18" of the finished grade, drill a 22" dia. hole, or drill two 12" dia. front to back overlapping holes, 24" into the rock. If solid rock is encountered below 18",drill a 12" dia. hole, 12" into the rock or to the standard embedment depth, whichever maybe less. Any excess post length, after meeting these depths, may be field cut to ensure proper guardrail mounting height. Backfill with a cohesionless material.
10. Posts shall not be set in concrete, of any depth.
11. Special fabrication will be required at installations having a curvature of less than 150 ft. radius.
12. Unless otherwise shown in the plans, a composite material post and/or block that meets the requirements of DMS-7210,"Composite Material Posts and Blocks for Metal Beam Guard Fence" may be substituted for posts and/or blocks of similar dimensions. The Construction Division, TxDOT maintains a Material Producer List (MPL) for producers of materials conforming to DMS-7210. Only producers on the MPL may furnish composite material posts and/or blocks.
13. For posts located partially or wholly between precast box culvert units, the use of a cast-in-place concrete closure between boxes is required. See Detail "A" on TXDOT Bridge Standards SCP-MD.



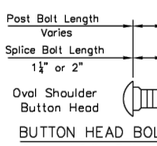
THRIE-BEAM TERMINAL CONNECTION
(SEE GENERAL NOTES 9 FOR REQUIRED HARDWARE)



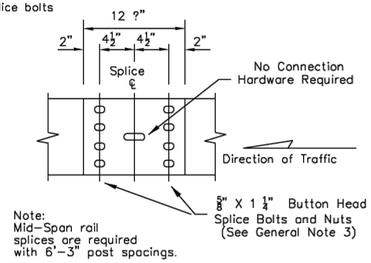
NON-SYMMETRICAL TRANSITION TO W-BEAM (10 Gauge)



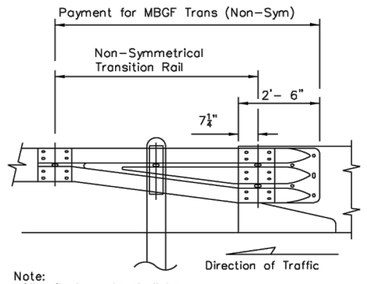
ELEVATION 25'- 0"(NOM.) W-BEAM SECTION
12'- 6" RAIL SECTIONS MAY ALSO BE SUPPLIED (SEE GENERAL NOTE 2)



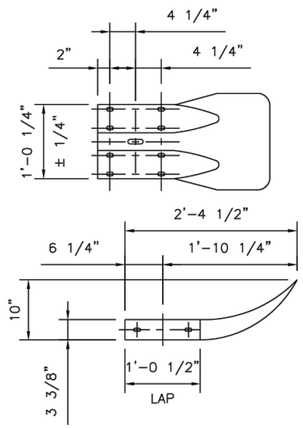
BUTTON HEAD BOLT
Post and Splice Bolts (See General Note 3)



MID-SPAN RAIL SPLICE DETAIL



DOWNSTREAM RAIL ATTACHMENT



TERMINAL SECTION

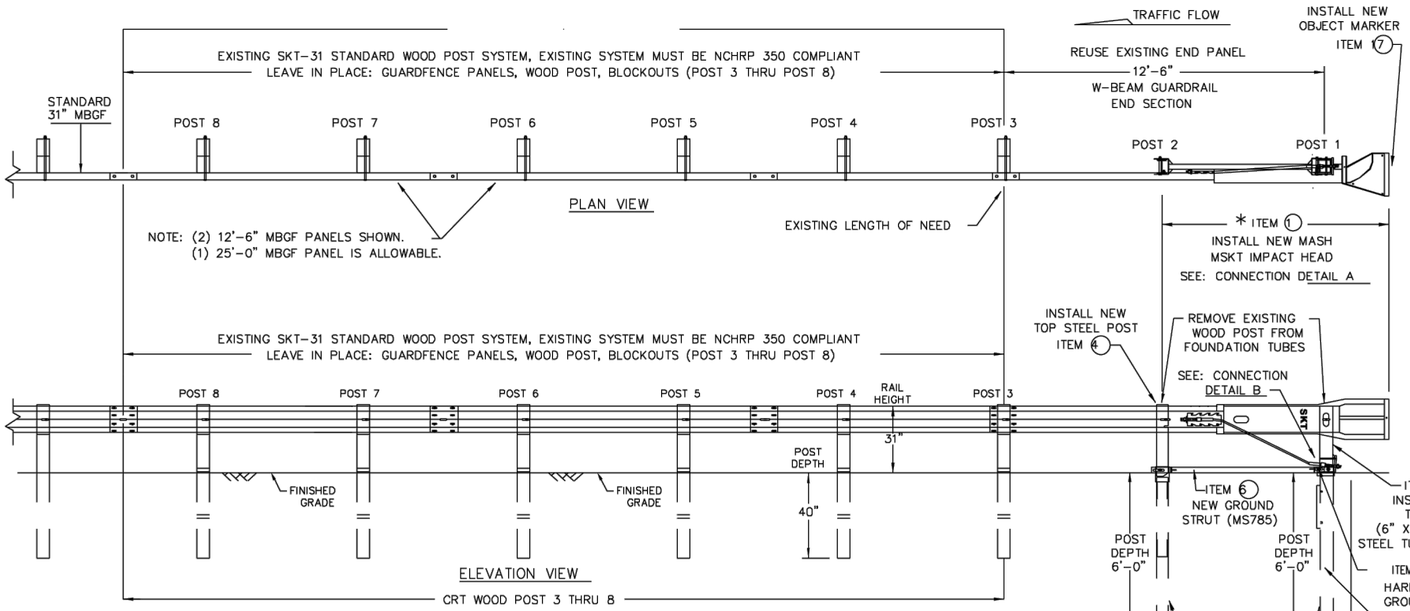
NO.	REVISIONS	DATE	NAME
1			
2			
3			
4			
5			

WALLER COUNTY
ENGINEERING DEPARTMENT

DOUBLE CULVERT ROAD SEGMENT 1

STANDARD DETAILS

PROJECT TITLE:		
DRAWN BY:		WCED STANDARD
CK'D BY:	SHEET DESCRIPTION: METAL BEAM GUARD FENCE	
SCALE:		SHEET NO: 61
DATE:	APPROVED BY:	

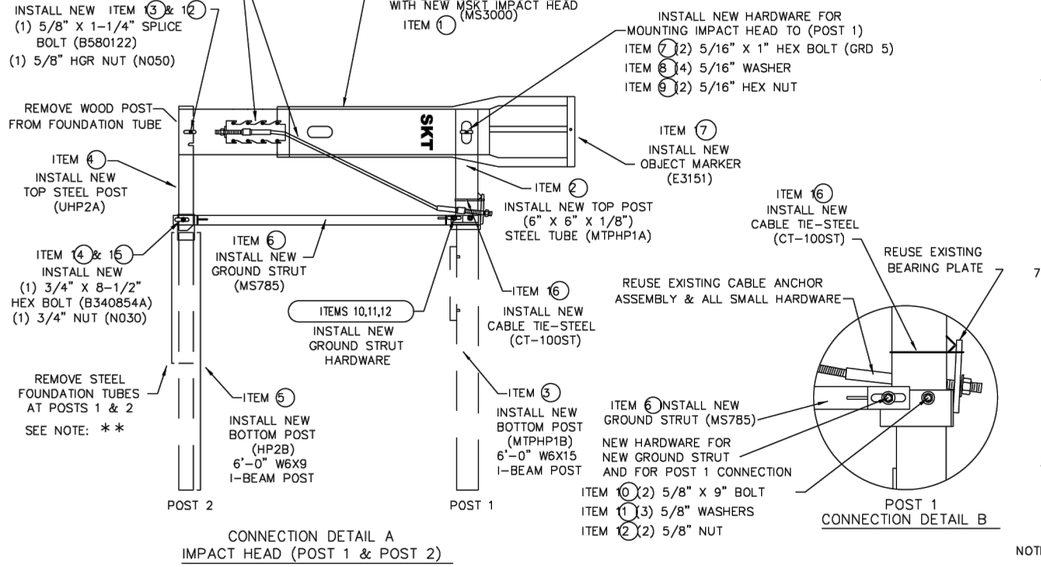


** NOTE: EXTRA SOIL COMPACTION WILL BE NEEDED AROUND NEW (POSTS 1 & 2) DUE TO THE REMOVAL OF THE STEEL FOUNDATION TUBES.

GENERAL NOTES

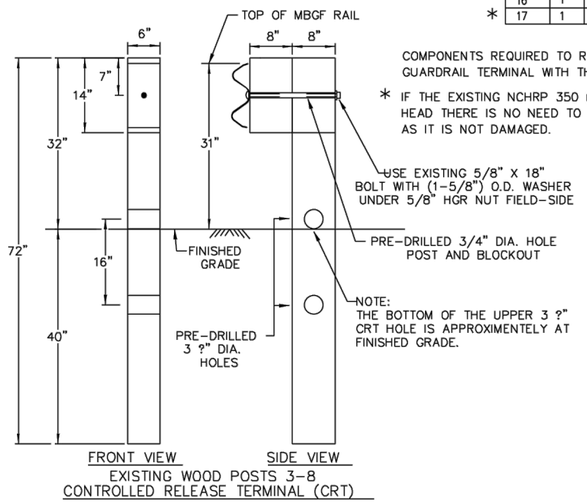
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: ROAD SYSTEMS, INC. (432)263-2435. 3616 OLD HOWARD COUNTY AIRPORT, BIG SPRING, TX 79720
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO; MSKT END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL (PUBLICATION~062717).
3. APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" ON THE FRONT FACE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
4. FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
5. HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH TxDOT ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. IF SOLID ROCK IS ENCOUNTERED IN THE AREA OF (POST 1) AND / OR (POST 2) CONTACT THE MANUFACTURER, AND REFER TO THE LATEST ROADWAY MBGF STANDARD FOR INSTALLATION GUIDANCE.
7. POSTS SHALL NOT BE SET IN CONCRETE.
8. THE EXISTING SKT 31" STANDARD WOOD POST SYSTEM MUST BE THOROUGHLY INSPECTED, AND DETERMINED TO BE INTACT, AND FREE OF ANY DAMAGE OR DEFECTS BEFORE RETROFITTING. THIS INSPECTION INCLUDES COMPLETING THE MSKT RETROFIT INSPECTION CHECKLIST FOR THE EXISTING SKT 31" WOOD POST NCHRP 350 SYSTEM. ALL EXISTING, AND REUSABLE PARTS MUST BE FREE OF ANY DAMAGE FOR A MASH COMPLIANT RETROFIT.
9. UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE MSKT SYSTEM BE CURVED.
10. A FLARE RATE OF UP TO 25:1 MAY BE USED TO PREVENT THE TERMINAL HEAD FROM ENCROACHING ON THE SHOULDER. THE FLARE MAY BE DECREASED OR ELIMINATED FOR SPECIFIC INSTALLATIONS, IF DIRECTED BY THE ENGINEER.
11. SPECIAL DRIVING CAP TO BE USED WHEN DRIVING (LOWER POSTS 1 & 2) TO PREVENT DAMAGE TO THE WELDED PLATES.

	ITEMS	QTY	MAIN SYSTEM COMPONENTS	PART NUMBERS
*	1	1	MSKT IMPACT HEAD	MS3000
	2	1	POST 1 – TOP (6" X 6" X 1/8" TUBE)	MTPHP1A
	3	1	POST 1 – BOTTOM (6' W6X15)	MTPHP1B
	4	1	POST 2 – ASSEMBLY TOP	UHP2A
	5	1	POST 2 – ASSEMBLY BOTTOM (6' W6X9)	HP2B
	6	1	GROUND STRUT	MS785
	7	2	5/16" X 1" HEX BOLT (GRD 5)	B516014A
	8	4	5/16" WASHERS	W0516
	9	2	5/16" HEX NUT	N0516
	10	2	5/8" X 9" HEX BOLT (GRD A449)	B580904A
	11	3	5/8" WASHERS	W050
	12	3	5/8" H.G.R NUT	N050
	13	1	5/8" X 1-1/4" SPLICE BOLT	B580122
	14	1	3/4" X 8-1/2" HEX BOLT (GRD 5)	B340854A
	15	1	3/4" HEX NUT	N030
	16	1	CABLE TIE-STEEL	CT-100ST
*	17	1	OBJECT MARKER 18" X 18"	E3151



CONNECTION DETAIL A
IMPACT HEAD (POST 1 & POST 2)

POST 1
CONNECTION DETAIL B



EXISTING WOOD POSTS 3-8
CONTROLLED RELEASE TERMINAL (CRT)

COMPONENTS REQUIRED TO RETROFIT: EXISTING 31" WOOD POST (NCHRP 350 SKT) GUARDRAIL TERMINAL WITH THE NEW 31" (MASH COMPLIANT MSKT IMPACT HEAD).

* IF THE EXISTING NCHRP 350 (31" WOOD POST SKT) ALREADY HAS THE MSKT IMPACT HEAD THERE IS NO NEED TO REPLACE THE IMPACT HEAD OR OBJECT MARKER AS LONG AS IT IS NOT DAMAGED.

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

NO.	REVISIONS	DATE	NAME
1			
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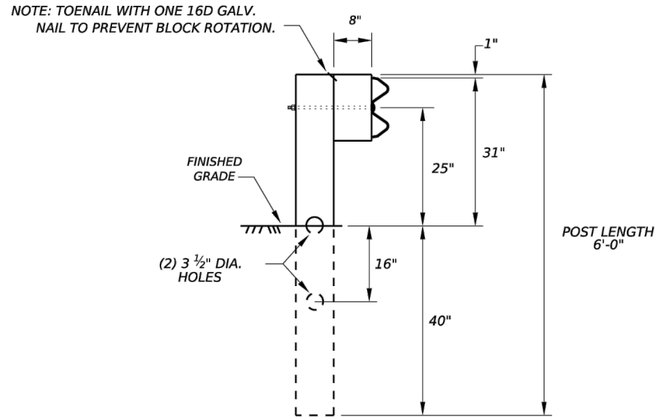
WALLER COUNTY
ENGINEERING DEPARTMENT

DOUBLE CULVERT ROAD
SEGMENT 1
STANDARD DETAILS

PROJECT TITLE:
DRAWN BY:
CK'D BY:
SHEET DESCRIPTION: SINGLE GUARDRAIL TERMINAL
SCALE:
DATE:
APPROVED BY:
WCED STANDARD
SHEET NO: 62

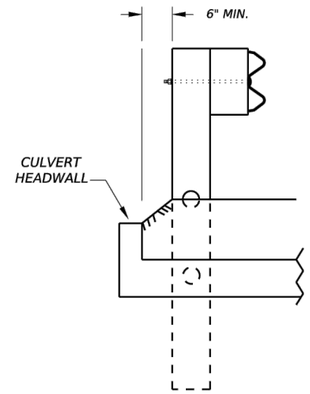
DISCLAIMER:
THE USE OF THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING PRACTICE ACT". NO WARRANTY OF ANY KIND IS MADE BY TXDOT FOR ANY PURPOSE WHATSOEVER. TXDOT ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.

DATE:
FILE:



RECTANGULAR CRT POST (6"X 8" X 6' LONG)

(6) CRT REQUIRED
SEE ELEVATION DETAIL FOR LOCATIONS



LATERAL OFFSET BETWEEN THE GUARDRAIL AND THE CULVERT HEADWALL

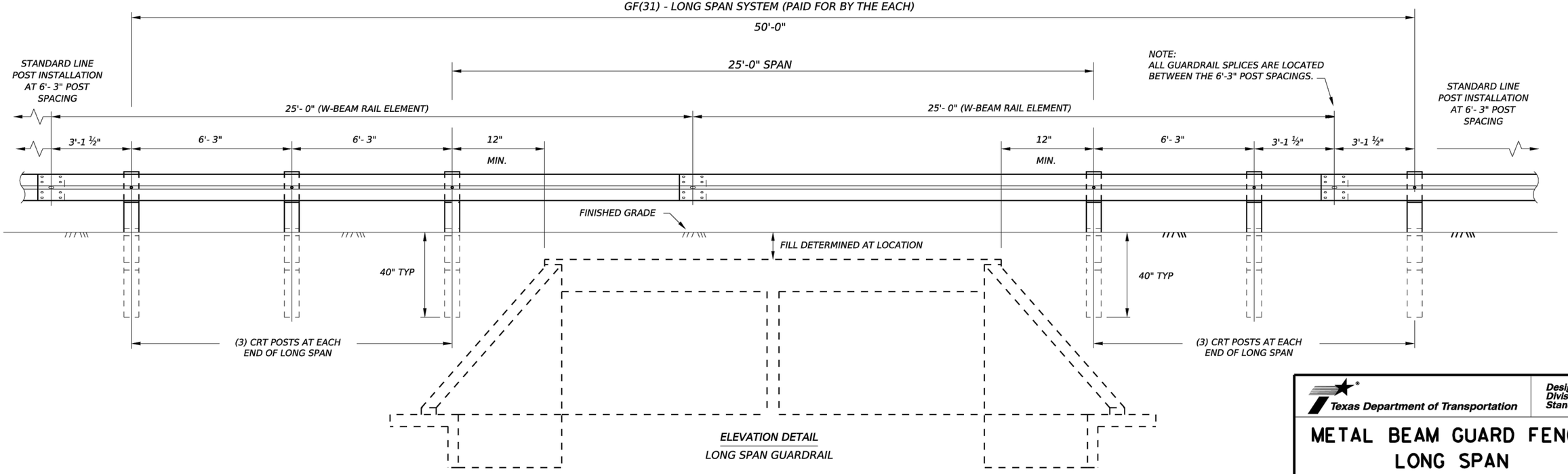
GENERAL NOTES

1. THE TYPE OF LINE POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF THE TRANSITIONS SHALL BE AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENT SHALL MEET ALL REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 12'- 6" OR 25'- 0" NOMINAL LENGTHS.
3. RAIL POST HOLES ARE OFFSET 3'- 1 ½" FROM STANDARD GUARDRAIL TO ACCOMMODATE THE MIDSPAN SPLICING.
4. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND ⅝" WASHER (FWC16a) AND NO MORE THAN 1" BEYOND IT.
5. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
7. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
8. REFER TO GF(31) STANDARD SHEET FOR ADDITIONAL DETAILS.
9. FLAME CUTTING OF HOLES IN GUARDRAIL SHALL NOT BE PERMITTED. IF YOU ENCOUNTER MIS-ALIGNED BOLT HOLES IN GUARDRAIL CONTACT THE DESIGN DIVISION FOR ADDITIONAL INFORMATION & OPTIONS.

NOTE: SEE GF(31) STANDARD FOR STANDARD LINE POSTS.

DIRECTION OF TRAFFIC

GF(31) - LONG SPAN SYSTEM (PAID FOR BY THE EACH)



ELEVATION DETAIL
LONG SPAN GUARDRAIL

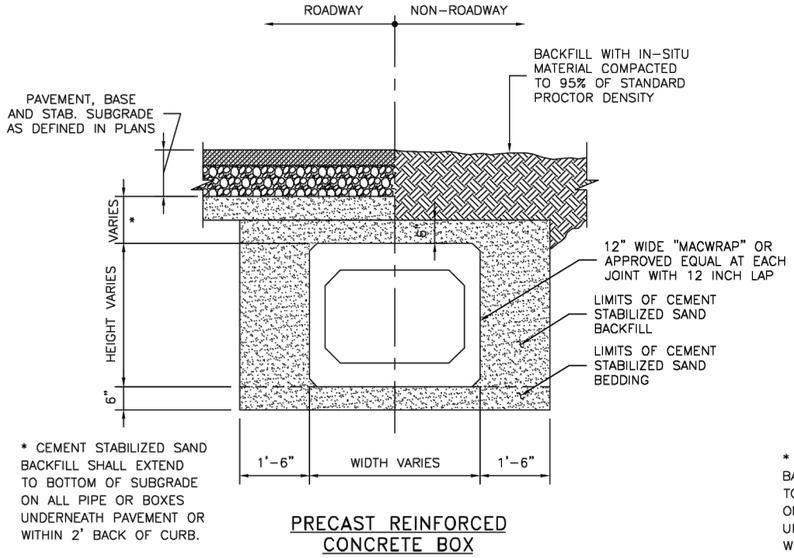
Texas Department of Transportation

Design Division Standard

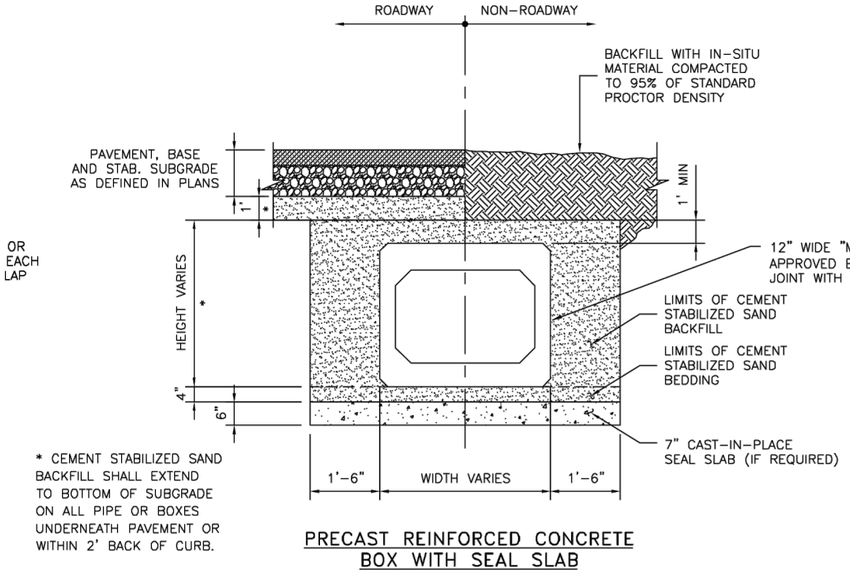
METAL BEAM GUARD FENCE LONG SPAN TL-3 MASH COMPLIANT

GF(31)LS-19

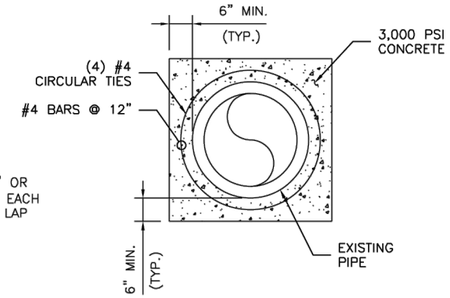
FILE: gf31ls19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG		
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB		HIGHWAY	
REVISIONS						
	DIST	COUNTY			SHEET NO.	
					63	



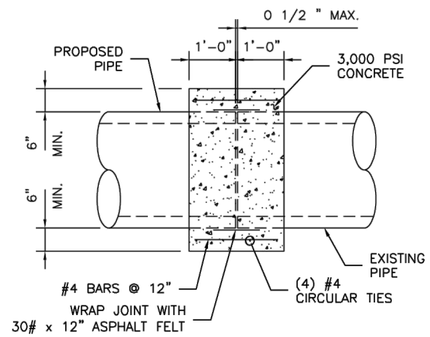
PRECAST REINFORCED CONCRETE BOX



PRECAST REINFORCED CONCRETE BOX WITH SEAL SLAB

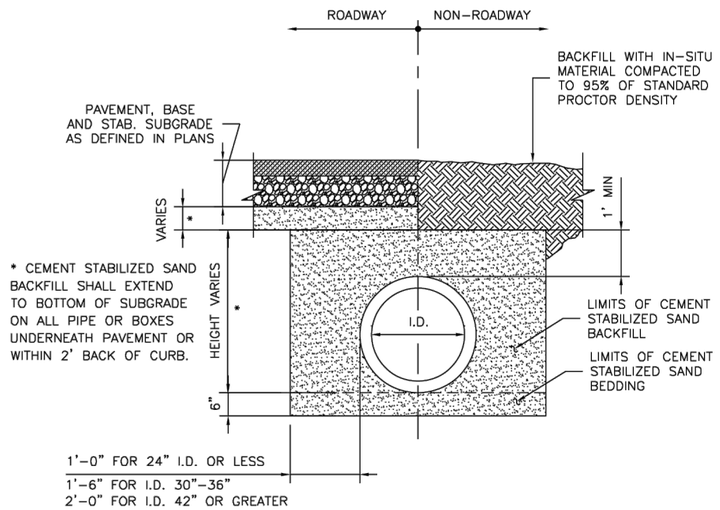


SECTION VIEW

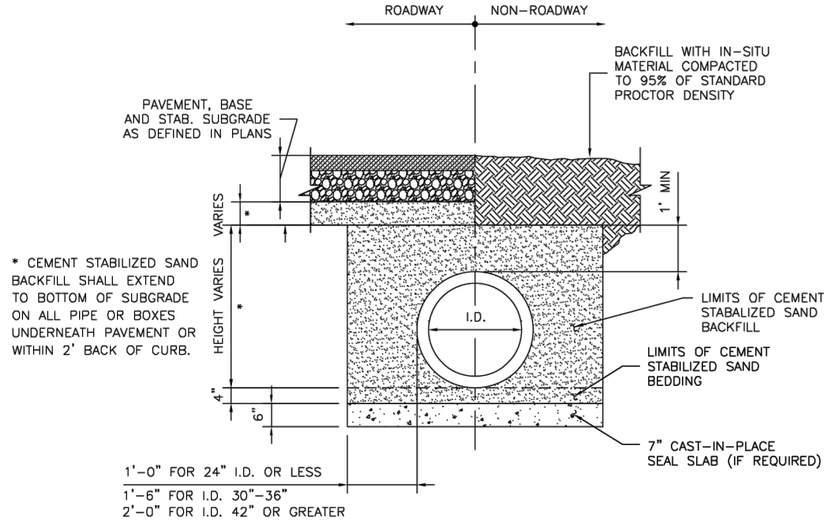


ELEVATION VIEW

TYPICAL CONCRETE COLLAR FOR 36" & SMALLER RCP



REINFORCED CONCRETE PIPE & POLYPROPYLENE (GRAY) PIPE
SEE NOTE 4



REINFORCED CONCRETE PIPE WITH SEAL SLAB

GENERAL NOTES:

1. FOR RCP LARGER THAN 36" DIAMETER, CONCRETE COLLARS MUST BE DESIGNED BY THE ENGINEER OF RECORD.
2. ALL TRENCHES IN ROW SHALL BE BACKFILLED WITH 2 SACKS/CY CEMENT STABILIZED SAND (HC ITEM 400) TO SUBGRADE. COMPACTED TO 95% STANDARD PROCTOR DENSITY BOTTOM OF SUBGRADE
3. CEMENT STABILIZED SAND IS INCIDENTAL TO INSTALLATION
4. USE OF POLYPROPYLENE PIPE SHALL FOLLOW HC SPEC ITEM 482 AND MUST ALSO BE APPROVED BY THE AGENCY THAT WILL MAINTAIN IT. ALL JOINTS SHALL BE WATER TIGHT AND BEDDING REQUIREMENTS SHALL FOLLOW HC ITEM SPEC ITEM 400.
5. ALL OUTFALLS INTO WC MAINTAINED DRAINAGE FACILITIES SHALL BE POLYMER COATED CMP, RCP, OR RCB, AS APPLICABLE.

NO.	REVISIONS	DATE	NAME
1			
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WALLER COUNTY
ENGINEERING DEPARTMENT

DOUBLE CULVERT ROAD SEGMENT 1

STANDARD DETAILS

PROJECT TITLE:

DRAWN BY:

CK'D BY:

SHEET DESCRIPTION: STORM SEWER CONSTRUCTION DETAILS

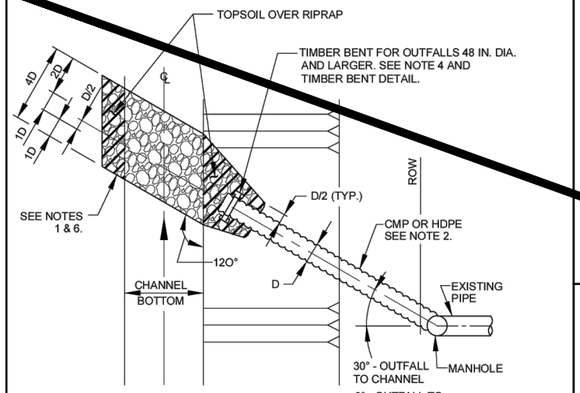
SCALE:

DATE:

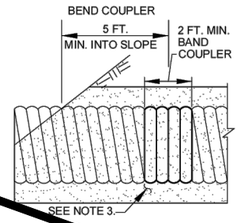
APPROVED BY:

WCED STANDARD

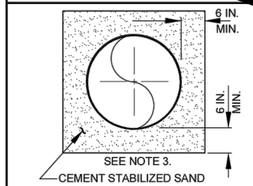
SHEET NO: 64



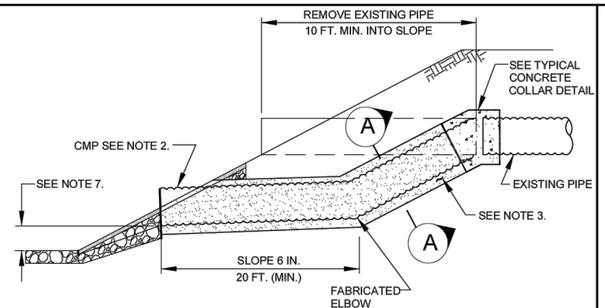
TYPICAL STORM SEWER OUTFALL STRUCTURE LAYOUT



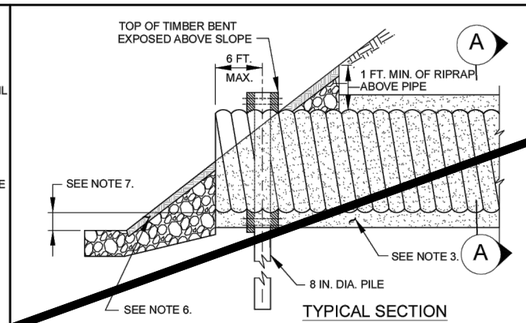
CMP BAND COUPLER DETAIL



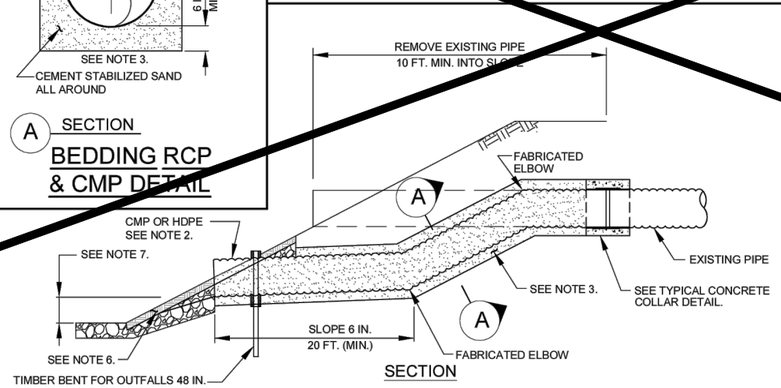
BEDDING RCP & CMP DETAIL



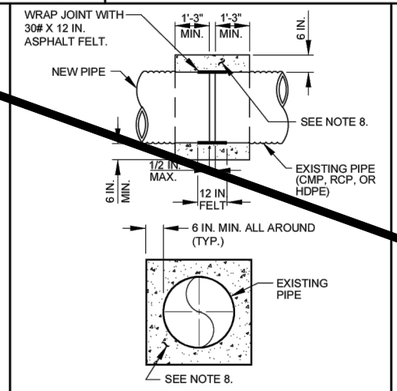
PIPE ADJUSTMENT DETAIL 24-INCH TO 42-INCH DIAMETER



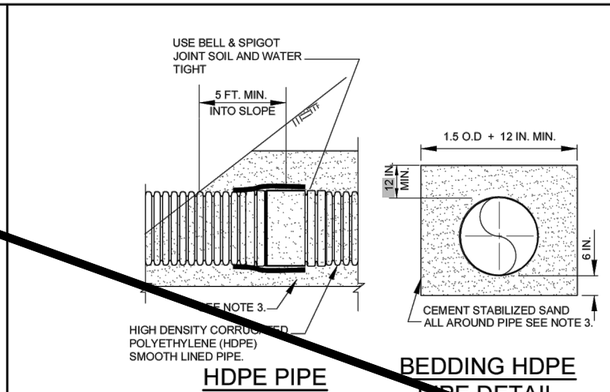
TIMBER BENT DETAIL FOR 48-INCH CMP; 36-INCH HDPE AND LARGER OUTFALLS



PIPE ADJUSTMENT DETAIL 48-INCH AND LARGER DIAMETER



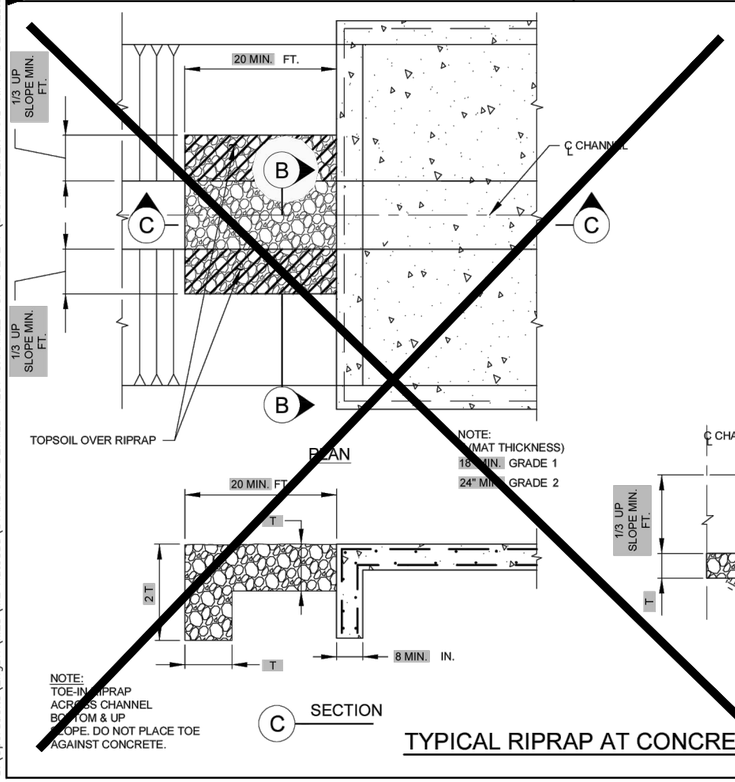
CONCRETE COLLAR DETAIL

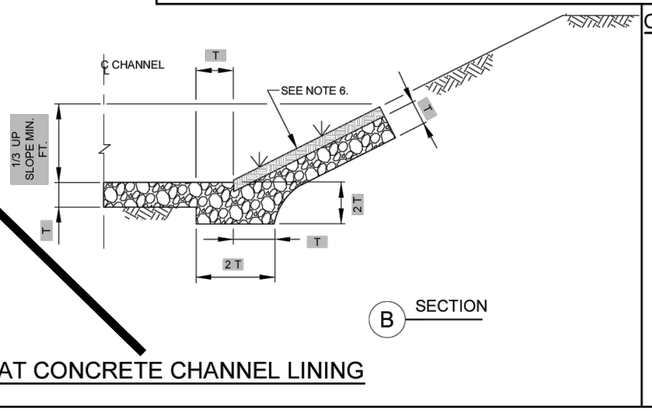


DOUBLE CULVERT ROAD
SEGMENT 1

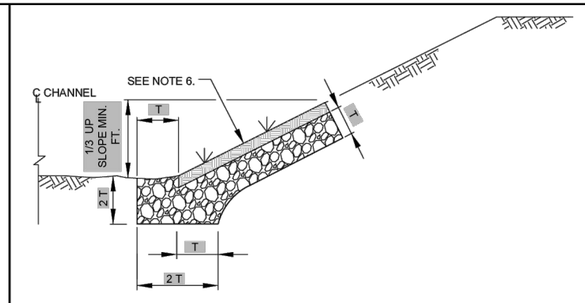
STORM SEWER AND RIPRAP DETAILS

REV	DESCRIPTION	DATE	APPR





TYPICAL RIPRAP AT CONCRETE CHANNEL LINING



TYPICAL RIPRAP LINING DETAIL-SIDE SLOPE ONLY

PIPE OUTFALL IN CHANNELS

BOTTOM WIDTH	PIPE OUTLET INVERT
6 FEET ≤ BW ≤ 20 FT	1 FOOT ABOVE FLOWLINE *
20 FEET < BW ≤ 60 FT	AT TOE OF SLOPE *
BW > 60 FT	AT TOE OF SLOPE *

* OR 1 FOOT ABOVE NORMAL WATER LEVEL, WHICHEVER IS HIGHER

CORRUGATED GALVANIZED STEEL PIPE (TYPE I)

	2-2/3" X 1/2" CORRUGATION					3" X 1" & 5" X 1" CORRUGATION				
PIPE DIA. (in.)	MIN. FILL* (in.)	SHEET THICKNESS gage	(in.)	(mm)		MIN. FILL* (in.)	SHEET THICKNESS gage	(in.)	(mm)	
24	12	16	.064	1.63		-	-	-	-	
30	12	16	.064	1.63		-	-	-	-	
36	12	16	.064	1.63		-	-	-	-	
42	12	16	.064	1.63		12	16	.064	1.63	
48	12	16	.064	1.63		12	16	.064	1.63	
54	12	14	.079	2.01		12	16	.064	1.63	
60	15	12	.109	2.77		12	16	.064	1.63	
66	15	12	.109	2.77		15	16	.064	1.63	
72	18	10	.138	3.51		15	16	.064	1.63	
78	18	8	.168	4.27		18	16	.064	1.63	
84	18	8	.168	4.27		18	14	.079	2.01	
90	-	-	-	-		18	14	.079	2.01	
96	-	-	-	-		18	14	.079	2.01	

* MINIMUM DEPTH OF COVER ABOVE TOP OF PIPE, MAXIMUM DEPTH OF COVER ABOVE TOP OF PIPE IS 20 FEET.

NOTES:

1. INSTALL RIPRAP EROSION PROTECTION IN GRASS LINED CHANNELS AND DETENTION BASINS FOR ANY SIZE STORM SEWER PIPE AND TREATMENT PLANT OUTFALL, DIMENSIONED AS SHOWN IN "TYPICAL STORM SEWER OUTFALL STRUCTURE LAYOUT."
2. STORM SEWER OUTFALL PIPES WITHIN THE HCFCD RIGHT-OF-WAY SHALL BE CMP OR HDPE IN ACCORDANCE WITH SPECIFICATION SECTION 02642-CORRUGATED METAL PIPE, HIGH DENSITY POLYETHYLENE PIPE (HDPE) IN ACCORDANCE WITH SPECIFICATION SECTION 02505-HIGH DENSITY POLYETHYLENE PIPE, OR APPROVED EQUAL. USE TABLE BELOW FOR CORRUGATED GALVANIZED STEEL PIPE.
3. PROVIDE AND PLACE CEMENT STABILIZED SAND IN ACCORDANCE WITH SPECIFICATION SECTION NO. 02321-CEMENT STABILIZED SAND.
4. TIMBER BENTS SHALL BE IN ACCORDANCE WITH SPECIFICATION SECTION 02464-TIMBER BENTS.
5. EXCAVATION, FILL, AND BACKFILL FOR STORM SEWER OUTFALLS SHALL BE IN ACCORDANCE WITH SPECIFICATION SECTION 02316- STRUCTURAL EXCAVATING AND BACKFILLING.
6. RIPRAP SHALL BE PLACED IN ACCORDANCE WITH SPECIFICATION SECTION 02378-RIPRAP AND GRANULAR FILL. FILL RIPRAP VOIDS AND BURY RIPRAP A MINIMUM OF 6 INCHES WITH TOPSOIL ON SIDE SLOPE AS DIRECTED BY THE ENGINEER.
7. IN DETENTION BASINS, SET FLOWLINE OF OUTFALL AT TOE OF THE SLOPE OR FLOWLINE OF PILOT CHANNEL. IN CHANNEL, USE ELEVATION INDICATED IN THE PIPE OUTFALL IN CHANNELS TABLE.
8. STRUCTURAL CONCRETE #4 BARS (GRADE 40) 12 INCH O.C. EACH WAY - FOR COLLARS ONLY. WAIT A MINIMUM OF 24 HOURS AFTER PLACING CONCRETE TO BACKFILL.
9. FOR RCP OUTFALL IN GRASS LINED CHANNELS AND DETENTION BASINS, USE HEADWALL/ WINGWALL/APRON DETAIL ON SHEET _____. FOR RCP OUTFALL IN CONCRETE LINED CHANNEL AND DETENTION BASINS , SEE HCFCD CONCRETE CHANNEL LINING DETAILS.

THIS DETAIL SHEET HAS BEEN PREPARED FOR USE ON HCFCD PROJECTS OR PROJECTS TO BE MAINTAINED BY THE HCFCD WHEN COMPLETED BY OTHERS. AN ENGINEER WHO INCORPORATES THE DETAILS ON THIS SHEET BECOMES RESPONSIBLE FOR ITS USE IN THE END PRODUCT IN ACCORDANCE WITH RULE 137.33 (b) AND (c) OF THE TEXAS BOARD OF PROFESSIONAL ENGINEERS.

P.E. SEAL AND SIGNATURE

ENGINEER - CONFIRM, CHANGE, OR FILL IN.

PREPARED: CHECKED: APPROVED:

HARRIS COUNTY FLOOD CONTROL DISTRICT
9900 Northwest Freeway
Houston, Texas 77092

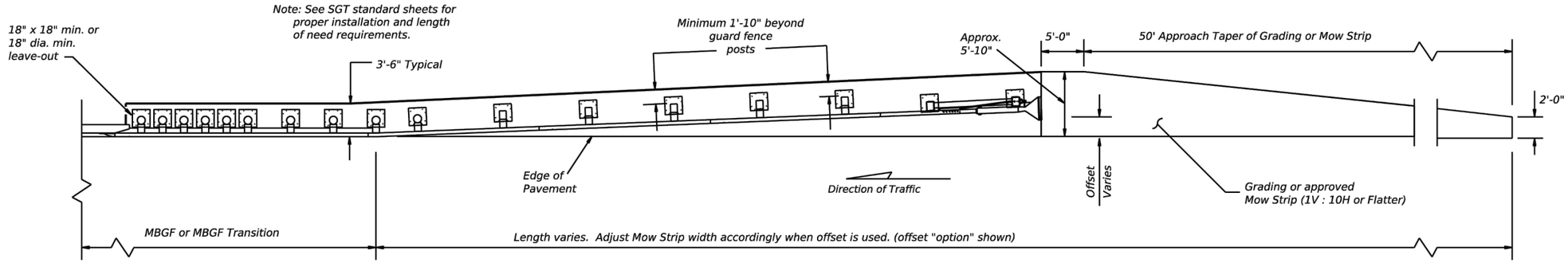
DATE: 10-23-2018
SCALE: NTS

SHEET NUMBER
65

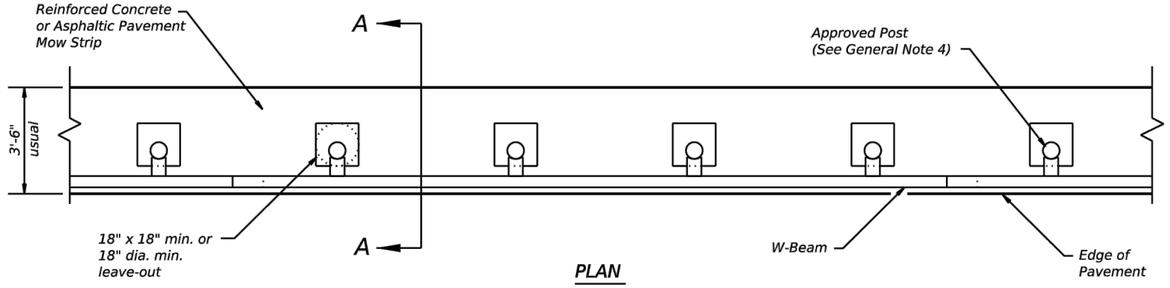
S:\Operations\EngDiv\MED\ME Autocad\STANDARD DETAILS PILOT CHANNEL FOR STEVE F\STORM SEWER AND RIPRAP DETAILS.dwg

DISCLAIMER:
THE USE OF THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING PRACTICE ACT". NO WARRANTY OF ANY KIND IS MADE BY TXDOT FOR ANY PURPOSE WHATSOEVER. TXDOT ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.

DATE:
FILE:

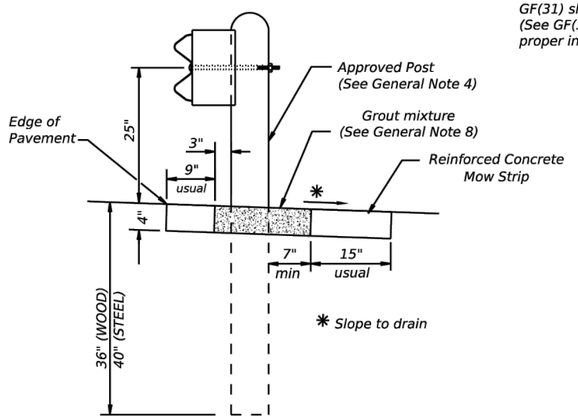


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



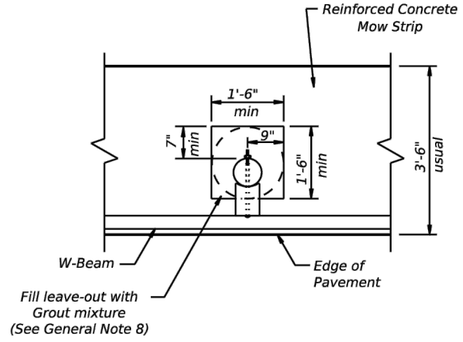
PLAN

GF(31) shown with Mow Strip
(See GF(31) standard sheet for
proper installation)



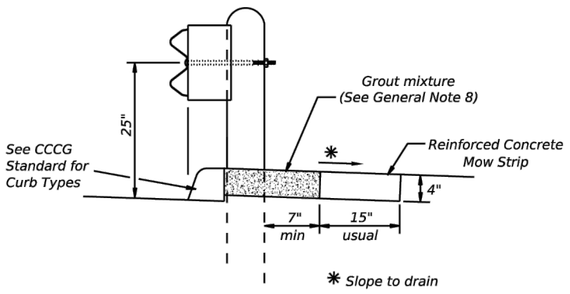
SECTION A-A

Typical



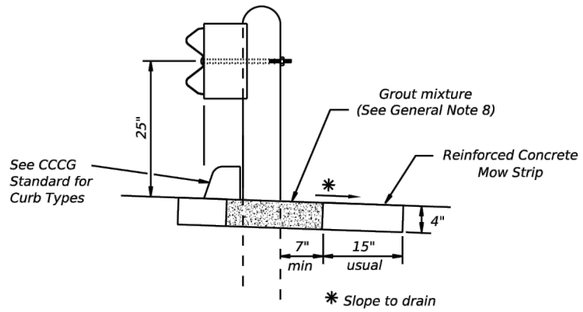
MOW STRIP DETAIL

Reinforced Concrete Mow Strip
with 18" x 18" Square or
18" Dia. minimum leave-out.



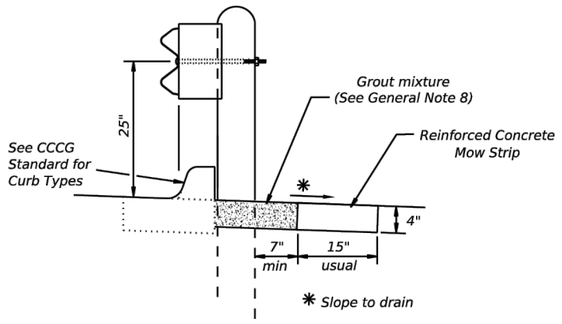
CURB OPTION (1)

This option will increase the post
embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Note: Site Condition(s)

Site conditions may exist where grading is required for the proper installation of metal guard fence and end treatments.

Approach grading or mow strip may be decreased or eliminated, as directed by the Engineer.

GENERAL NOTES

1. This mow strip design is for use with metal beam guard fence, guard fence transitions, and guard fence end treatments. See applicable GF(31) MBGF or GF(31) Transition Standard sheet for additional information.
2. Mow strips shall be reinforced concrete with (wire mesh or synthetic fiber), as shown on the plans and will be paid for under the pertinent bid item. Reinforced concrete shall be placed in accordance with Item 432, "Riprap." The use of the synthetic fiber in lieu of steel reinforcing is acceptable, provided the fiber producer is on the Department Material Producer List (MPL), maintained by TxDOT, Construction Division.
3. The leave-out behind the post shall be a minimum of 7".
4. Only steel (W6 x 8.5 or W6 x 9.0), or 7 ½" Dia. round wood posts are acceptable for use in the mow strip. See GF(31) Standard for additional details.
5. Other curb placement options may be used. Curbs are not considered part of the mow strip and will be paid for under other pertinent bid item.
6. Thickness of the mow strip will be 4".
7. The limits of payment for reinforced concrete will include leave-outs for the posts.
8. The leave-outs shall be filled with a Grout mixture consisting of: 2719 pounds sand, 188 pounds Type 1 or II cement, and 550 pounds of water per cubic yard, with a 28-day compressive strength of approximately 230 psi or less. Provide grout with a consistency that will flow into and completely fill all voids. Due to auger size, larger leave-out dimensions are acceptable from both an impact performance and maintenance repair standpoint (Suggested Maximum leave-out of 20"). Payment for furnishing and placing the grout mixture will be subsidiary to the pay item of riprap mow strip.

Texas Department of Transportation

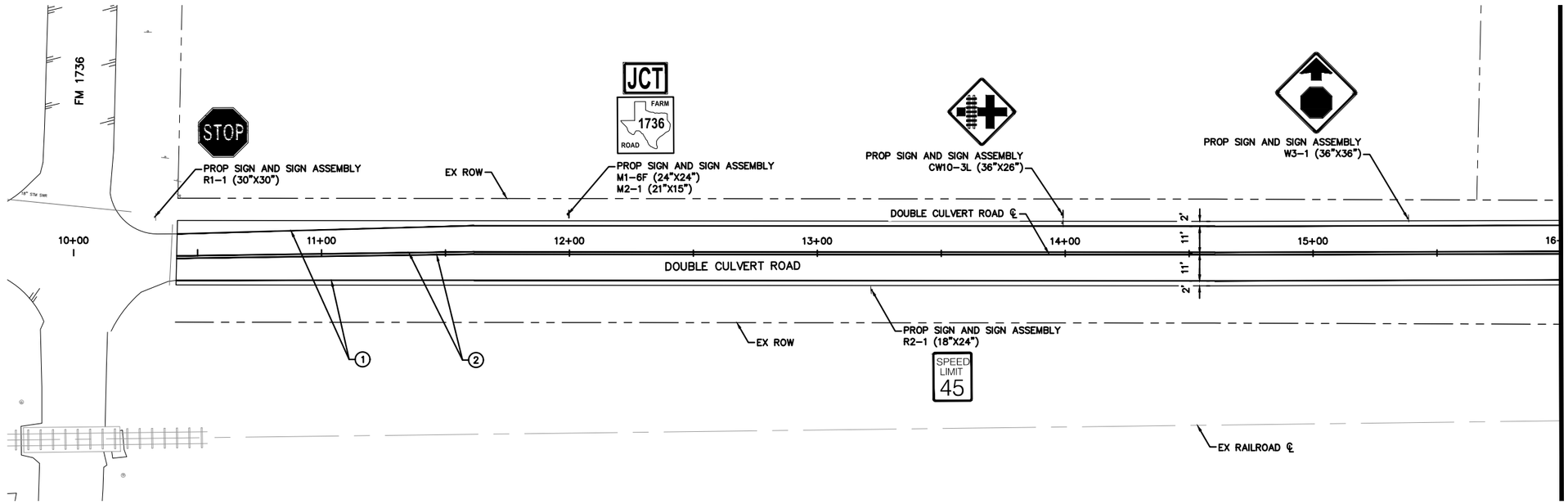
Design Division Standard

METAL BEAM GUARD FENCE (MOW STRIP) TL-3 MASH COMPLIANT

GF(31)MS-19

FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY	
REVISIONS					
	DIST	COUNTY		SHEET NO.	
				66	

100% SUBMITTAL

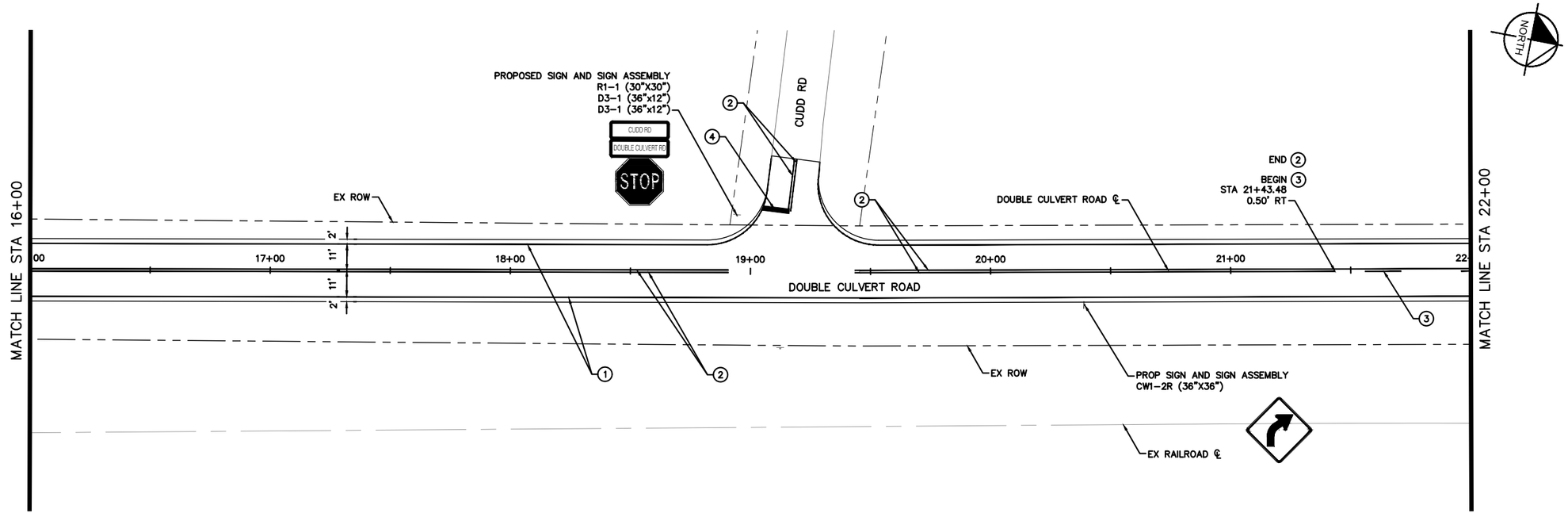


STRIPING LEGEND

1	INSTALL 4" SOLID WHITE EDGE LINE
2	INSTALL 4" SOLID YELLOW EDGE LINE
3	INSTALL 4" DASHED YELLOW LINE (15' DASH, 25' GAP)
4	INSTALL 24" STOP BAR MARKING
5	INSTALL RAILROAD CROSSING MARKINGS
XX	PROPOSED D-SW

NOTES

1. CONTRACTOR IS RESPONSIBLE FOR RELOCATION OF ANY SIGNS AND COORDINATION WITH THE COUNTY ON ANY NECESSARY MODIFICATIONS.



07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM

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TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
PAVEMENT MARKING
AND SIGNING
BEGIN TO STA 22 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		67

DATE: 7/28/2026 10:05:46 PM
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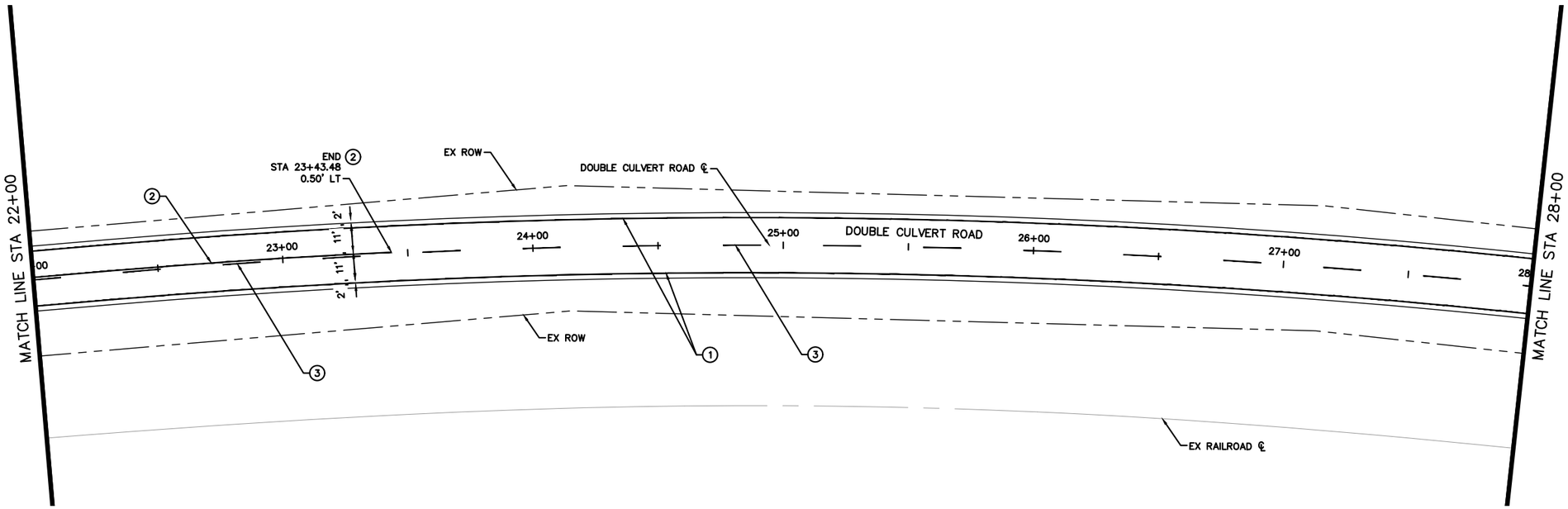
100% SUBMITTAL



GRAPHIC SCALE IN FEET
0 25 50

STRIPING LEGEND

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XX	PROPOSED D-SW

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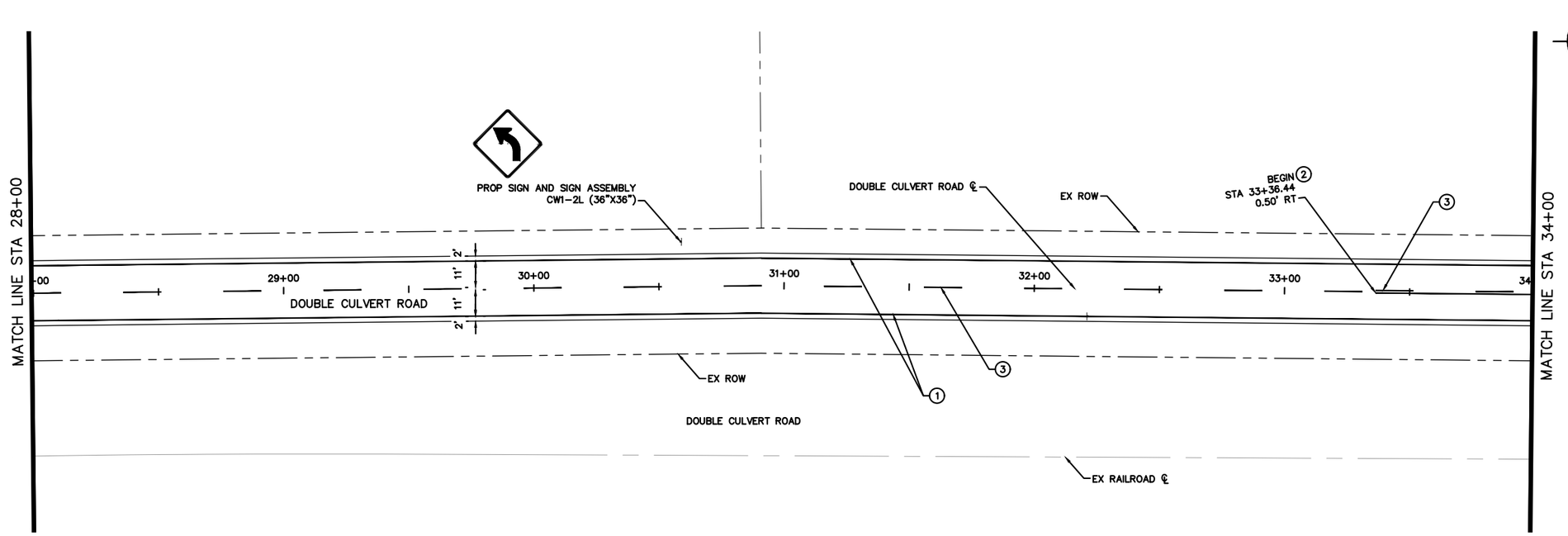

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

THE STATE OF TEXAS WALLER COUNTY

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
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DOUBLE CULVERT ROAD
SEGMENT 1
PAVEMENT MARKING
AND SIGNING
STA 22 00.00 TO STA 34 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		68

DATE: 7/28/2026 10:05:51 PM
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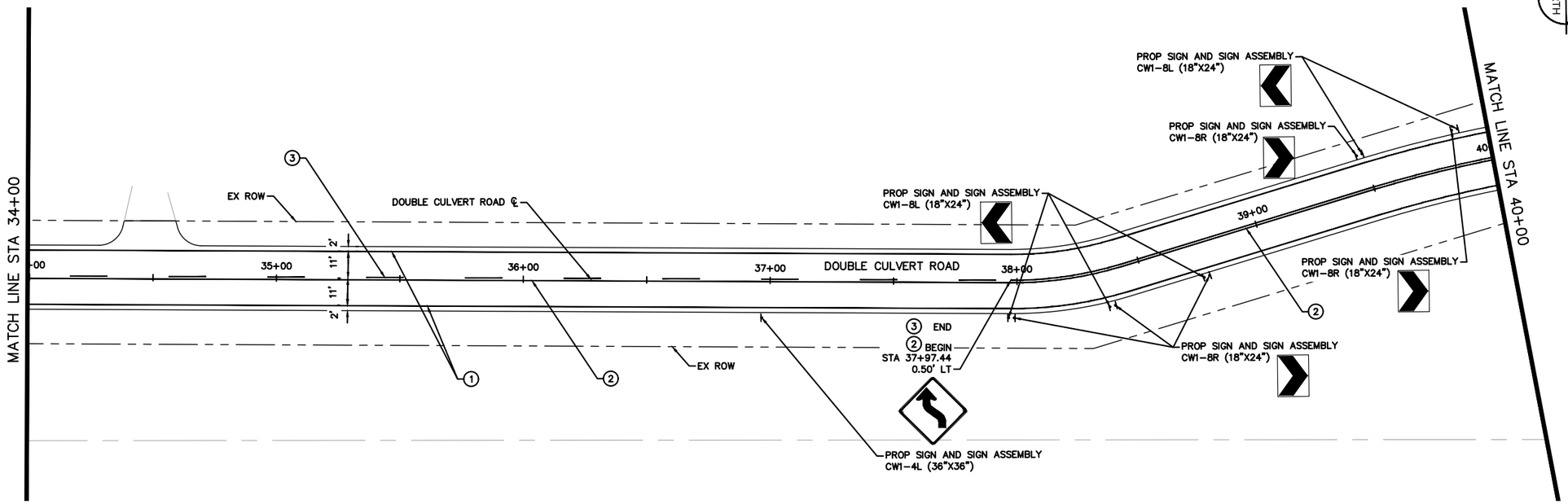

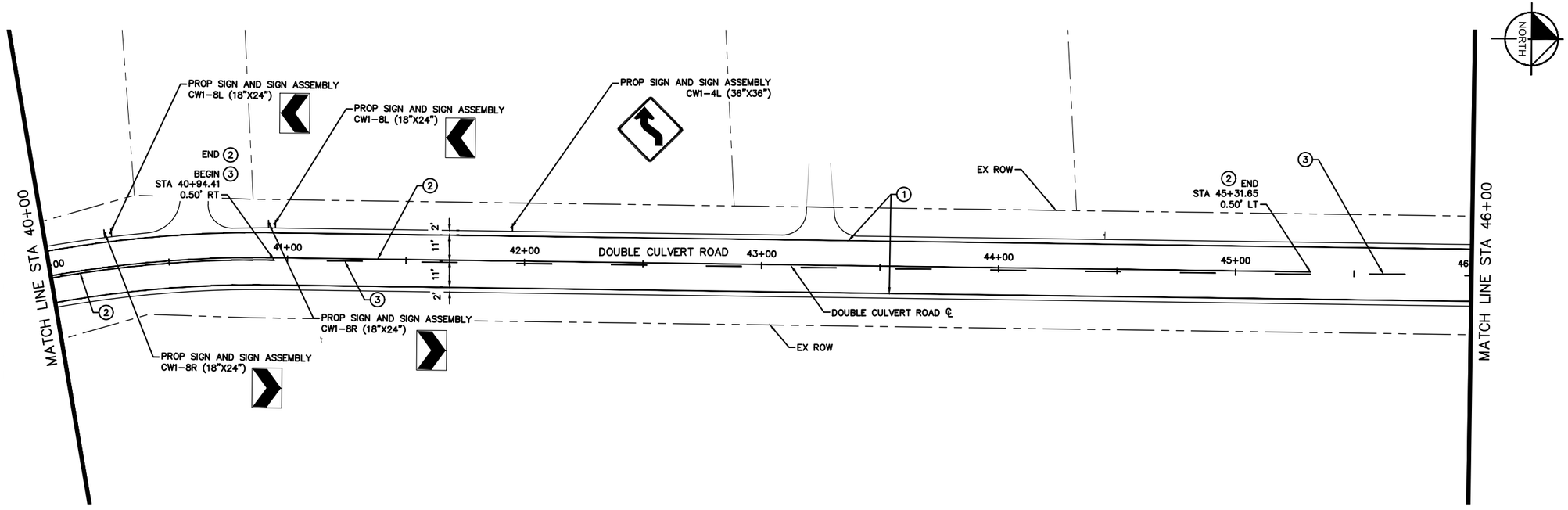

NORTH

GRAPHIC SCALE IN FEET
0 25 50

STRIPING LEGEND

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5	INSTALL RAILROAD CROSSING MARKINGS
xDx	PROPOSED D-SW

NOTES

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07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

DATE: 7/28/2026 10:05:57 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Pavement Mar_ing and Signing - 10_00.00 TO 58_00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
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11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
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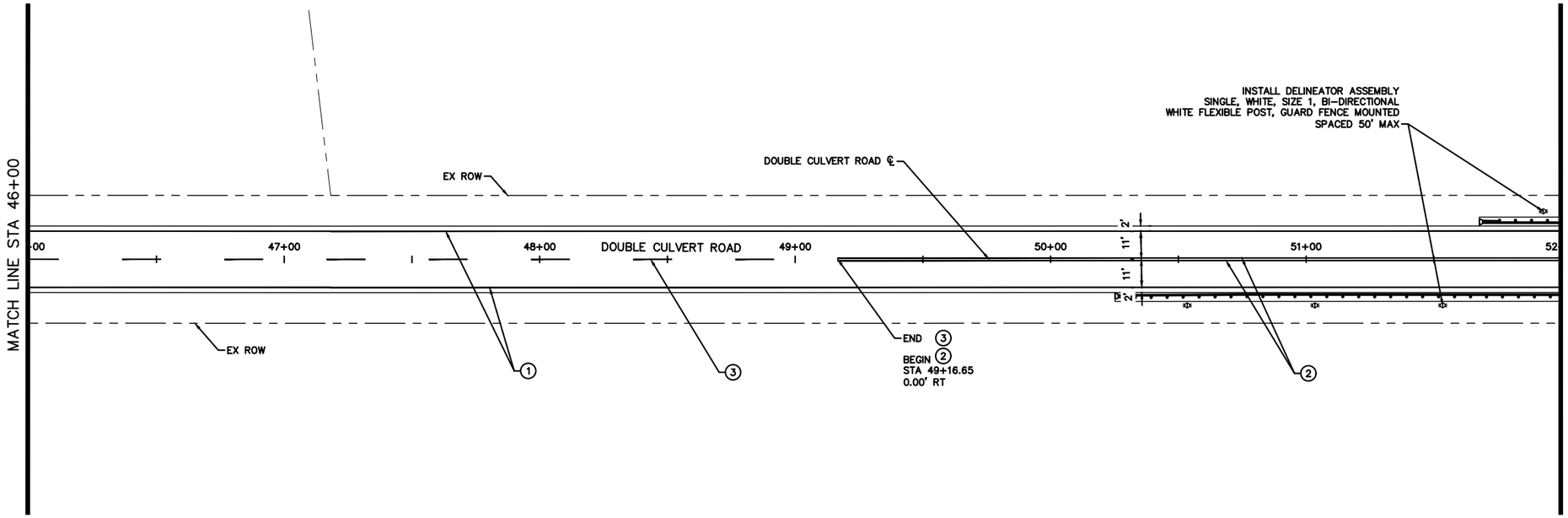
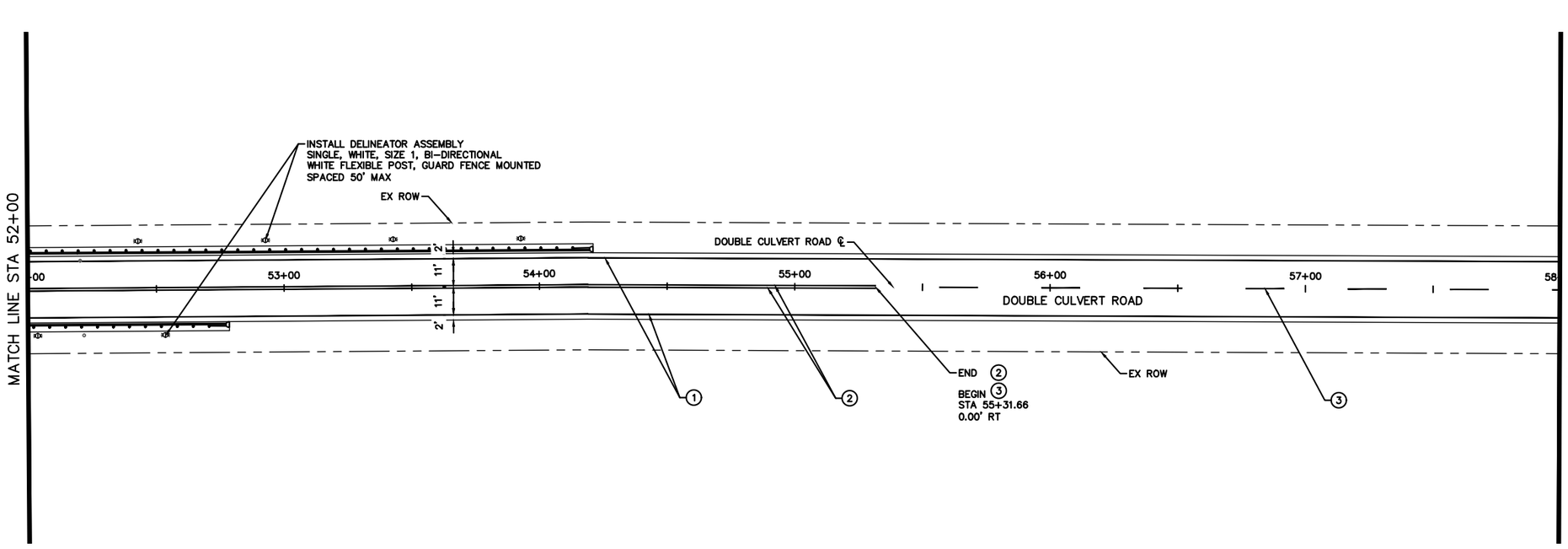
DOUBLE CULVERT ROAD
SEGMENT 1
PAVEMENT MARKING
AND SIGNING
STA 34 00.00 TO STA 46 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		69

100% SUBMITTAL





NORTH

GRAPHIC SCALE IN FEET
0 25 50

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⋇	PROPOSED D-SW

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07/28/2026
ABBEY M. POLZIN
151558
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PROFESSIONAL ENGINEER
STATE OF TEXAS
Abbey Polzin

DATE: 7/28/2026 10:06:03 PM
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REV. NO.	DATE	DESCRIPTION	BY

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DOUBLE CULVERT ROAD
SEGMENT 1
PAVEMENT MARKING
AND SIGNING
STA 46 00.00 TO STA 58 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
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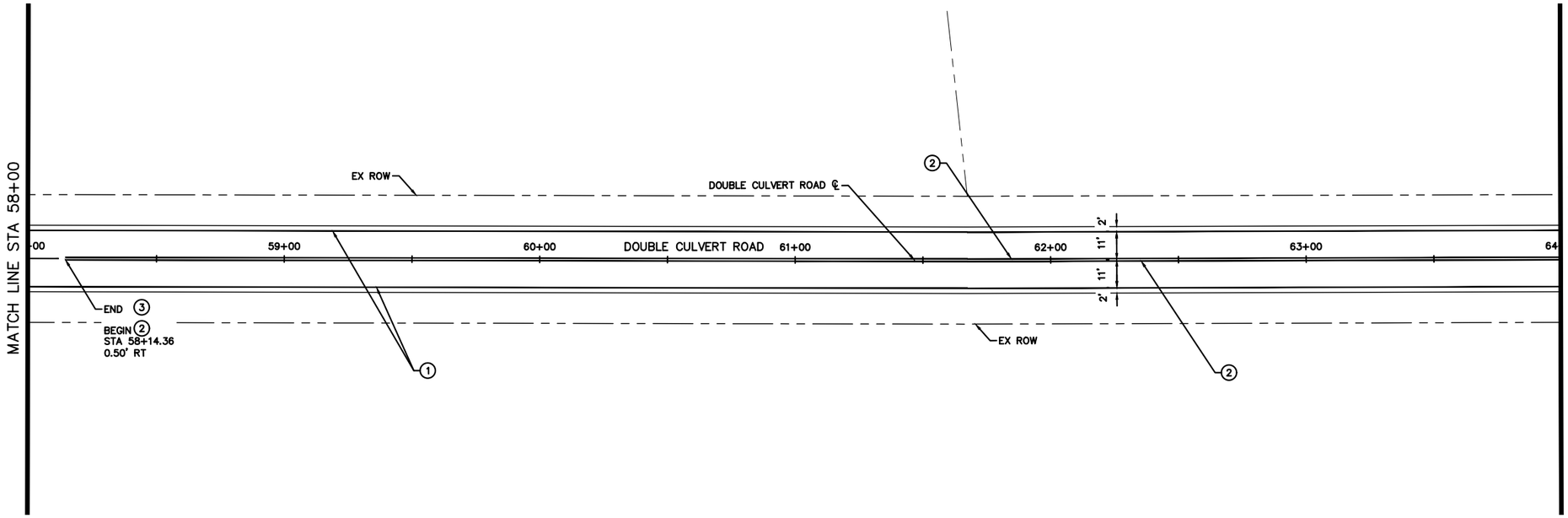

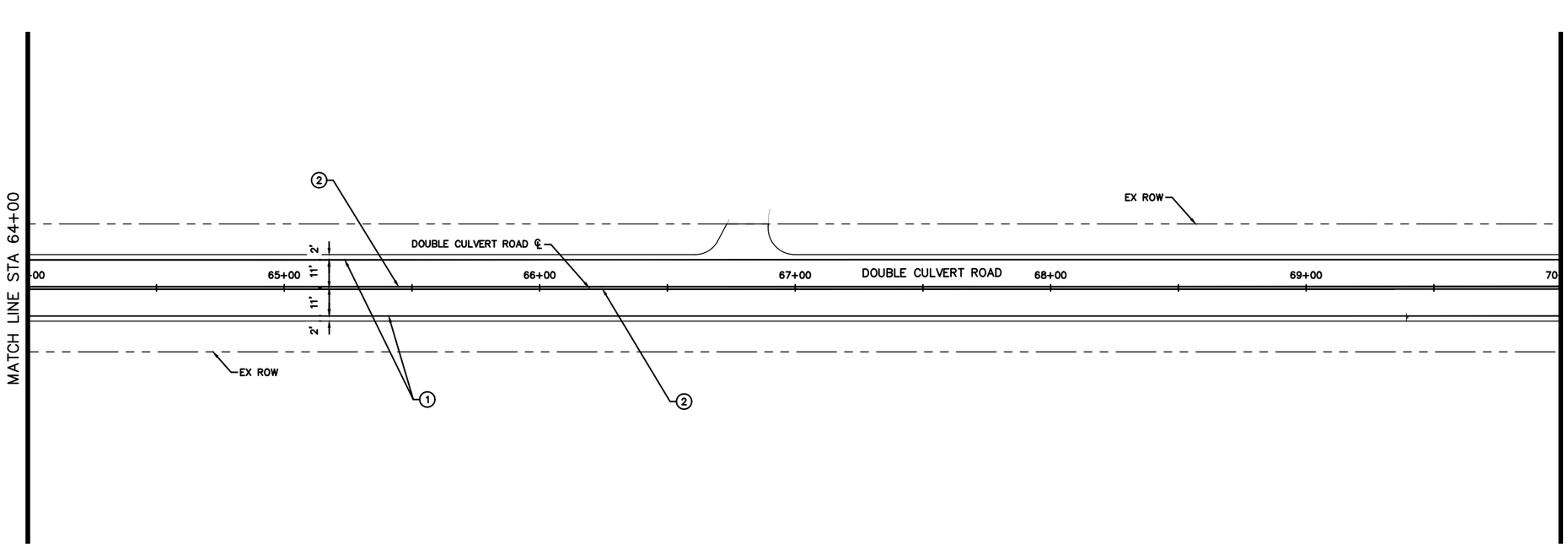

GRAPHIC SCALE IN FEET
0 25 50

NORTH

STRIPING LEGEND

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07/28/2026
STATE OF TEXAS
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Abbey Polzin

DATE: 7/28/2026 10:06:30 PM
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REV. NO.	DATE	DESCRIPTION	BY

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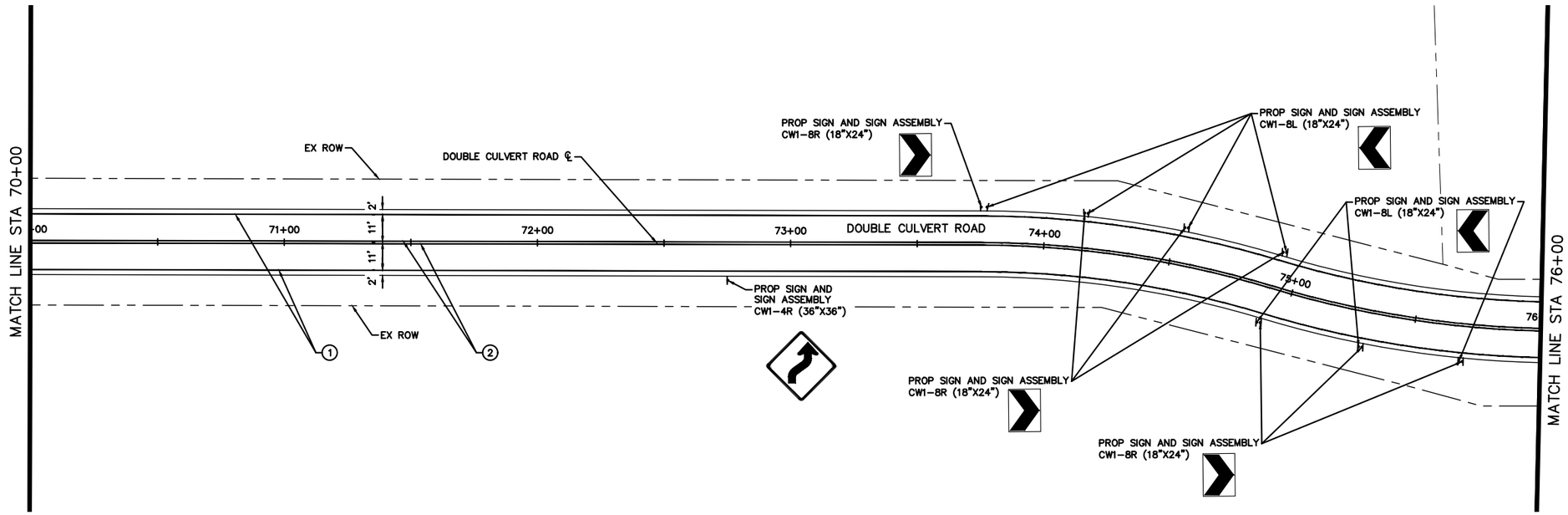
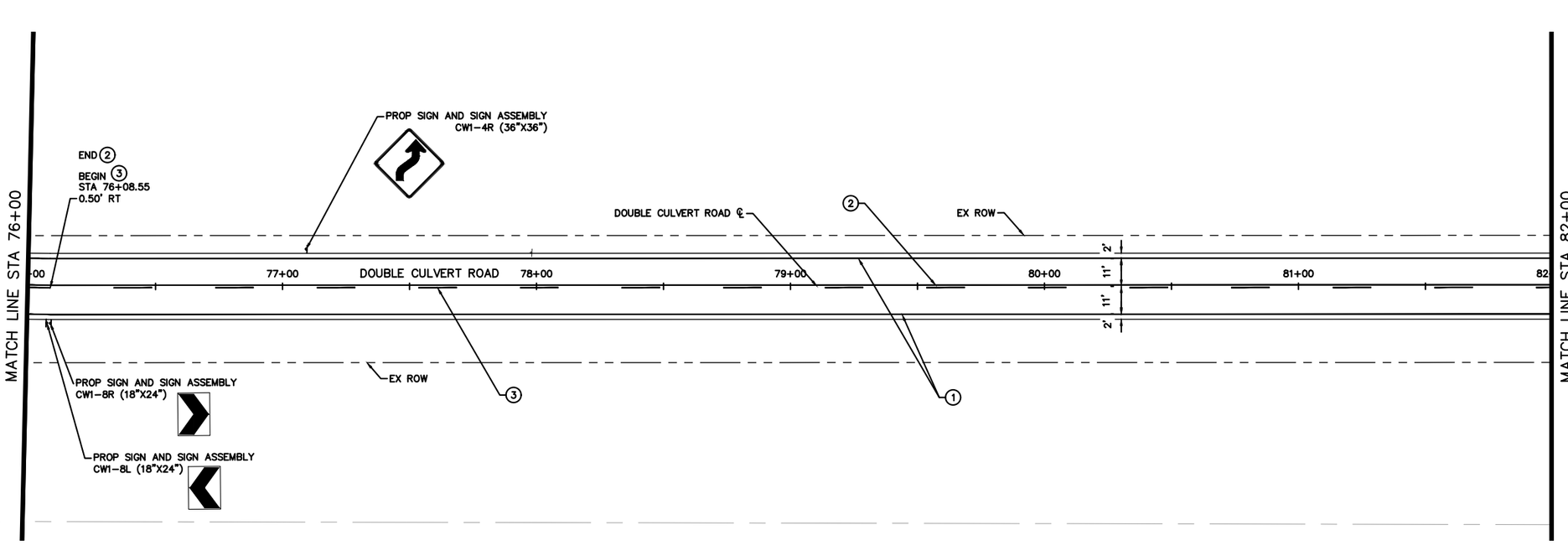
DOUBLE CULVERT ROAD
SEGMENT 1
PAVEMENT MARKING
AND SIGNING
STA 58 00.00 TO STA 70 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		71

100% SUBMITTAL





NORTH

GRAPHIC SCALE IN FEET
0 25 50

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STATE OF TEXAS
ABBEY M. POLZIN
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Abbey Polzin

DATE: 7/28/2026 10:06:36 PM
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REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

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PHONE: 281-597-9300
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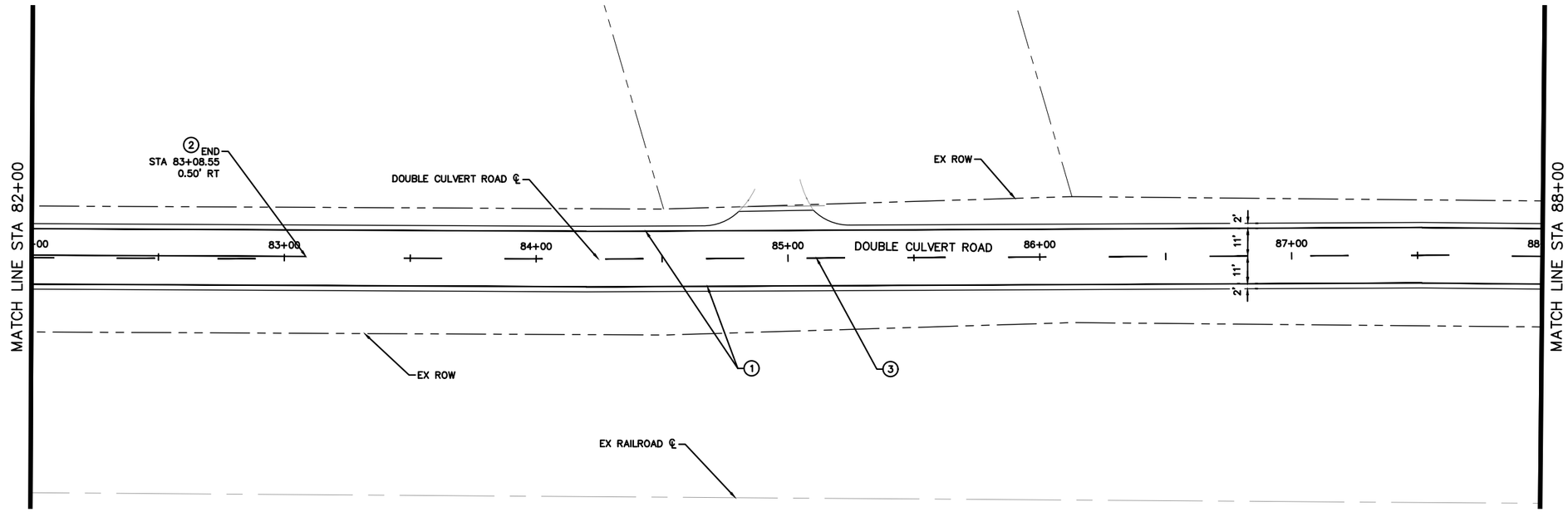
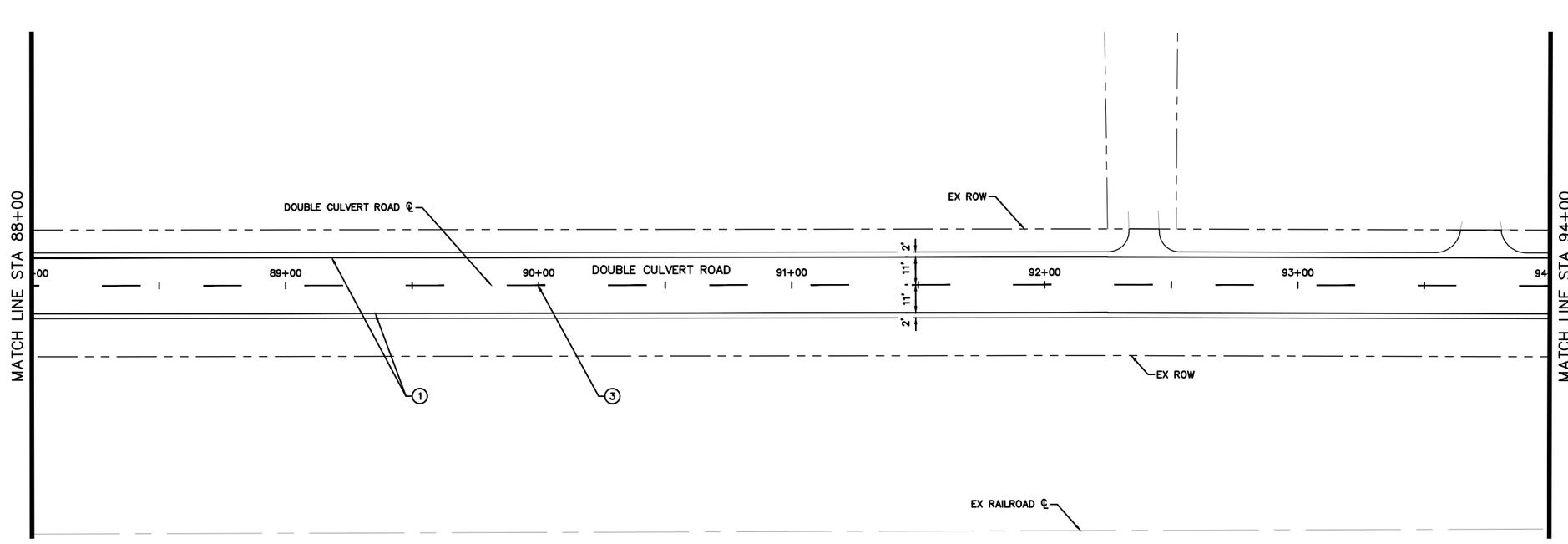
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
PAVEMENT MARKING AND SIGNING
STA 70 00.00 TO STA 82 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		72

100% SUBMITTAL





NORTH

GRAPHIC SCALE IN FEET
0 25 50

STRIPING LEGEND

1	INSTALL 4" SOLID WHITE EDGE LINE
2	INSTALL 4" SOLID YELLOW EDGE LINE
3	INSTALL 4" DASHED YELLOW LINE (15' DASH, 25' GAP)
4	INSTALL 24" STOP BAR MARKING
5	INSTALL RAILROAD CROSSING MARKINGS
XX	PROPOSED D-SW

NOTES

1. CONTRACTOR IS RESPONSIBLE FOR RELOCATION OF ANY SIGNS AND COORDINATION WITH THE COUNTY ON ANY NECESSARY MODIFICATIONS.

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

DATE: 7/28/2026 10:06:41 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Pavement Mar ing and Signing - 58_00.00 TO 106_00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM

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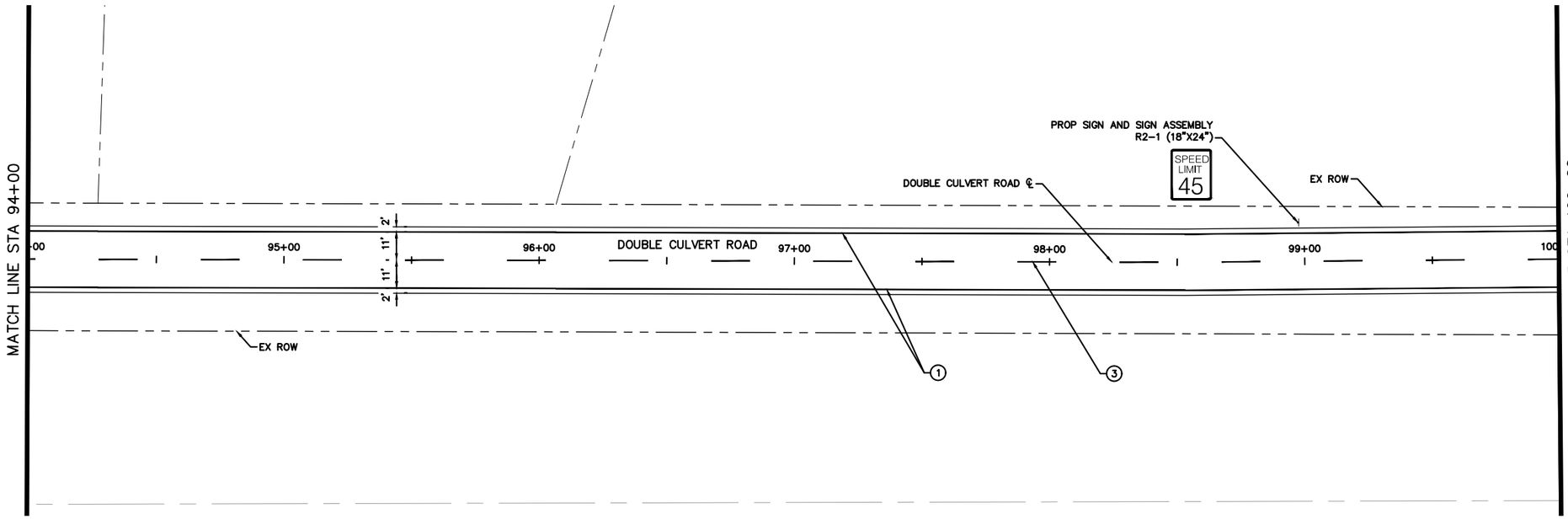
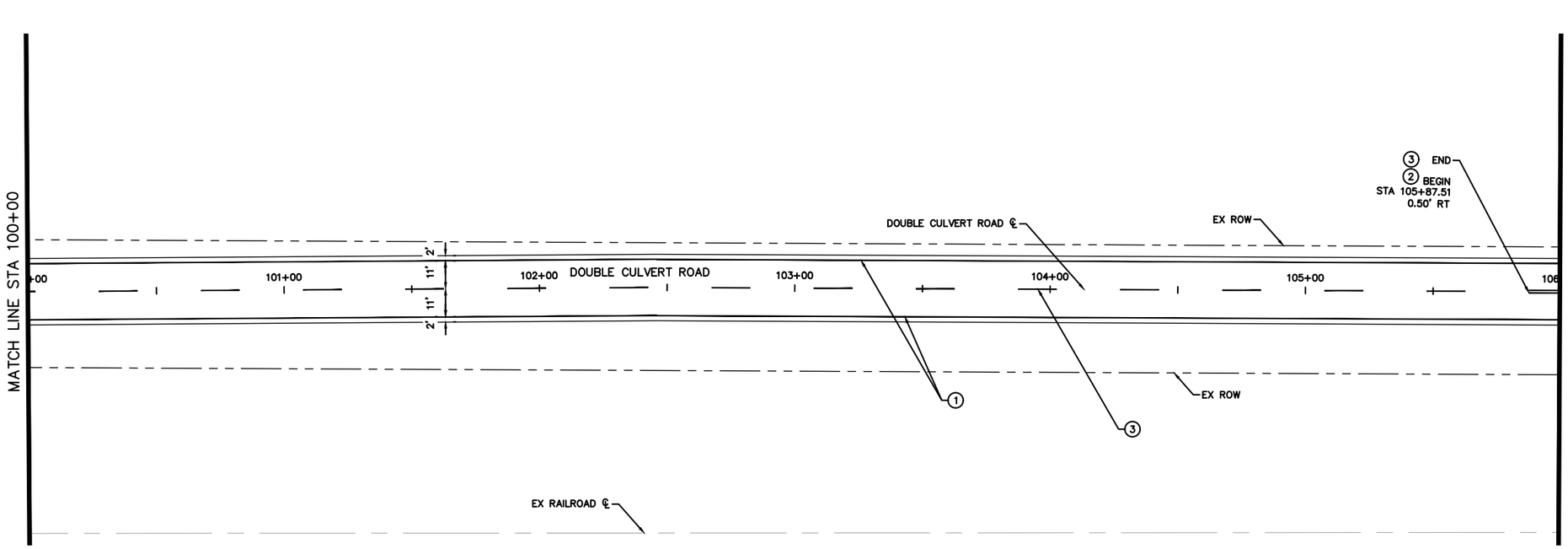
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
PAVEMENT MARKING
AND SIGNING
STA 82 00.00 TO STA 94 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		73

100% SUBMITTAL





GRAPHIC SCALE IN FEET
0 25 50

NORTH

STRIPING LEGEND

1	INSTALL 4" SOLID WHITE EDGE LINE
2	INSTALL 4" SOLID YELLOW EDGE LINE
3	INSTALL 4" DASHED YELLOW LINE (15' DASH, 25' GAP)
4	INSTALL 24" STOP BAR MARKING
5	INSTALL RAILROAD CROSSING MARKINGS
xDx	PROPOSED D-SW

NOTES

1. CONTRACTOR IS RESPONSIBLE FOR RELOCATION OF ANY SIGNS AND COORDINATION WITH THE COUNTY ON ANY NECESSARY MODIFICATIONS.

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

DATE: 7/28/2026 10:06:47 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Pavement Mar ing and Signing - 58_00.00 TO 106_00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

THE STATE OF TEXAS WALLER COUNTY

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
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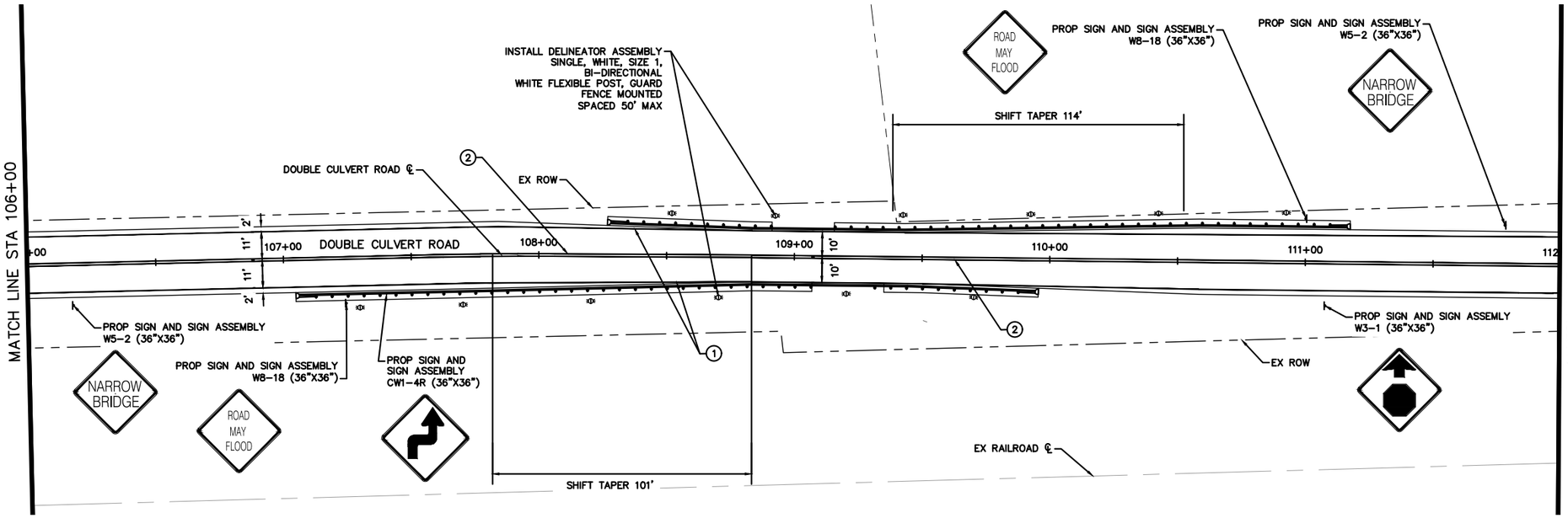
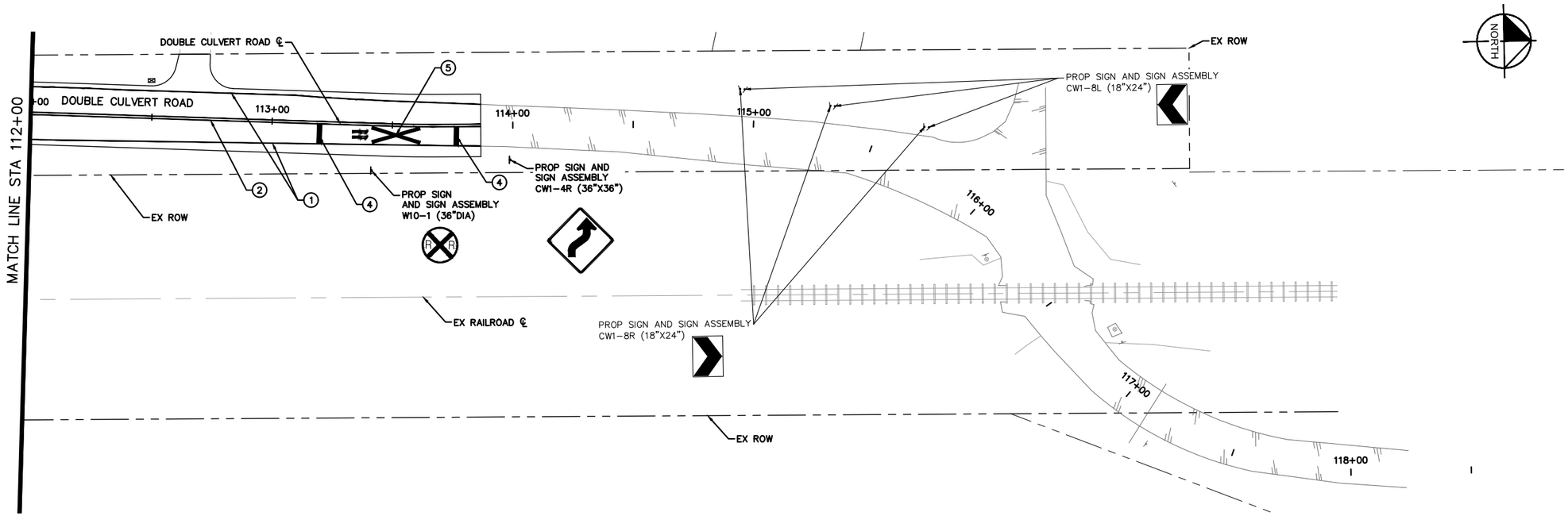
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
PAVEMENT MARKING AND SIGNING
STA 94 00.00 TO STA 106 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		74

100% SUBMITTAL





GRAPHIC SCALE IN FEET
0 25 50

NORTH

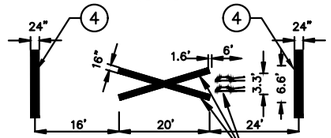
STRIPING LEGEND

1	INSTALL 4" SOLID WHITE EDGE LINE
2	INSTALL 4" SOLID YELLOW EDGE LINE
3	INSTALL 4" DASHED YELLOW LINE (15' DASH, 25' GAP)
4	INSTALL 24" STOP BAR MARKING
5	INSTALL RAILROAD CROSSING MARKINGS
xx	PROPOSED D-SW

NOTES

1. CONTRACTOR IS RESPONSIBLE FOR RELOCATION OF ANY SIGNS AND COORDINATION WITH THE COUNTY ON ANY NECESSARY MODIFICATIONS.

DETAIL A



07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED PROFESSIONAL ENGINEER

DATE: 7/28/2026 10:07:08 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Pavement Mar ing and Signing - 106 00.00 TO 118 00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM

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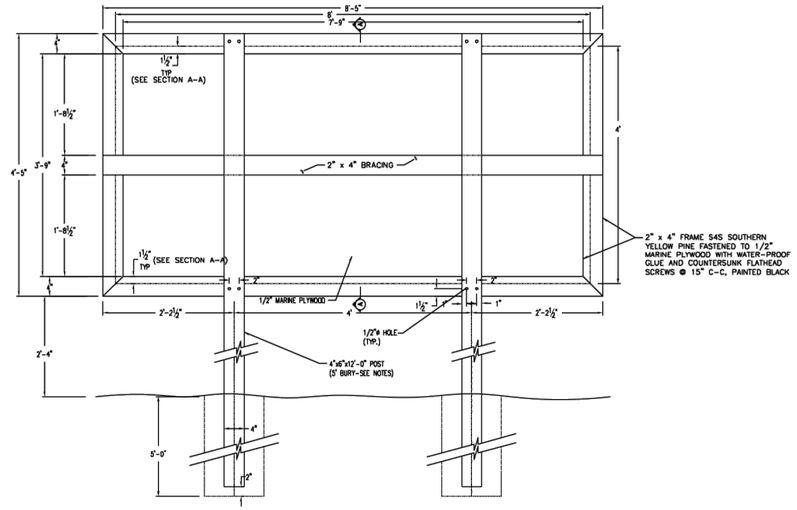
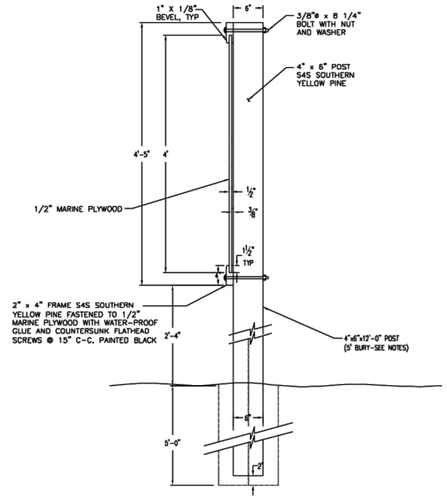
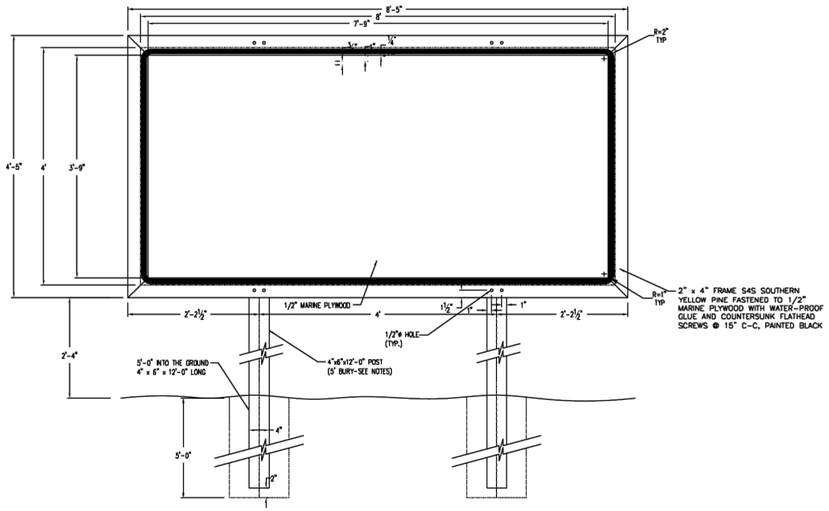
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
PAVEMENT MARKING AND SIGNING
STA 106 00.00 TO END

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		75







GENERAL NOTES:

1. THE SIGN SHALL HAVE BLACK LETTERS WITH WHITE BACKGROUND.
2. ALL LETTERING SHALL BE EITHER AERIAL FONT OR HELVETICA.
3. SIGN SHALL BE MOUNTED ON 4" x 6" POSTS AND LOCATED BY THE ENGINEER.
4. REMOVABLE PANEL SHALL BE 1/2" MARINE PLYWOOD.
5. ALL BOLTS, SCREWS, NAILS, NUTS AND WASHERS SHALL BE GALVANIZED OR CADMIUM PLATED.
6. 4" x 6" POST SHALL BE WOLMANIZED OR PENTACHLOROPHENOL TREATED.
7. ALL WOOD SURFACES SHALL HAVE PRIME COAT AND TWO (2) COATS OF SHERWIN-WILLIAMS KEM-LUSTRA ENAMEL OR EQUAL.

NO.	REVISIONS	DATE	NAME
1			
2			
3			
4			
5			

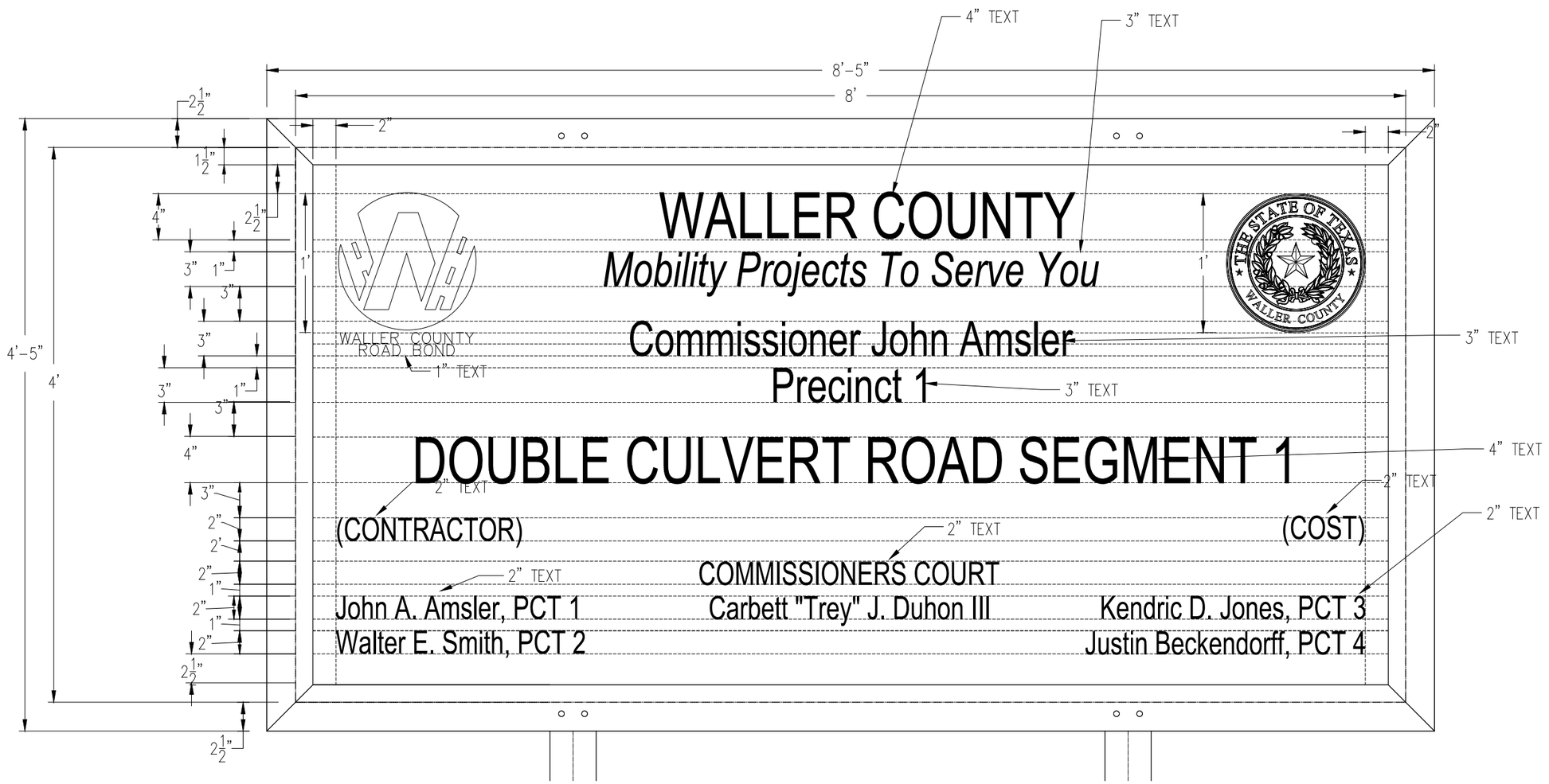
WALLER COUNTY
ENGINEERING DEPARTMENT

DOUBLE CULVERT ROAD SEGMENT 1

SIGN STANDARD DETAILS

PROJECT TITLE:		
DRAWN BY:		WCED STANDARD
CK'D BY:	SHEET DESCRIPTION:	
SCALE:		SHEET NO: 76
DATE:	APPROVED BY:	

100% SUBMITTAL



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REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
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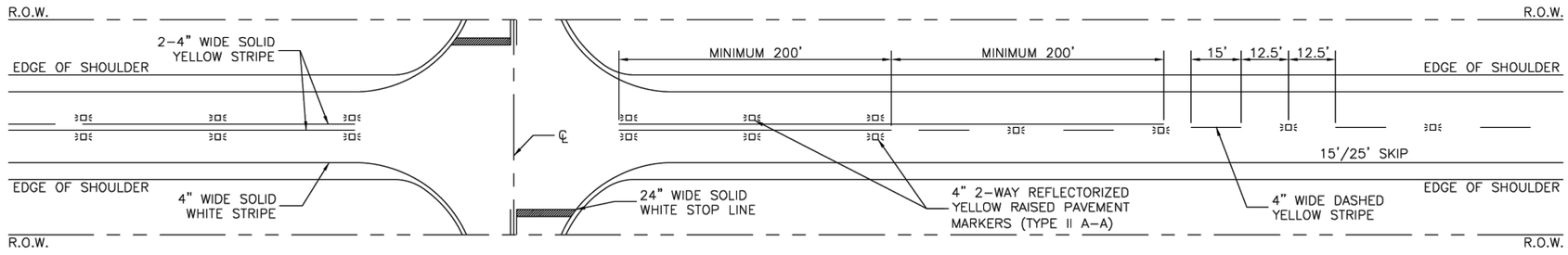
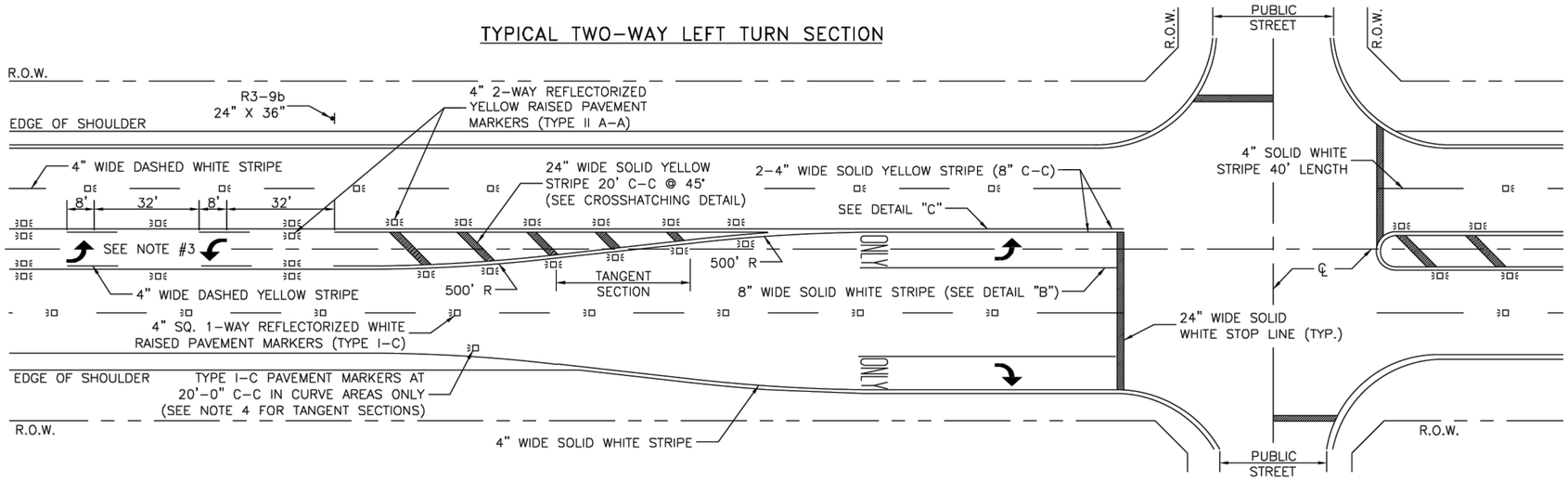
TEXAS REGISTERED ENGINEERING FIRM #F-928

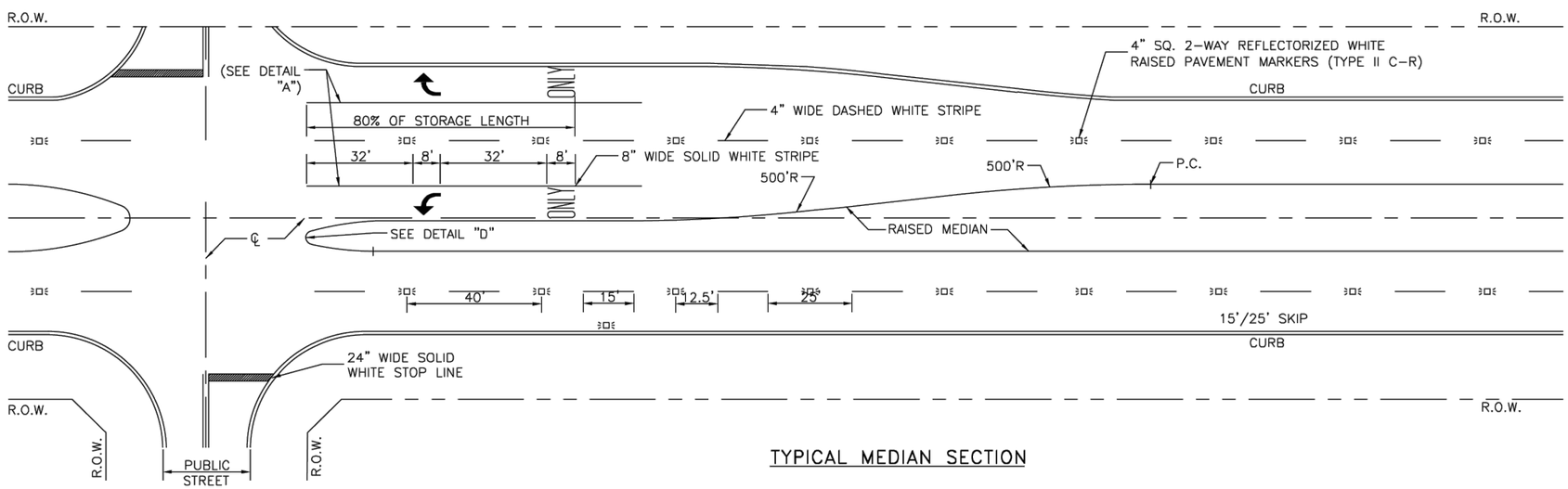
DOUBLE CULVERT ROAD SEGMENT 1
SIGN STANDARD DETAILS

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		77



TYPICAL TWO LANE TWO–WAY ROAD



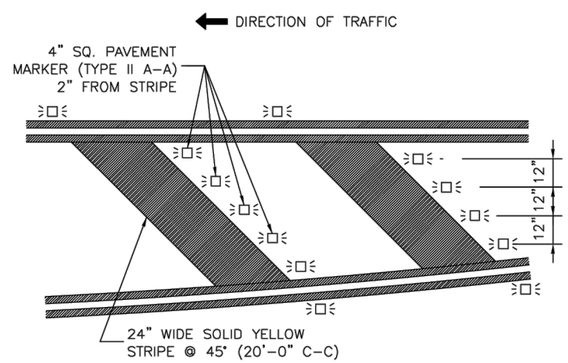


TYPICAL MEDIAN SECTION

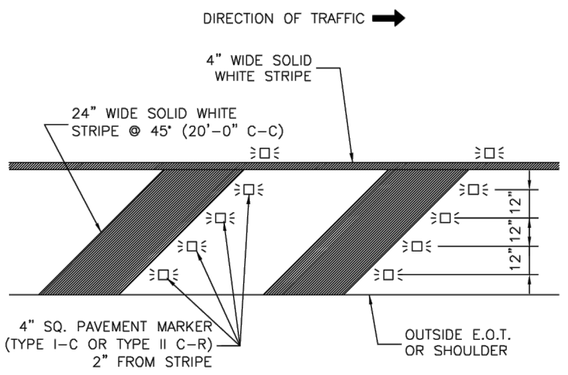
NOTES:

1. ALL PAVEMENT MARKINGS SHALL CONFORM TO THE LATEST EDITION OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS (TMUTCD).
2. ALL TRAFFIC BUTTONS AND MARKERS SHALL BE INSTALLED ADJACENT TO STRIPES (APPROXIMATELY 2").
3. REPEAT ARROWS AT APPROXIMATELY 1000' INTERVALS WITHIN TWO–WAY LEFT TURN SECTION.
4. WITHIN A TANGENT SECTION THE TYPE I–C PAVEMENT MARKERS SHALL BE PLACED AT 40' C–C ON ROADWAYS WITHOUT CURB AND GUTTERS.
5. WHEN PAVEMENT MARKINGS EXTEND INTO OR CONTINUE THROUGH AN INTERSECTION AREA, THEY SHALL BE THE SAME COLOR AND AT LEAST THE SAME WIDTH AS THE LINE MARKINGS THEY EXTEND.
6. WHEN CROSSWALK MARKINGS ARE USED WITHIN AN ESTABLISHED SCHOOL ZONE, MID–BLOCK, OR AT UNCONTROLLED INTERSECTIONS, CROSSWALK SHALL BE CONTINENTAL STYLE.
7. ADDITIONAL SET OF "WORD" AND "ARROW" PAVEMENT MARKINGS SHALL BE USED WHEN TURN LANE STORAGE LENGTH IS 160 FEET OR GREATER.

CROSSHATCHING DETAIL



OUTSIDE EDGE CROSSHATCHING DETAIL



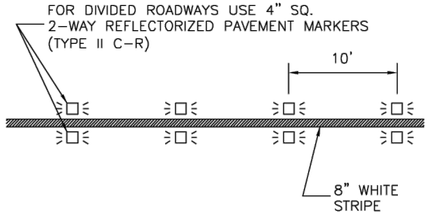
NO.	REVISIONS	DATE	NAME
1			
2			
3			
4			
5			

WALLER COUNTY
ENGINEERING DEPARTMENT

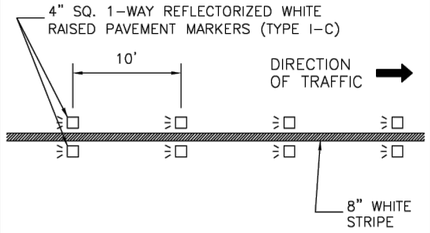
DOUBLE CULVERT ROAD
SEGMENT 1
STANDARD DETAILS

PROJECT TITLE:		
DRAWN BY:		WCED STANDARD
CK'D BY:	SHEET DESCRIPTION: PAVEMENT MARKINGS DETAILS 01	
SCALE:		SHEET NO: 78
DATE:	APPROVED BY:	

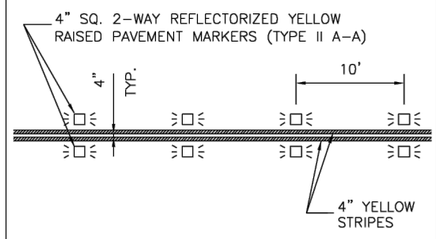
DETAIL "A"
(FOR DIVIDED ROADWAYS)



DETAIL "B"
(FOR UNDIVIDED ROADWAYS)



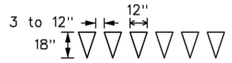
DETAIL "C"



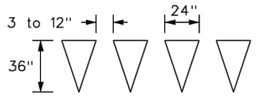
PAVEMENT MARKER LEGEND

SYMBOL	DESCRIPTION
≥□≤	4" x 4" REFLECTORIZED RAISED PAVEMENT MARKER
□≤	INDICATED DIRECTION OF TRAFFIC FLOW

YIELD LINE DETAILS



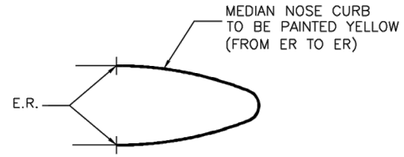
FOR POSTED SPEED ON ROAD BEING MARKED EQUAL TO OR LESS THAN 40 MPH.



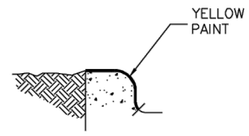
FOR POSTED SPEED ON ROAD BEING MARKED EQUAL TO OR GREATER THAN 45 MPH

DETAIL "D"

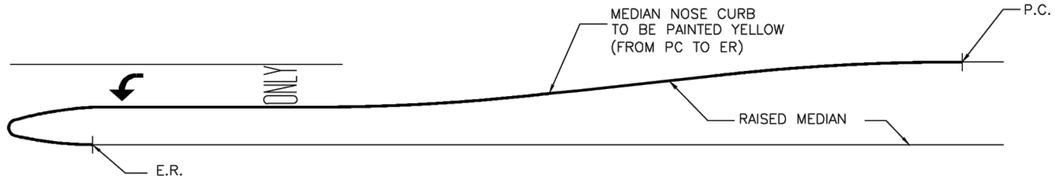
* PAINT FROM THE BACK OF CURB TO THE GUTTER LINE



TYPICAL MEDIAN NOSE



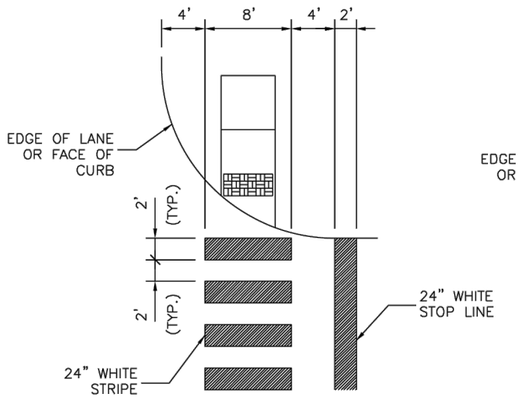
TYPICAL CURB SECTION



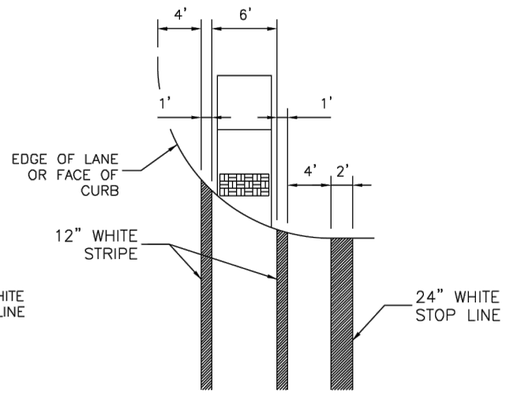
RAISED MEDIAN WITH TURN BAY

TYPICAL CROSSWALK PLACEMENT

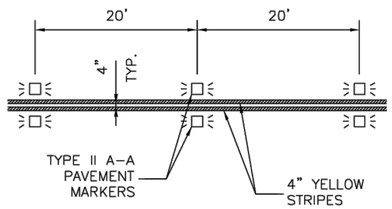
CONTINENTAL TYPE



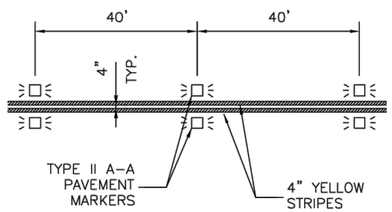
STANDARD TYPE



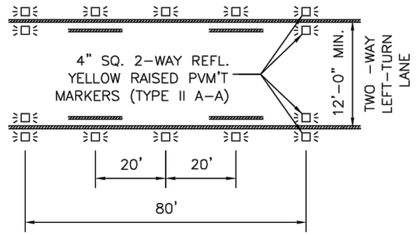
CENTER LINE DETAIL
CURVE SECTION



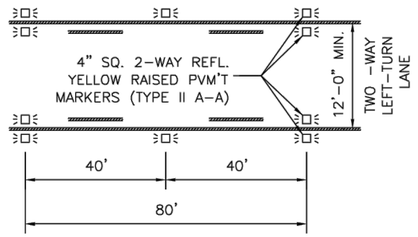
CENTER LINE DETAIL
TANGENT SECTION



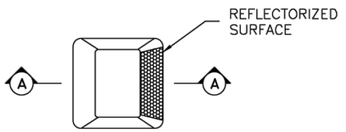
TWO-WAY LEFT TURN
CURVE SECTION



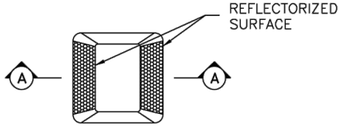
TWO-WAY LEFT TURN
TANGENT SECTION



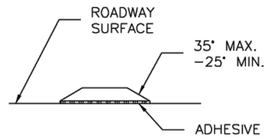
RAISED PAVEMENT MARKERS



TYPE I (TOP VIEW)



TYPE II (TOP VIEW)



SECTION A-A

NO.	REVISIONS	DATE	NAME
1			
2			
3			
4			
5			

WALLER COUNTY
ENGINEERING DEPARTMENT

DOUBLE CULVERT ROAD
SEGMENT 1
STANDARD DETAILS

PROJECT TITLE:

DRAWN BY:

CK'D BY:

SHEET DESCRIPTION:
PAVEMENT MARKINGS DETAILS 02

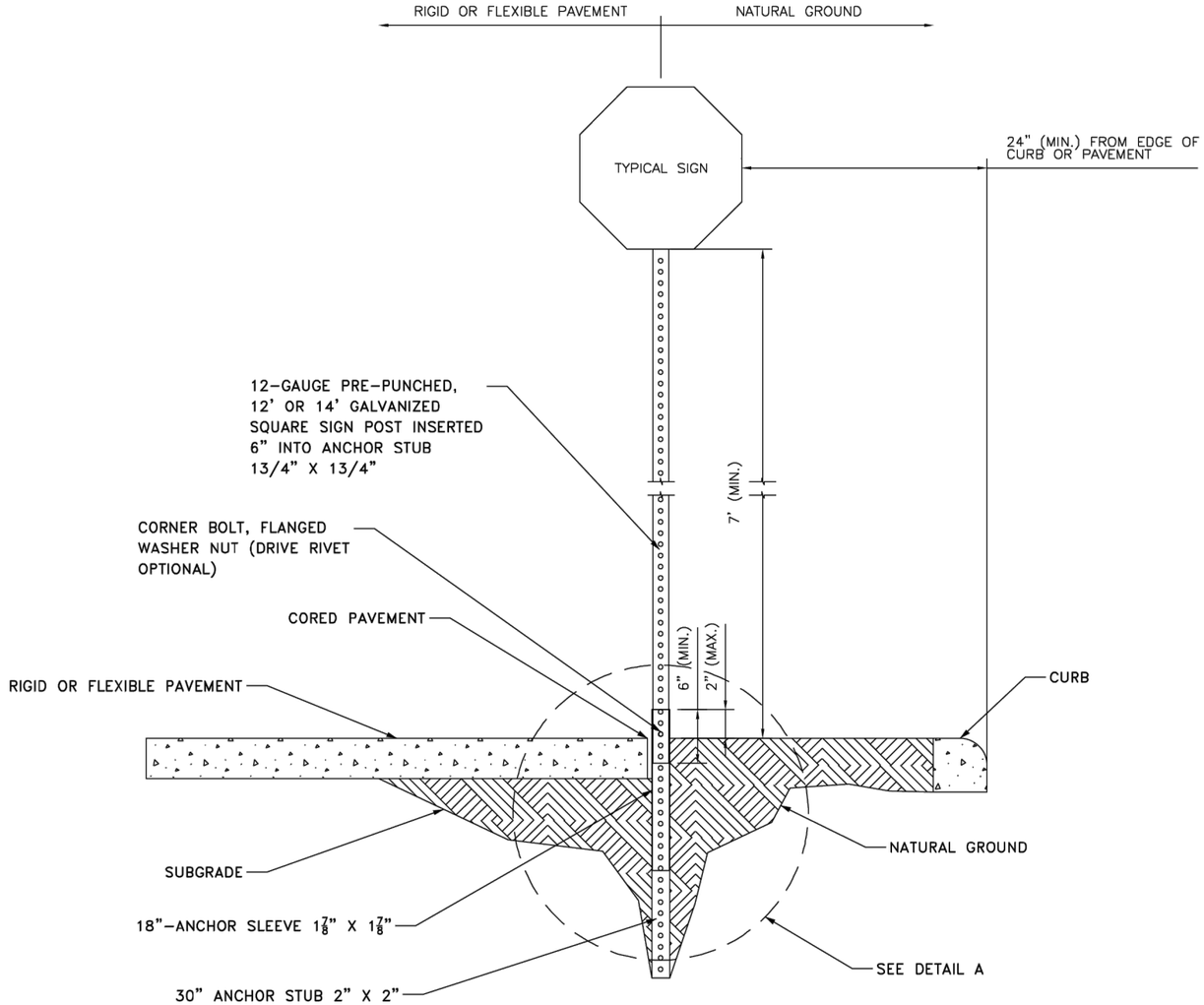
SCALE:

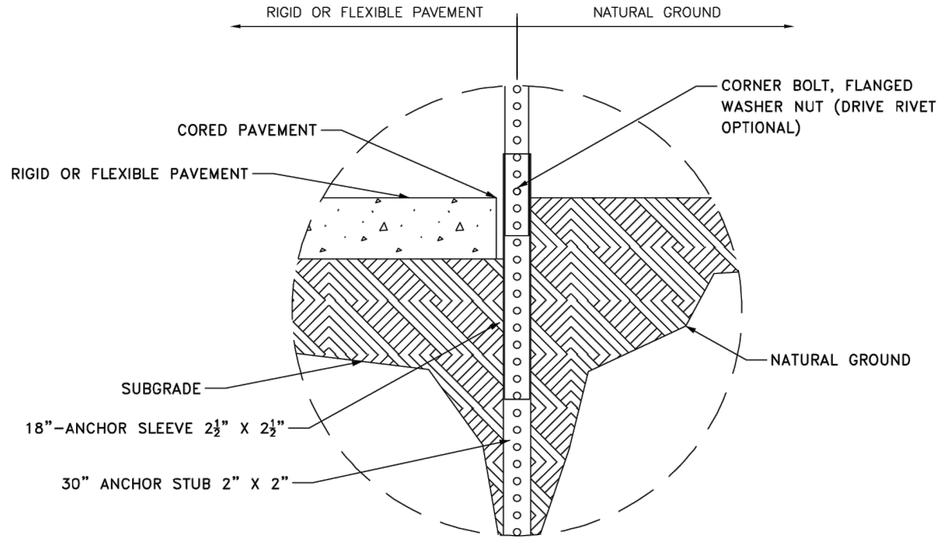
DATE:

APPROVED BY:

WCED STANDARD

SHEET NO:
79





TYPICAL GROUND SIGN INSTALLATION
DETAIL A

NOTES:

1. THE CROSS SECTION OF ALL MEMBERS SHALL BE SQUARE TUBE FORMED OF 12 GAUGE AND MANUFACTURED FROM HOT-GALVANIZED STEEL
2. THE TELESCOPE BREAKAWAY SYSTEM OR "SYSTEM" IS DEFINED AS FOLLOW:
   - A MINIMUM 30" ANCHOR STUB;
   - 18" ANCHOR SLEEVE.
3. DRIVE THE SYSTEM TOGETHER MAKING SURE THE HOLES ARE ALIGNED.
4. THE SYSTEM IS TO BE DRIVEN INTO NATURAL GROUND EXPOSED SUBGRADE UNTIL ONLY 1 TO 2 INCHES ARE LEFT EXPOSED.
5 ATTACH THE SIGN TO AN 1 3/4" SQUARE POST AT THE DESIRED HEIGHT, SUCH THAT IT MEETS THE MINIMUM VERTICAL CLEARANCE.
6. SIGNS ARE FASTENED TO THE POST BY USING DRIVE RIVETS OR BOLTS.
7. INSERT THE SIGN POST APPROXIMATELY 6 TO 8 INCHES INTO THE ANCHOR BASE.
8. BOLT THE SIGN POST TO THE ANCHOR ASSEMBLY WITH A CORNER BOLT.
9. WHEN INSTALLING IN RIGID OR FLEXIBLE PAVEMENT, USE A CORING MACHINE TO EXPOSE THE SUBGRADE MATERIAL AND INSTALL THE SYSTEM.

NO.	REVISIONS	DATE	NAME
1			
2			
3			
4			
5			

WALLER COUNTY
ENGINEERING DEPARTMENT

DOUBLE CULVERT ROAD
SEGMENT 1
STANDARD DETAILS

PROJECT TITLE:		
DRAWN BY:		WCED STANDARD
CK'D BY:	SHEET DESCRIPTION: TYPICAL GROUND SIGN INSTALLATION	
SCALE:		SHEET NO: 80
DATE:	APPROVED BY:	

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DELINEATOR - BID ITEM DESCRIPTIONS

XXXXX DEL ASSM (D-XX)SZ X (XXXX)XXXXX(XX)

PAYMENT
INSTL = Installation
REPLC = Replacement

NUMBER OF REFLECTORS
S = Single
D = Double

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

REFLECTOR UNIT SIZE
SZ 1 or SZ 2 or SZ 5 or SZ 6

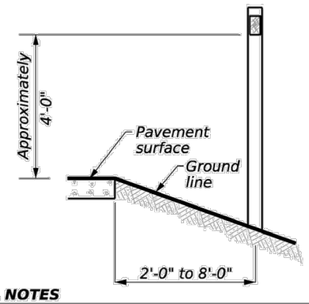
TYPE OF POST OR DELINEATOR
WC = Wing Channel Post
YFLX = Yellow Flexible Post
WFLX = White Flexible Post
BRF = Barrier Reflector

TYPE OF MOUNT
GND = Ground Embedded (drivable or set in concrete)
CAB1 or CAB2 or CAB3 = Cable Barrier
CTB = Concrete Traffic Barrier
GF1 or GF2 = Guard Fence
SRF = Surface Mount

IDENTIFICATION
LL= Low Speed, Low Impact
HH = High Speed, High Impact

DIRECTION [if required]
BI = Bi-Directional
BR = Bi-Directional with red on back

DELINEATOR - TYPICAL INSTALLATION



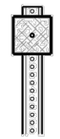
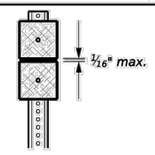
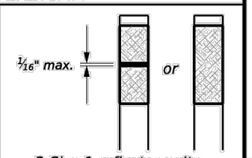
GENERAL NOTES

1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
2. When 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 delineator as close to the desired height as possible.
3. Install all delineators and barrier reflectors in accordance with the manufacturer's recommendation.
4. GF1, GF2, and CTB barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.
5. 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.
6. Delineator substrates and sign substrates shall be 0.080" aluminum sign blank and confrom to ASTM B-209 Alloy 6061-T6 or an approved alternative.

DELINEATOR DEFINITION

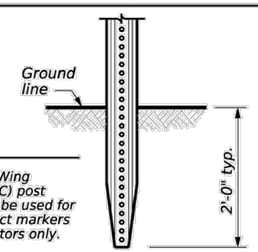
Retroreflective devices mounted on the roadway surface or at the side of the roadway in a series to indicate the alignment of the roadway, especially at night or in adverse weather. (See TMUTCD - Part 3, DELINEATORS.)

SINGLE AND DOUBLE MOUNTED DELINEATORS

	SINGLE		DOUBLE	
DEVICE	 1-Size 2 reflector unit	1-Size 1 reflector unit	 2-Size 2 reflector units	 2-Size 1 reflector units or 1-Size 5 reflector unit
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GNDLL	GNDLL, GNDHH, SRFLL, SRFHH	GNDLL	GNDLL, GNDHH, SRFLL, SRFHH

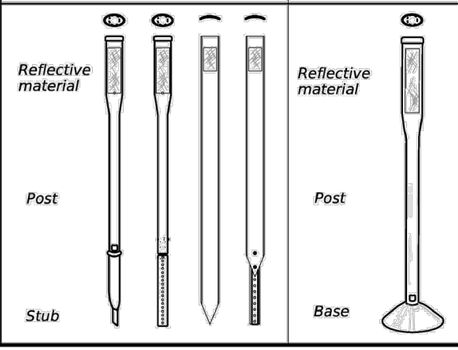
POST TYPE AND SUPPORT FOUNDATION DETAILS

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)

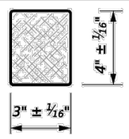
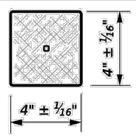
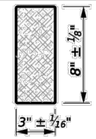
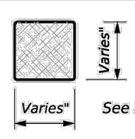


NOTES
1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.

DEPARTMENTAL MATERIAL SPECIFICATIONS

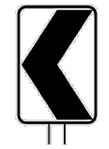
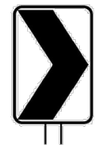
FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

REFLECTOR UNIT DIMENSIONS FOR DELINEATORS

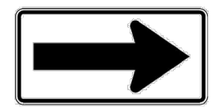
	SIZE 1	SIZE 2	SIZE 5	SIZE 6
DEVICE				 See Note 3
SHEETING	Yellow, White, or Red Type B or C reflective sheeting			

NOTES
1. Size 1 and 5 - Direct applied reflective sheeting for use on flexible post (flx).
2. Size 2 - For use on wing channel (wc) post only. Use approved metal, plastic, or fiberglass backplate with 17/64" mounting holes.
3. Size 6 - For use on cable barrier systems only. Direct applied reflective sheeting. Various dimensions as specified elsewhere in the plans or as defined by the manufacturer.

CHEVRONS

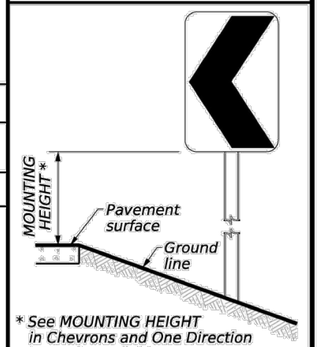
DEVICE				
	W1-8			
SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" to 4'-6" or 7'-0" to 7'-6"		7'-0" to 7'-6"	

ONE DIRECTION LARGE ARROW

DEVICE		
	W1-6	
SIZE (W x L)	48"x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0" to 7'-6"	

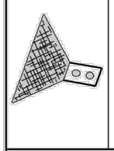
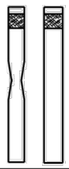
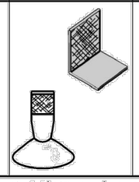
NOTES
1. Chevron Alignment (W1-8) signs and One-Direction Large Arrow (W1-6) signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies).
2. When there is a need to increase conspicuity, a larger One-Direction Large Arrow (W1-9T) sign may be used in lieu of the typical W1-6 sign.

CHEVRONS AND ONE DIRECTION LARGE ARROW SIGNS TYPICAL INSTALLATION



* See MOUNTING HEIGHT in Chevrons and One Direction Large Arrow tables.

BARRIER REFLECTORS (BRF)

	GF1	GF2	CTB	CAB1	CAB2	CAB3
DEVICE						

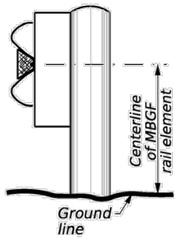
1. Barrier reflectors shall meet the requirements of DMS-8600.
2. Approved barrier reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.
3. GF2 and CAB3 are coded as "YFLX" or "WFLX" instead of "BRF".
4. CAB1, CAB2, and CAB3 are only to be used as replacements. Per Item 543, original installation is to be considered subsidiary to the Cable Barrier System.

SHEETING	Yellow, White, Red
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches by 3 inches and minimum surface area of 9 square inches.

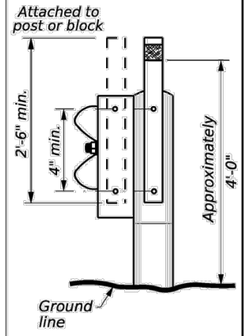
BARRIER MOUNT TYPES

GUARD FENCE

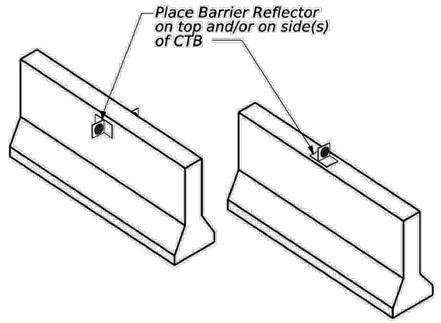
GF1



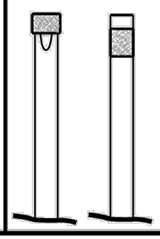
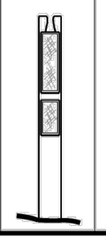
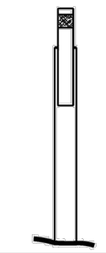
GF2



CONCRETE TRAFFIC BARRIER (CTB)



CABLE BARRIER

CAB1	CAB2	CAB3
		

Texas Department of Transportation — Traffic Safety Division Standard

DELINEATOR MATERIAL DESCRIPTION & INSTALLATION

D & OM(1)-25

FILE: dom1-25.dgn			DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT	
©TxDOT May 2025	CONT	SECT	JOB		HIGHWAY		
REVISIONS							
8-04 3-15	DIST	COUNTY				SHEET NO.	
10-09 7-20						81	
4-10 5-25							

20A

DATE:
FILE:

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DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

CONDITION	REQUIRED TREATMENT	MINIMUM SPACING
Fwy./Exp. Tangent	RPMs	See PM and FPM standard sheets
Fwy./Exp. Curve	Single delineators on right side	See delineator spacing table
Fwy/Exp.Ramp	Single delineators on at least one side of ramp (should be on outside of curves) (see Detail 4a on D&OM(4))	100 feet on ramp tangents Use delineator spacing table for ramp curves ("straightway spacing" does not apply to ramp curves)
Acceleration/ Deceleration Lane	Double delineators (see Detail 4a on D&OM(4))	100 feet (See Detail 4a on D & OM(4))
Truck Escape Ramp	Single red delineators on both sides	50 feet
Bridge Rail (steel or concrete) and Metal Beam Guard Fence	Bi-Directional Delineators when undivided with one lane each direction Single Delineators when multiple lanes each direction	Equal spacing (100'max) but not less than 3 delineators
Concrete Traffic Barrier (CTB) or Steel Traffic Barrier	Barrier reflectors matching the color of the edge line	Equal spacing 100' max
Cable Barrier	Reflectors matching the color of the edge line Bi-Directional Delineators when within clearzone	Every 5th cable barrier post (up to 100'max)
Cable Barrier Terminus / Impact Head	Object marker on end	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM(6)
Guard Rail Terminus / Impact Head	Divided highway - Object marker on approach end Undivided 2-lane highways - Object marker on approach and departure end	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM(5) and D & OM(6)
Bridges with no Approach Rail	Type 3 Object Marker (OM-3) at end of rail and 3 single delineators approaching rail	See D & OM(5)
Reduced Width Approaches to Bridge Rail	Type 2 and Type 3 Object Markers (OM-3) and 3 single delineators approaching bridge	Requires reflective sheeting provided by manufacturer per D & OM(VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM(5)
Culverts without MBGF	Type 2 Object Markers	See Detail 2 on D & OM(4)
Crossovers	Double yellow delineators and RPMs	See Detail 1 on D & OM(4)
Pavement Narrowing (lane merge) on Freeways/Expressway	Single delineators adjacent to affected lane for full length of transition	100 feet

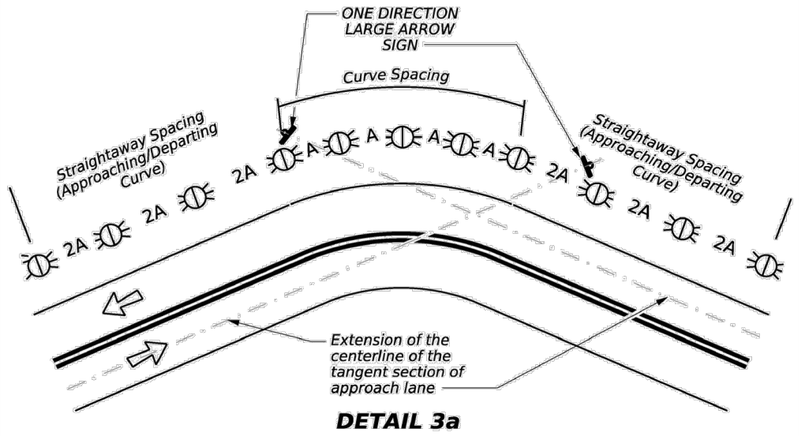
MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

Amount by which Advisory Speed is less than Posted Speed	Turn/Curve Advisory Speed: Turn (30 MPH or less)	Turn/Curve Advisory Speed: Curve (35 MPH or more)
5 MPH	• RPMs and Pavement Markings	
10 MPH	• Advance Horizontal Alignment Warning Sign with Advisory Speed Plaque; and • RPMs and Pavement Markings	
15 MPH	• Advance Horizontal Alignment Warning Sign with Advisory Speed Plaque; and • RPMs, Pavement Markings, and Delineators; or • RPMs, Pavement Markings, and One Direction Large Arrow sign(s)	• Advance Horizontal Alignment Warning Sign with Advisory Speed Plaque; and • RPMs, Pavement Markings, and Chevrons; or • RPMs, Pavement Markings, and One Direction Large Arrow sign(s) where geometric conditions or roadside obstacles prevent the installation of chevrons
20 MPH	• Advance Horizontal Alignment Warning Sign with Advisory Speed Plaque; and • RPMs, Pavement Markings, and Chevrons; or • RPMs, Pavement Markings, and One Direction Large Arrow sign(s) where geometric conditions or roadside obstacles prevent the installation of chevrons	
25 MPH or more	• Advance Horizontal Alignment Warning Sign with Advisory Speed Plaque; and • RPMs, Pavement Markings, and Chevrons; or • RPMs, Pavement Markings, and One Direction Large Arrow sign(s) where geometric conditions or roadside obstacles prevent the installation of chevrons	• Advance Horizontal Alignment Warning Sign with Advisory Speed Plaque; and • RPMs, Pavement Markings, and Chevrons

NOTE

A roadway is considered to have pavement markings when either a center line, edge lines, or both are present. A roadway is considered to have RPMs when they are used to supplement centerline pavement markings.

SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



DETAIL 3a

NOTE

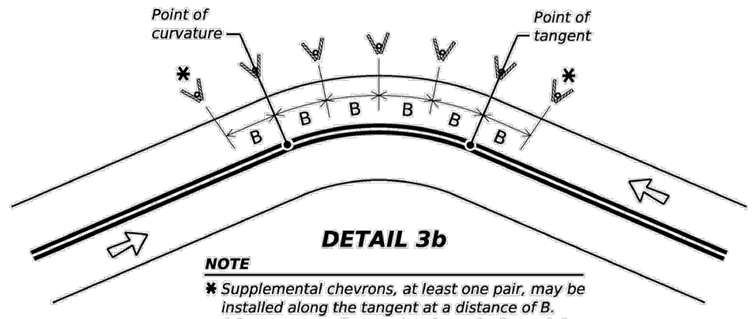
ONE DIRECTION LARGE ARROW (W1-6) sign should be located at approximately and perpendicular to the extension of the centerline of the tangent section of approach lane.

LEGEND	
	Delineator
	Bi-directional Delineator
	Sign

GENERAL NOTES

1. Unless otherwise indicated, 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.

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



DETAIL 3b

NOTE

✱ Supplemental chevrons, at least one pair, may be installed along the tangent at a distance of B. Adverse curve aligment is a factor in determining if supplemental chevrons are needed.

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)	FEET: Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2A	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).

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS APPLICATION & SPACING D & OM(3)-25

FILE:	dom3-25.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	May 2025	CONT	SECT	JOB	HIGHWAY
REVISIONS		DIST	COUNTY		SHEET NO.
8-04 7-20 3-15 5-25 8-15					82

DATE:
FILE:

20C

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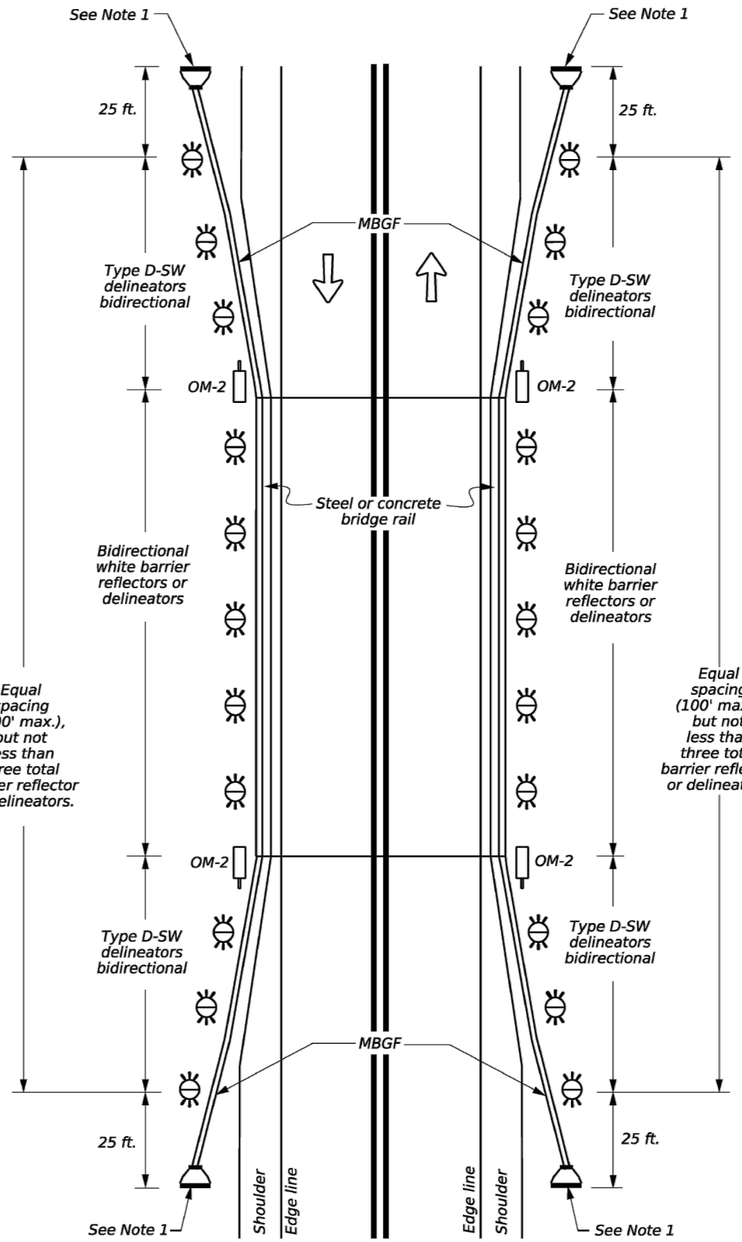
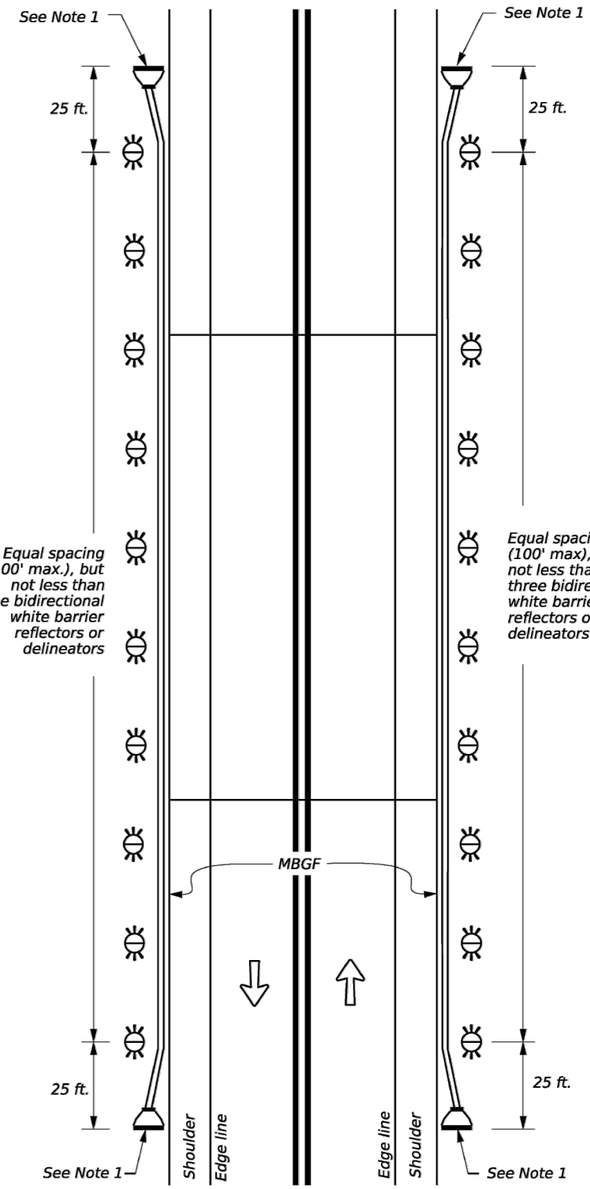
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



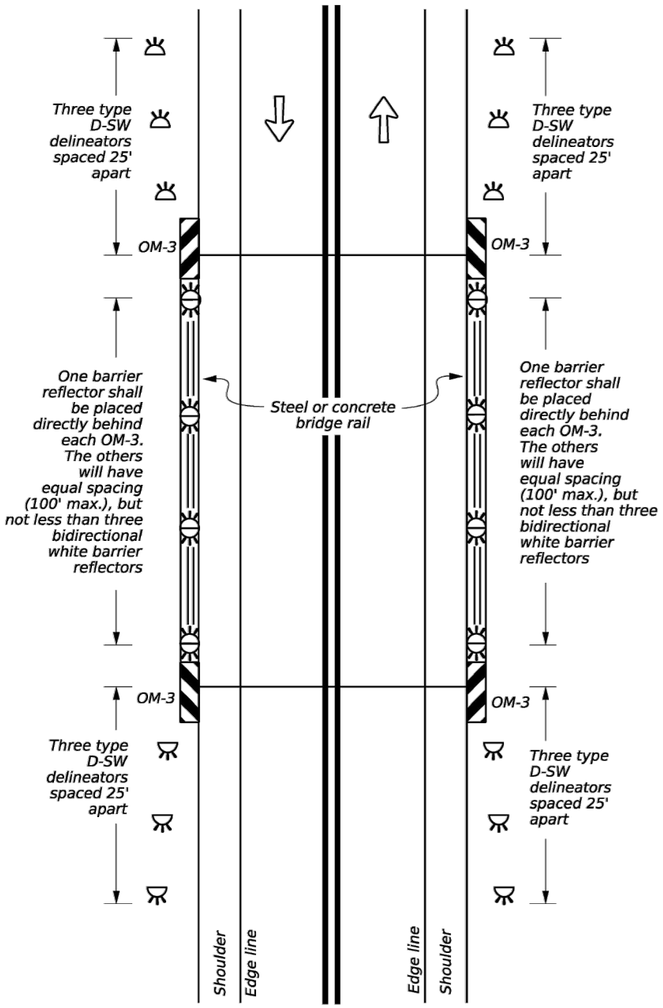
DETAIL 5a

TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



DETAIL 5b

TWO-WAY, TWO LANE ROADWAY BRIDGE WITH NO APPROACH RAIL



DETAIL 5c

NOTES

1. Terminal ends require reflective sheeting provided by manufacturer per D&OM(VIA) or a Type 3 object marker (OM-3) in front of the terminal end.
2. Bridge-class culverts may require OMs on or in advance of culvert headwalls. Refer to the TxDOT Roadway Design Manual and the TMUTCD.

GENERAL NOTE

Delineators (D) indicate roadway alignment. Object Markers (OM) identify obstructions. See D and OM definitions on D&OM(1) and D&OM(2), respectively.

DATE:
FILE:

LEGEND

	Delineator
	Bidirectional Delineator
	OM-2
	OM-3
	Terminal End
	Traffic Flow

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS (BRIDGE & BRIDGE-CLASS CULVERTS)

D & OM(5)-25

FILE: dom5-25.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 2025	CONT	SECT	JOB	HIGHWAY
REVISIONS				
8-15	DIST	COUNTY		SHEET NO.
7-20				83
5-25				
20E				

100% SUBMITTAL

TRAFFIC CONTROL NARRATIVE

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

GENERAL

1. THE PROTECTION AND CONVENIENCE OF THE PUBLIC DURING CONSTRUCTION OF THIS PROJECT ARE OF PRIMARY IMPORTANCE. TRAFFIC MUST BE HANDLED THROUGHOUT THE PROJECT DURING CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING A SAFE AND COMFORTABLE PASSAGE FOR VEHICULAR AND PEDESTRIAN TRAFFIC WITH MINIMAL INCONVENIENCE TO THE PUBLIC, AS SHOWN IN THE PLANS OR AS DIRECTED/APPROVED BY THE COUNTY. AT LOCATIONS WHERE IT IS NECESSARY FOR CONSTRUCTION TRAFFIC TO OPERATE NEAR TRAFFIC, WARNING SIGNS, FLAGGERS, PORTABLE CHANGEABLE MESSAGE SIGNS, AND WHERE NECESSARY, POLICE SHALL BE PROVIDED TO ADEQUATELY PROTECT AND INFORM THE TRAVELING PUBLIC.

2. PRIOR TO ANY WORK THE CONTRACTOR WILL SCHEDULE A PRE-CONSTRUCTION MEETING WITH WALLER COUNTY. THE PRE-CONSTRUCTION MEETING SHOULD BE SCHEDULED 1 WEEK IN ADVANCE OF ALL PROPOSED CONSTRUCTION ACTIVITIES.

3. THE CONTRACTOR MAY PROPOSE/RECOMMEND MODIFICATIONS TO THE SEQUENCE OF WORK FOR CONSIDERATION BY THE COUNTY. ANY MAJOR RECOMMENDED MODIFICATION BY THE CONTRACTOR SHALL INCLUDE ANY CHANGES TO THE VARIOUS BID ITEMS, IMPACT TO TRAFFIC, EFFECT OF OVERALL PROJECT IN TIME AND COST, ETC. IF THIS PROPOSAL IS IMPLEMENTED, THE CONTRACTOR WILL BE RESPONSIBLE FOR DEVELOPING DETAILED PLAN SHEETS TO BE SIGNED AND SEALED BY A LICENSED PROFESSIONAL ENGINEER FOR INCLUSION WITH THE CHANGE ORDER. THE CONTRACTOR CANNOT PROCEED WITH ANY CONSTRUCTION OPERATIONS BASED ON A REVISED PHASE/SEQUENCE UNTIL WRITTEN APPROVAL IS OBTAINED FROM THE COUNTY. IF AT ANY TIME DURING CONSTRUCTION THE CONTRACTOR'S PROPOSED PLAN OF OPERATION FOR HANDLING TRAFFIC DOES NOT PROVIDE FOR SAFE AND COMFORTABLE MOVEMENT, THE CONTRACTOR WILL IMMEDIATELY CHANGE THEIR OPERATION TO CORRECT THE UNSATISFACTORY CONDITION.

4. ALL TEMPORARY TRAFFIC CONTROL DEVICES SHALL CONFORM TO THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD), CURRENT EDITION.

5. DO NOT STORE ANY CONSTRUCTION MATERIAL OR EQUIPMENT AT ANY LOCATION THAT WILL CONSTITUTE A HAZARD AND WILL ENDANGER TRAFFIC. UNLESS THE TRAFFIC CONTROL DEVICES ARE PROTECTING AN ACTIVE CONSTRUCTION SITE, ALL NONESSENTIAL TRAFFIC CONTROL DEVICES SHALL BE REMOVED FROM ROAD VISIBILITY IN ORDER TO PREVENT CONFUSION FOR THE ROAD USER.

6. ACCESS TO ADJOINING PROPERTY MUST BE MAINTAINED AT ALL TIMES. ALL EXISTING DRIVEWAYS WITHIN THE TRAFFIC CONTROL ZONE SHALL REMAIN OPEN AT ALL TIMES UNLESS AGREED UPON BY THE OWNER OF THE DRIVEWAY. ALL AGREEMENTS FOR OFF-SITE DRIVEWAY CLOSURES SHALL BE INCLUDED WITH THE TRAFFIC CONTROL PLAN SUBMITTAL.

7. NO WORK WITHIN THE WALLER COUNTY ROW MAY OCCUR WITHOUT THE FULL IMPLEMENTATION OF THE APPROVED TRAFFIC CONTROL PLAN INTENDED TO PROTECT THAT WORK.

8. NO WORK WITHIN WALLER COUNTY ROW THAT REQUIRES TRENCHING, EXCAVATION, OR DIGGING MAY BE LEFT UNPROTECTED WHEN WORKERS ARE NOT PRESENT. CONTACT WALLER COUNTY TRAFFIC ENGINEERING FOR ACCEPTABLE METHODS OF WORK PROTECTION.

9. NO STAGING OF EQUIPMENT, WORK, MATERIALS, OR WORKERS MAY TAKE PLACE WITHOUT APPROPRIATE TRAFFIC CONTROL IN PLACE.

10. CONTRACTOR IS TO MAINTAIN TEMPORARY DRAINAGE AT ALL TIMES.

11. AT NO TIME SHALL TWO CONSECUTIVE SIDE STREETS ALONG THE PROJECT BE CLOSED AT ONE TIME DURING CONSTRUCTION.

12. PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS) PER TMUTCD, WHEN REQUIRED, MUST BE PLACED 7 DAYS IN ADVANCE OF THE WORK BEGINNING AND ANY TRAFFIC CONFIGURATION CHANGES. THE CITY SHALL APPROVE THE LOCATION OF THE PCMS PRIOR TO RELOCATING THE PCMS. THE WORDING OF THE PCMS SHALL BE APPROVED BY THE ENGINEER.

13. ALL SEQUENCE OF WORK ON THIS PROJECT SHALL BE COORDINATED TO COINCIDE WITH ANY PROJECTS WITHIN OR ADJACENT TO THIS PROJECT.

14. COVER PERMANENT SIGNS IF NOT USED.

15. TEMPORARY TIE-INS NEEDED TO MAINTAIN ACCESS TO ADJACENT PROPERTIES WILL NOT BE PAID FOR DIRECTLY BUT WILL BE SUBSIDIARY TO PERTINENT ITEMS.

16. CAUTION. UNDERGROUND UTILITIES ARE IN THE AREA. CONTRACTOR TO FIELD VERIFY PRIOR TO CONSTRUCTION.

LANE CLOSURES

1. ALL DETOURS, HORIZONTAL TRAFFIC MOVEMENTS, LANE CLOSURES, ETC. ARE DIRECTLY RELATED TO THE SEQUENCE OF WORK.

2. UNLESS OTHERWISE NOTED IN THE PLANS AND/OR AS DIRECTED BY THE COUNTY, LANE CLOSURES IN ADDITION TO THE CONFIGURATIONS SHOWN IN THE PLANS SHALL BE LIMITED ACCORDING TO THE FOLLOWING RESTRICTIONS:
   a. LANE CLOSURES DURING THE WEEK WILL ONLY BE ALLOWED MONDAY-FRIDAY BETWEEN 9:00AM AND 4:00PM.
   b. NIGHTTIME LANE CLOSURES WILL NOT BE ALLOWED UNLESS APPROVED BY THE COUNTY AND WITH LAW ENFORCEMENT OFFICERS PRESENT DURING THE CLOSURE.
   c. NO CLOSURES WILL BE PERMITTED BETWEEN DECEMBER 15 AND JANUARY 1.
   d. NO CLOSURES WILL BE PERMITTED THE WEDNESDAY, THURSDAY, FRIDAY, SATURDAY, AND SUNDAY OF THANKSGIVING.
   e. NO CLOSURES WILL BE PERMITTED THE SATURDAY AND SUNDAY BEFORE MEMORIAL DAY AND LABOR DAY.
   f. NO CLOSURES WILL BE PERMITTED ON THE ADJACENT SATURDAY OR SUNDAY WHEN JULY 4TH FALLS ON A FRIDAY OR MONDAY.
   g. ADVANCE NOTIFICATION OF LANE CLOSURES SHALL BE POSTED VIA PORTABLE CHANGEABLE MESSAGE SIGNS 5 DAYS IN ADVANCE OF ANY WORK.

4. FOR ALL DETOURS, PLACE MESSAGE BOARDS AND ADVANCE WARNING SIGNS 7 DAYS IN ADVANCE TO ADVISE TRAFFIC.

SAFETY

1. THE CONTRACTOR WILL PROVIDE, CONSTRUCT, AND MAINTAIN BARRICADES AND SIGNS IN ACCORDANCE WITH STATE STANDARDS BC (1-12)-14. ANY SIGNS REQUIRED THAT ARE NOT DETAILED IN THE STANDARD SHEETS SHALL BE IN CONFORMANCE WITH THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS" AND THE "STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS."

2. BARRICADES AND WARNING SIGNS SHALL BE PLACED AS INDICATED ON THE PLANS. THIS SHALL BE CONSIDERED THE MINIMUM REQUIRED TO PROVIDE FOR THE SAFETY OF TRAFFIC DURING CONSTRUCTION. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN OTHER SUCH BARRICADES AND SIGNS DEEMED NECESSARY BY THE COUNTY OR AS DIRECTED BY FIELD CONDITIONS, TO PROVIDE FOR THE PASSAGE OF TRAFFIC IN SAFETY AT ALL TIMES.

3. THE CONTRACTOR SHALL KEEP THE ROADWAY CLEAN AND FREE OF DIRT OR OTHER MATERIALS DURING HAULING OPERATIONS. IF THE CONTRACTOR DOES NOT MAINTAIN A CLEAN ROADWAY, THEY SHALL CEASE ALL CONSTRUCTION OPERATIONS WHEN DIRECTED TO CLEAN THE ROADWAY TO THE SATISFACTION OF THE COUNTY.

4. CONTRACTOR SHALL PROVIDE 3:1 SAFETY EDGES AT END OF EACH WORK DAY.

HAULING EQUIPMENT

THE USE OF RUBBER-TIRED EQUIPMENT WILL BE REQUIRED FOR MOVING DIRT OR OTHER MATERIALS ALONG OR ACROSS PAVEMENTED SURFACES. WHERE THE CONTRACTOR DESIRES TO MOVE ANY EQUIPMENT NOT LICENSED FOR OPERATION ON PUBLIC HIGHWAYS, ON OR ACROSS PAVEMENT, THEY SHALL PROTECT THE PAVEMENT FROM DAMAGE AS DIRECTED/APPROVED BY THE COUNTY. THROUGHOUT CONSTRUCTION OPERATIONS, THE CONTRACTOR WILL BE REQUIRED TO CONDUCT THEIR HAULING OPERATIONS IN A MANNER SUCH THAT VEHICLES WILL NOT HAUL OVER PREVIOUSLY RECOMPACTED SUBGRADE OR COMPACTED BASE MATERIAL, EXCEPT IN SHORT SECTIONS FOR DUMPING MANIPULATIONS.

PAYMENT

ALL BARRICADES, SIGNS, AND FLAGGERS SHALL BE SUBSIDIARY TO ITEM 502 BARRICADES, SIGNS, AND TRAFFIC HANDLING. ALL OTHER WORK AND MATERIALS SHALL BE SUBSIDIARY TO THE VARIOUS BID ITEMS UNLESS OTHERWISE INDICATED IN THE PLANS.

SEQUENCE OF WORK

1. THIS PROJECT WILL BE CONSTRUCTED IN THREE 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 COUNTY. DAILY LANE CLOSURES WILL BE USED IN ACCORDANCE WITH COUNTY TCP STANDARDS.

2. PREPARING ROW AND/OR REMOVAL OF EXISTING ITEMS IS TO BE DONE ONLY IN AREAS WHERE WORK IS OCCURRING, AS PER THE PHASES NOTED BELOW.

3. APPROVED TxDOT STANDARDS AND THE ATTACHED TCP TYPICAL SECTION CONFIGURATIONS SHALL BE USED.

4. THIS PROJECT WILL BE CONSTRUCTED IN 3 PHASES. THE PHASE 0 WORK ZONE IS CONSIDERED ROLLING AND IS LIMITED FROM THE EDGE OF ONE DRIVEWAY TO THE EDGE OF THE NEAREST DRIVEWAY.

5. DETOURS AS SHOWN IN THE PHASE 1 AND 2 DETOUR LAYOUT SHALL BE IMPLEMENTED AND MAINTAINED THROUGHOUT PHASES 1 AND 2 OF CONSTRUCTION.

6. PROPOSED SPEED THROUGH CONSTRUCTION ZONE TO BE REDUCED FROM 45 MPH TO 30 MPH FOR THE DURATION OF PHASES 1 AND 2 CONSTRUCTION.

7. TEMPORARY PAVEMENT PLACED IN PHASE 0 SHALL BE REMOVED BY MILLING ONCE TRAFFIC IS SHIFTED ONTO THE PAVEMENT THAT IS CONSTRUCTED IN PHASE 1. MILLINGS WILL REMAIN PROPERTY OF THE COUNTY AND DELIVERED TO THE LOCATIONS IDENTIFIED IN THE GENERAL NOTES (NOTE #17). PAYMENT FOR THIS WORK IS INCLUDED IN ITEM 697 CONSTRUCTING DETOURS.

8. A BRIEF DESCRIPTION OF THESE PHASES ARE AS FOLLOWS:
   PHASE 0 – INSTALL TEMPORARY PAVEMENT ON WEST SIDE OF DOUBLE CULVERT ROAD TO MAINTAIN A 10' TRAVEL LANE DURING PHASE 1. TEMPORARY PAVEMENT WILL BE INSTALLED DURING NON-PEAK HOURS IN ACCORDANCE WITH FLAGGER OPERATION.
   PHASE 1 – CONSTRUCT ROADWAY ON EAST SIDE OF DOUBLE CULVERT ROAD CENTERLINE, AND ANY ASSOCIATED IMPROVEMENTS TO THE EAST SIDE ROW.
   PHASE 2 – CONSTRUCT ROADWAY ON WEST SIDE OF DOUBLE CULVERT ROAD CENTERLINE, AND ANY ASSOCIATED IMPROVEMENTS TO THE WEST SIDE ROW.

PHASE 0

THE INTENT OF PHASE 0 IS TO CONSTRUCT TEMPORARY PAVEMENT

1. MOBILIZATION
2. SET UP ADVANCE WARNING SIGNS AND TRAFFIC CONTROL DEVICES PER PLANS AND IN ACCORDANCE WITH BC (2)-21.
3. PLACE TEMPORARY EROSION CONTROL DEVICES.
4. CONSTRUCT TEMPORARY PAVEMENT AS SHOWN IN THE PLANS. MATCH EXISTING PAVEMENT CROSS SLOPE FOR TEMPORARY PAVEMENT. SHIFT TRAFFIC AS SHOWN IN THE PLANS. CONTRACTOR TO CLOSE LANE DURING NON PEAK HOURS IN ACCORDANCE WITH TCP(1-2)-18 ONE-LANE TWO-WAY OPERATION WITH FLAGGERS. CONTRACTOR TO MAINTAIN POSITIVE DRAINAGE AT ALL TIMES.
5. LIMIT THE WORK LIMIT TO A LENGTH THAT CAN BE COMPLETED, PROTECTED BY 3:1 SAFETY EDGES, AND OPENED TO TWO-WAY TRAFFIC AT THE END OF EACH WORKING DAY.

PHASE 1

THE INTENT OF PHASE 1 IS TO CONSTRUCT PROPOSED ROADBED ON THE EAST SIDE OF DOUBLE CULVERT ROAD

1. ADJUST TEMPORARY EROSION CONTROL DEVICES, BARRICADES, AND SIGNS AS NEEDED.
2. REMOVE EXISTING PAVEMENT MARKINGS IN CONFLICT WITH WORK ZONE PAVEMENT MARKINGS FOR THIS PHASE.
3. PLACE WORK ZONE PAVEMENT MARKINGS AND CHANNELIZING DEVICES AS SHOWN IN THE PLANS.
4. SHIFT TRAFFIC AS SHOWN IN THE PLANS, MAINTAINING ONE LANE OF TRAFFIC FLOWING SOUTHBOUND..
5. CONSTRUCT PROPOSED IMPROVEMENTS ON THE EAST SIDE OF DOUBLE CULVERT ROAD AS SHOWN IN THE PLANS.

PHASE 2

THE INTENT OF PHASE 2 IS TO CONSTRUCT PROPOSED ROADBED ON THE WEST SIDE OF DOUBLE CULVERT ROAD

1. ADJUST TEMPORARY EROSION CONTROL DEVICES, BARRICADES, AND SIGNS AS NEEDED.
2. REMOVE EXISTING PAVEMENT MARKINGS IN CONFLICT WITH WORK ZONE PAVEMENT MARKINGS FOR THIS PHASE.
3. PLACE WORK ZONE PAVEMENT MARKINGS AND CHANNELIZING DEVICES AS SHOWN IN THE PLANS.
4. SHIFT TRAFFIC AS SHOWN IN THE PLANS, MAINTAINING ONE LANE OF TRAFFIC FLOWING SOUTHBOUND.
5. REMOVE PREVIOUSLY CONSTRUCTED TEMPORARY PAVEMENT ON THE WEST SIDE OF DOUBLE CULVERT ROAD.
6. CONSTRUCT PROPOSED IMPROVEMENTS ON THE WEST SIDE OF DOUBLE CULVERT ROAD. CONSTRUCT DRIVEWAYS IN TWO STEP CONSTRUCTION, MAINTAINING ACCESS AT ALL TIMES. ANY ADDITIONAL TEMPORARY PAVEMENT OR DRAINAGE MEASURES WILL BE SUBSIDIARY TO PERTINENT ITEMS.
7. PLACE FINAL PAVEMENT MARKINGS AND MARKERS AS SHOWN IN THE PLANS.
8. REMOVE ALL TEMPORARY EROSION CONTROL DEVICES
9. PERFORM FINAL CLEAN UP.

FINAL CLEAN UP

UPON COMPLETION OF THE WORK AND BEFORE FINAL ACCEPTANCE AND FINAL PAYMENT IS MADE, THE CONTRACTOR SHALL CLEAR AND REMOVE FROM THE SITE SURPLUS AND DISCARDED MATERIALS AND DEBRIS OF EVERY KIND AND LEAVE THE ENTIRE PROJECT IN A SMOOTH, NEAT, AND SIGHTLY CONDITION.

07/28/2026

STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER

Abbey Polzin

DATE: 7/29/2026 8:21:44 PM
FILE: K:\HOU_Roadway\065035800 - Double Culvert Rd Segment 1\04 CAD\PlanSheets\TCP Narrative.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

THE STATE OF TEXAS WALLER COUNTY

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
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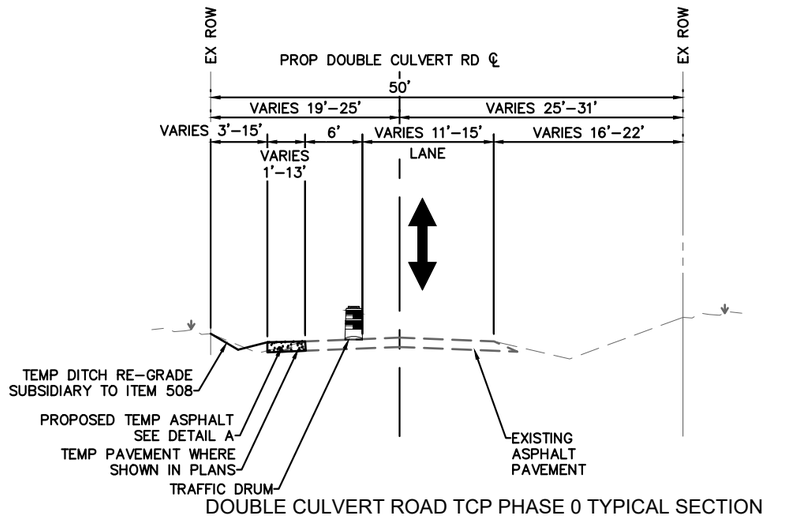
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
TRAFFIC CONTROL PLAN
TCP NARRATIVE

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		84

100% SUBMITTAL



DOUBLE CULVERT ROAD TCP PHASE 0 TYPICAL SECTION

BEGIN TO END

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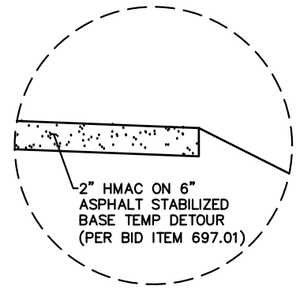
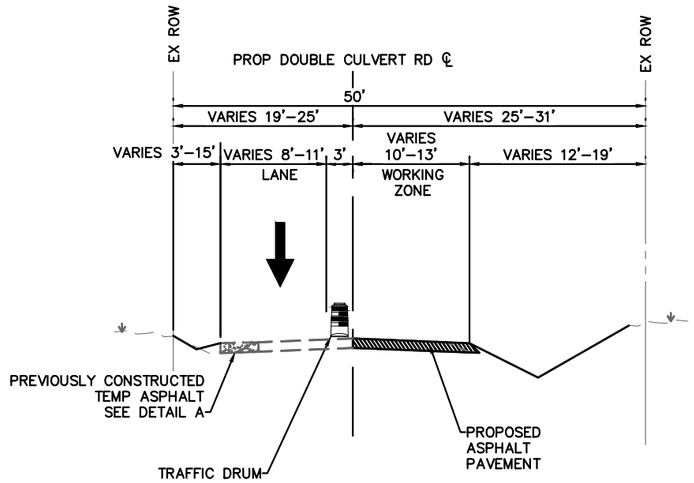


DETAIL A



DOUBLE CULVERT ROAD TCP PHASE 1 TYPICAL SECTION

BEGIN TO END

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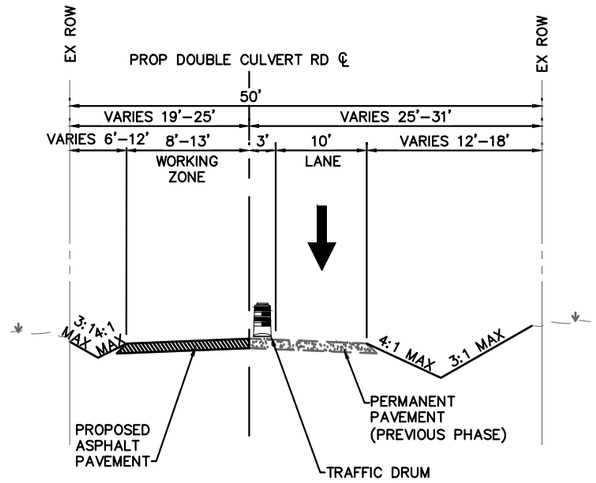

DOUBLE CULVERT ROAD TCP PHASE 2 TYPICAL SECTION

BEGIN TO END

SCALE: H: 1" 10 , V: 1" 20

07/28/2026

STATE OF TEXAS
ABBEY W. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER

Abbey Polzin

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY ENGINEERING DEPARTMENT

THE STATE OF TEXAS WALLER COUNTY

Kimley»Horn
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DOUBLE CULVERT ROAD SEGMENT 1
TRAFFIC CONTROL PLAN
TYPICAL SECTIONS

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		85

DATE: 7/30/2026 9:00:54 AM
FILE: K:\HOU_Roadway\065035800 - Double Culvert Rd Segment 1\04_CAD\PlanSheets\TCP Typical Sections Sheet.dwg

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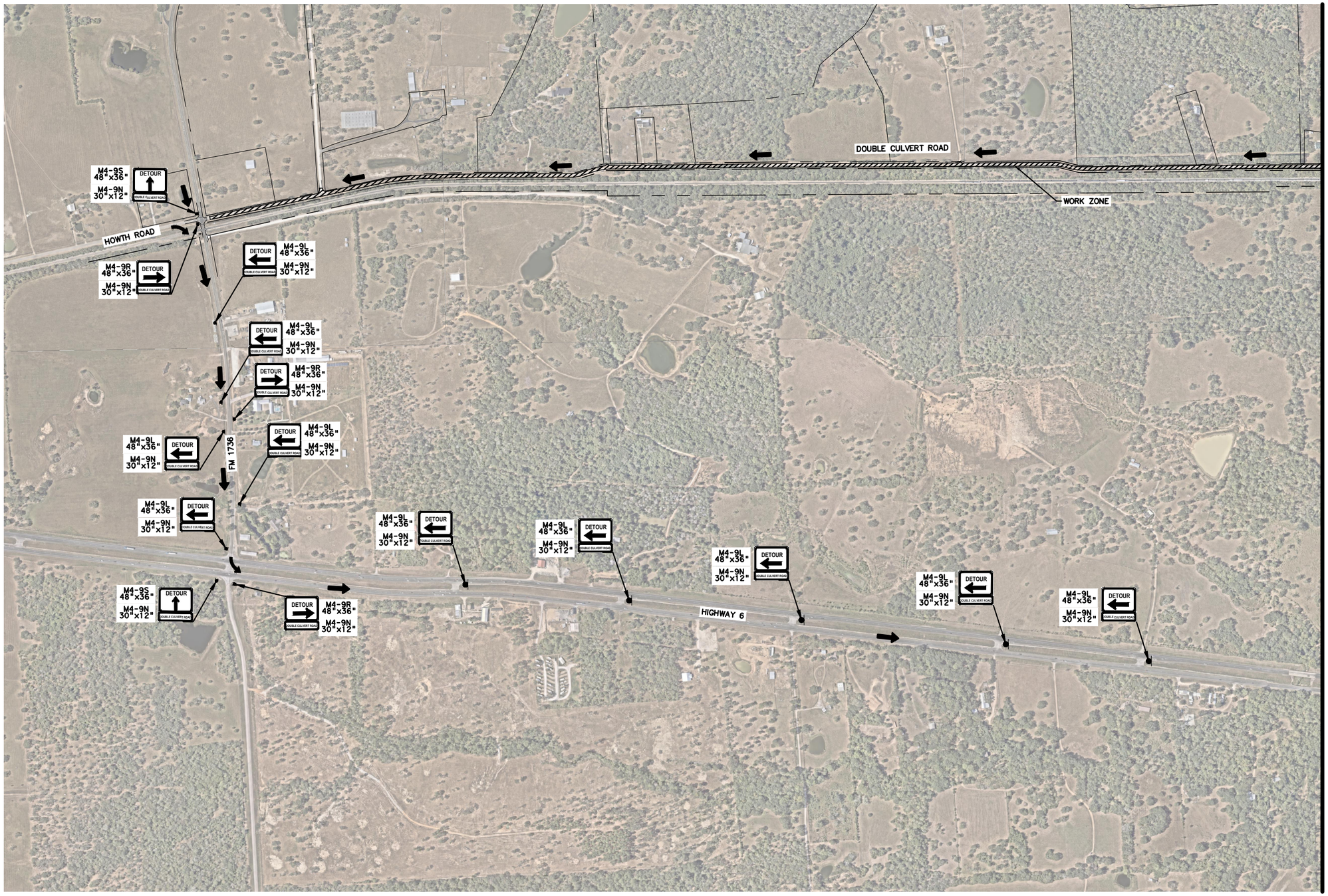

MATCH LINE A

NORTH

GRAPHIC SCALE IN FEET
0 375 750 1500

LEGEND

- WORK ZONE
- TRAFFIC FLOW
- TRAFFIC SIGN

NOTES

1. TWO WEEKS PRIOR TO CONSTRUCTION, CONTRACTOR TO PLACE ELECTRONIC DMS ON DOUBLE CULVERT ROAD TO NOTIFYING DRIVERS OF FUTURE LANE CLOSURES.

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

DATE: 7/28/2026 8:22:21 PM
FILE: K:\HOU_Roadway\065035800 - Double Culvert Rd Segment 1\04_CAD\PlanSheets\Detour Sheet PHASE 1.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

THE STATE OF TEXAS
WALLER COUNTY

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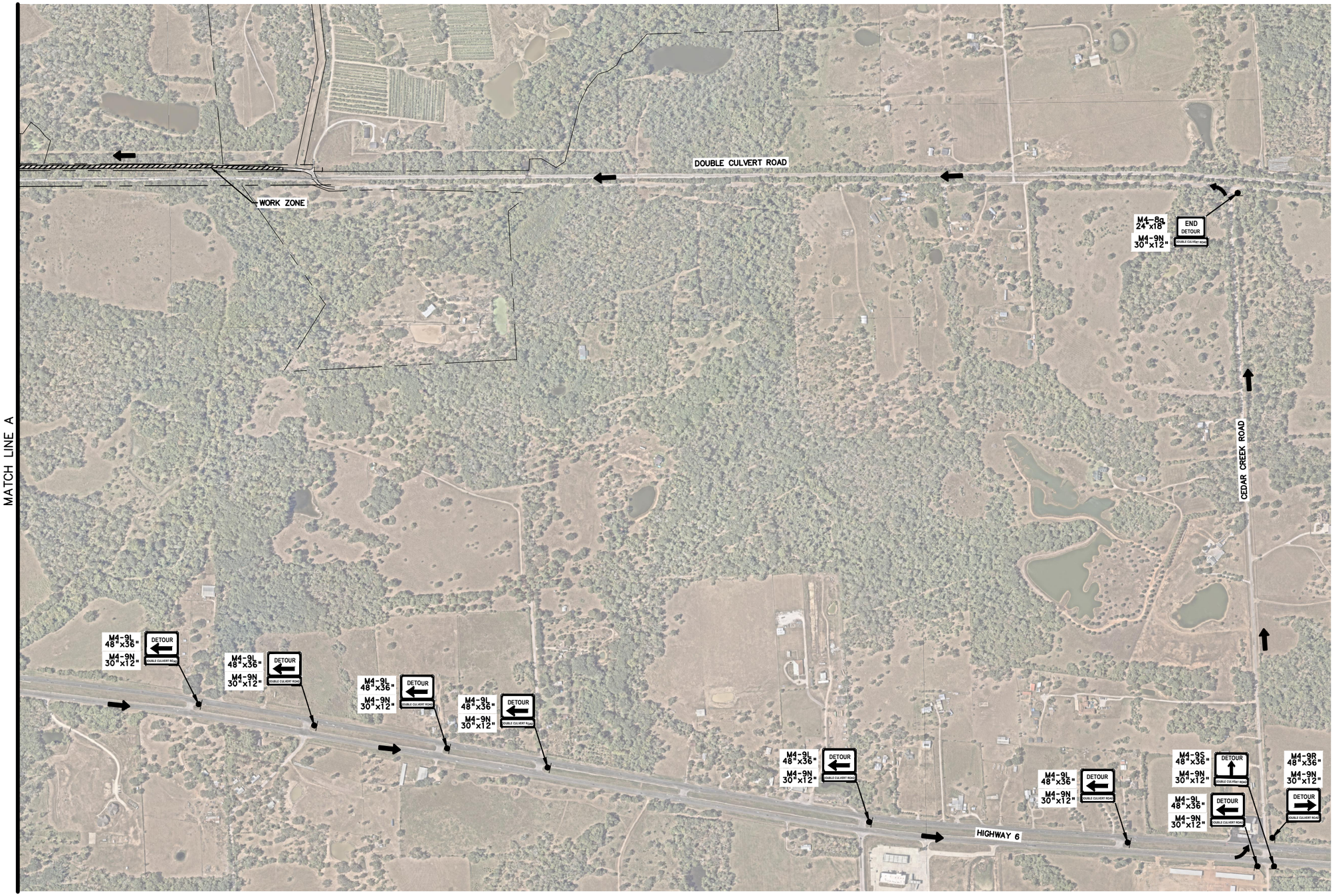
DOUBLE CULVERT ROAD
SEGMENT 1
TRAFFIC CONTROL PLAN
PHASE 1 AND 2 DETOUR

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		86

100% SUBMITTAL



NORTH

GRAPHIC SCALE IN FEET
0 375 750 1500

LEGEND

- WORK ZONE
- TRAFFIC FLOW
- TRAFFIC SIGN

NOTES

1. TWO WEEKS PRIOR TO CONSTRUCTION, CONTRACTOR TO PLACE ELECTRONIC DMS ON DOUBLE CULVERT ROAD TO NOTIFYING DRIVERS OF FUTURE LANE CLOSURES.

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

DATE: 7/28/2026 8:22:30 PM
FILE: K:\HOU_Roadway\065035800 - Double Culvert Rd Segment 1\04_CAD\PlanSheets\Detour Sheet PHASE 1.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

THE STATE OF TEXAS
WALLER COUNTY

Kimley»Horn
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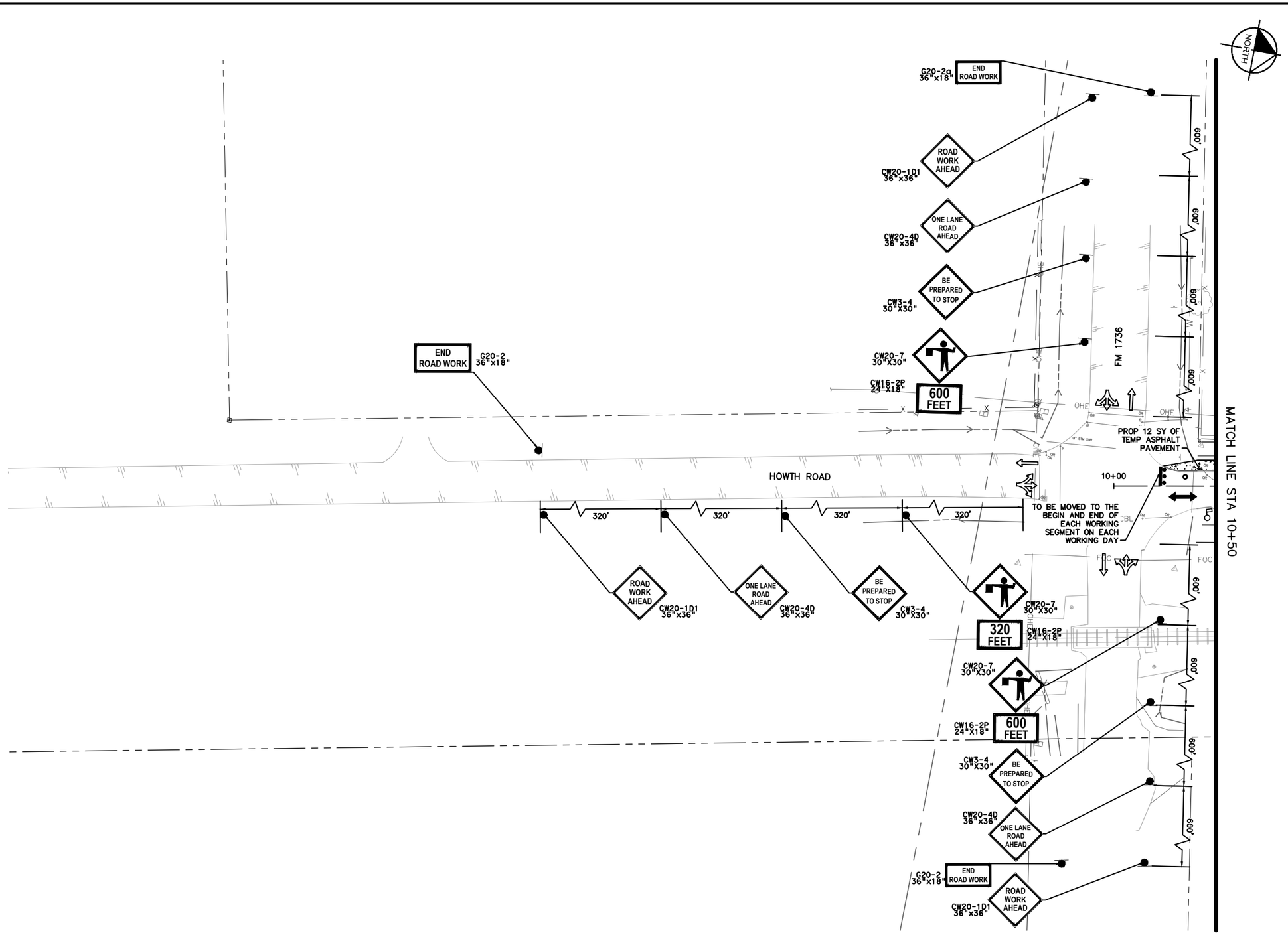
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
TRAFFIC CONTROL PLAN
PHASE 1 AND 2 DETOUR

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		87

100% SUBMITTAL



LEGEND

- TEMP ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION PREVIOUS PHASE
- TEMP ASPHALT PAVEMENT PREVIOUS PHASE
- EXIST TRAVEL LANE
- PROP TRAVEL LANE
- SIGN
- TRAFFIC BARRELS
- TYPE III BARRICADE

NOTES

1. SEE SHEET 86 – 87 FOR PHASE 1 AND 2 DETOUR PLAN.
2. REMOVE ALL EXISTING AND TEMPORARY TRAFFIC SIGNING AND PAVEMENT MARKINGS IN CONFLICT WITH TRAFFIC CONTROL SIGNS AND MARKINGS SHOWN IN THIS PHASE/STEP (SUBSIDIARY TO ITEM 503).
3. CONTRACTOR TO MAINTAIN POSITIVE DRAINAGE AT ALL TIMES.
4. CONTRACTOR TO PROVIDE ACCESS TO ALL ADJACENT PROPERTIES AT ALL TIMES DURING CONSTRUCTION.
5. REFER TO SHEET 121 FOR TXDOT ONE–LANE TWO–WAY TRAFFIC CONTROL DETAIL.

07/28/2026
STATE OF TEXAS
ABBY M. POLZIN
151558
LICENSED
PROFESSIONAL
ENGINEER
Abby Polzin

DATE: 7/28/2026
FILE: K:\HOU Roadway\065035800 - Double Culvert Rd Segment 1\04_CAD\PlanSheets\TCP PHASE 0 - 10 00.00 TO 58 00.00.dwg
8:22:52 PM

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

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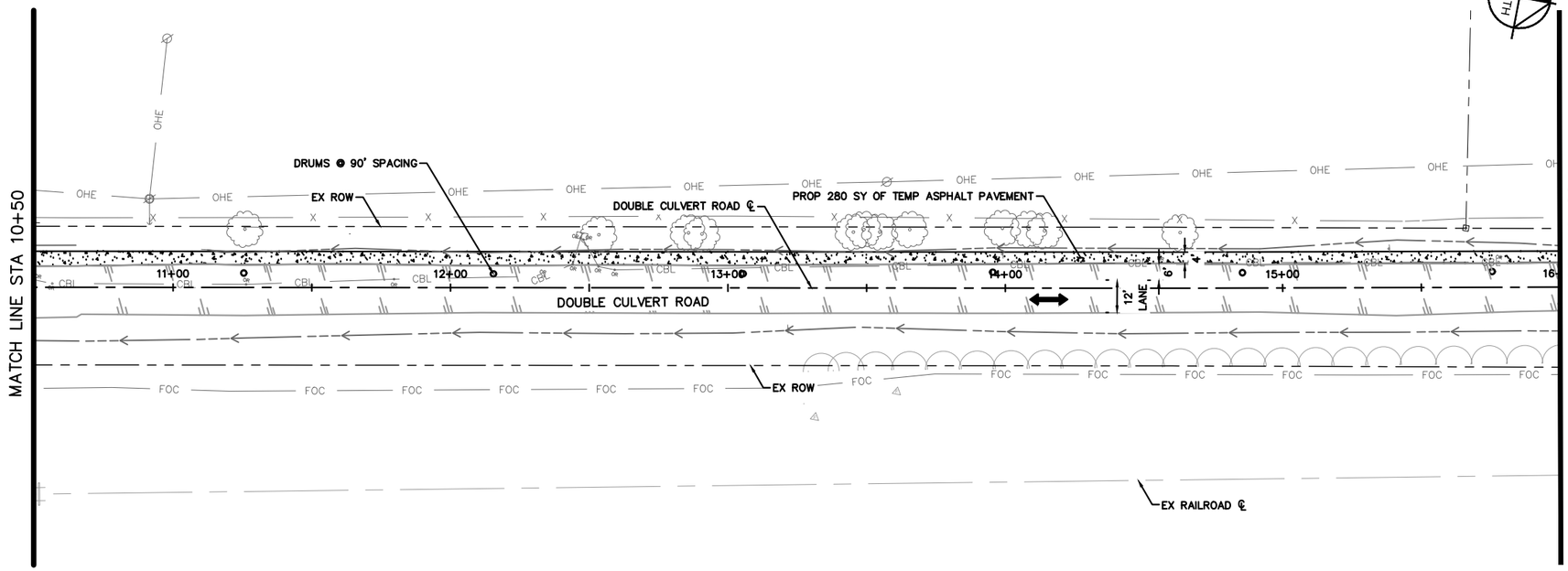
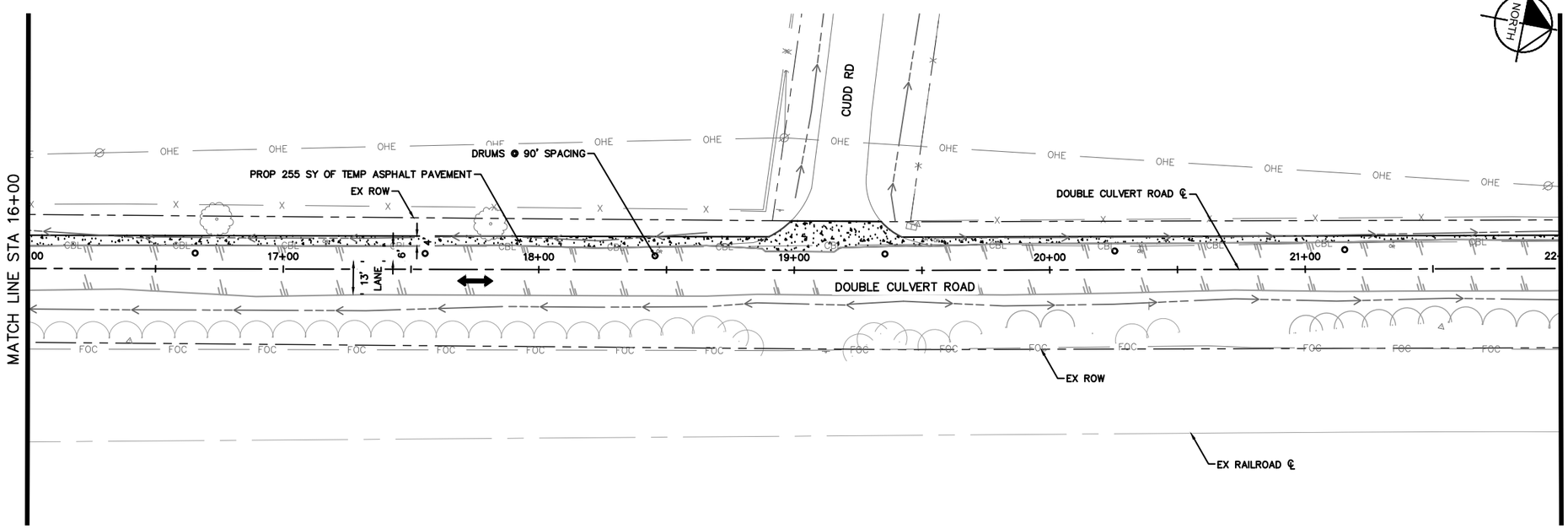
DOUBLE CULVERT ROAD
SEGMENT 1
TRAFFIC CONTROL PLAN
PHASE 0
BEGIN TO STA 10 50

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		88

100% SUBMITTAL





GRAPHIC SCALE IN FEET
0 25 50

LEGEND

- TEMP ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION PREVIOUS PHASE
- TEMP ASPHALT PAVEMENT PREVIOUS PHASE
- EXIST TRAVEL LANE
- PROP TRAVEL LANE
- SIGN
- TRAFFIC BARRELS
- TYPE III BARRICADE

NOTES

1. SEE SHEET 86 – 87 FOR PHASE 1 AND 2 DETOUR PLAN.
2. REMOVE ALL EXISTING AND TEMPORARY TRAFFIC SIGNING AND PAVEMENT MARKINGS IN CONFLICT WITH TRAFFIC CONTROL SIGNS AND MARKINGS SHOWN IN THIS PHASE/STEP (SUBSIDIARY TO ITEM 503).
3. CONTRACTOR TO MAINTAIN POSITIVE DRAINAGE AT ALL TIMES.
4. CONTRACTOR TO PROVIDE ACCESS TO ALL ADJACENT PROPERTIES AT ALL TIMES DURING CONSTRUCTION.
5. REFER TO SHEET 121 FOR TXDOT ONE–LANE TWO–WAY TRAFFIC CONTROL DETAIL.

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

DATE: 7/28/2026 8:23:00 PM
FILE: K:\HOU_Roadway\065035800 - Double Culvert Rd Segment 1\04_CAD\PlanSheets\TCP PHASE 0 - 10_00.00 TO 58_00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM

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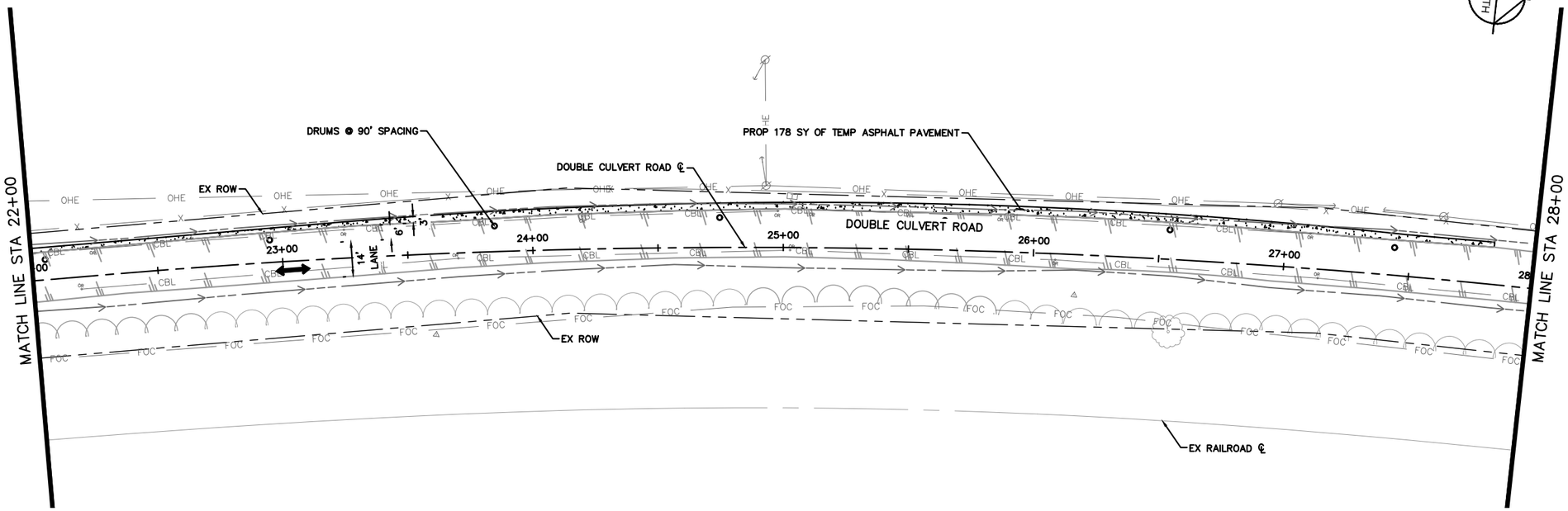
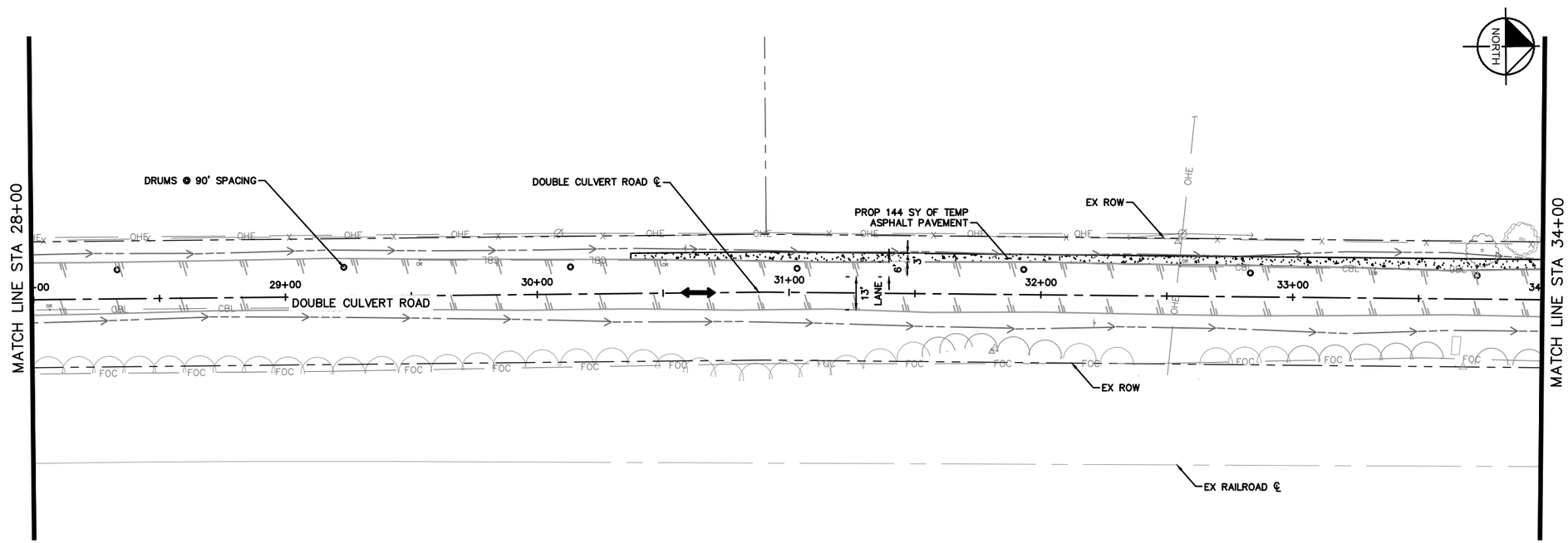
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
TRAFFIC CONTROL PLAN
PHASE 0
STA 10 50 TO STA 22 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		89

100% SUBMITTAL





GRAPHIC SCALE IN FEET
0 25 50

NORTH

LEGEND

- TEMP ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION PREVIOUS PHASE
- TEMP ASPHALT PAVEMENT PREVIOUS PHASE
- EXIST TRAVEL LANE
- PROP TRAVEL LANE
- SIGN
- TRAFFIC BARRELS
- TYPE III BARRICADE

NOTES

1. SEE SHEET 86 – 87 FOR PHASE 1 AND 2 DETOUR PLAN.
2. REMOVE ALL EXISTING AND TEMPORARY TRAFFIC SIGNING AND PAVEMENT MARKINGS IN CONFLICT WITH TRAFFIC CONTROL SIGNS AND MARKINGS SHOWN IN THIS PHASE/STEP (SUBSIDIARY TO ITEM 503).
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5. REFER TO SHEET 121 FOR TXDOT ONE–LANE TWO–WAY TRAFFIC CONTROL DETAIL.

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

DATE: 7/28/2026 8:23:10 PM
FILE: K:\HOU_Roadway\065035800 - Double Culvert Rd Segment 1\04_CAD\PlanSheets\TCP PHASE 0 - 10_00.00 TO 58_00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM

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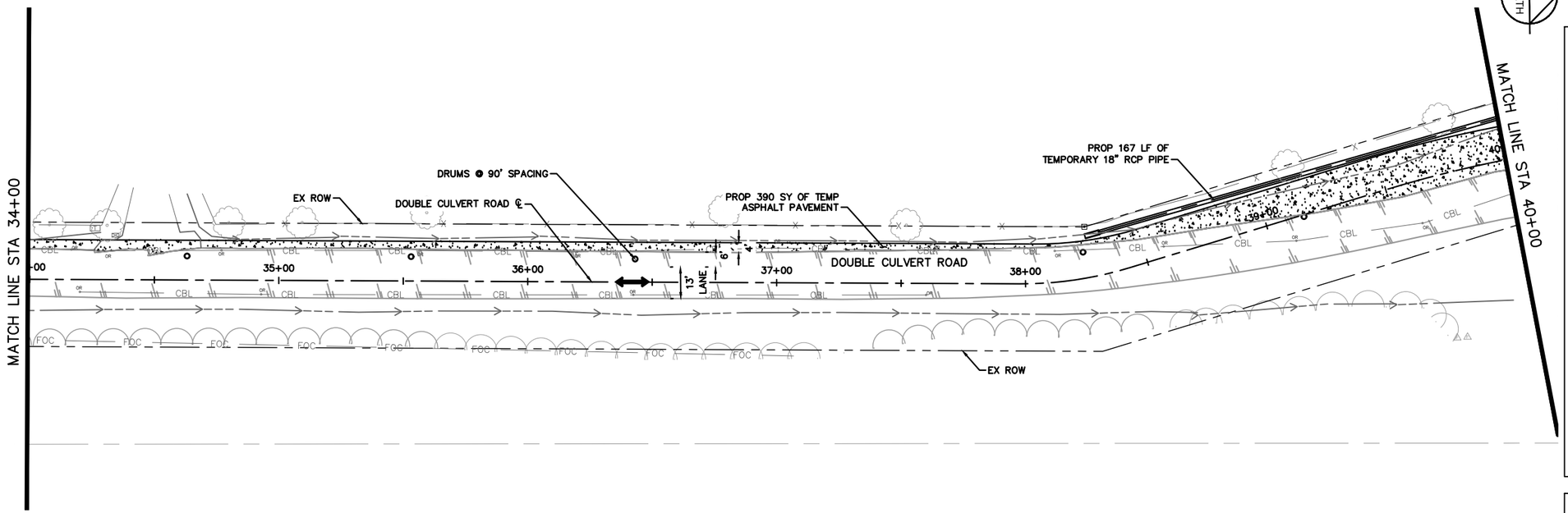
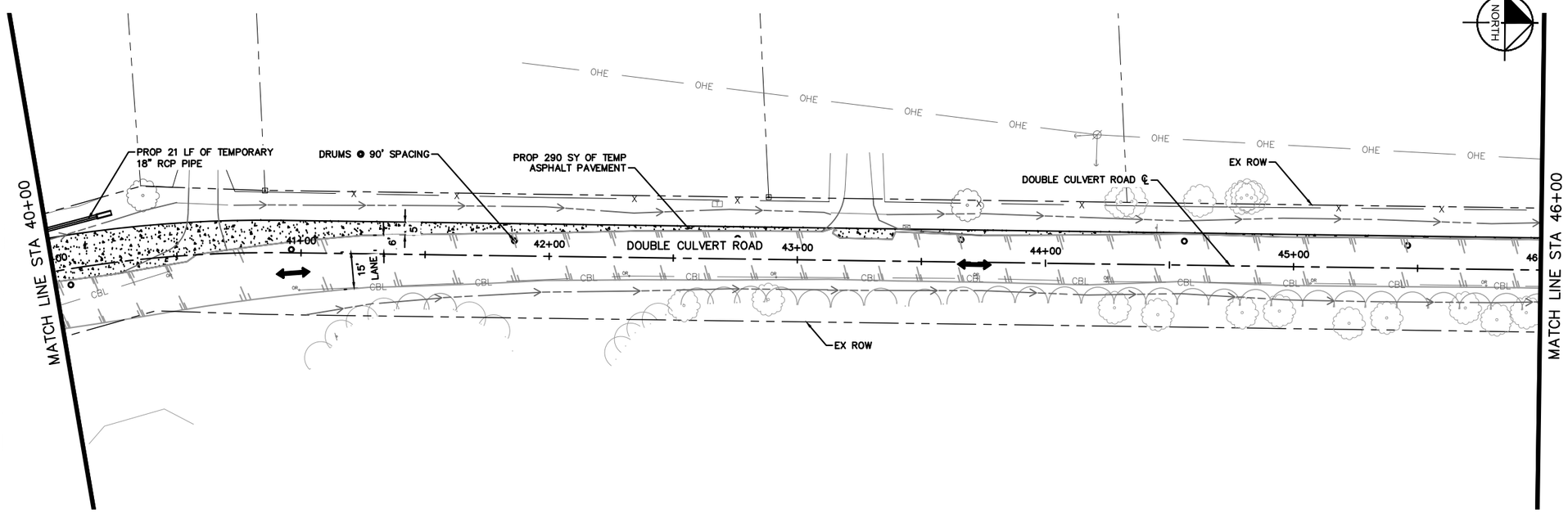
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
TRAFFIC CONTROL PLAN
PHASE 0
STA 22 00.00 TO STA 34 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		90

100% SUBMITTAL





GRAPHIC SCALE IN FEET
0 25 50

NORTH

LEGEND

- TEMP ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION PREVIOUS PHASE
- TEMP ASPHALT PAVEMENT PREVIOUS PHASE
- EXIST TRAVEL LANE
- PROP TRAVEL LANE
- SIGN
- TRAFFIC BARRELS
- TYPE III BARRICADE

NOTES

1. SEE SHEET 86 – 87 FOR PHASE 1 AND 2 DETOUR PLAN.
2. REMOVE ALL EXISTING AND TEMPORARY TRAFFIC SIGNING AND PAVEMENT MARKINGS IN CONFLICT WITH TRAFFIC CONTROL SIGNS AND MARKINGS SHOWN IN THIS PHASE/STEP (SUBSIDIARY TO ITEM 503).
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5. REFER TO SHEET 121 FOR TXDOT ONE–LANE TWO–WAY TRAFFIC CONTROL DETAIL.

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

DATE: 7/28/2026 9:21:42 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\TCP PHASE 0 - 10_00.00 TO 58_00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

THE STATE OF TEXAS WALLER COUNTY

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
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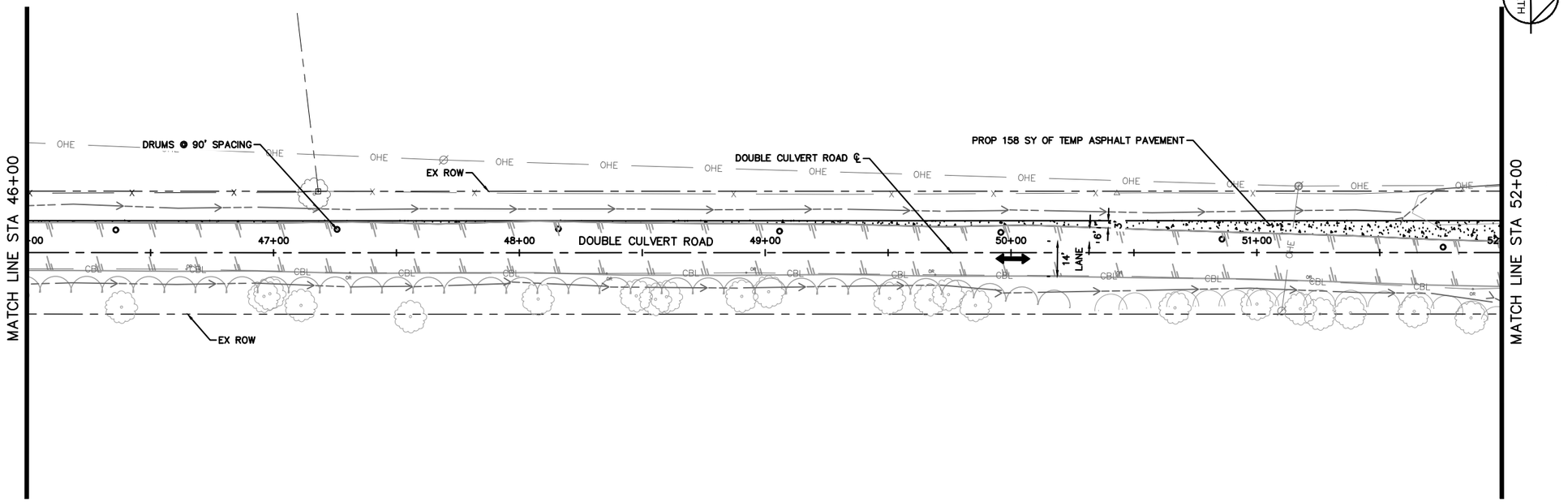
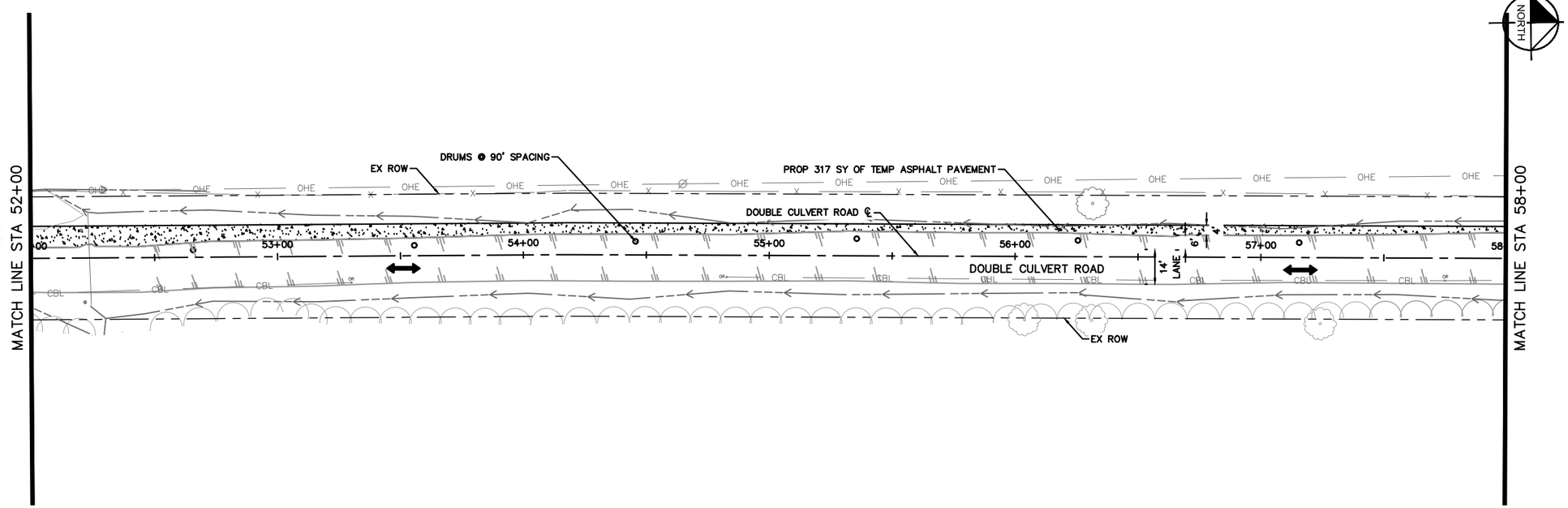
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
TRAFFIC CONTROL PLAN
PHASE 0
STA 34 00.00 TO STA 46 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		91

100% SUBMITTAL





GRAPHIC SCALE IN FEET
0 25 50

NORTH

LEGEND

- TEMP ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION PREVIOUS PHASE
- TEMP ASPHALT PAVEMENT PREVIOUS PHASE
- EXIST TRAVEL LANE
- PROP TRAVEL LANE
- SIGN
- TRAFFIC BARRELS
- TYPE III BARRICADE

NOTES

1. SEE SHEET 86 – 87 FOR PHASE 1 AND 2 DETOUR PLAN.
2. REMOVE ALL EXISTING AND TEMPORARY TRAFFIC SIGNING AND PAVEMENT MARKINGS IN CONFLICT WITH TRAFFIC CONTROL SIGNS AND MARKINGS SHOWN IN THIS PHASE/STEP (SUBSIDIARY TO ITEM 503).
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4. CONTRACTOR TO PROVIDE ACCESS TO ALL ADJACENT PROPERTIES AT ALL TIMES DURING CONSTRUCTION.
5. REFER TO SHEET 121 FOR TXDOT ONE–LANE TWO–WAY TRAFFIC CONTROL DETAIL.

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151598
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

DATE: 7/28/2026 8:23:30 PM
FILE: K:\HOU_Roadway\065035800 - Double Culvert Rd Segment 1\04_CAD\PlanSheets\TCP PHASE 0 - 10_00.00 TO 58_00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
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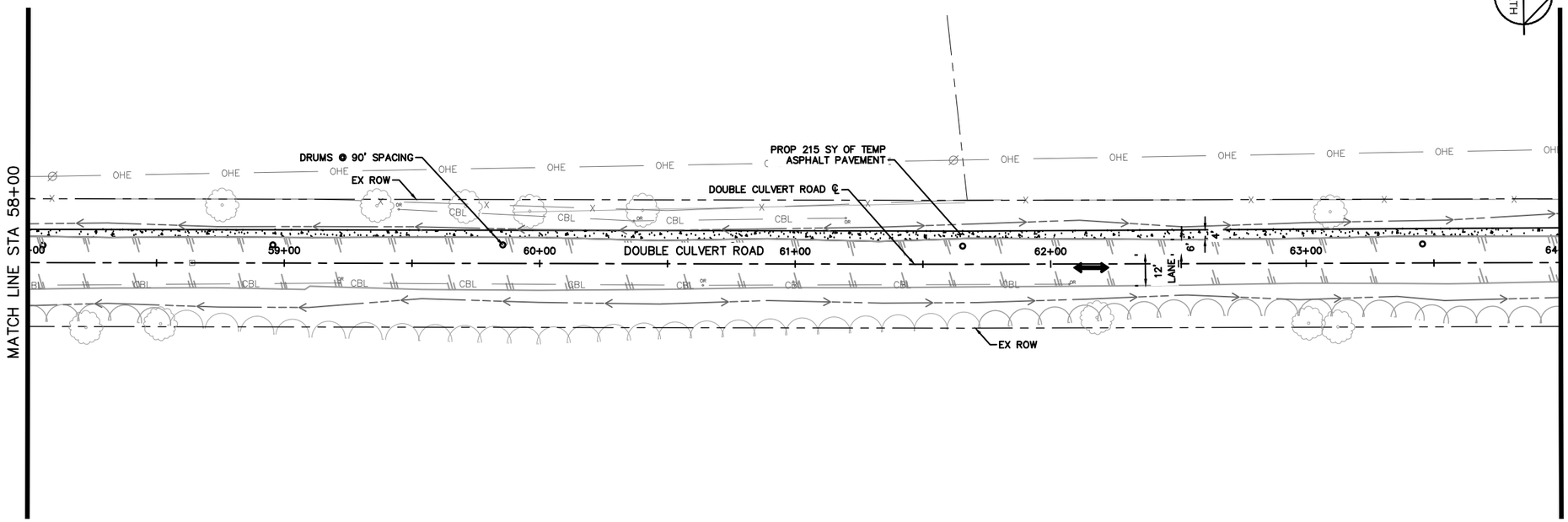
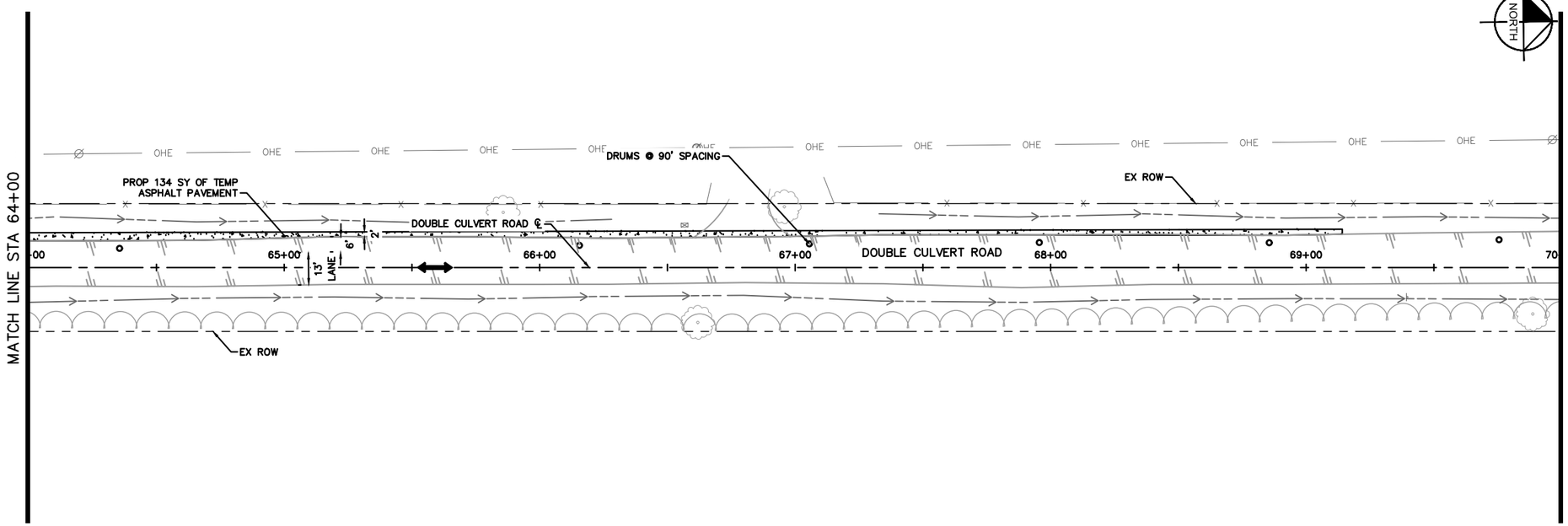
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
TRAFFIC CONTROL PLAN
PHASE 0
STA 46 00.00 TO STA 58 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		92

100% SUBMITTAL





GRAPHIC SCALE IN FEET
0 25 50

NORTH

LEGEND

- TEMP ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION PREVIOUS PHASE
- TEMP ASPHALT PAVEMENT PREVIOUS PHASE
- EXIST TRAVEL LANE
- PROP TRAVEL LANE
- SIGN
- TRAFFIC BARRELS
- TYPE III BARRICADE

NOTES

1. SEE SHEET 86 – 87 FOR PHASE 1 AND 2 DETOUR PLAN.
2. REMOVE ALL EXISTING AND TEMPORARY TRAFFIC SIGNING AND PAVEMENT MARKINGS IN CONFLICT WITH TRAFFIC CONTROL SIGNS AND MARKINGS SHOWN IN THIS PHASE/STEP (SUBSIDIARY TO ITEM 503).
3. CONTRACTOR TO MAINTAIN POSITIVE DRAINAGE AT ALL TIMES.
4. CONTRACTOR TO PROVIDE ACCESS TO ALL ADJACENT PROPERTIES AT ALL TIMES DURING CONSTRUCTION.
5. REFER TO SHEET 121 FOR TXDOT ONE–LANE TWO–WAY TRAFFIC CONTROL DETAIL.

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

DATE: 7/28/2026 8:23:53 PM
FILE: K:\HOU_Roadway\065035800 - Double Culvert Rd Segment 1\04_CAD\PlanSheets\TCP PHASE 0 - 58 00.00 TO 106 00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM

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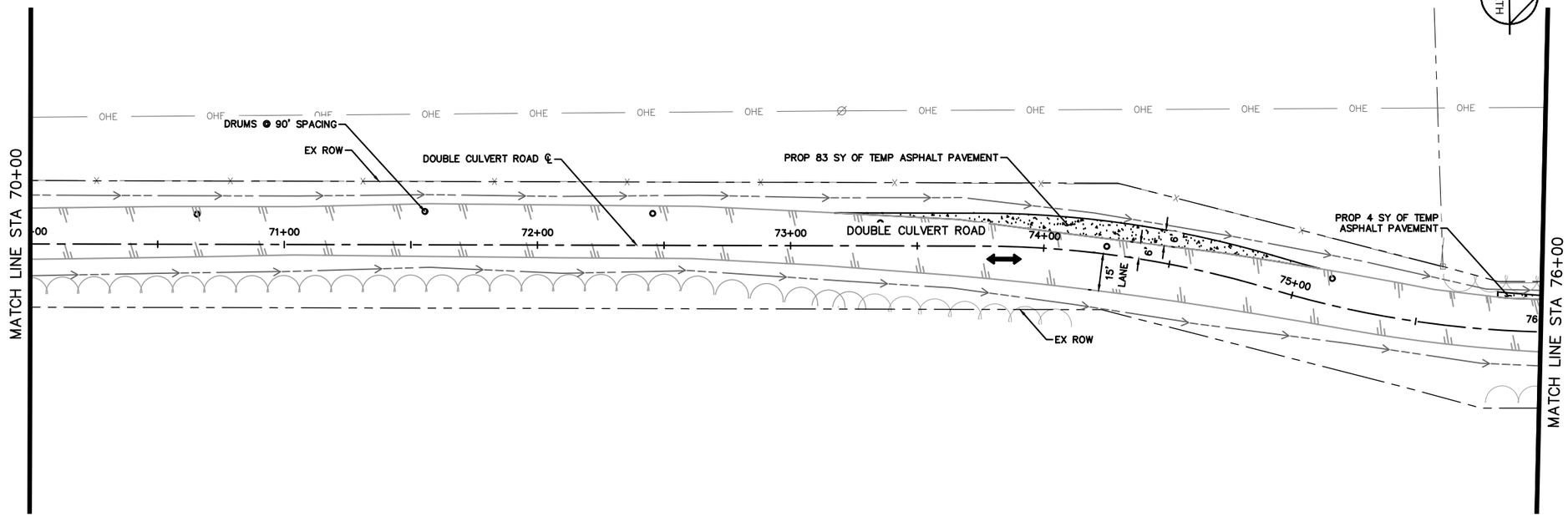
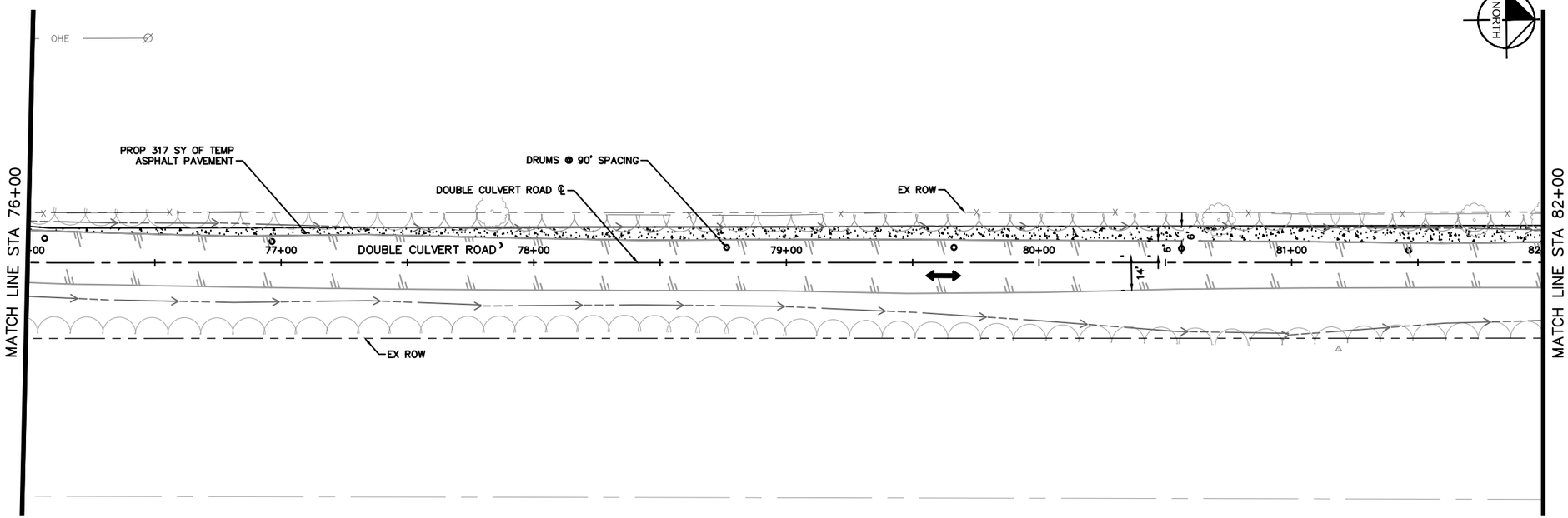
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
TRAFFIC CONTROL PLAN
PHASE 0
STA 58 00.00 TO STA 70 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		93

100% SUBMITTAL





GRAPHIC SCALE IN FEET
0 25 50

NORTH

LEGEND

- TEMP ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION PREVIOUS PHASE
- TEMP ASPHALT PAVEMENT PREVIOUS PHASE
- EXIST TRAVEL LANE
- PROP TRAVEL LANE
- SIGN
- TRAFFIC BARRELS
- TYPE III BARRICADE

NOTES

1. SEE SHEET 86 – 87 FOR PHASE 1 AND 2 DETOUR PLAN.
2. REMOVE ALL EXISTING AND TEMPORARY TRAFFIC SIGNING AND PAVEMENT MARKINGS IN CONFLICT WITH TRAFFIC CONTROL SIGNS AND MARKINGS SHOWN IN THIS PHASE/STEP (SUBSIDIARY TO ITEM 503).
3. CONTRACTOR TO MAINTAIN POSITIVE DRAINAGE AT ALL TIMES.
4. CONTRACTOR TO PROVIDE ACCESS TO ALL ADJACENT PROPERTIES AT ALL TIMES DURING CONSTRUCTION.
5. REFER TO SHEET 121 FOR TXDOT ONE–LANE TWO–WAY TRAFFIC CONTROL DETAIL.

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM

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TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
TRAFFIC CONTROL PLAN
PHASE 0
STA 70 00.00 TO STA 82 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		94

DATE: 7/28/2026 8:24:01 PM
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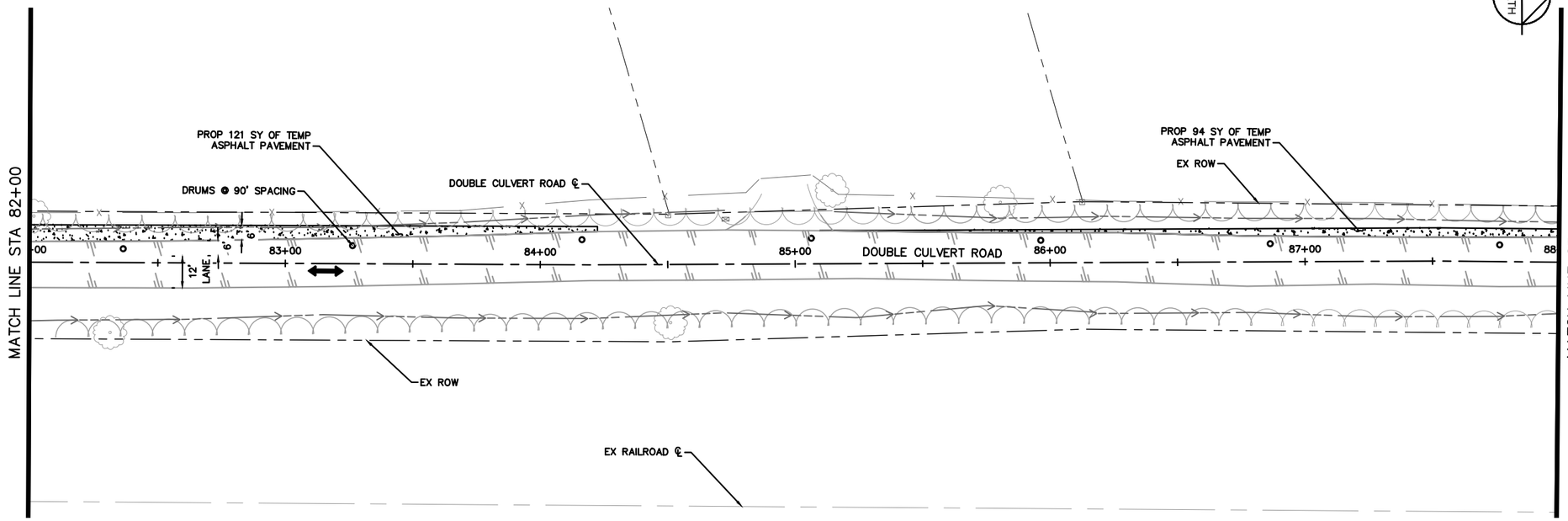

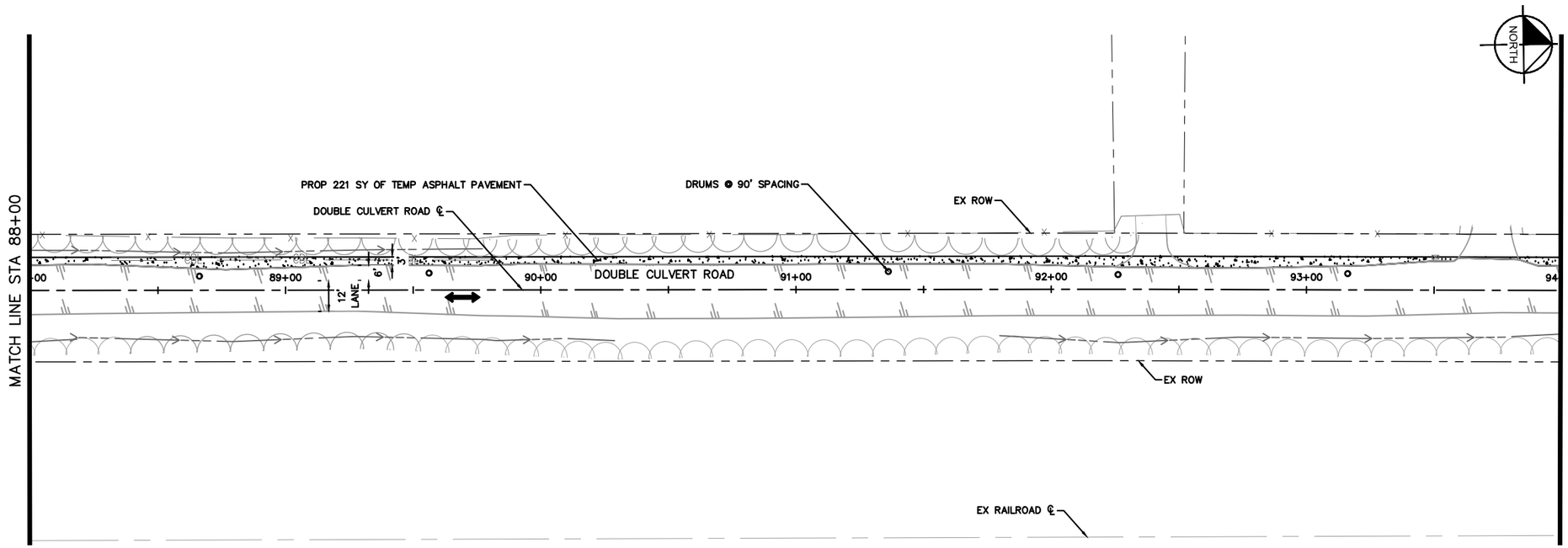

GRAPHIC SCALE IN FEET
0 25 50

LEGEND

- TEMP ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION PREVIOUS PHASE
- TEMP ASPHALT PAVEMENT PREVIOUS PHASE
- EXIST TRAVEL LANE
- PROP TRAVEL LANE
- SIGN
- TRAFFIC BARRELS
- TYPE III BARRICADE

NOTES

1. SEE SHEET 86 – 87 FOR PHASE 1 AND 2 DETOUR PLAN.
2. REMOVE ALL EXISTING AND TEMPORARY TRAFFIC SIGNING AND PAVEMENT MARKINGS IN CONFLICT WITH TRAFFIC CONTROL SIGNS AND MARKINGS SHOWN IN THIS PHASE/STEP (SUBSIDIARY TO ITEM 503).
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07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

DATE: 7/28/2026 8:24:09 PM
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REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM

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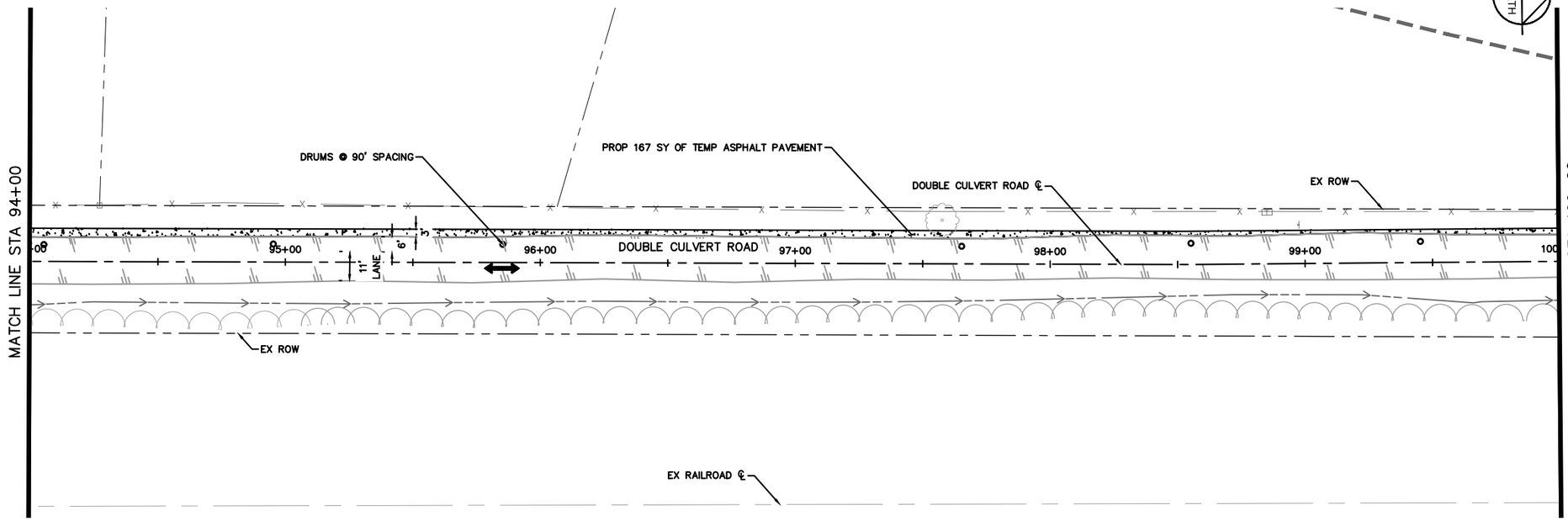
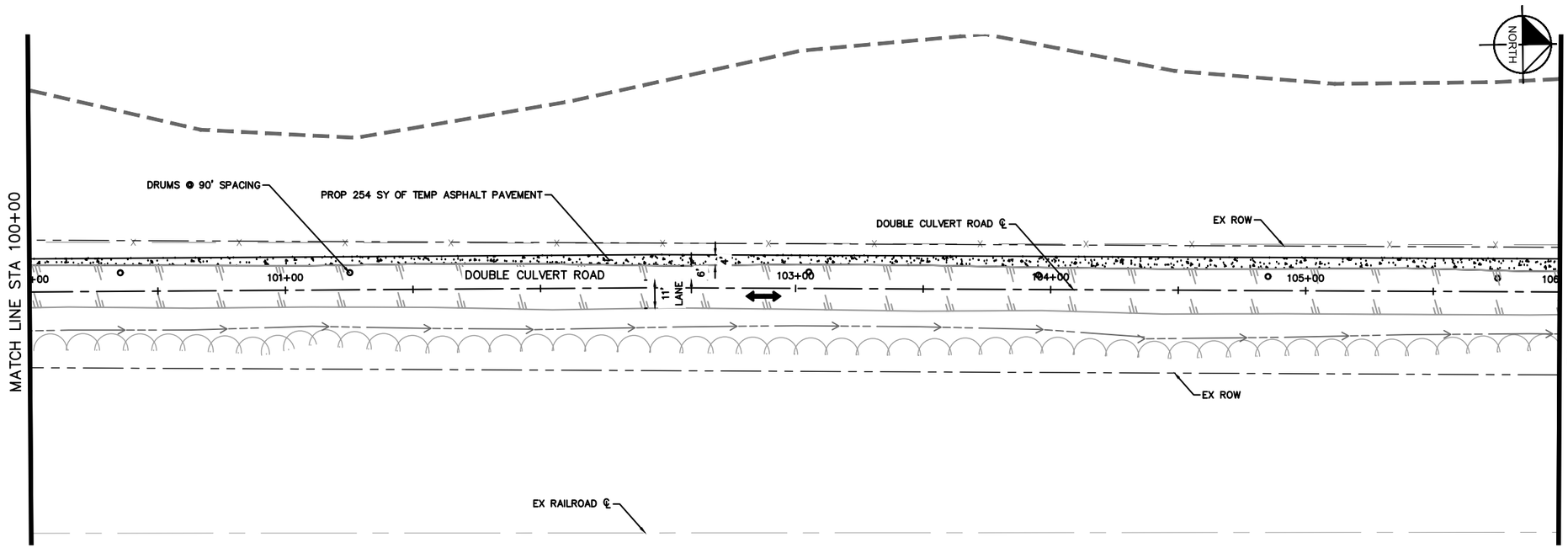
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
TRAFFIC CONTROL PLAN
PHASE 0
STA 82 00.00 TO STA 94 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		95

100% SUBMITTAL





GRAPHIC SCALE IN FEET
0 25 50

NORTH

LEGEND

- TEMP ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION PREVIOUS PHASE
- TEMP ASPHALT PAVEMENT PREVIOUS PHASE
- EXIST TRAVEL LANE
- PROP TRAVEL LANE
- SIGN
- TRAFFIC BARRELS
- TYPE III BARRICADE

NOTES

1. SEE SHEET 86 – 87 FOR PHASE 1 AND 2 DETOUR PLAN.
2. REMOVE ALL EXISTING AND TEMPORARY TRAFFIC SIGNING AND PAVEMENT MARKINGS IN CONFLICT WITH TRAFFIC CONTROL SIGNS AND MARKINGS SHOWN IN THIS PHASE/STEP (SUBSIDIARY TO ITEM 503).
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5. REFER TO SHEET 121 FOR TXDOT ONE–LANE TWO–WAY TRAFFIC CONTROL DETAIL.

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

DATE: 7/28/2026 8:24:20 PM
FILE: K:\HOU_Roadway\065035800 - Double Culvert Rd Segment 1\04_CAD\PlanSheets\TCP PHASE 0 - 58 00.00 TO 106 00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
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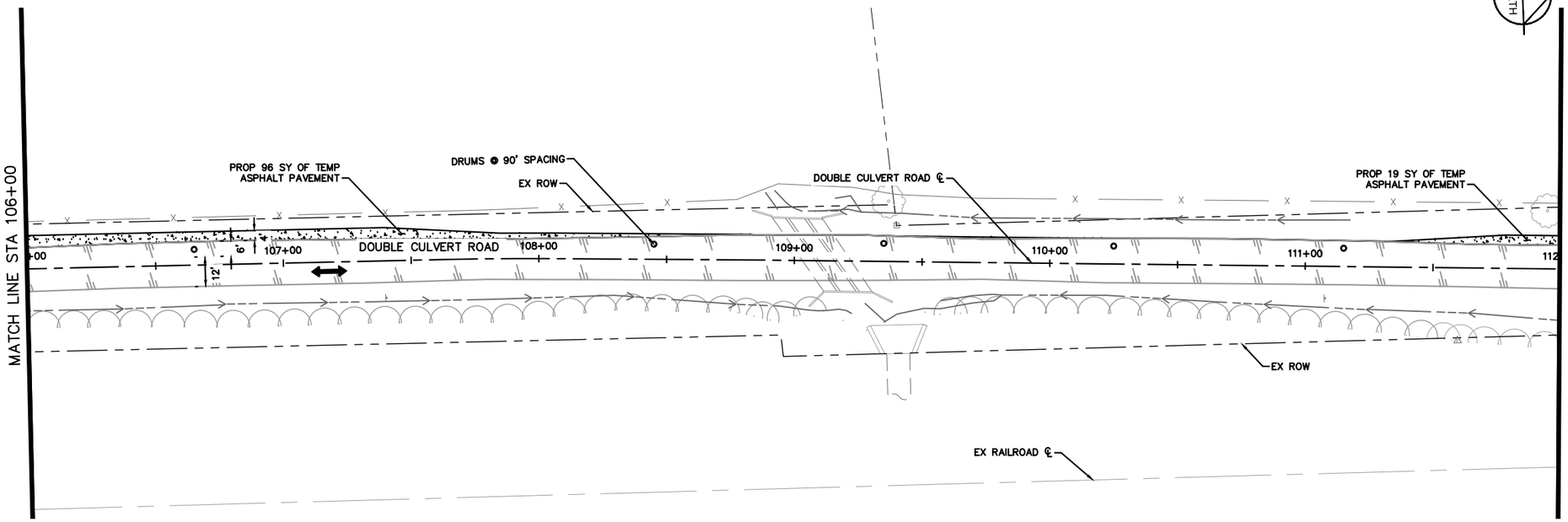
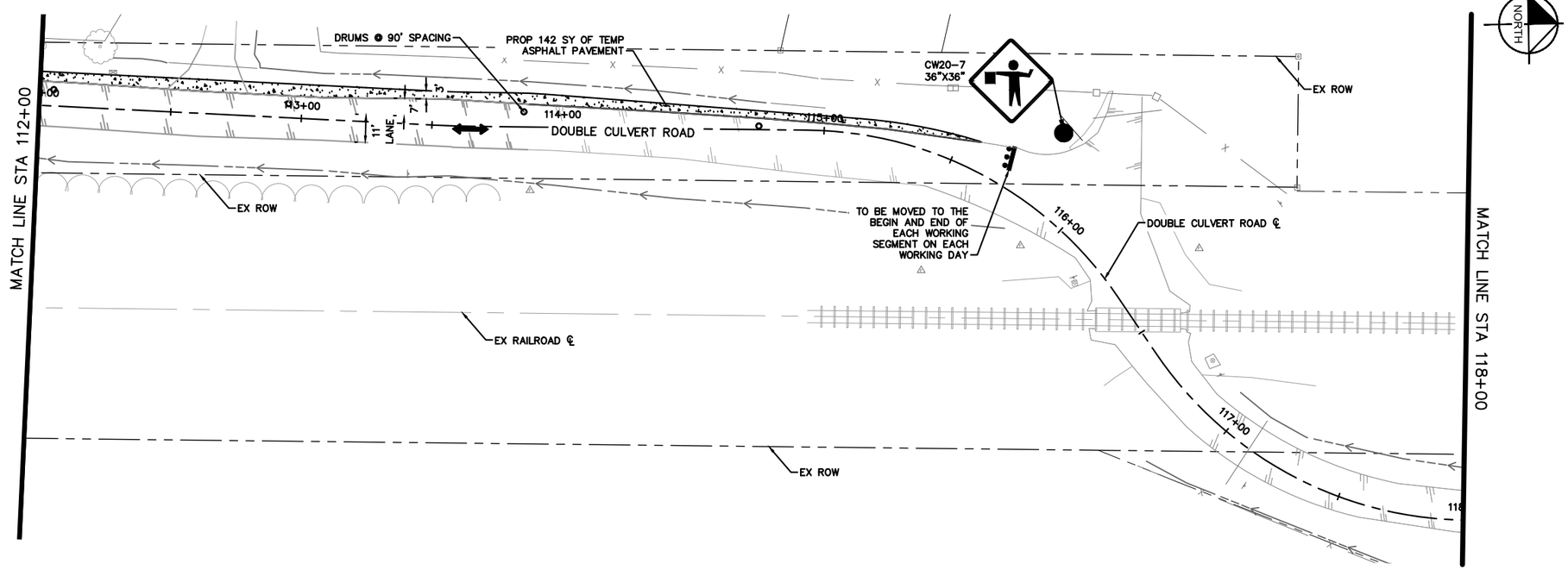
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
TRAFFIC CONTROL PLAN
PHASE 0
STA 94 00.00 TO STA 106 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		96

100% SUBMITTAL





GRAPHIC SCALE IN FEET
0 25 50

NORTH

LEGEND

- TEMP ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION PREVIOUS PHASE
- TEMP ASPHALT PAVEMENT PREVIOUS PHASE
- EXIST TRAVEL LANE
- PROP TRAVEL LANE
- SIGN
- TRAFFIC BARRELS
- TYPE III BARRICADE

NOTES

1. SEE SHEET 86 – 87 FOR PHASE 1 AND 2 DETOUR PLAN.
2. REMOVE ALL EXISTING AND TEMPORARY TRAFFIC SIGNING AND PAVEMENT MARKINGS IN CONFLICT WITH TRAFFIC CONTROL SIGNS AND MARKINGS SHOWN IN THIS PHASE/STEP (SUBSIDIARY TO ITEM 503).
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07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

DATE: 7/28/2026 9:22:04 PM
FILE: K:\hou_roadway\066035800 - double culvert rd segment 1\04_CAD\PlanSheets\TCP PHASE 0 - 106_00.00 TO 118_00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
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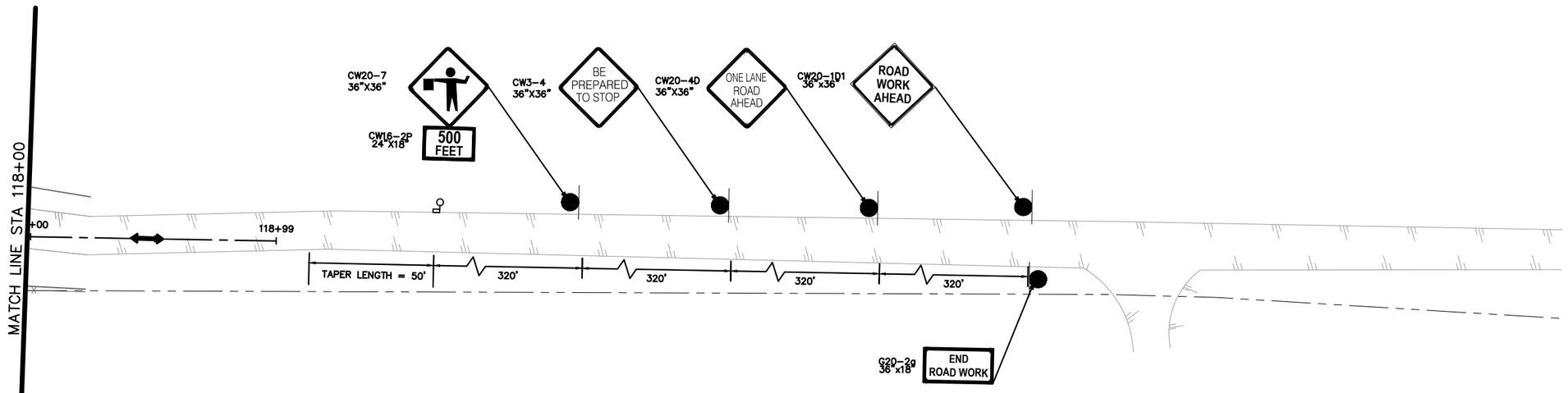
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
TRAFFIC CONTROL PLAN
PHASE 0
STA 106 00.00 TO STA 118 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		97

100% SUBMITTAL



NORTH

GRAPHIC SCALE IN FEET
0 25 50

LEGEND

- TEMP ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION PREVIOUS PHASE
- TEMP ASPHALT PAVEMENT PREVIOUS PHASE
- EXIST TRAVEL LANE
- PROP TRAVEL LANE
- SIGN
- TRAFFIC BARRELS
- TYPE III BARRICADE

NOTES

1. SEE SHEET 86 – 87 FOR PHASE 1 AND 2 DETOUR PLAN.
2. REMOVE ALL EXISTING AND TEMPORARY TRAFFIC SIGNING AND PAVEMENT MARKINGS IN CONFLICT WITH TRAFFIC CONTROL SIGNS AND MARKINGS SHOWN IN THIS PHASE/STEP (SUBSIDIARY TO ITEM 503).
3. CONTRACTOR TO MAINTAIN POSITIVE DRAINAGE AT ALL TIMES.
4. CONTRACTOR TO PROVIDE ACCESS TO ALL ADJACENT PROPERTIES AT ALL TIMES DURING CONSTRUCTION.
5. REFER TO SHEET 121 FOR TXDOT ONE–LANE TWO–WAY TRAFFIC CONTROL DETAIL.

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL
ENGINEER
Abbey Polzin

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FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\TCP PHASE 0 - 106_00.00 TO 118_00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
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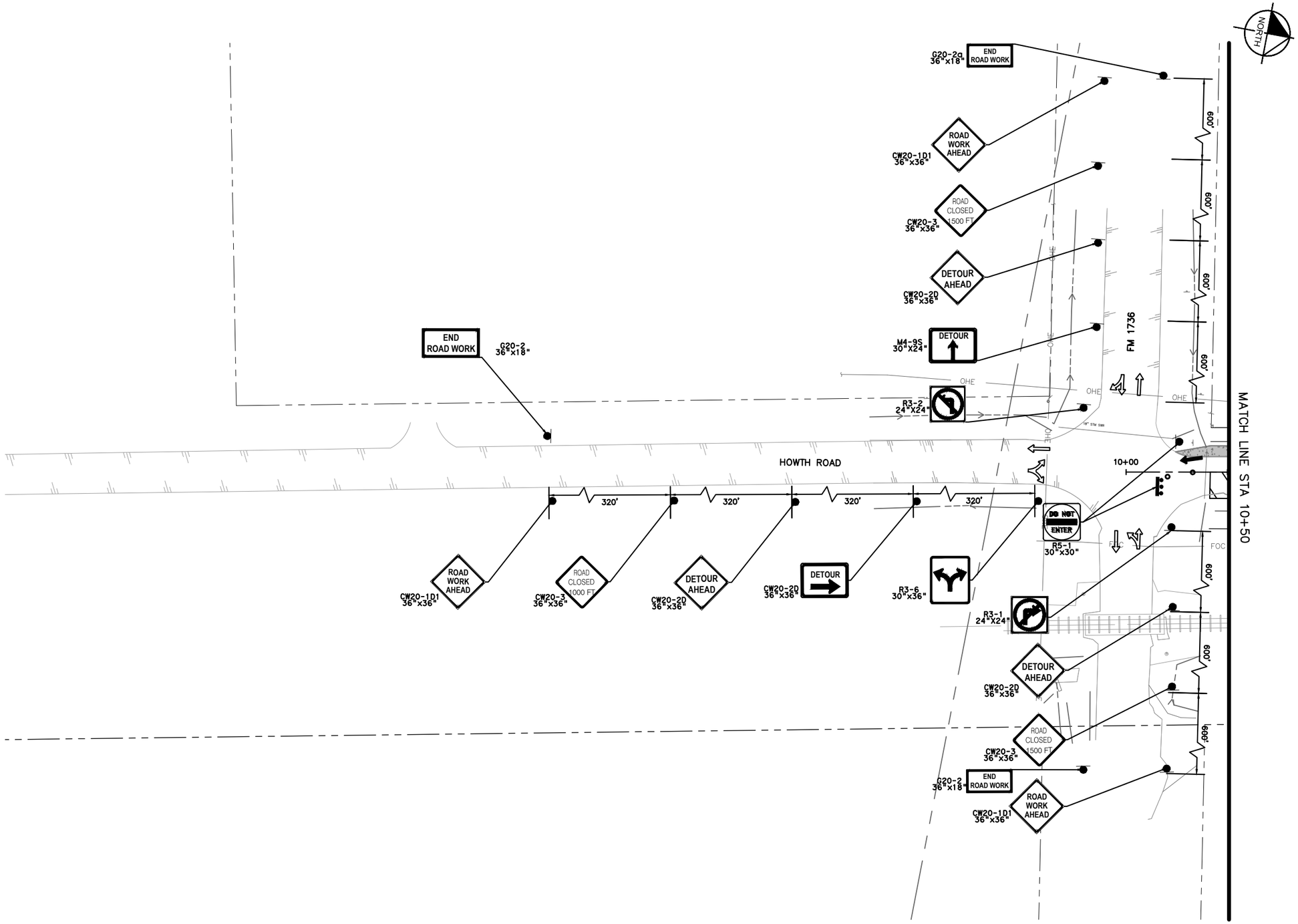
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
TRAFFIC CONTROL PLAN
PHASE 0
STA 118 00.00 TO END

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		98

100% SUBMITTAL



LEGEND

- TEMP ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION PREVIOUS PHASE
- TEMP ASPHALT PAVEMENT PREVIOUS PHASE
- EXIST TRAVEL LANE
- PROP TRAVEL LANE
- SIGN
- TRAFFIC BARRELS
- TYPE III BARRICADE

NOTES

1. SEE SHEET 86 – 87 FOR PHASE 1 AND 2 DETOUR PLAN.
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07/28/2026

ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
STATE OF TEXAS

Abbey Polzin

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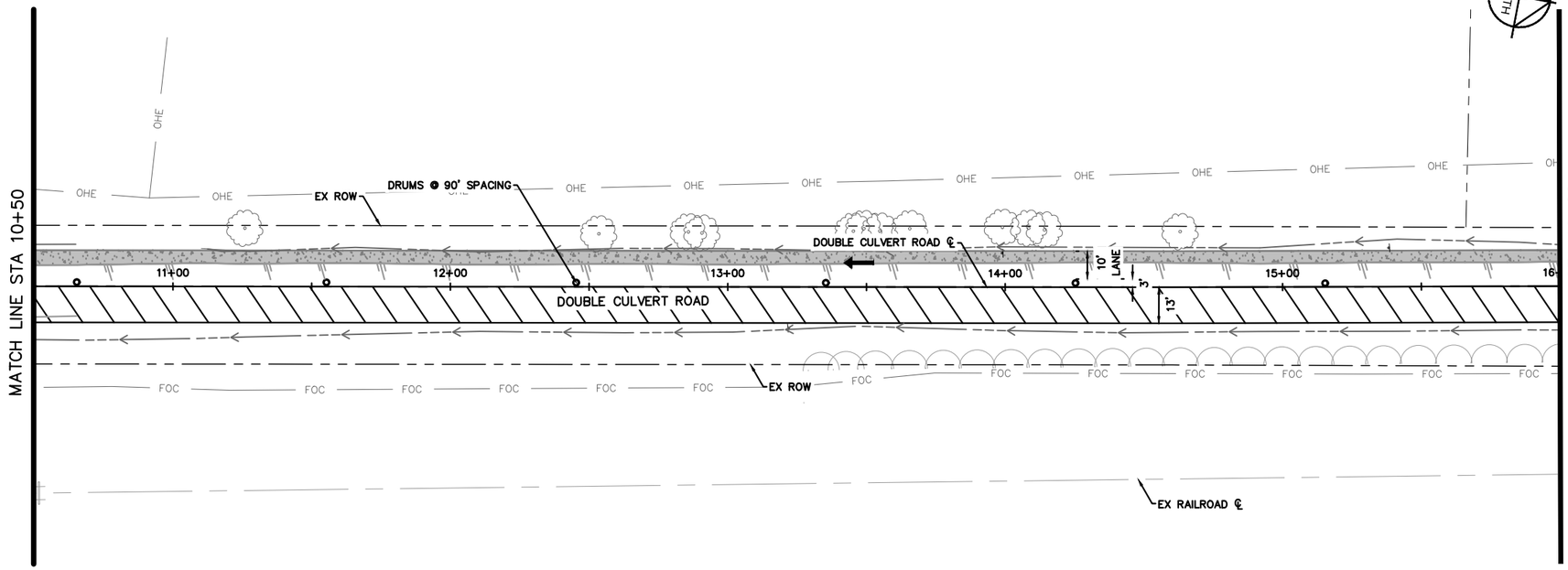
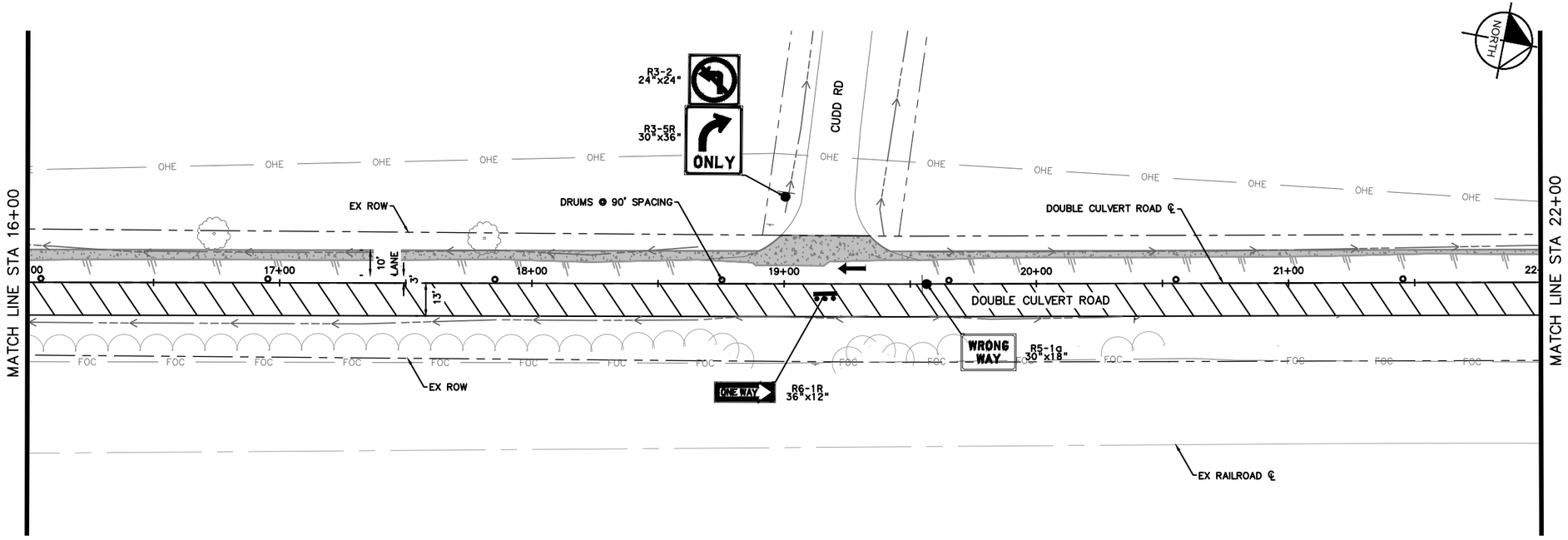
DOUBLE CULVERT ROAD
SEGMENT 1
TRAFFIC CONTROL PLAN
PHASE 1
BEGIN TO STA 10 50

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		99

100% SUBMITTAL





GRAPHIC SCALE IN FEET
0 25 50

LEGEND

- TEMP ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION PREVIOUS PHASE
- TEMP ASPHALT PAVEMENT PREVIOUS PHASE
- EXIST TRAVEL LANE
- PROP TRAVEL LANE
- SIGN
- TRAFFIC BARRELS
- TYPE III BARRICADE

NOTES

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STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

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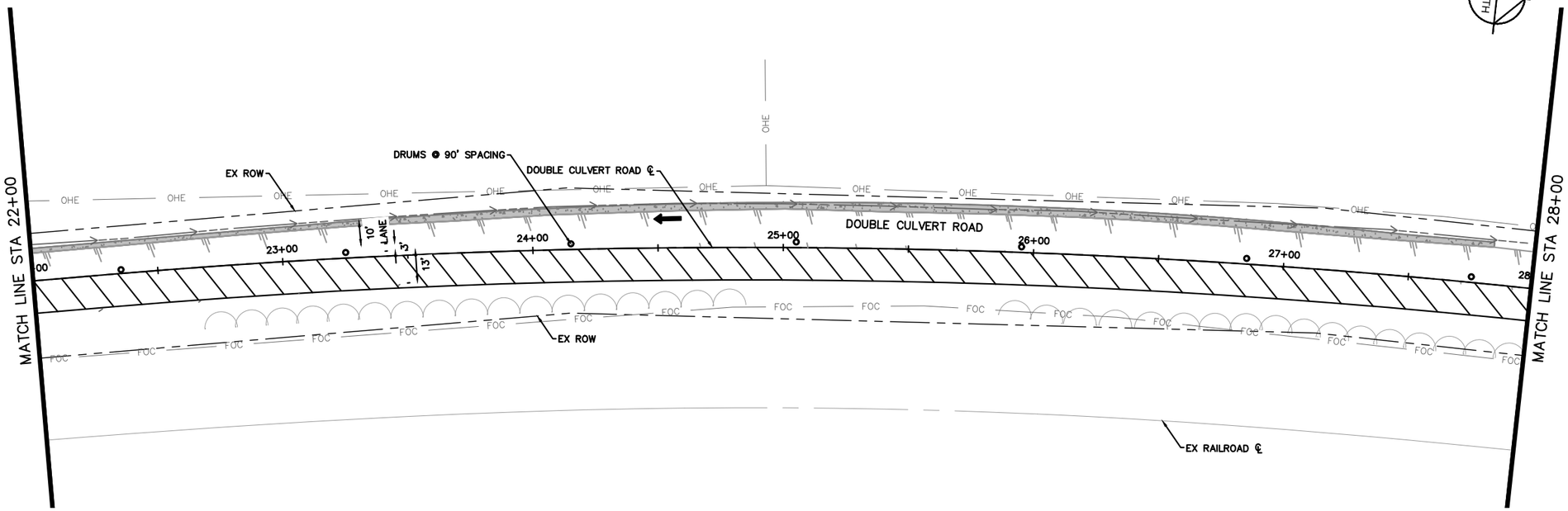
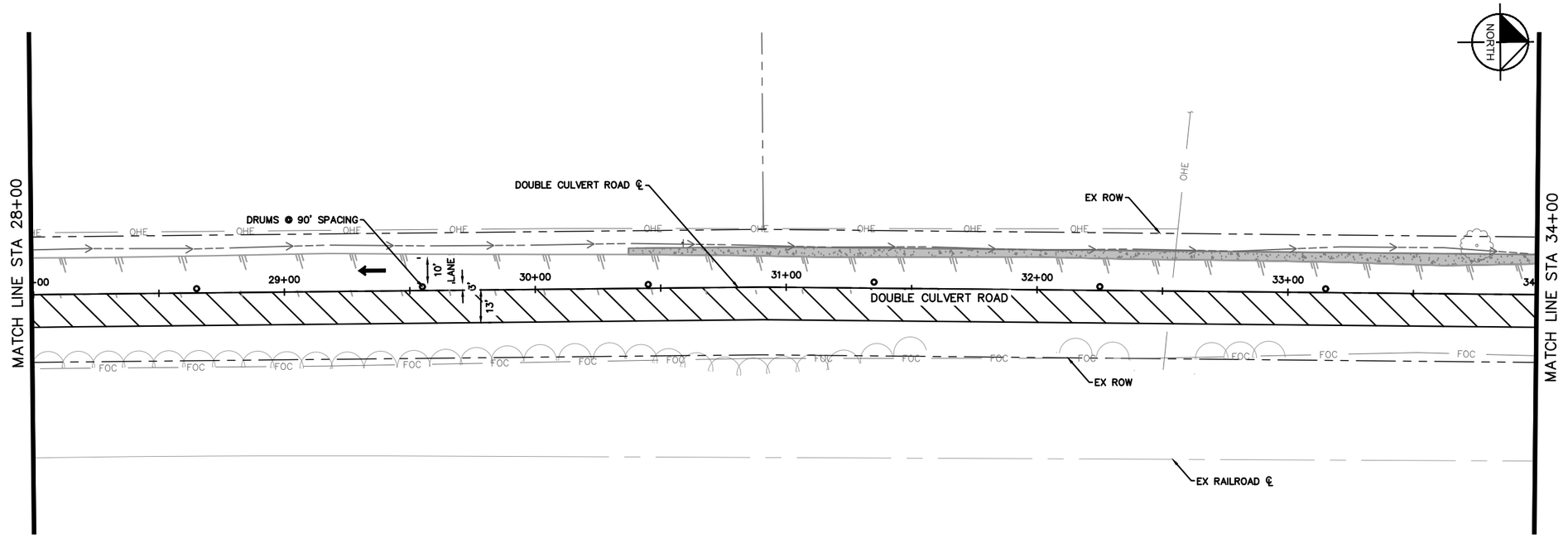
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
TRAFFIC CONTROL PLAN
PHASE 1
STA 10 50 TO STA 22 00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		100

100% SUBMITTAL





GRAPHIC SCALE IN FEET
0 25 50

LEGEND

- TEMP ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION PREVIOUS PHASE
- TEMP ASPHALT PAVEMENT PREVIOUS PHASE
- EXIST TRAVEL LANE
- PROP TRAVEL LANE
- SIGN
- TRAFFIC BARRELS
- TYPE III BARRICADE

NOTES

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TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
TRAFFIC CONTROL PLAN
PHASE 1
STA 22 00.00 TO STA 34 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		101

DATE: 7/28/2026 8:25:25 PM
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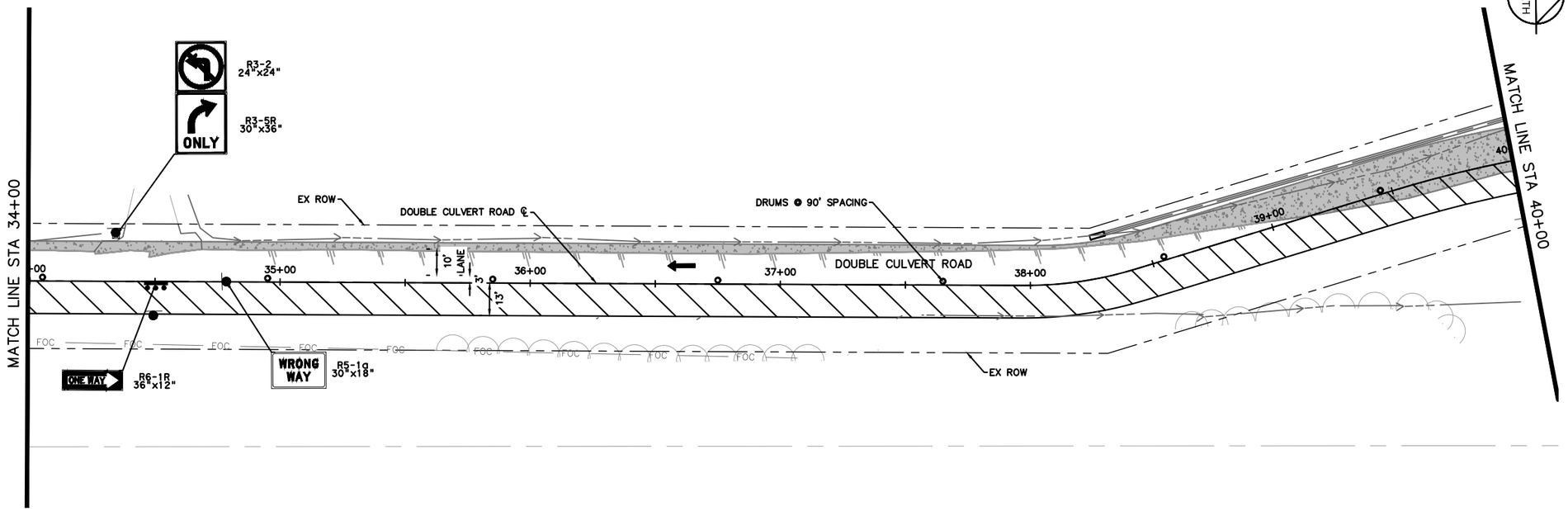

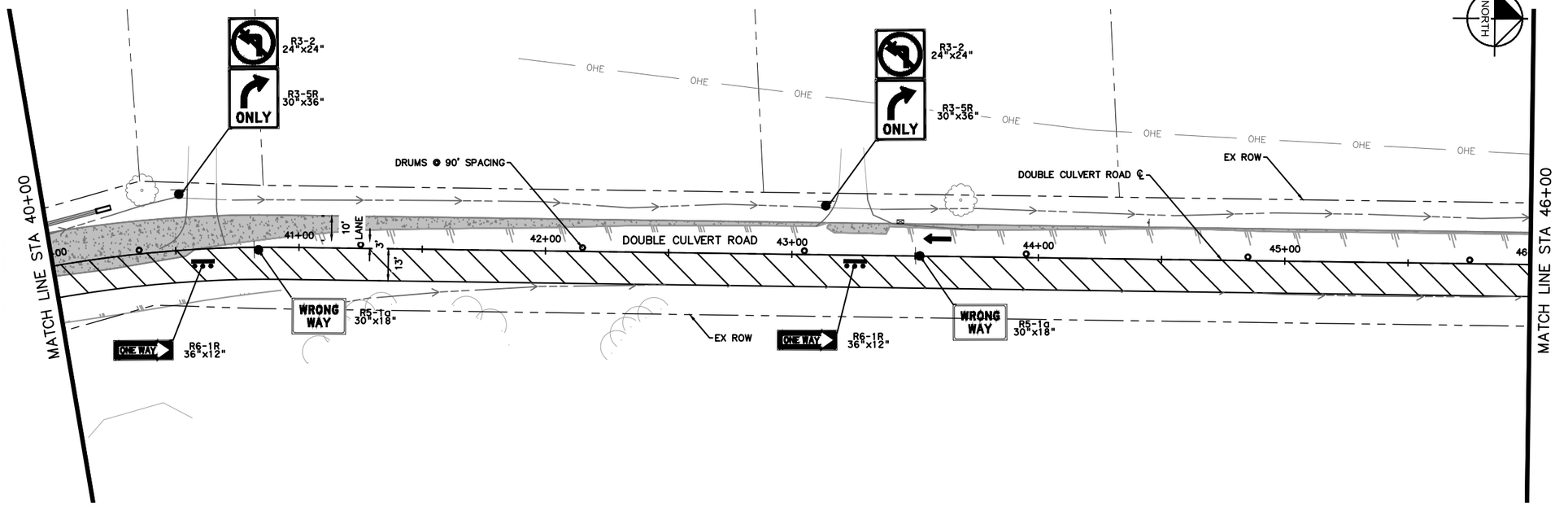

GRAPHIC SCALE IN FEET
0 25 50

NORTH

LEGEND

- TEMP ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION PREVIOUS PHASE
- TEMP ASPHALT PAVEMENT PREVIOUS PHASE
- EXIST TRAVEL LANE
- PROP TRAVEL LANE
- SIGN
- TRAFFIC BARRELS
- TYPE III BARRICADE

NOTES

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07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
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PROFESSIONAL ENGINEER
Abbey Polzin

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WALLER COUNTY
ENGINEERING DEPARTMENT

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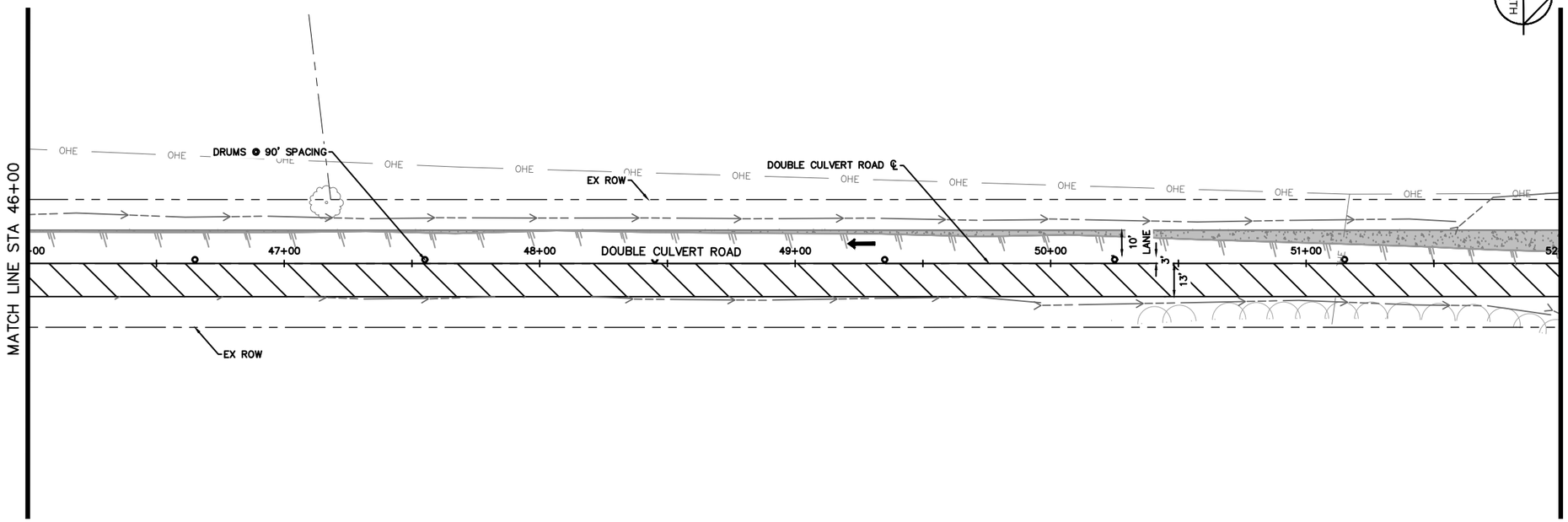
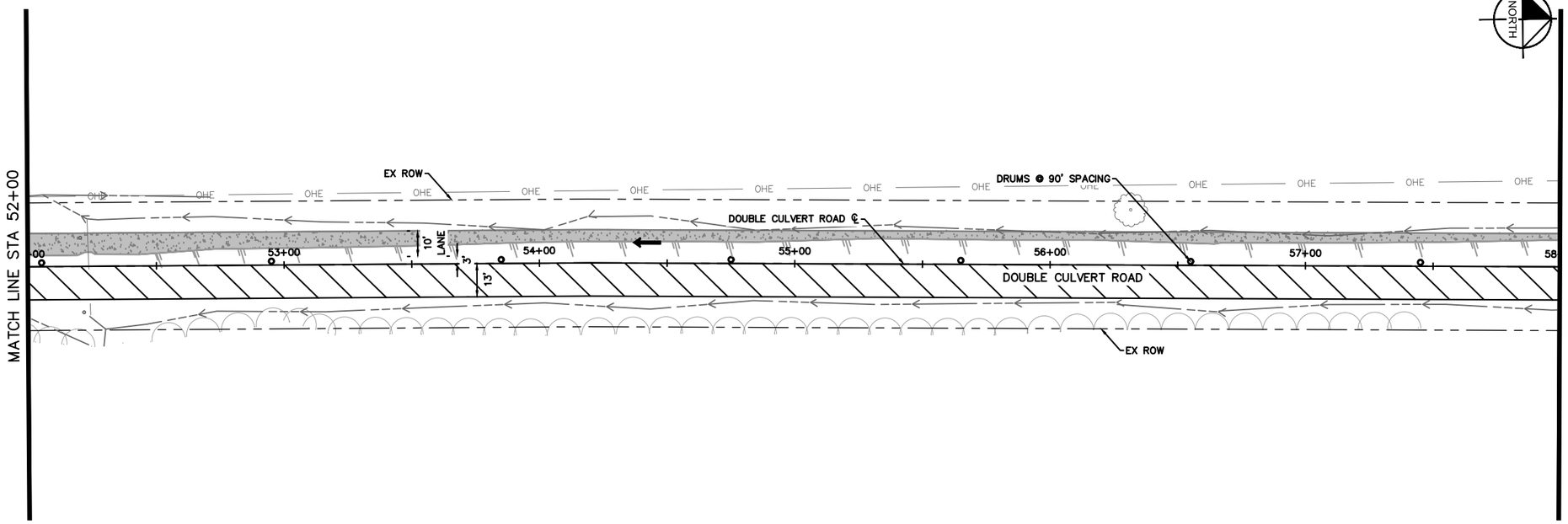
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
TRAFFIC CONTROL PLAN
PHASE 1
STA 34 00.00 TO STA 46 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		102

100% SUBMITTAL





GRAPHIC SCALE IN FEET
0 25 50

LEGEND

- TEMP ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION PREVIOUS PHASE
- TEMP ASPHALT PAVEMENT PREVIOUS PHASE
- EXIST TRAVEL LANE
- PROP TRAVEL LANE
- SIGN
- TRAFFIC BARRELS
- TYPE III BARRICADE

NOTES

1. SEE SHEET 86 – 87 FOR PHASE 1 AND 2 DETOUR PLAN.
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07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

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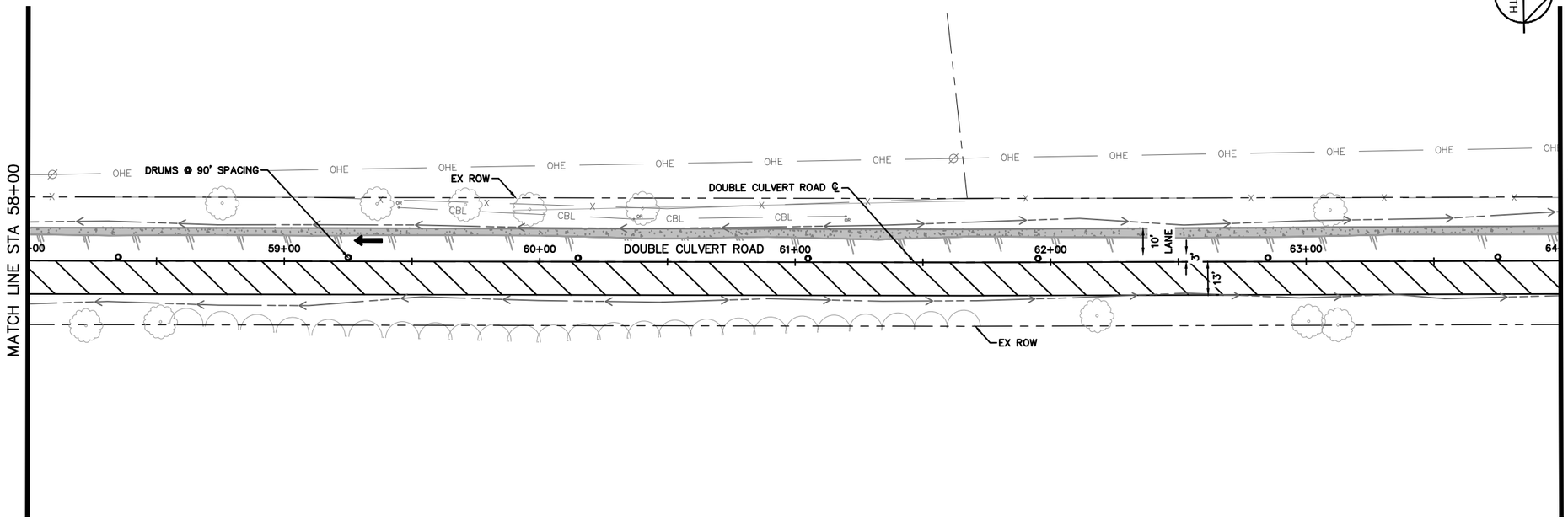
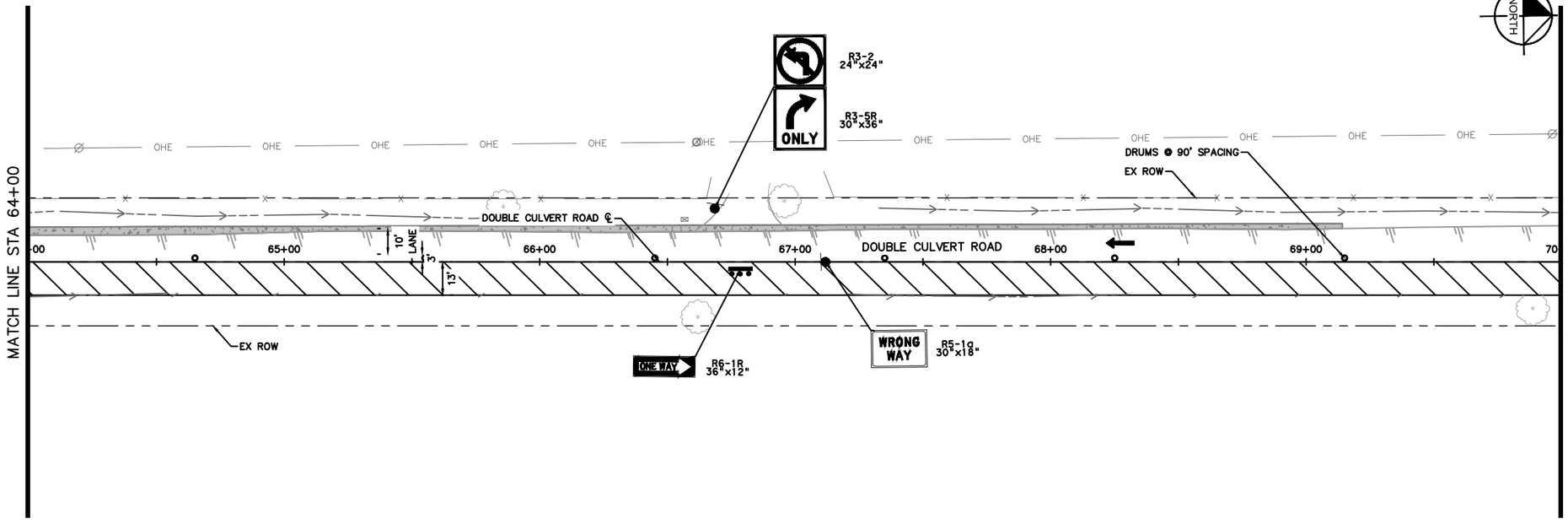
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
TRAFFIC CONTROL PLAN
PHASE 1
STA 46 00.00 TO STA 58 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		103

100% SUBMITTAL





GRAPHIC SCALE IN FEET
0 25 50

NORTH

LEGEND

- TEMP ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION PREVIOUS PHASE
- TEMP ASPHALT PAVEMENT PREVIOUS PHASE
- EXIST TRAVEL LANE
- PROP TRAVEL LANE
- SIGN
- TRAFFIC BARRELS
- TYPE III BARRICADE

NOTES

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07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

DATE: 7/28/2026 8:26:08 PM
FILE: K:\HOU_Roadway\065035800 - Double Culvert Rd Segment 1\04 CAD\PlanSheets\TCP PHASE 1 - 58 00.00 TO 106 00.00.dwg

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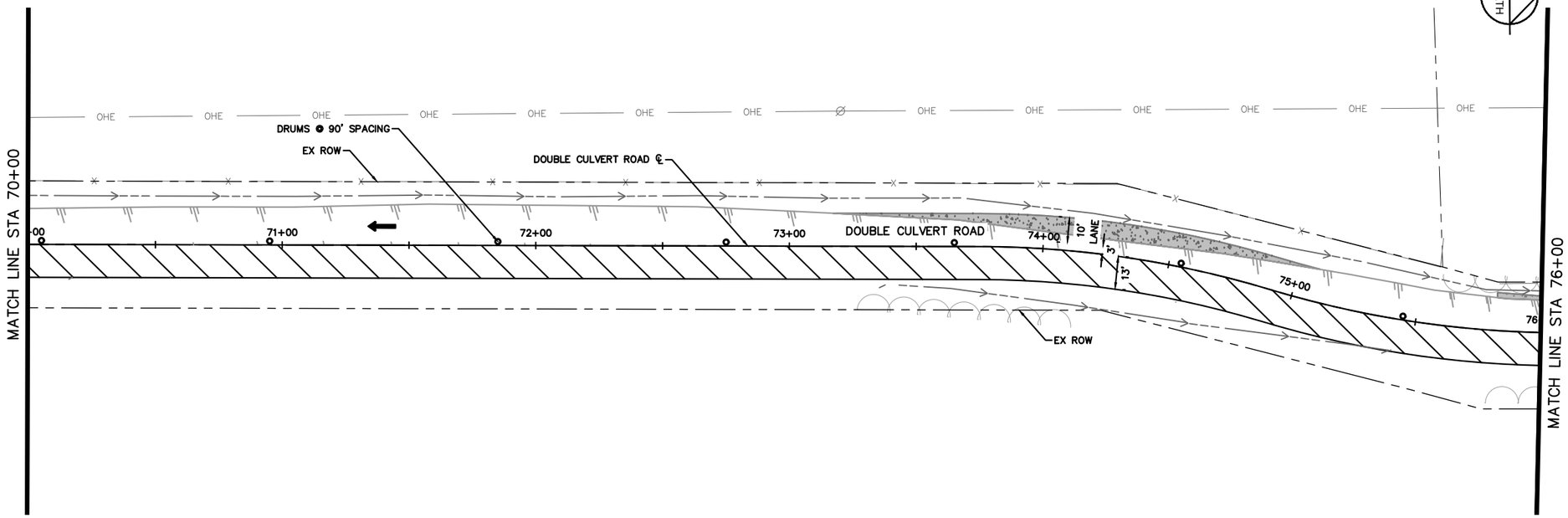
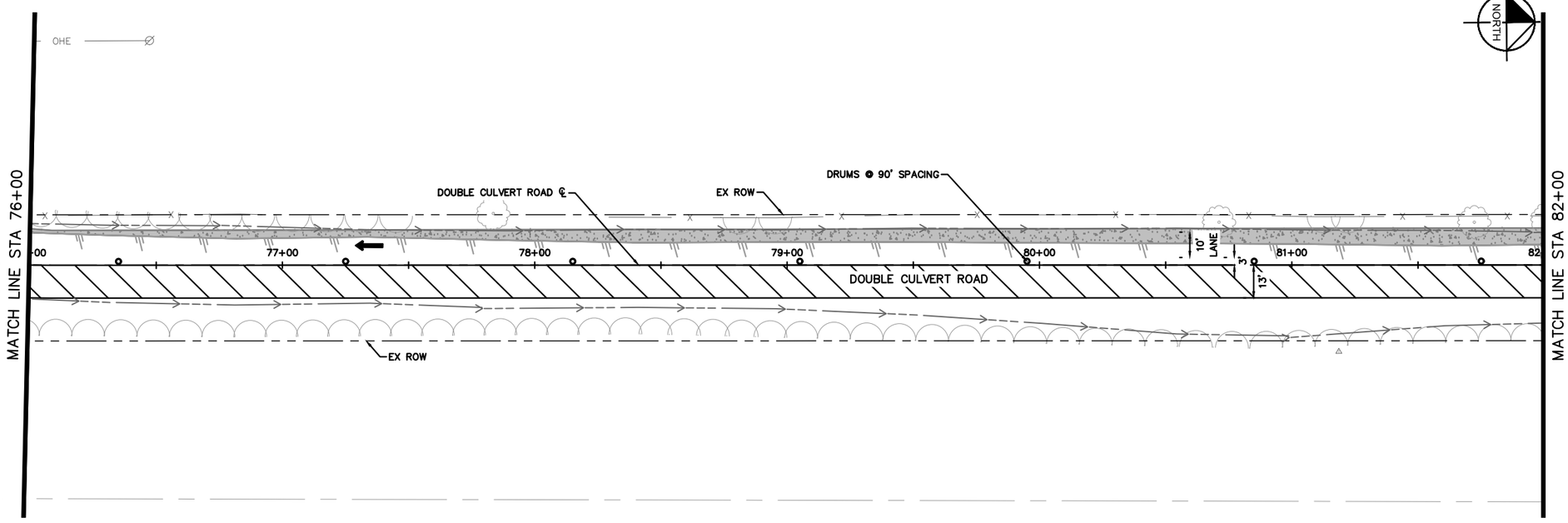
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
TRAFFIC CONTROL PLAN
PHASE 1
STA 58 00.00 TO STA 70 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		104

100% SUBMITTAL





GRAPHIC SCALE IN FEET
0 25 50

NORTH

LEGEND

- TEMP ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION PREVIOUS PHASE
- TEMP ASPHALT PAVEMENT PREVIOUS PHASE
- EXIST TRAVEL LANE
- PROP TRAVEL LANE
- SIGN
- TRAFFIC BARRELS
- TYPE III BARRICADE

NOTES

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07/28/2026
STATE OF TEXAS
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151558
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REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
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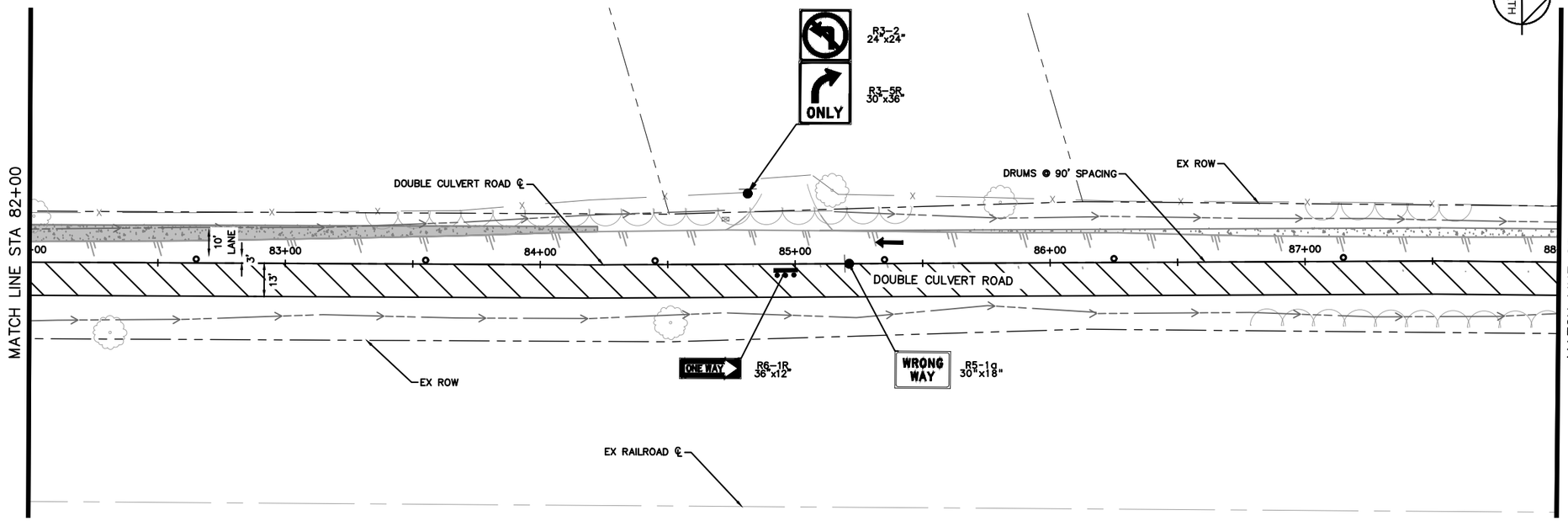
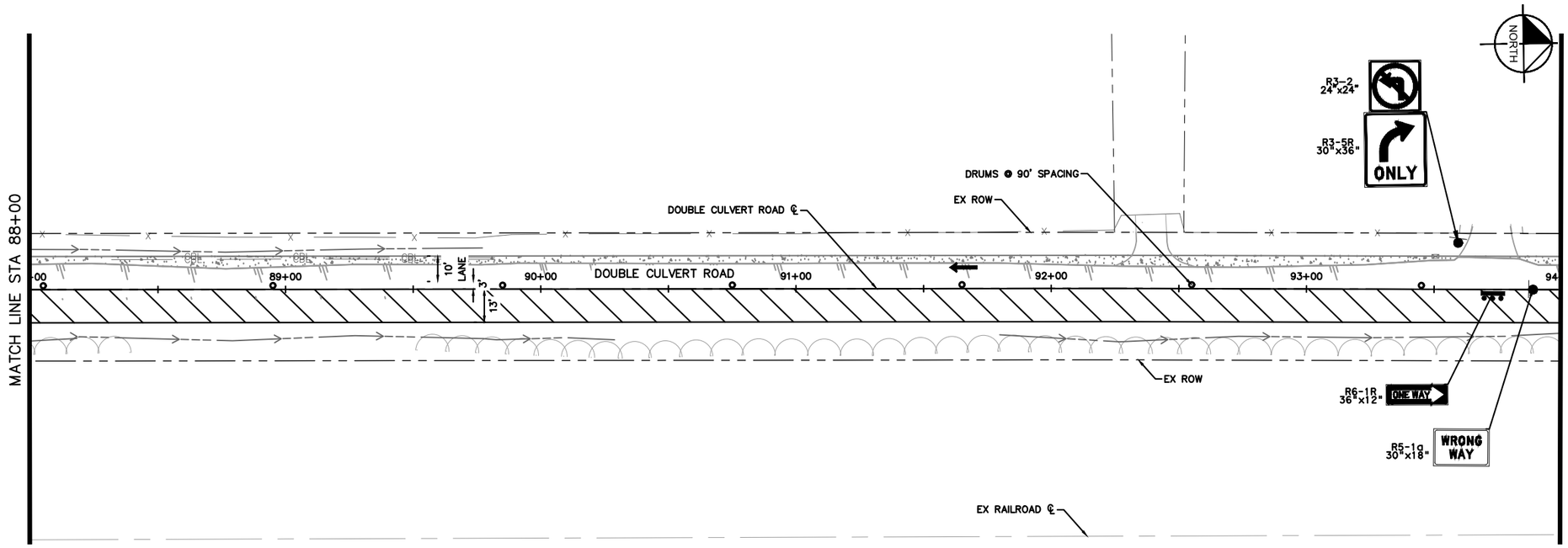
DOUBLE CULVERT ROAD
SEGMENT 1
TRAFFIC CONTROL PLAN
PHASE 1
STA 70 00.00 TO STA 82 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		105

100% SUBMITTAL





GRAPHIC SCALE IN FEET
0 25 50

NORTH

LEGEND

- TEMP ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION PREVIOUS PHASE
- TEMP ASPHALT PAVEMENT PREVIOUS PHASE
- EXIST TRAVEL LANE
- PROP TRAVEL LANE
- SIGN
- TRAFFIC BARRELS
- TYPE III BARRICADE

NOTES

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07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
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Abbey Polzin

DATE: 7/28/2026 8:26:30 PM
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REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
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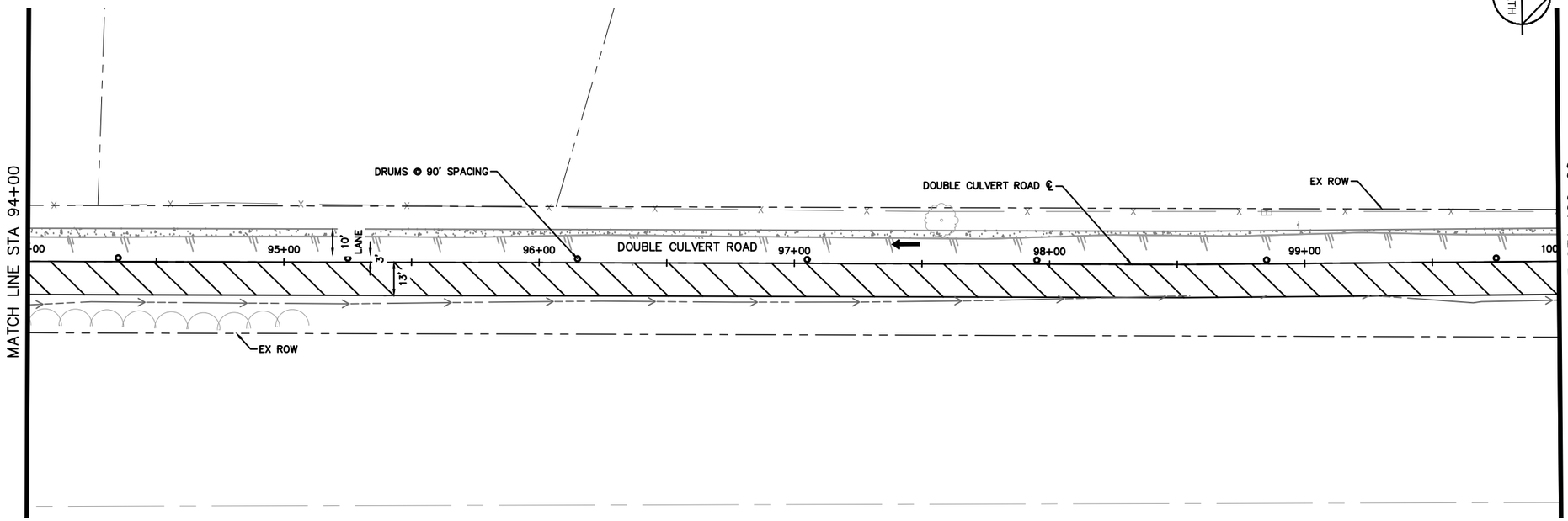
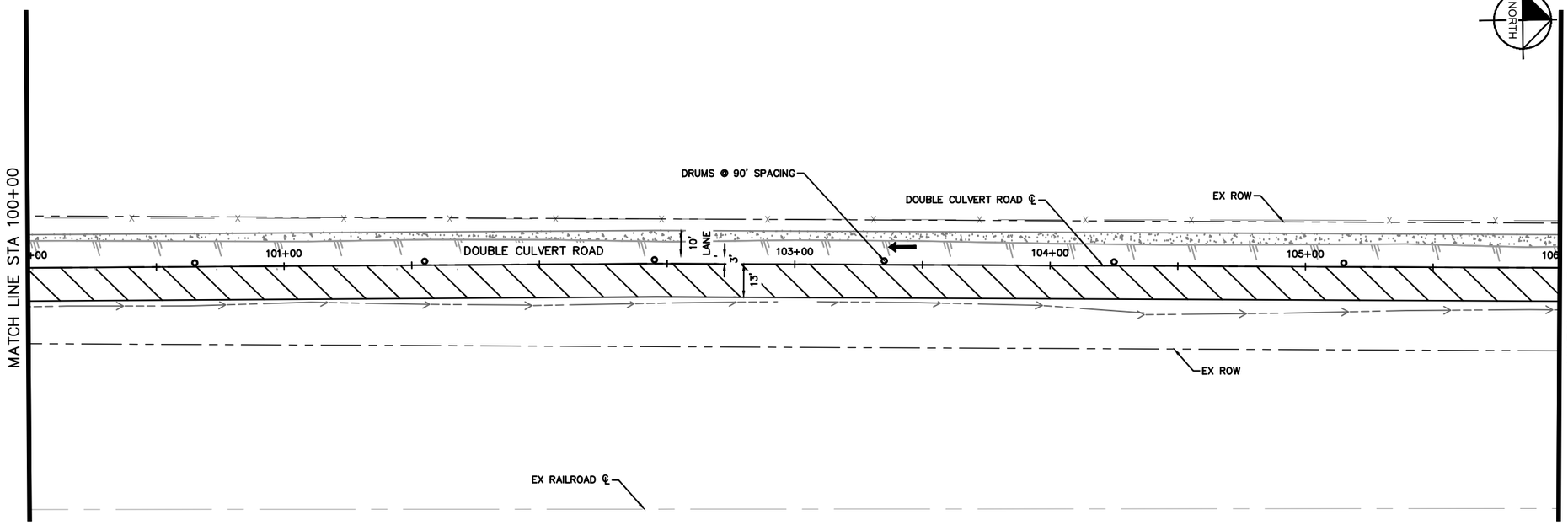
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
TRAFFIC CONTROL PLAN
PHASE 1
STA 82 00.00 TO STA 94 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		106

100% SUBMITTAL





GRAPHIC SCALE IN FEET
0 25 50

LEGEND

- TEMP ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION PREVIOUS PHASE
- TEMP ASPHALT PAVEMENT PREVIOUS PHASE
- EXIST TRAVEL LANE
- PROP TRAVEL LANE
- SIGN
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- TYPE III BARRICADE

NOTES

1. SEE SHEET 86 – 87 FOR PHASE 1 AND 2 DETOUR PLAN.
2. REMOVE ALL EXISTING AND TEMPORARY TRAFFIC SIGNING AND PAVEMENT MARKINGS IN CONFLICT WITH TRAFFIC CONTROL SIGNS AND MARKINGS SHOWN IN THIS PHASE/STEP (SUBSIDIARY TO ITEM 503).
3. CONTRACTOR TO MAINTAIN POSITIVE DRAINAGE AT ALL TIMES.
4. CONTRACTOR TO PROVIDE ACCESS TO ALL ADJACENT PROPERTIES AT ALL TIMES DURING CONSTRUCTION.

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

DATE: 7/28/2026 8:26:40 PM
FILE: K:\HOU_Roadway\065035800 - Double Culvert Rd Segment 1\104_CAD\PlanSheets\TCP PHASE 1 - 58_00.00 TO 106_00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM

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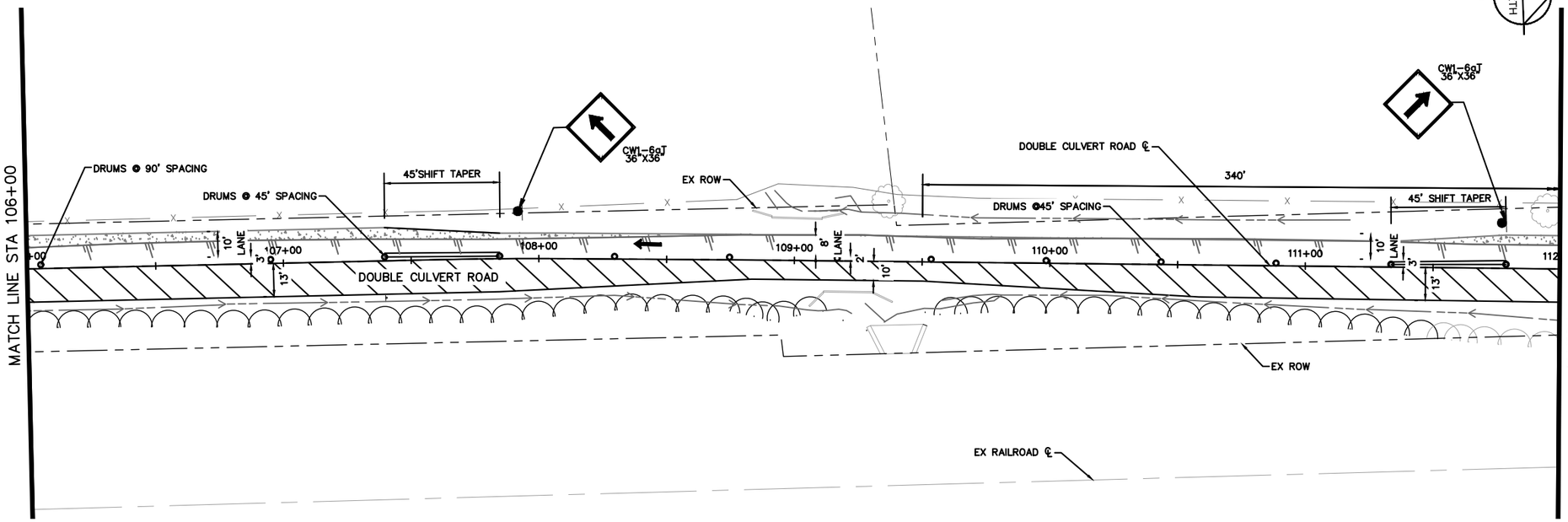
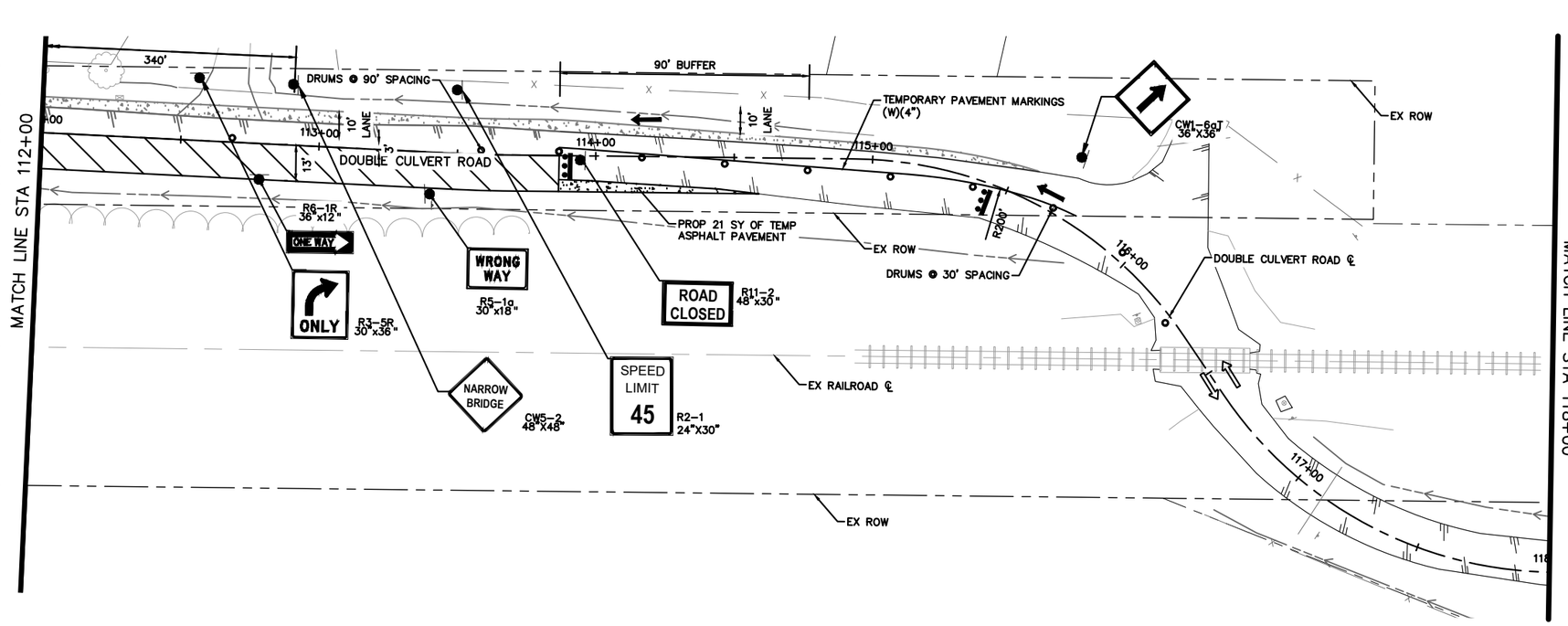
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
TRAFFIC CONTROL PLAN
PHASE 1
STA 94 00.00 TO STA 106 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		107

100% SUBMITTAL





GRAPHIC SCALE IN FEET
0 25 50

LEGEND

- TEMP ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION PREVIOUS PHASE
- TEMP ASPHALT PAVEMENT PREVIOUS PHASE
- EXIST TRAVEL LANE
- PROP TRAVEL LANE
- SIGN
- TRAFFIC BARRELS
- TYPE III BARRICADE

NOTES

1. SEE SHEET 86 – 87 FOR PHASE 1 AND 2 DETOUR PLAN.
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07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

DATE: 7/28/2026 8:27:08 PM
FILE: K:\HOU_Roadway\065035800 - Double Culvert Rd Segment 1\104_CAD\PlanSheets\TCP PHASE 1 - 106 00.00 TO 118 00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

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11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
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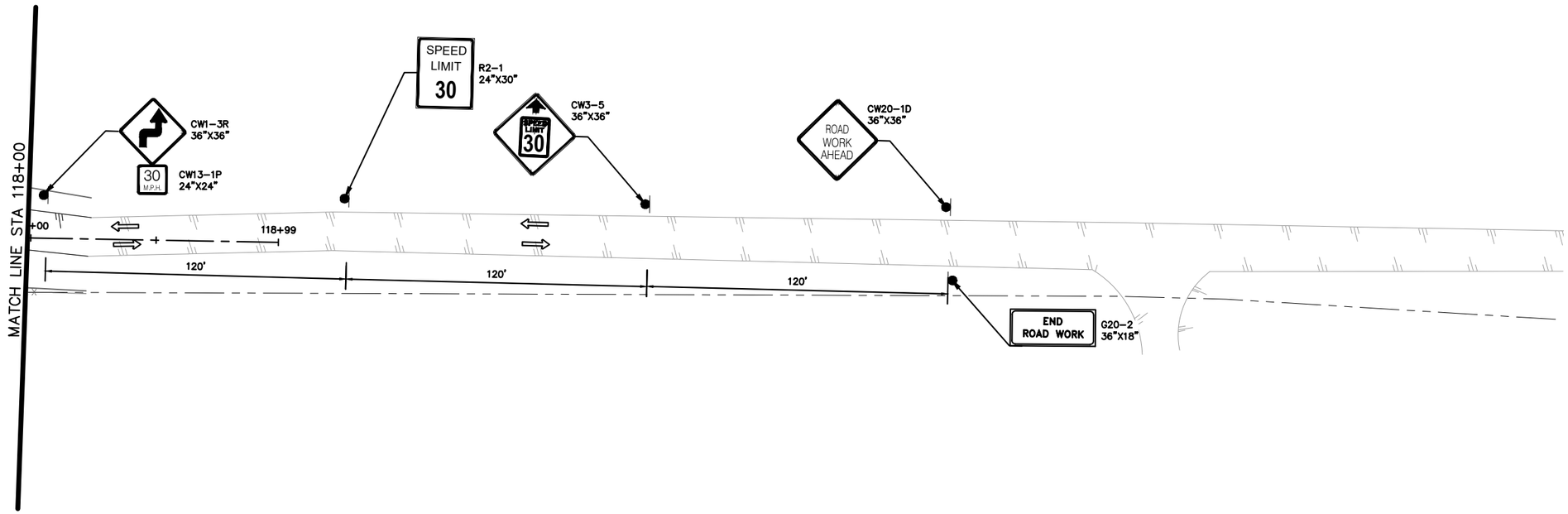
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
TRAFFIC CONTROL PLAN
PHASE 1
STA 106 00.00 TO STA 118 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		108

100% SUBMITTAL



NORTH

GRAPHIC SCALE IN FEET
0 25 50

LEGEND

- TEMP ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION PREVIOUS PHASE
- TEMP ASPHALT PAVEMENT PREVIOUS PHASE
- EXIST TRAVEL LANE
- PROP TRAVEL LANE
- SIGN
- TRAFFIC BARRELS
- TYPE III BARRICADE

NOTES

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07/28/2026

STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER

Abbey Polzin

DATE: 7/28/2026 8:27:14 PM
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REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

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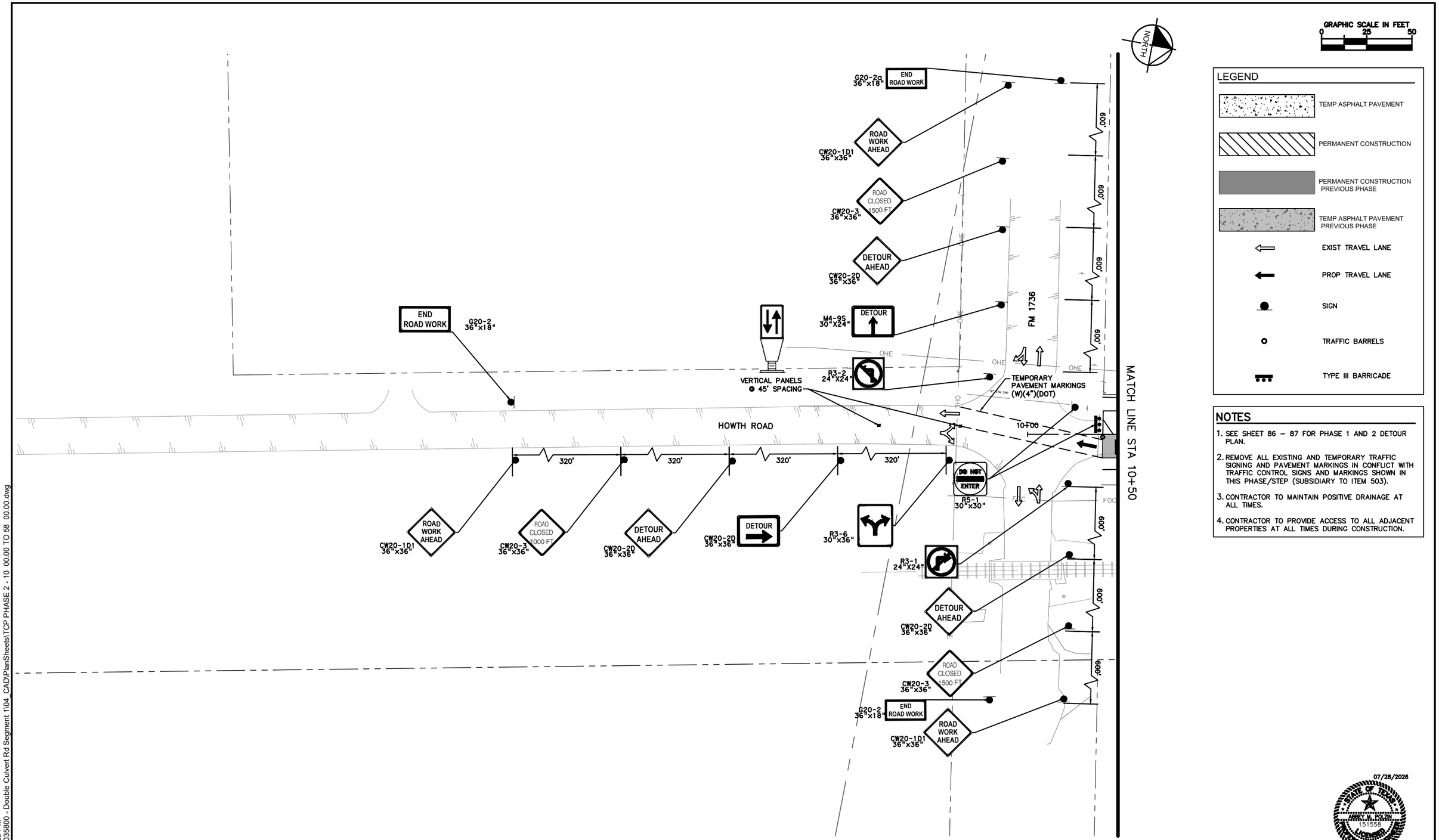
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
TRAFFIC CONTROL PLAN
PHASE 1
STA 118 00.00 TO END

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		109

100% SUBMITTAL



07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abby Polzin

DATE: 7/28/2026 8:27:39 PM
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REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

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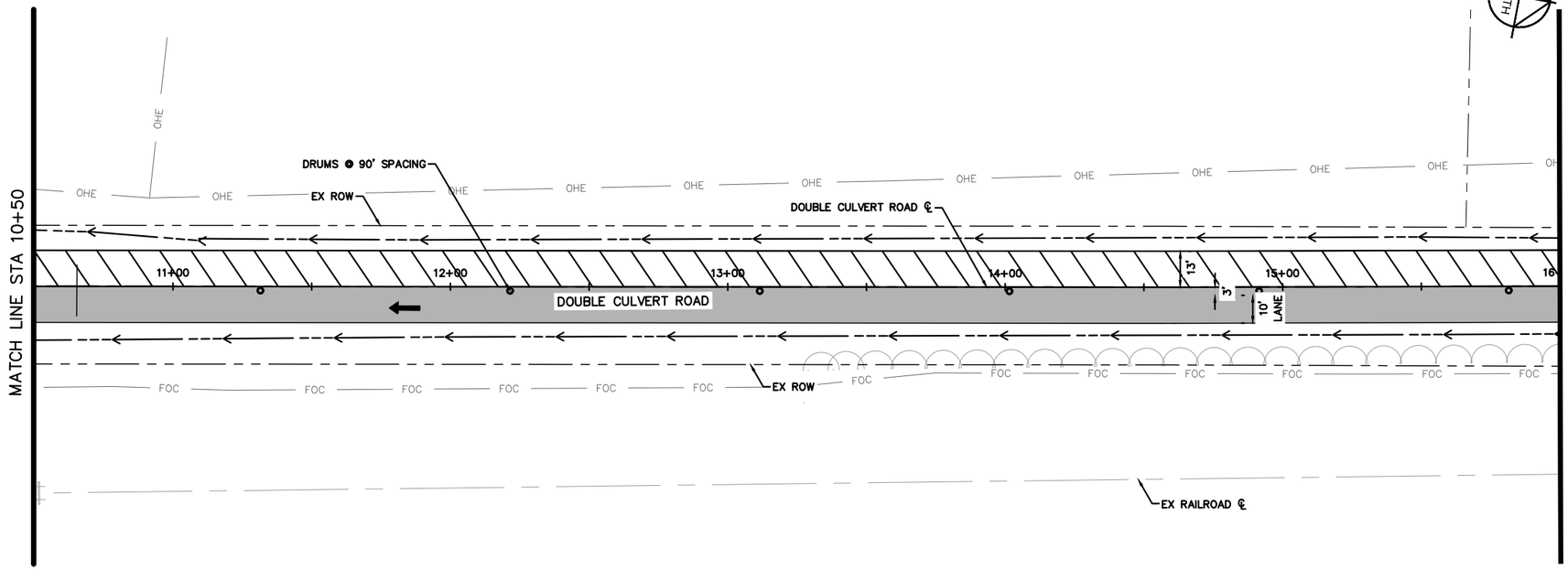
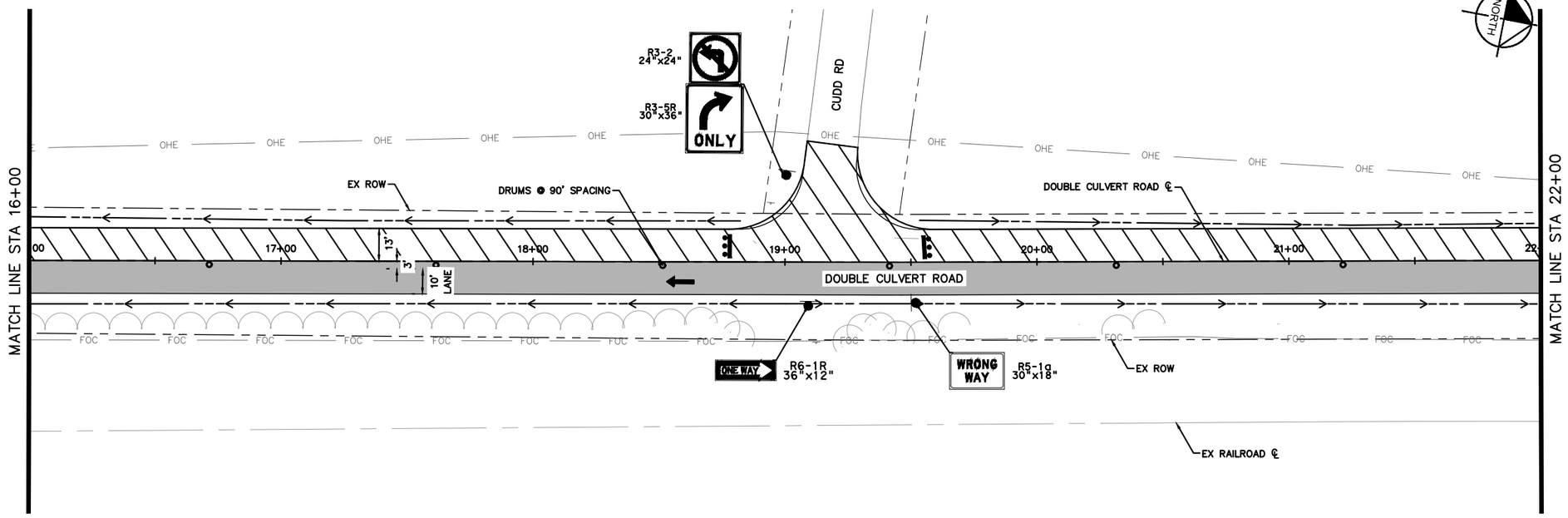
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
TRAFFIC CONTROL PLAN
PHASE 2
BEGIN TO STA 10 50

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		110

100% SUBMITTAL





GRAPHIC SCALE IN FEET
0 25 50

LEGEND

- TEMP ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION PREVIOUS PHASE
- TEMP ASPHALT PAVEMENT PREVIOUS PHASE
- EXIST TRAVEL LANE
- PROP TRAVEL LANE
- SIGN
- TRAFFIC BARRELS
- TYPE III BARRICADE

NOTES

1. SEE SHEET 86 – 87 FOR PHASE 1 AND 2 DETOUR PLAN.
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07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

DATE: 7/28/2026 8:27:53 PM
FILE: K:\HOU_Roadway\065035800 - Double Culvert Rd Segment 1\104 CAD\PlanSheets\TCP PHASE 2 - 10 00.00 TO 58 00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

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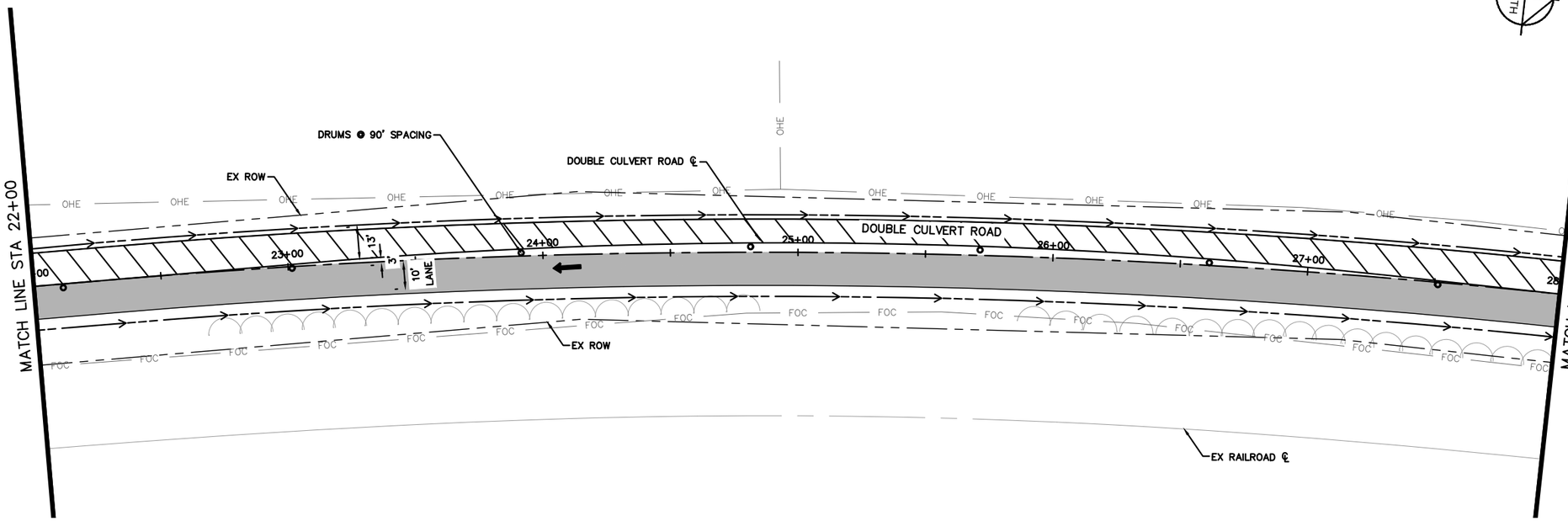
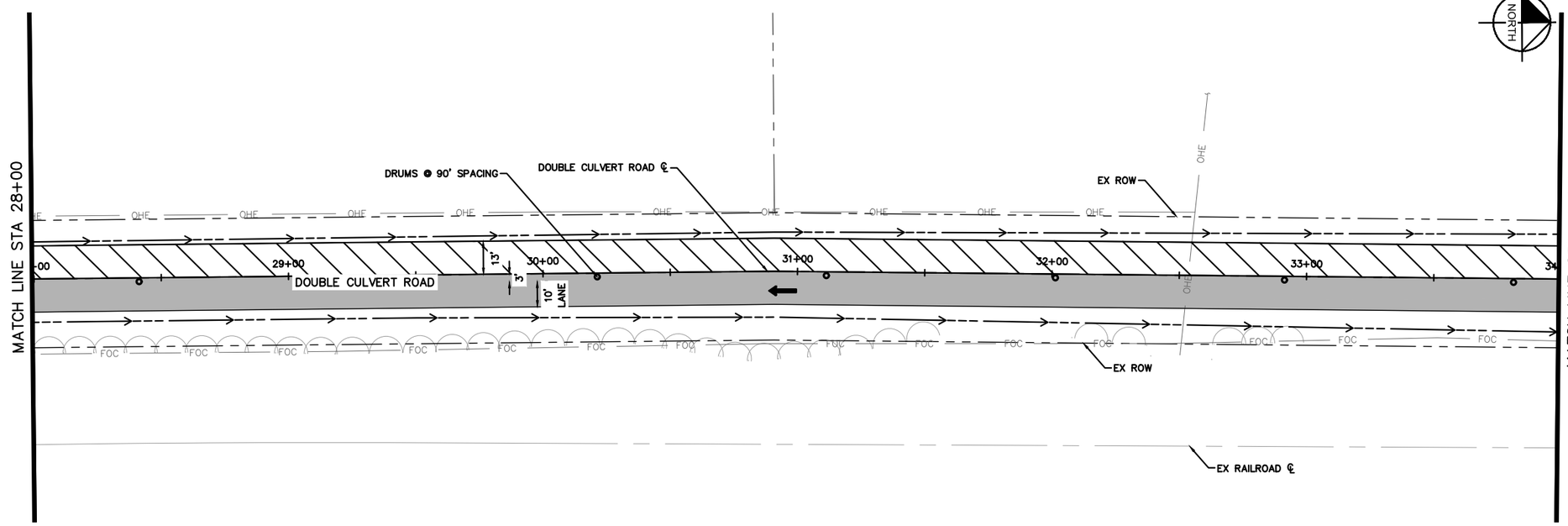
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
TRAFFIC CONTROL PLAN
PHASE 2
STA 10 50 TO STA 22 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		111

100% SUBMITTAL





GRAPHIC SCALE IN FEET
0 25 50

NORTH

LEGEND

- TEMP ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION PREVIOUS PHASE
- TEMP ASPHALT PAVEMENT PREVIOUS PHASE
- EXIST TRAVEL LANE
- PROP TRAVEL LANE
- SIGN
- TRAFFIC BARRELS
- TYPE III BARRICADE

NOTES

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07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

DATE: 7/28/2026 8:28:02 PM
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REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
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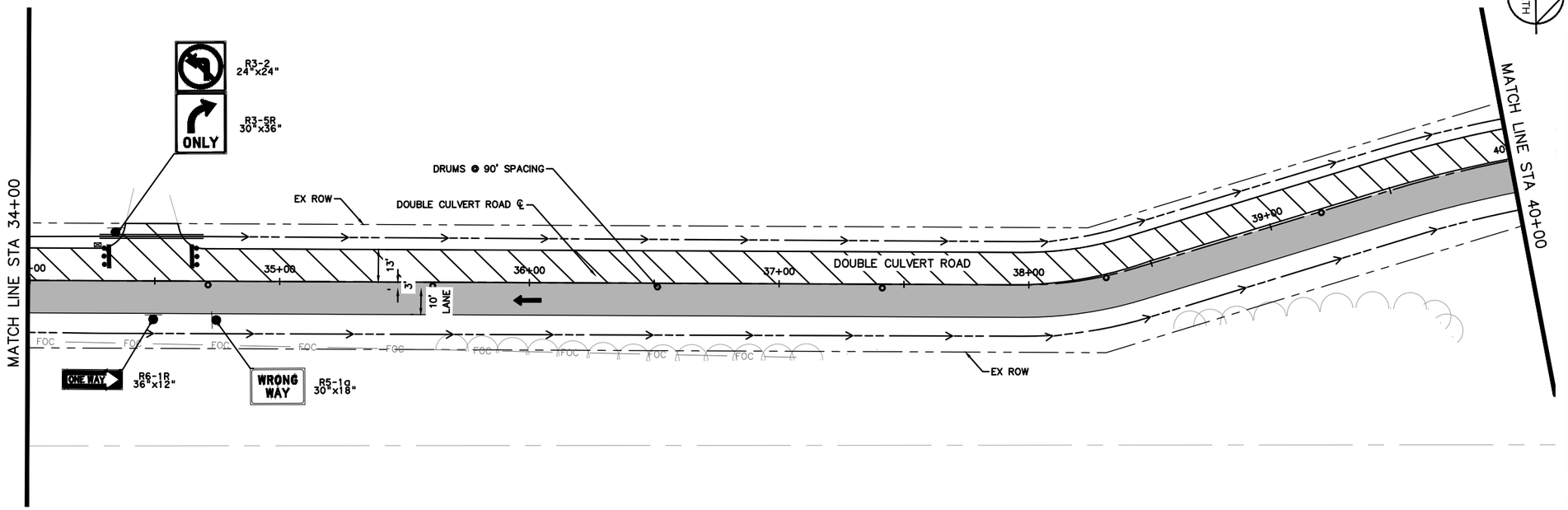
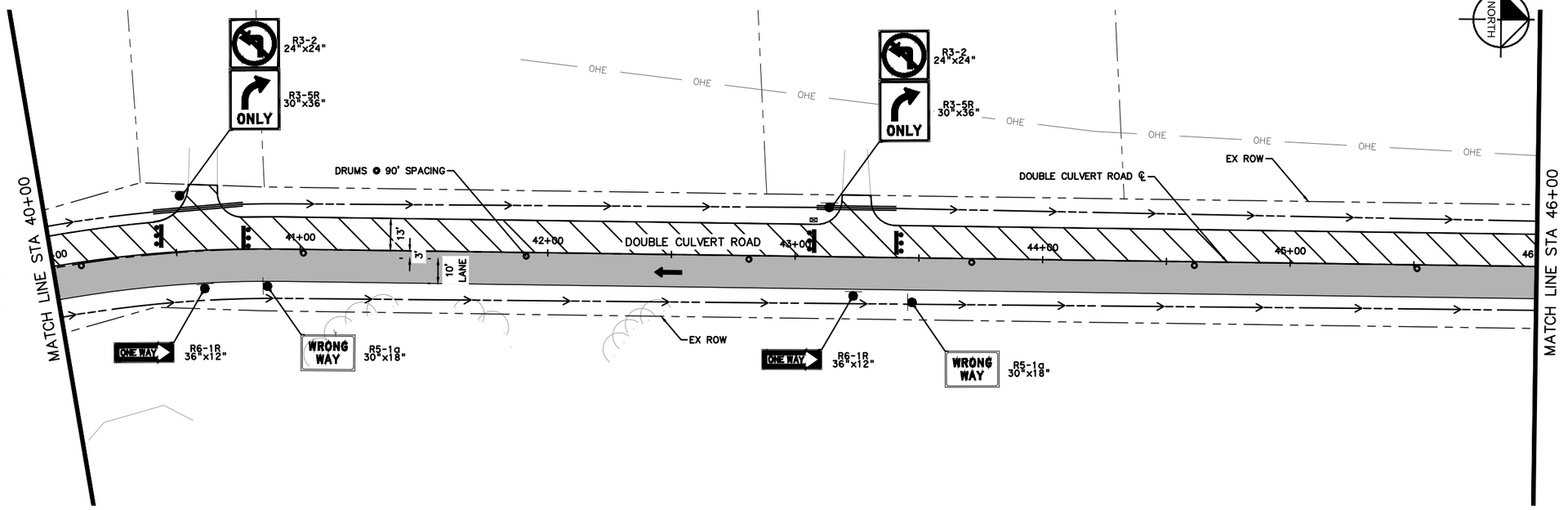
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
TRAFFIC CONTROL PLAN
PHASE 2
STA 22 00.00 TO STA 34 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		112

100% SUBMITTAL





GRAPHIC SCALE IN FEET
0 25 50

NORTH

LEGEND

- TEMP ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION PREVIOUS PHASE
- TEMP ASPHALT PAVEMENT PREVIOUS PHASE
- EXIST TRAVEL LANE
- PROP TRAVEL LANE
- SIGN
- TRAFFIC BARRELS
- TYPE III BARRICADE

NOTES

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07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

DATE: 7/28/2026 8:28:13 PM
FILE: K:\HOU_Roadway\065035800 - Double Culvert Rd Segment 1\104_CAD\PlanSheets\TCP PHASE 2 - 10_00.00 TO 58_00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

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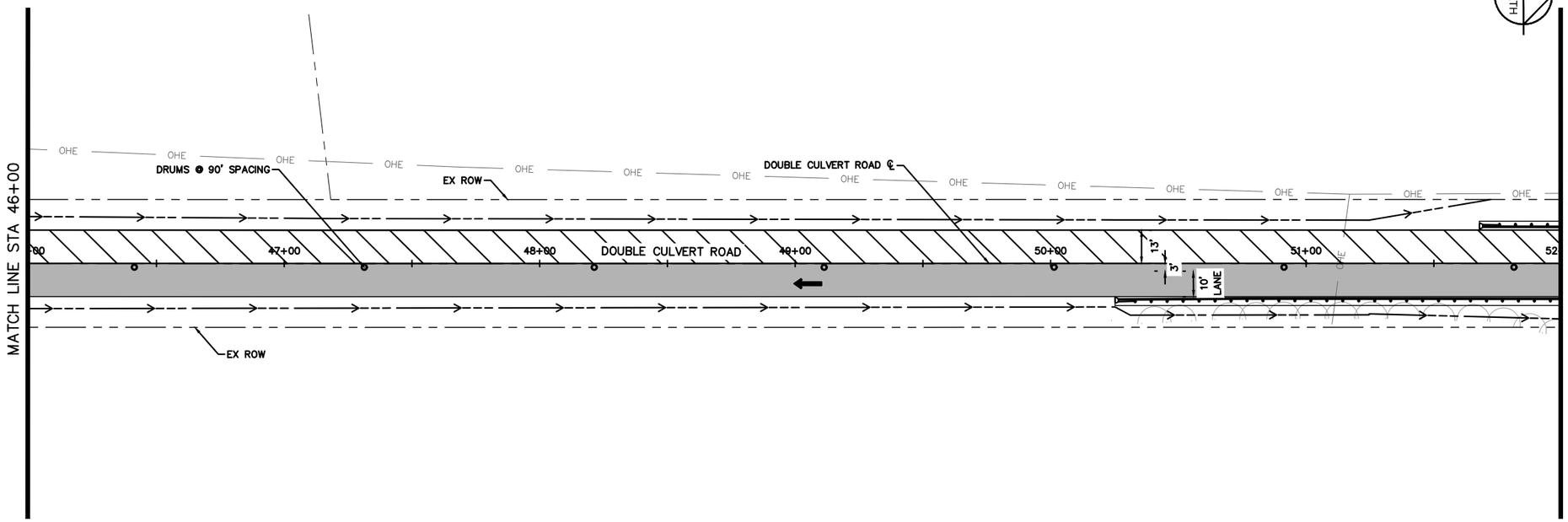
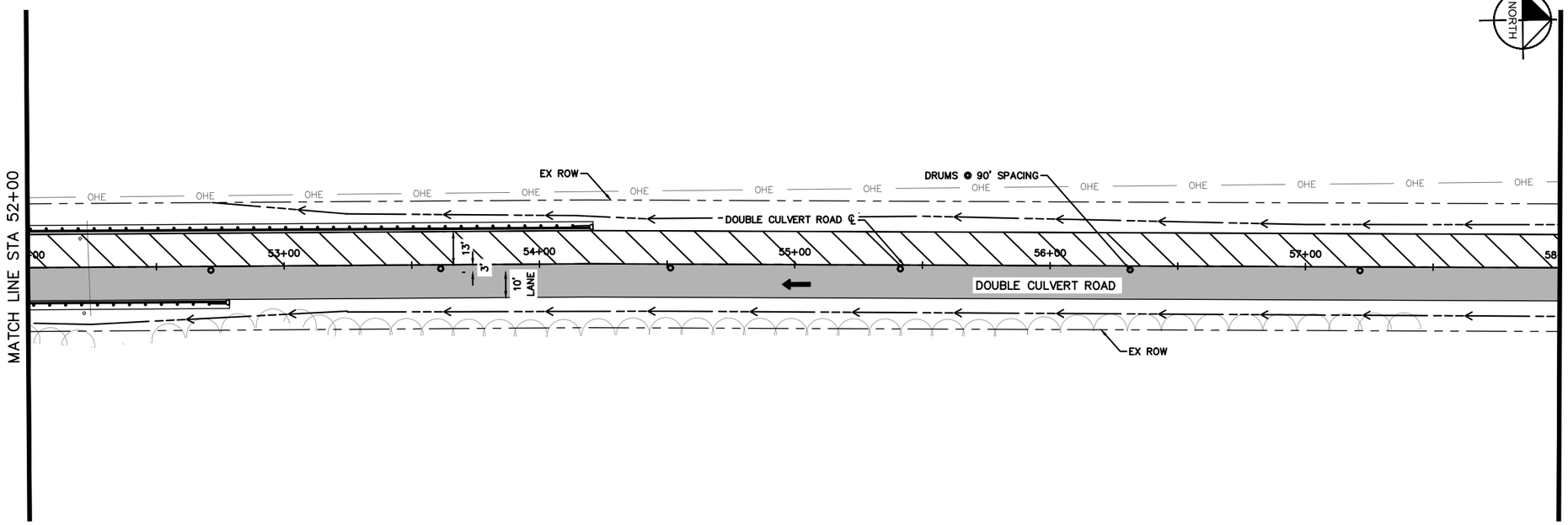
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
TRAFFIC CONTROL PLAN
PHASE 2
STA 34 00.00 TO STA 46 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		113

100% SUBMITTAL





GRAPHIC SCALE IN FEET
0 25 50

NORTH

LEGEND

- TEMP ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION PREVIOUS PHASE
- TEMP ASPHALT PAVEMENT PREVIOUS PHASE
- EXIST TRAVEL LANE
- PROP TRAVEL LANE
- SIGN
- TRAFFIC BARRELS
- TYPE III BARRICADE

NOTES

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07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

DATE: 7/28/2026 8:28:22 PM
FILE: K:\HOU_Roadway\065035800 - Double Culvert Rd Segment 1\04_CAD\PlanSheets\TCP PHASE 2 - 10_00.00 TO 58_00.00.dwg

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WALLER COUNTY
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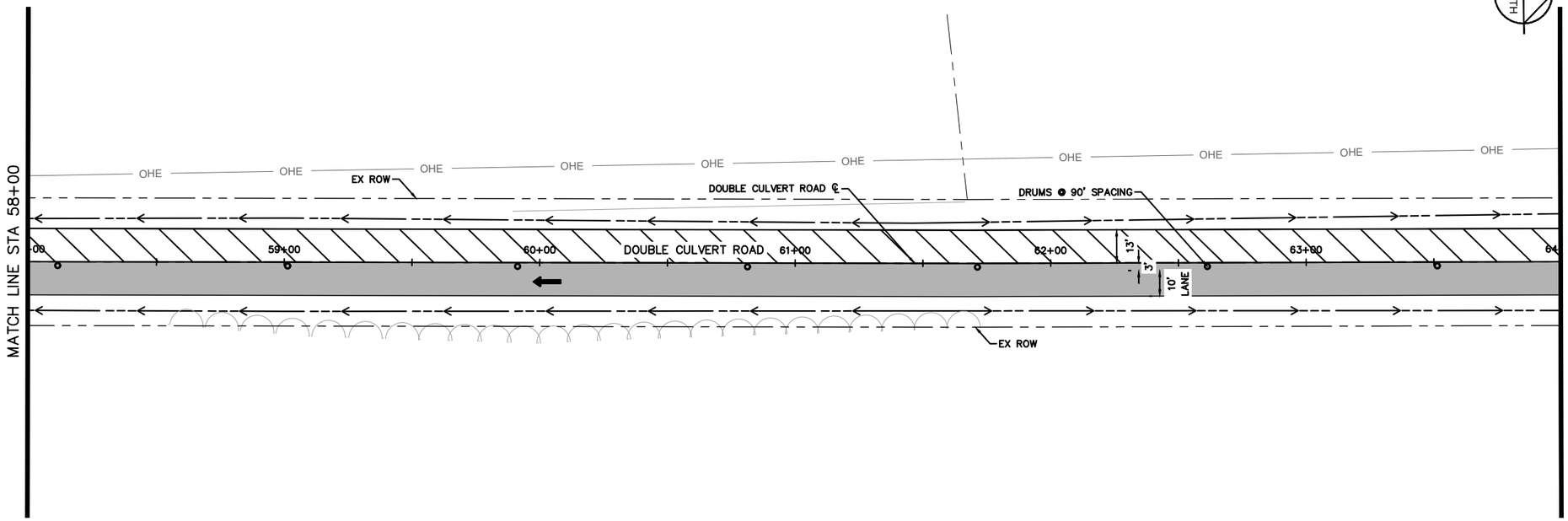
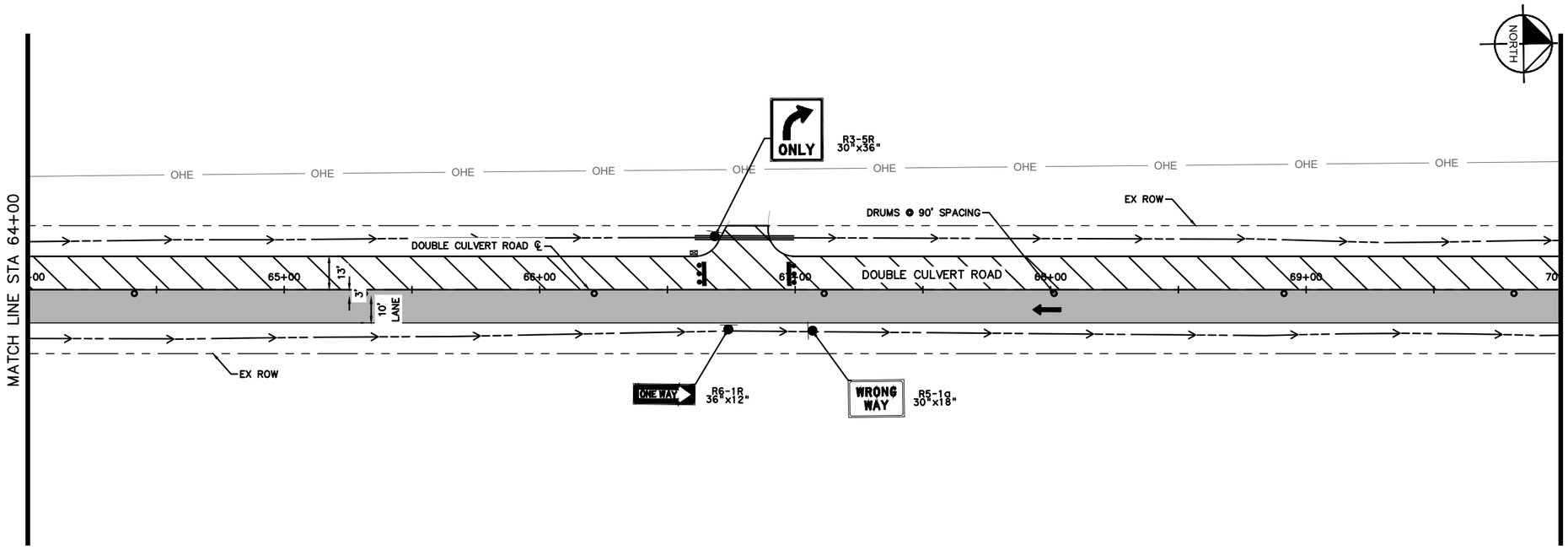
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
TRAFFIC CONTROL PLAN
PHASE 2
STA 46 00.00 TO STA 58 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		114

100% SUBMITTAL





GRAPHIC SCALE IN FEET
0 25 50

LEGEND

- TEMP ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION PREVIOUS PHASE
- TEMP ASPHALT PAVEMENT PREVIOUS PHASE
- EXIST TRAVEL LANE
- PROP TRAVEL LANE
- SIGN
- TRAFFIC BARRELS
- TYPE III BARRICADE

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07/28/2026
STATE OF TEXAS
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Abbey Polzin

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FILE: K:\HOU_Roadway\065035800 - Double Culvert Rd Segment 1\04_CAD\PlanSheets\TCP PHASE 2 - 58 00.00 TO 106 00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

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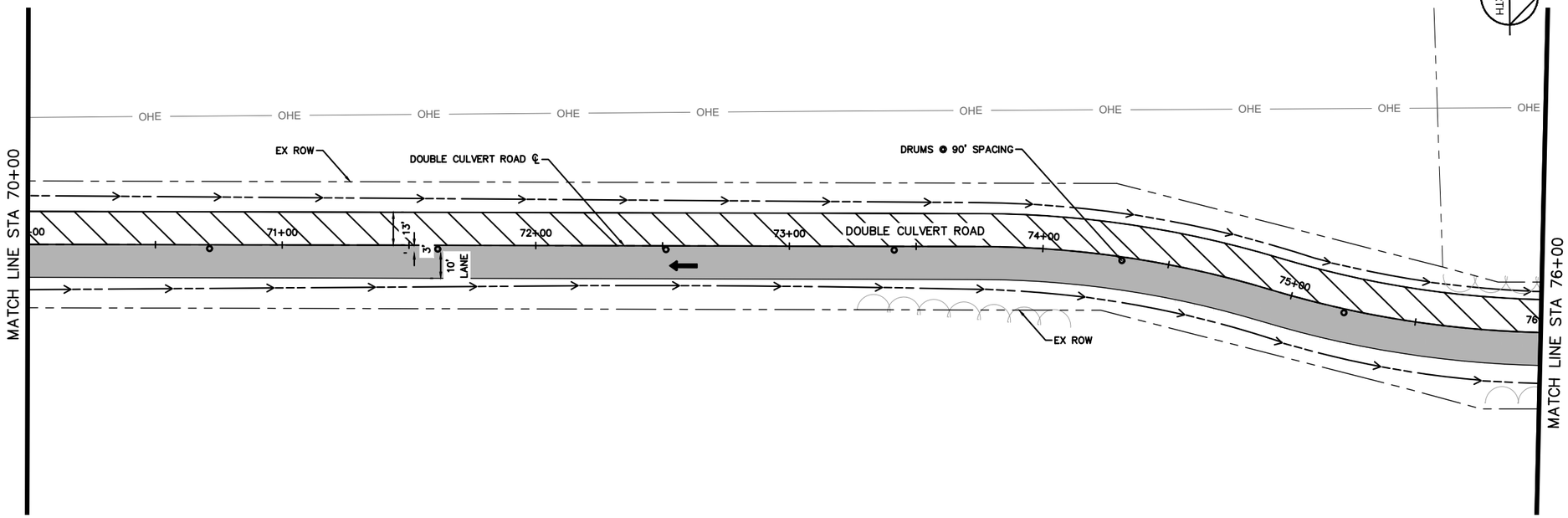
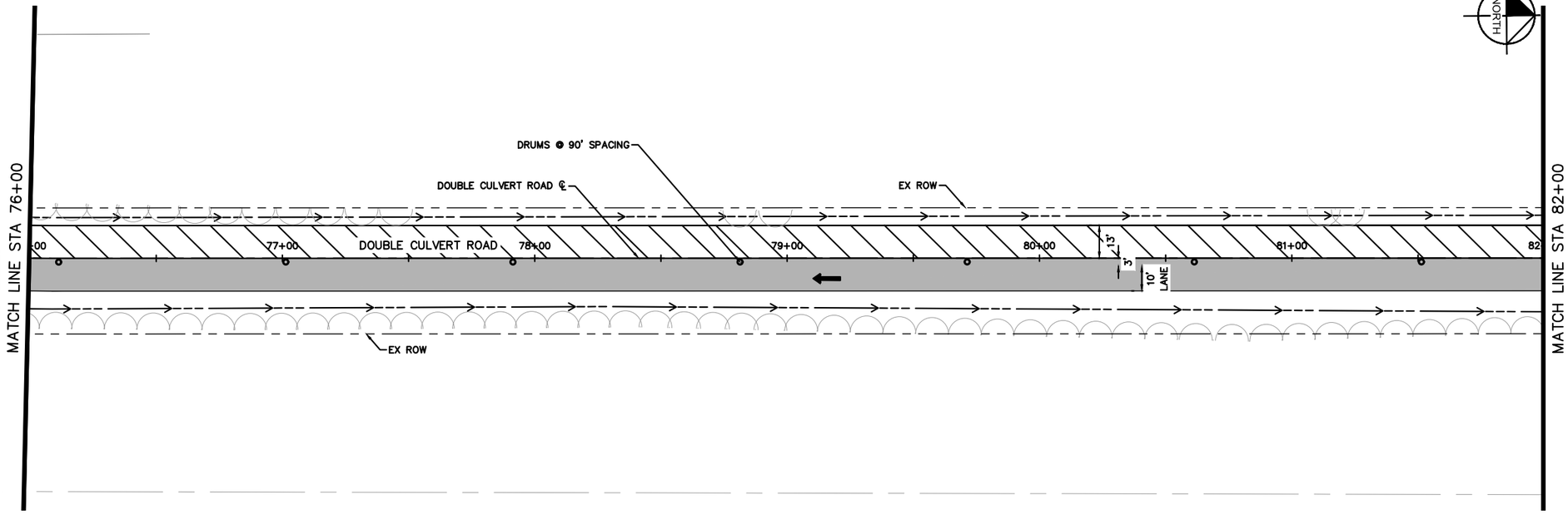
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
TRAFFIC CONTROL PLAN
PHASE 2
STA 58 00.00 TO STA 70 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		115

100% SUBMITTAL





GRAPHIC SCALE IN FEET
0 25 50

LEGEND

- TEMP ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION PREVIOUS PHASE
- TEMP ASPHALT PAVEMENT PREVIOUS PHASE
- EXIST TRAVEL LANE
- PROP TRAVEL LANE
- SIGN
- TRAFFIC BARRELS
- TYPE III BARRICADE

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STATE OF TEXAS
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Abbey Polzin

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REV. NO.	DATE	DESCRIPTION	BY

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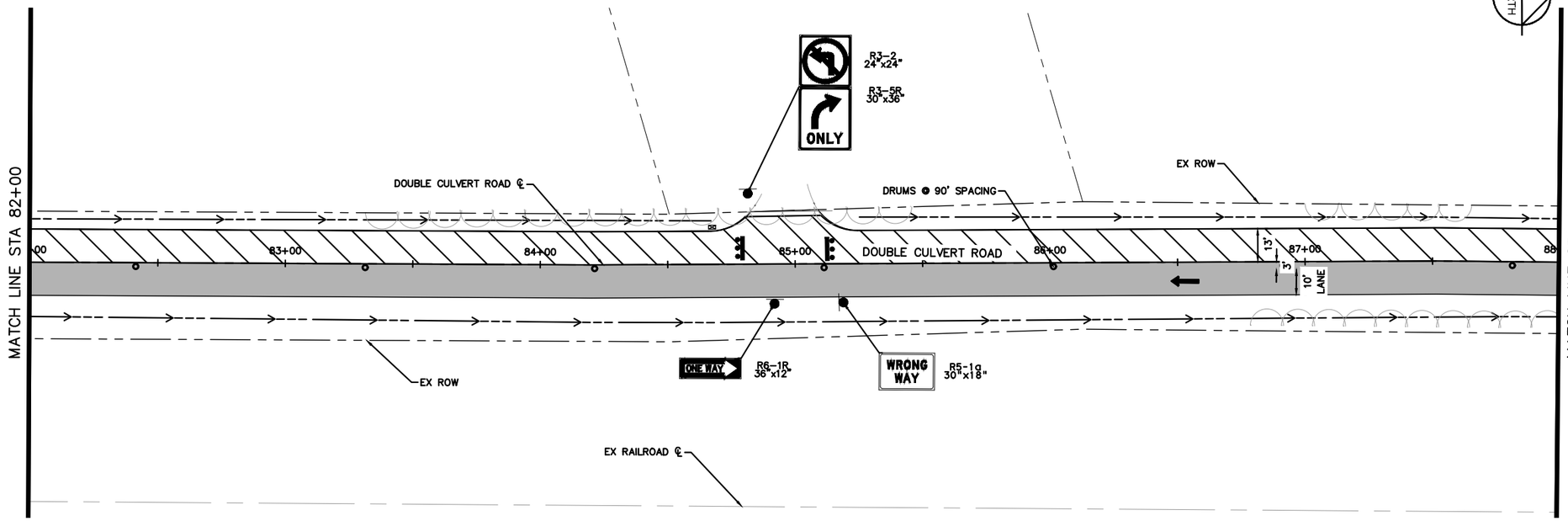
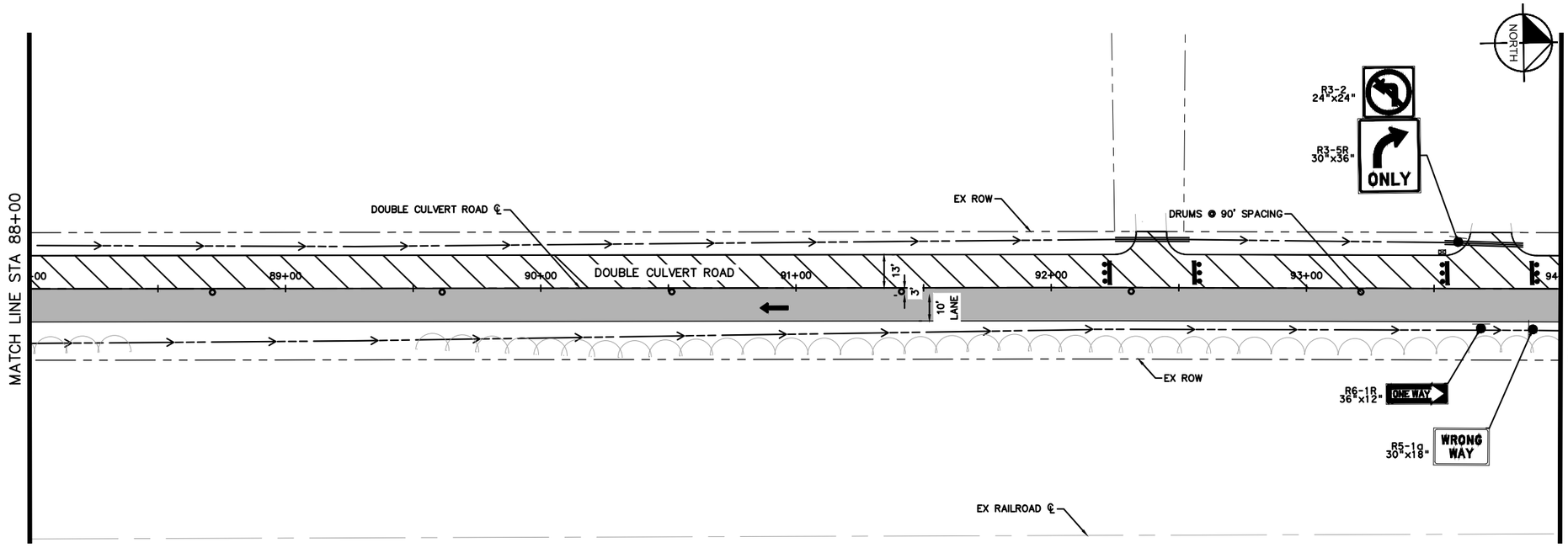
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
TRAFFIC CONTROL PLAN
PHASE 2
STA 70 00.00 TO STA 82 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		116

100% SUBMITTAL





GRAPHIC SCALE IN FEET
0 25 50

LEGEND

- TEMP ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION PREVIOUS PHASE
- TEMP ASPHALT PAVEMENT PREVIOUS PHASE
- EXIST TRAVEL LANE
- PROP TRAVEL LANE
- SIGN
- TRAFFIC BARRELS
- TYPE III BARRICADE

NOTES

1. SEE SHEET 86 – 87 FOR PHASE 1 AND 2 DETOUR PLAN.
2. REMOVE ALL EXISTING AND TEMPORARY TRAFFIC SIGNING AND PAVEMENT MARKINGS IN CONFLICT WITH TRAFFIC CONTROL SIGNS AND MARKINGS SHOWN IN THIS PHASE/STEP (SUBSIDIARY TO ITEM 503).
3. CONTRACTOR TO MAINTAIN POSITIVE DRAINAGE AT ALL TIMES.
4. CONTRACTOR TO PROVIDE ACCESS TO ALL ADJACENT PROPERTIES AT ALL TIMES DURING CONSTRUCTION.

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

DATE: 7/28/2026 8:28:59 PM
FILE: K:\HOU_Roadway\065035800 - Double Culvert Rd Segment 1\04 CAD\PlanSheets\TCP PHASE 2 - 58 00.00 TO 106 00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM

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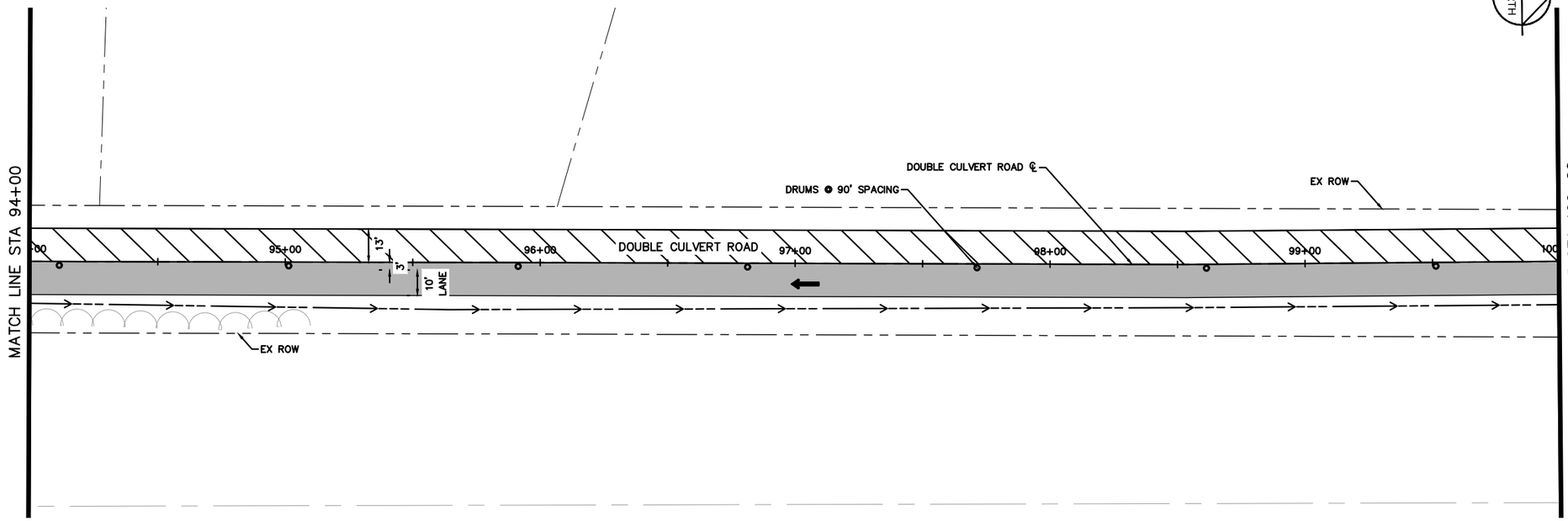
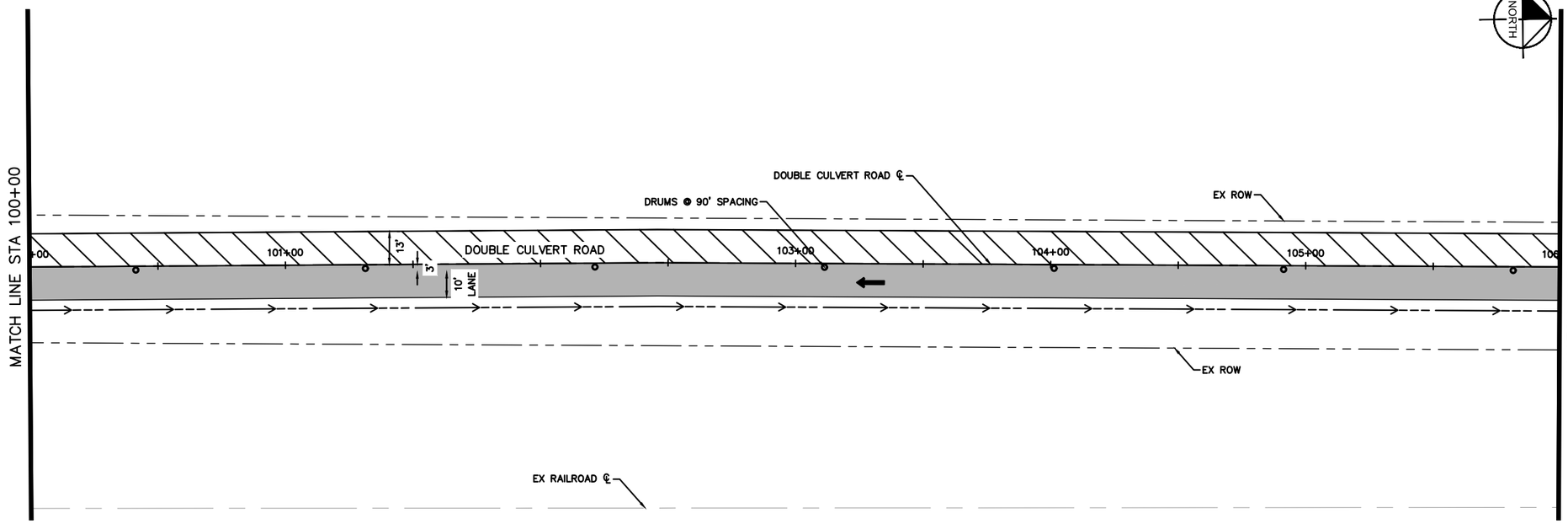
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
TRAFFIC CONTROL PLAN
PHASE 2
STA 82 00.00 TO STA 94 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		117

100% SUBMITTAL





GRAPHIC SCALE IN FEET
0 25 50

LEGEND

- TEMP ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION PREVIOUS PHASE
- TEMP ASPHALT PAVEMENT PREVIOUS PHASE
- EXIST TRAVEL LANE
- PROP TRAVEL LANE
- SIGN
- TRAFFIC BARRELS
- TYPE III BARRICADE

NOTES

1. SEE SHEET 86 – 87 FOR PHASE 1 AND 2 DETOUR PLAN.
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STATE OF TEXAS
ABBEY M. POLZIN
151558
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PROFESSIONAL ENGINEER
Abbey Polzin

DATE: 7/28/2026 8:29:09 PM
FILE: K:\HOU_Roadway\065035800 - Double Culvert Rd Segment 1\104_CAD\PlanSheets\TCP PHASE 2 - 58_00.00 TO 106_00.00.dwg

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ENGINEERING DEPARTMENT

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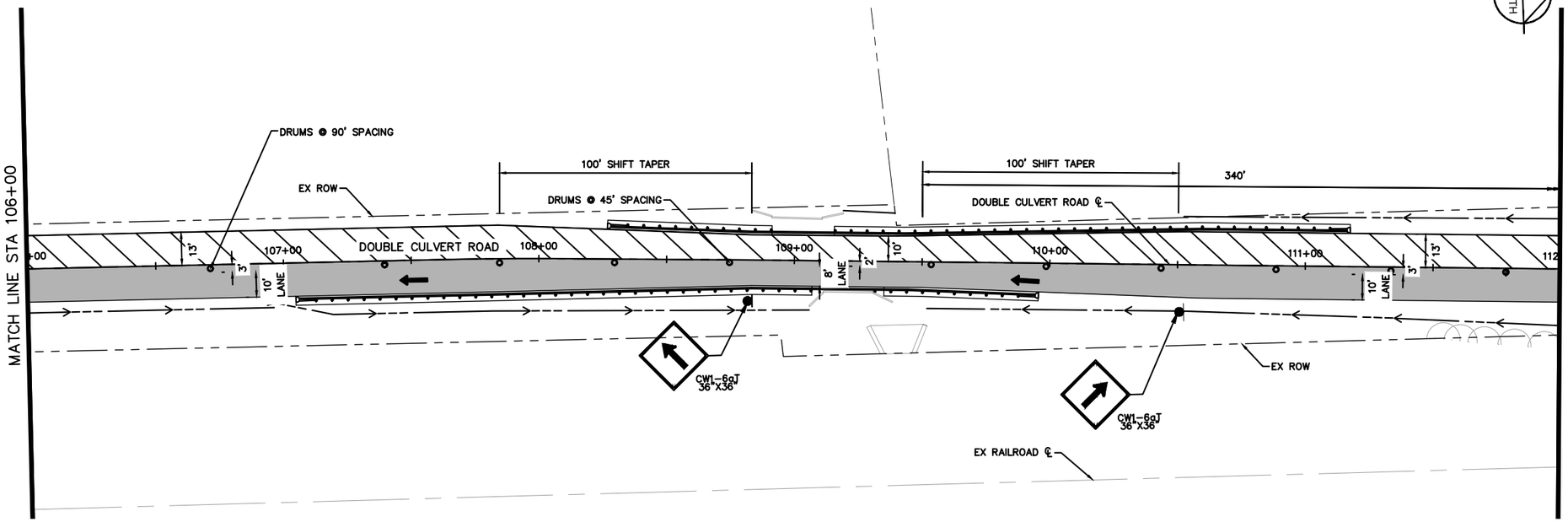
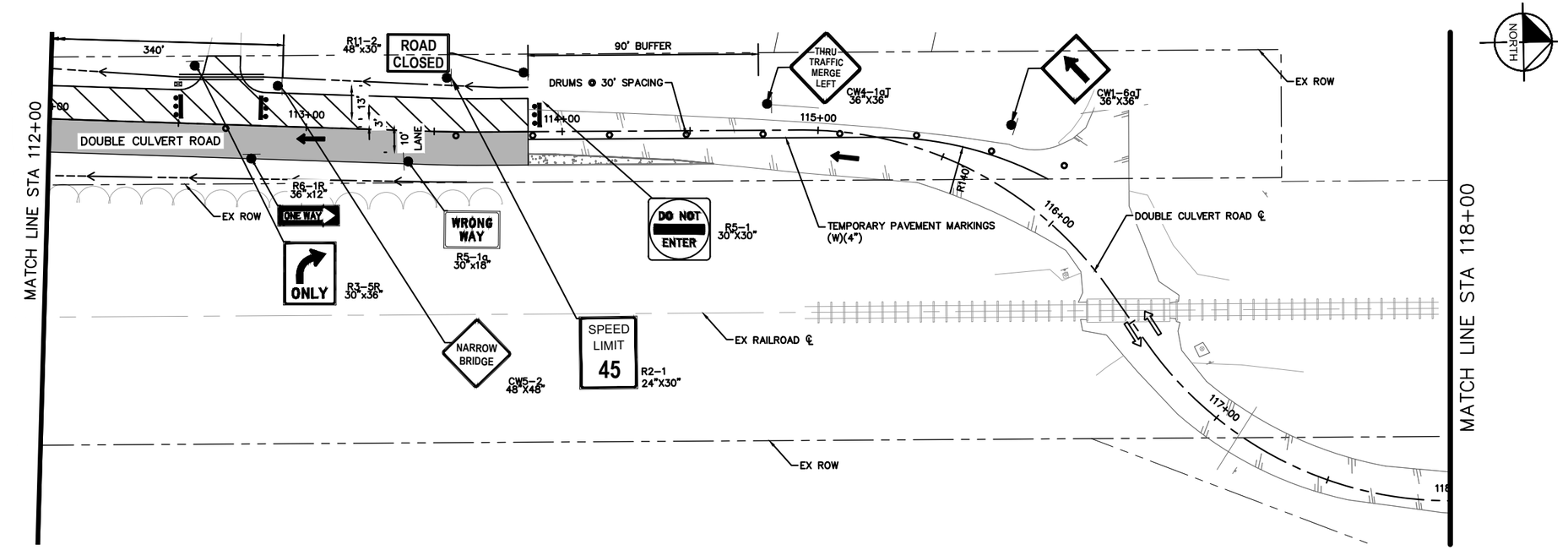
DOUBLE CULVERT ROAD
SEGMENT 1
TRAFFIC CONTROL PLAN
PHASE 2
STA 94 00.00 TO STA 106 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		118

100% SUBMITTAL





GRAPHIC SCALE IN FEET
0 25 50

LEGEND

- TEMP ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION PREVIOUS PHASE
- TEMP ASPHALT PAVEMENT PREVIOUS PHASE
- EXIST TRAVEL LANE
- PROP TRAVEL LANE
- SIGN
- TRAFFIC BARRELS
- TYPE III BARRICADE

NOTES

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2. REMOVE ALL EXISTING AND TEMPORARY TRAFFIC SIGNING AND PAVEMENT MARKINGS IN CONFLICT WITH TRAFFIC CONTROL SIGNS AND MARKINGS SHOWN IN THIS PHASE/STEP (SUBSIDIARY TO ITEM 503).
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STATE OF TEXAS
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151558
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Abbey Polzin

DATE: 7/28/2026 9:24:29 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\TCP PHASE 2 - 106 00.00 TO 118 00.00.dwg

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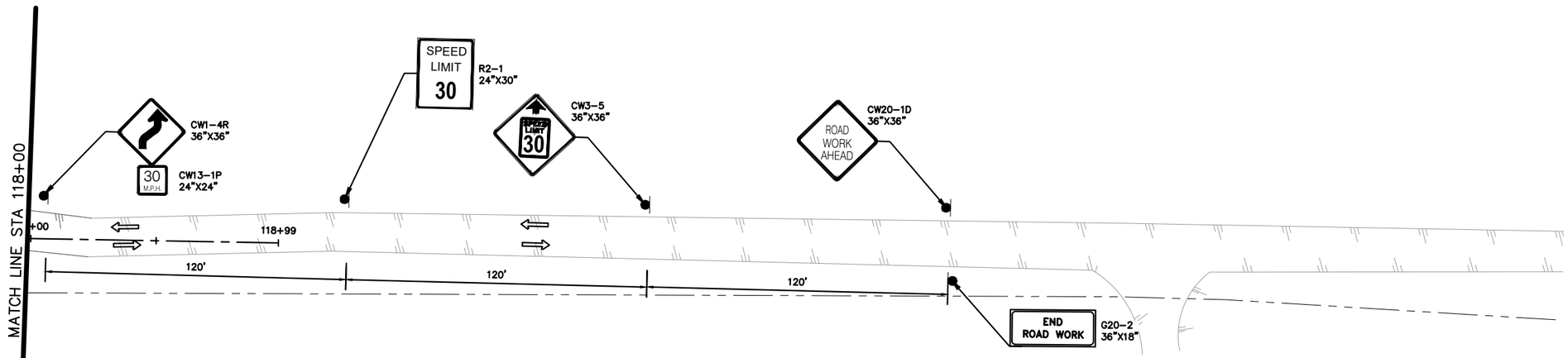
DOUBLE CULVERT ROAD
SEGMENT 1
TRAFFIC CONTROL PLAN
PHASE 2
STA 106 00.00 TO STA 118 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		119

100% SUBMITTAL



NORTH

GRAPHIC SCALE IN FEET
0 25 50

LEGEND

- TEMP ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION PREVIOUS PHASE
- TEMP ASPHALT PAVEMENT PREVIOUS PHASE
- EXIST TRAVEL LANE
- PROP TRAVEL LANE
- SIGN
- TRAFFIC BARRELS
- TYPE III BARRICADE

NOTES

1. SEE SHEET 86 – 87 FOR PHASE 1 AND 2 DETOUR PLAN.
2. REMOVE ALL EXISTING AND TEMPORARY TRAFFIC SIGNING AND PAVEMENT MARKINGS IN CONFLICT WITH TRAFFIC CONTROL SIGNS AND MARKINGS SHOWN IN THIS PHASE/STEP (SUBSIDIARY TO ITEM 503).
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07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

DATE: 7/28/2026 8:29:49 PM
FILE: K:\HOU_Roadway\065035800 - Double Culvert Rd Segment 1\04_CAD\PlanSheets\TCP PHASE 2 - 106_00.00 TO 118_00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

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TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
TRAFFIC CONTROL PLAN
PHASE 2
STA 118 00.00 TO END

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		120

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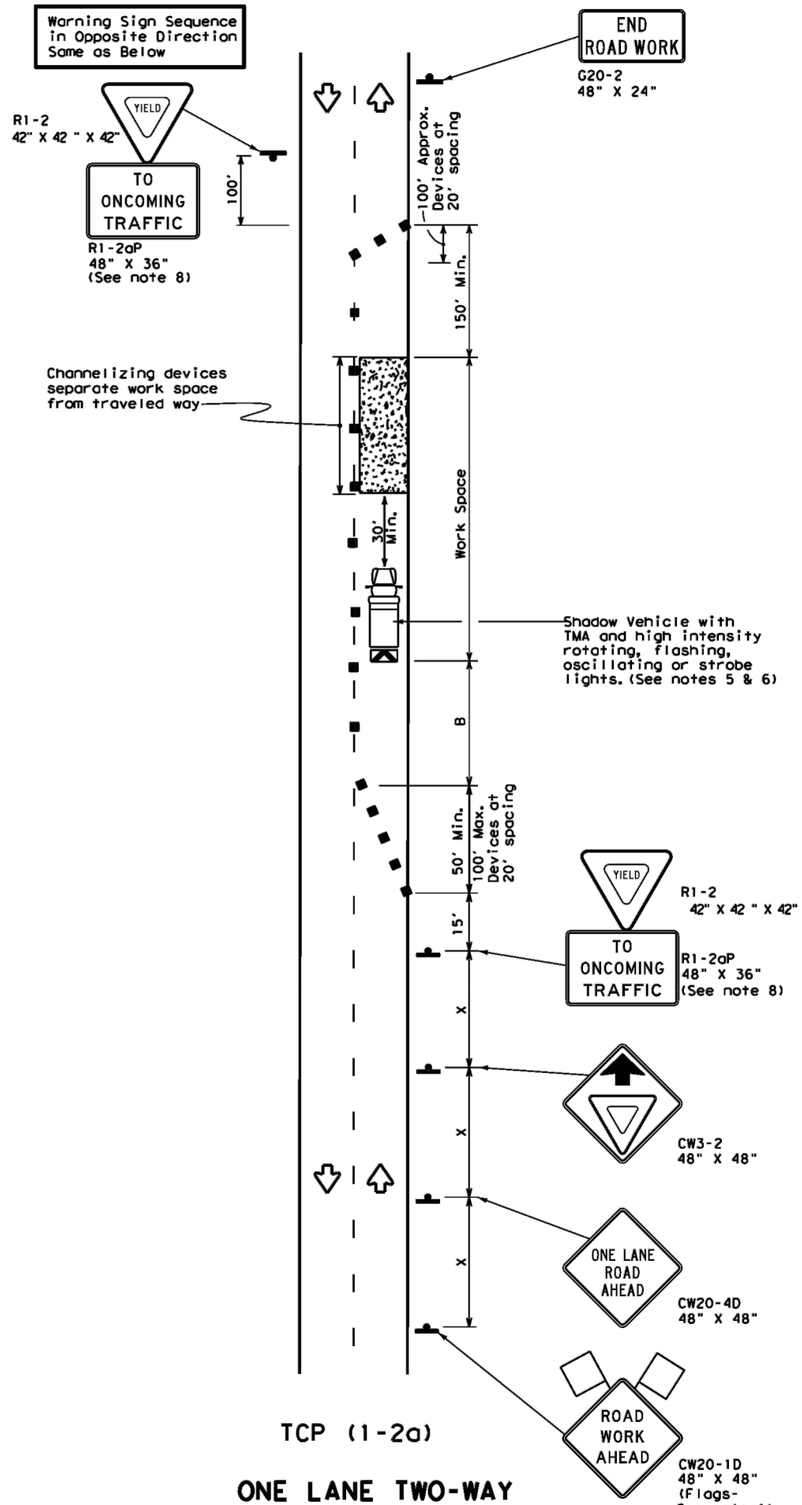
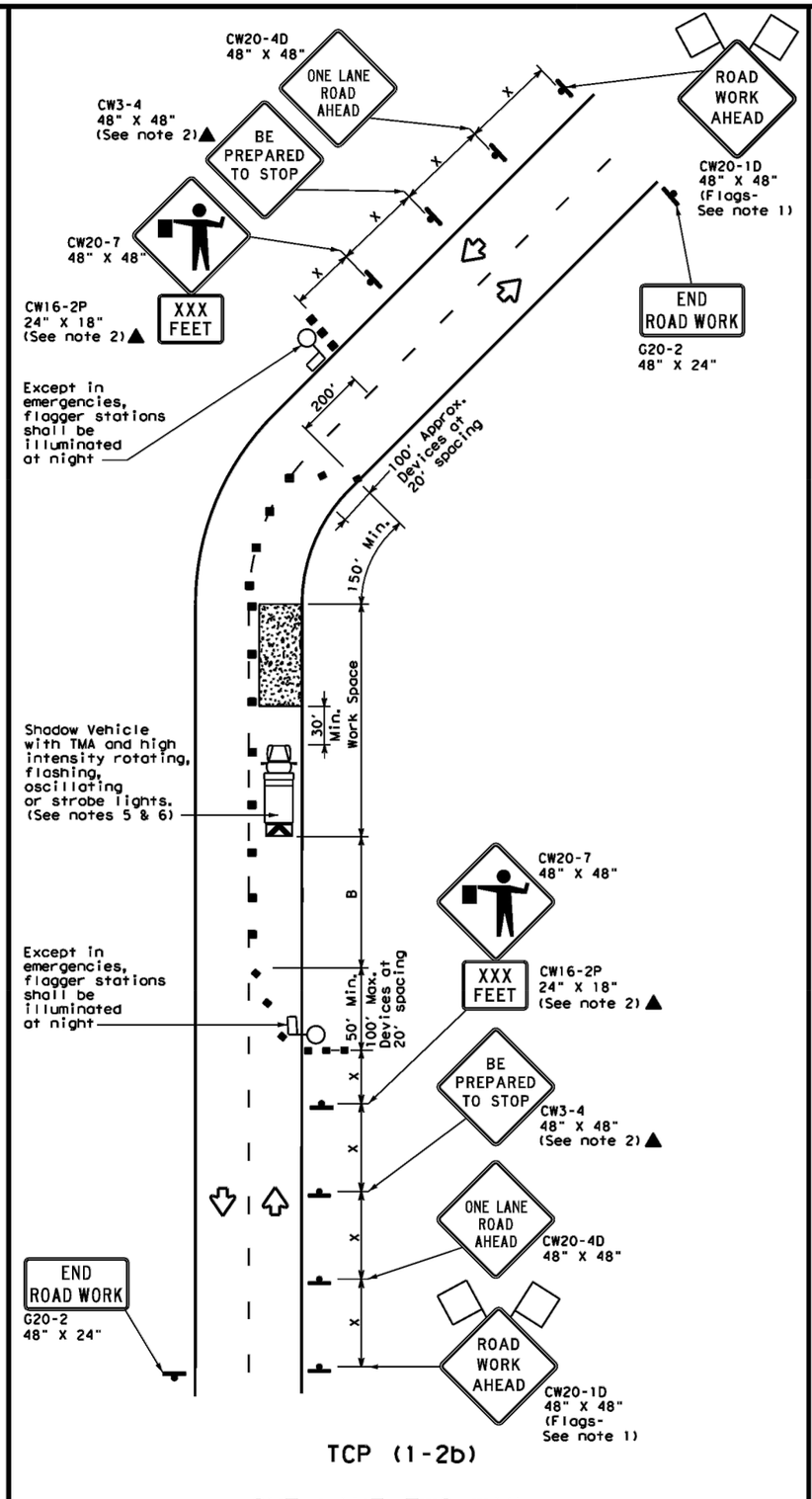
FILE:



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	DIST	COUNTY		SHEET NO. 121

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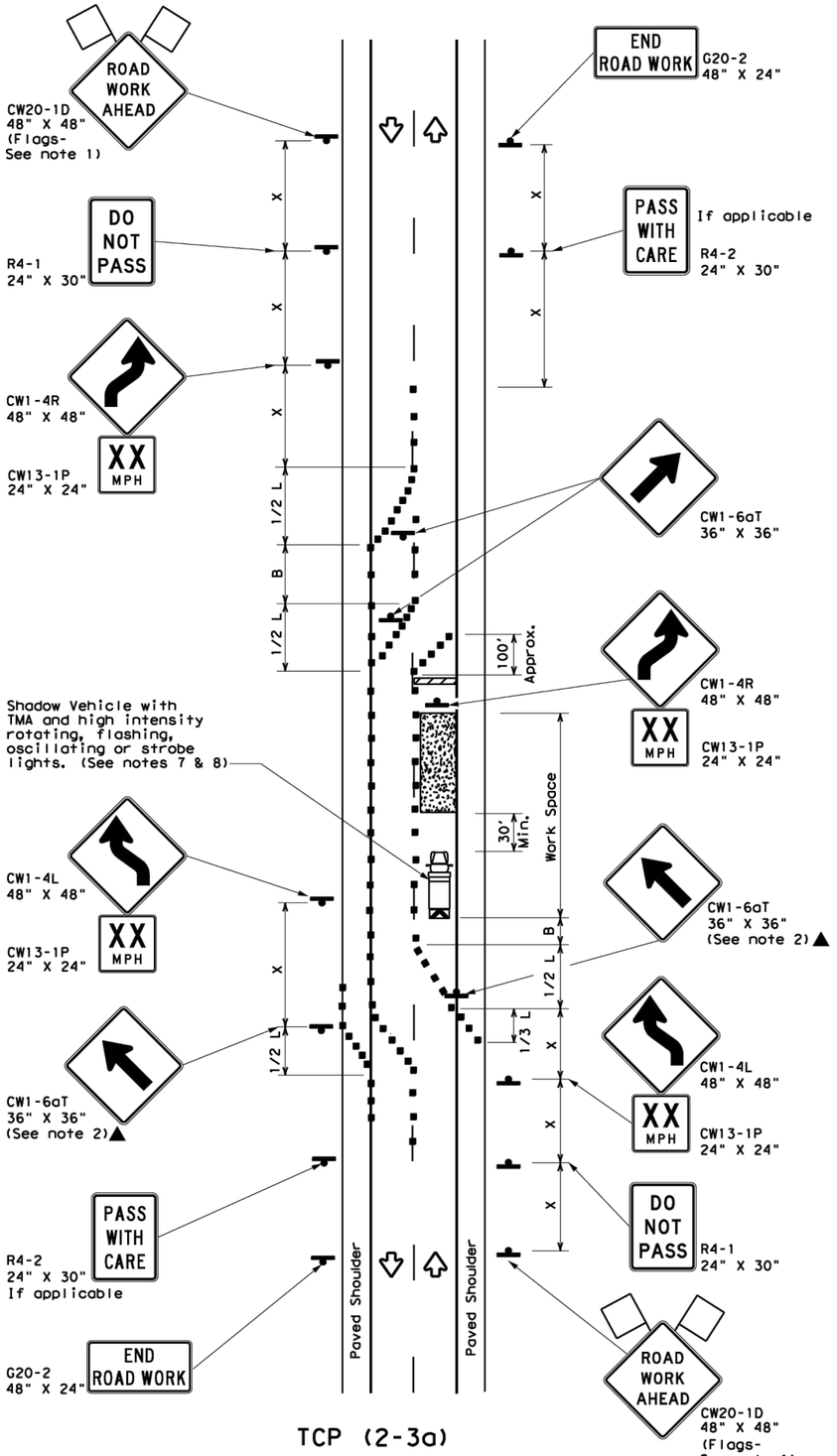
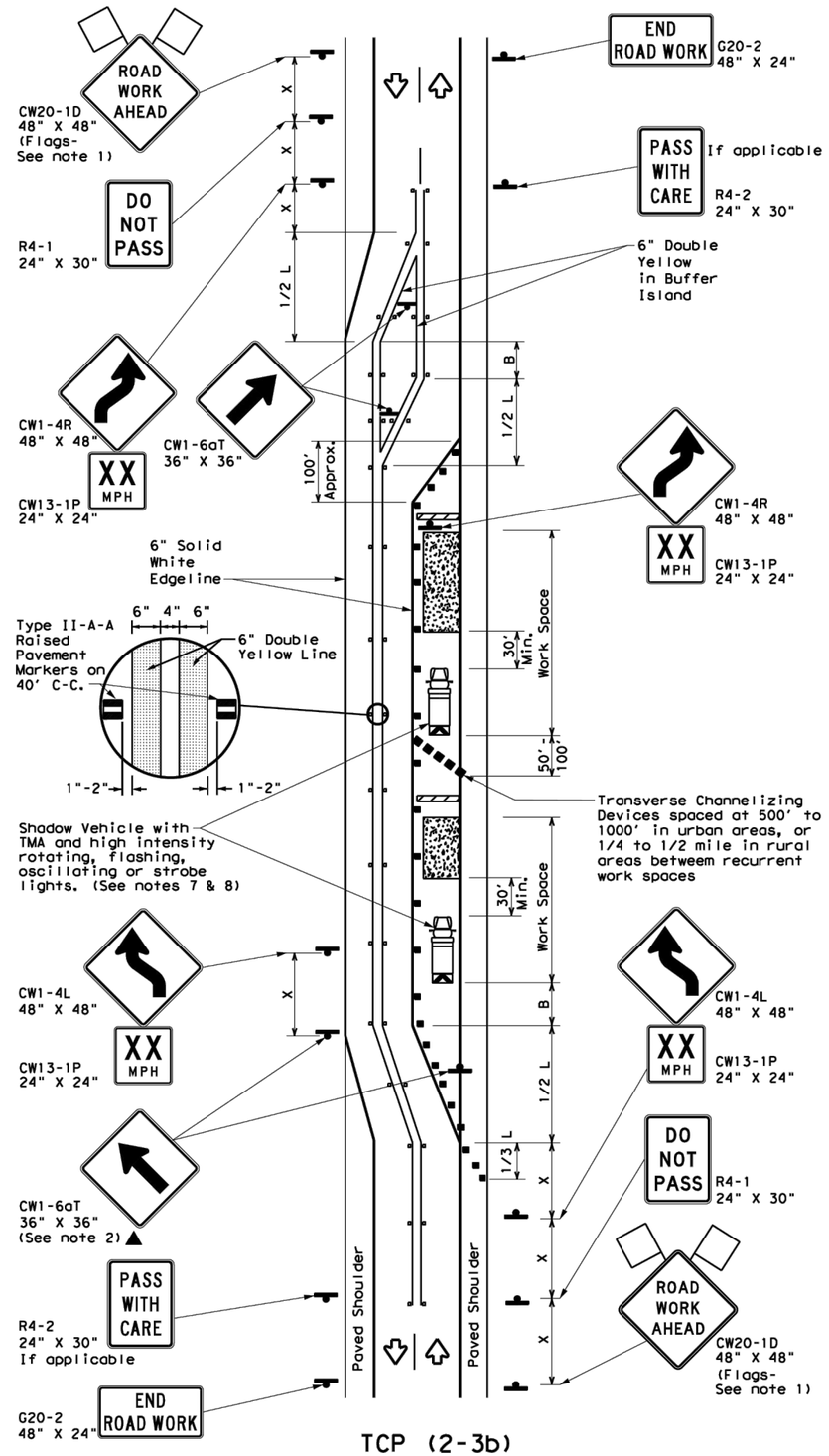
FILE:



TCP (2-3a)
2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED
ADEQUATE FIELD OF VIEW



TCP (2-3b)
2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED
INADEQUATE FIELD OF VIEW

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		Raised Pavement Markers Ty II-AA
	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
				TCP(2-3b)ONLY
			✓	✓

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. When work space will be in place less than three days existing pavement markings may remain in place. Channelizing devices shall be used to separate traffic.
4. Flagger control should NOT be used unless roadway conditions or heavy traffic volume require additional emphasis to safely control traffic. Flagger should be positioned at end of traffic queue.
5. The R4-1 "DO NOT PASS," R4-2 " PASS WITH CARE" and construction regulatory speed zone signs may be installed within CW20-1D "ROAD WORK AHEAD" signs. Proper spacing of signs shall be maintained.
6. Conflicting pavement marking shall be removed for long term projects.
7. 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.
8. 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 (2-3a)

9. Conflicting pavement markings shall be removed for long-term projects. For shorter durations where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections, at 1/2(S) where S is the speed in mph. This tighter device spacing is intended for the area of the conflicting markings, not the entire work zone.

Texas Department of Transportation — Traffic Safety Division Standard

TRAFFIC CONTROL PLAN TRAFFIC SHIFTS ON TWO-LANE ROADS

TCP(2-3)-23

FILE: tcp(2-3)-23.dgn	DN:	CK:	DW:	CK:
©TxDOT April 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-85 4-98 2-18 8-95 3-03 4-23 1-97 2-12	DIST	COUNTY		SHEET NO. 122

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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

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 7-13 9-07 8-14 5-10 5-21	DIST	COUNTY		SHEET NO. 123

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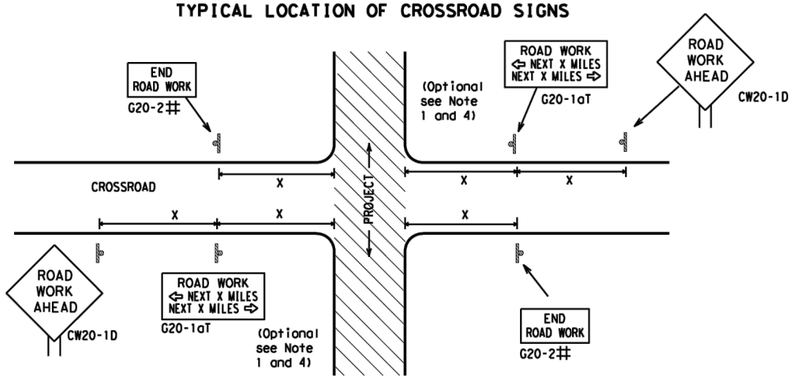
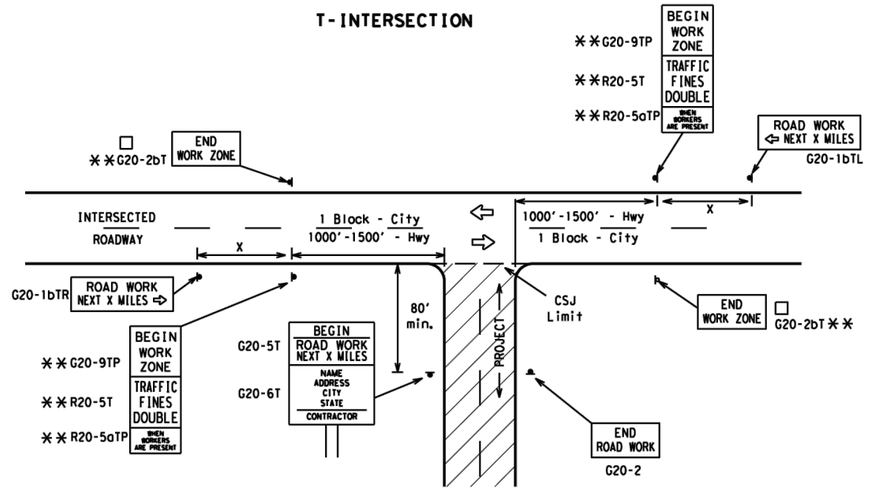
TYPICAL LOCATION OF CROSSROAD SIGNS



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]

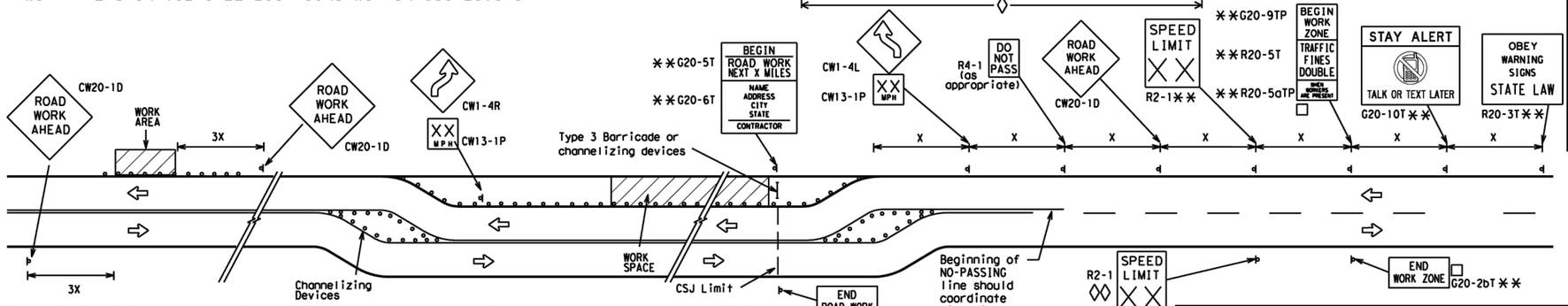
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

△ 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.

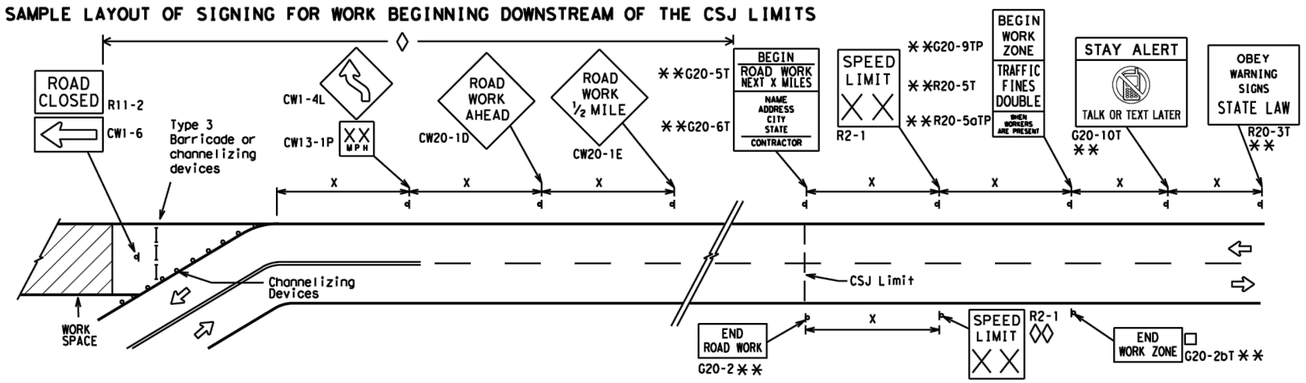
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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.

SHEET 2 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

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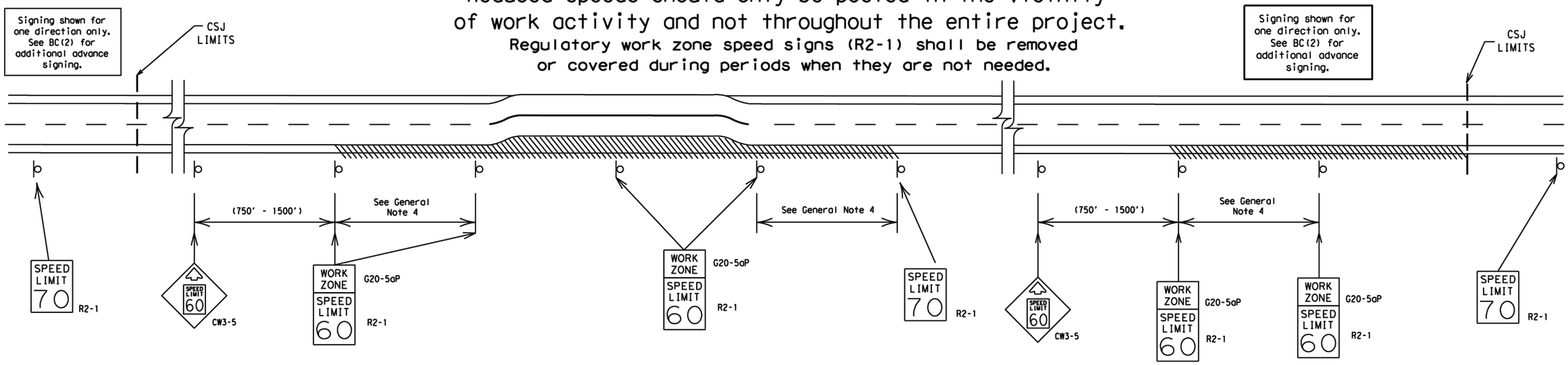
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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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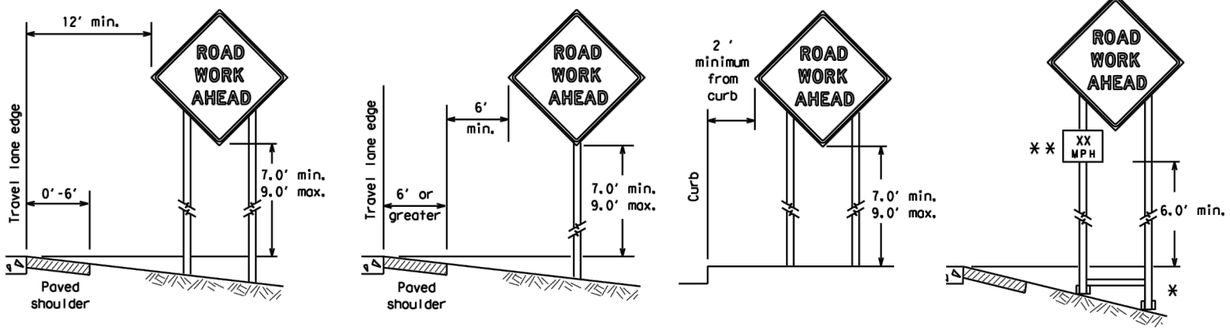
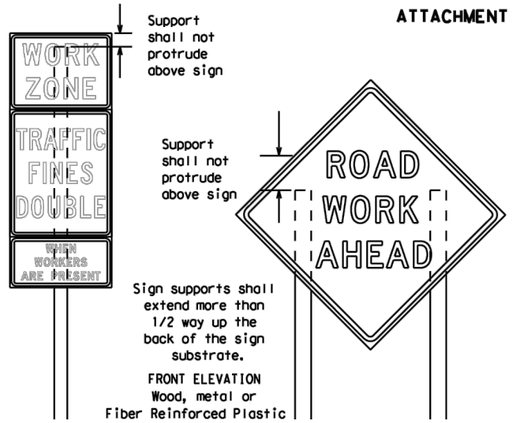
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



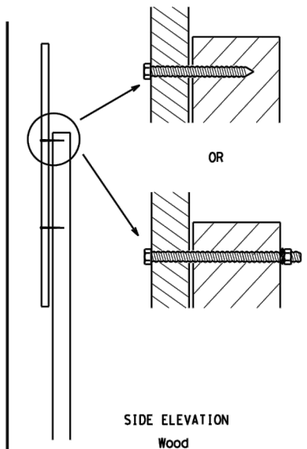
* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

** 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



FRONT ELEVATION
Wood, metal or
Fiber Reinforced Plastic



SIDE ELEVATION
Wood

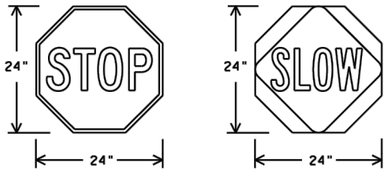
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



Background - Red
Legend & Border - White

Background - Orange
Legend & Border - Black

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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

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BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

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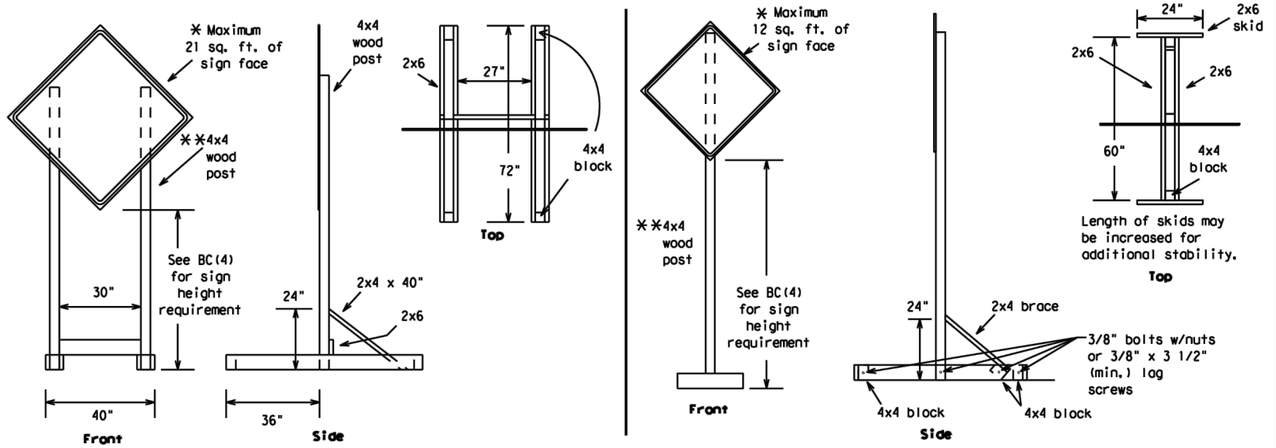
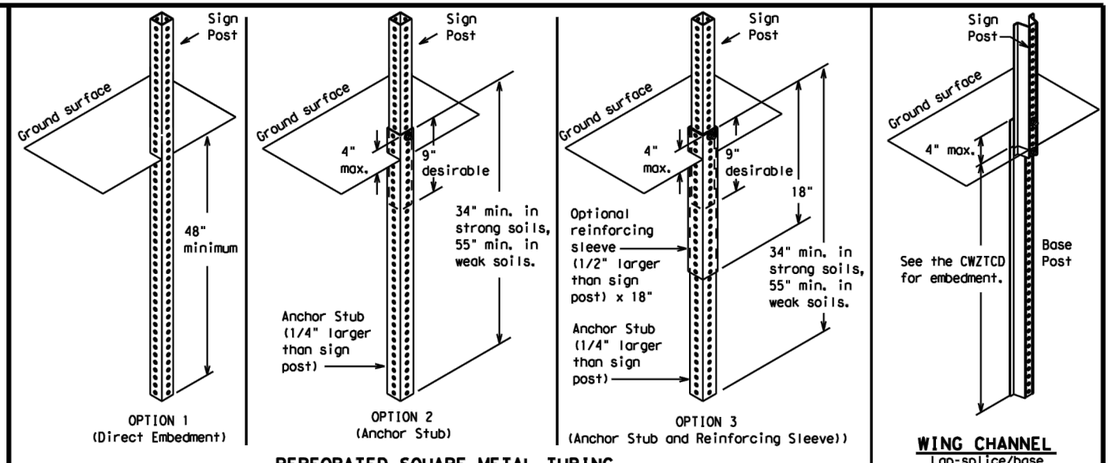


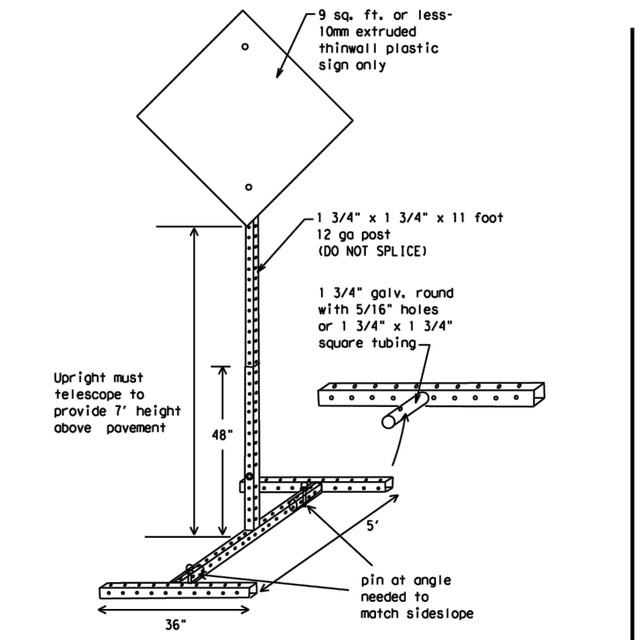
SKID MOUNTED WOOD SIGN SUPPORTS

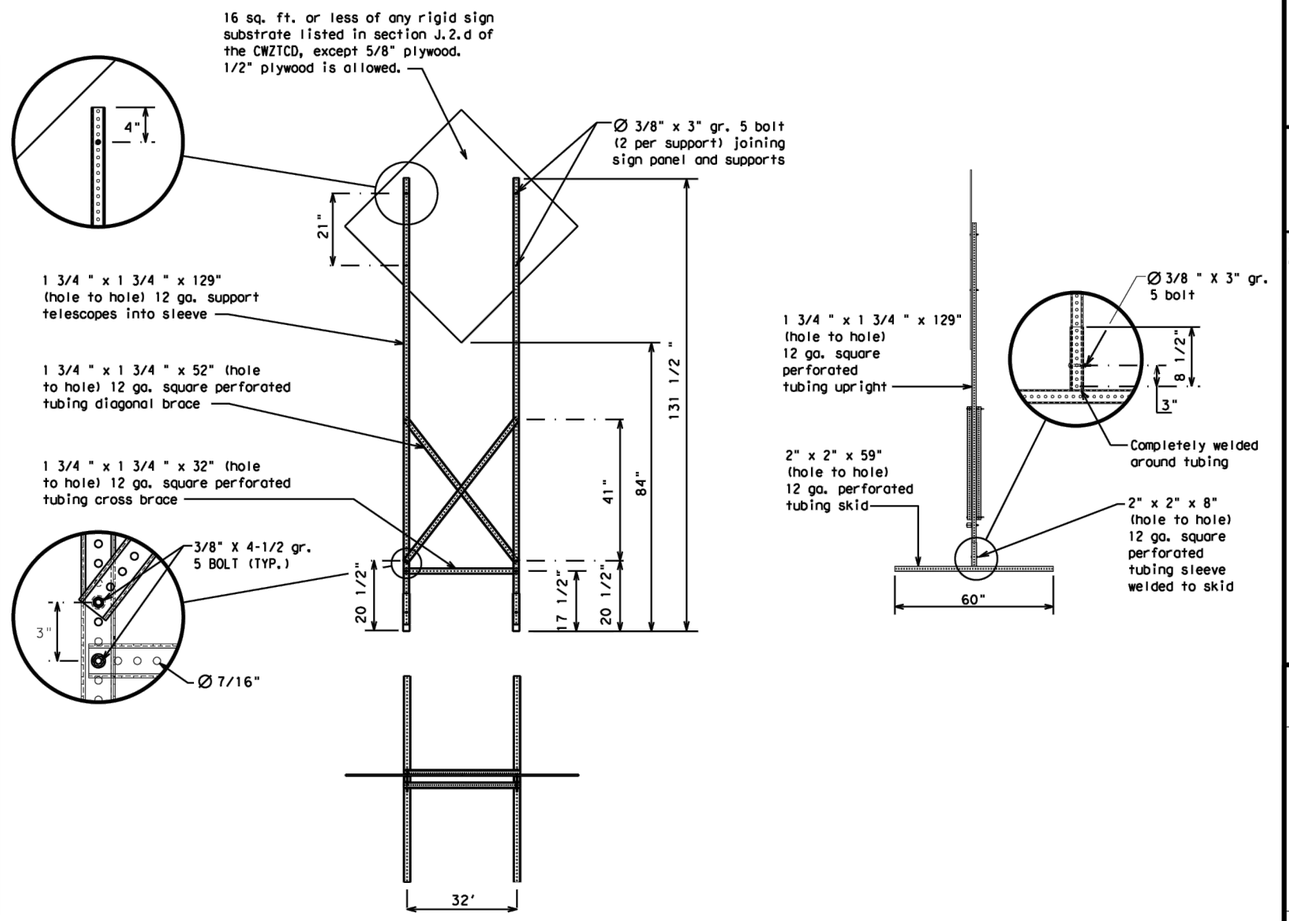
*** LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS**



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

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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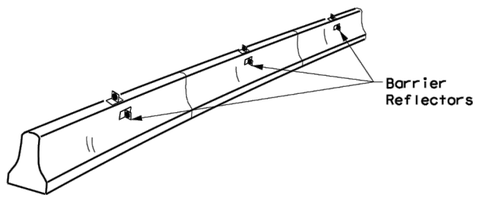
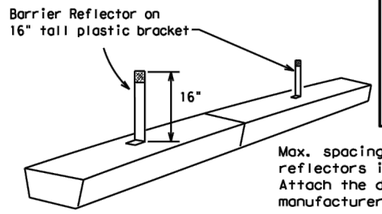
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost 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.

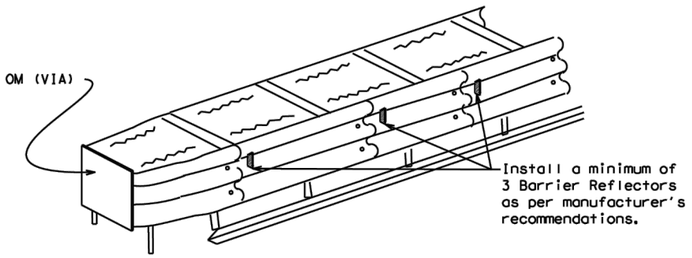


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB) 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.

LOW PROFILE CONCRETE BARRIER (LPCB)

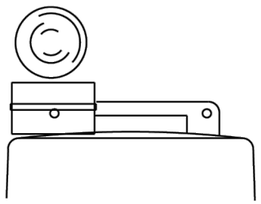


DELINEATION OF END TREATMENTS

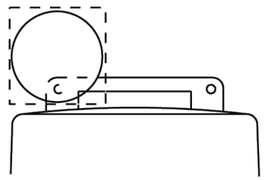
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

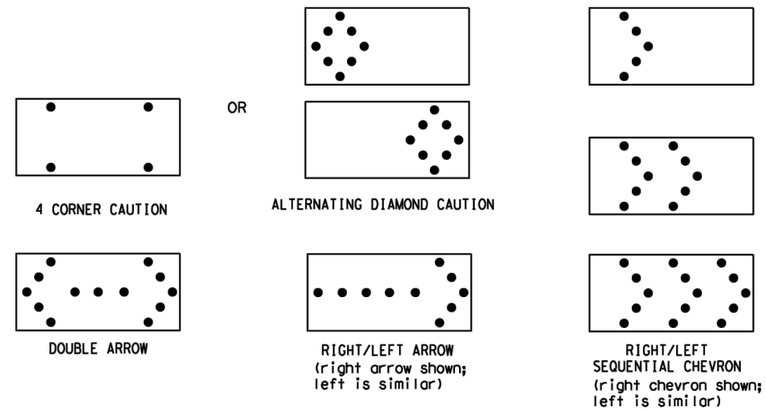
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation

Traffic Safety Division Standard

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

BC(7)-21

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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:

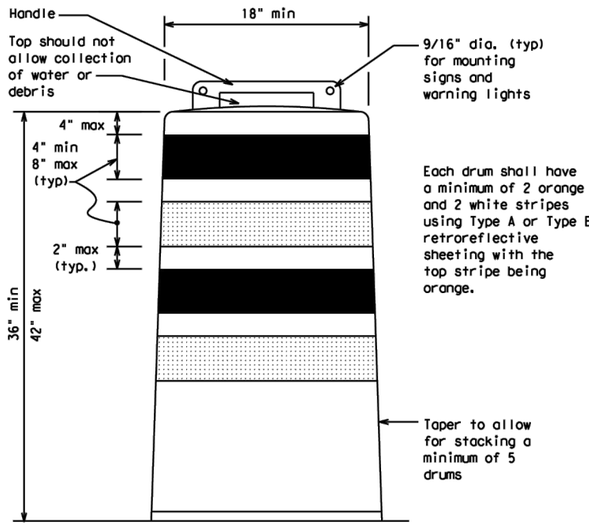
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

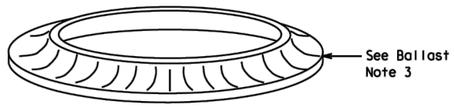
RETROREFLECTIVE SHEETING

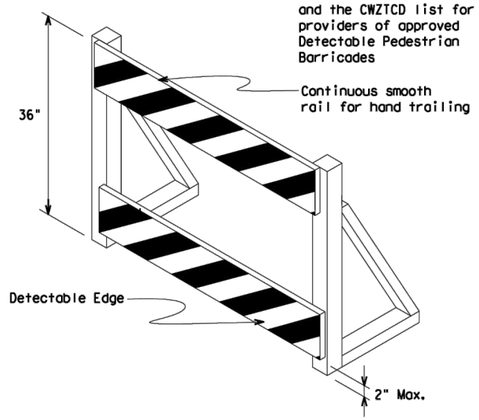
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

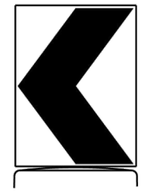




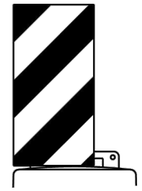


DETECTABLE PEDESTRIAN BARRICADES

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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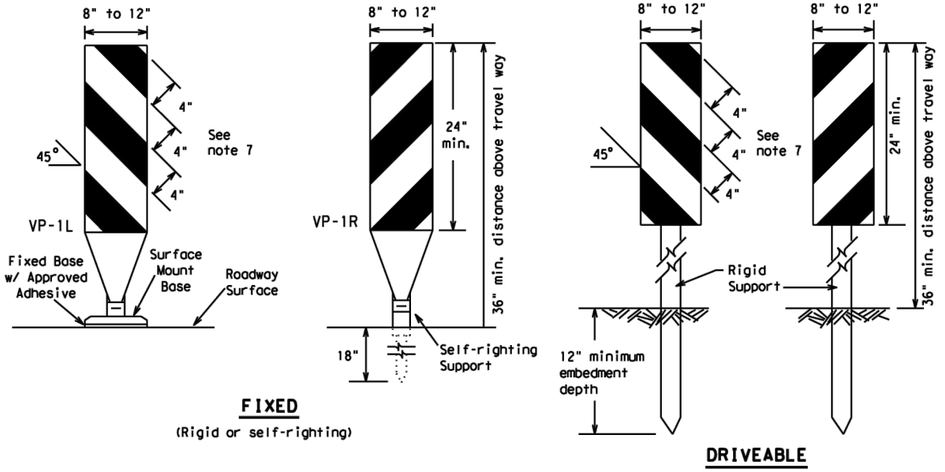
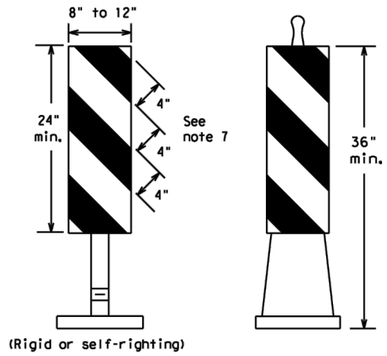


FIXED
(Rigid or self-righting)

DRIVEABLE

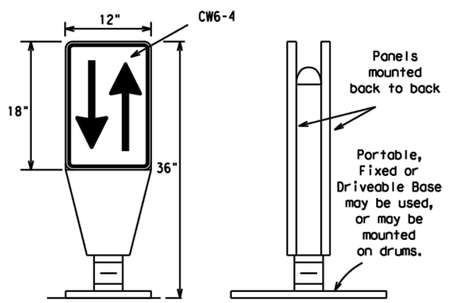


(Rigid or self-righting)

PORTABLE

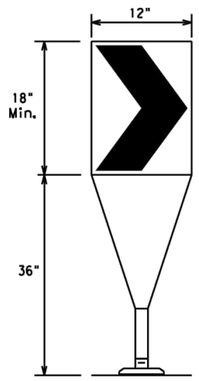
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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



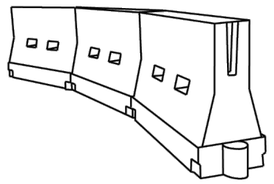
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

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Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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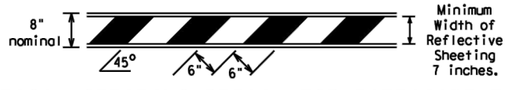
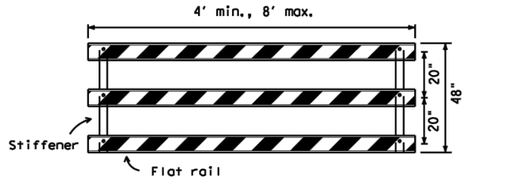
TYPE 3 BARRICADES

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.



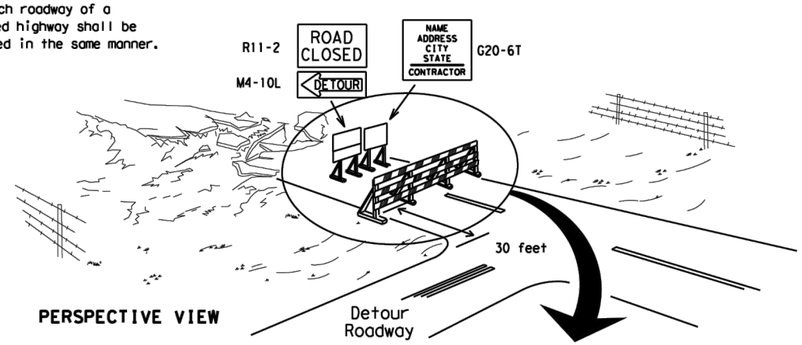
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

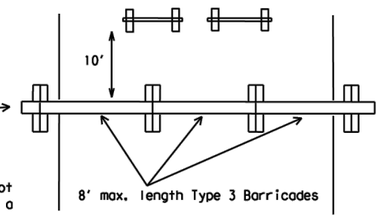
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

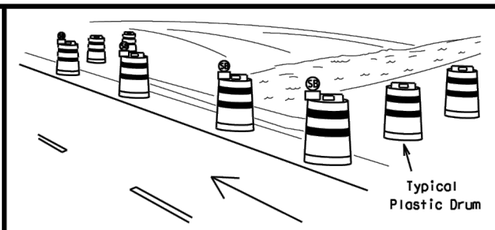
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

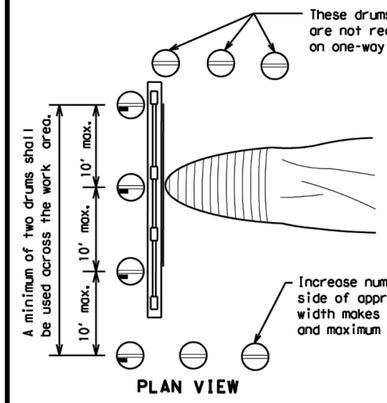
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

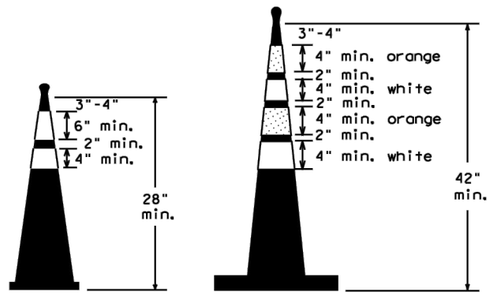
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



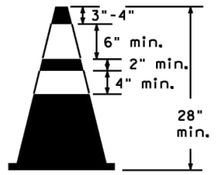
LEGEND	
	Plastic drum
	Plastic drum with steady burn light or yellow warning reflector
SB	Steady burn warning light or yellow warning reflector

PLAN VIEW

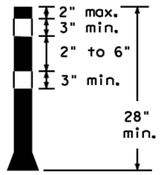
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

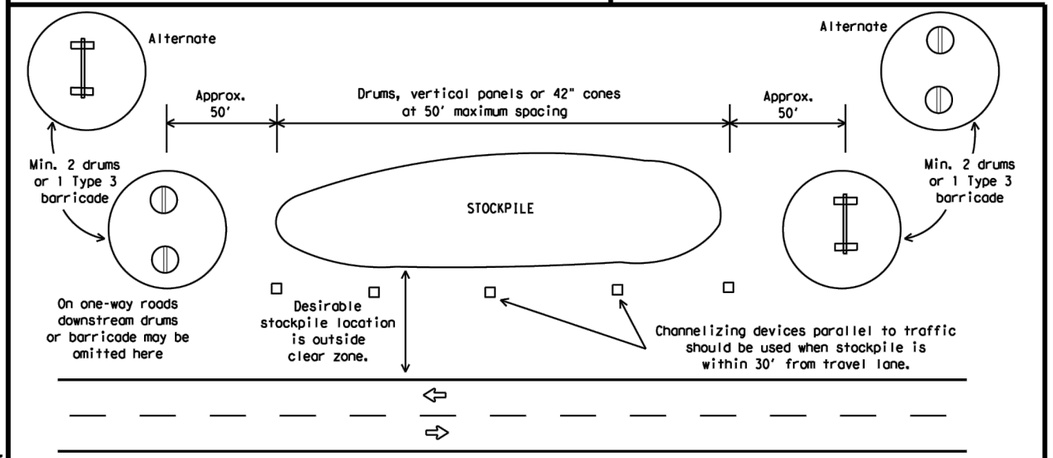


Tubular Marker

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

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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

SHEET 10 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

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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.

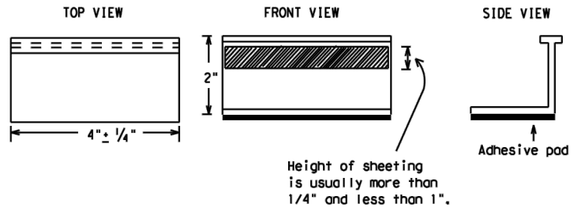
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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11-02 8-14				

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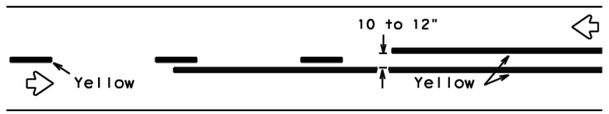
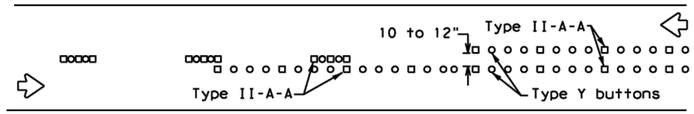
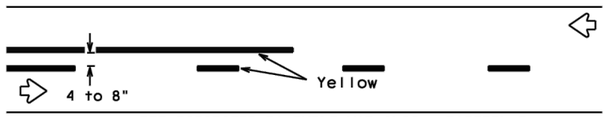
PAVEMENT MARKING PATTERNS



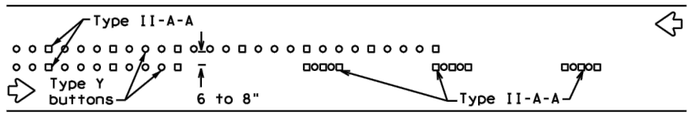
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



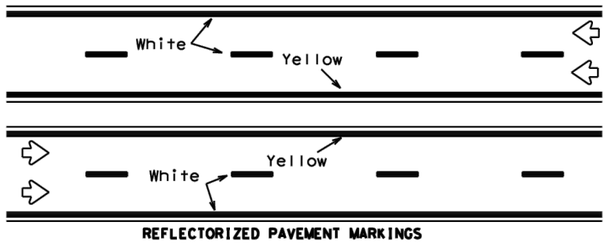
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



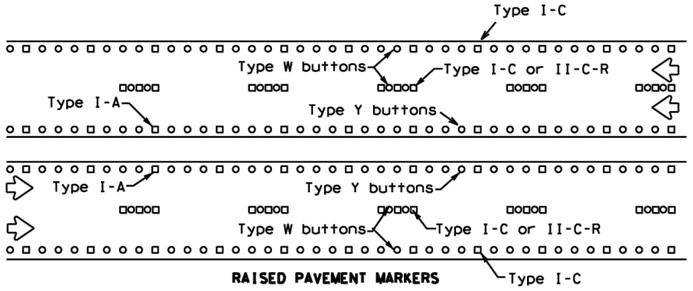
RAISED PAVEMENT MARKERS - PATTERN B

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

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



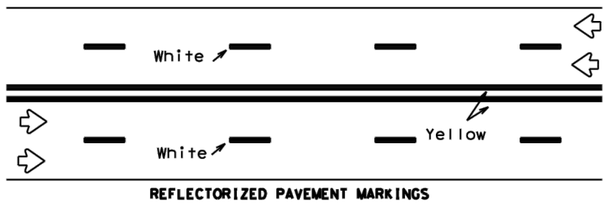
REFLECTORIZED PAVEMENT MARKINGS



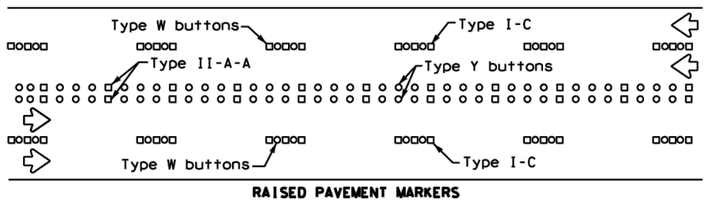
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



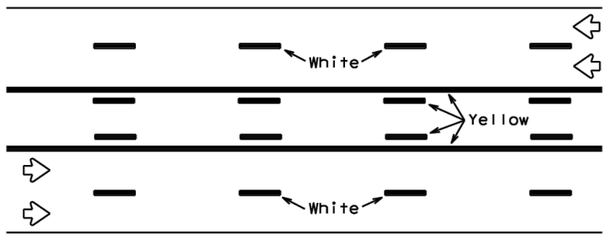
REFLECTORIZED PAVEMENT MARKINGS



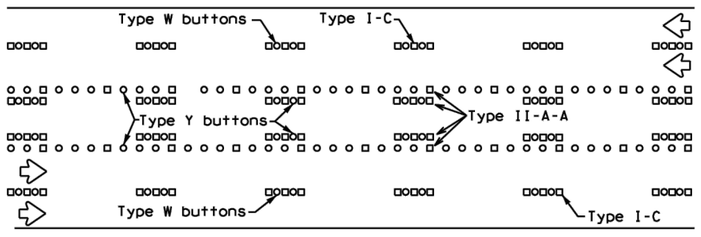
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

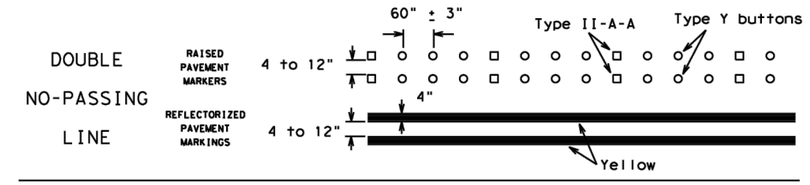
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

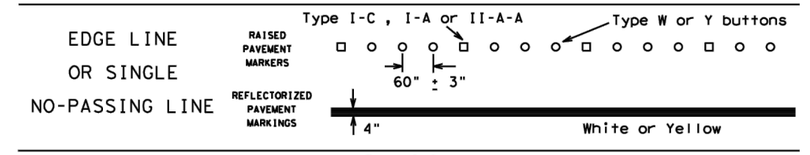
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

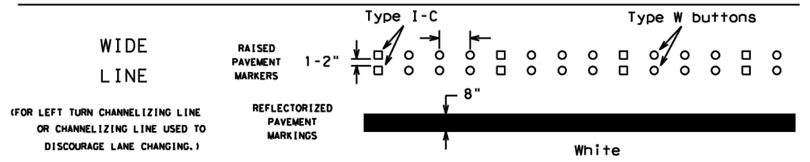


EDGE LINE OR SINGLE NO-PASSING LINE



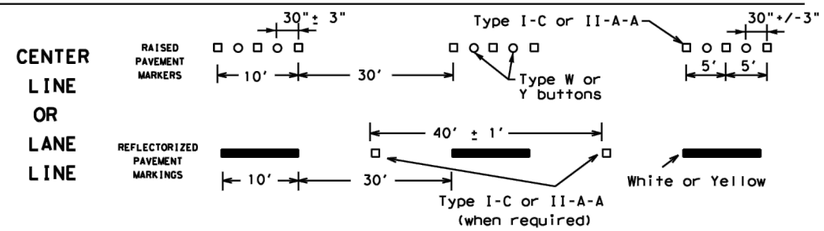
WIDE LINE

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

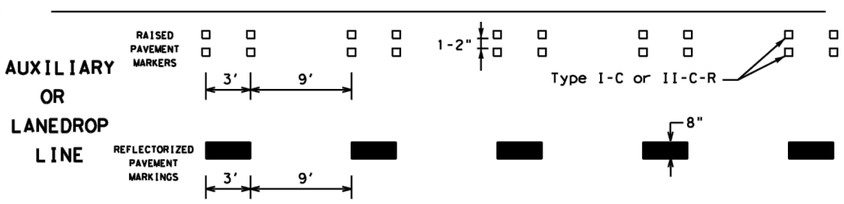


BROKEN LINES

CENTER LINE OR LANE LINE

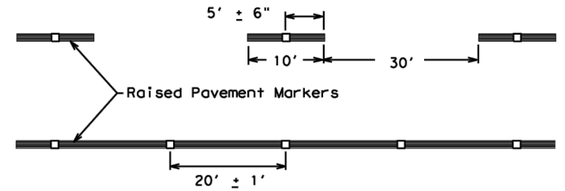


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	DIST	COUNTY		SHEET NO. 134

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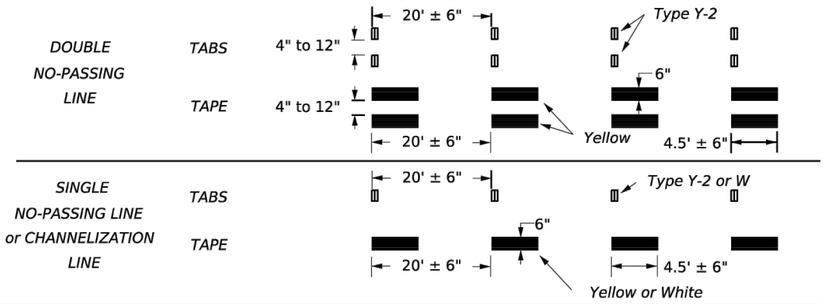
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



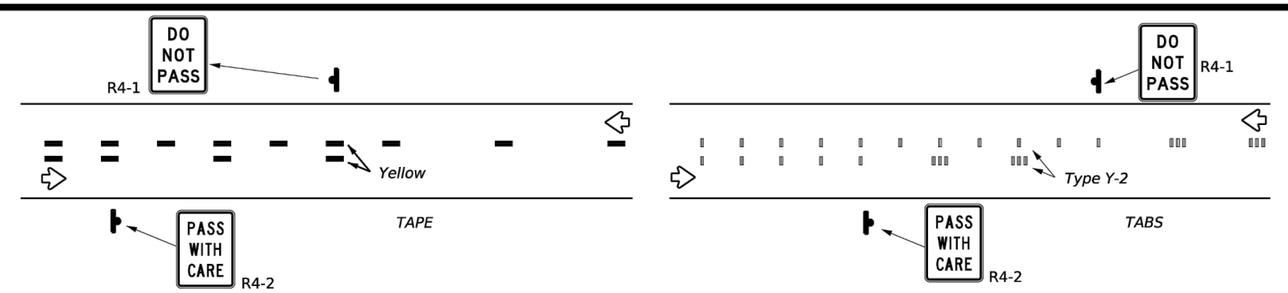
NOTES:

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.

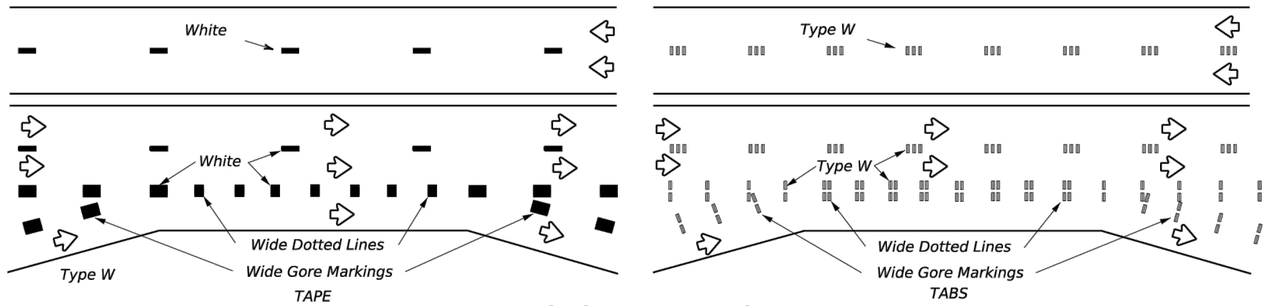
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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.

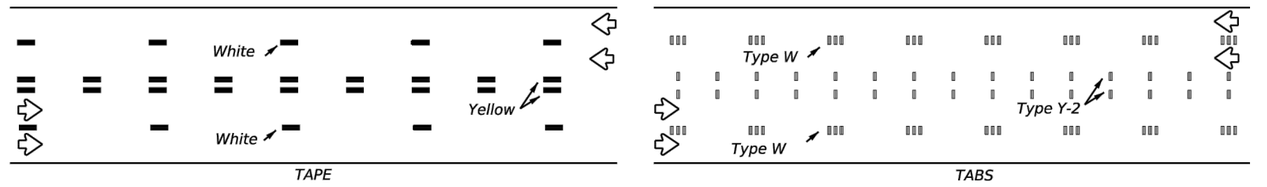
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



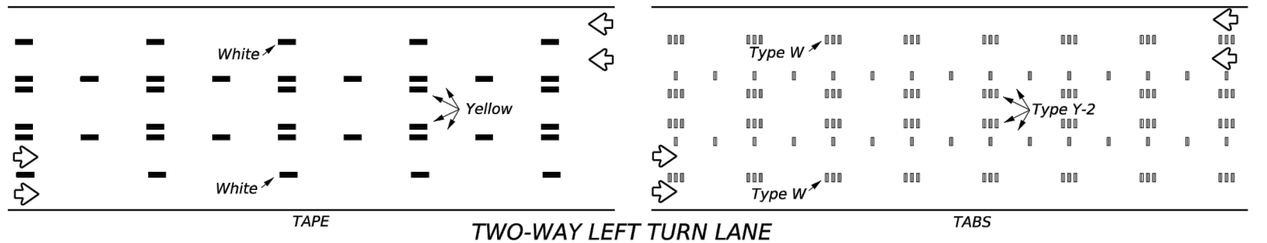
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



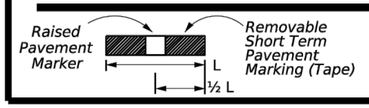
LANE LINES FOR DIVIDED HIGHWAY



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

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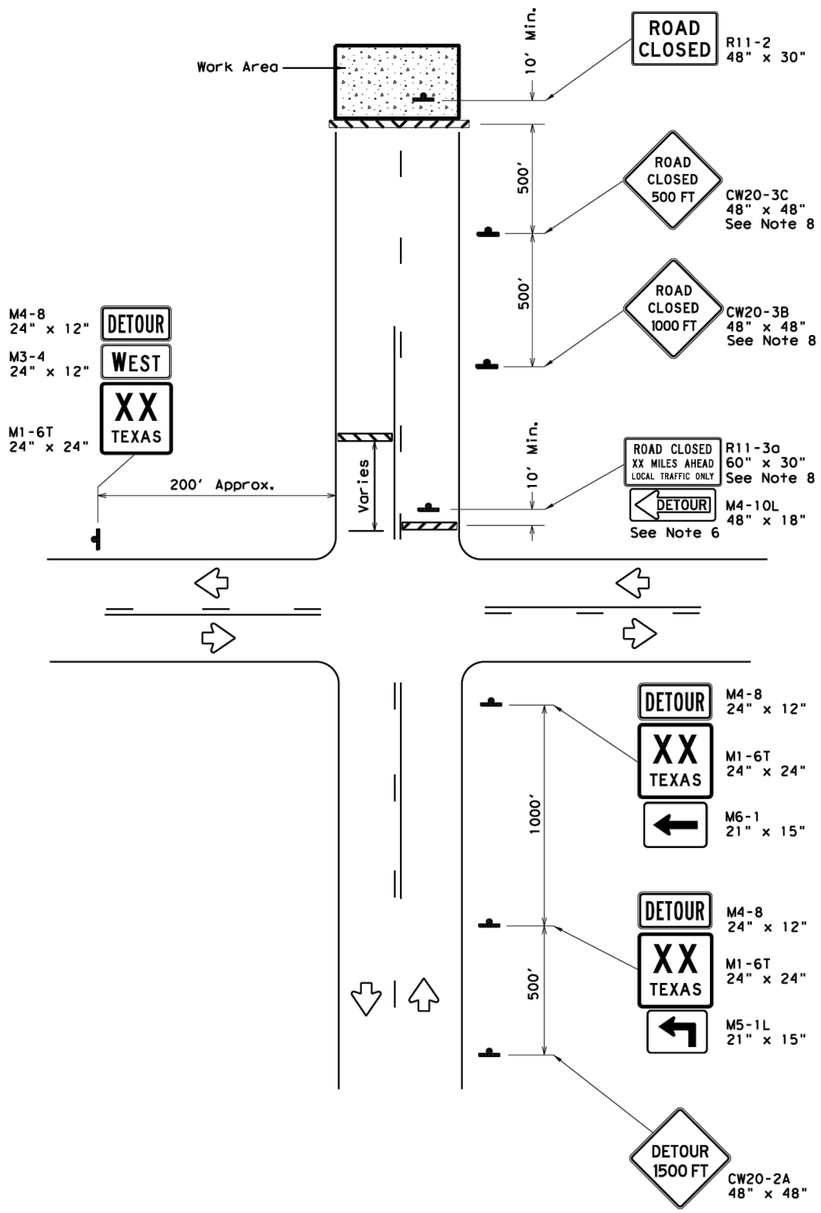
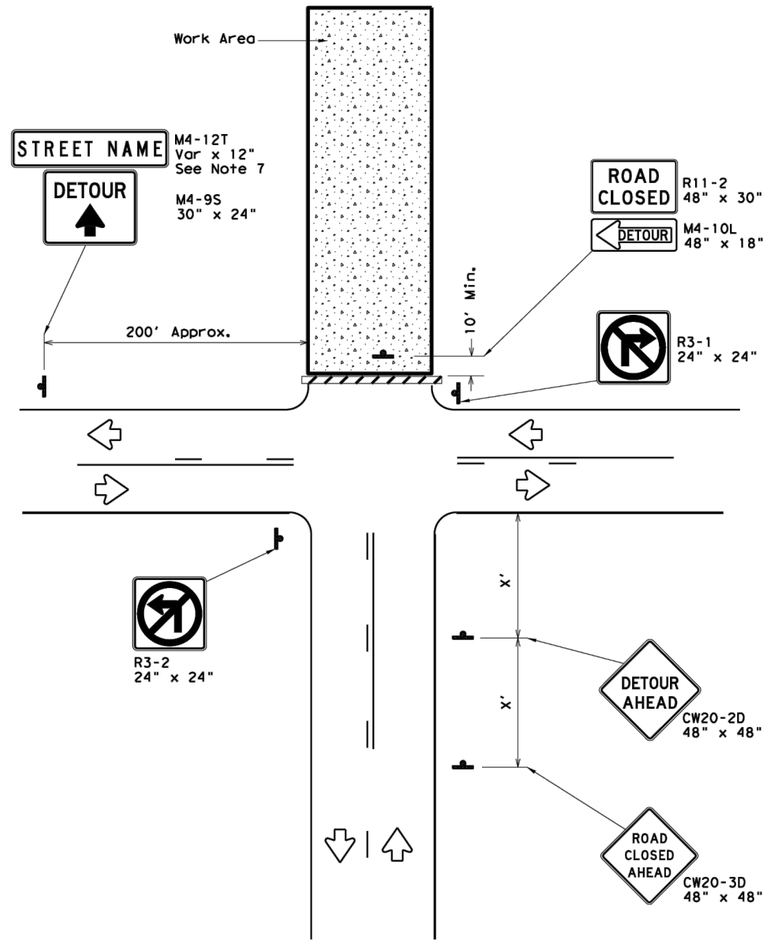


ROAD CLOSURE BEYOND THE INTERSECTION

Signing for a Numbered Route with an Off-Site Detour



ROAD CLOSURE AT THE INTERSECTION

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

LEGEND	
	Type 3 Barricade
	Sign

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

* Conventional Roads Only

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE ROAD CLOSURE DETAILS

WZ(RCD)-13

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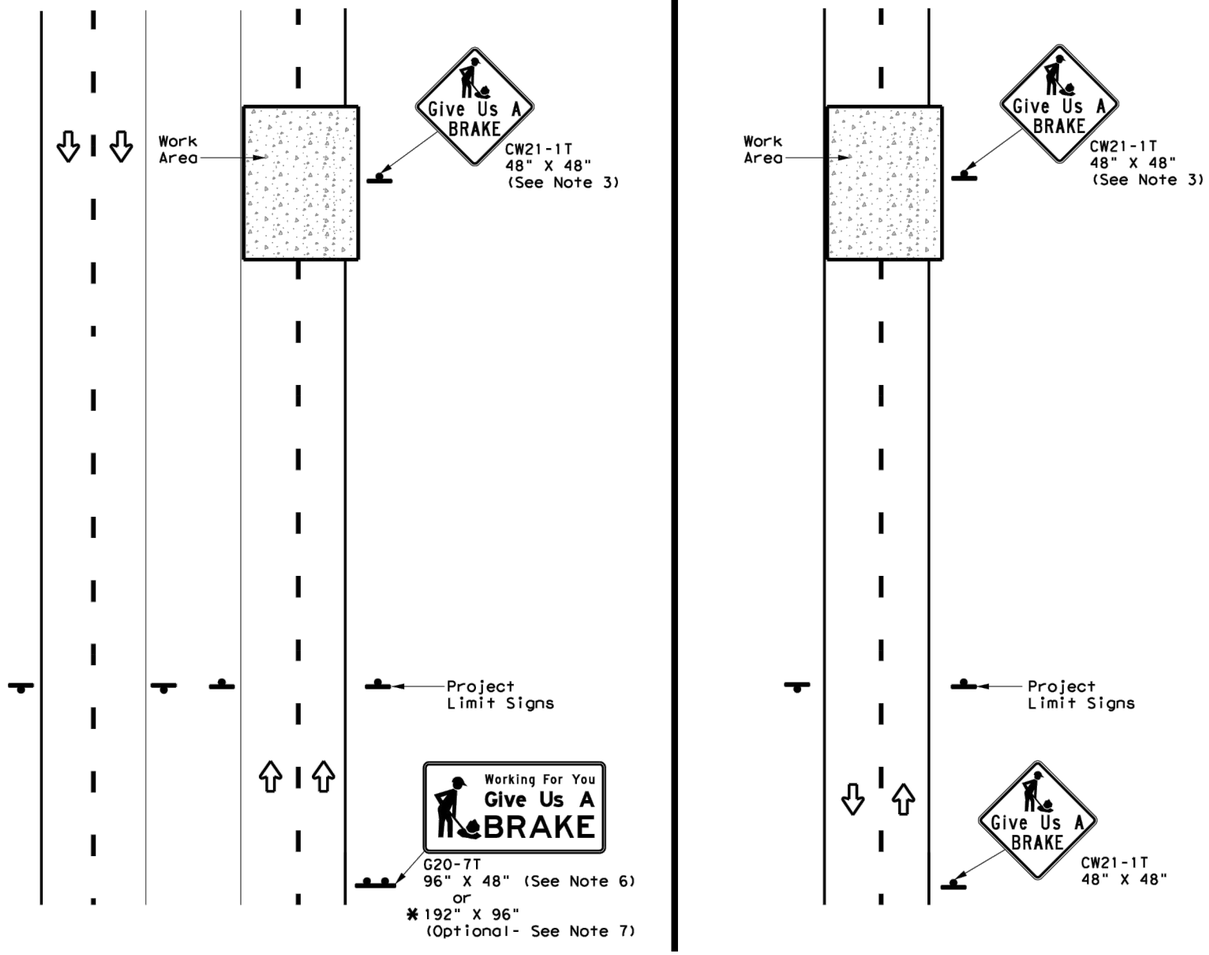

DIVIDED HIGHWAY

UNDIVIDED HIGHWAY

SIGNS ARE SHOWN FOR ONE DIRECTION OF TRAVEL

* When the optional larger WORKING FOR YOU GIVE US A BRAKE (G20-7T) 192" x 96" sign is required, the locations shall be noted elsewhere in the plans.

DATE:
FILE:

SUMMARY OF LARGE SIGNS

BACKGROUND COLOR	SIGN DESIGNATION	SIGN	SIGN DIMENSIONS	REFLECTIVE SHEETING	SQ FT	GALVANIZED STRUCTURAL STEEL			DRILLED SHAFT 24" DIA. (LF)
						Size	(LF) ①	(LF) ②	
Orange	G20-7T	Working For You Give Us A BRAKE	96" X 48"	Type B_{FL} or C_{FL}	32	▲	▲	▲	▲
Orange	G20-7T	Working For You Give Us A BRAKE	192" X 96"	Type B_{FL} or C_{FL}	128	W8x18	16	17	12

▲ See Note 6 Below

LEGEND	
	Sign
	Large Sign
	Traffic Flow

DEPARTMENTAL MATERIAL SPECIFICATIONS	
PLYWOOD SIGN BLANKS	DMS-7100
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

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

GENERAL NOTES

1. See BC and SMD sheets for additional sign support details.
2. Sign locations shall be approved by the Engineer.
3. For projects more than two miles in length, Give Us a BRAKE signs should be repeated halfway through the project. The Give Us a Brake (CW21-1T) may be used for this purpose.
4. Work zone speed limits are sometimes used in conjunction with GIVE US A BRAKE signing. See BC(3) for location and spacing of construction speed zone signing when required.
5. Give Us a Brake (CW21-1T) signs and supports shall be considered subsidiary to Item 502, "Barricades, Signs and Traffic Handling."
6. The 96" X 48" Working For You Give Us A BRAKE (G20-7T) may use a 1/2" or 5/8" plywood substrate or 0.125" aluminum sheeting substrate and may be supported by two 4" x 6" wood posts with drilled holes for breakaway as per BC(5) and will be subsidiary to Item 502.
7. The Working For You Give Us A BRAKE (G20-7T) 192" X 96" sign shall be paid for under the following specification items:
   Item 636 - Aluminum Signs
   Item 647 - Large Roadside Sign Supports and Assemblies.
   Item 416 - Drilled Shaft Foundations
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.

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE "GIVE US A BRAKE" SIGNS

WZ(BRK)-13

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REVISIONS				
6-96 5-98 7-13	DIST	COUNTY		SHEET NO.
8-96 3-03				137

116

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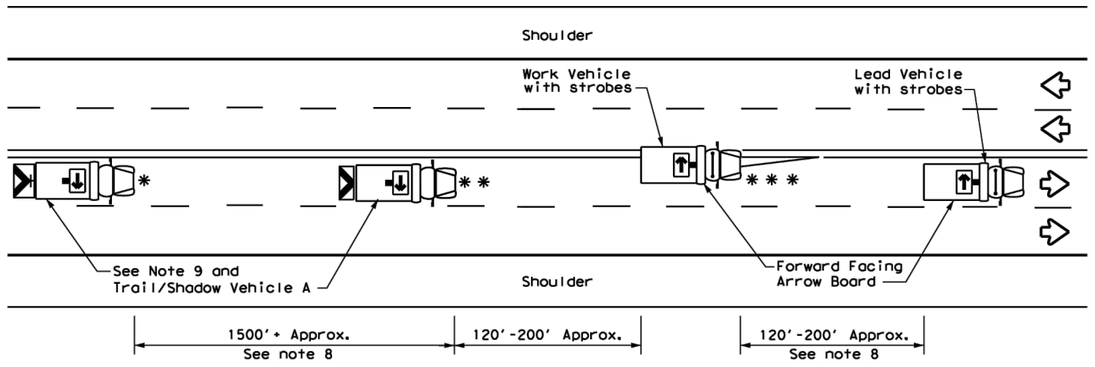
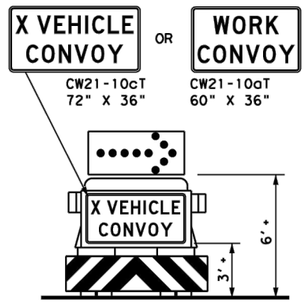


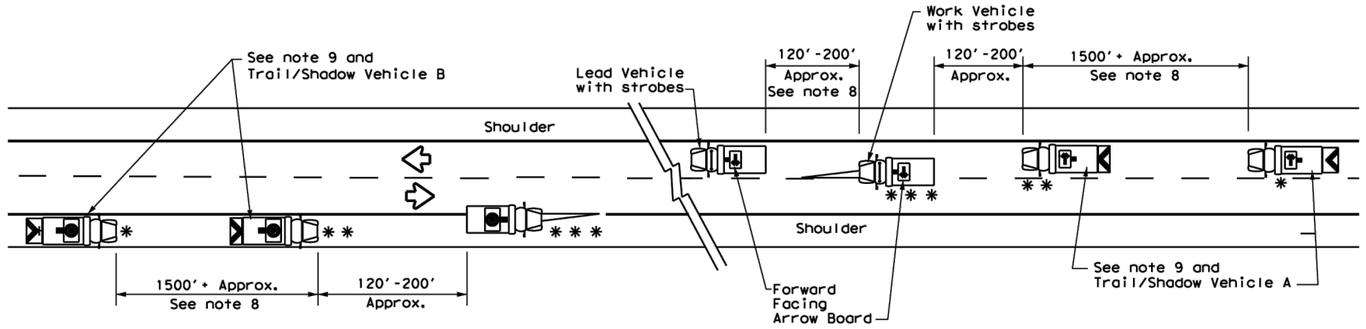
TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

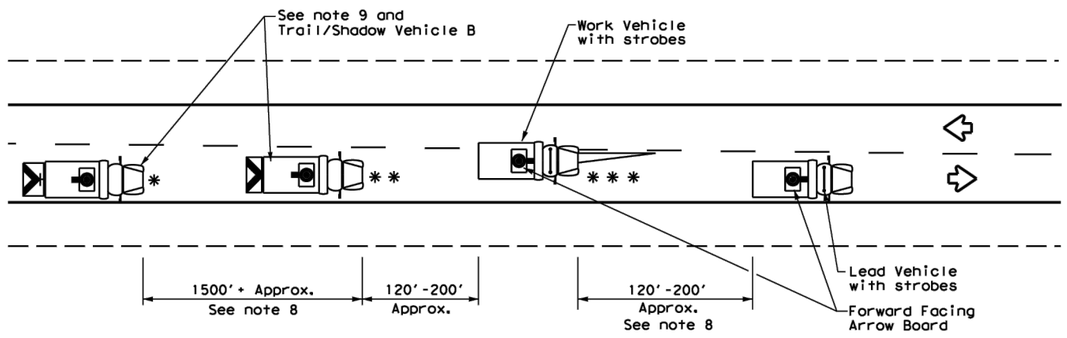


WORK ON SHOULDER

WORK ON TRAVEL LANE

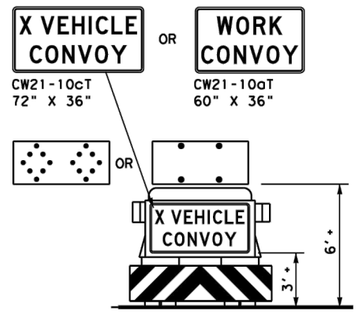
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

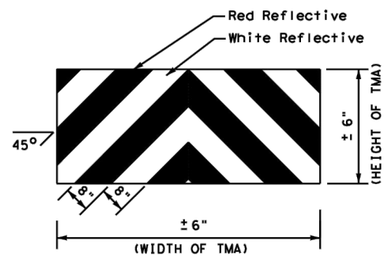
with Flashing Arrow Board in CAUTION display

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 2-94 4-98 8-95 7-13 1-97	DIST	COUNTY		SHEET NO. 138

DATE:
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DATE:
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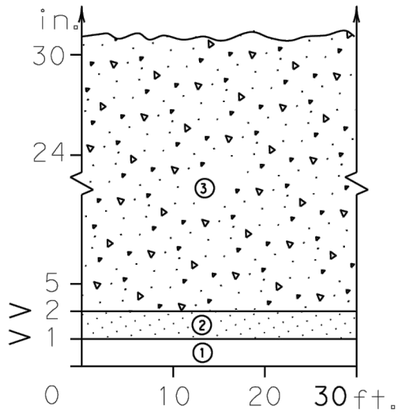
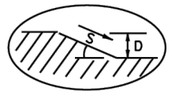
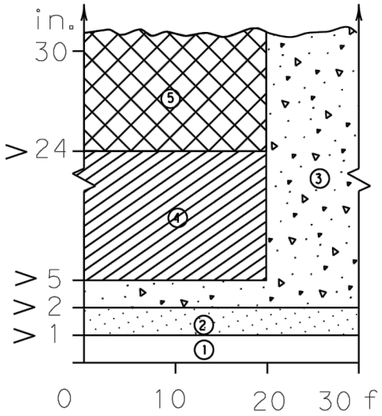
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

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

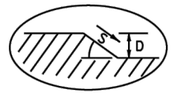


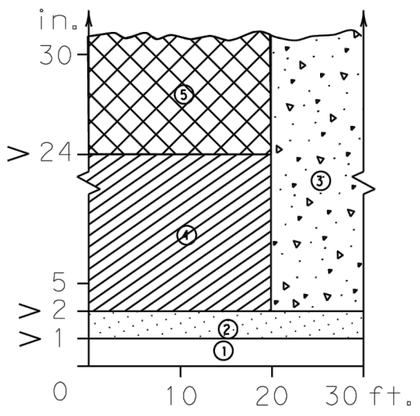
Edge Condition I
S = (3:1) (or flatter)



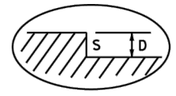


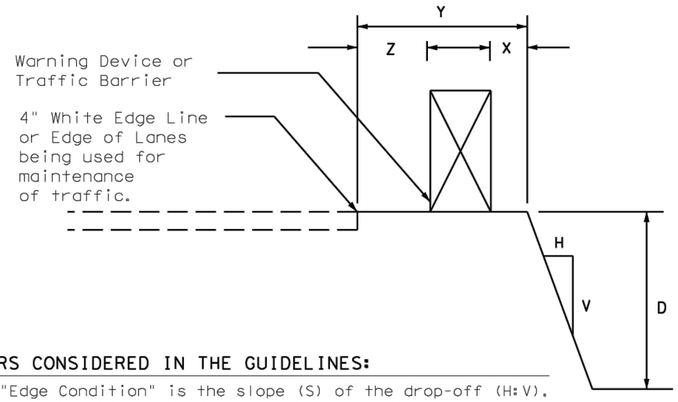
Edge Condition II
S = ((2.99):1) to (1:1)





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





FACTORS CONSIDERED IN THE GUIDELINES:

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

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

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

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

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

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

Edge Condition Notes:

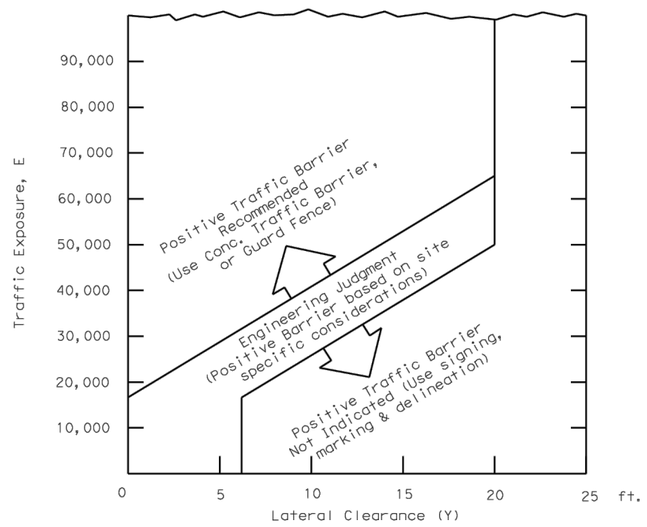
1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.

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

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

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

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



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

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

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

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

Engineer's Seal

07/28/2026
STATE OF TEXAS
ABBY L. POLZIN
151558
LICENSED
ENGINEER
Abby Polzin

Date _____

Texas Department of Transportation

Traffic Safety Division Standard

TREATMENT FOR VARIOUS EDGE CONDITIONS

FILE: edgecon.dgn	DN:	CK:	DW:	CK:
©TxDOT August 2000 REVISIONS 03-01 08-01 9-21	CONT	SECT	JOB	HIGHWAY
	DIST	COUNTY		SHEET NO.
				139

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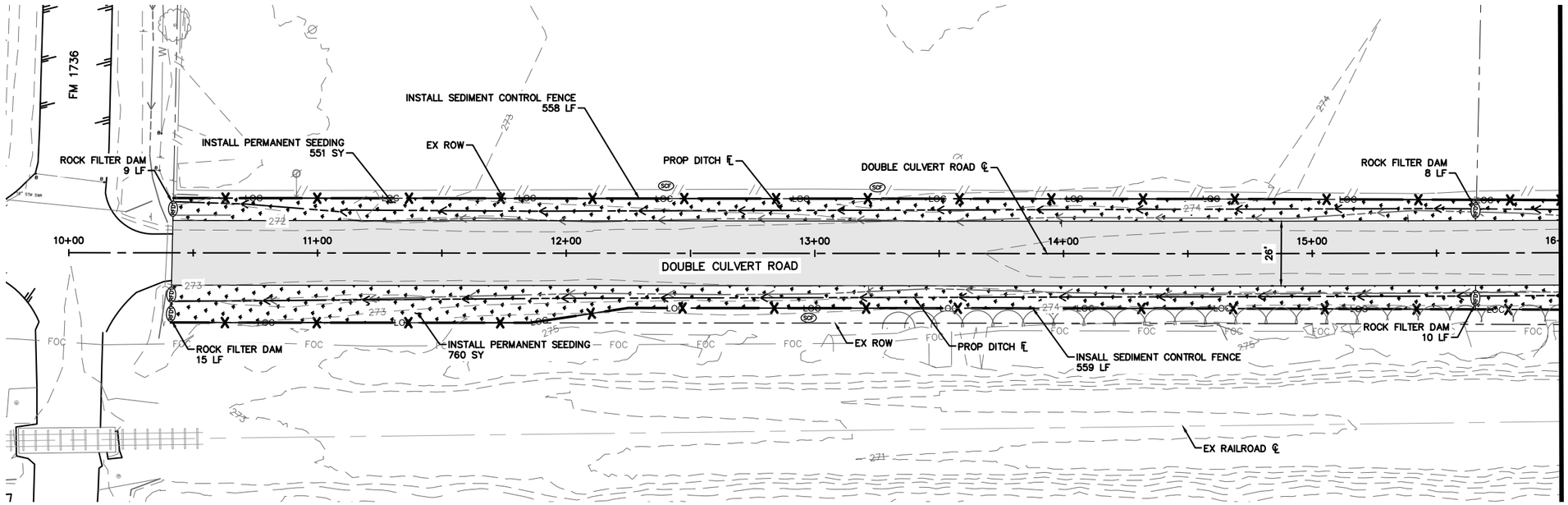

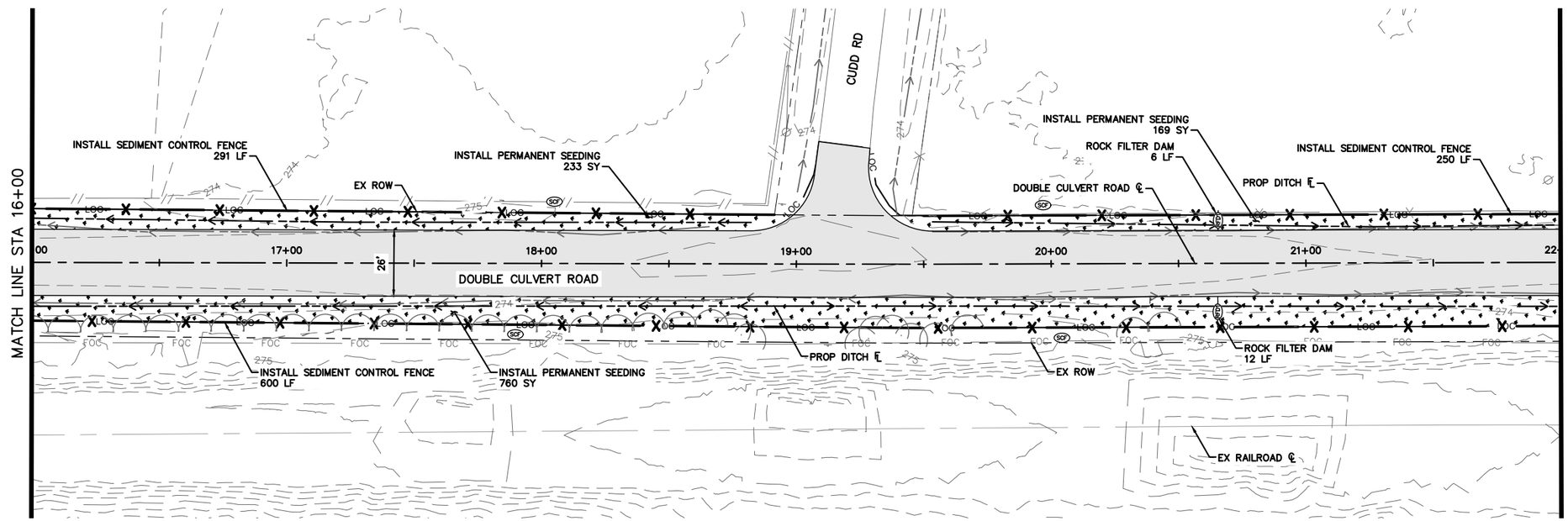

GRAPHIC SCALE IN FEET
0 25 50

LEGEND

- SCF — SEDIMENT CONTROL FENCE
- RFD — ROCK FILTER DAM TYPE 1
- PROP PAVEMENT
- SEEDING WITH 4" TOPSOIL

EROSION CONTROL NOTES

1. EROSION CONTROL DEVICES AS SHOWN ON THE EROSION CONTROL PLAN FOR THE PROJECT SHALL BE INSTALLED PRIOR TO THE START OF LAND DISTURBING ACTIVITIES ON THE PROJECT.
2. ALL EROSION CONTROL DEVICES ARE TO BE INSTALLED DURING SITE PREP IN ACCORDANCE WITH THE APPROVED PLANS AND SPECIFICATIONS FOR THE PROJECT.
3. CONTRACTOR SHALL MINIMIZE THE REMOVAL OF GRASS COVER UNTIL ACTUAL WORK PHASE BEGINS.
4. IF THE EROSION CONTROL PLAN AS APPROVED CANNOT CONTROL EROSION AND OFF-SITE SEDIMENTATION FROM THE PROJECT THE EROSION CONTROL PLAN WILL BE REQUIRED TO BE REVISED AND/OR ADDITIONAL EROSION CONTROL DEVICES WILL BE REQUIRED (NO SEPARATE PAY).
5. OFF-SITE SOIL BORROW AND SPOIL AREAS ARE CONSIDERED AS PART OF THE PROJECT SITE AND MUST ALSO COMPLY WITH THE EROSION CONTROL REQUIREMENTS FOR THIS PROJECT. THIS INCLUDES THE INSTALLATION OF BMP'S TO CONTROL OFFSITE SEDIMENTATION AND THE ESTABLISHMENT OF PERMANENT GROUND COVER ON DISTURBED AREAS PRIOR TO FINAL APPROVAL OF THE PROJECT.
6. INSPECTIONS SHALL BE MADE WEEKLY AND AFTER RAIN STORM EVENTS TO INSURE THAT THE DEVICES ARE FUNCTIONING PROPERLY.
7. CONTRACTOR SHALL BE RESPONSIBLE FOR IDENTIFYING APPROPRIATE CONSTRUCTION ENTRANCE. WHEN SEDIMENT OR MUD HAS CLOGGED THE VOID SPACES BETWEEN STONES OR MUD IS BEING TRACKED ONTO A PUBLIC ROADWAY, THE STABILIZED CONSTRUCTION ENTRANCE AGGREGATE PAD MUST BE WASHED DOWN OR REPLACED. RUNOFF FROM THE WASHDOWN OPERATION SHALL NOT BE ALLOWED TO DRAIN DIRECTLY OFF SITE WITHOUT FIRST FLOWING THROUGH ANOTHER BMP TO CONTROL OFF SITE SEDIMENTATION. PERIODIC RE-GRADING OR THE ADDITION OF NEW STONE MAY BE REQUIRED TO MAINTAIN THE EFFICIENCY OF THE INSTALLATION.
8. CONTRACTOR SHALL BE RESPONSIBLE FOR SUBMITTAL OF N.O.I., N.O.T. AND ANY ADDITIONAL INFORMATION REQUIRED BY THE E.P.A. CONTRACTOR SHALL COMPLY WITH ALL E.P.A. STORMWATER POLLUTION PREVENTION REQUIREMENTS.
9. PRIOR TO FINAL ACCEPTANCE AND/OR OPENING ROADWAY TO TRAFFIC, ALL DISTURBED AREAS SHALL BE STABILIZED AND EROSION CONTROL DEVICES SHALL BE REMOVED.
10. SEE GENERAL NOTES SHEET FOR EROSION CONTROL REQUIREMENTS

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL
ENGINEER
Abby Polzin

DATE: 7/29/2026 8:48:33 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Erosion Control Plan - 10_00.00 TO 58_00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM
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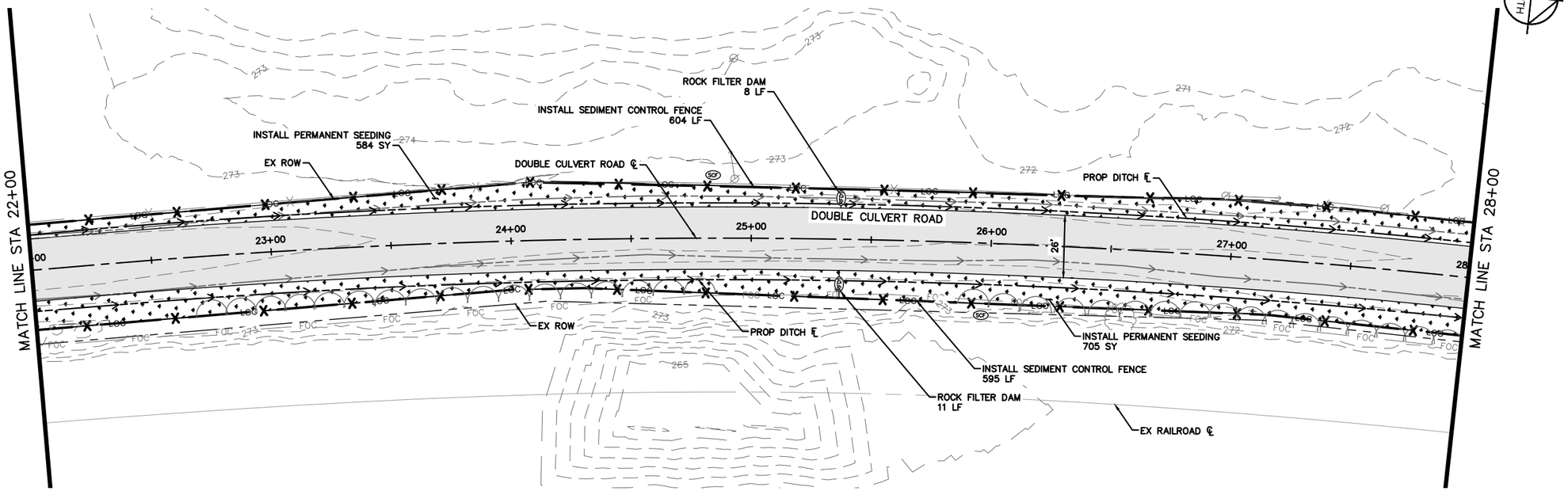
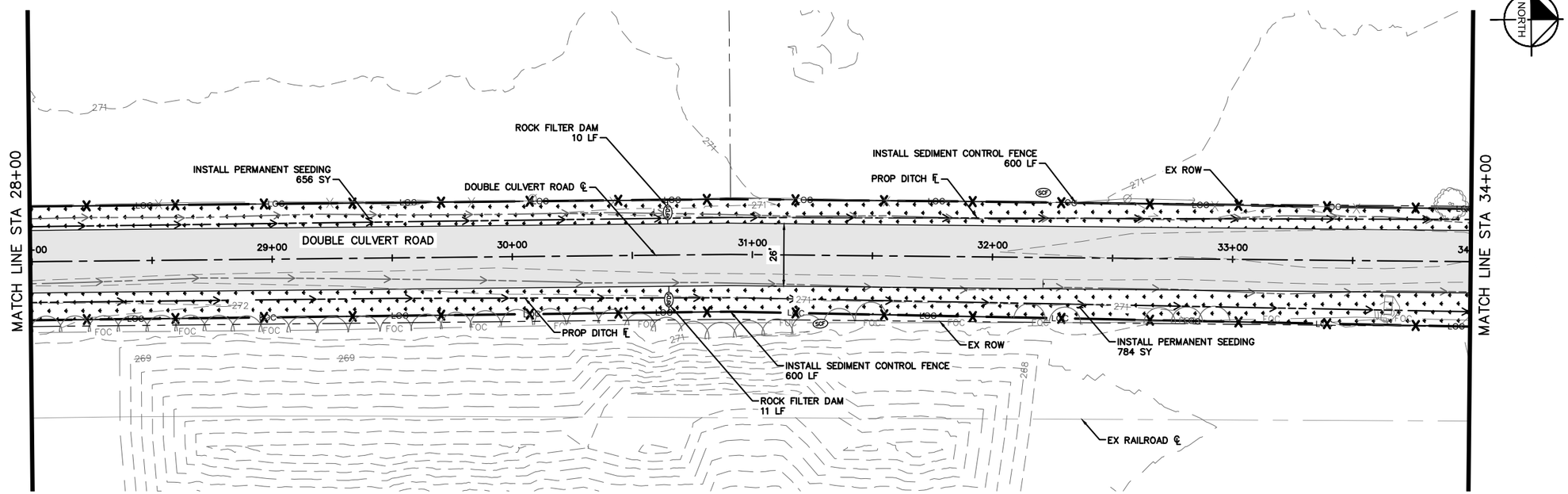
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
EROSION CONTROL
BEGIN TO STA 22 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		140

100% SUBMITTAL





GRAPHIC SCALE IN FEET
0 25 50

LEGEND

- SCF — SEDIMENT CONTROL FENCE
- RFD1 — ROCK FILTER DAM TYPE 1
- PROP PAVEMENT
- SEEDING WITH 4" TOPSOIL

EROSION CONTROL NOTES

1. EROSION CONTROL DEVICES AS SHOWN ON THE EROSION CONTROL PLAN FOR THE PROJECT SHALL BE INSTALLED PRIOR TO THE START OF LAND DISTURBING ACTIVITIES ON THE PROJECT.
2. ALL EROSION CONTROL DEVICES ARE TO BE INSTALLED DURING SITE PREP IN ACCORDANCE WITH THE APPROVED PLANS AND SPECIFICATIONS FOR THE PROJECT.
3. CONTRACTOR SHALL MINIMIZE THE REMOVAL OF GRASS COVER UNTIL ACTUAL WORK PHASE BEGINS.
4. IF THE EROSION CONTROL PLAN AS APPROVED CANNOT CONTROL EROSION AND OFF-SITE SEDIMENTATION FROM THE PROJECT THE EROSION CONTROL PLAN WILL BE REQUIRED TO BE REVISED AND/OR ADDITIONAL EROSION CONTROL DEVICES WILL BE REQUIRED (NO SEPARATE PAY).
5. OFF-SITE SOIL BORROW AND SPOIL AREAS ARE CONSIDERED AS PART OF THE PROJECT SITE AND MUST ALSO COMPLY WITH THE EROSION CONTROL REQUIREMENTS FOR THIS PROJECT. THIS INCLUDES THE INSTALLATION OF BMP'S TO CONTROL OFFSITE SEDIMENTATION AND THE ESTABLISHMENT OF PERMANENT GROUND COVER ON DISTURBED AREAS PRIOR TO FINAL APPROVAL OF THE PROJECT.
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8. CONTRACTOR SHALL BE RESPONSIBLE FOR SUBMITTAL OF N.O.I., N.O.T. AND ANY ADDITIONAL INFORMATION REQUIRED BY THE E.P.A. CONTRACTOR SHALL COMPLY WITH ALL E.P.A. STORMWATER POLLUTION PREVENTION REQUIREMENTS.
9. PRIOR TO FINAL ACCEPTANCE AND/OR OPENING ROADWAY TO TRAFFIC, ALL DISTURBED AREAS SHALL BE STABILIZED AND EROSION CONTROL DEVICES SHALL BE REMOVED.
10. SEE GENERAL NOTES SHEET FOR EROSION CONTROL REQUIREMENTS

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abby Polzin

DATE: 7/29/2026 8:48:48 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Erosion Control Plan - 10_00.00 TO 58_00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
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PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM
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TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
EROSION CONTROL
STA 22 00.00 TO STA 34 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		141

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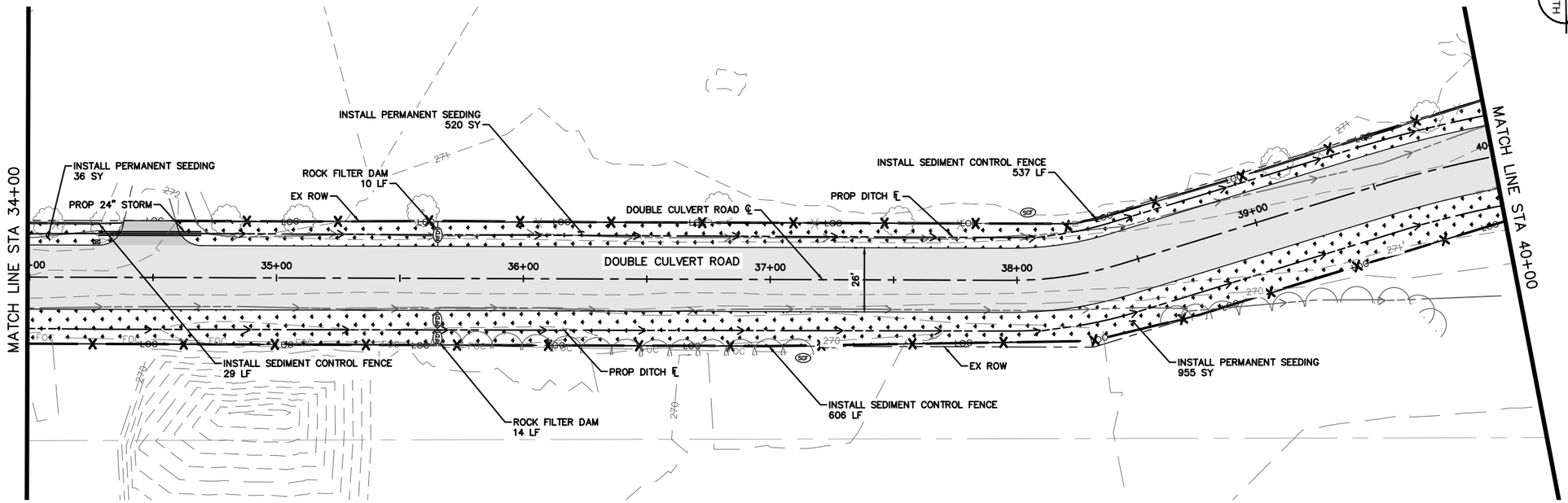

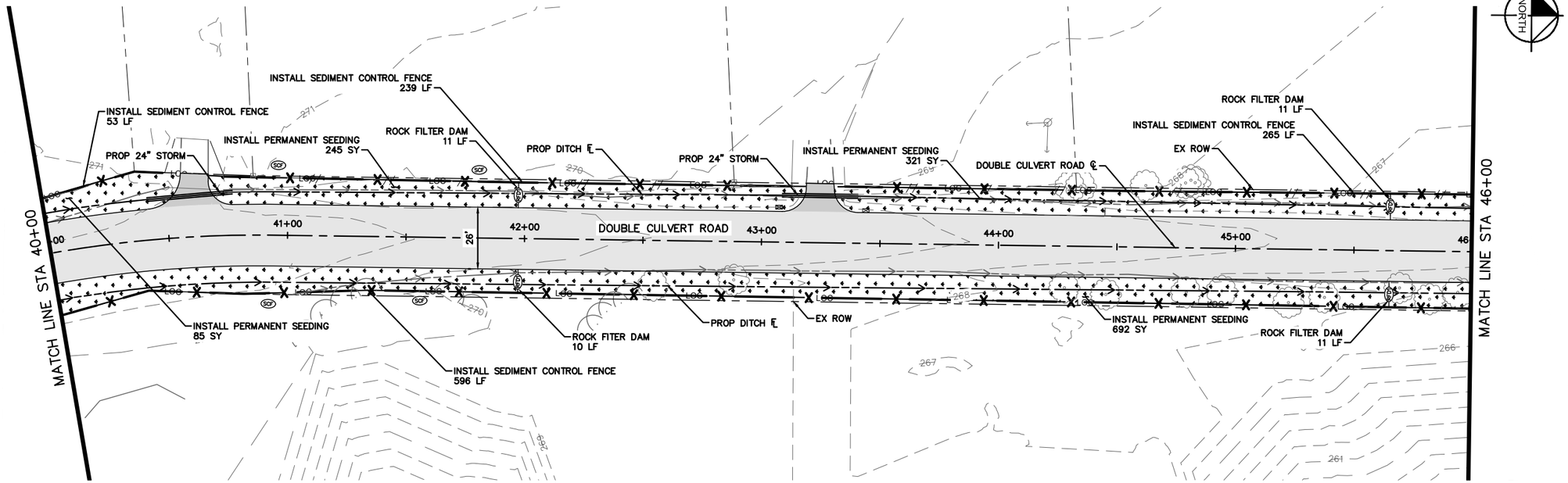

GRAPHIC SCALE IN FEET
0 25 50

LEGEND

- SCF — SEDIMENT CONTROL FENCE
- RFD — ROCK FILTER DAM TYPE 1
- PROP PAVEMENT
- SEEDING WITH 4" TOPSOIL

EROSION CONTROL NOTES

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5. OFF-SITE SOIL BORROW AND SPOIL AREAS ARE CONSIDERED AS PART OF THE PROJECT SITE AND MUST ALSO COMPLY WITH THE EROSION CONTROL REQUIREMENTS FOR THIS PROJECT. THIS INCLUDES THE INSTALLATION OF BMP'S TO CONTROL OFFSITE SEDIMENTATION AND THE ESTABLISHMENT OF PERMANENT GROUND COVER ON DISTURBED AREAS PRIOR TO FINAL APPROVAL OF THE PROJECT.
6. INSPECTIONS SHALL BE MADE WEEKLY AND AFTER RAIN STORM EVENTS TO INSURE THAT THE DEVICES ARE FUNCTIONING PROPERLY.
7. CONTRACTOR SHALL BE RESPONSIBLE FOR IDENTIFYING APPROPRIATE CONSTRUCTION ENTRANCE. WHEN SEDIMENT OR MUD HAS CLOGGED THE VOID SPACES BETWEEN STONES OR MUD IS BEING TRACKED ONTO A PUBLIC ROADWAY, THE STABILIZED CONSTRUCTION ENTRANCE AGGREGATE PAD MUST BE WASHED DOWN OR REPLACED. RUNOFF FROM THE WASHDOWN OPERATION SHALL NOT BE ALLOWED TO DRAIN DIRECTLY OFF SITE WITHOUT FIRST FLOWING THROUGH ANOTHER BMP TO CONTROL OFF SITE SEDIMENTATION. PERIODIC RE-GRADING OR THE ADDITION OF NEW STONE MAY BE REQUIRED TO MAINTAIN THE EFFICIENCY OF THE INSTALLATION.
8. CONTRACTOR SHALL BE RESPONSIBLE FOR SUBMITTAL OF N.O.I., N.O.T. AND ANY ADDITIONAL INFORMATION REQUIRED BY THE E.P.A. CONTRACTOR SHALL COMPLY WITH ALL E.P.A. STORMWATER POLLUTION PREVENTION REQUIREMENTS.
9. PRIOR TO FINAL ACCEPTANCE AND/OR OPENING ROADWAY TO TRAFFIC, ALL DISTURBED AREAS SHALL BE STABILIZED AND EROSION CONTROL DEVICES SHALL BE REMOVED.
10. SEE GENERAL NOTES SHEET FOR EROSION CONTROL REQUIREMENTS

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abby Polzin

DATE: 7/29/2026 9:38:44 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Erosion Control Plan - 10_00.00 TO 58_00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM
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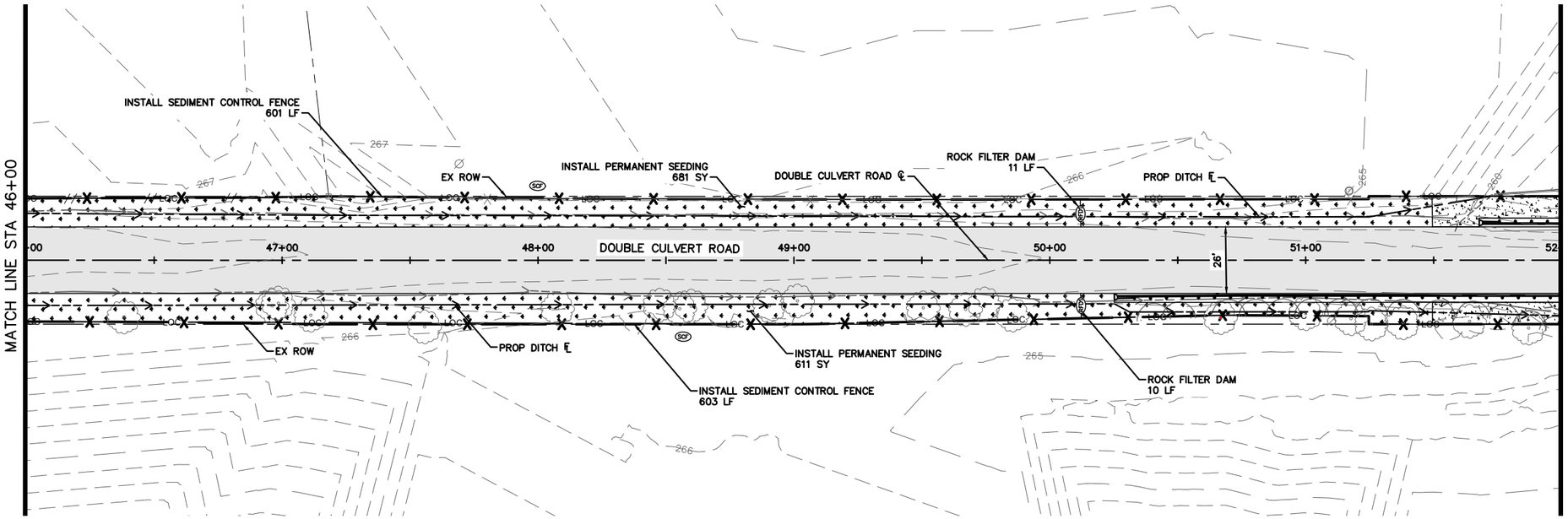
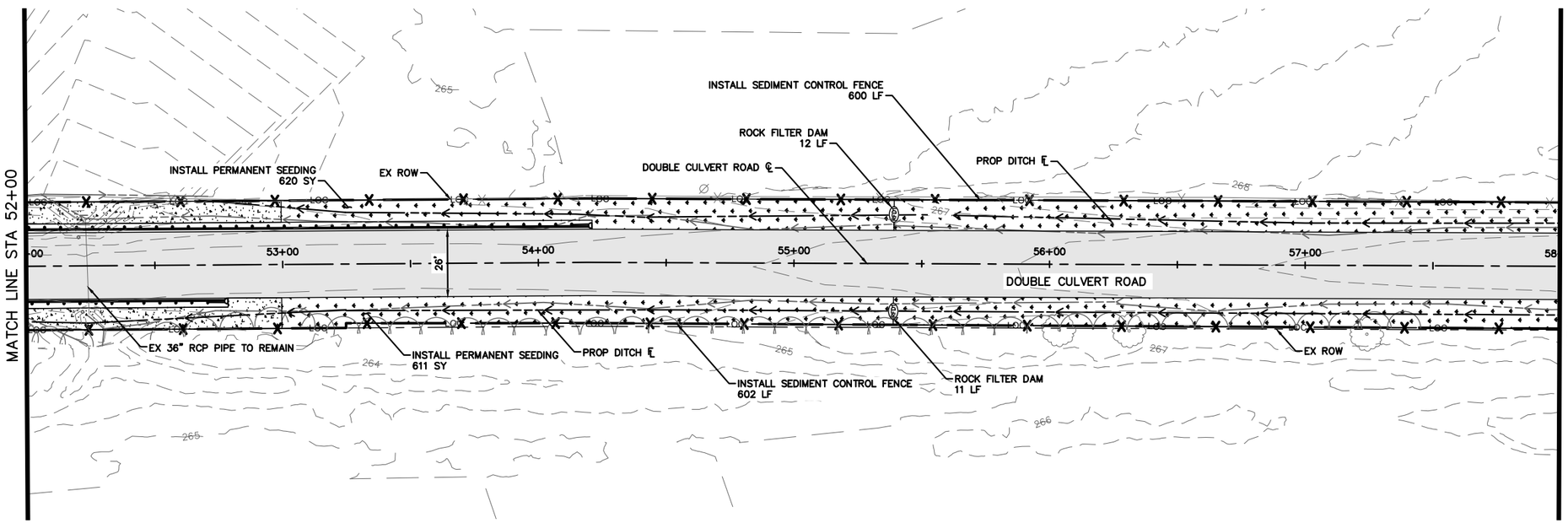
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
EROSION CONTROL
STA 34 00.00 TO STA 46 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		142

100% SUBMITTAL





NORTH

GRAPHIC SCALE IN FEET
0 25 50

LEGEND

- SCF — SEDIMENT CONTROL FENCE
- RFD — ROCK FILTER DAM TYPE 1
- PROP PAVEMENT
- SEEDING WITH 4" TOPSOIL

EROSION CONTROL NOTES

1. EROSION CONTROL DEVICES AS SHOWN ON THE EROSION CONTROL PLAN FOR THE PROJECT SHALL BE INSTALLED PRIOR TO THE START OF LAND DISTURBING ACTIVITIES ON THE PROJECT.
2. ALL EROSION CONTROL DEVICES ARE TO BE INSTALLED DURING SITE PREP IN ACCORDANCE WITH THE APPROVED PLANS AND SPECIFICATIONS FOR THE PROJECT.
3. CONTRACTOR SHALL MINIMIZE THE REMOVAL OF GRASS COVER UNTIL ACTUAL WORK PHASE BEGINS.
4. IF THE EROSION CONTROL PLAN AS APPROVED CANNOT CONTROL EROSION AND OFF-SITE SEDIMENTATION FROM THE PROJECT THE EROSION CONTROL PLAN WILL BE REQUIRED TO BE REVISED AND/OR ADDITIONAL EROSION CONTROL DEVICES WILL BE REQUIRED (NO SEPARATE PAY).
5. OFF-SITE SOIL BORROW AND SPOIL AREAS ARE CONSIDERED AS PART OF THE PROJECT SITE AND MUST ALSO COMPLY WITH THE EROSION CONTROL REQUIREMENTS FOR THIS PROJECT. THIS INCLUDES THE INSTALLATION OF BMP'S TO CONTROL OFFSITE SEDIMENTATION AND THE ESTABLISHMENT OF PERMANENT GROUND COVER ON DISTURBED AREAS PRIOR TO FINAL APPROVAL OF THE PROJECT.
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9. PRIOR TO FINAL ACCEPTANCE AND/OR OPENING ROADWAY TO TRAFFIC, ALL DISTURBED AREAS SHALL BE STABILIZED AND EROSION CONTROL DEVICES SHALL BE REMOVED.
10. SEE GENERAL NOTES SHEET FOR EROSION CONTROL REQUIREMENTS

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL
ENGINEER
Abby Polzin

DATE: 7/29/2026 8:49:15 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Erosion Control Plan - 10 00.00 TO 58 00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM
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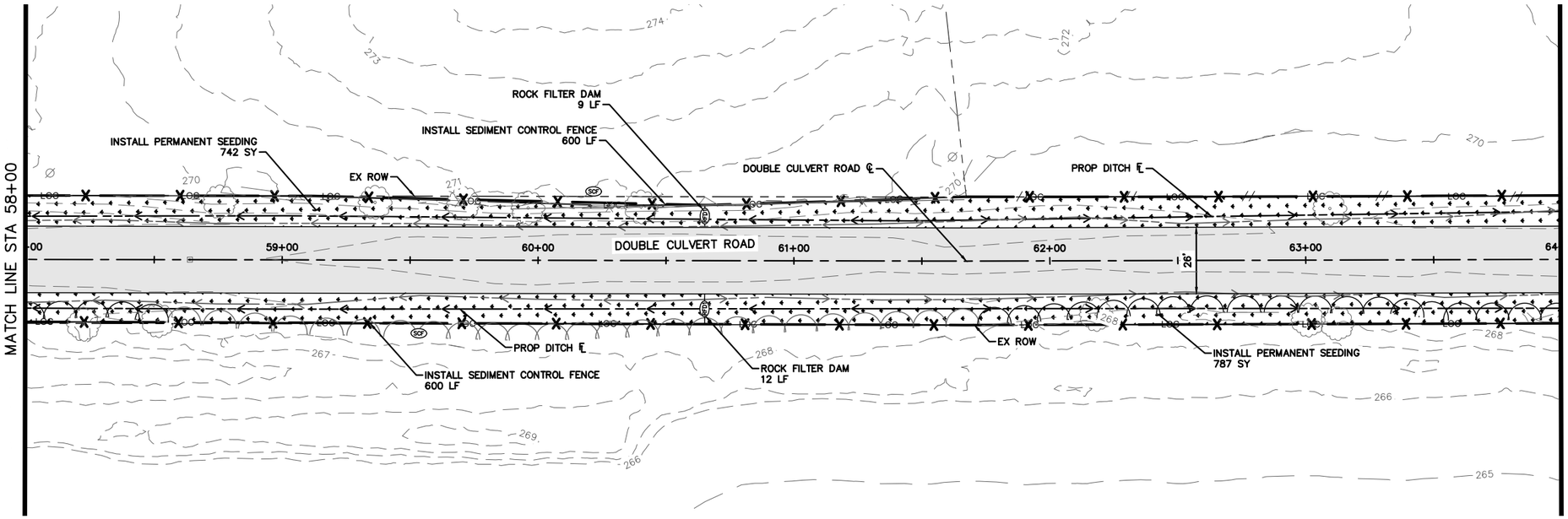
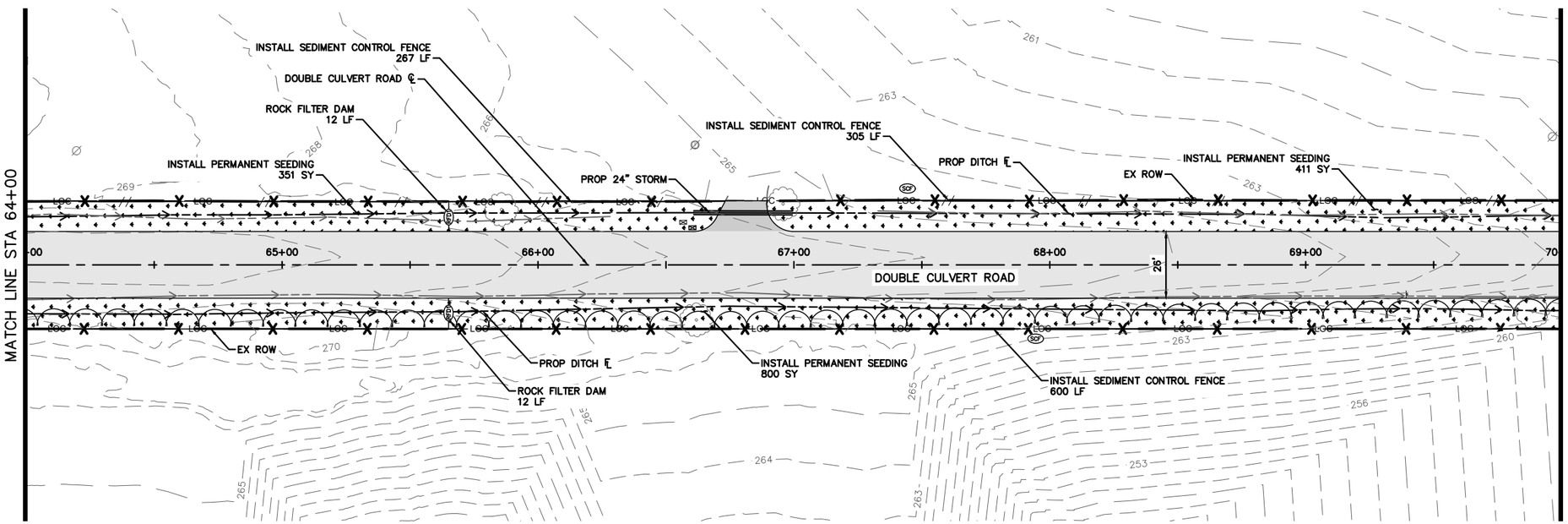
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
EROSION CONTROL
STA 46 00.00 TO STA 58 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		143

100% SUBMITTAL





GRAPHIC SCALE IN FEET
0 25 50

LEGEND

- SCF — SEDIMENT CONTROL FENCE
- RFD — ROCK FILTER DAM TYPE 1
- PROP PAVEMENT
- SEEDING WITH 4" TOPSOIL

EROSION CONTROL NOTES

1. EROSION CONTROL DEVICES AS SHOWN ON THE EROSION CONTROL PLAN FOR THE PROJECT SHALL BE INSTALLED PRIOR TO THE START OF LAND DISTURBING ACTIVITIES ON THE PROJECT.
2. ALL EROSION CONTROL DEVICES ARE TO BE INSTALLED DURING SITE PREP IN ACCORDANCE WITH THE APPROVED PLANS AND SPECIFICATIONS FOR THE PROJECT.
3. CONTRACTOR SHALL MINIMIZE THE REMOVAL OF GRASS COVER UNTIL ACTUAL WORK PHASE BEGINS.
4. IF THE EROSION CONTROL PLAN AS APPROVED CANNOT CONTROL EROSION AND OFF-SITE SEDIMENTATION FROM THE PROJECT THE EROSION CONTROL PLAN WILL BE REQUIRED TO BE REVISED AND/OR ADDITIONAL EROSION CONTROL DEVICES WILL BE REQUIRED (NO SEPARATE PAY).
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10. SEE GENERAL NOTES SHEET FOR EROSION CONTROL REQUIREMENTS

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL
ENGINEER
Abby Polzin

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM

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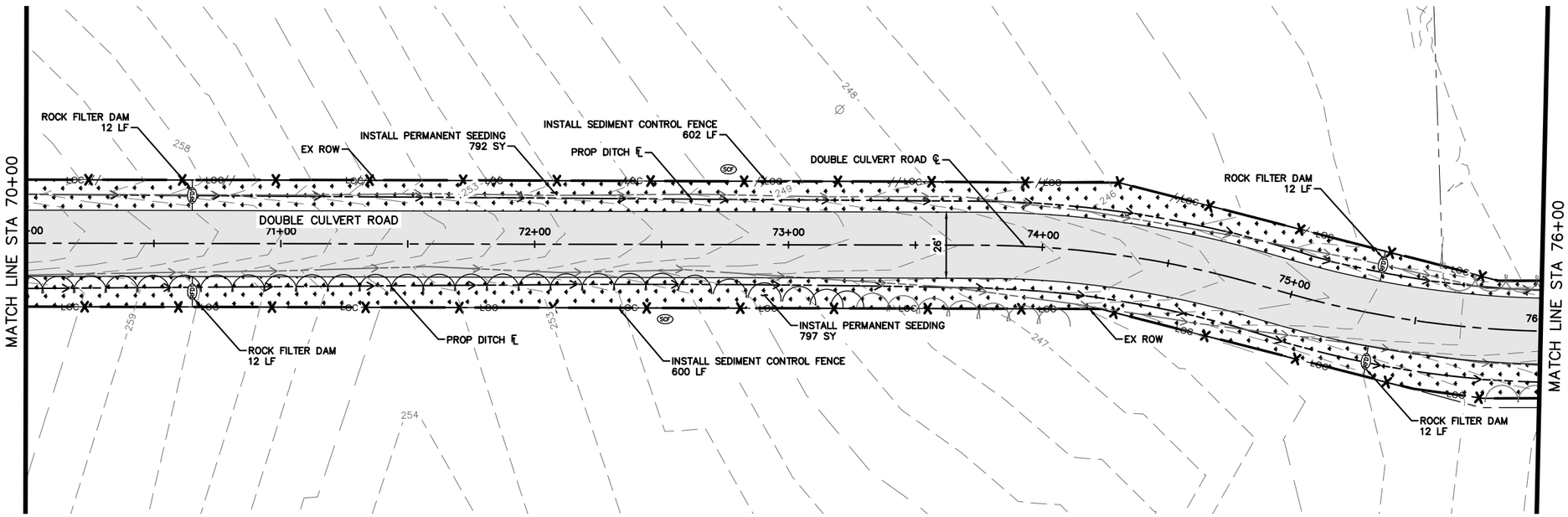
TEXAS REGISTERED ENGINEERING FIRM #F-928

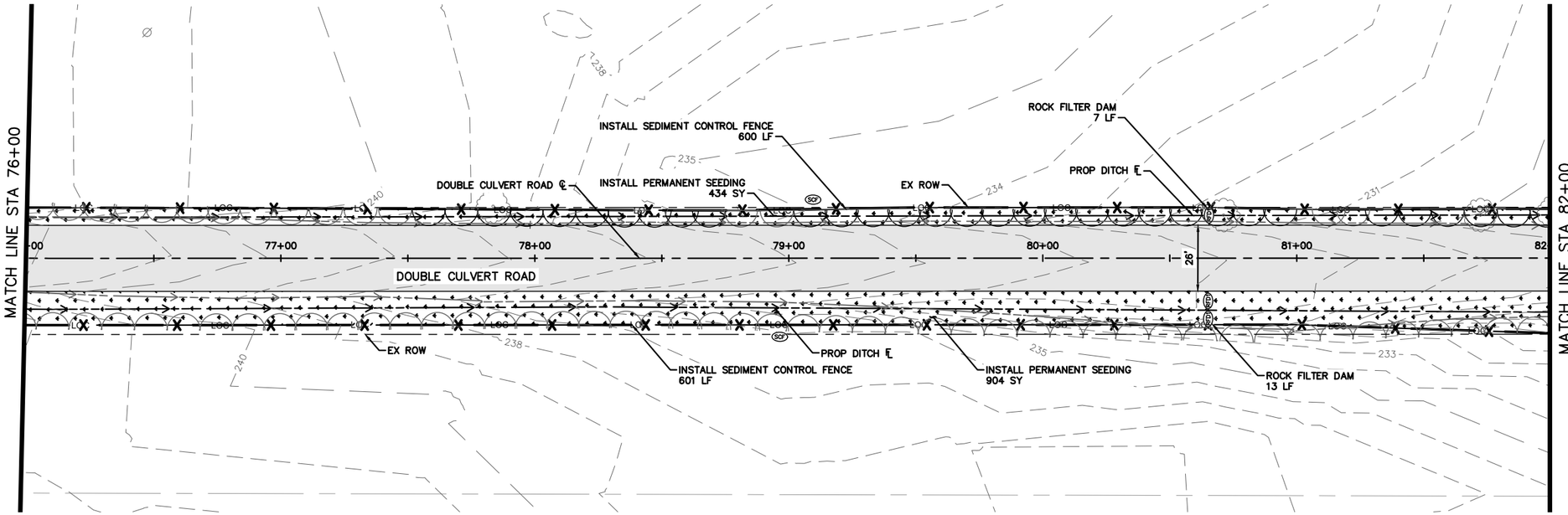
DOUBLE CULVERT ROAD
SEGMENT 1
EROSION CONTROL
STA 58 00.00 TO STA 70 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		144

DATE: 7/28/2026 9:37:18 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Erosion Control Plan - 58 00.00 TO 106 00.00.dwg

100% SUBMITTAL





NORTH

GRAPHIC SCALE IN FEET
0 25 50

LEGEND

- SCF — SEDIMENT CONTROL FENCE
- RFD — ROCK FILTER DAM TYPE 1
- PROP PAVEMENT
- SEEDING WITH 4" TOPSOIL

EROSION CONTROL NOTES

1. EROSION CONTROL DEVICES AS SHOWN ON THE EROSION CONTROL PLAN FOR THE PROJECT SHALL BE INSTALLED PRIOR TO THE START OF LAND DISTURBING ACTIVITIES ON THE PROJECT.
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3. CONTRACTOR SHALL MINIMIZE THE REMOVAL OF GRASS COVER UNTIL ACTUAL WORK PHASE BEGINS.
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10. SEE GENERAL NOTES SHEET FOR EROSION CONTROL REQUIREMENTS

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abby Polzin

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM

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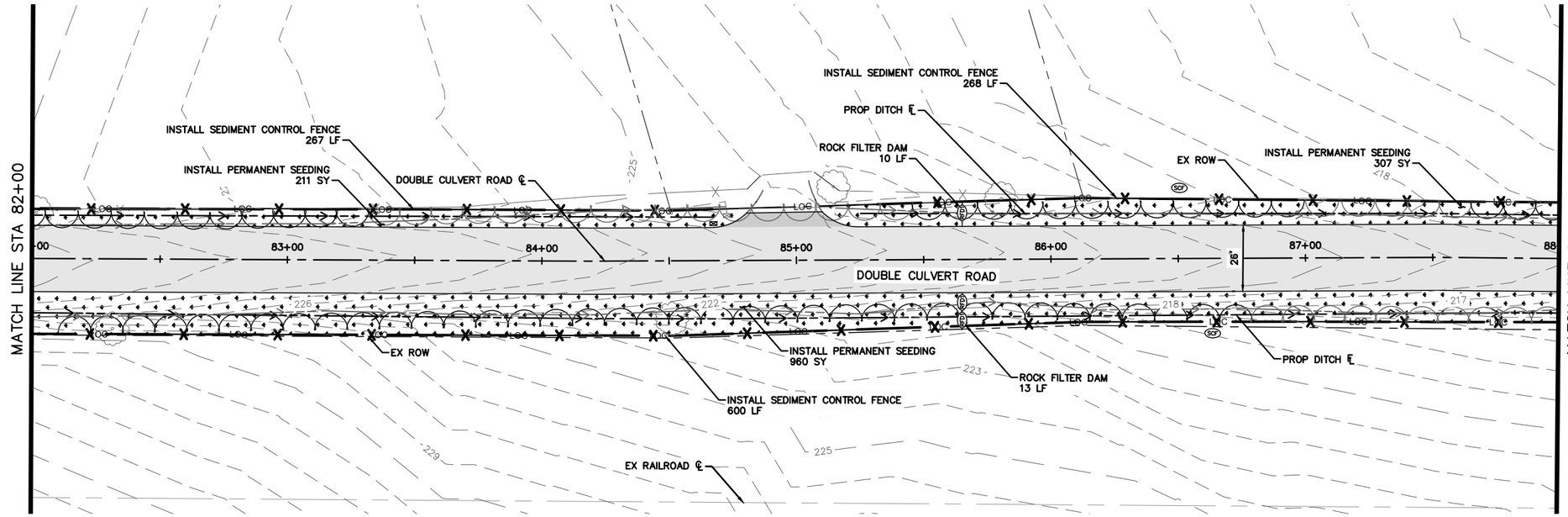
TEXAS REGISTERED ENGINEERING FIRM #F-928

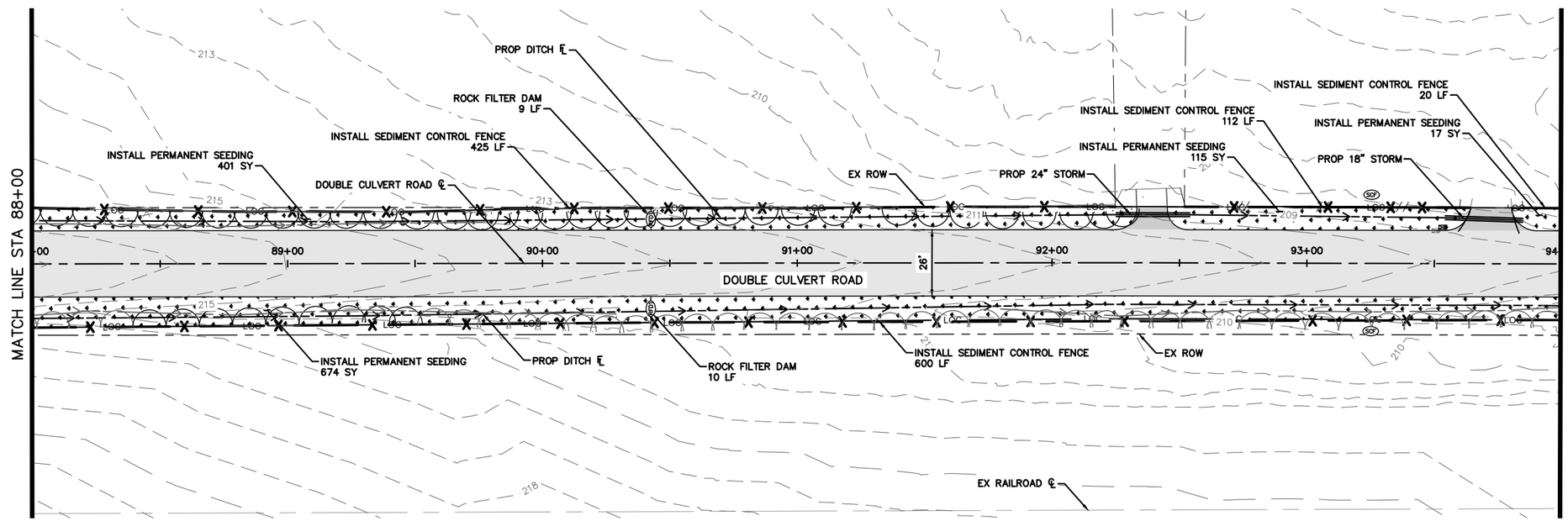
DOUBLE CULVERT ROAD
SEGMENT 1
EROSION CONTROL
STA 70 00.00 TO STA 82 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		145

DATE: 7/28/2026 8:50:46 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Erosion Control Plan - 58 00.00 TO 106 00.00.dwg

100% SUBMITTAL





GRAPHIC SCALE IN FEET
0 25 50

LEGEND

- SCF — SEDIMENT CONTROL FENCE
- RFD — ROCK FILTER DAM TYPE 1
- PROP PAVEMENT
- SEEDING WITH 4" TOPSOIL

EROSION CONTROL NOTES

1. EROSION CONTROL DEVICES AS SHOWN ON THE EROSION CONTROL PLAN FOR THE PROJECT SHALL BE INSTALLED PRIOR TO THE START OF LAND DISTURBING ACTIVITIES ON THE PROJECT.
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07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL
ENGINEER
Abby Polzin

DATE: 7/29/2026 9:35:22 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Erosion Control Plan - 58 00.00 TO 106 00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM

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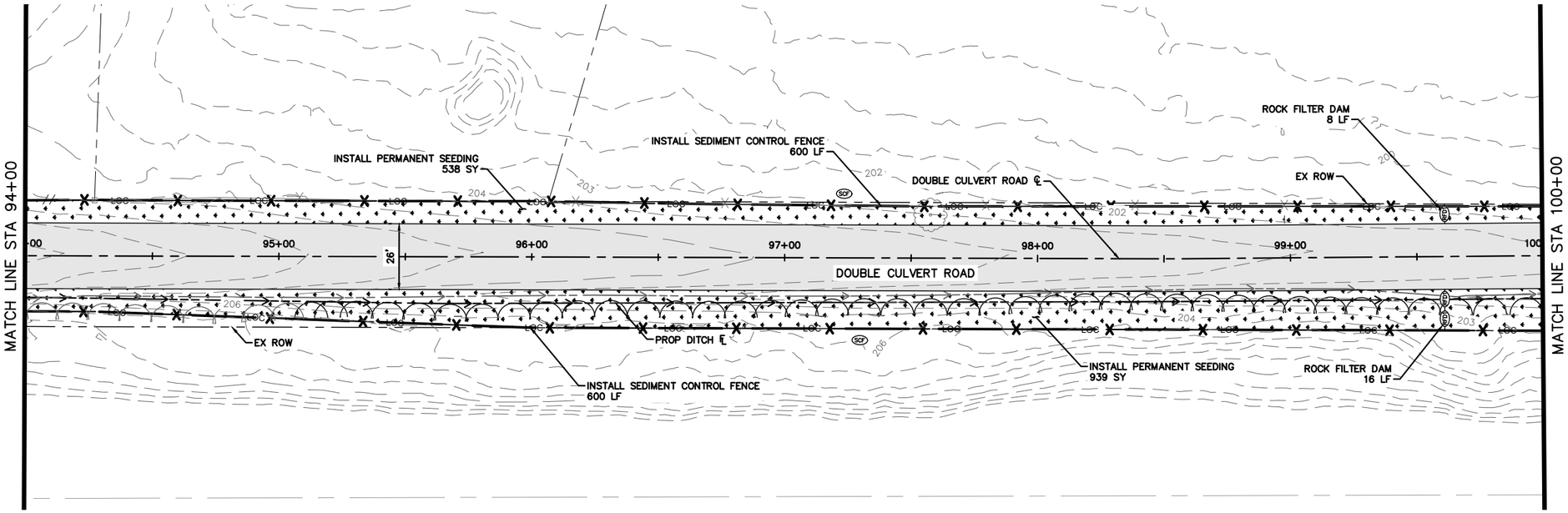
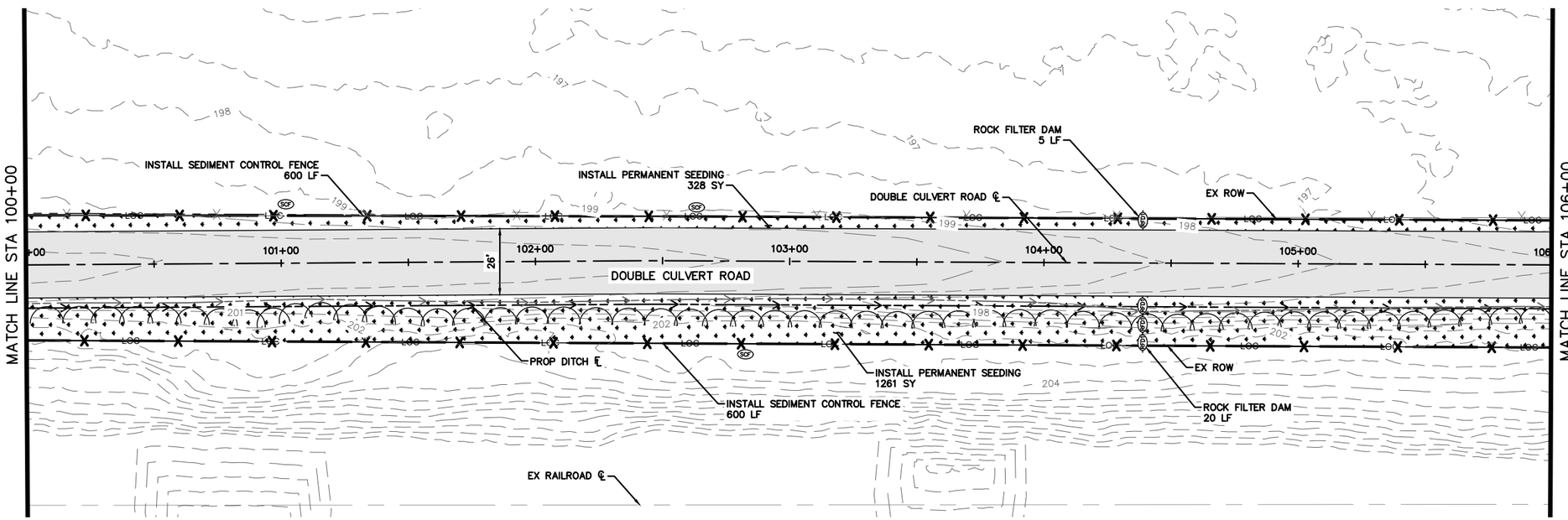
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
EROSION CONTROL
STA 82 00.00 TO STA 94 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		146

100% SUBMITTAL





GRAPHIC SCALE IN FEET
0 25 50

LEGEND

- SCF — SEDIMENT CONTROL FENCE
- RFD — ROCK FILTER DAM TYPE 1
- PROP PAVEMENT
- SEEDING WITH 4" TOPSOIL

EROSION CONTROL NOTES

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07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL
ENGINEER
Abby Polzin

DATE: 7/29/2026 8:51:16 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Erosion Control Plan - 58 00.00 TO 106 00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
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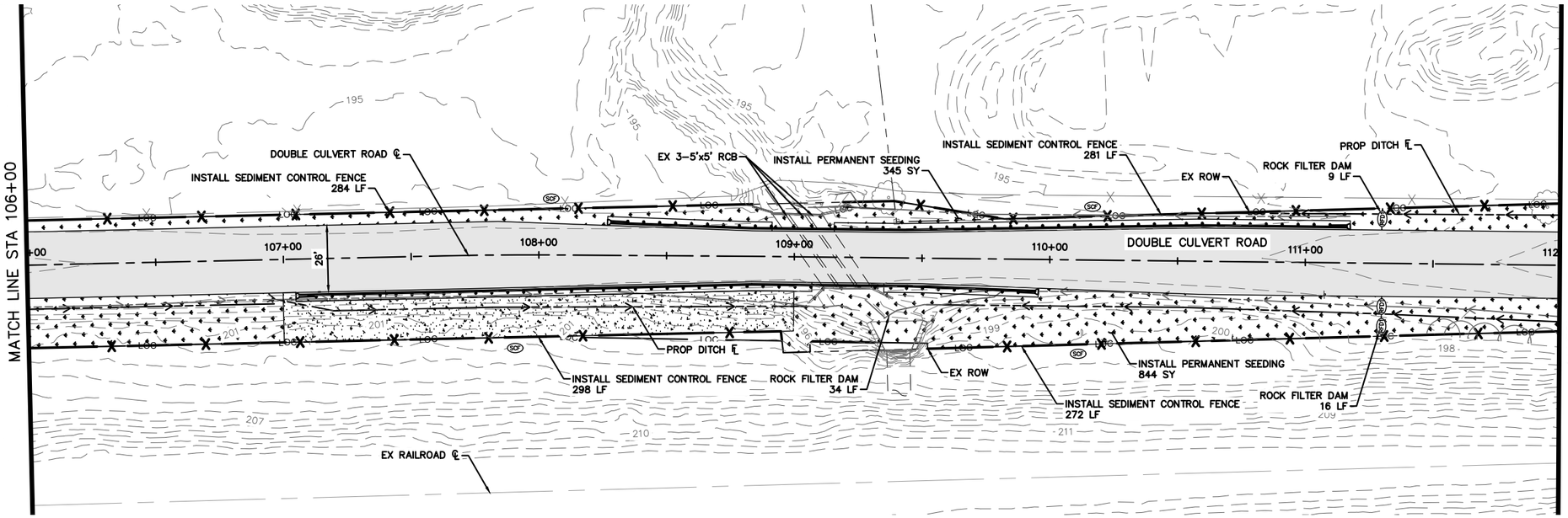
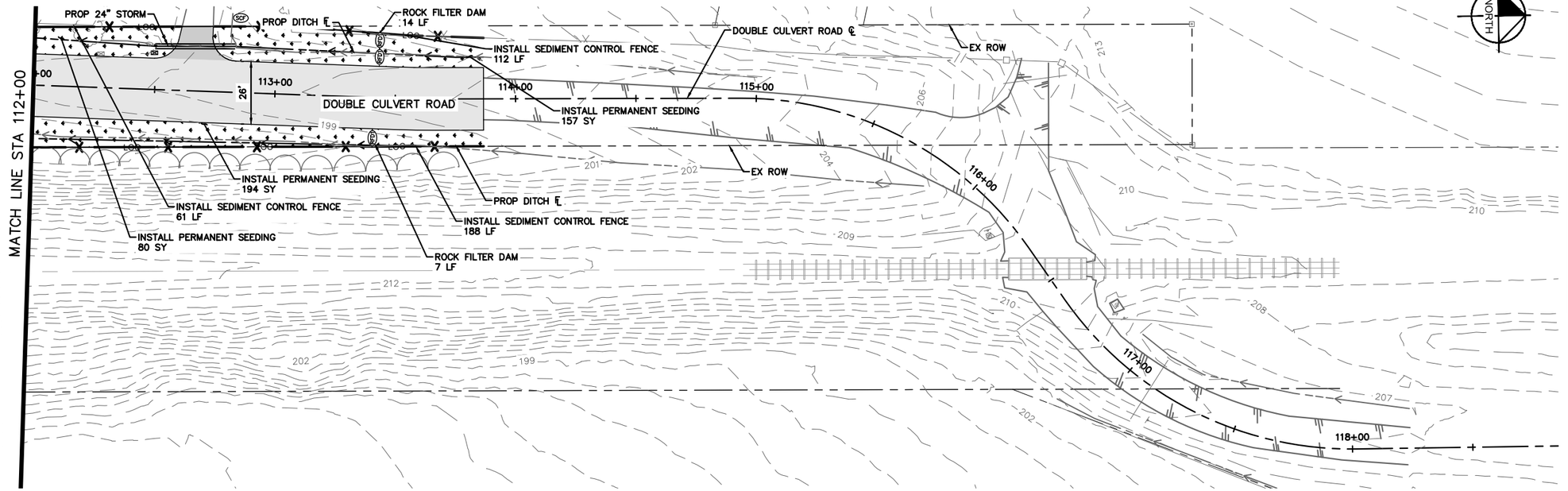
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
EROSION CONTROL
STA 94 00.00 TO STA 106 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		147

100% SUBMITTAL





GRAPHIC SCALE IN FEET
0 25 50

LEGEND

- SCF — SEDIMENT CONTROL FENCE
- RFD — ROCK FILTER DAM TYPE 1
- PROP PAVEMENT
- SEEDING WITH 4" TOPSOIL

EROSION CONTROL NOTES

1. EROSION CONTROL DEVICES AS SHOWN ON THE EROSION CONTROL PLAN FOR THE PROJECT SHALL BE INSTALLED PRIOR TO THE START OF LAND DISTURBING ACTIVITIES ON THE PROJECT.
2. ALL EROSION CONTROL DEVICES ARE TO BE INSTALLED DURING SITE PREP IN ACCORDANCE WITH THE APPROVED PLANS AND SPECIFICATIONS FOR THE PROJECT.
3. CONTRACTOR SHALL MINIMIZE THE REMOVAL OF GRASS COVER UNTIL ACTUAL WORK PHASE BEGINS.
4. IF THE EROSION CONTROL PLAN AS APPROVED CANNOT CONTROL EROSION AND OFF-SITE SEDIMENTATION FROM THE PROJECT THE EROSION CONTROL PLAN WILL BE REQUIRED TO BE REVISED AND/OR ADDITIONAL EROSION CONTROL DEVICES WILL BE REQUIRED (NO SEPARATE PAY).
5. OFF-SITE SOIL BORROW AND SPOIL AREAS ARE CONSIDERED AS PART OF THE PROJECT SITE AND MUST ALSO COMPLY WITH THE EROSION CONTROL REQUIREMENTS FOR THIS PROJECT. THIS INCLUDES THE INSTALLATION OF BMP'S TO CONTROL OFFSITE SEDIMENTATION AND THE ESTABLISHMENT OF PERMANENT GROUND COVER ON DISTURBED AREAS PRIOR TO FINAL APPROVAL OF THE PROJECT.
6. INSPECTIONS SHALL BE MADE WEEKLY AND AFTER RAIN STORM EVENTS TO INSURE THAT THE DEVICES ARE FUNCTIONING PROPERLY.
7. CONTRACTOR SHALL BE RESPONSIBLE FOR IDENTIFYING APPROPRIATE CONSTRUCTION ENTRANCE. WHEN SEDIMENT OR MUD HAS CLOGGED THE VOID SPACES BETWEEN STONES OR MUD IS BEING TRACKED ONTO A PUBLIC ROADWAY, THE STABILIZED CONSTRUCTION ENTRANCE AGGREGATE PAD MUST BE WASHED DOWN OR REPLACED. RUNOFF FROM THE WASHDOWN OPERATION SHALL NOT BE ALLOWED TO DRAIN DIRECTLY OFF SITE WITHOUT FIRST FLOWING THROUGH ANOTHER BMP TO CONTROL OFF SITE SEDIMENTATION. PERIODIC RE-GRADING OR THE ADDITION OF NEW STONE MAY BE REQUIRED TO MAINTAIN THE EFFICIENCY OF THE INSTALLATION.
8. CONTRACTOR SHALL BE RESPONSIBLE FOR SUBMITTAL OF N.O.I., N.O.T. AND ANY ADDITIONAL INFORMATION REQUIRED BY THE E.P.A. CONTRACTOR SHALL COMPLY WITH ALL E.P.A. STORMWATER POLLUTION PREVENTION REQUIREMENTS.
9. PRIOR TO FINAL ACCEPTANCE AND/OR OPENING ROADWAY TO TRAFFIC, ALL DISTURBED AREAS SHALL BE STABILIZED AND EROSION CONTROL DEVICES SHALL BE REMOVED.
10. SEE GENERAL NOTES SHEET FOR EROSION CONTROL REQUIREMENTS

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abby Polzin

DATE: 7/29/2026 8:52:51 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Erosion Control Plan - 106 00.00 TO 118 00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM
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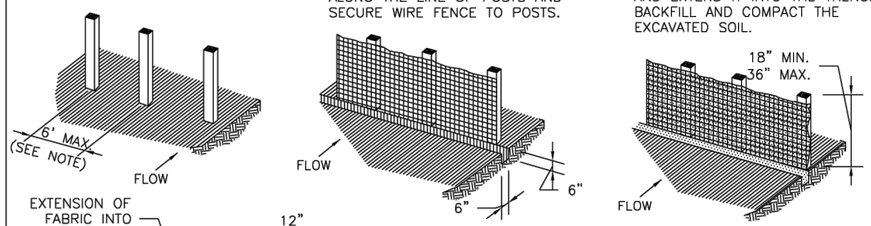
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
EROSION CONTROL
STA 106 00.00 TO END

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		148

1. SET POSTS AT REQUIRED SPACING
2. EXCAVATE A 6"x6" TRENCH UPSLOPE ALONG THE LINE OF POSTS AND SECURE WIRE FENCE TO POSTS.
3. ATTACH FILTER FABRIC TO POSTS AND EXTEND IT INTO THE TRENCH. BACKFILL AND COMPACT THE EXCAVATED SOIL.

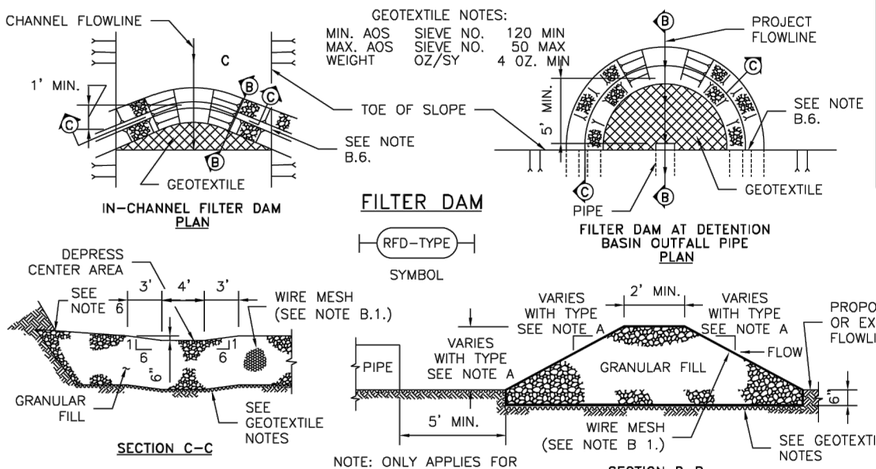


REINFORCED FILTER FABRIC BARRIER

RFB
SYMBOL

GENERAL NOTES:

1. SECURELY FASTEN MESH FENCING TO POSTS WITH STAPLES OR TIE WIRES.
2. SECURELY FASTEN FILTER FABRIC TO MESH FENCING.
3. WHEN TWO SECTIONS OF FILTER FABRIC ADJOIN EACH OTHER, OVERLAP 6 INCHES AT A POST, FOLD TOGETHER, AND ATTACH TO A POST.
4. REMOVE SEDIMENT DEPOSITS WHEN SILT REACHES ONE-THIRD OF THE HEIGHT OF THE FENCE IN DEPTH.
5. SILT FENCE MINIMUM 2' BEHIND CURB.



FILTER DAM

RFD-TYPE
SYMBOL

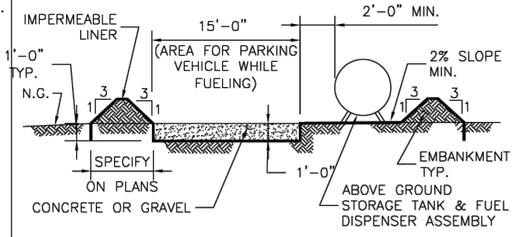
NOTE: ONLY APPLIES FOR DETENTION BASIN OUTFALL PIPE PROTECTION.

A. TYPES OF FILTER DAMS

1. TYPE 1 (NON-REINFORCED)
   a. HEIGHT - 18-24 INCHES. MEASURE VERTICALLY FROM EXISTING GROUND TO TOP OF FILTER DAM.
   b. TOP WIDTH - 2 FEET (MINIMUM)
   c. SLOPES - 2:1 (MAXIMUM).
2. TYPE 2 (REINFORCED).
   a. HEIGHT - 18-36 INCHES. MEASURE VERTICALLY FROM EXISTING GROUND TO TOP OF FILTER DAM.
   b. TOP WIDTH - 2 FEET (MINIMUM).
   c. SLOPES - 2:1 (MAXIMUM).
3. TYPE 3 (REINFORCED)
   a. HEIGHT - 36-48 INCHES. MEASURE VERTICALLY FROM EXISTING GROUND TO TOP OF FILTER DAM.
   b. TOP WIDTH - 2 FEET (MINIMUM).
   c. SLOPES - 3:1 (MAXIMUM).
4. TYPE 4 (GABION)
   a. HEIGHT - 30 INCHES (MINIMUM). MEASURE VERTICALLY FROM EXISTING GROUND TO TOP OF FILTER DAM.
   b. TOP WIDTH - 2 FEET (MINIMUM).
5. TYPE 5. AS SHOWN ON THE PLANS.

B. CONSTRUCT FILTER DAMS ACCORDING TO THE FOLLOWING CRITERIA UNLESS SHOWN OTHERWISE ON THE PLANS.

1. TYPE 2 AND 3 FILTER DAMS: SECURE WITH 20 GAUGE GALVANIZED WOVEN WIRE MESH WITH 1 INCH DIAMETER HEXAGONAL OPENINGS.
2. PLACE GRANULAR FILL ON THE WIRE MESH TO HEIGHT AND SLOPES SHOWN ON PLANS OR AS SPECIFIED BY THE ENGINEER.
   a. 3-5 INCHES FOR ROCK FILTER DAM TYPES 1, 2 AND 4.
   b. 4-8 INCHES FOR ROCK FILTER DAM TYPE REFER TO GRANULAR FILL IN SPECIFICATION SECTION No. 02378 RIPRAP AND GRANULAR FILL.
3. FOLD WIRE MESH AT UPSTREAM SIDE OVER GRANULAR FILL AND TIGHTLY SECURED TO ITSELF ON THE DOWNSTREAM SIDE USING WIRE TIES OR HOG RINGS.
4. IN STREAMS: SECURE OR STAKE MESH TO STREAM BED PRIOR TO AGGREGATE PLACEMENT.
5. SEE HCFCD SPECIFICATION SECTION NO. 02364-FILTER DAMS.
6. EMBED ONE FOOT MINIMUM INTO SLOPE AND RAISE ONE FOOT HIGHER THAN CENTER OF DEPRESSED AREA AT SLOPE.

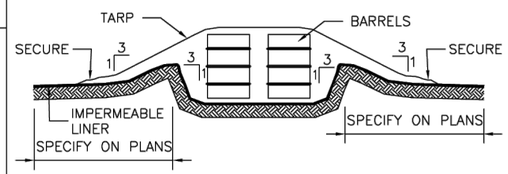


ABOVE GROUND TEMP. VEHICLE & EQUIPMENT FUELING AREA WITH TANK

TFA
SYMBOL

GENERAL NOTES:

1. THE SIZE OF TANK FOUNDATION AREA DEPENDS ON THE SIZE OF ABOVE GROUND STORAGE TANK AND DISPENSER ASSEMBLY.
2. PROVIDE A MINIMUM SLOPE OF 2 % TOWARD THE SUMP PIT.
3. INSTALL IMPERMEABLE LINER AS PER MANUFACTURER'S RECOMMENDATIONS.

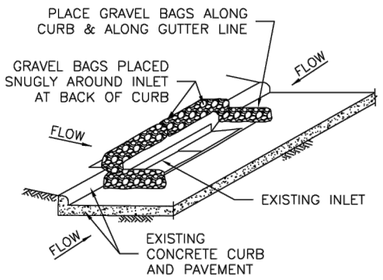


BARREL STORAGE AREA

BSA
SYMBOL

GENERAL NOTES:

1. ALTERNATIVELY, STORE BARRELS IN AN ENCLOSED BUILDING OR SHED.
2. INSTALL IMPERMEABLE LINER AS PER MANUFACTURER'S RECOMMENDATIONS. 60 mil MINIMUM.
3. CONSTRUCT BERMED AREA WITH VOLUME GREATER THAN OR EQUAL TO 110% VOLUME OF BARRELS.

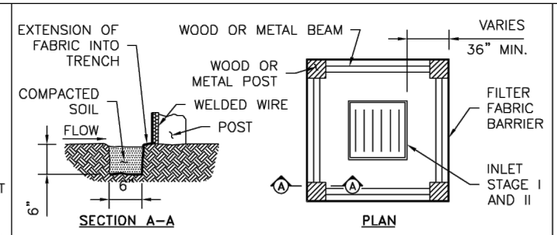


INLET PROTECTION BARRIERS FOR STAGE II INLETS

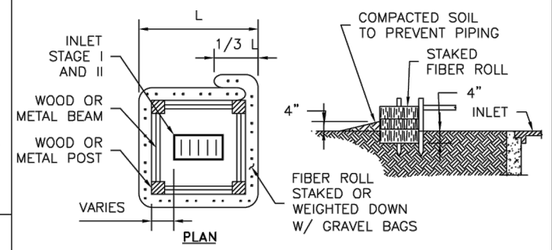
IPB-II
SYMBOL

GENERAL NOTES:

1. REMOVE SEDIMENT DEPOSIT WHEN THE SEDIMENT HAS ACCUMULATED TO ONE-THIRD THE HEIGHT OF THE BARRIER.
2. GRAVEL BAGS SHALL NOT BLOCK THROAT OF INLET UNLESS DIRECTED BY ENGINEER.



INLET PROTECTION BARRIER WITH REINFORCED FILTER FABRIC



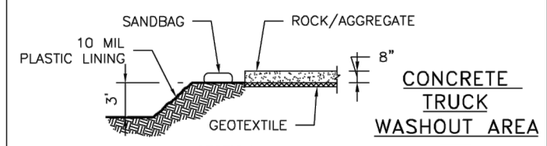
INLET PROTECTION BARRIER WITH FILTER ROLLS

GENERAL NOTES:

1. FIBER ROLLS WILL BE UTILIZED ONLY WHEN SITE CONDITIONS DO NOT PERMIT THE USE OF FILTER FABRIC BARRIER, AND AS APPROVED BY THE ENGINEER.

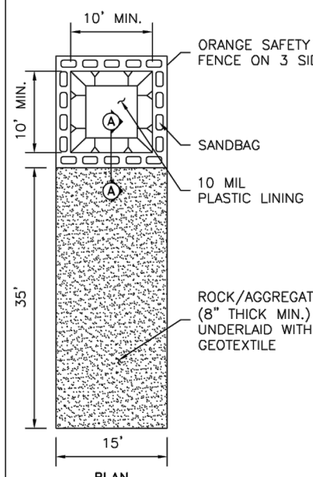
INLET PROTECTION BARRIERS FOR STAGE I INLETS

IPB
SYMBOL



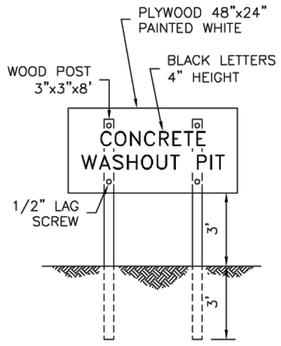
CONCRETE TRUCK WASHOUT AREA

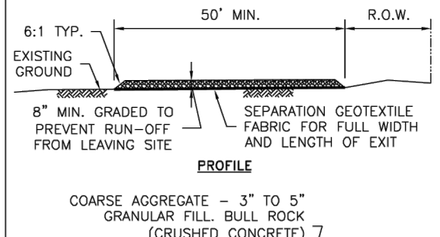
CTW
SYMBOL



GENERAL NOTES:

1. POST A SIGN READING "CONCRETE WASHOUT PIT" NEXT TO THE PIT.
2. VERBALLY INSTRUCT THE CONCRETE TRUCK DRIVERS WHERE THE PIT IS AND TO WASHOUT THEIR TRUCKS IN THE PIT AND NOWHERE ELSE.
3. UPON THE CONCRETE SETTING UP (CURING, DRYING OUT), THE CONCRETE WASTE SHALL BE REMOVED FROM THE PROJECT SITE AND DISPOSED OF PROPERLY BY THE CONTRACTOR. AFTER REMOVAL OF THE CONCRETE WASTE, THE WASHOUT PIT SHALL BE FILLED WITH CLEAN FILL MATERIAL AND COMPACTED TO IN-SITU CONDITIONS, OR AS DIRECTED BY THE PROJECT SPECIFICATIONS.
4. CONCRETE WASHOUT PITS SHALL NOT BE LOCATED DIRECTLY ADJACENT TO, NOR AT ANY TIME DRAIN INTO THE STORM SEWER SYSTEM OR ANY OTHER SWALE, DITCH, OR WATERWAY.
5. CONSTRUCT ENTRY ROAD AND BOTTOM OF WASHOUT AREA TO SUPPORT EXPECTED LOADINGS FROM TRUCKS EQUIPMENT.





STABILIZED CONSTRUCTION ACCESS

SC-1
SYMBOL

GENERAL NOTES:

1. MINIMUM LENGTH IS AS SHOWN ON CONSTRUCTION DRAWINGS OR 50 FEET, WHICHEVER IS MORE.
2. CONSTRUCT AND MAINTAIN CONSTRUCTION EXIT WITH CONSTANT WIDTH ACROSS ITS LENGTH, INCLUDING ALL POINTS OF INGRESS OR EGRESS.
3. UNLESS SHOWN ON THE CONSTRUCTION DRAWINGS, STABILIZATION FOR OTHER AREAS WILL HAVE THE SAME AGGREGATE THICKNESS AND WIDTH REQUIREMENTS AS THE STABILIZED CONSTRUCTION EXIT.
4. WHEN SHOWN ON THE CONSTRUCTION DRAWINGS, WIDEN OR LENGTHEN STABILIZED AREA TO ACCOMMODATE A TRUCK WASHING AREA. PROVIDE OUTLET SEDIMENT TRAP FOR THE TRUCK WASHING AREA.
5. PROVIDE PERIODIC TOP DRESSING WITH ADDITIONAL COARSE AGGREGATE TO MAINTAIN THE REQUIRED DEPTH OR WHEN SURFACE BECOMES PACKED WITH MUD.
6. PERIODICALLY TURN AGGREGATE TO EXPOSE A CLEAN DRIVING SURFACE.
7. MINIMUM 14' WIDTH FOR ONE WAY TRAFFIC AND 20' WIDTH FOR TWO WAY TRAFFIC.

NO.	REVISIONS	DATE	NAME
1			
2			
3			
4			
5			

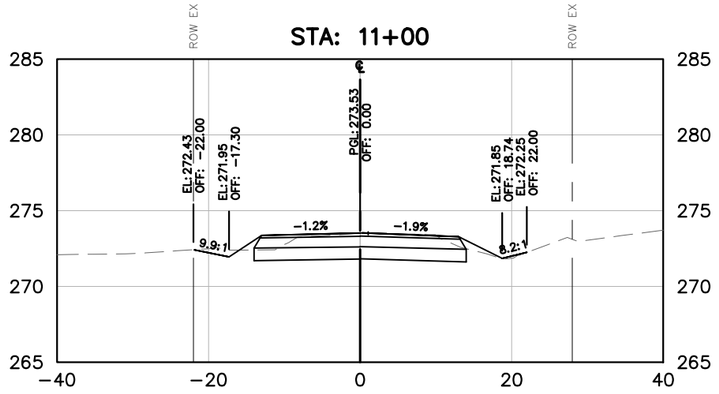
WALLER COUNTY
ENGINEERING DEPARTMENT

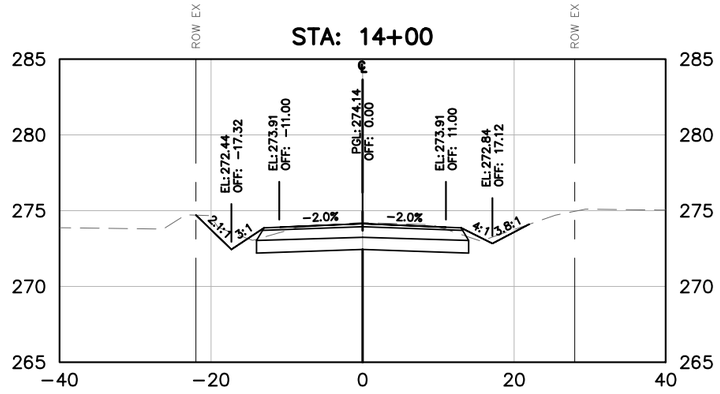
DOUBLE CULVERT ROAD SEGMENT 1

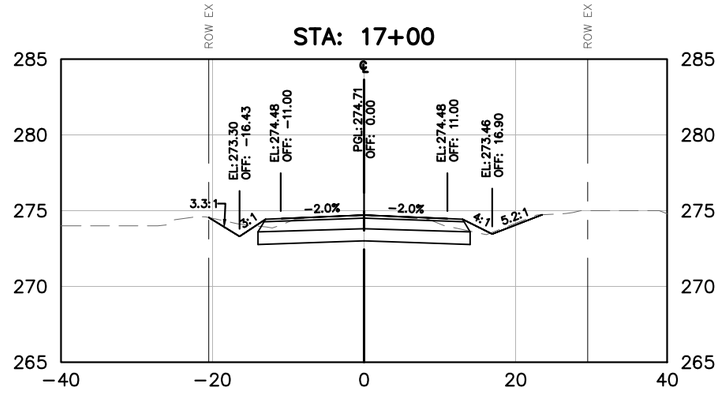
STANDARD DETAILS

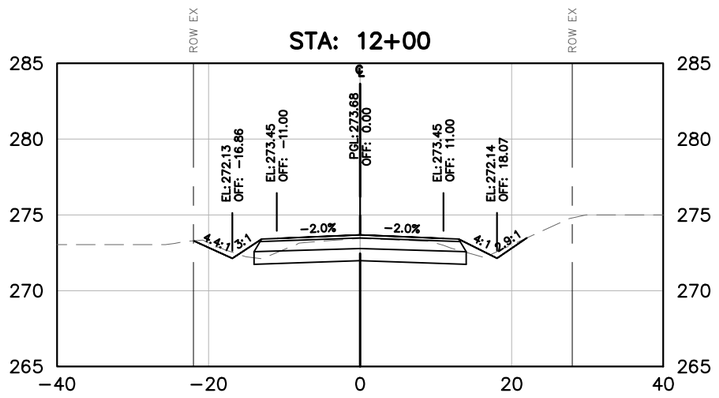
PROJECT TITLE:		
DRAWN BY:		WCED STANDARD
CK'D BY:	SHEET DESCRIPTION: STORM WATER POLLUTION PREVENTION PLAN DETAILS	
SCALE:		SHEET NO: 149
DATE:	APPROVED BY:	

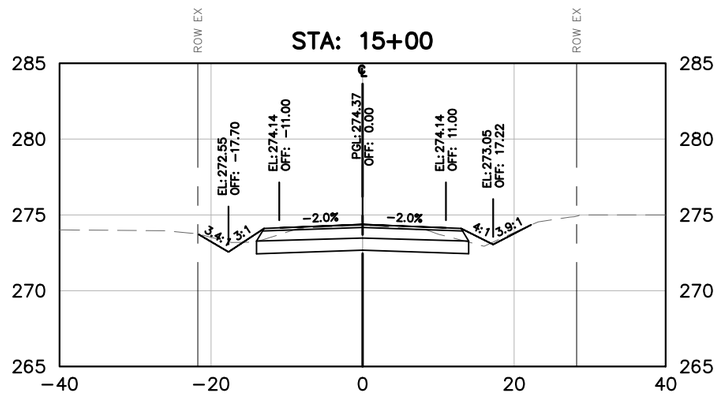
100% SUBMITTAL

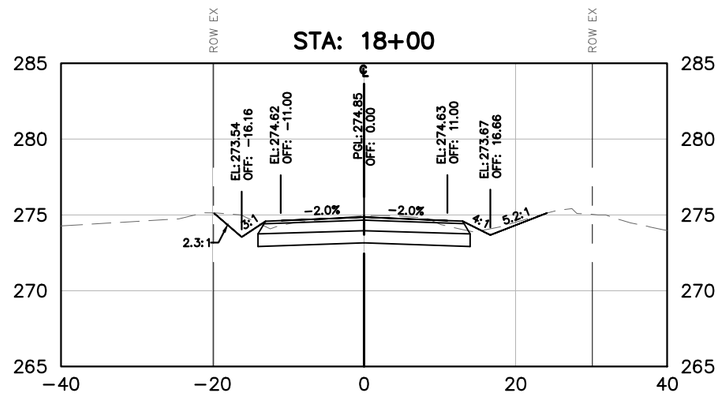


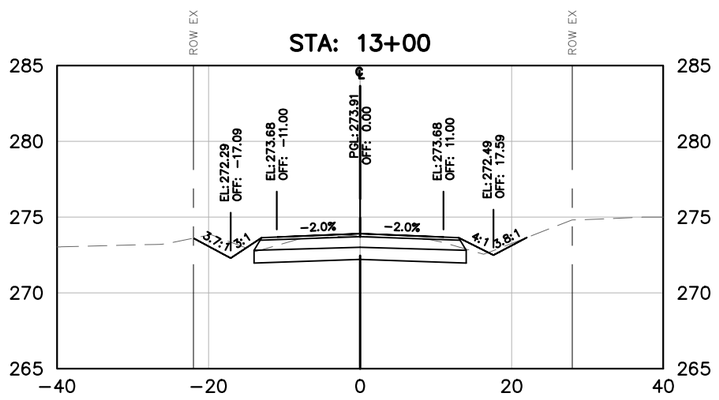


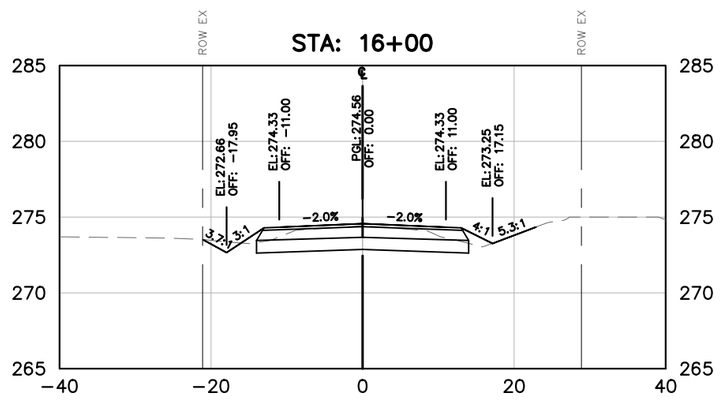


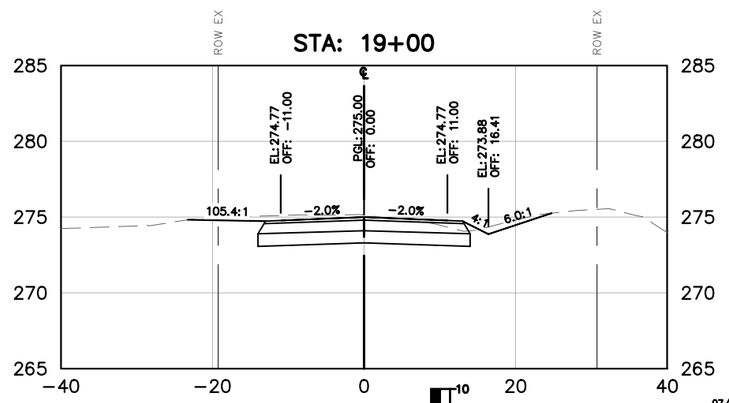


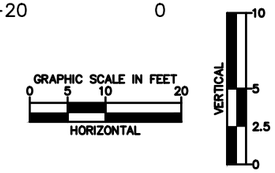












07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

DATE: 7/28/2026 9:08:04 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Cross Sections - 10_00.00 - dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

THE STATE OF TEXAS
WALLER COUNTY

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM
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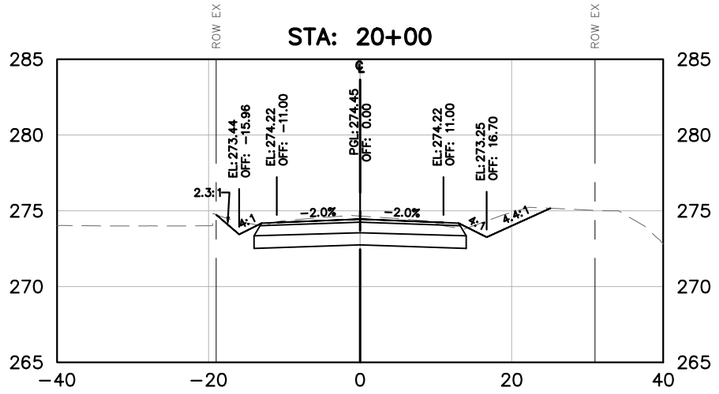
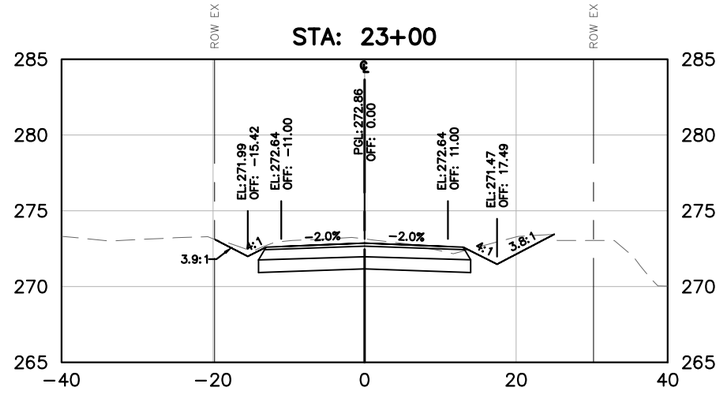
TEXAS REGISTERED ENGINEERING FIRM #F-928

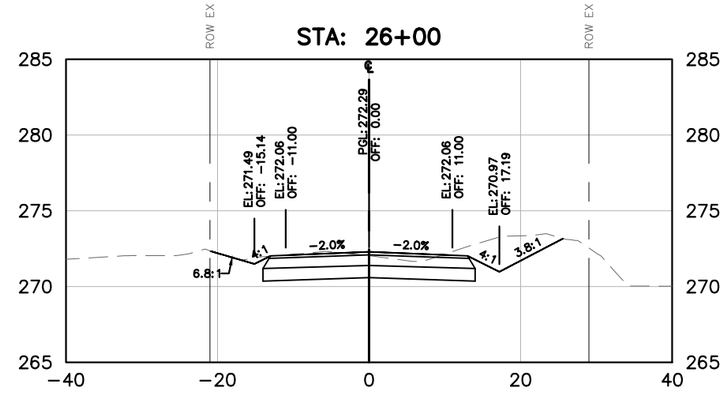
DOUBLE CULVERT ROAD
SEGMENT 1
CROSS SECTIONS
BEGIN TO STA 19 00.00

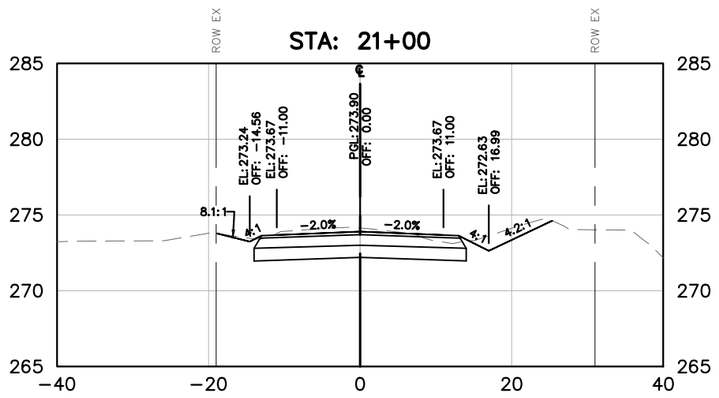
DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		150

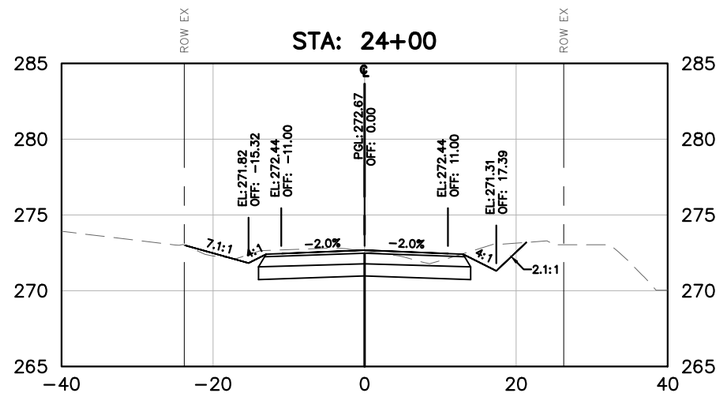
100% SUBMITTAL

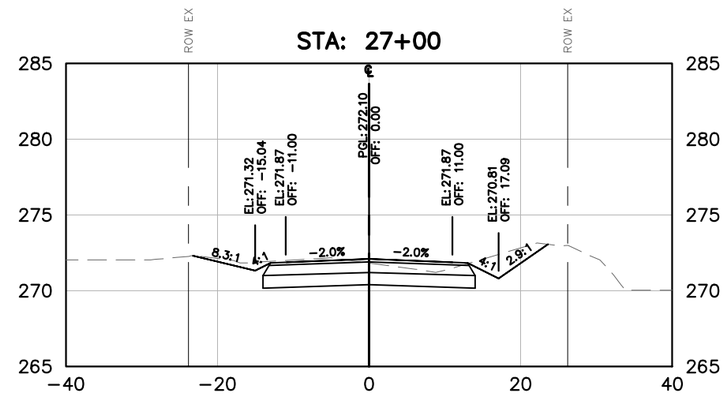


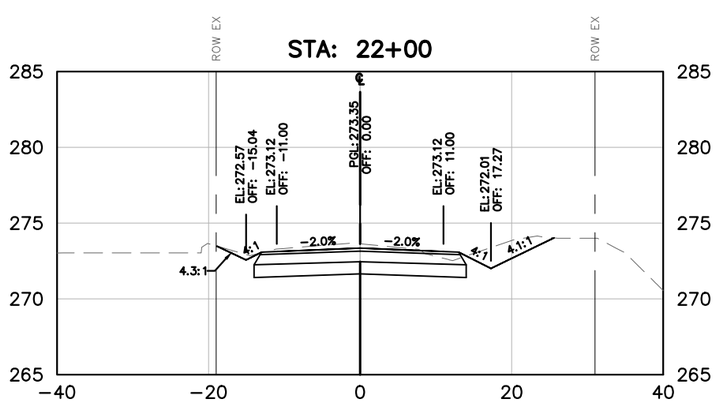


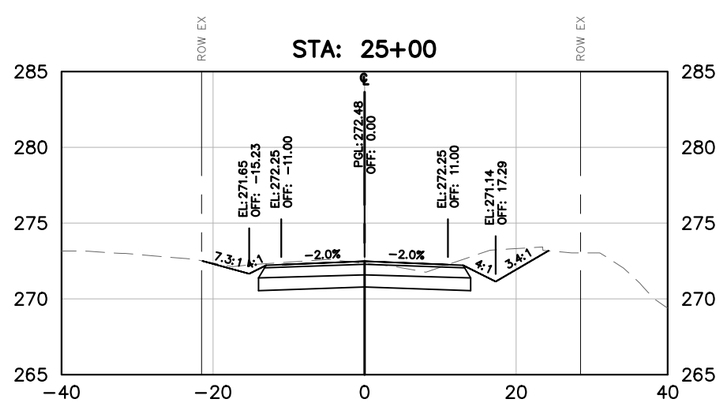


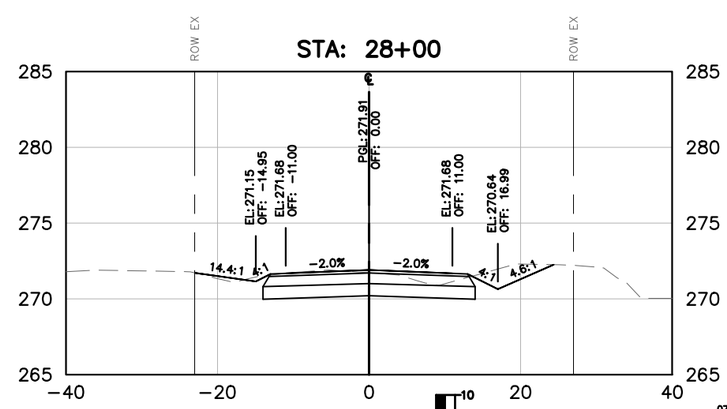












GRAPHIC SCALE IN FEET
0 5 10 20
HORIZONTAL

VERTICAL
10
5
2.5
0

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL
ENGINEER
Abbey Polzin

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

THE STATE OF TEXAS
WALLER COUNTY

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM
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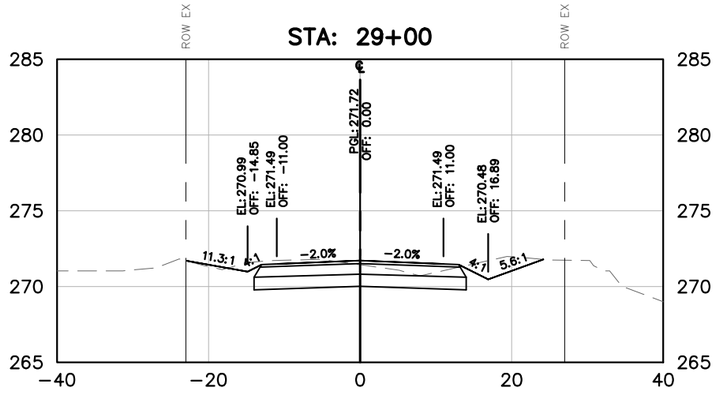
TEXAS REGISTERED ENGINEERING FIRM #F-928

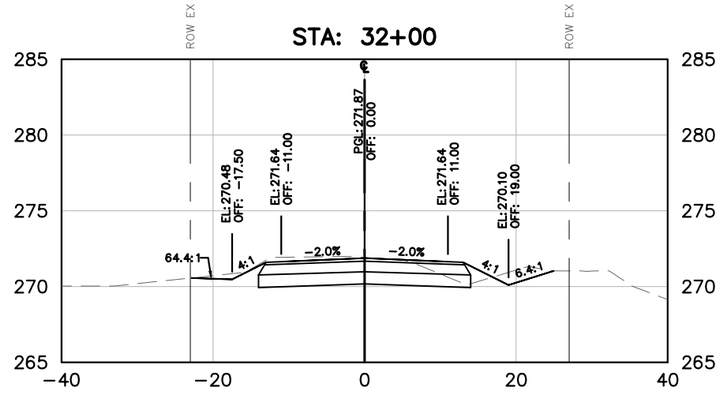
DOUBLE CULVERT ROAD
SEGMENT 1
CROSS SECTIONS
STA 20 00.00 TO STA 28 00.00

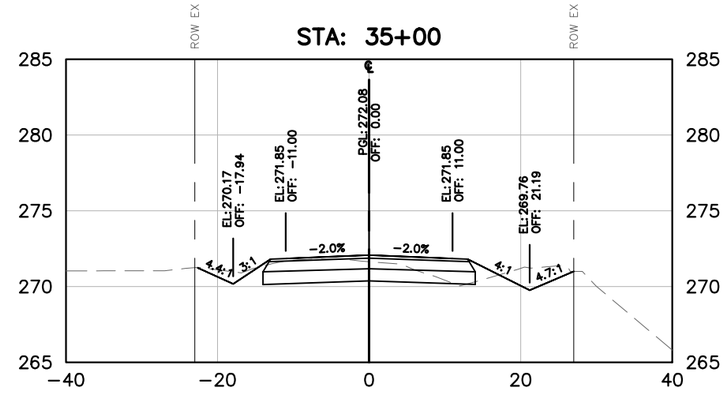
DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		151

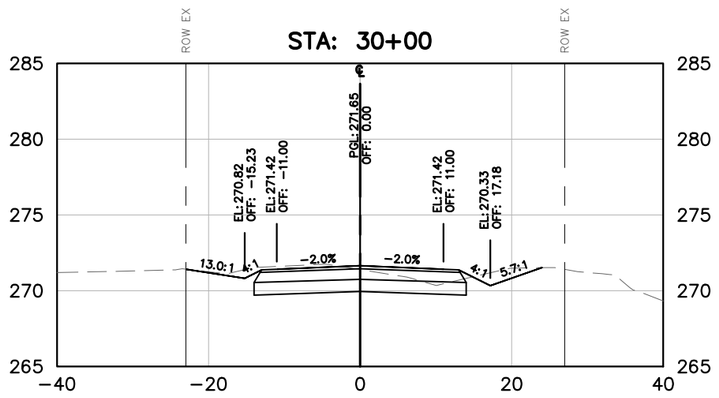
DATE: 7/28/2026 9:08:10 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Cross Sections - 10_00.00 - dwg

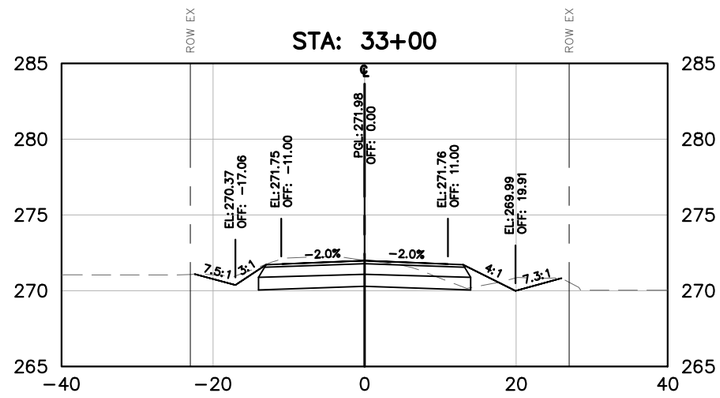
100% SUBMITTAL

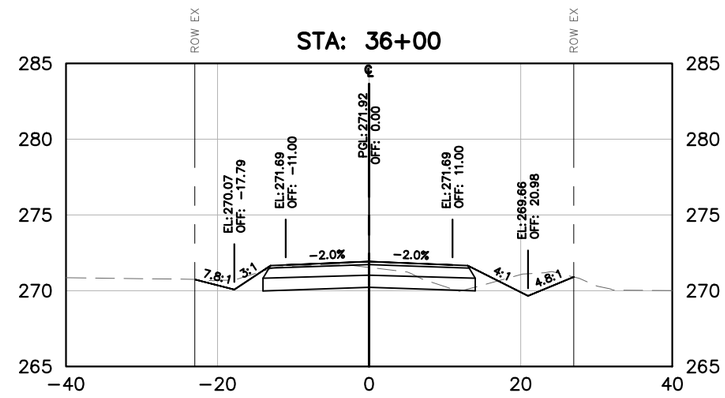


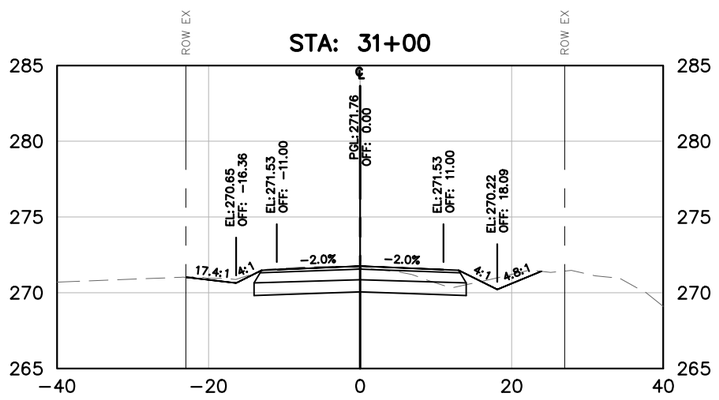


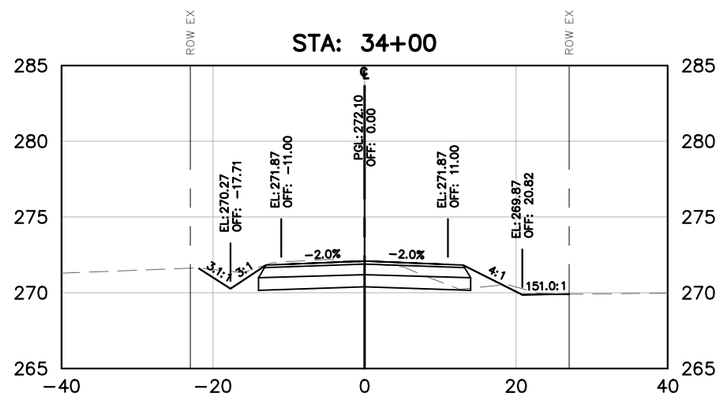


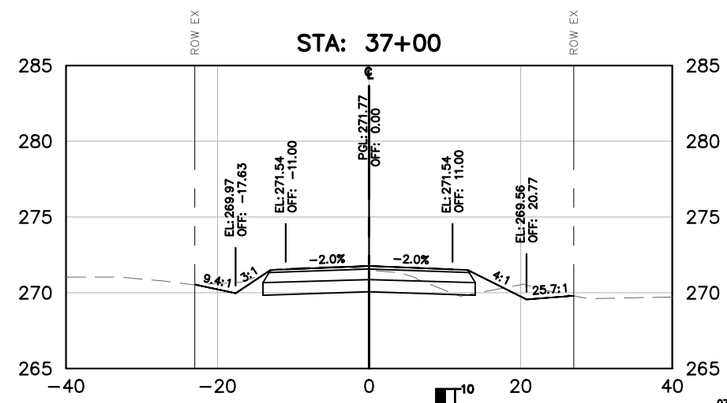












GRAPHIC SCALE IN FEET
0 5 10 20
HORIZONTAL

VERTICAL
10
5
2.5
0

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

DATE: 7/28/2026 9:08:15 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Cross Sections - 10_00.00 - dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

THE STATE OF TEXAS
WALLER COUNTY

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM
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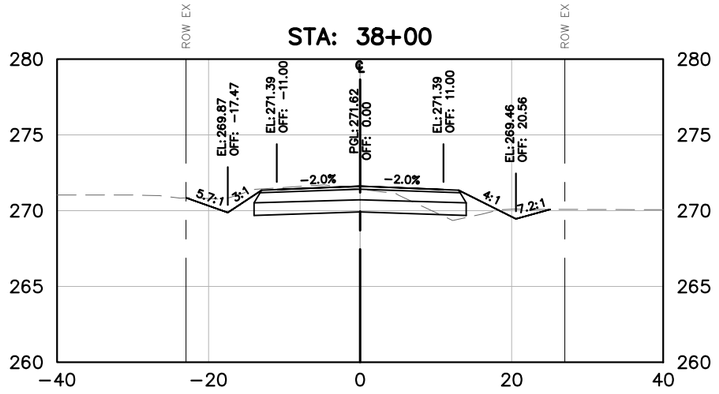
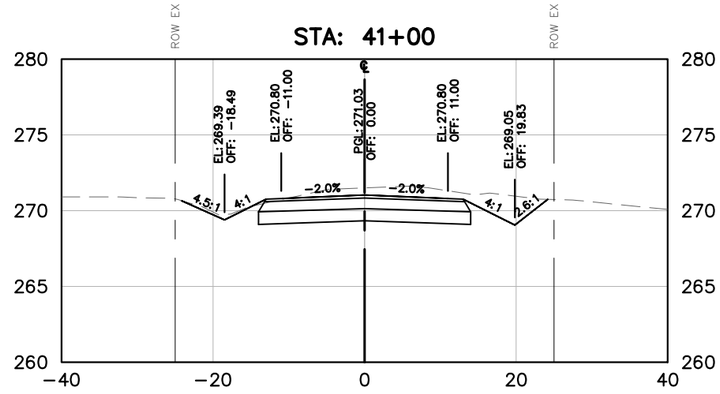
TEXAS REGISTERED ENGINEERING FIRM #F-928

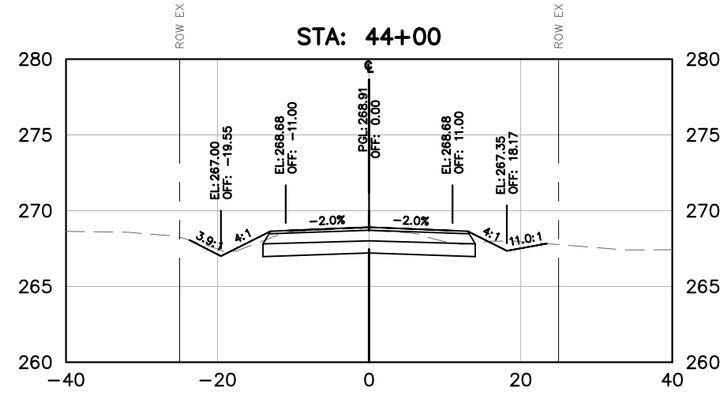
DOUBLE CULVERT ROAD
SEGMENT 1
CROSS SECTIONS
STA 29 00.00 TO STA 37 00.00

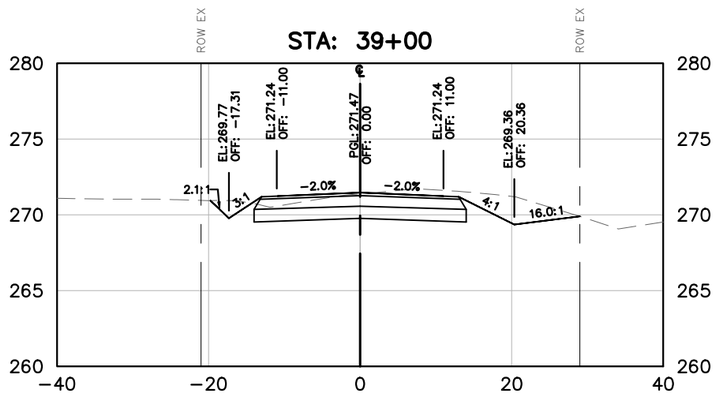
DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		152

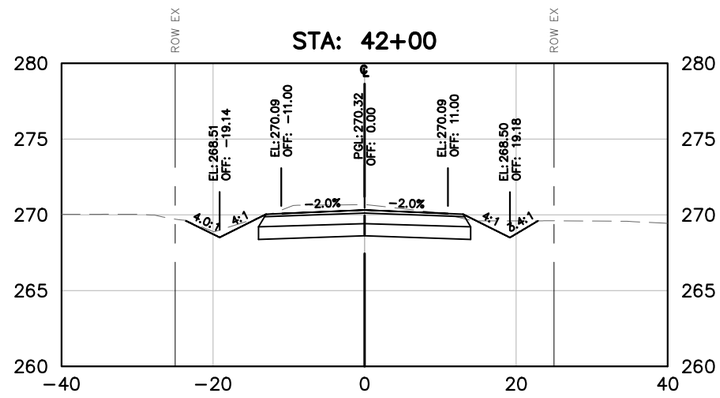
100% SUBMITTAL

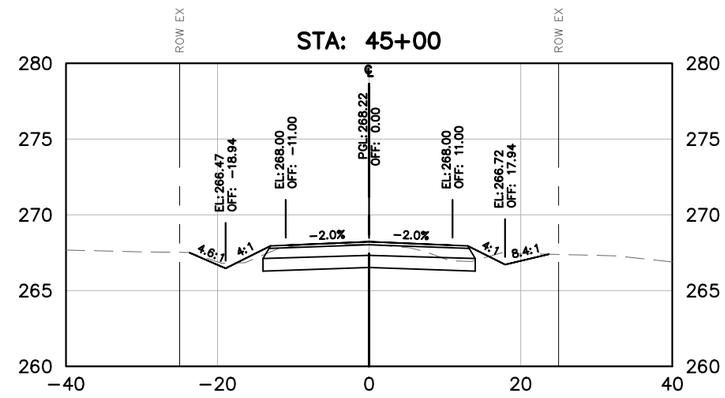


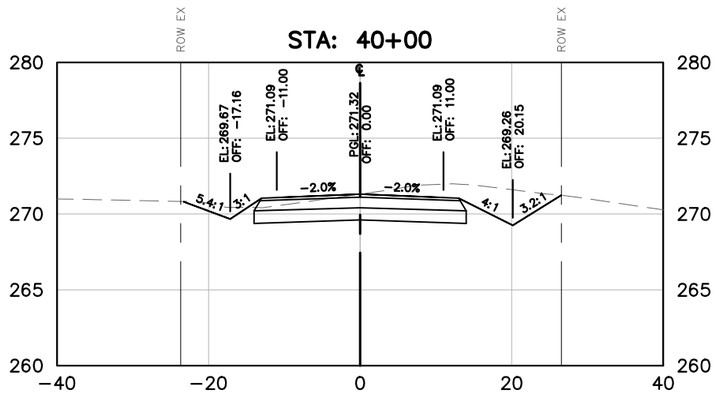


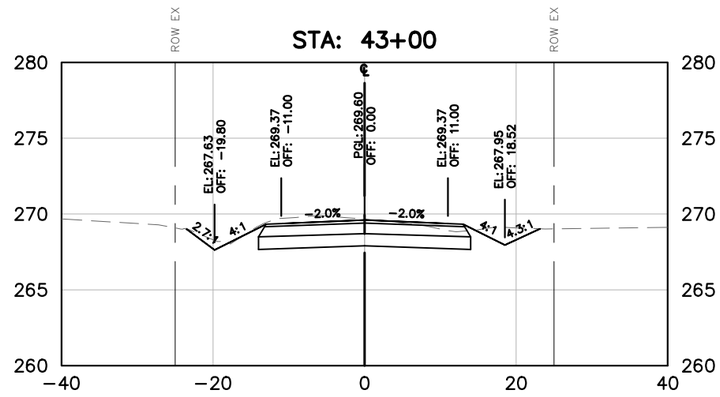


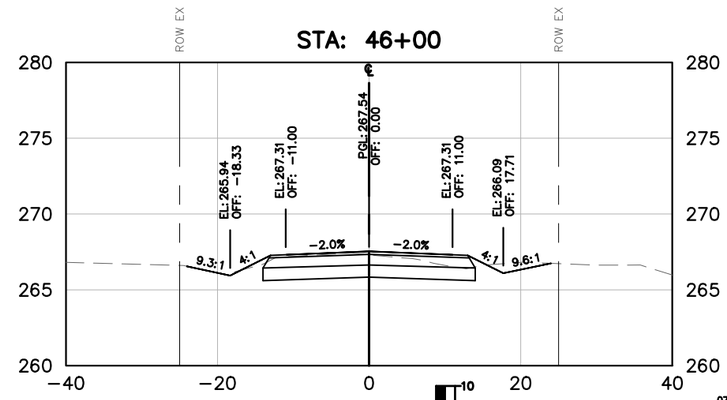












GRAPHIC SCALE IN FEET
0 5 10 20
HORIZONTAL

VERTICAL
10
5
2.5
0

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

THE STATE OF TEXAS
WALLER COUNTY

Kimley»Horn
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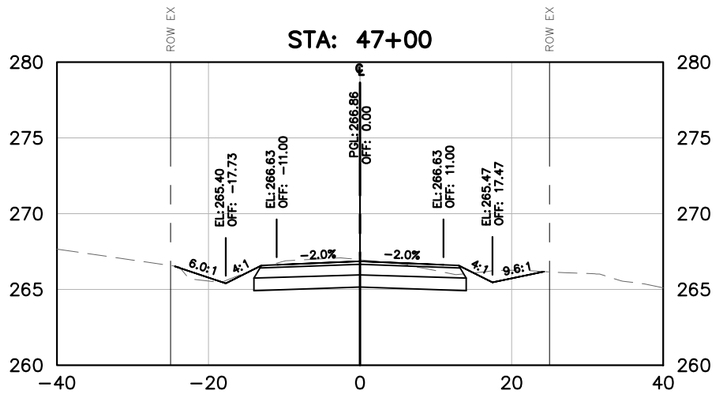
TEXAS REGISTERED ENGINEERING FIRM #F-928

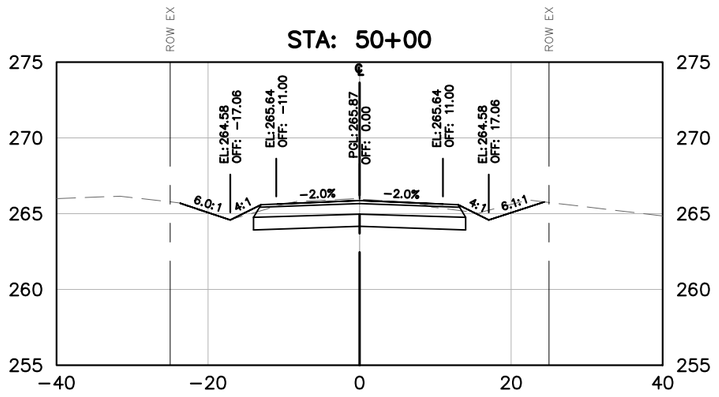
DOUBLE CULVERT ROAD
SEGMENT 1
CROSS SECTIONS
STA 38 00.00 TO STA 46 00.00

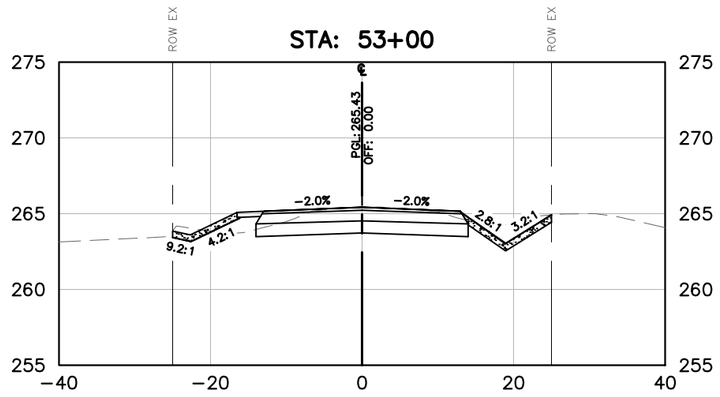
DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		153

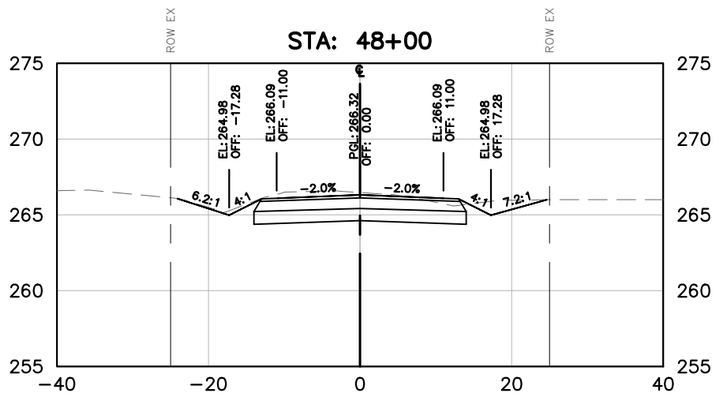
DATE: 7/28/2026 9:08:21 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Cross Sections - 10_00.00 - dwg

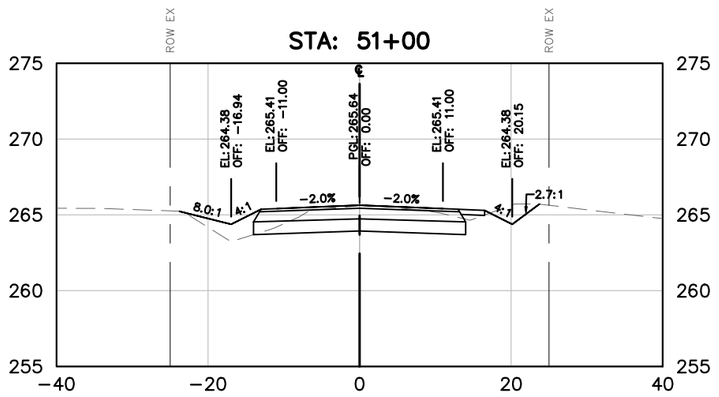
100% SUBMITTAL

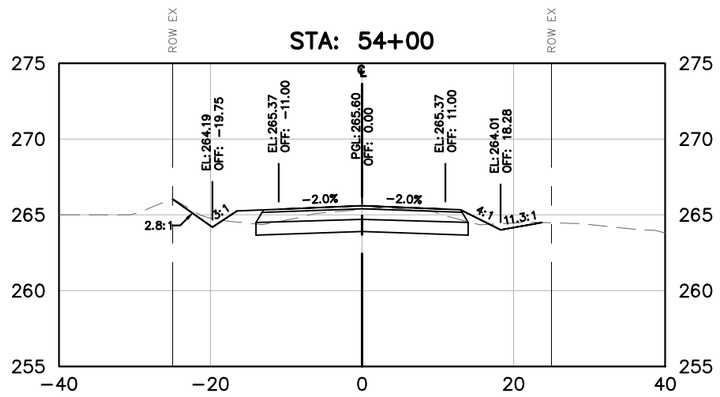


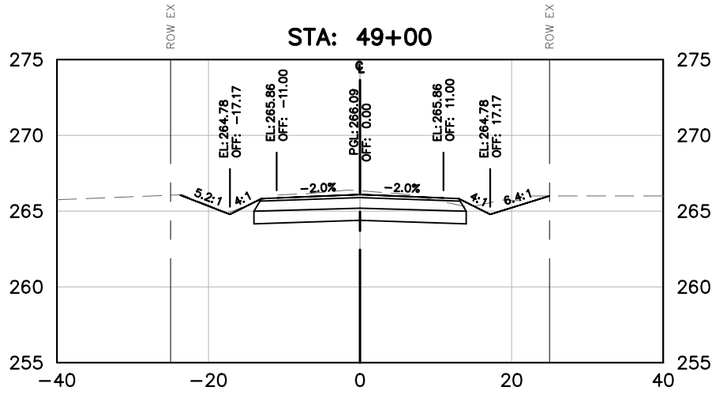


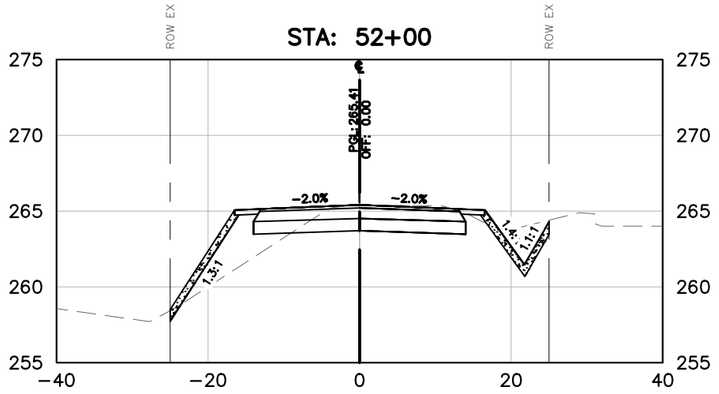


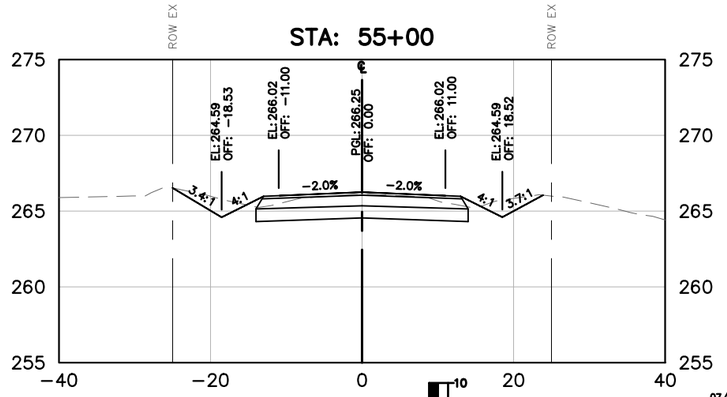












GRAPHIC SCALE IN FEET
0 5 10 20
HORIZONTAL

VERTICAL
10
5
2.5
0

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

THE STATE OF TEXAS
WALLER COUNTY

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM
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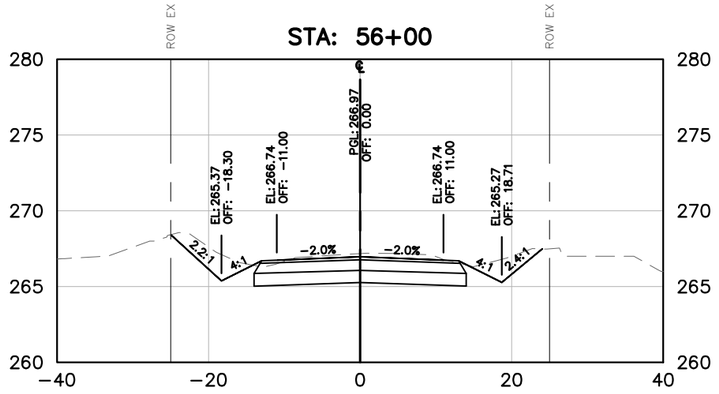
TEXAS REGISTERED ENGINEERING FIRM #F-928

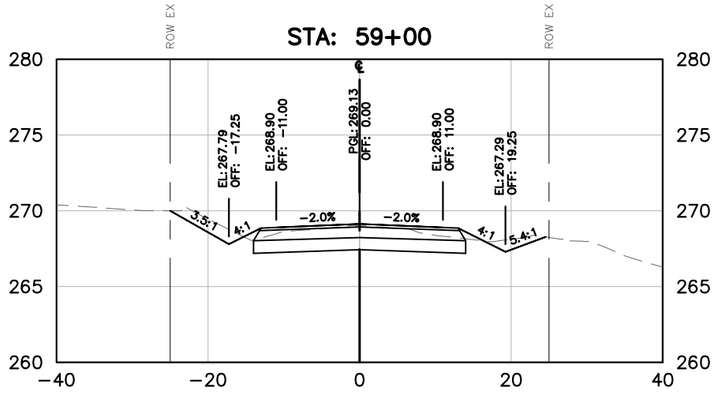
DOUBLE CULVERT ROAD SEGMENT 1
CROSS SECTIONS
STA 47 00.00 TO STA 55 00.00

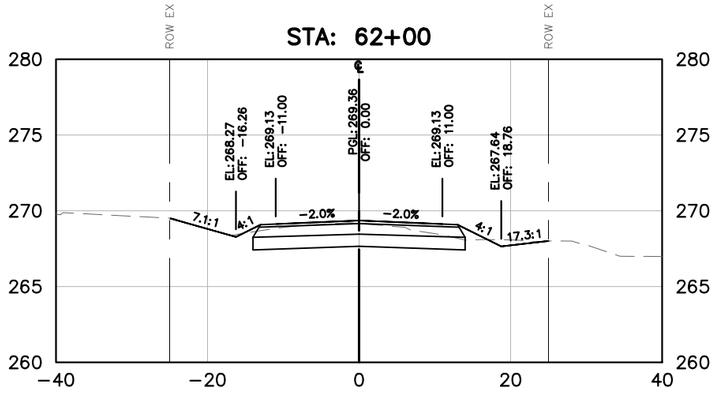
DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		154

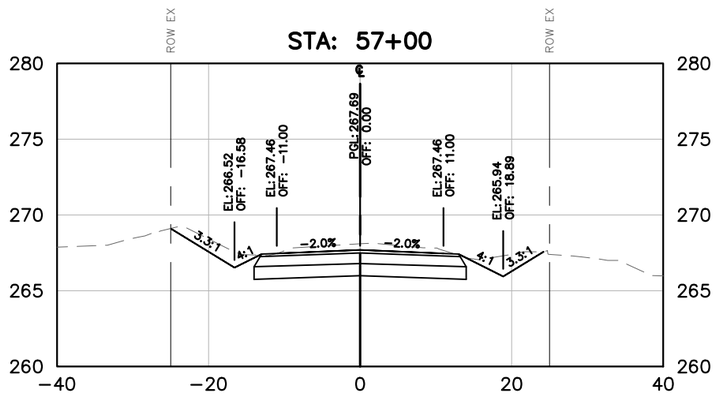
DATE: 7/28/2026 9:08:50 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Cross Sections - 47 00.00 - 82 00.00.dwg

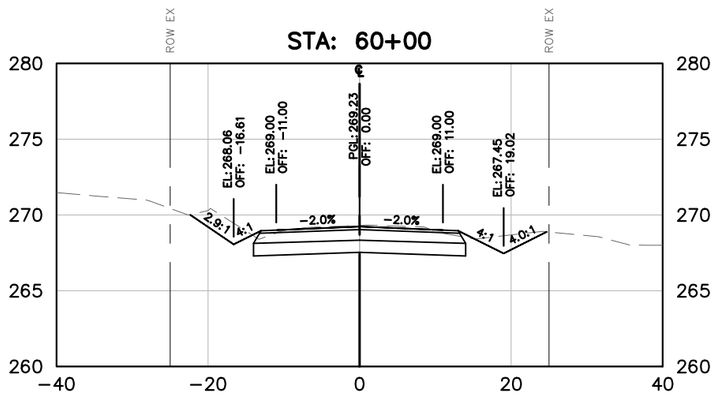
100% SUBMITTAL

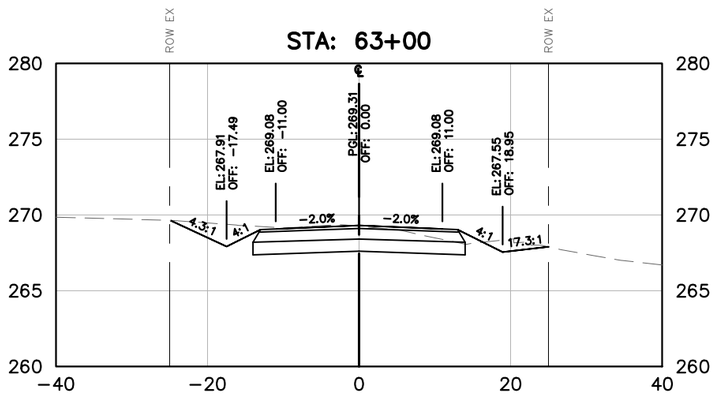


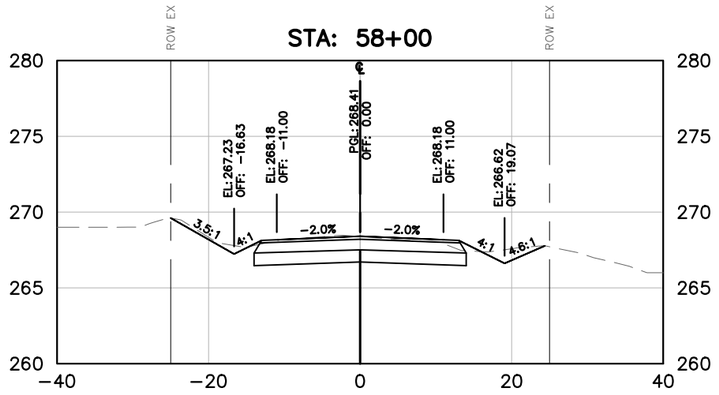


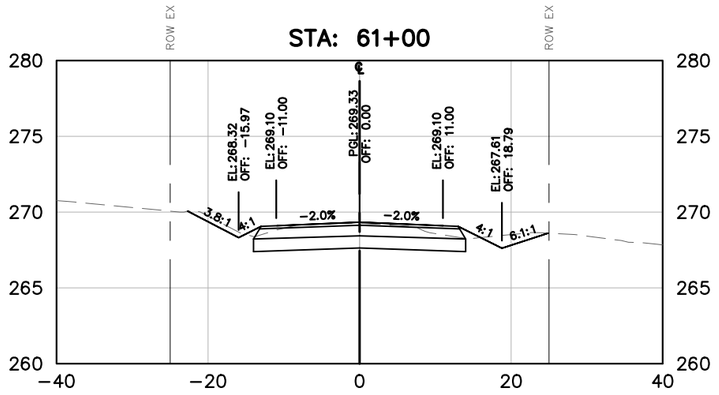


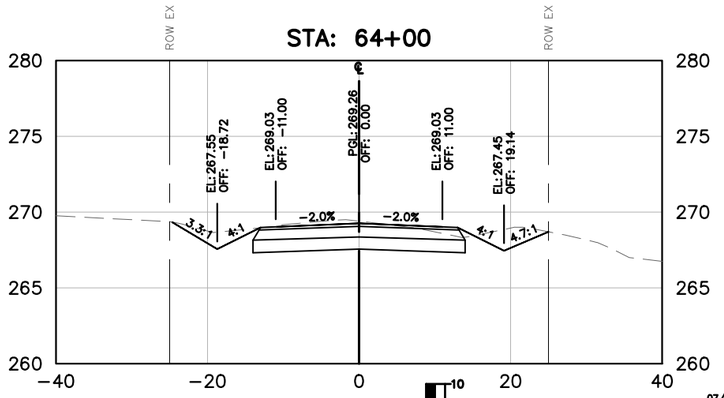


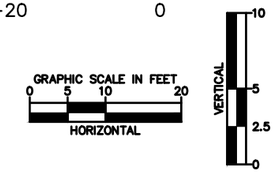












07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

DATE: 7/28/2026 9:08:55 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Cross Sections - 47_00.00 - 82_00.00.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

THE STATE OF TEXAS
WALLER COUNTY

Kimley»Horn
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WWW.KIMLEY-HORN.COM
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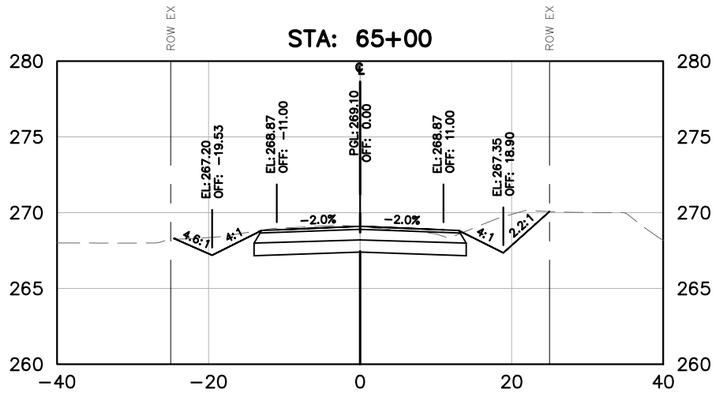
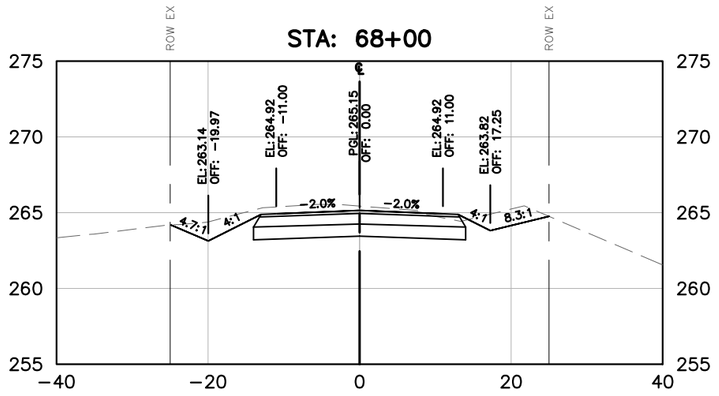
TEXAS REGISTERED ENGINEERING FIRM #F-928

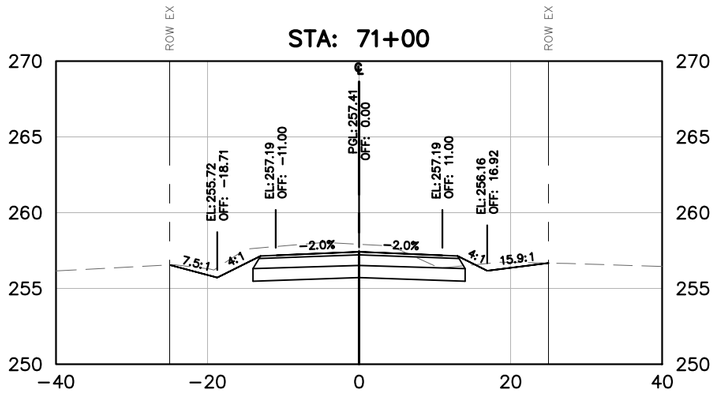
DOUBLE CULVERT ROAD
SEGMENT 1
CROSS SECTIONS
STA 56 00.00 TO STA 64 00.00

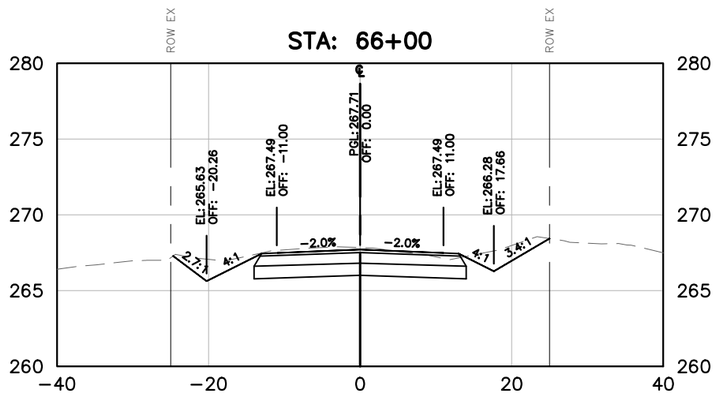
DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		155

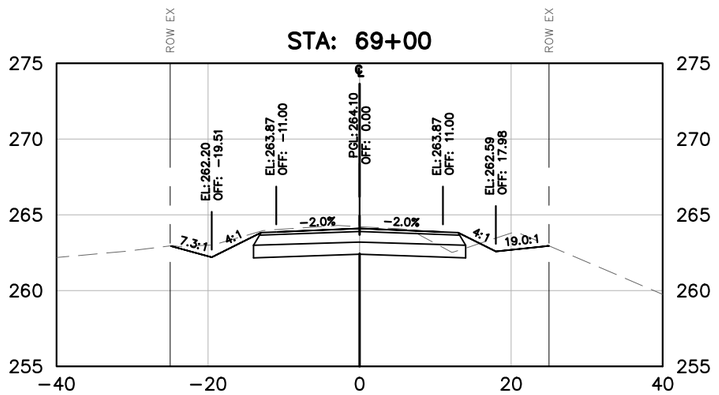
100% SUBMITTAL

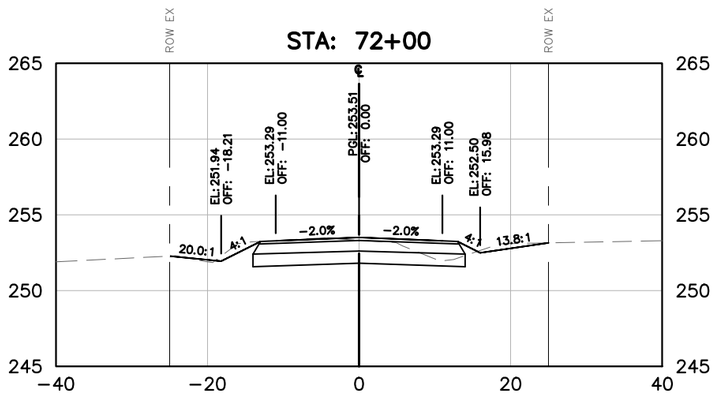


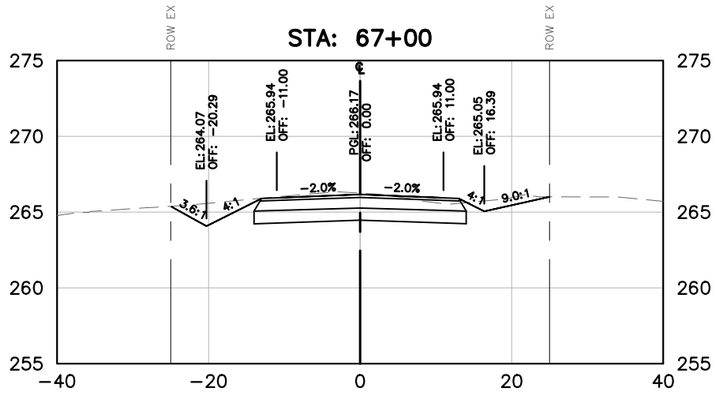


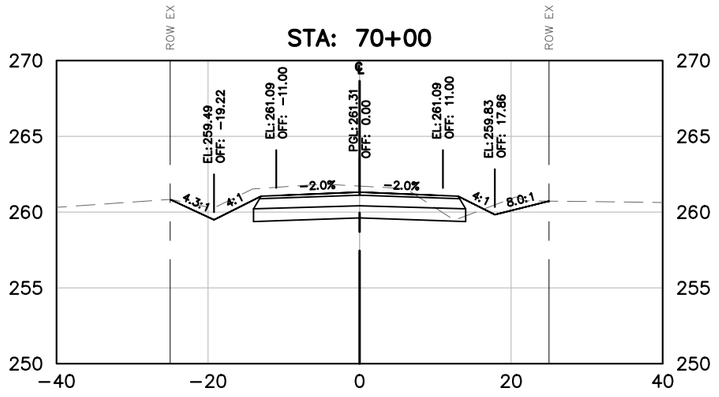


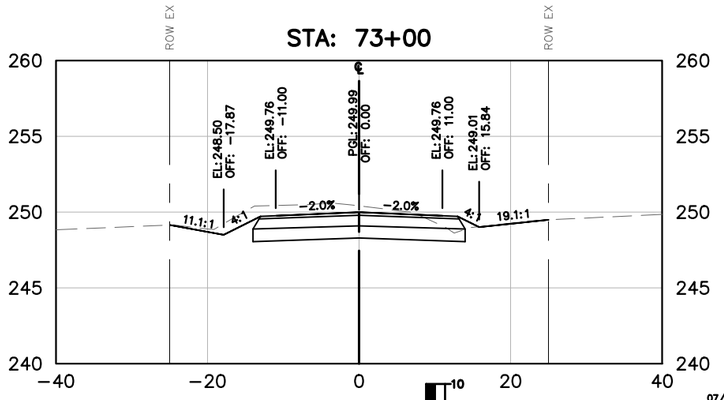












GRAPHIC SCALE IN FEET
0 5 10 20
HORIZONTAL

VERTICAL
10
5
2.5
0

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

REV. NO.	DATE	DESCRIPTION	BY

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TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD SEGMENT 1
CROSS SECTIONS
STA 65 00.00 TO STA 73 00.00

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		156

DATE: 7/28/2026 9:05:22 PM
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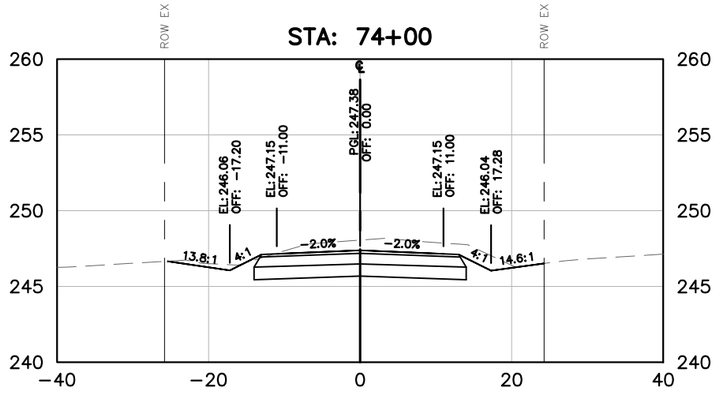
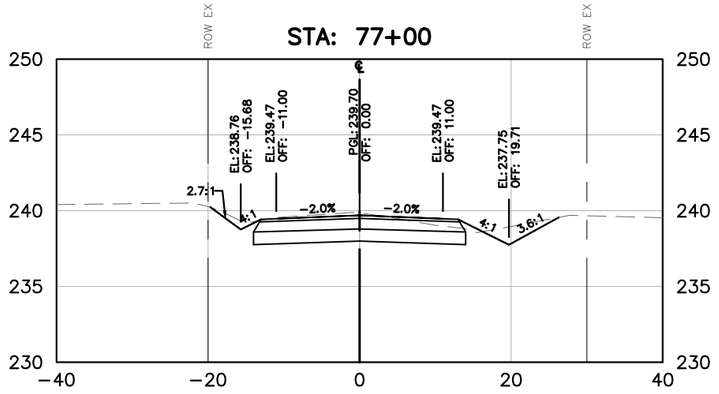
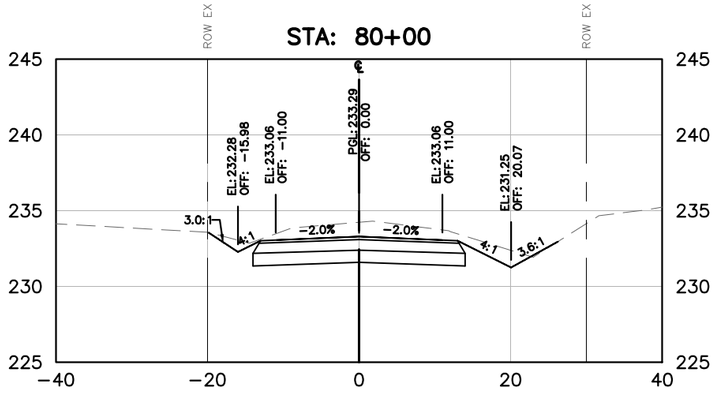
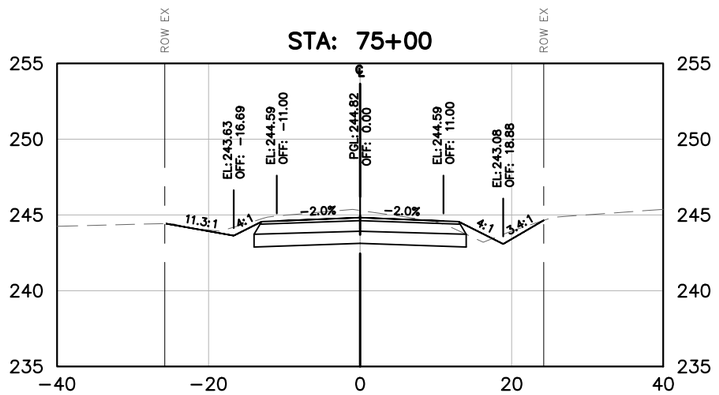
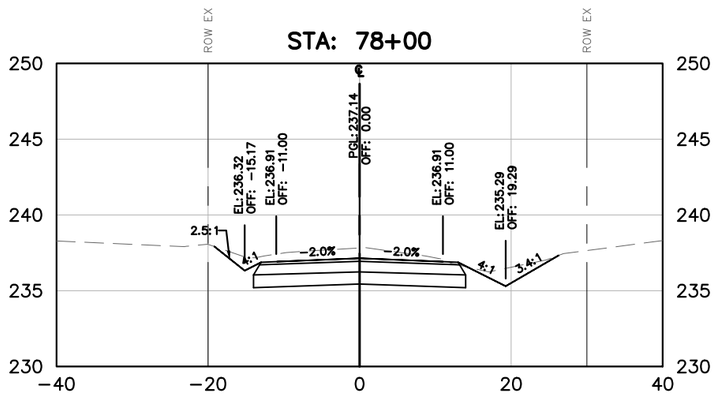
100% SUBMITTAL

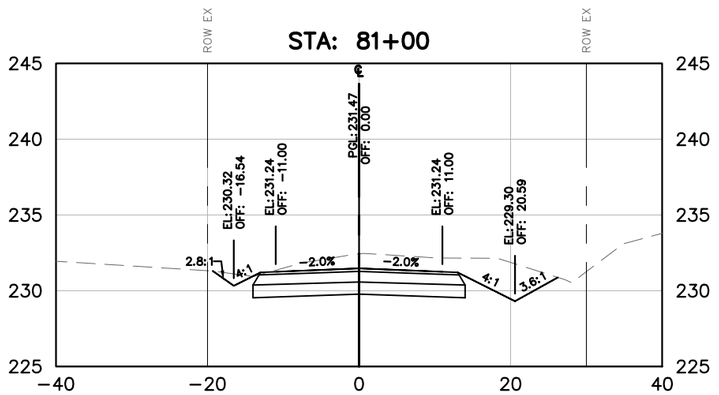


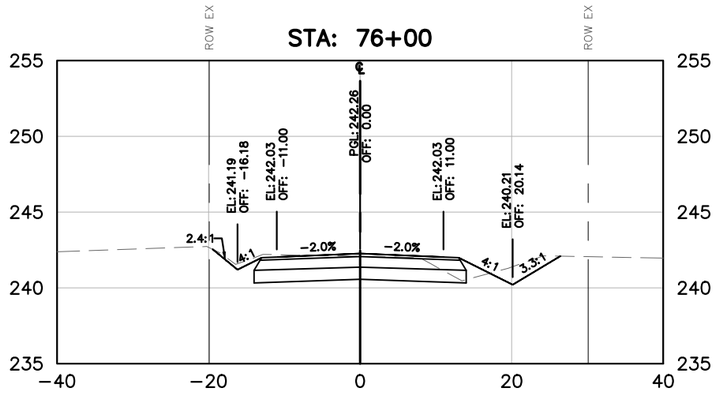


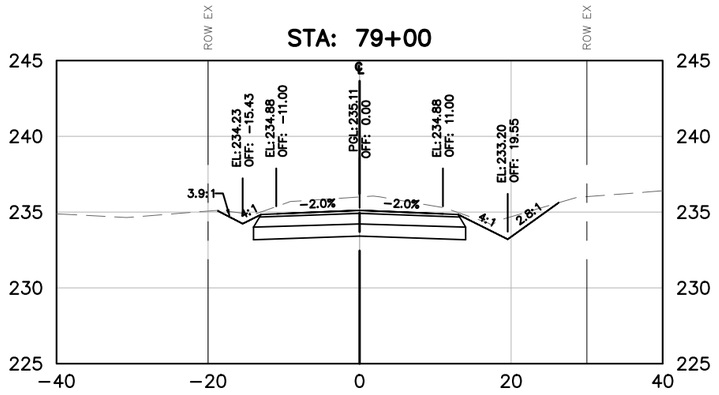


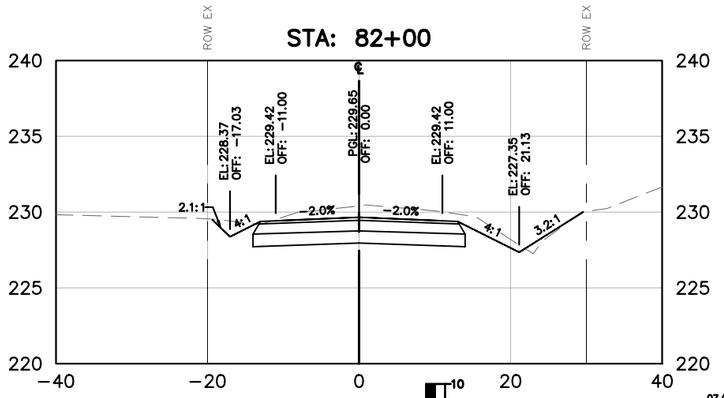












GRAPHIC SCALE IN FEET
0 5 10 20
HORIZONTAL

VERTICAL
10
5
2.5
0

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

THE STATE OF TEXAS
WALLER COUNTY

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM
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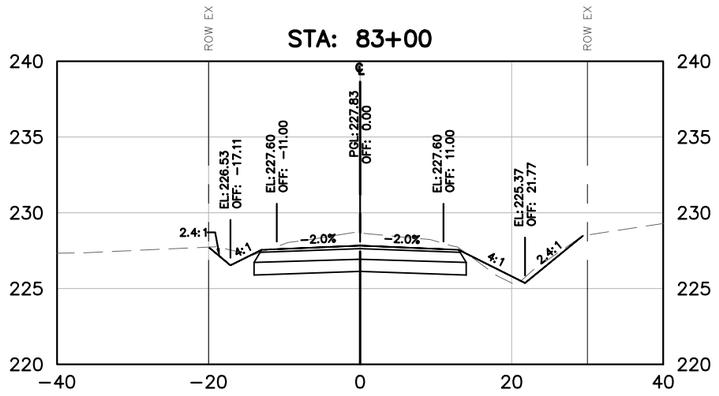
TEXAS REGISTERED ENGINEERING FIRM #F-928

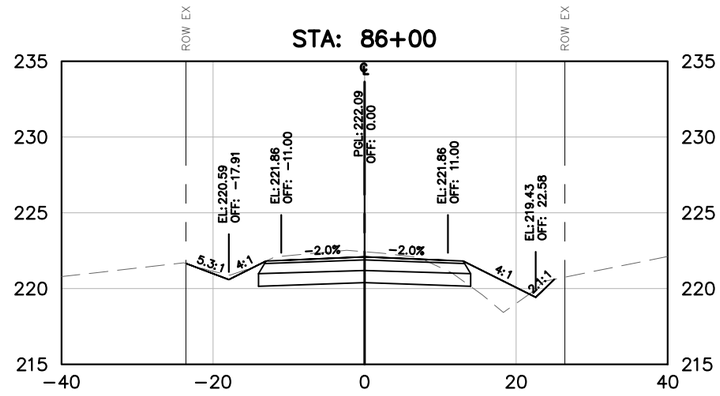
DOUBLE CULVERT ROAD SEGMENT 1
CROSS SECTIONS
STA 74 00.00 TO STA 82 00.00

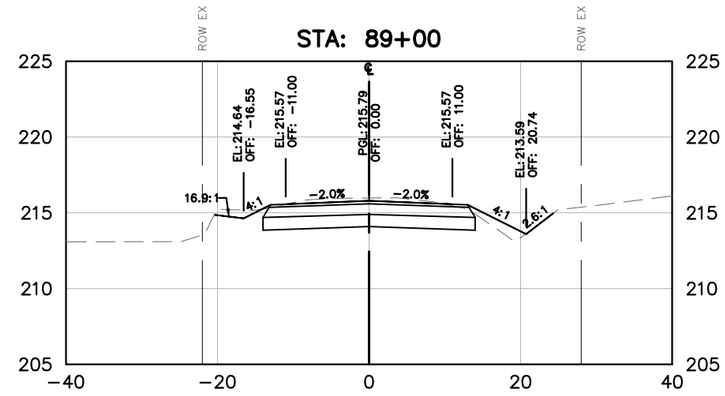
DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		157

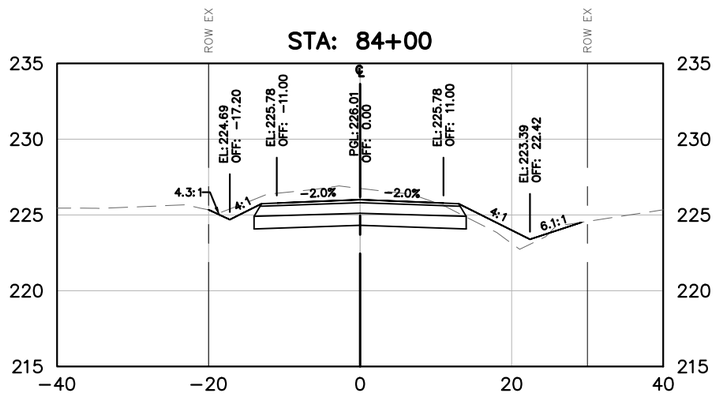
DATE: 7/28/2026 9:05:28 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Cross Sections - 47 00.00 - 82 00.00.dwg

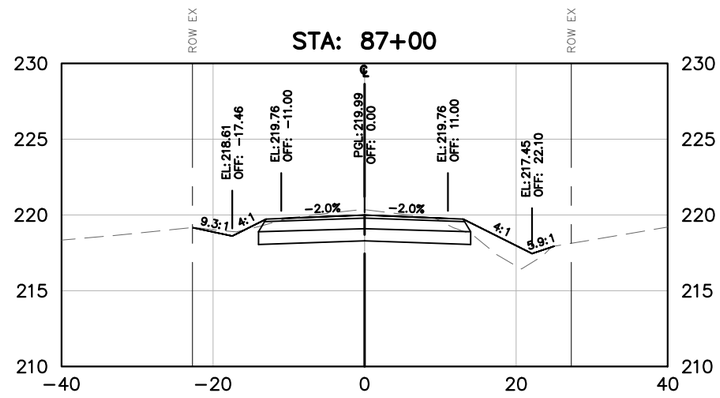
100% SUBMITTAL

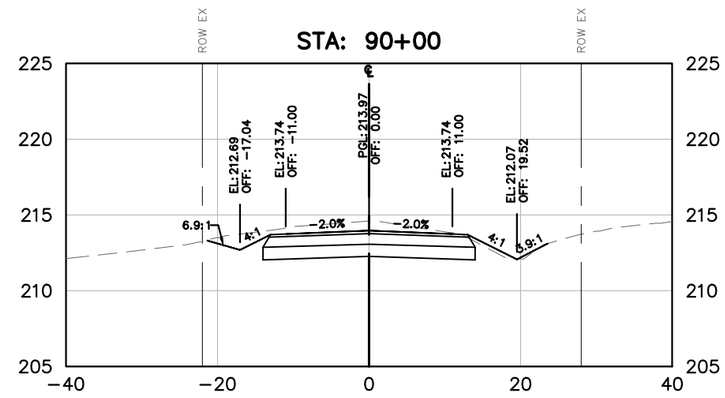


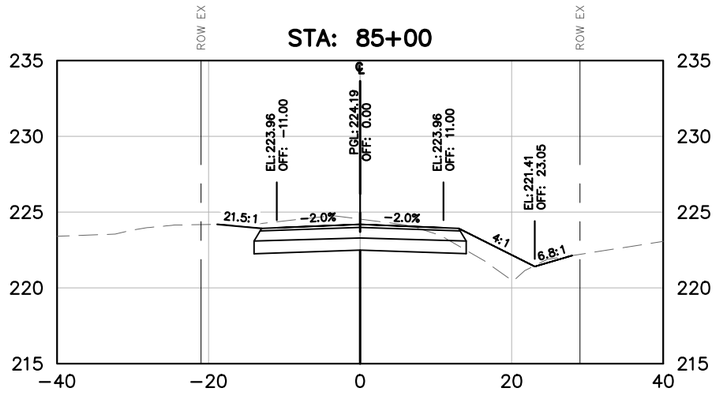


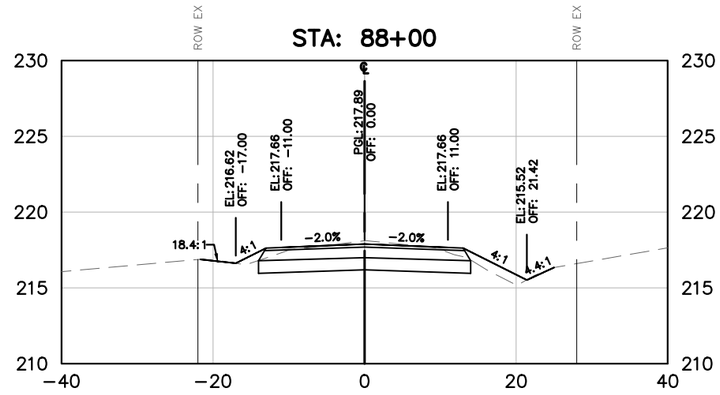


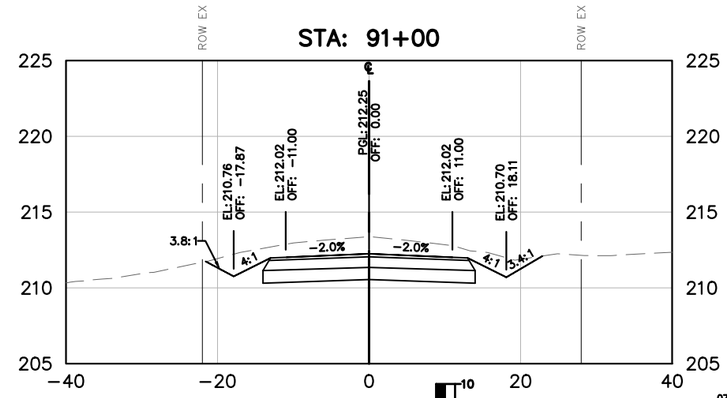












GRAPHIC SCALE IN FEET
0 5 10 20
HORIZONTAL

VERTICAL
10
5
2.5
0

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

DATE: 7/28/2026 9:06:34 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Cross Sections - 83 00.00 - END.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM

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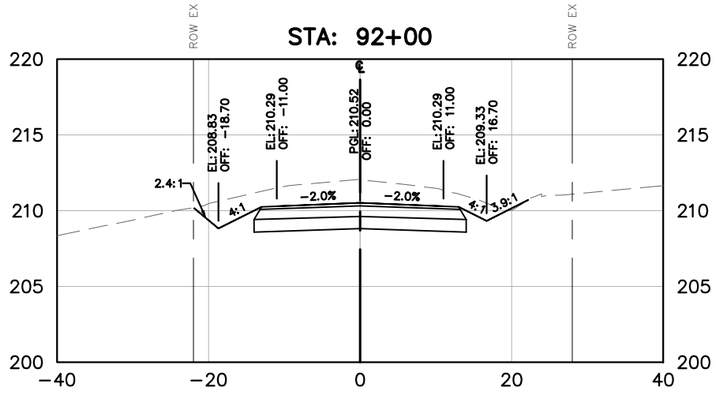
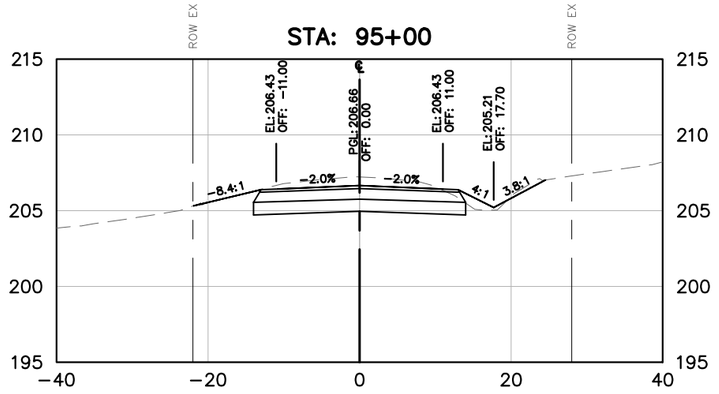
TEXAS REGISTERED ENGINEERING FIRM #F-928

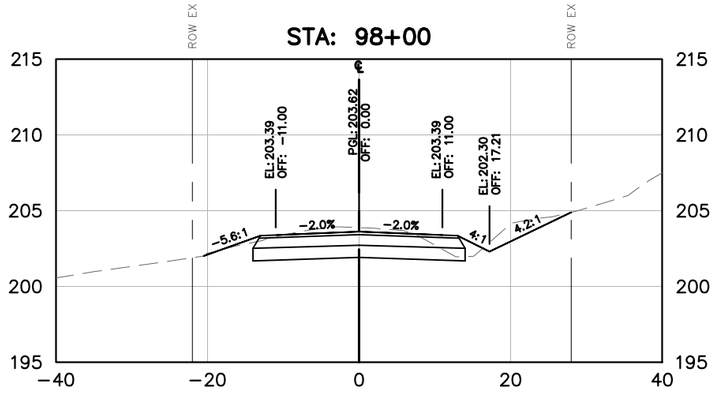
DOUBLE CULVERT ROAD SEGMENT 1
CROSS SECTIONS
STA 83 00.00 TO STA 91 00.00

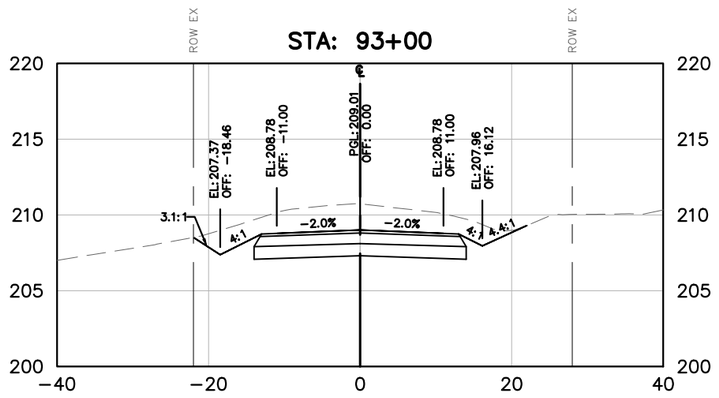
DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		158

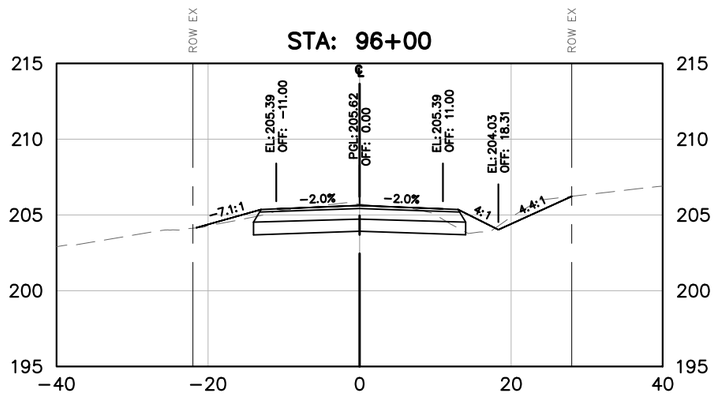
100% SUBMITTAL

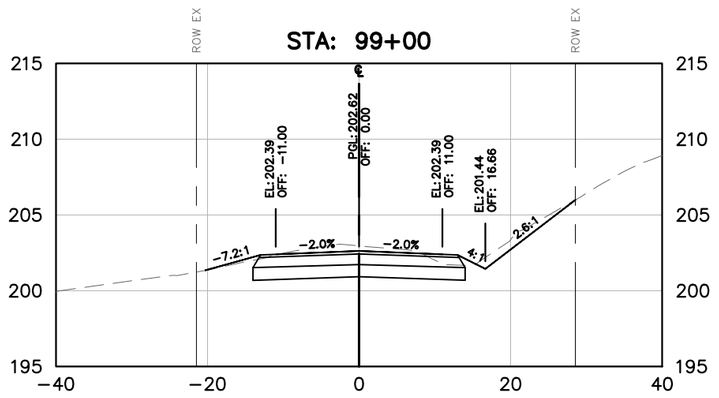


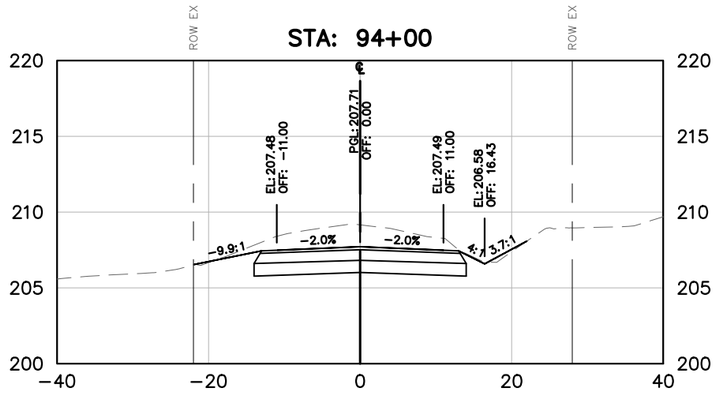


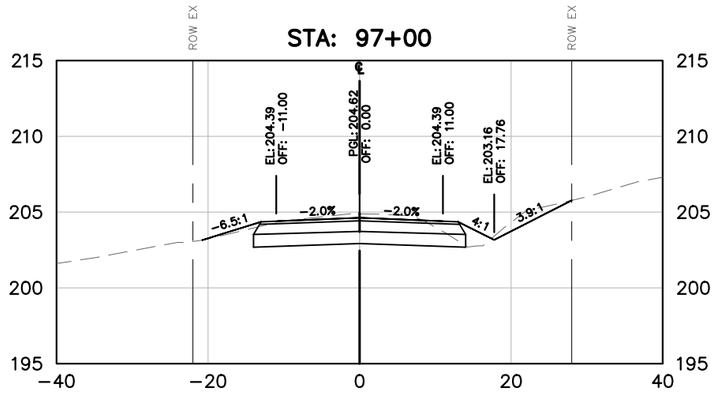


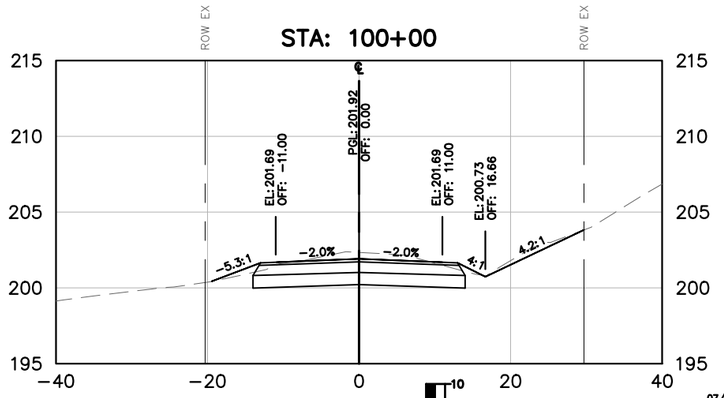


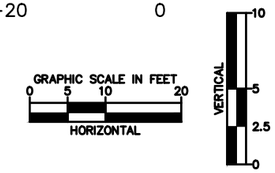












07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

DATE: 7/28/2026 9:06:40 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Cross Sections - 83_00.00 - END.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM
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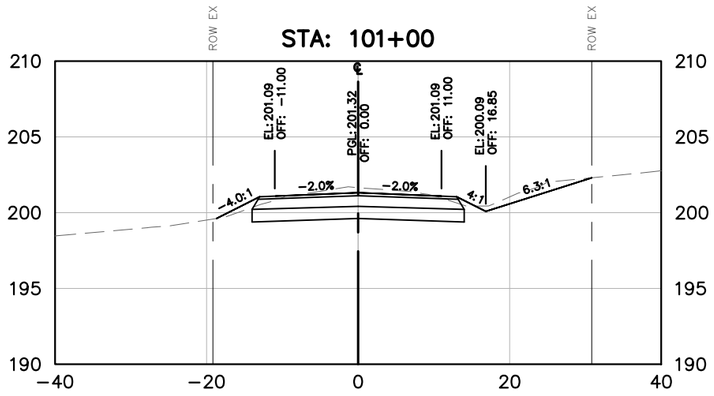
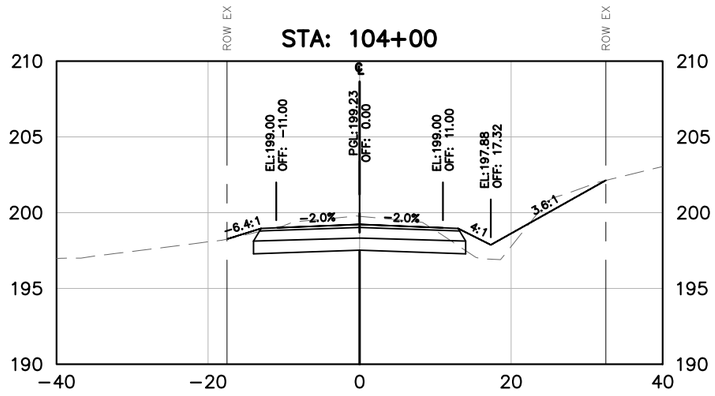
TEXAS REGISTERED ENGINEERING FIRM #F-928

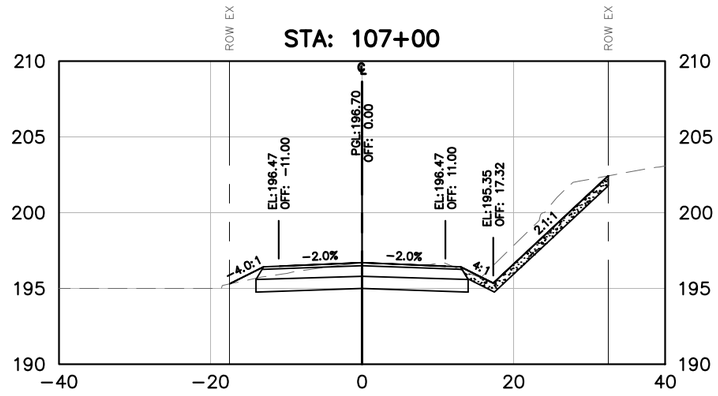
DOUBLE CULVERT ROAD SEGMENT 1
CROSS SECTIONS
STA 92 00.00 TO STA 100 00.00

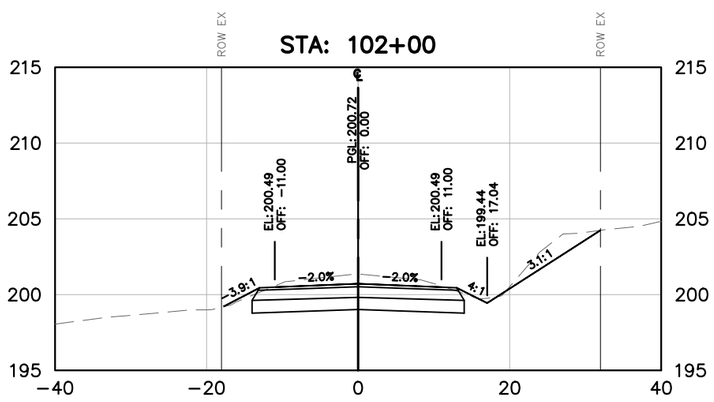
DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		159

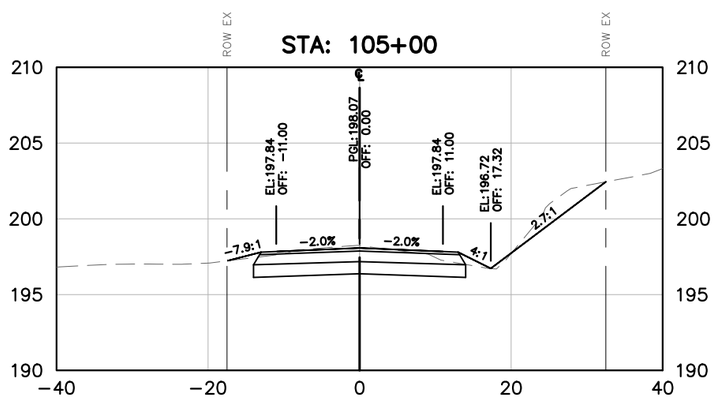
100% SUBMITTAL

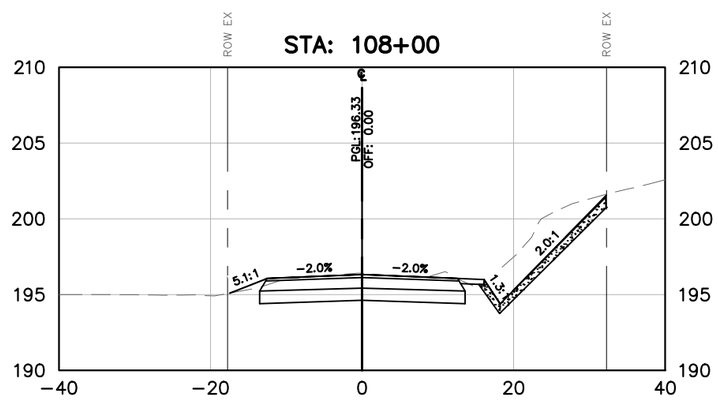


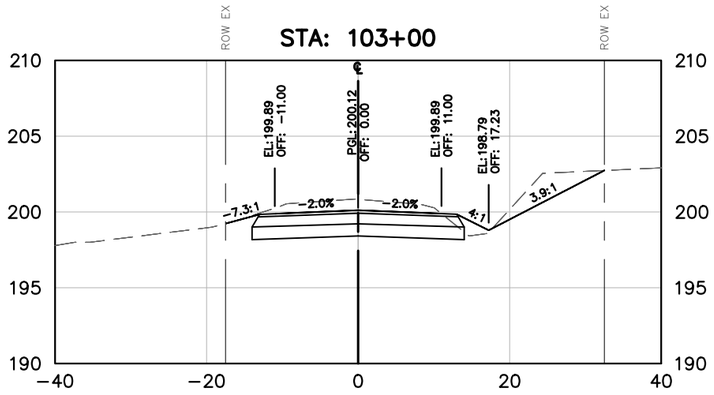


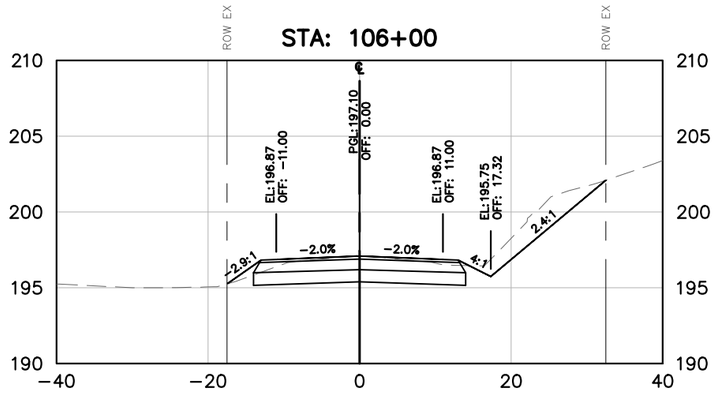


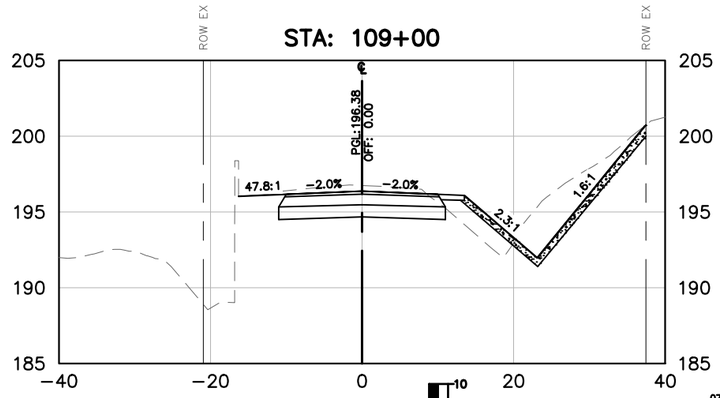












GRAPHIC SCALE IN FEET
0 5 10 20
HORIZONTAL

VERTICAL
10
5
2.5
0

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

DATE: 7/28/2026 9:06:46 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Cross Sections - 83_00.00 - END.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

THE STATE OF TEXAS
WALLER COUNTY

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM
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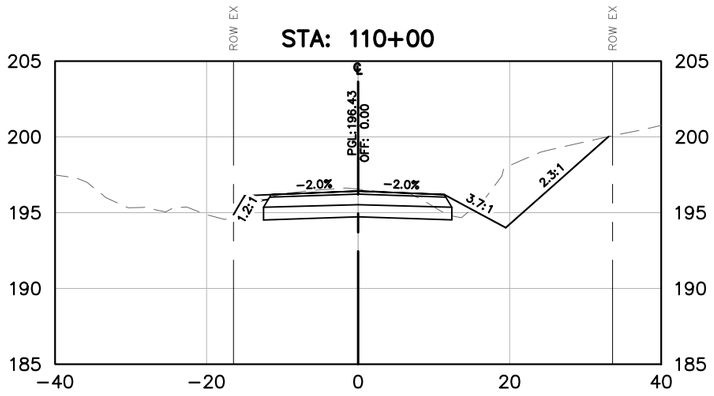
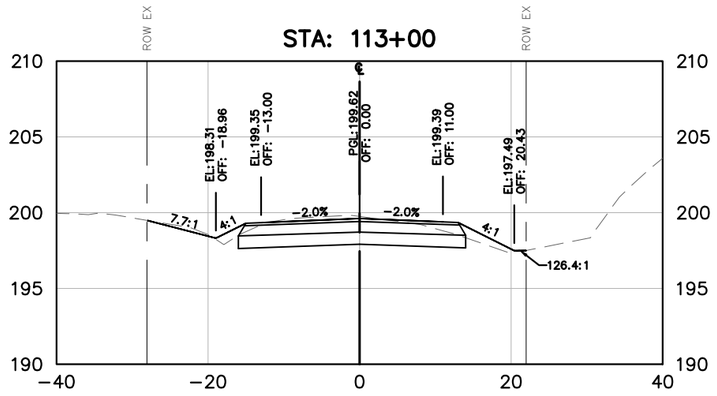
TEXAS REGISTERED ENGINEERING FIRM #F-928

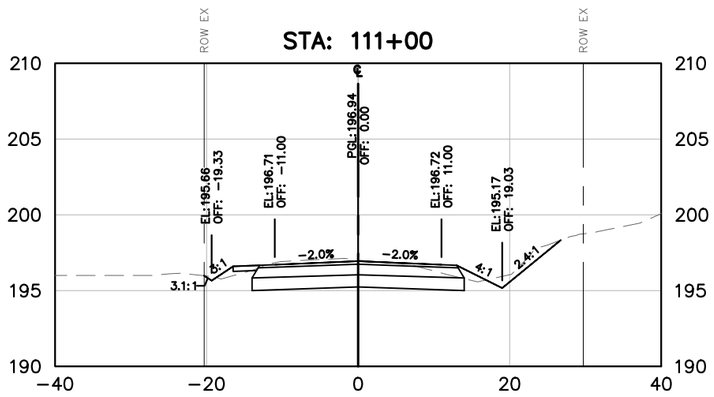
DOUBLE CULVERT ROAD
SEGMENT 1
CROSS SECTIONS
STA 101 00.00 TO STA 109 00.00

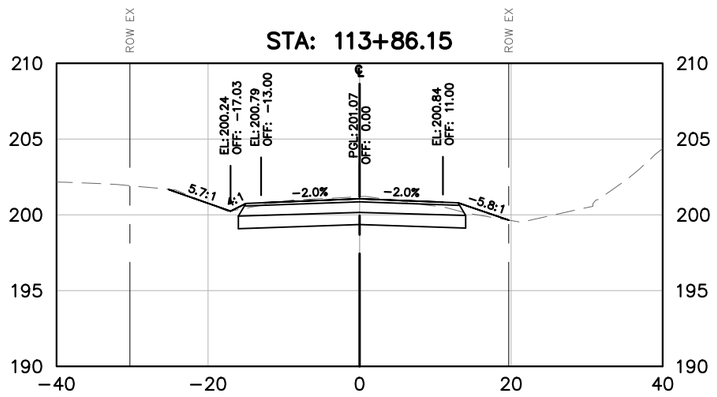
DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		160

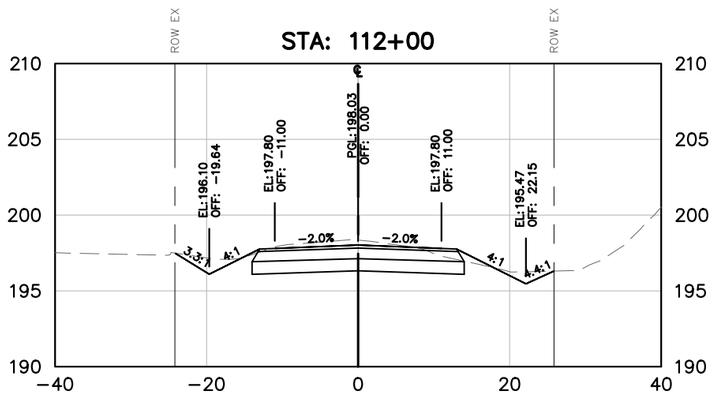
100% SUBMITTAL











GRAPHIC SCALE IN FEET
0 5 10 20
HORIZONTAL

VERTICAL
10
5
2.5
0

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL ENGINEER
Abbey Polzin

DATE: 7/28/2026 9:06:51 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Cross Sections - 83_00.00 - END.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
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WWW.KIMLEY-HORN.COM

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TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
CROSS SECTIONS
STA 109 00.00 TO END

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		161

100% SUBMITTAL

BEGIN STATION	END STATION	LENGTH	CUT			FILL		
			A1 (ST)	A2 (ST)	V (CF)	A1 (ST)	A2 (ST)	V (CF)
	10+53.00	0	0	40	0	0	7	0
10+53.00	11+00.00	47	40	42	1926	7	3	240
11+00.00	12+00.00	100	42	37	3945	3	3	286
12+00.00	13+00.00	100	37	43	3986	3	2	243
13+00.00	14+00.00	100	43	49	4596	2	2	172
14+00.00	15+00.00	100	49	41	4517	2	2	194
15+00.00	16+00.00	100	41	38	3972	2	3	259
16+00.00	17+00.00	100	38	45	4140	3	1	210
17+00.00	18+00.00	100	45	50	4753	1	1	103
18+00.00	19+00.00	100	50	50	5014	1	0	36
19+00.00	20+00.00	100	50	56	5283	0	0	13
20+00.00	21+00.00	100	56	54	5478	0	0	22
21+00.00	22+00.00	100	54	58	5600	0	0	19
22+00.00	23+00.00	100	58	60	5891	0	0	9
23+00.00	24+00.00	100	60	52	5604	0	1	43
24+00.00	25+00.00	100	52	59	5543	1	0	40
25+00.00	26+00.00	100	59	61	5962	0	0	13
26+00.00	27+00.00	100	61	53	5665	0	0	13
27+00.00	28+00.00	100	53	49	5061	0	1	45
28+00.00	29+00.00	100	49	50	4934	1	1	71
29+00.00	30+00.00	100	50	45	4765	1	0	45
30+00.00	31+00.00	100	45	44	4466	0	1	69
31+00.00	32+00.00	100	44	49	4639	1	2	149
32+00.00	33+00.00	100	49	48	4833	2	3	230
33+00.00	34+00.00	100	48	43	4557	3	3	280
34+00.00	35+00.00	100	43	41	4198	3	3	276
35+00.00	36+00.00	100	41	41	4097	3	2	235
36+00.00	37+00.00	100	41	41	4112	2	3	249
37+00.00	38+00.00	100	41	41	4120	3	4	357
38+00.00	39+00.00	100	41	63	5237	4	0	226
39+00.00	40+00.00	100	63	72	6754	0	0	27
40+00.00	41+00.00	100	72	70	7092	0	0	27
41+00.00	42+00.00	100	70	59	6439	0	0	22
42+00.00	43+00.00	100	59	55	5662	0	0	30
43+00.00	44+00.00	100	55	42	4822	0	2	120
44+00.00	45+00.00	100	42	41	4149	2	2	206
45+00.00	46+00.00	100	41	41	4099	2	1	172
46+00.00	47+00.00	100	41	50	4550	1	2	162
47+00.00	48+00.00	100	50	55	5254	2	0	103
48+00.00	49+00.00	100	55	54	5426	0	0	30
49+00.00	50+00.00	100	54	50	5156	0	1	79
50+00.00	51+00.00	100	50	40	4488	1	9	528
51+00.00	52+00.00	100	40	43	4161	9	32	2065
52+00.00	53+00.00	100	43	47	4517	32	7	1963
53+00.00	54+00.00	100	47	38	4249	7	4	594
54+00.00	55+00.00	100	38	45	4150	4	1	290
55+00.00	56+00.00	100	45	63	5428	1	0	76
56+00.00	57+00.00	100	63	68	6537	0	0	12
57+00.00	58+00.00	100	68	50	5871	0	1	46
58+00.00	59+00.00	100	50	48	4892	1	2	120
59+00.00	60+00.00	100	48	59	5363	2	1	101
60+00.00	61+00.00	100	59	47	5308	1	1	94
61+00.00	62+00.00	100	47	39	4277	1	2	158
62+00.00	63+00.00	100	39	54	4658	2	1	146
63+00.00	64+00.00	100	54	60	5726	1	1	82
64+00.00	65+00.00	100	60	66	6291	1	0	27
65+00.00	66+00.00	100	66	64	6467	0	0	6
66+00.00	67+00.00	100	64	59	6143	0	0	10
67+00.00	68+00.00	100	59	69	6440	0	0	17
68+00.00	69+00.00	100	69	55	6229	0	1	61
69+00.00	70+00.00	100	55	61	5784	1	2	128
70+00.00	71+00.00	100	61	62	6114	2	1	103
71+00.00	72+00.00	100	62	41	5134	1	1	85
72+00.00	73+00.00	100	41	58	4956	1	1	98
73+00.00	74+00.00	100	58	69	6366	1	0	51
74+00.00	75+00.00	100	69	57	6305	0	2	106
75+00.00	76+00.00	100	57	48	5236	2	2	203
76+00.00	77+00.00	100	48	46	4708	2	1	150
77+00.00	78+00.00	100	46	68	5723	1	0	46
78+00.00	79+00.00	100	68	74	7122	0	0	4
79+00.00	80+00.00	100	74	76	7511	0	0	12
80+00.00	81+00.00	100	76	88	8190	0	0	15
81+00.00	82+00.00	100	88	70	7885	0	1	77
82+00.00	83+00.00	100	70	66	6770	1	2	186
83+00.00	84+00.00	100	66	64	6463	2	7	451
84+00.00	85+00.00	100	64	52	5764	7	11	889
85+00.00	86+00.00	100	52	51	5112	11	11	1114
86+00.00	87+00.00	100	51	48	4929	11	11	1088
87+00.00	88+00.00	100	48	44	4594	11	6	830
88+00.00	89+00.00	100	44	52	4779	6	4	512
89+00.00	90+00.00	100	52	62	5684	4	2	288
90+00.00	91+00.00	100	62	86	7416	2	0	81
91+00.00	92+00.00	100	86	97	9156	0	0	11
92+00.00	93+00.00	100	97	103	9970	0	0	11
93+00.00	94+00.00	100	103	77	8982	0	1	50
94+00.00	95+00.00	100	77	56	6675	1	3	182
95+00.00	96+00.00	100	56	46	5143	3	5	378
96+00.00	97+00.00	100	46	51	4843	5	4	460
97+00.00	98+00.00	100	51	52	5114	4	3	346
98+00.00	99+00.00	100	52	55	5337	3	1	206
99+00.00	100+00.00	100	55	52	5358	1	2	184
100+00.00	101+00.00	100	52	54	5316	2	2	212
101+00.00	102+00.00	100	54	66	5992	2	1	160
102+00.00	103+00.00	100	66	73	6937	1	10	575
103+00.00	104+00.00	100	73	55	6419	10	9	954
104+00.00	105+00.00	100	55	53	5425	9	2	557
105+00.00	106+00.00	100	53	61	5730	2	2	199
106+00.00	107+00.00	100	61	62	6170	2	2	155
107+00.00	107+63.90	64	62	72	4289	2	1	89
107+63.90	108+00.00	36	72	71	2590	1	2	53
108+00.00	108+50.00	50	71	77	3697	2	5	163
108+50.00	109+00.00	50	77	54	3273	5	10	362
109+00.00	109+50.00	50	54	36	2264	10	55	1618
109+50.00	109+87.46	37	36	79	2169	55	8	1185
109+87.46	110+00.00	13	79	76	974	8	7	93
110+00.00	111+00.00	100	76	50	6293	7	4	519
111+00.00	112+00.00	100	50	55	5252	4	2	261
112+00.00	113+00.00	100	55	48	5171	2	5	348
113+00.00	114+00.00	100	48	49	4194	5	1	327
TOTAL VOLUME (CF)					572754			27677
TOTAL PAVEMENT TO BE REMOVED (CY)					5563			0
TOTAL VOLUME (CY)					15650			1025

07/28/2026
STATE OF TEXAS
ABBEY M. POLZIN
151558
LICENSED
PROFESSIONAL
ENGINEER
Abbey Polzin

DATE: 7/28/2026 9:07:14 PM
FILE: K:\hou_roadway\065035800 - double culvert rd segment 1\04_CAD\PlanSheets\Cut and Fill Quantities.dwg

REV. NO.	DATE	DESCRIPTION	BY

WALLER COUNTY
ENGINEERING DEPARTMENT

Kimley»Horn
11700 KATY FREEWAY, SUITE 800, HOUSTON, TX 77079
PHONE: 281-597-9300
WWW.KIMLEY-HORN.COM
© 2026 KIMLEY-HORN AND ASSOCIATES, INC.
TEXAS REGISTERED ENGINEERING FIRM #F-928

DOUBLE CULVERT ROAD
SEGMENT 1
EARTHWORK TABLES

DN: MLR	CONT	SECT	JOB	HIGHWAY
CK DN: AMP			23102	DOUBLE CULVERT ROAD
DW:	DIST	COUNTY		SHEET NO.
CK DW:		WALLER		162

WALLER COUNTY ENGINEERING DEPARTMENT

DOUBLE CULVERT ROAD SEGMENT 2
AND CEDAR CREEK ROAD

2023 MOBILITY BOND PROJECT NO. 23103
PRECINCT 1
PROJECT LENGTH: 2.2 MILES
DESIGN SPEED: 35 MPH

FULL DEPTH RECONTRUCTION FOR THE LIMITS OF THE PROJECT
LIMITS: FROM 200' WEST UPRR TO CEDAR CREEK ROAD
FROM DOUBLE CULVERT ROAD TO SH 6

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4	EXISTING TYPICAL SECTIONS
5	PROPOSED TYPICAL SECTIONS DOUBLE CULVERT RD
6	PROPOSED TYPICAL SECTIONS CEDAR CREEK RD
7	PROJECT LAYOUT DOUBLE CULVERT RD
8	PROJECT LAYOUT CEDAR CREEK RD
9	CONTROL INDEX SHEET
10	H&V CONTROL SHEET
11 - 16	DOUBLE CULVERT RD MAP SHEET
17 - 20	CEDAR CREEK RD MAP SHEET
21	HORIZONTAL ALIGNMENT DATA DOUBLE CULVERT RD
22	HORIZONTAL ALIGNMENT DATA CEDAR CREEK RD
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35 - 40	MINOR DRAINAGE AREA MAPDOUBLE CULVERT RD
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47	CULVERT HYDRAULIC DATA
48 - 51	DITCH HYDRAULIC CALCULATIONS
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53	DRIVEWAY CULVERT SUMMARY CEDAR CREEK RD
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80	DRIVEWAY SUMMARY DOUBLE CULVERT RD
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98 - 99	TRAFFIC CONTROL PLAN NARRATIVE
100	TRAFFIC CONTROL PLAN TYPICAL SECTIONS
101 - 102	TRAFFIC CONTROL PLAN DETOUR LAYOUT DOUBLE CULVERT RD
103 - 104	TRAFFIC CONTROL PLAN DETOUR LAYOUT CEDAR CREEK RD
105 - 111	TRAFFIC CONTROL PLAN DOUBLE CULVERT RD PHASE 0
112 - 118	TRAFFIC CONTROL PLAN DOUBLE CULVERT RD PHASE 1
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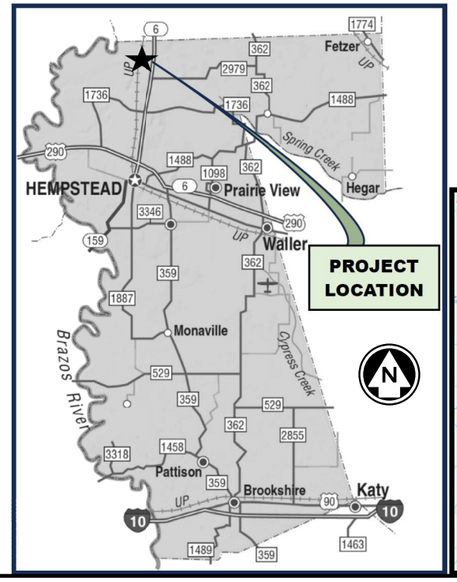
JOHN A. AMSLER
COMMISSIONER *PRECINCT 1*

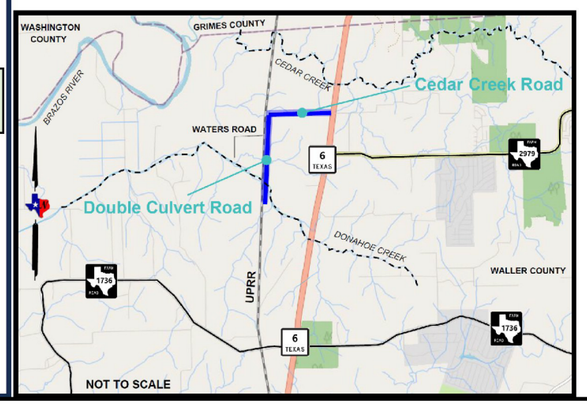
KENDRIC D. JONES
COMMISSIONER *PRECINCT 3*

CARBETT J. DUHON III
COUNTY JUDGE

WALTER E. SMITH
COMMISSIONER *PRECINCT 2*

JUSTIN BECKENDORFF
COMMISSIONER *PRECINCT 4*





AUGUST 2026

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

ROY M. DILL
84626
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS

R. M. Dill, P.E.
7/28/2026

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

100% SUBMITTAL

GENERAL NOTES

1. THE CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS BEFORE BEGINNING CONSTRUCTION.
2. NOTIFY THE COUNTY ENGINEER IMMEDIATELY IF DISCREPANCIES ARE DISCOVERED IN THE HORIZONTAL CONTROL OR BENCHMARK DATA.
3. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING SECURITY TO PROTECT THE PROJECT SITE, CONTRACTOR PROPERTY, EQUIPMENT, AND WORK.
4. THE CONTRACTOR IS RESPONSIBLE FOR CLEANING STREETS OF CONSTRUCTION DIRT AND DEBRIS AT CLOSE OF EACH WORK DAY.
5. THE CONDITION OF THE ROAD AND/OR RIGHT-OF-WAY, UPON COMPLETION OF THE PROJECT SHALL BE AS GOOD OR BETTER THAN PRIOR TO STARTING WORK.
6. PRIOR TO CONSTRUCTION, THE CONTRACTOR, ALONG WITH CONCURRENCE FROM THE ENGINEER, SHALL AGREE TO LAY-DOWN AND/OR STAGING AREA LOCATIONS.
7. THE CONTRACTOR SHALL NOTIFY ALL PROPERTY OWNERS A MINIMUM OF 24 HOURS PRIOR TO BLOCKING DRIVEWAYS OR ENTERING UTILITY EASEMENTS. ACCESS TO DRIVEWAYS SHALL BE MAINTAINED AT ALL TIMES.
8. TRAFFIC INGRESS AND EGRESS FOR DRIVEWAYS AND PEDESTRIAN ACCESS FACILITIES SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION WITH ALL WEATHER SURFACES.
9. THE CONTRACTOR SHALL REMOVE ANY FENCES, POSTS, MAILBOXES, PLANTERS, PERMANENT TRASH CONTAINERS, CULVERTS, ETC. OR SECTIONS THEREOF, THAT ENCROACH WITHIN THE COUNTY'S RIGHT-OF-WAY. MAILBOXES SHALL BE REPLACED IN ACCORDANCE WITH THE PLANS.

   ANY DAMAGE CAUSED BY THE CONTRACTOR TO SUCH ITEMS LOCATED OUTSIDE OF THE COUNTY'S RIGHT-OF-WAY, SHALL BE REPLACED WITH LIKE-KIND OR BETTER AT THE CONTRACTOR'S EXPENSE. ALSO, IF THESE ITEMS ARE LOCATED WITHIN THE PROJECT RIGHT-OF-WAY AND ARE DESIGNATED TO REMAIN, ANY DAMAGE CAUSED BY THE CONTRACTOR TO SUCH ITEMS, SHALL BE REPLACED WITH LIKE-KIND OR BETTER AT THE CONTRACTOR'S EXPENSE.

   TREES, BUSHES, SHRUBBERY AND OTHER DAMAGED PLANTINGS DESIGNATED TO REMAIN SHALL BE REPLACED WITHIN 72 HOURS OF REMOVAL AND ARE TO BE THOROUGHLY WATERED-IN. PAY IS SUBSIDIARY TO THE PROJECT.
10. PAVED SURFACES, PAVEMENT MARKERS AND MARKINGS SHALL BE PROTECTED FROM DAMAGE BY TRACKED EQUIPMENT.
11. IRON RODS DISTURBED DURING CONSTRUCTION ARE TO BE REPLACED BY A REGISTERED PROFESSIONAL LAND SURVEYOR FOR THE ORIGINAL PROPERTY OWNER. COST IS SUBSIDIARY TO THE PROJECT.
12. CONSTRUCTION STAKING WILL BE PROVIDED BY THE CONTRACTOR. TWO COPIES OF STAKING NOTES TO BE PROVIDED TO THE ENGINEER PRIOR TO CONSTRUCTION.
13. THE CONTRACTOR SHALL MAINTAIN UPDATED RED-LINED RECORD DRAWINGS ON SITE FOR INSPECTION BY THE ENGINEER. RECORD DRAWING SHALL BE SUBMITTED AT COMPLETION OF THE PROJECT.
14. MOWING, MAINTENANCE, AND CLEAN-UP IS REQUIRED FOR THE PROJECT LIMITS AND DURATION, REGARDLESS OF THE CONTRACTOR'S SCOPE OF ACTIVITIES WITHIN THE PROJECT LIMITS.
15. THE REMOVAL OF ANY ABANDONED UTILITIES REQUIRED TO COMPLETE THE WORK SHALL BE INCIDENTAL AND COST SHALL BE SUBSIDIARY TO THE PREOJCT.
16. IT IS THE CONTRACTOR'S RESPONSIBILITY TO STOCKPILE NECESSARY MATERIAL ON-SITE OR AT A SECURED OFF-SITE LOCATION AT NO ADDITIONAL EXPENSE TO WALLER COUNTY. ANY SUITABLE EXCAVATED MATERIAL ON THE PROJECT WHICH IS AVAILABLE AT THE TIME OF NEED; WHETHER FROM STORM SEWER, ROADWAY, AND/OR CHANNEL EXCAVATION, SHALL BE USED BEFORE BORROW IS BROUGHT ON-SITE.
17. MILLINGS COLLECTED FROM PROJECT SITE ARE TO BE TRANSPORTED AND DEPOSITTED AT THE LOCATION KLOECKER ROAD AND HEISE ROAD.
18. MANHOLES, JUNCTION BOXES, INLETS, AND RISERS ARE TO BE PRE-CAST OR CAST IN PLACE.
19. POP UP DRAINS ARE NOT ALLOWED IN WALLER COUNTY RIGHT OF WAY.
20. CONTRACTOR IS RESPONSIBLE FOR CONTACTING UTILITY COMPANIES IN ORDER TO PREVENT DAMAGE TO PIPELINES FROM CONSTRUCTION EQUIPMENT.
21. BIDDERS ARE REQUESTED TO VISIT THE VICINITY OF THE PROJECT SITE AND EVALUATE THE EXISTING SITE CONDITIONS.
22. IN THOSE INSTANCES WHERE FIXED FEATURES REQUIRE, THE GOVERNING SLOPES INDICATED HEREIN MAY BE VARIED BETWEEN THE LIMITS SHOWN AND TO THE EXTENT DETERMINED BY THE ENGINEER.
23. CONTRACTOR SHALL ESTABLISH GRADE STREET INTERSECTIONS AND MEDIAN OPENINGS FOR ADEQUATE SURFACE DRAINAGE.
24. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MARKING STATIONS EVERY 100 FEET AND SHALL MAINTAIN THE MARKINGS FOR THE DURATION OF THE PROJECT.
25. THE APPROXIMATE LOCATIONS OF KNOWN UNDERGROUND UTILITIES HAVE BEEN SHOWN ON THE PLAN SHEETS. PRIOR TO BEGINNING ANY EXCAVATION WORK INTHE AREA OF EXISTING UTILITIES, THE CONTRACTOR SHALL CONTACT THE UTILITY COMPANIES OR THE UTILITY COORDINATING COMMITTEE FOR EXACT LOCATIONS TO PREVENT ANY DAMAGE OR INTERFERENCE WITH PRESENT FACILITIES. THE UTILITY COORDINATING COMMITTEE AND THE TEXAS ONE CALL SYSTEM SHALL BE NOTIFIED AT THE FOLLOWING NUMBER: OUTSIDE HMA, TOLL FREE 1-800-245-4545

   THIS ACTION, HOWEVER, SHALL IN NO WAY BE INTERPRETED AS RELIEVING THE CONTRACTOR OF THEIR RESPONSIBILITIES UNDER THE TERMS OF THE CONTRACT AS SET OUT IN THE PLANS AND SPECIFICATIONS. THE CONTRACTOR SHALL REPAIR ANY DAMAGE CAUSED BY THEIR OPERATIONS AT THE CONTRACTOR'S EXPENSE AND SHALL RESTORE FACILITIES TO SERVICE IN A TIMELY MANNER.

   IF ANY OVERHEAD OR UNDERGROUND POWER LINES NEED TO BE DE-ENERGIZED, THE CONTRACTOR SHALL CALL THE POWER COMPANY TO DO THIS WORK. ANY COST ASSOCIATED WITH DE-ENERGIZING THE POWER LINE AND/OR ANY OTHER PROTECTIVE MEASURES REQUIRED SHALL BE AT THE CONTRACTOR'S EXPENSE.

   WHEN THE CONTRACTOR IS WORKING NEAR ANY POWER LINES, IT IS THEIR RESPONSIBILITY TO COMPLY WITH THE APPROPRIATE SECTIONS OF TEXAS STATE LAW AND FEDERAL REGULATIONS RELATING TO THE TYPE OF WORK INVOLVED.

   DO NOT MIX OR STORE MATERIALS, OR STORE OR REPAIR EQUIPMENT, ON BRIDGE DECKS UNLESS AUTHORIZED BY THE COUNTY ENGINEER.
25. PERSONAL VEHICLES OF EMPLOYEES ARE NOT PERMITTED TO PARK WITHIN THE RIGHT OF WAY. EMPLOYEES MAY PARK AT THE CONTRACTOR'S OFFICE, EQUIPMENT, AND MATERIALS STORAGE YARD SITES.
26. CONTRACTOR SHALL ASSUME OWNERSHIP OF DEBRIS AND DISPOSE OF AT APPROVED LOCATION. DO NOT DISPOSE OF DEBRIS ON PRIVATE PROPERTY UNLESS APPROVED IN WRITING BY COUNTY ENGINEER.
27. THE CONTRACTOR SHALL FIELD VERIFY ALL EXISTING ELEVATIONS AT LOCATIONS WHERE A PROPOSED TO EXISTING TIE-IN IS LOCATED. LIMITS OF WORK MAY BE ADJUSTED AS DIRECTED BY THE ENGINEER IN ORDER TO MATCH EXISTING ROADWAY ELEVATIONS, EXISTING CHANNEL BANKS AND OUTFALLS.
28. CONTRACTOR SHALL SEQUENCE WORK TO MIMINZE IMPACTS TO THE TRAVELLING PUBLIC AND ADJACENT PROPERTY OWNERS.
29. SCHEDULE WORK SO THAT IT LIMITS IMPACTS TO THE PUBLIC AND ADJACENT PROPERTY OWNERS.

    IF THE CONTRACTOR DAMAGES OR CAUSE DAMAGE (BREAKS, LEAKS, NICKS, DENTS, GOUGES, ETC.) TO THE UTILITY, CONTACT THE UTILITY FACILITY OWNER OR OPERATOR IMMEDIATELY.

    NOTIFY THE ENGINEER AT LEAST 48 HOURS BEFORE CONSTRUCTING JUNCTION BOXES AT STORM DRAIN AND UTILITY INTERSECTIONS.

    INSTALL OR REMOVE POLES AND LUMINAIRES LOCATED NEAR OVERHEAD OR UNDERGROUND ELECTRICAL LINES USING ESTABLISHED INDUSTRY AND UTILITY SAFETY PRACTICES. CONSULT THE APPROPRIATE UTILITY COMPANY BEFORE BEGINNING SUCH WORK.

    IF OVERHEAD OR UNDERGROUND POWER LINES NEED TO BE DE-ENERGIZED, CONTACT THE ELECTRICAL SERVICE PROVIDER TO PERFORM THIS WORK. COSTS ASSOCIATED WITH DE-ENERGIZING THE POWER LINES OR OTHER PROTECTIVE MEASURES REQUIRED ARE AT NO EXPENSE TO THE COUNTY.

    IF WORKING NEAR POWER LINES, COMPLY WITH THE APPROPRIATE SECTIONS OF TEXAS STATE LAW AND FEDERAL REGULATIONS RELATING TO THE TYPE OF WORK INVOLVED.

    PERFORM ELECTRICAL WORK IN CONFORMANCE WITH THE NATIONAL ELECTRICAL CODE (NEC) AND STANDARD SHEETS.
30. BEFORE COMMENCING CONSTRUCTION, PREPARE AND SUBMIT A SCHEDULE BASED ON THE SEQUENCE OF WORK AND TRAFFIC CONTROL PLAN SHOWN IN THE CONTRACT. INCLUDE ALL PLANNED WORK ACTIVITIES AND SEQUENCES AND SHOW COMPLETION WITHIN THE NUMBER OF CALENDAR DAYS SPECIFIED. INCORPORATE MAJOR MATERIAL PROCUREMENTS, KNOWN UTILITY RELOCATIONS, AND OTHER ACTIVITIES THAT MAY AFFECT THE COMPLETION OF THE CONTRACT IN THE SCHEDULE. INCLUDE ALL MILESTONES INCLUDING BEGINNING DATE, ENDING DATE, AND DURATION IN NUMBER OF CALENDAR DAYS FOR EACH ACTIVITY. DO NOT USE ACTIVITIES EXCEEDING 30 CALENDAR DAYS, EXCEPT FOR AGREED UPON ACTIVITIES. SHOW AN ESTIMATED PRODUCTION RATE PER CALENDAR DAY FOR EACH WORK ACTIVITY.

    SUBMIT AN UPDATED PROGRESS SCHEDULE MONTHLY, UNLESS OTHERWISE SHOWN IN THE CONTRACT OR AS DIRECTED. UPDATE THE PROGRESS SCHEDULE BY ADDING ACTUAL PROGRESS MADE DURING THE PREVIOUS UPDATE PERIOD, INCLUDING APPROVED CHANGES TO THE SEQUENCE OF WORK AND THE TRAFFIC CONTROL PLAN. IF AN UPDATED PROGRESS SCHEDULE INDICATES THE CONTRACT WILL NOT BE COMPLETED WITHIN THE NUMBER OF CALENDAR DAYS SPECIFIED, NOTIFY THE ENGINEER IN WRITING WHETHER THE CONTRACTOR WILL REVISE THE PROGRESS SCHEDULE TO MEET THE NUMBER OF CALENDAR DAYS SPECIFIED OR EXCEED THE NUMBER OF CALENDAR DAYS SPECIFIED.

    NO DIRECT COMPENSATION WILL BE MADE FOR FULFILLING THESE REQUIREMENTS, AS THIS WORK IS CONSIDERED SUBSIDIARY TO THE ITEMS OF THE CONTRACT.

    CALENDAR DAYS WILL BE CHARGED SUNDAY THROUGH SATURDAY, INCLUDING ALL HOLIDAYS, REGARDLESS OF WEATHER CONDITIONS, MATERIAL AVAILABILITY, OR OTHER CONDITIONS NOT UNDER THE CONTROL OF THE CONTRACTOR. WORK DAYS EQUAL CALENDAR DAYS.
31. ANY GROUNDWATER ELEVATION INFORMATION PROVIDED IS REPRESENTATIVE OF CONDITIONS EXISTING ON THE DAY WHEN AND FOR THE SPECIFIC LOCATION WHERE THIS INFORMATION WAS COLLECTED. THE ACTUAL GROUNDWATER ELEVATION MAY FLUCTUATE WITH TIME, CLIMATIC CONDITIONS, AND CONSTRUCTION ACTIVITY.
32. UTILITY CONTRACTORS MAY BE RELOCATING UTILITY LINES IN TEMPORARY LOCATIONS AND PERMANENT LOCATIONS IN CONJUNCTION WITH PHASED CONSTRUCTION. THE CONTRACTOR WILL PROVIDE AND COORDINATE ACCESS FOR THE VARIOUS UTILITY CONTRACTOR'S CREWS THROUGHOUT THE DURATION OF THE PROJECT.
33. MAINTAIN THE ROADWAY SLOPE STABILITY. MAINTAINING SLOPE STABILITY IS SUBSIDIARY TO THE VARIOUS BID ITEMS.

NOTES:

1. WALLER COUNTY NOTES SUPERSEDE ANY CONFLICTING NOTES.

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY M. DILL
84626
LICENSED PROFESSIONAL ENGINEER

R. M. Dill, P.E.
7/22/2026

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

GENERAL NOTES

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		2

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CONSTRUCTION NOTES

1. CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL PERMITS REQUIRED FROM WALLER COUNTY PRIOR TO COMMENCING CONSTRUCTION OF ANY IMPROVEMENTS WITHIN COUNTY ROAD RIGHTS OF WAY. THE ATTENTION OF PROSPECTIVE BIDDERS IS DIRECTED TO ORDINANCES AND REGULATIONS OF LOCAL MUNICIPAL AND COUNTY GOVERNMENTS AND THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY WHICH MAY BE APPLICABLE ON THIS PROJECT.

2. ALL PAVING IMPROVEMENTS SHALL BE CONSTRUCTED IN ACCORDANCE WITH" WALLER COUNTY SUBDIVISION & DEVELOPMENT REGULATIONS" RELATING TO THE APPROVAL AND ACCEPTANCE OF IMPROVEMENTS IN SUBDIVISIONS AS CURRENTLY AMENDED.

3. ALL WEATHER ACCESS TO EXISTING STREETS AND DRIVEWAYS SHALL BE MAINTAINED AT ALL TIMES.

4. GUIDELINES ARE SET FORTH IN THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES", AS CURRENTLY AMENDED, SHALL BE OBSERVED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ADEQUATE FLAGMEN, SIGNING,STRIPING, AND WARNING DEVICES, ETC., DURING CONSTRUCTION - BOTH DAY AND NIGHT.

5. ALL R1-1 STOP SIGNS SHALL BE A MINIMUM OF 36"X36" WITH DIAMOND GRADE SHEETING PER "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES".

6. SIGN POSTS AND SIGNS ARE TO BE INSTALLED PER WALLER COUNTY APPROVED SIGNAGE DESIGN DRAWINGS.

7. STREET NAME SIGNAGE SHALL BE ON A 9" HIGH SIGN FLAT BLADE W/ REFLECTIVE GREEN BACKGROUND. STREET NAMES SHALL BE UPPER AND LOWERCASE LETTERING WITH UPPERCASE LETTERS OF 6" MINIMUM AND LOWERCASE LETTERS OF 4.5" MINIMUM. THE LETTERS SHALL BE REFLECTIVE WHITE. STREET NAME SIGNS SHALL BE MOUNTED ON STOP SIGN POST.

8. THE PROJECT AND ALL PARTS THEREOF SHALL BE SUBJECT TO INSPECTION FROM TIME TO TIME BY INSPECTORS DESIGNATED BY WALLER COUNTY. NO SUCH INSPECTIONS SHALL RELIEVE THE CONTRACTOR OF ANY OF ITS OBLIGATIONS HEREUNDER. NEITHER FAILURE TO INSPECT NOR FAILURE TO DISCOVER OR REJECT ANY OF THE WORK AS NOT IN ACCORDANCE WITH THE DRAWINGS AND SPECIFICATIONS. REQUIREMENTS AND SPECIFICATIONS OF WALLER COUNTY OR ANY PROVISION OF THIS PROJECT SHALL BE CONSTRUED TO IMPLY AN ACCEPTANCE OF SUCH WORK OR TO RELIEVE THE CONTRACTOR OF ANY OF ITS OBLIGATIONS HEREUNDER.

9. STABILIZED SUBGRADE: DETERMINE THE THICKNESS OF THE STABILIIZED SUBGRADE AFTER CURING AND COMPACTION. IF THE SUBGRADE DEPTH IS GREATER THAN THE PROPOSED THICKNESS BY 20% OR MORE. THE CMT LAB MUST PROVIDE VERIFICATION THE PERCENTAGE OF MATERIAL BEING USED TO STABILIZE THE SUBGRADE MEETS OR EXCEEDS PROJECT REQUIREMENTS. TEST RESULTS REQUIRED.

TRAFFIC CONTROL PLAN NOTES

1. THE CONTRACTOR SHALL PROVIDE AND INSTALL TRAFFIC CONTROL DEVICES IN CONFORMANCE WITH PART VI OF THE MOST RECENT EDITION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES AND THE APPROVED TRAFFIC CONTROL PLAN.

2. UNIFORMED PEACE OFFICERS OR FLAGGERS IN RADIO CONTACT ARE REQUIRED TO DIRECT TRAFFIC DURING LANE CLOSURES AS INDICATED ON THE PLANS.

3. DETOURS REQUIRE PRIOR APPROVAL OF THE ENGINEER. DETOUR PLANS, IF ALLOWED, MUST INCLUDE APPROPRIATE DETOUR SIGNAGE, PUBLIC NOTICE VIA SIGNAGE TWO WEEKS IN ADVANCE STATING THE DATES OF THE AGREED UPON DATE OF CLOSURE AND DATE THE ROAD WILL RE-OPEN TO TRAFFIC. CONTRACTOR TO USE (WITH PRIOR APPROVAL OF THE ENGINEER) VARIOUS CONSTRUCTION METHODS TO MINIMIZE THE DURATION OF THE DETOUR AND TO ENSURE THAT THE ROADWAY IS OPEN ON, OR PRIOR TO, THE AGREED UPON DATE.

4. ONE DAY PRIOR TO THE IMPLEMENTATION OF A TRAFFIC CONTROL PLAN PHASE OR STEP, OR THE IMPLEMENTATION OF AN ADDITIONAL, REVISED, OR NEW TRAFFIC CONTROL ELEMENT, THE CONTRACTOR SHALL MEET WITH THE ENGINEER TO GIVE A DETAILED DESCRIPTION OF THE CONTRACTOR'S PLAN AND PREPARATIONS. THE CONTRACTOR SHALL OBTAIN WRITTEN CONCURRENCE FROM THE ENGINEER THAT ADEQUATE PROJECT PROGRESS HAS BEEN ACHIEVED AND THAT ADEQUATE PREPARATIONS ARE IN PLACE PRIOR TO SWITCHING TRAFFIC. IF, IN THE OPINION OF THE ENGINEER, REQUIRED PROGRESS AND ADEQUATE PREPARATIONS ARE NOT COMPLETE, THE CONTRACTOR SHALL NOT IMPLEMENT THE NEXT PHASE, STEP, OR ELEMENT OF TRAFFIC CONTROL UNTIL INCOMPLETE CONSTRUCTION ITEMS OR PREPARATIONS ARE COMPLETED. TIME EXTENSIONS WILL NOT BE GRANTED FOR DELAYS CAUSED BY THE INCOMPLETE CONSTRUCTION ITEMS OR INADEQUATE CONTRACTOR PREPARATIONS REQUIRED TO IMPLEMENT TRAFFIC CONTROL.

5. TRAFFIC CONTROL PER THE CONTRACT IS REQUIRED FOR THE ENTIRE DURATION OF THE PROJECT, INCLUDING THE PUNCHLIST PERIOD. PAYMENT FOR TRAFFIC CONTROL THAT IS PROPERLY INSTALLED FOR LESS THAN A FULL MONTH SHALL BE BASED ON A PERCENTAGE BASIS OF THE TIME INSTALLED. TRAFFIC CONTROL PAYMENTS TO THE CONTRACTOR SHALL END 10 DAYS AFTER SUBSTANTIAL COMPLETION, ALTHOUGH PROPER TRAFFIC CONTROL MUST BE MAINTAINED UNTIL PUNCHLIST COMPLETION.

6. THE PURPOSE OF THE CONSTRUCTION SEQUENCE AND TRAFFIC HANDLING OUTLINED HEREIN IS TO DOCUMENT A VIABLE TCP THAT CAN BE UTILIZED TO CONSTRUCT THE PROJECT. IT IS THE BASIS OF ESTIMATION FOR THE TRAFFIC CONTROL BID ITEMS, AND IS TO BE UTILIZED AND IMPLEMENTED, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

   IF THE CONTRACTOR CHOOSES TO USE A DIFFERENT TCP, THE ALTERNATIVE TCP SHALL BE SUBMITTED TO THE COUNTY FOR APPROVAL NO LESS THAN 10 WORKING DAYS PRIOR TO THE PROPOSED IMPLEMENTATION DATE. THE TCP SHALL BE DRAWN TO SCALE AND SIGNED & SEALED BY A PROFESSIONAL ENGINEER LICENSED TO PRACTICE IN THE STATE OF TEXAS. UPON APPROVAL BY WALLER COUNTY, THE ALTERNATIVE PLAN SHALL BECOME THE BASIS FOR A "CHANGE IN CONTRACT" TO REVISE THE TRAFFIC CONTROL BID ITEMS ACCORDINGLY AND BECOME PART OF THE CONTRACT DOCUMENTS.

7. ALL TEMPORARY PAVEMENT MARKINGS ON PERMANENT PAVEMENT SHOULD BE TABS.

8. TRAFFIC PATTERN CHANGES REQUIRE CHANGEABLE MESSAGE BOARDS PLACED AT LEAST 2 WEEKS IN ADVANCE OF PROPOSED CHANGE. QUANTITY, PLACEMENT AND WORDING TBD BY WALLER COUNTY.

UTILITY GENERAL NOTES

AT&T TEXAS/SWBT FACILITIES

1. THE LOCATIONS OF AT&T TEXAS/SWBT FACILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION BEFORE COMMENCING WORK. HE AGREES TO BE FULLY RESPONSIBLE FOR ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THIS FAILURE TO EXACTLY LOCATE AND PRESERVE THESE UNDERGROUND UTILITIES.

2. THE CONTRACTOR SHALL CALL 1-800-344-8377 (TEXAS 811) A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION TO HAVE UNDERGROUND LINES FIELD LOCATED.

3. WHEN EXCAVATING WITHIN EIGHTEEN INCHES (18") OF THE INDICATED LOCATION OF AT&T TEXAS/SWBT FACILITIES, ALL EXCAVATIONS MUST BE ACCOMPLISHED USING NON-MECHANIZED EXCAVATION PROCEDURES. WHEN BORING, THE CONTRACTOR SHALL EXPOSE THE AT&T TEXAS/SWBT FACILITIES.

4. WHEN AT&T TEXAS/SWBT FACILITIES ARE EXPOSED, THE CONTRACTOR WILL PROVIDE SUPPORT TO PREVENT DAMAGE TO THE CONDUIT DUCTS OR CABLES. WHEN EXCAVATING NEAR TELEPHONE POLES THE CONTRACTOR SHALL BRACE THE POLE FOR SUPPORT.

5. THE PRESENCE OR ABSENCE OF AT&T TEXAS/SWBT UNDERGROUND CONDUIT FACILITIES OR BURIED CABLE FACILITIES SHOWN ON THESE PLANS DOES NOT MEAN THAT THERE ARE NO DIRECT BURIED CABLES OR OTHER CABLES IN CONDUIT IN THE AREA.

6. PLEASE CONTACT THE AT&T TEXAS DAMAGE PREVENTION MANAGER KEVIN RAY AT (713) 614-1983 OR E-MAIL HIM AT KR7896@ATT.COM IF CABLE LOCATE REQUESTS ARE NOT COMPLETED FOR OUR AT&T TEXAS/SWBT FACILITIES.

SAN BERNARD ELECTRIC COOPERATIVE (SBEC)

1. SBEC HAS FACILITIES WITHIN THE PROJECT LIMITS. THE CONTRACTOR SHALL CONTACT SBEC PRIOR TO PERFORMING ANY WORK IN THE VICINITY OF THEIR FACILITIES. NO WORK THAT MAY IMPACT SBEC FACILITIES SHALL BEGIN WITHOUT COORDINATION AND APPROVAL. DAMAGE TO SBEC FACILITIES CAUSED BY CONTRACTOR OPERATIONS WILL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.

ENERGY TRANFER CO. – PIPELINE

REVIEW PIPELINE OWNER GUIDELINES AND EXECUTED LETTER OF NO OBJECTION (LONO).

NO EXCAVATION SHALL OCCUR IN THE VICINITY OF ET'S PIPELINE FACILITIES UNTIL:

1. IN ACCORDANCE WITH THE STATE APPROVED NOTIFICATION CENTERS, ET SHALL BE NOTIFIED AT LEAST 48 HOURS IN ADVANCE OF ANY CONSTRUCTION OR MAINTENANCE ACTIVITY. YOU MUST CONTACT THE STATE APPROVED NOTIFICATION CENTER AT 811. BEFORE COMMENCING ANY CROSSING AT OR NEAR ET'S PIPELINE FACILITY YOU MUST CONTACT ET'S FIELD REPRESENTATIVE(S) LISTED BELOW:

A. DANNY CHAVIN 832-370-3176 DANNY.CHAVIN@ENERGYTRANSFER.COM

2. AN ET REPRESENTATIVE WILL BE ON SITE TO MONITOR EXCAVATION ACTIVITIES.

NOTES:

1. WALLER COUNTY NOTES SUPERSEDE ANY CONFLICTING NOTES.

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY M. DILL
84626
LICENSED
PROFESSIONAL ENGINEER

R. M. Dill, P.E.
7/28/2026

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

GENERAL NOTES

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		3

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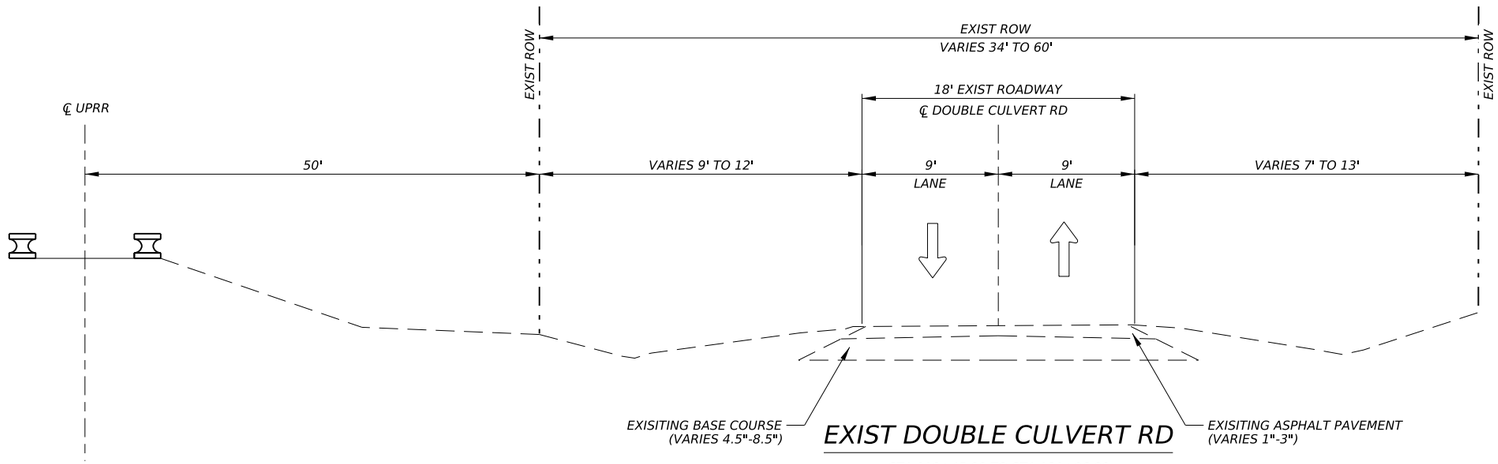
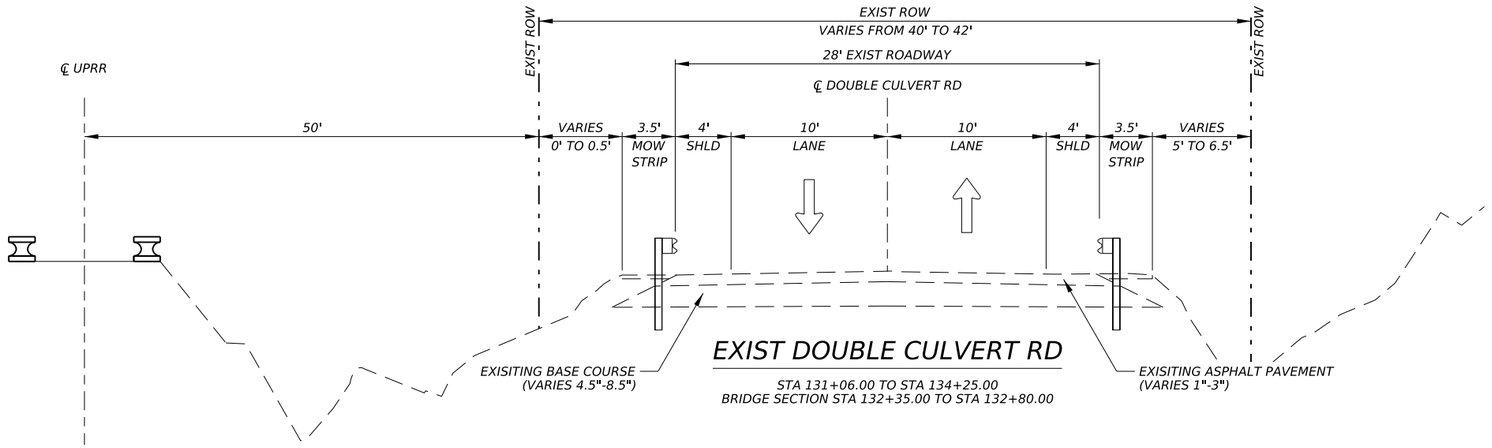


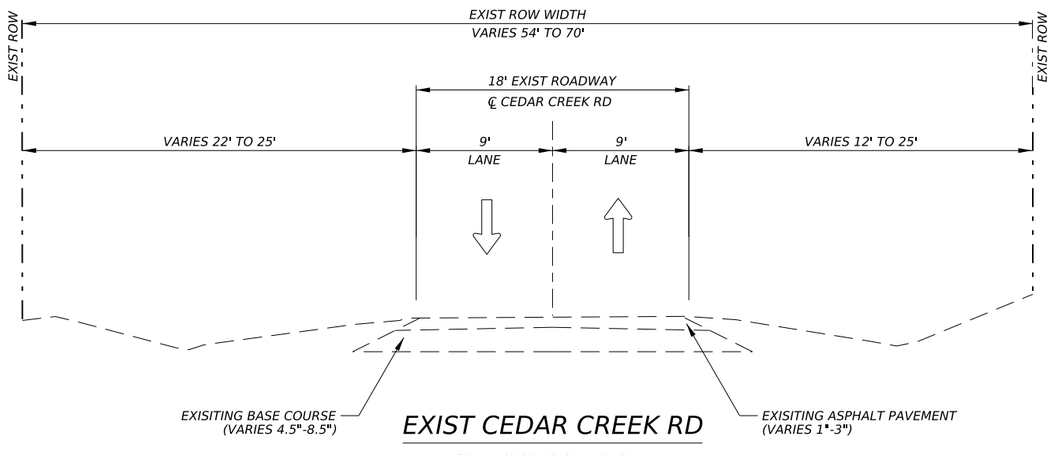
EXIST DOUBLE CULVERT RD

STA 118+45.00 TO STA 131+06.00
STA 134+25.00 TO STA 185+68.87



EXIST DOUBLE CULVERT RD

STA 131+06.00 TO STA 134+25.00
BRIDGE SECTION STA 132+35.00 TO STA 132+80.00



EXIST CEDAR CREEK RD

STA 1+67.30 TO STA 49+65.41

NOTES:

1. SECTION CONTAINING BRIDGE STA 132+35 TO STA 132+80 NOT SHOWN. NO WORK TO BE PERFORMED.

NOT TO SCALE

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY W. DILL
84626
LICENSED
PROFESSIONAL ENGINEER

R. W. Dill, P.E.
7/28/2026

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THE STATE OF TEXAS
WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

EXISTING TYPICAL SECTIONS

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		4

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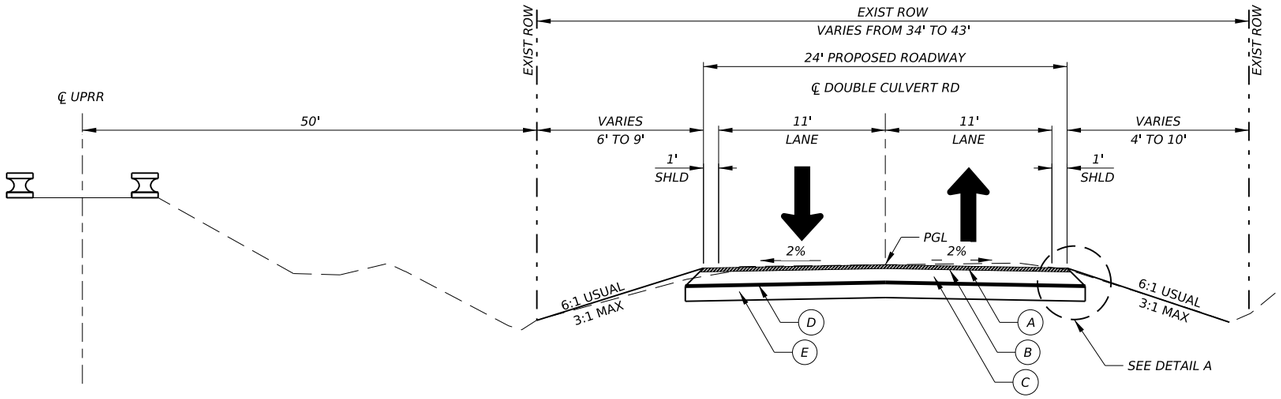
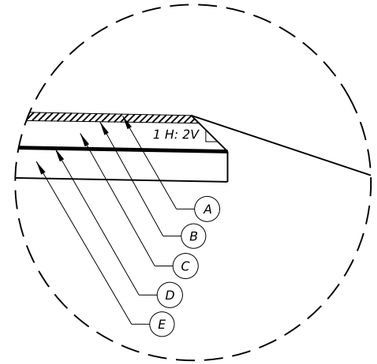
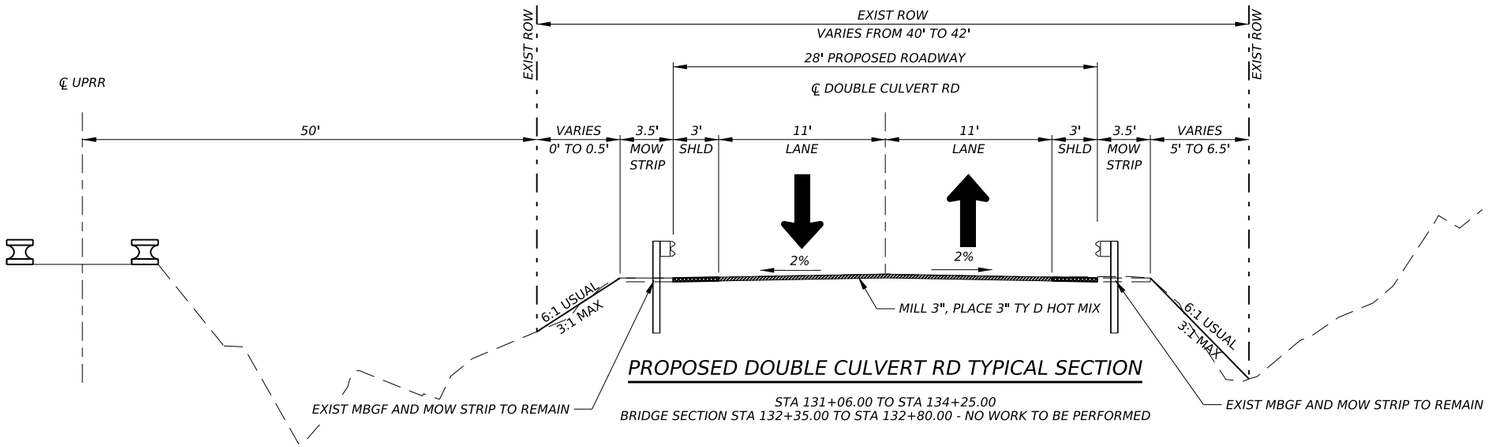


PROPOSED DOUBLE CULVERT RD TYPICAL SECTION

STA 118+45.00 TO STA 131+06.00

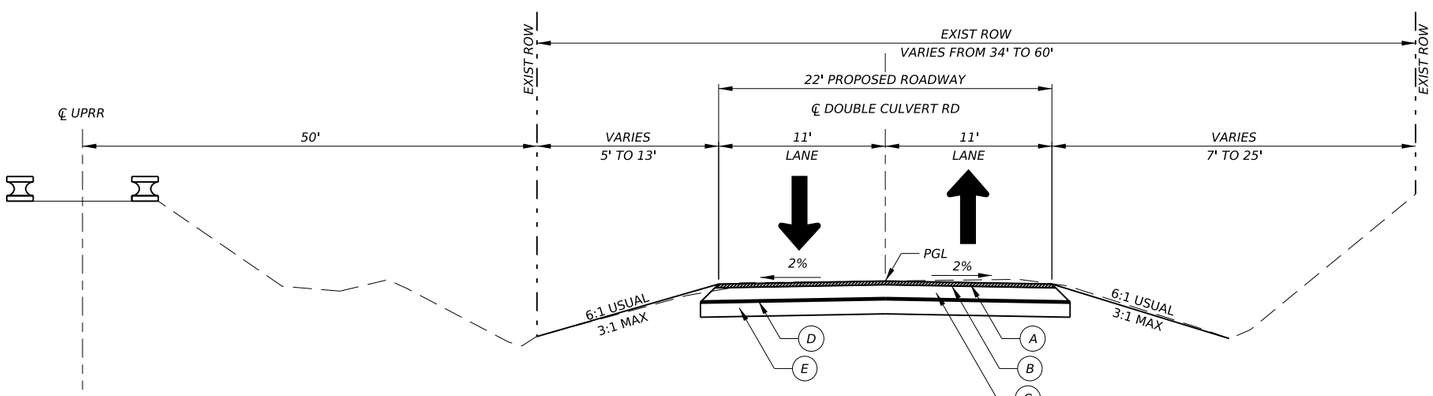


DETAIL A



PROPOSED DOUBLE CULVERT RD TYPICAL SECTION

STA 131+06.00 TO STA 134+25.00
BRIDGE SECTION STA 132+35.00 TO STA 132+80.00 - NO WORK TO BE PERFORMED



PROPOSED DOUBLE CULVERT RD TYPICAL SECTION

STA 134+25.00 TO STA 185+68.87

LEGEND

- EXISTING ROW
- PROPOSED DIRECTION OF TRAFFIC
- (A) 3" TYPE D HOT MIX ASPHALT CONCRETE
- (B) TACK COAT
- (C) 8" BLACK BASE
- (D) PRIME COAT
- (E) 8" LIME STABILIZED SUBGRADE (5% LIME AT 102.6 LB/SY)

NOTES:

1. SECTION CONTAINING BRIDGE STA 132+35 TO STA 132+80 NOT SHOWN. NO WORK TO BE PERFORMED.

NOT TO SCALE

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CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY M. DILL
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THE STATE OF TEXAS
WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

PROPOSED TYPICAL SECTIONS DOUBLE CULVERT RD

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		5

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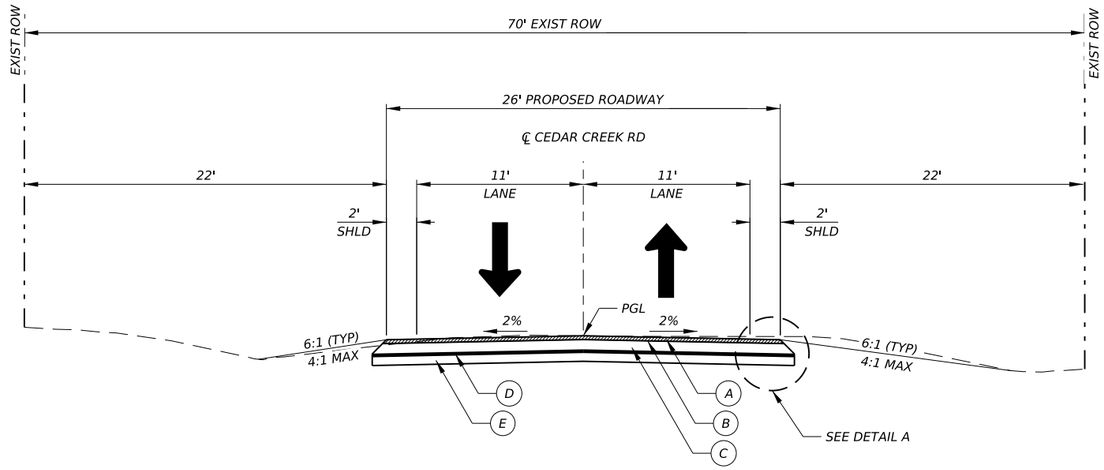
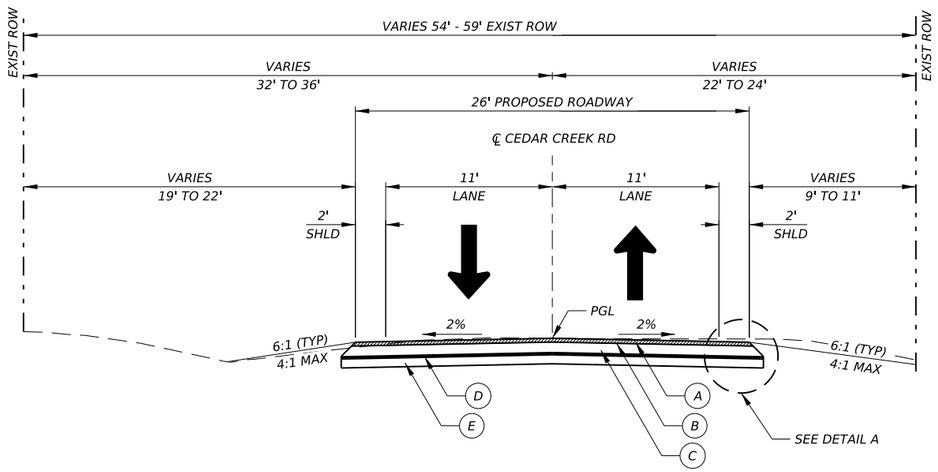


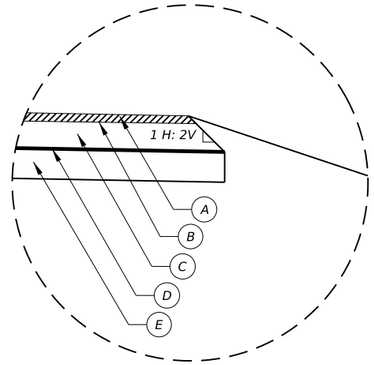
PROPOSED CEDAR CREEK RD TYPICAL SECTION

STA 1+67.30 TO STA 47+81.51



PROPOSED CEDAR CREEK RD TYPICAL SECTION

STA 47+81.51 TO STA 49+65.41



DETAIL A

LEGEND

- EXISTING ROW
- PROPOSED DIRECTION OF TRAFFIC
- (A) 3" TYPE D HOT MIX ASPHALT CONCRETE
- (B) TACK COAT
- (C) 8" BLACK BASE
- (D) PRIME COAT
- (E) 8" LIME STABILIZED SUBGRADE (5% LIME AT 102.6 LB/SY)

NOT TO SCALE

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CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

PROPOSED TYPICAL SECTIONS CEDAR CREEK RD

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD

DIST	COUNTY	SHEET NO.
	WALLER	6

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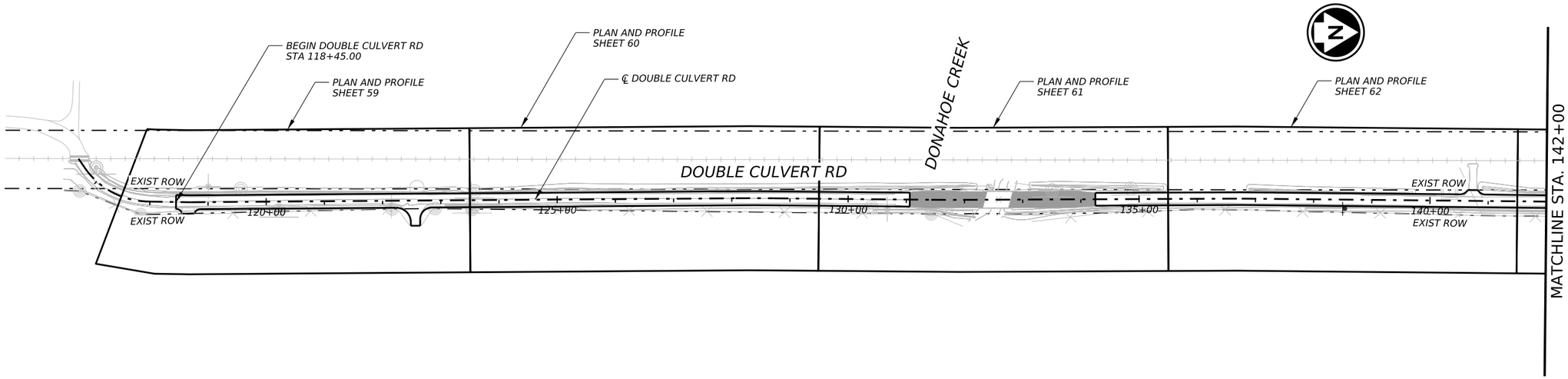

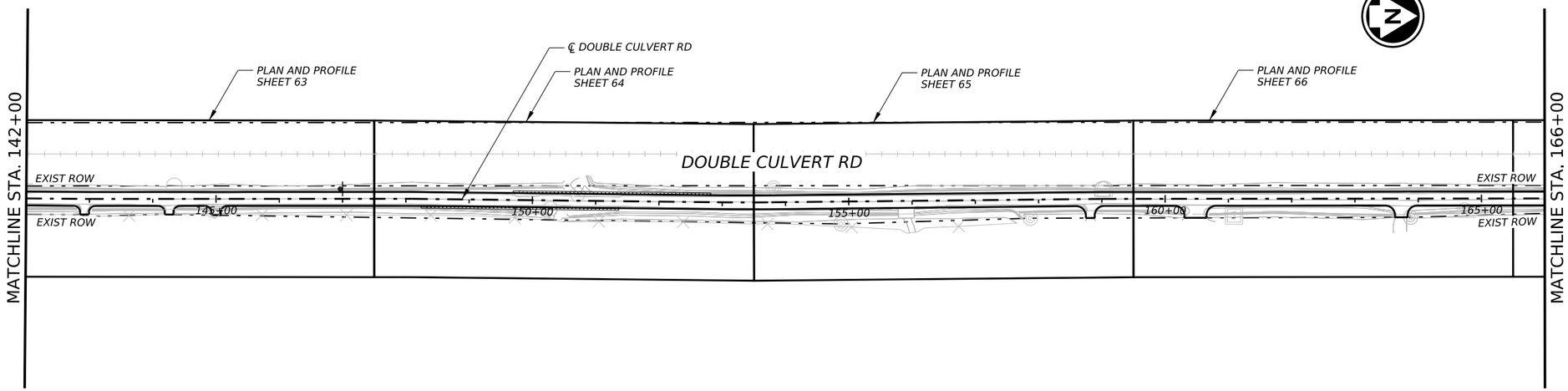

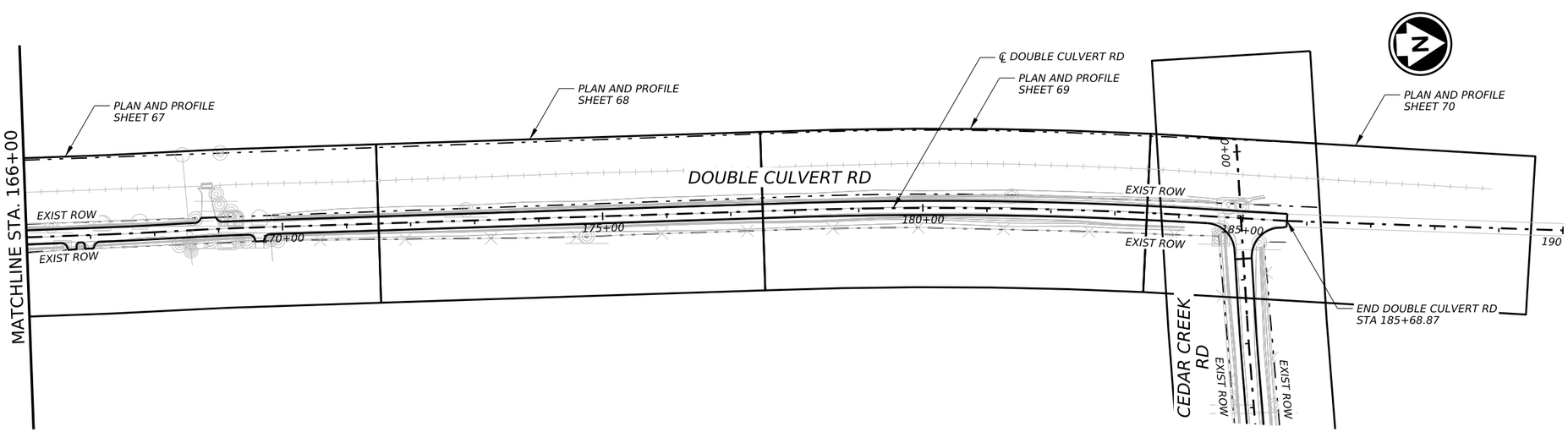

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NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
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STATE OF TEXAS
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THE STATE OF TEXAS
WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

PROJECT LAYOUT DOUBLE CULVERT RD

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		7

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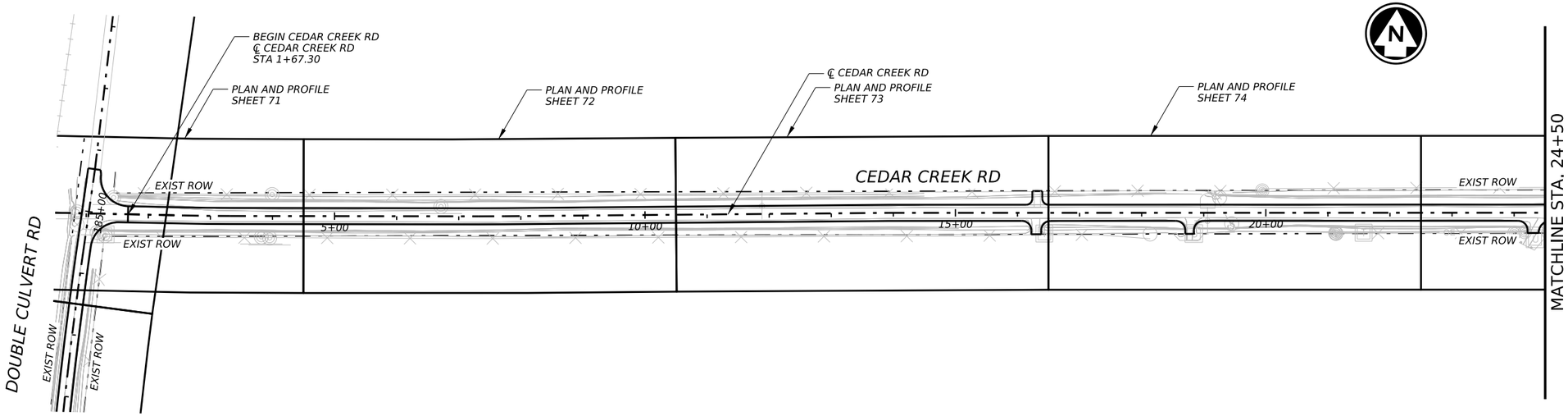

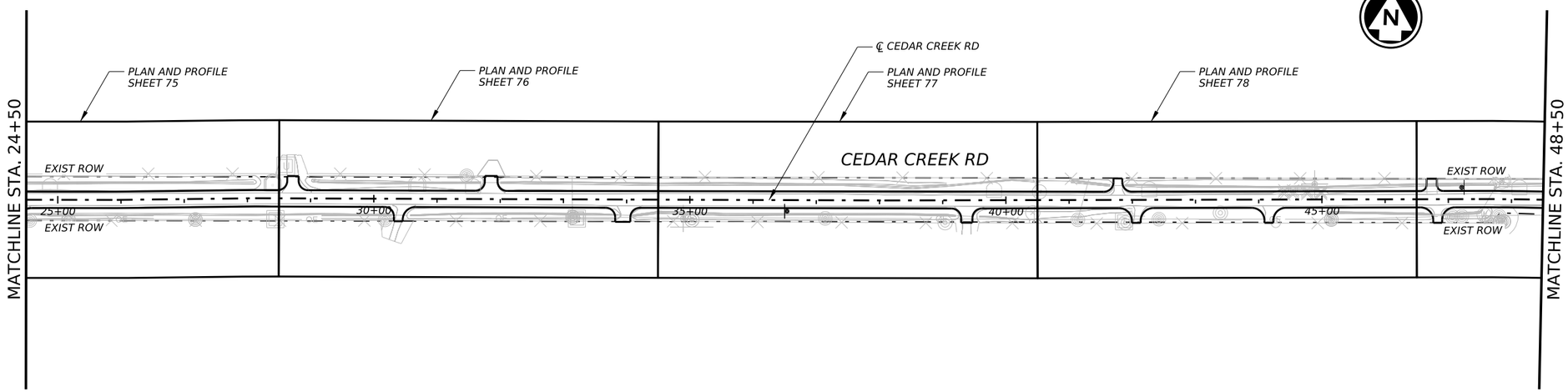

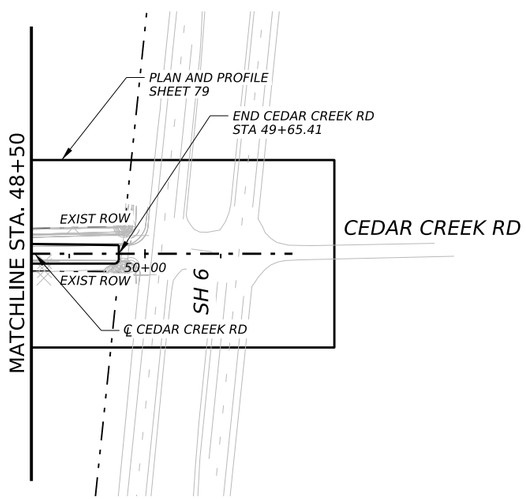

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SCALE: 1" = 200'

NO.	DATE	REVISION	APPROV.

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R. M. Dill, P.E.
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THE STATE OF TEXAS
WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

PROJECT
LAYOUT
CEDAR CREEK RD

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		8

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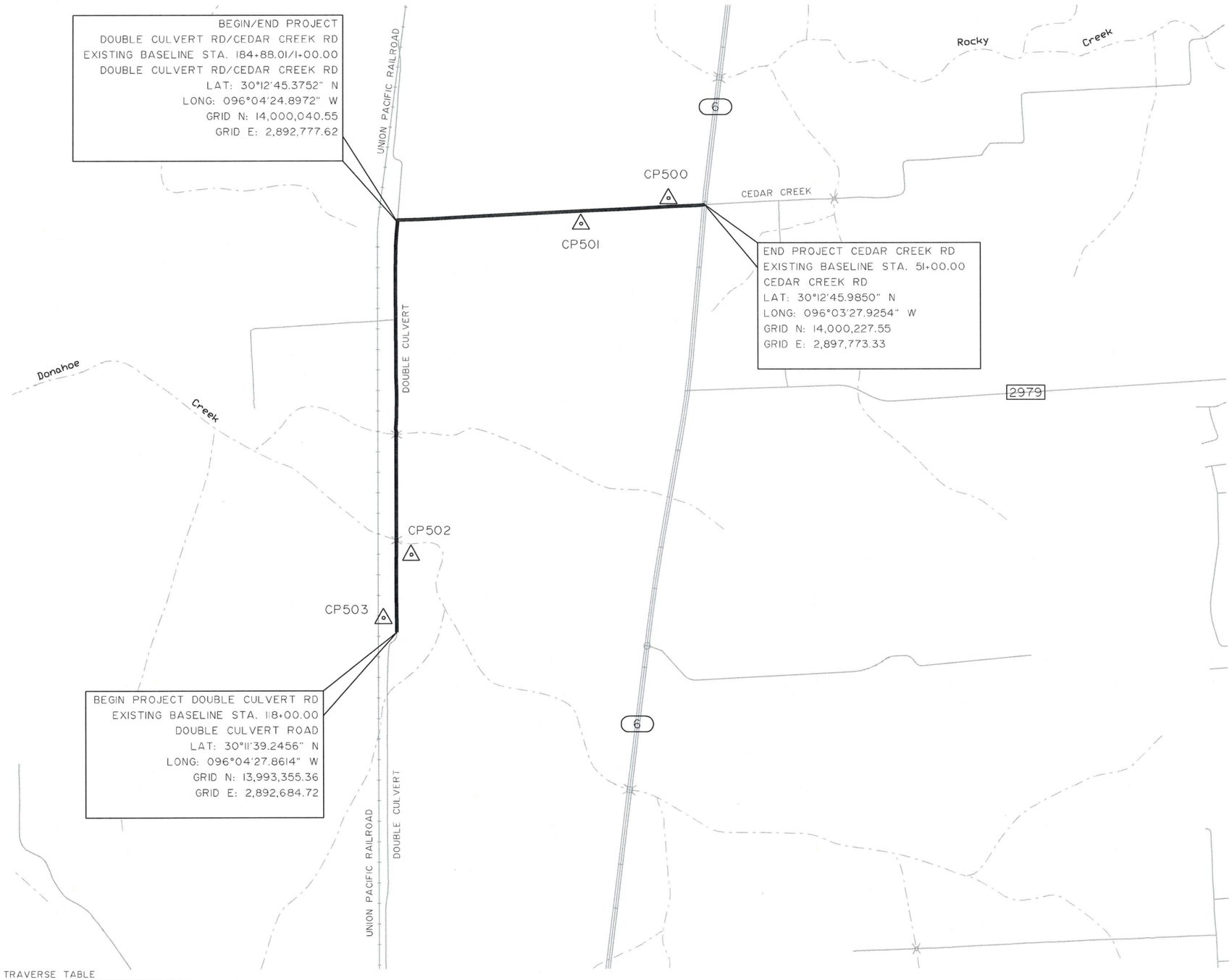

LEGEND

- EXISTING ROW
- PROPOSED DIRECTION OF TRAFFIC
- XX DRIVEWAY NUMBER

N

NOTES:

1. ALL BEARINGS ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM OF 1983, SOUTH CENTRAL ZONE (NAD83, 2011 ADJUSTMENT, EPOCH 2010.00). ESTABLISHED BY TXDOT RTN, HELD NORIZONTAL MONUMENTS "HEMPSTEAD BASE STATION".

2. ALL COORDINATES AND DISTANCES ARE IN US SURVEY FEET DISPLAYED IN SURFACE VALUES WITH THE TXDOT SURFACE ADJUSTMENT FACTOR OF 1.00013.

3. ALL ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) USING GEOID12B. ESTABLISHED BY TXDOT RTN, HELD VERTICAL MONUMENTS "HEMPSTEAD BASE STATION".

0 50' 100'

SCALE: 1" = 50' (22x34)
1" = 100' (11x17)

TRAVERSE TABLE

FROM	TO	BEARING	DISTANCE
CP500	CP501	S 84°37'36" W	1,000.42'
CP502	CP503	S 02°22'44" W	1,167.27'

POINT INFO TABLE

POINT No.	LATITUDE (N)	LONGITUDE (W)	GRID NORTHING	GRID EASTING	SURFACE NORTHING	SURFACE EASTING	ELEVATION	DESCRIPTION
CP500	29°43'12.0157"	094°59'37.4707"	13,831,114.99	3,239,853.67	13,832,913.03	3,240,274.85	13.91'	CP-5/8" IRON ROD WITH QUIDDITY CONTROL CAP
CP501	29°43'25.7784"	094°59'31.9486"	13,832,521.01	3,240,292.62	13,834,319.23	3,240,713.86	13.52'	CP-5/8" IRON ROD WITH QUIDDITY CONTROL CAP
CP502	29°43'35.9590"	094°59'28.0475"	13,833,560.52	3,240,601.12	13,835,358.88	3,241,022.40	16.07'	CP-5/8" IRON ROD WITH QUIDDITY CONTROL CAP
CP503	29°43'47.9799"	094°59'36.9500"	13,834,747.13	3,239,775.13	13,836,545.65	3,240,196.30	20.21'	CP-5/8" IRON ROD WITH QUIDDITY CONTROL CAP

NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
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DAVID H. SPRADLEY
6035
PROFESSIONAL
LAND SURVEYOR

David H. Spradley 6/12/26

QUIDDITY
Texas Board of Professional Engineers and Land Surveyors Reg. No. 10046100
2322 W. Grand Parkway North, Suite 150 •Katy, Texas 77449 •832.913.4000

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

DOUBLE CULVERT ROAD CONTROL INDEX SHEET

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST		COUNTY	SHEET NO.
		WALLER	9

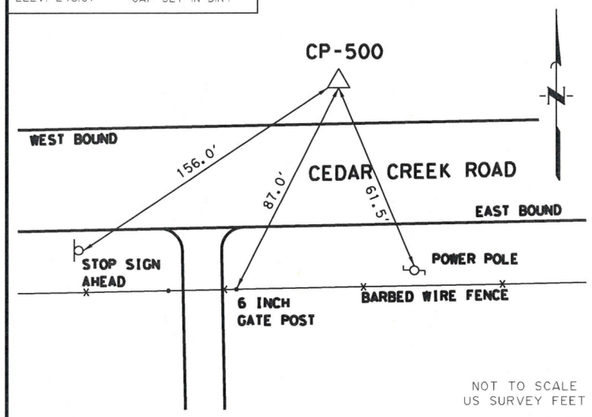
$TIME$
DATE: $DATE$
FILE: $FILE$

100% SUBMITTAL

CP500

N: 14,002,053.70
E: 2,897,537.93
ELEV: 248.67'

DESC: 5/8" IR W/ QUIDDITY CONTROL CAP SET IN DIRT

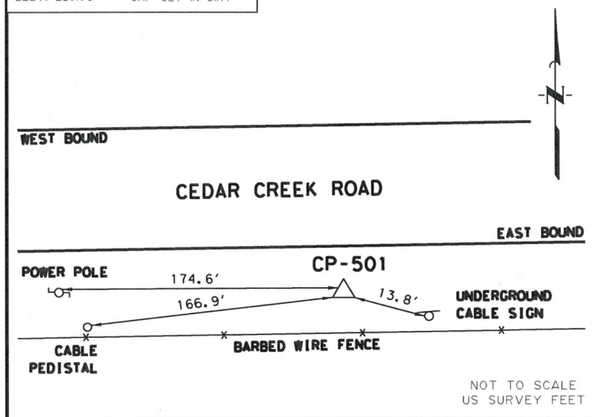


CONTROL POINT CP-500 IS A 5/8" IRON ROD WITH QUIDDITY CONTROL CAP SET IN DIRT, ON THE NORTH SIDE OF CEDAR CREEK ROAD, LOCATED APPROXIMATELY 600' WEST OF STATE HIGHWAY 6.

CP501

N: 14,001,960.01
E: 2,896,541.78
ELEV: 259.90'

DESC: 5/8" IR W/ QUIDDITY CONTROL CAP SET IN DIRT

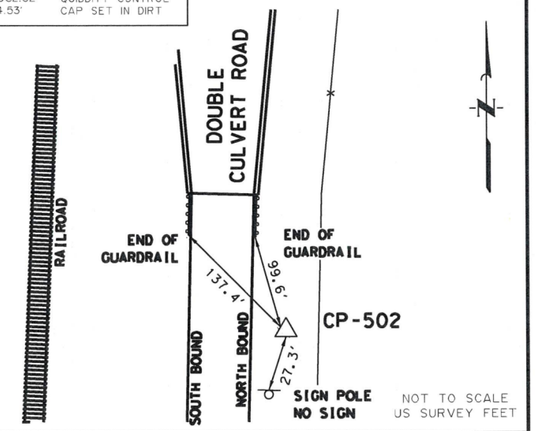


CONTROL POINT CP-501 IS A 5/8" IRON ROD WITH QUIDDITY CONTROL CAP SET IN DIRT, ON THE SOUTH SIDE OF CEDAR CREEK ROAD, LOCATED APPROXIMATELY 1,500' WEST OF STATE HIGHWAY 6.

CP502

N: 13,996,432.76
E: 2,893,082.62
ELEV: 184.53'

DESC: 5/8" IR W/ QUIDDITY CONTROL CAP SET IN DIRT

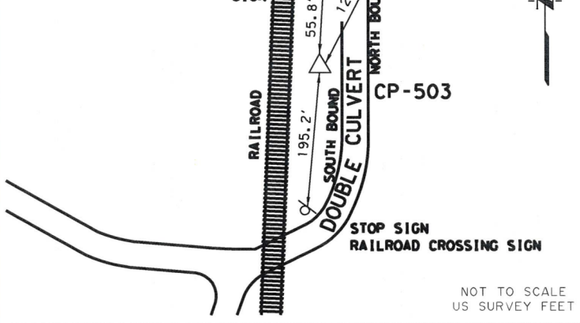


CONTROL POINT CP-502 IS A 5/8" IRON ROD WITH QUIDDITY CONTROL CAP SET IN DIRT, ON THE EAST SIDE OF DOUBLE CULVERT ROAD, LOCATED APPROXIMATELY 3,800' SOUTH OF WATERS ROAD.

CP503

N: 13,995,266.34
E: 2,893,034.16
ELEV: 208.92'

DESC: 5/8" IR W/ QUIDDITY CONTROL CAP SET IN DIRT



CONTROL POINT CP-503 IS A 5/8" IRON ROD WITH QUIDDITY CONTROL CAP SET IN DIRT, ON THE WEST SIDE OF DOUBLE CULVERT ROAD, LOCATED APPROXIMATELY 5,000' SOUTH OF WATERS ROAD.

LEGEND

- EXISTING ROW
- PROPOSED DIRECTION OF TRAFFIC
- XX DRIVEWAY NUMBER

N

NOTES:

1. ALL BEARINGS ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM OF 1983, SOUTH CENTRAL ZONE (NAD83, 2011 ADJUSTMENT, EPOCH 2010.00). ESTABLISHED BY TXDOT RTN, HELD NORIZONTAL MONUMENTS "HEMPSTEAD BASE STATION".

2. ALL COORDINATES AND DISTANCES ARE IN US SURVEY FEET DISPLAYED IN SURFACE VALUES WITH THE TXDOT SURFACE ADJUSTMENT FACTOR OF 1.00013.

3. ALL ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) USING GEOID12B. ESTABLISHED BY TXDOT RTN, HELD VERTICAL MONUMENTS "HEMPSTEAD BASE STATION".

0 50' 100'

SCALE: 1" = 50' (22x34)
1" = 100' (11x17)

NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
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DAVID H. SPRADLEY
6035
PROFESSIONAL
LAND SURVEYOR

David H. Spradley 6/12/26

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WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

DOUBLE CULVERT ROAD
H&V CONTROL SHEET

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST		COUNTY	SHEET NO.
		WALLER	10

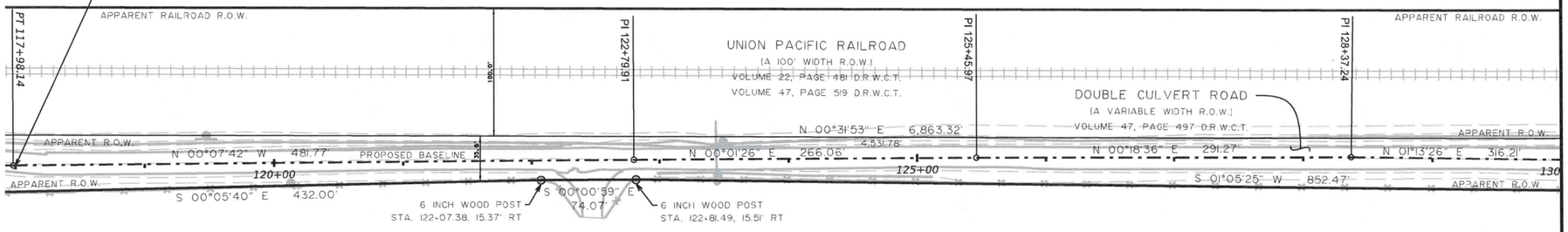
DATE: $DATE$ $TIME$
FILE: $FILE$

100% SUBMITTAL

MC LIN BRACEY SURVEY,
ABSTRACT NUMBER 15

AP 44644 & 45587
CALLED 156.998 ACRES
KIRK FOLKERTS AND WIFE, MANDILYN FOLKERTS
VOLUME 580, PAGE 222 D.R.W.C.T.
EXECUTED FEBRUARY 9, 1998

BEGIN PROJECT
STA. 118+00.00
DOUBLE CULVERT ROAD
GRID N: 13,993,355.36
GRID E: 2,892,684.72



AP 44645
CALLED 49.616 ACRES
CODY THORNTON
DOCUMENT 2201719 O.P.R.W.C.T.
EXECUTED FEBRUARY 10, 2022

MC LIN BRACEY SURVEY,
ABSTRACT NUMBER 15

MATCHLINE BASELINE (STA. 130+00.00)

LEGEND

- EXISTING ROW
- PROPOSED DIRECTION OF TRAFFIC
- XX — DRIVEWAY NUMBER

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4. ABSTRACTING WAS PERFORMED IN OCTOBER 2025.

5. FIELD SURVEYING WAS PERFORMED SEPTEMBER 2025.

6. ALL MEASUREMENTS ARE IN U.S. SURVEY FEET.

7. PRELIMINARY ROW MAP WAS COMPLETED IN APRIL 2026.

8. ** THE MONUMENT DESCRIBED AND SET MAY BE REPLACED WITH A TXDOT TYPE II RIGHT-OF-WAY MARKER UPON COMPLETION OF THE CONSTRUCTION PROJECT UNDER THE SUPERVISION OF A REGISTERED PROFESSIONAL LAND SURVEYOR, EITHER EMPLOYED OR RETAINED BY TXDOT.

0 50' 100'
SCALE: 1" = 50' (22x34)
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WALLER COUNTY ROAD BOND

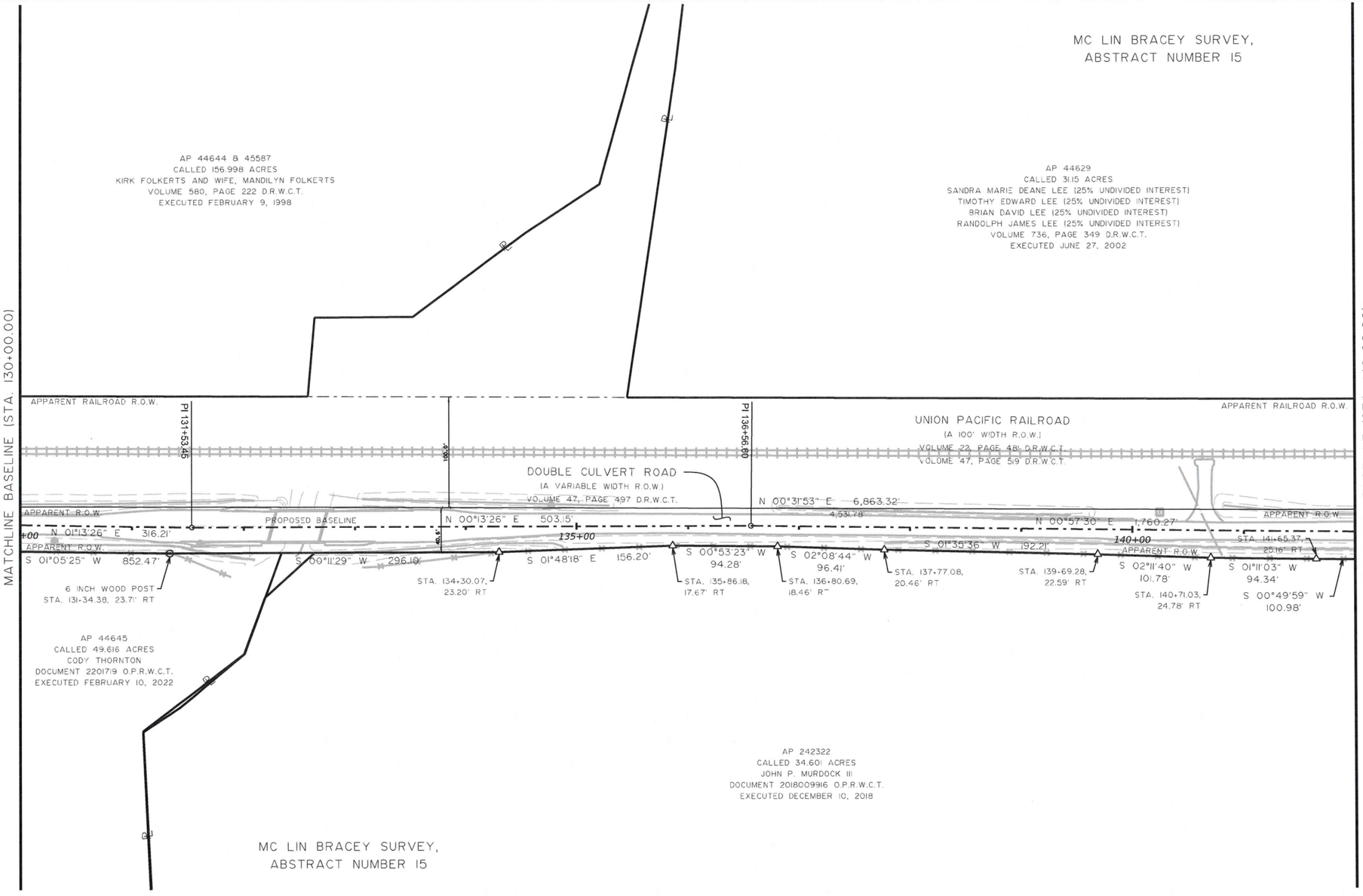
WALLER COUNTY
ENGINEERING DEPARTMENT

DOUBLE CULVERT ROAD
MAP SHEET
STA. 118+00.00 TO STA. 130+00.00
SHEET 1 OF 6

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST		COUNTY	SHEET NO.
		WALLER	11

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

100% SUBMITTAL



LEGEND

- EXISTING ROW
- PROPOSED DIRECTION OF TRAFFIC
- XX DRIVEWAY NUMBER

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WALLER COUNTY ROAD BOND

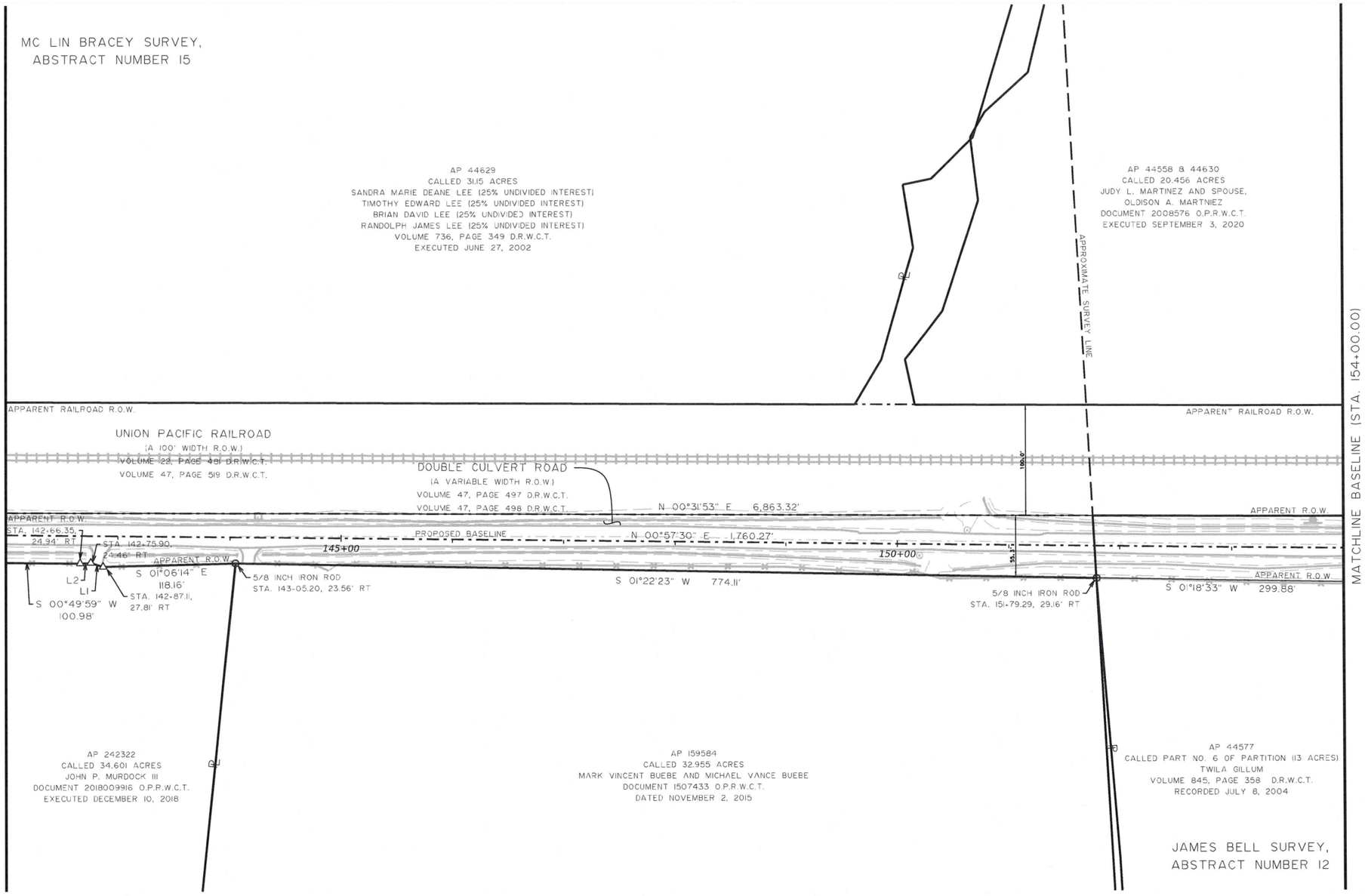
WALLER COUNTY
ENGINEERING DEPARTMENT

DOUBLE CULVERT ROAD
MAP SHEET
STA. 130+00.00 TO STA. 142+00.00
SHEET 2 OF 6

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		12

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

100% SUBMITTAL



LINE TABLE

LINE	BEARING	LENGTH
L1	S 17°36'30" W	11.70'
L2	S 01°55'04" E	9.57'

LEGEND

- EXISTING ROW
- PROPOSED DIRECTION OF TRAFFIC
- (XX) DRIVEWAY NUMBER

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WALLER COUNTY ROAD BOND

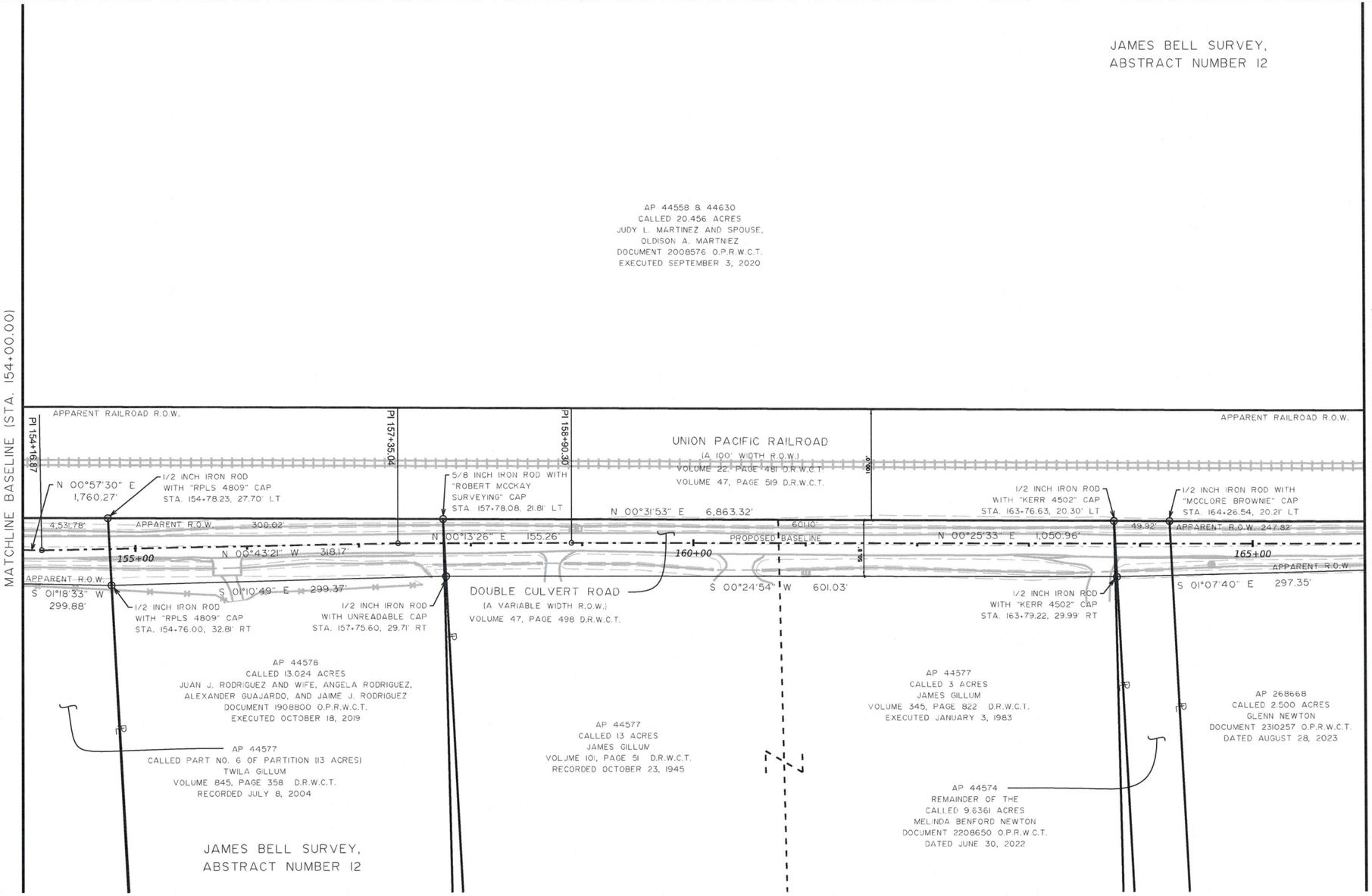
WALLER COUNTY
ENGINEERING DEPARTMENT

DOUBLE CULVERT ROAD
MAP SHEET
STA. 142+00.00 TO STA. 154+00.00
SHEET 3 OF 6

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST		COUNTY	SHEET NO.
		WALLER	13

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

100% SUBMITTAL



LEGEND

- EXISTING ROW
- PROPOSED DIRECTION OF TRAFFIC
- (XX) DRIVEWAY NUMBER

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WALLER COUNTY ROAD BOND

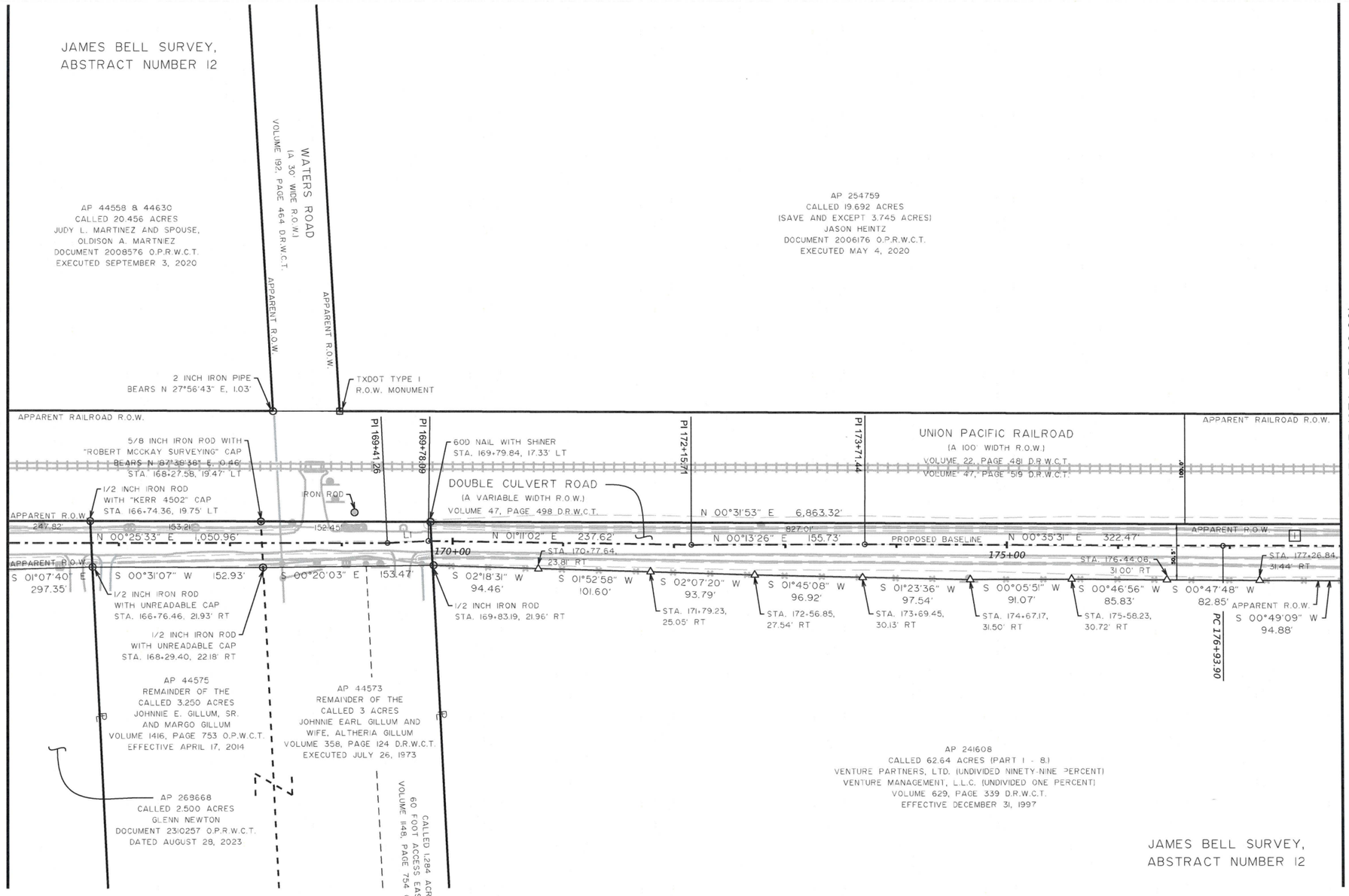
WALLER COUNTY
ENGINEERING DEPARTMENT

DOUBLE CULVERT ROAD
MAP SHEET
STA. 154+00.00 TO STA. 166+00.00
SHEET 4 OF 6

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST		COUNTY	SHEET NO.
		WALLER	14

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

100% SUBMITTAL



LEGEND:

(1)	PARCEL NUMBER FOR R.O.W. ACQUISITION
℄	PROPERTY LINE
AP:	APPRAISAL NUMBER
ESMT	EASEMENT
N.T.S.	NOT TO SCALE
R.O.W.	RIGHT-OF-WAY
D.R.W.C.T.	DEED RECORDS WALLER COUNTY, TEXAS
W.C.C.F.	WALLER COUNTY CLERK'S FILE
O.P.R.W.C.T.	OFFICIAL PUBLIC RECORDS WALLER COUNTY, TEXAS
O.P.R.R.P.W.C.T.	OFFICIAL PUBLIC RECORDS OF REAL PROPERTY WALLER COUNTY, TEXAS

■ : SET 5/8 INCH IRON ROD WITH TXDOT ALUMINUM CAP (UNLESS NOTED OTHERWISE)

□ : FOUND 5/8 INCH IRON ROD WITH TXDOT ALUMINUM CAP (UNLESS NOTED OTHERWISE)

● : SET (AS INDICATED)

○ : FOUND PROPERTY CORNER (AS INDICATED)

△ : CALCULATED POINT

[1]

BASELINE CURVE DATA:

PI STATION:	181+33.80
RADIUS:	8,009.00'
DELTA:	06°17'16" (RT)
LENGTH:	878.92'
TANGET LENGTH:	439.90'
CHORD BEARING:	N 03°22'19" E
CHORD DISTANCE:	878.48'
PI NORTHING:	14,001,507.10
PI EASTING:	2,893,124.99

LINE TABLE

LINE	BEARING	LENGTH
L1	N 02°30'01" W	36.83'

LEGEND

EXISTING ROW

PROPOSED DIRECTION OF TRAFFIC

(XX) DRIVEWAY NUMBER

NOTES:

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0 50' 100'

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WALLER COUNTY ROAD BOND

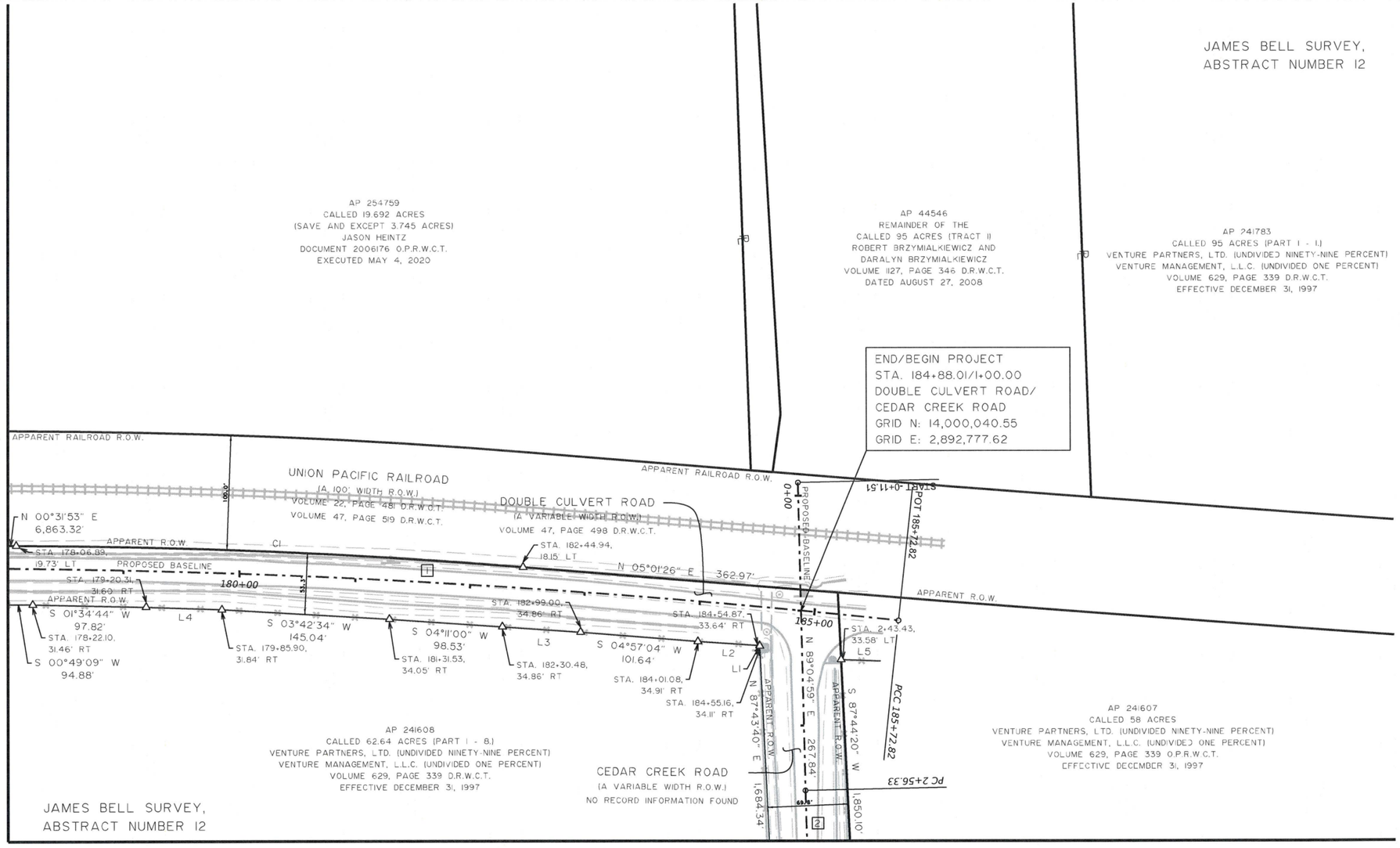
WALLER COUNTY
ENGINEERING DEPARTMENT

DOUBLE CULVERT ROAD
MAP SHEET
STA. 166+00.00 TO 178+00.00
SHEET 5 OF 6

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		15

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

100% SUBMITTAL



LEGEND

- EXISTING ROW
- PROPOSED DIRECTION OF TRAFFIC
- XX — DRIVEWAY NUMBER

NOTES:

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WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

DOUBLE CULVERT ROAD
MAP SHEET
STA. 178+00.00 TO 184+88.01
SHEET 6 OF 6

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		16

LEGEND:

(1)	PARCEL NUMBER FOR R.O.W. ACQUISITION
PL	PROPERTY LINE
AP:	APPRAISAL NUMBER
ESMT	EASEMENT
N.T.S.	NOT TO SCALE
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- ■ : SET 5/8 INCH IRON ROD WITH TXDOT ALUMINUM CAP (UNLESS NOTED OTHERWISE)
- □ : FOUND 5/8 INCH IRON ROD WITH TXDOT ALUMINUM CAP (UNLESS NOTED OTHERWISE)
- ● : SET (AS INDICATED)
- ○ : FOUND PROPERTY CORNER (AS INDICATED)
- △ : CALCULATED POINT

[1] BASELINE CURVE DATA:

PI STATION:	181+33.80
RADIUS:	8,009.00'
DELTA:	06°17'16" (RT)
LENGTH:	878.92'
TANGET LENGTH:	439.90'
CHORD BEARING:	N 03°22'19" E
CHORD DISTANCE:	878.48'
PI NORTHING:	14,001,507.10
PI EASTING:	2,893,124.99

[2] BASELINE CURVE DATA:

PI STATION:	2+94.20
RADIUS:	3,815.00'
DELTA:	01°08'15" (LT)
LENGTH:	75.73'
TANGET LENGTH:	37.87'
CHORD BEARING:	N 88°30'52" E
CHORD DISTANCE:	75.73'
PI NORTHING:	14,001,863.85
PI EASTING:	2,893,347.85

LINE TABLE

LINE	BEARING	LENGTH
L1	S 64°01'00" W	0.56'
L2	S 04°07'11" W	53.57'
L3	S 04°18'34" W	68.22'
L4	S 02°17'33" W	65.34'
L5	N 02°34'57" E	34.07'

CURVE TABLE

CURVE	RADIUS	ARC LENGTH	DELTA ANGLE	CHORD BEARING	CHORD LENGTH
C1	5,679.65'	439.14'	04°25'48"	N 02°48'32" E	439.03'

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

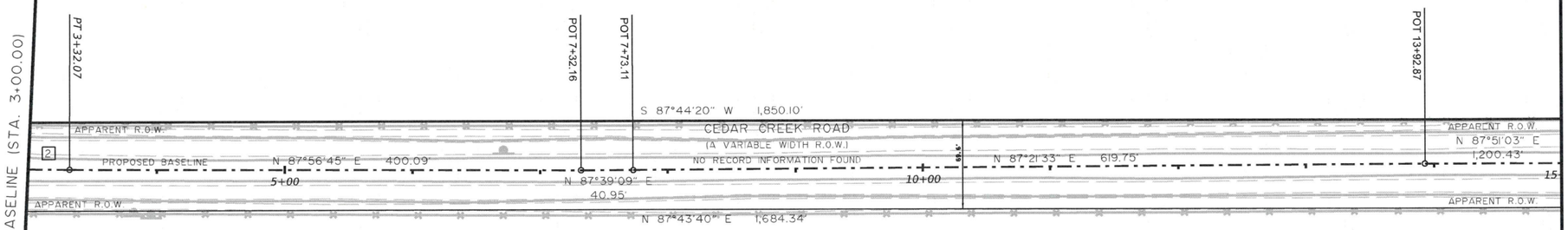
100% SUBMITTAL

N

MATCHLINE BASELINE (STA. 3+00.00)

JAMES BELL SURVEY,
ABSTRACT NUMBER 12

AP 241607
CALLED 58 ACRES
VENTURE PARTNERS, LTD. (UNDIVIDED NINETY-NINE PERCENT)
VENTURE MANAGEMENT, L.L.C. (UNDIVIDED ONE PERCENT)
VOLUME 629, PAGE 339 O.P.R.W.C.T.
EFFECTIVE DECEMBER 31, 1997



AP 241608
CALLED 62.64 ACRES (PART 1 - 8)
VENTURE PARTNERS, LTD. (UNDIVIDED NINETY-NINE PERCENT)
VENTURE MANAGEMENT, L.L.C. (UNDIVIDED ONE PERCENT)
VOLUME 629, PAGE 339 O.P.R.W.C.T.
EFFECTIVE DECEMBER 31, 1997

JAMES BELL SURVEY,
ABSTRACT NUMBER 12

MATCHLINE BASELINE (STA. 15+00.00)

LEGEND:

(1)	PARCEL NUMBER FOR R.O.W. ACQUISITION
PL	PROPERTY LINE
AP:	APPRAISAL NUMBER
ESMT	EASEMENT
N.T.S.	NOT TO SCALE
R.O.W.	RIGHT-OF-WAY
D.R.W.C.T.	DEED RECORDS WALLER COUNTY, TEXAS
W.C.C.F.	WALLER COUNTY CLERK'S FILE
O.P.R.W.C.T.	OFFICIAL PUBLIC RECORDS WALLER COUNTY, TEXAS
O.P.R.R.P.W.C.T.	OFFICIAL PUBLIC RECORDS OF REAL PROPERTY WALLER COUNTY, TEXAS

■ : SET 5/8 INCH IRON ROD WITH TXDOT ALUMINUM CAP (UNLESS NOTED OTHERWISE)
□ : FOUND 5/8 INCH IRON ROD WITH TXDOT ALUMINUM CAP (UNLESS NOTED OTHERWISE)
● : SET (AS INDICATED)
○ : FOUND PROPERTY CORNER (AS INDICATED)
△ : CALCULATED POINT

[2]

BASELINE CURVE DATA:

PI STATION:	2+94.20
RADIUS:	3,815.00'
DELTA:	01°08'15" (LT)
LENGTH:	75.73'
TANGET LENGTH:	37.87'
CHORD BEARING:	N 88°30'52" E
CHORD DISTANCE:	75.73'
PI NORTHING:	14,001,863.85
PI EASTING:	2,693,347.85

LEGEND

— · — EXISTING ROW
➡ PROPOSED DIRECTION OF TRAFFIC
(XX) DRIVEWAY NUMBER

NOTES:

1. ALL BEARINGS ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM OF 1983, SOUTH CENTRAL ZONE (NAD83, 2011 ADJUSTMENT, EPOCH 2010.00). ESTABLISHED BY TXDOT RTN, HELD NORIZONTAL MONUMENTS "HEMPSTEAD BASE STATION".

2. ALL COORDINATES AND DISTANCES ARE IN US SURVEY FEET DISPLAYED IN SURFACE VALUES WITH THE TXDOT SURFACE ADJUSTMENT FACTOR OF 1.00013.

3. ALL ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) USING GEOID12B. ESTABLISHED BY TXDOT RTN, HELD VERTICAL MONUMENTS "HEMPSTEAD BASE STATION".

4. ABSTRACTING WAS PERFORMED IN OCTOBER 2025.

5. FIELD SURVEYING WAS PERFORMED SEPTEMBER 2025.

6. ALL MEASUREMENTS ARE IN U.S. SURVEY FEET.

7. PRELIMINARY ROW MAP WAS COMPLETED IN APRIL 2026.

8. ** THE MONUMENT DESCRIBED AND SET MAY BE REPLACED WITH A TXDOT TYPE II RIGHT-OF-WAY MARKER UPON COMPLETION OF THE CONSTRUCTION PROJECT UNDER THE SUPERVISION OF A REGISTERED PROFESSIONAL LAND SURVEYOR, EITHER EMPLOYED OR RETAINED BY TXDOT.

0 50' 100'
SCALE: 1" = 50' (22x34)
1" = 100' (11x17)

NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
REGISTERED
DAVID H. SPRADLEY
6035
PROFESSIONAL
LAND SURVEYOR
6/12/26

QUIDDITY
Texas Board of Professional Engineers and Land Surveyors Reg. No. 10046100
2322 W. Grand Parkway North, Suite 150 • Katy, Texas 77449 • 832.913.4000

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

CEDAR CREEK ROAD
MAP SHEET
STA. 3+00.00 TO 15+00.00
SHEET 1 OF 4

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST		COUNTY	SHEET NO.
		WALLER	17

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

100% SUBMITTAL

JAMES BELL SURVEY,
ABSTRACT NUMBER 12

AP 241607
CALLED 58 ACRES
VENTURE PARTNERS, LTD. (UNDIVIDED NINETY-NINE PERCENT)
VENTURE MANAGEMENT, L.L.C. (UNDIVIDED ONE PERCENT)
VOLUME 629, PAGE 339 O.P.R.W.C.T.
EFFECTIVE DECEMBER 31, 1997

AP 242496
CALLED 41.285 ACRES
CHARLES E. WILLIAMS AND STACY L. WILLIAMS
DOCUMENT 2207737 O.P.R.W.C.T.
EXECUTED JUNE 9, 2022

MATCHLINE BASELINE (STA. 15+00.00)

MATCHLINE BASELINE (STA. 27+00.00)

8 INCH WOOD POST
STA. 19+94.31, 35.70' LT

POT 25+93.30

S 87°44'20" W 1,850.10'

S 87°41'34" W 1,152.66'

APPARENT R.O.W.

CEDAR CREEK ROAD
(A VARIABLE WIDTH R.O.W.)
NO RECORD INFORMATION FOUND

APPARENT R.O.W.

N 87°21'33" E
619.75'

PROPOSED BASELINE

60.4'

N 87°51'03" E 1,200.43'

00

20+00

25+00

APPARENT R.O.W.

APPARENT R.O.W.

N 87°43'40" E 1,684.34'

N 87°40'44" E 299.29'

N 87°45'23" E 403.78'

N 87°54'53" E 1,387.16'

3/4 INCH IRON PIPE
STA. 18+13.66, 34.12' RT

3/4 INCH IRON PIPE
STA. 21+12.95, 33.22' RT

1/2 INCH IRON ROD
STA. 25+16.73, 32.56' RT

AP 241608
CALLED 62.64 ACRES (PART 1 - 8)
VENTURE PARTNERS, LTD. (UNDIVIDED NINETY-NINE PERCENT)
VENTURE MANAGEMENT, L.L.C. (UNDIVIDED ONE PERCENT)
VOLUME 629, PAGE 339 O.R.W.C.T.
EFFECTIVE DECEMBER 31, 1997

AP 44560
CALLED 4.3741 ACRES
SAMANTHA MAPES
VDOCUMENT 221491 O.P.R.W.C.T.
DATED AUGUST 25, 2022

AP 208142
CALLED 64.870 ACRES
BRUCE DODDS AND SPOUSE, TERESA DODDS
VOLUME 791, PAGE 424 D.R.W.C.T.
EXECUTED JULY 23, 2003

AP 184085
CALLED 20.72 ACRES
RONALD B. DRAKE
DOCUMENT 2204229 O.P.R.W.C.T.
DATED APRIL ', 2022

JAMES BELL SURVEY,
ABSTRACT NUMBER 12

LEGEND

- EXISTING ROW
- PROPOSED DIRECTION OF TRAFFIC
- XX — DRIVEWAY NUMBER

NOTES:

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0 50' 100'

SCALE: 1" = 50' (22x34)
1" = 100' (11x17)

LEGEND:

(1)	PARCEL NUMBER FOR R.O.W. ACQUISITION
℄	PROPERTY LINE
AP:	APPRAISAL NUMBER
ESMT	EASEMENT
N.T.S.	NOT TO SCALE
R.O.W.	RIGHT-OF-WAY
D.R.W.C.T.	DEED RECORDS WALLER COUNTY, TEXAS
W.C.C.F.	WALLER COUNTY CLERK'S FILE
O.P.R.W.C.T.	OFFICIAL PUBLIC RECORDS WALLER COUNTY, TEXAS
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△ : CALCULATED POINT

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STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

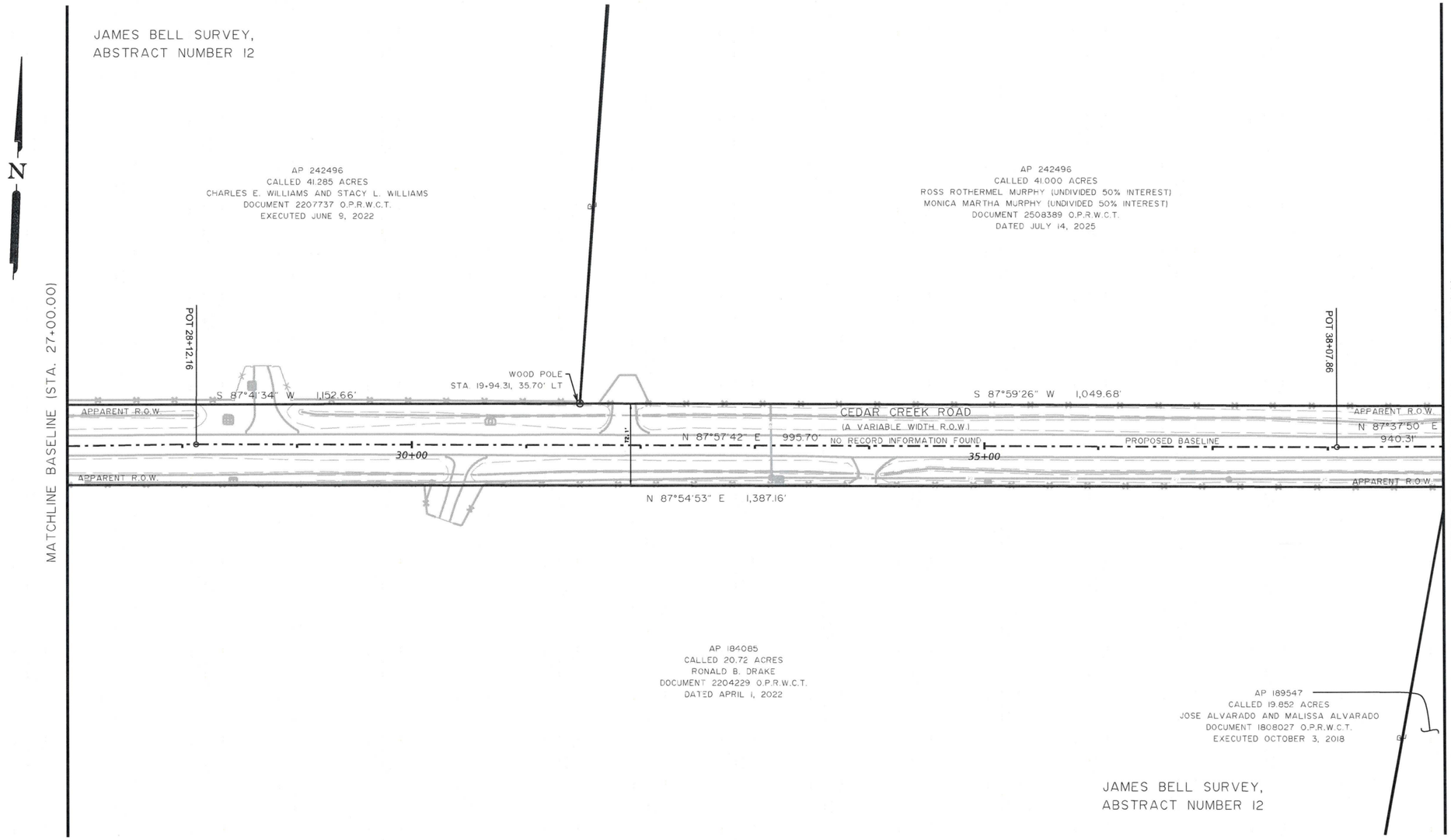
WALLER COUNTY
ENGINEERING DEPARTMENT

CEDAR CREEK ROAD
MAP SHEET
STA. 15+00.00 TO 27+00.00
SHEET 2 OF 4

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST		COUNTY	SHEET NO.
		WALLER	18

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

100% SUBMITTAL



LEGEND

- EXISTING ROW
- PROPOSED DIRECTION OF TRAFFIC
- (XX) DRIVEWAY NUMBER

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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

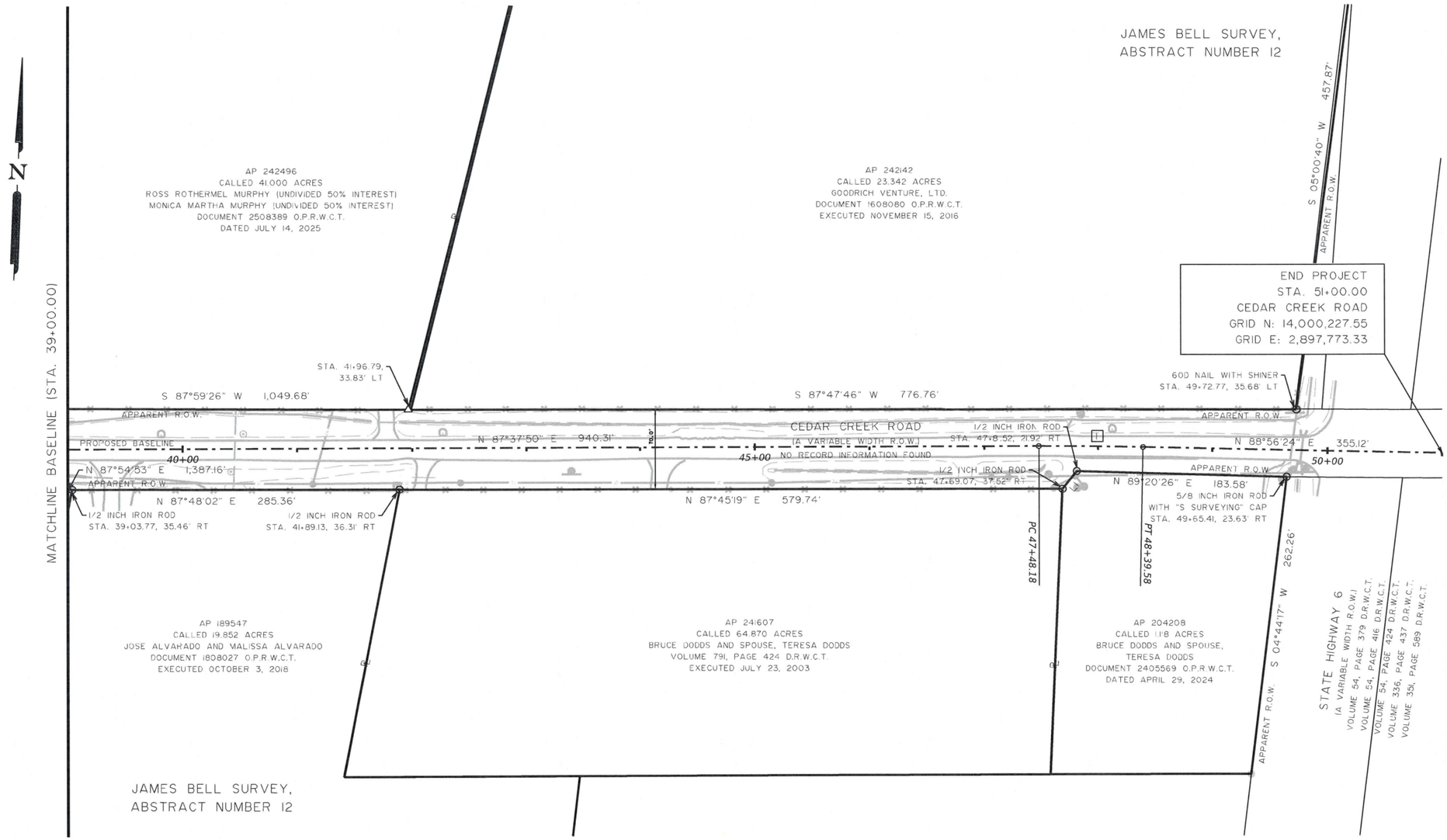
WALLER COUNTY
ENGINEERING DEPARTMENT

CEDAR CREEK ROAD
MAP SHEET
STA. 27+00.00 TO 39+00.00
SHEET 3 OF 4

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST		COUNTY	SHEET NO.
		WALLER	19

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

100% SUBMITTAL



LEGEND

- EXISTING ROW
- PROPOSED DIRECTION OF TRAFFIC
- (XX) DRIVEWAY NUMBER

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R.O.W.	RIGHT-OF-WAY
D.R.W.C.T.	DEED RECORDS WALLER COUNTY, TEXAS
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O.P.R.R.P.W.C.T.	OFFICIAL PUBLIC RECORDS OF REAL PROPERTY WALLER COUNTY, TEXAS

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- ● : SET (AS INDICATED)
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- △ : CALCULATED POINT

BASELINE CURVE DATA:

PI STATION:	47+93.88
RADIUS:	4,000.00'
DELTA:	01°18'33" (RT)
LENGTH:	91.41'
TANGET LENGTH:	45.70'
CHORD BEARING:	N 88°17'07" E
CHORD DISTANCE:	91.40'
PI NORTHING:	14,002,041.66
PI EASTING:	2,897,843.97

LINE TABLE

LINE	BEARING	LENGTH
L1	S 36°24'46" W	19.89'

NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
REGISTERED
DAVID H. SPRADLEY
6035
PROFESSIONAL
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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

CEDAR CREEK ROAD
MAP SHEET
STA. 39+00.00 TO 51+00.00
SHEET 4 OF 4

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST		COUNTY	SHEET NO.
		WALLER	20

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

100% SUBMITTAL

HORIZONTAL ALIGNMENT REPORT

Alignment name: CL_Double Culvert Rd

	STATION	X	Y
POT	116+50.00 R1	2892984.574	13995043.773
PC	116+68.52 R1	2892999.905	13995054.162
Tangential Direction:	N55°52'36.300"E		
Tangential Length:	18.520		
PC	116+68.52 R1	2892999.905	13995054.162
PI	117+38.04 R1	2893057.459	13995093.163
CC		2892924.174	13995165.920
PT	117+96.92 R1	2893059.134	13995162.666
Radius:	135.000		
Delta:	54°29'45.042" Left		
Degree of Curvature(Arc):	42°26'28.745"		
Length:	128.403		
Tangent:	69.523		
Chord:	123.617		
Middle Ordinate:	14.980		
External:	16.850		
Tangent Back Direction:	N55°52'36.300"E		
Radial Direction:	S34°07'23.700"E		
Chord Direction:	N28°37'43.779"E		
Radial Direction:	S88°37'08.742"E		
Tangent Ahead Direction:	N01°22'51.258"E		
PT	117+96.92 R1	2893059.134	13995162.666
PI	118+70.37 R1	2893060.904	13995236.088
Tangential Direction:	N01°22'51.258"E		
Tangential Length:	73.443		
PI	118+70.37 R1	2893060.904	13995236.088
PC	128+06.64 R1	2893061.772	13996172.364
Tangential Direction:	N00°03'11.237"E		
Tangential Length:	936.276		
PC	128+06.64 R1	2893061.772	13996172.364
PI	128+39.64 R1	2893061.803	13996205.361
CC		2897061.771	13996168.655
PT	128+72.63 R1	2893062.378	13996238.353
Radius:	4000.000		
Delta:	00°56'43.012" Right		
Degree of Curvature(Arc):	01°25'56.620"		
Length:	65.993		
Tangent:	32.997		
Chord:	65.992		
Middle Ordinate:	0.136		
External:	0.136		
Tangent Back Direction:	N00°03'11.237"E		
Radial Direction:	S89°56'48.763"E		
Chord Direction:	N00°31'32.743"E		
Radial Direction:	S89°00'05.750"E		
Tangent Ahead Direction:	N00°59'54.250"E		
PT	128+72.63 R1	2893062.378	13996238.353
PC	131+42.97 R1	2893067.089	13996508.652
Tangential Direction:	N00°59'54.250"E		
Tangential Length:	270.340		
PC	131+42.97 R1	2893067.089	13996508.652
PI	131+70.32 R1	2893067.565	13996535.994
CC		2889067.696	13996578.350
PT	131+97.67 R1	2893067.668	13996563.340
Radius:	4000.000		
Delta:	00°47'00.257" Left		
Degree of Curvature(Arc):	01°25'56.620"		
Length:	54.692		
Tangent:	27.346		
Chord:	54.692		
Middle Ordinate:	0.093		
External:	0.093		
Tangent Back Direction:	N00°59'54.250"E		
Radial Direction:	S89°00'05.750"E		
Chord Direction:	N00°36'24.121"E		
Radial Direction:	S89°47'06.008"E		
Tangent Ahead Direction:	N00°12'53.992"E		
PT	131+97.67 R1	2893067.668	13996563.340
PI	136+76.39 R1	2893069.464	13997042.065
Tangential Direction:	N00°12'53.992"E		
Tangential Length:	478.728		
PI	136+76.39 R1	2893069.464	13997042.065
PI	142+97.35 R1	2893080.628	13997662.924
Tangential Direction:	N01°01'48.559"E		
Tangential Length:	620.959		
PI	142+97.35 R1	2893080.628	13997662.924
PI	148+09.73 R1	2893085.411	13998175.279
Tangential Direction:	N00°32'05.493"E		
Tangential Length:	512.377		
PI	148+09.73 R1	2893085.411	13998175.279
PC	152+91.95 R1	2893095.467	13998657.397
Tangential Direction:	N01°11'41.733"E		
Tangential Length:	482.223		
PC	152+91.95 R1	2893095.467	13998657.397
PI	153+34.81 R1	2893096.361	13998700.247
CC		2889096.337	13998740.813
PT	153+77.67 R1	2893096.336	13998743.106
Radius:	4000.000		
Delta:	01°13'40.011" Left		
Degree of Curvature(Arc):	01°25'56.620"		
Length:	85.715		
Tangent:	42.859		
Chord:	85.714		
Middle Ordinate:	0.230		
External:	0.230		
Tangent Back Direction:	N01°11'41.733"E		
Radial Direction:	S88°48'18.267"E		
Chord Direction:	N00°34'51.728"E		
Radial Direction:	N89°58'01.722"E		
Tangent Ahead Direction:	N00°01'58.278"W		
PT	153+77.67 R1	2893096.336	13998743.106
PI	158+98.09 R1	2893096.038	13999263.528
Tangential Direction:	N00°01'58.278"W		
Tangential Length:	520.422		
PI	158+98.09 R1	2893096.038	13999263.528
PC	167+22.84 R1	2893103.048	14000088.244
Tangential Direction:	N00°29'13.128"E		
Tangential Length:	824.746		
PC	167+22.84 R1	2893103.048	14000088.244
PI	167+58.28 R1	2893103.349	14000123.685
CC		2889103.192	14000122.241
PT	167+93.72 R1	2893103.022	14000159.126
Radius:	4000.000		
Delta:	01°00'55.136" Left		
Degree of Curvature(Arc):	01°25'56.620"		
Length:	70.882		
Tangent:	35.442		
Chord:	70.881		
Middle Ordinate:	0.157		
External:	0.157		
Tangent Back Direction:	N00°29'13.128"E		
Radial Direction:	S89°30'46.872"E		
Chord Direction:	N00°01'14.439"W		
Radial Direction:	N89°28'17.993"E		
Tangent Ahead Direction:	N00°31'42.007"W		
PT	167+93.72 R1	2893103.022	14000159.126
PC	168+59.10 R1	2893102.419	14000224.503
Tangential Direction:	N00°31'42.007"W		
Tangential Length:	65.380		
PC	168+59.10 R1	2893102.419	14000224.503
PI	169+03.27 R1	2893102.012	14000268.673
CC		2897102.249	14000261.387
PT	169+47.44 R1	2893102.580	14000312.842
Radius:	4000.000		
Delta:	01°15'55.398" Right		
Degree of Curvature(Arc):	01°25'56.620"		
Length:	88.341		
Tangent:	44.172		
Chord:	88.339		
Middle Ordinate:	0.244		
External:	0.244		
Tangent Back Direction:	N00°31'42.007"W		
Radial Direction:	N89°28'17.993"E		
Chord Direction:	N00°06'15.692"E		
Radial Direction:	S89°15'46.609"E		
Tangent Ahead Direction:	N00°44'13.391"E		
PT	169+47.44 R1	2893102.580	14000312.842
PC	177+93.47 R1	2893113.463	14001158.805
Tangential Direction:	N00°44'13.391"E		
Tangential Length:	846.033		
PC	177+93.47 R1	2893113.463	14001158.805
PI	181+14.67 R1	2893117.595	14001479.971
CC		2900112.884	14001068.759
PT	184+35.41 R1	2893151.121	14001799.409
Radius:	7000.000		
Delta:	05°15'15.532" Right		
Degree of Curvature(Arc):	00°49'06.640"		
Length:	641.936		
Tangent:	321.193		
Chord:	641.711		
Middle Ordinate:	7.357		
External:	7.365		
Tangent Back Direction:	N00°44'13.391"E		
Radial Direction:	S89°15'46.609"E		
Chord Direction:	N03°21'51.157"E		
Radial Direction:	S84°00'31.077"E		
Tangent Ahead Direction:	N05°59'28.923"E		
PT	184+35.41 R1	2893151.121	14001799.409
PI	185+68.87 R1	2893165.051	14001932.140
Tangential Direction:	N05°59'28.923"E		
Tangential Length:	133.460		
PI	185+68.87 R1	2893165.051	14001932.140
POT	194+04.04 R1	2893231.261	14002764.682
Tangential Direction:	N04°32'49.240"E		
Tangential Length:	835.170		

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY M. DILL
84626
LICENSED
PROFESSIONAL ENGINEER

R. M. Dill, P.E.
7/21/2026

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

DOUBLE CULVERT RD HORIZONTAL ALIGNMENT DATA

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		21

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HORIZONTAL ALIGNMENT REPORT

Alignment name: CL_Cedar Creek Rd

	STATION	X	Y
POT	-0+11.51 R1	2893042.184	14001858.774
PC	2+56.33 R1	2893309.994	14001863.060
Tangential Direction:	N89°04'59.241"E		
Tangential Length:	267.844		
PC	2+56.33 R1	2893309.994	14001863.060
PI	2+94.20 R1	2893347.856	14001863.666
CC		2893248.947	14005677.572
PT	3+32.07 R1	2893385.700	14001865.023
Radius:	3815.000		
Delta:	01°08'14.616" Left		
Degree of Curvature(Arc):	01°30'06.679"		
Length:	75.733		
Tangent:	37.868		
Chord:	75.731		
Middle Ordinate:	0.188		
External:	0.188		
Tangent Back Direction:	N89°04'59.241"E		
Radial Direction:	S00°55'00.759"E		
Chord Direction:	N88°30'51.933"E		
Radial Direction:	S02°03'15.375"E		
Tangent Ahead Direction:	N87°56'44.625"E		
PT	3+32.07 R1	2893385.700	14001865.023
PI	7+32.16 R1	2893785.536	14001879.365
Tangential Direction:	N87°56'44.625"E		
Tangential Length:	400.094		
PI	7+32.16 R1	2893785.536	14001879.365
PI	7+73.11 R1	2893826.455	14001881.043
Tangential Direction:	N87°39'08.724"E		
Tangential Length:	40.953		
PI	7+73.11 R1	2893826.455	14001881.043
PI	13+92.87 R1	2894445.551	14001909.598
Tangential Direction:	N87°21'32.824"E		
Tangential Length:	619.754		
PI	13+92.87 R1	2894445.551	14001909.598
PI	25+93.30 R1	2895645.139	14001954.613
Tangential Direction:	N87°51'03.497"E		
Tangential Length:	1200.432		
PI	25+93.30 R1	2895645.139	14001954.613
PI	28+12.16 R1	2895863.717	14001965.742
Tangential Direction:	N87°05'07.098"E		
Tangential Length:	218.861		
PI	28+12.16 R1	2895863.717	14001965.742
PI	38+07.86 R1	2896858.789	14002001.155
Tangential Direction:	N87°57'42.495"E		
Tangential Length:	995.702		
PI	38+07.86 R1	2896858.789	14002001.155
PC	47+48.18 R1	2897798.300	14002040.028
Tangential Direction:	N87°37'50.374"E		
Tangential Length:	940.315		
PC	47+48.18 R1	2897798.300	14002040.028
PI	47+93.88 R1	2897843.966	14002041.918
CC		2897963.664	13998043.448
PT	48+39.58 R1	2897889.662	14002042.763
Radius:	4000.000		
Delta:	01°18'33.427" Right		
Degree of Curvature(Arc):	01°25'56.620"		
Length:	91.405		
Tangent:	45.705		
Chord:	91.403		
Middle Ordinate:	0.261		
External:	0.261		
Tangent Back Direction:	N87°37'50.374"E		
Radial Direction:	S02°22'09.626"E		
Chord Direction:	N88°17'07.088"E		
Radial Direction:	S01°03'36.199"E		
Tangent Ahead Direction:	N88°56'23.801"E		
PT	48+39.58 R1	2897889.662	14002042.763
POT	51+94.71 R1	2898244.725	14002049.333
Tangential Direction:	N88°56'23.801"E		
Tangential Length:	355.124		

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY M. DILL
84626
LICENSED
PROFESSIONAL ENGINEER

R. M. Dill, P.E.
7/21/2026

CivilCorp
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29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

CEDAR CREEK RD
HORIZONTAL
ALIGNMENT DATA

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		22

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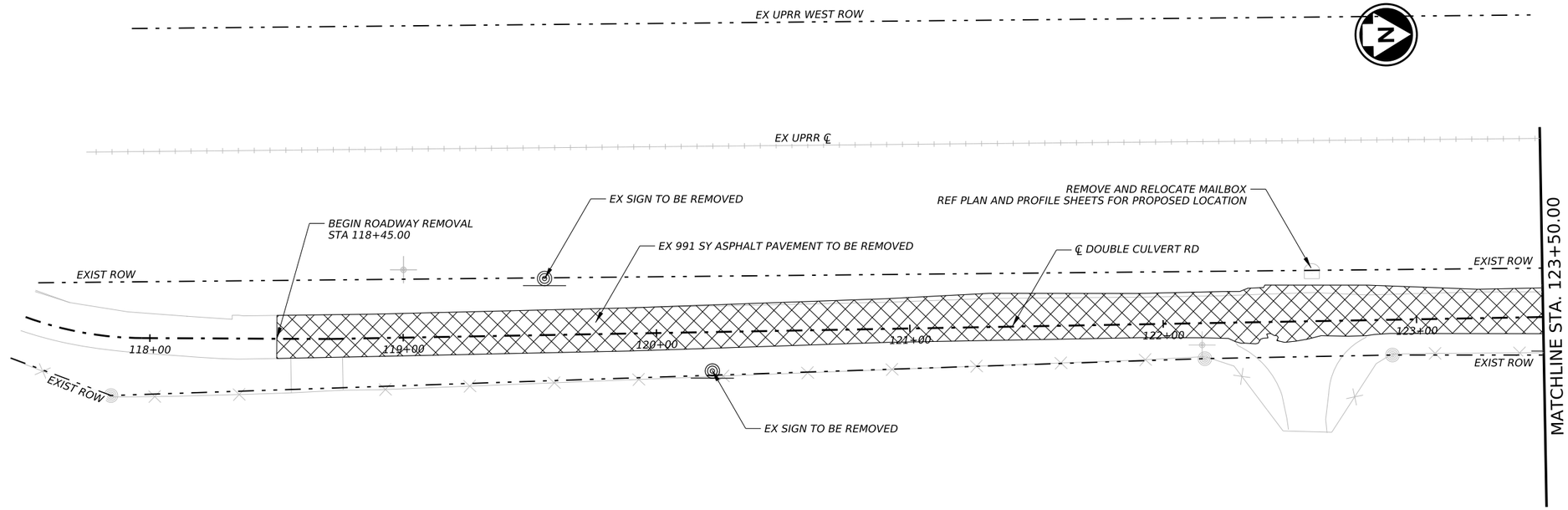

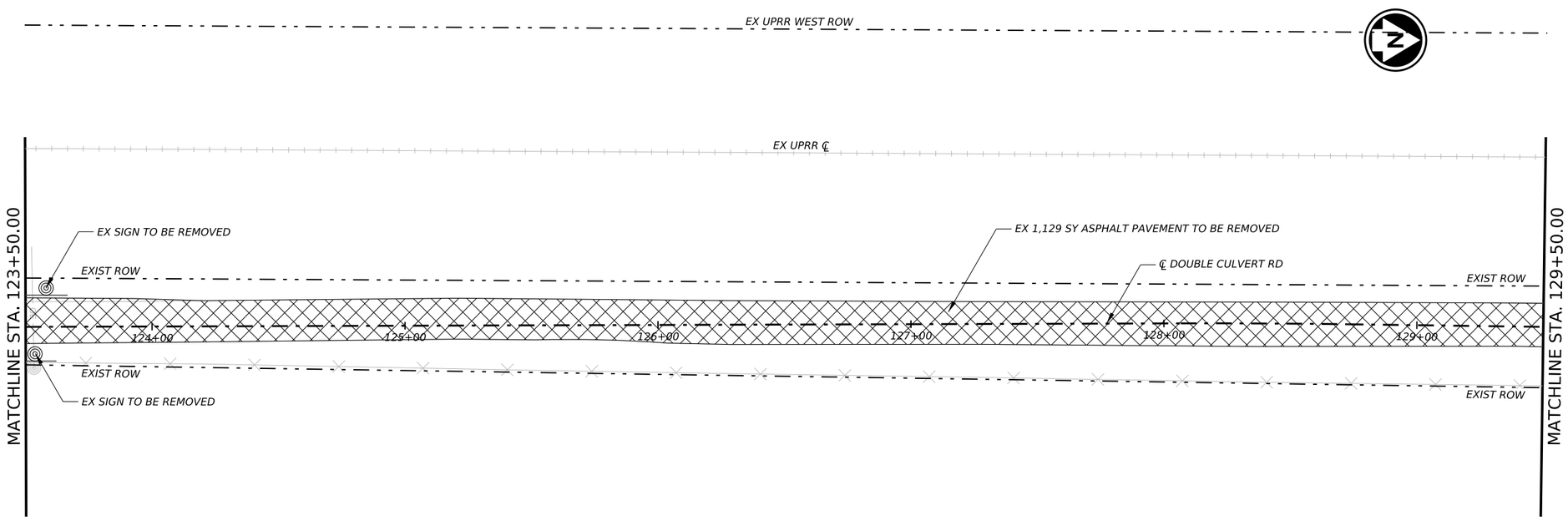

LEGEND

- EXISTING ROW
- ROADWAY REMOVAL
- DRIVEWAY REMOVAL
- 3" MILLING
- EXISTING SIGN
- EXISTING MAILBOX
- EXISTING TREE

NOTES:

1. CONTRACTOR SHALL REMOVE ALL THE SURPLUS MATERIAL FROM THE PROJECT AREA. THE WORK SHALL BE SUBSIDIARY TO THE CONTRACT AND IS NOT A SEPARATE PAY ITEM.

0 25' 50'

SCALE: 1" = 50'

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
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84626
LICENSED
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R. M. Dill, P.E.
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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

DEMOLITION PLAN
DOUBLE CULVERT RD
BEGIN TO STA 129+50.00

SHEET 1 OF 6

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		23

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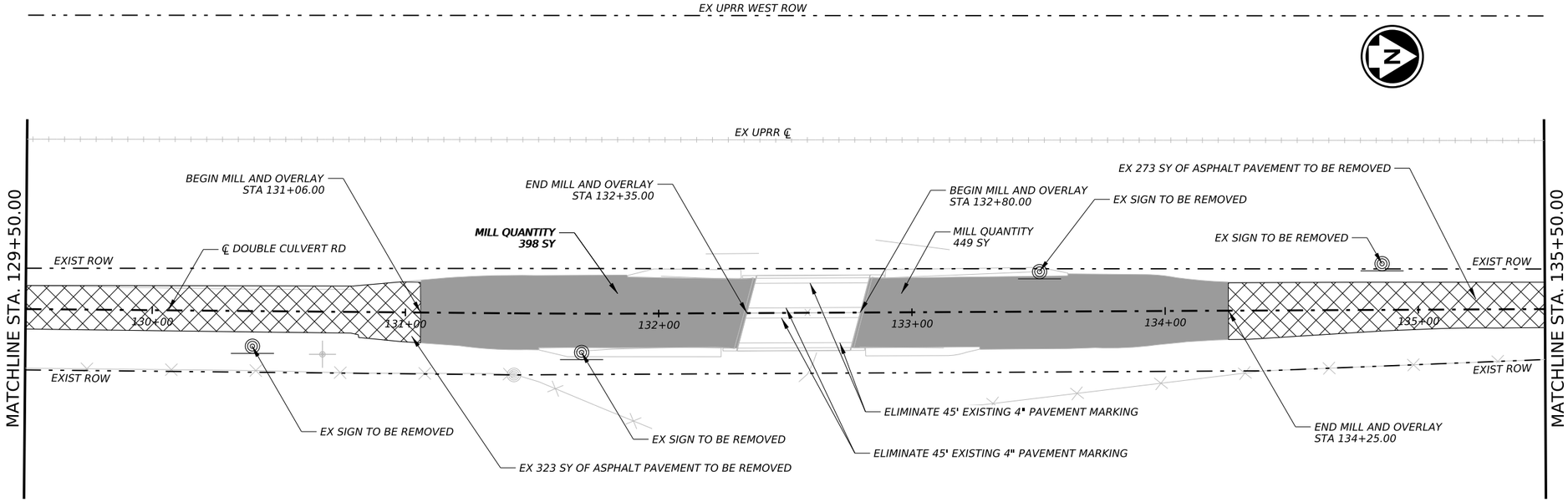

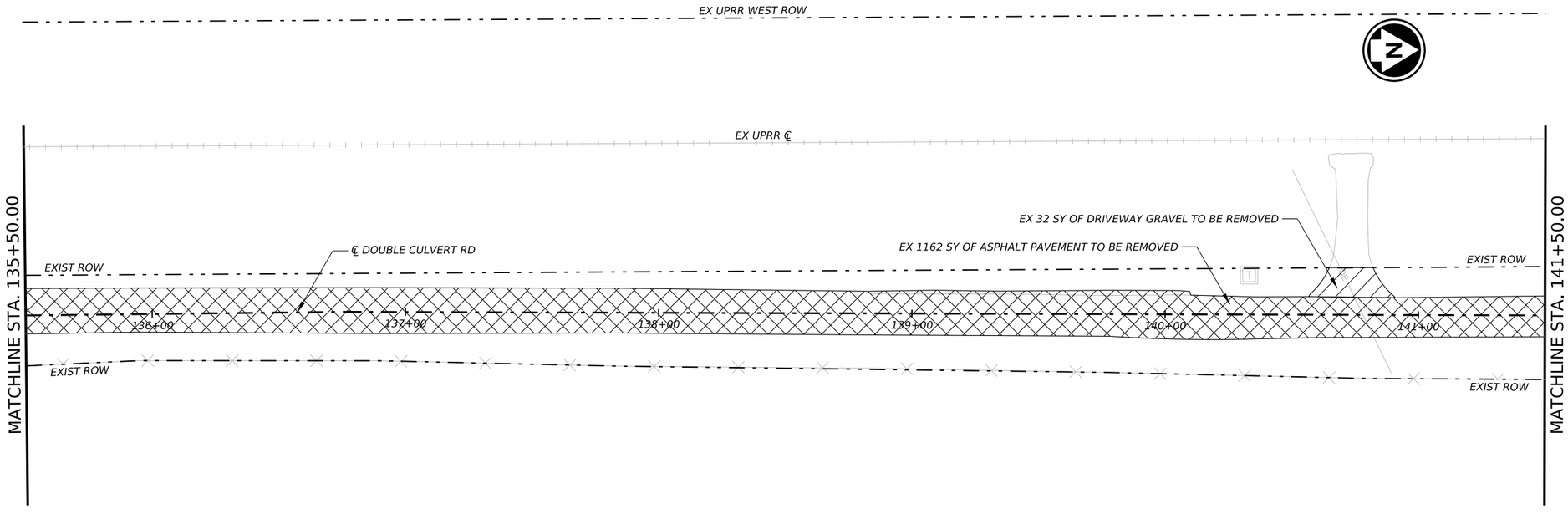

LEGEND

- EXISTING ROW
- ROADWAY REMOVAL
- DRIVEWAY REMOVAL
- 3" MILLING
- EXISTING SIGN
- EXISTING MAILBOX
- EXISTING TREE

NOTES:

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0 25' 50'

SCALE: 1" = 50'

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY M. DILL
84626
LICENSED PROFESSIONAL ENGINEER

R. M. Dill, P.E.
7/21/2026

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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

DEMOLITION PLAN
DOUBLE CULVERT RD
STA 129+50.00 TO STA 141+50.00

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		24

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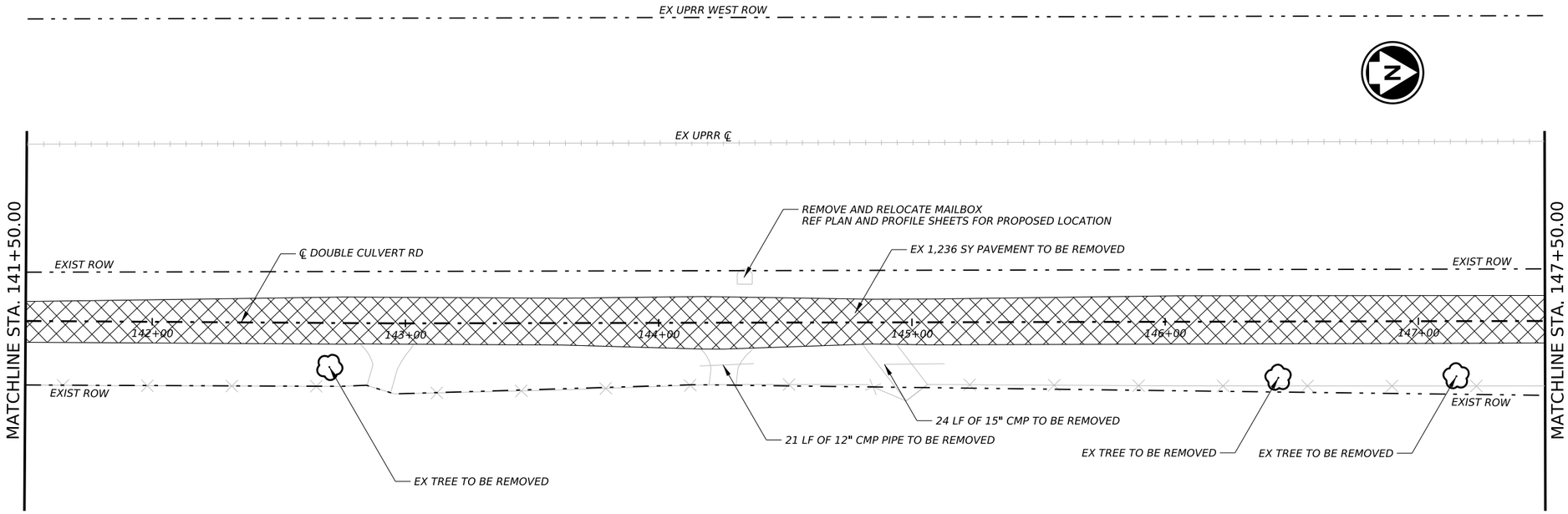

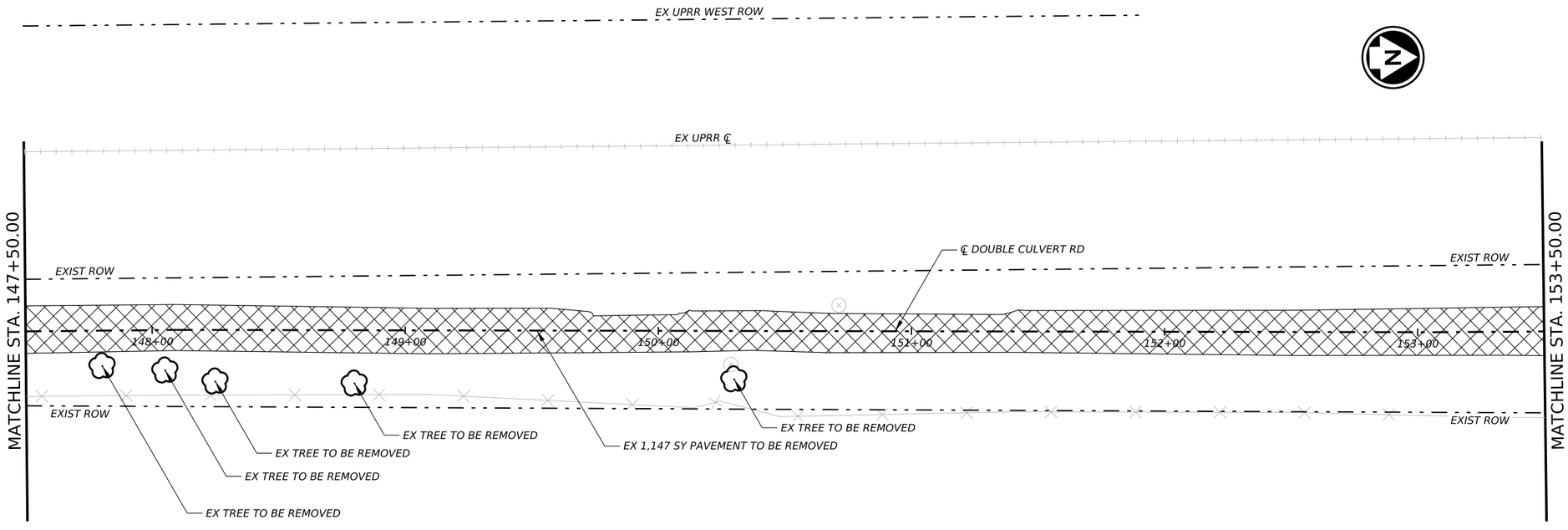

LEGEND

- EXISTING ROW
- ROADWAY REMOVAL
- DRIVEWAY REMOVAL
- 3" MILLING
- EXISTING SIGN
- EXISTING MAILBOX
- EXISTING TREE

NOTES:

1. CONTRACTOR SHALL REMOVE ALL THE SURPLUS MATERIAL FROM THE PROJECT AREA. THE WORK SHALL BE SUBSIDIARY TO THE CONTRACT AND IS NOT A SEPARATE PAY ITEM.

0 25' 50'

SCALE: 1" = 50'

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY M. DILL
84626
LICENSED PROFESSIONAL ENGINEER

R. M. Dill, P.E.
7/21/2026

CivilCorp
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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

DEMOLITION PLAN
DOUBLE CULVERT RD
STA 141+50.00 TO STA 153+50.00

SHEET 3 OF 6

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		25

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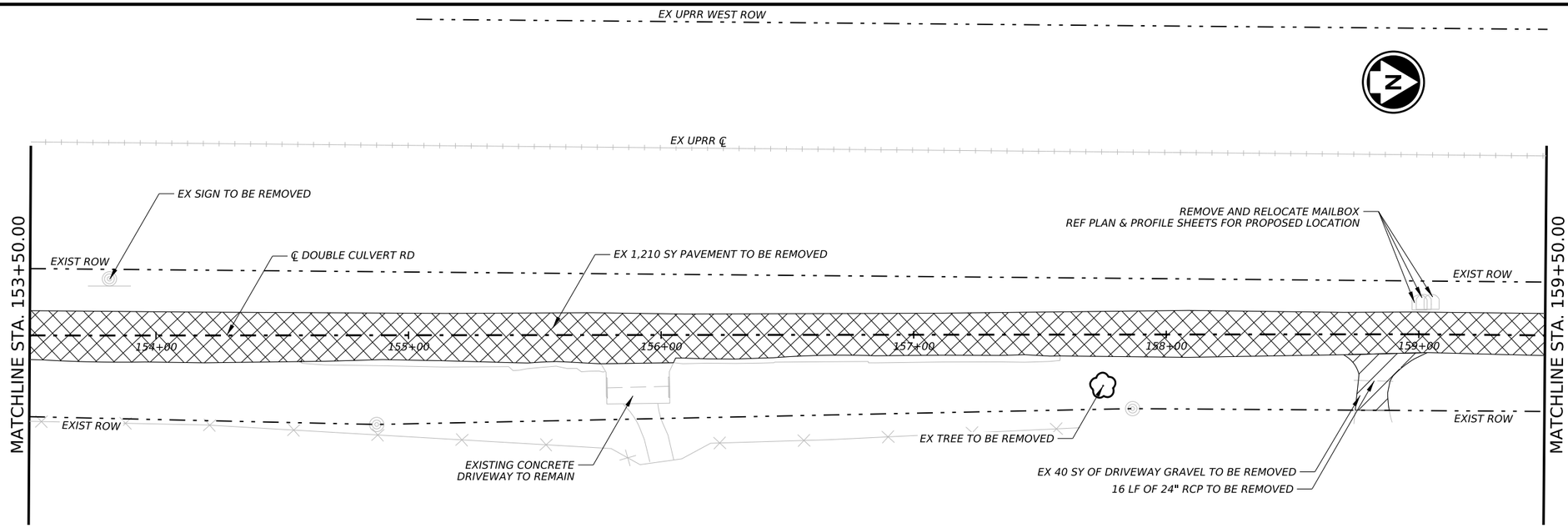

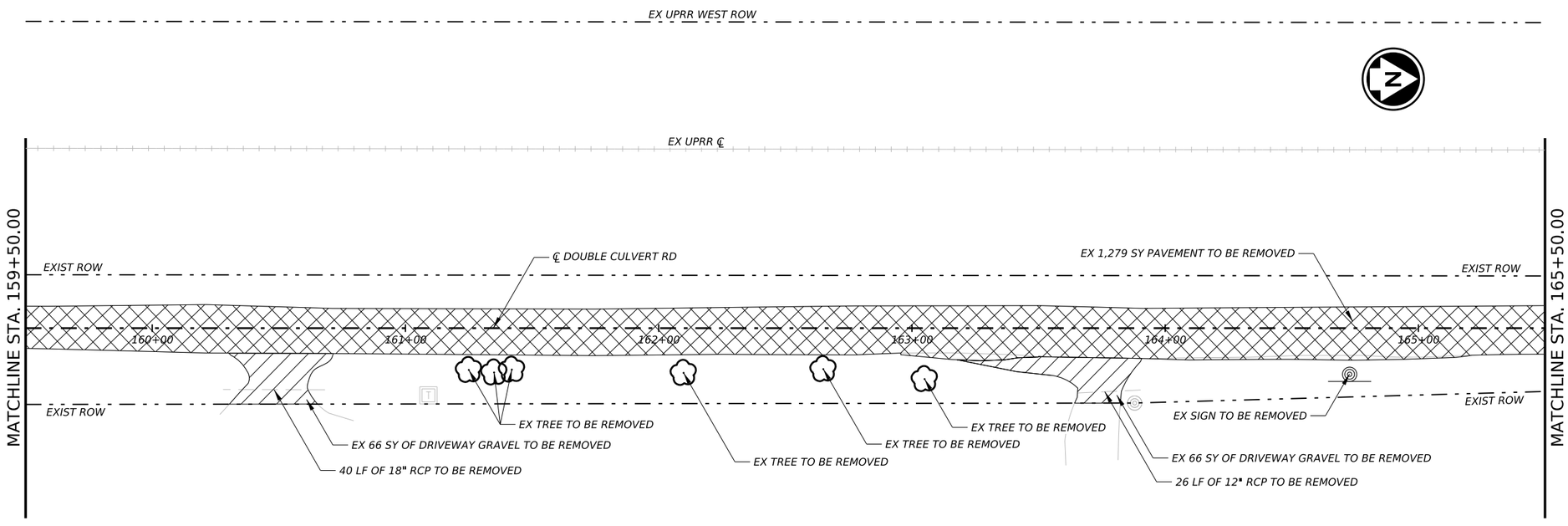

LEGEND

- EXISTING ROW
- ROADWAY REMOVAL
- DRIVEWAY REMOVAL
- 3" MILLING
- EXISTING SIGN
- EXISTING MAILBOX
- EXISTING TREE

NOTES:

1. CONTRACTOR SHALL REMOVE ALL THE SURPLUS MATERIAL FROM THE PROJECT AREA. THE WORK SHALL BE SUBSIDIARY TO THE CONTRACT AND IS NOT A SEPARATE PAY ITEM.

0 25' 50'

SCALE: 1" = 50'

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY M. DILL
84626
LICENSED
PROFESSIONAL ENGINEER

R. M. Dill, P.E.
7/21/2026

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

DEMOLITION PLAN
DOUBLE CULVERT RD
STA 153+50.00 TO STA 165+50.00

SHEET 4 OF 6

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		26

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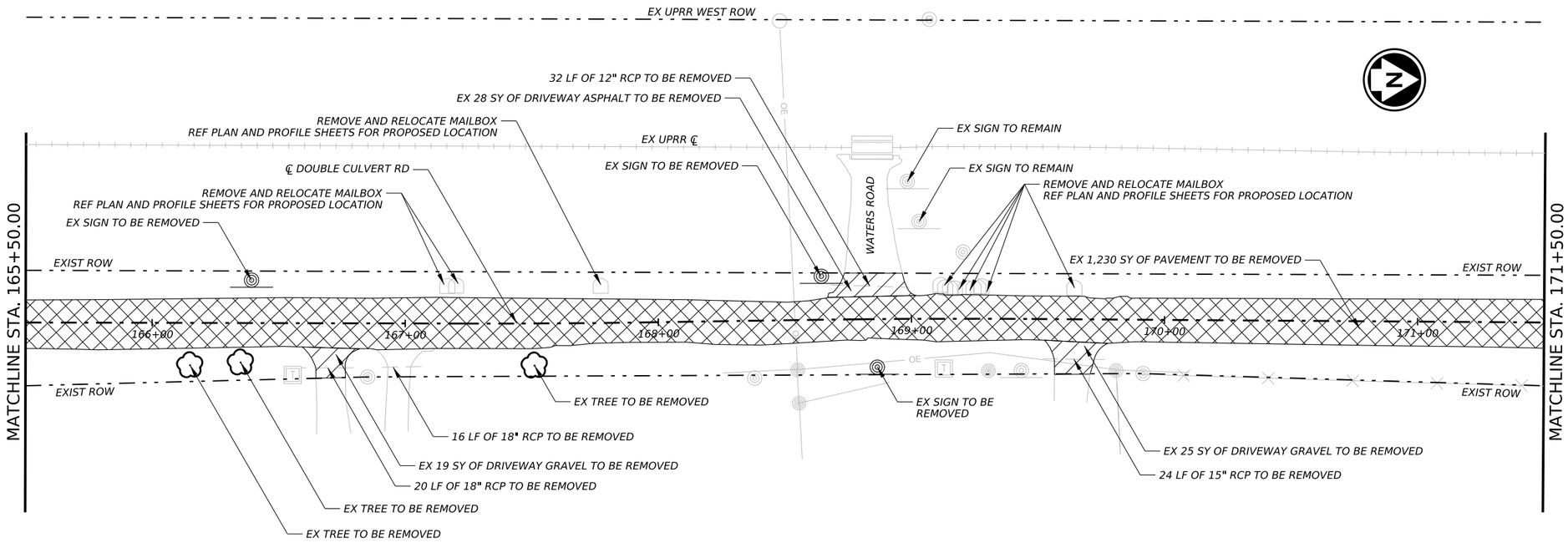

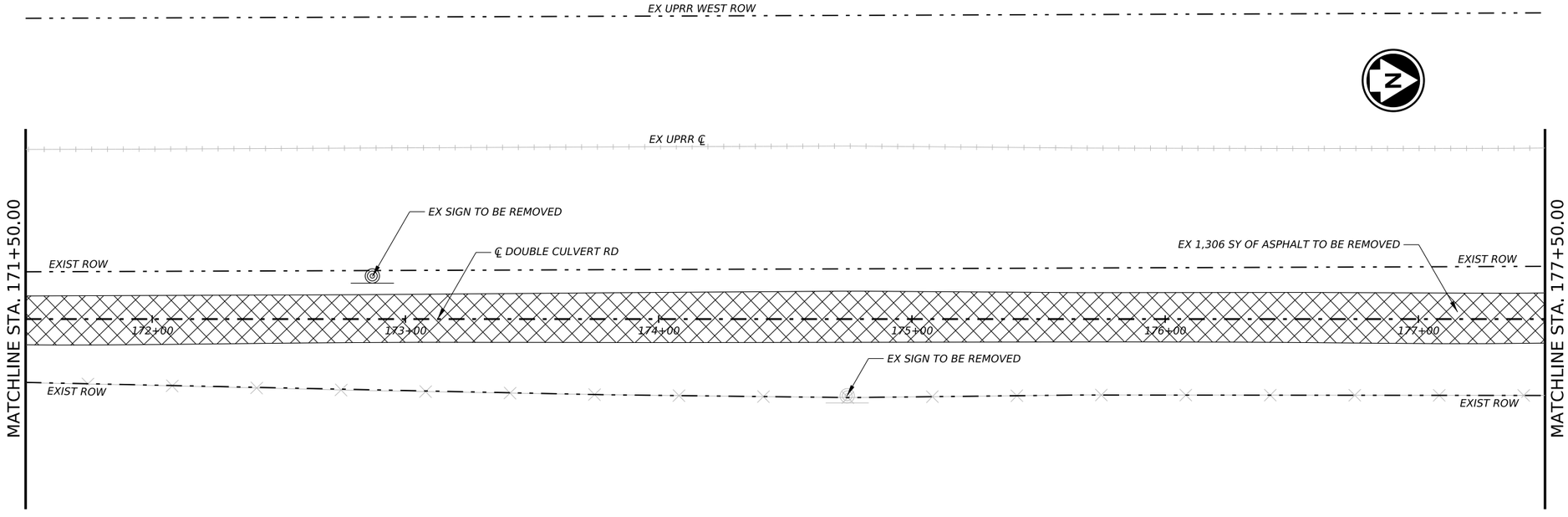

LEGEND

- EXISTING ROW
- ROADWAY REMOVAL
- DRIVEWAY REMOVAL
- 3" MILLING
- EXISTING SIGN
- EXISTING MAILBOX
- EXISTING TREE

NOTES:

1. CONTRACTOR SHALL REMOVE ALL THE SURPLUS MATERIAL FROM THE PROJECT AREA. THE WORK SHALL BE SUBSIDIARY TO THE CONTRACT AND IS NOT A SEPARATE PAY ITEM.

0 25' 50'

SCALE: 1" = 50'

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY M. DILL
84626
LICENSED PROFESSIONAL ENGINEER

R. M. Dill, P.E.
7/21/2026

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

DEMOLITION PLAN
DOUBLE CULVERT RD
STA 165+50.00 TO STA 177+50.00

SHEET 5 OF 6

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		27

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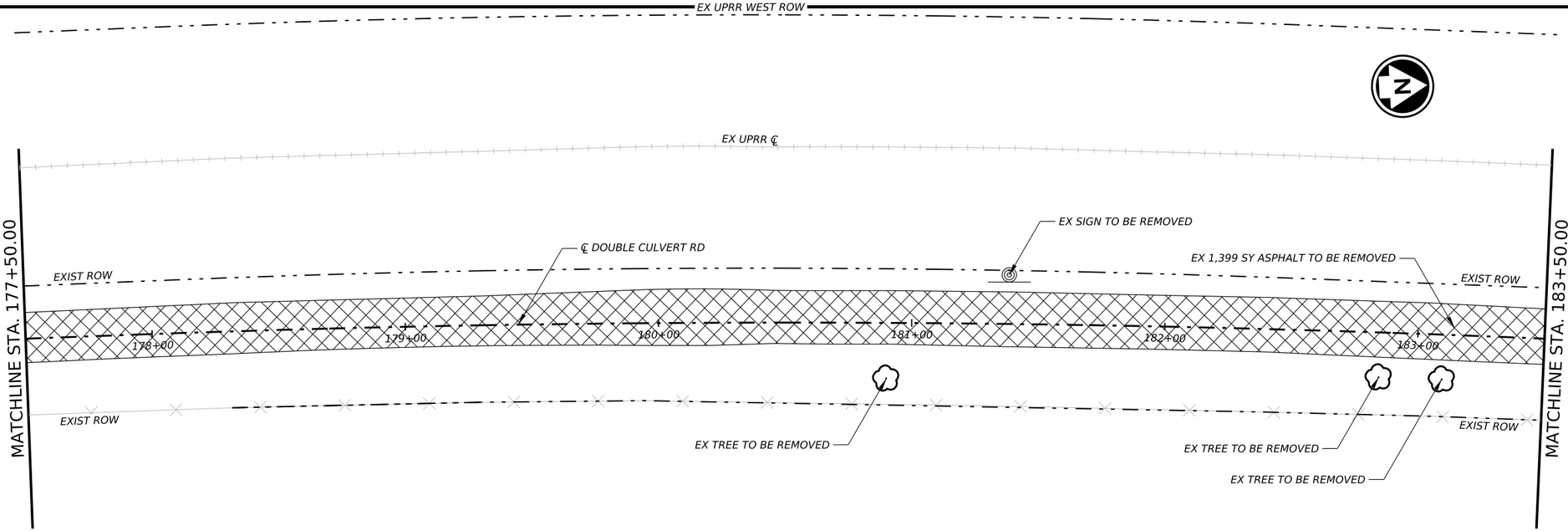

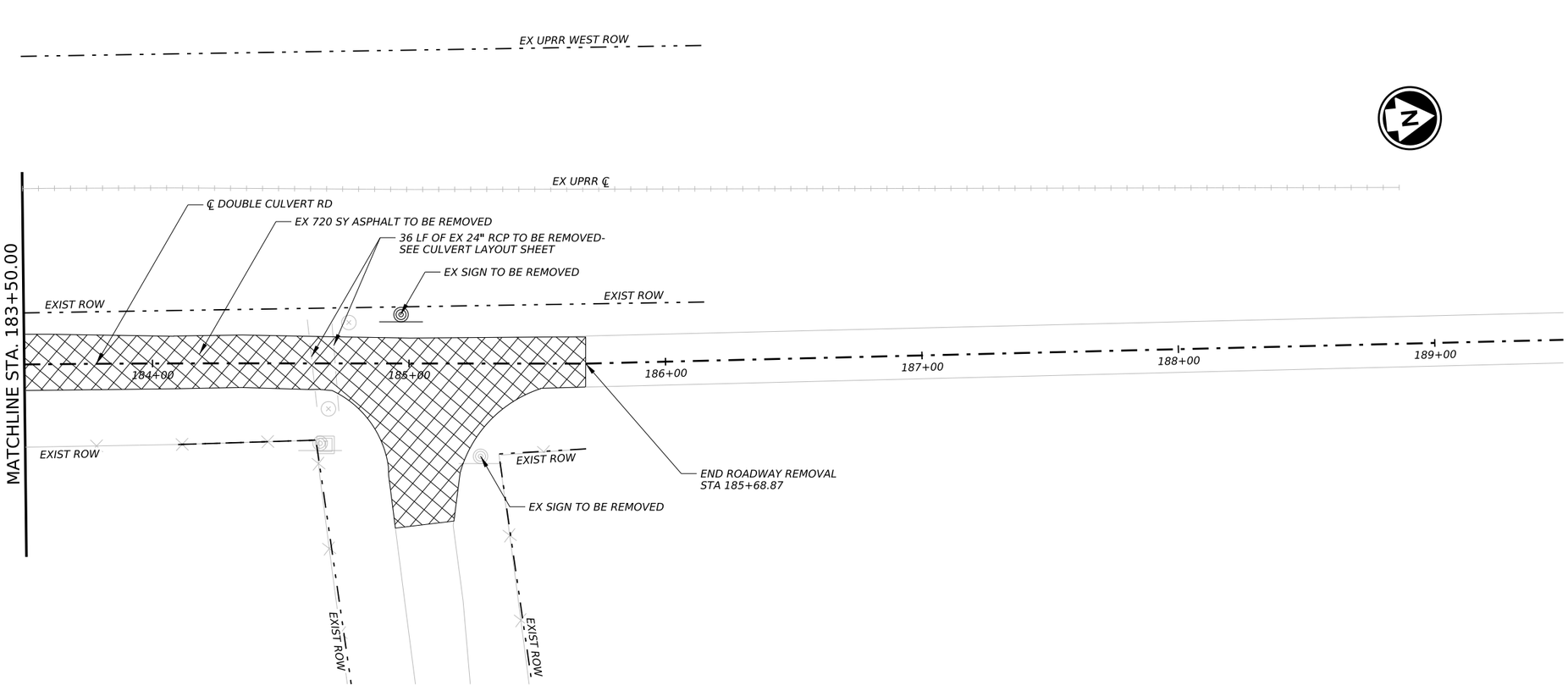

LEGEND

- EXISTING ROW
- ROADWAY REMOVAL
- DRIVEWAY REMOVAL
- 3" MILLING
- EXISTING SIGN
- EXISTING MAILBOX
- EXISTING TREE

NOTES:

1. CONTRACTOR SHALL REMOVE ALL THE SURPLUS MATERIAL FROM THE PROJECT AREA. THE WORK SHALL BE SUBSIDIARY TO THE CONTRACT AND IS NOT A SEPARATE PAY ITEM.

0 25' 50'

SCALE: 1" = 50'

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY M. DILL
84626
LICENSED PROFESSIONAL ENGINEER

R. M. Dill, P.E.
7/21/2026

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

DEMOLITION PLAN
DOUBLE CULVERT RD
STA 177+50.00 TO END

SHEET 6 OF 6

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		28

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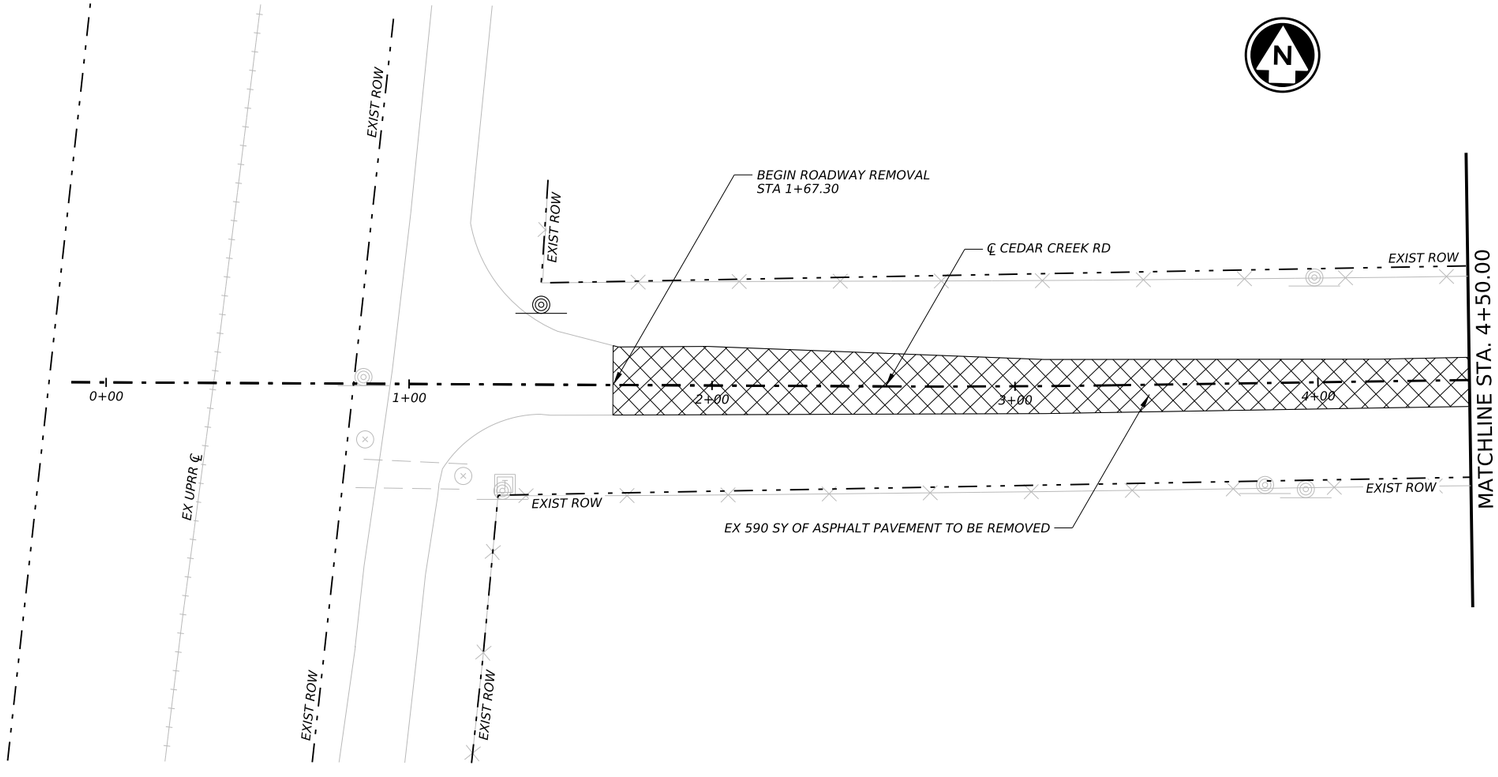

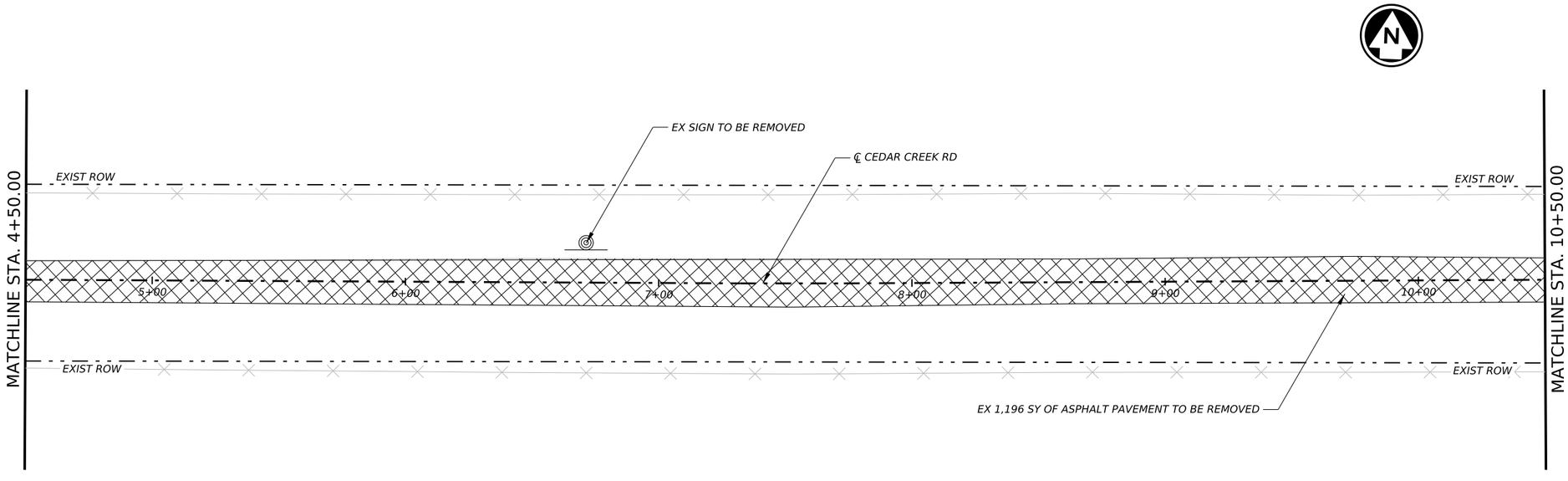

LEGEND

- EXISTING ROW
- ROADWAY REMOVAL
- DRIVEWAY REMOVAL
- 3" MILLING
- EXISTING SIGN
- EXISTING MAILBOX
- EXISTING TREE

NOTES:

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0 25' 50'

SCALE: 1" = 50'

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
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an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

DEMOLITION PLAN
CEDAR CREEK RD
BEGIN TO STA 10+50.00

SHEET 1 OF 5

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		29

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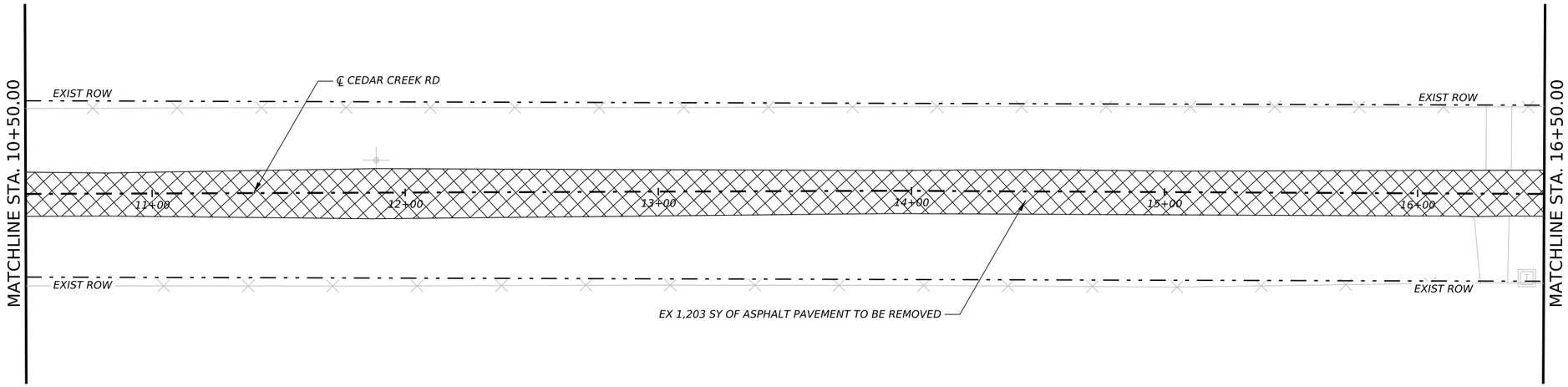

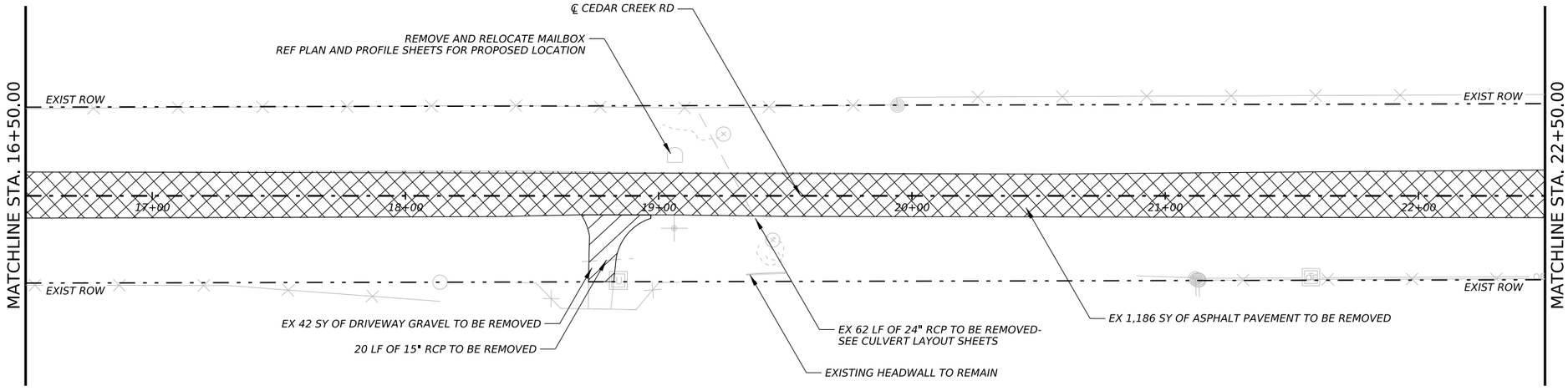

LEGEND

- EXISTING ROW
- ROADWAY REMOVAL
- DRIVEWAY REMOVAL
- 3" MILLING
- EXISTING SIGN
- EXISTING MAILBOX
- EXISTING TREE

NOTES:

1. CONTRACTOR SHALL REMOVE ALL THE SURPLUS MATERIAL FROM THE PROJECT AREA. THE WORK SHALL BE SUBSIDIARY TO THE CONTRACT AND IS NOT A SEPARATE PAY ITEM.

0 25' 50'

SCALE: 1" = 50'

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY M. DILL
84626
LICENSED PROFESSIONAL ENGINEER

R. M. Dill, P.E.
7/21/2026

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

DEMOLITION PLAN
CEDAR CREEK RD
10+50.00 TO STA 22+50.00

SHEET 2 OF 5

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		30

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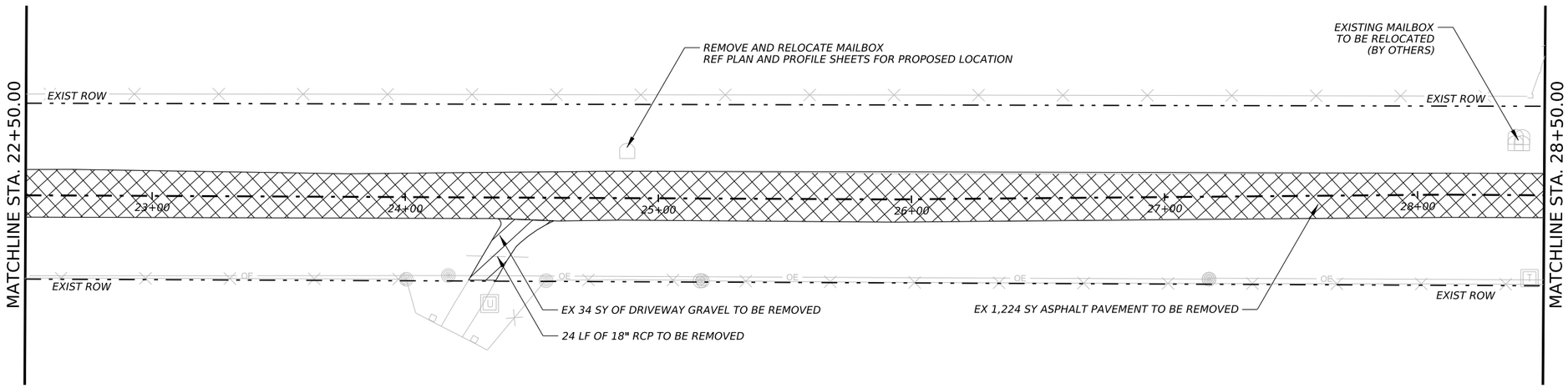

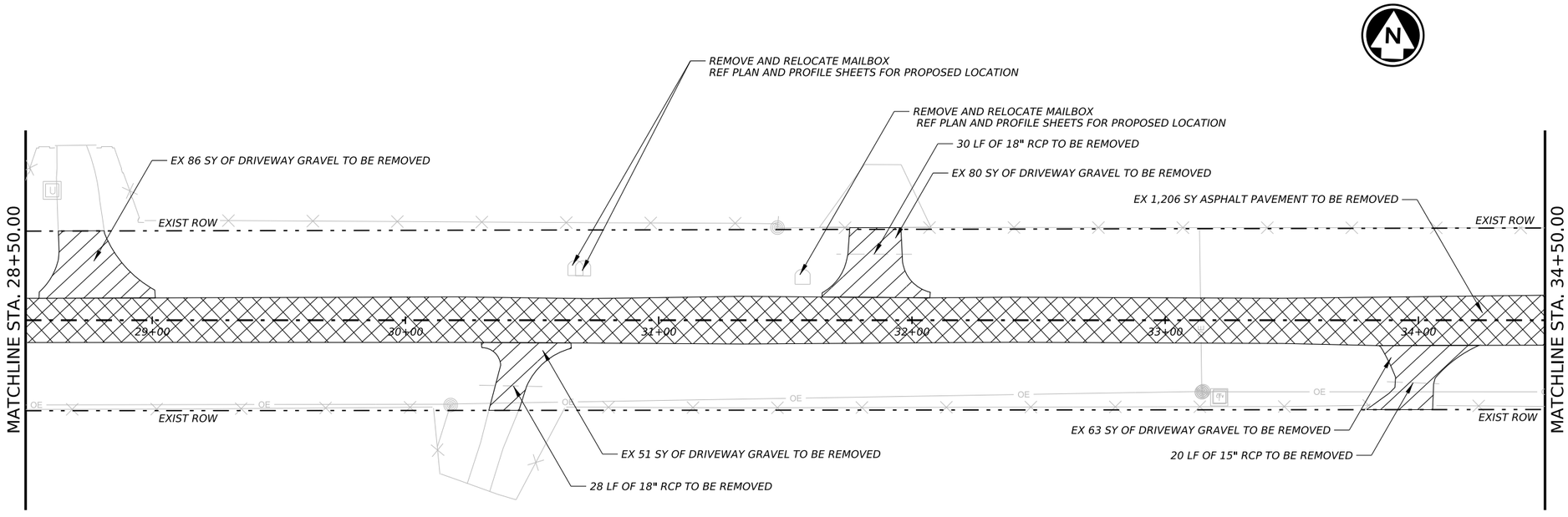

LEGEND

- EXISTING ROW
- ROADWAY REMOVAL
- DRIVEWAY REMOVAL
- 3" MILLING
- EXISTING SIGN
- EXISTING MAILBOX
- EXISTING TREE

NOTES:

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0 25' 50'

SCALE: 1" = 50'

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

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ROY M. DILL
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LICENSED PROFESSIONAL ENGINEER

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7/21/2026

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TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

DEMOLITION PLAN
CEDAR CREEK RD
22+50.00 TO STA 34+50.00

SHEET 3 OF 5

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		31

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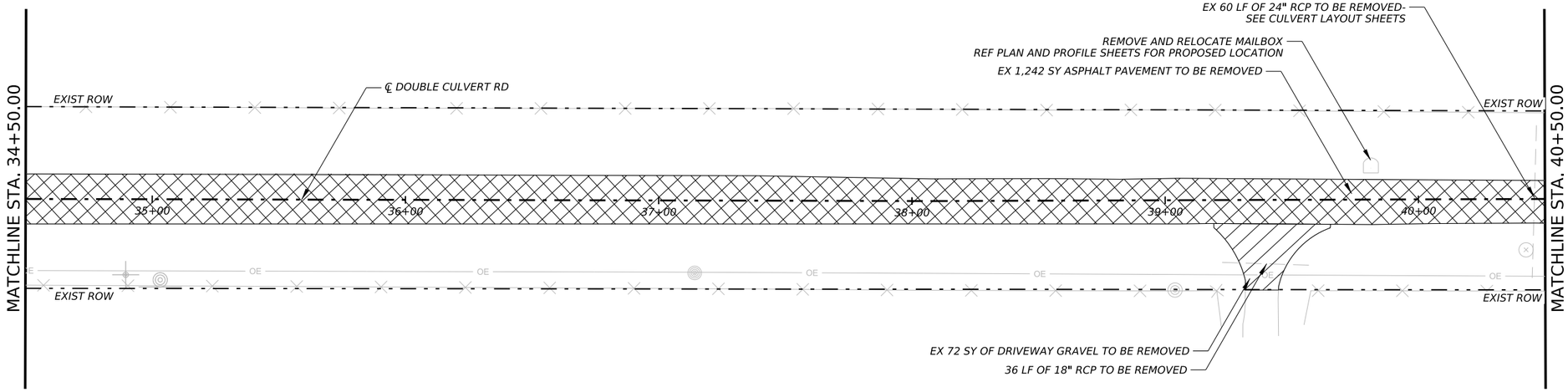

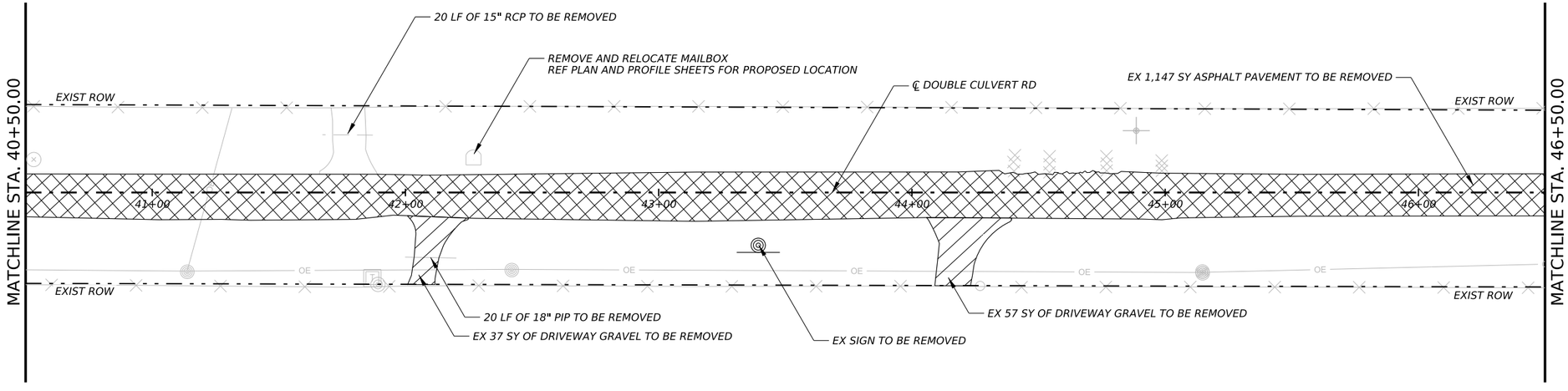

LEGEND

- EXISTING ROW
- ROADWAY REMOVAL
- DRIVEWAY REMOVAL
- 3" MILLING
- EXISTING SIGN
- EXISTING MAILBOX
- EXISTING TREE

NOTES:

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0 25' 50'

SCALE: 1" = 50'

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY M. DILL
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LICENSED PROFESSIONAL ENGINEER

R. M. Dill, P.E.
7/21/2026

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TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

DEMOLITION PLAN
CEDAR CREEK RD
34+50.00 TO STA 46+50.00

SHEET 4 OF 5

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		32

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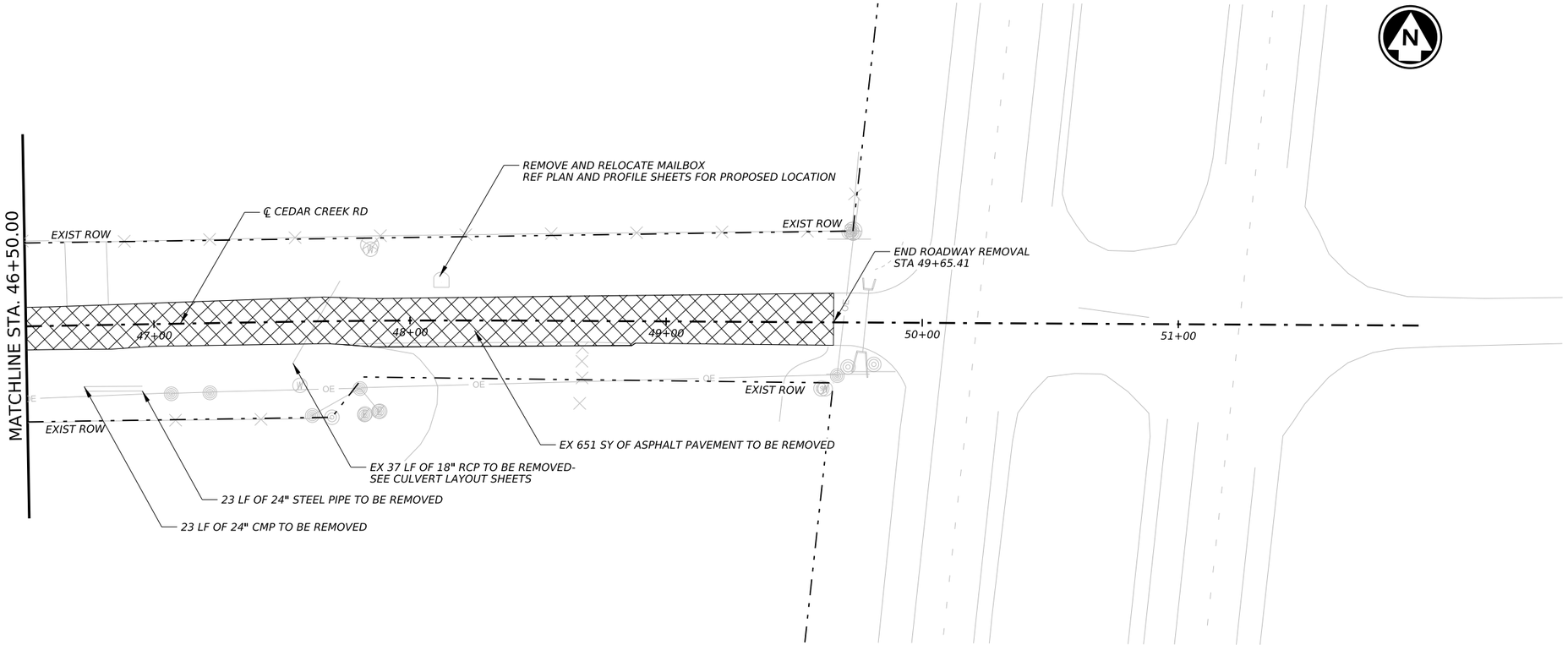

LEGEND

- EXISTING ROW
- ROADWAY REMOVAL
- DRIVEWAY REMOVAL
- 3" MILLING
- EXISTING SIGN
- EXISTING MAILBOX
- EXISTING TREE

NOTES:

1. CONTRACTOR SHALL REMOVE ALL THE SURPLUS MATERIAL FROM THE PROJECT AREA. THE WORK SHALL BE SUBSIDIARY TO THE CONTRACT AND IS NOT A SEPARATE PAY ITEM.

0 25' 50'

SCALE: 1" = 50'

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY M. DILL
84626
LICENSED
PROFESSIONAL ENGINEER

R. M. Dill, P.E.
7/21/2026

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS
WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

DEMOLITION PLAN
CEDAR CREEK RD
46+50.00 TO END

SHEET 5 OF 5

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		33

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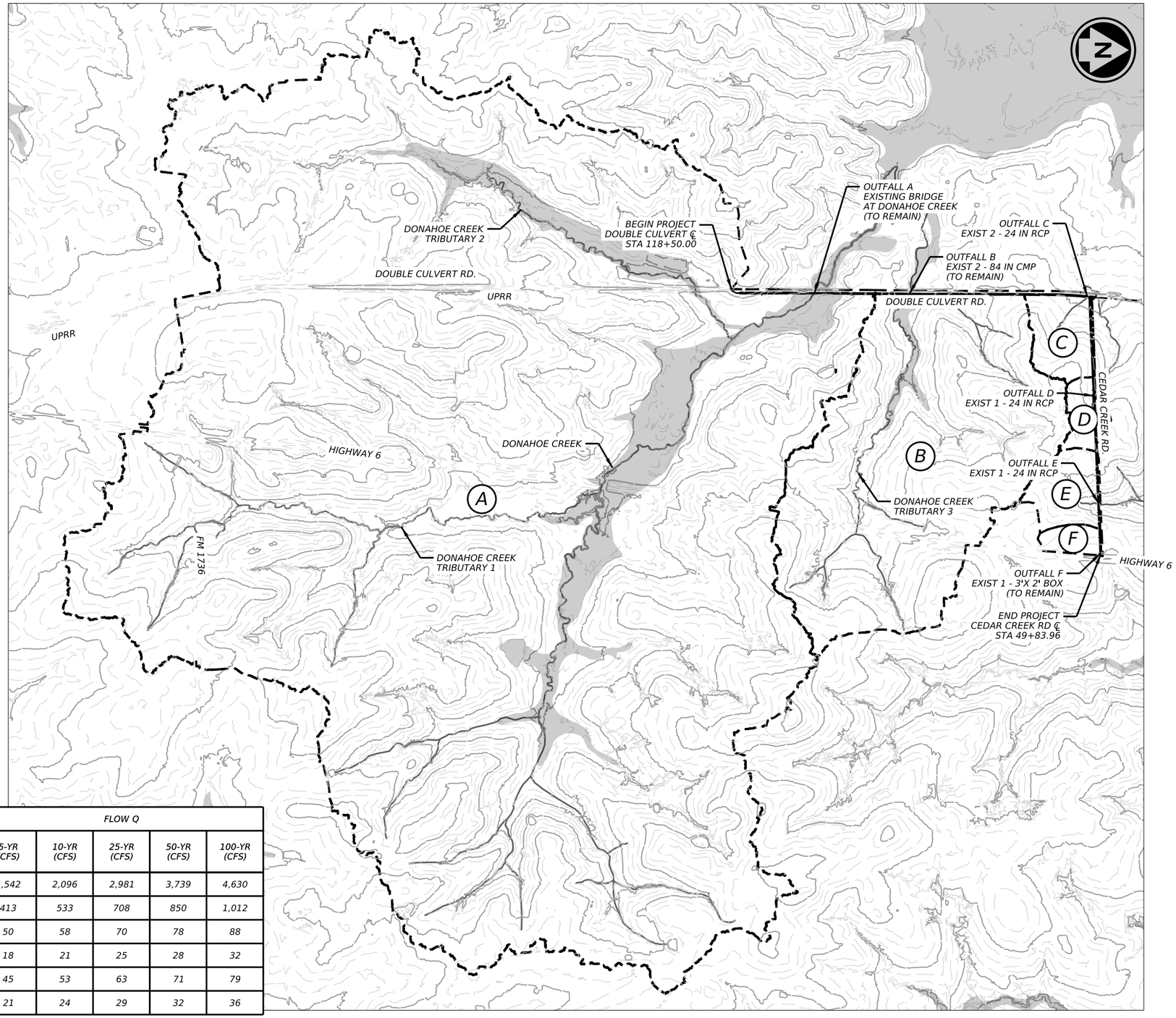

LEGEND:

- DRAINAGE AREA BOUNDARY
- FEMA 100-YR FLOODPLAIN
- (A) DRAINAGE AREA ID

0 1000' 2000'

SCALE: 1" = 2000'

		FLOW Q				
AREA ID	AREA (AC)	5-YR (CFS)	10-YR (CFS)	25-YR (CFS)	50-YR (CFS)	100-YR (CFS)
A	4,006	1,542	2,096	2,981	3,739	4,630
B	576	413	533	708	850	1,012
C	41.6	50	58	70	78	88
D	16.3	18	21	25	28	32
E	38.6	45	53	63	71	79
F	13.2	21	24	29	32	36

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
HUMBERTO CONTRERAS
99213
LICENSED
PROFESSIONAL ENGINEER

7/23/2026

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

OVERALL DRAINAGE AREA MAP

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		34

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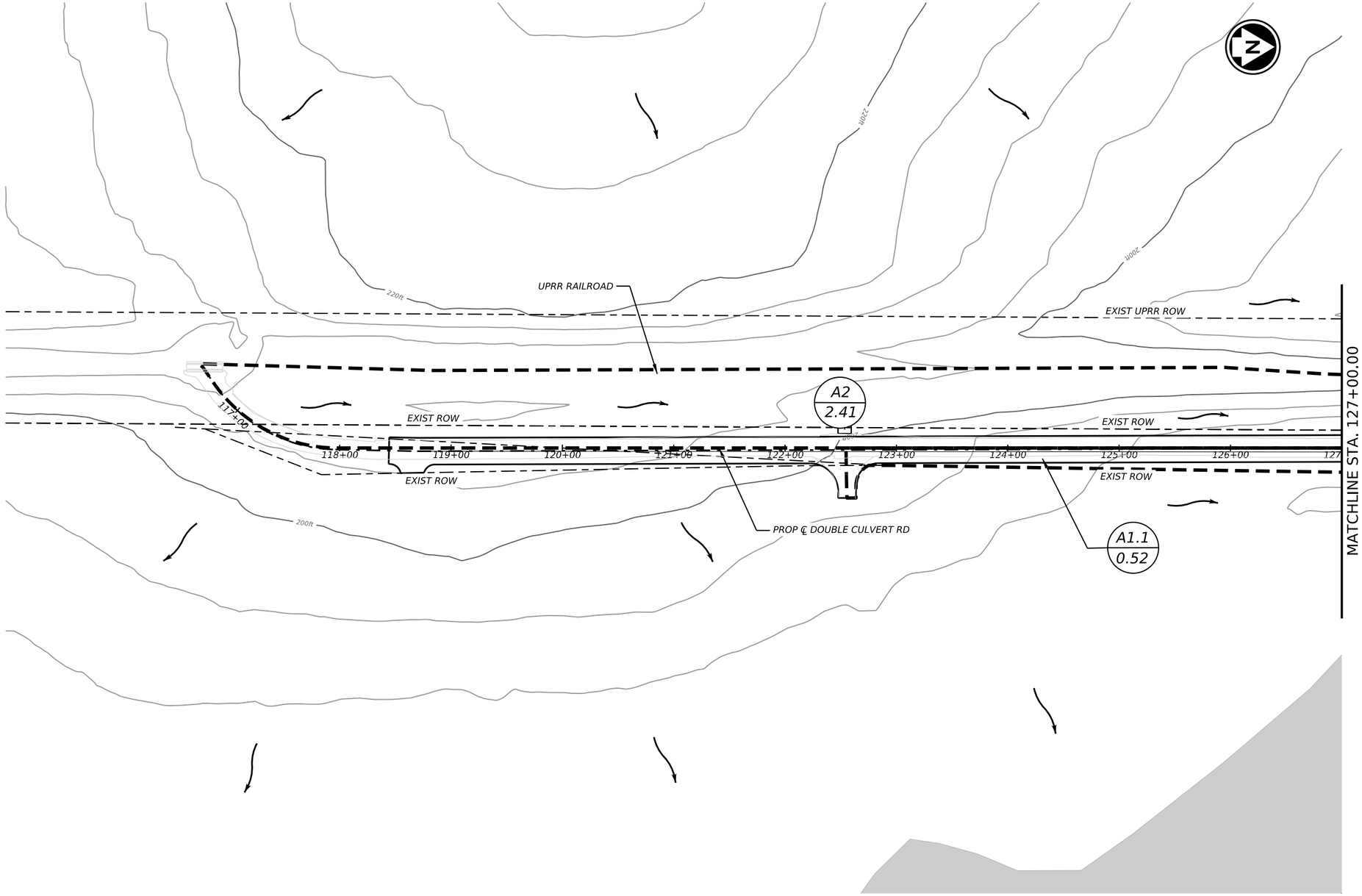

LEGEND

- DRAINAGE AREA BOUNDARY
- XX / XX — DRAINAGE AREA ID / DRAINAGE AREA (ACRES)
- FLOW DIRECTION
- EFFECTIVE 100-YR FEMA FLOODPLAIN (ZONE A)

0 50' 100'

SCALE: 1" = 100'

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
HUMBERTO CONTRERAS
99213
LICENSED
PROFESSIONAL ENGINEER

7/22/2026

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS
WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

MINOR DRAINAGE AREA MAP
DOUBLE CULVERT RD
BEGIN TO STA 127+00.00

SHEET 1 OF 6

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		35

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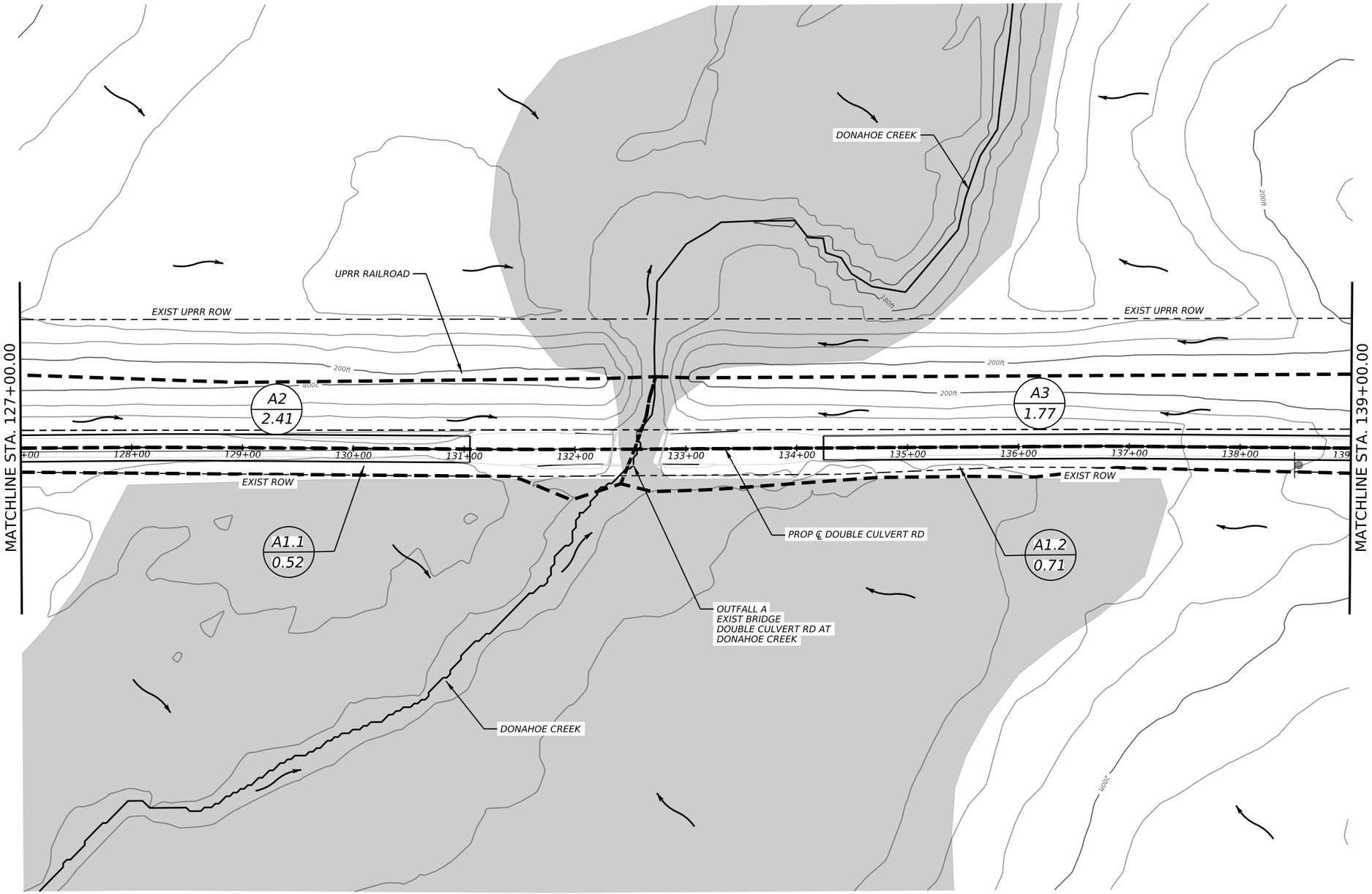

LEGEND

- DRAINAGE AREA BOUNDARY
- XX / XX — DRAINAGE AREA ID / DRAINAGE AREA (ACRES)
- FLOW DIRECTION
- EFFECTIVE 100-YR FEMA FLOODPLAIN (ZONE A)

0 50' 100'
SCALE: 1" = 100'

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
HUMBERTO CONTRERAS
99213
LICENSED
PROFESSIONAL ENGINEER
7/22/2026

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

MINOR DRAINAGE AREA MAP
DOUBLE CULVERT RD
STA 127+00.00 TO STA 139+00.00

SHEET 2 OF 6

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		36

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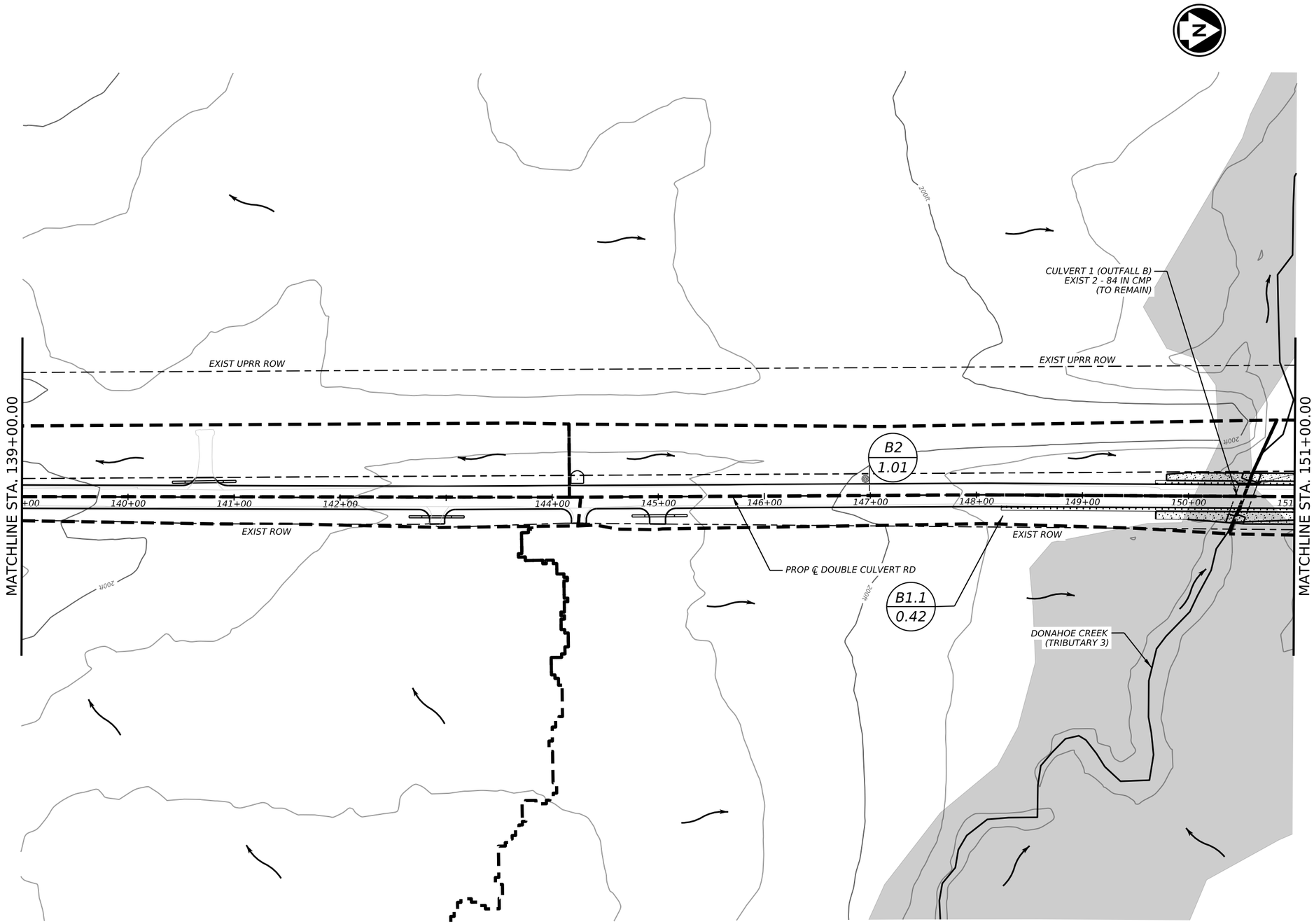

LEGEND

- DRAINAGE AREA BOUNDARY
- XX / XX — DRAINAGE AREA ID / DRAINAGE AREA (ACRES)
- FLOW DIRECTION
- EFFECTIVE 100-YR FEMA FLOODPLAIN (ZONE A)

0 50' 100'
SCALE: 1" = 100'

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
HUMBERTO CONTRERAS
99213
LICENSED
PROFESSIONAL ENGINEER
7/22/2026

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

MINOR DRAINAGE AREA MAP
DOUBLE CULVERT RD
STA 139+00.00 TO STA 151+00.00

SHEET 3 OF 6

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		37

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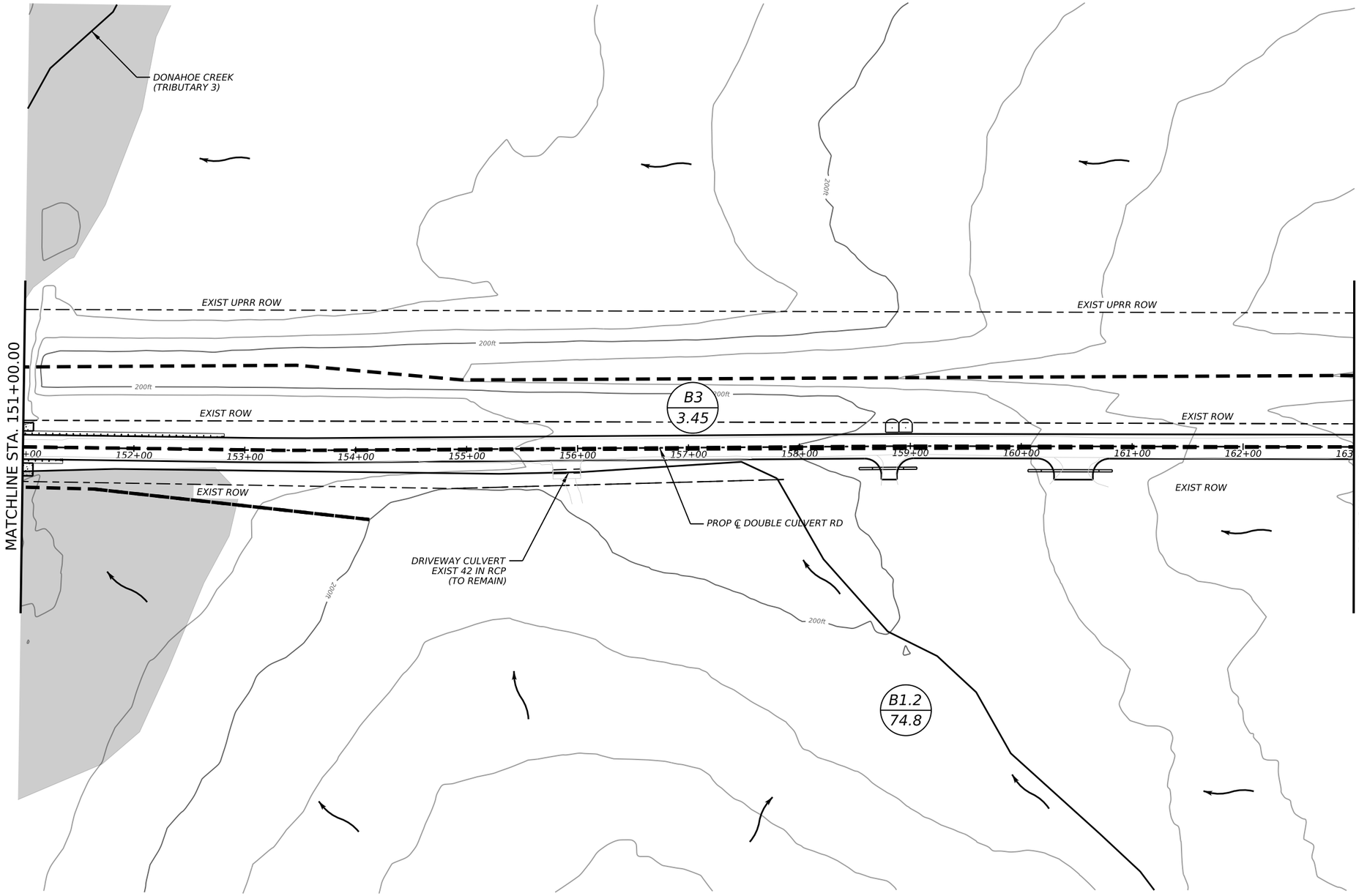

LEGEND

- DRAINAGE AREA BOUNDARY
- XX / XX — DRAINAGE AREA ID / DRAINAGE AREA (ACRES)
- FLOW DIRECTION
- EFFECTIVE 100-YR FEMA FLOODPLAIN (ZONE A)

0 50' 100'
SCALE: 1" = 100'

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
HUMBERTO CONTRERAS
99213
LICENSED
PROFESSIONAL ENGINEER
7/22/2026

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS
WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

MINOR DRAINAGE AREA MAP
DOUBLE CULVERT RD
STA 151+00.00 TO STA 163+00.00

SHEET 4 OF 6

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		38

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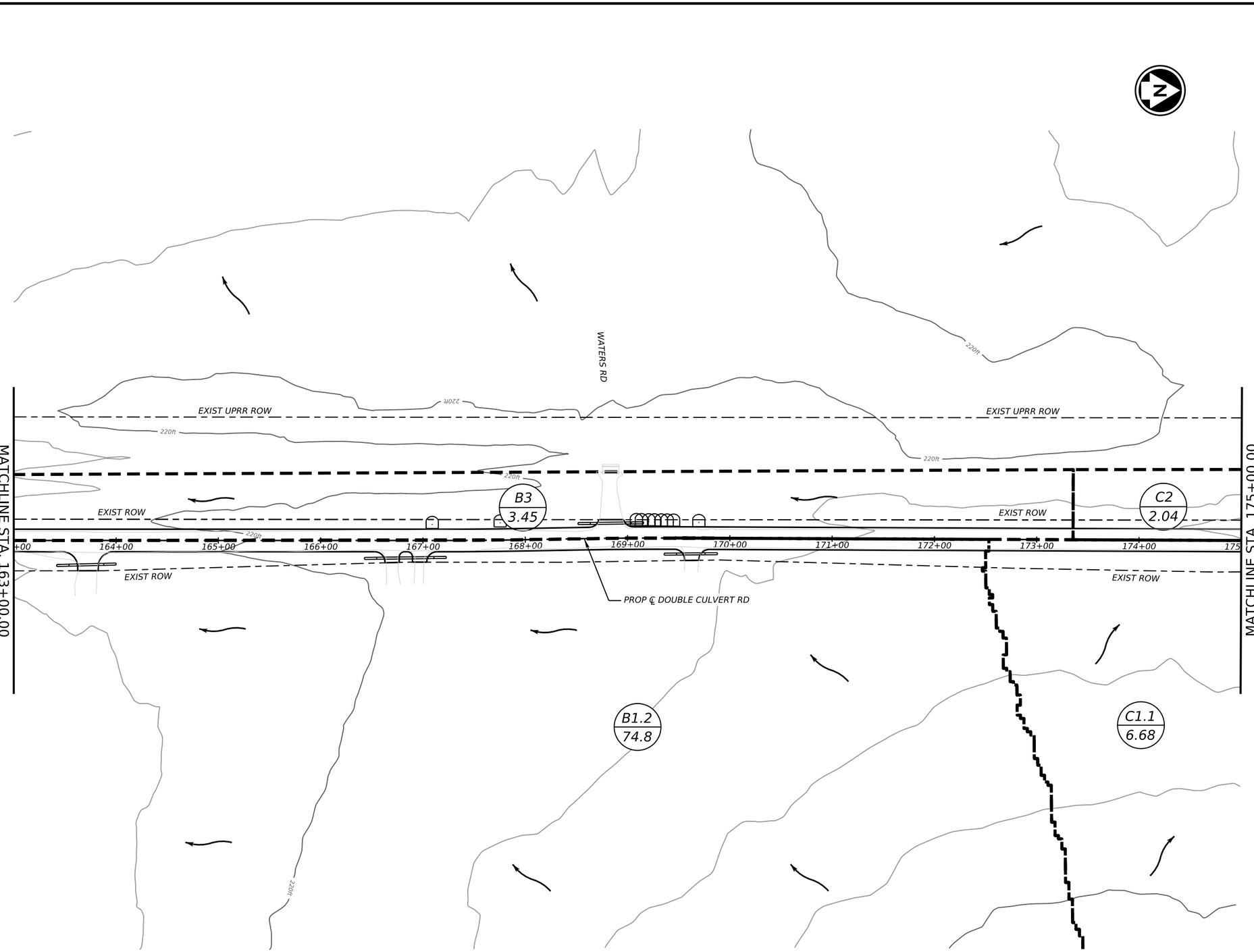

LEGEND

- DRAINAGE AREA BOUNDARY
- XX / XX — DRAINAGE AREA ID / DRAINAGE AREA (ACRES)
- FLOW DIRECTION
- EFFECTIVE 100-YR FEMA FLOODPLAIN (ZONE A)

0 50' 100'

SCALE: 1" = 100'

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
HUMBERTO CONTRERAS
99213
LICENSED
PROFESSIONAL ENGINEER
7/23/2026

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TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

MINOR DRAINAGE AREA MAP
DOUBLE CULVERT RD
STA 163+00.00 TO STA 175+00.00

SHEET 5 OF 6

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		39

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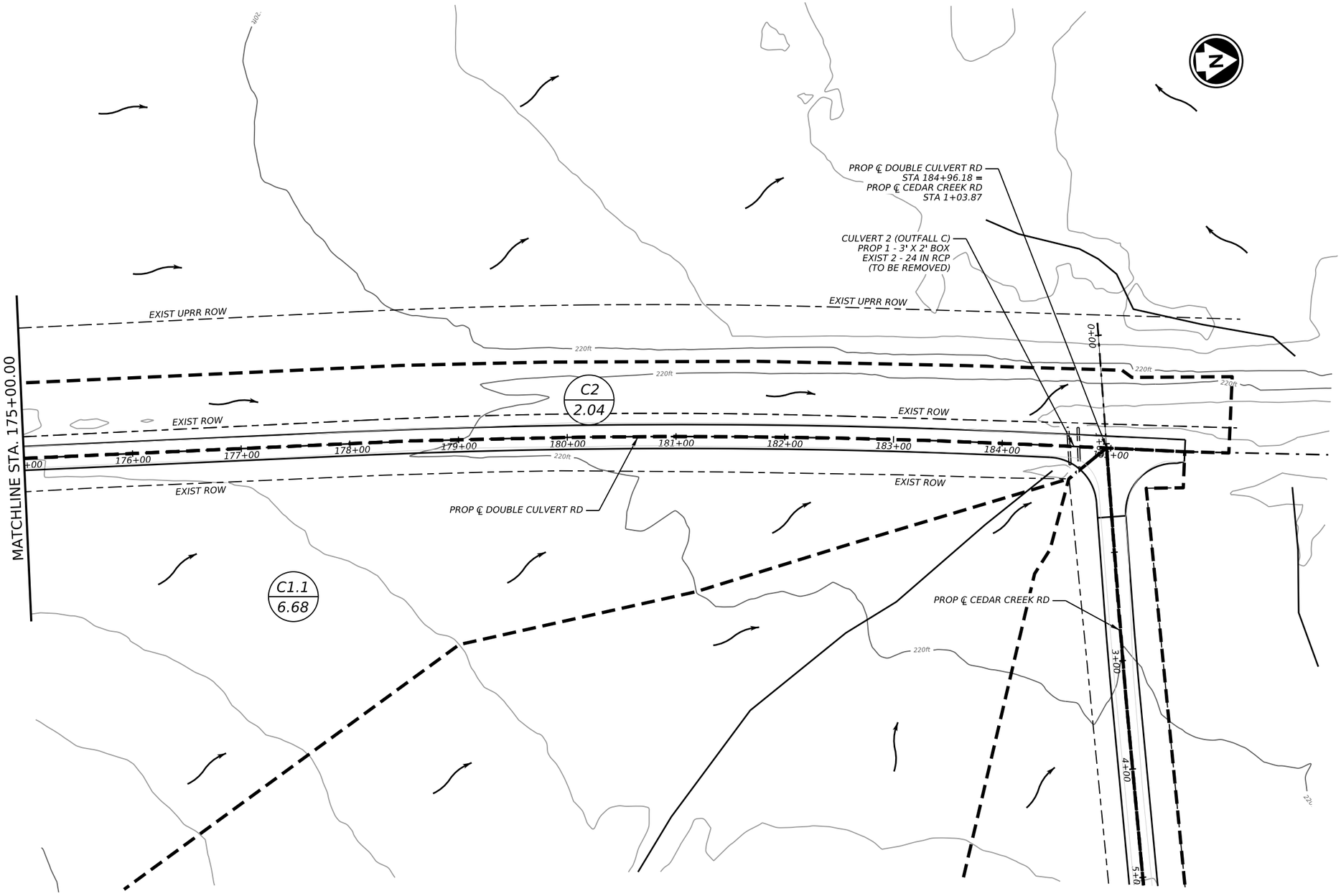

LEGEND

- DRAINAGE AREA BOUNDARY
- XX / XX — DRAINAGE AREA ID / DRAINAGE AREA (ACRES)
- FLOW DIRECTION
- EFFECTIVE 100-YR FEMA FLOODPLAIN (ZONE A)

0 50' 100'

SCALE: 1" = 100'

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

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THE STATE OF TEXAS
WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

MINOR DRAINAGE AREA MAP
DOUBLE CULVERT RD
STA 175+00.00 TO END

SHEET 6 OF 6

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		40

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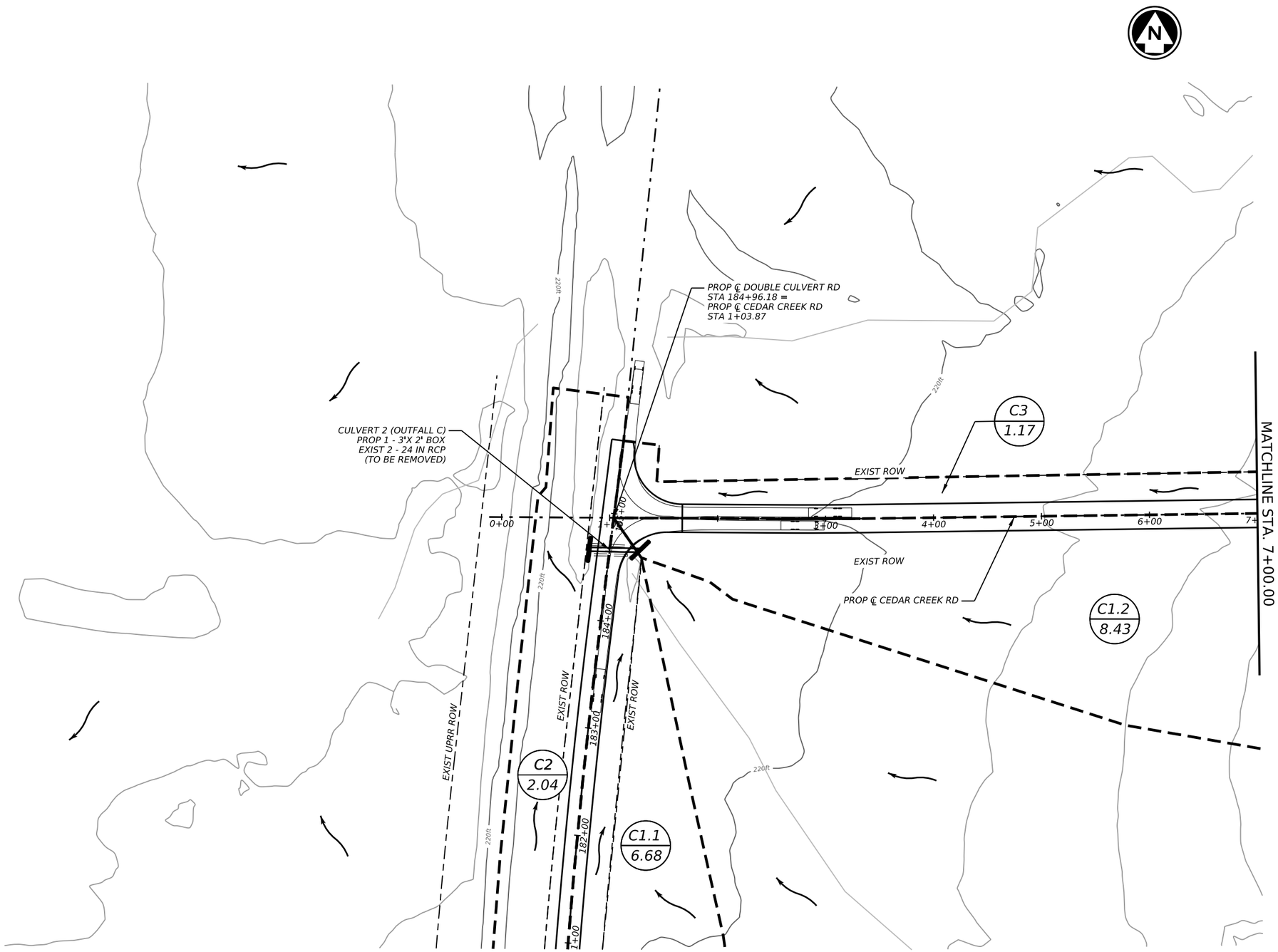

LEGEND

- DRAINAGE AREA BOUNDARY
- XX / XX — DRAINAGE AREA ID / DRAINAGE AREA (ACRES)
- FLOW DIRECTION
- EFFECTIVE 100-YR FEMA FLOODPLAIN (ZONE A)

0 50' 100'
SCALE: 1" = 100'

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CIVILCORP, LLC
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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

MINOR DRAINAGE AREA MAP
CEDAR CREEK RD
BEGIN TO STA 7+00.00

SHEET 1 OF 5

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		41

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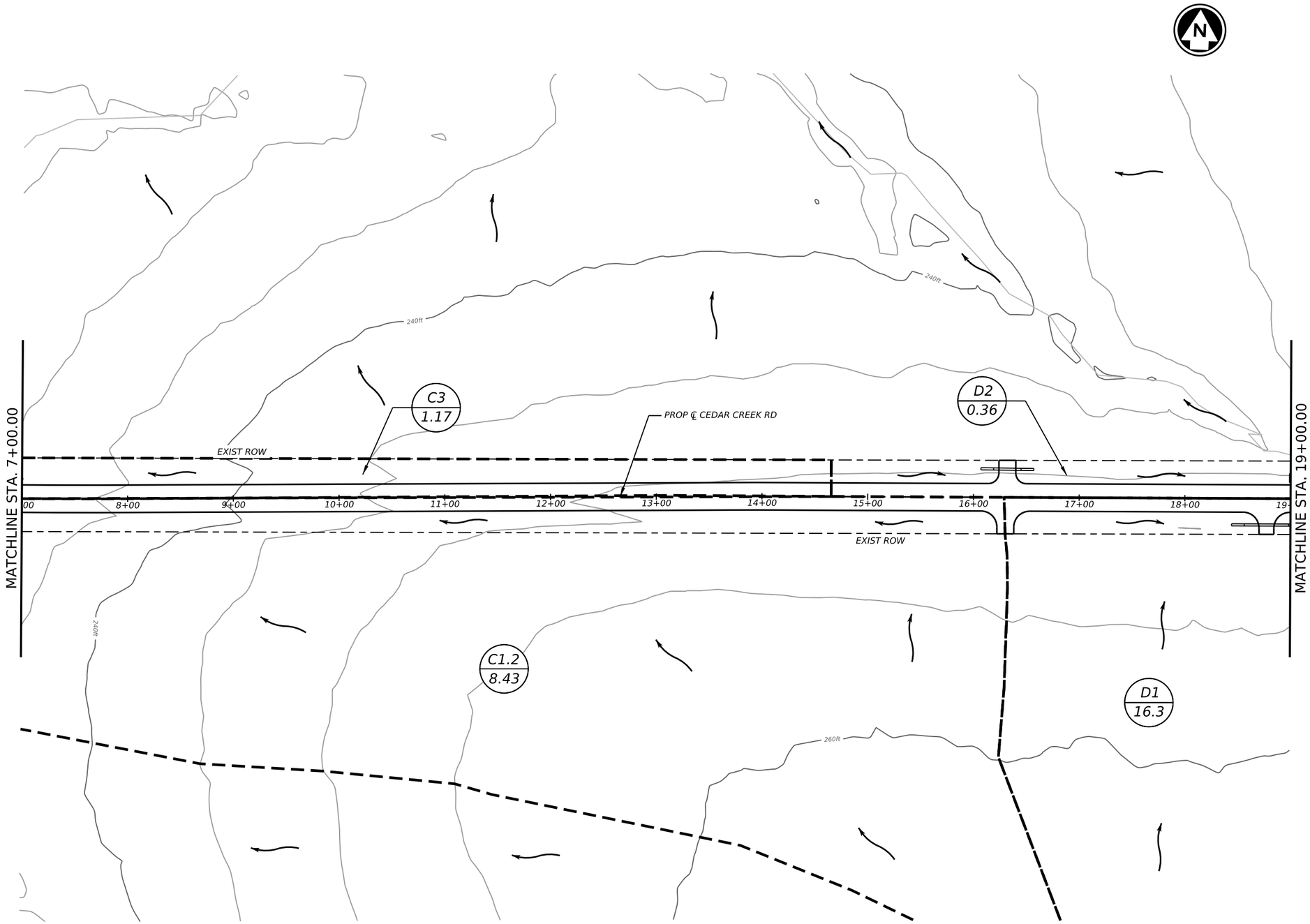

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
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STATE OF TEXAS
HUMBERTO CONTRERAS
99213
LICENSED PROFESSIONAL ENGINEER
7/21/2026

CivilCorp
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29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

MINOR DRAINAGE AREA MAP
CEDAR CREEK RD
STA 7+00.00 TO STA 19+00.00

SHEET 2 OF 5

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		42

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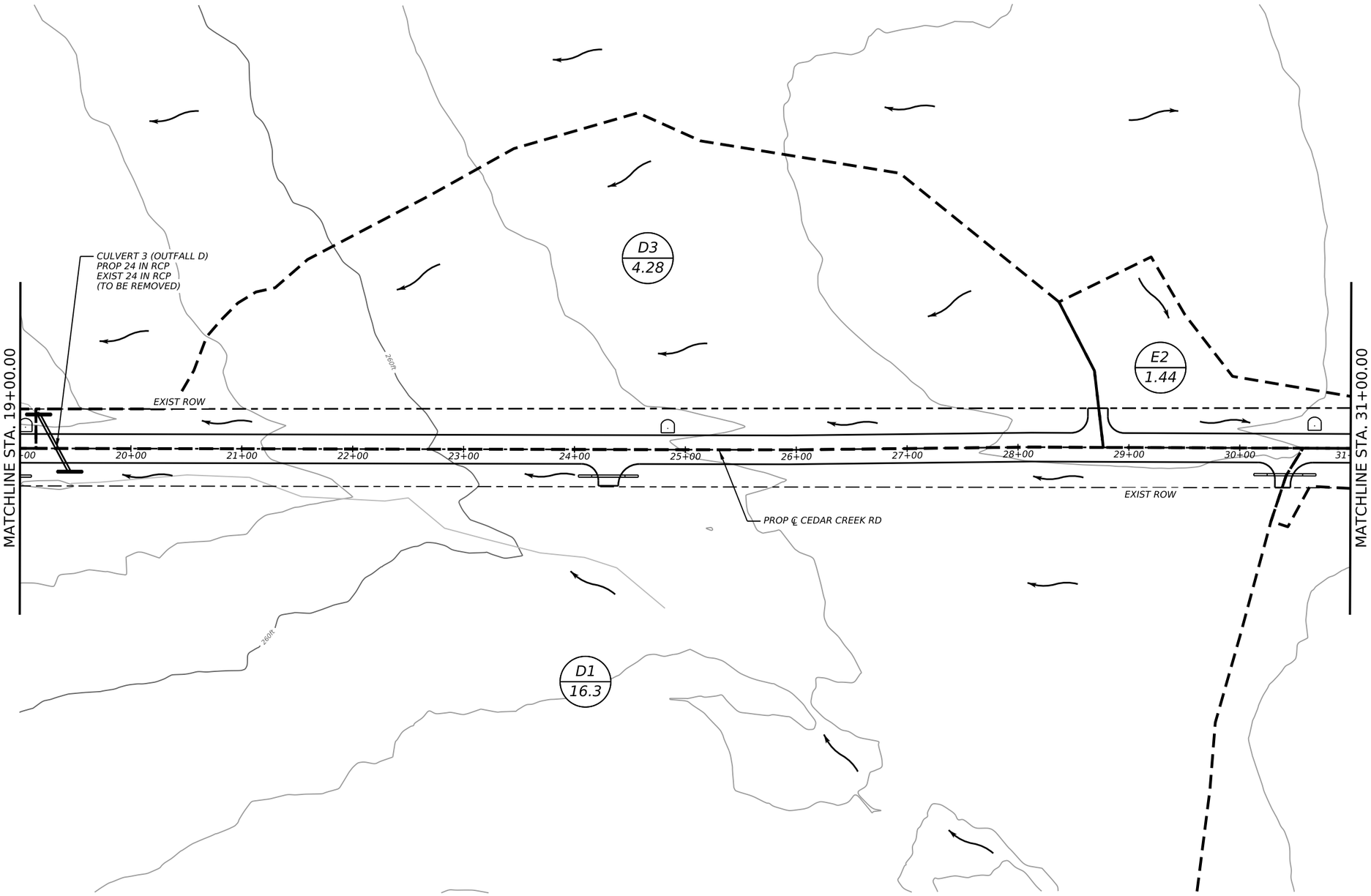

LEGEND

- DRAINAGE AREA BOUNDARY
- XX / XX — DRAINAGE AREA ID / DRAINAGE AREA (ACRES)
- FLOW DIRECTION
- EFFECTIVE 100-YR FEMA FLOODPLAIN (ZONE A)

0 50' 100'
SCALE: 1" = 100'

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
HUMBERTO CONTRERAS
99213
LICENSED
PROFESSIONAL ENGINEER
7/21/2026

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

MINOR DRAINAGE AREA MAP
CEDAR CREEK RD
STA 19+00.00 TO STA 31+00.00

SHEET 3 OF 5

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		43

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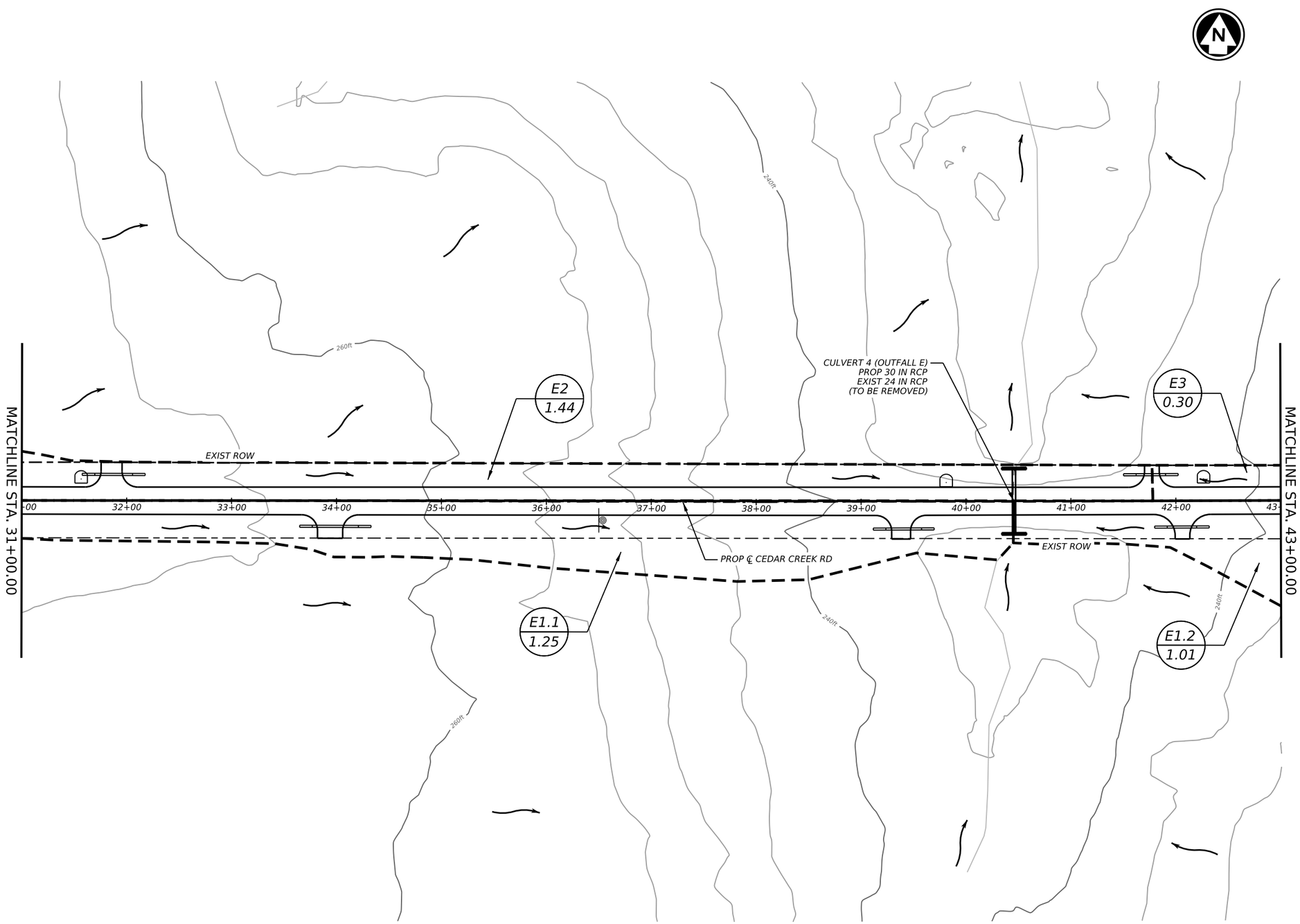

LEGEND

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- XX / XX — DRAINAGE AREA ID / DRAINAGE AREA (ACRES)
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WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

MINOR DRAINAGE AREA MAP
CEDAR CREEK RD
STA 31+00.00 TO STA 43+00.00
SHEET 4 OF 5

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		44

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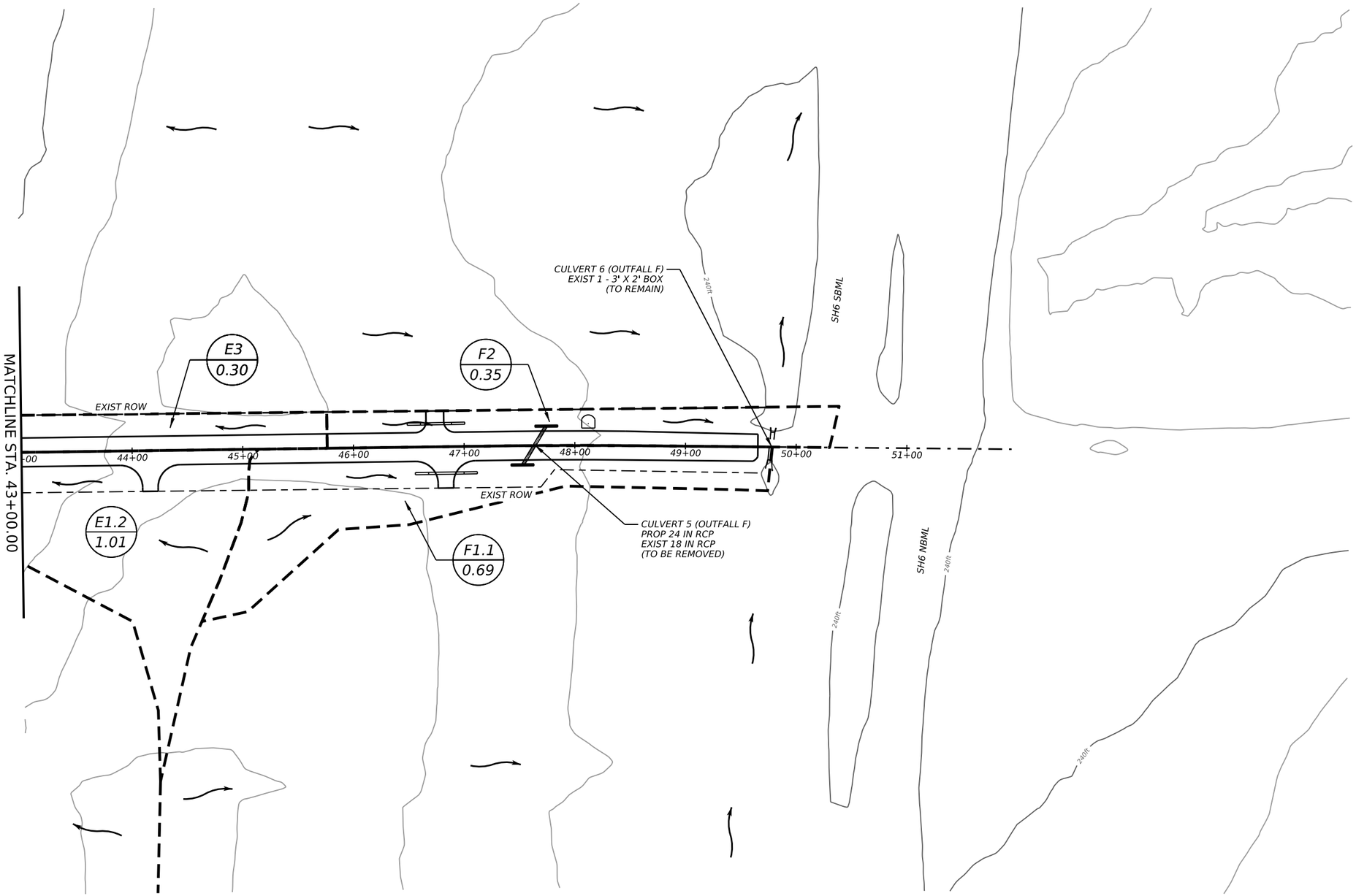

LEGEND

- DRAINAGE AREA BOUNDARY
- XX / XX — DRAINAGE AREA ID / DRAINAGE AREA (ACRES)
- FLOW DIRECTION
- EFFECTIVE 100-YR FEMA FLOODPLAIN (ZONE A)

0 50' 100'
SCALE: 1" = 100'

NO.	DATE	REVISION	APPROV.

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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

MINOR DRAINAGE AREA MAP
CEDAR CREEK RD
STA 43+00.00 TO END

SHEET 5 OF 5

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		45

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WALLER COUNTY DESIGN INTENSITY VALUES FOR RATIONAL METHOD

	DESIGN STORM FREQUENCY					
COEFFICIENTS	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
e	0.7962	0.7737	0.7521	0.7252	0.7012	0.6829
b	63.3769	71.4160	75.9155	81.2936	82.4987	86.2332
d	12.3799	12.0518	11.7528	11.4671	10.9481	11.1001

WALLER COUNTY RUNOFF COEFFICIENTS (RATIONAL METHOD)

LAND USE/LAND COVER	RATIONAL COEFFICIENT (C)
RAW, UNDEVELOPED	0.20
IMPROVED, UNDEVELOPED	0.30
RESIDENTIAL	0.40
INDUSTRIAL	0.90
PAVEMENT	0.90

SUMMARY OF HYDROLOGIC DATA - CULVERT DRAINAGE AREAS

Drainage Area ID	Bridge/ Culvert	Hydrologic Method Used	Area		Composite C- Value	CN	TC (Min)	Lag Time (Min)	5-YR		10-YR		25-YR		50-YR		100-YR	
			Acres	Sq. Miles					Intensity (In/Hr)	Q (CFS)	Intensity (In/Hr)	Q (CFS)	Intensity (In/Hr)	Q (CFS)	Intensity (In/Hr)	Q (CFS)	Intensity (In/Hr)	Q (CFS)
A	Bridge	Regression	4,006	6.26	-	-	-	-	-	1,542	-	2,096	-	2,981	-	3,739	-	4,630
B	Culvert	NRCS	576	0.90	-	71	263	158	-	413	-	533	-	708	-	850	-	1,012
C	Culvert	Rational	41.55	0.06	0.36	-	40	-	3.36	50	3.90	58	4.67	70	5.24	78	5.87	88
D	Culvert	Rational	16.32	0.03	0.36	-	46	-	3.08	18	3.59	21	4.31	25	4.85	28	5.45	32
E	Culvert	Rational	38.62	0.06	0.35	-	40	-	3.36	45	3.90	53	4.67	63	5.24	71	5.87	79
F	Culvert	Rational	13.16	0.02	0.41	-	31	-	3.89	21	4.5	24	5.36	29	6.01	32	6.71	36

SUMMARY OF HYDROLOGIC DATA - PROJECT SUBAREAS

Drainage Area ID	Area (AC)	Composite C- Value	TC (Min)	5-YR		10-YR		25-YR		50-YR		100-YR	
				Intensity (In/Hr)	Q (CFS)	Intensity (In/Hr)	Q (CFS)	Intensity (In/Hr)	Q (CFS)	Intensity (In/Hr)	Q (CFS)	Intensity (In/Hr)	Q (CFS)
A1.1	0.52	0.67	10	6.52	2.27	7.49	2.61	8.80	3.07	9.77	3.40	10.75	3.75
A1.2	0.71	0.59	10	6.52	2.73	7.49	3.14	8.80	3.69	9.77	4.09	10.75	4.50
A2	2.41	0.52	23	4.56	5.71	5.26	6.59	6.24	7.82	6.97	8.73	7.74	9.70
A3	1.77	0.56	12	6.10	6.05	7.01	6.95	8.25	8.18	9.17	9.09	10.10	10.01
B1.1	0.42	0.57	10	6.52	1.56	7.49	1.79	8.80	2.11	9.77	2.34	10.75	2.57
B1.2	74.81	0.31	44	3.17	73.52	3.69	85.58	4.42	102.50	4.97	115.26	5.58	129.41
B2	1.01	0.41	10	6.52	2.70	7.49	3.10	8.80	3.64	9.77	4.05	10.75	4.45
B3	3.45	0.42	19	5.00	7.25	5.77	8.36	6.82	9.88	7.61	11.03	8.43	12.22
C1.1	6.68	0.38	31	3.89	9.87	4.50	11.42	5.36	13.61	6.01	15.26	6.71	17.03
C1.2	8.43	0.36	29	4.03	12.23	4.67	14.17	5.55	16.84	6.22	18.88	6.93	21.03
C2	2.04	0.41	17	5.27	4.41	6.07	5.08	7.17	6.00	7.98	6.67	8.84	7.39
C3	1.17	0.52	11	6.3	3.83	7.24	4.40	8.51	5.18	9.46	5.76	10.41	6.33
D1	16.3	0.32	46	3.08	16.07	3.59	18.73	4.31	22.48	4.85	25.30	5.45	28.43
D2	0.36	0.52	10	6.52	1.22	7.49	1.40	8.80	1.65	9.77	1.83	10.75	2.01
D3	4.28	0.34	27	4.19	6.10	4.85	7.06	5.76	8.38	6.44	9.38	7.18	10.45
E1.1	1.25	0.45	10	6.52	3.67	7.49	4.21	8.80	4.95	9.77	5.50	10.75	6.05
E1.2	1.01	0.38	18	5.13	1.97	5.92	2.27	6.99	2.68	7.79	2.99	8.63	3.31
E2	1.44	0.47	22	4.66	3.15	5.38	3.64	6.37	4.31	7.11	4.81	7.90	5.35
E3	0.30	0.54	10	6.52	1.06	7.49	1.21	8.80	1.43	9.77	1.58	10.75	1.74
F1.1	0.69	0.42	16	5.41	1.57	6.23	1.81	7.36	2.13	8.19	2.37	9.06	2.63
F2	0.35	0.56	10	6.52	1.28	7.49	1.47	8.8	1.72	9.77	1.91	10.75	2.11

NOTES:

1. DESIGN FLOWS CALCULATED USING THE RATIONAL METHOD, WITH INTENSITIES BASED ON NOAA ATLAS-14 RAINFALL DATA AND (e,b,d) VALUES FROM THE WALLER COUNTY SUBDIVISION AND REGULATIONS MANUAL.
2. DESIGN/ANALYSIS OF PROPOSED CROSS DRAINAGE STRUCTURES BASED ON 25-YR AND 100-YR DESIGN STORM FREQUENCIES.
3. DESIGN/ANALYSIS OF ROADSIDE DITCHES BASED ON 5-YR DESIGN STORM.

NO.	DATE	REVISION	APPROV.

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THE STATE OF TEXAS
WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

DRAINAGE HYDRAULIC CALCULATIONS

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST		COUNTY	SHEET NO.
		WALLER	46

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CULVERT LOCATION & DESCRIPTION					DESIGN FREQUENCY	FLOW (CFS)	HYDRAULIC DATA (EXISTING)					HYDRAULIC DATA (PROPOSED)				
CULVERT ID	OUTFALL ID	STATION	EXISTING STRUCTURE	PROPOSED STRUCTURE			ALLOW HW (FT)	HW (FT)	TW (FT)	SLOPE (%)	VEL (FT/S)	ALLOW HW (FT)	HW (FT)	TW (FT)	SLOPE (%)	VEL (FT/S)
1	B	DOUBLE CULVERT RD STA 150+53	2 - 84 IN. X 36 LF STEEL PIPES	EXISTING TO REMAIN	25-YR	708	192.22	192.48	187.47	0.69	11.92	192.48	192.48	187.42	0.69	11.92
					100-YR	1012	192.22	192.92	188.04	0.69	12.20	192.48	192.92	187.99	0.69	12.20
2	C	DOUBLE CULVERT RD STA 184+67	2 - 24 IN. X 36 LF RCP	1 - 3' X 2' X 48 LF RCB	25-YR	70	216.57	216.77	213.46	1.94	11.44	216.68	215.41	213.46	1.94	5.83
					100-YR	88	216.57	216.90	213.46	1.94	11.52	216.68	215.96	213.46	1.94	7.33
3	D	CEDAR CREEK RD STA 19+33	1 - 24 IN X 61 LF RCP	1 - 24 IN X 62 LF RCP	25-YR	25	251.58	250.34	244.68	7.02	16.67	251.93	250.34	244.80	6.82	16.47
					100-YR	32	251.58	251.61	244.68	7.02	17.49	251.93	251.64	244.80	6.82	17.37
4	E	CEDAR CREEK RD STA 40+46	1 - 24 IN X 60 LF RCP	1 - 30 IN X 64 LF RCP	25-YR	63	237.46	237.61	228.87	1.95	15.79	241.14	235.50	229.60	2.30	14.55
					100-YR	79	237.46	237.69	228.87	1.95	15.86	241.14	238.21	229.60	2.30	16.09
5	F	CEDAR CREEK RD STA 47+64	1 - 18 IN X 34 LF RCP	1 - 24 IN X 42 LF RCP	25-YR	2	246.39	245.63	245.45	0.35	3.62	246.63	243.15	242.97	0.53	2.06
					100-YR	3	246.39	245.73	245.51	0.35	3.86	246.63	243.23	243.03	0.53	2.28
6	F	CEDAR CREEK RD STA 49+78	1 - 3' X 2' X 25 LF RCB	EXISTING TO REMAIN	25-YR	29	240.68	238.78	238.20	0.40	4.83	-	-	-	-	-
					100-YR	36	240.68	239.10	238.20	0.40	6.00	-	-	-	-	-

NOTES:

1. HYDRAULIC CALCULATIONS PERFORMED USING FHWA HY-8 CULVERT ANALYSIS PROGRAM (V7.80.0.2).

2. SEE DRAINAGE AREA MAPS AND HYDROLOGIC DATA SHEETS FOR ADDITIONAL INFORMATION.

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WALLER COUNTY
ENGINEERING DEPARTMENT

DRAINAGE CULVERT HYDRAULIC DATA

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		47

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PROPOSED WEST DITCH CALCULATIONS - DOUBLE CULVERT RD.

DRAINAGE ID	STATION	FLOWLINE ELEVATION	STATION	FLOWLINE ELEVATION	BOTTOM WIDTH	LEFT SIDE SLOPE	RIGHT SIDE SLOPE	CHANNEL DEPTH	MANNING'S "n"	DESIGN FLOW (5-YR)	SLOPE	NORMAL DEPTH	VELOCITY	SHEAR STRESS	TOP OF DITCH ELEVATION	WATER SURFACE ELEVATION	FREE BOARD
	(ft)	(ft)	(ft)	(ft)	(ft)	X:1	X:1	(ft)		(cfs)	(ft/ft)	(ft)	(f/s)	lb/ft^3	(ft)	(ft)	(ft)
	118+50	206.05	119+00	206.24	0.0	4	6	0.76	0.04	0.68	0.0038	0.41	0.79	0.05	206.81	206.46	0.35
	119+00	206.24	119+80	206.36	0.0	3	6	0.82	0.04	0.68	0.0015	0.51	0.57	0.02	207.06	206.75	0.31
	119+80	206.36															
	120+00	206.10	119+80	206.36	0.0	4	5	0.75	0.04	0.43	0.0130	0.29	1.15	0.11	206.85	206.39	0.46
	121+00	204.35	120+00	206.10	0.0	4	6	0.69	0.04	0.81	0.0175	0.33	1.47	0.18	205.04	204.68	0.36
	122+00	201.00	121+00	204.35	0.0	2	6	0.69	0.04	1.20	0.0335	0.37	2.16	0.37	201.69	201.37	0.32
	123+00	197.25	122+00	201.00	0.0	3	6	0.64	0.04	1.58	0.0375	0.39	2.36	0.44	197.89	197.64	0.25
A2	124+00	193.30	123+00	197.25	0.0	3	5	0.79	0.04	1.97	0.0395	0.43	2.61	0.52	194.09	193.73	0.36
	125+00	189.35	124+00	193.30	0.0	4	3	1.23	0.04	2.36	0.0395	0.49	2.81	0.58	190.58	189.84	0.74
	126+00	186.90	125+00	189.35	0.0	6	3	1.09	0.04	2.76	0.0245	0.52	2.31	0.38	187.99	187.42	0.57
	127+00	185.27	126+00	186.90	0.0	3	5	1.04	0.04	3.13	0.0163	0.61	2.10	0.30	186.31	185.88	0.43
	128+00	184.37	127+00	185.27	0.0	6	4	1.20	0.04	3.48	0.0090	0.65	1.64	0.18	185.57	185.02	0.55
	129+00	184.17	128+00	184.37	6.0	3	3	1.28	0.04	3.81	0.0020	0.53	0.95	0.05	185.45	184.70	0.75
	130+00	184.02	129+00	184.17	6.0	3	3	1.33	0.04	4.13	0.0015	0.60	0.88	0.04	185.35	184.62	0.73
	131+00	184.09	130+00	184.02	0.0	4	5	1.29	0.04	4.46	0.0007	1.20	0.69	0.03	185.38	185.29	0.09
	132+00	184.00	131+00	184.09	0.0	4	3	2.50	0.04	5.03	0.0009	1.32	0.82	0.04	186.50	185.32	1.18
	134+00	184.83	135+00	185.40	7.0	3	4	0.89	0.04	6.05	0.0057	0.47	1.49	0.14	185.72	185.30	0.42
	135+00	185.40	136+00	186.39	7.0	3	12	0.45	0.04	4.34	0.0099	0.32	1.47	0.15	185.85	185.72	0.13
	136+00	186.39	137+00	187.73	7.0	10	16	0.40	0.04	3.83	0.0134	0.26	1.44	0.16	186.79	186.65	0.14
	137+00	187.73	138+00	190.82	0.0	7	4	1.13	0.04	3.32	0.0309	0.49	2.52	0.46	188.86	188.22	0.64
A3	138+00	190.82	139+00	195.41	0.0	3	4	1.23	0.04	2.80	0.0459	0.51	3.11	0.70	192.05	191.33	0.72
	139+00	195.41	140+00	200.35	0.0	3	3	0.95	0.04	1.73	0.0494	0.44	2.92	0.65	196.36	195.85	0.51
	140+00	200.35	141+00	202.03	0.0	2	4	0.77	0.04	1.50	0.0168	0.52	1.88	0.26	201.12	200.87	0.25
	141+00	202.03	142+00	203.77	0.0	3	3	0.76	0.04	1.19	0.0174	0.47	1.80	0.24	202.79	202.50	0.29
	142+00	203.77	143+00	205.37	0.0	8	4	0.84	0.04	0.65	0.0160	0.29	1.29	0.14	204.61	204.06	0.55
	143+00	205.37	144+00	206.50	0.0	6	4	0.64	0.04	0.10	0.0113	0.16	0.74	0.06	206.01	205.53	0.48
	145+00	205.15	144+00	206.50	0.0	4	6	0.72	0.04	0.00	0.0135	0.04	0.34	0.02	205.87	205.19	0.68
	146+00	201.95	145+00	205.15	0.0	2	5	0.68	0.04	0.35	0.0320	0.25	1.61	0.24	202.63	202.20	0.43
	147+00	197.34	146+00	201.95	0.0	5	4	1.39	0.04	0.76	0.0461	0.28	2.13	0.40	198.73	197.62	1.11
B2	148+00	193.79	147+00	197.34	0.0	10	4	1.51	0.04	1.17	0.0355	0.29	1.93	0.32	195.30	194.08	1.22
	149+00	191.50	148+00	193.79	8.0	7	4	1.62	0.04	1.57	0.0229	0.13	1.37	0.17	193.12	191.63	1.49
	150+00	188.74	149+00	191.50	0.0	2	2	1.86	0.04	2.70	0.0276	0.69	2.82	0.53	190.60	189.43	1.17
	150+50	187.15	150+00	188.74	0.0												
	153+00	191.40	154+00	191.75	4.0	7	4	0.73	0.04	6.05	0.0035	0.64	1.26	0.09	192.13	192.04	0.09
	154+00	191.75	155+00	192.65	0.0	4	6	1.19	0.04	5.74	0.0090	0.78	1.86	0.22	192.94	192.53	0.41
	155+00	192.65	156+00	194.23	0.0	4	5	1.20	0.04	5.44	0.0158	0.72	2.33	0.35	193.85	193.37	0.48
	156+00	194.23	157+00	195.82	0.0	3	5	1.55	0.04	5.13	0.0159	0.74	2.36	0.35	195.78	194.97	0.81
	157+00	195.82	158+00	197.93	0.0	3	4	1.29	0.04	4.83	0.0211	0.72	2.66	0.46	197.11	196.54	0.57
	158+00	197.93	159+00	200.57	0.0	4	4	0.72	0.04	4.55	0.0264	0.64	2.77	0.51	198.65	198.57	0.08
	159+00	200.57	160+00	203.76	0.0	4	4	0.70	0.04	4.24	0.0319	0.60	2.92	0.58	201.27	201.17	0.10
	160+00	203.76	161+00	206.94	0.0	6	4	1.30	0.04	3.95	0.0318	0.54	2.73	0.52	205.06	204.30	0.76
	161+00	206.94	162+00	210.48	0.0	3	4	1.39	0.04	3.64	0.0354	0.59	3.01	0.62	208.33	207.53	0.80
	162+00	210.48	163+00	214.28	0.0	3	4	1.34	0.04	3.33	0.0380	0.56	3.02	0.64	211.82	211.04	0.78
	163+00	214.28	164+00	217.49	0.0	2	5	1.04	0.04	3.03	0.0321	0.56	2.76	0.54	215.32	214.84	0.48
	164+00	217.49	165+00	219.02	0.0	2	5	0.89	0.04	2.70	0.0153	0.62	2.03	0.28	218.38	218.11	0.27
	165+00	219.02	166+00	219.43	0.0	3	4	1.02	0.04	2.37	0.0041	0.75	1.20	0.09	220.04	219.77	0.27
	166+00	219.43	167+00	220.59	0.0	3	3	1.30	0.04	1.74	0.0116	0.58	1.70	0.20	220.73	220.01	0.72
	167+00	220.59	168+00	220.90	0.0	5	5	0.79	0.04	1.60	0.0031	0.59	0.91	0.06	221.38	221.18	0.20
	168+00	220.90	169+00	221.73	0.0	4	4	1.13	0.04	1.42	0.0083	0.51	1.34	0.13	222.03	221.41	0.62
	169+00	221.73	170+00	222.30	0.0	3	4	0.95	0.04	1.10	0.0057	0.53	1.12	0.09	222.68	222.26	0.42
	170+00	222.30	171+00	224.00	0.0	3	3	1.02	0.04	0.77	0.0170	0.40	1.60	0.20	223.32	222.70	0.62
	171+00	224.00	172+00	225.15	0.0	6	4	1.12	0.04	0.45	0.0115	0.29	1.08	0.10	225.12	224.29	0.83
	172+00	225.15	173+00	225.32	0.0	6	3	1.22	0.04	0.12	0.0017	0.26	0.39	0.01	226.37	225.41	0.96
	174+00	224.59	173+00	225.32	0.0	10	3	0.97	0.04	0.00	0.0073	0.04	0.23	0.01	225.56	224.63	0.93
	175+00	224.16	174+00	224.59	0.0	10	4	0.73	0.04	0.22	0.0043	0.23	0.58	0.03	224.89	224.39	0.50
	176+00	223.29	175+00	224.16	0.0	7	4	1.38	0.04	0.56	0.0087	0.32	1.01	0.08	224.67	223.61	1.06
	177+00	222.34	176+00	223.29	0.0	6	4	1.33	0.04	0.91	0.0095	0.39	1.20	0.11	223.67	222.73	0.94
	178+00	221.03	177+00	222.34	0.0	6	4	1.35	0.04	1.25	0.0131	0.41	1.47	0.17	222.38	221.44	0.94
C2	179+00	219.36	178+00	221.03	0.0	9	4	1.68	0.04	1.60	0.0167	0.39	1.60	0.20	221.04	219.75	1.29
	180+00	217.87	179+00	219.36	0.0	7	4	1.91	0.04	1.95	0.0149	0.46	1.68	0.21	219.78	218.33	1.45
	181+00	216.91	180+00	217.87	0.0	10	6	0.88	0.04	2.30	0.0096	0.46	1.36	0.14	217.79	217.37	0.42
	182+00	215.94	181+00	216.91	0.0	18	6	0.55	0.04	2.64	0.0097	0.41	1.28	0.12	216.49	216.35	0.14
	183+00	214.84	182+00	215.94	4.0	13	6	0.42	0.04	2.98	0.0110	0.31	1.40	0.15	215.26	215.15	0.11
	184+00	214.23	183+00	214.84	0.0	4	5	1.10	0.04	4.41	0.0061	0.80	1.54	0.15	215.33	215.03	0.30

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
HUMBERTO CONTRERAS
99213
LICENSED
PROFESSIONAL ENGINEER
7/21/2026

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

DITCH HYDRAULIC CALCULATIONS

SHEET 1 OF 4

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		48

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PROPOSED EAST DITCH CALCULATIONS - DOUBLE CULVERT RD.

DRAINAGE ID	STATION	FLOWLINE ELEVATION	STATION	FLOWLINE ELEVATION	BOTTOM WIDTH	LEFT SIDE SLOPE	RIGHT SIDE SLOPE	CHANNEL DEPTH	MANNING'S "n"	DESIGN FLOW (5-YR)	SLOPE	NORMAL DEPTH	VELOCITY	SHEAR STRESS	TOP OF DITCH ELEVATION	WATER SURFACE ELEVATION	FREE BOARD
	(ft)	(ft)	(ft)	(ft)	(ft)	X:1	X:1	(ft)		(cfs)	(ft/ft)	(ft)	(f/s)	lb/ft^3	(ft)	(ft)	(ft)
	127+00	184.82	126+00	186.65	0.0	4	4	0.55	0.04	0.25	0.0183	0.30	1.39	0.17	185.37	185.12	0.25
	128+00	184.19	127+00	184.82	0.0	4	4	0.42	0.04	0.50	0.0063	0.37	0.93	0.07	184.61	184.56	0.05
	129+00	183.89	128+00	184.19	5.0	4	5	0.45	0.04	1.26	0.0030	0.25	0.72	0.04	184.34	184.14	0.20
	130+00	183.59	129+00	183.89	0.0	3	4	0.84	0.04	1.50	0.0030	0.67	0.96	0.06	184.43	184.26	0.17
	131+00	183.29	130+00	183.59	0.0	3	3	1.50	0.04	1.74	0.0030	0.75	1.02	0.07	184.79	184.04	0.75
	132+00	183.04	131+00	183.29	0.0	3	3	2.91	0.04	2.27	0.0025	0.86	1.02	0.06	185.95	183.90	2.05
	138+00	190.75	139+00	195.50	0.0	4	4	1.02	0.04	1.39	0.0475	0.37	2.57	0.53	191.77	191.12	0.65
	139+00	195.50	140+00	200.05	0.0	6	2	0.86	0.04	1.19	0.0455	0.35	2.42	0.48	196.36	195.85	0.51
A1.2	140+00	200.05	141+00	201.50	0.0	5	3	1.07	0.04	0.98	0.0145	0.40	1.51	0.18	201.12	200.45	0.67
	141+00	201.50	142+00	202.90	0.0	3	4	1.72	0.04	0.77	0.0140	0.39	1.44	0.16	203.22	201.89	1.33
	142+00	202.90	143+00	204.05	0.0	4	4	1.78	0.04	0.54	0.0115	0.34	1.19	0.12	204.68	203.24	1.44
	143+00	204.05	144+00	205.19	0.0	3	4	2.12	0.04	0.06	0.0114	0.16	0.71	0.05	206.17	204.21	1.96
	145+00	203.78	144+00	205.19	0.0	3	3	2.09	0.04		0.0141	0.04	0.34	0.02	205.87	203.82	2.05
	146+00	201.42	145+00	203.78	0.0	6	3	1.21	0.04	0.18	0.0236	0.19	1.15	0.13	202.63	201.61	1.02
	147+00	197.75	146+00	201.42	0.0	7	3	0.98	0.04	0.44	0.0367	0.23	1.66	0.26	198.73	197.98	0.75
B1.1	148+00	193.55	147+00	197.75	0.0	4	3	1.75	0.04	0.68	0.0420	0.30	2.11	0.38	195.30	193.85	1.45
	149+00	190.80	148+00	193.55	0.0	3	4	0.86	0.04	0.92	0.0275	0.37	1.94	0.30	191.66	191.17	0.49
	150+00	188.38	149+00	190.80	0.0	2	3	2.70	0.04	1.56	0.0242	0.53	2.25	0.37	191.08	188.91	2.17
	150+50	185.87	150+00	188.38	0.0	2		6.25	0.04	1.56	0.0502	0.71	3.04	0.69	192.12	186.58	5.54
	150+50	185.87	151+00	187.21	0.0	2		6.25	0.04	73.52	0.0268	3.42	6.30	1.76	192.12	189.29	2.83
	151+00	187.21	152+00	187.95	2.0	2	2	2.79	0.04	73.52	0.0074	2.59	3.94	0.63	190.00	189.80	0.20
	152+00	187.95	153+00	189.07	1.5	3	2	2.91	0.04	73.39	0.0112	2.29	4.43	0.83	190.86	190.24	0.62
	153+00	189.07	154+00	190.66	2.0	3	3	3.08	0.04	73.29	0.0159	1.93	4.87	1.05	192.15	191.00	1.15
	154+00	190.66	155+00	191.44	2.0	3	2	2.70	0.04	73.18	0.0078	2.38	3.86	0.62	193.36	193.04	0.32
	155+00	191.44	156+00	191.65	0.0	2	2	2.94	0.012	72.89	0.0021	2.46	6.04	0.14	194.38	193.90	0.48
	156+00	191.65	157+00	194.28	0.0	2	2	4.13	0.04	72.00	0.0263	2.39	6.30	1.75	195.78	194.04	1.74
	157+00	194.28	158+00	196.30	0.0	3	3	3.26	0.04	71.08	0.0202	2.12	5.29	1.27	197.54	196.40	1.14
	158+00	196.30	159+00	198.97	0.0	3	3	2.30	0.04	4.96	0.0267	0.74	3.02	0.58	198.60	197.04	1.56
	159+00	198.97	160+00	202.60	0.0	3	3	2.12	0.04	4.86	0.0363	0.69	3.38	0.75	201.09	199.66	1.43
	160+00	202.60	161+00	205.76	0.0	4	3	2.07	0.04	4.75	0.0316	0.66	3.08	0.63	204.67	203.26	1.41
B1.2	161+00	205.76	162+00	209.74	0.0	4	3	2.57	0.04	4.64	0.0398	0.63	3.34	0.75	208.33	206.39	1.94
	162+00	209.74	163+00	212.65	0.0	5	2	2.08	0.04	4.49	0.0291	0.66	2.94	0.57	211.82	210.40	1.42
	163+00	212.65	164+00	215.50	0.0	5	3	2.04	0.04	4.35	0.0285	0.62	2.82	0.54	214.69	213.27	1.42
	164+00	215.50	165+00	217.78	0.0	4	4	1.14	0.04	4.25	0.0228	0.64	2.58	0.44	216.64	216.14	0.50
	165+00	217.78	166+00	218.50	0.0	4	4	1.16	0.04	4.16	0.0072	0.79	1.66	0.17	218.94	218.57	0.37
	166+00	218.50	167+00	219.33	0.0	3	4	1.44	0.04	4.02	0.0083	0.80	1.79	0.20	219.94	219.30	0.64
	167+00	219.33	168+00	220.04	0.0	3	3	1.59	0.04	4.00	0.0071	0.87	1.74	0.18	220.92	220.20	0.72
	168+00	220.04	169+00	220.75	0.0	3	3	1.63	0.04	3.93	0.0071	0.87	1.73	0.18	221.67	220.91	0.76
	169+00	220.75	170+00	222.44	0.0	3	3	1.93	0.04	3.76	0.0169	0.73	2.37	0.36	222.68	221.48	1.20
	170+00	222.44	171+00	224.25	0.0	3	3	1.27	0.04	3.23	0.0181	0.68	2.35	0.36	223.71	223.12	0.59
	171+00	224.25	172+00	225.33	0.0	6	3	0.87	0.04	2.64	0.0108	0.59	1.68	0.19	225.12	224.84	0.28
	172+00	225.33	173+00	225.73	0.0	5	4	1.04	0.04	2.00	0.0040	0.64	1.08	0.08	226.37	225.97	0.40
	174+00	225.03	173+00	225.73	0.0	5	12	1.04	0.04	0.21	0.0070	0.19	0.65	0.04	226.07	225.22	0.85
	175+00	224.41	174+00	225.03	0.0	5	10	0.96	0.04	1.11	0.0062	0.39	0.98	0.07	225.37	224.80	0.57
	176+00	223.41	175+00	224.41	0.0	4	7	1.26	0.04	2.44	0.0100	0.54	1.53	0.17	224.67	223.95	0.72
	177+00	222.05	176+00	223.41	0.0	3	5	1.62	0.04	4.08	0.0136	0.70	2.10	0.29	223.67	222.75	0.92
	178+00	220.29	177+00	222.05	0.0	4	5	2.09	0.04	5.45	0.0176	0.71	2.42	0.38	222.38	221.00	1.38
C1.1	179+00	218.80	178+00	220.29	0.0	3	3	2.28	0.04	6.56	0.0149	0.92	2.60	0.40	221.08	219.72	1.36
	180+00	217.75	179+00	218.80	0.0	3	4	2.03	0.04	7.40	0.0105	0.96	2.28	0.30	219.78	218.71	1.07
	181+00	216.71	180+00	217.75	0.0	5	3	1.78	0.04	7.85	0.0104	0.94	2.24	0.29	218.49	217.65	0.84
	182+00	215.66	181+00	216.71	0.0	6	4	1.54	0.04	8.44	0.0105	0.88	2.17	0.28	217.20	216.54	0.66
	183+00	214.61	182+00	215.66	0.0	5	4	1.83	0.04	9.38	0.0105	0.95	2.29	0.31	216.44	215.56	0.88
	184+00	213.56	183+00	214.61	0.0	3	4	1.60	0.04	9.87	0.0105	1.07	2.45	0.34	215.16	214.63	0.53

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
HUMBERTO CONTRERAS
99213
LICENSED PROFESSIONAL ENGINEER
7/21/2026

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29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

DITCH HYDRAULIC CALCULATIONS

SHEET 2 OF 4

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		49

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PROPOSED NORTH DITCH CALCULATIONS - CEDAR CREEK RD.

DRAINAGE ID	STATION	FLOWLINE ELEVATION	STATION	FLOWLINE ELEVATION	BOTTOM WIDTH	LEFT SIDE SLOPE	RIGHT SIDE SLOPE	CHANNEL DEPTH	MANNING'S "n"	DESIGN FLOW (5-YR)	SLOPE	NORMAL DEPTH	VELOCITY	SHEAR STRESS	TOP OF DITCH ELEVATION	WATER SURFACE ELEVATION	FREE BOARD
	(ft)	(ft)	(ft)	(ft)	(ft)	X:1	X:1	(ft)		(cfs)	(ft/ft)	(ft)	(f/s)	lb/ft^3	(ft)	(ft)	(ft)
C3	2+00	216.84	3+00	218.20	0.0	6	10	0.94	0.04	3.83	0.0136	0.52	1.76	0.22	217.78	217.36	0.42
	3+00	218.20	4+00	219.97	0.0	4	8	0.80	0.04	3.49	0.0177	0.54	2.03	0.29	219.00	218.74	0.26
	4+00	219.97	5+00	222.15	0.0	4	6	1.61	0.04	3.23	0.0218	0.54	2.25	0.36	221.58	220.51	1.07
	5+00	222.15	6+00	225.76	0.0	4	4	2.72	0.04	2.95	0.0361	0.51	2.79	0.56	224.87	222.66	2.21
	6+00	225.76	7+00	229.89	0.0	4	5	1.47	0.04	2.66	0.0413	0.46	2.79	0.58	227.23	226.22	1.01
	7+00	229.89	8+00	234.15	0.0	6	5	1.25	0.04	2.38	0.0426	0.41	2.62	0.53	231.14	230.30	0.84
	8+00	234.15	9+00	238.57	0.0	6	5	1.56	0.04	2.09	0.0442	0.38	2.57	0.52	235.71	234.53	1.18
	9+00	238.57	10+00	242.39	0.0	6	6	1.72	0.04	1.51	0.0382	0.34	2.20	0.40	240.29	238.91	1.38
	10+00	242.39	11+00	245.50	0.0	6	6	1.70	0.04	1.24	0.0311	0.33	1.94	0.31	244.09	242.72	1.37
	11+00	245.50	12+00	247.51	0.0	6	6	1.03	0.04	0.95	0.0201	0.32	1.54	0.20	246.53	245.82	0.71
	12+00	247.51	13+00	248.65	0.0	6	6	0.78	0.04	0.69	0.0114	0.32	1.15	0.11	248.29	247.83	0.46
	13+00	248.65	14+00	249.05	0.0	8	5	0.52	0.04	0.43	0.0040	0.31	0.68	0.04	249.17	248.96	0.21
	14+00	249.05	15+00	249.25	0.0	10	4	0.14	0.04	0.17	0.0020	0.24	0.41	0.02	249.19	249.29	-0.10
D2	16+00	247.95	15+00	249.25	0.0	3	3	1.71	0.04	1.22	0.0130	0.50	1.62	0.19	249.66	248.45	1.21
	17+00	247.54	16+00	247.95	0.0	3	4	0.79	0.04	1.22	0.0041	0.58	1.02	0.07	248.33	248.12	0.21
	20+00	249.79	21+00	253.28	0.0	6	4	0.95	0.04	5.77	0.0349	0.61	3.10	0.65	250.74	250.40	0.34
	21+00	253.28	22+00	255.77	0.0	6	8	1.43	0.04	5.24	0.0249	0.55	2.47	0.42	254.71	253.83	0.88
	22+00	255.77	23+00	258.25	0.0	4	8	1.65	0.04	4.52	0.0248	0.55	2.46	0.42	257.42	256.32	1.10
	23+00	258.25	24+00	260.74	0.0	4	8	1.67	0.04	3.64	0.0249	0.51	2.33	0.39	259.92	258.76	1.16
	24+00	260.74	25+00	262.99	0.0	4	8	1.68	0.04	2.69	0.0225	0.46	2.08	0.32	262.42	261.20	1.22
	25+00	262.99	26+00	265.16	0.0	4	7	1.93	0.04	1.80	0.0217	0.42	1.90	0.28	264.92	263.41	1.51
	26+00	265.16	27+00	267.11	0.0	6	6	2.26	0.04	0.96	0.0195	0.32	1.53	0.19	267.42	265.48	1.94
	27+00	267.11	28+00	269.75	0.0	4	5	1.85	0.04	0.96	0.0264	0.34	1.83	0.27	268.96	267.45	1.51
	28+00	269.75	28+50	270.45	0.0	7	7	1.15	1.04	1.96	0.0140	1.19	0.20	0.51	270.90	270.94	-0.04
E2	30+00	268.43	29+00	270.25	0.0	3	6	1.99	0.04	0.90	0.0182	0.36	1.56	0.20	270.42	268.79	1.63
	31+00	267.00	30+00	268.43	0.0	4	6	1.92	0.04	1.17	0.0143	0.40	1.49	0.17	268.92	267.40	1.52
	32+00	264.30	31+00	267.00	0.0	3	4	2.69	0.04	1.38	0.0270	0.43	2.13	0.35	266.99	264.73	2.26
	33+00	262.82	32+00	264.30	0.0	4	5	2.32	0.04	1.56	0.0148	0.46	1.66	0.21	265.14	263.28	1.86
	34+00	260.22	33+00	262.82	0.0	3	6	1.90	0.04	1.74	0.0260	0.43	2.11	0.34	262.12	260.65	1.47
	35+00	256.65	34+00	260.22	0.0	3	7	1.65	0.04	1.93	0.0357	0.40	2.38	0.44	258.30	257.05	1.25
	36+00	252.03	35+00	256.65	0.0	3	8	1.65	0.04	2.11	0.0462	0.38	2.62	0.54	253.68	252.41	1.27
	37+00	246.69	36+00	252.03	0.0	3	8	1.63	0.04	2.30	0.0534	0.38	2.82	0.63	248.32	247.07	1.25
	38+00	241.02	37+00	246.69	0.0	9	6	0.92	0.04	2.47	0.0567	0.35	2.74	0.61	241.94	241.37	0.57
	41+00	231.94	42+00	234.28	0.0	3	3	5.13	0.04	1.06	0.0234	0.43	1.96	0.29	237.07	232.37	4.70
	42+00	234.28	43+00	240.00	0.0	3	9	7.10	0.04	1.02	0.0572	0.27	2.32	0.48	241.38	234.55	6.83
	43+00	240.00	44+00	244.85	0.0	3	7	5.83	0.04	0.74	0.0485	0.27	2.10	0.39	245.83	240.27	5.56
	44+00	244.85	45+00	247.82	0.0	3	8	3.84	0.04	0.47	0.0297	0.24	1.53	0.22	248.69	245.09	3.60
F2	46+00	246.89	45+00	247.82	0.0	3	4	2.09	0.04	0.10	0.0093	0.20	0.74	0.05	248.98	247.09	1.89
	47+00	245.17	46+00	246.89	0.0	3	3	2.66	0.04	0.34	0.0172	0.30	1.31	0.15	247.83	245.47	2.36
	48+00	242.15	47+00	245.17	0.0	3	3	3.21	0.04	0.61	0.0302	0.33	1.87	0.29	245.36	242.48	2.88
	49+00	240.10	48+00	242.15	0.0	3	4	2.46	0.04	0.89	0.0205	0.38	1.72	0.24	242.56	240.48	2.08
	49+70	238.63	49+00	240.10	0.0	4	6	1.87	0.04	1.28	0.0210	0.38	1.76	0.25	240.50	239.01	1.49

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
HUMBERTO CONTRERAS
99213
LICENSED PROFESSIONAL ENGINEER
7/21/2026

CivilCorp
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29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

DITCH
HYDRAULIC
CALCULATIONS

SHEET 3 OF 4

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		50

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PROPOSED SOUTH DITCH CALCULATIONS - CEDAR CREEK RD.

DRAINAGE ID	STATION	FLOWLINE ELEVATION	STATION	FLOWLINE ELEVATION	BOTTOM WIDTH	LEFT SIDE SLOPE	RIGHT SIDE SLOPE	CHANNEL DEPTH	MANNING'S "n"	DESIGN FLOW (5-YR)	SLOPE	NORMAL DEPTH	VELOCITY	SHEAR STRESS	TOP OF DITCH ELEVATION	WATER SURFACE ELEVATION	FREE BOARD
	(ft)	(ft)	(ft)	(ft)	(ft)	X:1	X:1	(ft)		(cfs)	(ft/ft)	(ft)	(f/s)	lb/ft^3	(ft)	(ft)	(ft)
C1.2	2+00	216.26	3+00	218.15	0.0	8	6	0.80	0.04	12.23	0.0189	0.80	2.75	0.47	217.06	217.06	0.00
	3+00	218.15	4+00	220.12	0.0	8	9	0.81	0.04	11.81	0.0197	0.73	2.64	0.44	218.96	218.88	0.08
	4+00	220.12	5+00	223.04	0.0	6	4	1.65	0.04	11.41	0.0292	0.81	3.44	0.73	221.77	220.93	0.84
	5+00	223.04	6+00	226.60	0.0	6	4	1.42	0.04	10.91	0.0356	0.77	3.66	0.84	224.46	223.81	0.65
	6+00	226.60	7+00	230.45	0.0	6	4	1.33	0.04	10.29	0.0385	0.74	3.72	0.88	227.93	227.34	0.59
	7+00	230.45	8+00	234.70	0.0	6	3	1.83	0.04	9.59	0.0425	0.74	3.88	0.96	232.28	231.19	1.09
	8+00	234.70	9+00	239.05	0.0	7	3	1.59	0.04	8.83	0.0435	0.69	3.74	0.91	236.29	235.39	0.90
	9+00	239.05	10+00	242.93	0.0	9	3	1.24	0.04	8.01	0.0388	0.63	3.35	0.75	240.29	239.68	0.61
	10+00	242.93	11+00	245.86	0.0	9	3	1.18	0.04	7.16	0.0293	0.64	2.93	0.57	244.11	243.57	0.54
	11+00	245.86	12+00	247.82	0.0	8	3	1.34	0.04	6.28	0.0196	0.68	2.49	0.41	247.20	246.54	0.66
	12+00	247.82	13+00	249.18	0.0	7	3	1.69	0.04	5.34	0.0136	0.71	2.13	0.29	249.51	248.53	0.98
	13+00	249.18	14+00	249.90	0.0	6	3	1.85	0.04	4.33	0.0072	0.77	1.63	0.17	251.03	249.95	1.08
	14+00	249.90	15+00	250.45	0.0	6	4	1.88	0.04	3.25	0.0055	0.70	1.34	0.12	251.78	250.60	1.18
	15+00	250.45	16+00	250.55	0.0	7	4	1.47	0.04	2.06	0.0010	0.78	0.62	0.02	251.92	251.23	0.69
D1	17+00	250.24	16+50	250.70	0.0	6	10	0.69	0.04	0.55	0.0092	0.27	0.94	0.08	250.93	250.51	0.42
	18+00	249.14	17+00	250.24	0.0	4	4	1.39	0.04	1.65	0.0110	0.52	1.55	0.17	250.53	249.66	0.87
	19+00	248.50	18+00	249.14	0.0	3	3	2.48	0.04	3.06	0.0064	0.81	1.57	0.15	250.98	249.31	1.67
	19+50	247.20	19+00	248.50	0.0	3	3	3.30	0.04	3.06	0.0260	0.62	2.65	0.48	250.50	247.82	2.68
D1	19+50	247.20	20+00	249.81	0.0	3	3	3.30	0.04	12.72	0.0522	0.93	4.91	1.44	250.50	248.13	2.37
	20+00	249.81	21+00	252.01	0.0	3	6	1.54	0.04	12.03	0.0220	0.91	3.21	0.61	251.35	250.72	0.63
	21+00	252.01	22+00	254.63	0.0	4	4	0.94	0.04	10.81	0.0262	0.89	3.43	0.70	252.95	252.90	0.05
	22+00	254.63	23+00	257.94	0.0	4	4	1.08	0.04	9.61	0.0331	0.81	3.63	0.81	255.71	255.44	0.27
	23+00	257.94	24+00	260.86	0.0	6	4	1.65	0.04	8.41	0.0292	0.73	3.19	0.65	259.59	258.67	0.92
	24+00	260.86	25+00	262.04	0.0	7	4	1.56	0.04	6.23	0.0118	0.74	2.06	0.27	262.42	261.60	0.82
	25+00	262.04	26+00	264.12	0.0	4	3	2.38	0.04	5.18	0.0208	0.74	2.69	0.46	264.42	262.78	1.64
	26+00	264.12	27+00	265.94	0.0	3	4	1.17	0.04	4.94	0.0182	0.75	2.53	0.41	265.29	264.87	0.42
E1.1	30+00	267.17	28+85	268.72	0.0	3	4	1.26	0.04	0.10	0.0135	0.19	0.86	0.07	268.43	267.36	1.07
	31+00	266.30	30+00	267.17	0.0	4	4	0.93	0.04	0.17	0.0087	0.23	0.80	0.06	267.23	266.53	0.70
	32+00	265.38	31+00	266.30	0.0	6	4	1.20	0.04	0.42	0.0092	0.29	0.98	0.08	266.58	265.67	0.91
	33+00	263.87	32+00	265.38	0.0	9	4	1.27	0.04	0.69	0.0151	0.29	1.25	0.14	265.14	264.16	0.98
	34+00	260.06	33+00	263.87	0.0	5	3	2.06	0.04	0.98	0.0381	0.34	2.16	0.39	262.12	260.40	1.72
	35+00	256.22	34+00	260.06	0.0	6	3	2.08	0.04	1.35	0.0384	0.36	2.29	0.42	258.30	256.58	1.72
	36+00	252.06	35+00	256.22	0.0	7	4	1.62	0.04	1.73	0.0416	0.36	2.40	0.46	253.68	252.42	1.26
	37+00	246.68	36+00	252.06	0.0	7	4	1.64	0.04	2.18	0.0538	0.38	2.80	0.62	248.32	247.06	1.26
	38+00	241.29	37+00	246.68	0.0	6	4	1.20	0.04	2.67	0.0539	0.42	3.01	0.69	242.49	241.71	0.78
	39+00	235.90	38+00	241.29	0.0	4	4	0.93	0.04	3.15	0.0539	0.49	3.30	0.80	236.83	236.39	0.44
E1.2	42+00	235.34	43+00	239.74	0.0	4	3	2.11	0.04	1.69	0.0440	0.42	2.70	0.56	237.45	235.76	1.69
	43+00	239.74	44+00	244.50	0.0	7	3	1.64	0.04	1.36	0.0476	0.34	2.43	0.49	241.38	240.08	1.30
F1.1	45+00	246.97	44+50	247.10	0.0	5	3	1.72	0.04	0.10	0.0026	0.24	0.45	0.02	248.69	247.21	1.48
	46+00	246.60	45+00	246.97	0.0	5	3	2.38	0.04	0.61	0.0037	0.44	0.80	0.05	248.98	247.04	1.94
	47+00	245.47	46+00	246.60	0.0	5	4	2.36	0.04	0.98	0.0113	0.40	1.34	0.14	247.83	245.87	1.96
	47+50	242.60	47+00	245.47	0.0	3	3	4.15	0.04	1.57	0.0574	0.42	3.02	0.71	246.75	243.02	3.73

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
HUMBERTO CONTRERAS
99213
LICENSED
PROFESSIONAL ENGINEER
7/21/2026

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THE STATE OF TEXAS
WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

DITCH HYDRAULIC CALCULATIONS

SHEET 4 OF 4

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		51

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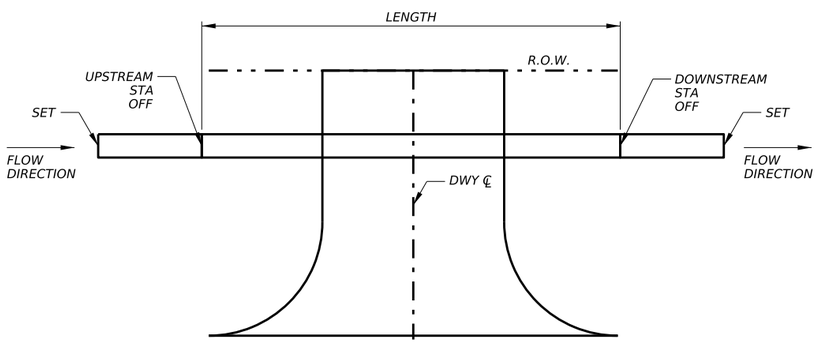
DRIVEWAY CULVERT SUMMARY

DOUBLE CULVERT RD

P&P SHEET NUMBER	DRIVEWAY NUMBER	SIZE (IN)	UPSTREAM STATION	UPSTREAM OFFSET	UPSTREAM FLOWLINE ELEVATION	DOWNSTREAM STATION	DOWNSTREAM OFFSET	DOWNSTREAM FLOWLINE ELEVATION	LENGTH (FT)	SLOPE (%)
SHEET 4 OF 12	DW# 4-1	24	140+91	15.00' LT	200.47	140+55	14.09' LT	200.36	36	0.31%
SHEET 5 OF 12	DW# 5-1	24	143+06	18.00' RT	203.58	142+78	17.98' RT	203.37	28	0.75%
SHEET 5 OF 12	DW# 5-3	24	144+90	18.00' RT	203.56	145+18	18.00' RT	202.90	28	2.36%
SHEET 7 OF 12	DW# 7-2	24	158+95	20.00' RT	198.90	158+67	20.00' RT	198.59	28	1.11%
SHEET 8 OF 12	DW# 8-1	24	160+71	22.00' RT	204.38	160+19	22.14' RT	203.15	52	2.37%
SHEET 8 OF 12	DW# 8-2	24	163+88	23.04' RT	214.78	163+54	24.46' RT	214.20	34	1.71%
SHEET 9 OF 12	DW# 9-1	24	167+12	16.59' RT	218.43	166+56	17.56' RT	218.14	56	0.52%
SHEET 9 OF 12	DW# 9-3	24	169+05	14.96' LT	220.25	168+65	14.87' LT	220.03	40	0.55%
SHEET 9 OF 12	DW# 9-4	24	169+77	15.30' RT	220.98	169+49	15.66' RT	220.71	28	0.96%
								TOTAL	330	



TYPICAL DRIVEWAY CULVERT DETAIL

(NTS)

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CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY M. DILL
84626
LICENSED PROFESSIONAL ENGINEER

R. M. Dill, P.E.
7/23/2026

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

DRIVEWAY CULVERT SUMMARY
DOUBLE CULVERT RD

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		52

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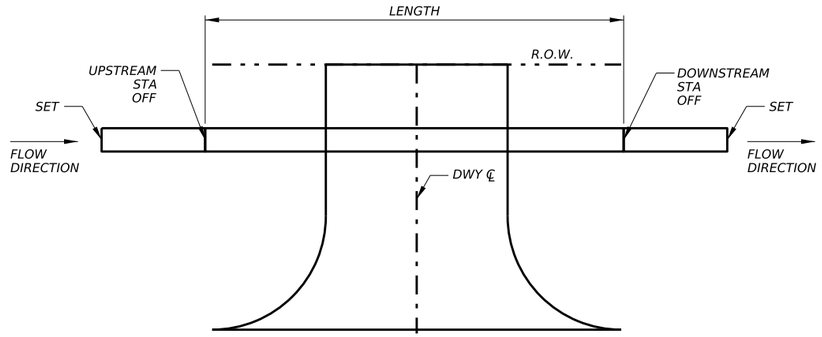
DRIVEWAY CULVERT SUMMARY

CEDAR CREEK RD

P&P SHEET NUMBER	DRIVEWAY NUMBER	SIZE (IN)	UPSTREAM STATION	UPSTREAM OFFSET	UPSTREAM FLOWLINE ELEVATION	DOWNSTREAM STATION	DOWNSTREAM OFFSET	DOWNSTREAM FLOWLINE ELEVATION	LENGTH (FT)	SLOPE (%)
SHEET 3 OF 9	DW# 3-1	24	16+19	29.27' LT	247.81	16+45	26.64' LT	247.72	26	0.35%
SHEET 4 OF 9	DW# 4-1	24	18+56	25.00' RT	248.62	18+98	25.00' RT	248.50	42	0.29%
SHEET 5 OF 9	DW# 5-1	24	24+46	24.00' RT	261.11	24+16	24.00' RT	260.98	30	0.43%
SHEET 6 OF 9	DW# 6-2	24	30+25	24.00' RT	266.90	30+57	24.00' RT	266.68	32	0.69%
SHEET 6 OF 9	DW# 6-3	24	31+70	25.00' LT	264.93	32+06	25.00' LT	264.20	36	2.03%
SHEET 6 OF 9	DW# 6-4	24	33+77	24.00' RT	260.80	34+21	24.00' RT	259.40	44	3.18%
SHEET 7 OF 9	DW# 7-1	24	39+24	26.00' RT	235.29	39+58	26.00' RT	234.45	34	2.47%
SHEET 8 OF 9	DW# 8-1	24	41+90	25.00' LT	234.18	41+62	25.00' LT	233.88	28	1.07%
SHEET 8 OF 9	DW# 8-2	24	42+20	25.00' RT	235.48	41+92	25.00' RT	235.28	28	0.71%
SHEET 9 OF 9	DW# 9-1	24	46+61	20.74' LT	245.73	46+89	20.99' LT	245.33	28	1.43%
SHEET 9 OF 9	DW# 9-2	24	46+68	24.00' RT	245.62	47+00	24.00' RT	245.48	32	0.44%
								TOTAL	360	



TYPICAL DRIVEWAY CULVERT DETAIL

(NTS)

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
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WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

DRIVEWAY CULVERT SUMMARY
CEDAR CREEK RD

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST		COUNTY	SHEET NO.
		WALLER	53

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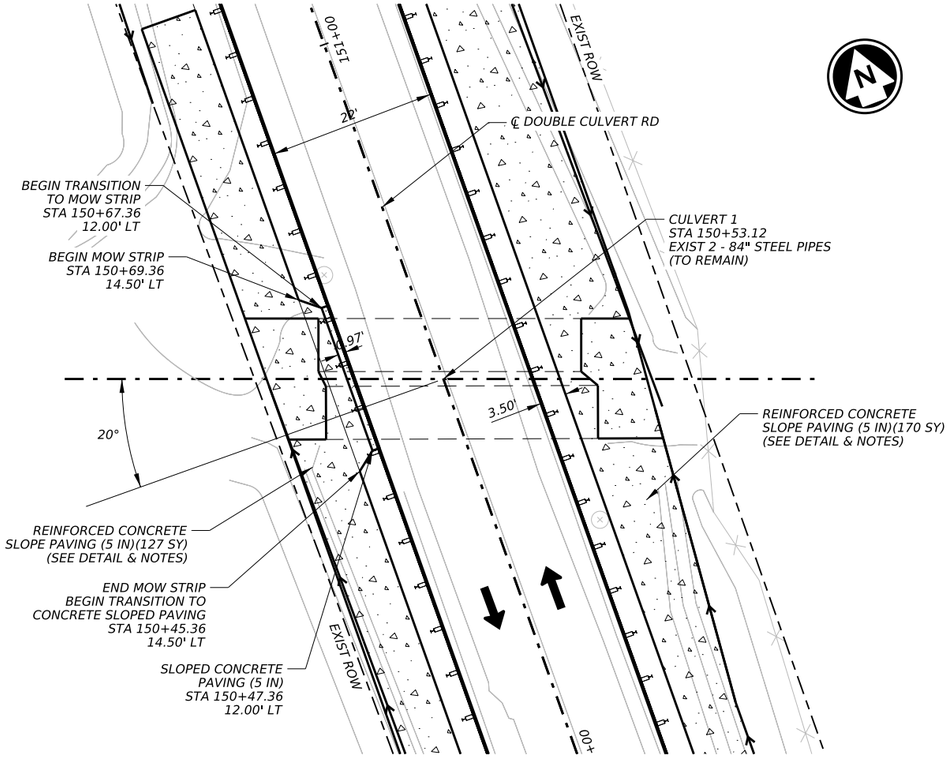
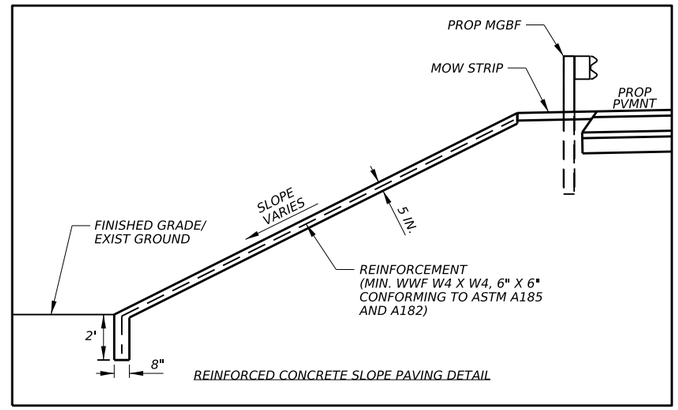




REINFORCED CONCRETE SLOPE PAVING DETAIL

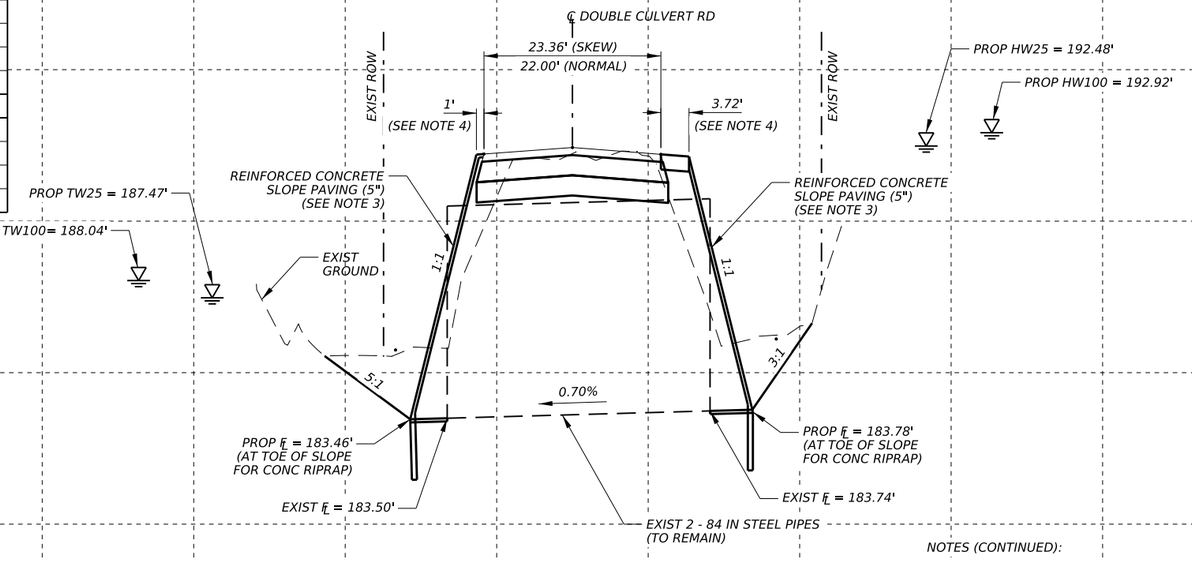
NOTES:

1. HYDRAULIC CALCULATIONS PERFORMED USING HY-8 VERSION 7.80.2.
2. PROPOSED CULVERT DESIGN BASED ON 25-YR DESIGN FREQUENCY.

0 10' 20'

SCALE: 1" = 20' H
1" = 5' V

HYDRAULIC DATA	
25-YR DESIGN FREQUENCY	
Q (CFS)	708
VEL (FPS)	11.92
HW ELEV. (FT)	192.48
TW ELEV. (FT)	187.47
100-YR DESIGN FREQUENCY	
Q (CFS)	1012
VEL (FPS)	12.2
HW ELEV. (FT)	192.92
TW ELEV. (FT)	188.04



℄ DOUBLE CULVERT RD STA 150+53.12
EXIST 2 - 84 IN STEEL PIPES (TO REMAIN)

NOTES (CONTINUED):

3. REINFORCED CONCRETE SLOPE PAVING (5") TO BE SHAPED AROUND OPENINGS OF EXISTING 2 - 84 IN. STEEL PIPES.
4. AT DOWNSTREAM END OF CULVERT (LT), 20 LF OF MOW STRIP FOR MBGF TO BE OMITTED. PROPOSED 1 FT WIDE BERM FOR SLOPE PAVING AT CULVERT FOR STATION LIMITS SHOWN ON PLAN VIEW.

200 195 190 185 180 175

0+00 1+00

NO.	DATE	REVISION	APPROV.

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WALLER COUNTY
ENGINEERING DEPARTMENT

CULVERT LAYOUT

CULVERT 1 - STA 150+53.12

SHEET 1 OF 5

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		54

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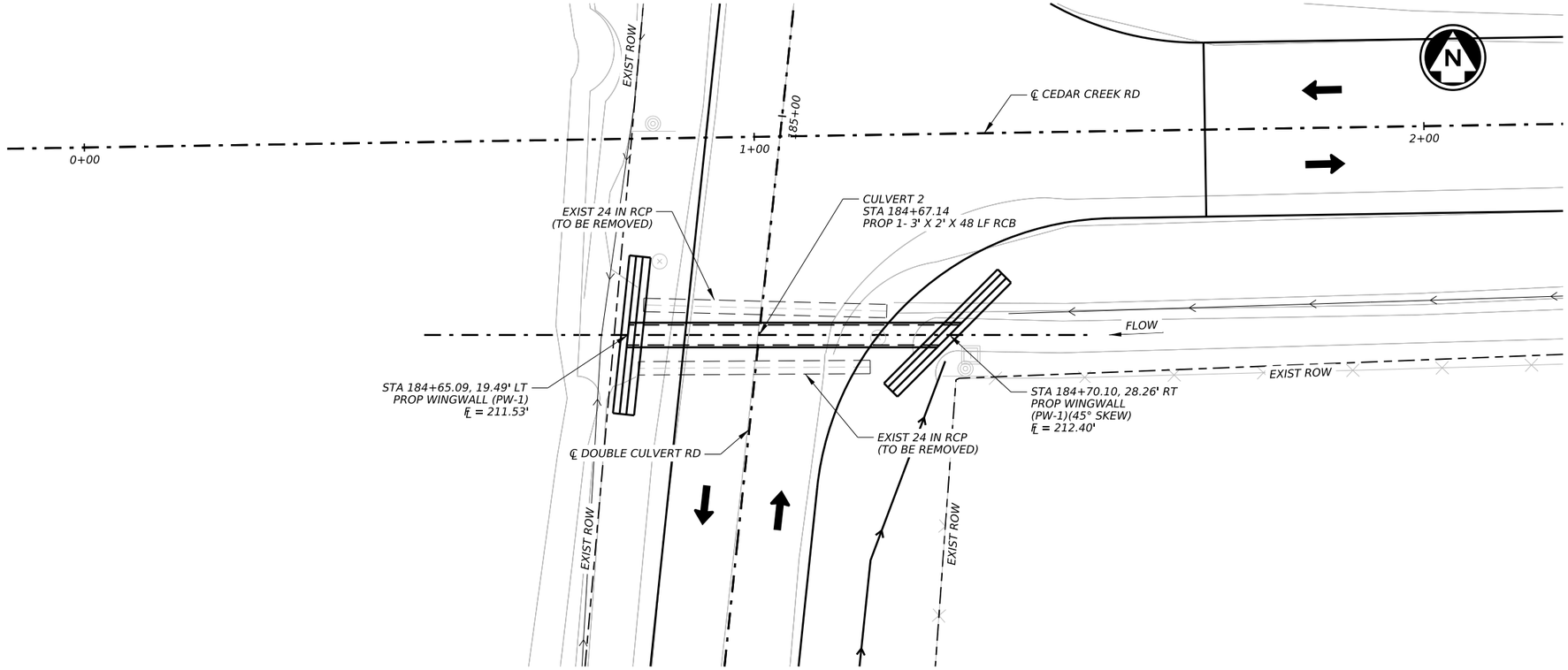


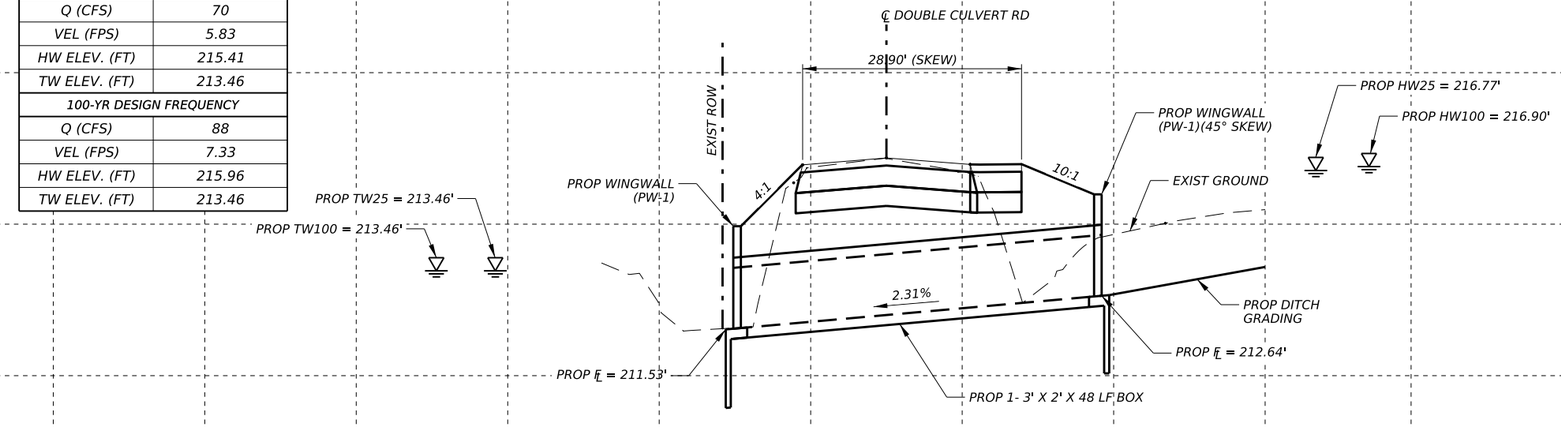
NOTES:

1. HYDRAULIC CALCULATIONS PERFORMED USING HY-8 VERSION 7.80.2.
2. PROPOSED CULVERT DESIGN BASED ON 25-YR DESIGN FREQUENCY.

0 10' 20'

SCALE: 1" = 20' H
1" = 5' V

HYDRAULIC DATA	
25-YR DESIGN FREQUENCY	
Q (CFS)	70
VEL (FPS)	5.83
HW ELEV. (FT)	215.41
TW ELEV. (FT)	213.46
100-YR DESIGN FREQUENCY	
Q (CFS)	88
VEL (FPS)	7.33
HW ELEV. (FT)	215.96
TW ELEV. (FT)	213.46



℄ DOUBLE CULVERT RD STA 184+67.14
PROP 1 - 3' X 2' X 48 LF RCB
W/ 2 - CONCRETE WINGWALLS (PW-1)

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
HUMBERTO CONTRERAS
99213
LICENSED
PROFESSIONAL ENGINEER
7/23/2026

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

CULVERT LAYOUT

CULVERT 2 - STA 184+67.14

SHEET 2 OF 5

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		55

DATE: 7/23/2026 1:35:32 PM
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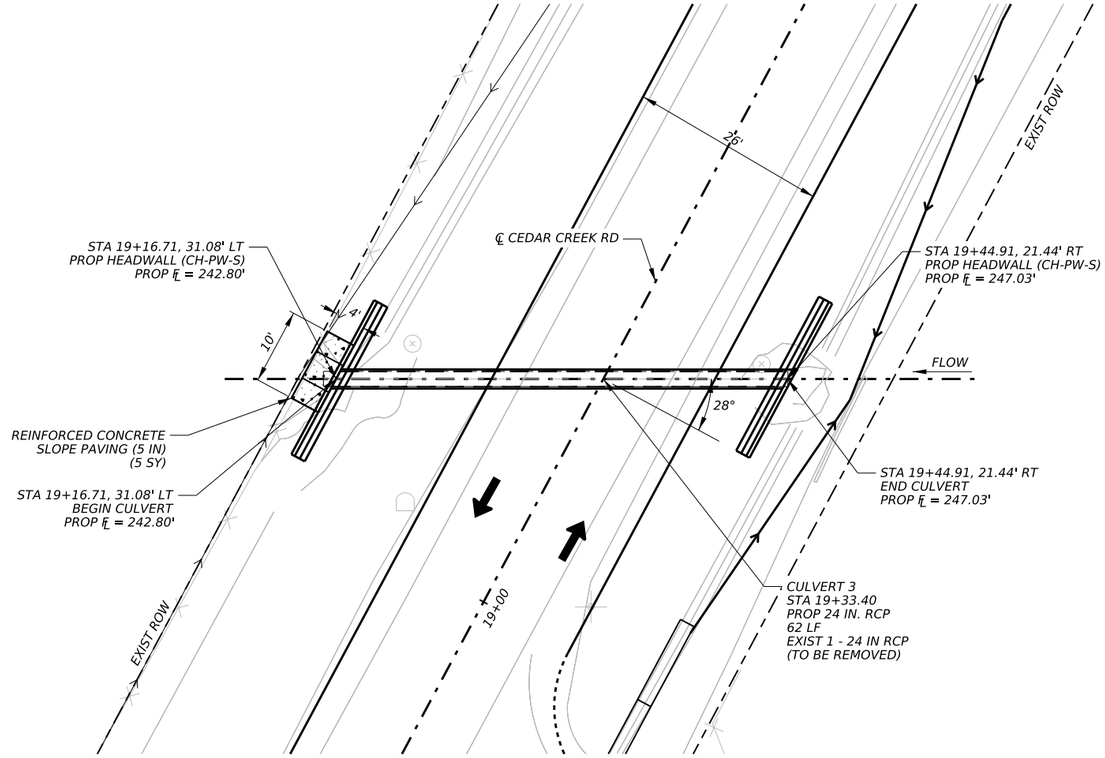
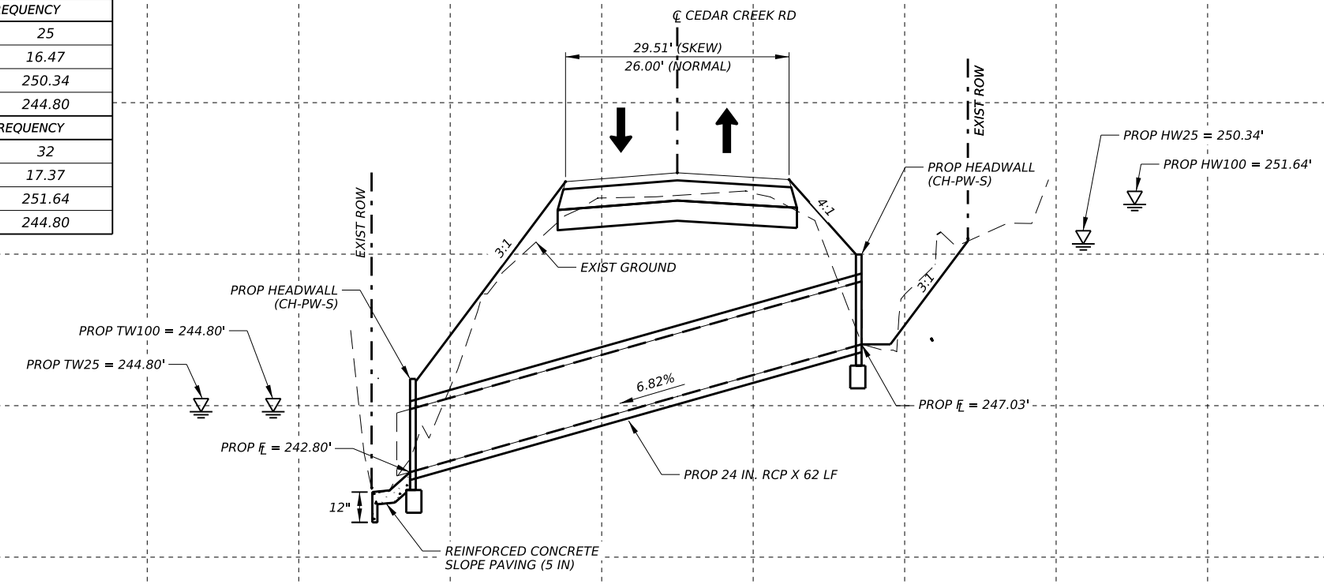


NOTES:

1. HYDRAULIC CALCULATIONS PERFORMED USING HY-8 VERSION 7.80.2.
2. PROPOSED CULVERT DESIGN BASED ON 25-YR DESIGN FREQUENCY.

0 10' 20'
SCALE: 1" = 20' H
1" = 5' V

HYDRAULIC DATA	
25-YR DESIGN FREQUENCY	
Q (CFS)	25
VEL (FPS)	16.47
HW ELEV. (FT)	250.34
TW ELEV. (FT)	244.80
100-YR DESIGN FREQUENCY	
Q (CFS)	32
VEL (FPS)	17.37
HW ELEV. (FT)	251.64
TW ELEV. (FT)	244.80



℄ CEDAR CREEK RD STA 19+33.40
PROP 1 - 24 IN. RCP X 62 LF
W/ 2 - CONCRETE HEADWALLS (CH-PW-S)

260 255 250 245 240 235

0+00 1+00

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
HUMBERTO CONTRERAS
99213
LICENSED PROFESSIONAL ENGINEER
7/23/2026

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

CULVERT LAYOUT

CULVERT 3 - STA 19+33.40

SHEET 3 OF 5

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		56

DATE: 7/23/2026 1:35:36 PM
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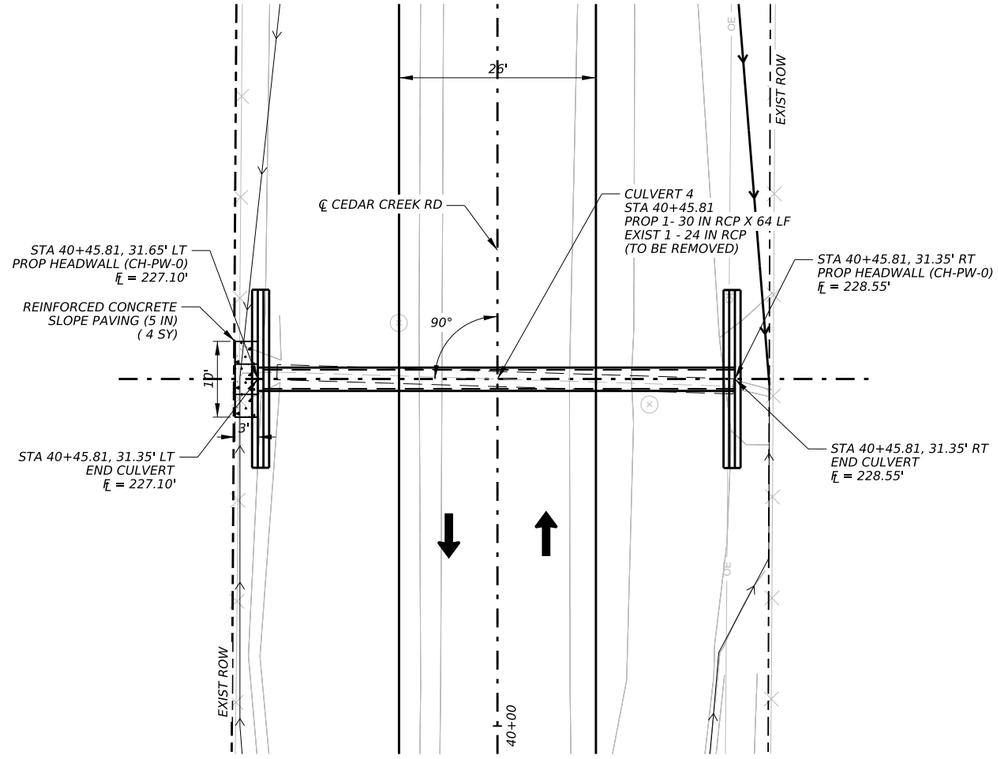


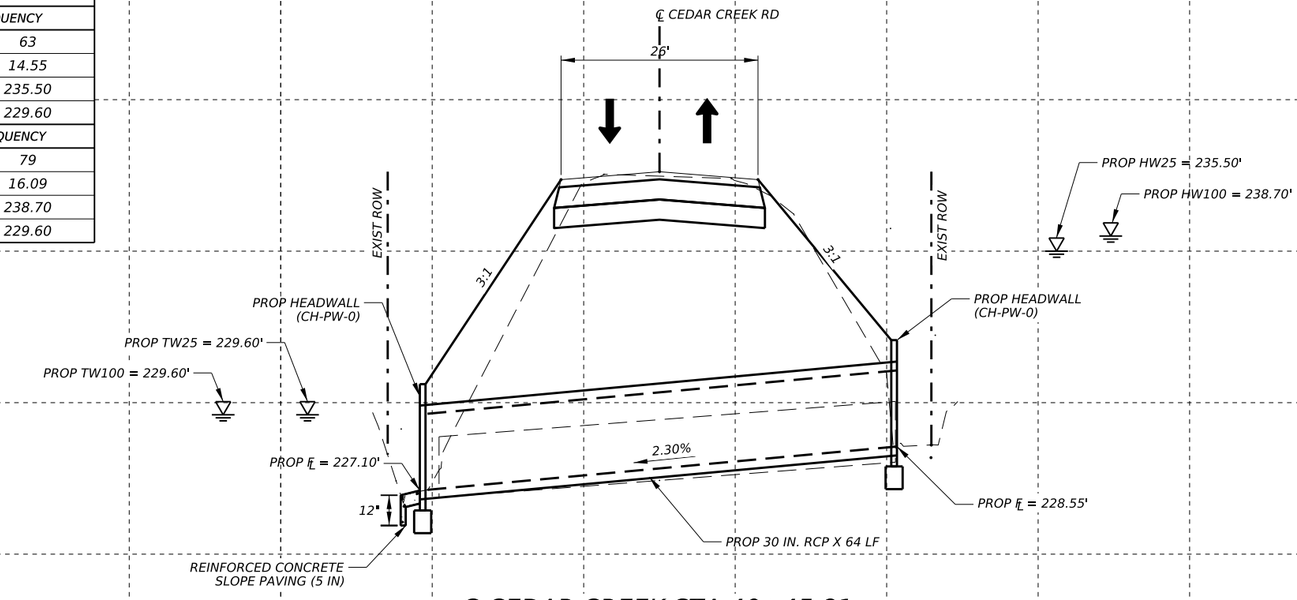
NOTES:

1. HYDRAULIC CALCULATIONS PERFORMED USING HY-8 VERSION 7.80.2.
2. PROPOSED CULVERT DESIGN BASED ON 25-YR DESIGN FREQUENCY.

0 10' 20'

SCALE: 1" = 20' H
1" = 5' V

HYDRAULIC DATA	
25-YR DESIGN FREQUENCY	
Q (CFS)	63
VEL (FPS)	14.55
HW ELEV. (FT)	235.50
TW ELEV. (FT)	229.60
100-YR DESIGN FREQUENCY	
Q (CFS)	79
VEL (FPS)	16.09
HW ELEV. (FT)	238.70
TW ELEV. (FT)	229.60



℄ CEDAR CREEK STA 40+45.81
PROP 1 - 30 IN. RCP X 64 LF
W/ (2) - CONCRETE HEADWALLS (CH-PW-0)

245 240 235 230 225 220

0+00 1+00

NO.	DATE	REVISION	APPROV.

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7/23/2026

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THE STATE OF TEXAS
WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

CULVERT LAYOUT

CULVERT 4 - STA 40+45.81

SHEET 4 OF 5

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		57

DATE: 7/23/2026 1:35:38 PM
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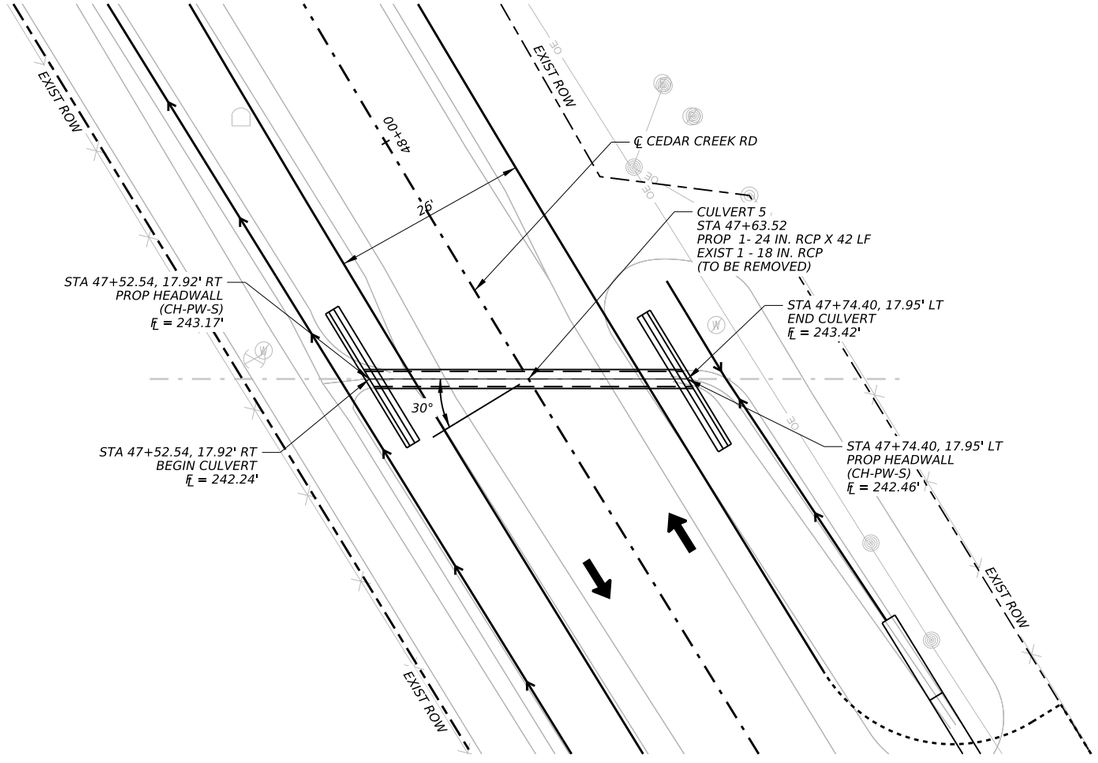


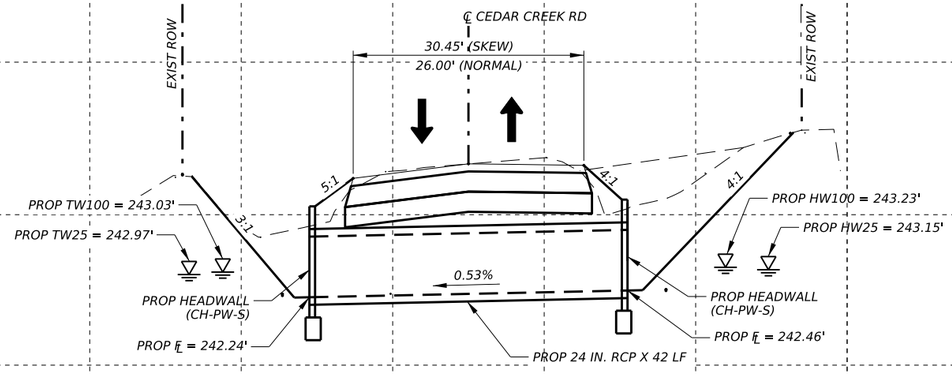
NOTES:

1. HYDRAULIC CALCULATIONS PERFORMED USING HY-8 VERSION 7.80.2.
2. PROPOSED CULVERT DESIGN BASED ON 25-YR DESIGN FREQUENCY.

0 10' 20'

SCALE: 1" = 20' H
1" = 5' V

HYDRAULIC DATA	
25-YR DESIGN FREQUENCY	
Q (CFS)	2.13
VEL (FPS)	2.06
HW ELEV. (FT)	243.15
TW ELEV. (FT)	242.97
100-YR DESIGN FREQUENCY	
Q (CFS)	2.63
VEL (FPS)	2.28
HW ELEV. (FT)	243.23
TW ELEV. (FT)	243.03



℄ CEDAR CREEK RD STA 47+63.52
PROP 1 - 24 IN. RCP X 42 LF
W/ (2) - CONCRETE HEADWALLS (CH-PW-S)

260 255 250 245 240 235

0+00 1+00

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
HUMBERTO CONTRERAS
99213
LICENSED
PROFESSIONAL ENGINEER
7/23/2026

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

CULVERT LAYOUT

CULVERT 5 - STA 47+63.52

SHEET 5 OF 5

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		58

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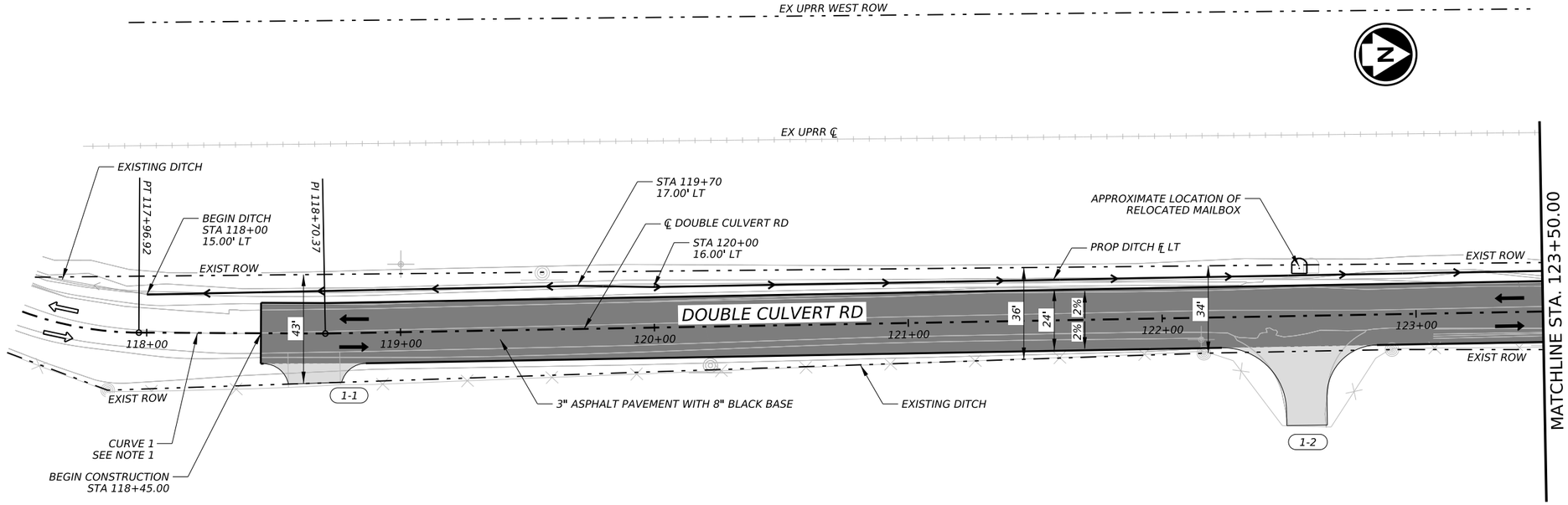


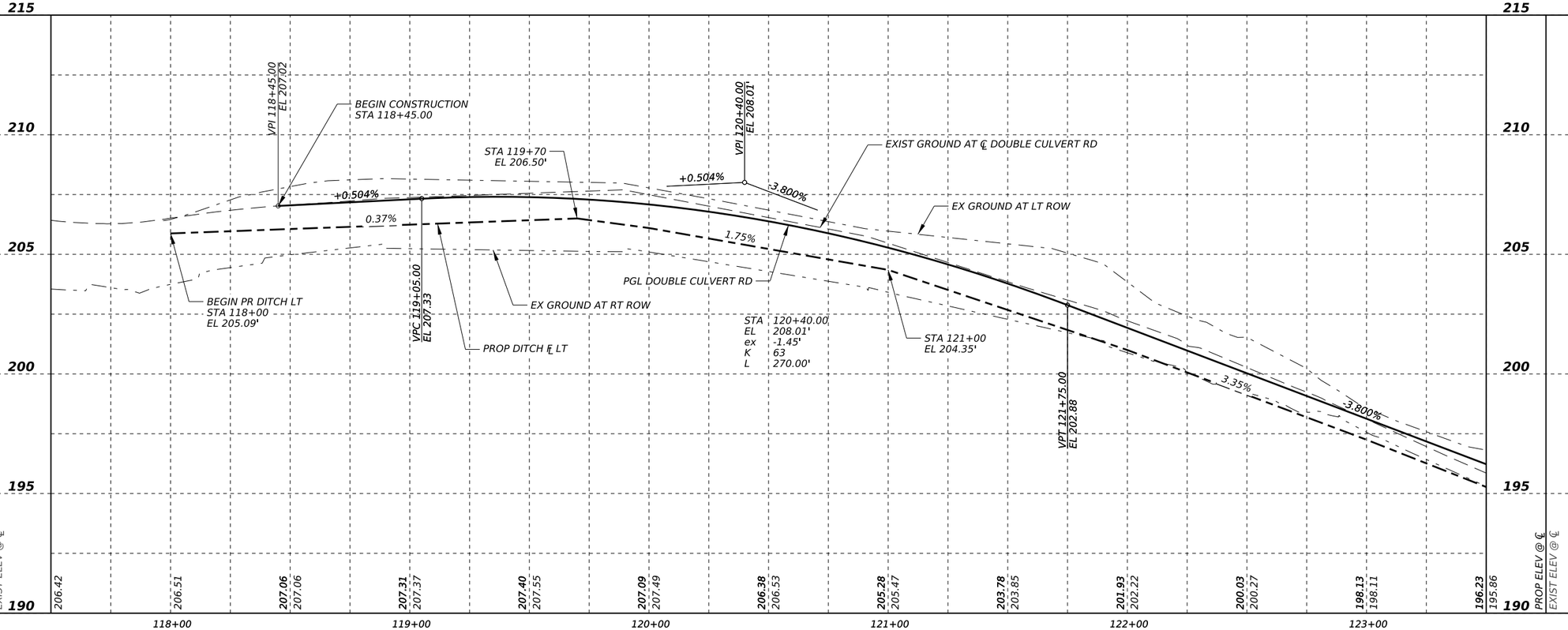
LEGEND

- PROPOSED DIRECTION OF TRAFFIC
- XX — DRIVEWAY NUMBER
- EXISTING ROW
- OE — EXISTING OVERHEAD ELECTRIC
- T (B) — EXISTING AT&T TELEPHONE
- EXISTING DITCH FLOWLINE
- PROPOSED DITCH FLOWLINE
- PROPOSED ASHPALT PAVEMENT
- PROPOSED ASHPALT DRIVEWAY
- PROFILE ROW N/E (LEFT)
- PROFILE ROW S/W (RIGHT)
- PROFILE DITCH FLOWLINE N/E (LEFT)
- PROFILE DITCH FLOWLINE S/W (RIGHT)
- FEMA 100-YR FLOODPLAIN

NOTES:

1. REFER TO HORIZONTAL ALIGNMENT DATA SHEET FOR CURVE DATA AND ALIGNMENT INFORMATION.
2. REFER TO DRAINAGE SHEETS FOR ADDITIONAL INFORMATION.
3. CONTRACTOR TO REMOVE ALL TREES INSIDE EXISTING ROW FOUND TO BE IN CONFLICT WITH THE DESIGN AND REMOVE ANY DEAD TREES.
4. REFER TO DRIVEWAY CULVERT TABLE FOR CULVERT DATA.

0 25' 50'
SCALE: 1" = 50'



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NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY M. DILL
84626
LICENSED PROFESSIONAL ENGINEER

R. M. Dill, P.E.
7/23/2026

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

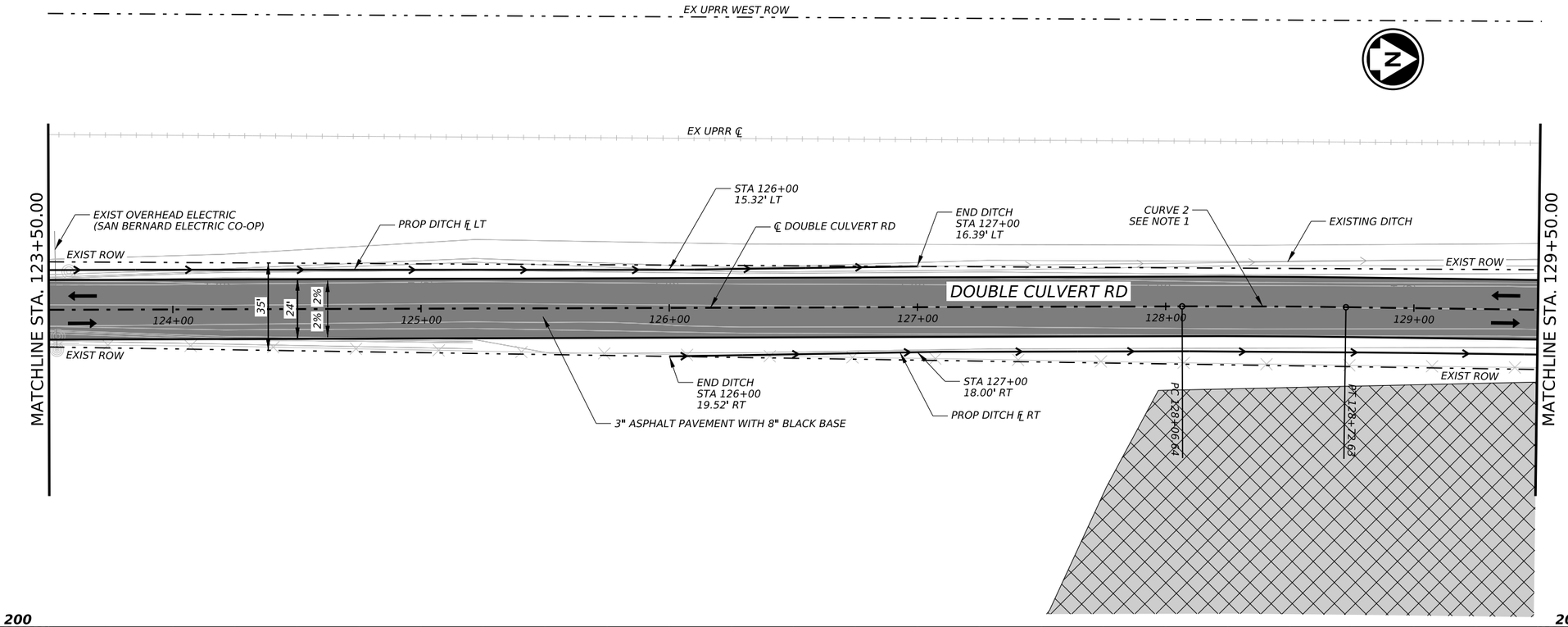
THE STATE OF TEXAS WALLER COUNTY
WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

PAVING
PLAN & PROFILE
DOUBLE CULVERT RD
BEGIN TO STA 123+50.00
SHEET 1 OF 12

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		59

100% SUBMITTAL



LEGEND

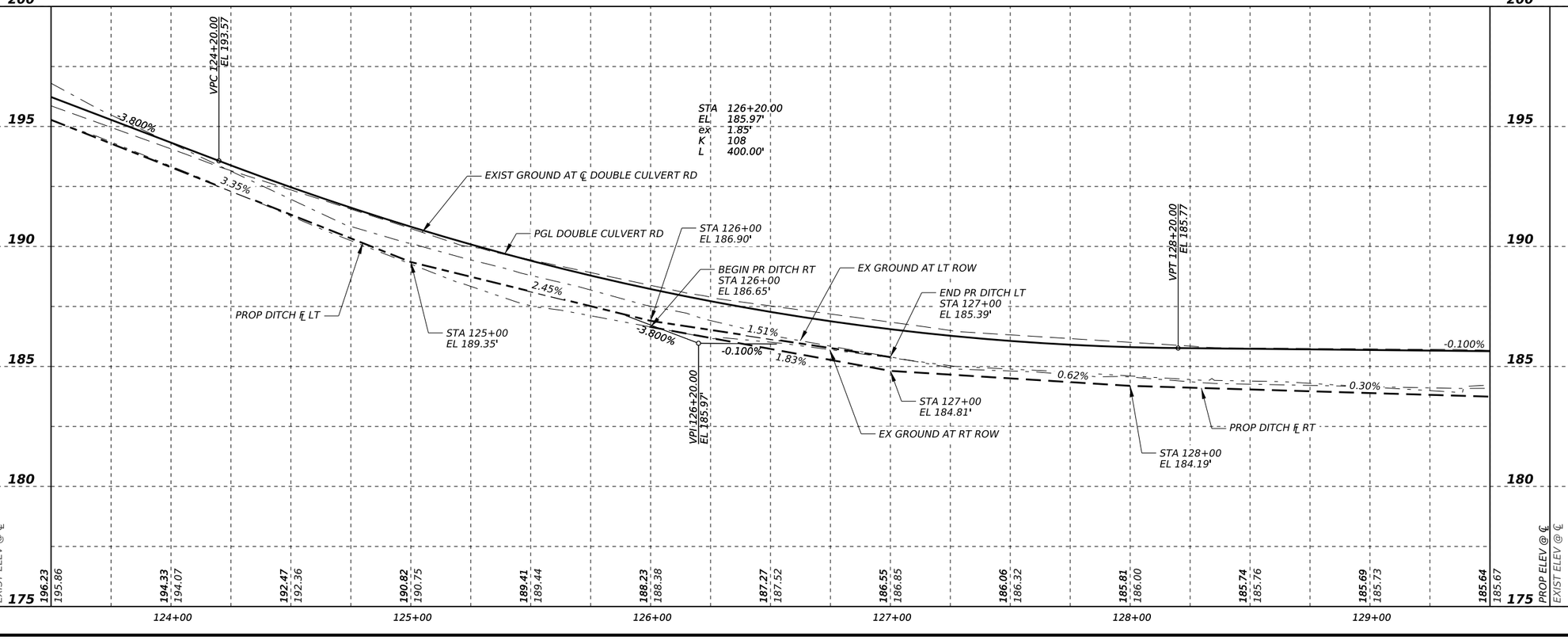
- PROPOSED DIRECTION OF TRAFFIC
- XX — DRIVEWAY NUMBER
- EXISTING ROW
- OE — EXISTING OVERHEAD ELECTRIC
- T (B) — EXISTING AT&T TELEPHONE
- EXISTING DITCH FLOWLINE
- PROPOSED DITCH FLOWLINE
- PROPOSED ASHPALT PAVEMENT
- PROPOSED ASHPALT DRIVEWAY
- PROFILE ROW N/E (LEFT)
- PROFILE ROW S/W (RIGHT)
- PROFILE DITCH FLOWLINE N/E (LEFT)
- PROFILE DITCH FLOWLINE S/W (RIGHT)
- FEMA 100-YR FLOODPLAIN

NOTES:

1. REFER TO HORIZONTAL ALIGNMENT DATA SHEET FOR CURVE DATA AND ALIGNMENT INFORMATION.
2. REFER TO DRAINAGE SHEETS FOR ADDITIONAL INFORMATION.
3. CONTRACTOR TO REMOVE ALL TREES INSIDE EXISTING ROW FOUND TO BE IN CONFLICT WITH THE DESIGN AND REMOVE ANY DEAD TREES.
4. REFER TO DRIVEWAY CULVERT TABLE FOR CULVERT DATA.

0 25' 50'

SCALE: 1" = 50'



NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY M. DILL
84626
LICENSED PROFESSIONAL ENGINEER

R. M. Dill, P.E.
7/23/2026

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

PAVING
PLAN & PROFILE
DOUBLE CULVERT RD
STA 123+50.00 TO STA 129+50.00

SHEET 2 OF 12

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		60

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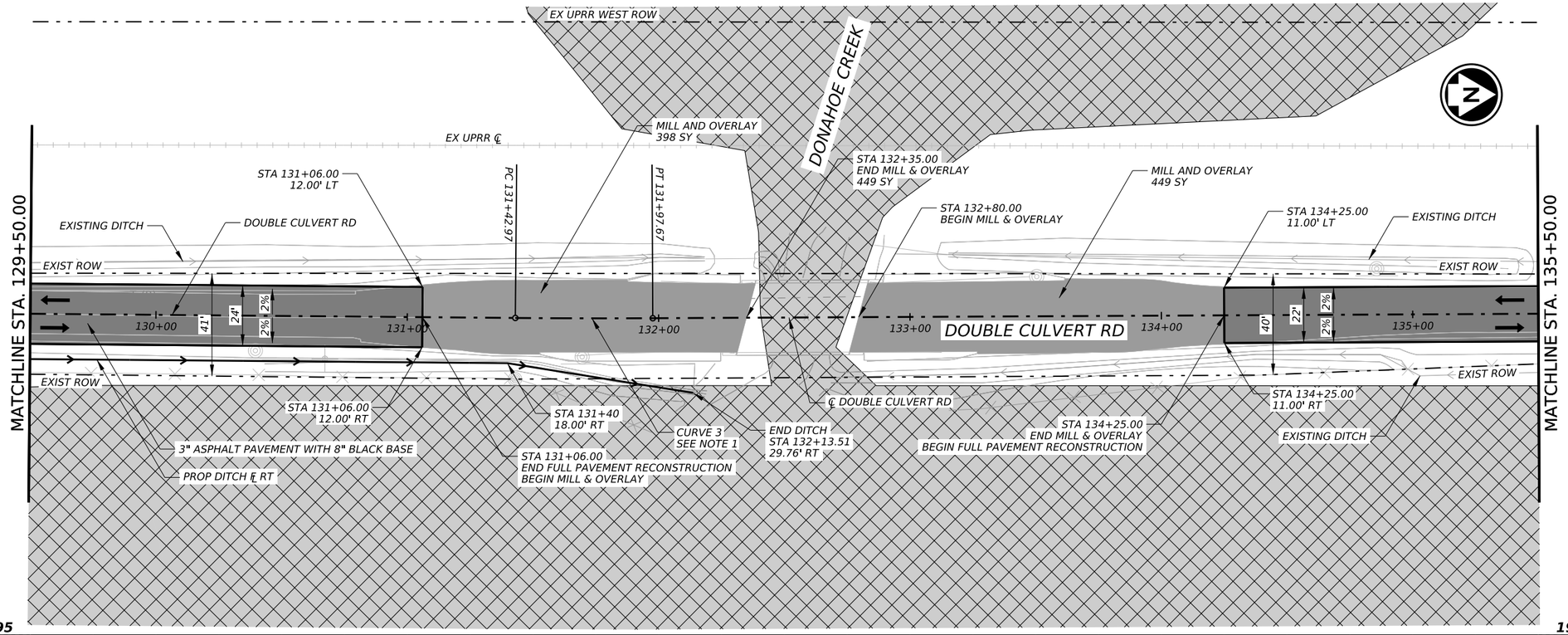


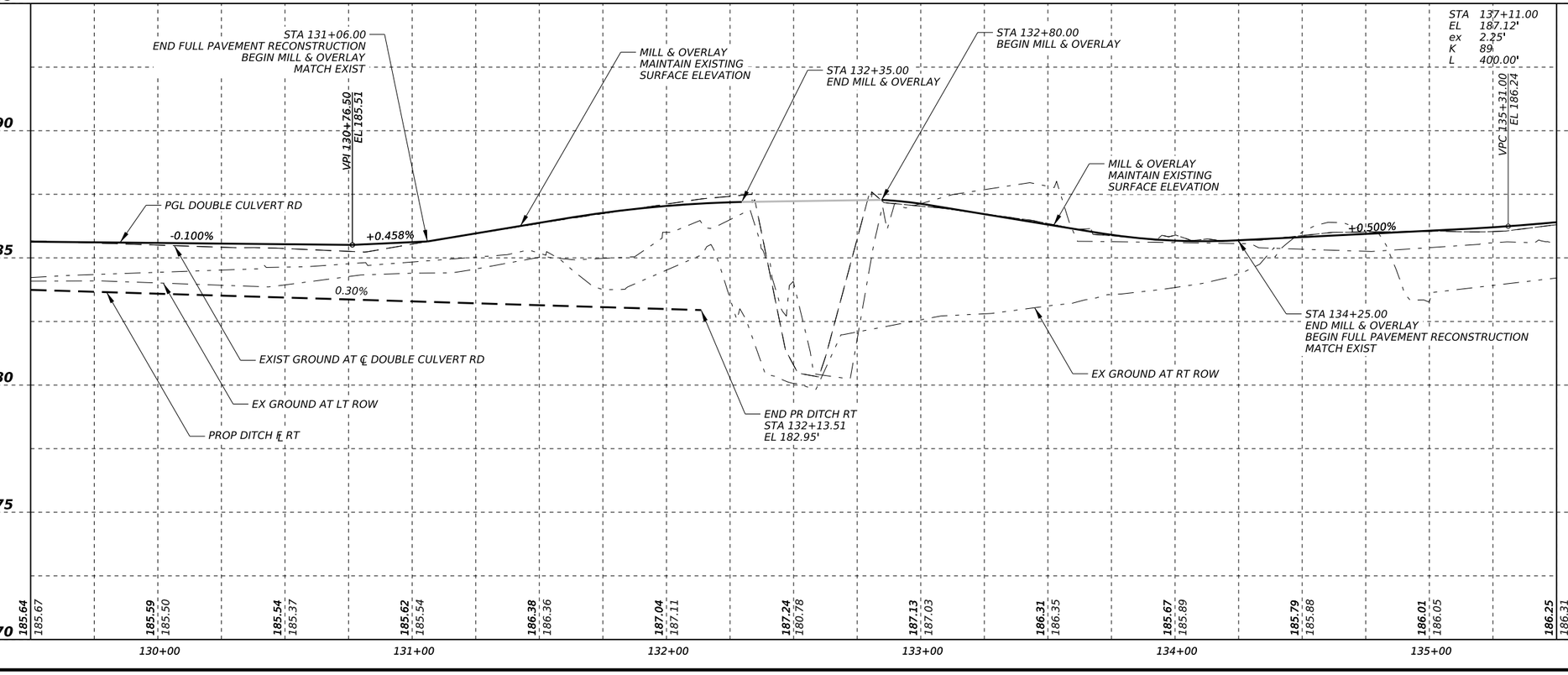
LEGEND

- PROPOSED DIRECTION OF TRAFFIC
- XX — DRIVEWAY NUMBER
- EXISTING ROW
- OE — EXISTING OVERHEAD ELECTRIC
- T (B) — EXISTING AT&T TELEPHONE
- EXISTING DITCH FLOWLINE
- PROPOSED DITCH FLOWLINE
- PROPOSED ASHPALT PAVEMENT
- PROPOSED ASHPALT DRIVEWAY
- PROFILE ROW N/E (LEFT)
- PROFILE ROW S/W (RIGHT)
- PROFILE DITCH FLOWLINE N/E (LEFT)
- PROFILE DITCH FLOWLINE S/W (RIGHT)
- FEMA 100-YR FLOODPLAIN
- MILL AND OVERLAY

NOTES:

1. REFER TO HORIZONTAL ALIGNMENT DATA SHEET FOR CURVE DATA AND ALIGNMENT INFORMATION.
2. REFER TO DRAINAGE SHEETS FOR ADDITIONAL INFORMATION.
3. CONTRACTOR TO REMOVE ALL TREES INSIDE EXISTING ROW FOUND TO BE IN CONFLICT WITH THE DESIGN AND REMOVE ANY DEAD TREES.
4. REFER TO DRIVEWAY CULVERT TABLE FOR CULVERT DATA.

0 25' 50'
SCALE: 1" = 50'



NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY M. DILL
84626
LICENSED PROFESSIONAL ENGINEER

R. M. Dill, P.E.
7/23/2026

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

PAVING
PLAN & PROFILE
DOUBLE CULVERT RD
STA 129+50.00 TO STA 135+50.00

SHEET 3 OF 12

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		61

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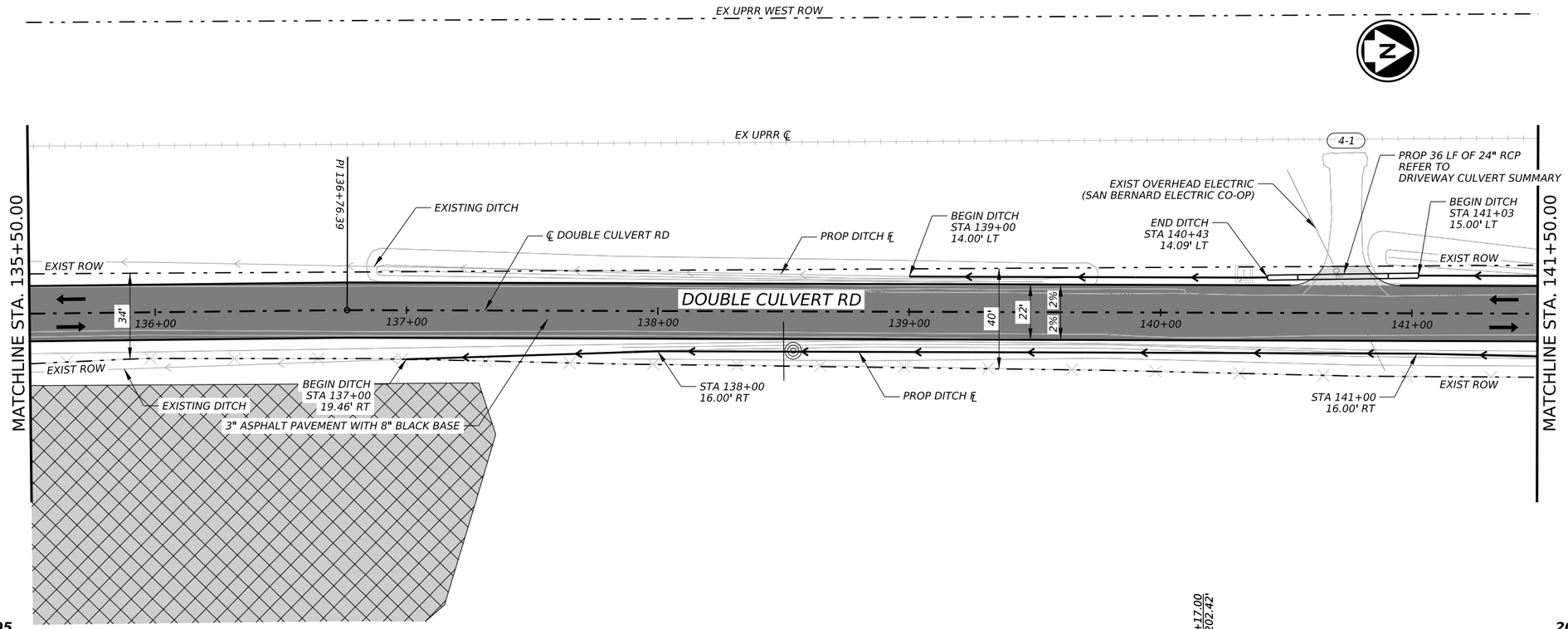


LEGEND

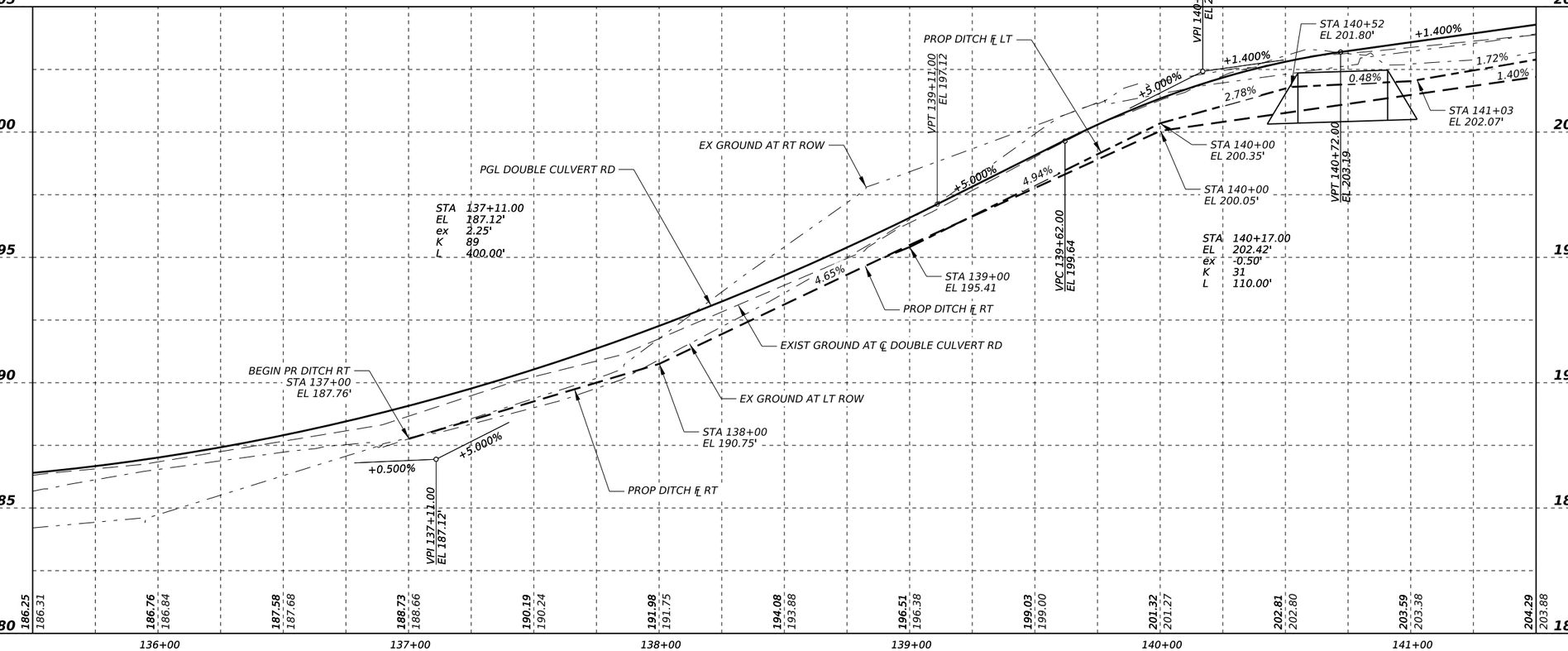
- PROPOSED DIRECTION OF TRAFFIC
- XX — DRIVEWAY NUMBER
- EXISTING ROW
- OE — EXISTING OVERHEAD ELECTRIC
- T (B) — EXISTING AT&T TELEPHONE
- EXISTING DITCH FLOWLINE
- PROPOSED DITCH FLOWLINE
- PROPOSED ASHPALT PAVEMENT
- PROPOSED ASHPALT DRIVEWAY
- PROFILE ROW N/E (LEFT)
- PROFILE ROW S/W (RIGHT)
- PROFILE DITCH FLOWLINE N/E (LEFT)
- PROFILE DITCH FLOWLINE S/W (RIGHT)
- FEMA 100-YR FLOODPLAIN

NOTES:

1. REFER TO HORIZONTAL ALIGNMENT DATA SHEET FOR CURVE DATA AND ALIGNMENT INFORMATION.
2. REFER TO DRAINAGE SHEETS FOR ADDITIONAL INFORMATION.
3. CONTRACTOR TO REMOVE ALL TREES INSIDE EXISTING ROW FOUND TO BE IN CONFLICT WITH THE DESIGN AND REMOVE ANY DEAD TREES.
4. REFER TO DRIVEWAY CULVERT TABLE FOR CULVERT DATA.

0 25' 50'

SCALE: 1" = 50'



NO.	DATE	REVISION	APPROV.

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ROY M. DILL
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LICENSED PROFESSIONAL ENGINEER

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TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

PAVING
PLAN & PROFILE
DOUBLE CULVERT RD
STA 135+50.00 TO STA 141+50.00

SHEET 4 OF 12

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		62

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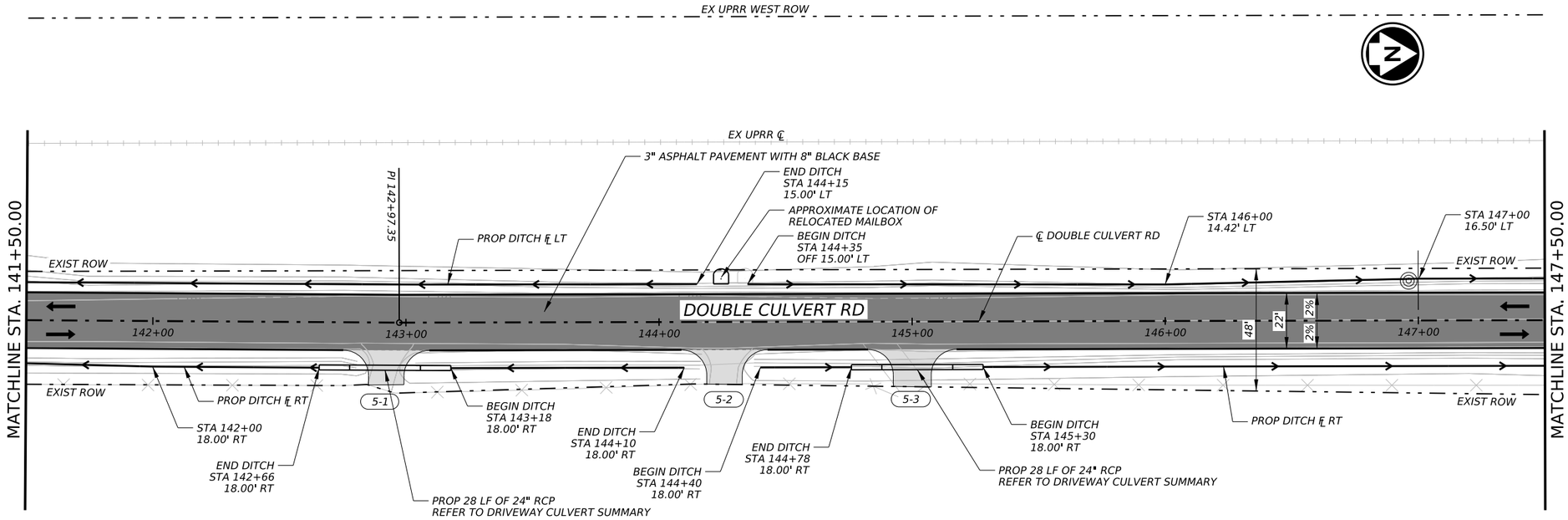


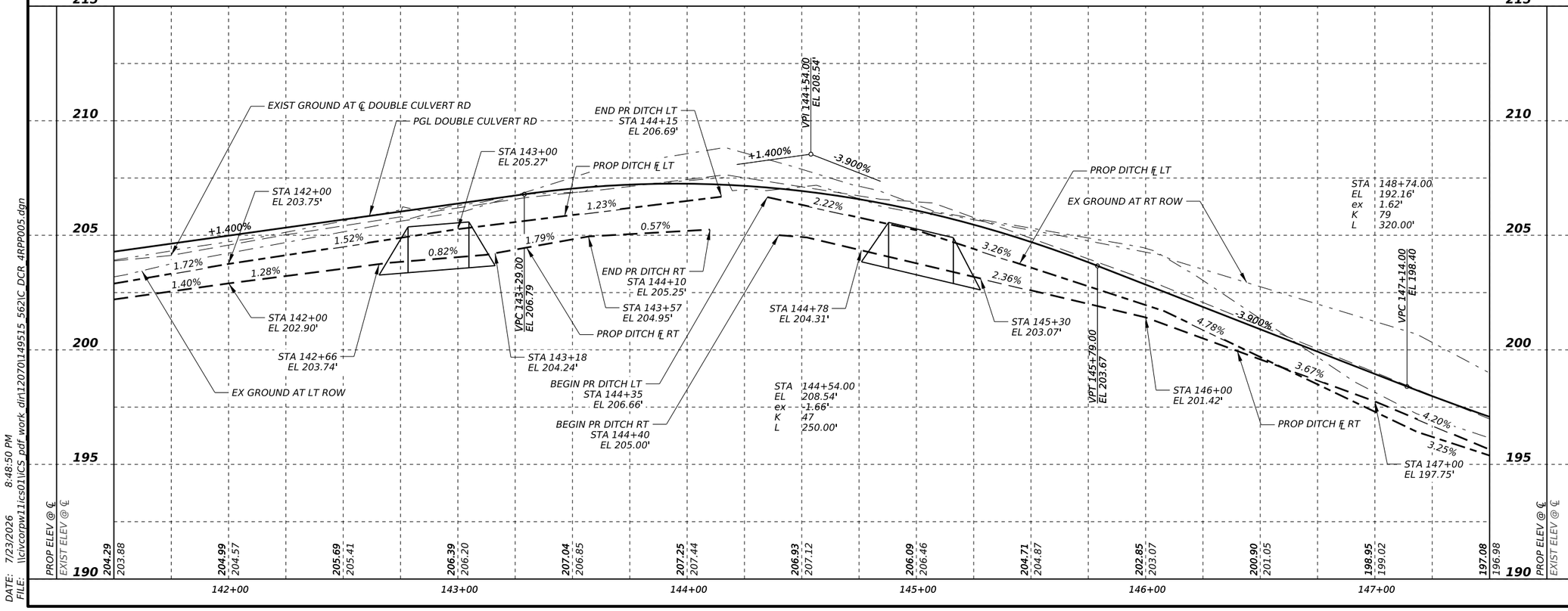
LEGEND

- PROPOSED DIRECTION OF TRAFFIC
- XX — DRIVEWAY NUMBER
- EXISTING ROW
- OE — EXISTING OVERHEAD ELECTRIC
- T (B) — EXISTING AT&T TELEPHONE
- EXISTING DITCH FLOWLINE
- PROPOSED DITCH FLOWLINE
- PROPOSED ASHPALT PAVEMENT
- PROPOSED ASHPALT DRIVEWAY
- PROFILE ROW N/E (LEFT)
- PROFILE ROW S/W (RIGHT)
- PROFILE DITCH FLOWLINE N/E (LEFT)
- PROFILE DITCH FLOWLINE S/W (RIGHT)
- FEMA 100-YR FLOODPLAIN

NOTES:

1. REFER TO HORIZONTAL ALIGNMENT DATA SHEET FOR CURVE DATA AND ALIGNMENT INFORMATION.
2. REFER TO DRAINAGE SHEETS FOR ADDITIONAL INFORMATION.
3. CONTRACTOR TO REMOVE ALL TREES INSIDE EXISTING ROW FOUND TO BE IN CONFLICT WITH THE DESIGN AND REMOVE ANY DEAD TREES.
4. REFER TO DRIVEWAY CULVERT TABLE FOR CULVERT DATA.

0 25' 50'
SCALE: 1" = 50'



NO.	DATE	REVISION	APPROV.

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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

PAVING
PLAN & PROFILE
DOUBLE CULVERT RD
STA 141+50.00 TO STA 147+50.00
SHEET 5 OF 12

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		63

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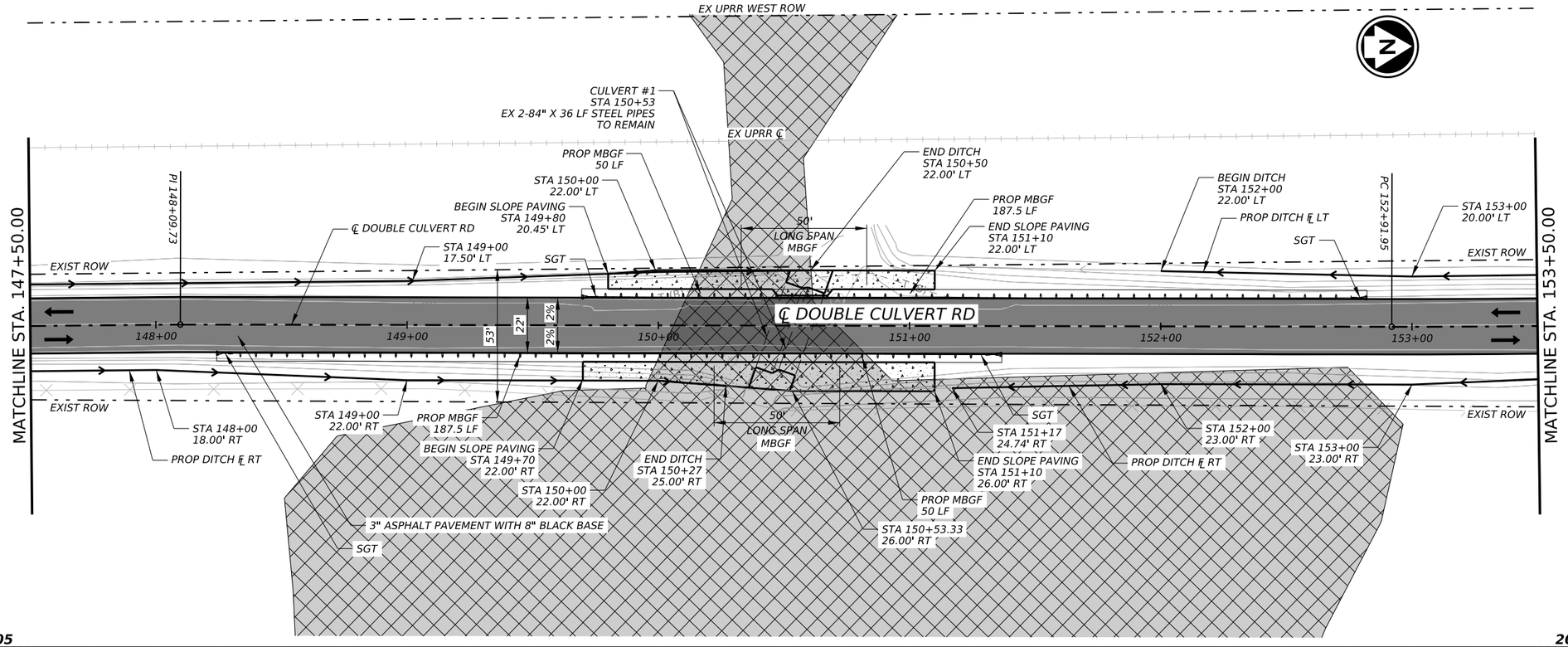


LEGEND

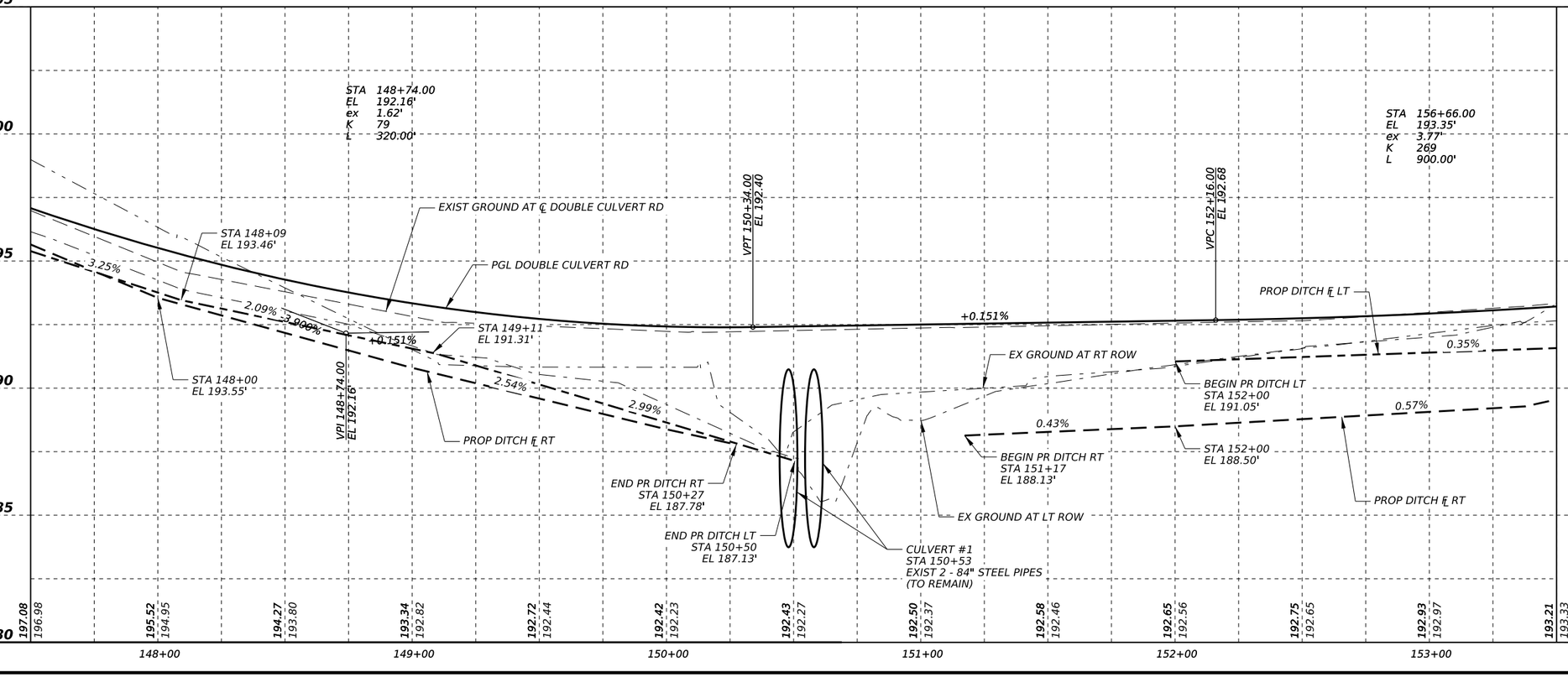
- PROPOSED DIRECTION OF TRAFFIC
- XX — DRIVEWAY NUMBER
- EXISTING ROW
- OE — EXISTING OVERHEAD ELECTRIC
- T (B) — EXISTING AT&T TELEPHONE
- EXISTING DITCH FLOWLINE
- PROPOSED DITCH FLOWLINE
- PROPOSED ASHPALT PAVEMENT
- PROPOSED ASHPALT DRIVEWAY
- PROFILE ROW N/E (LEFT)
- PROFILE ROW S/W (RIGHT)
- PROFILE DITCH FLOWLINE N/E (LEFT)
- PROFILE DITCH FLOWLINE S/W (RIGHT)
- FEMA 100-YR FLOODPLAIN

NOTES:

1. *REFER TO HORIZONTAL ALIGNMENT DATA SHEET FOR CURVE DATA AND ALIGNMENT INFORMATION.*
2. *REFER TO DRAINAGE SHEETS FOR ADDITIONAL INFORMATION.*
3. *CONTRACTOR TO REMOVE ALL TREES INSIDE EXISTING ROW FOUND TO BE IN CONFLICT WITH THE DESIGN AND REMOVE ANY DEAD TREES.*
4. *REFER TO DRIVEWAY CULVERT TABLE FOR CULVERT DATA.*

0 25' 50'

SCALE: 1" = 50'



NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY M. DILL
84626
LICENSED PROFESSIONAL ENGINEER

R. M. Dill, P.E.
7/23/2026

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

PAVING
PLAN & PROFILE
DOUBLE CULVERT RD
STA 147+50.00 TO STA 153+50.00

SHEET 6 OF 12

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		64

DATE: 7/23/2026 8:48:31 PM
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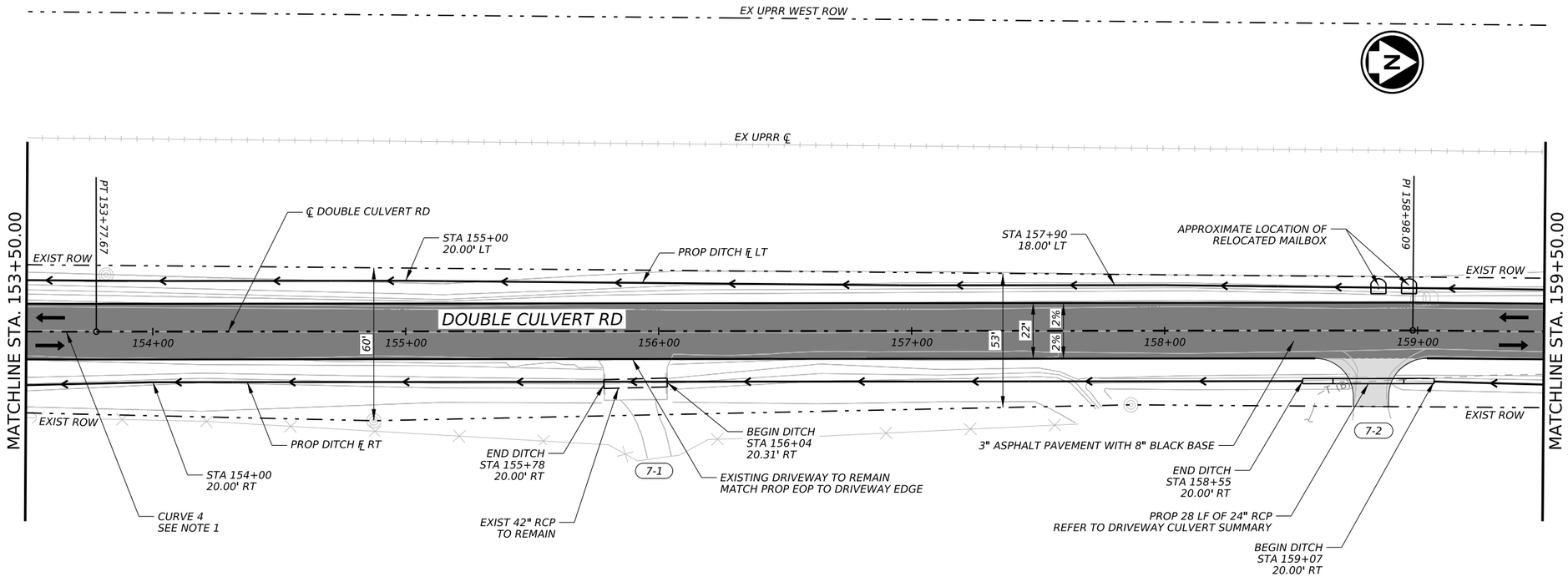

LEGEND

- PROPOSED DIRECTION OF TRAFFIC
- XX — DRIVEWAY NUMBER
- EXISTING ROW
- OE — EXISTING OVERHEAD ELECTRIC
- T (B) — EXISTING AT&T TELEPHONE
- EXISTING DITCH FLOWLINE
- PROPOSED DITCH FLOWLINE
- PROPOSED ASHPALT PAVEMENT
- PROPOSED ASHPALT DRIVEWAY
- PROFILE ROW N/E (LEFT)
- PROFILE ROW S/W (RIGHT)
- PROFILE DITCH FLOWLINE N/E (LEFT)
- PROFILE DITCH FLOWLINE S/W (RIGHT)
- FEMA 100-YR FLOODPLAIN

NOTES:

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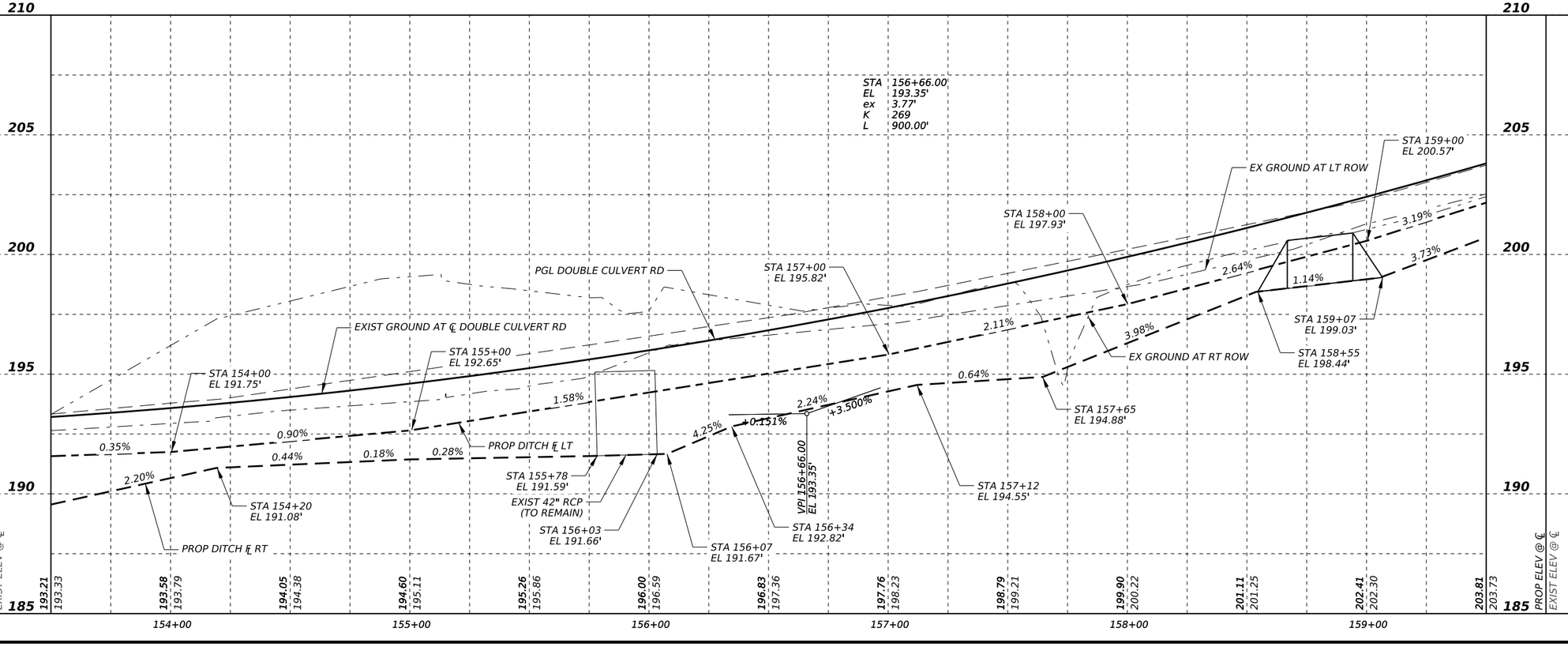
2. REFER TO DRAINAGE SHEETS FOR ADDITIONAL INFORMATION.
3. CONTRACTOR TO REMOVE ALL TREES INSIDE EXISTING ROW FOUND TO BE IN CONFLICT WITH THE DESIGN AND REMOVE ANY DEAD TREES.
4. REFER TO DRIVEWAY CULVERT TABLE FOR CULVERT DATA.

0 25' 50'

SCALE: 1" = 50'



NO.	DATE	REVISION	APPROV.

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FIRM REGISTRATION NUMBER: 17252

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TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

PAVING
PLAN & PROFILE
DOUBLE CULVERT RD
STA 153+50.00 TO STA 159+50.00

SHEET 7 OF 12

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		65

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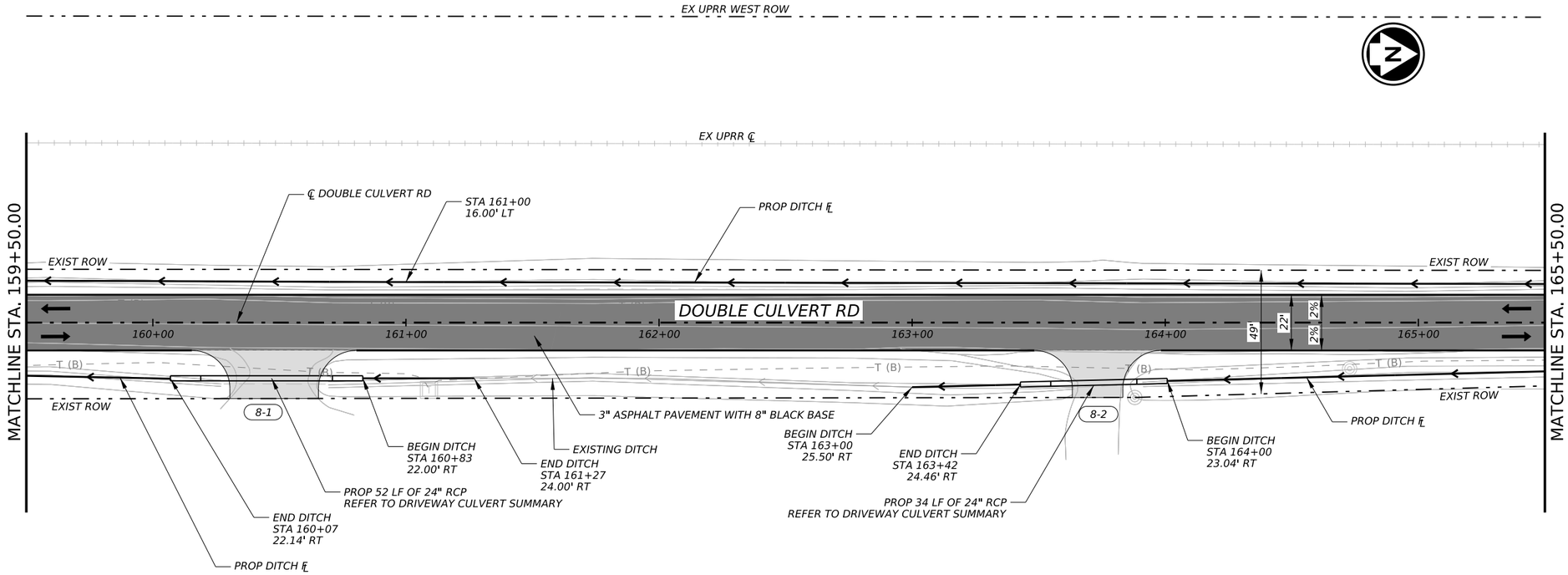

LEGEND

- PROPOSED DIRECTION OF TRAFFIC
- XX — DRIVEWAY NUMBER
- EXISTING ROW
- OE — EXISTING OVERHEAD ELECTRIC
- T (B) — EXISTING AT&T TELEPHONE
- EXISTING DITCH FLOWLINE
- PROPOSED DITCH FLOWLINE
- PROPOSED ASHPALT PAVEMENT
- PROPOSED ASHPALT DRIVEWAY
- PROFILE ROW N/E (LEFT)
- PROFILE ROW S/W (RIGHT)
- PROFILE DITCH FLOWLINE N/E (LEFT)
- PROFILE DITCH FLOWLINE S/W (RIGHT)
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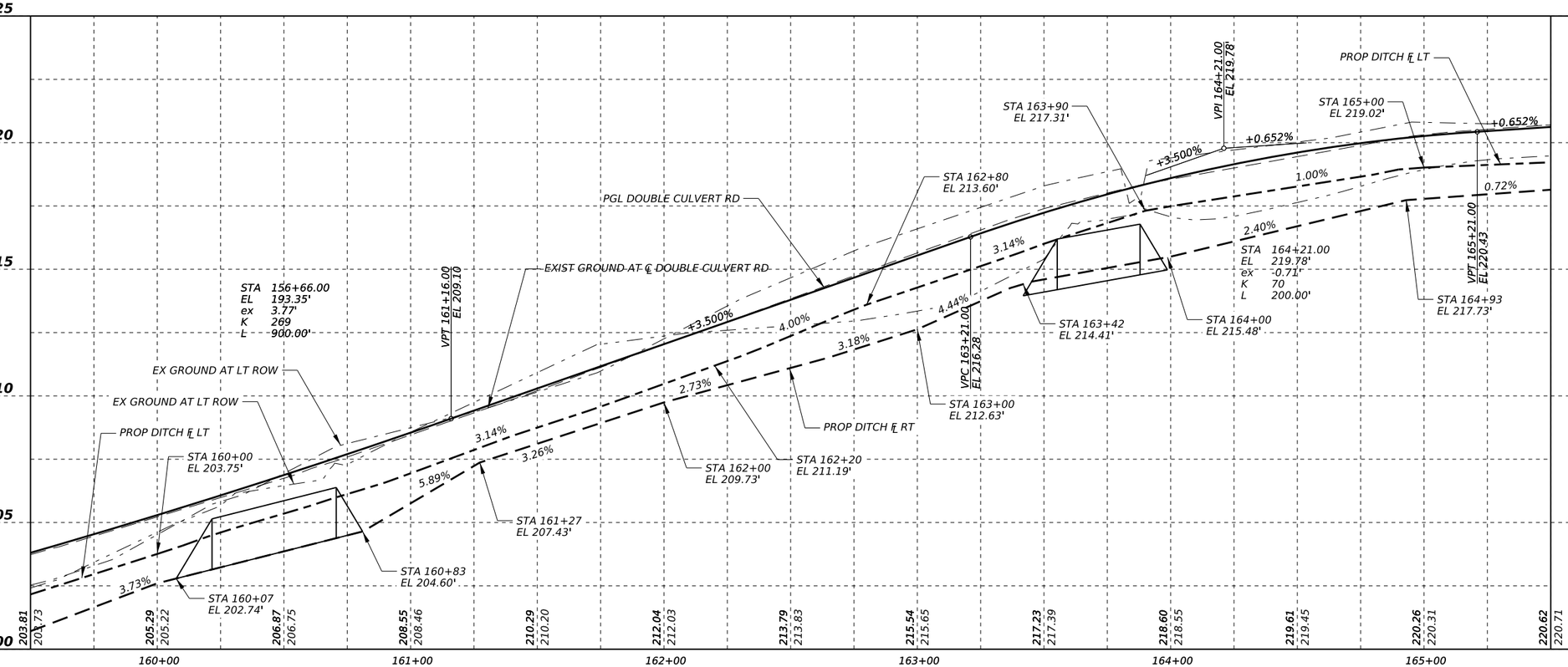
SCALE: 1" = 50'



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TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

PAVING
PLAN & PROFILE
DOUBLE CULVERT RD
STA 159+50.00 TO STA 165+50.00
SHEET 8 OF 12

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		66

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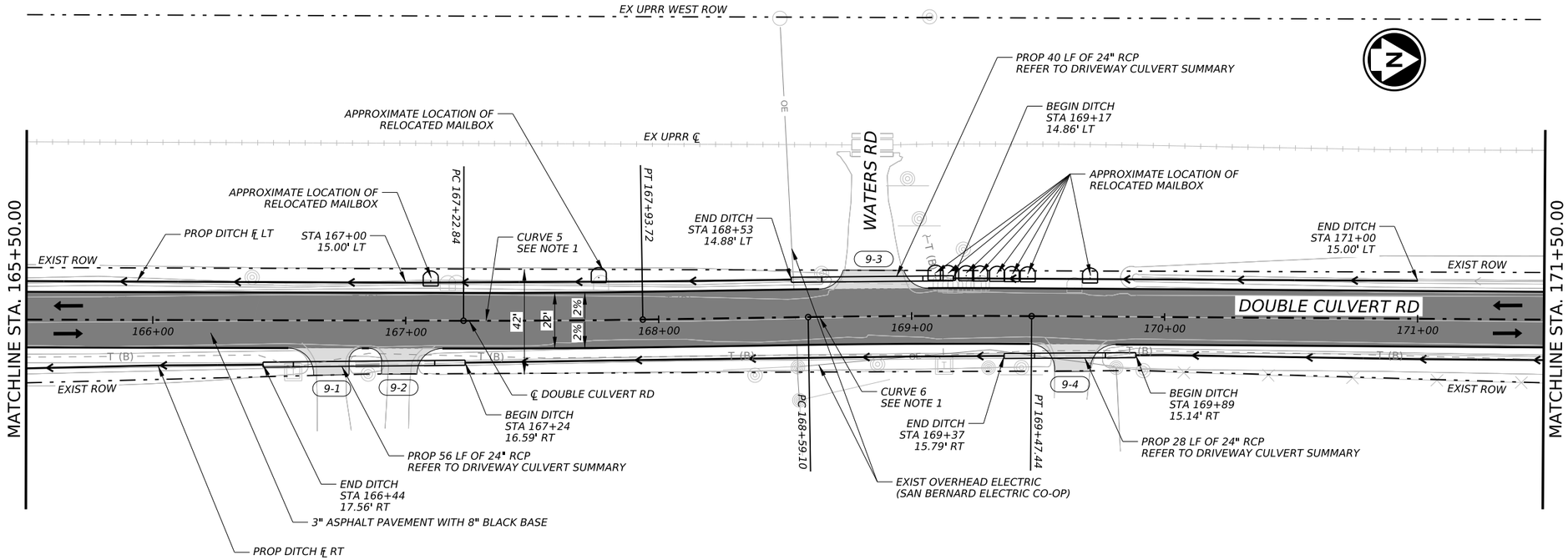

LEGEND

- PROPOSED DIRECTION OF TRAFFIC
- XX — DRIVEWAY NUMBER
- EXISTING ROW
- OE — EXISTING OVERHEAD ELECTRIC
- T (B) — EXISTING AT&T TELEPHONE
- EXISTING DITCH FLOWLINE
- PROPOSED DITCH FLOWLINE
- PROPOSED ASHPALT PAVEMENT
- PROPOSED ASHPALT DRIVEWAY
- PROFILE ROW N/E (LEFT)
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- PROFILE DITCH FLOWLINE N/E (LEFT)
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- FEMA 100-YR FLOODPLAIN

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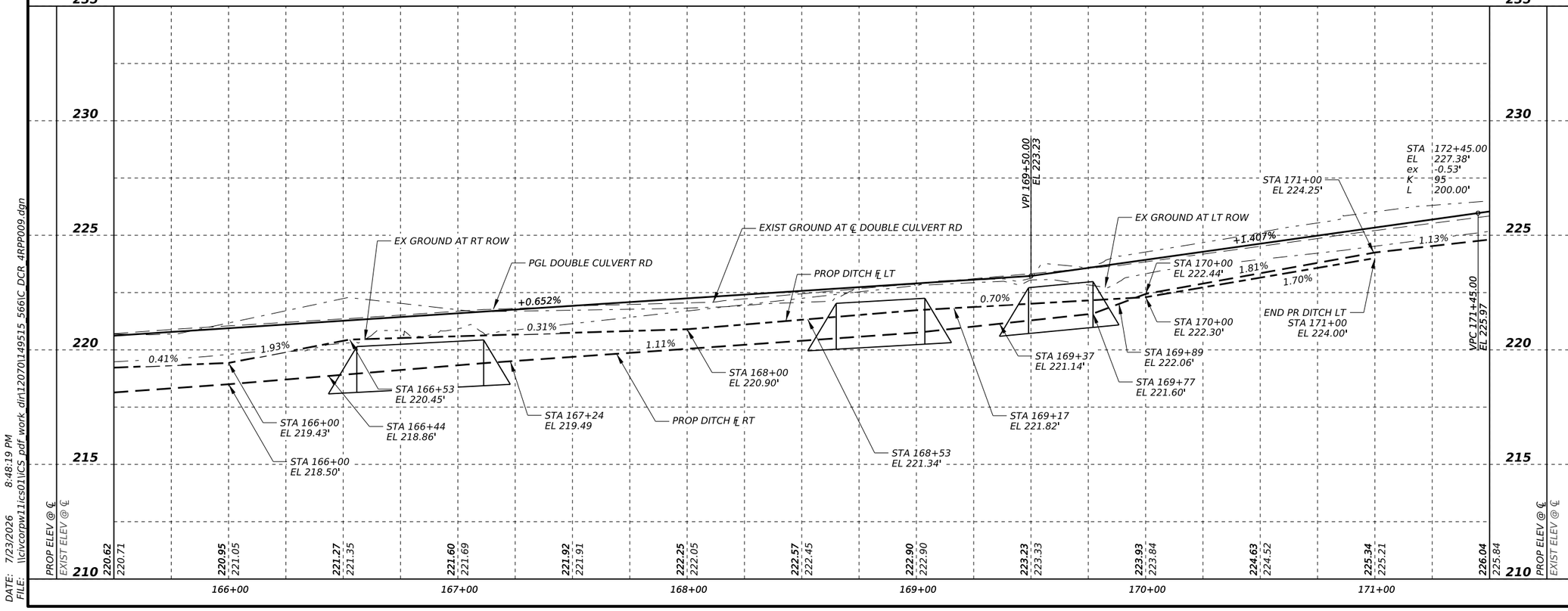
0 25' 50'
SCALE: 1" = 50'



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7/23/2026

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TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

PAVING
PLAN & PROFILE
DOUBLE CULVERT RD
STA 165+50.00 TO STA 171+50.00
SHEET 9 OF 12

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		67

DATE: 7/23/2026 8:48:19 PM
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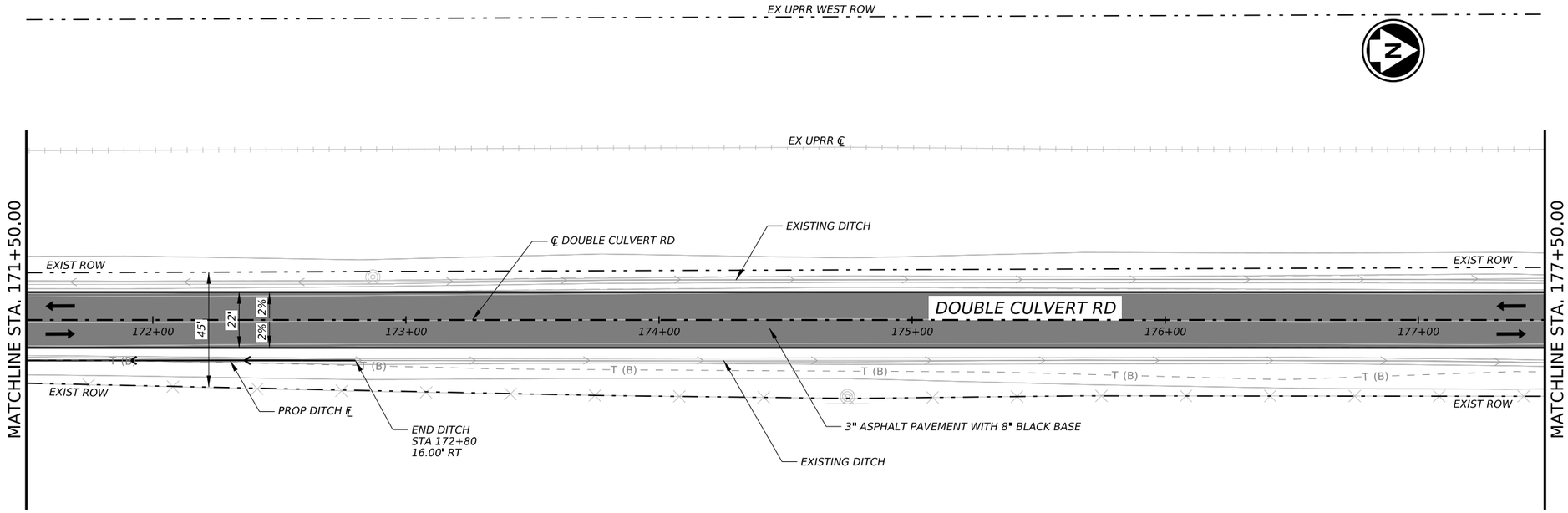

LEGEND

- PROPOSED DIRECTION OF TRAFFIC
- XX — DRIVEWAY NUMBER
- EXISTING ROW
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- PROPOSED ASHPALT PAVEMENT
- PROPOSED ASHPALT DRIVEWAY
- PROFILE ROW N/E (LEFT)
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- PROFILE DITCH FLOWLINE S/W (RIGHT)
- FEMA 100-YR FLOODPLAIN

NOTES:

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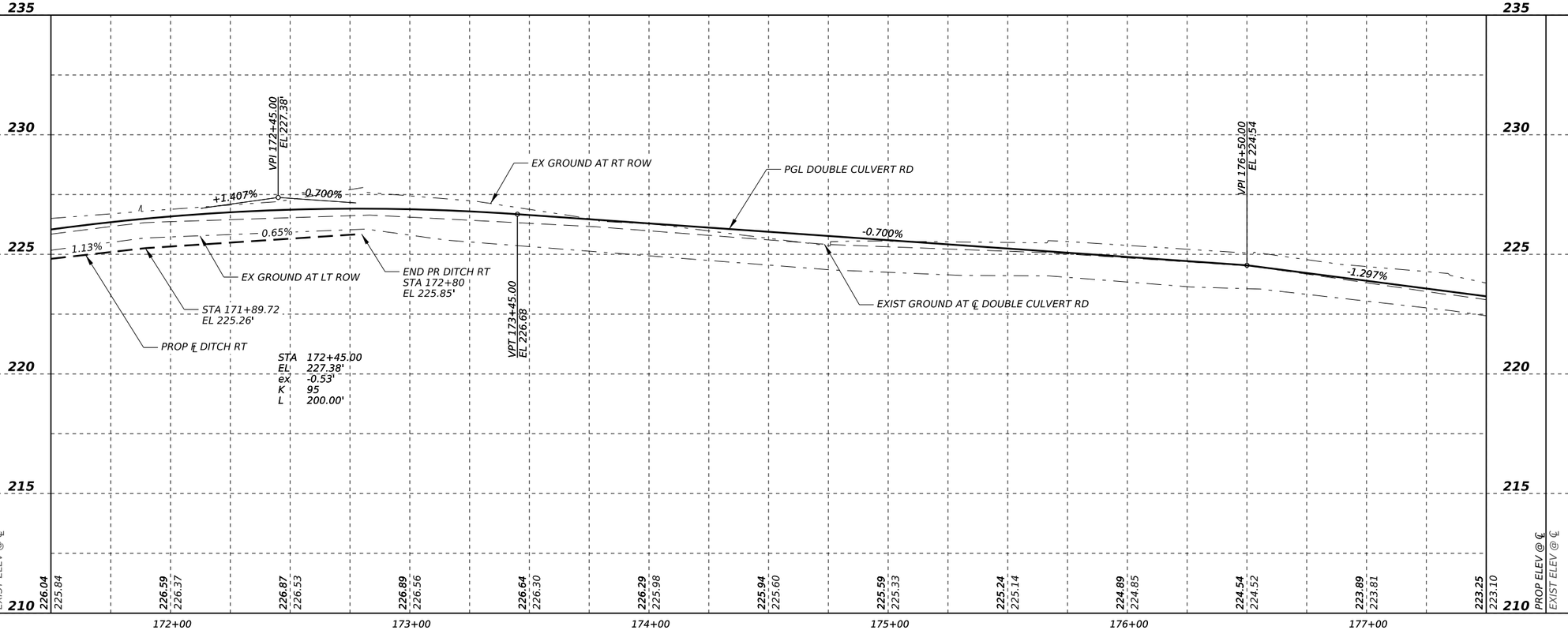
0 25' 50'

SCALE: 1" = 50'



NO.	DATE	REVISION	APPROV.

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TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY

ENGINEERING DEPARTMENT

PAVING
PLAN & PROFILE
DOUBLE CULVERT RD

STA 171+50.00 TO STA 177+50.00

SHEET 10 OF 12

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		68

DATE: 7/23/2026 8:48:37 PM
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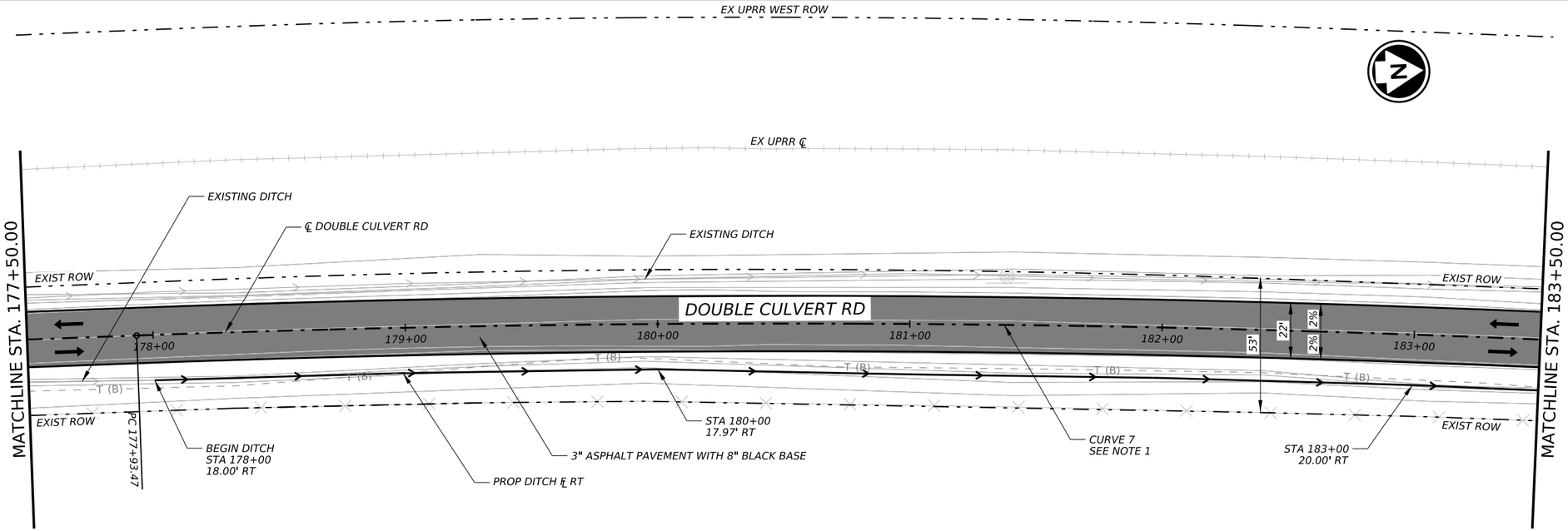

LEGEND

- PROPOSED DIRECTION OF TRAFFIC
- XX — DRIVEWAY NUMBER
- EXISTING ROW
- OE — EXISTING OVERHEAD ELECTRIC
- T (B) — EXISTING AT&T TELEPHONE
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- PROPOSED ASHPALT DRIVEWAY
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- PROFILE ROW S/W (RIGHT)
- PROFILE DITCH FLOWLINE N/E (LEFT)
- PROFILE DITCH FLOWLINE S/W (RIGHT)
- FEMA 100-YR FLOODPLAIN

NOTES:

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0 25' 50'

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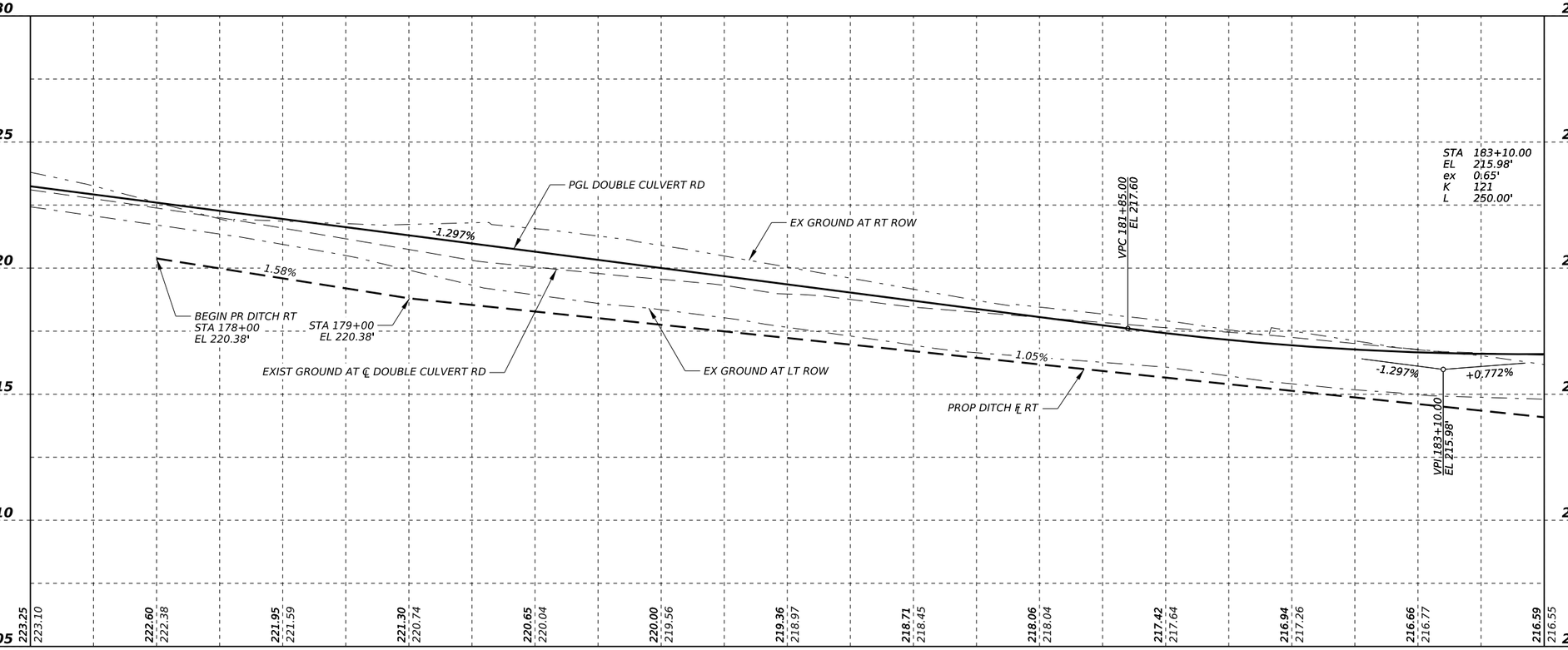

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY M. DILL
84626
LICENSED PROFESSIONAL ENGINEER

R. M. Dill, P.E.
7/23/2026

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

PAVING
PLAN & PROFILE
DOUBLE CULVERT RD
STA 177+50.00 TO STA 183+50.00

SHEET 11 OF 12

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		69

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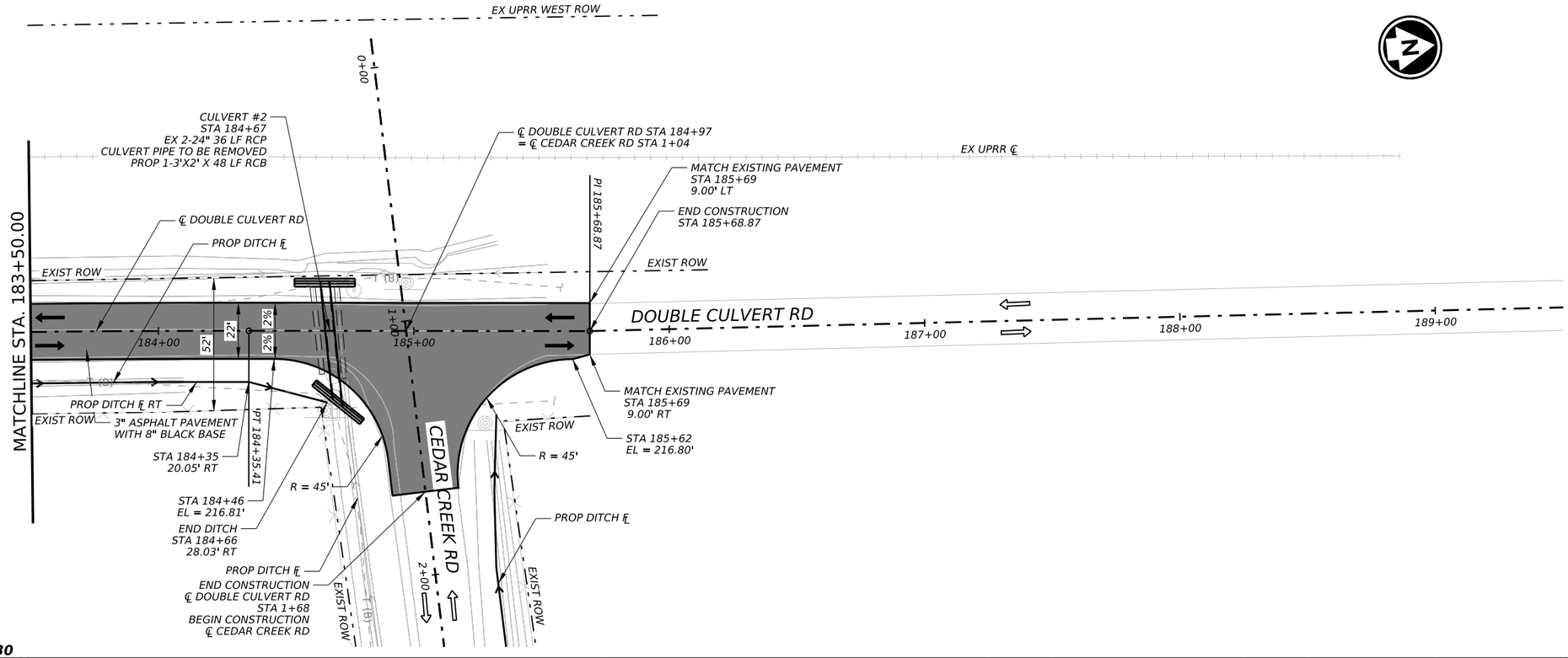

LEGEND

- PROPOSED DIRECTION OF TRAFFIC
- XX — DRIVEWAY NUMBER
- EXISTING ROW
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0 25' 50'

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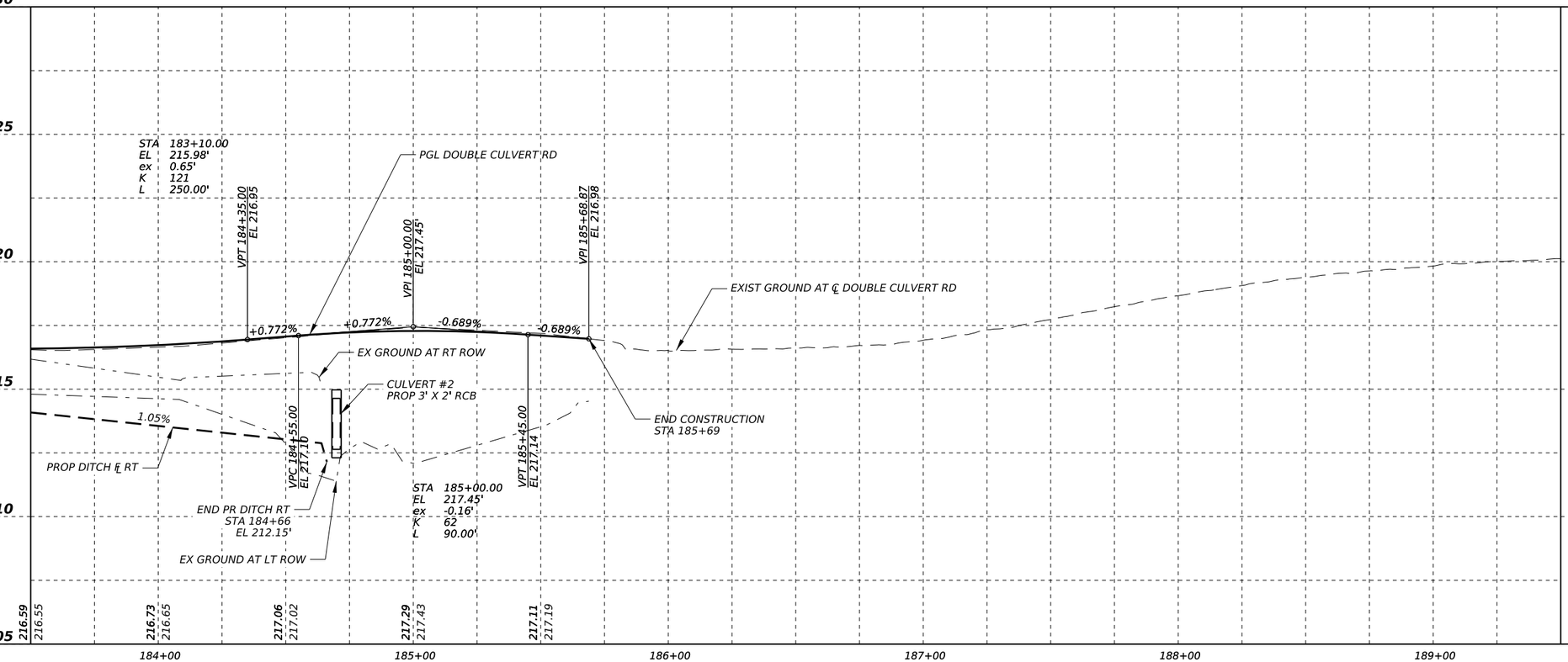

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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

PAVING
PLAN & PROFILE
DOUBLE CULVERT RD
STA 183+50.00 TO STA END

SHEET 12 OF 12

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		70

DATE: 7/23/2026 8:50:34 PM
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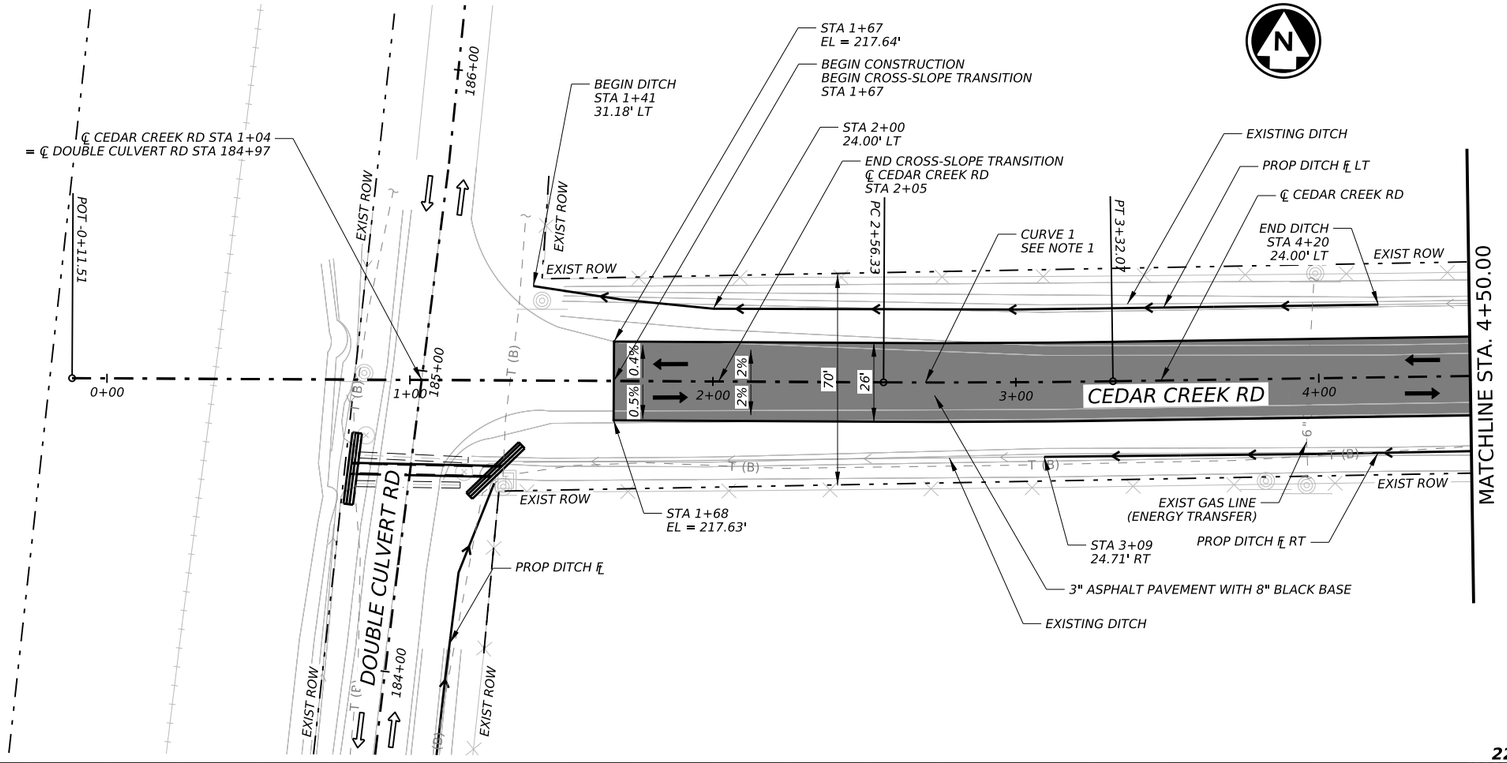

LEGEND

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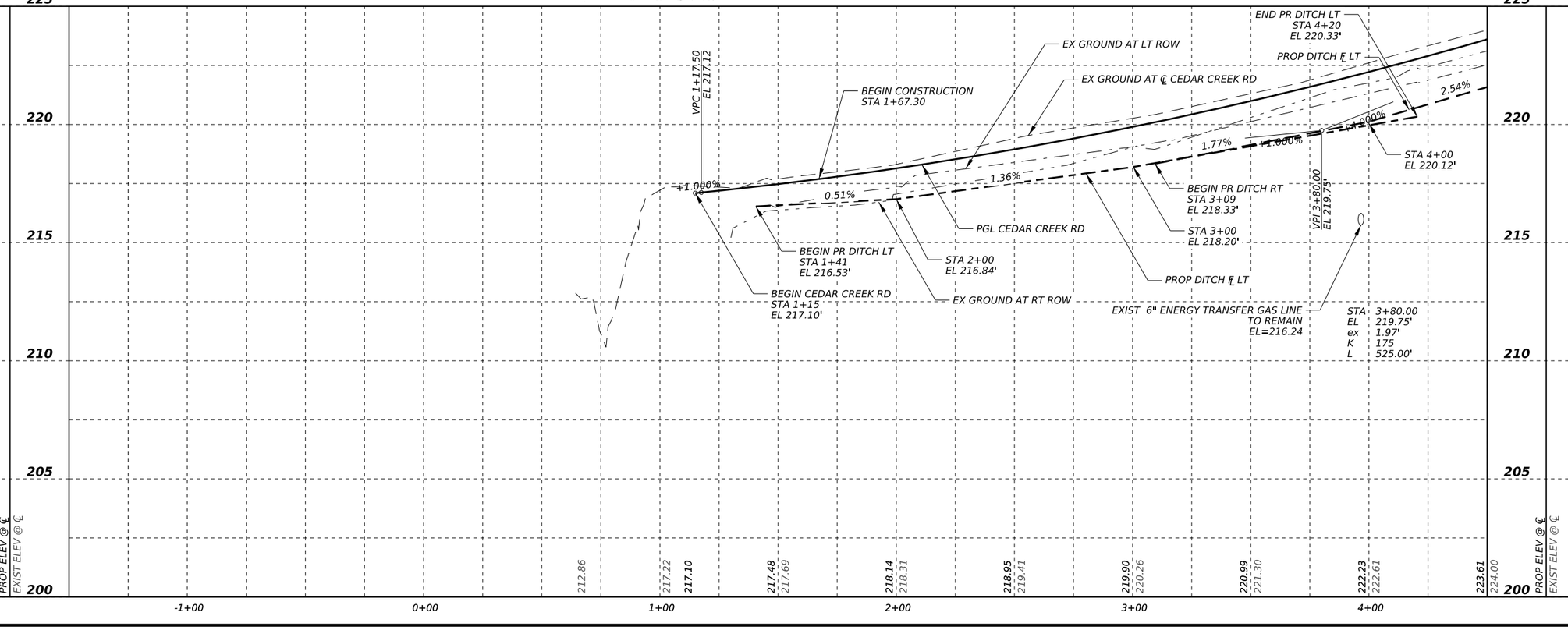

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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

PAVING
PLAN & PROFILE
CEDAR CREEK RD
BEGIN TO STA 4+50.00
SHEET 1 OF 9

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		71

DATE: 7/23/2026 8:51:07 PM
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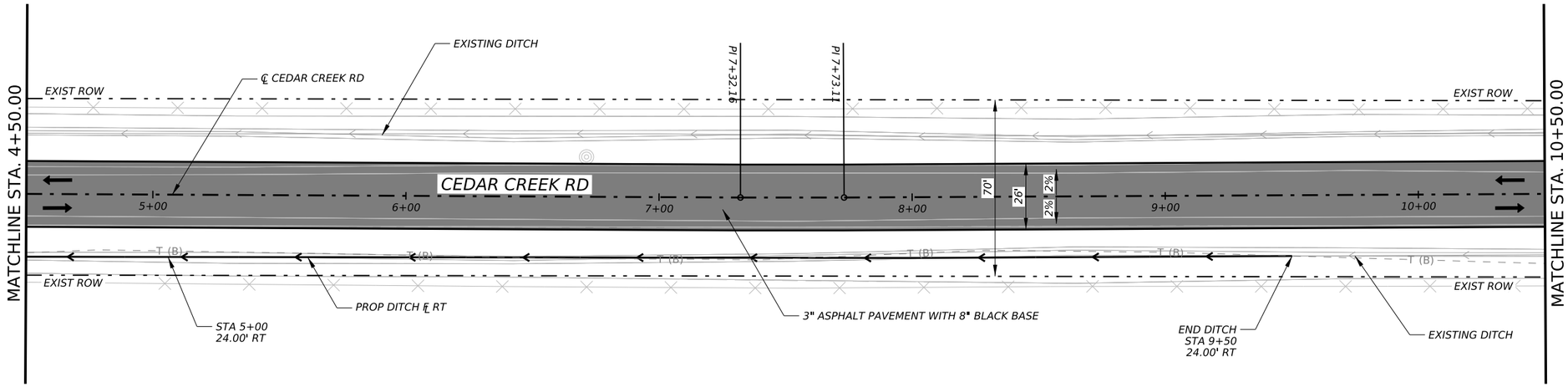

LEGEND

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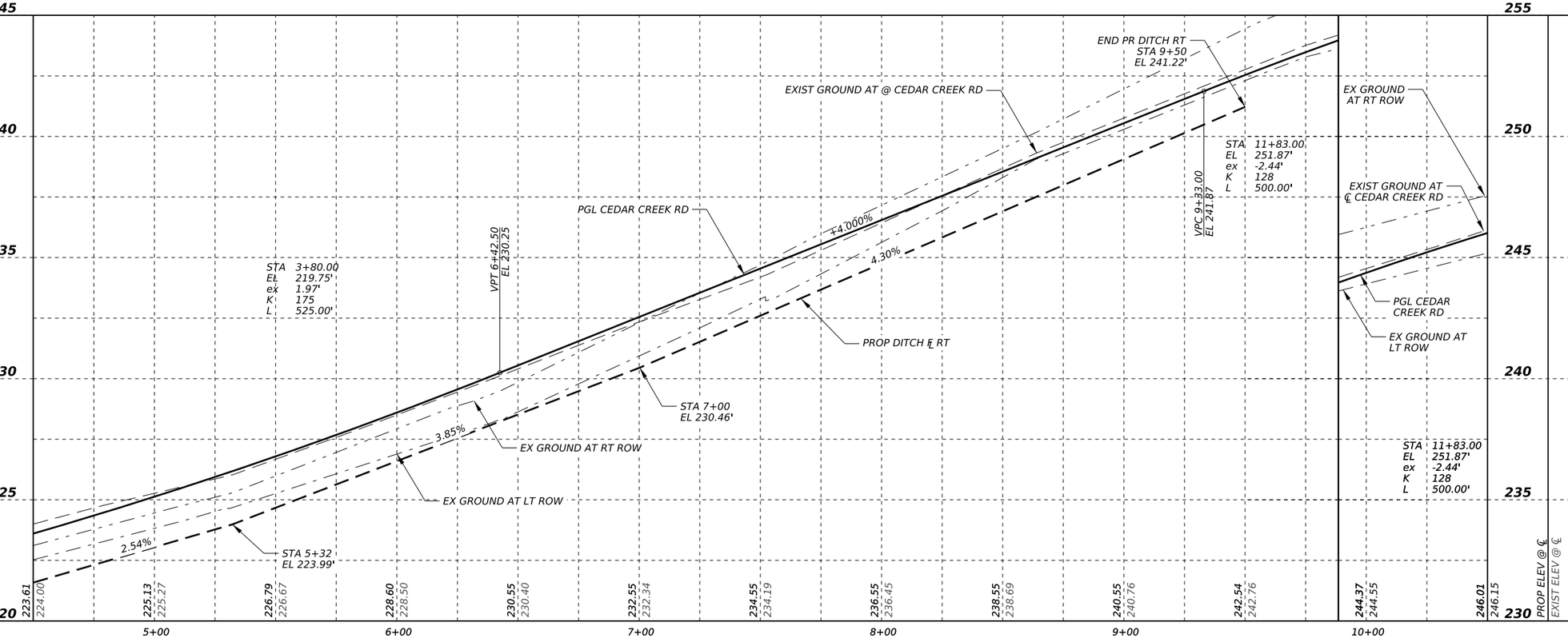

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84626
LICENSED PROFESSIONAL ENGINEER

R. M. Dill, P.E.
7/23/2026

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

PAVING
PLAN & PROFILE
CEDAR CREEK RD
STA 4+50.00 TO STA 10+50.00
SHEET 2 OF 9

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD

DIST	COUNTY	SHEET NO.
	WALLER	72

DATE: 7/23/2026 8:49:09 PM
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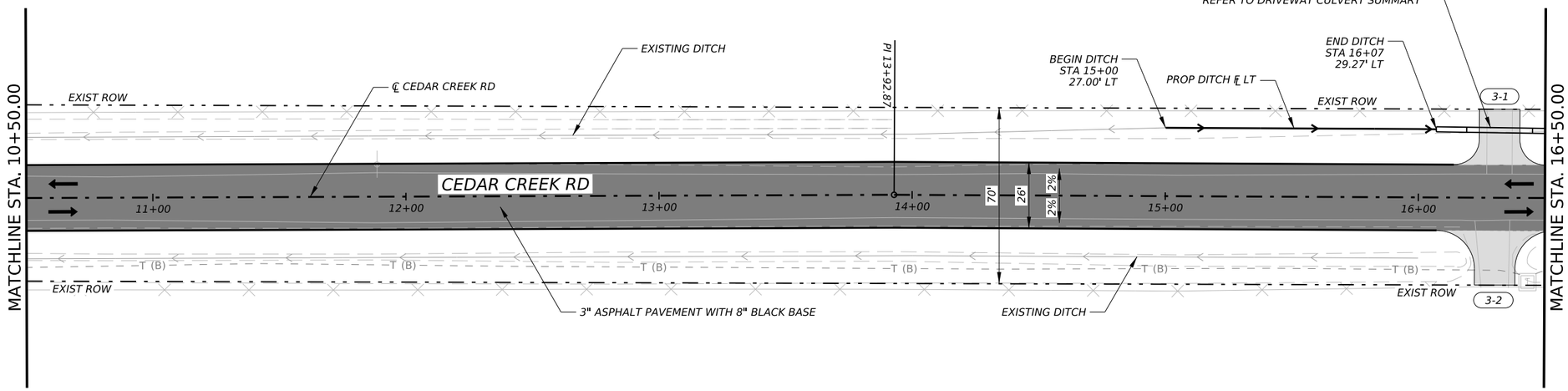


LEGEND

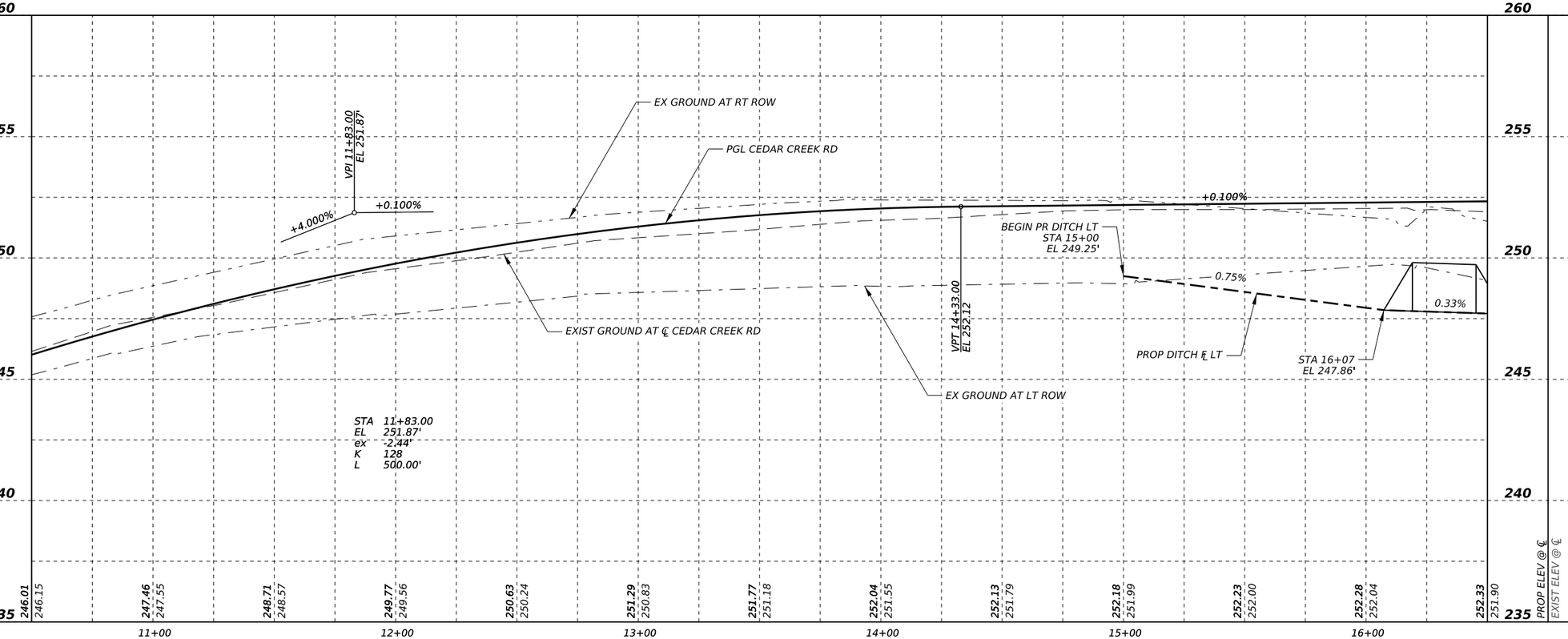
- PROPOSED DIRECTION OF TRAFFIC
- XX — DRIVEWAY NUMBER
- EXISTING ROW
- OE — EXISTING OVERHEAD ELECTRIC
- T (B) — EXISTING AT&T TELEPHONE
- EXISTING DITCH FLOWLINE
- PROPOSED DITCH FLOWLINE
- PROPOSED ASHPALT PAVEMENT
- PROPOSED ASHPALT DRIVEWAY
- PROFILE ROW N/E (LEFT)
- PROFILE ROW S/W (RIGHT)
- PROFILE DITCH FLOWLINE N/E (LEFT)
- PROFILE DITCH FLOWLINE S/W (RIGHT)
- FEMA 100-YR FLOODPLAIN

NOTES:

1. REFER TO HORIZONTAL ALIGNMENT DATA SHEET FOR CURVE DATA AND ALIGNMENT INFORMATION.
2. REFER TO DRAINAGE SHEETS FOR ADDITIONAL INFORMATION.
3. CONTRACTOR TO REMOVE ALL TREES INSIDE EXISTING ROW FOUND TO BE IN CONFLICT WITH THE DESIGN AND REMOVE ANY DEAD TREES.
4. REFER TO DRIVEWAY CULVERT TABLE FOR CULVERT DATA.

0 25' 50'

SCALE: 1" = 50'



NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY M. DILL
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ENGINEERING DEPARTMENT

PAVING
PLAN & PROFILE
CEDAR CREEK RD
STA 10+50.00 TO STA 16+50.00

SHEET 3 OF 9

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		73

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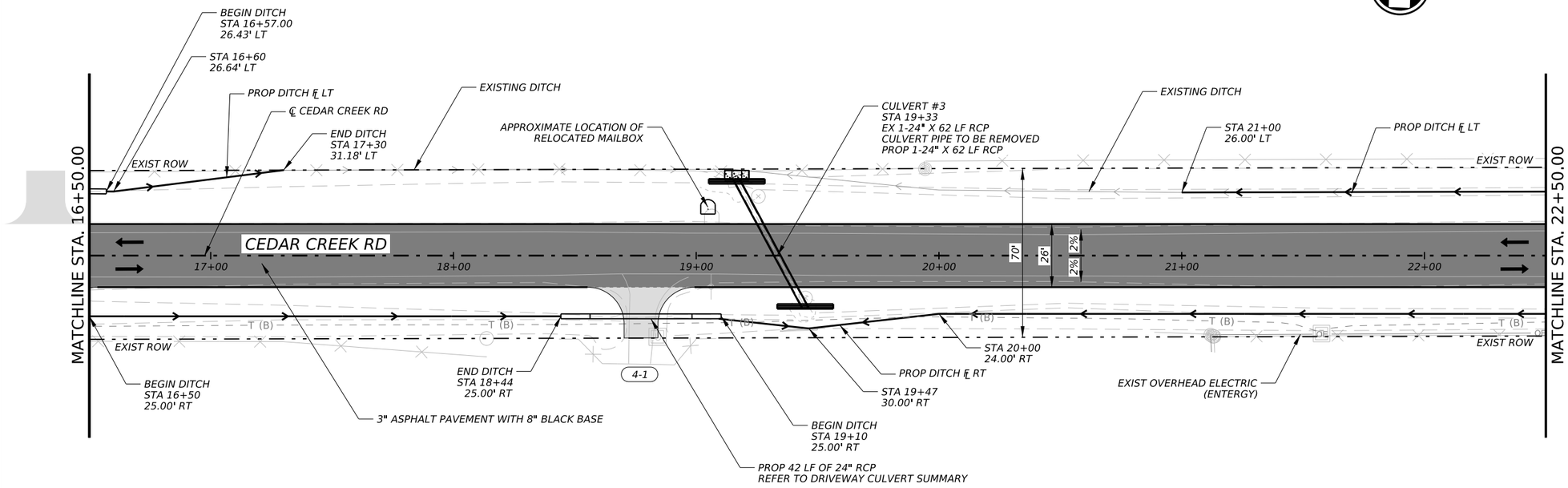

LEGEND

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- XX — DRIVEWAY NUMBER
- EXISTING ROW
- OE — EXISTING OVERHEAD ELECTRIC
- T (B) — EXISTING AT&T TELEPHONE
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- PROPOSED DITCH FLOWLINE
- PROPOSED ASHPALT PAVEMENT
- PROPOSED ASHPALT DRIVEWAY
- PROFILE ROW N/E (LEFT)
- PROFILE ROW S/W (RIGHT)
- PROFILE DITCH FLOWLINE N/E (LEFT)
- PROFILE DITCH FLOWLINE S/W (RIGHT)
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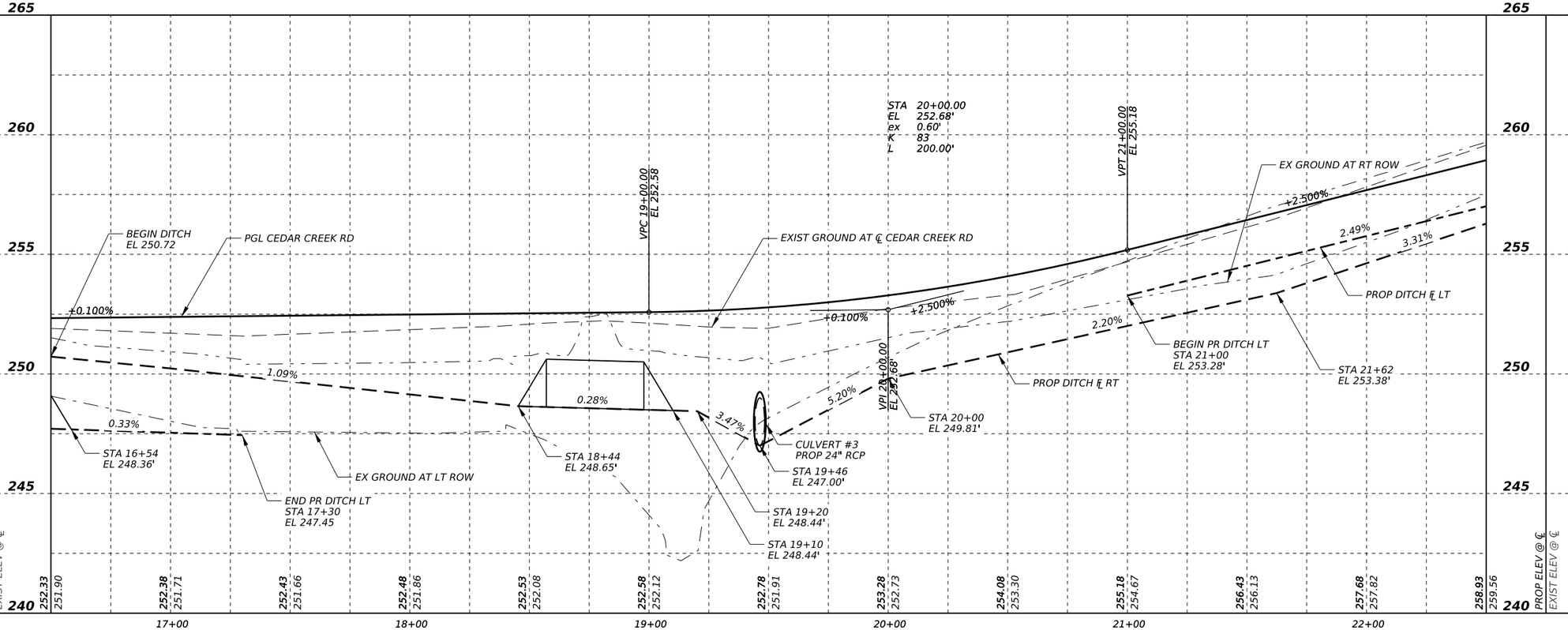

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ENGINEERING DEPARTMENT

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PLAN & PROFILE
CEDAR CREEK RD
STA 16+50.00 TO STA 22+50.00

SHEET 4 OF 9

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		74

DATE: 7/23/2026 8:49:36 PM
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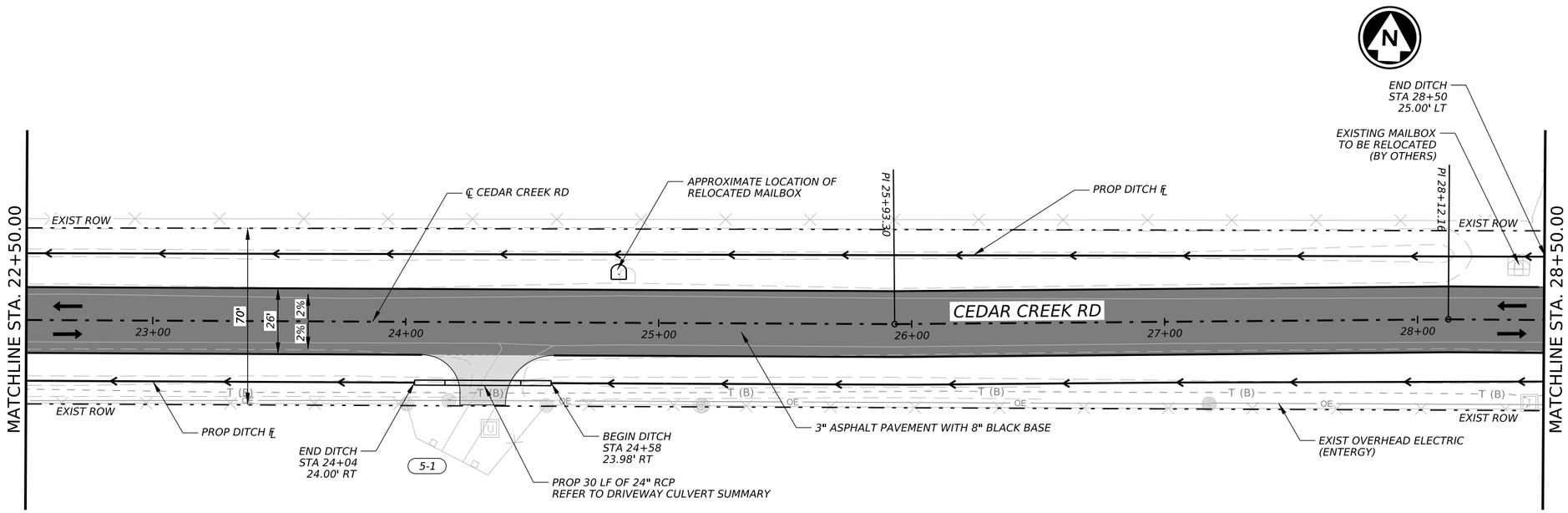

LEGEND

- PROPOSED DIRECTION OF TRAFFIC
- XX — DRIVEWAY NUMBER
- EXISTING ROW
- OE — EXISTING OVERHEAD ELECTRIC
- T (B) — EXISTING AT&T TELEPHONE
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- PROPOSED DITCH FLOWLINE
- PROPOSED ASHPALT PAVEMENT
- PROPOSED ASHPALT DRIVEWAY
- PROFILE ROW N/E (LEFT)
- PROFILE ROW S/W (RIGHT)
- PROFILE DITCH FLOWLINE N/E (LEFT)
- PROFILE DITCH FLOWLINE S/W (RIGHT)
- FEMA 100-YR FLOODPLAIN

NOTES:

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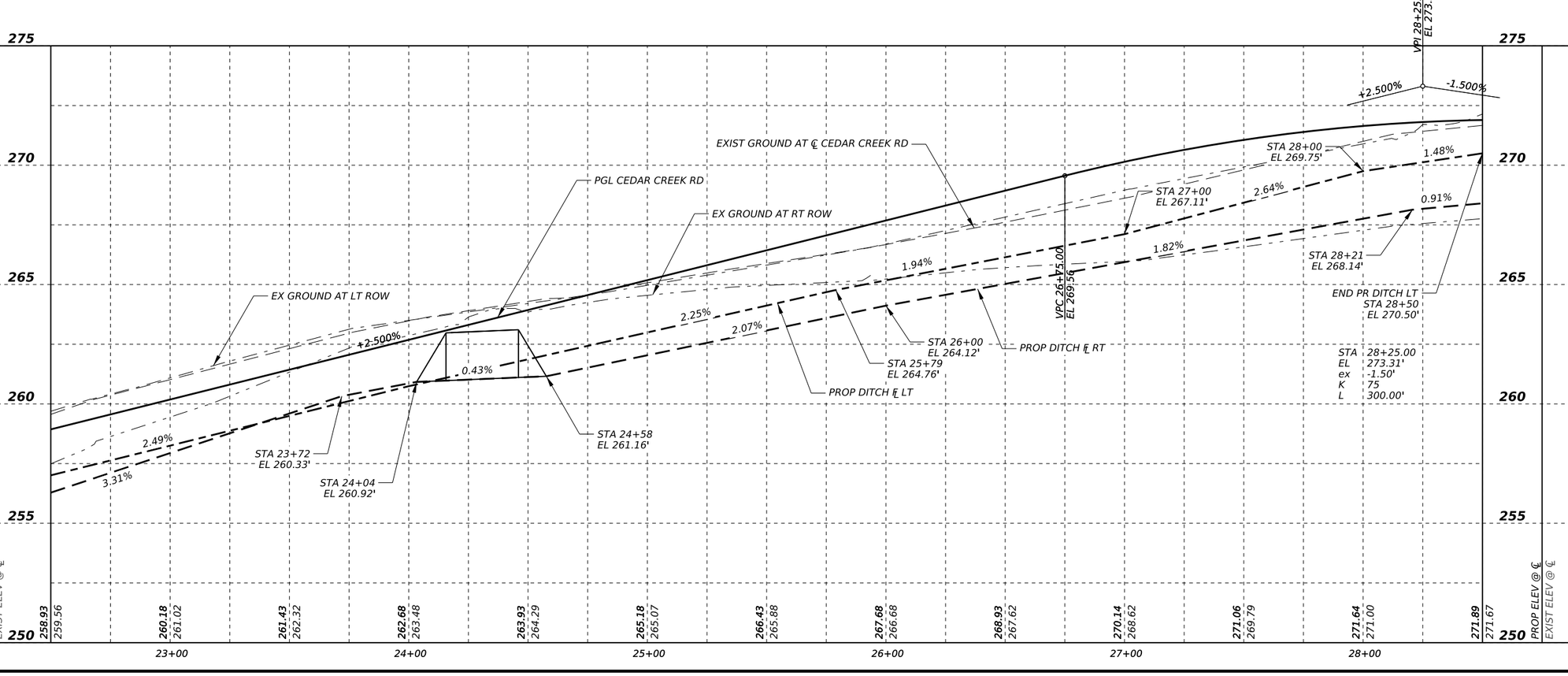

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PLAN & PROFILE
CEDAR CREEK RD
STA 22+50.00 TO STA 28+50.00

SHEET 5 OF 9

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		75

DATE: 7/23/2026 8:49:22 PM
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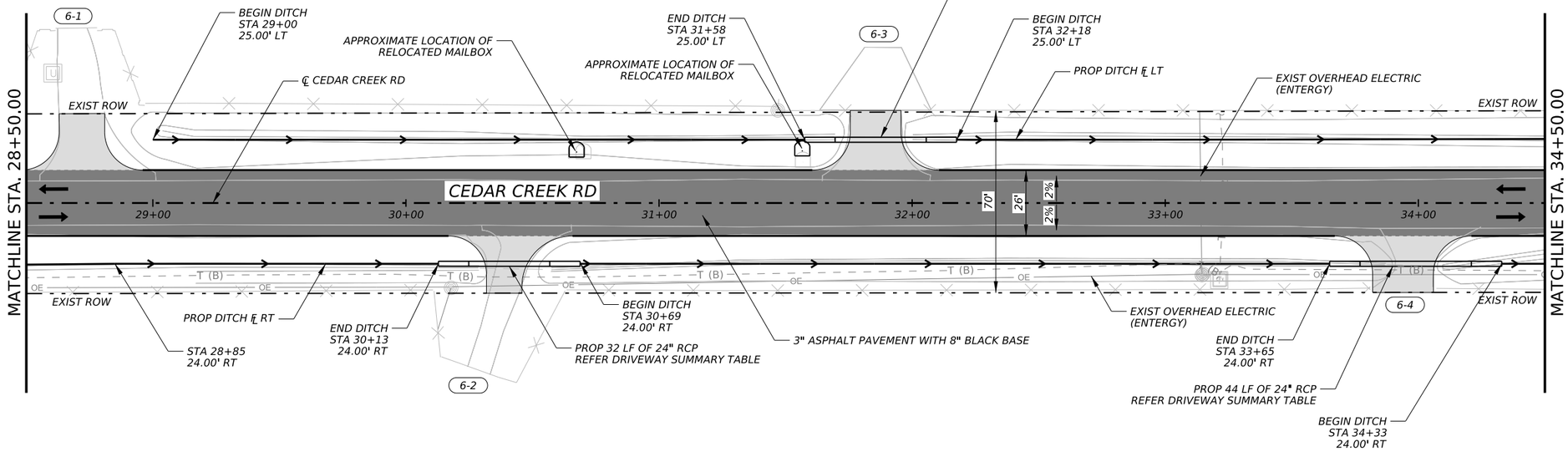

LEGEND

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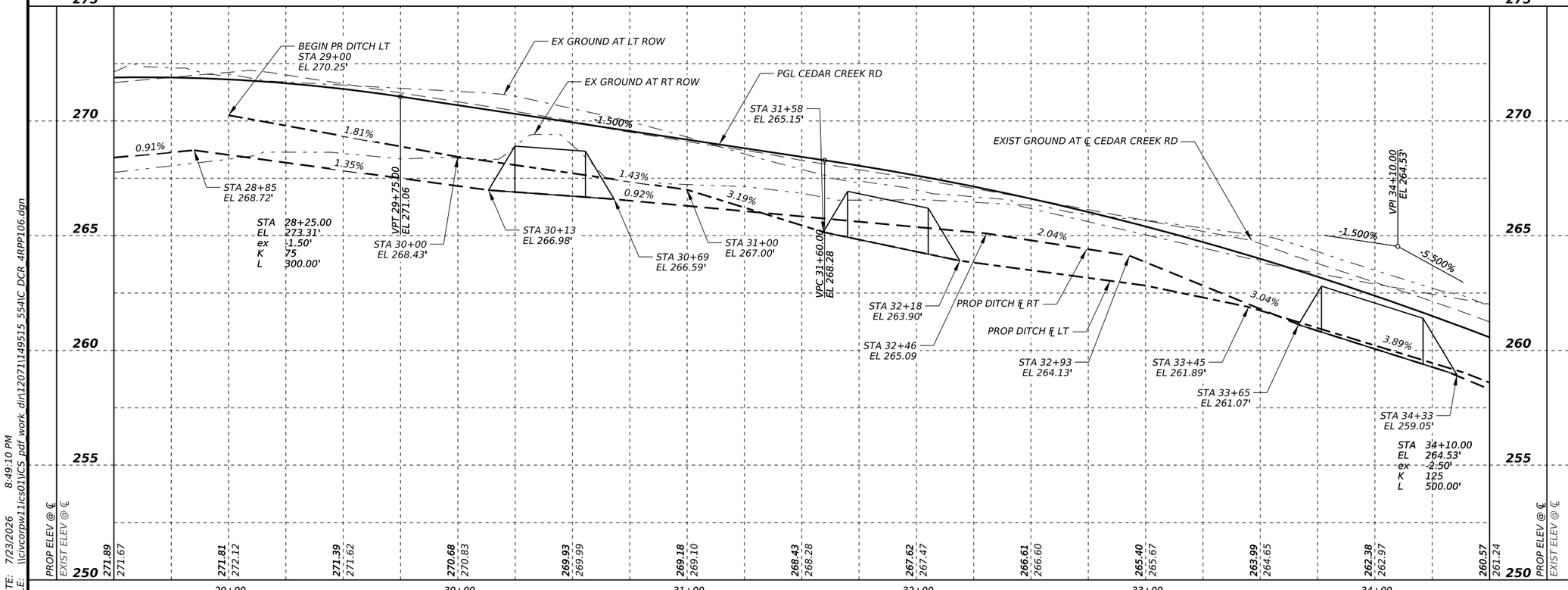

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SHEET 6 OF 9

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		76

DATE: 7/23/2026 8:49:10 PM
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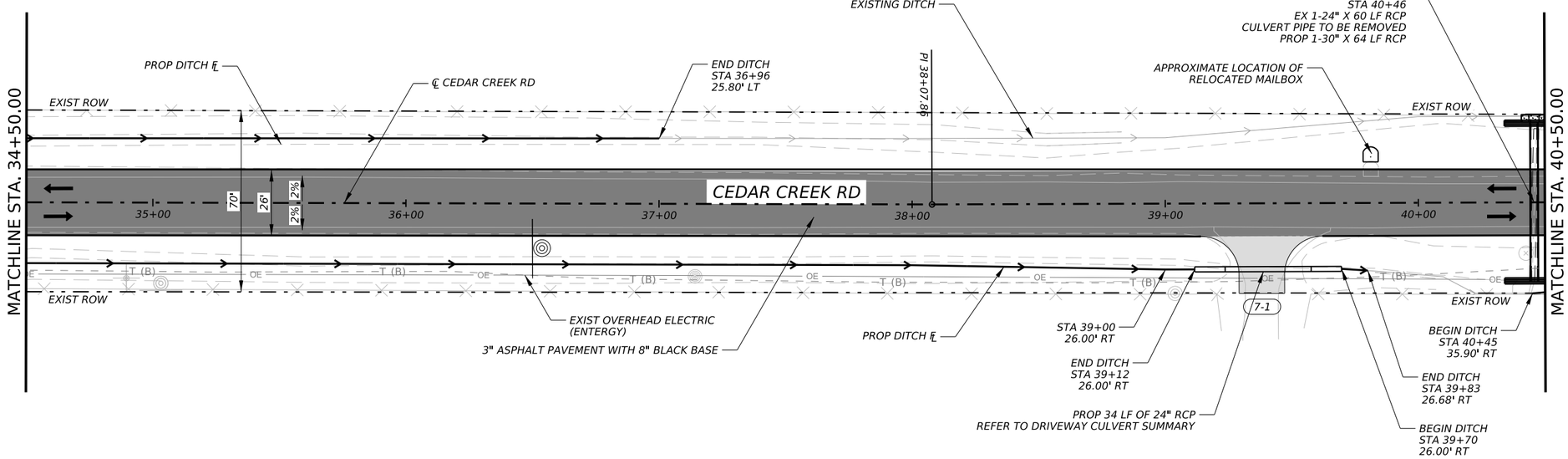

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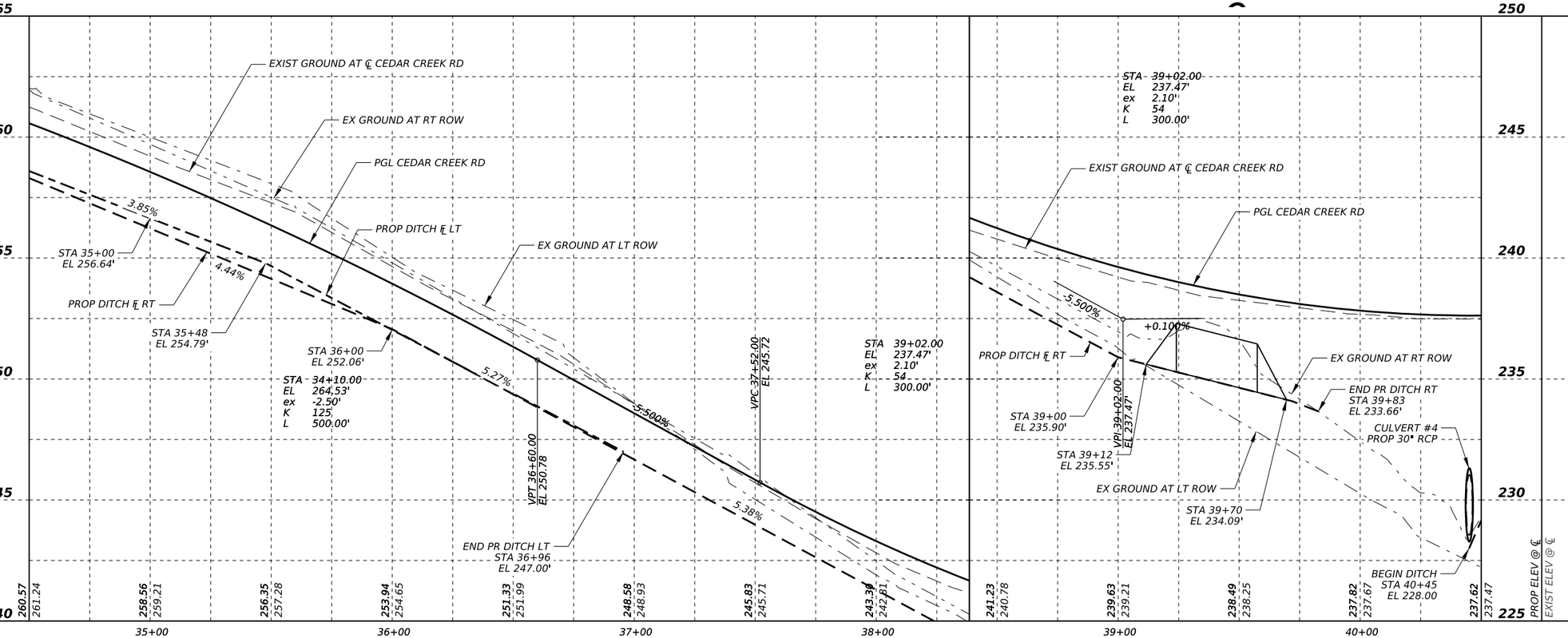

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PAVING
PLAN & PROFILE
CEDAR CREEK RD
STA 34+50.00 TO STA 40+50.00
SHEET 7 OF 9

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		77

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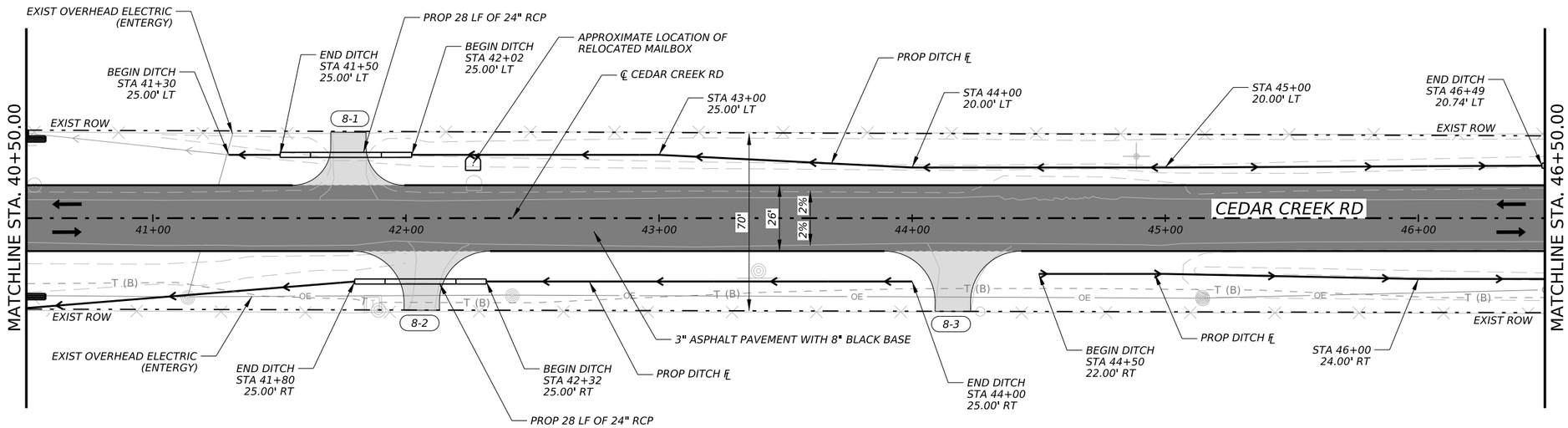

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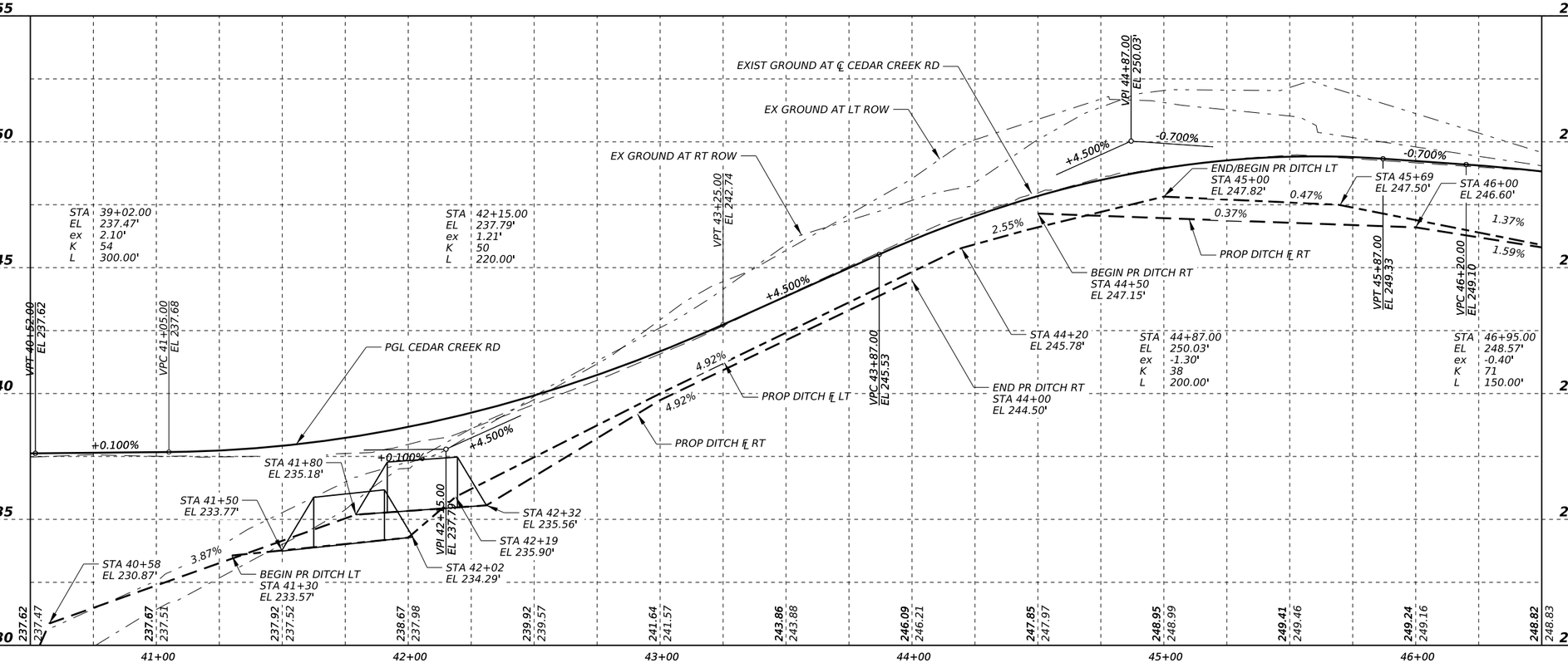

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CEDAR CREEK RD
STA 40+50.00 TO STA 46+50.00
SHEET 8 OF 9

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		78

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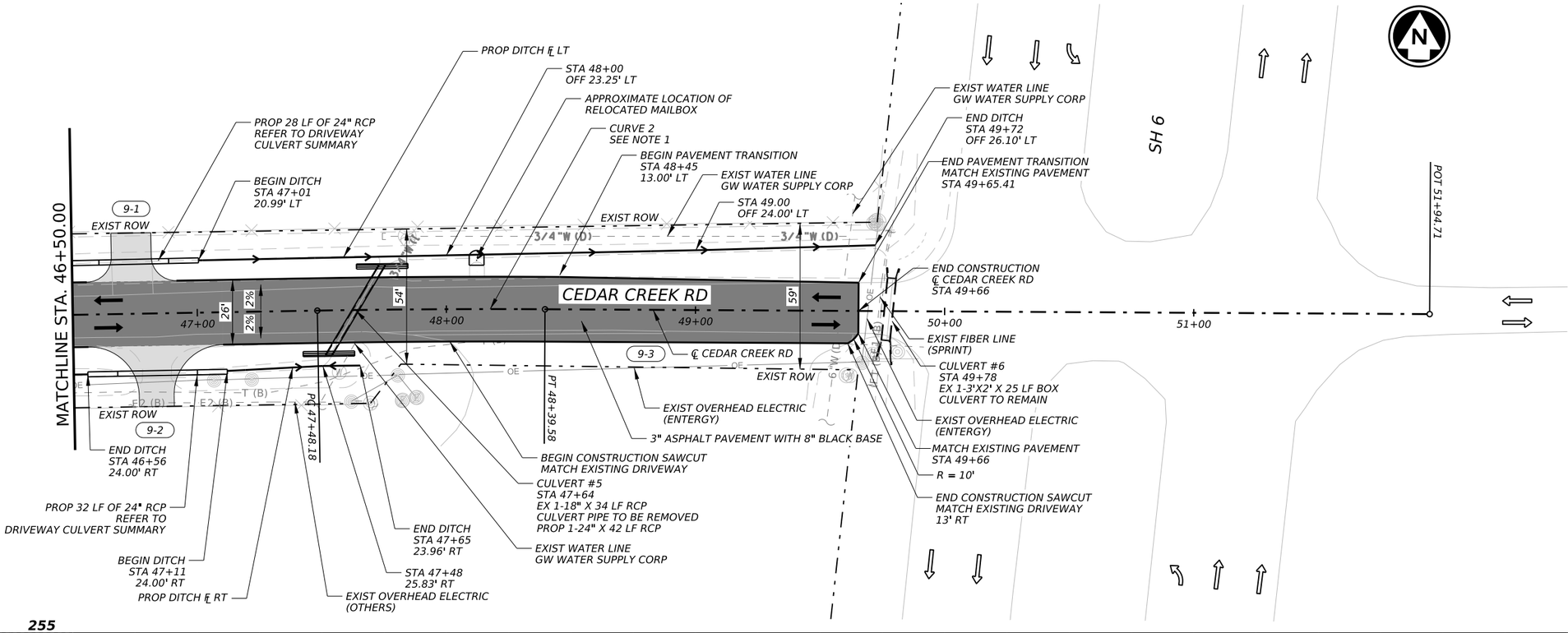

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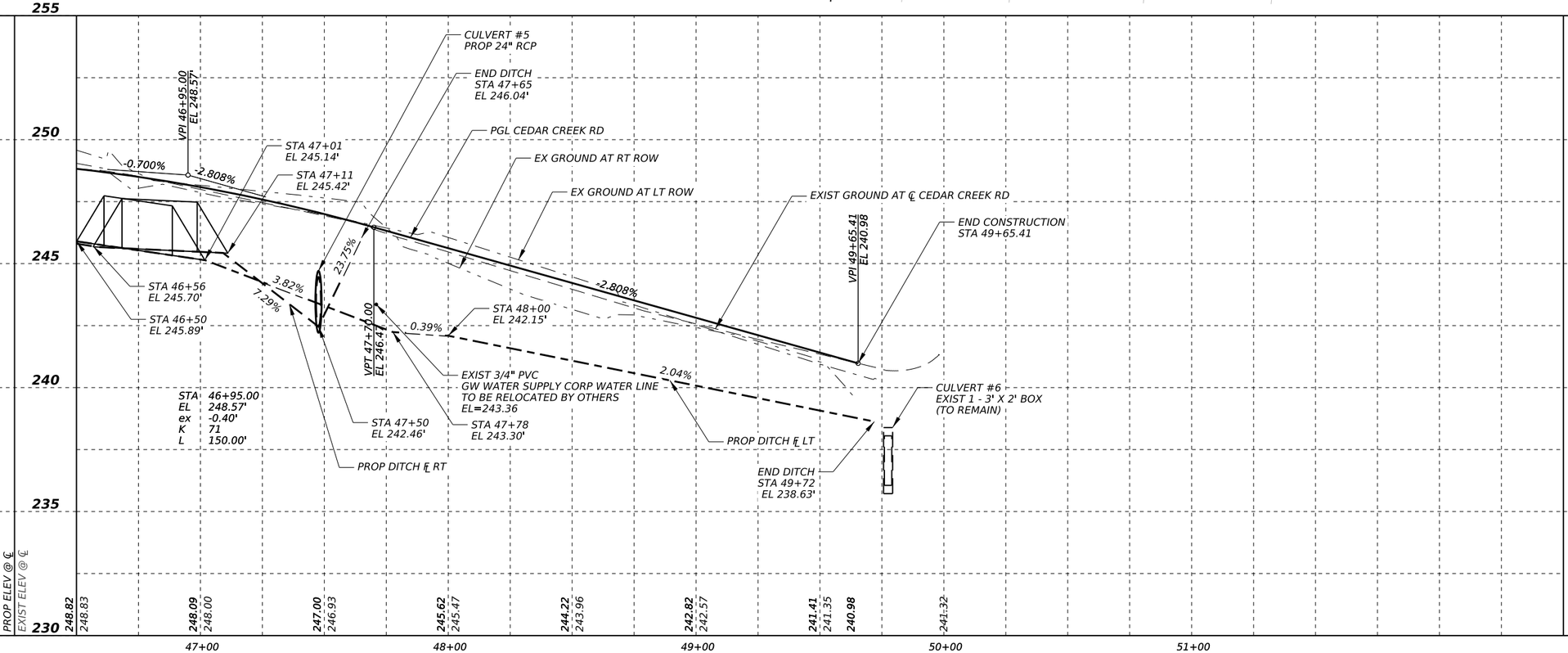

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STA 46+50.00 TO END

SHEET 9 OF 9

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		79

DATE: 7/23/2026 8:49:38 PM
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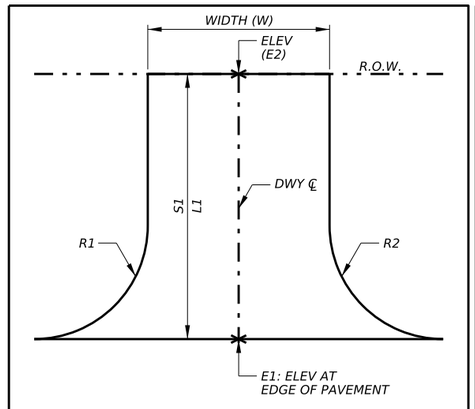
DRIVEWAY SUMMARY

DOUBLE CULVERT RD

P&P SHEET NUMBER	DRIVEWAY NUMBER	DRIVEWAY CULVERT (Y/N)	STATION	LT / RT	DESCRIPTION	DRIVEWAY TYPE	WIDTH W (FT)	LENGTH L1 (FT)	RADIUS R1 (FT)	RADIUS R2 (FT)	ELEVATION E1 (FT)	ELEVATION E2 (FT)	SLOPE S1 (%)	DRIVEWAY AREA (SY)
SHEET 59	DW# 1-1	N	118+80.00	RT	FIELD	TYPE 1	21	8	10	10	206.97	205.33	-20.50	18
SHEET 59	DW# 1-2	N	122+56.43	RT	RESIDENTIAL	TYPE 2	16	31	25	25	199.54	196.84	-8.71	80
SHEET 62	DW# 4-1	Y	140+73.58	LT	FIELD	TYPE 1	18	8	15	15	202.99	203.16	2.12	21
SHEET 63	DW# 5-1	Y	142+92.36	RT	FIELD	TYPE 1	14	14	10	10	206.06	206.16	0.71	26
SHEET 63	DW# 5-2	N	144+25.82	RT	RESIDENTIAL	TYPE 1	14	14	10	10	206.93	206.99	0.43	26
SHEET 63	DW# 5-3	Y	145+00.00	RT	FIELD	TYPE 1	15	15	10	10	205.86	205.98	0.80	30
SHEET 65	DW# 7-1	N/A	155+90.20	RT	RESIDENTIAL	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0
SHEET 65	DW# 7-2	Y	158+81.55	RT	RESIDENTIAL	TYPE 1	14	19	15	15	201.78	200.78	-5.26	41
SHEET 66	DW# 8-1	Y	160+47.93	RT	RESIDENTIAL	TYPE 1	35	19	15	15	206.59	206.43	-0.84	85
SHEET 66	DW# 8-2	Y	163+73.28	RT	RESIDENTIAL	TYPE 1	20	19	15	15	217.69	216.95	-3.89	53
SHEET 67	DW# 9-1	Y	166+70.62	RT	RESIDENTIAL	TYPE 1	14	11	10	5	221.19	220.85	-3.09	20
SHEET 67	DW# 9-2	N	166+97.51	RT	RESIDENTIAL	TYPE 1	14	10	5	10	221.36	220.88	-4.80	19
SHEET 67	DW# 9-3	Y	168+85.09	LT	WATERS ROAD	TYPE 1	24	8	10	10	222.58	222.79	2.62	24
SHEET 67	DW# 9-4	Y	169+63.72	RT	RESIDENTIAL	TYPE 1	14	11	10	10	223.2	223.7	4.55	22
TOTAL														465

NOTE: NO PROPOSED WORK ON DW# 7-1, EXISTING DRIVEWAY TO REMAIN.



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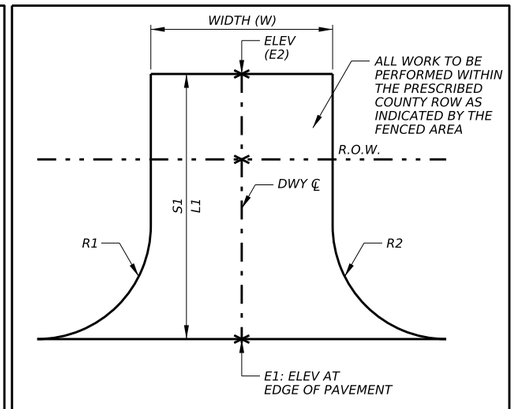

TYPE 2

NOTES:

1. FOR ADDITIONAL DRIVEWAY CULVERT INFORMATION SEE DRIVEWAY CULVERT SUMMARY SHEET

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

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ENGINEERING DEPARTMENT

DRIVEWAY SUMMARY
DOUBLE CULVERT RD

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		80

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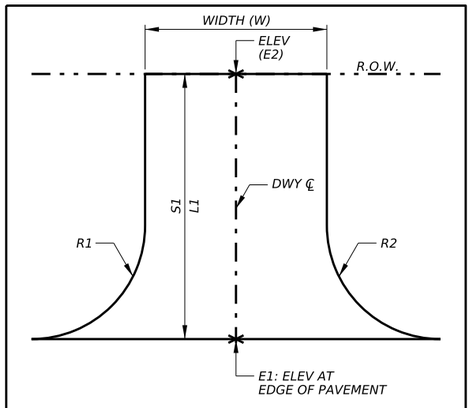
100% SUBMITTAL

DRIVEWAY SUMMARY

CEDAR CREEK RD

P&P SHEET NUMBER	DRIVEWAY NUMBER	DRIVEWAY CULVERT (Y/N)	STATION	LT / RT	DESCRIPTION	DRIVEWAY TYPE	WIDTH W (FT)	LENGTH L1 (FT)	RADIUS R1 (FT)	RADIUS R2 (FT)	ELEVATION E1 (FT)	ELEVATION E2 (FT)	SLOPE S1 (%)	DRIVEWAY AREA (SY)
SHEET 73	DW# 3-1	Y	16+30.30	RT	FIELD	TYPE 1	16	22	15	15	252.05	252.07	0.09	49
SHEET 73	DW# 3-2	N	16+32.00	LT	FIELD	TYPE 1	16	22	10	10	252.06	249.49	-11.68	44
SHEET 74	DW# 4-1	Y	18+77.22	RT	RESIDENTIAL	TYPE 1	14	21	15	15	252.3	252.43	0.62	44
SHEET 75	DW# 5-1	Y	24+30.59	RT	RESIDENTIAL	TYPE 1	16	20	15	19	263.19	263.83	3.20	54
SHEET 76	DW# 6-1	N	28+71.96	LT	RESIDENTIAL	TYPE 1	18	23	15	15	271.64	272.33	3.00	56
SHEET 76	DW# 6-2	Y	30+38.81	RT	RESIDENTIAL	TYPE 1	14	23	15	20	269.84	269.41	-1.87	51
SHEET 76	DW# 6-3	Y	31+85.56	LT	RESIDENTIAL	TYPE 1	20	24	15	15	267.61	267.24	-1.54	64
SHEET 76	DW# 6-4	Y	33+93.96	RT	FIELD	TYPE 1	24	23	15	15	262.32	262.58	1.13	71
SHEET 77	DW# 7-1	Y	39+38.07	RT	RESIDENTIAL	TYPE 1	18	23	15	15	238.46	237.32	-4.96	56
SHEET 78	DW# 8-1	Y	41+77.27	LT	FIELD	TYPE 1	14	21	15	15	238.01	235.57	-11.62	44
SHEET 78	DW# 8-2	Y	42+06.23	RT	FIELD	TYPE 1	14	24	20	20	238.55	237.43	-4.67	56
SHEET 78	DW# 8-3	N	44+16.08	RT	FIELD	TYPE 1	14	24	20	20	246.46	248.1	6.83	57
SHEET 79	DW# 9-1	Y	46+73.84	LT	FIELD	TYPE 1	16	20	10	10	248.25	248.02	-1.15	40
SHEET 79	DW# 9-2	Y	46+83.13	RT	FIELD	TYPE 1	14	25	20	20	248.11	248.33	0.88	58
SHEET 79	DW# 9-3	N/A	48+50.00	RT	COMMERICAL	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0
TOTAL														744

NOTE: NO PROPOSED WORK ON DW# 9-3, EXISTING DRIVEWAY TO REMAIN.



TYPE 1

NOTES:

1. FOR ADDITIONAL DRIVEWAY CULVERT INFORMATION SEE DRIVEWAY CULVERT SUMMARY SHEET

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY M. DILL
84626
LICENSED PROFESSIONAL ENGINEER

R. M. Dill, P.E.
7/23/2026

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY

ENGINEERING DEPARTMENT

DRIVEWAY SUMMARY
CEDAR CREEK RD

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		81

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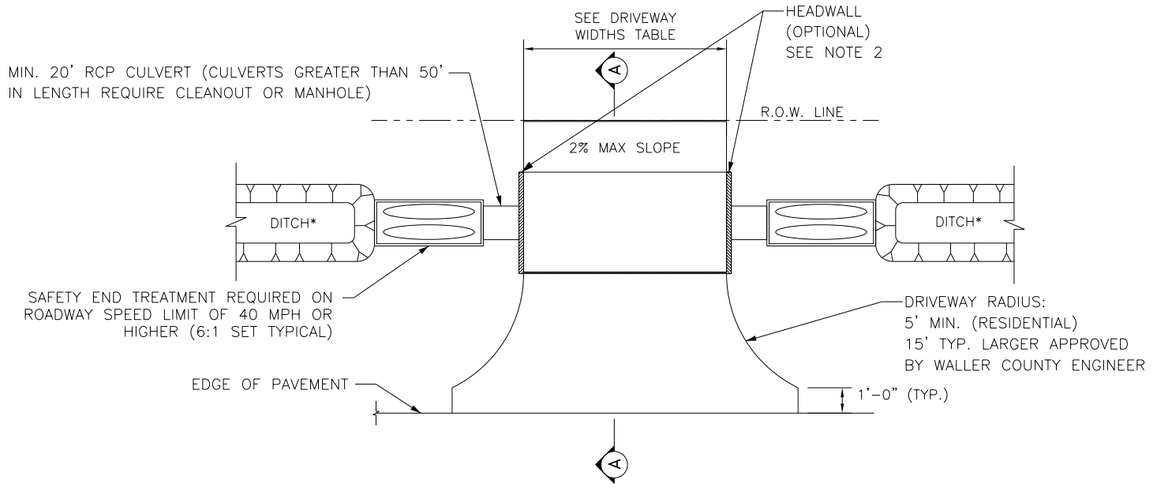
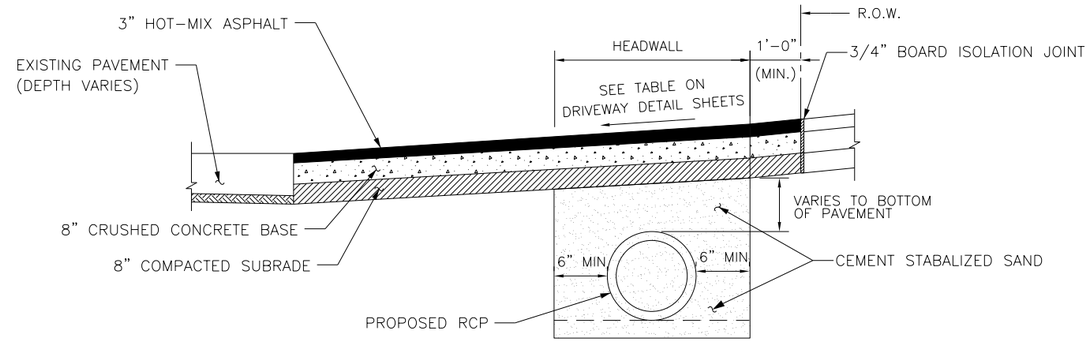


OPEN DITCH DRIVEWAY

*DITCH IS TO HAVE 4:1 SLOPE



SECTION A-A FOR RESIDENTIAL DRIVEWAYS

MINIMUM RADII REQUIREMENTS – DRIVEWAYS

	LOCAL	COLLECTOR	MAJOR
RESIDENTIAL	5'	5'	–
COMMERCIAL	10'	10'	25'

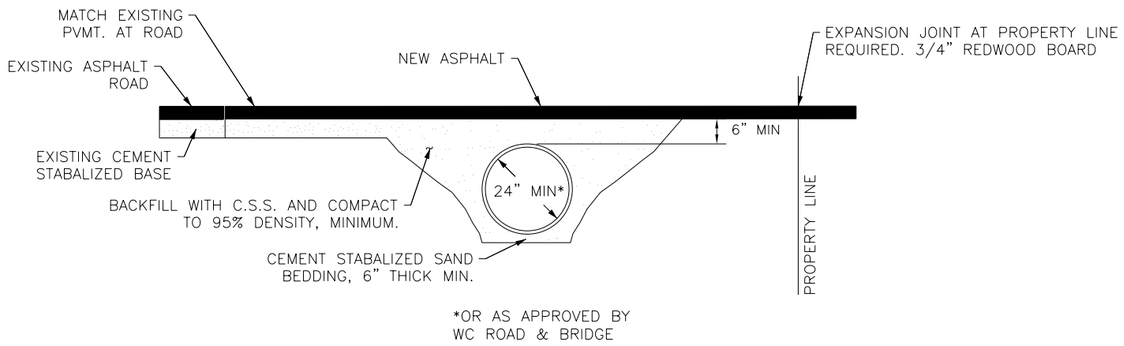
DRIVEWAY WIDTHS*

	MINIMUM	MAXIMUM
RESIDENTIAL	10'	25'
COMMERCIAL	20'	40'

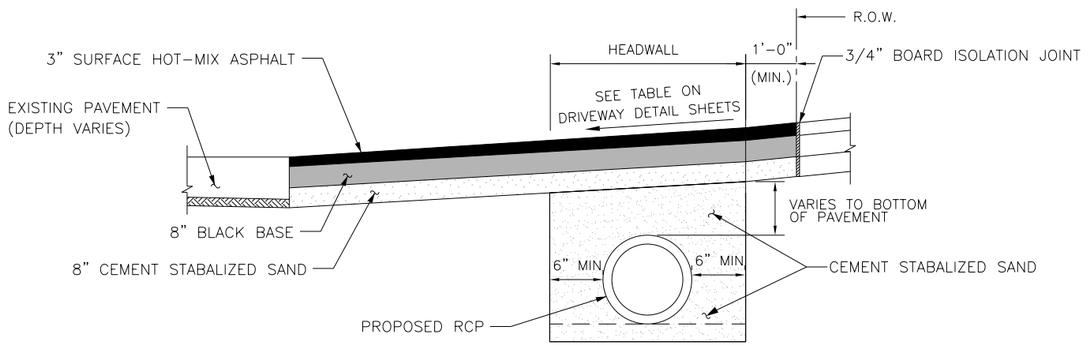
*DRIVEWAY WIDTHS ARE MEASURED AT THE ROW LINE

NOTES:

1. MAINTAIN A MIN. OF 6" BETWEEN DRIVEWAY AND CULVERT
2. HEADWALLS ARE ONLY ALLOWED ON ROADWAYS WITH POSTED SPEED LIMITS OF 35 MPH OR LESS
3. ALL DRIVEWAY CONNECTIONS SHALL HAVE THE SAME SURFACE AS THE EXISTING OR PROPOSED STREET.



ASPHALT APRON DETAIL – DRIVEWAY PROFILE FOR CULVERT DRAINAGE



SECTION A-A FOR COMMERCIAL DRIVEWAYS

NO.	REVISIONS	DATE	NAME
1			
2			
3			
4			
5			

WALLER COUNTY ENGINEERING DEPARTMENT

CivilCorp an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

PAVING AND DRAINAGE STANDARD DETAILS

PROJECT TITLE: DOUBLE CULVERT RD AND CEDAR CREEK RD

DRAWN BY:

CK'D BY:

SHEET DESCRIPTION: ASPHALT DRIVEWAY DETAILS

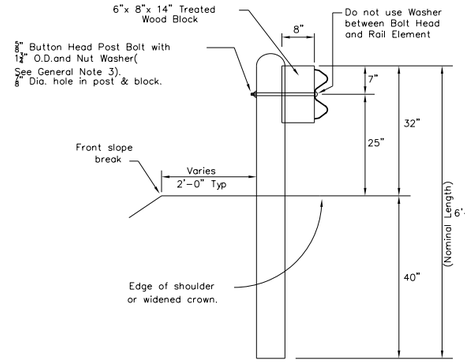
WCED STANDARD

SCALE:

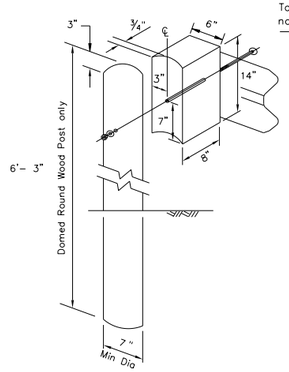
DATE:

APPROVED BY:

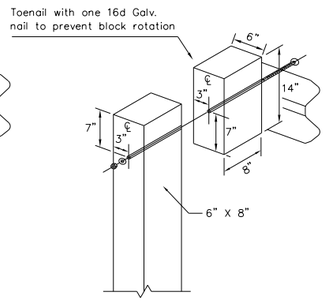
SHEET NO: 82 / 244



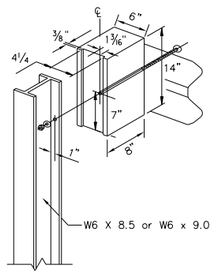
TYPICAL POST



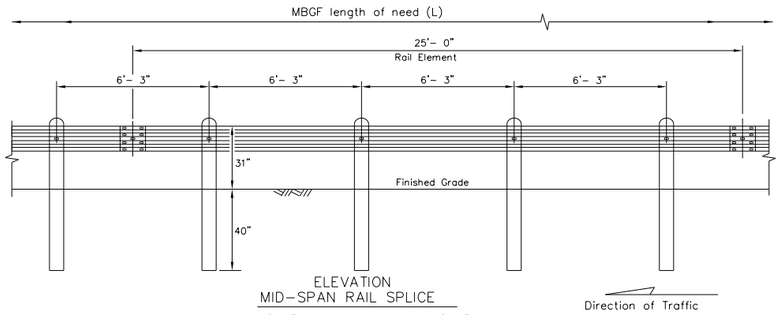
WOOD BLOCK TO ROUND WOOD POST



WOOD BLOCK TO RECTANGULAR WOOD POST



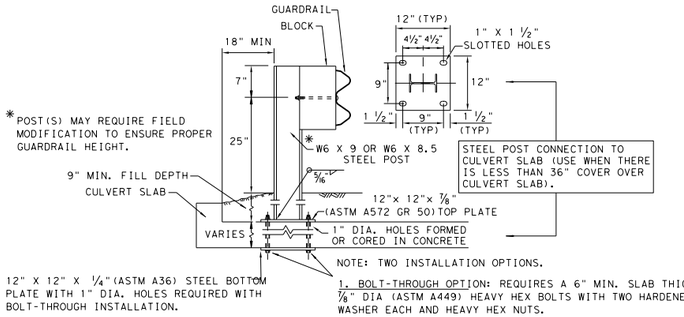
WOOD BLOCK TO STEEL POST



ELEVATION
MID-SPAN RAIL SPLICE

Showing a 25'- 0" section of W-Beam rail, 12'- 6" rail sections may also be supplied (See General Note 2)

Direction of Traffic



NOTE: TWO INSTALLATION OPTIONS.

1. BOLT-THROUGH OPTION: REQUIRES A 6" MIN. SLAB THICKNESS. 7/8" DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED WASHER EACH AND HEAVY HEX NUTS.
NOTE: BOLT LENGTH = SLAB PLUS 2 1/4" MIN.

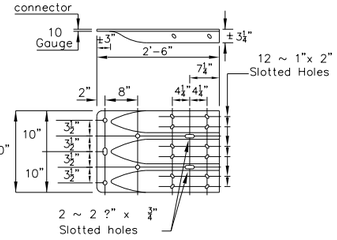
2. EPOXY ANCHOR OPTION: THIS OPTION MAY ONLY BE USED IF THE CULVERT SLAB IS 8" MIN. THICK. THREADED ANCHOR RODS MUST BE 7/8" DIA. ASTM A449 OR A193 GRADE B7 WITH HEAVY HEX NUT, AND ONE HARDENED WASHER EACH. EMBED ANCHOR RODS 6" WITH HILTI HIT RE 500 EPOXY ADHESIVE. OTHER TYPE III CLASS C EPOXY ADHESIVES MEETING THE REQUIREMENTS OF DMS-6100, "EPOXIES AND ADHESIVES", MAY BE USED IF IT CAN BE DEMONSTRATED THAT THEY MEET OR EXCEED THE STRENGTH OF HILTI HIT RE 500 WITH THE SAME EMBEDMENT DEPTH AND THREADED ROD DIA. FOLLOW THE MANUFACTURER'S REQUIREMENTS FOR INSTALLING EPOXIED THREADED RODS. EXTEND RODS 1/4" MIN. BEYOND NUT.

LOW FILL CULVERT POST

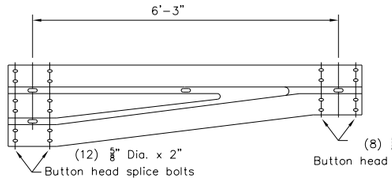
Culverts of 25 ft. or less, see TXDOT GF(31)LS standard for "Long Span" option.

GENERAL NOTES

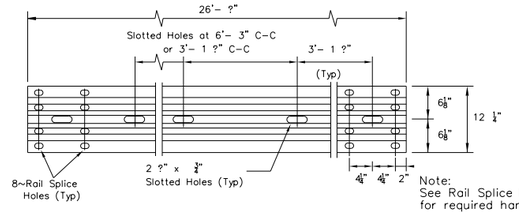
1. The type of post (round wood post, rectangular wood post, or steel post) will be as shown in the plans. The exact position of MBGF shall be shown in the plans or as directed by the Engineer. Steel posts to be galvanized in accordance with TxDOT Item 445, "Galvanizing."
2. Rail element shall meet the requirements of TxDOT Item 540,"Metal Beam Guard Fence" except as modified in the plans. The Contractor may furnish rail elements of 25'- 0", or 12'- 6" (nom.) lengths. Rail elements may have slotted holes at 3'-1?" C-C or 6'-3" C-C. A special length of rail may be manufactured to accommodate the downstream anchor terminal (DAT) and the transition sections of guardrail.
3. Button head "post" bolts (ASTM A307) shall be of sufficient length to extend through the full thickness of the nut (ASTM A563) and 5/8" washer and not more than 1" beyond it. Button head "splice" bolts (ASTM A307) are 5/8" x 1 1/4" (or 2" long at triple rail splices) with a 7/8" double recessed nut (ASTM A563). Thrie beam "connection" 7/8" dia. (ASTM A325) hex bolts shall be of sufficient length to extend through the full thickness of the rail, washers, and nuts.
4. Fittings (bolts, nuts, and washers) shall be galvanized in accordance with TxDOT Item 445, "Galvanizing." Fittings shall be subsidiary to the bid item.
5. Crown shall be widened to accommodate the Metal Beam Guard Fence.
6. The lateral approach to the guard fence, shall have a maximum slope of 1V:10H.
7. If shown elsewhere in the plans or as directed by the Engineer, the guard fence may be flared at a rate of 25:1 or flatter.
8. Unless otherwise shown in the plans, guard fence placed in the vicinity of curbs shall be positioned so that the face of curb is located directly below or behind the face of the rail. Rail placed over curbs shall be installed so that the post bolt is located approximately 25 inches above the gutter pan or edge of shoulder.
9. If solid rock is encountered within 0 to 18" of the finished grade, drill a 22" dia. hole, or drill two 12" dia. front to back overlapping holes, 24" into the rock. If solid rock is encountered below 18",drill a 12" dia. hole, 12" into the rock or to the standard embedment depth, whichever maybe less. Any excess post length, after meeting these depths, may be field cut to ensure proper guardrail mounting height. Backfill with a cohesionless material.
10. Posts shall not be set in concrete, of any depth.
11. Special fabrication will be required at installations having a curvature of less than 150 ft. radius.
12. Unless otherwise shown in the plans, a composite material post and/or block that meets the requirements of DMS-7210,"Composite Material Posts and Blocks for Metal Beam Guard Fence" may be substituted for posts and/or blocks of similar dimensions. The Construction Division, TxDOT maintains a Material Producer List (MPL) for producers of materials conforming to DMS-7210. Only producers on the MPL may furnish composite material posts and/or blocks.
13. For posts located partially or wholly between precast box culvert units, the use of a cast-in-place concrete closure between boxes is required. See Detail "A" on TXDOT Bridge Standards SCP-MD.



THRIE-BEAM TERMINAL CONNECTION
(SEE GENERAL NOTES 9 FOR REQUIRED HARDWARE)

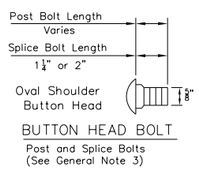


NON-SYMMETRICAL TRANSITION TO W-BEAM (10 Gauge)

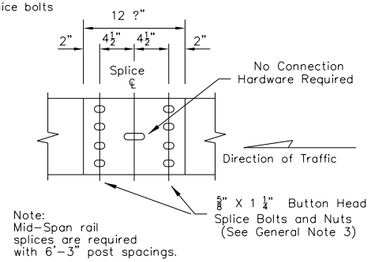


Note: See Rail Splice Detail for required hardware.

ELEVATION 25'- 0"(NOM.) W-BEAM SECTION
12'- 6" RAIL SECTIONS MAY ALSO BE SUPPLIED (SEE GENERAL NOTE 2)

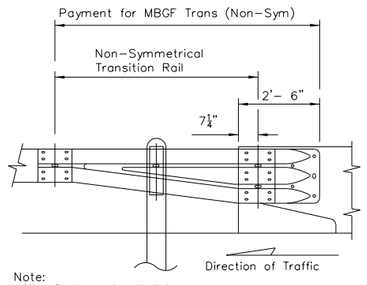


BUTTON HEAD BOLT
Post and Splice Bolts (See General Note 3)



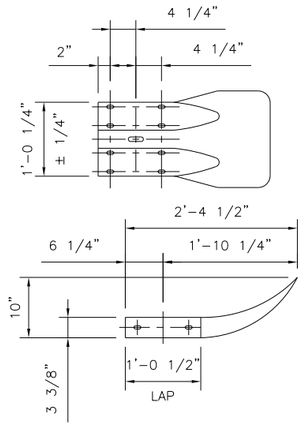
Note: Mid-Span rail splices are required with 6'-3" post spacings.

MID-SPAN RAIL SPLICE DETAIL



Note: All rail elements shall be lapped in the direction of adjacent traffic.

DOWNSTREAM RAIL ATTACHMENT



TERMINAL SECTION

NO.	REVISIONS	DATE	NAME
1			
2			
3			
4			
5			

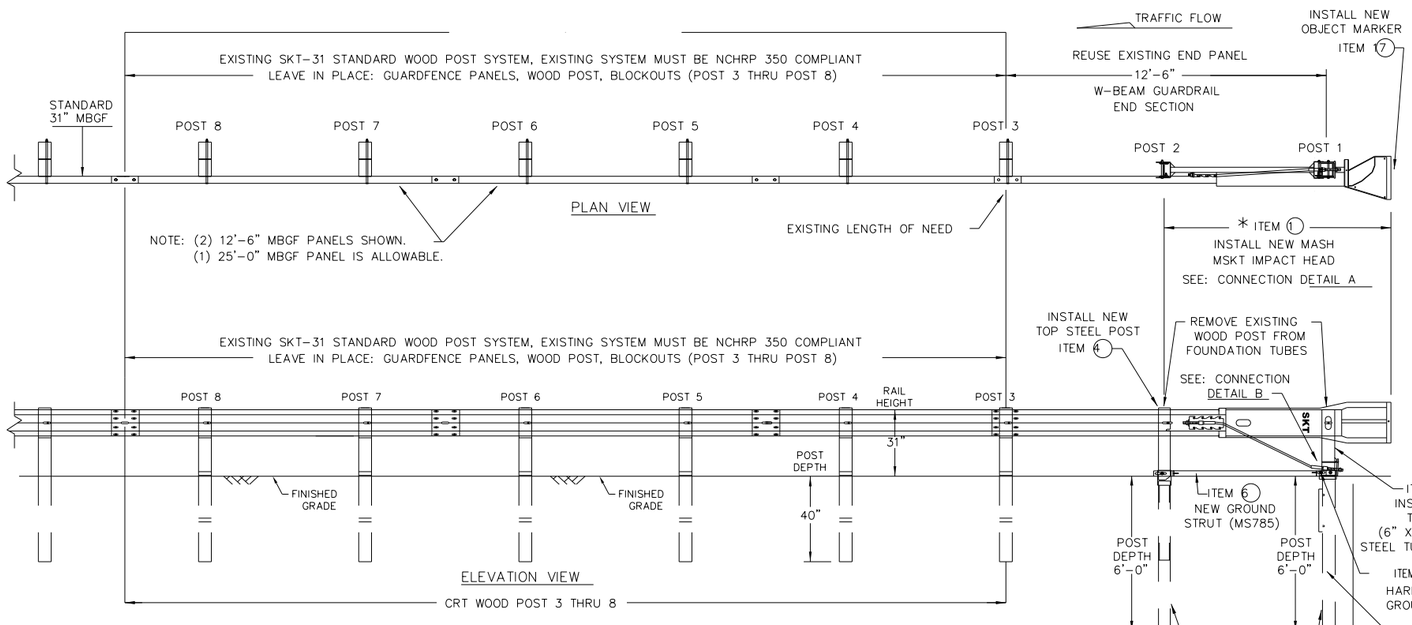
WALLER COUNTY
ENGINEERING DEPARTMENT

THE STATE OF TEXAS WALLER COUNTY

CivilCorp an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

PAVING AND DRAINAGE STANDARD DETAILS

PROJECT TITLE: DOUBLE CULVERT RD AND CEDAR CREEK RD		
DRAWN BY:		WCED STANDARD
CK'D BY:	SHEET DESCRIPTION: METAL BEAM GUARD FENCE	
SCALE:		SHEET NO: 83 / 244
DATE:	APPROVED BY:	



** NOTE: EXTRA SOIL COMPACTION WILL BE NEEDED AROUND NEW (POSTS 1 & 2) DUE TO THE REMOVAL OF THE STEEL FOUNDATION TUBES.

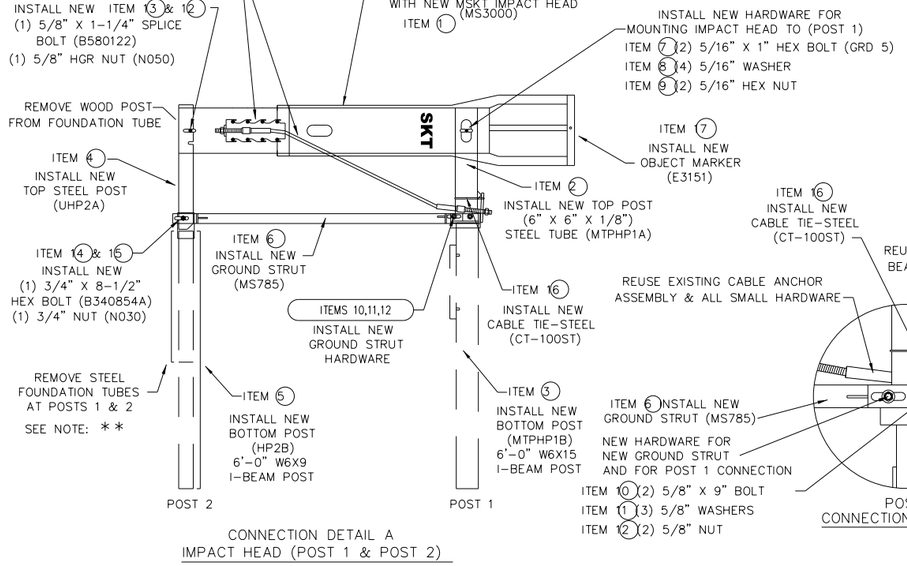
GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: ROAD SYSTEMS, INC. (432)263-2435. 3616 OLD HOWARD COUNTY AIRPORT, BIG SPRING, TX 79720
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO; MSKT END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL (PUBLICATION~062717).
3. APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" ON THE FRONT FACE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
4. FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
5. HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH TxDOT ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. IF SOLID ROCK IS ENCOUNTERED IN THE AREA OF (POST 1) AND / OR (POST 2) CONTACT THE MANUFACTURER, AND REFER TO THE LATEST ROADWAY MBGF STANDARD FOR INSTALLATION GUIDANCE.
7. POSTS SHALL NOT BE SET IN CONCRETE.
8. THE EXISTING SKT 31" STANDARD WOOD POST SYSTEM MUST BE THOROUGHLY INSPECTED, AND DETERMINED TO BE INTACT, AND FREE OF ANY DAMAGE OR DEFECTS BEFORE RETROFITTING. THIS INSPECTION INCLUDES COMPLETING THE MSKT RETROFIT INSPECTION CHECKLIST FOR THE EXISTING SKT 31" WOOD POST NCHRP 350 SYSTEM. ALL EXISTING, AND REUSABLE PARTS MUST BE FREE OF ANY DAMAGE FOR A MASH COMPLIANT RETROFIT.
9. UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE MSKT SYSTEM BE CURVED.
10. A FLARE RATE OF UP TO 25:1 MAY BE USED TO PREVENT THE TERMINAL HEAD FROM ENCROACHING ON THE SHOULDER. THE FLARE MAY BE DECREASED OR ELIMINATED FOR SPECIFIC INSTALLATIONS, IF DIRECTED BY THE ENGINEER.
11. SPECIAL DRIVING CAP TO BE USED WHEN DRIVING (LOWER POSTS 1 & 2) TO PREVENT DAMAGE TO THE WELDED PLATES.

ITEMS	QTY	MAIN SYSTEM COMPONENTS	PART NUMBERS
1	1	MSKT IMPACT HEAD	MS3000
2	1	POST 1 – TOP (6" X 6" X 1/8" TUBE)	MTPHP1A
3	1	POST 1 – BOTTOM (6' W6X15)	MTPHP1B
4	1	POST 2 – ASSEMBLY TOP	UHP2A
5	1	POST 2 – ASSEMBLY BOTTOM (6' W6X9)	HP2B
6	1	GROUND STRUT	MS785
7	2	5/16" X 1" HEX BOLT (GRD 5)	B516014A
8	4	5/16" WASHERS	W0516
9	2	5/16" HEX NUT	N0516
10	2	5/8" X 9" HEX BOLT (GRD A449)	B580904A
11	3	5/8" WASHERS	W050
12	3	5/8" H.G.R NUT	N050
13	1	5/8" X 1-1/4" SPLICE BOLT	B580122
14	1	3/4" X 8-1/2" HEX BOLT (GRD 5)	B340854A
15	1	3/4" HEX NUT	N030
16	1	CABLE TIE-STEEL	CT-100ST
* 17	1	OBJECT MARKER 18" X 18"	E3151

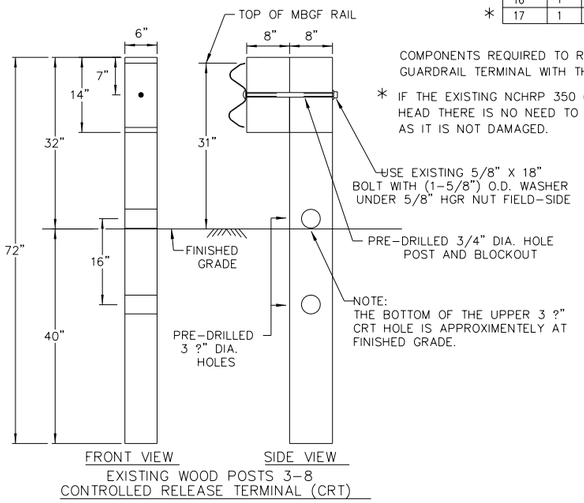
COMPONENTS REQUIRED TO RETROFIT: EXISTING 31" WOOD POST (NCHRP 350 SKT) GUARDRAIL TERMINAL WITH THE NEW 31" (MASH COMPLIANT MSKT IMPACT HEAD).

* IF THE EXISTING NCHRP 350 (31" WOOD POST SKT) ALREADY HAS THE MSKT IMPACT HEAD THERE IS NO NEED TO REPLACE THE IMPACT HEAD OR OBJECT MARKER AS LONG AS IT IS NOT DAMAGED.



CONNECTION DETAIL A
IMPACT HEAD (POST 1 & POST 2)

POST 1
CONNECTION DETAIL B



EXISTING WOOD POSTS 3-8
CONTROLLED RELEASE TERMINAL (CRT)

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

NO.	REVISIONS	DATE	NAME
1			
2			
3			
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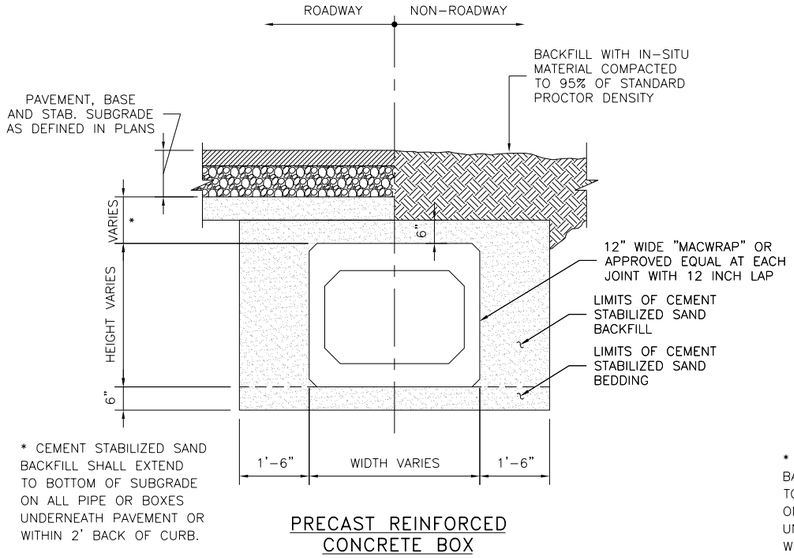
WALLER COUNTY ENGINEERING DEPARTMENT

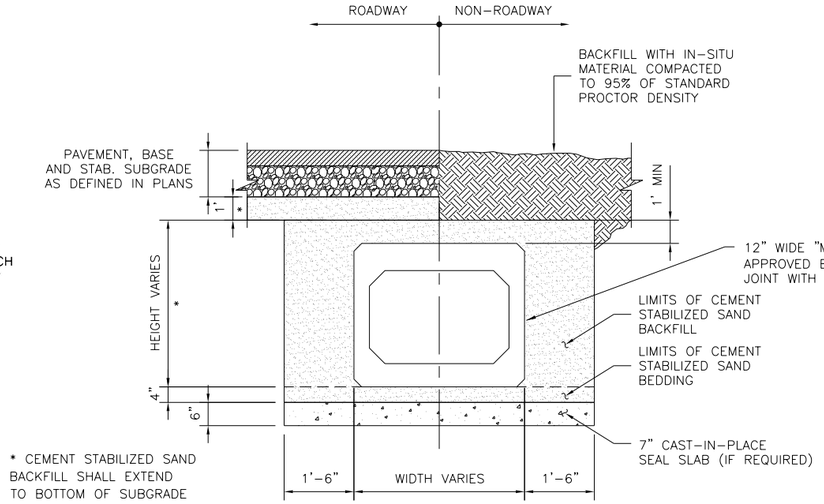
CivilCorp an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

PAVING AND DRAINAGE STANDARD DETAILS

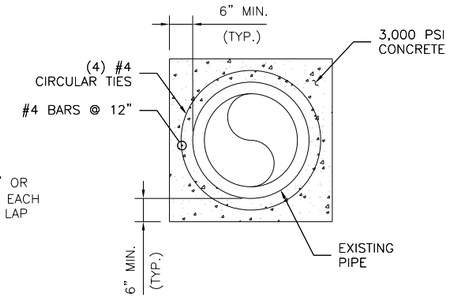
PROJECT TITLE: DOUBLE CULVERT RD AND CEDAR CREEK RD
DRAWN BY:
CK'D BY:
SHEET DESCRIPTION: SINGLE GUARDRAIL TERMINAL
SCALE:
DATE:
APPROVED BY:
WCED STANDARD
SHEET NO: 84 / 244



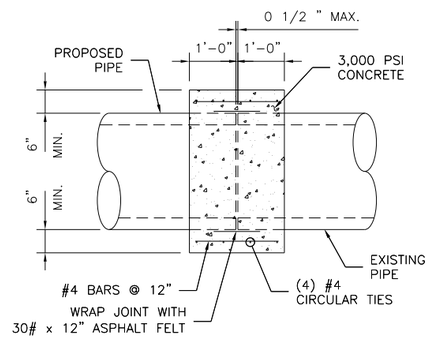
PRECAST REINFORCED CONCRETE BOX



PRECAST REINFORCED CONCRETE BOX WITH SEAL SLAB

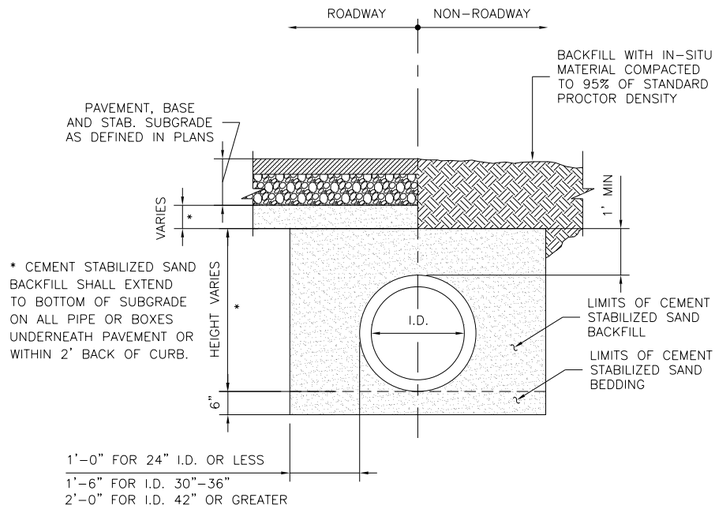


SECTION VIEW

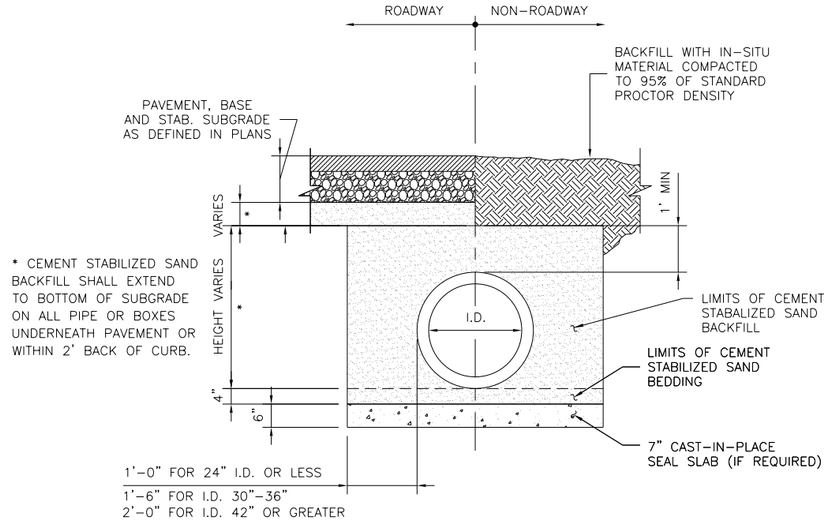


ELEVATION VIEW

TYPICAL CONCRETE COLLAR FOR 36" & SMALLER RCP



REINFORCED CONCRETE PIPE & POLYPROPYLENE (GRAY) PIPE
SEE NOTE 4



REINFORCED CONCRETE PIPE WITH SEAL SLAB

GENERAL NOTES:

1. FOR RCP LARGER THAN 36" DIAMETER, CONCRETE COLLARS MUST BE DESIGNED BY THE ENGINEER OF RECORD.
2. ALL TRENCHES IN ROW SHALL BE BACKFILLED WITH 2 SACKS/CY CEMENT STABILIZED SAND (HC ITEM 400) TO SUBGRADE. COMPACTED TO 95% STANDARD PROCTOR DENSITY BOTTOM OF SUBGRADE
3. CEMENT STABILIZED SAND IS INCIDENTAL TO INSTALLATION
4. USE OF POLYPROPYLENE PIPE SHALL FOLLOW HC SPEC ITEM 482 AND MUST ALSO BE APPROVED BY THE AGENCY THAT WILL MAINTAIN IT. ALL JOINTS SHALL BE WATER TIGHT AND BEDDING REQUIREMENTS SHALL FOLLOW HC ITEM SPEC ITEM 400.
5. ALL OUTFALLS INTO WC MAINTAINED DRAINAGE FACILITIES SHALL BE POLYMER COATED CMP, RCP, OR RCB, AS APPLICABLE.

NO.	REVISIONS	DATE	NAME
1			
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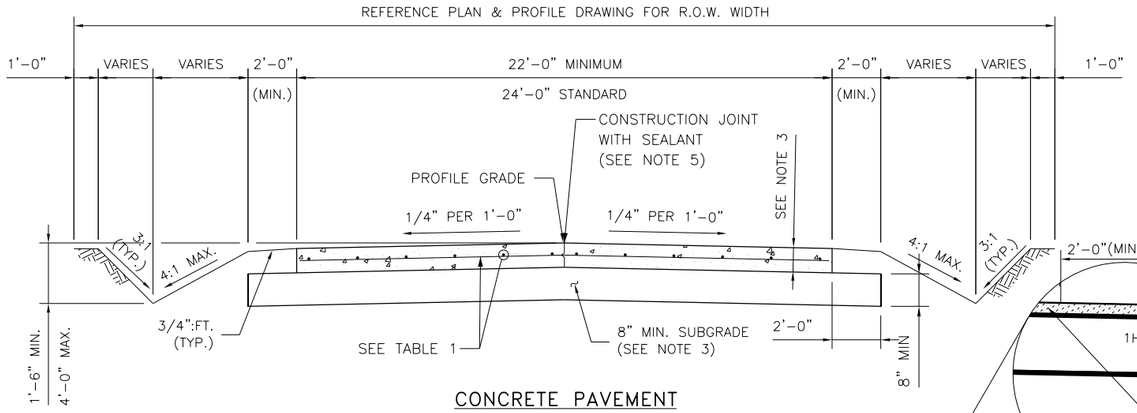
4			
5			

WALLER COUNTY ENGINEERING DEPARTMENT

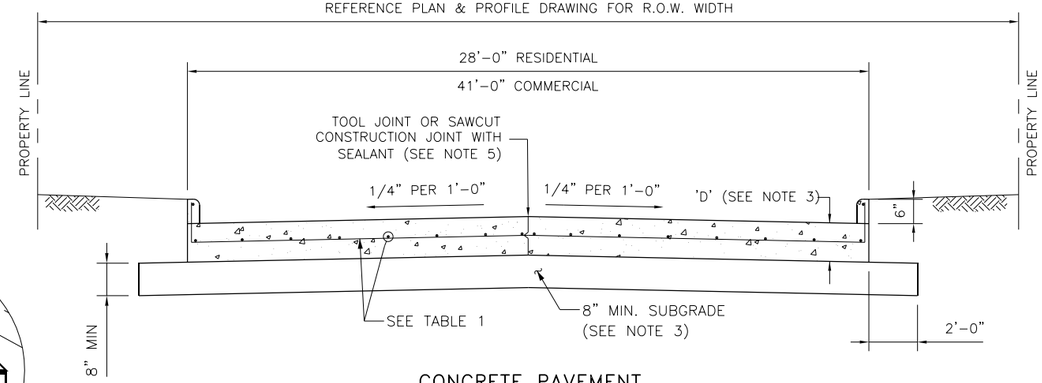
CivilCorp an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

PAVING AND DRAINAGE STANDARD DETAILS

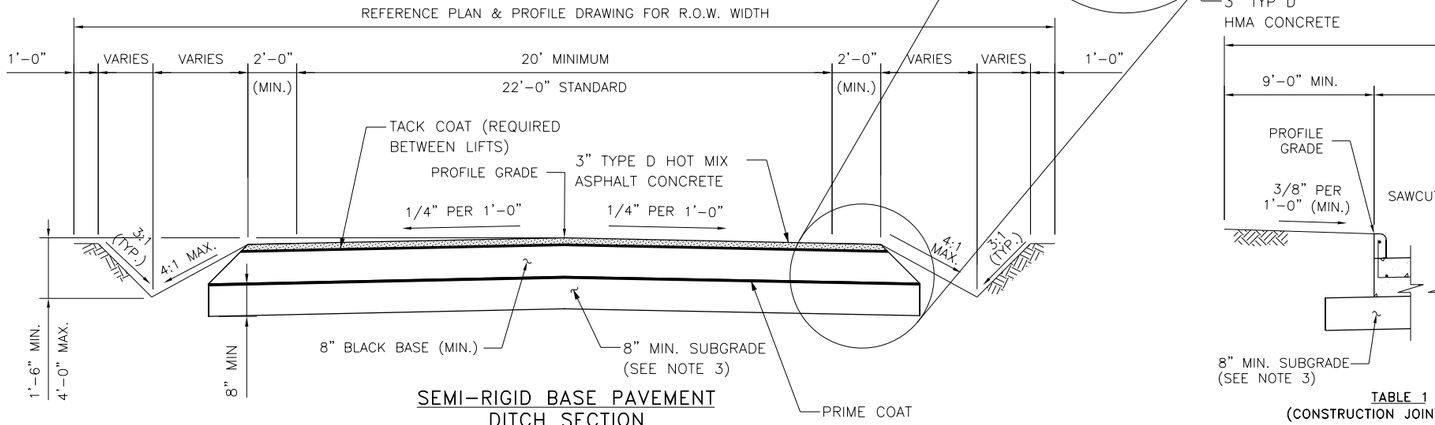
PROJECT TITLE: DOUBLE CULVERT RD AND CEDAR CREEK RD
DRAWN BY:
CK'D BY:
SCALE:
DATE:
APPROVED BY:
WCED STANDARD
SHEET DESCRIPTION: STORM SEWER CONSTRUCTION DETAILS
SHEET NO: 85 / 244



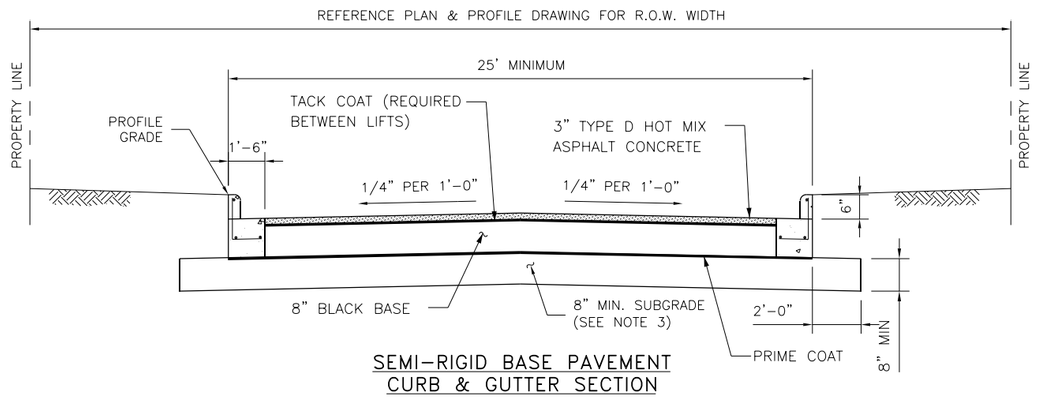
CONCRETE PAVEMENT
DITCH SECTION



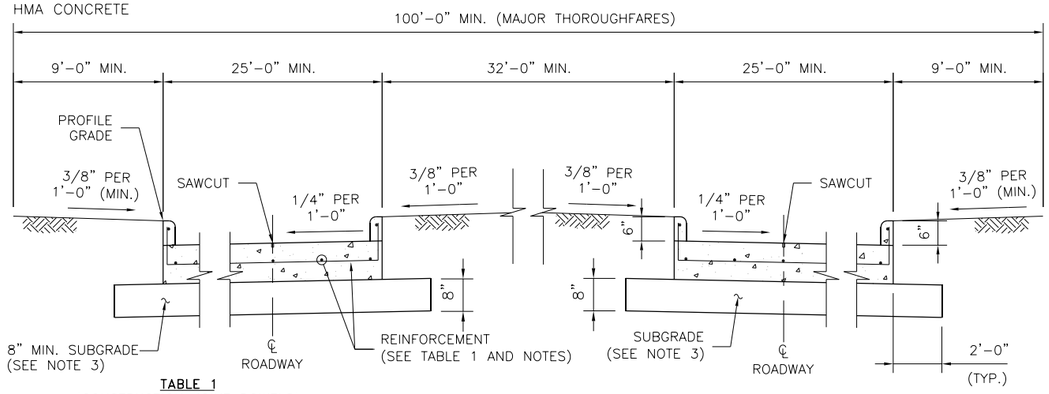
CONCRETE PAVEMENT
CURB & GUTTER SECTION
(PARABOLIC CROWN IS AN ACCEPTABLE OPTION)



SEMI-RIGID BASE PAVEMENT
DITCH SECTION



SEMI-RIGID BASE PAVEMENT
CURB & GUTTER SECTION



TYPICAL SECTIONS FOR
MAJOR THOROUGHFARES

TABLE 1
(CONSTRUCTION JOINT DOWELS)

DOWEL SIZE	PAVEMENT DEPTH
#4 BAR	< 6"
#5 BAR	6" ≤ D < 9"
#6 BAR	≥9"
DOWEL SHALL BE DRILLED INTO EXISTING PAVEMENT (MIN. 10", MAX. 12") AND EPOXIED. (SEE HC ITEM 361.3)_	

NOTES:

1. PAVEMENT SECTIONS SHOWN ARE INTENDED FOR DEVELOPMENT PROJECTS AND NOT FOR PUBLIC PROJECTS, WHERE WIDTH OF R.O.W. MAY VARY.
2. PAVEMENT SECTIONS SHALL BE LOCATED IN CENTER OF R.O.W.
3. SUBGRADE TREATMENT AND PAVEMENT THICKNESS AS DESIGNATED IN PLANS
4. REFERENCE CONSTRUCTION JOINT DETAIL ON THE STANDARD CIVIL DRAWING "CONCRETE PAVEMENT DETAILS – SHEET 1 OF 2" FOR JOINT AND SEALANT REQUIREMENTS.
5. NO TRAFFIC ON CONCRETE PAVEMENT FOR 7 DAYS AND COMPRESSIVE STRENGTH OF 3,500 psi HAS BEEN REACHED.
6. ALL CONSTRUCTION JOINTS SHALL BE SEALED
7. MINIMUM DEPTH FOR BORES/UTILITIES SHALL BE AS FOLLOWS:
   OPEN DITCH – 3' MIN. BELOW FLOWLINE; 5' MIN. BELOW TOP OF PAVEMENT
   CURBED STREETS – 5' MIN. BELOW TOP OF PAVEMENT

HORIZONTAL SCALE: 1"=3'-0"
VERTICAL SCALE: 1"=1'-6"

SLAB AND REBAR NOTES:

1. TYPICAL SLAB THICKNESS D=8"
2. TYPICAL REBAR SIZE AND SPACING ARE:
   a. #4 BAR @ 18" C-C LONGITUDINAL
   b. #4 BAR @ 18" C-C TRANSVERSE
3. REBAR SIZE FOR PAVEMENT LESS THAN 8" THICK
   a. #4 BAR @ 24" C-C LONGITUDINAL
   b. #4 BAR @ 24" C-C TRANSVERSE
4. REBAR SHALL NOT BE PLACED WITHIN 3" FROM THE EDGE OF PAVEMENT.
5. TYPICAL STABILIZED SUBGRADE THICKNESS IS 8 INCHES.
6. FOR HEAVY INDUSTRIAL TRAFFIC, SLAB THICKNESS AND REBAR SIZE AND SPACING WILL BE AS PER GEOTECHNICAL RECOMMENDATION.
7. ALL BENT BARS SHALL BE GRADE 40 STEEL, ALL OTHER SHALL BE GRADE 60.
8. MINIMUM LAP SPLICE 16".
9. LAP SPLICES SHOULD BE ON ALTERNATING BARS, ADJACENT LAP SPLICES ARE NOT ACCEPTABLE.

NO.	REVISIONS	DATE	NAME
1			
2			
3			
4			
5			

WALLER COUNTY
ENGINEERING DEPARTMENT

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

PAVING AND DRAINAGE
STANDARD DETAILS

PROJECT TITLE: DOUBLE CULVERT RD AND CEDAR CREEK RD
DRAWN BY:
CK'D BY:
SCALE:
DATE:
APPROVED BY:
SHEET DESCRIPTION: WC TYPICAL PAVEMENT SECTIONS FOR DEV PROJECTS
WCED STANDARD
SHEET NO: 86 / 244

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Culvert Station and/or Creek Name followed by applicable end (Lt, Rt or Both)	Description of Box Culvert No. Spans ~ Span X Height	Max Fill Height (Ft)	Applicable Box Culvert Standard (4)	Applicable Wingwall or End Treatment Standard	Skew Angle (0°,15°, 30° or 45°)	Side Slope or Channel Slope Ratio (SL:1)	T Culvert Top Slab Thickness (In)	U Culvert Wall Thickness (In)	C Estimated Curb Height (Ft)	Hw Height of Wingwall (1) (Ft)	A Curb to End of Wingwall (Ft)	B Offset of End of Wingwall (Ft)	Lw Length of Longest Wingwall (Ft)	Ltw Culvert Toewall Length (Ft)	Atw Anchor Toewall Length (Ft)	Riprap Apron (CY)	Class "C" Conc (Curb) (2) (CY)	Class "C" Conc (Wingwall) (3) (CY)	Total Wingwall Area (SF)
Culvert 2 - STA 184+67 (Rt)	1 ~ 3' x 2'	3'	SCP-3	PW-1	45°	2:1	4"	4"	1.000'	3.333'	N/A	N/A	9.428'	5.185'	N/A	0.0'	0.2'	4.9'	63
Culvert 2 - STA 184+67 (Lt)	1 ~ 3' x 2'	3'	SCP-3	PW-1	0°	3:1	4"	4"	1.000'	3.333'	N/A	N/A	10.000'	3.667'	N/A	0.0'	0.1'	5.1'	67

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.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
HUMBERTO CONTRERAS
99213
LICENSED PROFESSIONAL ENGINEER
7/21/2026

Texas Department of Transportation

Bridge Division Standard

BOX CULVERT SUPPLEMENT
WINGS AND END TREATMENTS

BCS

FILE: BCS.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS			23103	DOUBLE CULVERT RD
	DIST	COUNTY		SHEET NO.
		WALLER		87

DATE:
FILE:

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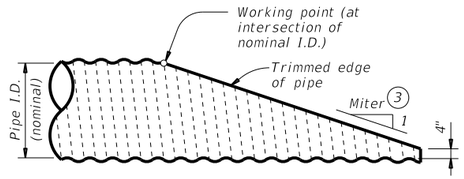
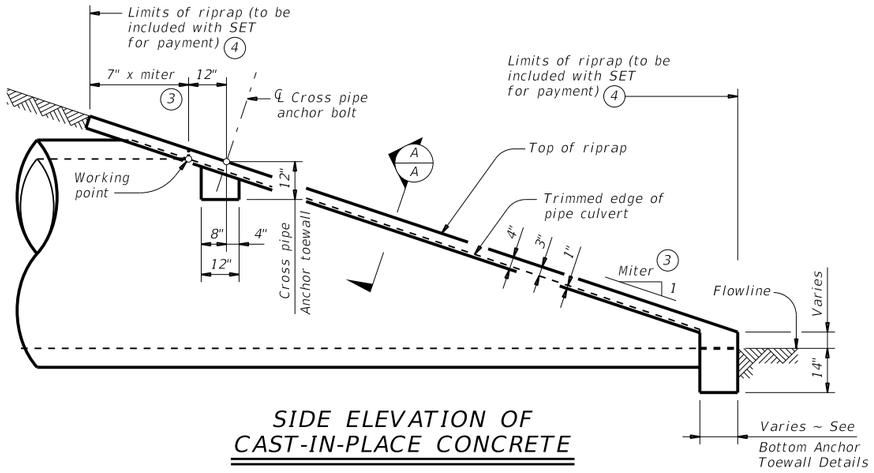


NOTE: All pipe runners, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

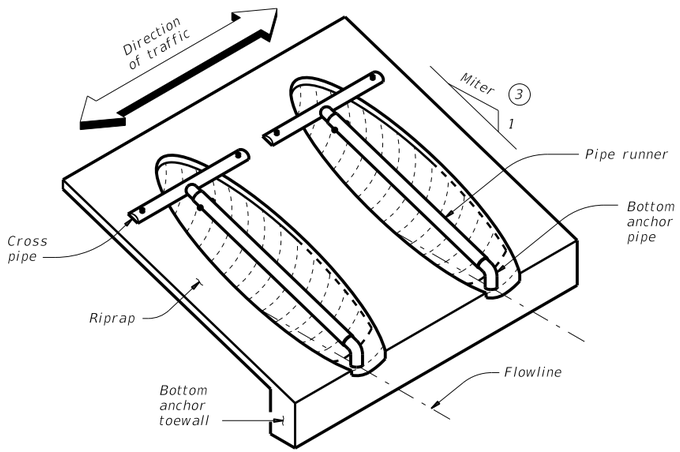
SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

(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.

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: CD-SETP-CD-20 (1).dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS			23103	DOUBLE CULVERT RD
	DIST	COUNTY		SHEET NO.
		WALLER		88

DATE:
FILE:

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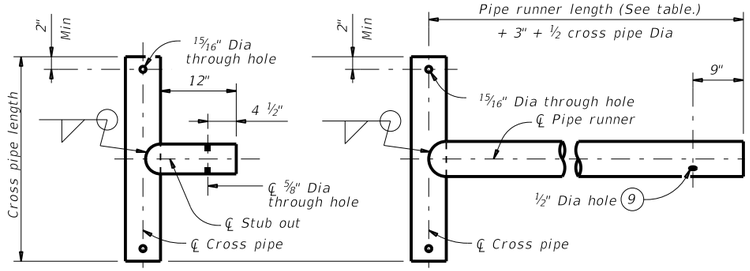
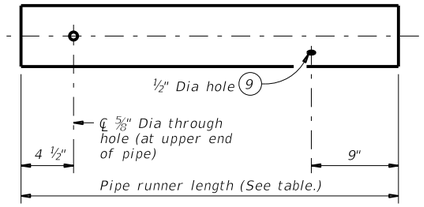


OPTION A1 OPTION A2

CROSS PIPE AND CONNECTIONS DETAILS

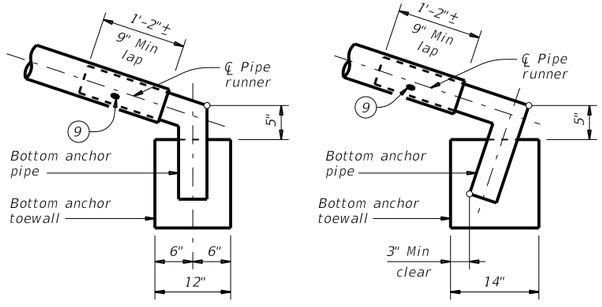


NOTE: The separate pipe runner shown is required when Cross Pipe Connection Option A1 is used.

PIPE RUNNER DETAILS

OPTION B1 OPTION B2

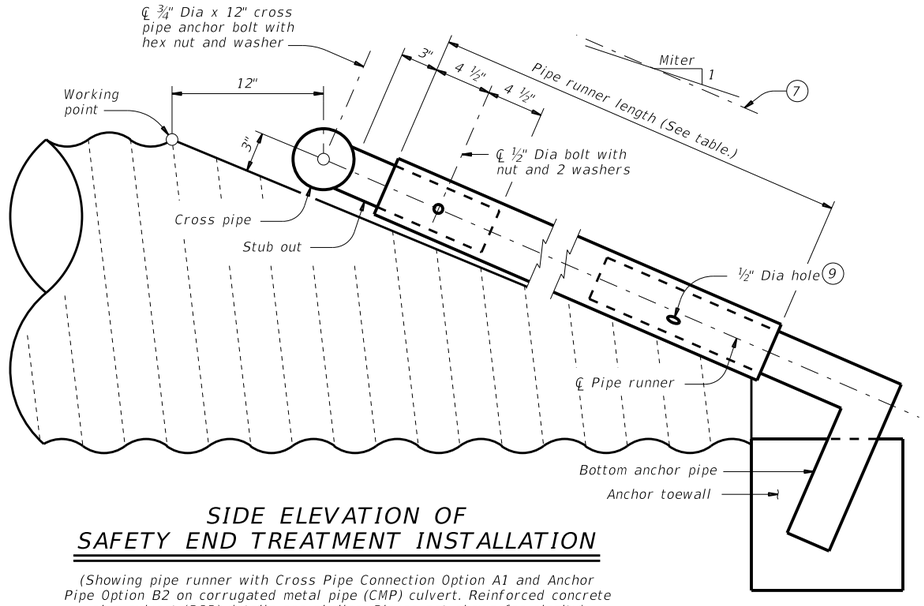
BOTTOM ANCHOR PIPE DETAILS (10)



OPTION B1 OPTION B2

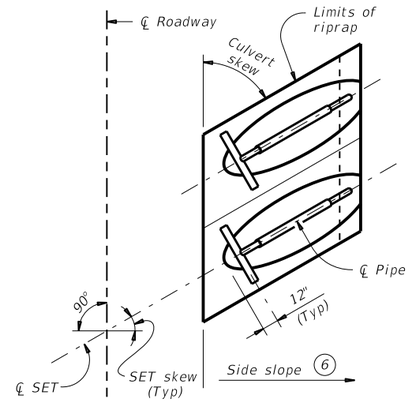
BOTTOM ANCHOR TOEWALL DETAILS

(Culvert and riprap not shown for clarity.)

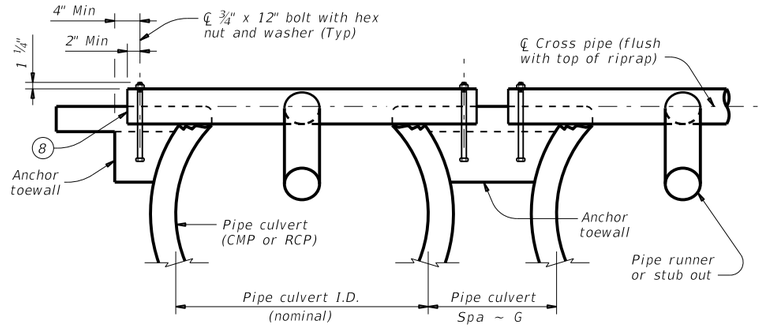


SIDE ELEVATION OF SAFETY END TREATMENT INSTALLATION

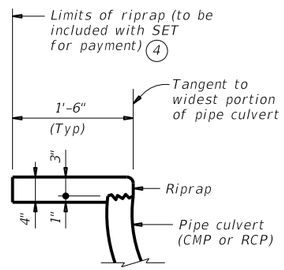
(Showing pipe runner with Cross Pipe Connection Option A1 and Anchor Pipe Option B2 on corrugated metal pipe (CMP) culvert. Reinforced concrete pipe culvert (RCP) details are similar. Riprap not shown for clarity)



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."

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: CD-SETP-CD-20 (2).dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS			23103	DOUBLE CULVERT RD
	DIST	COUNTY		SHEET NO.
		WALLER		89

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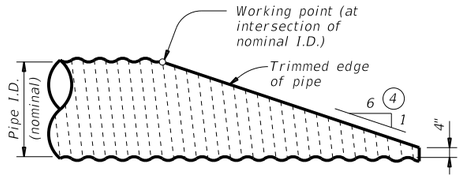
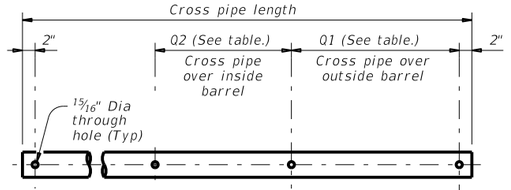
DATE:
FILE:



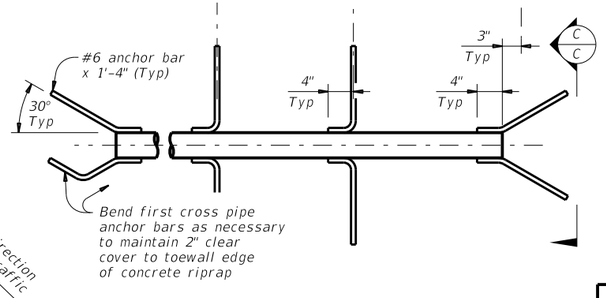
NOTE: All cross pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

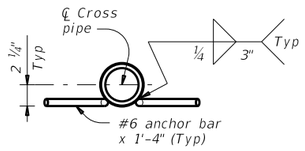
(Showing corrugated metal pipe (CMP) culvert Details at reinforced concrete pipe (RCP) culvert are similar.)



PIPE WITH BOLTED ANCHOR

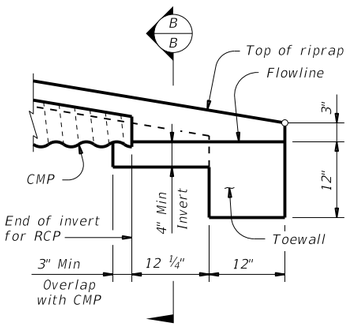


PIPE WITH ANCHOR BARS



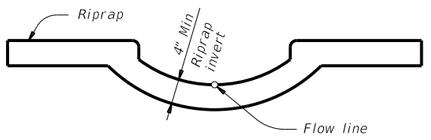
SECTION C-C

CROSS PIPE DETAILS



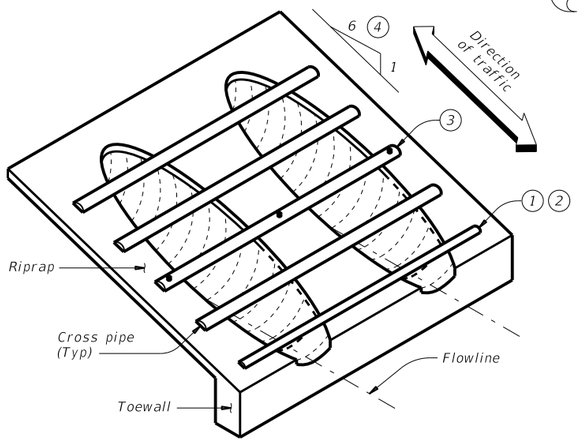
DETAIL "A"

(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.)



ISOMETRIC VIEW OF TYPICAL INSTALLATION

CROSS PIPE LENGTHS, REQUIRED PIPE SIZES, AND RIPRAP QUANTITIES (2)

Nominal Culvert I.D.	Conc Riprap (CY) (6)	Pipe Culvert Spa ~ G	Single Barrel ~ Q1	Multi-Barrel ~ Q1	Q2	Conditions for Use of Cross Pipes	Cross Pipe Sizes
12"	0.6	0' - 9"	N/A	2' - 1"	1' - 9"	3 or more pipe culverts	3" Std (3.500" O.D.)
15"	0.7	0' - 11"	N/A	2' - 5"	2' - 2"		
18"	0.8	1' - 2"	N/A	2' - 10"	2' - 8"		
21"	0.9	1' - 4"	N/A	3' - 2"	3' - 1"		
24"	0.9	1' - 7"	N/A	3' - 6"	3' - 7"		
27"	1.0	1' - 8"	N/A	3' - 10"	3' - 11"	3 or more pipe culverts	3 ½" Std (4.000" O.D.)
30"	1.1	1' - 10"	N/A	4' - 2"	4' - 4"	2 or more pipe culverts	
33"	1.2	1' - 11"	4' - 2"	4' - 5"	4' - 8"	All pipe culverts	
36"	1.3	2' - 1"	4' - 5"	4' - 9"	5' - 1"	All pipe culverts	4" Std (4.500" O.D.)
42"	1.5	2' - 4"	4' - 11"	5' - 5"	5' - 10"		
48"	1.7	2' - 7"	5' - 5"	6' - 0"	6' - 7"	All pipe culverts	5" Std (5.563" O.D.)
54"	2.0	3' - 0"	5' - 11"	6' - 9"	7' - 6"		
60"	2.2	3' - 3"	6' - 5"	7' - 4"	8' - 3"		
66"	2.4	3' - 3"	6' - 11"	7' - 10"	8' - 9"		
72"	2.7	3' - 4"	7' - 5"	8' - 5"	9' - 4"		

(1) The proper installation of the first cross pipe is critical for vehicle safety. Place the top of the first cross pipe no more than 6" above the flow line.

(2) Provide cross pipes, except the first bottom pipe, of the size shown in the table. Provide a 3 1#2" standard pipe (4" O.D.) for the first bottom pipe.

(3) Install the third cross pipe from the bottom of the culvert using a bolted connection. Ensure that riprap concrete does not flow into the cross pipe so as to permit disassembly of the bolted connection to allow cleanout access. At the Contractor's option, install all other cross pipes using the bolted connection details.

(4) Match cross slope as shown elsewhere in the plans. Cross slope of 6:1 or flatter is required for vehicle safety.

(5) Riprap placed beyond the limits shown will be paid for as concrete riprap in accordance with Item 432, "Riprap."

(6) Quantities shown are for one end of one reinforced concrete pipe (RCP) culvert. For multiple pipe culverts or for corrugated metal pipe (CMP) culverts, quantities will need to be adjusted. Riprap quantities are for contractor's information only.

MATERIAL NOTES:

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

Provide cross pipes that meet the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 (Gr B), or API 5LX52.

Provide ASTM A307 bolts and nuts.

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

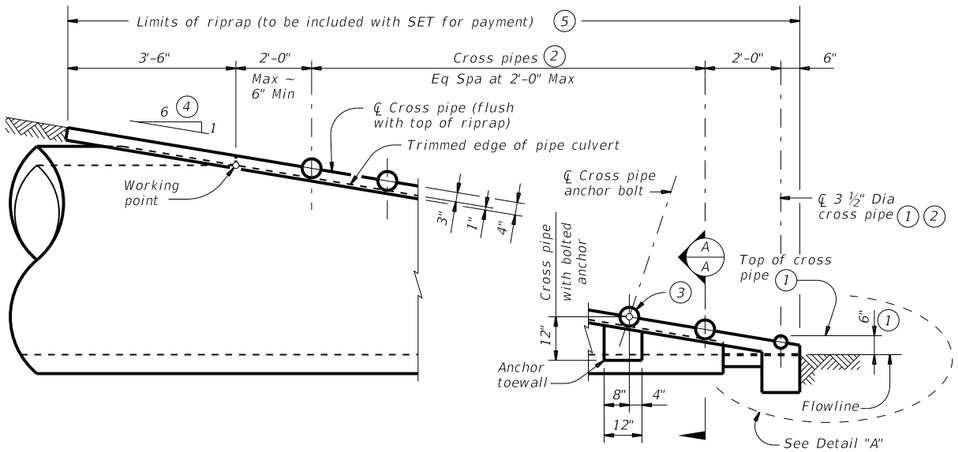
GENERAL NOTES:

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

Safety end treatments (SET) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the cross pipes.

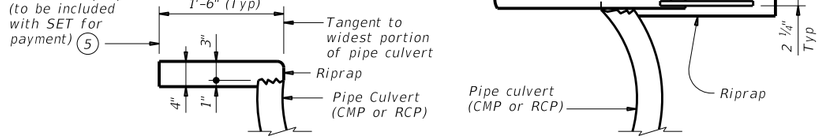
Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap."

Payment for riprap and toewall is included in the Price Bid for each Safety End Treatment.



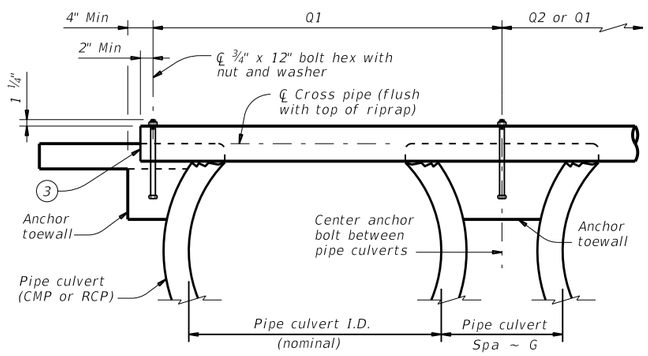
SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

(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

FILE: CD-SETP-PD-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS			23103	DOUBLE CULVERT RD
	DIST	COUNTY		SHEET NO.
		WALLER		90

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DATE:
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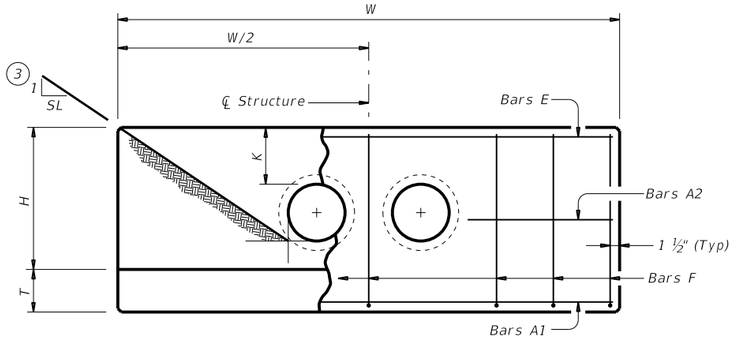
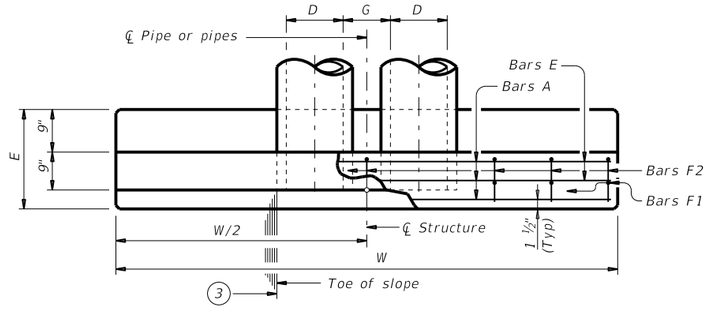
TABLE OF VARIABLE DIMENSIONS AND QUANTITIES FOR ONE HEADWALL (5)

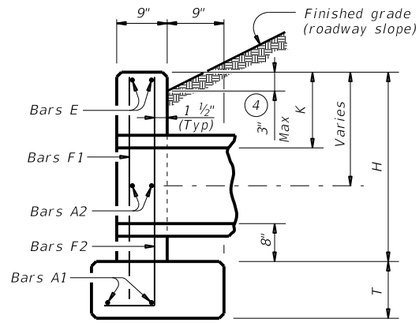
Slope	Dia of Pipe (D)	Values for One Pipe			Values To Be Added for Each Addt'l Pipe		
		W	Reinf (Lbs) (1)	Conc (CY) (2)	W	Reinf (Lbs) (1)	Conc (CY) (2)
2:1	12"	9' – 0"	122	1.1	1' – 9"	15	0.2
	15"	10' – 3"	136	1.3	2' – 2"	16	0.2
	18"	11' – 6"	163	1.5	2' – 8"	19	0.3
	21"	12' – 9"	200	1.8	3' – 1"	31	0.4
	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



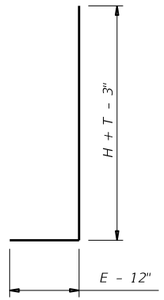
ELEVATION



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.

Texas Department of Transportation

Bridge Division Standard

CONCRETE HEADWALLS
WITH PARALLEL WINGS FOR NON-SKEWED PIPE CULVERTS

CH-PW-0

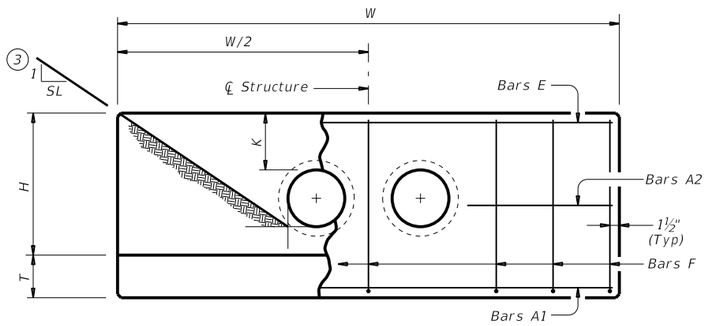
FILE: CH-PW-0.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT	
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY	
REVISIONS			23103	DOUBLE CULVERT RD	
	DIST	COUNTY		SHEET NO.	
		WALLER		91	

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.

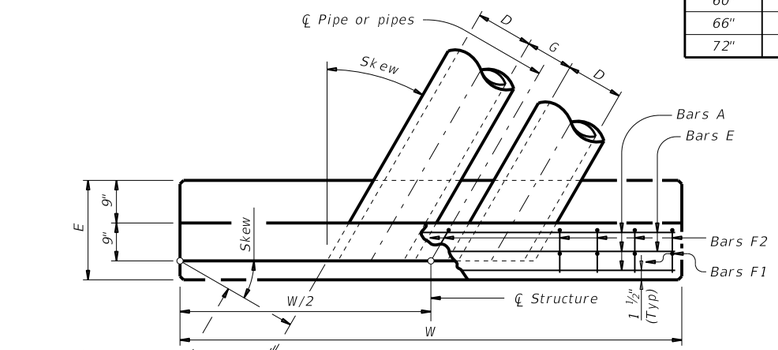
DATE:

TABLE OF VARIABLE DIMENSIONS AND QUANTITIES FOR ONE HEADWALL (5)

Slope	Dia of Pipe (D)	15° Skew						30° Skew						45° Skew					
		Values for One Pipe			Values To Be Added for Each Addt'l Pipe			Values for One Pipe			Values To Be Added for Each Addt'l Pipe			Values for One Pipe			Values To Be Added for Each Addt'l Pipe		
		W	Reinf (Lbs) (1)	Conc (CY) (2)	W	Reinf (Lbs) (1)	Conc (CY) (2)	W	Reinf (Lbs) (1)	Conc (CY) (2)	W	Reinf (Lbs) (1)	Conc (CY) (2)	W	Reinf (Lbs) (1)	Conc (CY) (2)	W	Reinf (Lbs) (1)	Conc (CY) (2)
2:1	12"	9' – 4"	124	1.1	1' – 9 3/4"	15	0.2	10' – 5"	130	1.2	2' – 0"	16	0.2	12' – 9"	159	1.5	2' – 5 3/4"	17	0.3
	15"	10' – 7"	136	1.3	2' – 3"	17	0.2	11' – 10"	159	1.5	2' – 6"	18	0.2	14' – 6"	191	1.8	3' – 0 3/4"	20	0.3
	18"	11' – 11"	165	1.5	2' – 9"	19	0.3	13' – 3"	174	1.7	3' – 1"	29	0.3	16' – 3"	207	2.1	3' – 9 1/4"	33	0.4
	21"	13' – 2"	203	1.9	3' – 2 1/4"	31	0.4	14' – 9"	233	2.1	3' – 6 3/4"	33	0.4	18' – 0"	276	2.6	4' – 4 1/4"	36	0.5
	24"	14' – 6"	240	2.1	3' – 8 1/4"	34	0.4	16' – 2"	251	2.4	4' – 1 3/4"	36	0.5	19' – 10"	318	2.9	5' – 0 3/4"	39	0.6
	27"	15' – 9"	258	2.5	4' – 0 3/4"	38	0.5	17' – 7"	292	2.8	4' – 6 1/4"	39	0.6	21' – 7"	342	3.4	5' – 6 1/4"	44	0.7
	30"	17' – 1"	297	2.8	4' – 5 3/4"	40	0.6	19' – 1"	311	3.1	5' – 0"	42	0.6	23' – 4"	388	3.8	6' – 1 3/4"	47	0.8
	33"	18' – 5"	320	3.3	4' – 9 3/4"	43	0.6	20' – 6"	358	3.6	5' – 4 3/4"	46	0.7	25' – 1"	439	4.4	6' – 7 1/4"	51	0.9
	36"	19' – 8"	401	4.0	5' – 3"	47	0.9	21' – 11"	422	4.5	5' – 10 3/4"	50	0.9	26' – 10"	517	5.5	7' – 2 1/4"	55	1.2
	42"	22' – 3"	476	5.0	6' – 0 3/4"	53	1.1	24' – 10"	528	5.6	6' – 8 3/4"	56	1.2	30' – 5"	634	6.9	8' – 3"	76	1.4
	48"	25' – 11"	577	6.6	6' – 9 3/4"	60	1.3	28' – 10"	637	7.3	7' – 7 1/4"	79	1.5	35' – 4"	791	9.0	9' – 3 3/4"	88	1.8
	54"	28' – 6"	711	7.8	7' – 9"	83	1.6	31' – 9"	781	8.7	8' – 8"	81	1.8	38' – 11"	958	10.7	10' – 7 1/4"	97	2.2
	60"	31' – 1"	805	9.2	8' – 6 1/4"	91	1.9	34' – 8"	881	10.2	9' – 6 1/4"	97	2.1	42' – 5"	1,113	12.5	11' – 8"	124	2.6
	66"	33' – 8"	907	10.6	9' – 0 3/4"	98	2.1	37' – 6"	1,028	11.8	10' – 1 1/4"	102	2.4	46' – 0"	1,235	14.5	12' – 4 1/4"	132	2.9
	72"	36' – 3"	1,071	12.1	9' – 8"	105	2.4	40' – 5"	1,207	13.5	10' – 9 1/4"	110	2.6	49' – 6"	1,446	16.6	13' – 2 1/2"	141	3.2
3:1	12"	13' – 6"	178	1.6	1' – 9 3/4"	15	0.2	15' – 0"	189	1.8	2' – 0"	15	0.2	18' – 5"	237	2.2	2' – 5 3/4"	17	0.2
	15"	15' – 3"	212	1.9	2' – 3"	17	0.2	17' – 0"	223	2.1	2' – 6"	17	0.3	20' – 10"	276	2.6	3' – 0 3/4"	20	0.3
	18"	17' – 1"	231	2.3	2' – 9"	19	0.3	19' – 1"	259	2.5	3' – 1"	29	0.3	23' – 4"	318	3.1	3' – 9 1/4"	32	0.4
	21"	18' – 11"	306	2.7	3' – 2 1/4"	31	0.4	21' – 1"	339	3.0	3' – 6 3/4"	33	0.4	25' – 10"	413	3.7	4' – 4 1/4"	36	0.5
	24"	20' – 8"	345	3.1	3' – 8 3/4"	35	0.4	23' – 1"	384	3.5	4' – 1 3/4"	36	0.5	28' – 3"	462	4.2	5' – 0 3/4"	40	0.6
	27"	22' – 6"	376	3.7	4' – 0 3/4"	38	0.5	25' – 1"	438	4.1	4' – 6 1/4"	39	0.6	30' – 9"	522	5.0	5' – 6 1/4"	44	0.7
	30"	24' – 4"	422	4.1	4' – 5 3/4"	40	0.6	27' – 2"	466	4.6	5' – 0"	42	0.6	33' – 3"	578	5.6	6' – 1 3/4"	47	0.8
	33"	26' – 2"	476	4.8	4' – 10"	43	0.6	29' – 2"	522	5.3	5' – 4 3/4"	46	0.7	35' – 9"	644	6.5	6' – 7 1/4"	51	0.9
	36"	27' – 11"	590	5.9	5' – 3"	47	0.8	31' – 2"	645	6.6	5' – 10 3/4"	50	0.9	38' – 2"	787	8.0	7' – 2 1/4"	56	1.2
	42"	31' – 7"	684	7.3	6' – 0 1/4"	53	1.1	35' – 3"	776	8.2	6' – 8 3/4"	56	1.2	43' – 2"	933	10.0	8' – 3"	79	1.4
	48"	36' – 9"	880	9.6	6' – 9 3/4"	61	1.3	41' – 0"	953	10.7	7' – 7 1/4"	81	1.5	50' – 2"	1,166	13.1	9' – 3 3/4"	88	1.8
	54"	40' – 5"	1,065	11.4	7' – 9"	85	1.6	45' – 0"	1,185	12.7	8' – 8"	89	1.8	55' – 2"	1,435	15.5	10' – 7 1/4"	97	2.2
	60"	44' – 0"	1,224	13.3	8' – 6 1/4"	93	1.9	49' – 1"	1,356	14.8	9' – 6 1/4"	96	2.1	60' – 1"	1,635	18.2	11' – 8"	124	2.6
	66"	47' – 7"	1,357	15.4	9' – 1"	98	2.1	53' – 1"	1,497	17.2	10' – 1 1/4"	103	2.3	65' – 1"	1,892	21.1	12' – 4 1/4"	130	2.9
	72"	51' – 3"	1,624	17.7	9' – 8"	105	2.3	57' – 2"	1,787	19.7	10' – 9 1/4"	109	2.6	70' – 0"	2,218	24.1	13' – 2 1/4"	139	3.2
4:1	12"	17' – 7"	232	2.1	1' – 9 3/4"	15	0.2	19' – 8"	259	2.4	2' – 0"	16	0.2	24' – 0"	314	2.9	2' – 5 3/4"	18	0.2
	15"	19' – 11"	272	2.5	2' – 3"	17	0.2	22' – 3"	301	2.8	2' – 6"	18	0.3	27' – 3"	361	3.5	3' – 0 3/4"	21	0.3
	18"	22' – 3"	313	3.0	2' – 9"	19	0.3	24' – 10"	344	3.3	3' – 1"	29	0.3	30' – 5"	427	4.0	3' – 9 1/4"	32	0.4
	21"	24' – 7"	407	3.6	3' – 2 1/4"	31	0.4	27' – 5"	446	4.0	3' – 6 3/4"	33	0.4	33' – 7"	549	4.9	4' – 4 1/4"	36	0.5
	24"	26' – 11"	455	4.1	3' – 8 3/4"	35	0.4	30' – 0"	499	4.5	4' – 1 3/4"	36	0.5	36' – 9"	609	5.6	5' – 0 3/4"	40	0.6
	27"	29' – 3"	514	4.8	4' – 0 3/4"	38	0.5	32' – 7"	562	5.4	4' – 6 1/4"	40	0.6	39' – 11"	703	6.6	5' – 6 1/4"	43	0.7
	30"	31' – 7"	568	5.4	4' – 5 3/4"	40	0.6	35' – 3"	620	6.0	5' – 0"	42	0.6	43' – 2"	768	7.4	6' – 1 3/4"	49	0.8
	33"	33' – 11"	634	6.2	4' – 10"	43	0.7	37' – 10"	710	7.0	5' – 4 3/4"	46	0.7	46' – 4"	848	8.5	6' – 7 1/4"	52	0.9
	36"	36' – 3"	776	7.7	5' – 3"	48	0.9	40' – 5"	868	8.6	5' – 10 3/4"	49	0.9	49' – 6"	1,058	10.6	7' – 2 1/4"	56	1.1
	42"	40' – 11"	921	9.6	6' – 0 1/4"	53	1.0	45' – 7"	1,022	10.7	6' – 8 3/4"	57	1.2	55' – 10"	1,262	13.1	8' – 3"	78	1.4
	48"	47' – 7"	1,152	12.6	6' – 10"	61	1.3	53' – 1"	1,268	14.0	7' – 7 1/4"	80	1.5	65' – 1"	1,587	17.2	9' – 3 3/4"	86	1.8
	54"	52' – 3"	1,416	14.9	7' – 9 1/4"	86	1.6	58' – 4"	1,589	16.6	8' – 8"	89	1.8	71' – 5"	1,924	20.4	10' – 7 1/4"	95	2.2
	60"	56' – 11"	1,606	17.5	8' – 6 3/4"	92	1.9	63' – 6"	1,806	19.5	9' – 6 1/4"	95	2.1	77' – 9"	2,192	23.9	11' – 8"	122	2.6
	66"	61' – 7"	1,819	20.2	9' – 0 3/4"	97	2.1	68' – 8"	2,019	22.5	10' – 1 1/4"	101	2.4	84' – 2"	2,472	27.6	12' – 4 1/4"	131	2.9
	72"	66' – 3"	2,150	23.2	9' – 8"	104	2.4	73' – 11"	2,379	25.9	10' – 9 1/4"	108	2.6	90' – 6"	2,937	31.7	13' – 2 1/2"	138	3.2
6:1	12"	25' – 11"	342	3.1	1' – 9 3/4"	15	0.2	28' – 10"	374	3.5	2' – 0"	16	0.2	35' – 4"	456	4.3	2' – 5 3/4"	17	0.2
	15"	29' – 3"	390	3.7	2' – 3"	17	0.2	32' – 7"	442	4.2	2' – 6"	18	0.2	39' – 11"	549	5.1	3' – 0 3/4"	20	0.3
	18"	32' – 7"	459	4.4	2' – 9"	20	0.3	36' – 4"	515	4.9	3' – 1"	29	0.3	44' – 7"	629	6.0	3' – 9 1/4"	33	0.4
	21"	36' – 0"	608	5.3	3' – 2 1/4"	31	0.4	40' – 2"	660	5.9	3' – 6 3/4"	33	0.4	49' – 2"	823	7.2	4' – 4 1/4"	38	0.5
	24"	39' – 4"	672	6.0	3' – 8 3/4"	35	0.4	43' – 11"	748	6.7	4' – 1 3/4"	36	0.5	53' – 9"	920	8.2	5' – 0 3/4"	42	0.6
	27"	42' – 8"	770	7.1	4' – 0 3/4"	38	0.5	47' – 8"	852	8.0	4' – 6 1/4"	41	0.5	58' – 4"	1,039	9.7	5' – 6 1/4"	45	0.7
	30"	46' – 1"	839	8.0	4' – 5 3/4"	40	0.6	51' – 5"	949	8.9	5' – 0"	44	0.6	62' – 11"	1,162	10.9	6' – 1 3/4"	48	0.8
	33"	49' – 5"	947	9.2	4' – 10"	45	0.7	55' – 2"	1,040	10.3	5' – 4 3/4"	48	0.7	67' – 6"	1,292	12.6	6' – 7 1/4"	50	0.9
	36"	52' – 10"	1,151	11.4	5' – 3"	49	0.8	58' – 11"	1,287	12.7	5' – 10 3/4"	51	1.0	72' – 1"	1,583	15.6	7' – 2 1/4"	55	1.1
	42"	59' – 6"	1,365	14.2	6' – 0 1/4"	55	1.0	66' – 5"	1,530	15.8	6' – 8 3/4"	57	1.2	81' – 4"	1,875	19.4	8' – 3"	76	1.4
	48"	69' – 4"	1,737	18.5	6' – 10"	59	1.3	77' – 4"	1,942	20.7	7' – 7 1/4"	79	1.5	94' – 9"	2,368	25.3	9' – 3 3/4"	86	1.8
	54"	76' – 1"	2,138	22.0	7' – 9 1/4"	83	1.6	84' – 10"	2,378	24.6	8' – 8"	87	1.8	103' – 11"	2,912	30.1	10' – 7 1/4"	95	2.2
	60"	82' – 10"	2,426	25.8	8' – 6 3/4"	90	1.9	92' – 5"	2,681	28.8	9' – 6 1/4"	94	2.1	113' – 2"	3,294	35.3	11' – 8"	122	2.6
	66"	89' – 7"	2,730	29.9	9' – 0 3/4"	96	2.1	99' – 11"	3,038	33.3	10' – 1 1/4"	101	2.4	122' – 4"	3,697	40.8	12' – 4 1/4"	130	2.9
	72"	96' – 3"	3,218	34.2	9' – 8"	102	2.4	107' – 5"	3,580	38.2	10' – 9 1/4"	108	2.6	131' – 6"	4,372	46.8	13' – 2 1/4"	139	3.2

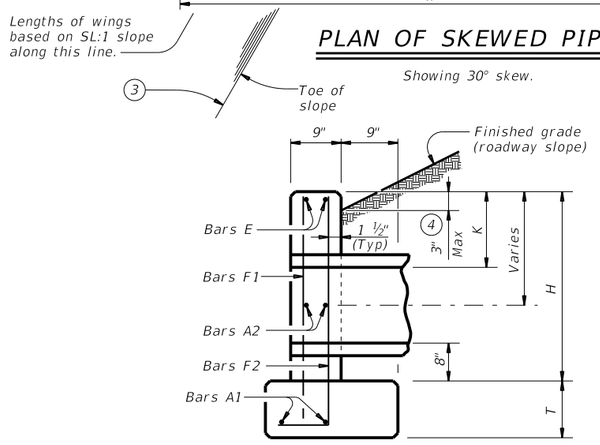


ELEVATION



PLAN OF SKEWED PIPES

Showing 30° skew.



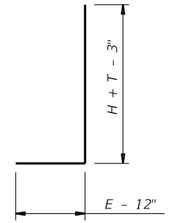
SECTION AT CENTER OF PIPE

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 (6) REINFORCING STEEL

Bar	Size	Spa	No.
A1	#5	~	2
A2	#5	1' – 6"	~
E	#5	~	2
F	#5	1' – 0"	~



BARS F2

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.

(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).

Texas Department of Transportation

Bridge Division Standard

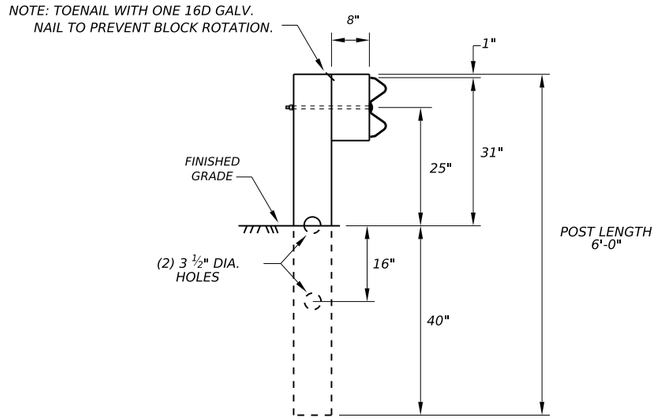
CONCRETE HEADWALLS
WITH PARALLEL WINGS FOR SKEWED PIPE CULVERTS

CH-PW-S

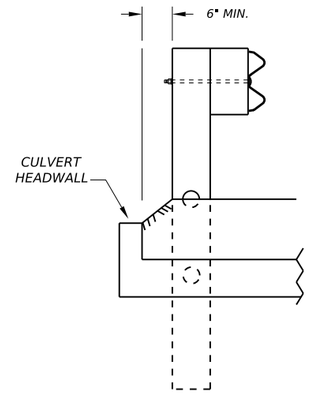
FILE: CH-PW-S.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS			23103	DOUBLE CULVERT RD
	DIST	COUNTY		SHEET NO.
		WALLER		92

DISCLAIMER:
THE USE OF THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING PRACTICE ACT". NO WARRANTY OF ANY KIND IS MADE BY TXDOT FOR ANY PURPOSE WHATSOEVER. TXDOT ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.

DATE:
FILE:



RECTANGULAR CRT POST
(6"X 8" X 6' LONG)
(6) CRT REQUIRED
SEE ELEVATION DETAIL FOR LOCATIONS



LATERAL OFFSET BETWEEN THE GUARDRAIL AND THE CULVERT HEADWALL

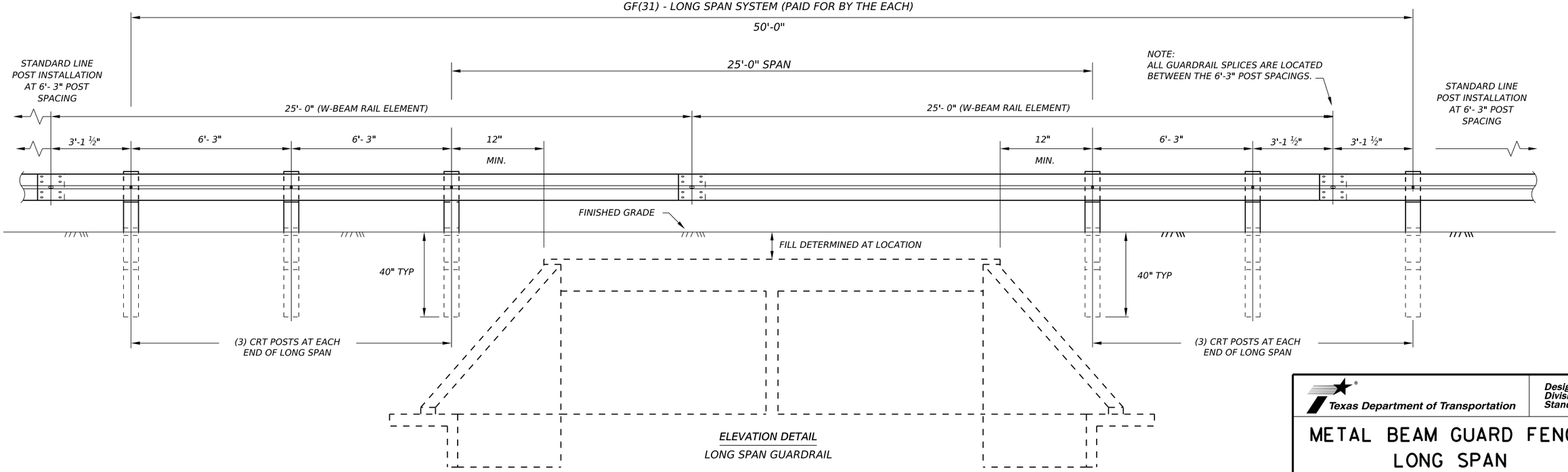
GENERAL NOTES

1. THE TYPE OF LINE POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF THE TRANSITIONS SHALL BE AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENT SHALL MEET ALL REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 12'- 6" OR 25'- 0" NOMINAL LENGTHS.
3. RAIL POST HOLES ARE OFFSET 3'- 1 ½" FROM STANDARD GUARDRAIL TO ACCOMMODATE THE MIDSPAN SPLICING.
4. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND ⅝" WASHER (FWC16a) AND NO MORE THAN 1" BEYOND IT.
5. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
7. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
8. REFER TO GF(31) STANDARD SHEET FOR ADDITIONAL DETAILS.
9. FLAME CUTTING OF HOLES IN GUARDRAIL SHALL NOT BE PERMITTED. IF YOU ENCOUNTER MIS-ALIGNED BOLT HOLES IN GUARDRAIL CONTACT THE DESIGN DIVISION FOR ADDITIONAL INFORMATION & OPTIONS.

NOTE: SEE GF(31) STANDARD FOR STANDARD LINE POSTS.

DIRECTION OF TRAFFIC

GF(31) - LONG SPAN SYSTEM (PAID FOR BY THE EACH)



ELEVATION DETAIL
LONG SPAN GUARDRAIL

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE LONG SPAN TL-3 MASH COMPLIANT

GF(31)LS-19

FILE: gf31ls19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG		
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY		
REVISIONS			23103	DOUBLE CULVERT RD		
	DIST	COUNTY		SHEET NO.		
		WALLER		93		

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TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for one structure end)

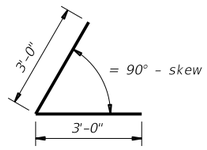
Dimensions					Variable Reinforcing				Estimated Quantities per ft of wing (2~wings) (4)		Estimated Quantities per ft of Toewall (1~toewall)	
					Bars J1		Bars J2					
Maximum Wingwall Height Hw	W	X	Y	Z	Size	Spa	Size	Spa	Reinf Lb/Ft)	Conc (CY/Ft)	Reinf (Lb/Ft)	Conc (CY/Ft)
2'-6"	2'-10"	10"	1'-0"	7"	#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)

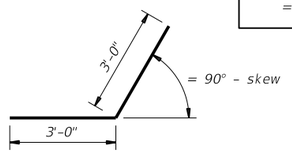
Bar	Size	No.	Spa
D1	#6	~	1'-0"
D2	#6	~	1'-0"
E1	#4	~	1'-0"
F	#4	~	1'-0"
G	#6	~	8"
M1	#4	4	~
P	#4	~	1'-0"
V	#4	~	1'-0"

TABLE OF TOEWALL REINFORCING

Bar	Size	No.	Spa
J3	#4	~	1'-0"
M2	#4	2	~
E2	#4	~	1'-0"



BARS D1



BARS D2

WING DIMENSION FORMULAS:
(All values are in feet.)

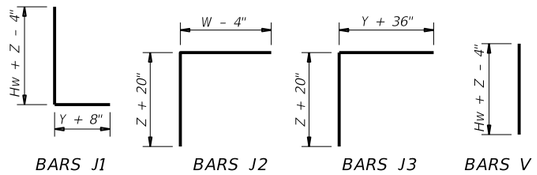
Hw = H + T + C
Lw = (Hw) (SL) ÷ cosine (θ) for Type PW-1
= (Hw - 1') (SL) ÷ cosine (θ) for Type PW-2 and Hw ≥ 4'
= (Hw - 0.5') (SL) ÷ cosine (θ) for Type PW-2 and Hw < 4'

For cast-in-place culverts:
Ltw = [(N) (S) + (N + 1) (U)] ÷ cosine (θ)

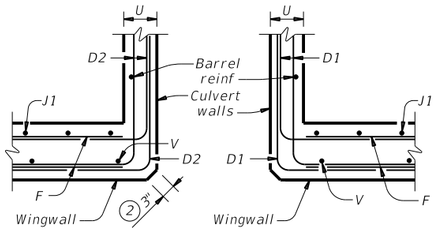
For precast culverts:
Ltw = [(N) (2 U + S) + (N - 1) (0.5')] ÷ cosine (θ)
Total Wingwall Area (two wings ~ SF)
= (2)(Hw)(Lw) for Type PW-1
= (2)(Hw)(Lw) - 6 SF for Type PW-2 and Hw ≥ 4'
= (2)(Hw)(Lw) - 1.5 SF for Type PW-2 and Hw < 4'

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

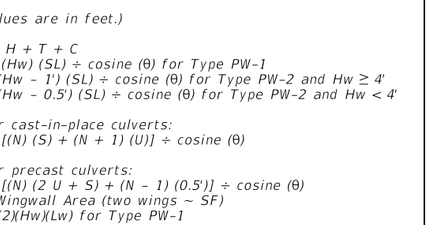
See applicable box culvert standard sheet for S, H, T, and U values.



BARS J1 BARS J2 BARS J3 BARS V



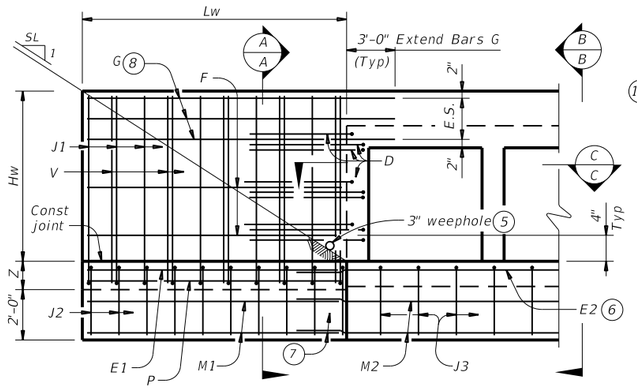
SECTION C-C - PW-1



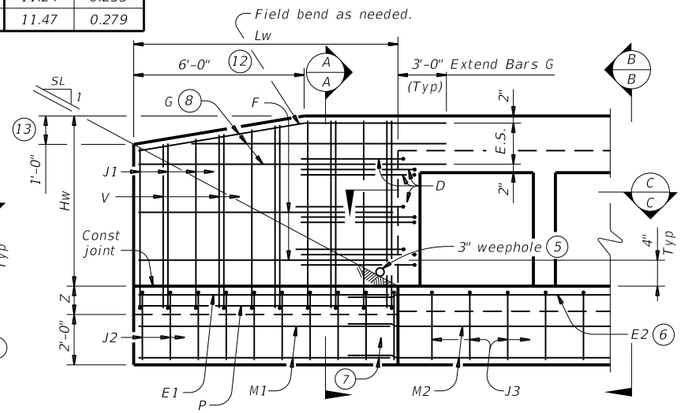
SECTION C-C - PW-2

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.

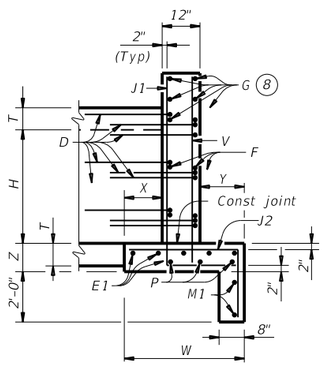
    Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
11. 1'-0" typical. 2'-3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elsewhere in the plans.
12. 3'-0" for Hw < 4'.
13. 6" for Hw < 4'.



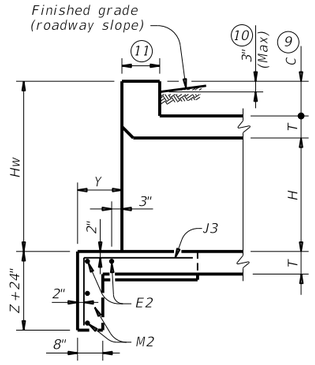
PARTIAL ELEVATION - PW-1



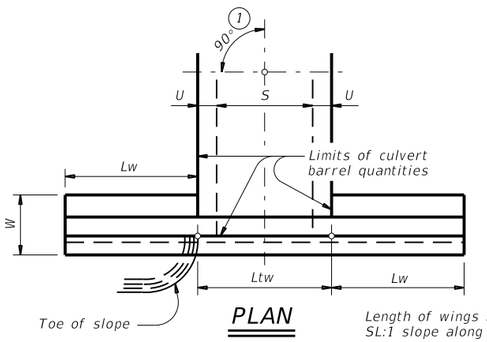
PARTIAL ELEVATION - PW-2



SECTION A-A
(Showing wing reinforcement.)

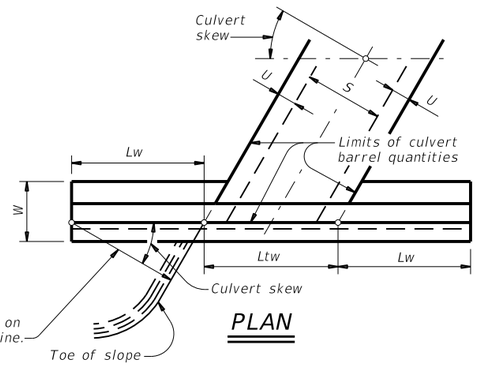


SECTION B-B
(Showing wing reinforcement.)



PLAN

DETAILS FOR NON-SKEWED BOX CULVERTS



PLAN

DETAILS FOR SKEWED BOX CULVERTS
(Showing 30° skew.)

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 reinforcing 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: PW.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS			23103	DOUBLE CULVERT RD
	DIST	COUNTY		SHEET NO.
		WALLER		94

DATE:
FILE:

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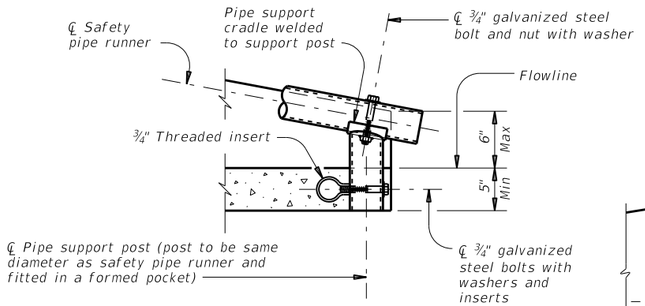
DATE:
FILE:

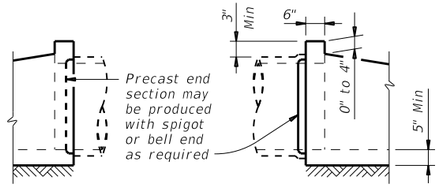
REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	RCP Wall "B" Thickness	TP Wall Thickness (8)	"D" (1)	Slope	Min Length of Unit	Single Pipe		Multiple Pipes	
						Skew	Pipe Runners Required	Skew	Pipe Runners Required
12"	2"	1.15"	17.00"	3:1	2' – 11"	≤ 45°	No	≤ 45°	No
				4:1	3' – 6"				
				6:1	4' – 9"				
15"	2 ¼"	1.30"	20.50"	3:1	3' – 8"	≤ 45°	No	≤ 45°	No
				4:1	4' – 7"				
				6:1	6' – 5"				
18"	2 ½"	1.60"	24.00"	3:1	4' – 6"	≤ 45°	No	≤ 45°	No
				4:1	5' – 8"				
				6:1	8' – 0"				
24"	3"	1.95"	31.00"	3:1	6' – 2"	≤ 45°	No	= 30°	No
				4:1	7' – 10"			> 30°	Yes
				6:1	11' – 3"				
30"	3 ½"	2.65"	38.50"	3:1	7' – 10"	= 15°	No	= 15°	No
				4:1	10' – 1"	> 15°	Yes	> 15°	Yes
				6:1	14' – 8"				
36"	4"	2.75"	45.50"	3:1	9' – 5"	= 0°	No	≥ 0°	Yes
				4:1	12' – 3"	> 0°	Yes		
				6:1	17' – 11"				
42"	4 ½"	2.7"	52.50"	3:1	11' – 1"	≥ 0°	Yes	≥ 0°	Yes
				4:1	14' – 5"				
				6:1	21' – 2"				



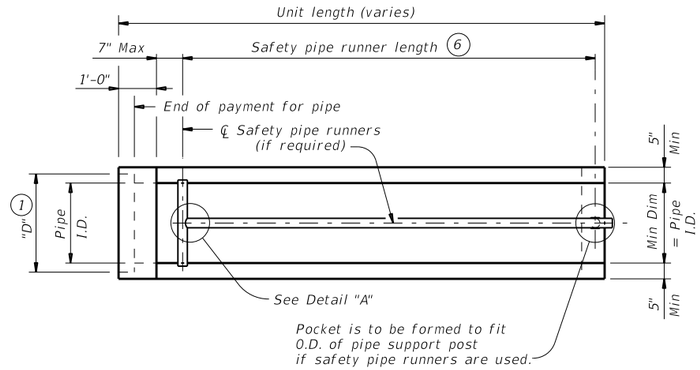
END DETAIL FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)



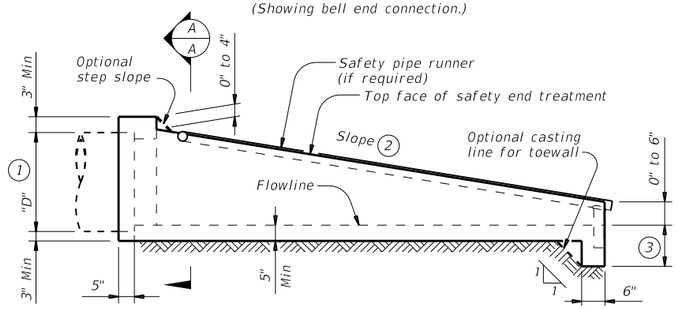
OPTIONAL JOINT FOR RCP

(Showing joint between RCP and precast safety end treatment)



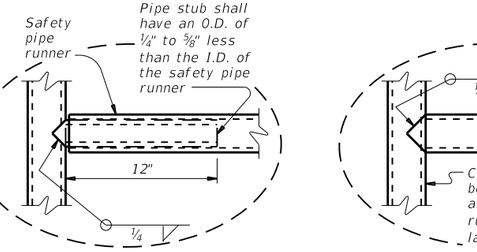
PLAN

(Showing bell end connection.)



LONGITUDINAL ELEVATION

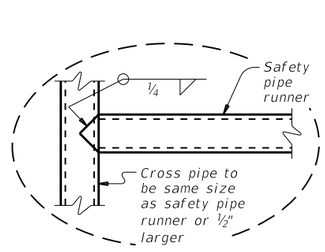
(Showing bell end connection.)



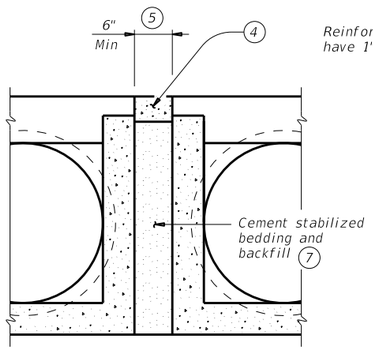
OPTION A

DETAIL A

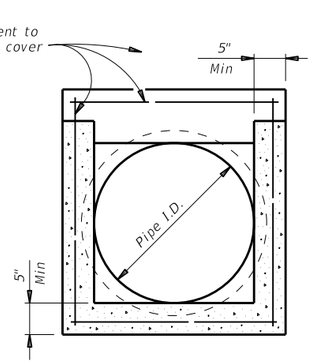
(If required)



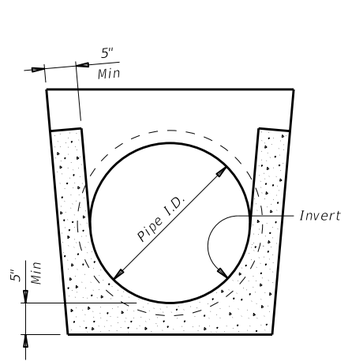
OPTION B



MULTIPLE PIPE INSTALLATION

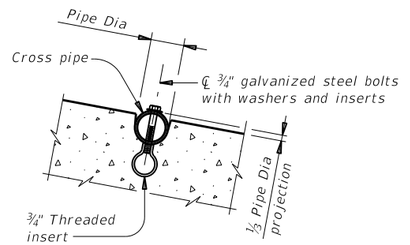


OPTION WITH SQUARE BOTTOM



OPTION WITH INVERT BOTTOM

SECTION A-A



INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)

SAFETY PIPE RUNNER DIMENSIONS

Max Safety Pipe Runner Length	Required Pipe Runner Size		
	Pipe Size	Pipe O.D.	Pipe I.D.
11' – 2"	3" STD	3.500"	3.068"
15' – 6"	3 ½" STD	4.000"	3.548"
20' – 10"	4" STD	4.500"	4.026"
35' – 4"	5" STD	5.563"	5.047"

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

(2) Slope as shown elsewhere in plans. Slope of 3:1 or flatter is required for vehicle safety.

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

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

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

(6) Measured along slope.

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

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

GENERAL NOTES:

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

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

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

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

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

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

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

Pipe runners are designed for a traversing load of 1,800 Lbs at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.

Provide safety pipe runners, cross pipes, pipe support posts, and pipe stubs meeting the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

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

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

Texas Department of Transportation

Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II ~ CROSS DRAINAGE

PSET-SC

FILE:	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-21: Added 42" TP			23103	DOUBLE CULVERT RD
	DIST	COUNTY		SHEET NO.
		WALLER		95

DISCLAIMER:
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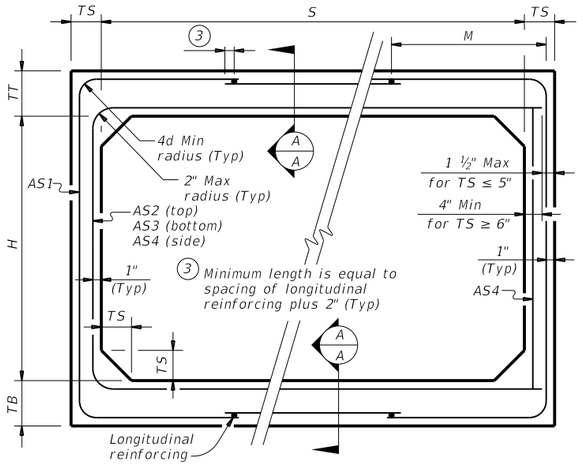
BOX DATA

SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (sq. in. / ft.) (2)							(1) Lift Weight
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
3	2	7	6	4	< 2	–	0.17	0.25	0.16	0.10	0.17	0.17	0.14	3.3
3	2	4	4	4	2 < 3	31	0.13	0.19	0.18	0.10	–	–	–	2.4
3	2	4	4	4	3 – 5	31	0.10	0.11	0.12	0.10	–	–	–	2.4
3	2	4	4	4	10	31	0.10	0.10	0.10	0.10	–	–	–	2.4
3	2	4	4	4	15	31	0.10	0.13	0.13	0.10	–	–	–	2.4
3	2	4	4	4	20	31	0.11	0.17	0.17	0.10	–	–	–	2.4
3	2	4	4	4	25	31	0.14	0.21	0.21	0.10	–	–	–	2.4
3	2	4	4	4	30	31	0.17	0.25	0.25	0.10	–	–	–	2.4
3	2	4	4	4	35	31	0.20	0.29	0.30	0.10	–	–	–	2.4
3	3	7	6	4	< 2	–	0.17	0.27	0.17	0.10	0.17	0.17	0.14	3.7
3	3	4	4	4	2 < 3	31	0.10	0.22	0.21	0.10	–	–	–	2.8
3	3	4	4	4	3 – 5	31	0.10	0.14	0.14	0.10	–	–	–	2.8
3	3	4	4	4	10	31	0.10	0.11	0.11	0.10	–	–	–	2.8
3	3	4	4	4	15	31	0.10	0.14	0.15	0.10	–	–	–	2.8
3	3	4	4	4	20	31	0.10	0.18	0.19	0.10	–	–	–	2.8
3	3	4	4	4	25	31	0.10	0.23	0.23	0.10	–	–	–	2.8
3	3	4	4	4	30	31	0.12	0.27	0.28	0.10	–	–	–	2.8
3	3	4	4	4	35	31	0.14	0.32	0.32	0.10	–	–	–	2.8

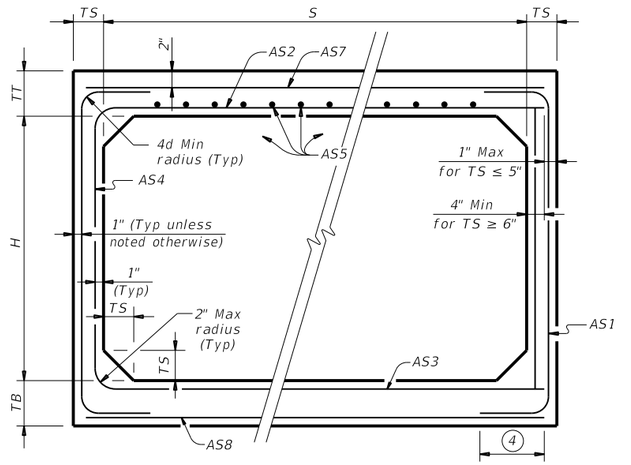
(1) For box length = 8'-0"

(2) AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.



CORNER OPTION "A" CORNER OPTION "B"

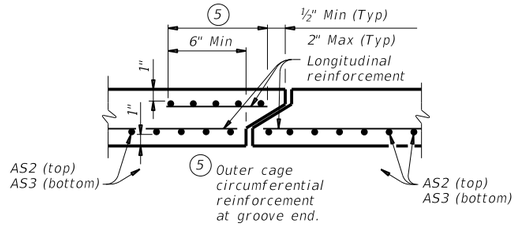
FILL HEIGHT 2 FT AND GREATER



CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT LESS THAN 2 FT

(4) Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)



SECTION A-A

(Showing top and bottom slab joint reinforcement.)

MATERIAL NOTES:

Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.

Provide Class H concrete (f`c = 5,000 psi).

GENERAL NOTES:

Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.

See Box Culverts Precast Miscellaneous Details (SCP-MD) standard sheet for details and notes not shown.

In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)."

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS PRECAST

3'-0" SPAN

SCP-3

FILE: SPC-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS			23103	DOUBLE CULVERT RD
	DIST	COUNTY		SHEET NO.
		WALLER		96

DATE:
FILE:

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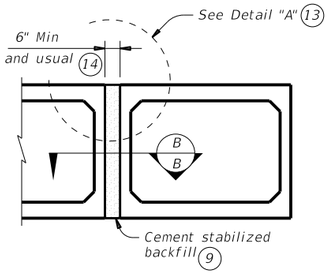
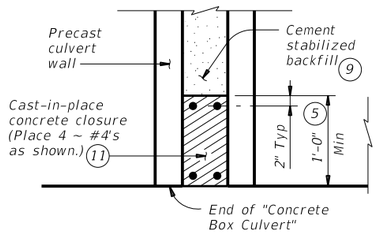
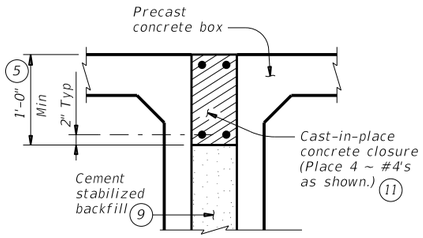
DATE:
FILE:



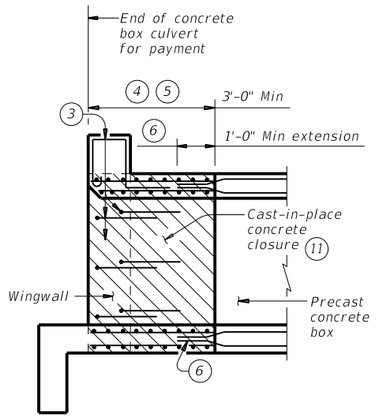
MULTIPLE UNIT PLACEMENT



SECTION B-B

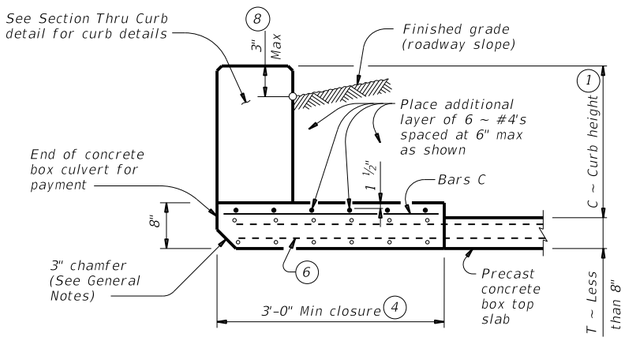


DETAIL "A" (13)

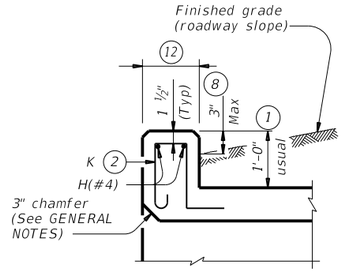


WINGWALL CONNECTION

(Also applies to safety end treatment.)

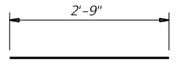


SECTION THRU TOP SLABS LESS THAN 8"

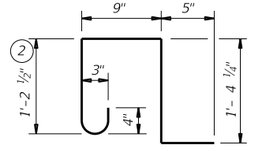


SECTION THRU CURB

QUANTITIES PER FOOT OF CURB (10)	
Reinforcing Steel	4.12 Lb
Concrete	0.037 CY



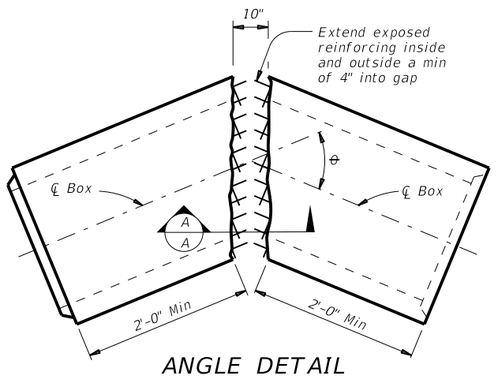
BARS C (#4)
(Spa = 1'–0" Max)



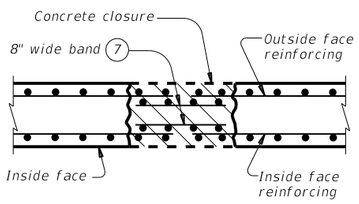
BARS K (#4)
(Spa = 1'–0" Max)
(Length = 4'–2")

1. 0" Min to 5'–0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail, bicycle rail, or curbs taller than 1'–0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631–CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.
2. For curbs less than 1'–0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.
3. Extend curb, wingwall, or safety end treatment reinforcing into concrete closure. Bend or trim, as necessary, any reinforcing that does not fit into closure area.
4. Provide a 3'–0" Min cast–in–place concrete closure. Break back boxes in the field or cast boxes short. Provide bands of reinforcing in the closure that are the same size and spacing as in the precast box section. Provide #4 longitudinal reinforcement spaced at 12 inches Max within the closure. Except where shown otherwise, construct the cast–in–place closure flush with the inside and outside faces of the precast box section.
5. For multiple unit placements, adjust the length of the closure for the interior walls as necessary. Provide a 3'–0" Min cast–in–place closure in the top slab, bottom slab, and exterior wall. See Section B–B detail when interior walls are cast full length.
6. Extend precast box reinforcing a minimum of 1'–0" into concrete closure (Typ).
7. Place bands of reinforcing matching the inside and outside face reinforcing in the gaps of the top and bottom slabs. Place a band matching the outside face reinforcing of the wall in the gaps of the walls (placed in the outside face only). Tack weld the bands to the exposed reinforcing at each point of contact.
8. For vehicle safety, the following requirements must be met:
   - For structures without bridge rail, construct curbs no more than 3" above finished grade.
   - For structures with bridge rail, construct curbs flush with finished grade.

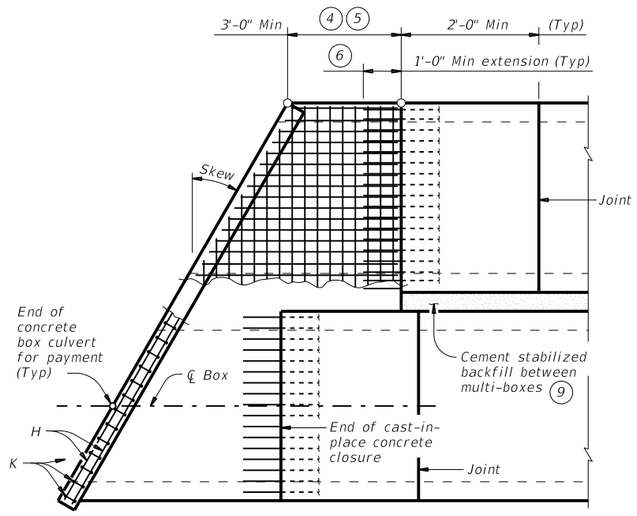
   Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
9. Cement stabilized backfill between boxes is considered part of the box culvert for payment.
10. All curb concrete and reinforcing is considered part of the box culvert for payment.
11. Any additional concrete and reinforcing required for the closures will be considered subsidiary to the box culvert for payment.
12. 1'–0" typical. 2'–3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elsewhere in the plans.
13. For multiple unit placement with overlay, with 1 to 2 course surface treatment, or with the top slab as the final riding surface, provide wall closure as shown in Detail "A".
14. This dimension may be increased with approval of the Engineer to allow the precast boxes to be tunneled or jacked in accordance with Item 476, "Jacking, Boring, or Tunneling Pipe or Box." No payment will be made for any additional material in the gap between adjacent boxes.



ANGLE DETAIL



SECTION A-A



PLAN OF SKEWED ENDS
(Showing multi–box placement.)

MATERIAL NOTES:
Provide Grade 60 reinforcing steel.
Provide ASTM A1064 welded wire reinforcement.
Provide Class C concrete (f'c = 3,600 psi) for the closures.
Provide cement stabilized 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.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

BOX CULVERTS PRECAST MISCELLANEOUS DETAILS

SCP-MD

FILE: SPC-MD.dgn	DN: GAF	CK: LMW	DW: BWH/TxDOT	CK: GAF	
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY	
REVISIONS			23103	DOUBLE CULVERT RD	
	DIST	COUNTY		SHEET NO.	
		WALLER		97	

100% SUBMITTAL

TRAFFIC CONTROL NARRATIVE

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

GENERAL

1. THE PROTECTION AND CONVENIENCE OF THE PUBLIC DURING CONSTRUCTION OF THIS PROJECT ARE OF PRIMARY IMPORTANCE. TRAFFIC MUST BE HANDLED THROUGHOUT THE PROJECT DURING CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING A SAFE AND COMFORTABLE PASSAGE FOR VEHICULAR AND PEDESTRIAN TRAFFIC WITH MINIMAL INCONVENIENCE TO THE PUBLIC, AS SHOWN IN THE PLANS OR AS DIRECTED/APPROVED BY THE COUNTY. AT LOCATIONS WHERE IT IS NECESSARY FOR CONSTRUCTION TRAFFIC TO OPERATE NEAR TRAFFIC, WARNING SIGNS, FLAGGERS, PORTABLE CHANGEABLE MESSAGE SIGNS, AND WHERE NECESSARY, POLICE SHALL BE PROVIDED TO ADEQUATELY PROTECT AND INFORM THE TRAVELING PUBLIC.
2. PRIOR TO ANY WORK THE CONTRACTOR WILL SCHEDULE A PRE-CONSTRUCTION MEETING WITH WALLER COUNTY. THE PRE-CONSTRUCTION MEETING SHOULD BE SCHEDULED 1 WEEK IN ADVANCE OF ALL PROPOSED CONSTRUCTION ACTIVITIES.
3. THE CONTRACTOR MAY PROPOSE/RECOMMEND MODIFICATIONS TO THE SEQUENCE OF WORK FOR CONSIDERATION BY THE COUNTY. ANY MAJOR RECOMMENDED MODIFICATION BY THE CONTRACTOR SHALL INCLUDE ANY CHANGES TO THE VARIOUS BID ITEMS, IMPACT TO TRAFFIC, EFFECT OF OVERALL PROJECT IN TIME AND COST, ETC. IF THIS PROPOSAL IS IMPLEMENTED, THE CONTRACTOR WILL BE RESPONSIBLE FOR DEVELOPING DETAILED PLAN SHEETS TO BE SIGNED AND SEALED BY A LICENSED PROFESSIONAL ENGINEER FOR INCLUSION WITH THE CHANGE ORDER. THE CONTRACTOR CANNOT PROCEED WITH ANY CONSTRUCTION OPERATIONS BASED ON A REVISED PHASE/SEQUENCE UNTIL WRITTEN APPROVAL IS OBTAINED FROM THE COUNTY. IF AT ANYTIME DURING CONSTRUCTION THE CONTRACTOR'S PROPOSED PLAN OF OPERATION FOR HANDLING TRAFFIC DOES NOT PROVIDE FOR SAFE AND COMFORTABLE MOVEMENT, THE CONTRACTOR WILL IMMEDIATELY CHANGE THEIR OPERATION TO CORRECT THE UNSATISFACTORY CONDITION.
4. ALL TEMPORARY TRAFFIC CONTROL DEVICES SHALL CONFORM TO THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD), CURRENT EDITION.
5. DO NOT STORE ANY CONSTRUCTION MATERIAL OR EQUIPMENT AT ANY LOCATION THAT WILL CONSTITUTE A HAZARD AND WILL ENDANGER TRAFFIC. UNLESS THE TRAFFIC CONTROL DEVICES ARE PROTECTING AN ACTIVE CONSTRUCTION SITE, ALL NONESSENTIAL TRAFFIC CONTROL DEVICES SHALL BE REMOVED FROM ROAD VISIBILITY IN ORDER TO PREVENT CONFUSION FOR THE ROAD USER.
6. ACCESS TO ADJOINING PROPERTY MUST BE MAINTAINED AT ALL TIMES. ALL EXISTING DRIVEWAYS WITHIN THE TRAFFIC CONTROL ZONE SHALL REMAIN OPEN AT ALL TIMES UNLESS AGREED BY THE OWNER OF THE DRIVEWAY. ALL AGREEMENTS FOR OFF-SITE DRIVEWAY CLOSURES SHALL BE INCLUDED WITH THE TRAFFIC CONTROL PLAN SUBMITTAL.
7. NO WORK WITHIN THE WALLER COUNTY ROW MAY OCCUR WITHOUT THE FULL IMPLEMENTATION OF THE APPROVED TRAFFIC CONTROL PLAN INTENDED TO PROTECT THAT WORK.
8. NO WORK WITHIN WALLER COUNTY ROW THAT REQUIRES TRENCHING, EXCAVATION, OR DIGGING MAY BE LEFT UNPROTECTED WHEN WORKERS ARE NOT PRESENT. CONTACT WALLER COUNTY TRAFFIC ENGINEERING FOR ACCEPTABLE METHODS OF WORK PROTECTION.
9. NO STAGING OF EQUIPMENT, WORK, MATERIALS, OR WORKERS MAY TAKE PLACE WITHOUT APPROPRIATE TRAFFIC CONTROL IN PLACE.
10. CONTRACTOR IS TO MAINTAIN TEMPORARY DRAINAGE AT ALL TIMES.
11. PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS) PER TMUTCD, WHEN REQUIRED, MUST BE PLACED 14 DAYS IN ADVANCE OF THE WORK BEGINNING AND ANY TRAFFIC CONFIGURATION CHANGES. THE COUNTY SHALL APPROVE THE LOCATION OF THE PCMS PRIOR TO RELOCATING THE PCMS. THE WORDING OF THE PCMS SHALL BE APPROVED BY THE ENGINEER.
12. ALL SEQUENCE OF WORK ON THIS PROJECT SHALL BE COORDINATED TO COINCIDE WITH ANY PROJECTS WITHIN OR ADJACENT TO THIS PROJECT.
13. COVER PERMANENT SIGNS IF NOT USED.
14. TEMPORARY TIE-INS NEEDED TO MAINTAIN ACCESS TO ADJACENT PROPERTIES WILL NOT BE PAID FOR DIRECTLY BUT WILL BE SUBSIDIARY TO PERTINENT ITEMS.
15. CAUTION: UNDERGROUND UTILITIES ARE IN THE AREA. CONTRACTOR TO FIELD VERIFY PRIOR TO CONSTRUCTION.

LANE CLOSURES

1. ALL DETOURS, HORIZONTAL TRAFFIC MOVEMENTS, LANE CLOSURES, ETC. ARE DIRECTLY RELATED TO THE SEQUENCE OF WORK.
2. UNLESS OTHERWISE NOTED IN THE PLANS AND/OR AS DIRECTED BY THE COUNTY, LANE CLOSURES IN ADDITION TO THE CONFIGURATIONS SHOWN IN THE PLANS SHALL BE LIMITED ACCORDING TO THE FOLLOWING RESTRICTIONS:
   a. LANE CLOSURES DURING THE WEEK WILL ONLY BE ALLOWED MONDAY-FRIDAY BETWEEN 9:00AM AND 4:00PM.
   b. NIGHT-TIME LANE CLOSURES WILL NOT BE ALLOWED UNLESS APPROVED BY THE COUNTY AND WITH LAW ENFORCEMENT OFFICERS PRESENT DURING THE CLOSURE.
   c. NO CLOSURES WILL BE PERMITTED BETWEEN DECEMBER 15 AND JANUARY 1.
   d. NO CLOSURES WILL BE PERMITTED WEDNESDAY, THURSDAY, FRIDAY, SATURDAY, AND SUNDAY OF THANKSGIVING.
   e. NO CLOSURES WILL BE PERMITTED THE SATURDAY AND SUNDAY BEFORE MEMORIAL DAY AND LABOR DAY.
   f. NO CLOSURES WILL BE PERMITTED ON THE ADJACENT SATURDAY OR SUNDAY WHEN JULY 4TH FALLS ON A FRIDAY OR MONDAY.
   g. ADVANCE NOTIFICATION OF LANE CLOSURES SHALL BE POSTED VIA PORTABLE CHANGEABLE MESSAGE SIGNS 5 DAYS IN ADVANCE OF ANY WORK.
3. FOR ALL DETOURS, PLACE MESSAGE BOARDS AND ADVANCE WARNING SIGNS 14 DAYS IN ADVANCE TO ADVISE TRAFFIC.

SAFETY

1. THE CONTRACTOR WILL PROVIDE, CONSTRUCT, AND MAINTAIN BARRICADES AND SIGNS IN ACCORDANCE WITH STATE STANDARDS BC (1-12)-21. ANY SIGNS REQUIRED THAT ARE NOT DETAILED IN THE STANDARD SHEETS SHALL BE IN CONFORMANCE WITH THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS" AND THE "STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS."
2. BARRICADES AND WARNING SIGNS SHALL BE PLACED AS INDICATED ON THE PLANS. THIS SHALL BE CONSIDERED THE MINIMUM REQUIRED TO PROVIDE FOR THE SAFETY OF TRAFFIC DURING CONSTRUCTION THE CONTRACTOR SHALL PROVIDE AND MAINTAIN OTHER SUCH BARRICADES AND SIGNS DEEMED NECESSARY BY THE COUNTY OR AS DIRECTED BY FIELD CONDITIONS, TO PROVIDE FOR THE PASSAGE OF TRAFFIC IN SAFETY AT ALL TIMES.
3. THE CONTRACTOR SHALL KEEP THE ROADWAY CLEAN AND FREE OF DIRT OR OTHER MATERIALS DURING HAULING OPERATIONS. IF THE CONTRACTOR DOES NOT MAINTAIN A CLEAN ROADWAY, THEY SHALL CEASE ALL CONSTRUCTION OPERATIONS WHEN DIRECTED TO CLEAN THE ROADWAY TO THE SATISFACTION OF THE COUNTY.
4. CONTRACTOR SHALL PROVIDE 3:1 SAFETY EDGES AT END OF EACH WORK DAY.

HAULING EQUIPMENT

THE USE OF RUBBER-TIRED EQUIPMENT WILL BE REQUIRED FOR MOVING DIRT OR OTHER MATERIALS ALONG OR ACROSS PAVEMENTED SURFACES. WHERE THE CONTRACTOR DESIRES TO MOVE ANY EQUIPMENT NOT LICENSED FOR OPERATION ON PUBLIC HIGHWAYS, ON OR ACROSS PAVEMENT, THEY SHALL PROTECT THE PAVEMENT FROM DAMAGE AS DIRECTED/APPROVED BY THE COUNTY. THROUGHOUT CONSTRUCTION OPERATIONS, THE CONTRACTOR WILL BE REQUIRED TO CONDUCT THEIR HAULING OPERATIONS IN A MANNER SUCH THAT VEHICLES WILL NOT HAUL OVER PREVIOUSLY RECOMPACTED SUBGRADE OR COMPACTED BASE MATERIAL, EXCEPT IN SHORT SECTIONS FOR DUMPING MANIPULATIONS.

PAYMENT

ALL BARRICADES, SIGNS, AND FLAGGERS SHALL BE SUBSIDIARY TO ITEM 502 BARRICADES, SIGNS, AND TRAFFIC HANDLING. ALL OTHER WORK AND MATERIALS SHALL BE SUBSIDIARY TO THE VARIOUS BID ITEMS UNLESS OTHERWISE INDICATED IN THE PLANS.

TEMPORARY PAVEMENT PLACED IN PHASE 0 SHALL BE REMOVED BY MILLING ONCE TRAFFIC IS SHIFTED ONTO THE PAVEMENT THAT IS CONSTRUCTED IN PHASE 1. MILLINGS WILL REMAIN PROPERTY OF THE COUNTY AND DELIVERED TO THE LOCATIONS IDENTIFIED IN THE GENERAL NOTES (NOTE #17). PAYMENT FOR THIS WORK IS INCLUDED IN ITEM 697 CONSTRUCTING DETOURS.

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
PHILIP M. BARNES
84571
LICENSED
PROFESSIONAL ENGINEER

Philip M. Barnes
7/22/2026

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS
WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

TRAFFIC CONTROL PLAN NARRATIVE

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD

DIST	COUNTY	SHEET NO.
	WALLER	98

DATE: 7/22/2026 3:19:18 PM
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100% SUBMITTAL

SEQUENCE OF WORK

1. THIS PROJECT WILL BE CONSTRUCTED IN THREE PHASES EACH FOR DOUBLE CULVERT ROAD SEGMENT 2 AND CEDAR CREEK ROAD. BEFORE COMMENCEMENT OF EACH PHASE, INSTALL ADVANCE WARNING SIGNS, TEMPORARY SIGNS AND BARRICADES AS SHOWN ON THE PLANS AND/OR AS DIRECTED/APPROVED BY THE COUNTY. CONSTRUCTION OF DOUBLE CULVERT ROAD AND CEDAR CREEK ROAD CAN NOT BE PERFORMED CONCURRENTLY.
2. PREPARING ROW AND/OR REMOVAL OF EXISTING ITEMS IS TO BE DONE ONLY IN AREAS WHERE WORK IS OCCURING, AS PER THE PHASES NOTED BELOW.
3. APPROVED TxDOT STANDARDS AND THE INCLUDED TCP TYPICAL SECTION CONFIGURATIONS SHALL BE USED.
4. THIS PROJECT WILL BE CONSTRUCTED IN THREE PHASES. THE PHASE 0 WORK ZONE IS CONSIDERED ROLLING AND WILL BE LIMITED IN LENGTH SUCH THAT THE WORK IS COMPLETED AND THE ROADWAY OPEN TO TWO-WAY TRAFFIC AT THE END OF EACH WORKDAY. TCP(1-2)-18 ONE-LANE TWO-WAY OPERATION WITH FLAGGERS WILL BE USED FOR TRAFFIC CONTROL ON A DAILY BASIS DURING THIS PHASE.
5. DETOURS AS SHOWN IN THE APPLICABLE PHASE 1 AND 2 DETOUR LAYOUTS FOR DOUBLE CULVERT ROAD AND CEDAR CREEK ROAD SHALL BE IMPLEMENTED AND MAINTAINED THROUGHOUT PHASES 1 AND 2 OF CONSTRUCTION FOR EACH ROADWAY.
6. PROPOSED SPEED THROUGH CONSTRUCTON ZONE TO BE REDUCED FROM 45 MPH TO 30 MPH FOR THE DURATION OF PHASES 1 AND 2 OF EACH ROADWAY.
7. A BRIEF DESCRIPTION OF THE THREE PHASES FOR EACH ROADWAY ARE AS FOLLOWS:

DOUBLE CULVERT ROAD SEGMENT 2:

PHASE 0 – INSTALL CROSS-CULVERTS AND TEMPORARY PAVEMENT ON THE WEST SIDE OF DOUBLE CULVERT ROAD TO MAINTAIN A 10' TRAVEL LANE DURING PHASE 1.TEMPORARY PAVEMENT WILL BE INSTALLED DURING NON-PEAK HOURS IN ACCORDANCE WITH FLAGGER OPERATION.

PHASE 1 – CONSTRUCT ROADWAY ON THE EAST SIDE OF DOUBLE CULVERT ROAD CENTERLINE, AND ANY ASSOCIATED IMPROVEMENTS TO THE EAST SIDE ROW.

PHASE 2 – CONSTRUCT ROADWAY ON THE WEST SIDE OF DOUBLE CULVERT ROAD CENTERLINE, AND ANY ASSOCIATED IMPROVEMENTS TO THE WEST SIDE ROW.

CEDAR CREEK ROAD:

PHASE 0 – INSTALL CROSS-CULVERTS AND TEMPORARY PAVEMENT ON THE NORTH SIDE OF CEDAR CREEK ROAD TO MAINTAIN AN 11' TRAVEL LANE DURING PHASE 1. TEMPORARY PAVEMENT WILL BE INSTALLED DURING NON-PEAK HOURS IN ACCORDANCE WITH FLAGGER OPERATION.

PHASE 1 – CONSTRUCT ROADWAY ON THE SOUTH SIDE OF DOUBLE CULVERT ROAD CENTERLINE, AND ANY ASSOCIATED IMPROVEMENTS TO THE SOUTH SIDE ROW.

PHASE 2 – CONSTRUCT ROADWAY ON THE NORTH SIDE OF DOUBLE CULVERT ROAD CENTERLINE, AND ANY ASSOCIATED IMPROVEMENTS TO THE NORTH SIDE ROW.

DOUBLE CULVERT ROAD SEGMENT 2

PHASE 0

THE INTENT OF THIS PHASE IS TO INSTALL CROSS-DRAINAGE STRUCTURES AND CONSTRUCT TEMPORARY PAVEMENT ON DOUBLE CULVERT ROAD

1. MOBILIZATION
2. SET UP ADVANCE WARNING SIGNS AND TRAFFIC CONTROL DEVICES PER PLANS
3. PLACE TEMPORARY EROSION CONTROL DEVICES
4. INSTALL CROSS-DRAINAGE STRUCTURES (HALF-WIDTH AT A TIME)
5. CONSTRUCT TEMPORARY PAVEMENT ON THE WEST SIDE OF THE ROAD AS SHOWN IN THE PLANS. MATCH EXISTING CROSS SLOPE FOR TEMPORARY PAVEMENT. CONTRACTOR TO CLOSE THE LANE ADJACENT TO TEMPORARY PAVEMENT DURING NON-PEAK HOURS IN ACCORDANCE WITH TCP (1-2)-18 ONE LANE TWO-WAY TRAFFIC OPERATION WITH FLAGGERS. CONTRACTOR TO MAINTAIN POSITIVE DRAINAGE AT ALL TIMES. BEGIN WORK AT CEDAR CREEK ROAD AND PROCEED SOUTH.
6. LIMIT THE WORK ZONE TO A LENGTH THAT CAN BE COMPLETED, PROTECTED BY 3:1 SAFETY SLOPES, AND OPENED TO TRAFFIC AT THE END OF EACH WORKING DAY.

PHASE 1

THE INTENT OF THIS PHASE IS TO CONSTRUCT THE PROPOSED ROADBED ON THE EAST SIDE OF DOUBLE CULVERT ROAD

1. ADJUST TEMPORARY EROSION CONTROL DEVICES, BARRICADES AND SIGNS AS NEEDED.
2. PLACE SIGNS FOR DETOUR AS SHOWN ON THE PHASE 1 DETOUR PLAN SHEETS FOR DOUBLE CULVERT ROAD.
3. PLACE TRAFFIC CONTROL CHANNELIZING DEVICES AS SHOWN IN THE PLANS. REMOVE ANY EXISTING PAVEMENT MARKINGS OR SIGNS IN CONFLICT WITH THE TEMPORARY WORK ZONE MARKINGS OR SIGNS FOR THIS PHASE.
4. SHIFT TRAFFIC AS SHOWN IN THE PLANS, MAINTAINING ONE LANE OF TRAFFIC FLOWING SOUTHBOUND.
5. CONSTRUCT PROPOSED IMPROVEMENTS ON THE EAST SIDE OF DOUBLE CULVERT ROAD AS SHOWN IN THE PLANS. CONSTRUCT DRIVEWAYS IN TWO-STEP CONSTRUCTION, MAINTAINING ACCESS AT ALL TIMES. ANY ADDITIONAL TEMPORARY PAVEMENT OR DRAINAGE MEASURES WILL BE SUBSIDIARY TO PERTINENT ITEMS.

PHASE 2

THE INTENT OF THIS PHASE IS TO CONSTRUCT THE PROPOSED ROADBED ON THE WEST SIDE OF DOUBLE CULVERT ROAD

1. ADJUST TEMPORARY EROSION CONTROL DEVICES, BARRICADES AND SIGNS AS NEEDED.
2. PLACE TRAFFIC CONTROL CHANNELIZING DEVICES AS SHOWN IN THE PLANS. REMOVE ANY EXISTING PAVEMENT MARKINGS OR SIGNS IN CONFLICT WITH THE TEMPORARY WORK ZONE MARKINGS OR SIGNS FOR THIS PHASE.
3. SHIFT TRAFFIC AS SHOWN IN THE PLANS, MAINTAINING ONE LANE OF TRAFFIC FLOWING SOUTHBOUND.
4. CONSTRUCT PROPOSED IMPROVEMENTS ON THE WEST SIDE OF DOUBLE CULVERT ROAD AS SHOWN IN THE PLANS. CONSTRUCT DRIVEWAYS IN TWO-STEP CONSTRUCTION, MAINTAINING ACCESS AT ALL TIMES. ANY ADDITIONAL TEMPORARY PAVEMENT OR DRAINAGE MEASURES WILL BE SUBSIDIARY TO PERTINENT ITEMS. BEGIN WORK AT SH 6 AND PROCEED WEST.
5. PLACE FINAL PAVEMENT MARKINGS AND MARKERS AS SHOWN IN THE PLANS.
6. PLACE PERMANENT SIGNS AS SHOWN IN THE PLANS.

CEDAR CREEK ROAD

PHASE 0

THE INTENT OF THIS PHASE IS TO INSTALL CROSS-DRAINAGE STRUCTURES AND CONSTRUCT TEMPORARY PAVEMENT ON CEDAR CREEK ROAD

1. MOBILIZATION
2. SET UP ADVANCE WARNING SIGNS AND TRAFFIC CONTROL DEVICES PER PLANS
3. PLACE TEMPORARY EROSION CONTROL DEVICES
4. INSTALL CROSS-DRAINAGE STRUCTURES (HALF-WIDTH AT A TIME)
5. CONSTRUCT TEMPORARY PAVEMENT ON THE NORTH SIDE OF THE ROAD AS SHOWN IN THE PLANS. MATCH EXISTING CROSS SLOPE FOR TEMPORARY PAVEMENT. CONTRACTOR TO CLOSE THE LANE ADJACENT TO TEMPORARY PAVEMENT DURING NON-PEAK HOURS IN ACCORDANCE WITH TCP (1-2)-18 ONE LANE TWO-WAY TRAFFIC OPERATION WITH FLAGGERS. CONTRACTOR TO MAINTAIN POSITIVE DRAINAGE AT ALL TIMES.
6. LIMIT THE WORK ZONE TO A LENGTH THAT CAN BE COMPLETED, PROTECTED BY 3:1 SAFETY SLOPES, AND OPENED TO TRAFFIC AT THE END OF EACH WORKING DAY.

PHASE 1

THE INTENT OF THIS PHASE IS TO CONSTRUCT THE PROPOSED ROADBED ON THE SOUTH SIDE OF CEDAR CREEK ROAD

1. ADJUST TEMPORARY EROSION CONTROL DEVICES, BARRICADES AND SIGNS AS NEEDED.
2. PLACE SIGNS FOR DETOUR AS SHOWN ON THE PHASE 1 DETOUR PLAN SHEETS FOR CEDAR CREEK ROAD.
3. PLACE TRAFFIC CONTROL CHANNELIZING DEVICES AS SHOWN IN THE PLANS. REMOVE ANY EXISTING PAVEMENT MARKINGS OR SIGNS IN CONFLICT WITH THE TEMPORARY WORK ZONE MARKINGS OR SIGNS FOR THIS PHASE.
4. SHIFT TRAFFIC AS SHOWN IN THE PLANS, MAINTAINING ONE LANE OF TRAFFIC FLOWING SOUTHBOUND.
5. CONSTRUCT PROPOSED IMPROVEMENTS ON THE SOUTH SIDE OF CEDAR CREEK ROAD AS SHOWN IN THE PLANS. CONSTRUCT DRIVEWAYS IN TWO-STEP CONSTRUCTION, MAINTAINING ACCESS AT ALL TIMES. ANY ADDITIONAL TEMPORARY PAVEMENT OR DRAINAGE MEASURES WILL BE SUBSIDIARY TO PERTINENT ITEMS.

PHASE 2

THE INTENT OF THIS PHASE IS TO CONSTRUCT THE PROPOSED ROADBED ON THE NORTH SIDE OF CEDAR CREEK ROAD

1. ADJUST TEMPORARY EROSION CONTROL DEVICES, BARRICADES AND SIGNS AS NEEDED.
2. PLACE TRAFFIC CONTROL CHANNELIZING DEVICES AS SHOWN IN THE PLANS. REMOVE ANY EXISTING PAVEMENT MARKINGS OR SIGNS IN CONFLICT WITH THE TEMPORARY WORK ZONE MARKINGS OR SIGNS FOR THIS PHASE.
3. SHIFT TRAFFIC AS SHOWN IN THE PLANS, MAINTAINING ONE LANE OF TRAFFIC FLOWING SOUTHBOUND.
4. CONSTRUCT PROPOSED IMPROVEMENTS ON THE WEST SIDE OF DOUBLE CULVERT ROAD AS SHOWN IN THE PLANS. CONSTRUCT DRIVEWAYS IN TWO-STEP CONSTRUCTION, MAINTAINING ACCESS AT ALL TIMES. ANY ADDITIONAL TEMPORARY PAVEMENT OR DRAINAGE MEASURES WILL BE SUBSIDIARY TO PERTINENT ITEMS.
5. PLACE FINAL PAVEMENT MARKINGS AND MARKERS AS SHOWN IN THE PLANS.
6. PLACE PERMANENT SIGNS AS SHOWN IN THE PLANS

FINAL CLEAN-UP

UPON COMPLETION OF THE WORK AND BEFORE FINAL ACCEPTANCE AND FINAL PAYMENT IS MADE, THE CONTRACTOR SHALL CLEAR AND REMOVE FROM THE SITE SURPLUS AND DISCARDED MATERIALS AND DEBRIS OF EVERY KIND AND LEAVE THE PROJECT IN A SMOOTH, NEAT AND SIGHTLY CONDITION.

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
PHILIP M. BARNES
84571
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Philip M. Barnes
7/21/2026

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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

TRAFFIC CONTROL PLAN NARRATIVE

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		99

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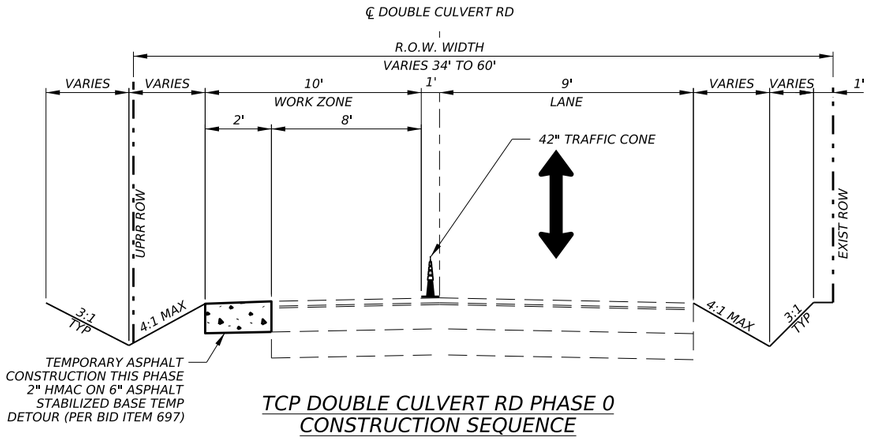
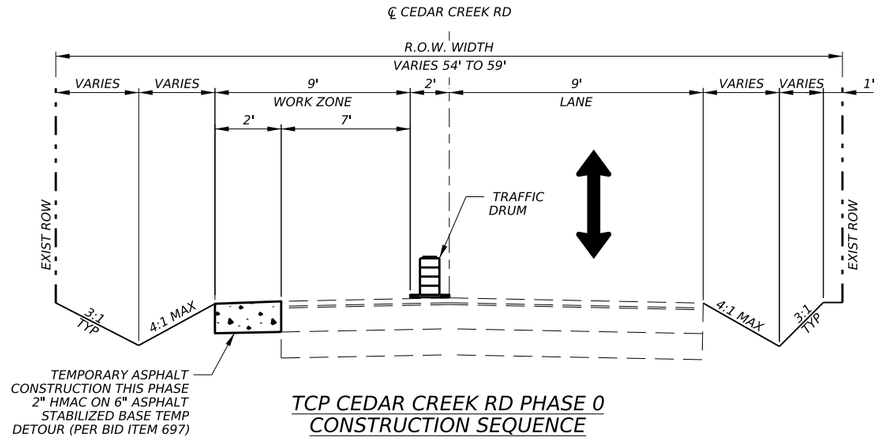


TCP DOUBLE CULVERT RD PHASE 0 CONSTRUCTION SEQUENCE

STA 118+45.00 TO STA 185+68.87

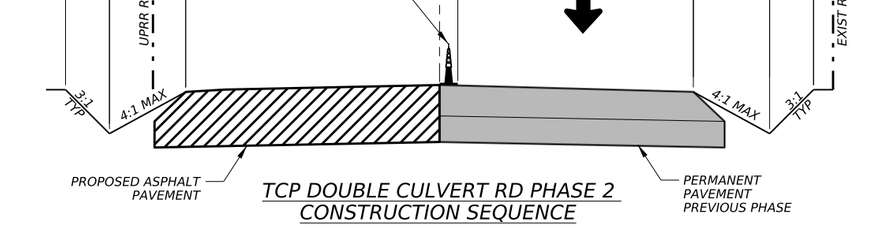


TCP CEDAR CREEK RD PHASE 0 CONSTRUCTION SEQUENCE

STA 1+67.30 TO STA 49+65.41

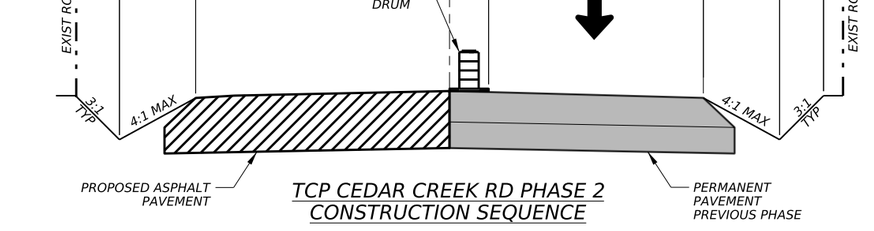
LEGEND

- EXISTING ROW
- TEMPORARY PAVEMENT CONSTRUCTION THIS PHASE
- PERMANENT PAVEMENT CONSTRUCTION THIS PHASE
- TEMPORARY PAVEMENT CONSTRUCTION PREVIOUS PHASE
- PERMANENT PAVEMENT CONSTRUCTION PREVIOUS PHASE
- PLASTIC DRUM
- 42" TRAFFIC CONE



TCP DOUBLE CULVERT RD PHASE 1 CONSTRUCTION SEQUENCE

STA 118+45.00 TO STA 185+68.87



TCP CEDAR CREEK RD PHASE 1 CONSTRUCTION SEQUENCE

STA 1+67.30 TO STA 49+65.41

TCP DOUBLE CULVERT RD PHASE 2 CONSTRUCTION SEQUENCE

STA 118+45.00 TO STA 185+68.87

TCP CEDAR CREEK RD PHASE 2 CONSTRUCTION SEQUENCE

STA 1+67.30 TO STA 49+65.41

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

TRAFFIC CONTROL PLAN TYPICAL SECTIONS

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		100

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LEGEND

- WORK ZONE
- TRAFFIC FLOW
- SIGN

1. DOUBLE CULVERT RD / DETOUR — M4-9L (48X36)
2. DOUBLE CULVERT RD / DETOUR — M4-9R (48X36)
3. DOUBLE CULVERT RD / DETOUR — M4-9S (48X36)
4. END DETOUR — M4-8a (24X18)
5. ROAD CLOSED 2 MILE / DOUBLE CULVERT RD — CW20-3F (36"X36")

NOTES:

1. TWO WEEKS PRIOR TO CONSTRUCTION CONTRACTOR TO PLACE ELECTRONIC DMS ON DOUBLE CULVERT ROAD TO NOTIFY DRIVERS OF FUTURE LANE CLOSURES

0 375' 750'

SCALE: 1" = 750'

MATCHLINE A

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY

ENGINEERING DEPARTMENT

TRAFFIC CONTROL PLAN
DETOUR LAYOUT
DOUBLE CULVERT RD

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		101

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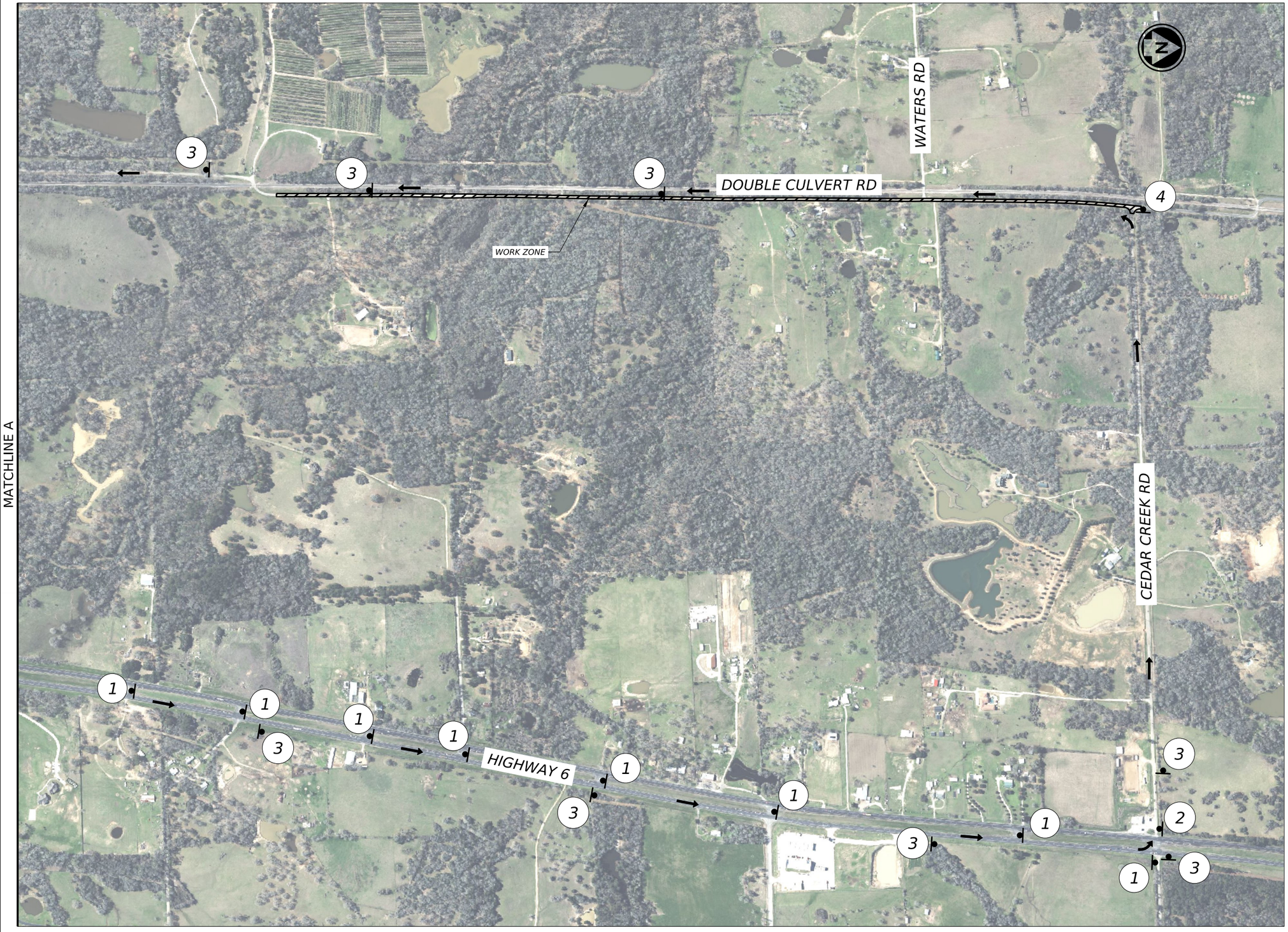

MATCHLINE A

LEGEND

- WORK ZONE
- TRAFFIC FLOW
- SIGN

1. DOUBLE CULVERT RD / DETOUR — M4-9L (48X36)
2. DOUBLE CULVERT RD / DETOUR — M4-9R (48X36)
3. DOUBLE CULVERT RD / DETOUR — M4-9S (48X36)
4. END DETOUR — M4-8a (24X18)
5. ROAD CLOSED 2 MILE / DOUBLE CULVERT RD — CW20-3F (36"X36")

NOTES:

1. TWO WEEKS PRIOR TO CONSTRUCTION CONTRACTOR TO PLACE ELECTRONIC DMS ON DOUBLE CULVERT ROAD TO NOTIFY DRIVERS OF FUTURE LANE CLOSURES

0 375' 750'

SCALE: 1" = 750'

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS — PHILIP M. BARNES — 84571 — LICENSED PROFESSIONAL ENGINEER

Philip M. Barnes
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THE STATE OF TEXAS — WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

TRAFFIC CONTROL PLAN
DETOUR LAYOUT
DOUBLE CULVERT RD

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		102

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LEGEND

- WORK ZONE
- TRAFFIC FLOW
- SIGN

1	CEDAR CREEK RD / DETOUR ←	M4-9L (48X36)
2	CEDAR CREEK RD / DETOUR →	M4-9R (48X36)
3	CEDAR CREEK RD / DETOUR ↑	M4-9S (48X36)
4	END DETOUR	M4-8a (24X18)
5	ROAD CLOSED 3 MILE; CEDAR CREEK RD	CW20-3F (36"X36")

NOTES:

1. TWO WEEKS PRIOR TO CONSTRUCTION CONTRACTOR TO PLACE ELECTRONIC DMS ON CEDAR CREEK ROAD TO NOTIFY DRIVERS OF FUTURE LANE CLOSURES

0 375' 750'

SCALE: 1" = 750'

MATCHLINE A

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
PHILIP M. BARNES
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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

TRAFFIC CONTROL PLAN
DETOUR LAYOUT
CEDAR CREEK RD

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		103

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MATCHLINE A

DOUBLE CULVERT RD

WATERS RD

HIGHWAY 6

CEDAR CREEK RD

WORK ZONE

LEGEND

- WORK ZONE
- TRAFFIC FLOW
- SIGN

1	CEDAR CREEK RD / DETOUR ←	M4-9L (48X36)
2	CEDAR CREEK RD / DETOUR →	M4-9R (48X36)
3	CEDAR CREEK RD / DETOUR ↑	M4-9S (48X36)
4	END DETOUR	M4-8a (24X18)
5	ROAD CLOSED 3 MILE / CEDAR CREEK RD	CW20-3F (36"X36")

NOTES:

1. TWO WEEKS PRIOR TO CONSTRUCTION CONTRACTOR TO PLACE ELECTRONIC DMS ON CEDAR CREEK ROAD TO NOTIFY DRIVERS OF FUTURE LANE CLOSURES

0 375' 750'

SCALE: 1" = 750'

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FIRM REGISTRATION NUMBER: 17252

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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

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ENGINEERING DEPARTMENT

TRAFFIC CONTROL PLAN
DETOUR LAYOUT
CEDAR CREEK RD

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		104

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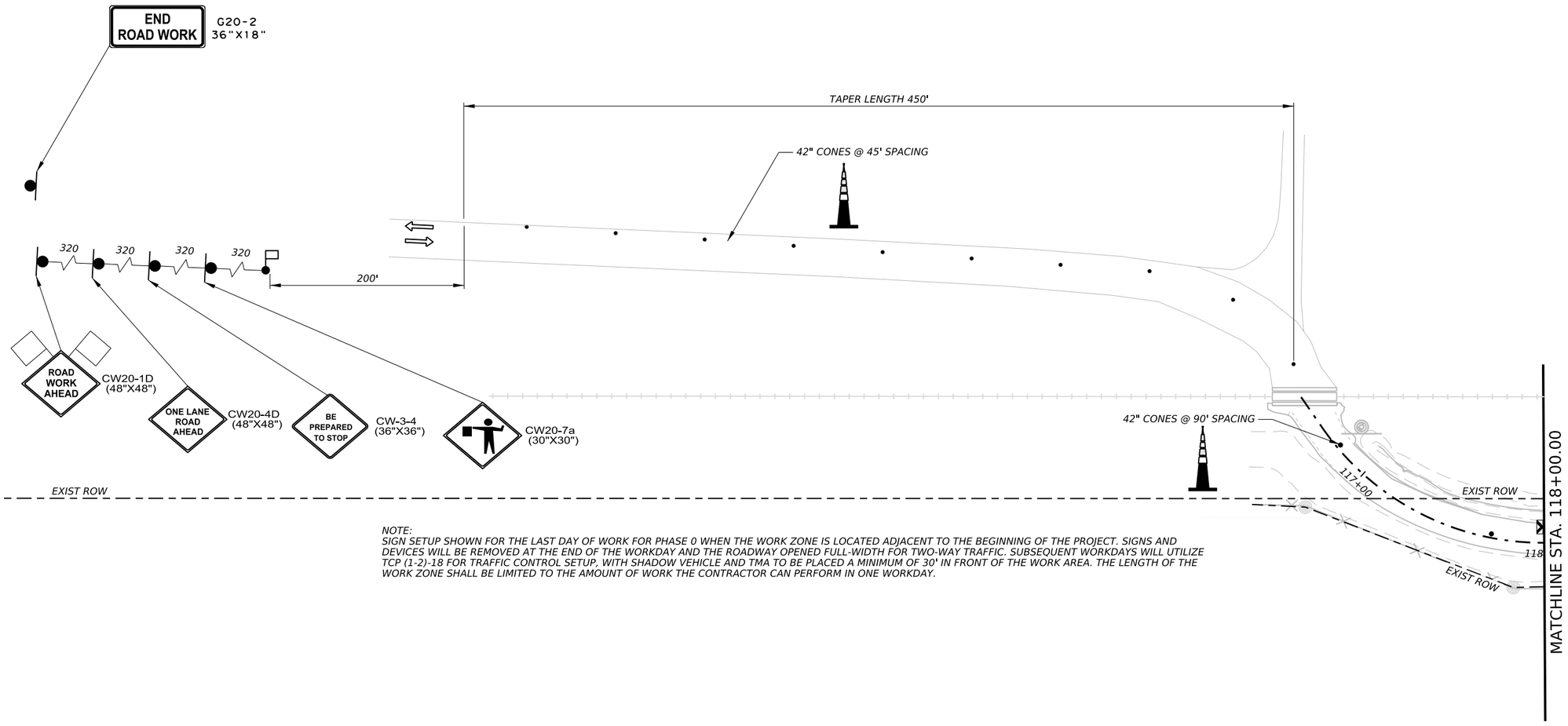

NOTE:
SIGN SETUP SHOWN FOR THE LAST DAY OF WORK FOR PHASE 0 WHEN THE WORK ZONE IS LOCATED ADJACENT TO THE BEGINNING OF THE PROJECT. SIGNS AND DEVICES WILL BE REMOVED AT THE END OF THE WORKDAY AND THE ROADWAY OPENED FULL-WIDTH FOR TWO-WAY TRAFFIC. SUBSEQUENT WORKDAYS WILL UTILIZE TCP (1-2)-18 FOR TRAFFIC CONTROL SETUP, WITH SHADOW VEHICLE AND TMA TO BE PLACED A MINIMUM OF 30' IN FRONT OF THE WORK AREA. THE LENGTH OF THE WORK ZONE SHALL BE LIMITED TO THE AMOUNT OF WORK THE CONTRACTOR CAN PERFORM IN ONE WORKDAY.

LEGEND

- EXISTING ROW
- TEMPORARY ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION (PREVIOUS PHASE)
- TEMPORARY ASPHALT PAVEMENT (PREVIOUS PHASE)
- EXISTING DIRECTION OF TRAFFIC
- PROPOSED DIRECTION OF TRAFFIC
- SIGN
- CHANNELIZING DEVICE
- TYPE III BARRICADE
- PROPOSED DITCH FLOWLINE
- UPRR CENTERLINE

NOTES:

1. CONTRACTOR TO PLAN WORK SUCH THAT ROAD IS FULLY OPEN TO TRAFFIC AT END OF EACH WORK DAY
2. UTILIZE TCP (1-2)-18 ONE LANE TWO WAY CONTROL WITH FLAGGERS
3. TEMPORARY PAVEMENT TO HAVE 2' MINIMUM PAVEMENT

0 30' 60'
SCALE: 1" = 60'

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
PHILIP M. BARNES
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Philip M. Barnes
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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

TRAFFIC CONTROL PLAN
DOUBLE CULVERT RD
PHASE 0
BEGIN TO STA 118+00.00

SHEET 1 OF 7

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		105

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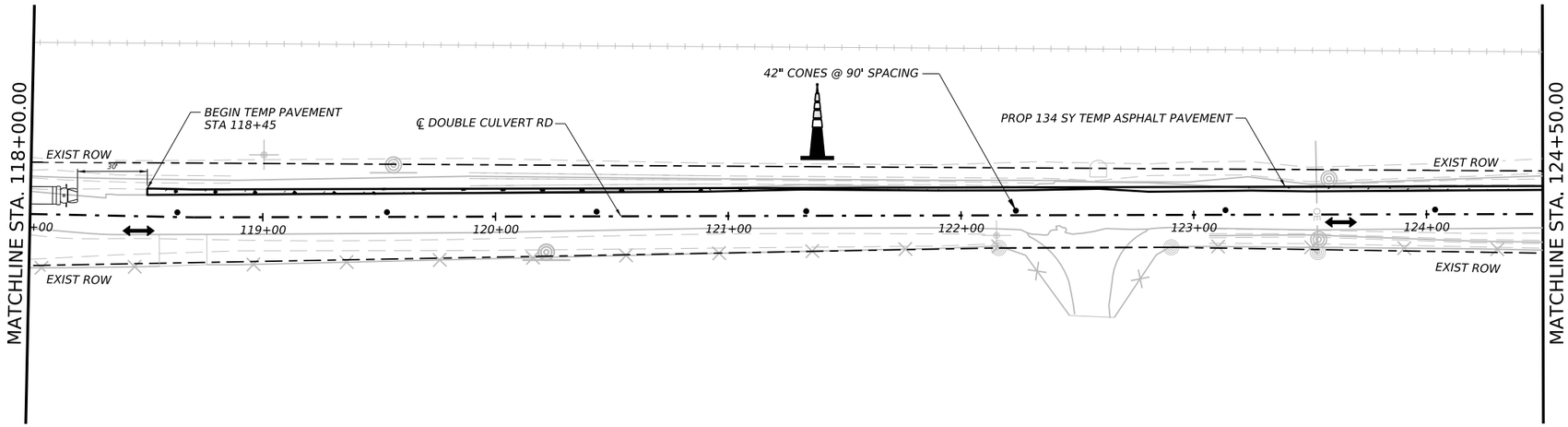

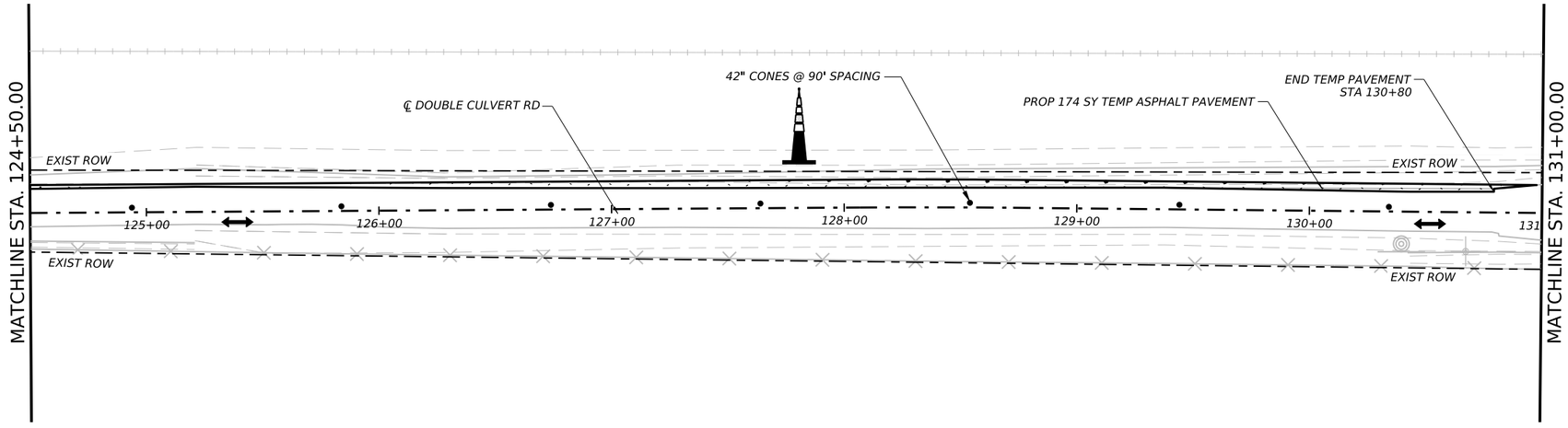

LEGEND

- EXISTING ROW
- TEMPORARY ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION (PREVIOUS PHASE)
- TEMPORARY ASPHALT PAVEMENT (PREVIOUS PHASE)
- EXISTING DIRECTION OF TRAFFIC
- PROPOSED DIRECTION OF TRAFFIC
- SIGN
- CHANNELIZING DEVICE
- TYPE III BARRICADE
- PROPOSED DITCH FLOWLINE
- UPRR CENTERLINE

NOTES:

1. CONTRACTOR TO PLAN WORK SUCH THAT ROAD IS FULLY OPEN TO TRAFFIC AT END OF EACH WORK DAY
2. UTILIZE TCP (1-2)-18 ONE LANE TWO WAY CONTROL WITH FLAGGERS
3. TEMPORARY PAVEMENT TO HAVE 2' MINIMUM PAVEMENT

0 30' 60'
SCALE: 1" = 60'

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
PHILIP M. BARNES
84571
LICENSED PROFESSIONAL ENGINEER

Philip M. Barnes
7/22/2026

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

TRAFFIC CONTROL PLAN
DOUBLE CULVERT RD
PHASE 0
STA 118+00.00 TO STA 131+50.00

SHEET 2 OF 7

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		106

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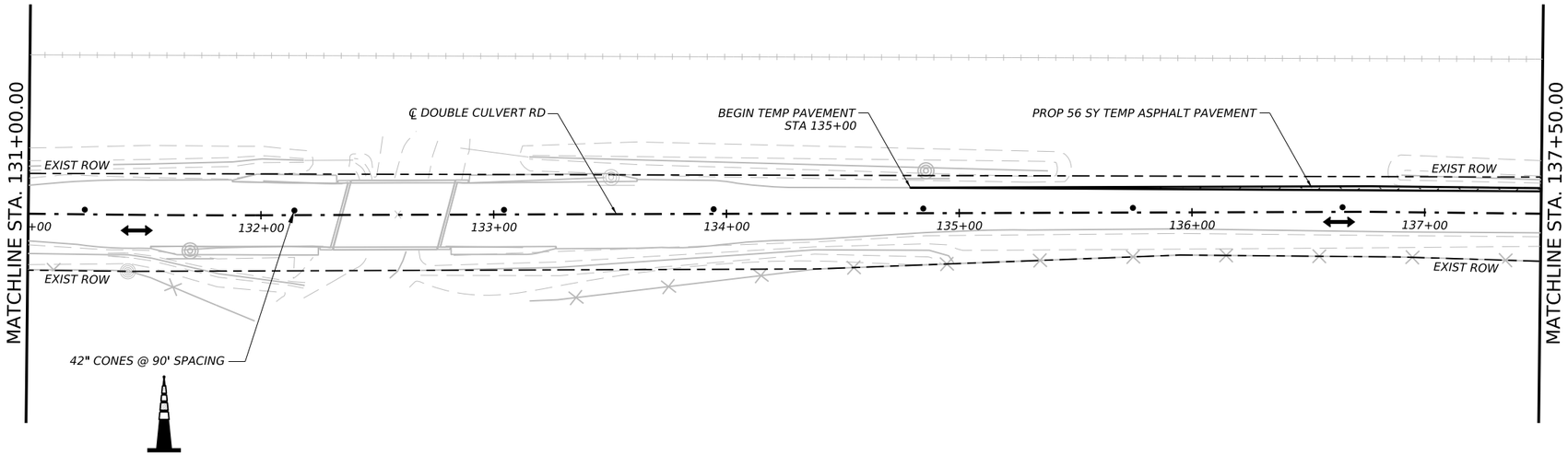

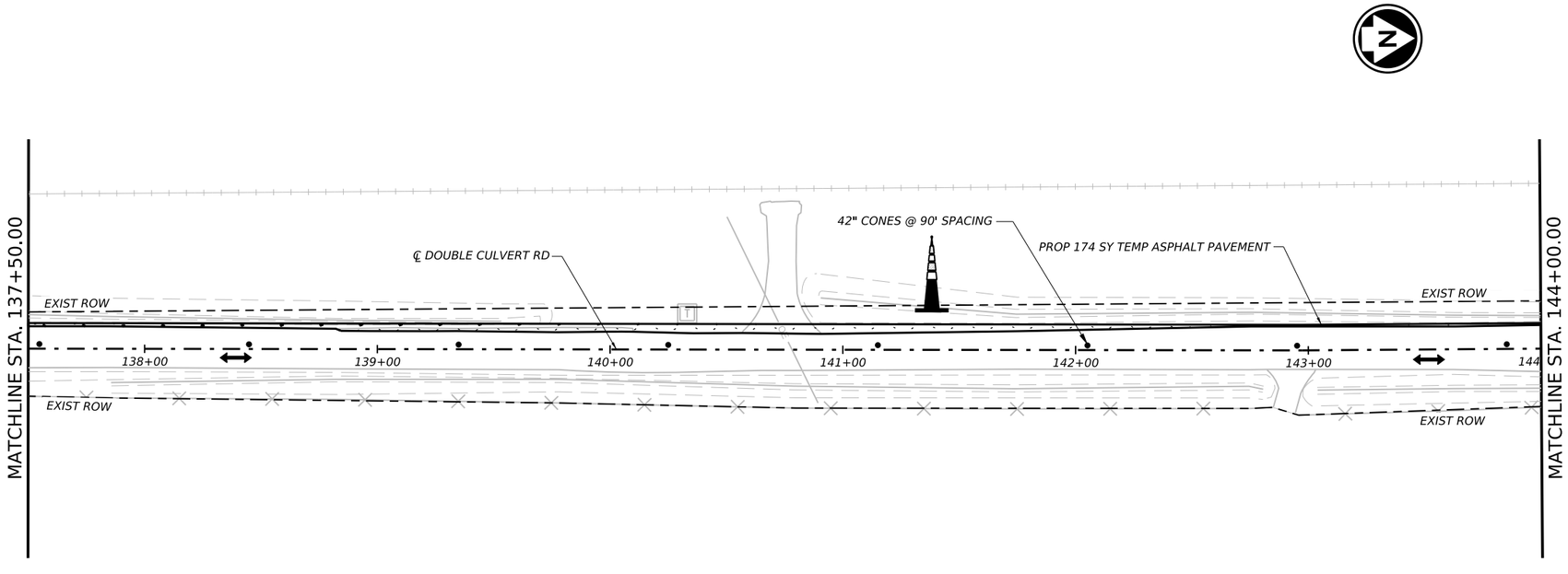

LEGEND

- EXISTING ROW
- TEMPORARY ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION (PREVIOUS PHASE)
- TEMPORARY ASPHALT PAVEMENT (PREVIOUS PHASE)
- EXISTING DIRECTION OF TRAFFIC
- PROPOSED DIRECTION OF TRAFFIC
- SIGN
- CHANNELIZING DEVICE
- TYPE III BARRICADE
- PROPOSED DITCH FLOWLINE
- UPRR CENTERLINE

NOTES:

1. CONTRACTOR TO PLAN WORK SUCH THAT ROAD IS FULLY OPEN TO TRAFFIC AT END OF EACH WORK DAY
2. UTILIZE TCP (1-2)-18 ONE LANE TWO WAY CONTROL WITH FLAGGERS
3. TEMPORARY PAVEMENT TO HAVE 2' MINIMUM PAVEMENT

0 30' 60'
SCALE: 1" = 60'

NO.	DATE	REVISION	APPROV.

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ENGINEERING DEPARTMENT

TRAFFIC CONTROL PLAN
DOUBLE CULVERT RD
PHASE 0
STA 131+50.00 TO STA 144+00.00
SHEET 3 OF 7

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		107

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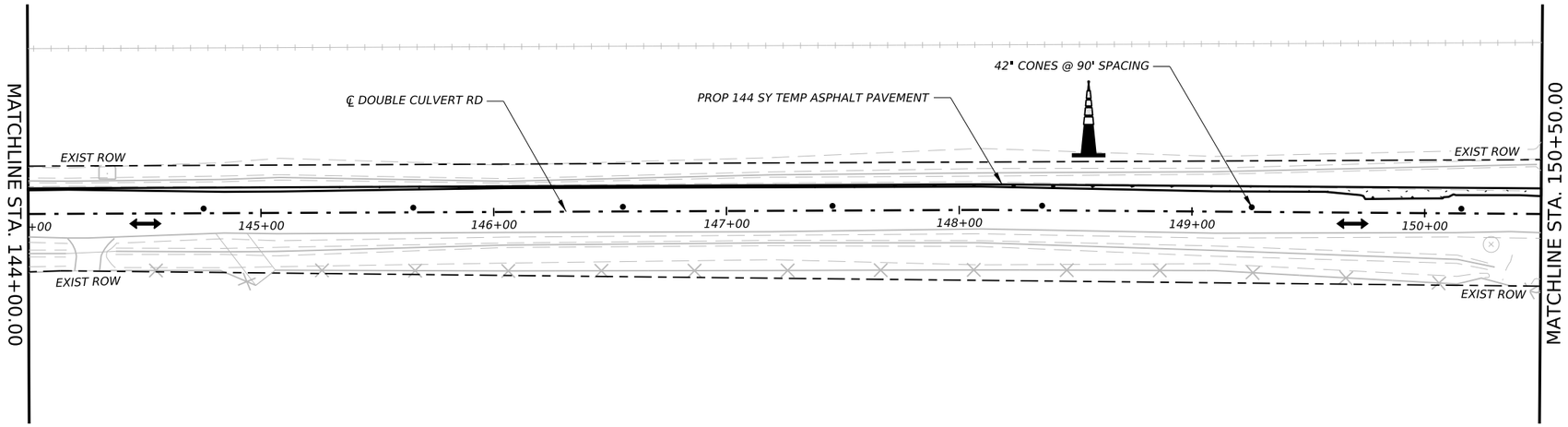

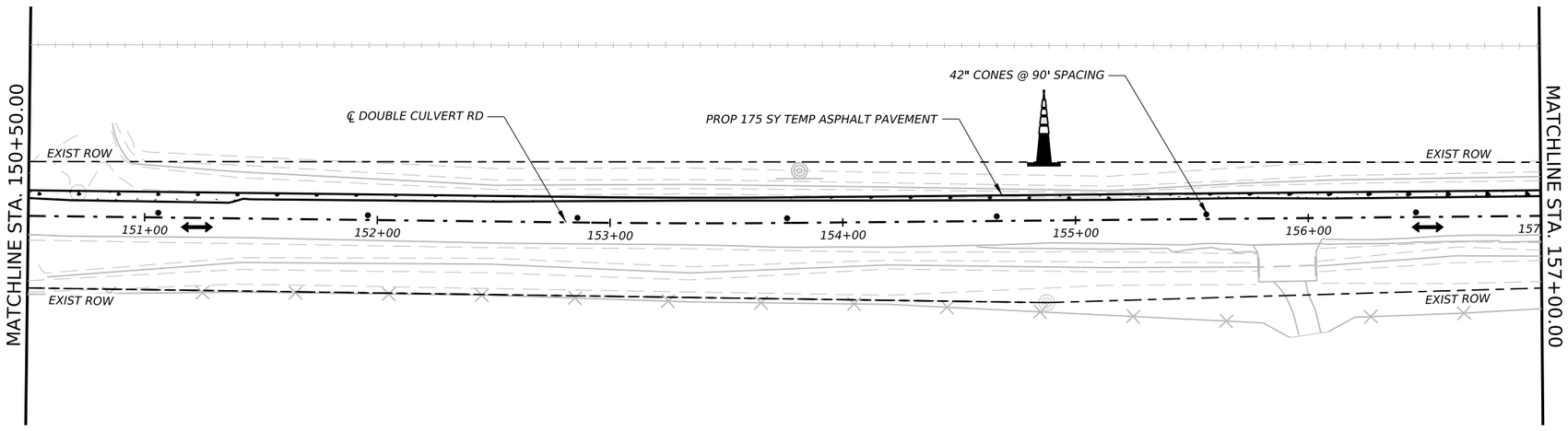

LEGEND

- EXISTING ROW
- TEMPORARY ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION (PREVIOUS PHASE)
- TEMPORARY ASPHALT PAVEMENT (PREVIOUS PHASE)
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WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

TRAFFIC CONTROL PLAN
DOUBLE CULVERT RD
PHASE 0

STA 144+00.00 TO STA 157+50.00

SHEET 4 OF 7

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		108

DATE: 7/22/2026 6:39:29 PM
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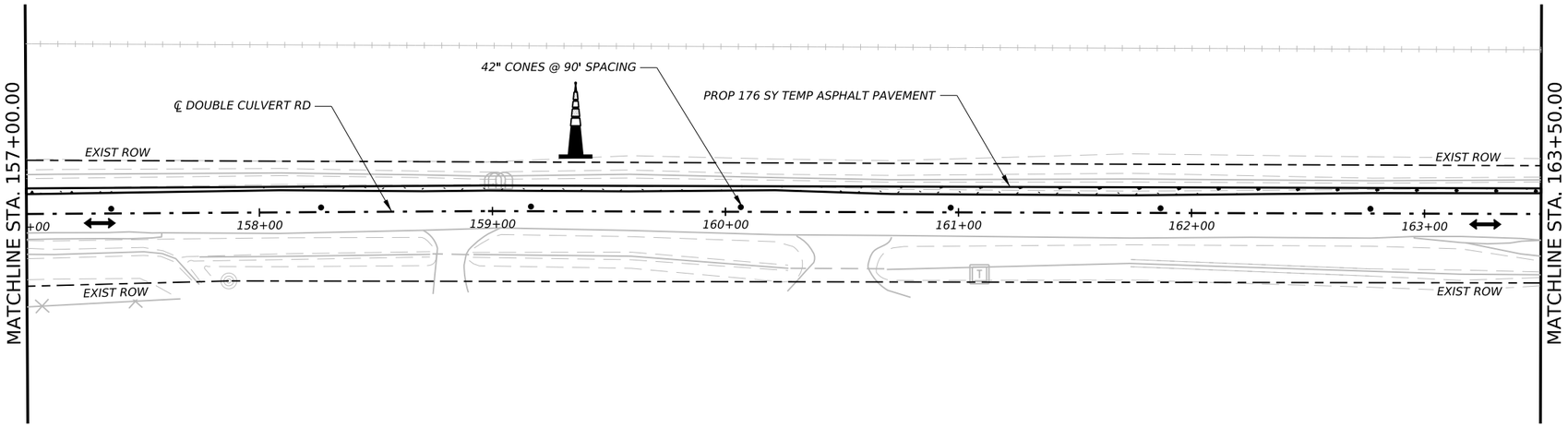

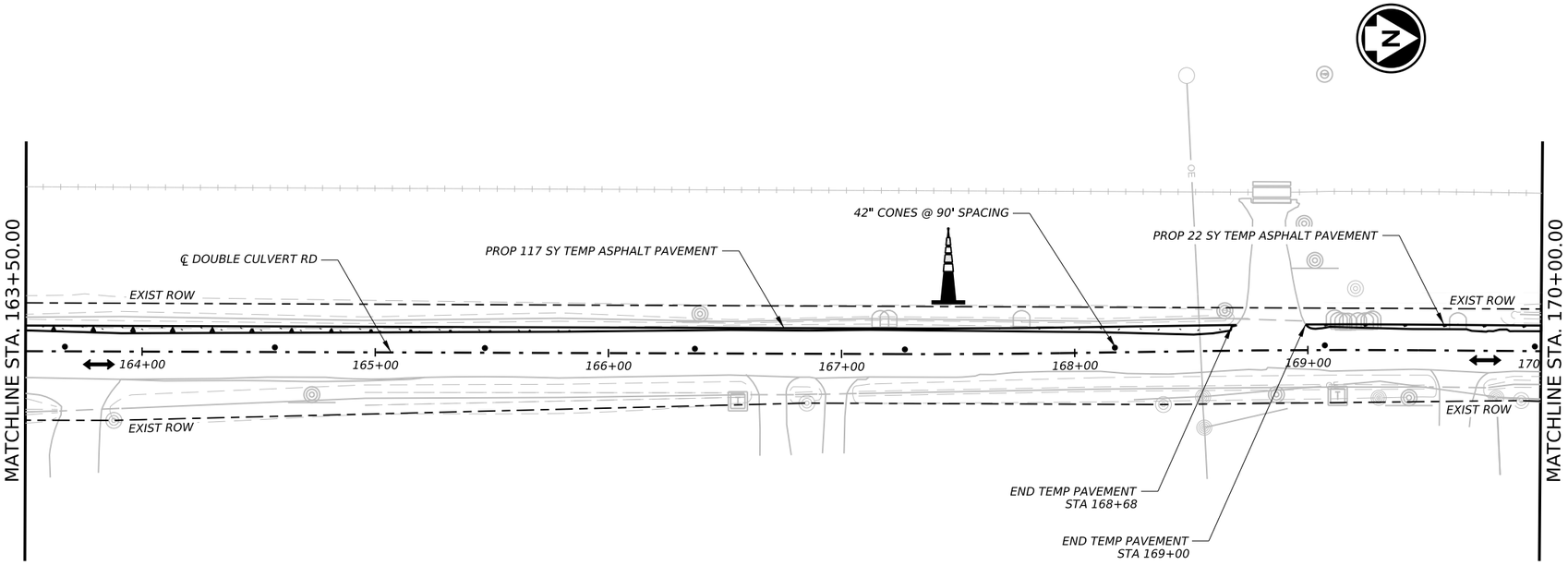

LEGEND

- EXISTING ROW
- TEMPORARY ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION (PREVIOUS PHASE)
- TEMPORARY ASPHALT PAVEMENT (PREVIOUS PHASE)
- EXISTING DIRECTION OF TRAFFIC
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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY

ENGINEERING DEPARTMENT

TRAFFIC CONTROL PLAN
DOUBLE CULVERT RD
PHASE 0

STA 157+50.00 TO STA 170+00.00

SHEET 5 OF 7

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		109

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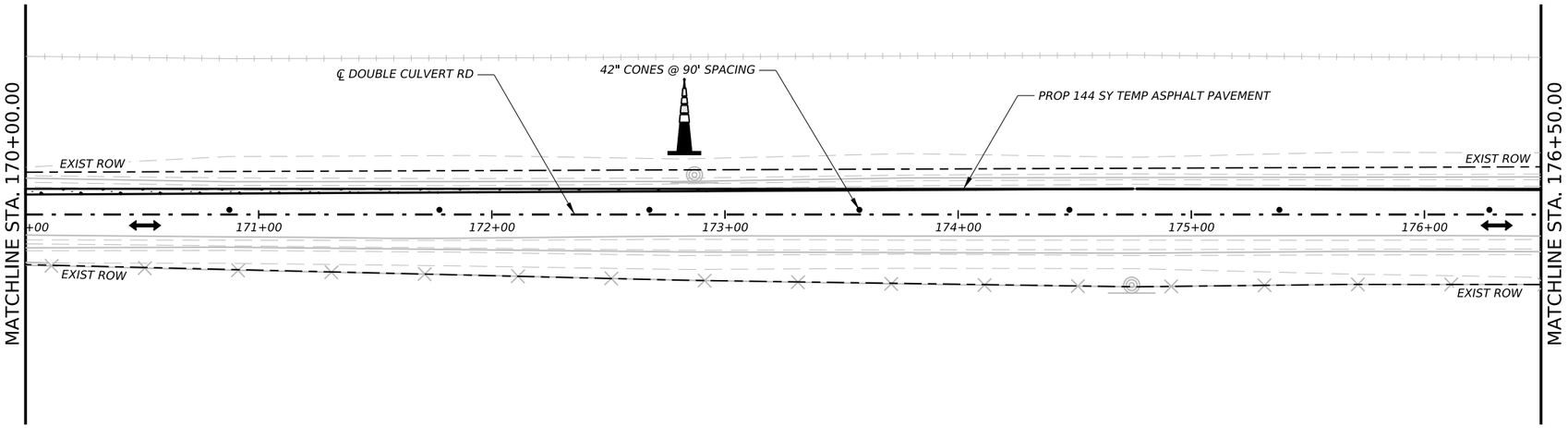

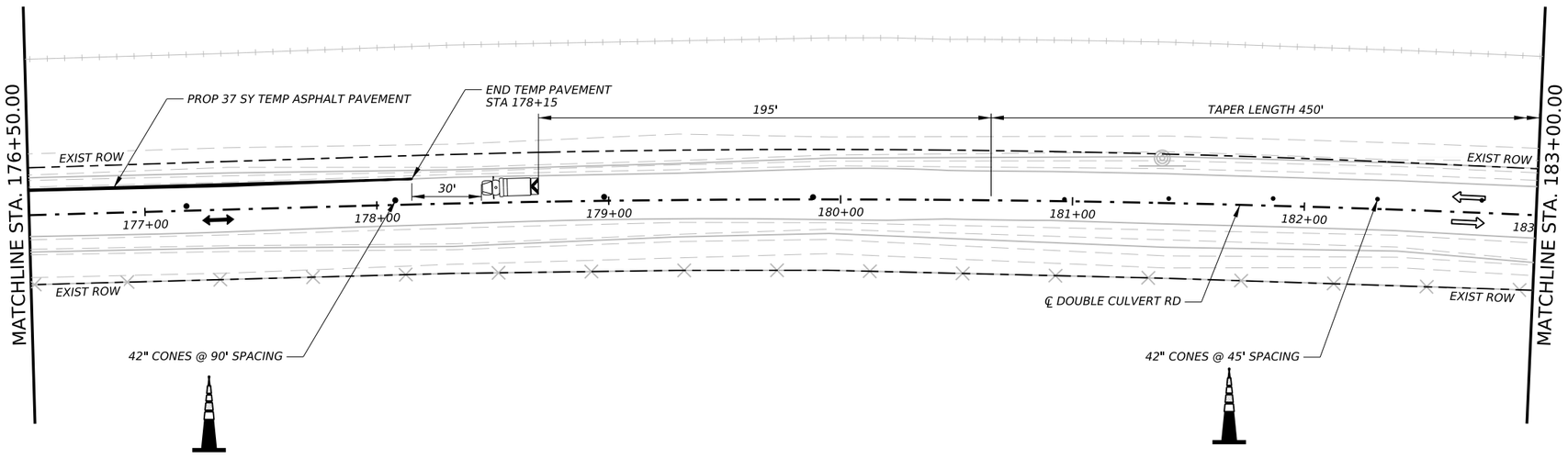

LEGEND

- EXISTING ROW
- TEMPORARY ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION (PREVIOUS PHASE)
- TEMPORARY ASPHALT PAVEMENT (PREVIOUS PHASE)
- EXISTING DIRECTION OF TRAFFIC
- PROPOSED DIRECTION OF TRAFFIC
- SIGN
- CHANNELIZING DEVICE
- TYPE III BARRICADE
- PROPOSED DITCH FLOWLINE
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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

TRAFFIC CONTROL PLAN
DOUBLE CULVERT RD
PHASE 0
STA 170+00.00 TO STA 183+50.00
SHEET 6 OF 7

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		110

DATE: 7/22/2026 6:39:56 PM
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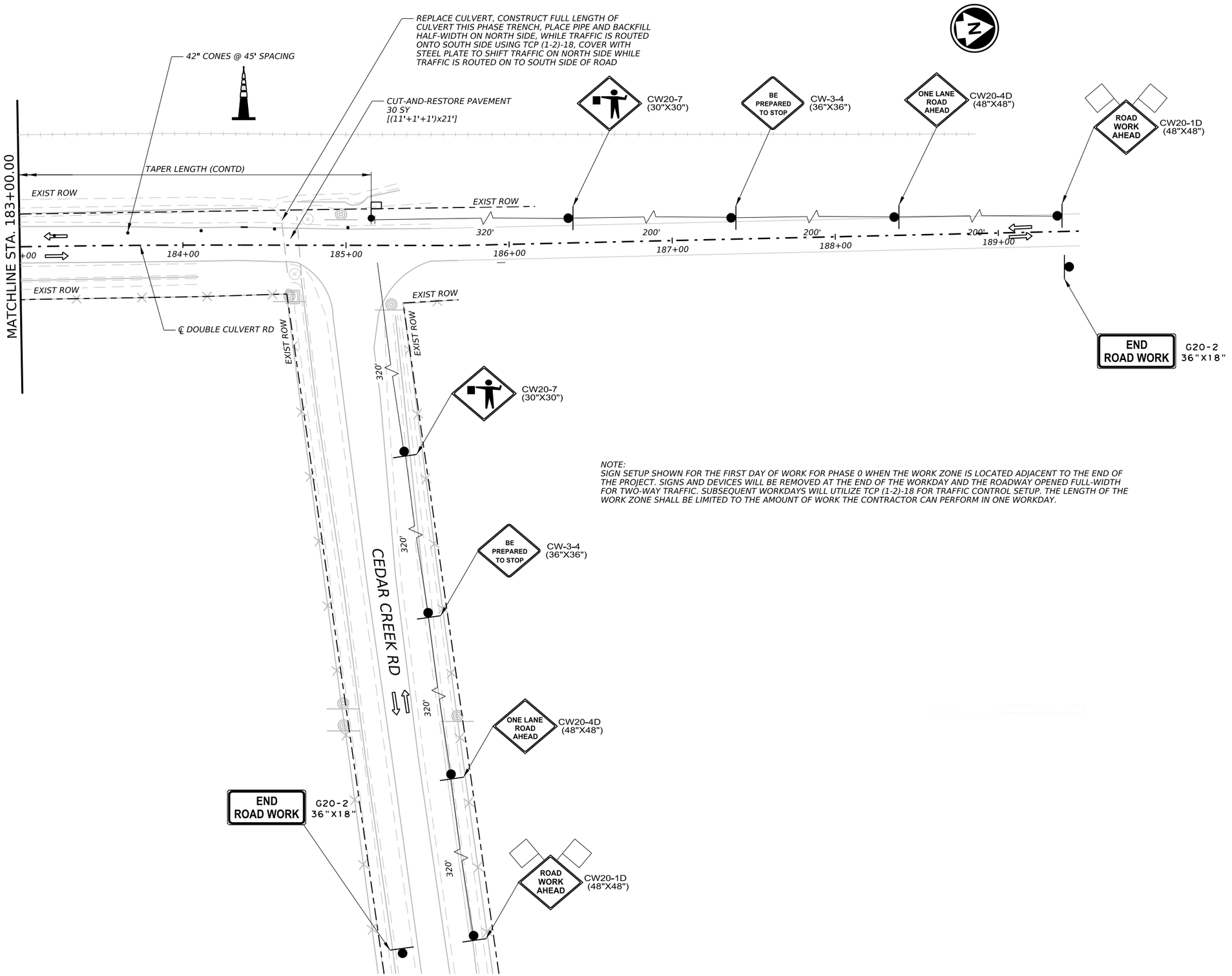

LEGEND

- EXISTING ROW
- TEMPORARY ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION (PREVIOUS PHASE)
- TEMPORARY ASPHALT PAVEMENT (PREVIOUS PHASE)
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NOTES:

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3. TEMPORARY PAVEMENT TO HAVE 2' MINIMUM PAVEMENT

0 30' 60'
SCALE: 1" = 60'

NOTE:
SIGN SETUP SHOWN FOR THE FIRST DAY OF WORK FOR PHASE 0 WHEN THE WORK ZONE IS LOCATED ADJACENT TO THE END OF THE PROJECT. SIGNS AND DEVICES WILL BE REMOVED AT THE END OF THE WORKDAY AND THE ROADWAY OPENED FULL-WIDTH FOR TWO-WAY TRAFFIC. SUBSEQUENT WORKDAYS WILL UTILIZE TCP (1-2)-18 FOR TRAFFIC CONTROL SETUP. THE LENGTH OF THE WORK ZONE SHALL BE LIMITED TO THE AMOUNT OF WORK THE CONTRACTOR CAN PERFORM IN ONE WORKDAY.

NO.	DATE	REVISION	APPROV.

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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

TRAFFIC CONTROL PLAN
DOUBLE CULVERT RD
PHASE 0
STA 183+50.00 TO END

SHEET 7 OF 7

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		111

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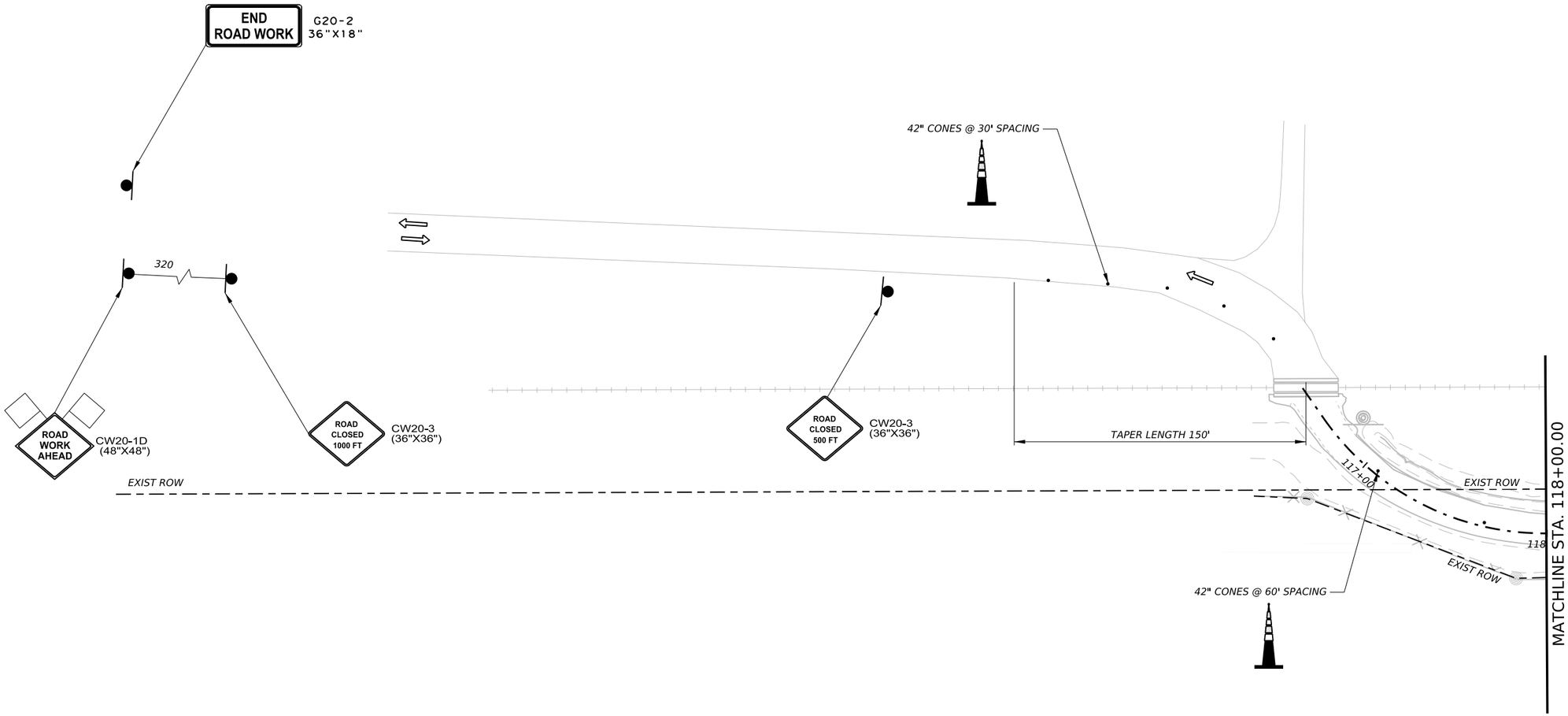

NOTES:

SEE DETOUR SHEETS FOR DETOUR LAYOUT AND SIGNAGE

LEGEND

- EXISTING ROW
- TEMPORARY ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION (PREVIOUS PHASE)
- TEMPORARY ASPHALT PAVEMENT (PREVIOUS PHASE)
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NOTES:

1. CONTRACTOR TO MAINTAIN ACCESS TO PROPERTIES AT ALL TIME
2. CONSTRUCT DRIVEWAYS HALF WIDTH PLACE FULL LENGTH CULVERT AT DRIVEWAY LOCATIONS USING STEEL PLATE TO TEMPORARILY COVER TRENCH TO MAINTAIN ACCESS
3. REFER TO TCP (2-2)-18 FOR ADDITIONAL INFORMATION

0 30' 60'
SCALE: 1" = 60'

NO.	DATE	REVISION	APPROV.

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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

TRAFFIC CONTROL PLAN
DOUBLE CULVERT RD
PHASE 1
BEGIN TO STA 118+00.00

SHEET 1 OF 7

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD

DIST	COUNTY	SHEET NO.
	WALLER	112

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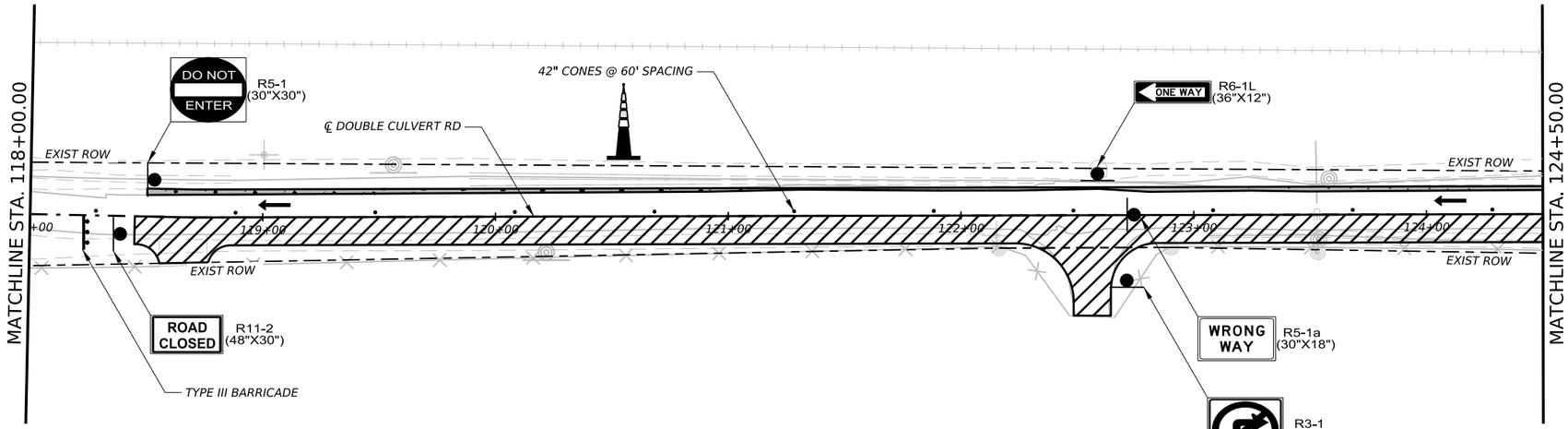

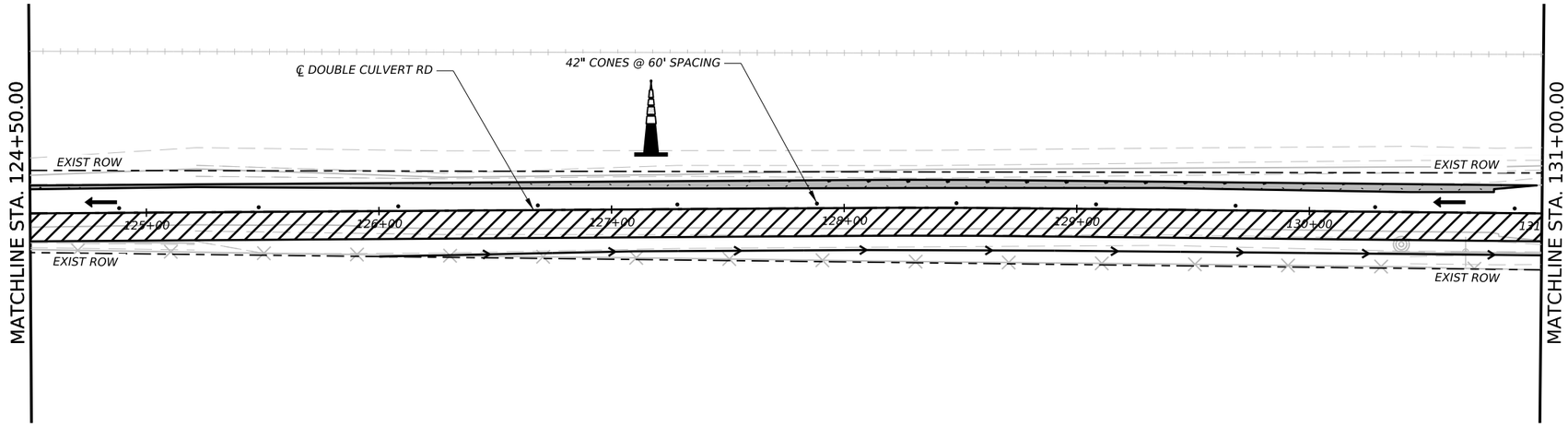

LEGEND

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TRAFFIC CONTROL PLAN
DOUBLE CULVERT RD
PHASE 1
118+00.00 TO STA 131+50.00

SHEET 2 OF 7

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		113

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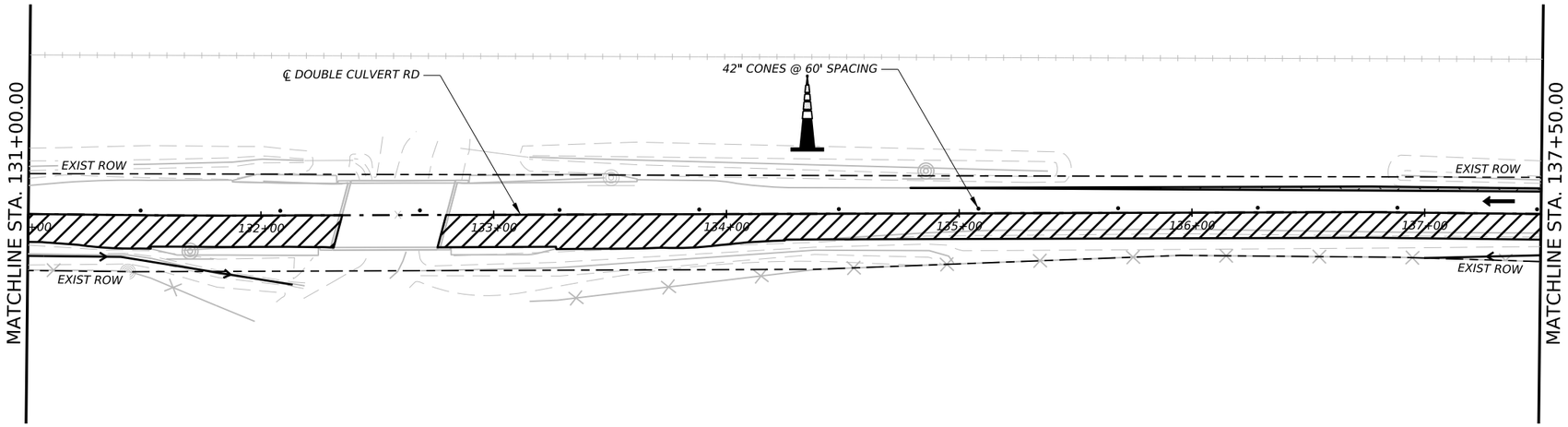

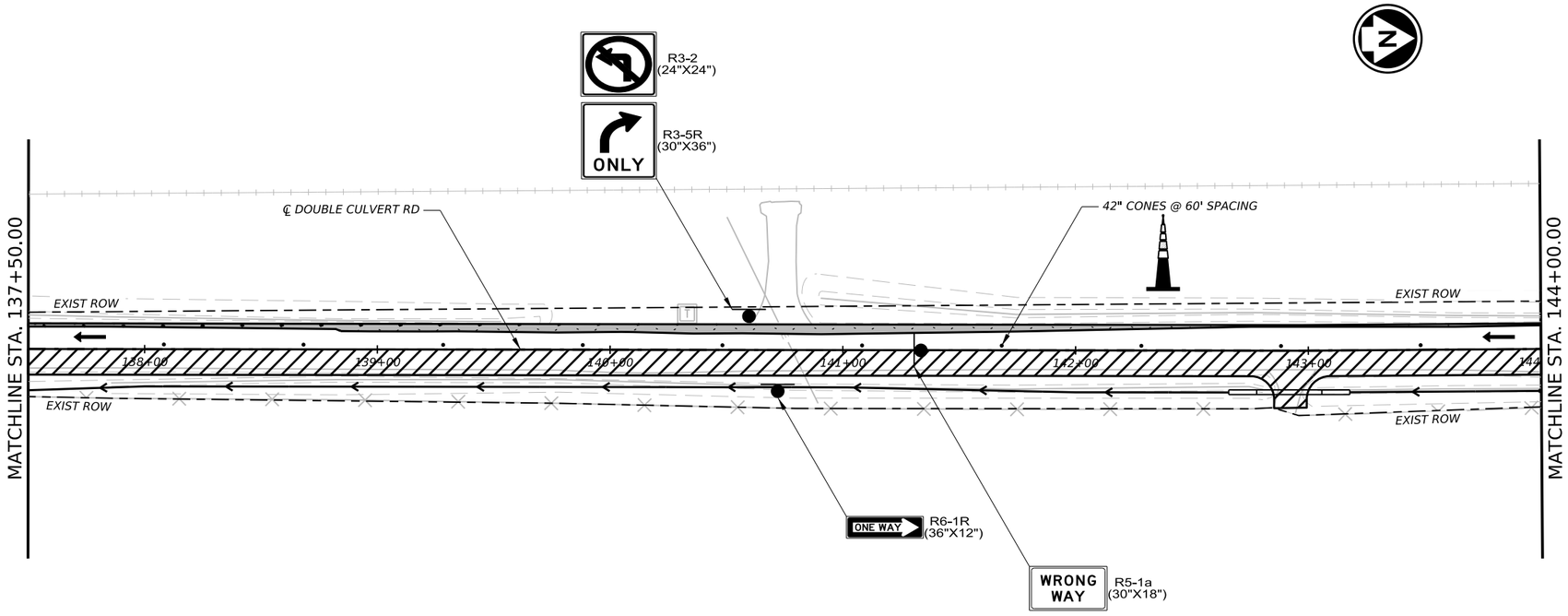

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DOUBLE CULVERT RD
PHASE 1
STA 131+50.00 TO STA 144+00.00

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		114

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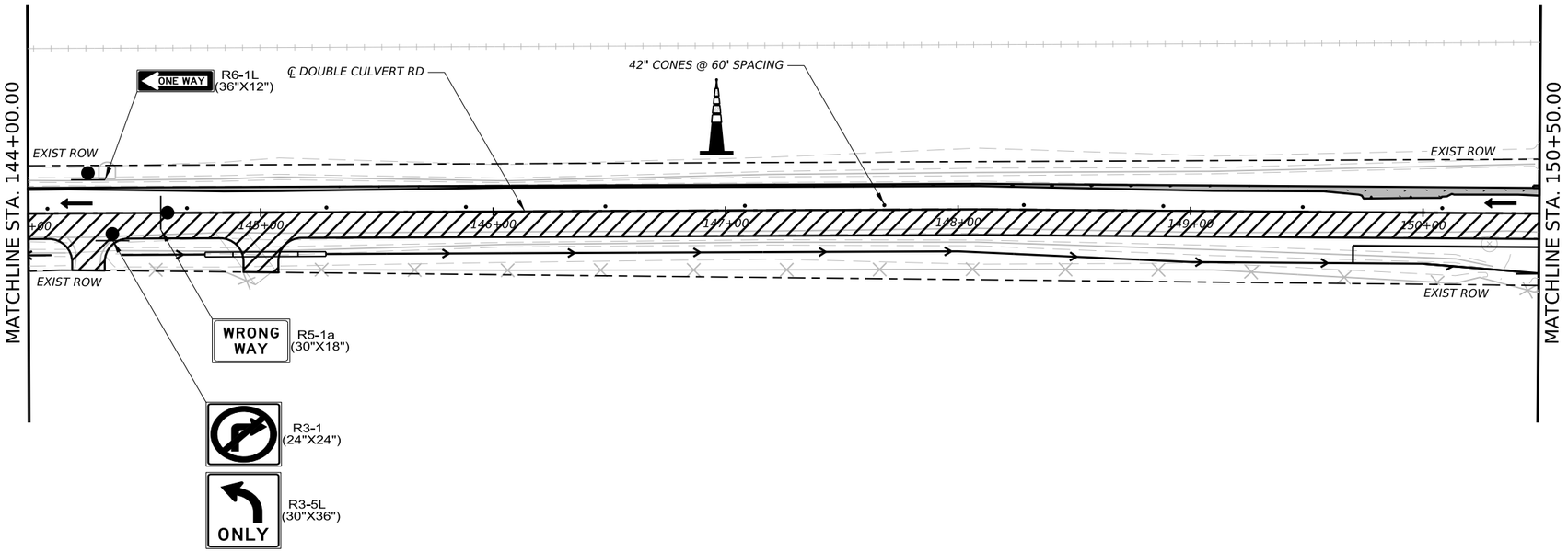

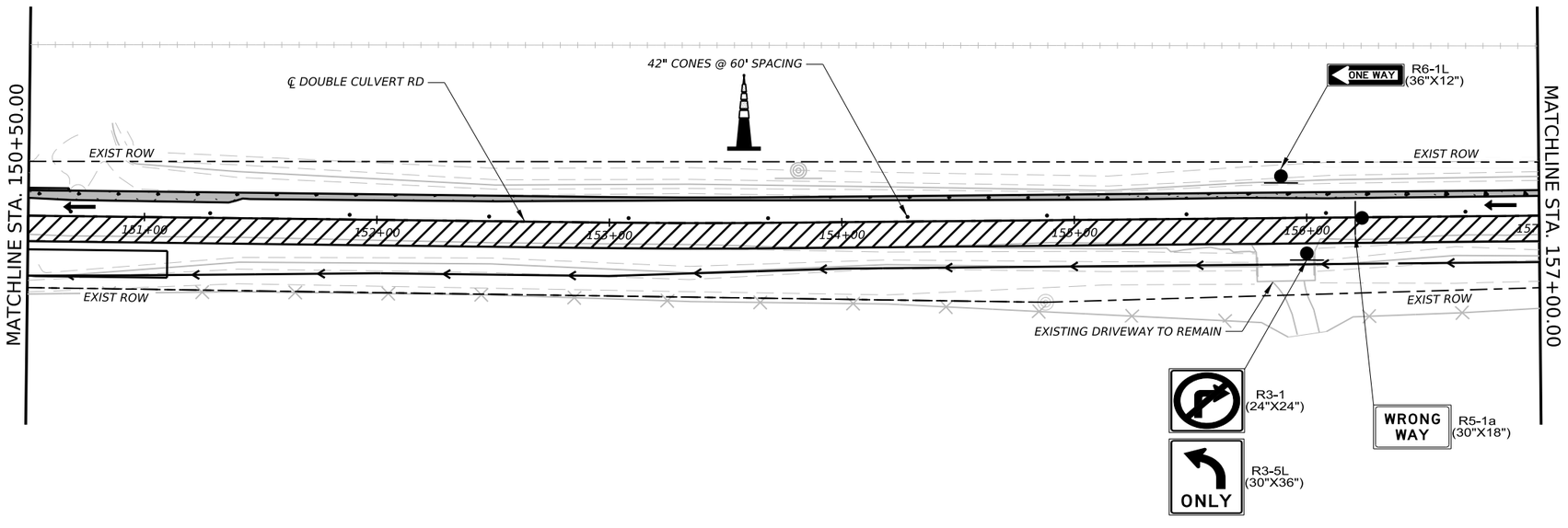

LEGEND

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ENGINEERING DEPARTMENT

TRAFFIC CONTROL PLAN
DOUBLE CULVERT RD
PHASE 1
STA 144+00.00 TO STA 157+50.00

SHEET 4 OF 7

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		115

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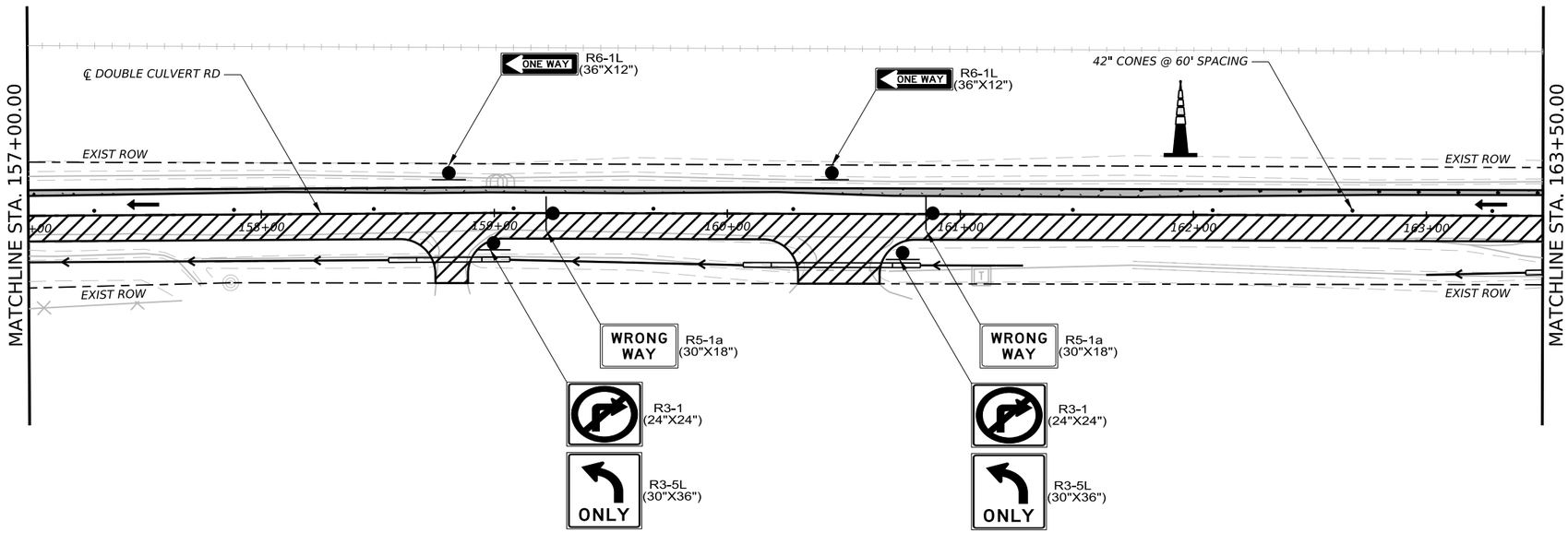

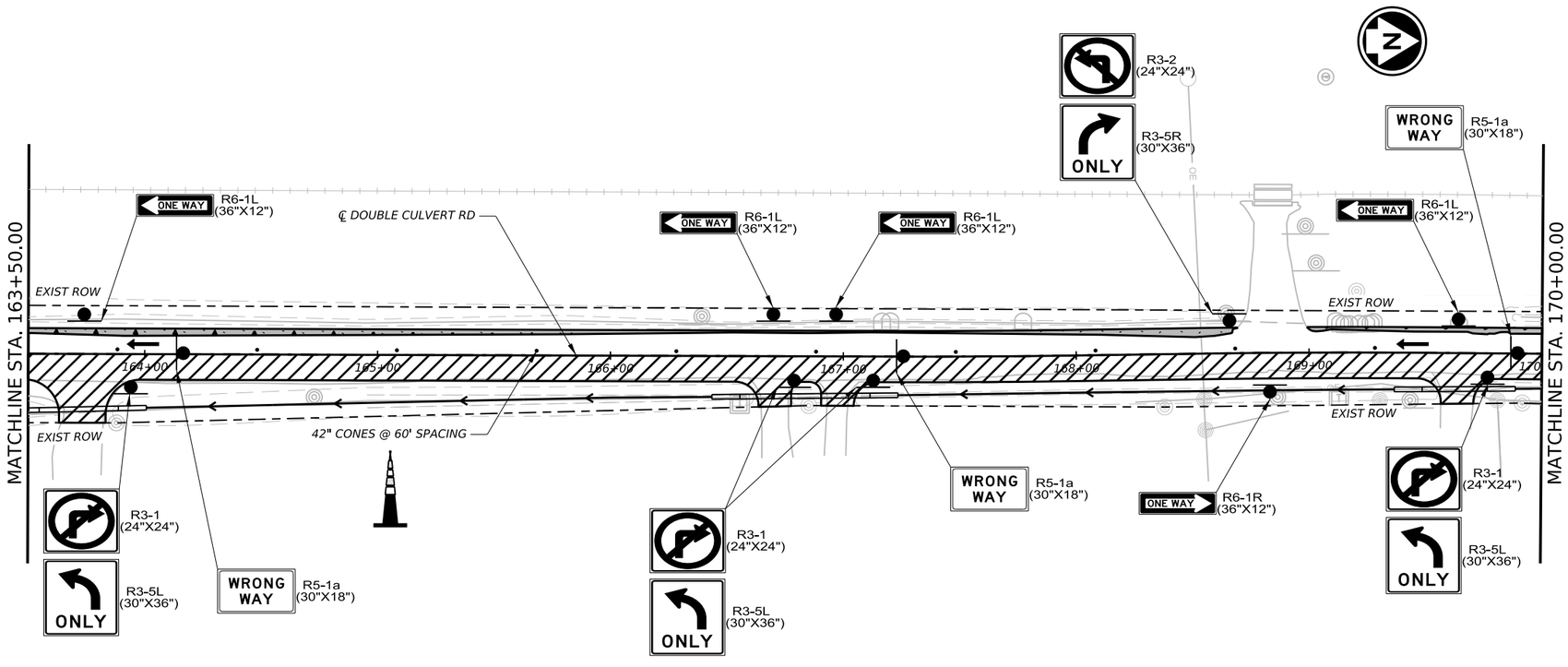

LEGEND

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- PROPOSED DIRECTION OF TRAFFIC
- SIGN
- CHANNELIZING DEVICE
- TYPE III BARRICADE
- PROPOSED DITCH FLOWLINE
- UPRR CENTERLINE

NOTES:

1. CONTRACTOR TO MAINTAIN ACCESS TO PROPERTIES AT ALL TIME
2. CONSTRUCT DRIVEWAYS HALF WIDTH PLACE FULL LENGTH CULVERT AT DRIVEWAY LOCATIONS USING STEEL PLATE TO TEMPORARILY COVER TRENCH TO MAINTAIN ACCESS
3. REFER TO TCP (2-2)-18 FOR ADDITIONAL INFORMATION

0 30' 60'
SCALE: 1" = 60'

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
PHILIP M. BARNES
84571
LICENSED PROFESSIONAL ENGINEER

Philip M. Barnes
7/22/2026

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

TRAFFIC CONTROL PLAN
DOUBLE CULVERT RD
PHASE 1
STA 157+50.00 TO STA 170+00.00

SHEET 5 OF 7

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		116

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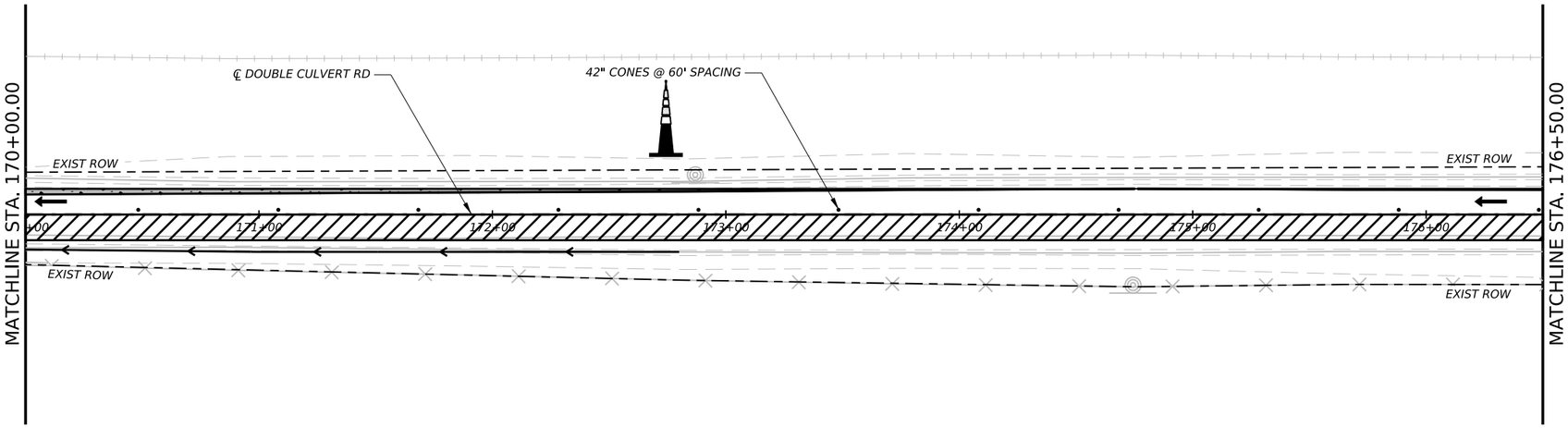

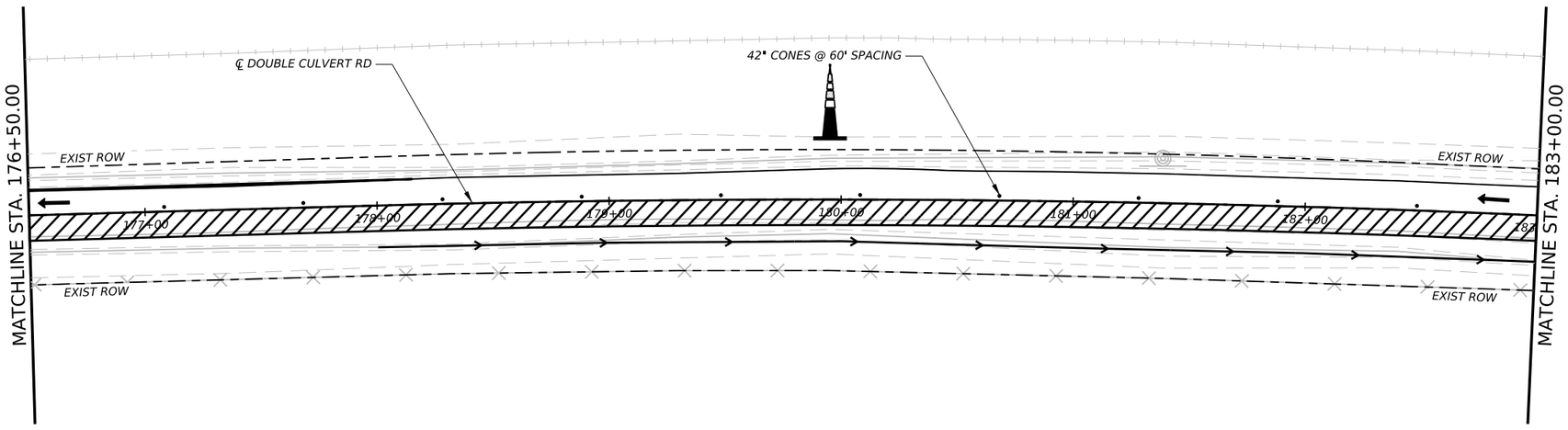

LEGEND

- EXISTING ROW
- TEMPORARY ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION (PREVIOUS PHASE)
- TEMPORARY ASPHALT PAVEMENT (PREVIOUS PHASE)
- EXISTING DIRECTION OF TRAFFIC
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NO.	DATE	REVISION	APPROV.

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WALLER COUNTY ROAD BOND

WALLER COUNTY

ENGINEERING DEPARTMENT

TRAFFIC CONTROL PLAN
DOUBLE CULVERT RD
PHASE 1

STA 170+00.00 TO STA 183+50.00

SHEET 6 OF 7

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		117

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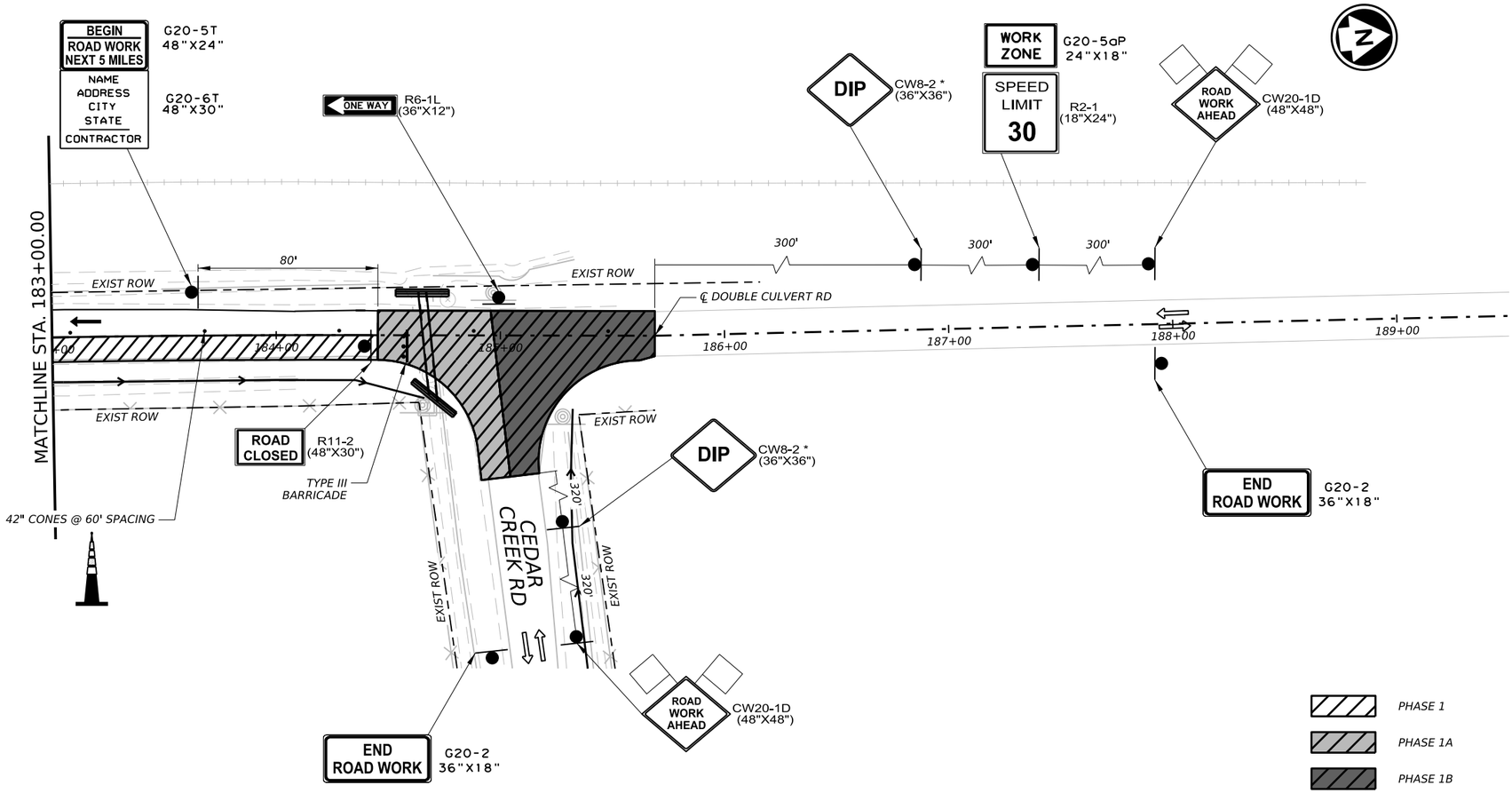

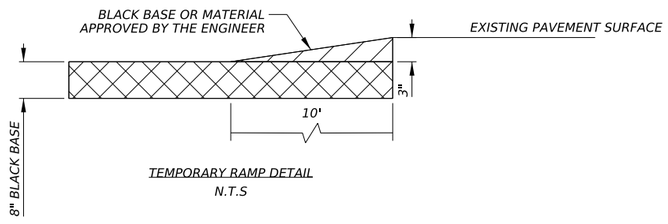

TEMPORARY RAMP DETAIL
N.T.S

LEGEND

- EXISTING ROW
- TEMPORARY ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION (PREVIOUS PHASE)
- TEMPORARY ASPHALT PAVEMENT (PREVIOUS PHASE)
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3. REFER TO TCP (2-2)-18 FOR ADDITIONAL INFORMATION

0 30' 60'
SCALE: 1" = 60'

- PHASE 1
- PHASE 1A
- PHASE 1B

NOTES:

1. LIME TREATED SUBGRADE NOT TO BE PERFORMED WITHIN LIMITS OF PHASE 1A AND PHASE 1B
2. TRAFFIC MAY BE ROUTED ONTO BLACK BASE WITH TEMPORARY RAMPS IN PLACE
3. *CW8-2 SIGNS TO BE PLACED FOR PHASE 1A & 1B ONLY WHEN TRAFFIC PLACED ON BLACK BASE

PHASE 1A

REMOVE 11" EXISTING MATERIAL TO LIMITS SHOWN AND PLACE 8" BLACK BASE
CONSTRUCT 10' TEMPORARY RAMPS TO TRANSITION TO EXIST PAVEMENT

1A & 1B MUST BE PERFORMED IN ONE DAY AND OPEN TO TRAFFIC

PHASE 1B

REMOVE 11" EXISTING MATERIAL TO LIMITS SHOWN AND PLACE 8" BLACK BASE
CONSTRUCT 10' TEMPORARY RAMPS TO TRANSITION TO EXIST PAVEMENT

1A & 1B MUST BE PERFORMED IN ONE DAY AND OPEN TO TRAFFIC

PHASE 1C

REMOVE TEMPORARY RAMPS AND PLACE 3" TYPE D MIX FOR LIMITS OF PHASE 1A & 1B

NO.	DATE	REVISION	APPROV.

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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

TRAFFIC CONTROL PLAN
DOUBLE CULVERT RD
PHASE 1
STA 183+50.00 TO END

SHEET 7 OF 7

CONT.	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		118

DATE: 7/22/2026 6:40:18 PM
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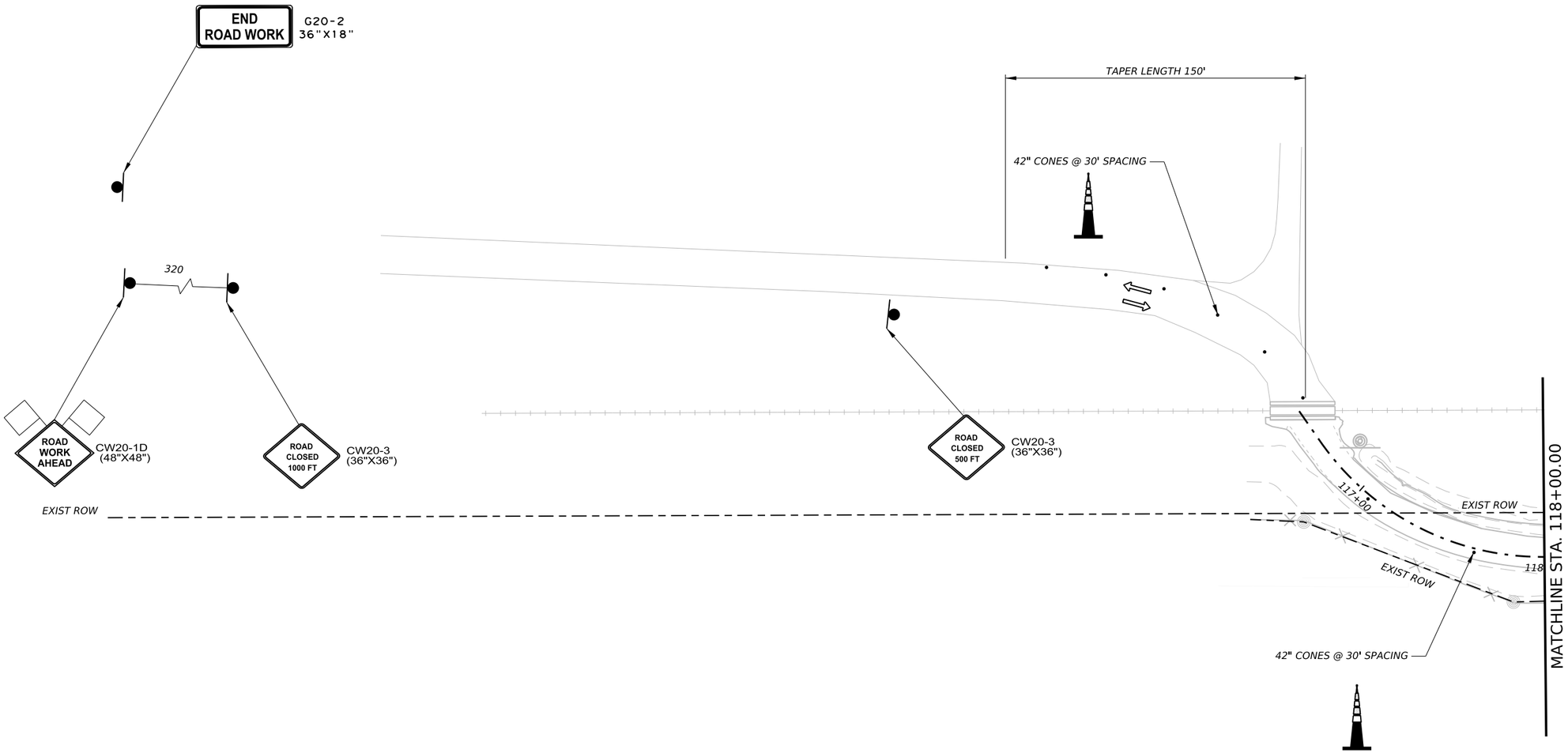

LEGEND

- EXISTING ROW
- TEMPORARY ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION (PREVIOUS PHASE)
- TEMPORARY ASPHALT PAVEMENT (PREVIOUS PHASE)
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3. REFER TO TCP (2-2)-18 FOR ADDITIONAL INFORMATION

0 30' 60'
SCALE: 1" = 60'

NO.	DATE	REVISION	APPROV.

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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

TRAFFIC CONTROL PLAN
DOUBLE CULVERT RD
PHASE 2
118+00.00 TO STA 131+50.00

SHEET 1 OF 7

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		119

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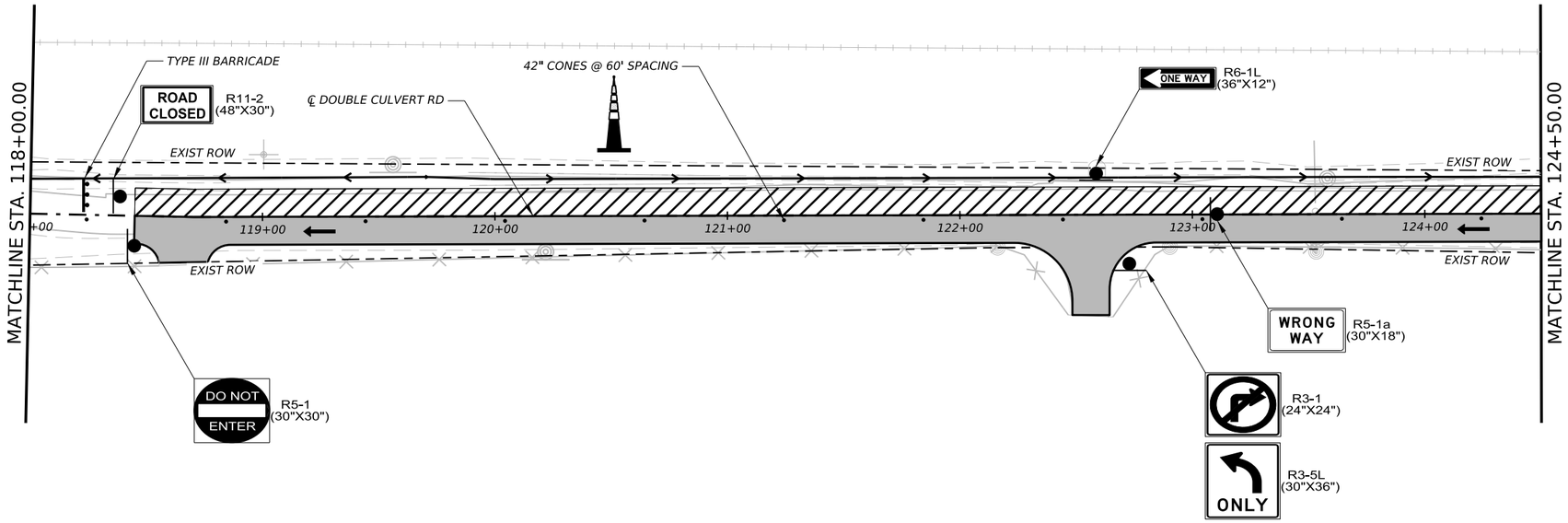

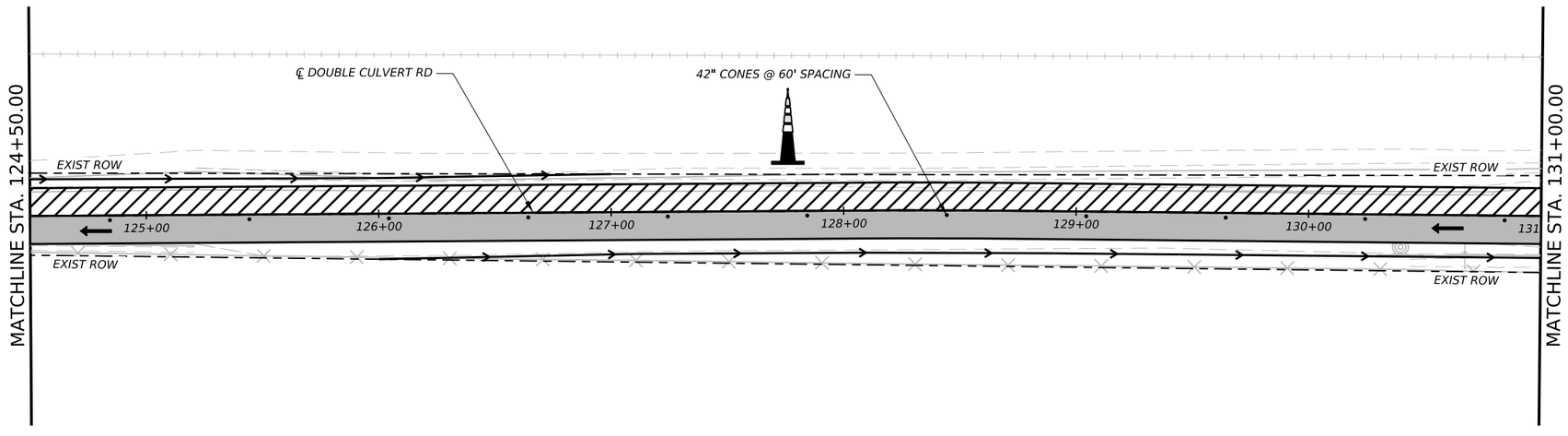

LEGEND

- EXISTING ROW
- TEMPORARY ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION (PREVIOUS PHASE)
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0 30' 60'

SCALE: 1" = 60'

NO.	DATE	REVISION	APPROV.

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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY

ENGINEERING DEPARTMENT

TRAFFIC CONTROL PLAN
DOUBLE CULVERT RD
PHASE 2

118+00.00 TO STA 131+50.00

SHEET 2 OF 7

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		120

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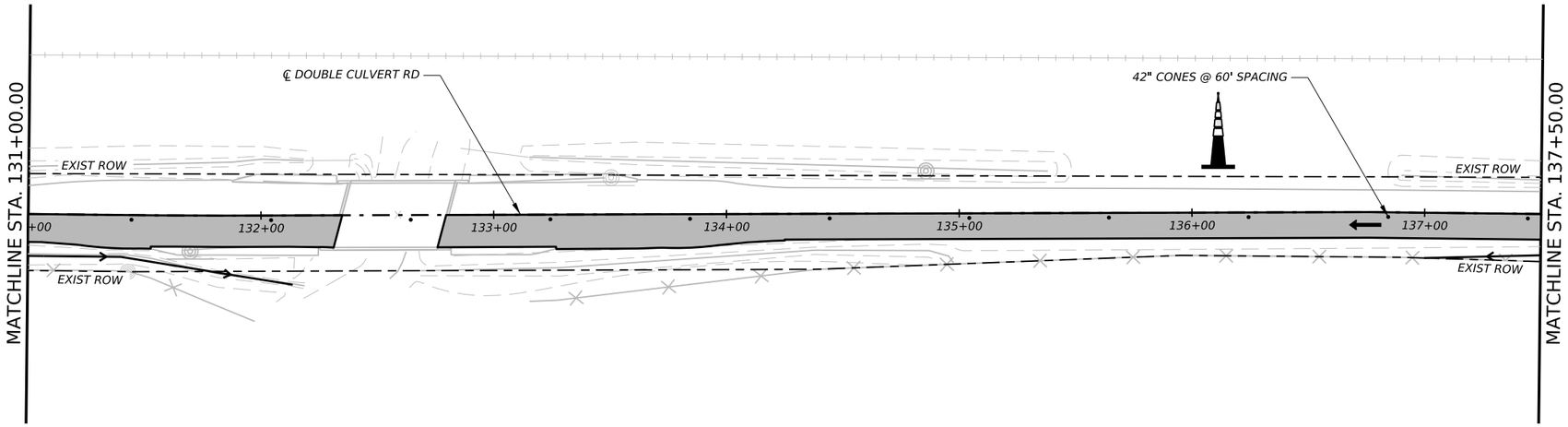

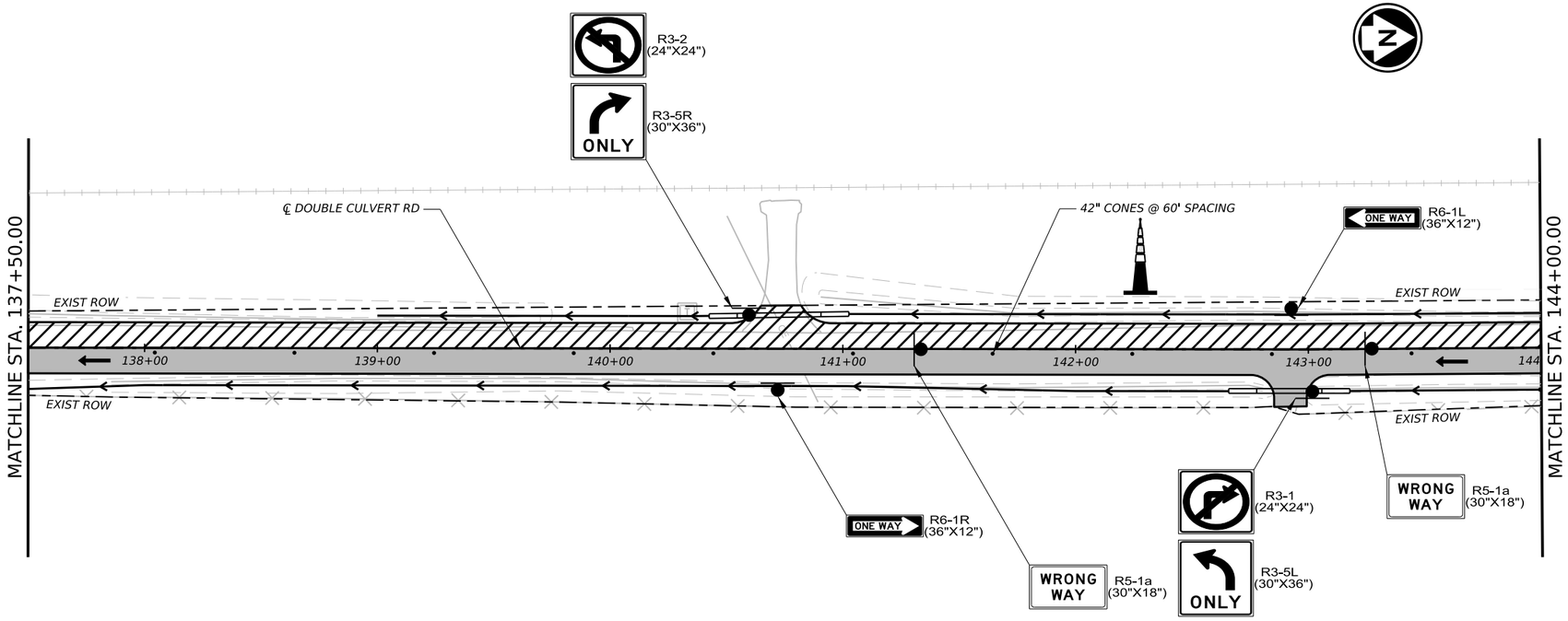

LEGEND

- EXISTING ROW
- TEMPORARY ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION (PREVIOUS PHASE)
- TEMPORARY ASPHALT PAVEMENT (PREVIOUS PHASE)
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0 30' 60'

SCALE: 1" = 60'

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

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TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY

ENGINEERING DEPARTMENT

TRAFFIC CONTROL PLAN
DOUBLE CULVERT RD
PHASE 2

STA 131+50.00 TO STA 144+00.00

SHEET 3 OF 7

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		121

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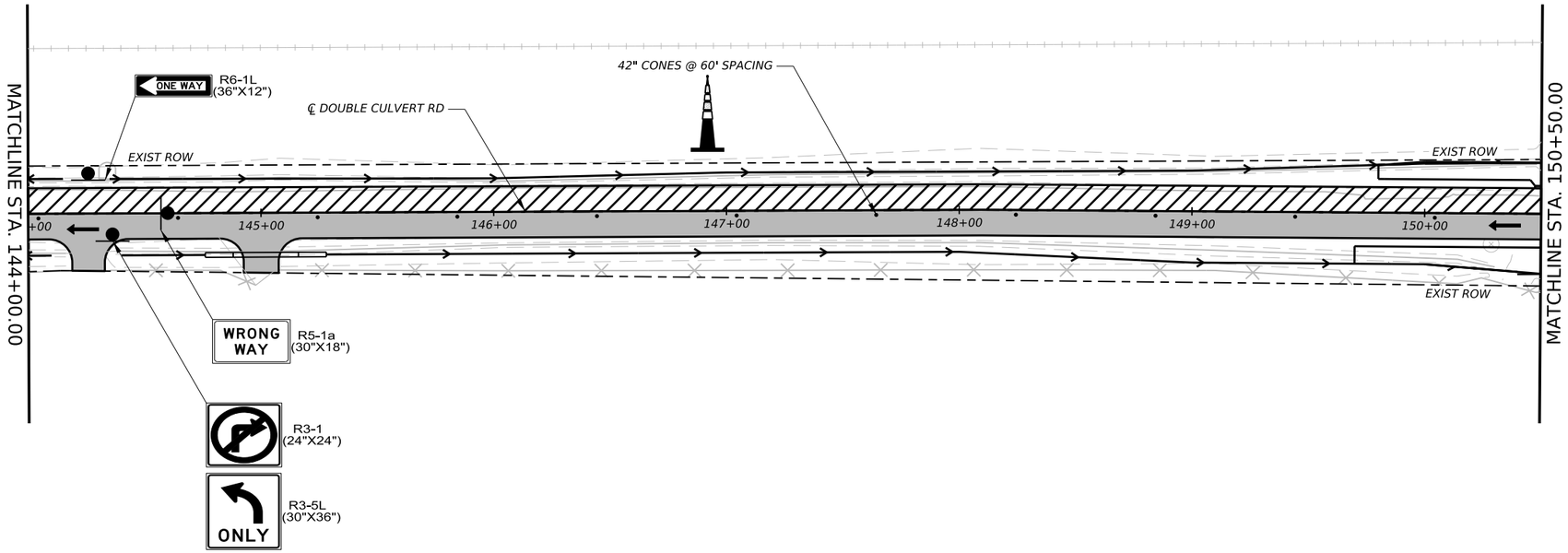

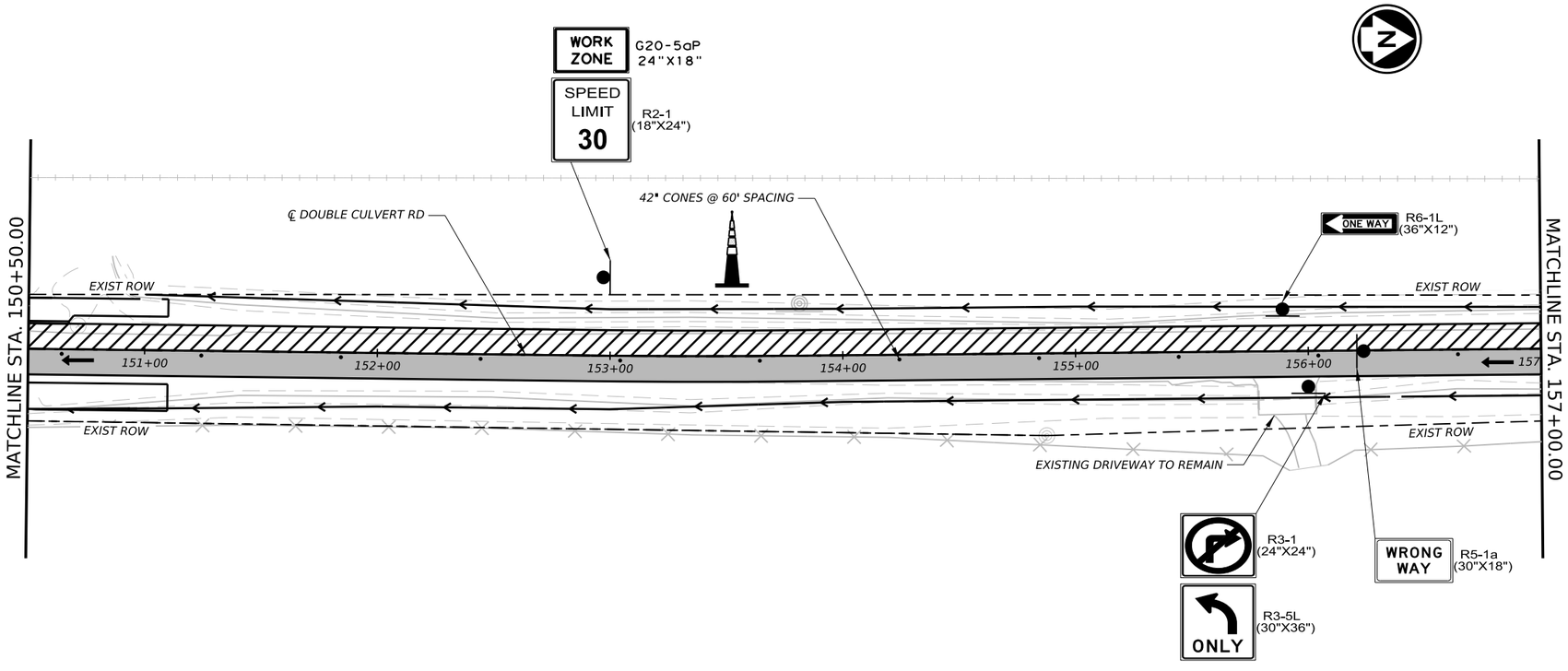

LEGEND

- EXISTING ROW
- TEMPORARY ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

TRAFFIC CONTROL PLAN
DOUBLE CULVERT RD
PHASE 2
STA 144+00.00 TO STA 157+50.00
SHEET 4 OF 7

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		122

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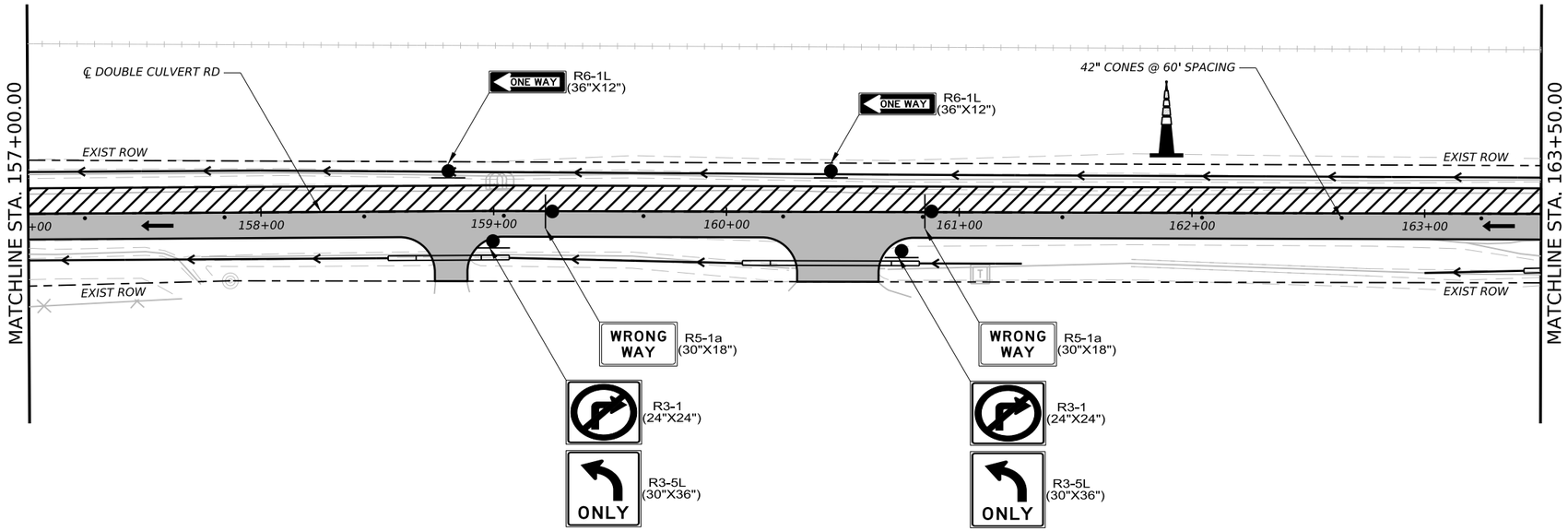

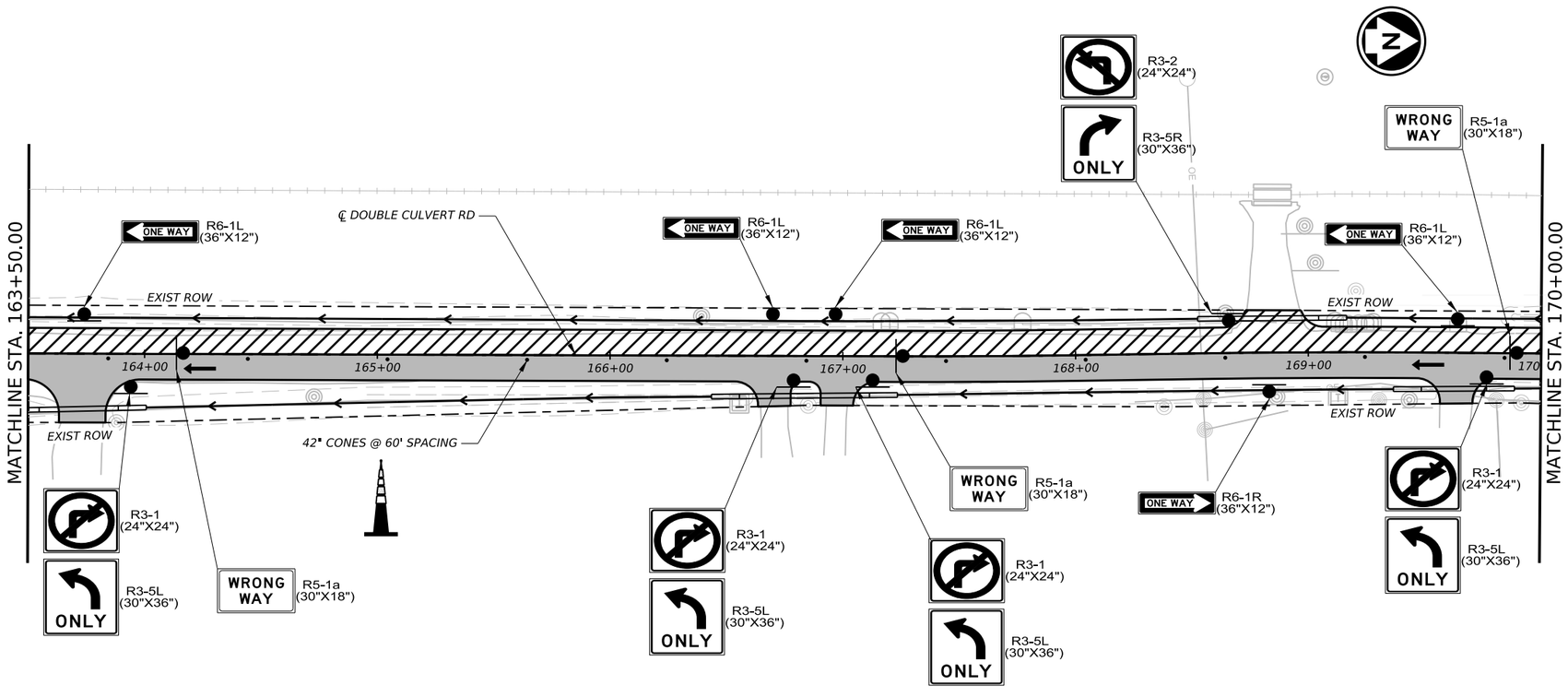

LEGEND

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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

TRAFFIC CONTROL PLAN
DOUBLE CULVERT RD
PHASE 2
STA 157+50.00 TO STA 170+00.00

SHEET 5 OF 7

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		123

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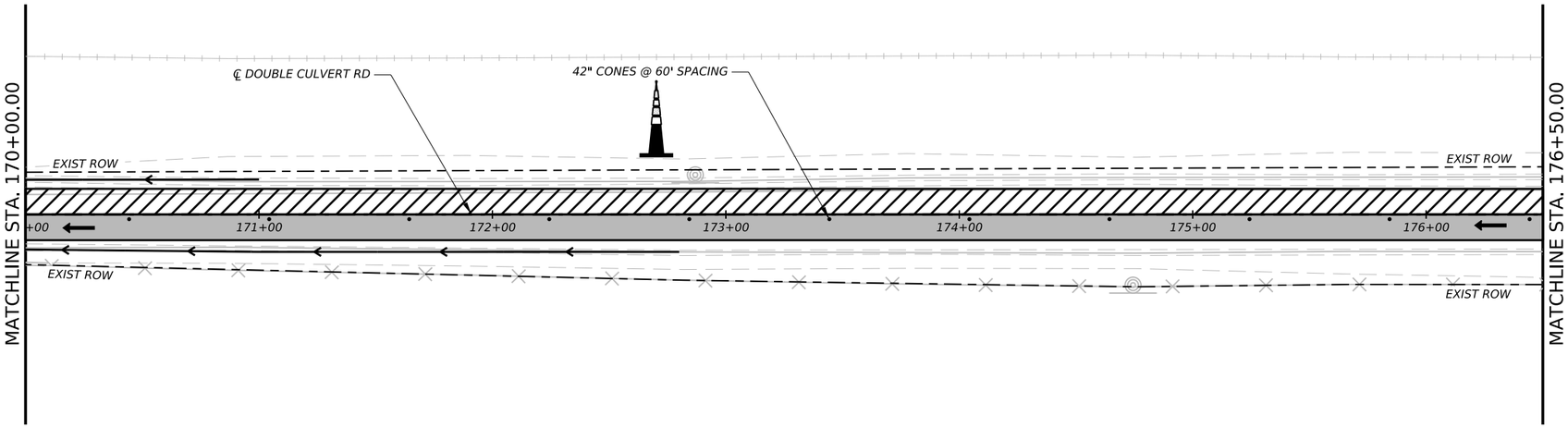

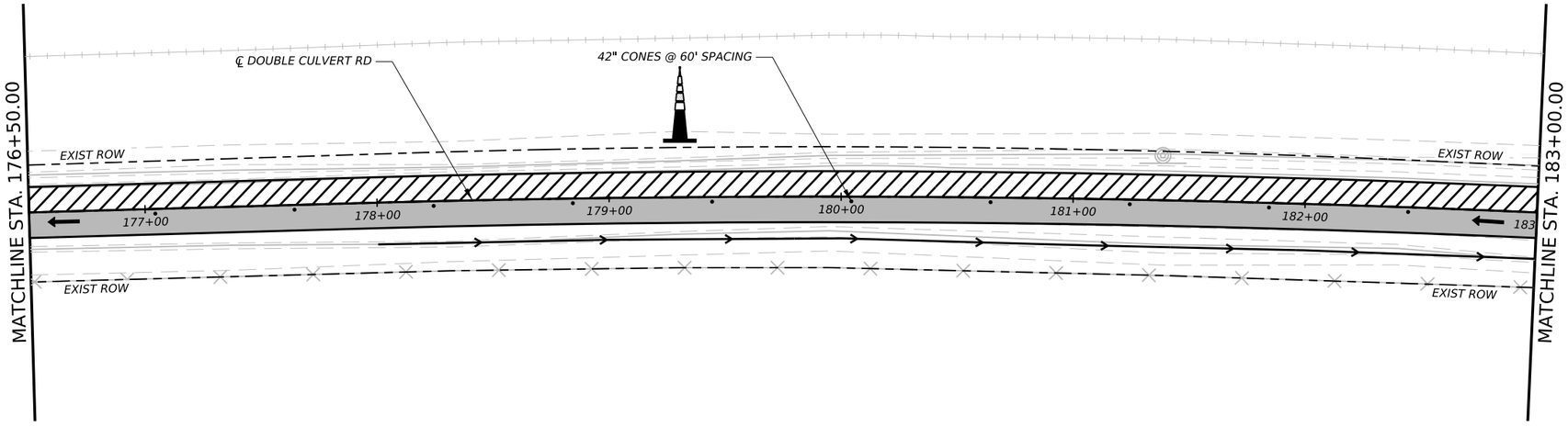

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WALLER COUNTY

ENGINEERING DEPARTMENT

TRAFFIC CONTROL PLAN
DOUBLE CULVERT RD
PHASE 2

STA 170+00.00 TO STA 183+50.00

SHEET 6 OF 7

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		124

DATE: 7/22/2026 6:43:59 PM
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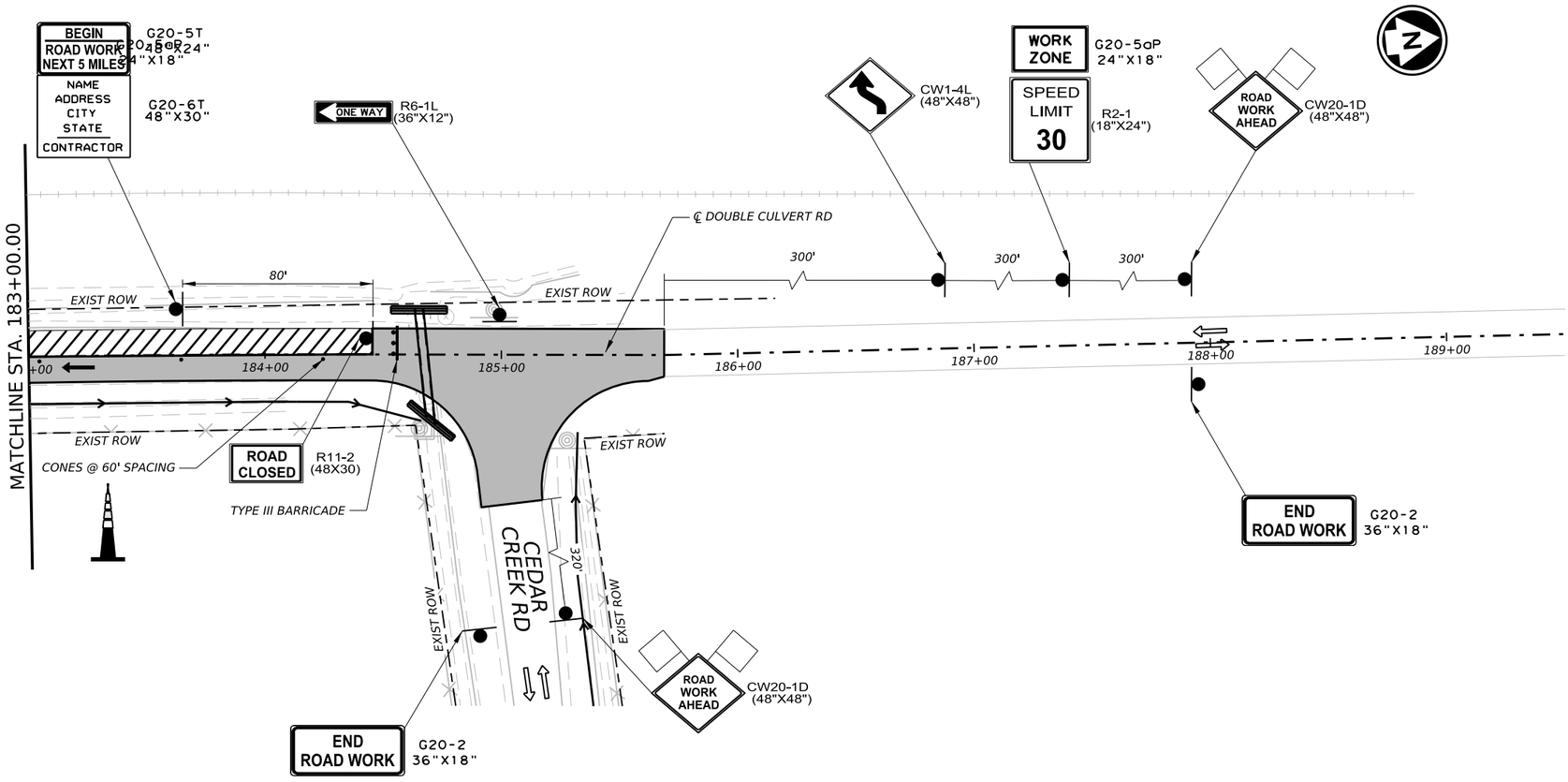

LEGEND

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ENGINEERING DEPARTMENT

TRAFFIC CONTROL PLAN
DOUBLE CULVERT RD
PHASE 2

STA 183+50.00 TO END

SHEET 7 OF 7

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		125

DATE: 7/22/2026 6:39:12 PM
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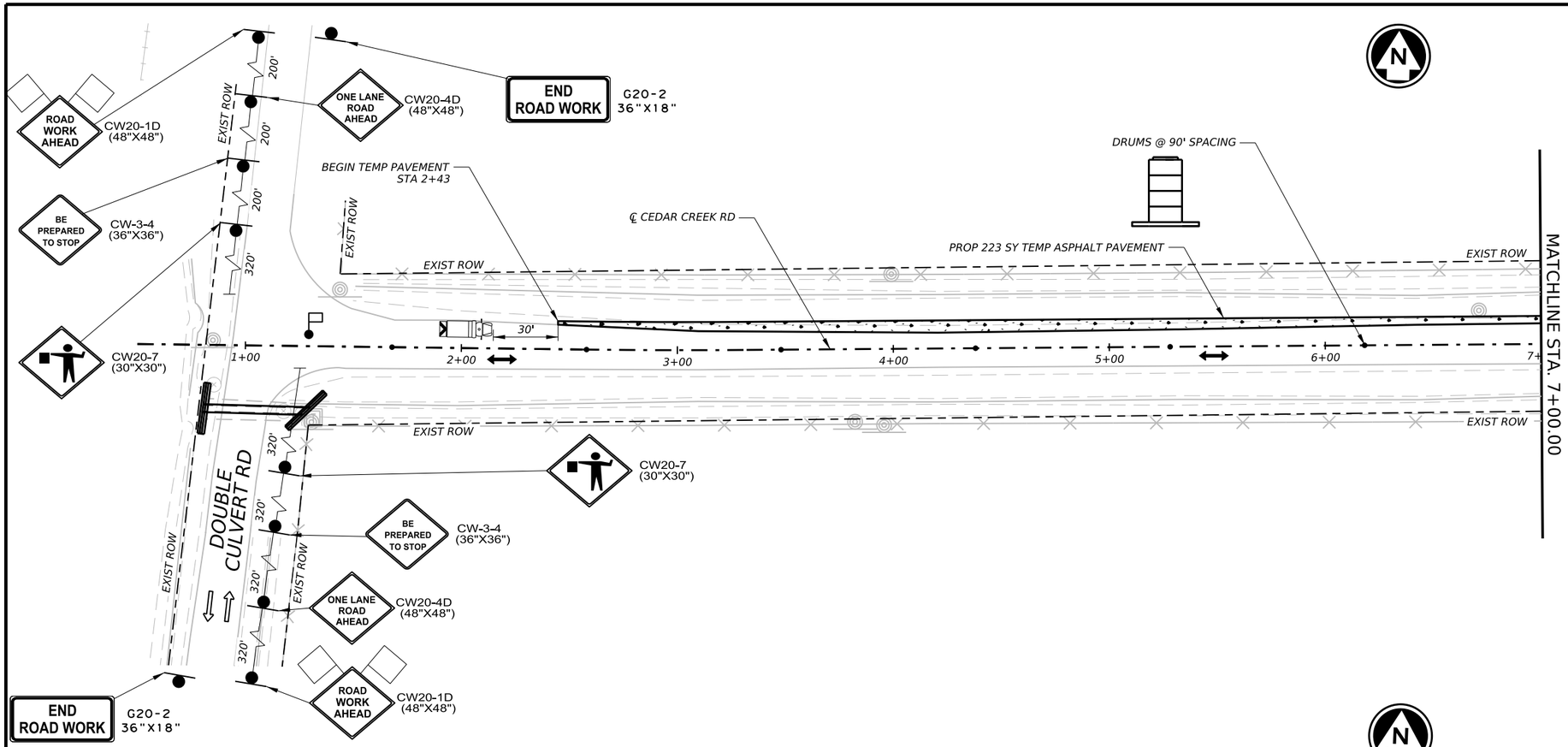

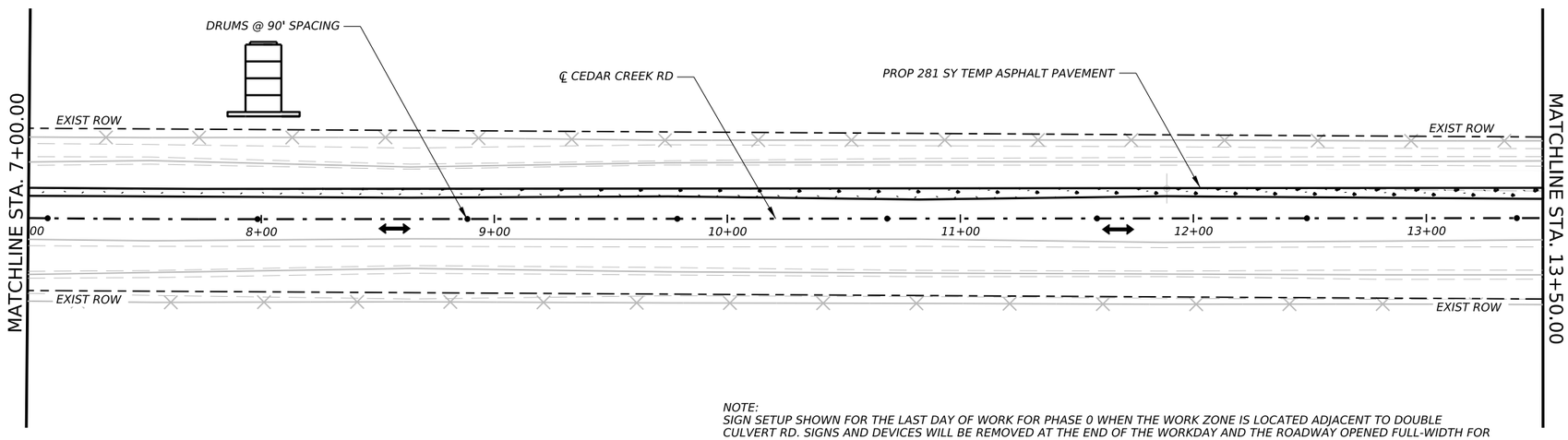

NOTE:
SIGN SETUP SHOWN FOR THE LAST DAY OF WORK FOR PHASE 0 WHEN THE WORK ZONE IS LOCATED ADJACENT TO DOUBLE CULVERT RD. SIGNS AND DEVICES WILL BE REMOVED AT THE END OF THE WORKDAY AND THE ROADWAY OPENED FULL-WIDTH FOR TWO-WAY TRAFFIC. SUBSEQUENT WORKDAYS WILL UTILIZE TCP (1-2)-18 FOR TRAFFIC CONTROL SETUP. THE LENGTH OF THE WORK ZONE SHALL BE LIMITED TO THE AMOUNT OF WORK THE CONTRACTOR CAN PERFORM IN ONE WORKDAY.

LEGEND

- EXISTING ROW
- TEMPORARY ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION (PREVIOUS PHASE)
- TEMPORARY ASPHALT PAVEMENT (PREVIOUS PHASE)
- EXISTING DIRECTION OF TRAFFIC
- PROPOSED DIRECTION OF TRAFFIC
- SIGN
- CHANNELIZING DEVICE
- TYPE III BARRICADE
- PROPOSED DITCH FLOWLINE
- UPRR CENTERLINE

NOTES:

1. CONTRACTOR TO PLAN WORK SUCH THAT ROAD IS FULLY OPEN TO TRAFFIC AT END OF EACH WORK DAY
2. UTILIZE TCP (1-2)-18 ONE LANE TWO WAY CONTROL WITH FLAGGERS
3. TEMPORARY PAVEMENT TO HAVE 2' MINIMUM PAVEMENT

0 30' 60'
SCALE: 1" = 60'

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
PHILIP M. BARNES
84571
LICENSED PROFESSIONAL ENGINEER

Philip M. Barnes
7/22/2026

CivilCorp an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

TRAFFIC CONTROL PLAN
CEDAR CREEK RD
PHASE 0
BEGIN TO STA 13+50.00

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		126

DATE: 7/22/2026 6:39:42 PM
FILE: \\civcorpw11\ics01\ICS pdf work din\20391149514 97IC DCR 4TCP101.dgn

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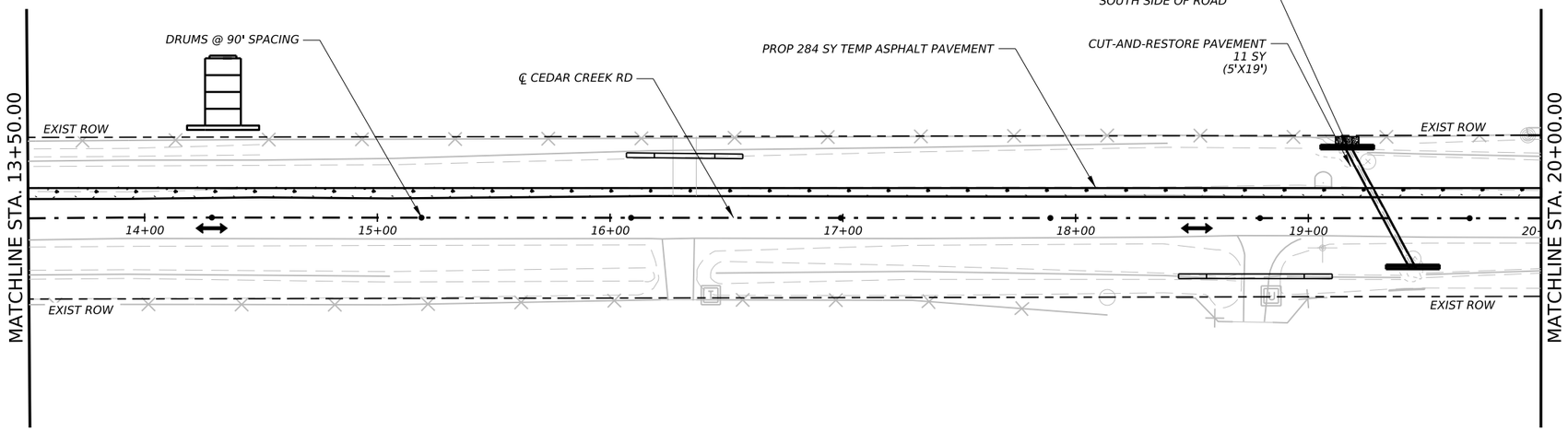

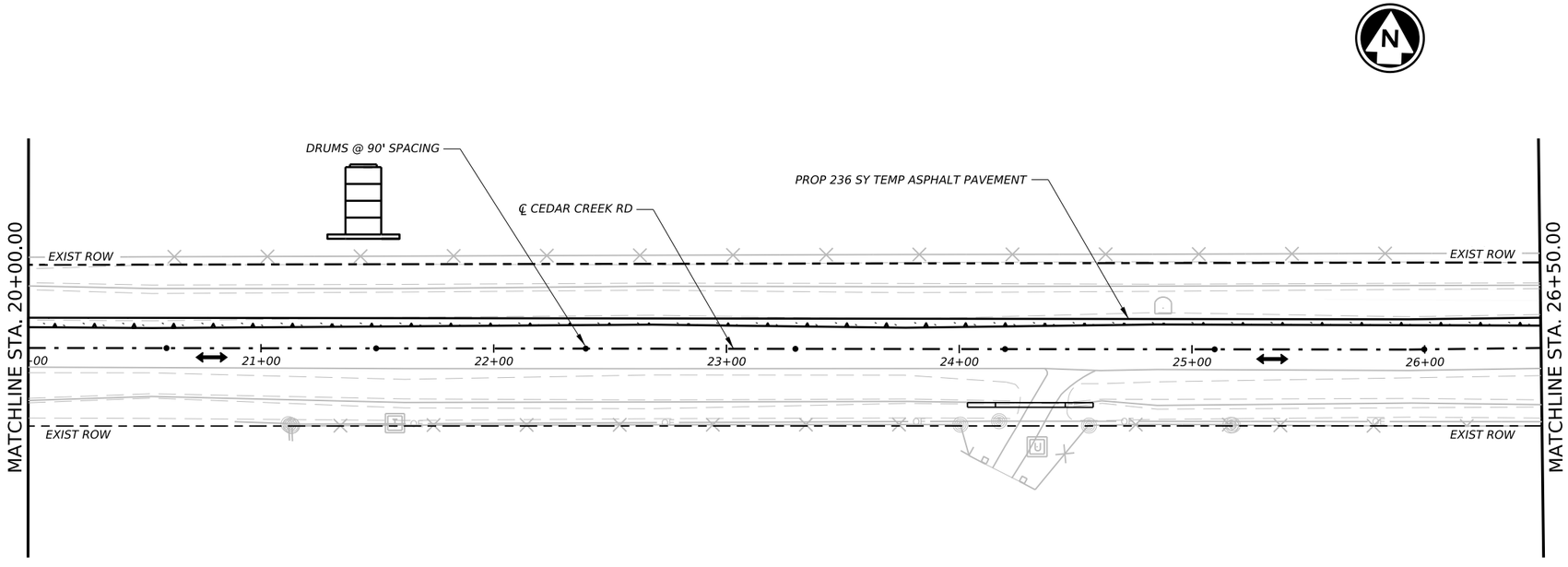

LEGEND

- EXISTING ROW
- TEMPORARY ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION (PREVIOUS PHASE)
- TEMPORARY ASPHALT PAVEMENT (PREVIOUS PHASE)
- EXISTING DIRECTION OF TRAFFIC
- PROPOSED DIRECTION OF TRAFFIC
- SIGN
- CHANNELIZING DEVICE
- TYPE III BARRICADE
- PROPOSED DITCH FLOWLINE
- UPRR CENTERLINE

NOTES:

1. CONTRACTOR TO PLAN WORK SUCH THAT ROAD IS FULLY OPEN TO TRAFFIC AT END OF EACH WORK DAY
2. UTILIZE TCP (1-2)-18 ONE LANE TWO WAY CONTROL WITH FLAGGERS
3. TEMPORARY PAVEMENT TO HAVE 2' MINIMUM PAVEMENT

0 30' 60'
SCALE: 1" = 60'

NO.	DATE	REVISION	APPROV.

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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

TRAFFIC CONTROL PLAN
CEDAR CREEK RD
PHASE 0
STA 13+50.00 TO STA 26+00.00

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		127

DATE: 7/22/2026 6:46:38 PM
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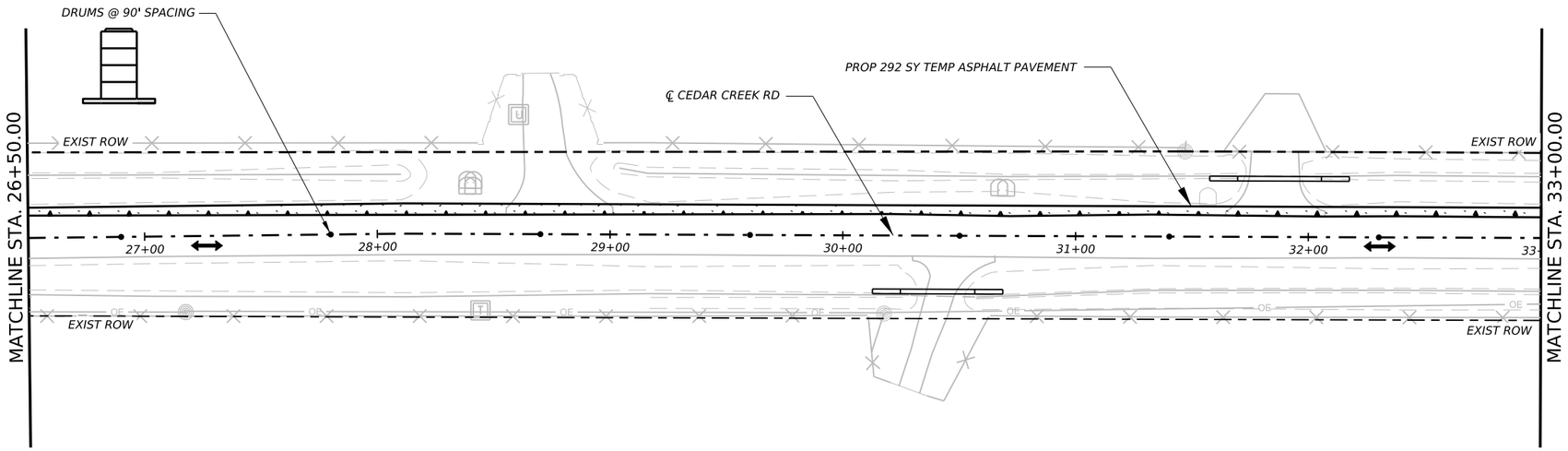

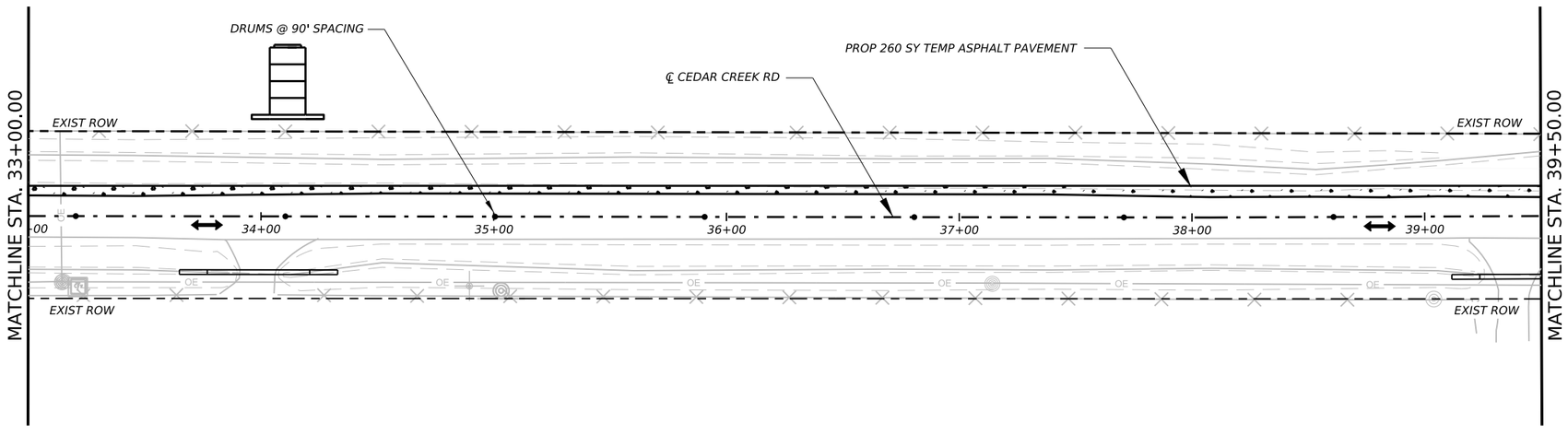

LEGEND

- EXISTING ROW
- TEMPORARY ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION (PREVIOUS PHASE)
- TEMPORARY ASPHALT PAVEMENT (PREVIOUS PHASE)
- EXISTING DIRECTION OF TRAFFIC
- PROPOSED DIRECTION OF TRAFFIC
- SIGN
- CHANNELIZING DEVICE
- TYPE III BARRICADE
- PROPOSED DITCH FLOWLINE
- UPRR CENTERLINE

NOTES:

1. CONTRACTOR TO PLAN WORK SUCH THAT ROAD IS FULLY OPEN TO TRAFFIC AT END OF EACH WORK DAY
2. UTILIZE TCP (1-2)-18 ONE LANE TWO WAY CONTROL WITH FLAGGERS
3. TEMPORARY PAVEMENT TO HAVE 2' MINIMUM PAVEMENT

0 30' 60'

SCALE: 1" = 60'

NO.	DATE	REVISION	APPROV.

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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY

ENGINEERING DEPARTMENT

TRAFFIC CONTROL PLAN
CEDAR CREEK RD
PHASE 0

STA 26+00.00 TO STA 39+50.00

SHEET 3 OF 4

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		128

DATE: 7/22/2026 6:40:01 PM
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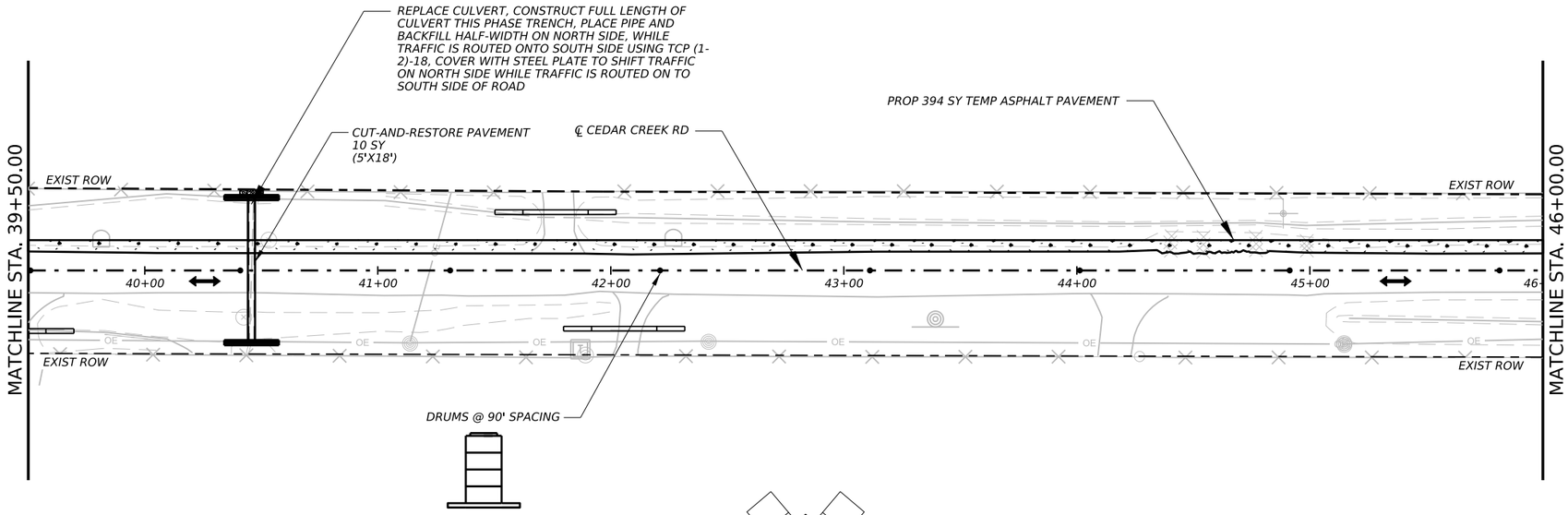

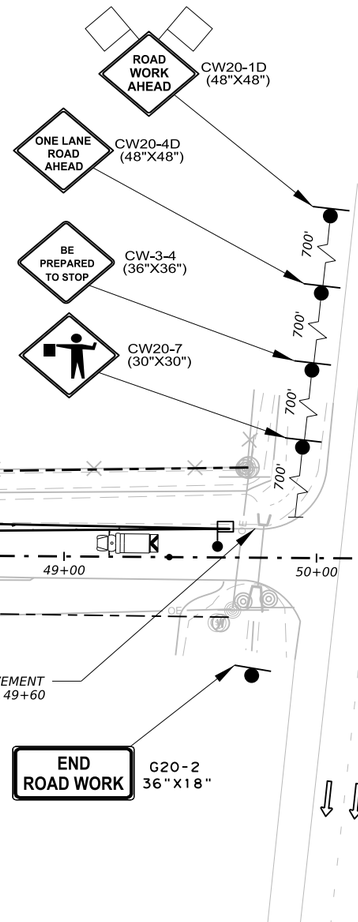

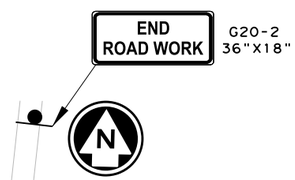

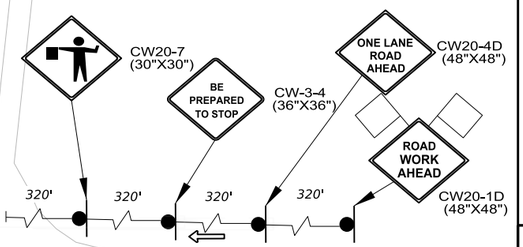

NOTE:
SIGN SETUP SHOWN FOR THE FIRST DAY OF WORK FOR PHASE 0 WHEN THE WORK ZONE IS LOCATED ADJACENT TO SH 6. SIGNS AND DEVICES WILL BE REMOVED AT THE END OF THE WORKDAY AND THE ROADWAY OPENED FULL-WIDTH FOR TWO-WAY TRAFFIC. SUBSEQUENT WORKDAYS WILL UTILIZE TCP (1-2)-18 FOR TRAFFIC CONTROL SETUP. THE LENGTH OF THE WORK ZONE SHALL BE LIMITED TO THE AMOUNT OF WORK THE CONTRACTOR CAN PERFORM IN ONE WORKDAY.

LEGEND

- EXISTING ROW
- TEMPORARY ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION (PREVIOUS PHASE)
- TEMPORARY ASPHALT PAVEMENT (PREVIOUS PHASE)
- EXISTING DIRECTION OF TRAFFIC
- PROPOSED DIRECTION OF TRAFFIC
- SIGN
- CHANNELIZING DEVICE
- TYPE III BARRICADE
- PROPOSED DITCH FLOWLINE
- UPRR CENTERLINE

NOTES:

1. CONTRACTOR TO PLAN WORK SUCH THAT ROAD IS FULLY OPEN TO TRAFFIC AT END OF EACH WORK DAY
2. UTILIZE TCP (1-2)-18 ONE LANE TWO WAY CONTROL WITH FLAGGERS
3. TEMPORARY PAVEMENT TO HAVE 2' MINIMUM PAVEMENT

0 30' 60'
SCALE: 1" = 60'

NO.	DATE	REVISION	APPROV.

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FIRM REGISTRATION NUMBER: 17252

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7/22/2026

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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

TRAFFIC CONTROL PLAN
CEDAR CREEK RD
PHASE 0
STA 39+50.00 TO END

SHEET 4 OF 4

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		129

DATE: 7/22/2026 7:10:09 PM
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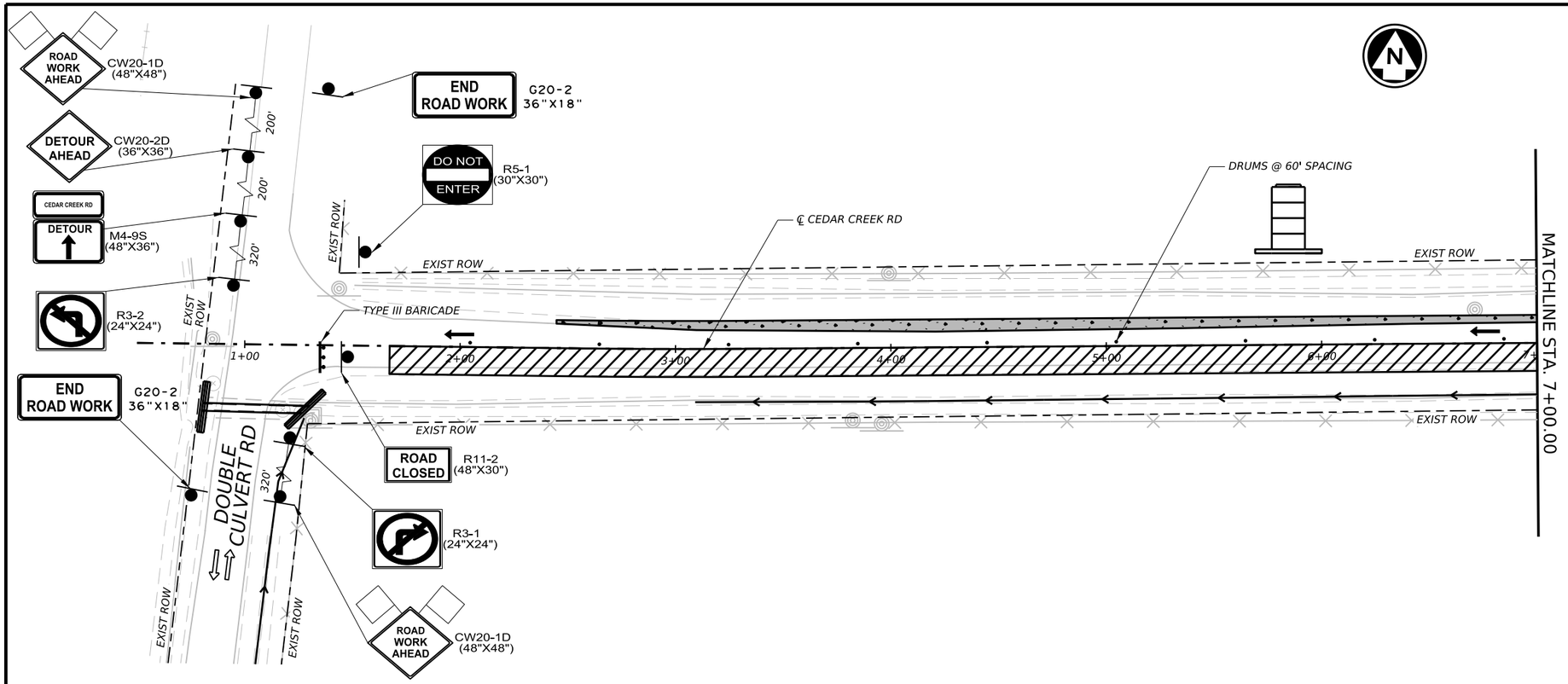

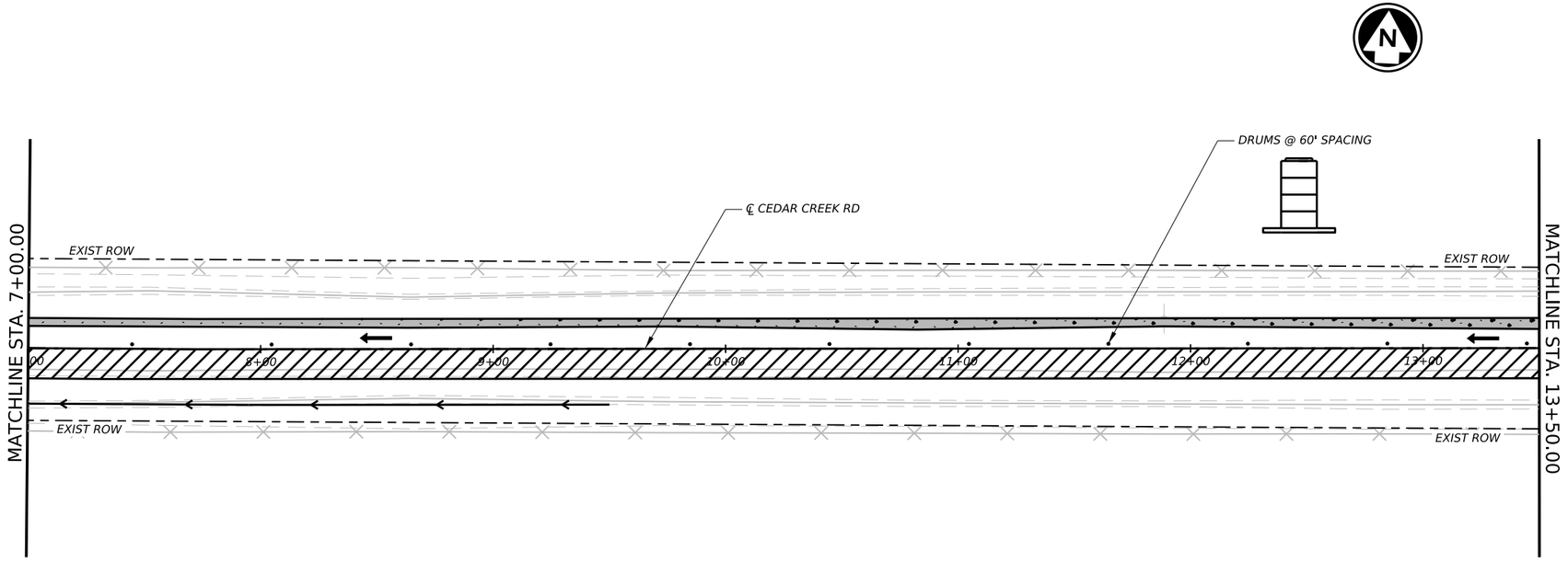

LEGEND

- EXISTING ROW
- TEMPORARY ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION (PREVIOUS PHASE)
- TEMPORARY ASPHALT PAVEMENT (PREVIOUS PHASE)
- EXISTING DIRECTION OF TRAFFIC
- PROPOSED DIRECTION OF TRAFFIC
- SIGN
- CHANNELIZING DEVICE
- TYPE III BARRICADE
- PROPOSED DITCH FLOWLINE
- UPRR CENTERLINE

NOTES:

1. CONTRACTOR TO MAINTAIN ACCESS TO PROPERTIES AT ALL TIME
2. CONSTRUCT DRIVEWAYS HALF WIDTH PLACE FULL LENGTH CULVERT AT DRIVEWAY LOCATIONS USING STEEL PLATE TO TEMPORARILY COVER TRENCH TO MAINTAIN ACCESS
3. REFER TO TCP (2-2)-18 FOR ADDITIONAL INFORMATION

0 30' 60'

SCALE: 1" = 60'

NO.	DATE	REVISION	APPROV.

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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY

ENGINEERING DEPARTMENT

TRAFFIC CONTROL PLAN
CEDAR CREEK RD
PHASE 1

BEGIN TO STA 13+50.00

SHEET 1 OF 4

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		130

DATE: 7/22/2026 6:39:47 PM
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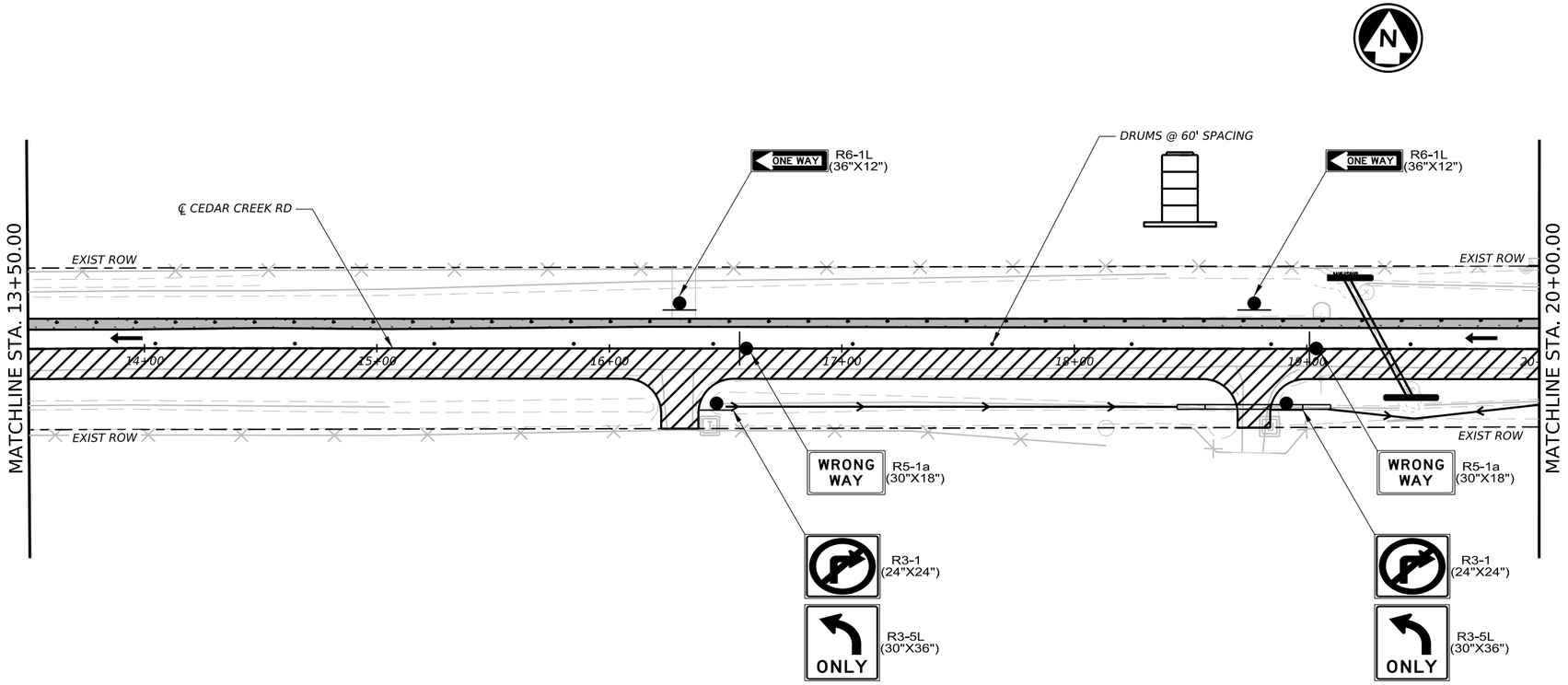

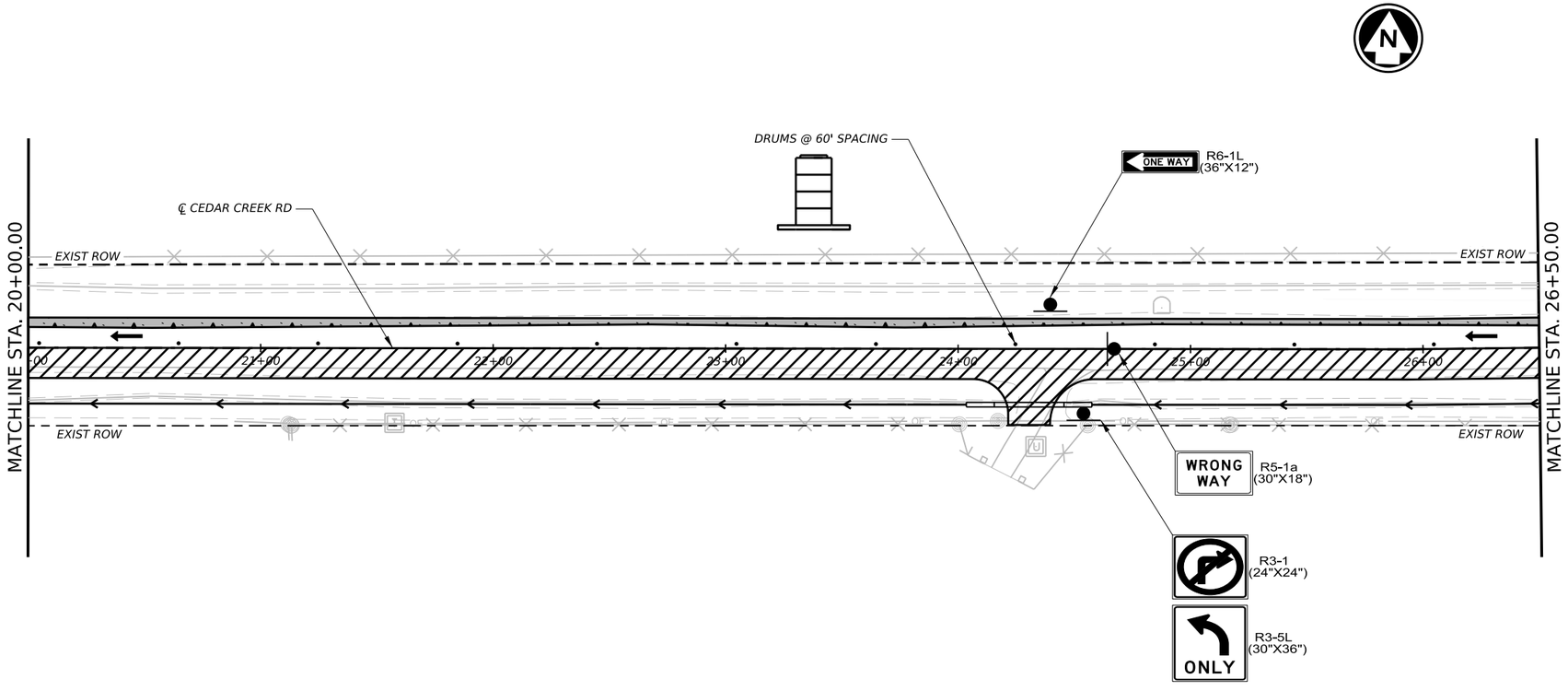

LEGEND

- EXISTING ROW
- TEMPORARY ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION (PREVIOUS PHASE)
- TEMPORARY ASPHALT PAVEMENT (PREVIOUS PHASE)
- EXISTING DIRECTION OF TRAFFIC
- PROPOSED DIRECTION OF TRAFFIC
- SIGN
- CHANNELIZING DEVICE
- TYPE III BARRICADE
- PROPOSED DITCH FLOWLINE
- UPRR CENTERLINE

NOTES:

1. CONTRACTOR TO MAINTAIN ACCESS TO PROPERTIES AT ALL TIME
2. CONSTRUCT DRIVEWAYS HALF WIDTH PLACE FULL LENGTH CULVERT AT DRIVEWAY LOCATIONS USING STEEL PLATE TO TEMPORARILY COVER TRENCH TO MAINTAIN ACCESS
3. REFER TO TCP (2-2)-18 FOR ADDITIONAL INFORMATION

0 30' 60'
SCALE: 1" = 60'

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
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7/22/2026

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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

TRAFFIC CONTROL PLAN
CEDAR CREEK RD
PHASE 1
STA 13+50.00 TO STA 26+00.00

SHEET 2 OF 4

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		131

DATE: 7/22/2026 6:43:29 PM
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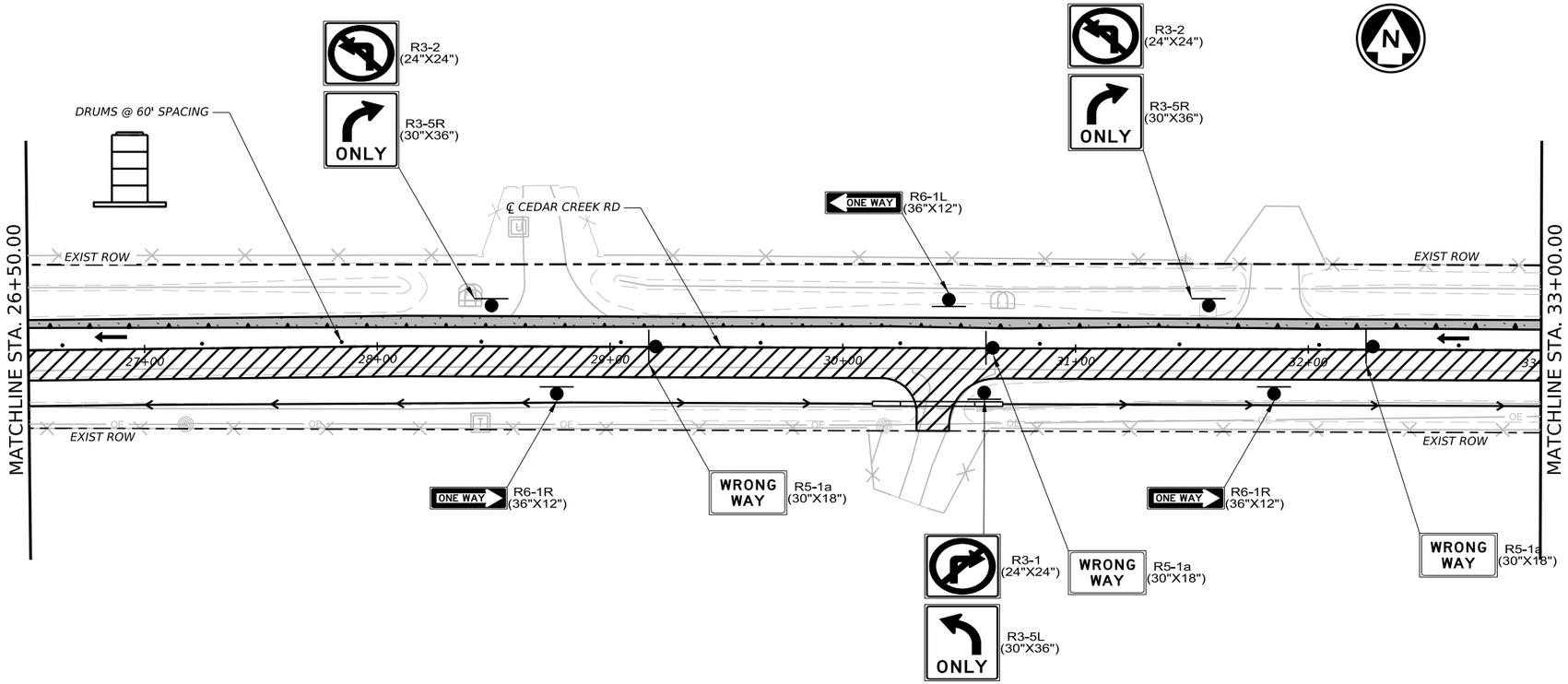

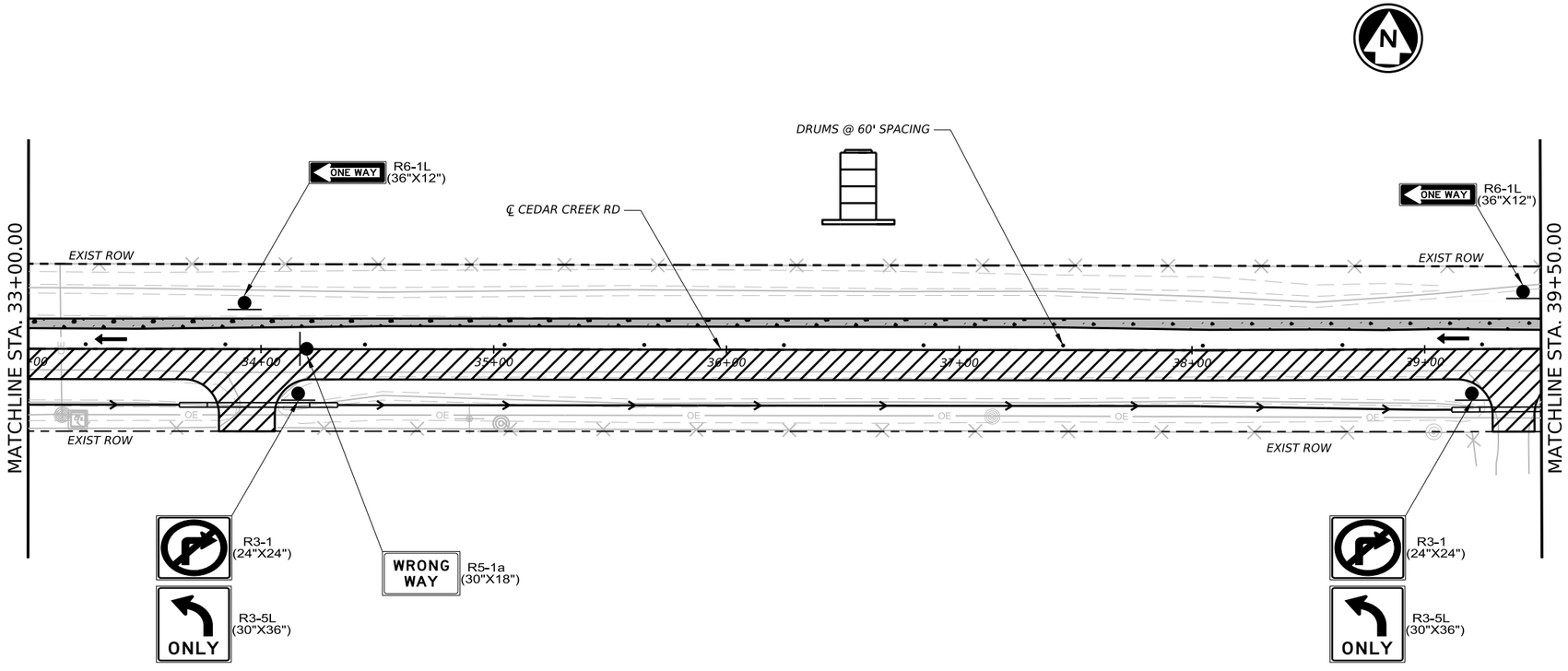

LEGEND

- EXISTING ROW
- TEMPORARY ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION (PREVIOUS PHASE)
- TEMPORARY ASPHALT PAVEMENT (PREVIOUS PHASE)
- EXISTING DIRECTION OF TRAFFIC
- PROPOSED DIRECTION OF TRAFFIC
- SIGN
- CHANNELIZING DEVICE
- TYPE III BARRICADE
- PROPOSED DITCH FLOWLINE
- UPRR CENTERLINE

NOTES:

1. CONTRACTOR TO MAINTAIN ACCESS TO PROPERTIES AT ALL TIME
2. CONSTRUCT DRIVEWAYS HALF WIDTH PLACE FULL LENGTH CULVERT AT DRIVEWAY LOCATIONS USING STEEL PLATE TO TEMPORARILY COVER TRENCH TO MAINTAIN ACCESS
3. REFER TO TCP (2-2)-18 FOR ADDITIONAL INFORMATION

0 30' 60'
SCALE: 1" = 60'

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

TRAFFIC CONTROL PLAN
CEDAR CREEK RD
PHASE 1
STA 26+00.00 TO STA 39+50.00

SHEET 3 OF 4

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		132

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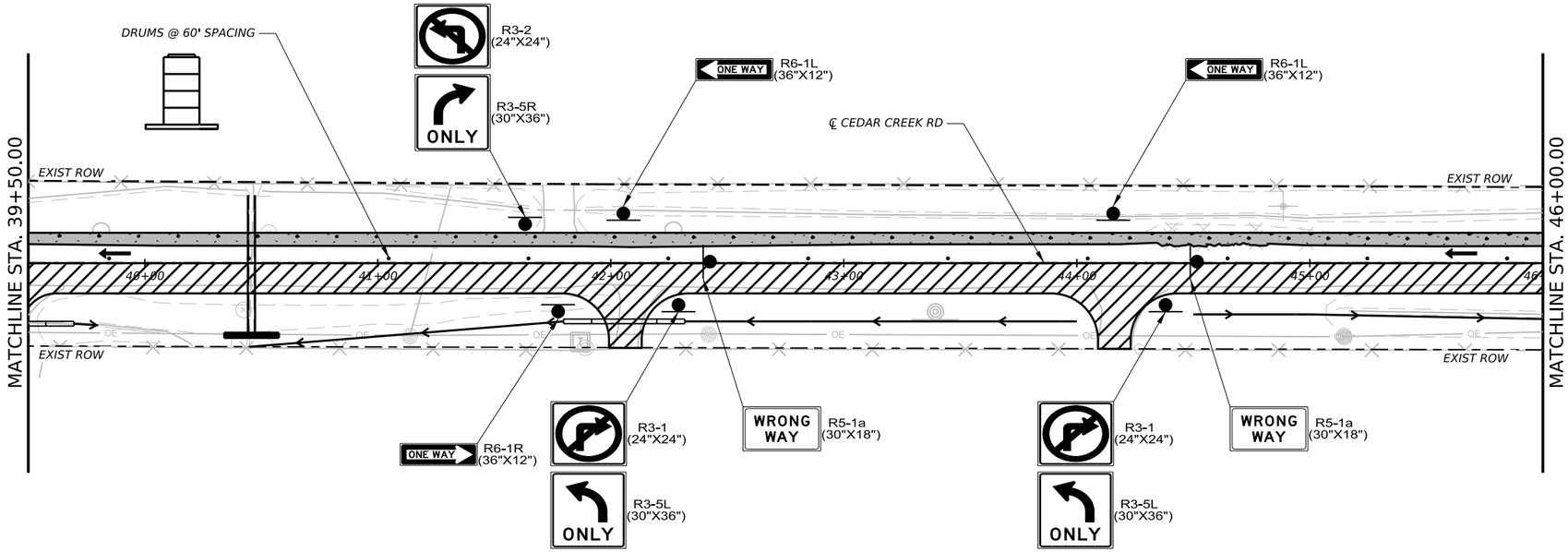

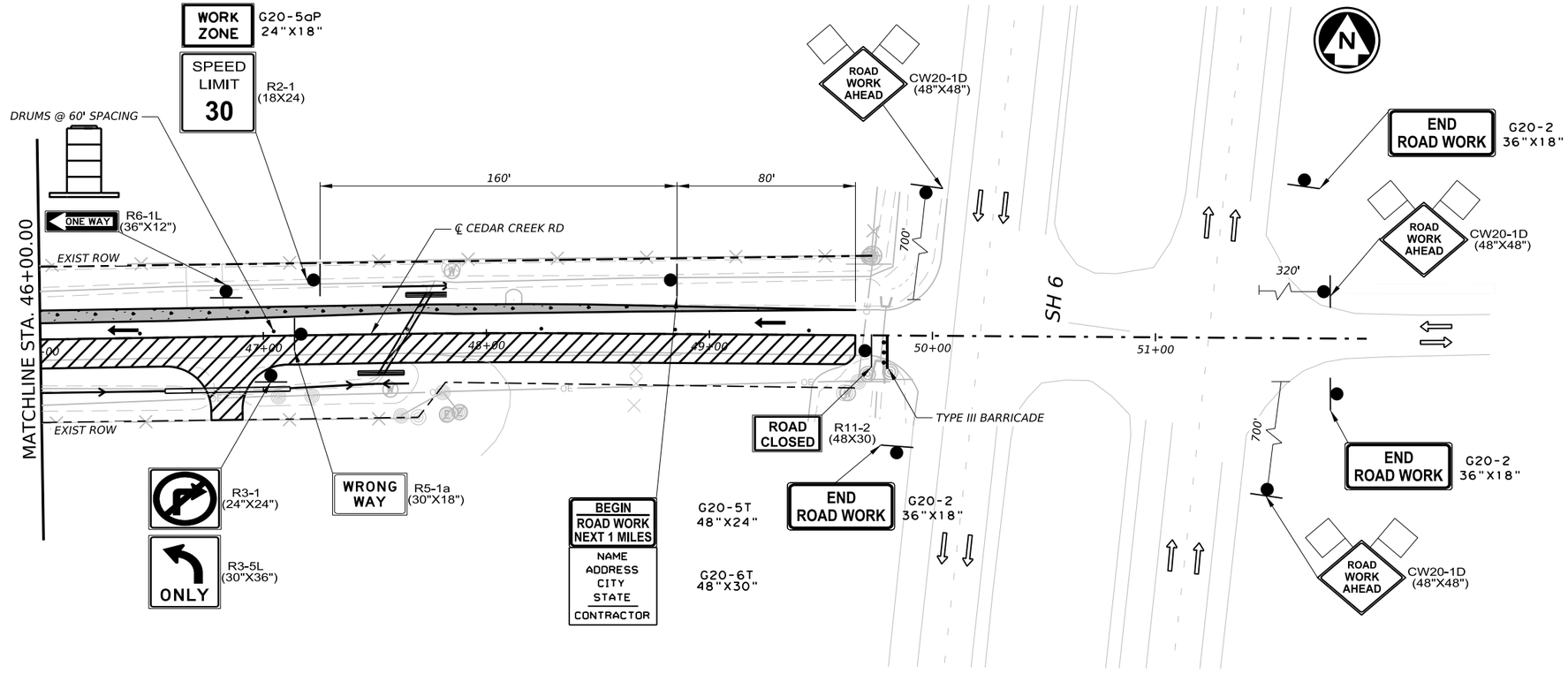

LEGEND

- EXISTING ROW
- TEMPORARY ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION (PREVIOUS PHASE)
- TEMPORARY ASPHALT PAVEMENT (PREVIOUS PHASE)
- EXISTING DIRECTION OF TRAFFIC
- PROPOSED DIRECTION OF TRAFFIC
- SIGN
- CHANNELIZING DEVICE
- TYPE III BARRICADE
- PROPOSED DITCH FLOWLINE
- UPRR CENTERLINE

NOTES:

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0 30' 60'
SCALE: 1" = 60'

NO.	DATE	REVISION	APPROV.

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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

TRAFFIC CONTROL PLAN
CEDAR CREEK RD
PHASE 1
STA 39+50.00 TO END

SHEET 4 OF 4

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		133

DATE: 7/22/2026 6:40:05 PM
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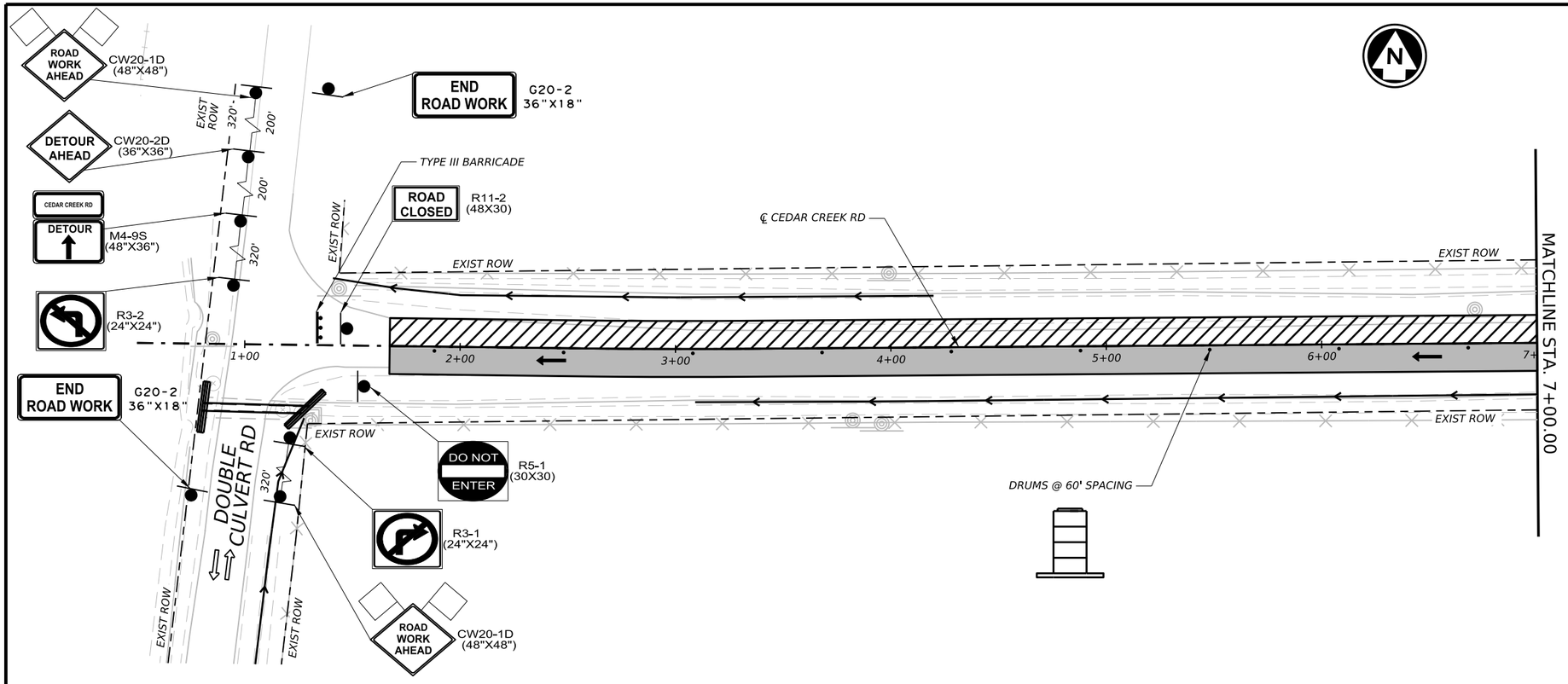

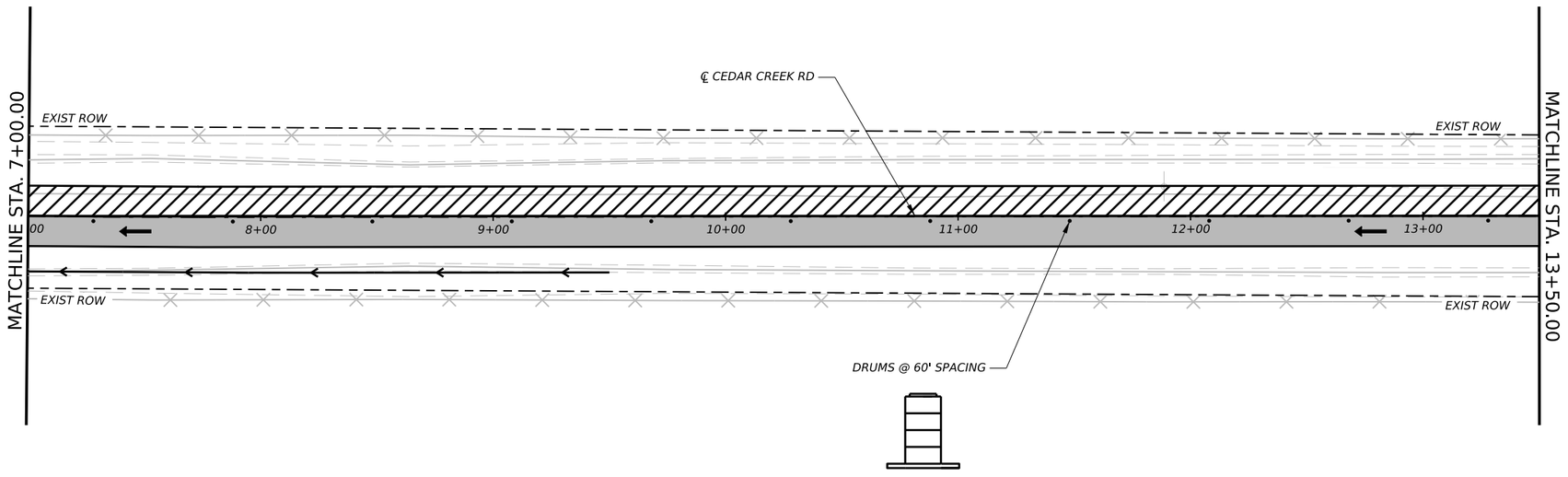

LEGEND

- EXISTING ROW
- TEMPORARY ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION (PREVIOUS PHASE)
- TEMPORARY ASPHALT PAVEMENT (PREVIOUS PHASE)
- EXISTING DIRECTION OF TRAFFIC
- PROPOSED DIRECTION OF TRAFFIC
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- TYPE III BARRICADE
- PROPOSED DITCH FLOWLINE
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NOTES:

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3. REFER TO TCP (2-2)-18 FOR ADDITIONAL INFORMATION

0 30' 60'

SCALE: 1" = 60'

NO.	DATE	REVISION	APPROV.

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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY

ENGINEERING DEPARTMENT

TRAFFIC CONTROL PLAN
CEDAR CREEK RD
PHASE 2

BEGIN TO STA 13+50.00

SHEET 1 OF 4

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		134

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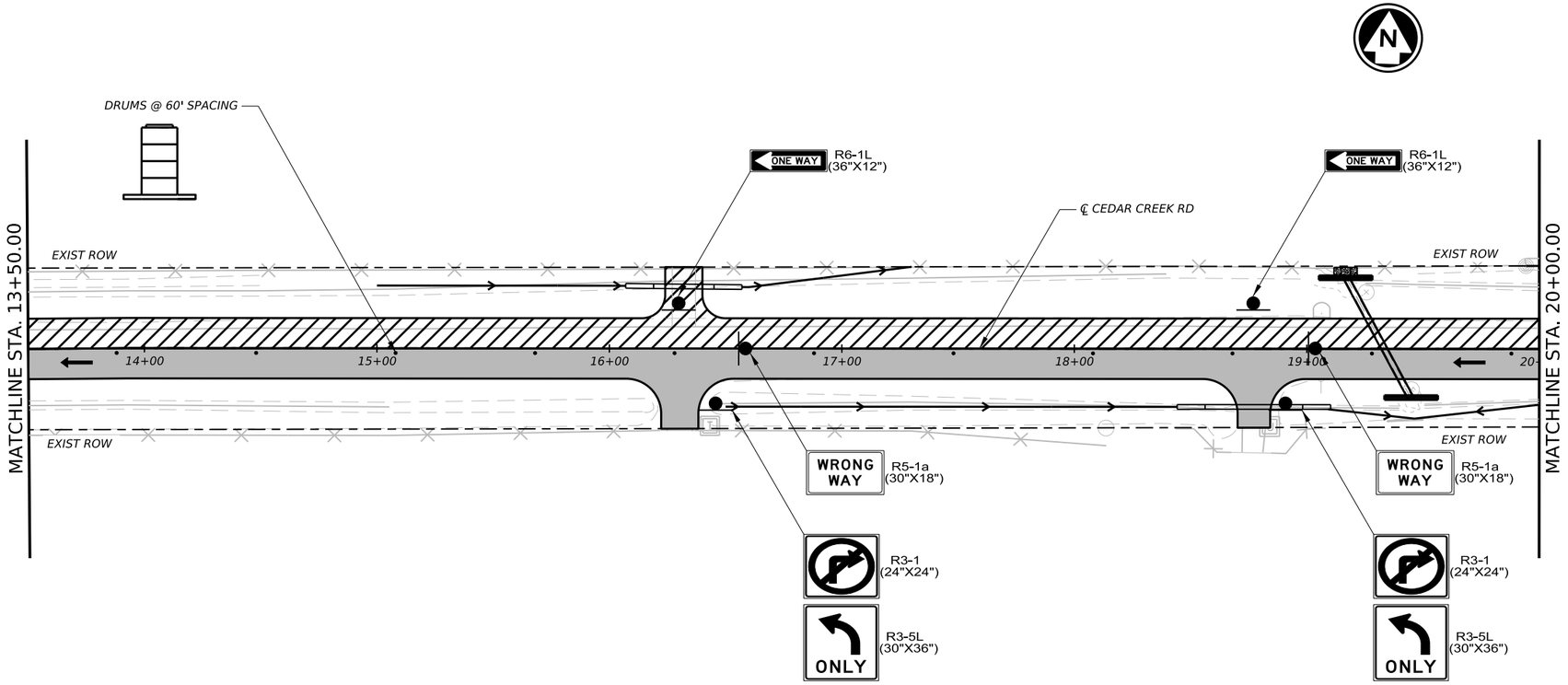

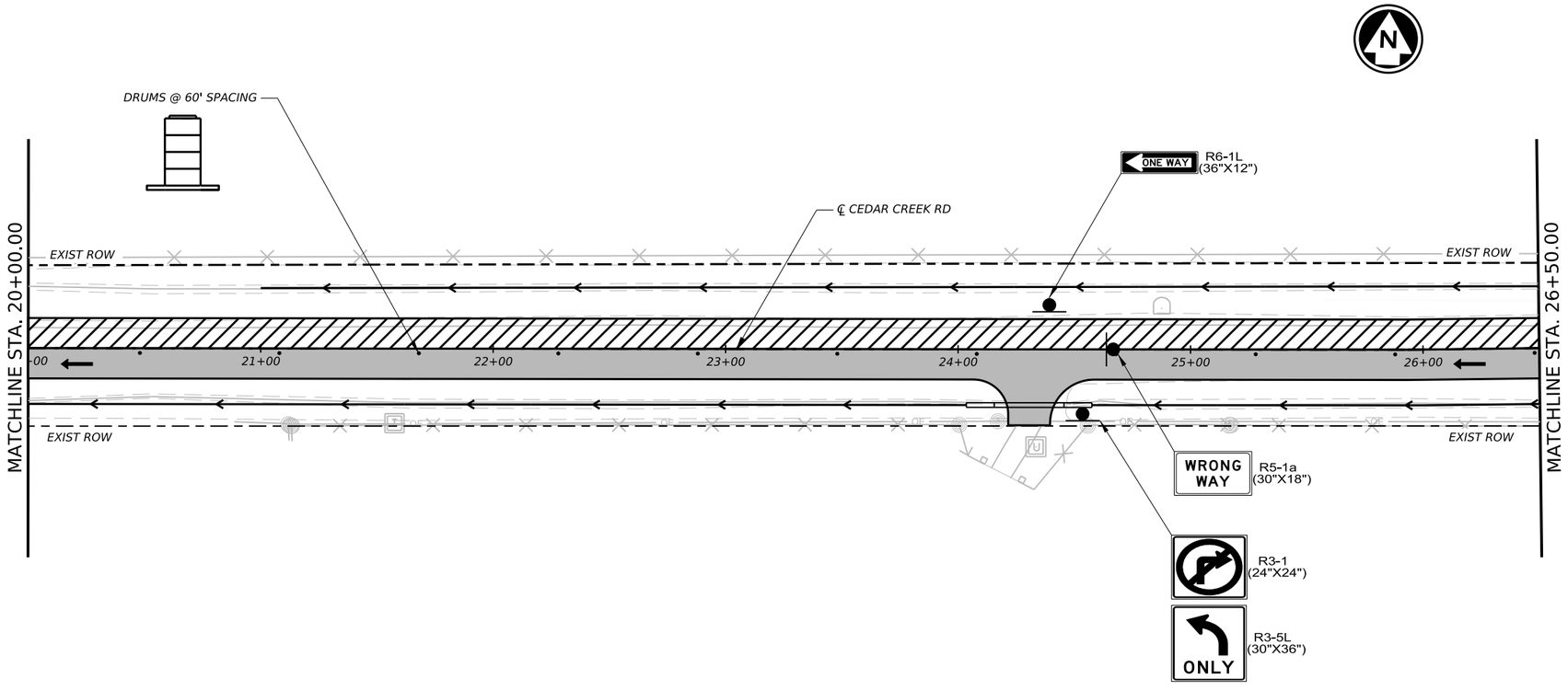

LEGEND

- EXISTING ROW
- TEMPORARY ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION (PREVIOUS PHASE)
- TEMPORARY ASPHALT PAVEMENT (PREVIOUS PHASE)
- EXISTING DIRECTION OF TRAFFIC
- PROPOSED DIRECTION OF TRAFFIC
- SIGN
- CHANNELIZING DEVICE
- TYPE III BARRICADE
- PROPOSED DITCH FLOWLINE
- UPRR CENTERLINE

NOTES:

1. CONTRACTOR TO MAINTAIN ACCESS TO PROPERTIES AT ALL TIME
2. CONSTRUCT DRIVEWAYS HALF WIDTH PLACE FULL LENGTH CULVERT AT DRIVEWAY LOCATIONS USING STEEL PLATE TO TEMPORARILY COVER TRENCH TO MAINTAIN ACCESS
3. REFER TO TCP (2-2)-18 FOR ADDITIONAL INFORMATION

0 30' 60'
SCALE: 1" = 60'

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
PHILIP M. BARNES
84571
LICENSED PROFESSIONAL ENGINEER

Philip M. Barnes
7/22/2026

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

TRAFFIC CONTROL PLAN
CEDAR CREEK RD
PHASE 2
STA 13+50.00 TO STA 26+00.00

SHEET 2 OF 4

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		135

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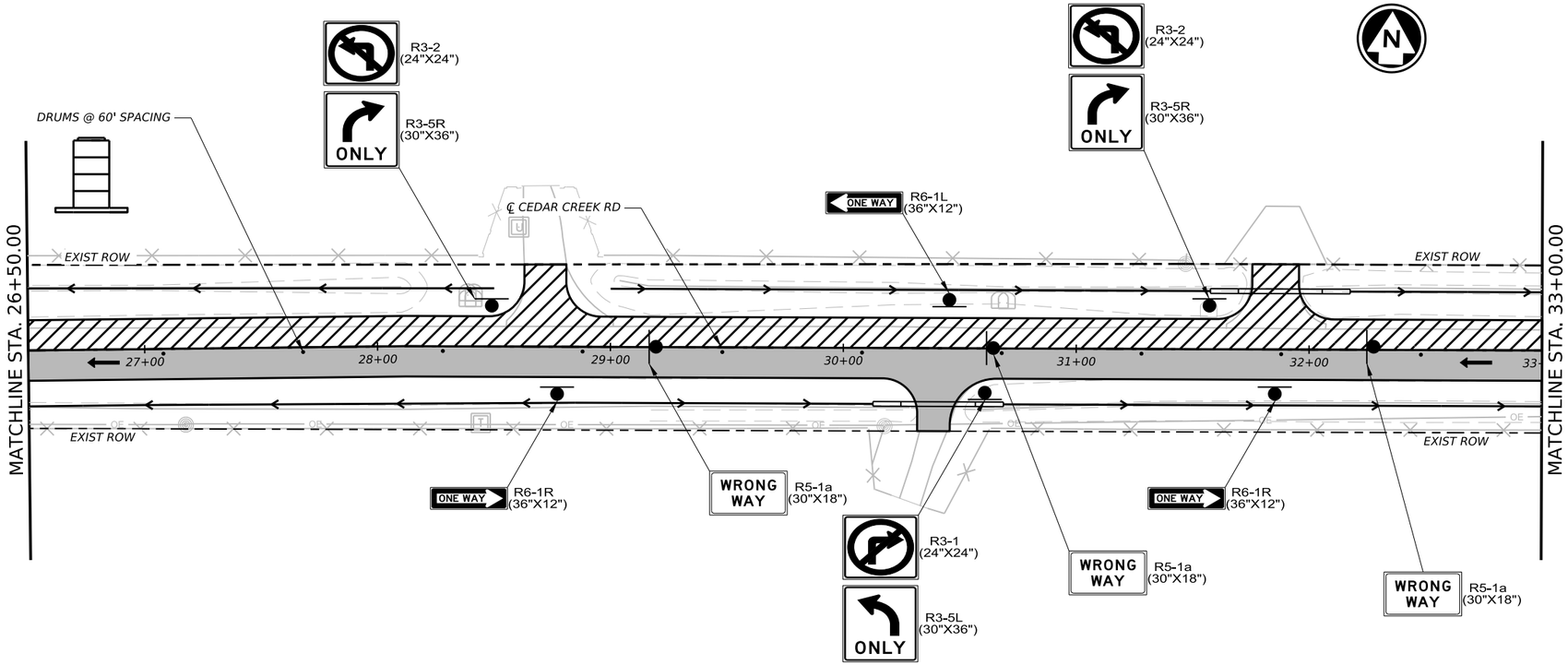

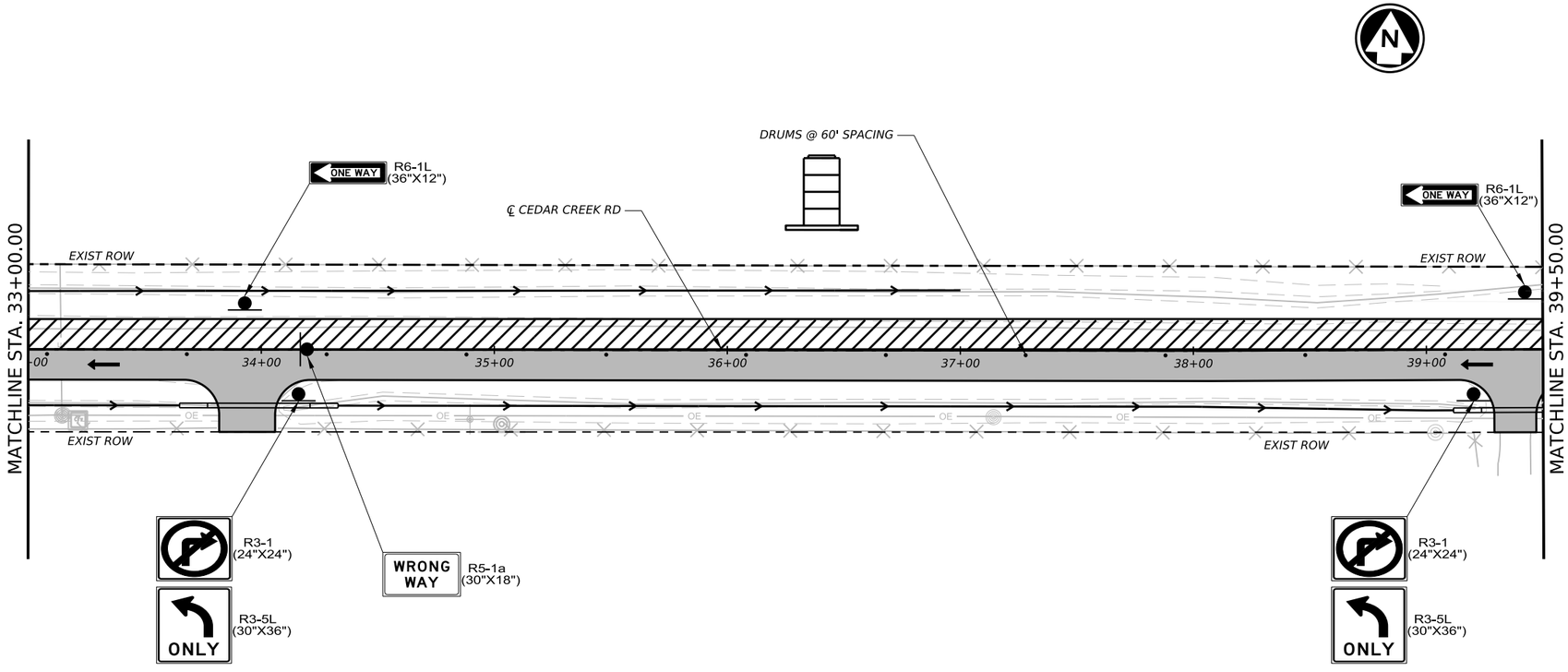

LEGEND

- EXISTING ROW
- TEMPORARY ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION (PREVIOUS PHASE)
- TEMPORARY ASPHALT PAVEMENT (PREVIOUS PHASE)
- EXISTING DIRECTION OF TRAFFIC
- PROPOSED DIRECTION OF TRAFFIC
- SIGN
- CHANNELIZING DEVICE
- TYPE III BARRICADE
- PROPOSED DITCH FLOWLINE
- UPRR CENTERLINE

NOTES:

1. CONTRACTOR TO MAINTAIN ACCESS TO PROPERTIES AT ALL TIME
2. CONSTRUCT DRIVEWAYS HALF WIDTH PLACE FULL LENGTH CULVERT AT DRIVEWAY LOCATIONS USING STEEL PLATE TO TEMPORARILY COVER TRENCH TO MAINTAIN ACCESS
3. REFER TO TCP (2-2)-18 FOR ADDITIONAL INFORMATION

0 30' 60'

SCALE: 1" = 60'

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
PHILIP M. BARNES
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7/22/2026

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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY

ENGINEERING DEPARTMENT

TRAFFIC CONTROL PLAN
CEDAR CREEK RD
PHASE 2

STA 26+00.00 TO STA 39+50.00

SHEET 3 OF 4

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		136

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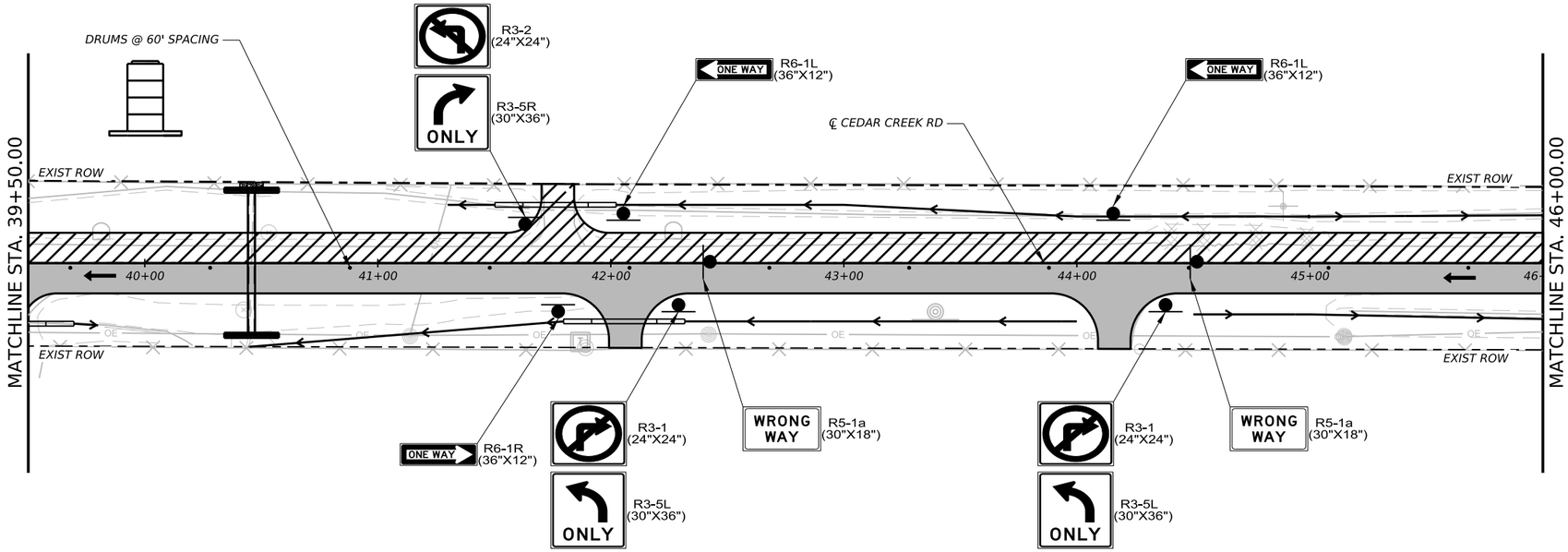

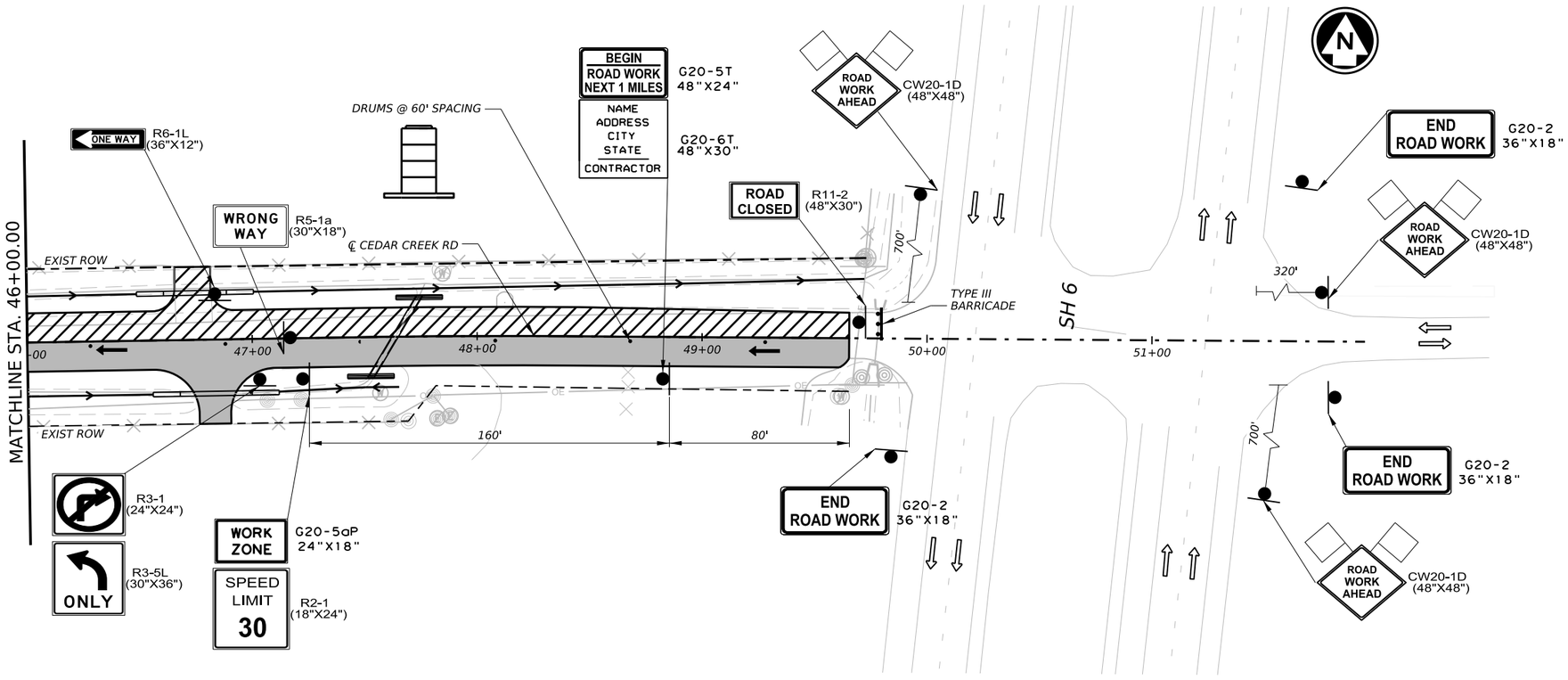

LEGEND

- EXISTING ROW
- TEMPORARY ASPHALT PAVEMENT
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION (PREVIOUS PHASE)
- TEMPORARY ASPHALT PAVEMENT (PREVIOUS PHASE)
- EXISTING DIRECTION OF TRAFFIC
- PROPOSED DIRECTION OF TRAFFIC
- SIGN
- CHANNELIZING DEVICE
- TYPE III BARRICADE
- PROPOSED DITCH FLOWLINE
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NOTES:

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2. CONSTRUCT DRIVEWAYS HALF WIDTH PLACE FULL LENGTH CULVERT AT DRIVEWAY LOCATIONS USING STEEL PLATE TO TEMPORARILY COVER TRENCH TO MAINTAIN ACCESS
3. REFER TO TCP (2-2)-18 FOR ADDITIONAL INFORMATION

0 30' 60'
SCALE: 1" = 60'

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
PHILIP M. BARNES
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LICENSED PROFESSIONAL ENGINEER

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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

TRAFFIC CONTROL PLAN
CEDAR CREEK RD
PHASE 2
STA 39+50.00 TO END

SHEET 4 OF 4

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		137

DATE: 7/22/2026 7:10:29 PM
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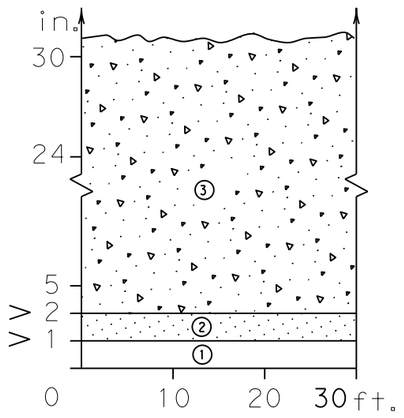
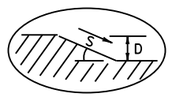
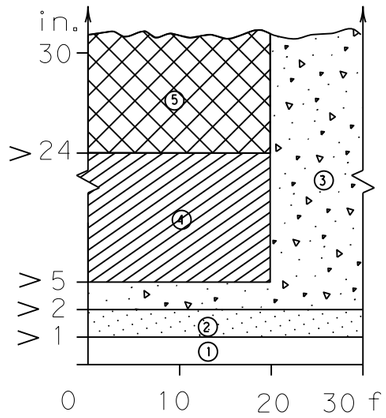
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

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

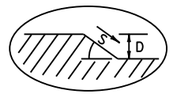


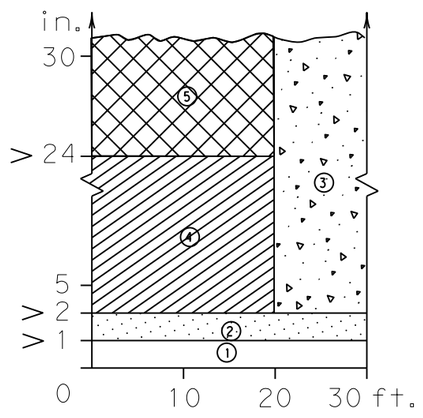
Edge Condition I
S = (3:1) (or flatter)



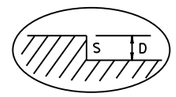


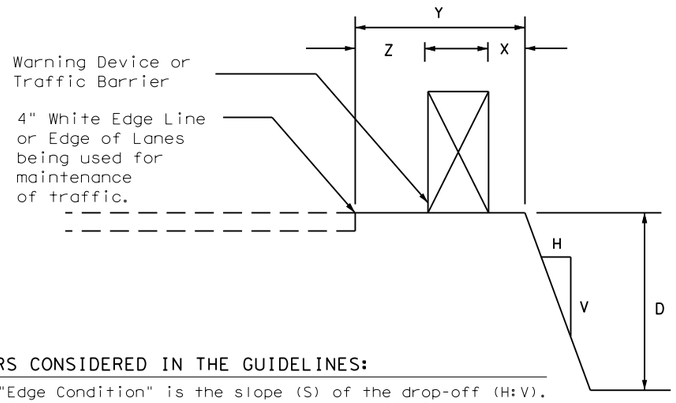
Edge Condition II
S = ((2.99):1) to (1:1)





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





FACTORS CONSIDERED IN THE GUIDELINES:

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

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

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

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

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

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

Edge Condition Notes:

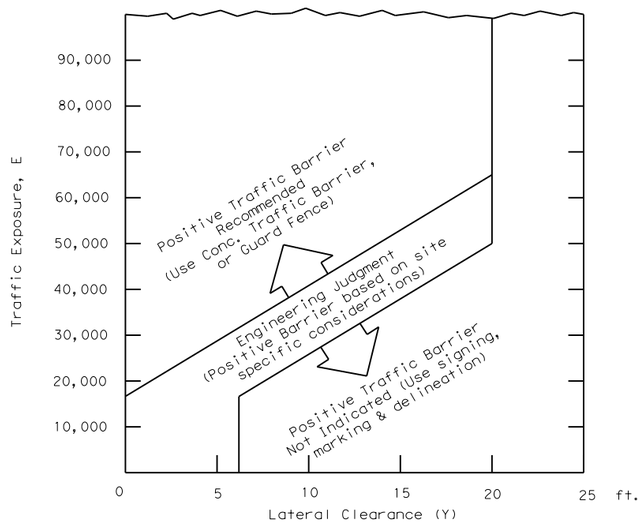
1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.

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

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

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

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



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

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

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

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

Engineer's Seal

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
PHILIP M. BARNES
84571
LICENSED PROFESSIONAL ENGINEER

Philip M. Barnes
7/22/2026

Texas Department of Transportation

Traffic Safety Division Standard

TREATMENT FOR VARIOUS EDGE CONDITIONS

FILE: edgecon.dgn	DN:	CK:	DW:	CK:
©TxDOT August 2000	CONT	SECT	JOB	HIGHWAY
REVISIONS			23103	DOUBLE CULVERT RD
03-01 08-01 9-21	DIST	COUNTY		SHEET NO.
		WALLER		138

DATE:
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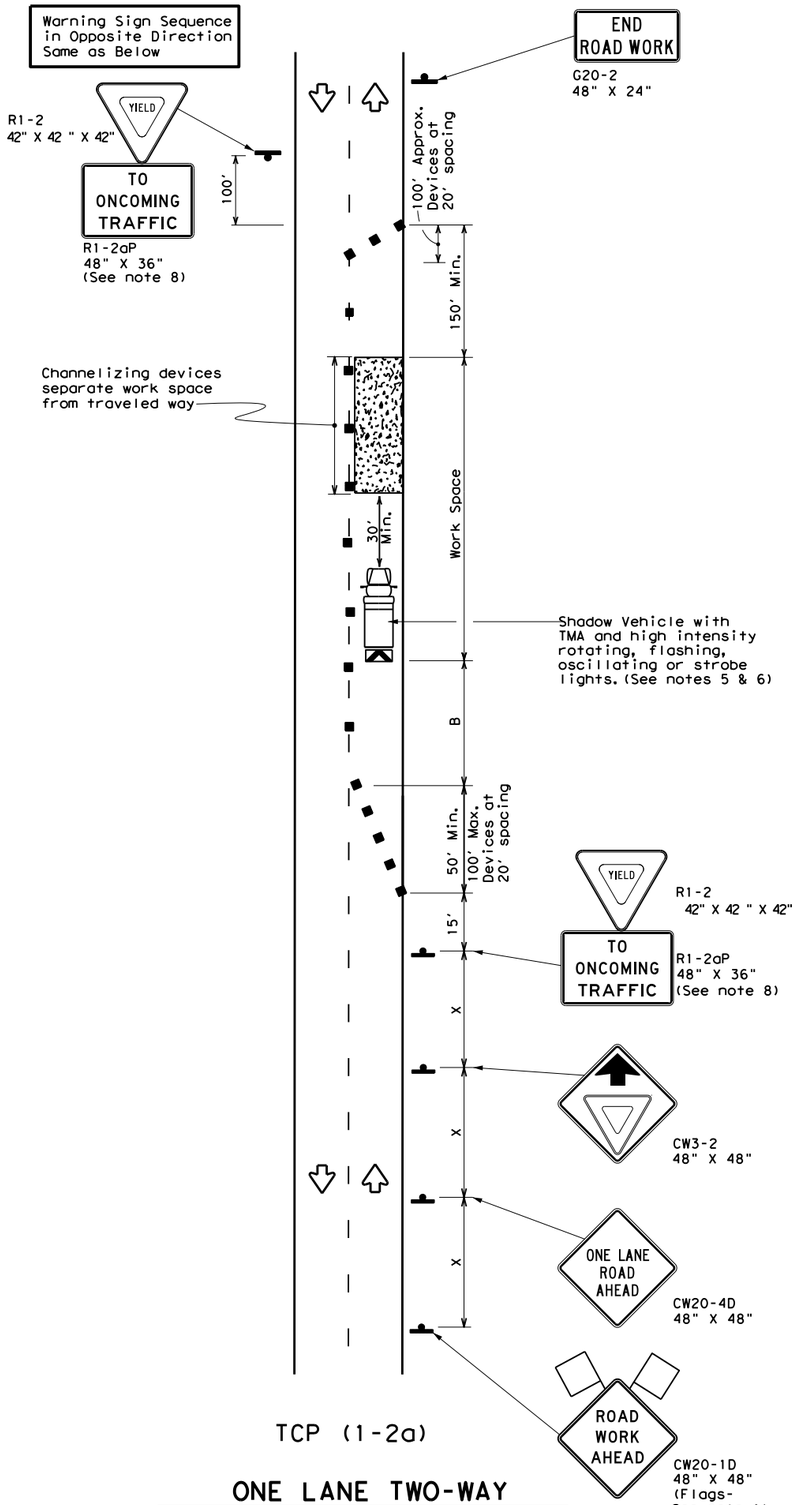
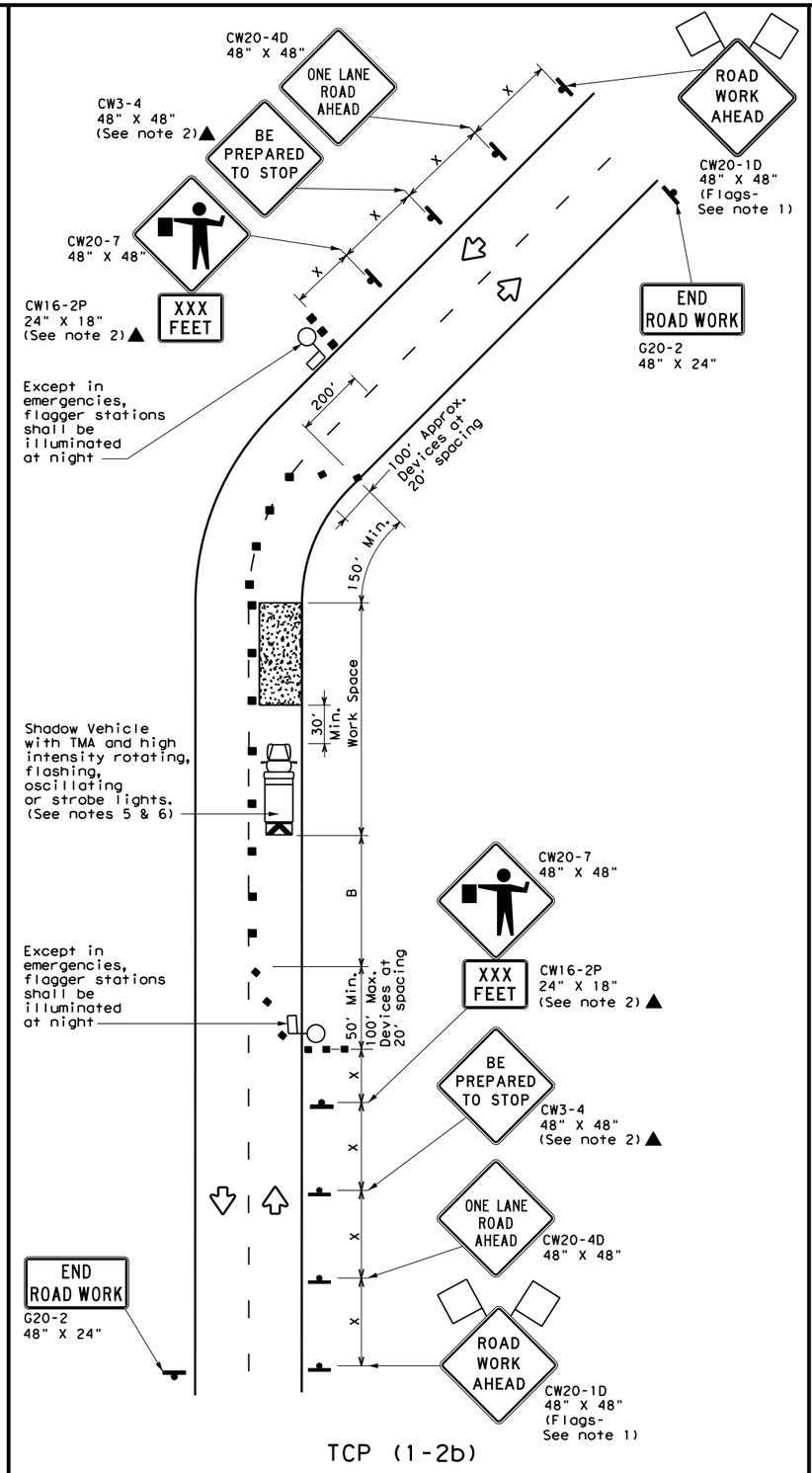


TCP (1-2a)

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			23103	DOUBLE CULVERT RD
4-90 4-98	DIST	COUNTY		SHEET NO.
2-94 2-12		WALLER		139
1-97 2-18				

152

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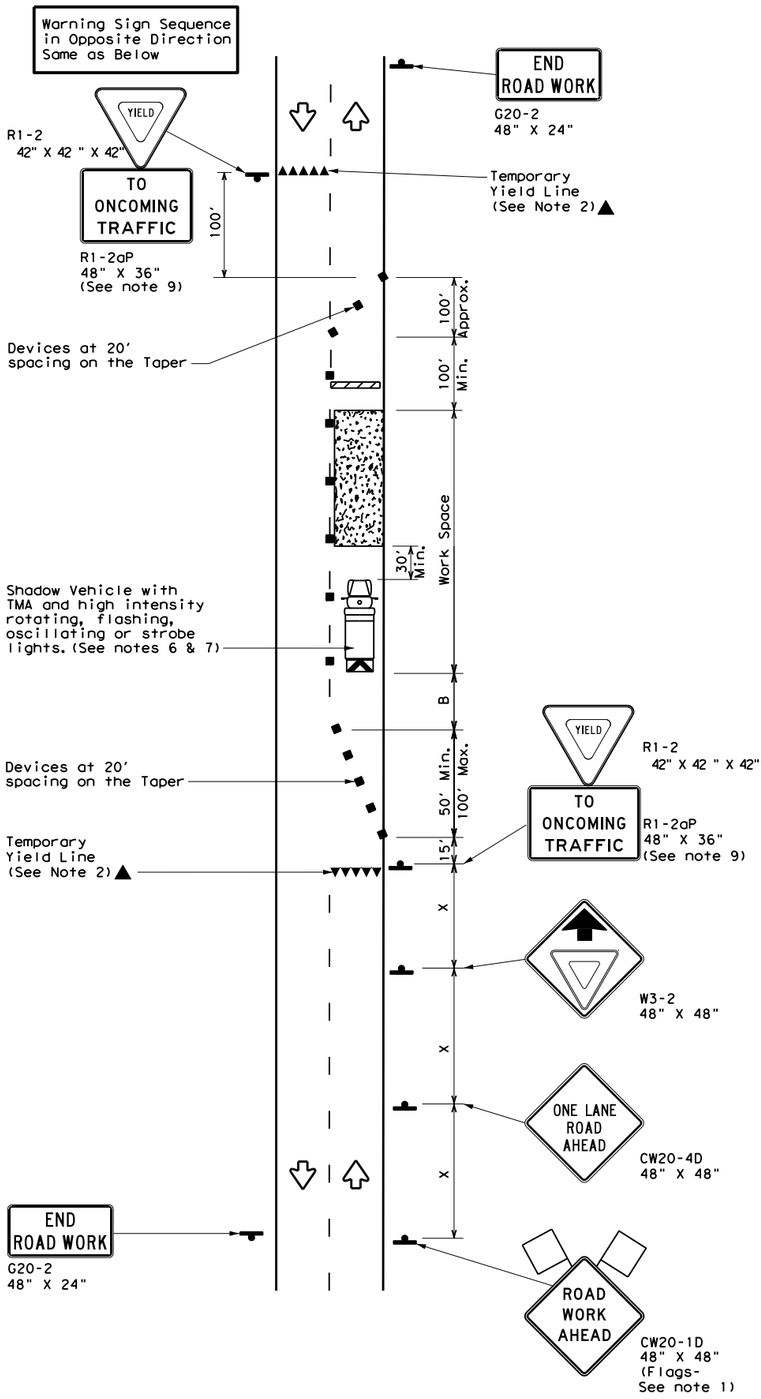
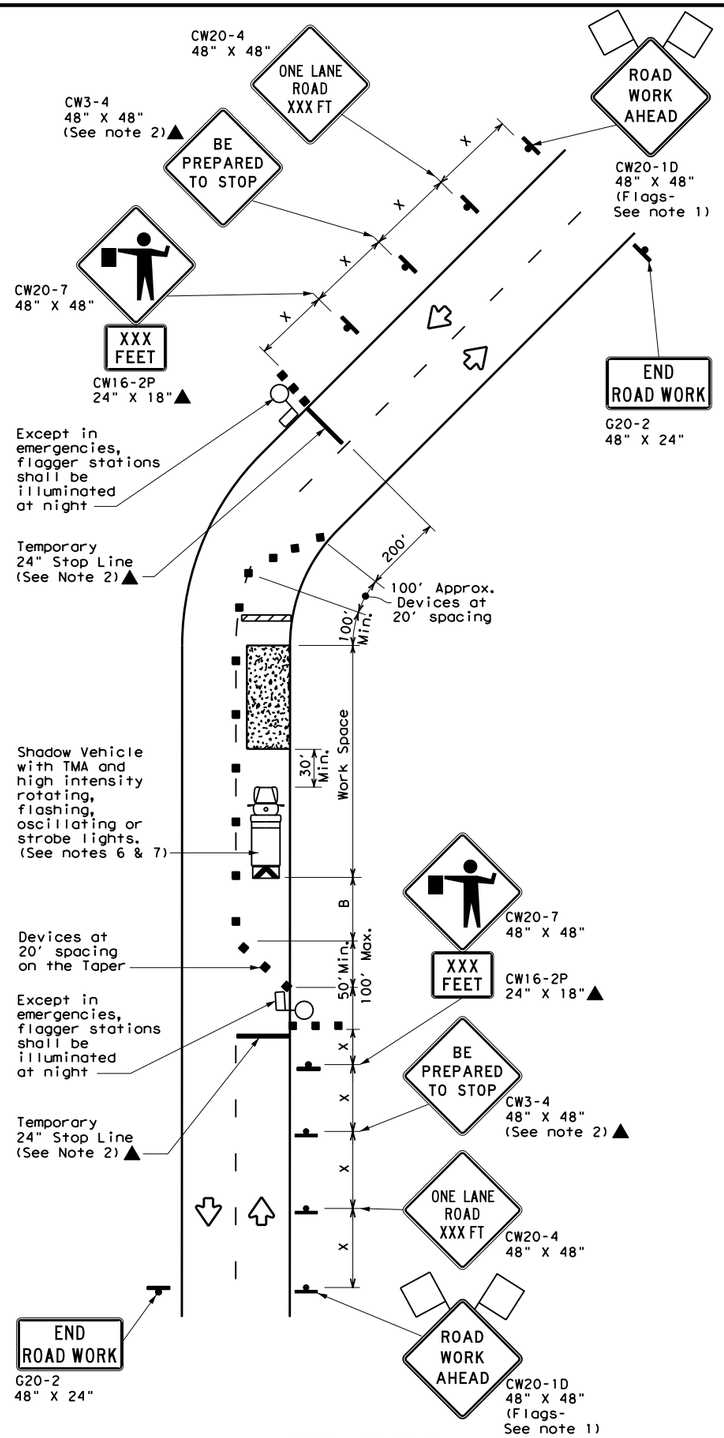
DATE:
FILE:



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



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

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
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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

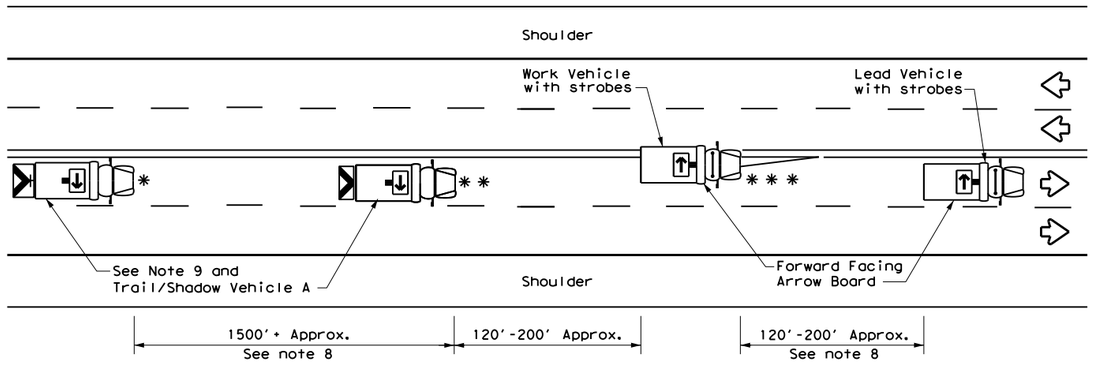
TRAFFIC CONTROL PLAN
ONE-LANE TWO-WAY
TRAFFIC CONTROL

TCP(2-2)-18

FILE: tcp2-2-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS			23103	DOUBLE CULVERT RD
8-95 3-03	DIST	COUNTY		SHEET NO.
1-97 2-12		WALLER		140
4-98 2-18				

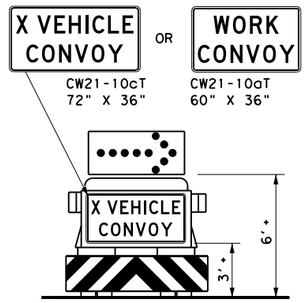
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:



TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

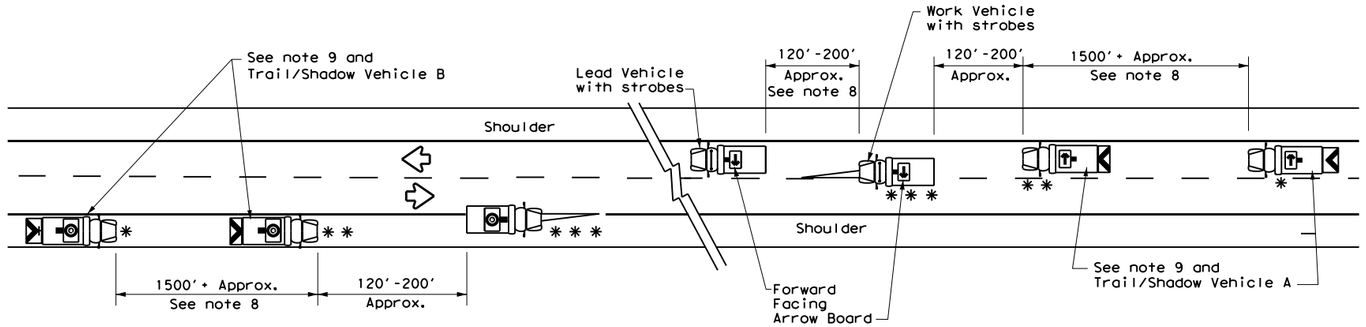
with RIGHT Directional display Flashing Arrow Board

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

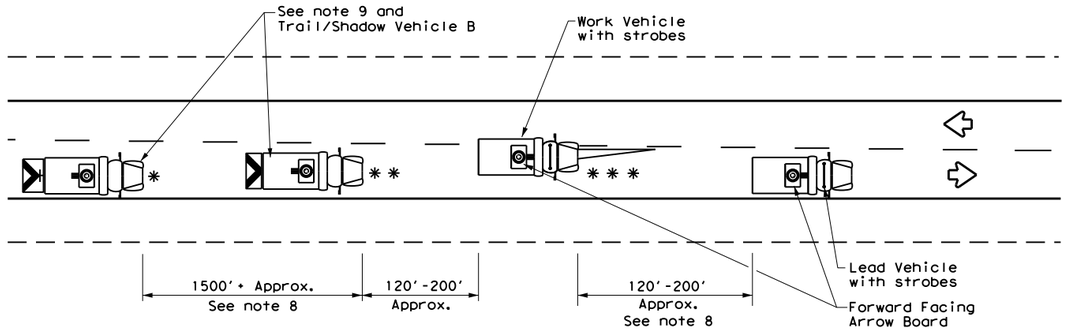
1. TRAIL, SHADOW, and LEAD vehicles shall be equipped with arrow boards as illustrated. When a LEAD vehicle is not used the WORK vehicle must be equipped with an arrow board. The Engineer will determine if the LEAD VEHICLE and/or TRAIL VEHICLE are required based on prevailing roadway conditions, traffic 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.



WORK ON SHOULDER — WORK ON TRAVEL LANE

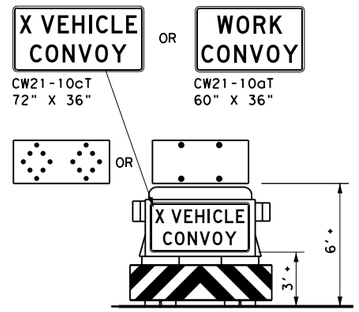
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



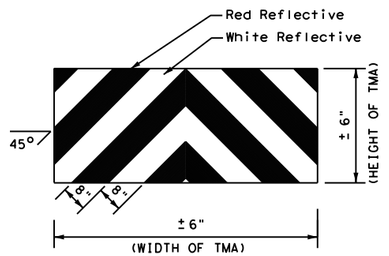
TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board in CAUTION display



STRIPING FOR TMA

Texas Department of Transportation

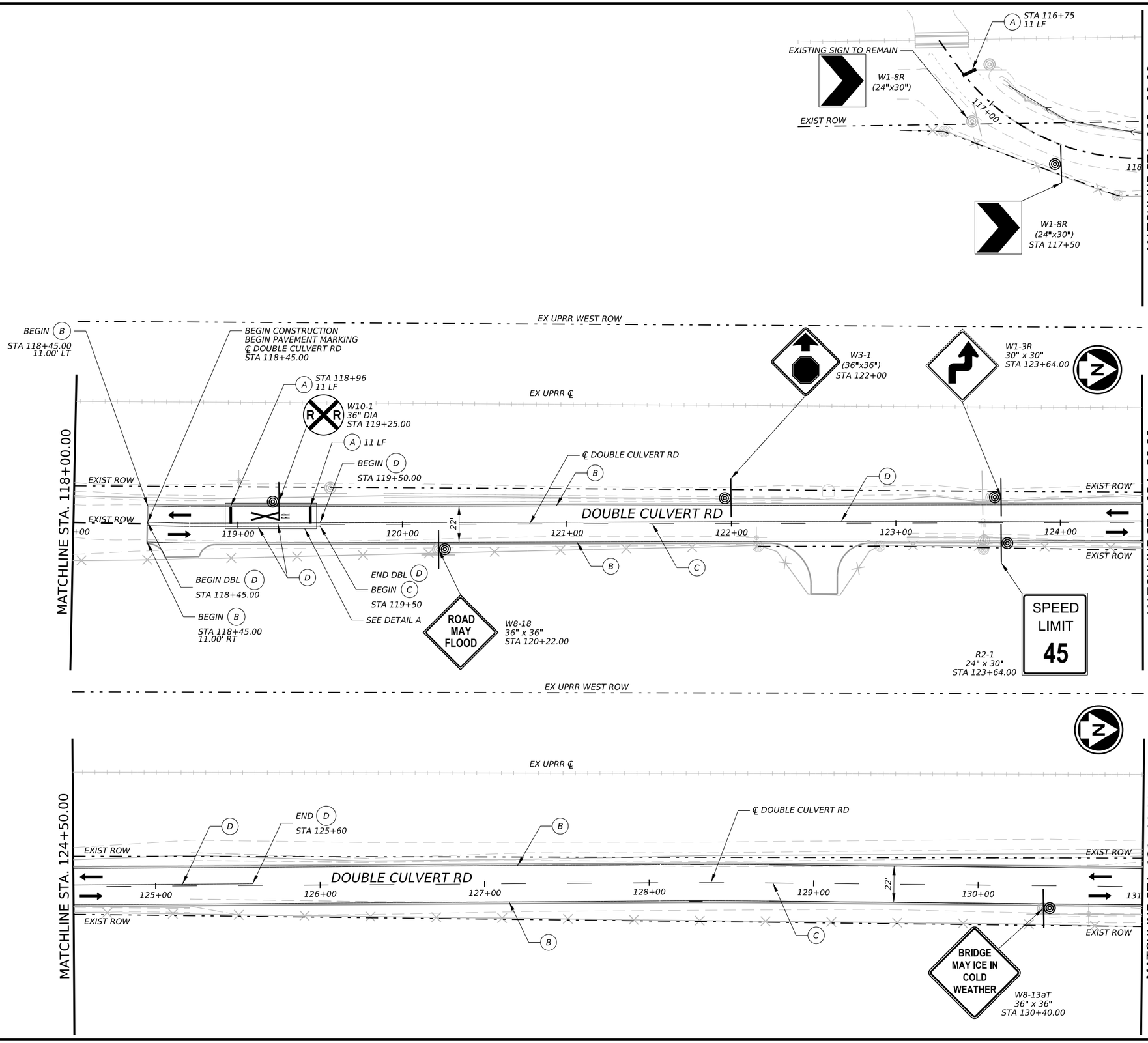
Traffic Operations Division Standard

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			23103	DOUBLE CULVERT RD
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13		WALLER		141
1-97				

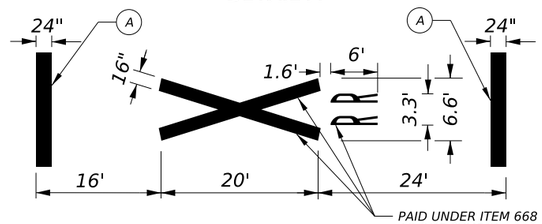
100% SUBMITTAL



LEGEND

- EXISTING ROW
- PROPOSED DIRECTION OF TRAFFIC
- (A) 24" SOLID WHITE PAVEMENT MARKING
- (B) 4" SOLID WHITE PAVEMENT MARKING
- (C) 4" BRK YELLOW PAVEMENT MARKING
- (D) 4" SOLID YELLOW PAVEMENT MARKING
- PROPOSED SIGN
- PROPOSED OM-2
- PROPOSED D-SW

DETAIL A



NOTE:

1. SEE PAVEMENT MARKING DETAIL SHEETS FOR ADDITIONAL INFORMATION.

0 30' 60'

SCALE: 1" = 60'

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY M. DILL
84626
LICENSED
PROFESSIONAL ENGINEER

R. M. Dill, P.E.

7/28/2026

CivilCorp
an ESP COMPANY

29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY

ENGINEERING DEPARTMENT

PAVEMENT MARKING AND SIGNING DOUBLE CULVERT RD

BEGIN TO STA 131+50.00

SHEET 1 OF 6

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		142

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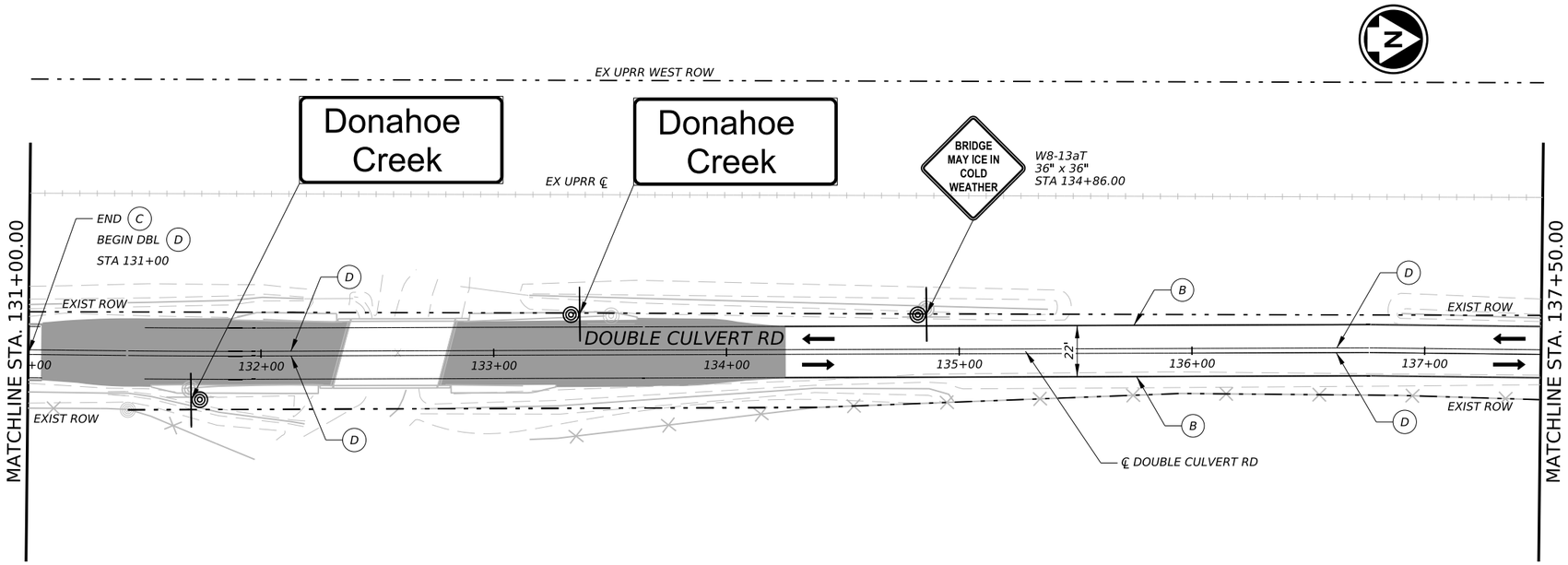
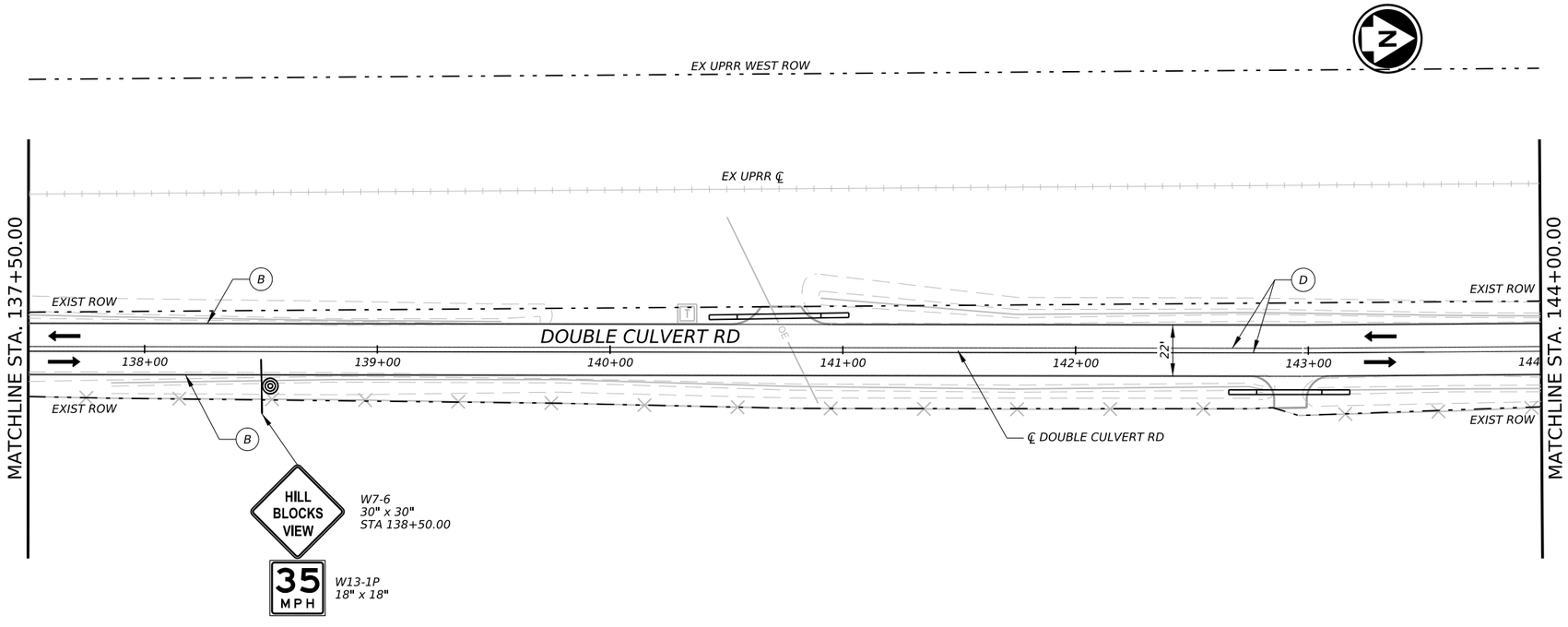
100% SUBMITTAL





LEGEND

- EXISTING ROW
- PROPOSED DIRECTION OF TRAFFIC
- (A) 24" SOLID WHITE PAVEMENT MARKING
- (B) 4" SOLID WHITE PAVEMENT MARKING
- (C) 4" BRK YELLOW PAVEMENT MARKING
- (D) 4" SOLID YELLOW PAVEMENT MARKING
- PROPOSED SIGN
- PROPOSED OM-2
- PROPOSED D-SW

NOTE:

1. SEE PAVEMENT MARKING DETAIL SHEETS FOR ADDITIONAL INFORMATION.

0 30' 60'

SCALE: 1" = 60'

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
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7/28/2026

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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

PAVEMENT MARKING AND SIGNING DOUBLE CULVERT RD

STA 131+50.00 TO STA 144+00.00

SHEET 2 OF 6

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		143

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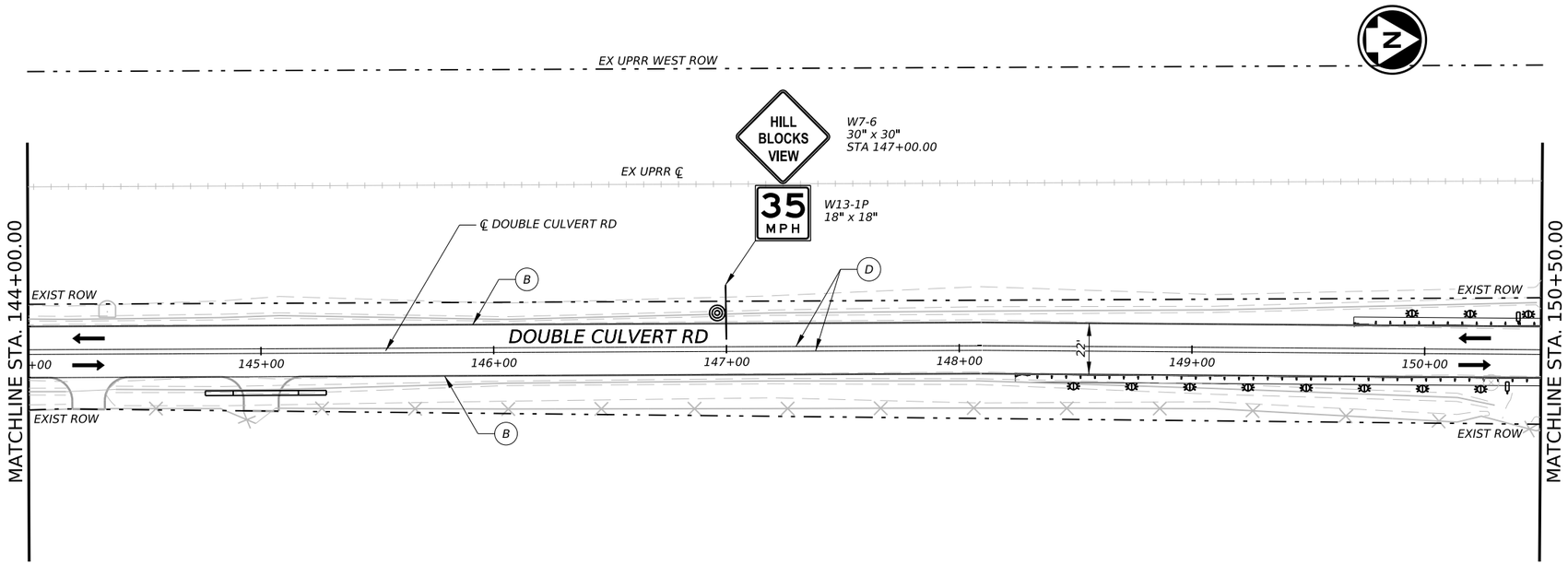

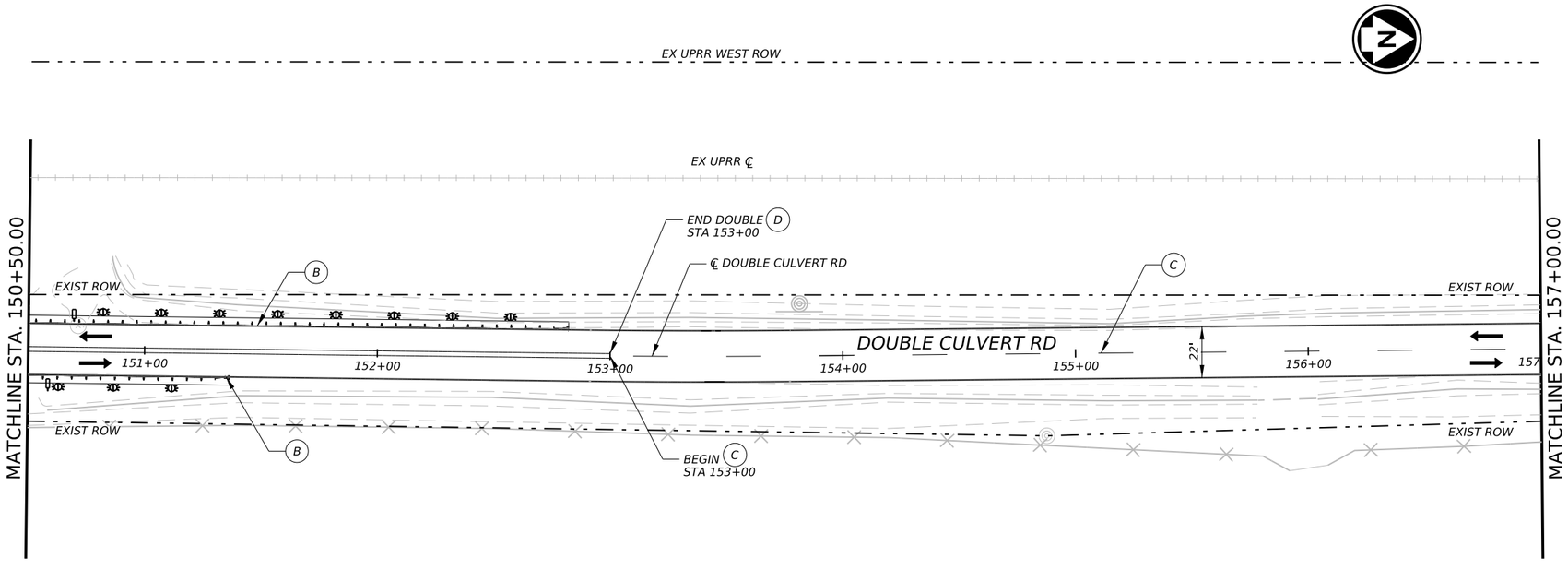

LEGEND

- EXISTING ROW
- PROPOSED DIRECTION OF TRAFFIC
- (A) 24" SOLID WHITE PAVEMENT MARKING
- (B) 4" SOLID WHITE PAVEMENT MARKING
- (C) 4" BRK YELLOW PAVEMENT MARKING
- (D) 4" SOLID YELLOW PAVEMENT MARKING
- PROPOSED SIGN
- PROPOSED OM-2
- PROPOSED D-SW

NOTE:

1. SEE PAVEMENT MARKING DETAIL SHEETS FOR ADDITIONAL INFORMATION.

0 30' 60'

SCALE: 1" = 60'

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

PAVEMENT MARKING AND SIGNING DOUBLE CULVERT RD

STA 144+00.00 TO STA 157+50.00

SHEET 3 OF 6

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		144

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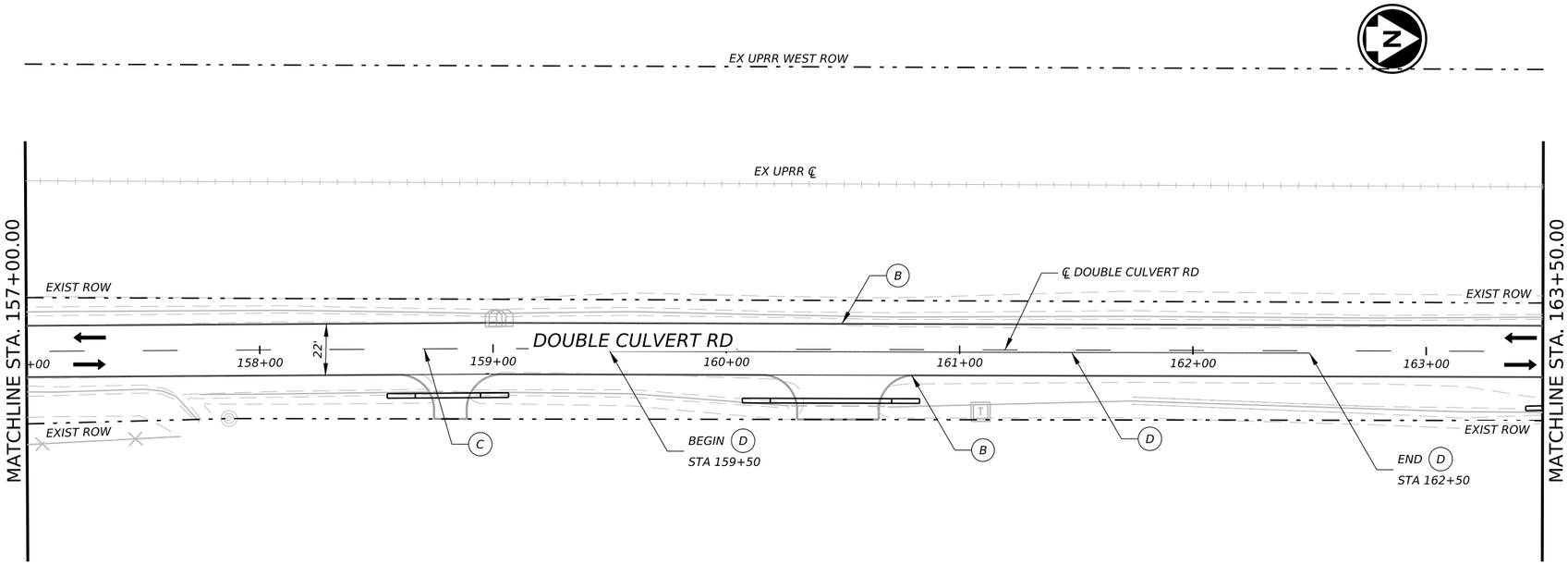

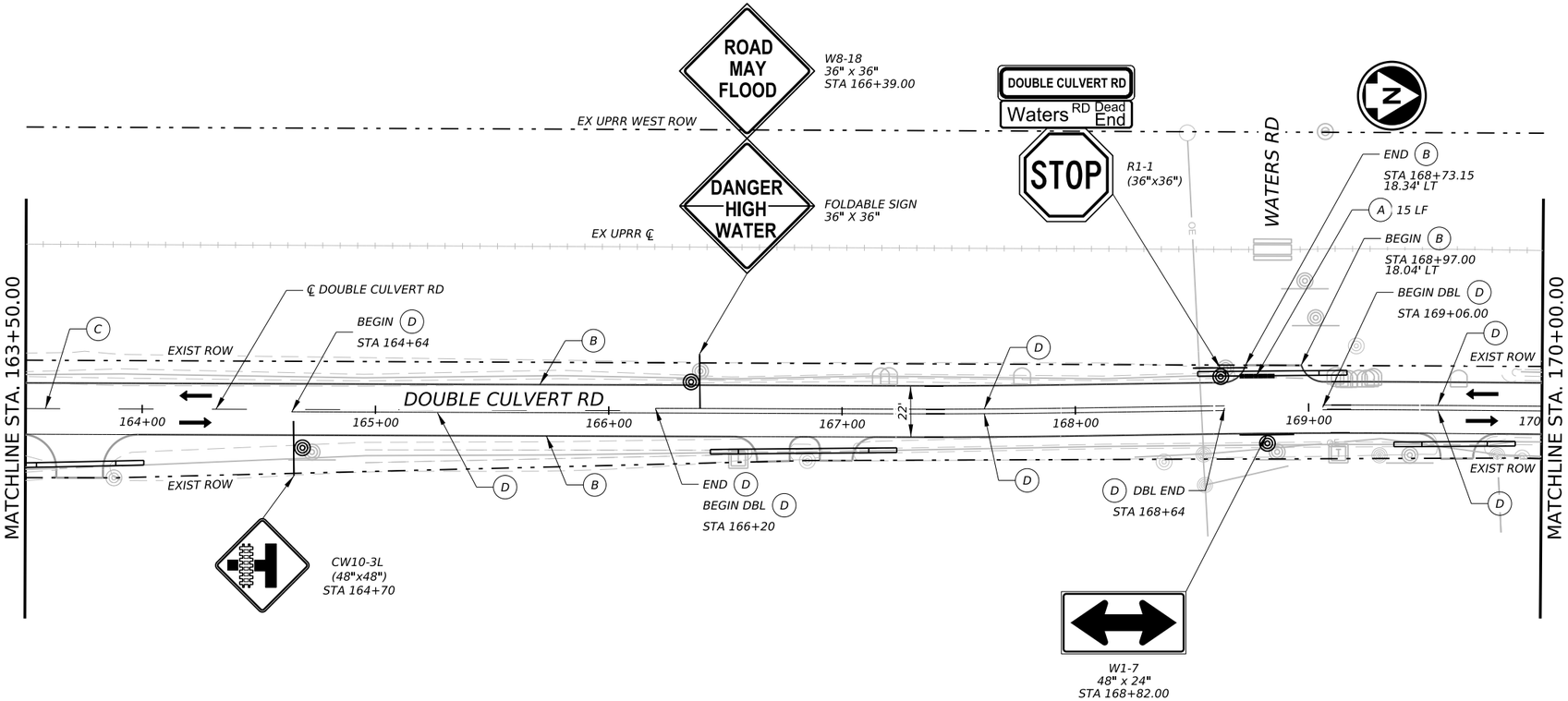

LEGEND

- EXISTING ROW
- PROPOSED DIRECTION OF TRAFFIC
- (A) 24" SOLID WHITE PAVEMENT MARKING
- (B) 4" SOLID WHITE PAVEMENT MARKING
- (C) 4" BRK YELLOW PAVEMENT MARKING
- (D) 4" SOLID YELLOW PAVEMENT MARKING
- PROPOSED SIGN
- PROPOSED OM-2
- PROPOSED D-SW

NOTE:

1. SEE PAVEMENT MARKING DETAIL SHEETS FOR ADDITIONAL INFORMATION.

0 30' 60'

SCALE: 1" = 60'

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

PAVEMENT MARKING AND SIGNING DOUBLE CULVERT RD

STA 157+50.00 TO STA 170+00.00

SHEET 4 OF 6

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		145

DATE: 7/22/2026 7:03:47 PM
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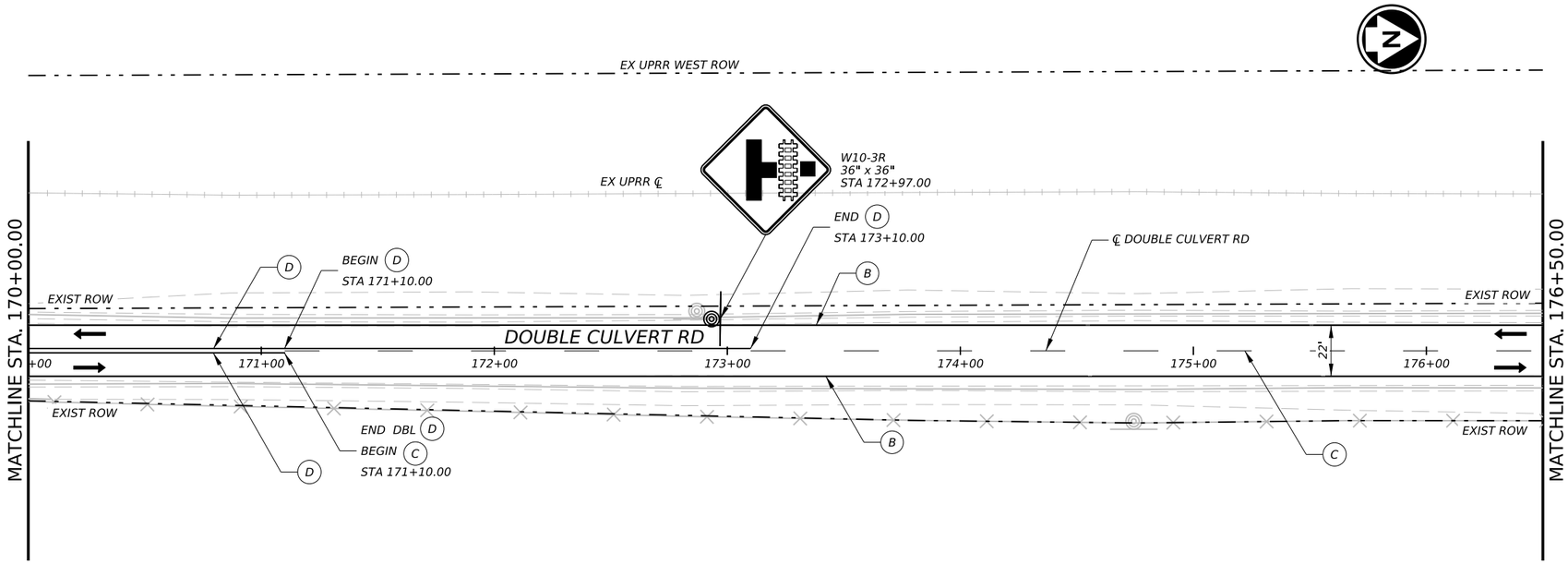

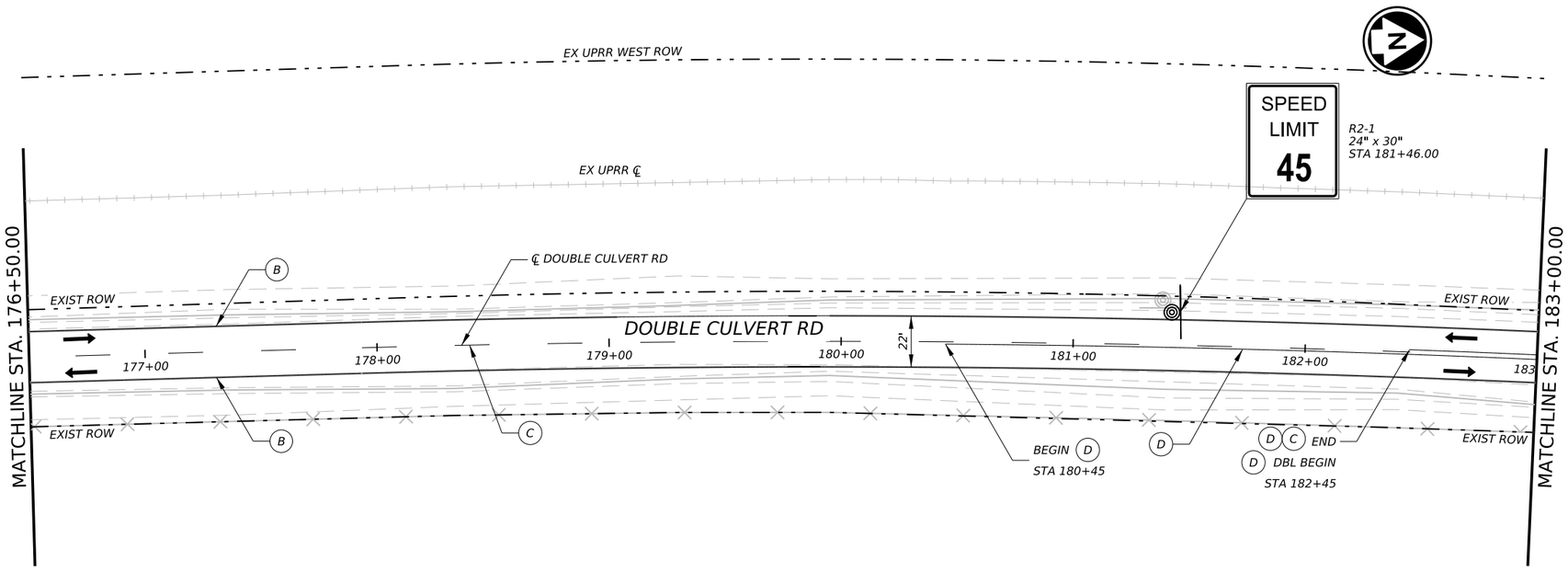

LEGEND

- EXISTING ROW
- PROPOSED DIRECTION OF TRAFFIC
- (A) 24" SOLID WHITE PAVEMENT MARKING
- (B) 4" SOLID WHITE PAVEMENT MARKING
- (C) 4" BRK YELLOW PAVEMENT MARKING
- (D) 4" SOLID YELLOW PAVEMENT MARKING
- PROPOSED SIGN
- PROPOSED OM-2
- PROPOSED D-SW

NOTE:

1. SEE PAVEMENT MARKING DETAIL SHEETS FOR ADDITIONAL INFORMATION.

0 30' 60'

SCALE: 1" = 60'

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY M. DILL
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7/22/2026

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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

PAVEMENT MARKING AND SIGNING DOUBLE CULVERT RD

STA 170+00.00 TO STA 183+50.00

SHEET 5 OF 6

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		146

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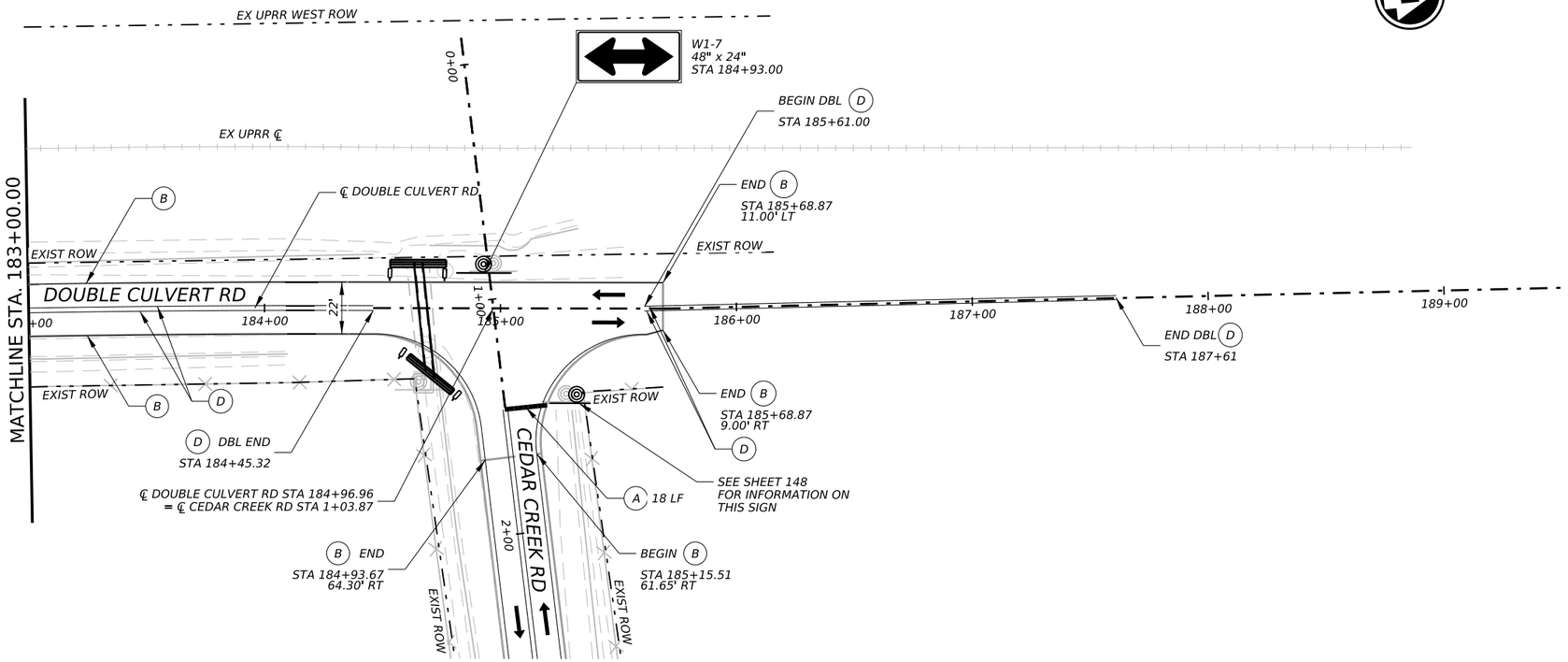

LEGEND

- EXISTING ROW
- PROPOSED DIRECTION OF TRAFFIC
- (A) 24" SOLID WHITE PAVEMENT MARKING
- (B) 4" SOLID WHITE PAVEMENT MARKING
- (C) 4" BRK YELLOW PAVEMENT MARKING
- (D) 4" SOLID YELLOW PAVEMENT MARKING
- PROPOSED SIGN
- PROPOSED OM-2
- PROPOSED D-SW

NOTE:

1. SEE PAVEMENT MARKING DETAIL SHEETS FOR ADDITIONAL INFORMATION.

0 30' 60'

SCALE: 1" = 60'

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY M. DILL
84626
LICENSED
PROFESSIONAL ENGINEER

R. M. Dill, P.E.
7/22/2026

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TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS
WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

PAVEMENT MARKING AND SIGNING DOUBLE CULVERT RD

STA 183+50.00 TO END

SHEET 6 OF 6

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		147

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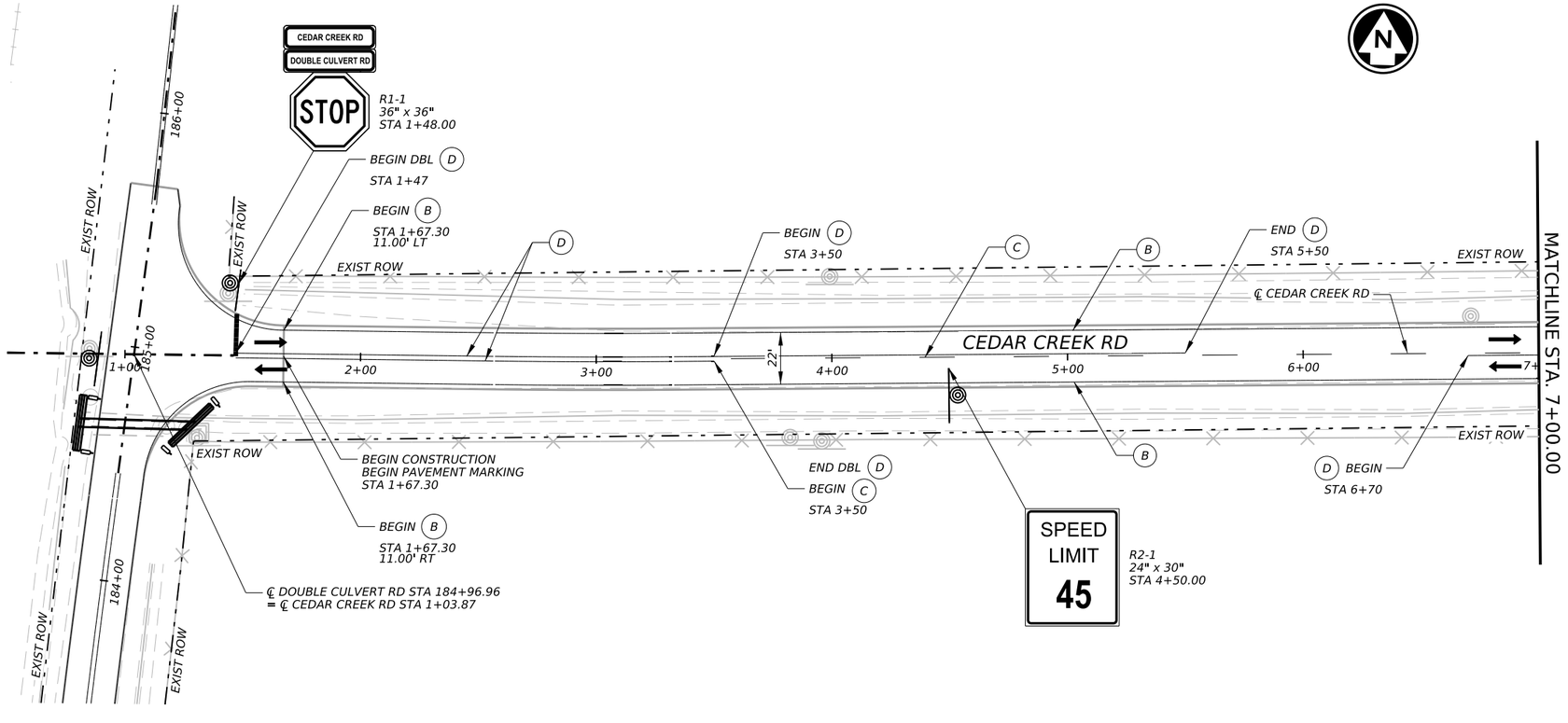

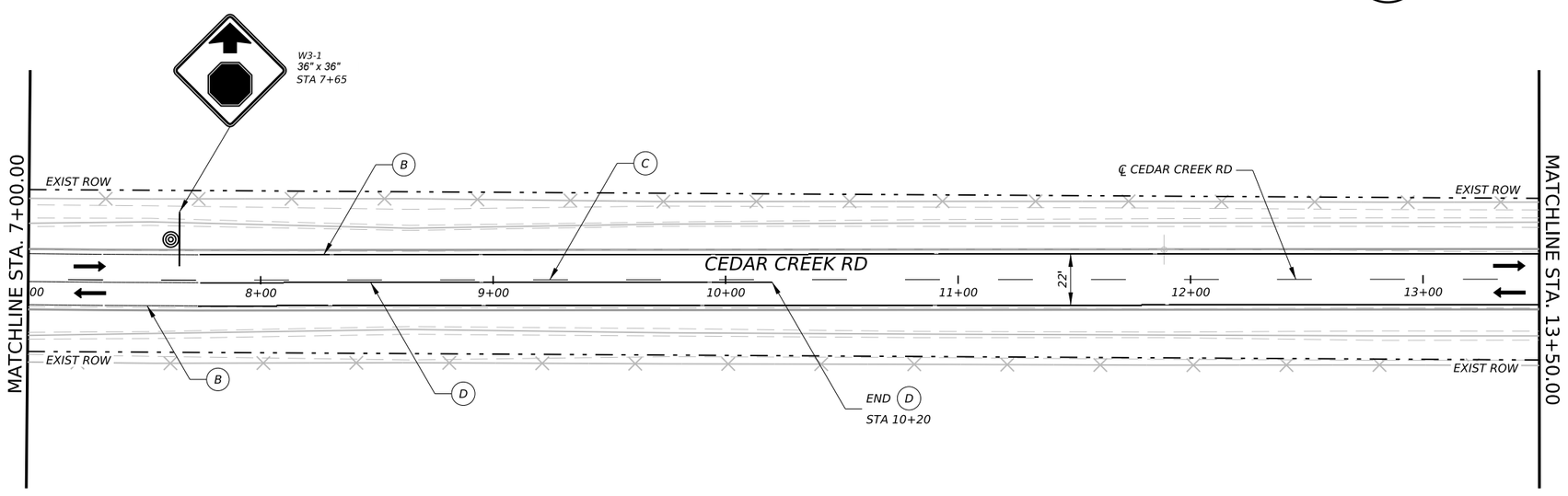

LEGEND

- EXISTING ROW
- PROPOSED DIRECTION OF TRAFFIC
- (A) 24" SOLID WHITE PAVEMENT MARKING
- (B) 4" SOLID WHITE PAVEMENT MARKING
- (C) 4" BRK YELLOW PAVEMENT MARKING
- (D) 4" SOLID YELLOW PAVEMENT MARKING
- PROPOSED SIGN
- PROPOSED OM-2
- PROPOSED D-SW

NOTE:

1. SEE PAVEMENT MARKING DETAIL SHEETS FOR ADDITIONAL INFORMATION.

0 30' 60'

SCALE: 1" = 60'

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY M. DILL
84626
LICENSED PROFESSIONAL ENGINEER

R. M. Dill, P.E.
7/28/2026

CivilCorp
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29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

PAVEMENT MARKING AND SIGNING CEDAR CREEK RD

BEGIN TO STA 13+50.00

SHEET 1 OF 4

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		148

DATE: 7/28/2026 9:49:47 PM
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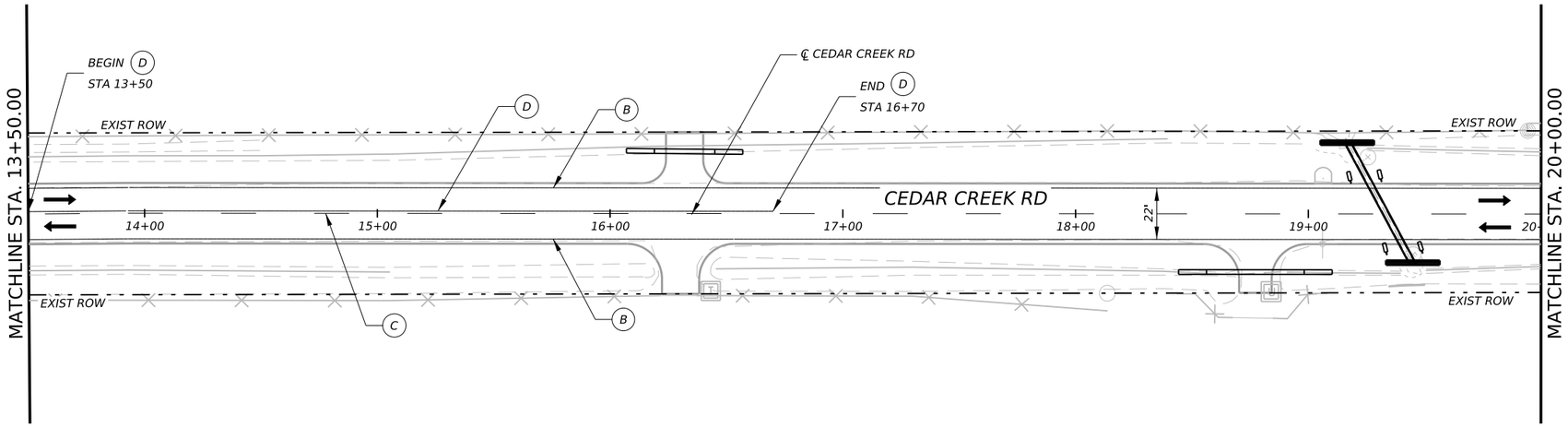

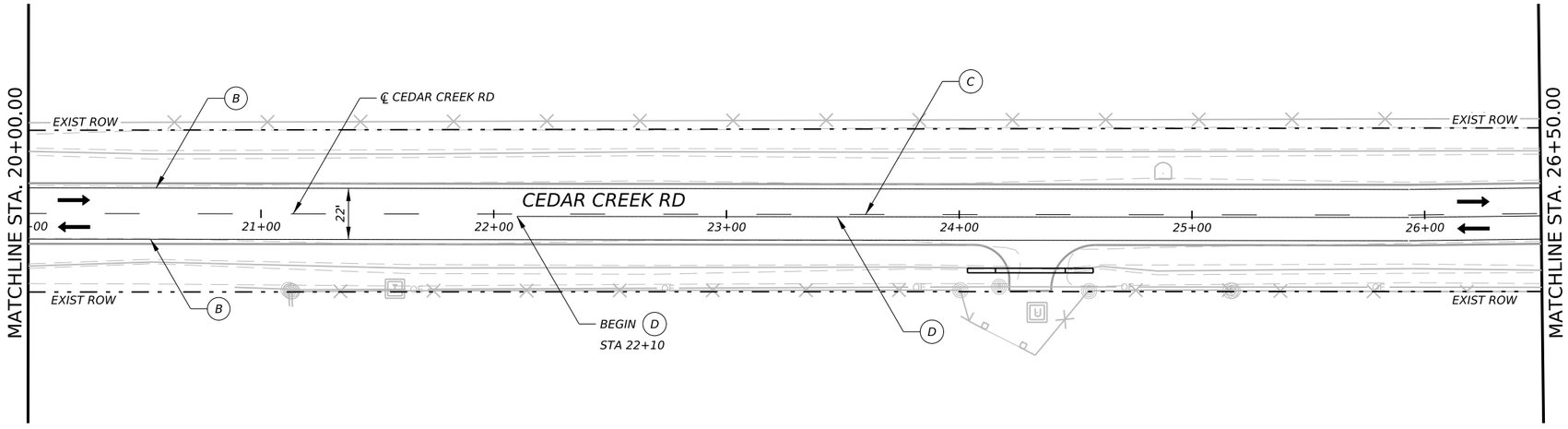

LEGEND

- EXISTING ROW
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- (A) 24" SOLID WHITE PAVEMENT MARKING
- (B) 4" SOLID WHITE PAVEMENT MARKING
- (C) 4" BRK YELLOW PAVEMENT MARKING
- (D) 4" SOLID YELLOW PAVEMENT MARKING
- PROPOSED SIGN
- PROPOSED OM-2
- PROPOSED D-SW

NOTE:

1. SEE PAVEMENT MARKING DETAIL SHEETS FOR ADDITIONAL INFORMATION.

0 30' 60'

SCALE: 1" = 60'

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY M. DILL
84626
LICENSED PROFESSIONAL ENGINEER

R. M. Dill, P.E.
7/22/2026

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

PAVEMENT MARKING AND SIGNING CEDAR CREEK RD

STA 13+50.00 TO STA 26+00.00

SHEET 2 OF 4

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		149

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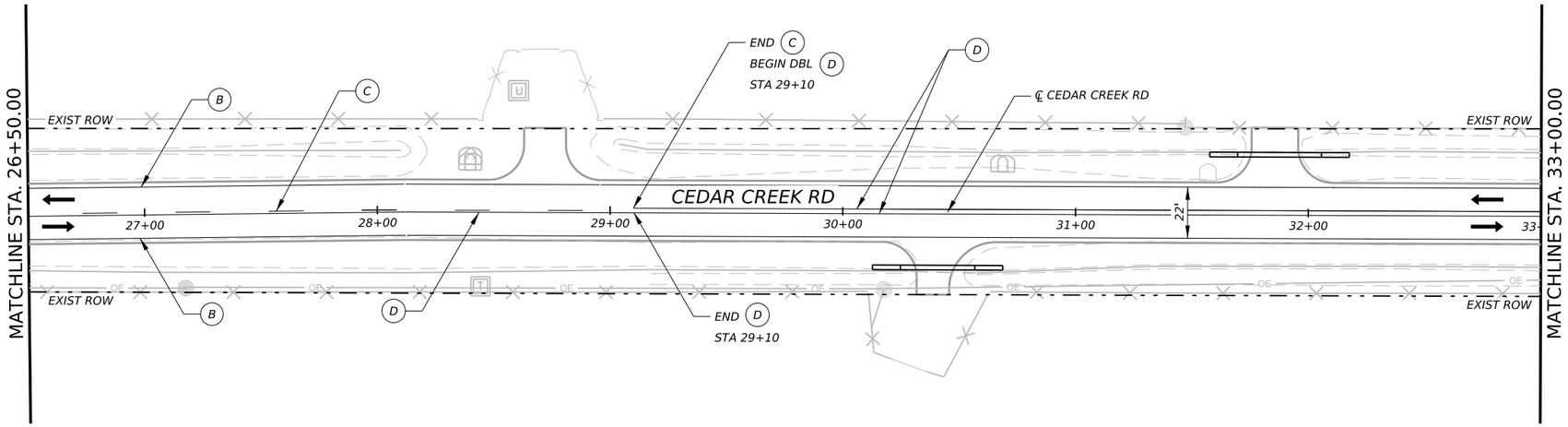

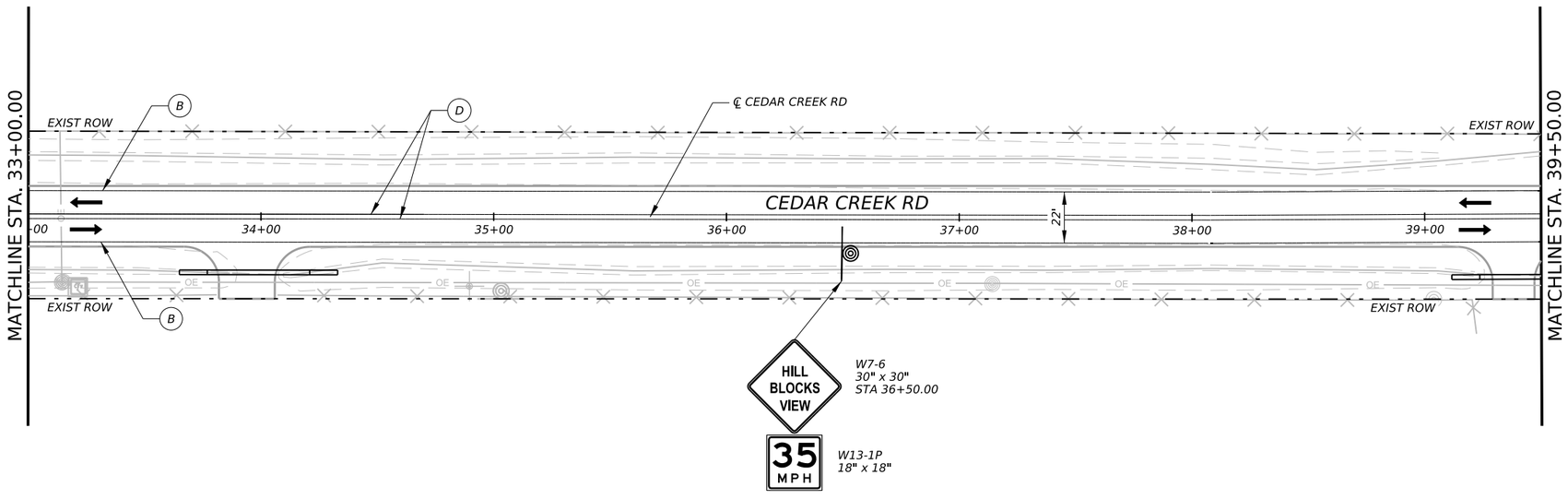

LEGEND

- EXISTING ROW
- PROPOSED DIRECTION OF TRAFFIC
- (A) 24" SOLID WHITE PAVEMENT MARKING
- (B) 4" SOLID WHITE PAVEMENT MARKING
- (C) 4" BRK YELLOW PAVEMENT MARKING
- (D) 4" SOLID YELLOW PAVEMENT MARKING
- PROPOSED SIGN
- PROPOSED OM-2
- PROPOSED D-SW

NOTE:

1. SEE PAVEMENT MARKING DETAIL SHEETS FOR ADDITIONAL INFORMATION.

0 30' 60'

SCALE: 1" = 60'

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY M. DILL
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LICENSED PROFESSIONAL ENGINEER

R. M. Dill, P.E.
7/28/2026

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29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

PAVEMENT MARKING AND SIGNING CEDAR CREEK RD

STA 26+00.00 TO STA 39+50.00

SHEET 3 OF 4

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		150

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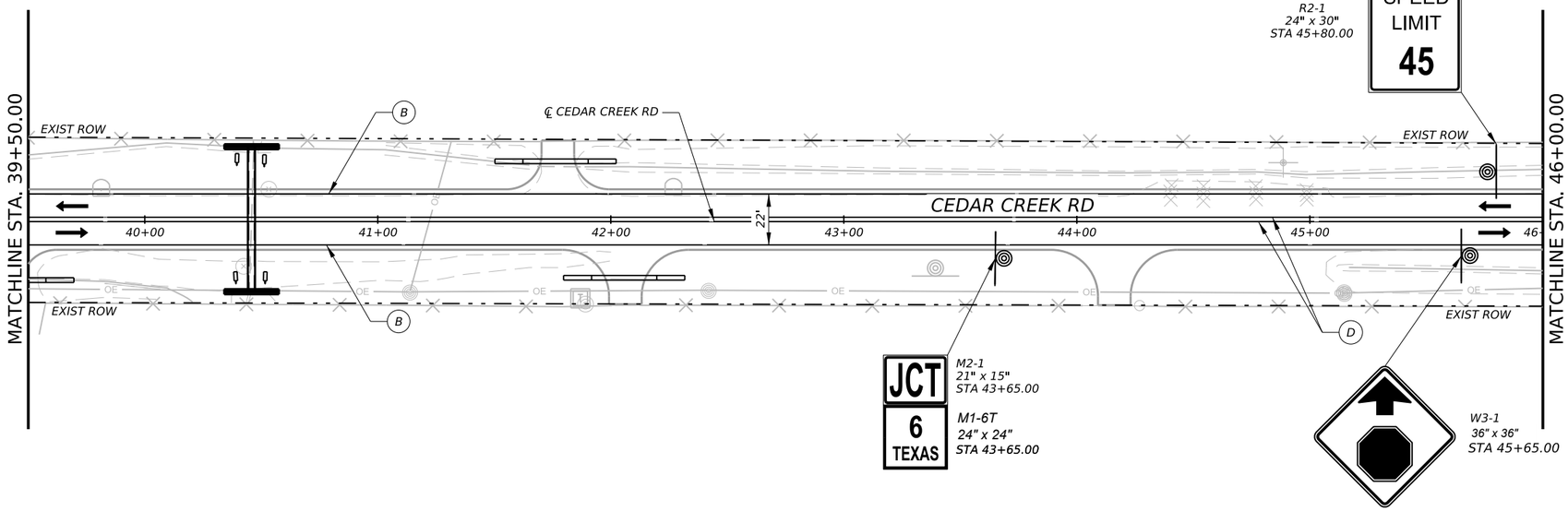

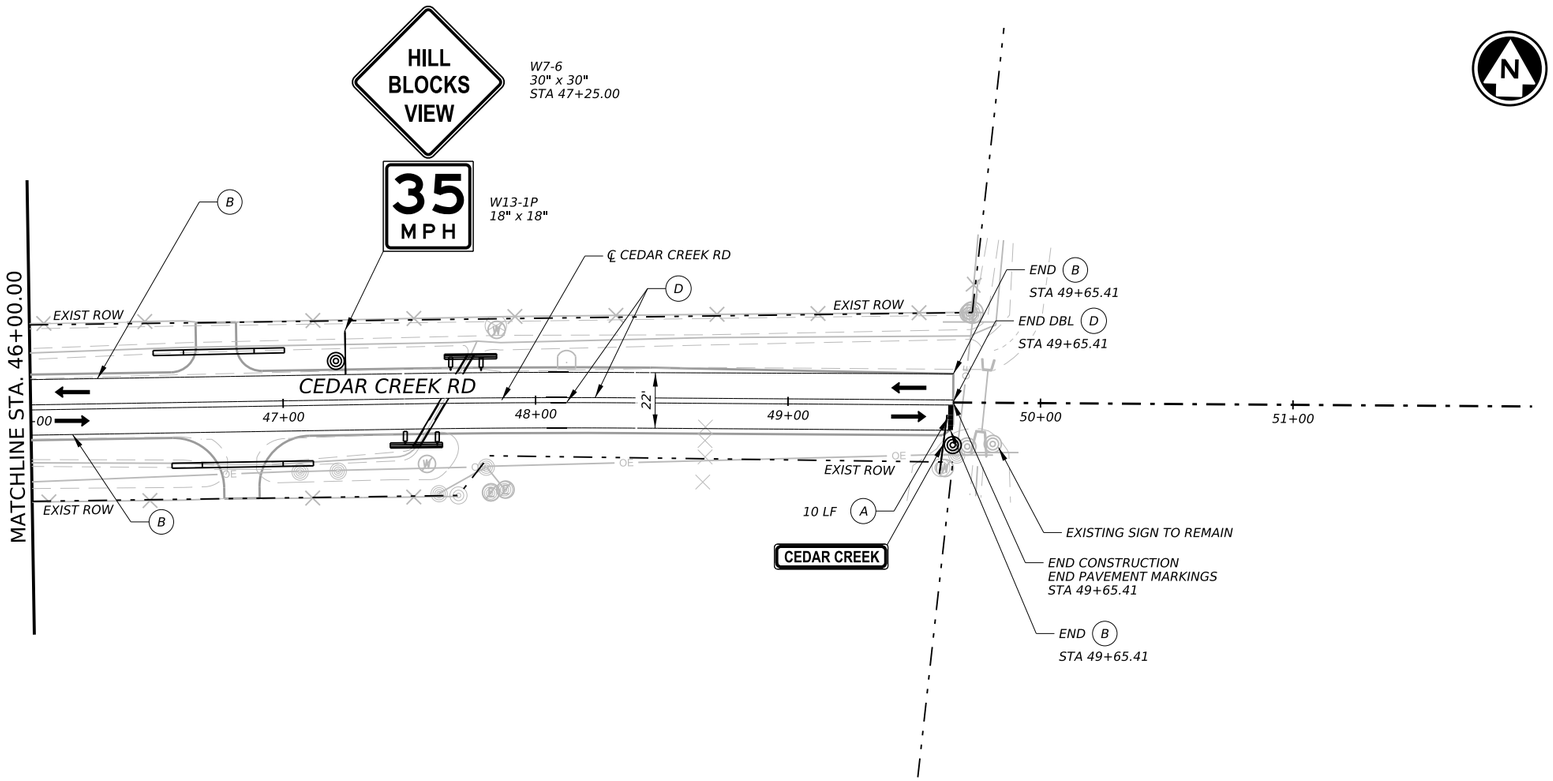

LEGEND

- EXISTING ROW
- PROPOSED DIRECTION OF TRAFFIC
- (A) 24" SOLID WHITE PAVEMENT MARKING
- (B) 4" SOLID WHITE PAVEMENT MARKING
- (C) 4" BRK YELLOW PAVEMENT MARKING
- (D) 4" SOLID YELLOW PAVEMENT MARKING
- PROPOSED SIGN
- PROPOSED OM-2
- PROPOSED D-SW

NOTE:

1. SEE PAVEMENT MARKING DETAIL SHEETS FOR ADDITIONAL INFORMATION.

0 30' 60'

SCALE: 1" = 60'

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY M. DILL
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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY

ENGINEERING DEPARTMENT

PAVEMENT MARKING AND SIGNING CEDAR CREEK RD

STA 39+50.00 TO END

SHEET 4 OF 4

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		151

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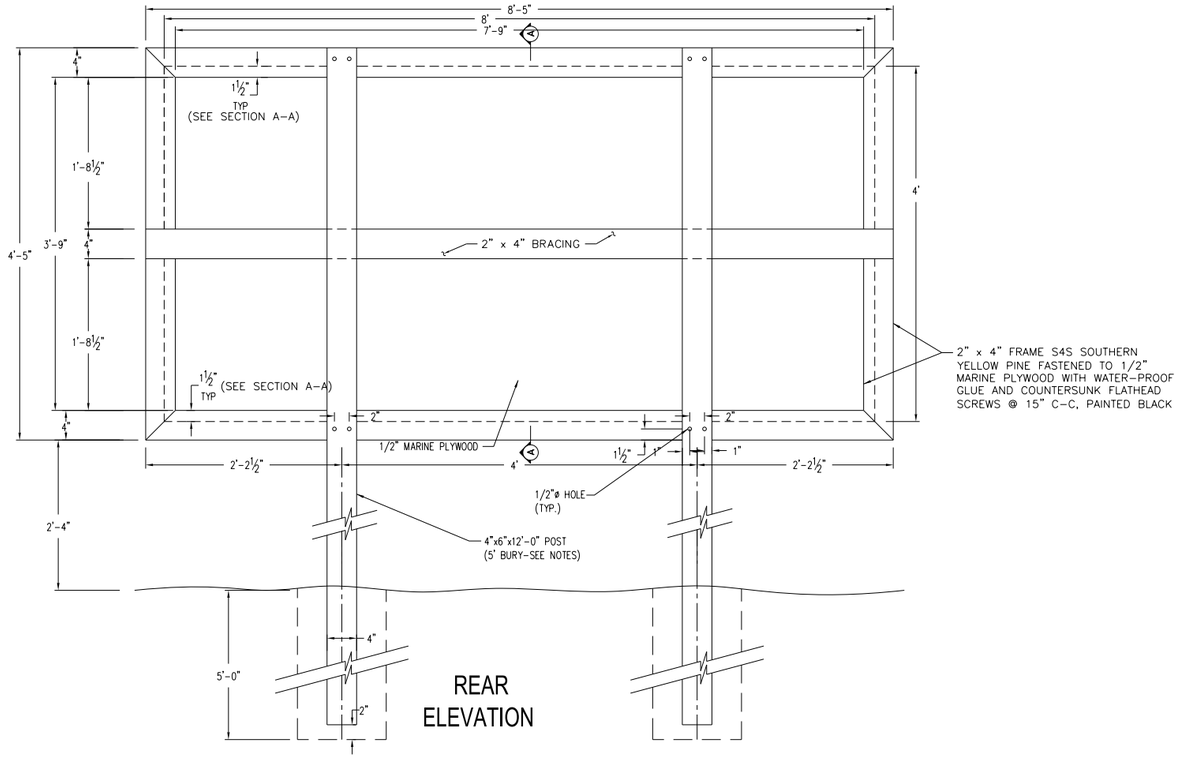
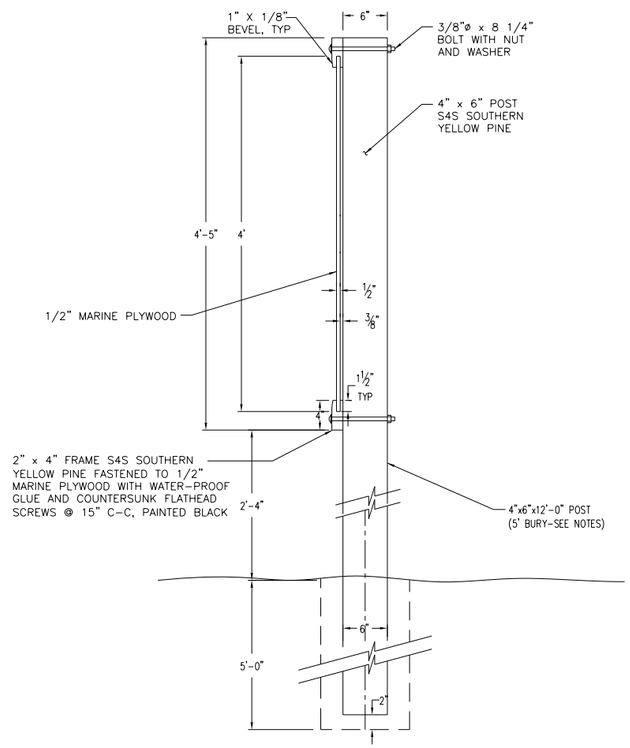
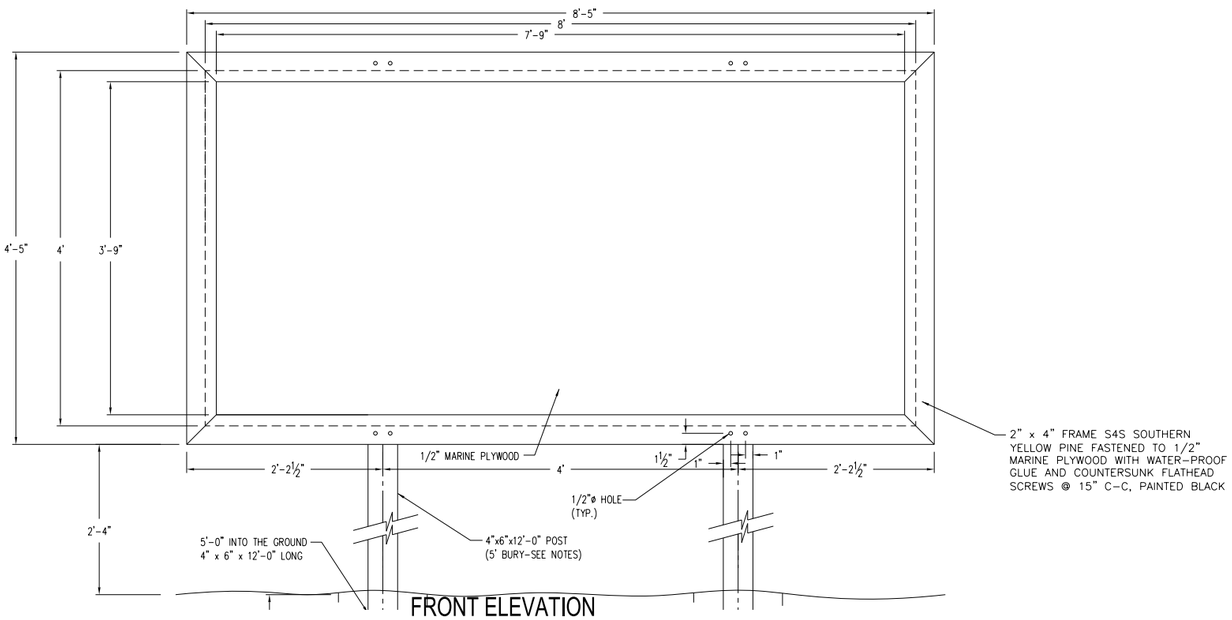


REAR ELEVATION



SECTION A-A



FRONT ELEVATION

GENERAL NOTES:

1. THE SIGN SHALL HAVE BLACK LETTERS WITH WHITE BACKGROUND.
2. ALL LETTERING SHALL BE EITHER AERIAL FONT OR HELVETICA FONT.
3. SIGN SHALL BE MOUNTED ON 4" x 6" POSTS AND LOCATED BY THE ENGINEER.
4. REMOVABLE PANEL SHALL BE 1/2" MARINE PLYWOOD.
5. ALL BOLTS, SCREWS, NAILS, NUTS AND WASHERS SHALL BE GALVANIZED OR CADMIUM PLATED.
6. 4" x 6" POST SHALL BE WOLMANIZED OR PENTACHLOROPHENOL TREATED.
7. ALL WOOD SURFACES SHALL HAVE PRIME COAT AND TWO (2) COATS OF SHERWIN-WILLIAMS KEM-LUSTRA ENAMEL OR EQUAL.

NO.	REVISIONS	DATE	NAME
1			
2			
3			
4			
5			

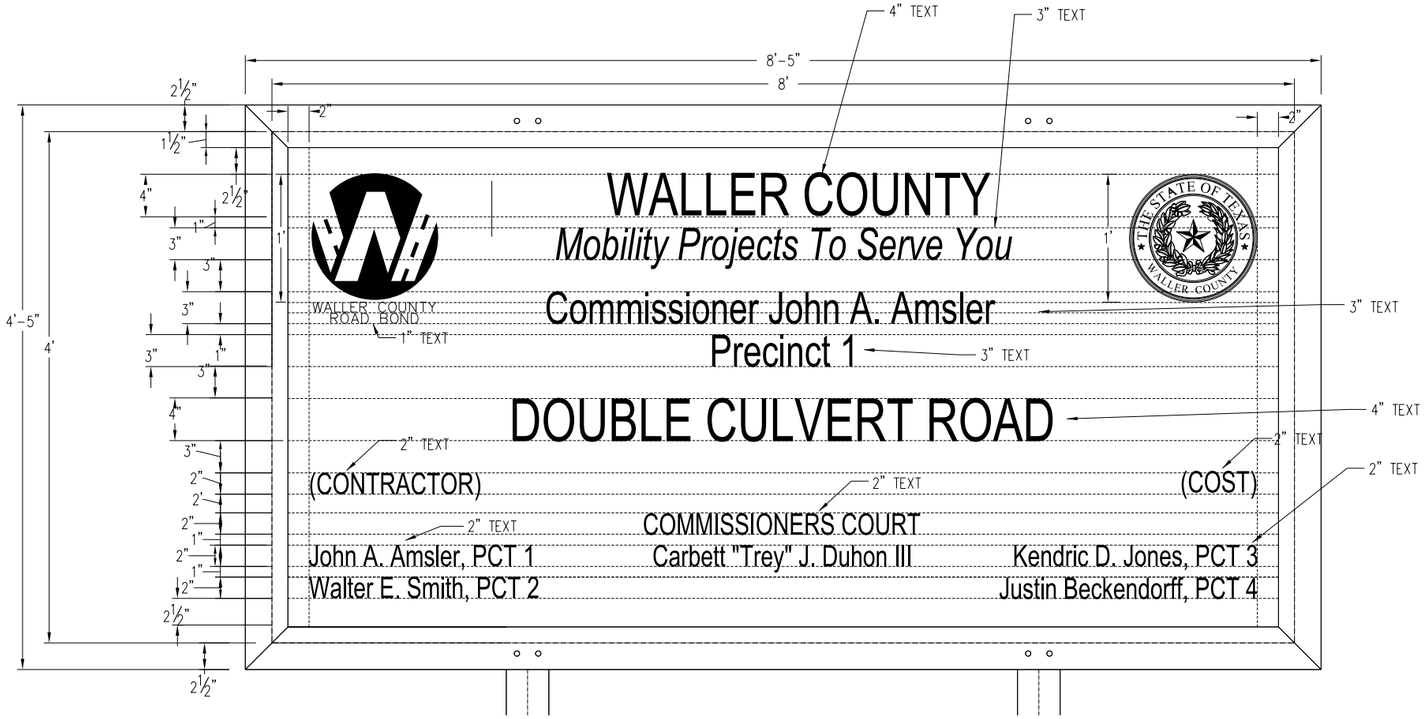
WALLER COUNTY ENGINEERING DEPARTMENT

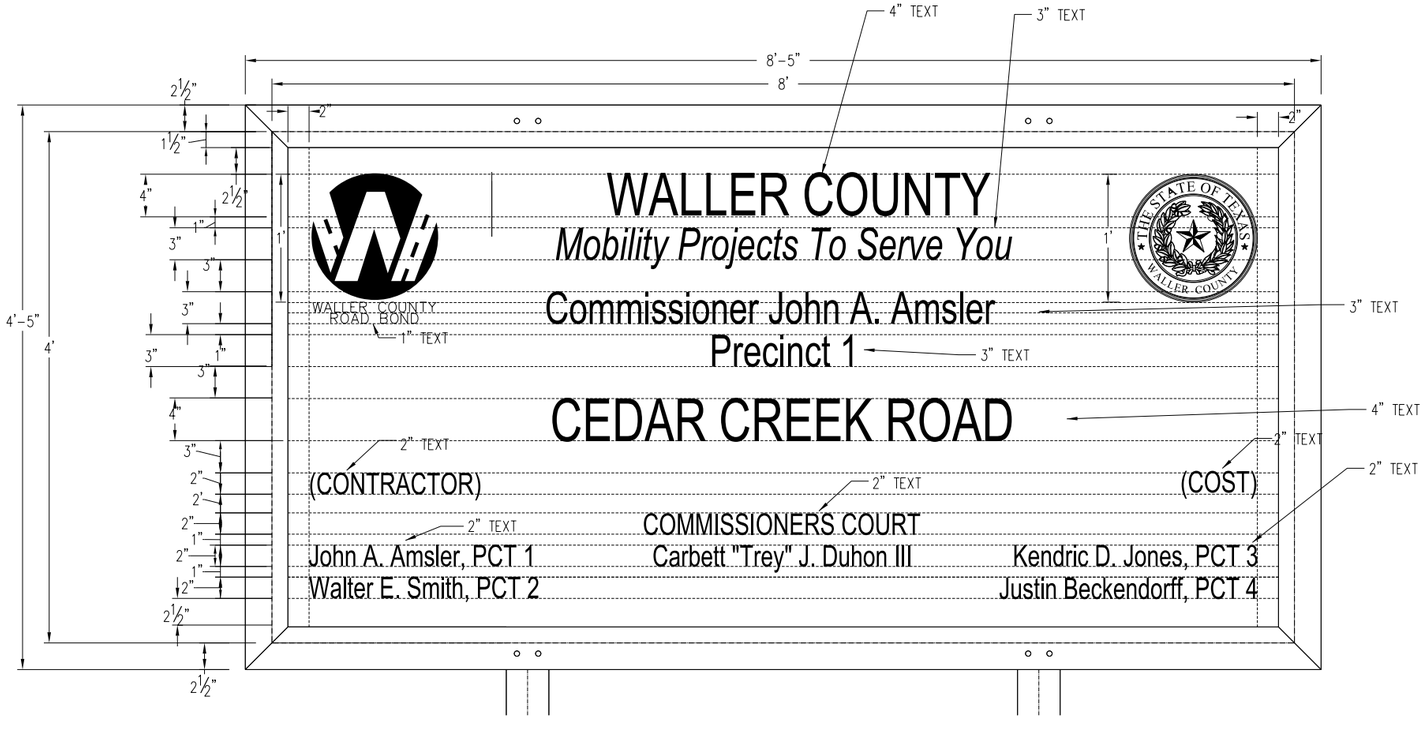
CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

PAVEMENT MARKING AND SIGNING STANDARD DETAILS
PROJECT SIGN DETAILS

PROJECT TITLE:	DOUBLE CULVERT RD AND CEDAR CREEK RD	
DRAWN BY:		WCED STANDARD
CK'D BY:	SHEET DESCRIPTION: PROJECT SIGN DETAILS	
SCALE:		SHEET NO:
DATE:	APPROVED BY:	152 / 244

100% SUBMITTAL





NOT TO SCALE

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY M. DILL
84626
LICENSED PROFESSIONAL ENGINEER

R. M. Dill, P.E.
7/28/2026

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WALLER COUNTY
ENGINEERING DEPARTMENT

PAVEMENT MARKING AND SIGNING STANDARD DETAILS FUNDING SIGN DETAILS

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		153

DATE: 7/28/2026 11:12:15 PM
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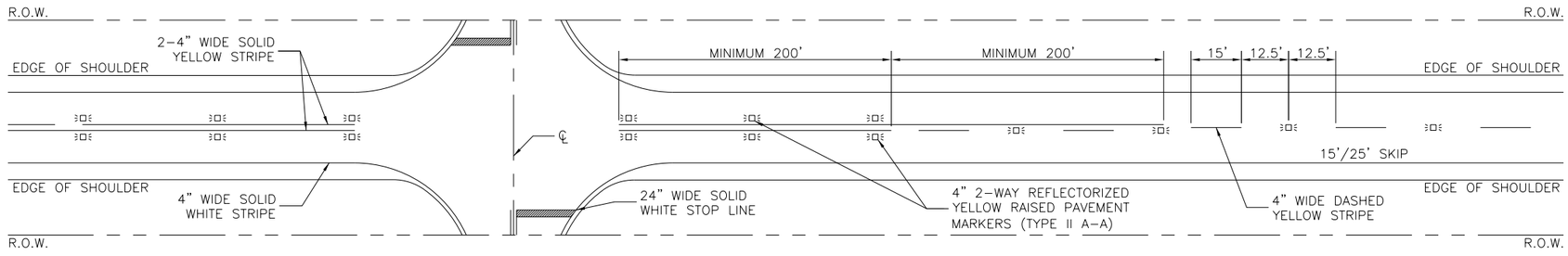
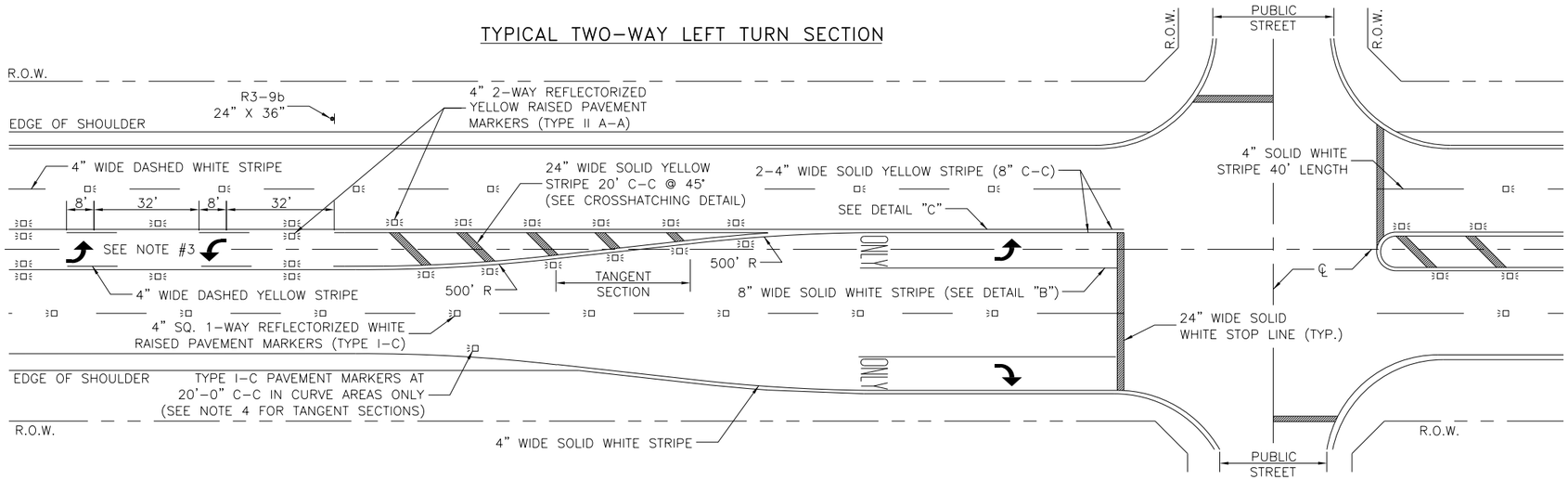
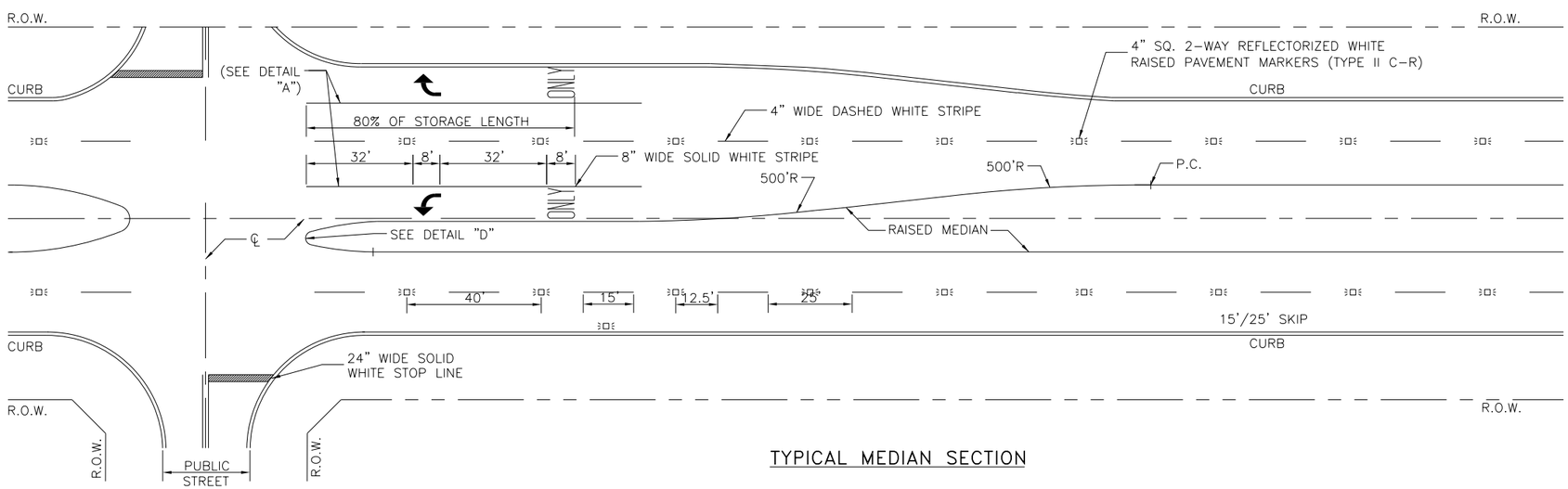


TYPICAL TWO LANE TWO–WAY ROAD



TYPICAL TWO–WAY LEFT TURN SECTION

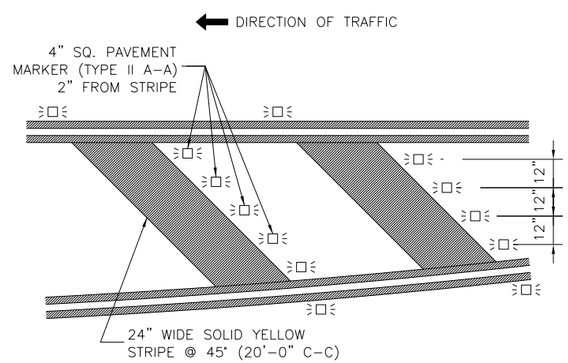


TYPICAL MEDIAN SECTION

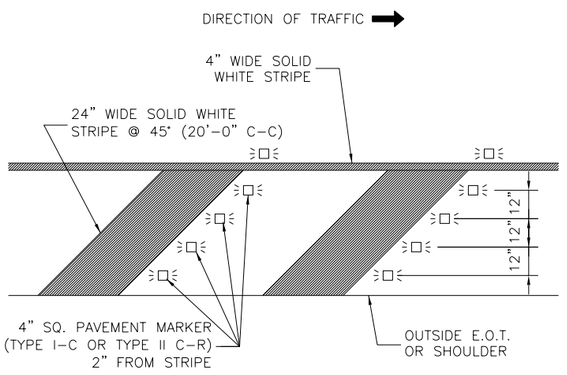
NOTES:

1. ALL PAVEMENT MARKINGS SHALL CONFORM TO THE LATEST EDITION OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS (TMUTCD).
2. ALL TRAFFIC BUTTONS AND MARKERS SHALL BE INSTALLED ADJACENT TO STRIPES (APPROXIMATELY 2").
3. REPEAT ARROWS AT APPROXIMATELY 1000' INTERVALS WITHIN TWO–WAY LEFT TURN SECTION.
4. WITHIN A TANGENT SECTION THE TYPE I–C PAVEMENT MARKERS SHALL BE PLACED AT 40' C–C ON ROADWAYS WITHOUT CURB AND GUTTERS.
5. WHEN PAVEMENT MARKINGS EXTEND INTO OR CONTINUE THROUGH AN INTERSECTION AREA, THEY SHALL BE THE SAME COLOR AND AT LEAST THE SAME WIDTH AS THE LINE MARKINGS THEY EXTEND.
6. WHEN CROSSWALK MARKINGS ARE USED WITHIN AN ESTABLISHED SCHOOL ZONE, MID–BLOCK, OR AT UNCONTROLLED INTERSECTIONS, CROSSWALK SHALL BE CONTINENTAL STYLE.
7. ADDITIONAL SET OF "WORD" AND "ARROW" PAVEMENT MARKINGS SHALL BE USED WHEN TURN LANE STORAGE LENGTH IS 160 FEET OR GREATER.

CROSSHATCHING DETAIL



OUTSIDE EDGE CROSSHATCHING DETAIL



NO.	REVISIONS	DATE	NAME
1			
2			
3			
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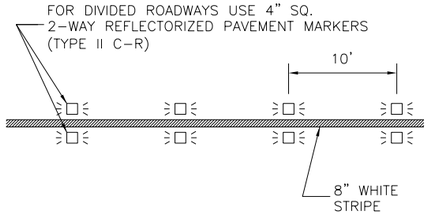
WALLER COUNTY ENGINEERING DEPARTMENT

CivilCorp an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

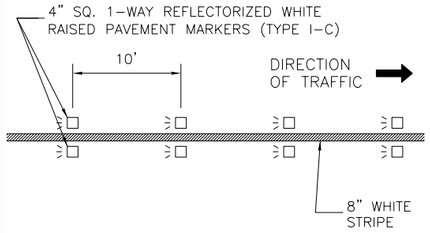
PAVEMENT MARKING AND SIGNING STANDARD DETAILS

PROJECT TITLE: *DOUBLE CULVERT RD AND CEDAR CREEK RD*		
DRAWN BY:		WCED STANDARD
CK'D BY:	SHEET DESCRIPTION: PAVEMENT MARKINGS DETAILS 01	
SCALE:		SHEET NO:
DATE:	APPROVED BY:	*154/244*

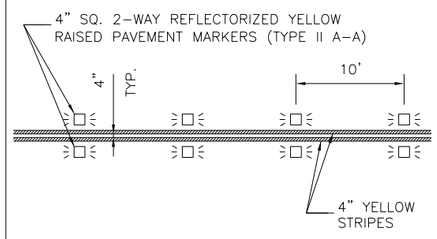
DETAIL "A"
(FOR DIVIDED ROADWAYS)



DETAIL "B"
(FOR UNDIVIDED ROADWAYS)



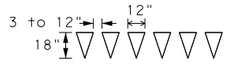
DETAIL "C"



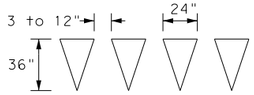
PAVEMENT MARKER LEGEND

SYMBOL	DESCRIPTION
≥□≤	4" x 4" REFLECTORIZED RAISED PAVEMENT MARKER
□≤	INDICATED DIRECTION OF TRAFFIC FLOW

YIELD LINE DETAILS



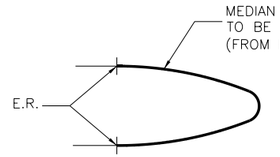
FOR POSTED SPEED ON ROAD BEING MARKED EQUAL TO OR LESS THAN 40 MPH.



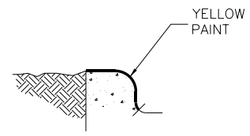
FOR POSTED SPEED ON ROAD BEING MARKED EQUAL TO OR GREATER THAN 45 MPH

DETAIL "D"

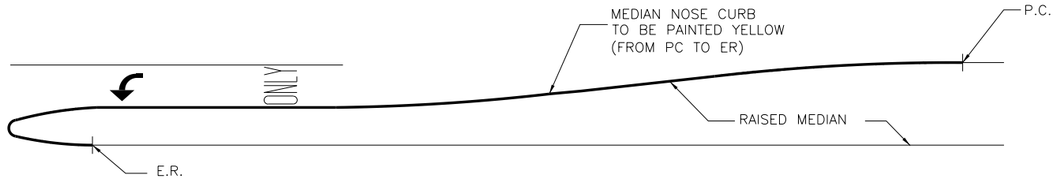
* PAINT FROM THE BACK OF CURB TO THE GUTTER LINE



TYPICAL MEDIAN NOSE



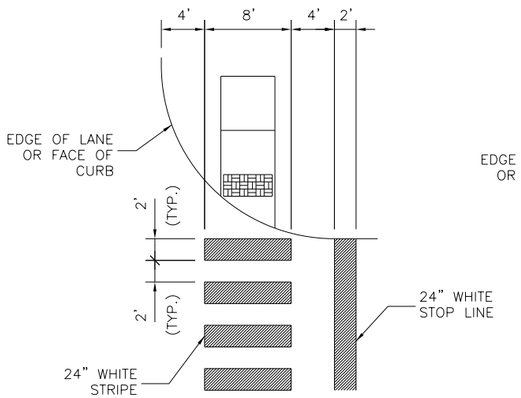
TYPICAL CURB SECTION



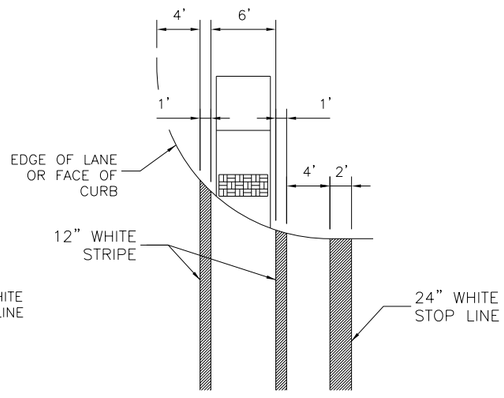
RAISED MEDIAN WITH TURN BAY

TYPICAL CROSSWALK PLACEMENT

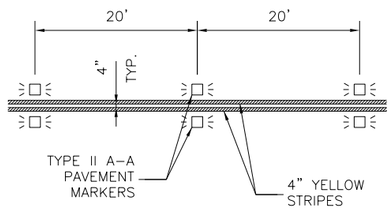
CONTINENTAL TYPE



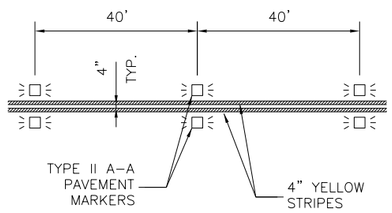
STANDARD TYPE



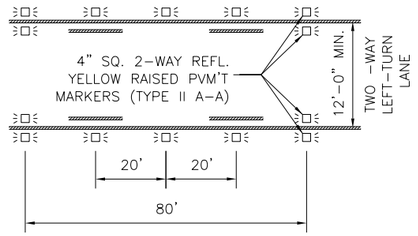
CENTER LINE DETAIL
CURVE SECTION



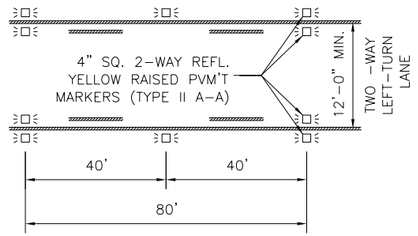
CENTER LINE DETAIL
TANGENT SECTION



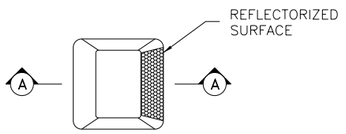
TWO-WAY LEFT TURN
CURVE SECTION



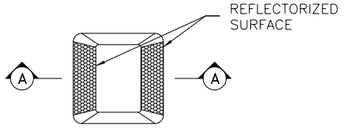
TWO-WAY LEFT TURN
TANGENT SECTION



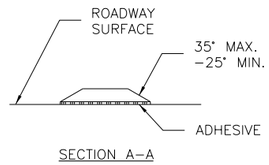
RAISED PAVEMENT MARKERS



TYPE I (TOP VIEW)



TYPE II (TOP VIEW)



SECTION A-A

NO.	REVISIONS	DATE	NAME
1			
2			
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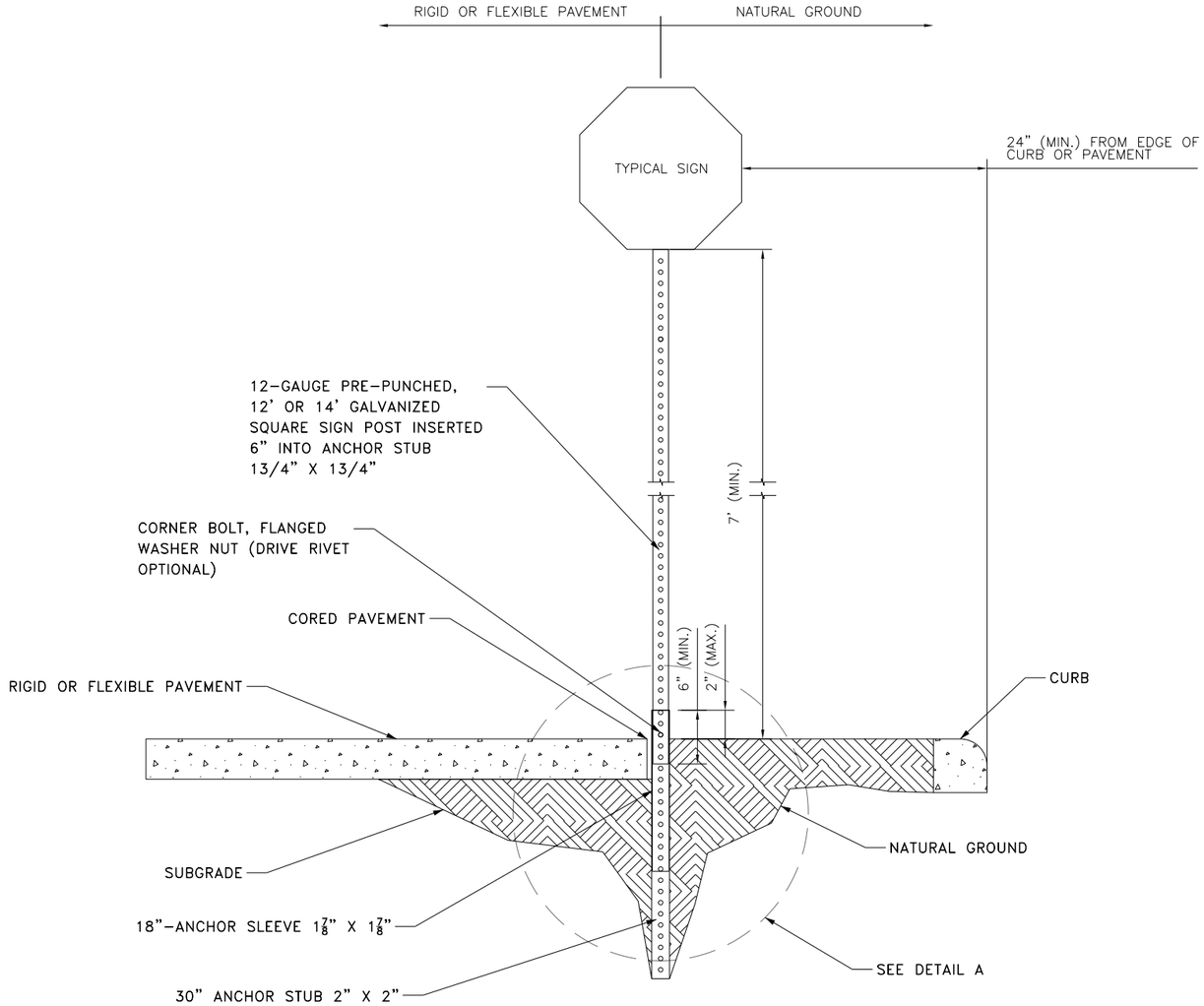
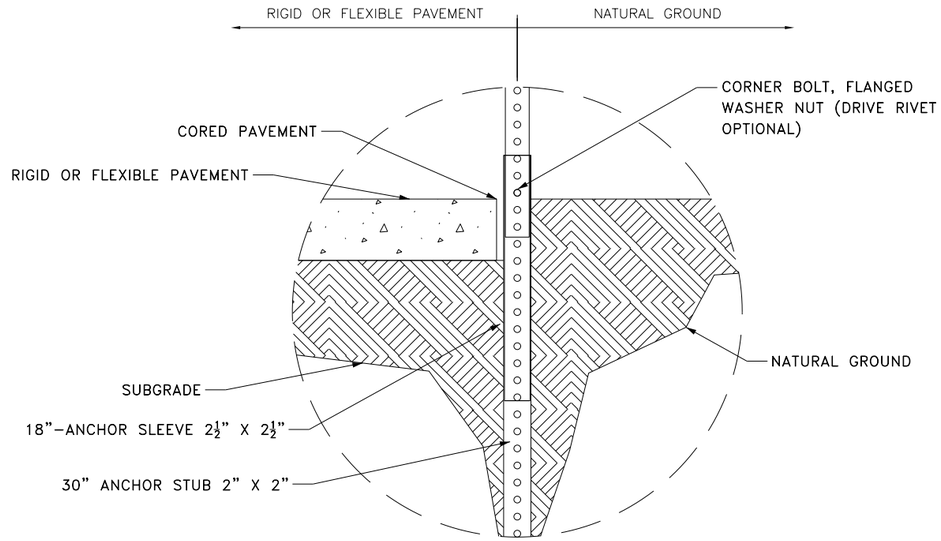
WALLER COUNTY ENGINEERING DEPARTMENT

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

PAVEMENT MARKING AND SIGNING STANDARD DETAILS

PROJECT TITLE: *DOUBLE CULVERT RD AND CEDAR CREEK RD*		
DRAWN BY:		WCED STANDARD
CK'D BY:	SHEET DESCRIPTION: PAVEMENT MARKINGS DETAILS 02	
SCALE:		SHEET NO:
DATE:	APPROVED BY:	155/244





TYPICAL GROUND SIGN INSTALLATION
DETAIL A

NOTES:

1. THE CROSS SECTION OF ALL MEMBERS SHALL BE SQUARE TUBE FORMED OF 12 GAUGE AND MANUFACTURED FROM HOT-GALVANIZED STEEL
2. THE TELESCOPE BREAKAWAY SYSTEM OR "SYSTEM" IS DEFINED AS FOLLOW:
   - A MINIMUM 30" ANCHOR STUB;
   - 18" ANCHOR SLEEVE.
3. DRIVE THE SYSTEM TOGETHER MAKING SURE THE HOLES ARE ALIGNED.
4. THE SYSTEM IS TO BE DRIVEN INTO NATURAL GROUND EXPOSED SUBGRADE UNTIL ONLY 1 TO 2 INCHES ARE LEFT EXPOSED.
5 ATTACH THE SIGN TO AN 1 3/4" SQUARE POST AT THE DESIRED HEIGHT, SUCH THAT IT MEETS THE MINIMUM VERTICAL CLEARANCE.
6. SIGNS ARE FASTENED TO THE POST BY USING DRIVE RIVETS OR BOLTS.
7. INSERT THE SIGN POST APPROXIMATELY 6 TO 8 INCHES INTO THE ANCHOR BASE.
8. BOLT THE SIGN POST TO THE ANCHOR ASSEMBLY WITH A CORNER BOLT.
9. WHEN INSTALLING IN RIGID OR FLEXIBLE PAVEMENT, USE A CORING MACHINE TO EXPOSE THE SUBGRADE MATERIAL AND INSTALL THE SYSTEM.

NO.	REVISIONS	DATE	NAME
1			
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WALLER COUNTY
ENGINEERING DEPARTMENT

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TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

PAVEMENT MARKING AND SIGNING STANDARD DETAILS

PROJECT TITLE: DOUBLE CULVERT RD AND CEDAR CREEK RD
DRAWN BY:
CK'D BY:
SCALE:
DATE:
APPROVED BY:
SHEET DESCRIPTION: TYPICAL GROUND SIGN INSTALLATION
WCED STANDARD
SHEET NO: 156 / 244

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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

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS			23103	DOUBLE CULVERT RD
4-03 7-13	DIST	COUNTY		SHEET NO.
9-07 8-14		WALLER		157
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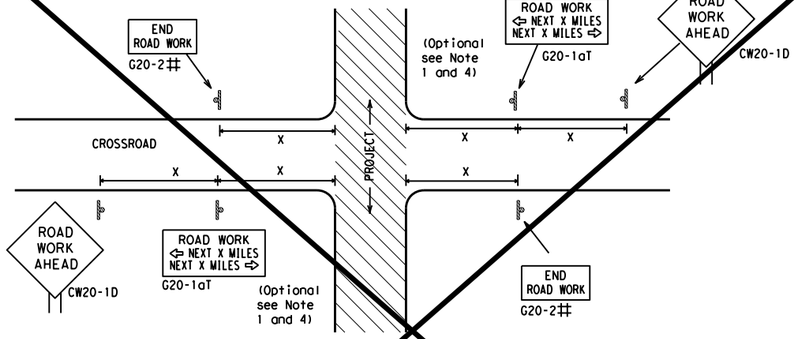
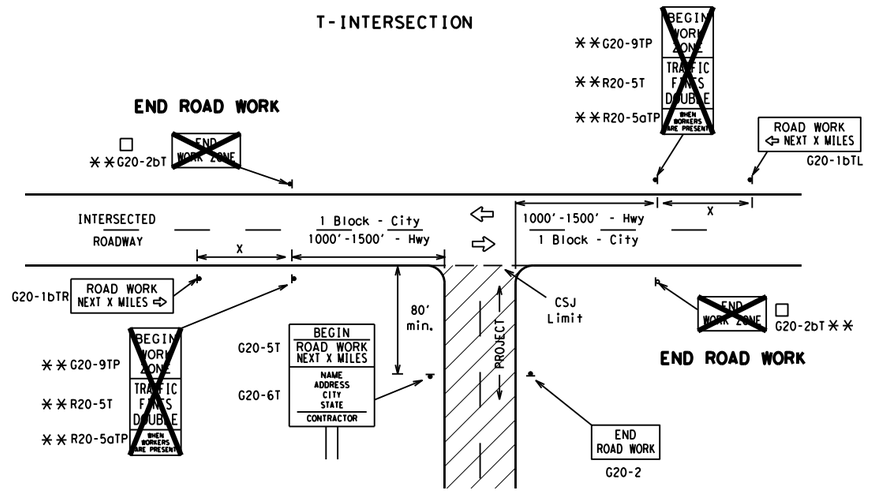
TYPICAL LOCATION OF CROSSROAD SIGNS



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]

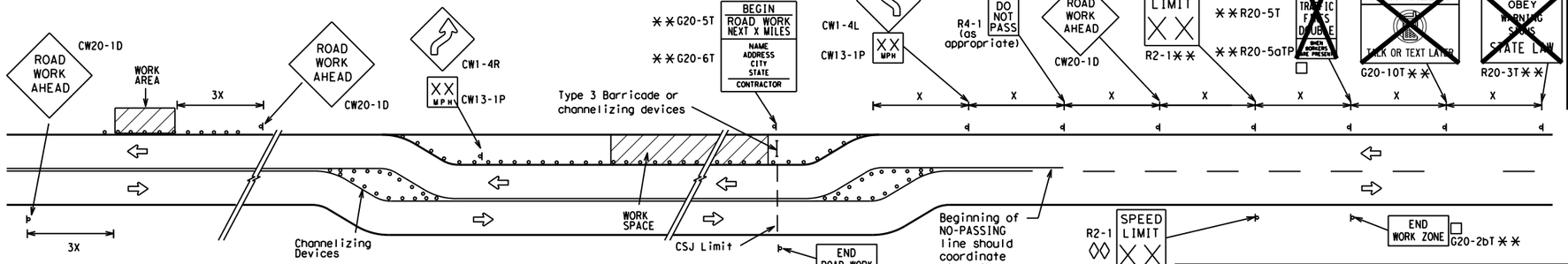
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

△ 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.

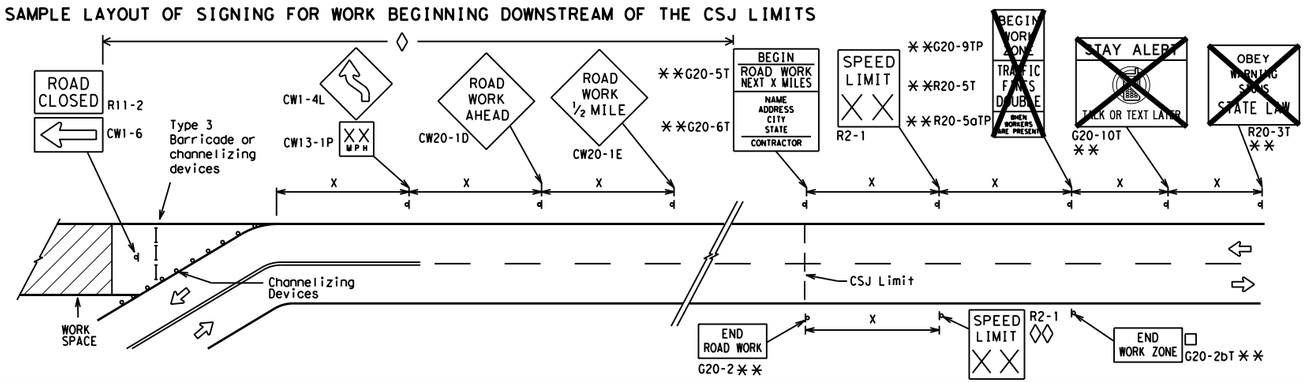
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY M. DILL
84626
LICENSED PROFESSIONAL ENGINEER

R. M. Dill, P.E.
7/21/2026

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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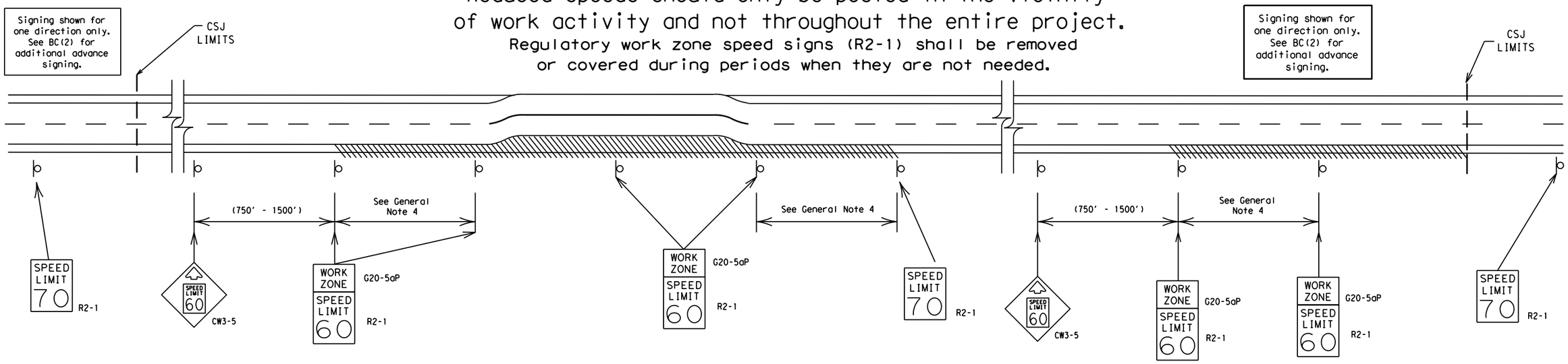
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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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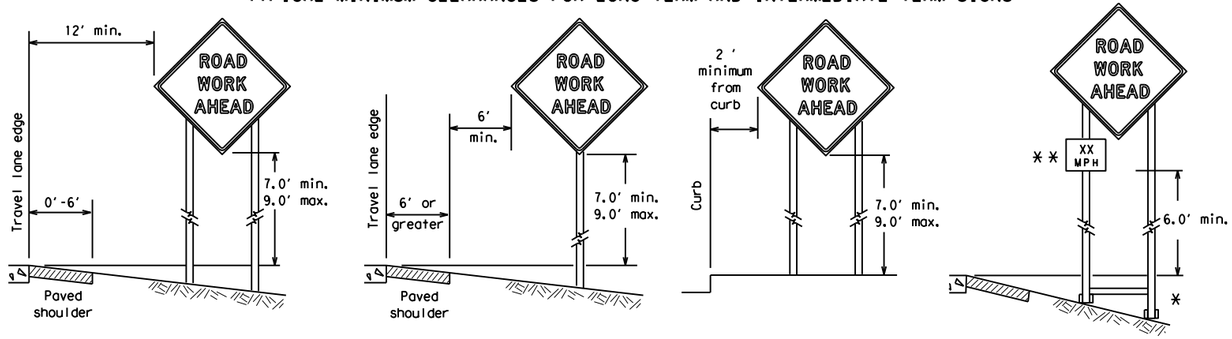
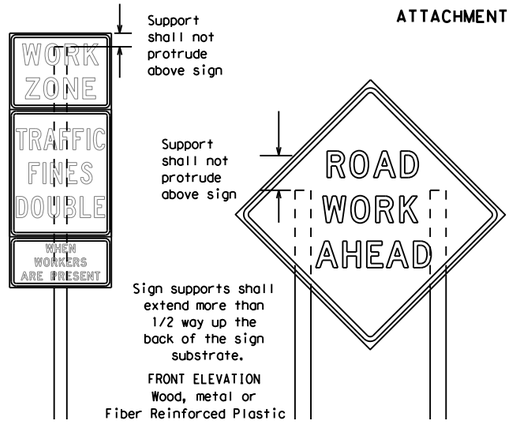
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

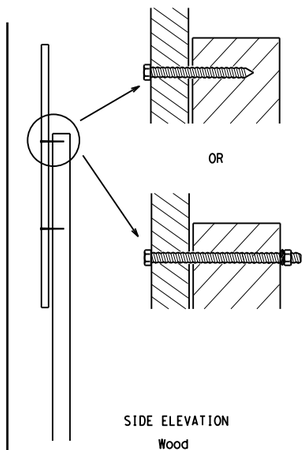


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

* * 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





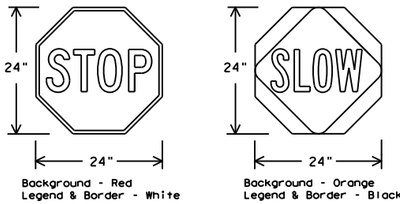
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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.

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BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

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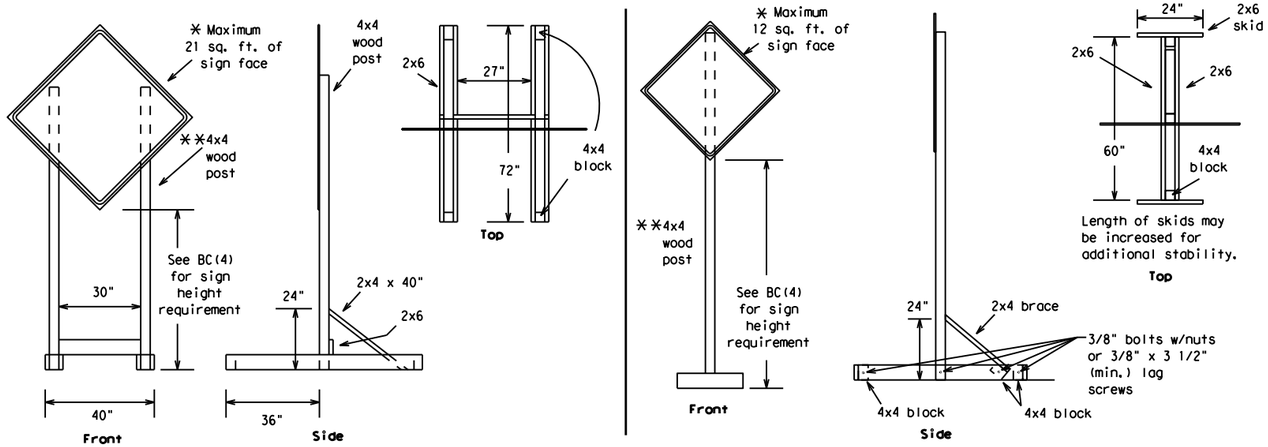
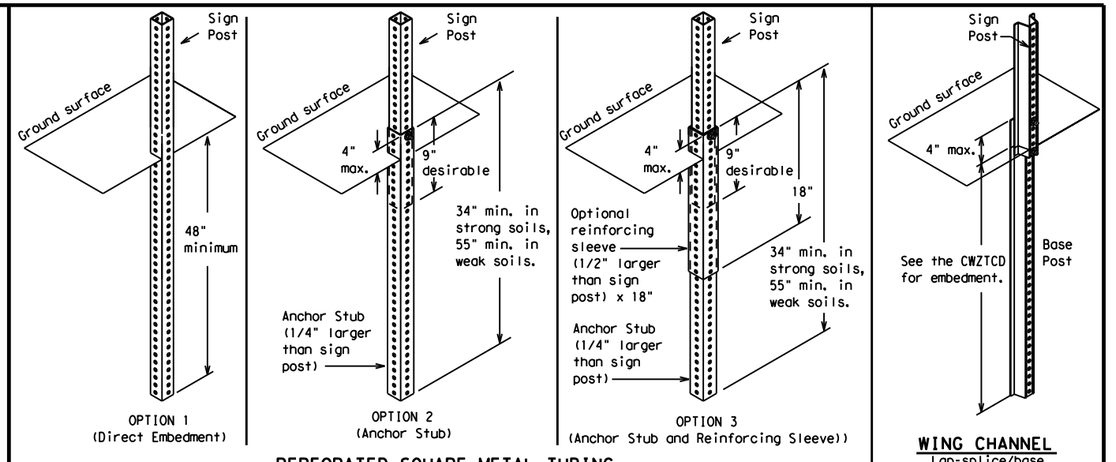


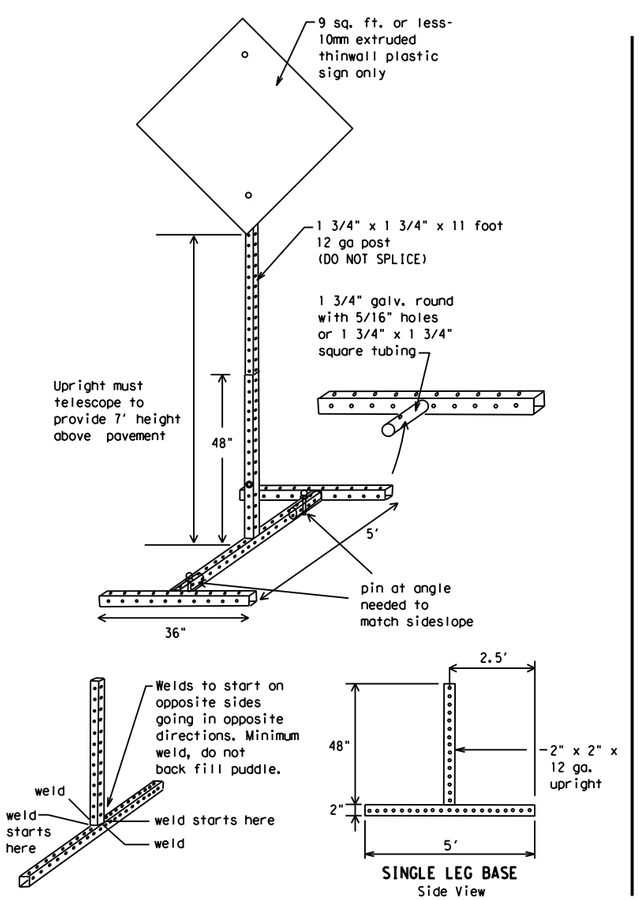
SKID MOUNTED WOOD SIGN SUPPORTS

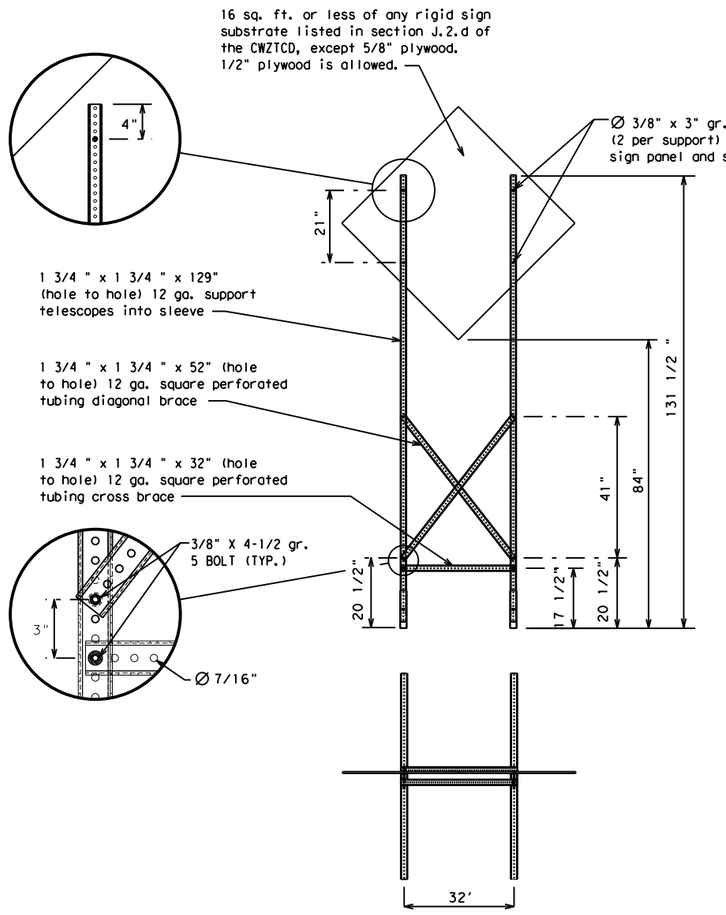
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

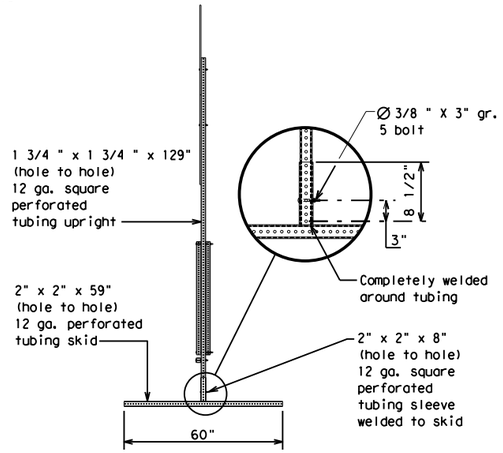


GROUND MOUNTED SIGN SUPPORTS

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.

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

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

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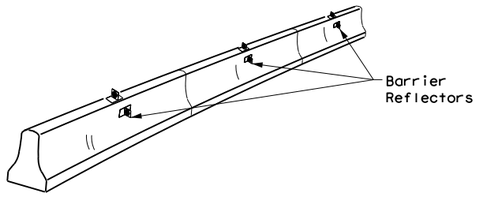
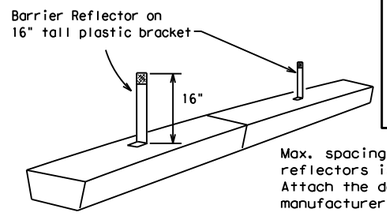
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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



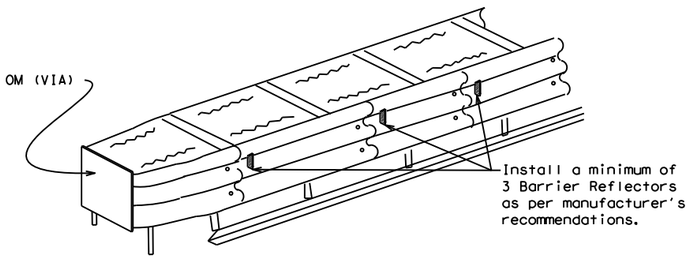
CONCRETE TRAFFIC BARRIER (CTB)

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

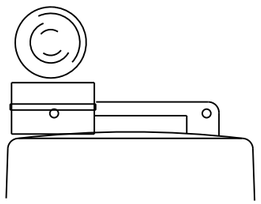
LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

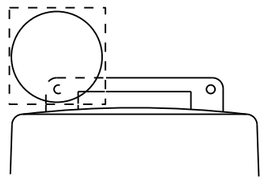
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

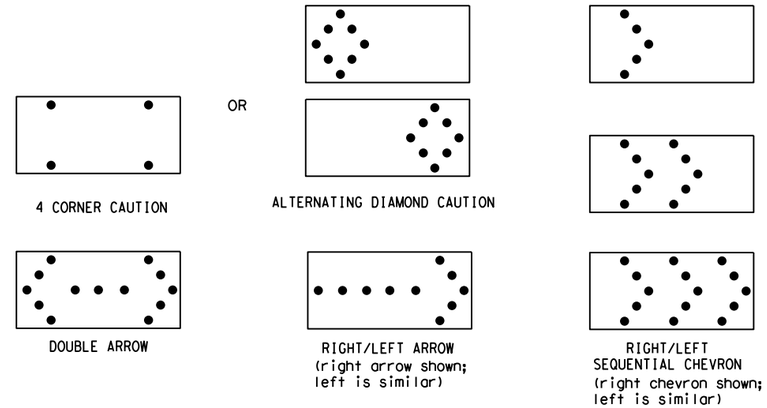
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation

Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS			23103	DOUBLE CULVERT RD
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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:

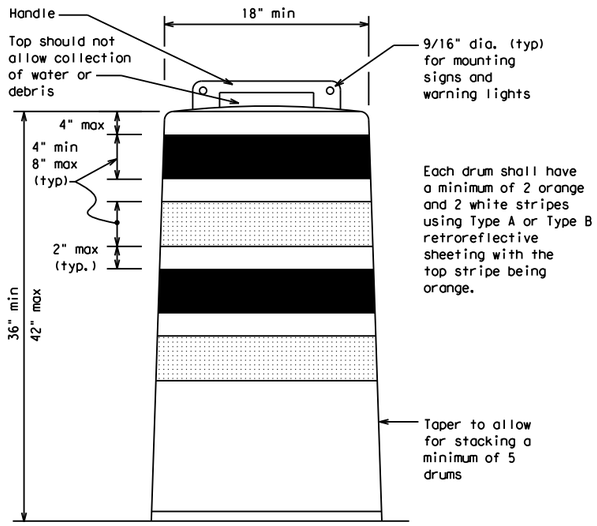
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

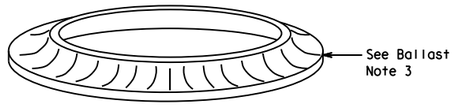
RETROREFLECTIVE SHEETING

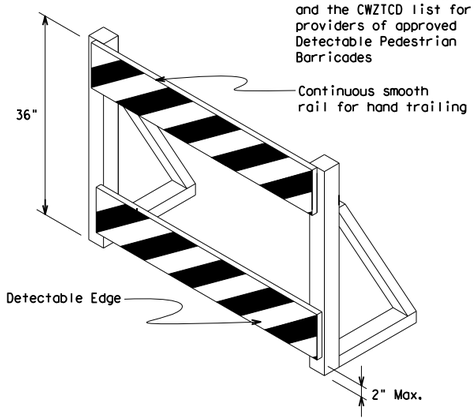
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

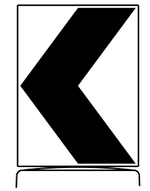




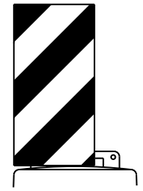


DETECTABLE PEDESTRIAN BARRICADES

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

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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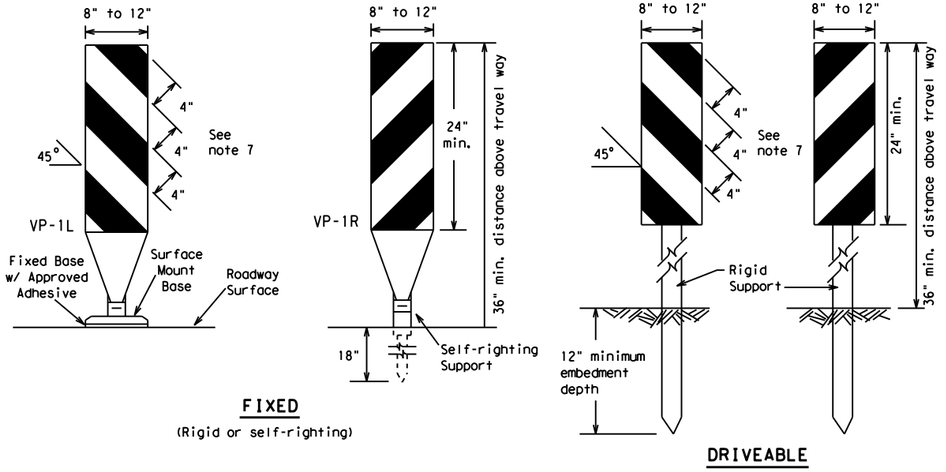
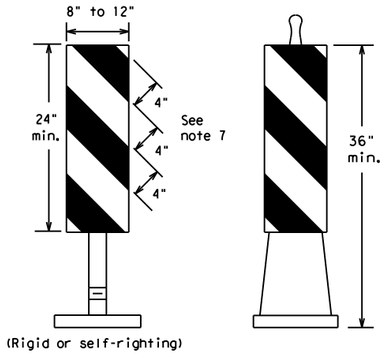


FIXED
(Rigid or self-righting)

DRIVEABLE

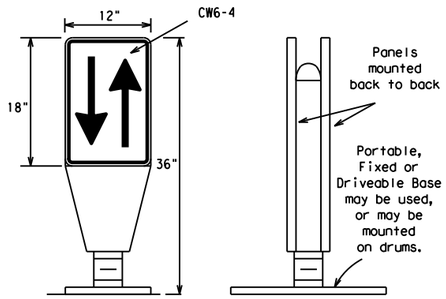


(Rigid or self-righting)

PORTABLE

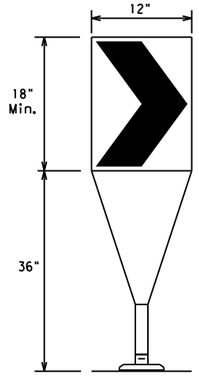
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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



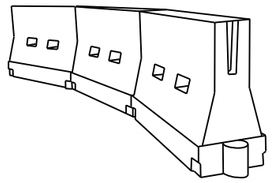
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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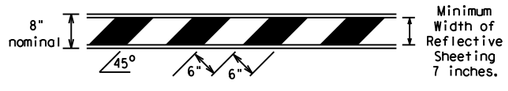
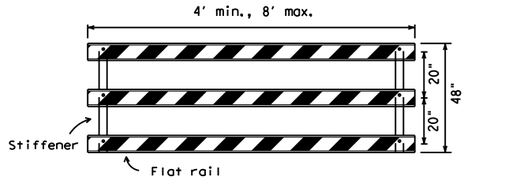
TYPE 3 BARRICADES

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.



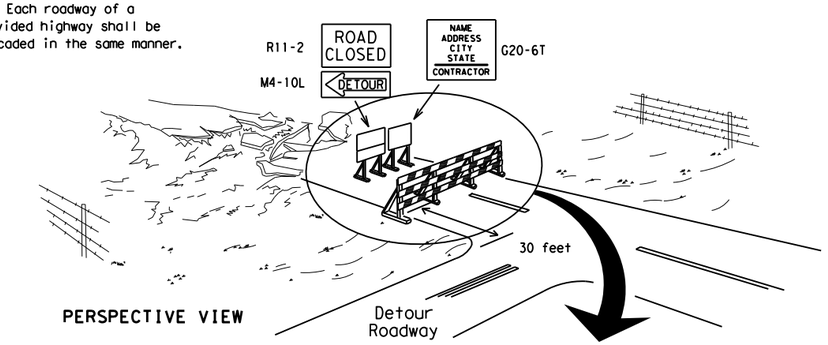
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

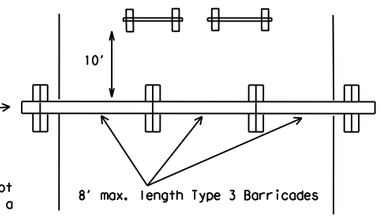
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

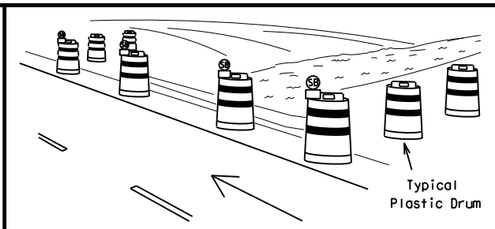
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

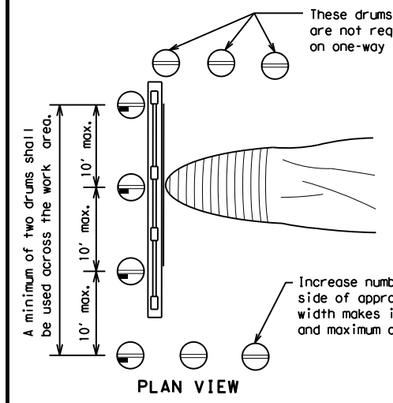
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

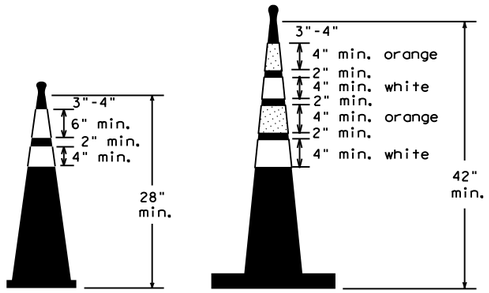
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



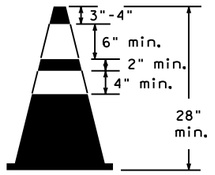
LEGEND	
	Plastic drum
	Plastic drum with steady burn light or yellow warning reflector
SB	Steady burn warning light or yellow warning reflector

PLAN VIEW

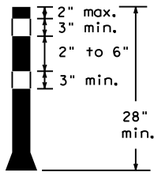
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

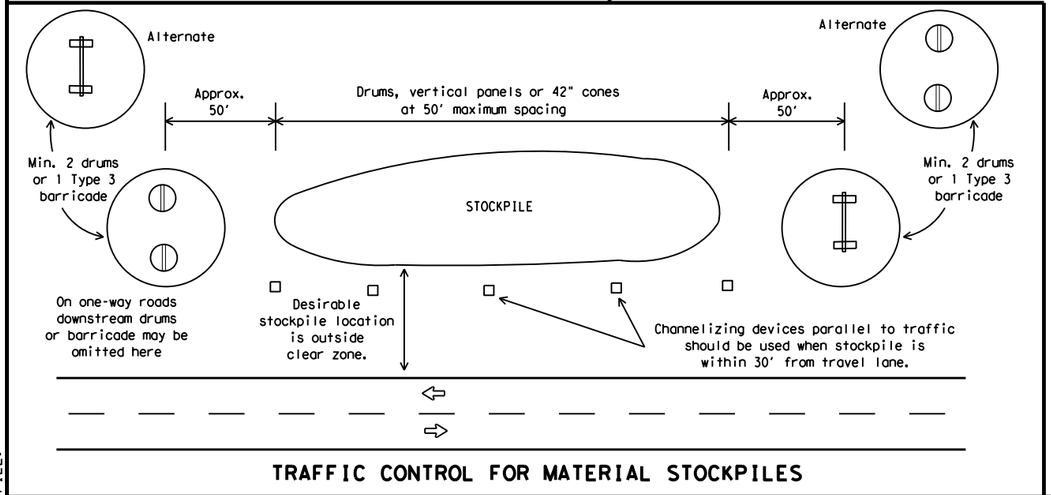


Tubular Marker

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

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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

DATE:
FILE:

SHEET 10 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21		WALLER		166

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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.

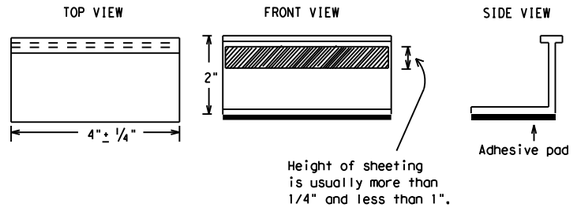
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
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2-98 9-07 5-21	DIST	COUNTY		SHEET NO.
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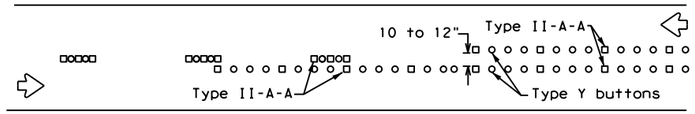
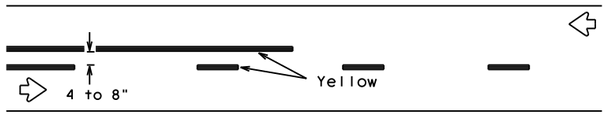
PAVEMENT MARKING PATTERNS



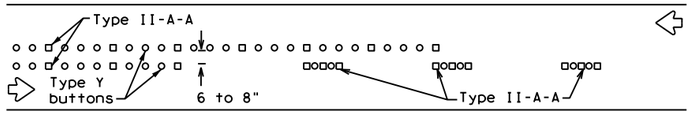
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



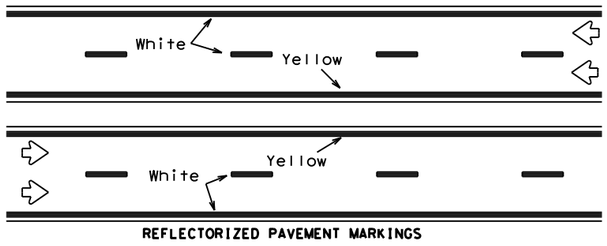
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



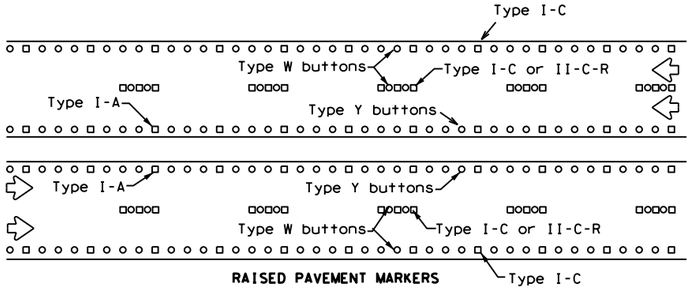
RAISED PAVEMENT MARKERS - PATTERN B

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



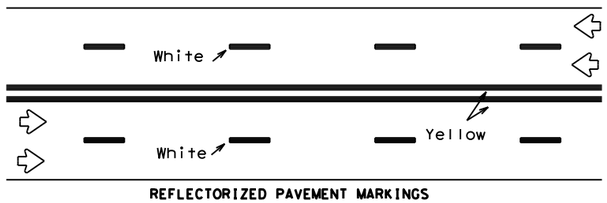
REFLECTORIZED PAVEMENT MARKINGS



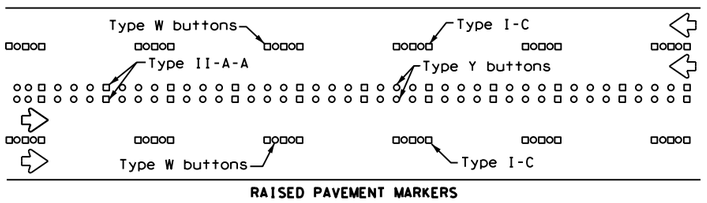
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



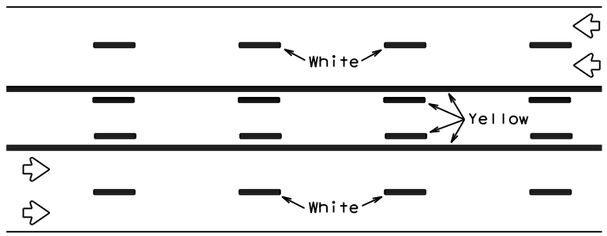
REFLECTORIZED PAVEMENT MARKINGS



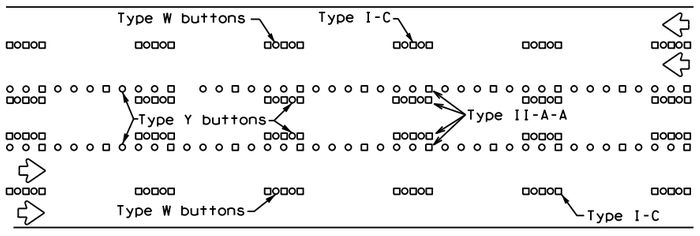
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

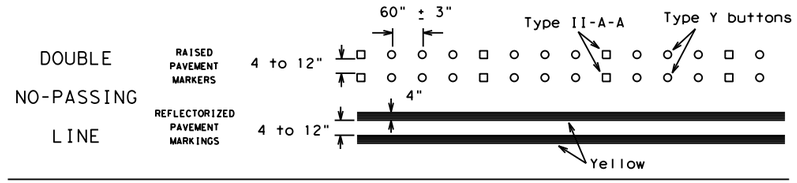
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

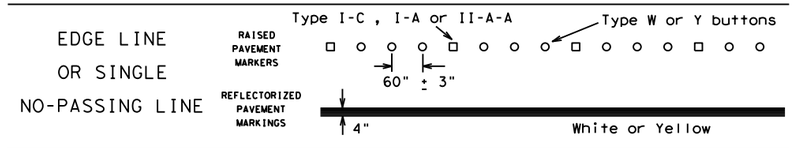
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

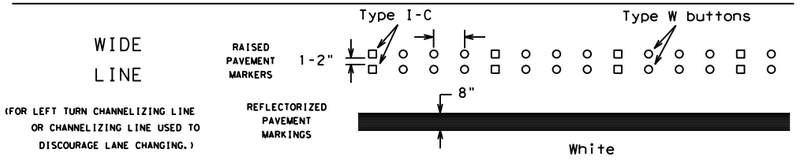


EDGE LINE OR SINGLE NO-PASSING LINE



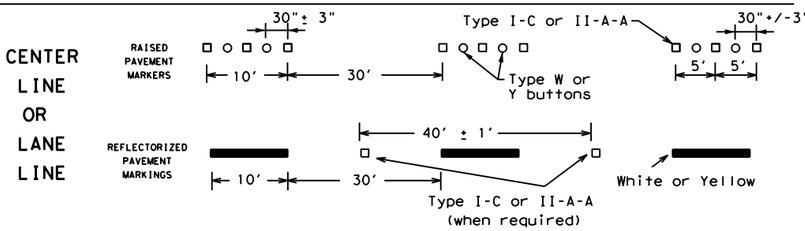
WIDE LINE

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

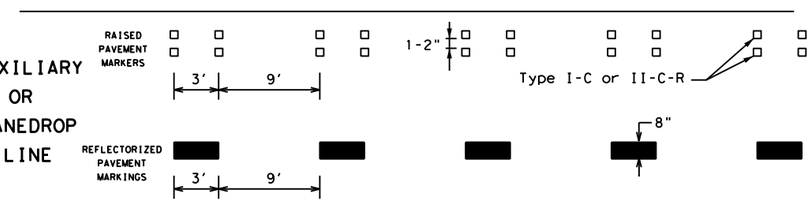


BROKEN LINES

CENTER LINE OR LANE LINE

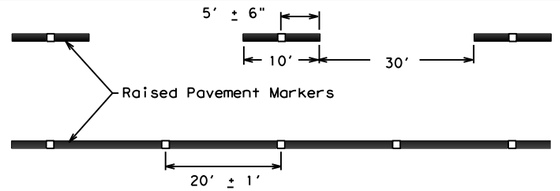


AUXILIARY OR LANEDROP LINE



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."

SHEET 12 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

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DELINEATOR - BID ITEM DESCRIPTIONS

XXXXX DEL ASSM (D-XX)SZ X (XXXX)XXXXX(XX)

PAYMENT
INSTL = Installation
REPLC = Replacement

NUMBER OF REFLECTORS
S = Single
D = Double

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

REFLECTOR UNIT SIZE
SZ 1 or SZ 2 or SZ 5 or SZ 6

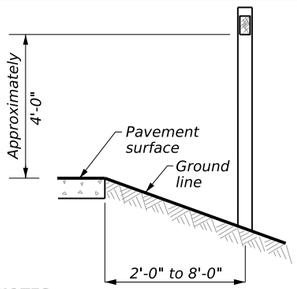
TYPE OF POST OR DELINEATOR
WC = Wing Channel Post
YFLX = Yellow Flexible Post
WFLX = White Flexible Post
BRF = Barrier Reflector

TYPE OF MOUNT
GND = Ground Embedded (drivable or set in concrete)
CAB1 or CAB2 or CAB3 = Cable Barrier
CTB = Concrete Traffic Barrier
GF1 or GF2 = Guard Fence
SRF = Surface Mount

IDENTIFICATION
LL= Low Speed, Low Impact
HH = High Speed, High Impact

DIRECTION [if required]
BI = Bi-Directional
BR = Bi-Directional with red on back

DELINEATOR - TYPICAL INSTALLATION



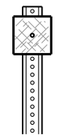
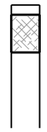
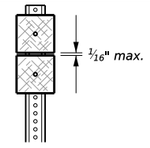
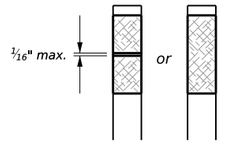
GENERAL NOTES

1. *Place delineators on a section of roadway at a consistent distance from the edge of pavement.*
2. *When 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 delineator as close to the desired height as possible.*
3. *Install all delineators and barrier reflectors in accordance with the manufacturer's recommendation.*
4. *GF1, GF2, and CTB barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.*
5. *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.*
6. *Delineator substrates and sign substrates shall be 0.080" aluminum sign blank and confrom to ASTM B-209 Alloy 6061-T6 or an approved alternative.*

DELINEATOR DEFINITION

Retroreflective devices mounted on the roadway surface or at the side of the roadway in a series to indicate the alignment of the roadway, especially at night or in adverse weather. (See TMUTCD - Part 3, DELINEATORS.)

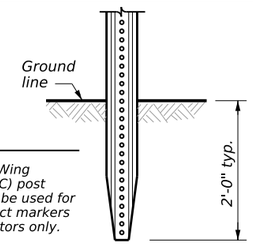
SINGLE AND DOUBLE MOUNTED DELINEATORS

	SINGLE		DOUBLE	
DEVICE	 1-Size 2 reflector unit	 1-Size 1 reflector unit	 2-Size 2 reflector units	 2-Size 1 reflector units or 1-Size 5 reflector unit
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GNDLL	GNDLL, GNDHH, SRFLL, SRFHH	GNDLL	GNDLL, GNDHH, SRFLL, SRFHH

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

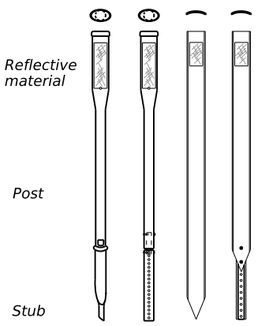
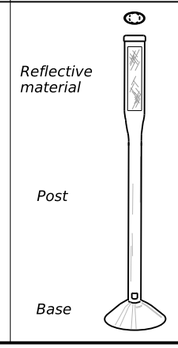
GND



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	SRF
	

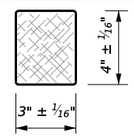
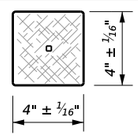
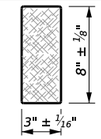
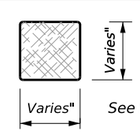
NOTES

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.*

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*

REFLECTOR UNIT DIMENSIONS FOR DELINEATORS

	SIZE 1	SIZE 2	SIZE 5	SIZE 6
DEVICE				 See Note 3
SHEETING	Yellow, White, or Red Type B or C reflective sheeting			
NOTES	1. Size 1 and 5 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 - For use on wing channel (wc) post only. Use approved metal, plastic, or fiberglass backplate with 17/64" mounting holes. 3. Size 6 - For use on cable barrier systems only. Direct applied reflective sheeting. Various dimensions as specified elsewhere in the plans or as defined by the manufacturer.			

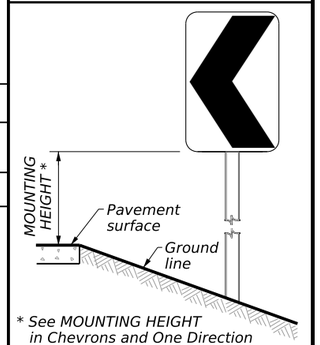
CHEVRONS

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" to 4'-6" or 7'-0" to 7'-6" | 7'-0" to 7'-6"

ONE DIRECTION LARGE ARROW

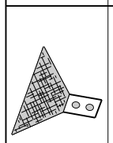
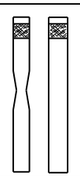
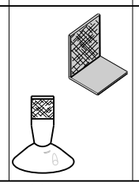
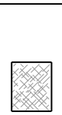
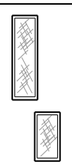
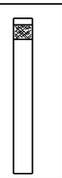
DEVICE	
	W1-6
SIZE (W x L)	48"x 24" (Conventional) | 60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0" to 7'-6"
NOTES	1. Chevron Alignment (W1-8) signs and One-Direction Large Arrow (W1-6) signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies). 2. When there is a need to increase conspicuity, a larger One-Direction Large Arrow (W1-9T) sign may be used in lieu of the typical W1-6 sign.

CHEVRONS AND ONE DIRECTION LARGE ARROW SIGNS TYPICAL INSTALLATION



* *See MOUNTING HEIGHT in Chevrons and One Direction Large Arrow tables.*

BARRIER REFLECTORS (BRF)

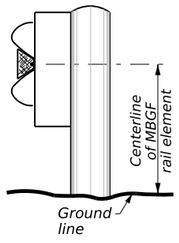
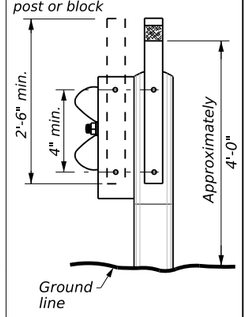
	GF1	GF2	CTB	CAB1	CAB2	CAB3
DEVICE						

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.*
3. *GF2 and CAB3 are coded as "YFLX" or "WFLX" instead of "BRF".*
4. *CAB1, CAB2, and CAB3 are only to be used as replacements. Per Item 543, original installation is to be considered subsidiary to the Cable Barrier System.*

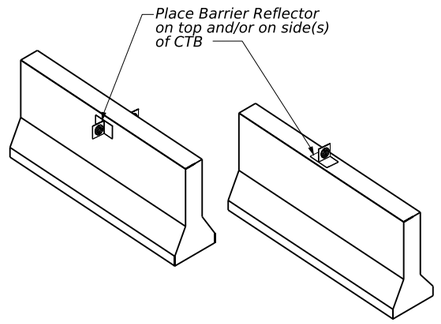
SHEETING	Yellow, White, Red
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches by 3 inches and minimum surface area of 9 square inches.

BARRIER MOUNT TYPES

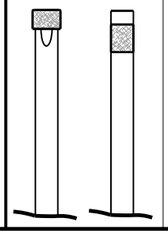
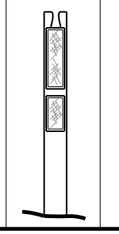
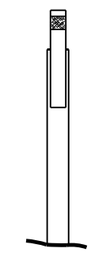
GUARD FENCE

GF1	GF2
	

CONCRETE TRAFFIC BARRIER (CTB)



CABLE BARRIER

CAB1	CAB2	CAB3
		

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR MATERIAL DESCRIPTION & INSTALLATION

D & OM(1)-25

FILE: dom1-25.dgn		DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT		
©TxDOT May 2025	CONT	SECT	JOB		HIGHWAY		
REVISIONS			23103		DOUBLE CULVERT RD		
8-04 3-15	DIST	COUNTY				SHEET NO.	
10-09 7-20		WALLER				169	
4-10 5-25							

DATE:
FILE:

20A

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OBJECT MARKER - BID ITEM DESCRIPTIONS

XXXXX OM ASSM (OM-XX)(XXXX)XXXXX(XX)

PAYMENT
- INSTL = Installation
- REPLC = Replacement

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
- YFLX = Yellow Flexible Post
- TWT = Thin Walled Tubing

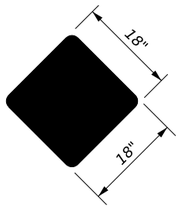
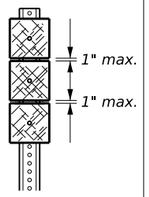
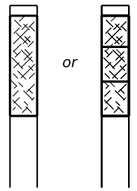
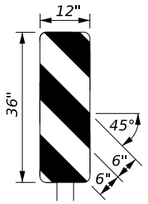
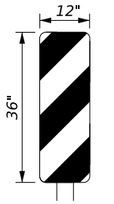
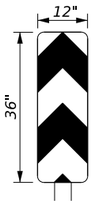
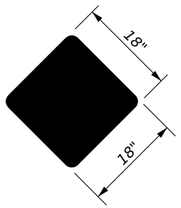
TYPE OF MOUNT
- GND = Ground Embedded (drivable or set in concrete)
- SRF = Surface Mount
- WAS = Wedge Anchor Steel
- WAP = Wedge Anchor Plastic

IDENTIFICATION
- LL = Low Speed, Low Impact
- HH = High Speed, High Impact

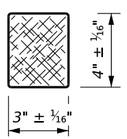
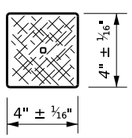
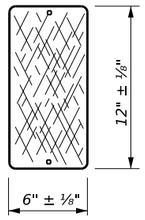
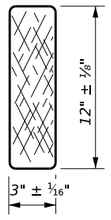
DIRECTION [if required]
- BI = Bi-Directional

OBJECT MARKER DEFINITION

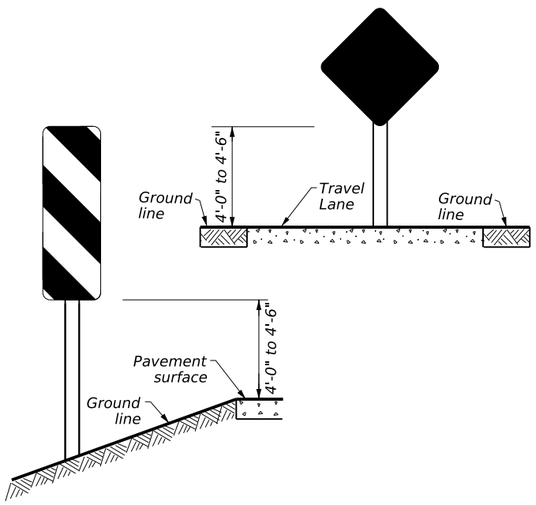
Devices used to mark obstructions within or adjacent to the roadway. (See TMUTCD - Chapter 2C, WARNING SIGNS AND OBJECT MARKERS.)

	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	 1-Size 4 reflector unit or 3-Size 1 reflector units				
SHEETING	Yellow - Type B_{FL} or C_{FL} sheeting	White and 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, YFLX	TWT, WFLX			TWT
MOUNT TYPE	WAS, WAP	GNDLL	GNDLL	GNDLL, GNDHH, SRFLL, SRFHH	WAS, WAP, GNDLL, GNDHH, SRFLL, SRFHH			WAS, WAP

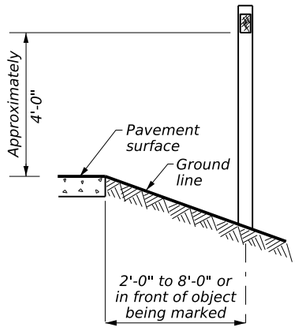
REFLECTOR UNIT DIMENSIONS FOR OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic, or fiberglass backplate with $^{17}/_{64}$" mounting holes.			

TYPES 1, 3, AND 4 OBJECT MARKERS TYPICAL INSTALLATION



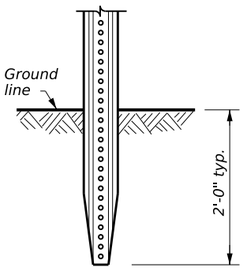
TYPE 2 OBJECT MARKERS TYPICAL INSTALLATION



See General Notes 1, 2, and 3

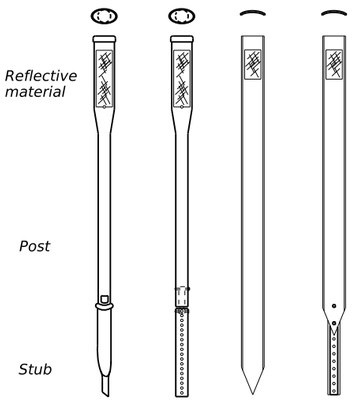
POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC) — GND

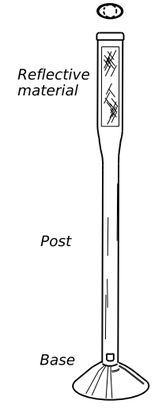


NOTES
1. Embedded Wing Channel (WC) post option may be used for Type 2 object markers and delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

FLEXIBLE POSTS (YFLX, WFLX) — GND

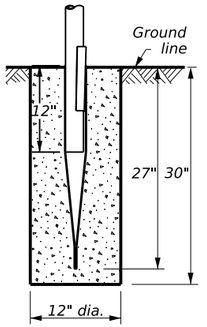


FLEXIBLE POSTS (YFLX, WFLX) — SRF

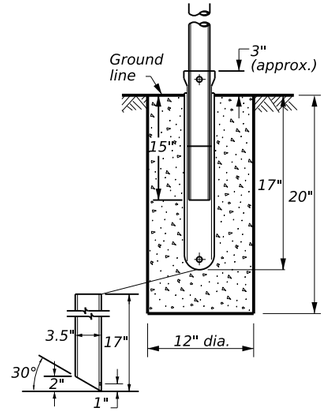


NOTES
1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.

WEDGE ANCHOR SYSTEMS — WAS



WEDGE ANCHOR SYSTEMS — WAP



NOTE
1. Install per manufacturer's recommendations.

GENERAL NOTES
1. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
2. When Type 2 object markers 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 as close to the recommended height as possible.
3. Install all object markers in accordance with the manufacturer's recommendation.
4. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.
5. Object marker substrates shall be 0.080" aluminum sign blank and conform to ASTM B-209 Alloy 6061-T6 or an approved alternative.

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

Texas Department of Transportation

Traffic Safety Division Standard

OBJECT MARKER MATERIAL DESCRIPTION & INSTALLATION

D & OM(2)-25

FILE: dom2-25.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 2025	CONT	SECT	JOB	HIGHWAY
REVISIONS			23103	DOUBLE CULVERT RD
8-04 5-25 3-15 7-20	DIST	COUNTY		SHEET NO.
		WALLER		170

20B

DATE:
FILE:

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DATE:
FILE:

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

CONDITION	REQUIRED TREATMENT	MINIMUM SPACING
Fwy./Exp. Tangent	RPMs	See PM and FPM standard sheets
Fwy./Exp. Curve	Single delineators on right side	See delineator spacing table
Fwy/Exp.Ramp	Single delineators on at least one side of ramp (should be on outside of curves) (see Detail 4a on D&OM(4))	100 feet on ramp tangents Use delineator spacing table for ramp curves ("straightway spacing" does not apply to ramp curves)
Acceleration/ Deceleration Lane	Double delineators (see Detail 4a on D&OM(4))	100 feet (See Detail 4a on D & OM(4))
Truck Escape Ramp	Single red delineators on both sides	50 feet
Bridge Rail (steel or concrete) and Metal Beam Guard Fence	Bi-Directional Delineators when undivided with one lane each direction Single Delineators when multiple lanes each direction	Equal spacing (100'max) but not less than 3 delineators
Concrete Traffic Barrier (CTB) or Steel Traffic Barrier	Barrier reflectors matching the color of the edge line	Equal spacing 100' max
Cable Barrier	Reflectors matching the color of the edge line Bi-Directional Delineators when within clearzone	Every 5th cable barrier post (up to 100'max)
Cable Barrier Terminus / Impact Head	Object marker on end	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM(6)
Guard Rail Terminus / Impact Head	Divided highway - Object marker on approach end Undivided 2-lane highways - Object marker on approach and departure end	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM(5) and D & OM(6)
Bridges with no Approach Rail	Type 3 Object Marker (OM-3) at end of rail and 3 single delineators approaching rail	See D & OM(5)
Reduced Width Approaches to Bridge Rail	Type 2 and Type 3 Object Markers (OM-3) and 3 single delineators approaching bridge	Requires reflective sheeting provided by manufacturer per D & OM(VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM(5)
Culverts without MBGF	Type 2 Object Markers	See Detail 2 on D & OM(4)
Crossovers	Double yellow delineators and RPMs	See Detail 1 on D & OM(4)
Pavement Narrowing (lane merge) on Freeways/Expressway	Single delineators adjacent to affected lane for full length of transition	100 feet

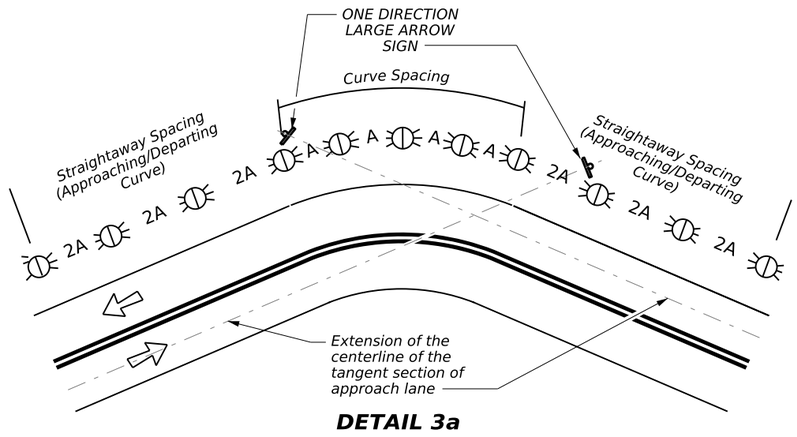
MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

Amount by which Advisory Speed is less than Posted Speed	Turn/Curve Advisory Speed: Turn (30 MPH or less)	Turn/Curve Advisory Speed: Curve (35 MPH or more)
5 MPH	• RPMs and Pavement Markings	
10 MPH	• Advance Horizontal Alignment Warning Sign with Advisory Speed Plaque; and • RPMs and Pavement Markings	
15 MPH	• Advance Horizontal Alignment Warning Sign with Advisory Speed Plaque; and • RPMs, Pavement Markings, and Delineators; or • RPMs, Pavement Markings, and One Direction Large Arrow sign(s)	• Advance Horizontal Alignment Warning Sign with Advisory Speed Plaque; and • RPMs, Pavement Markings, and Chevrons; or • RPMs, Pavement Markings, and One Direction Large Arrow sign(s) where geometric conditions or roadside obstacles prevent the installation of chevrons
20 MPH	• Advance Horizontal Alignment Warning Sign with Advisory Speed Plaque; and • RPMs, Pavement Markings, and Chevrons; or • RPMs, Pavement Markings, and One Direction Large Arrow sign(s) where geometric conditions or roadside obstacles prevent the installation of chevrons	
25 MPH or more	• Advance Horizontal Alignment Warning Sign with Advisory Speed Plaque; and • RPMs, Pavement Markings, and Chevrons; or • RPMs, Pavement Markings, and One Direction Large Arrow sign(s) where geometric conditions or roadside obstacles prevent the installation of chevrons	• Advance Horizontal Alignment Warning Sign with Advisory Speed Plaque; and • RPMs, Pavement Markings, and Chevrons

NOTE

A roadway is considered to have pavement markings when either a center line, edge lines, or both are present. A roadway is considered to have RPMs when they are used to supplement centerline pavement markings.

SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



DETAIL 3a

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.

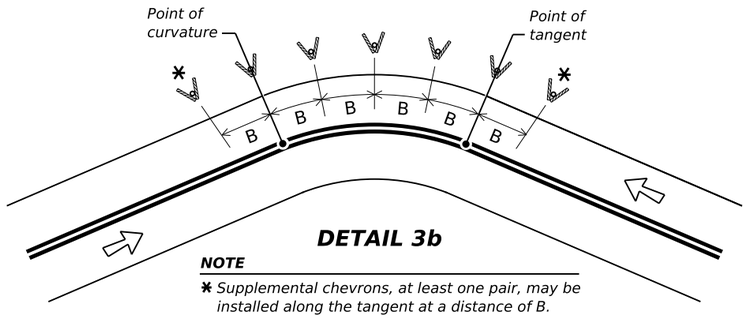
LEGEND

	Delineator
	Bi-directional Delineator
	Sign

GENERAL NOTES

1. Unless otherwise indicated, 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.

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



DETAIL 3b

NOTE

✱ Supplemental chevrons, at least one pair, may be installed along the tangent at a distance of B. Adverse curve aligment is a factor in determining if supplemental chevrons are needed.

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)	FEET: Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2A	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).

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS APPLICATION & SPACING D & OM(3)-25

FILE: dom3-25.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT			
© TxDOT May 2025	CONT	SECT	JOB	HIGHWAY			
REVISIONS			23103	DOUBLE CULVERT RD			
8-04 7-20 3-15 5-25 8-15	DIST	COUNTY		SHEET NO.			
		WALLER		171			

20C

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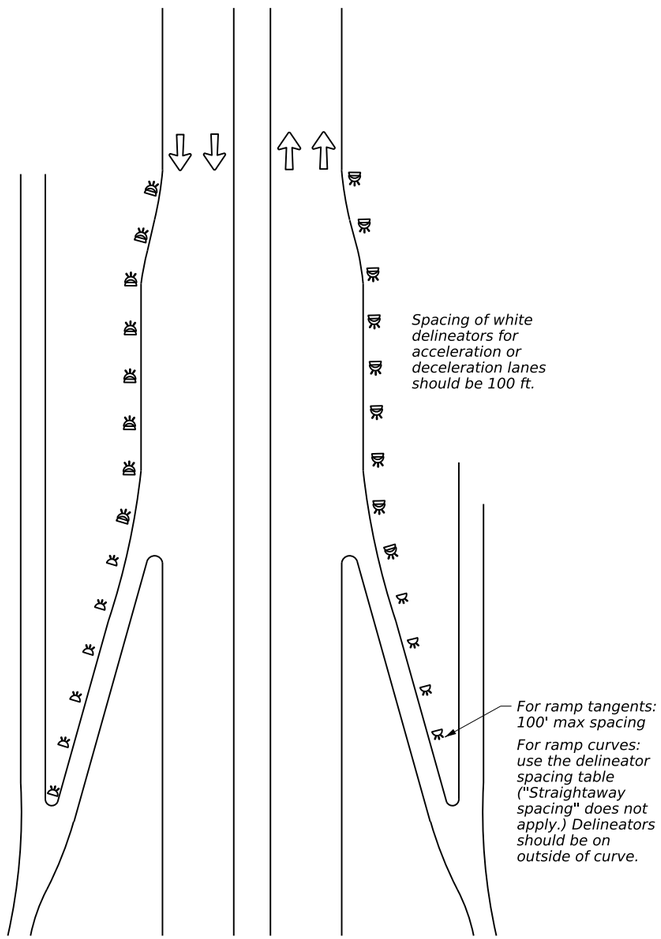
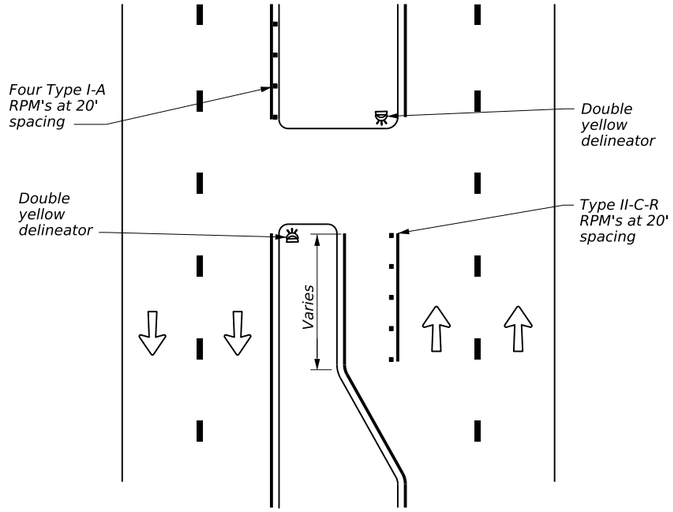
FREEWAY DELINEATION FOR RAMPS AND ACCELERATION / DECELERATION LANES



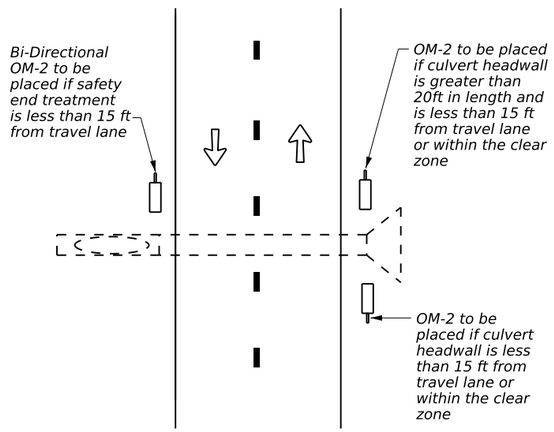
DETAIL 4a

CROSSOVERS



DETAIL 4b

FOR CULVERTS WITHOUT METAL BEAM GUARD FENCE (MBGF)

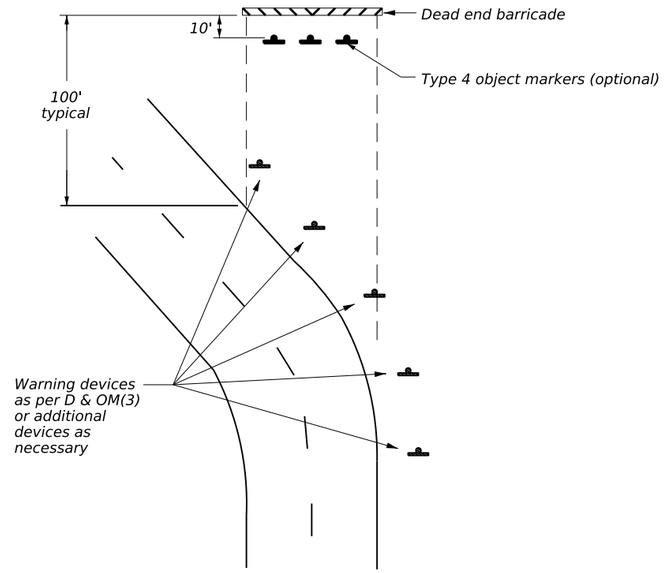


DETAIL 4c

NOTES

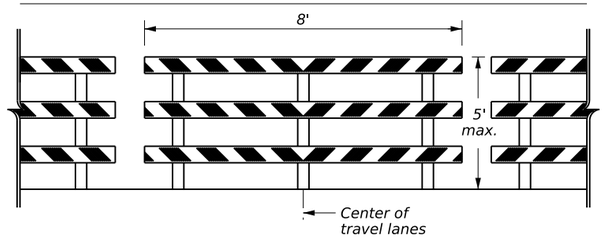
1. This detail applies for all existing culverts without MBGF, for application of OMs. New bridge-class culverts require safety end treatments, MBGF, or bridge railing. See the TxDOT Bridge Railing Manual.
2. For culverts with MBGF, see Sheet 5.

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4d

TYPICAL DEAD END BARRICADE INSTALLATION



DETAIL 4e

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 the Compliant Work Zone Traffic Control Devices list (CWZTCD).

LEGEND

	Delineator
	Double delineator
	OM-2
	Sign
	Raised Pavement Marker (RPM)
	Traffic Flow

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(4)-25

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© TxDOT May 2025	CONT	SECT	JOB	HIGHWAY			
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7-20							
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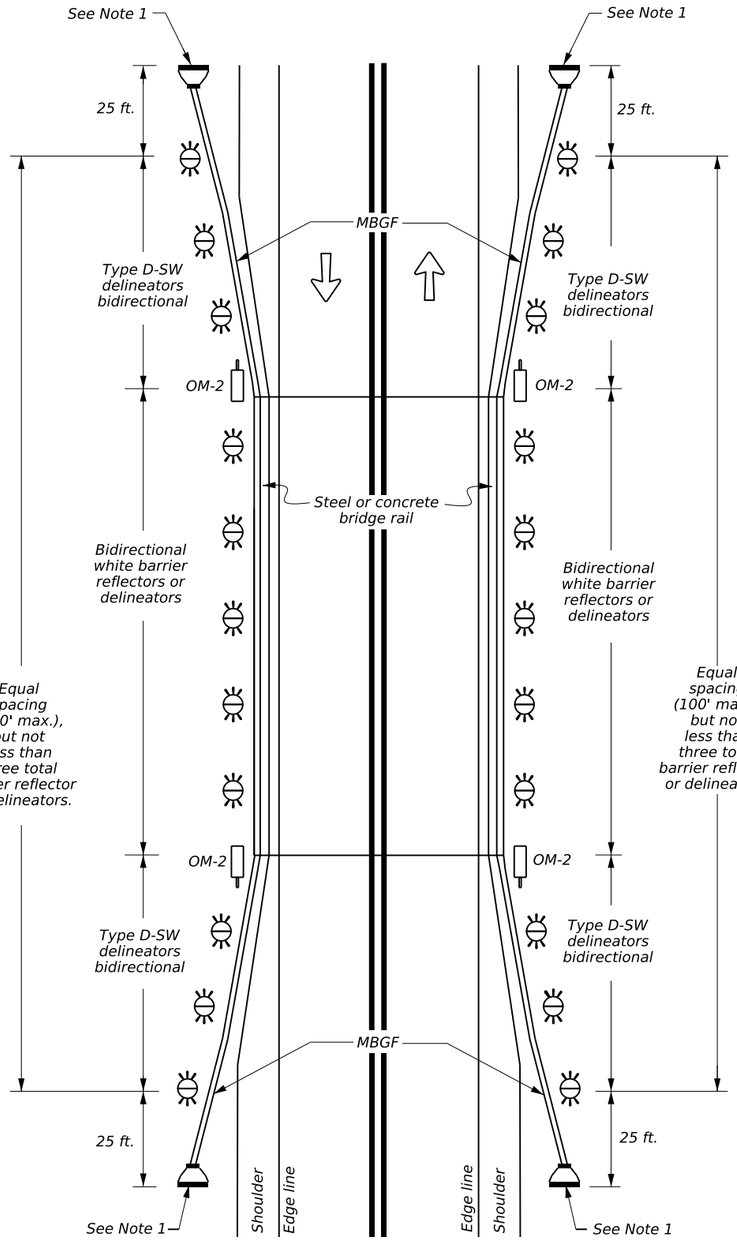
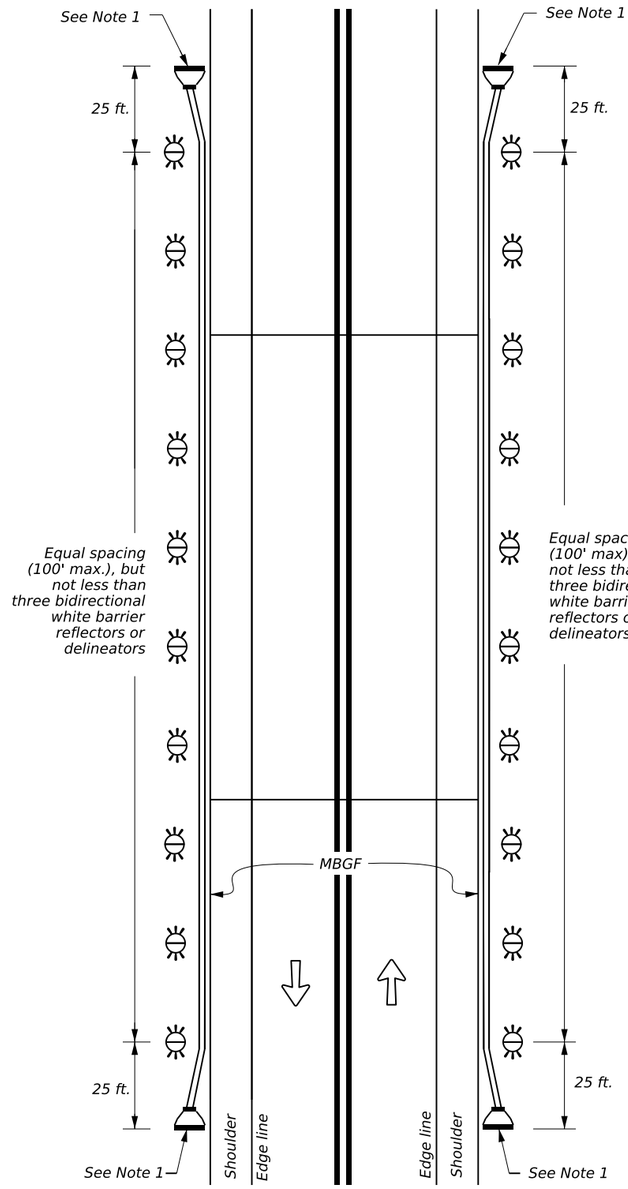
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



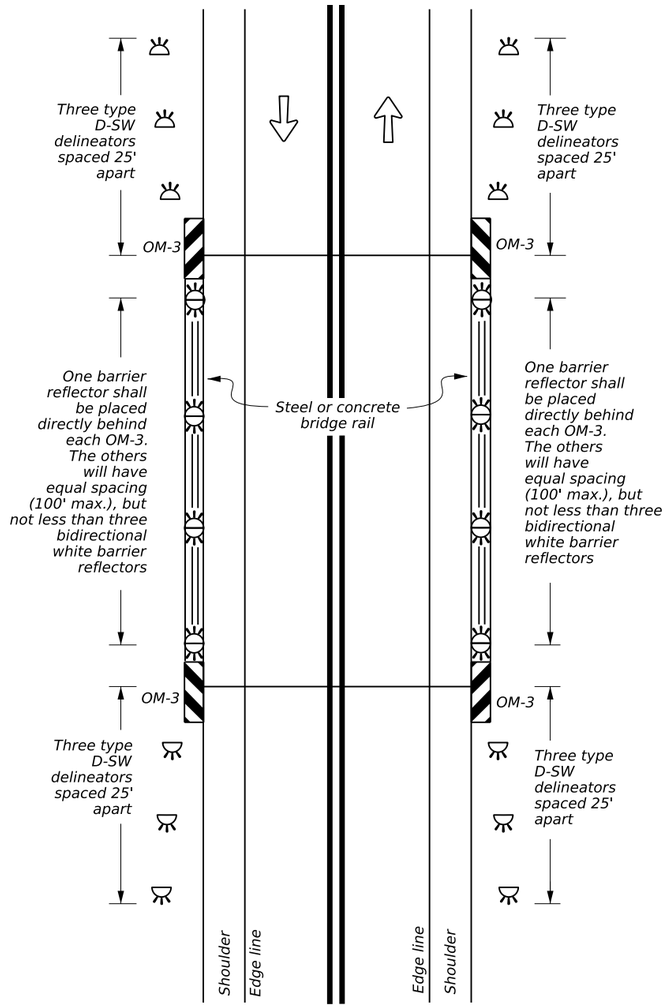
DETAIL 5a

TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



DETAIL 5b

TWO-WAY, TWO LANE ROADWAY BRIDGE WITH NO APPROACH RAIL



DETAIL 5c

NOTES

1. Terminal ends require reflective sheeting provided by manufacturer per D&OM(VIA) or a Type 3 object marker (OM-3) in front of the terminal end.
2. Bridge-class culverts may require OMs on or in advance of culvert headwalls. Refer to the TxDOT Roadway Design Manual and the TMUTCD.

GENERAL NOTE

Delineators (D) indicate roadway alignment. Object Markers (OM) identify obstructions. See D and OM definitions on D&OM(1) and D&OM(2), respectively.

LEGEND

	Delineator
	Bidirectional Delineator
	OM-2
	OM-3
	Terminal End
	Traffic Flow

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS (BRIDGE & BRIDGE-CLASS CULVERTS)

D & OM(5)-25

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REVISIONS			23103	DOUBLE CULVERT RD
8-15	DIST	COUNTY		SHEET NO.
7-20		WALLER		173
5-25				
20E				

DATE:
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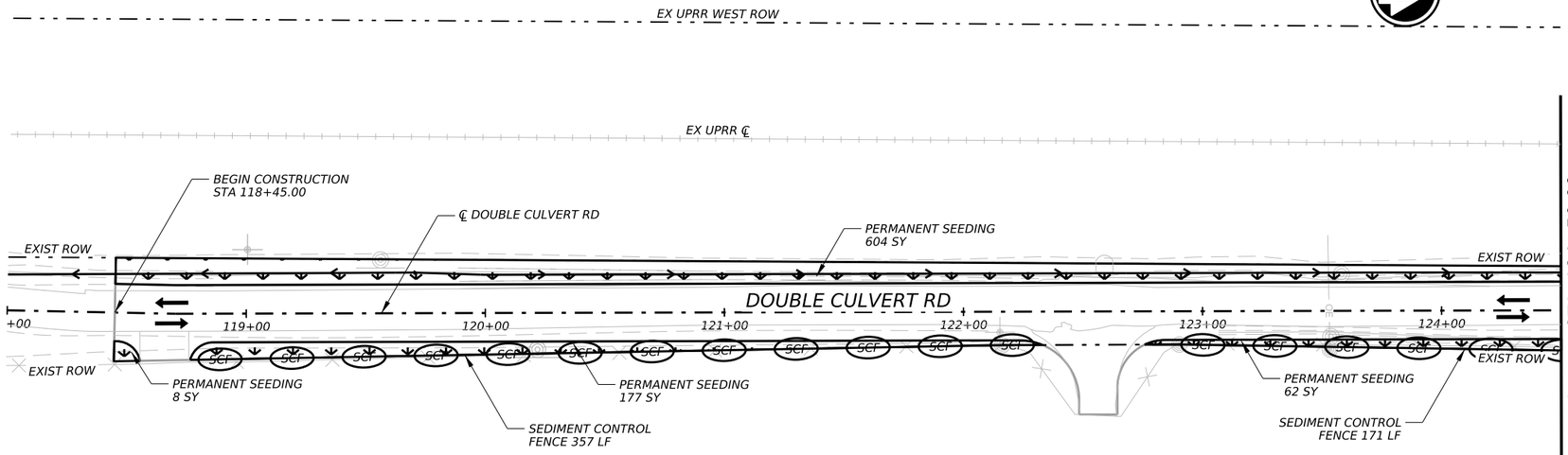

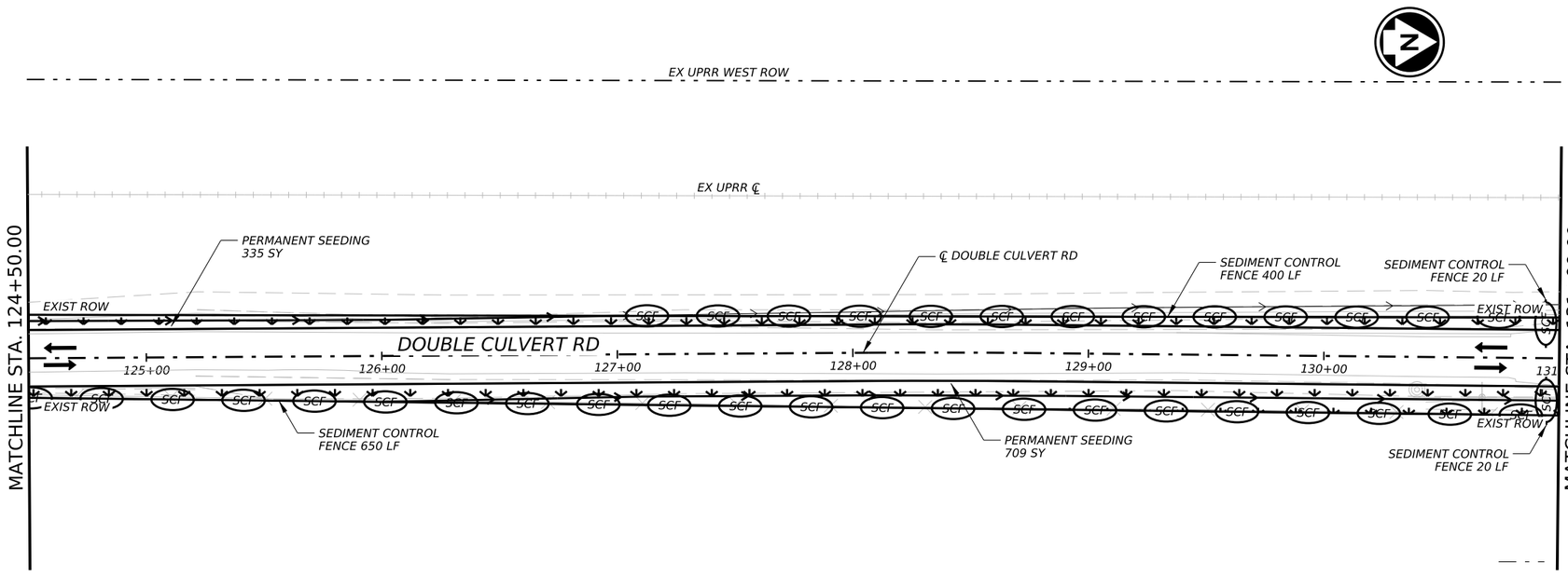

NOTES:

1. *EROSION CONTROL DEVICES AS SHOWN ON THE EROSION CONTROL PLAN FOR THE PROJECT SHALL BE INSTALLED PRIOR TO THE START OF LAND DISTURBING ACTIVITIES ON THE PROJECT.*
2. *ALL EROSION CONTROL DEVICES ARE TO BE INSTALLED DURING SITE PREP IN ACCORDANCE WITH THE APPROVED PLANS AND SPECIFICATIONS FOR THE PROJECT.*
3. *CONTRACTOR SHALL MINIMIZE THE REMOVAL OF GRASS COVER UNTIL ACTUAL WORK PHASE BEGINS.*
4. *IF THE EROSION CONTROL PLAN AS APPROVED CANNOT CONTROL EROSION AND OFF-SITE SEDIMENTATION FROM THE PROJECT, THE EROSION CONTROL PLAN WILL BE REQUIRED TO BE REVISED AND/OR ADDITIONAL EROSION CONTROL DEVICES WILL BE REQUIRED (NO SEPARATE PAY).*
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9. *PRIOR TO FINAL ACCEPTANCE AND/OR OPENING ROADWAY TO TRAFFIC, ALL DISTURBED AREAS SHALL BE STABILIZED.*
10. *SEE GENERAL NOTES SHEET FOR EROSION CONTROL REQUIREMENTS.*

0 30' 60'

SCALE: 1" = 60'

LEGEND

- EXISTING ROW
- PROPOSED DIRECTION OF TRAFFIC
- SEEDING WITH 4" TOPSOIL
- SCF — SEDIMENT CONTROL FENCE
- RFD1 — ROCK FILTER DAM TYPE 1
- EXISTING DITCH FLOWLINE
- PROPOSED DITCH FLOWLINE

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY M. DILL
84626
LICENSED PROFESSIONAL ENGINEER

R. M. Dill, P.E.
7/21/2026

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

EROSION CONTROL
DOUBLE CULVERT RD

BEGIN TO STA 131+50.00

SHEET 1 OF 6

CONT	SECT	JOB	HIGHWAY
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DIST	COUNTY		SHEET NO.
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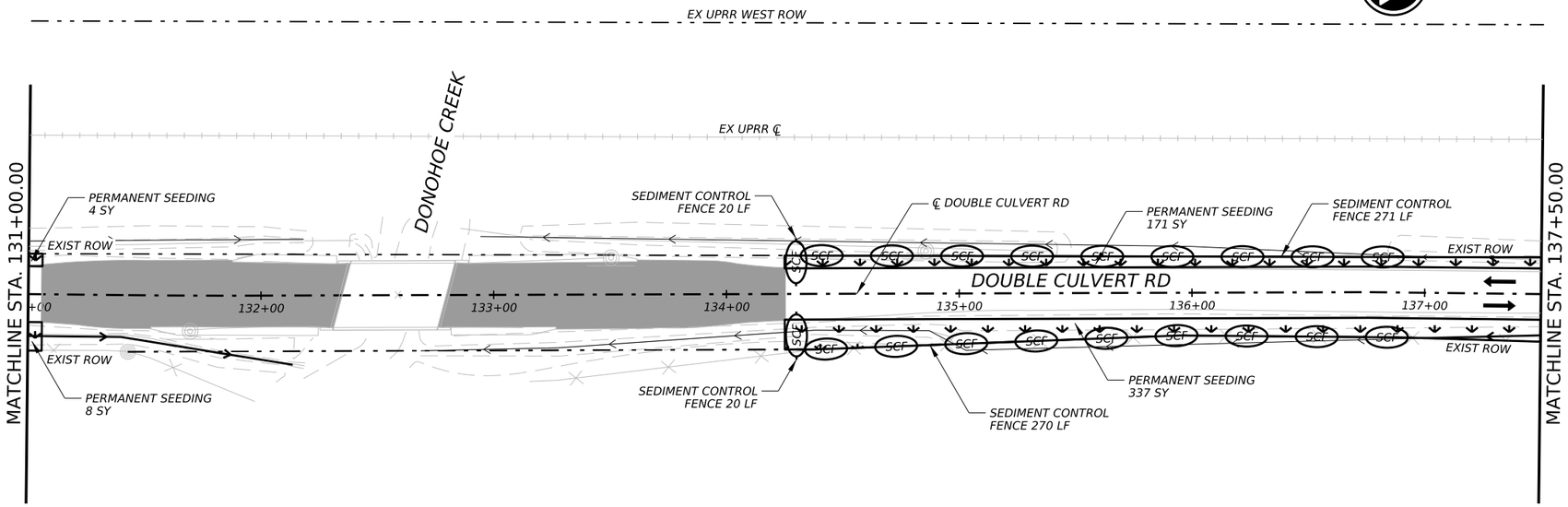

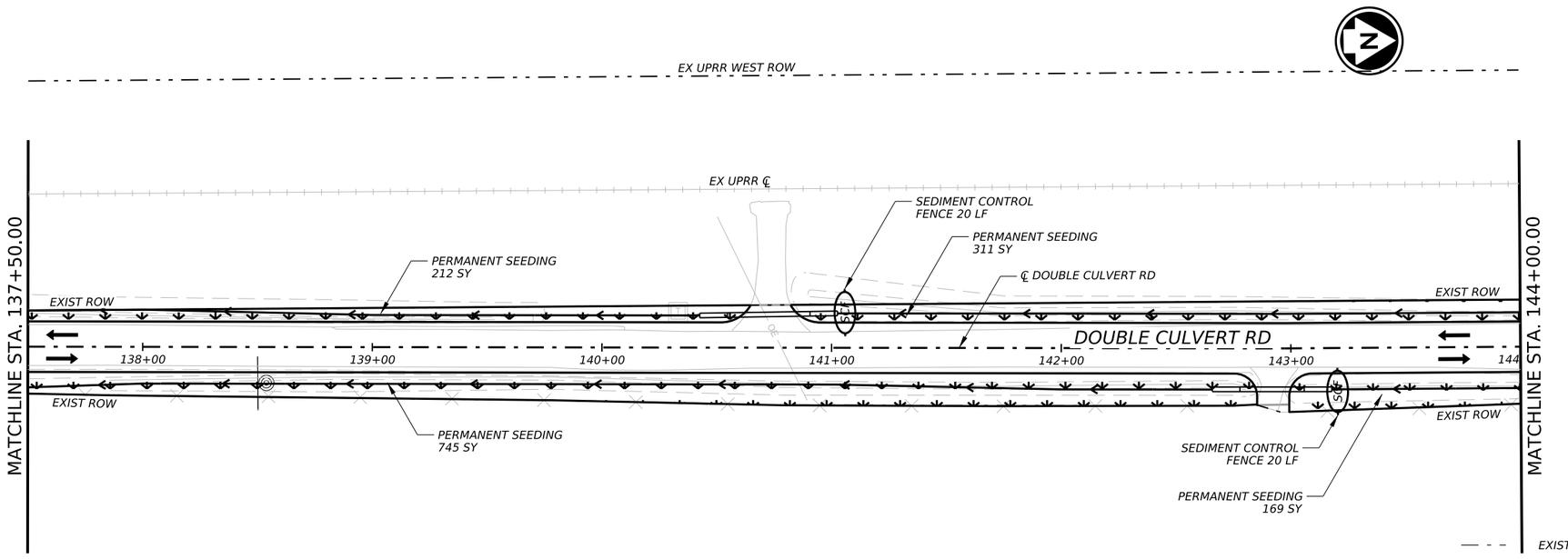

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10. SEE GENERAL NOTES SHEET FOR EROSION CONTROL REQUIREMENTS.

0 30' 60'
SCALE: 1" = 60'

LEGEND

- EXISTING ROW
- PROPOSED DIRECTION OF TRAFFIC
- SEEDING WITH 4" TOPSOIL
- SCF — SEDIMENT CONTROL FENCE
- RFD1 — ROCK FILTER DAM TYPE 1
- EXISTING DITCH FLOWLINE
- PROPOSED DITCH FLOWLINE

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WALLER COUNTY
ENGINEERING DEPARTMENT

EROSION CONTROL
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	WALLER		175

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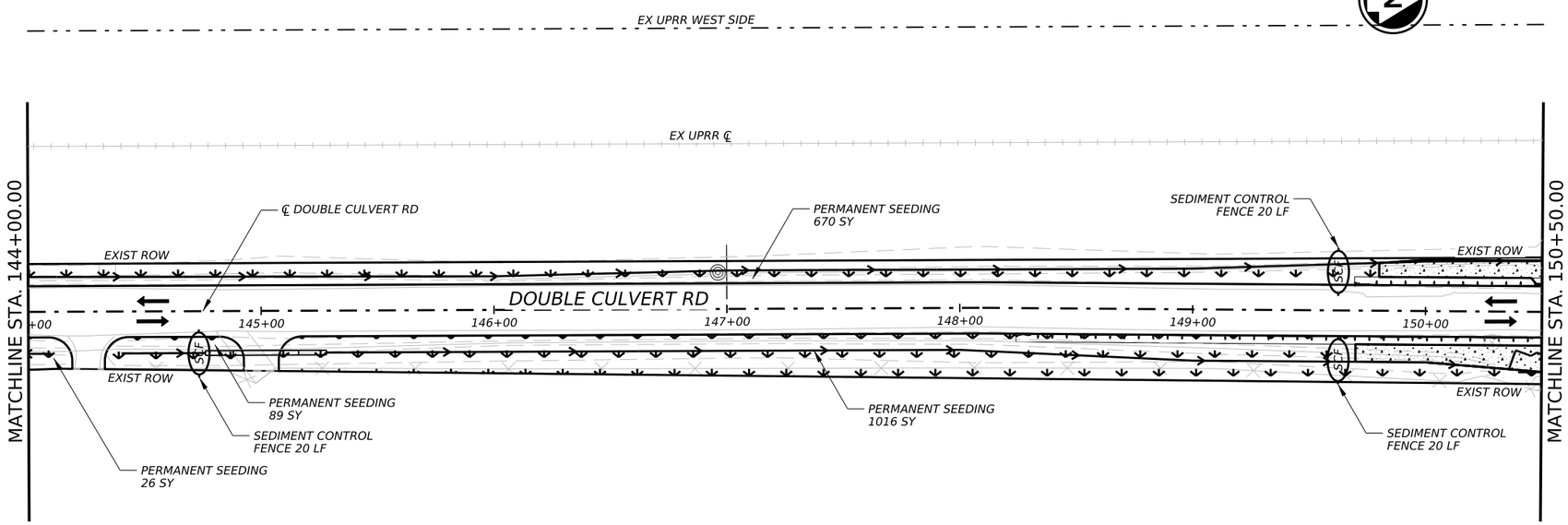

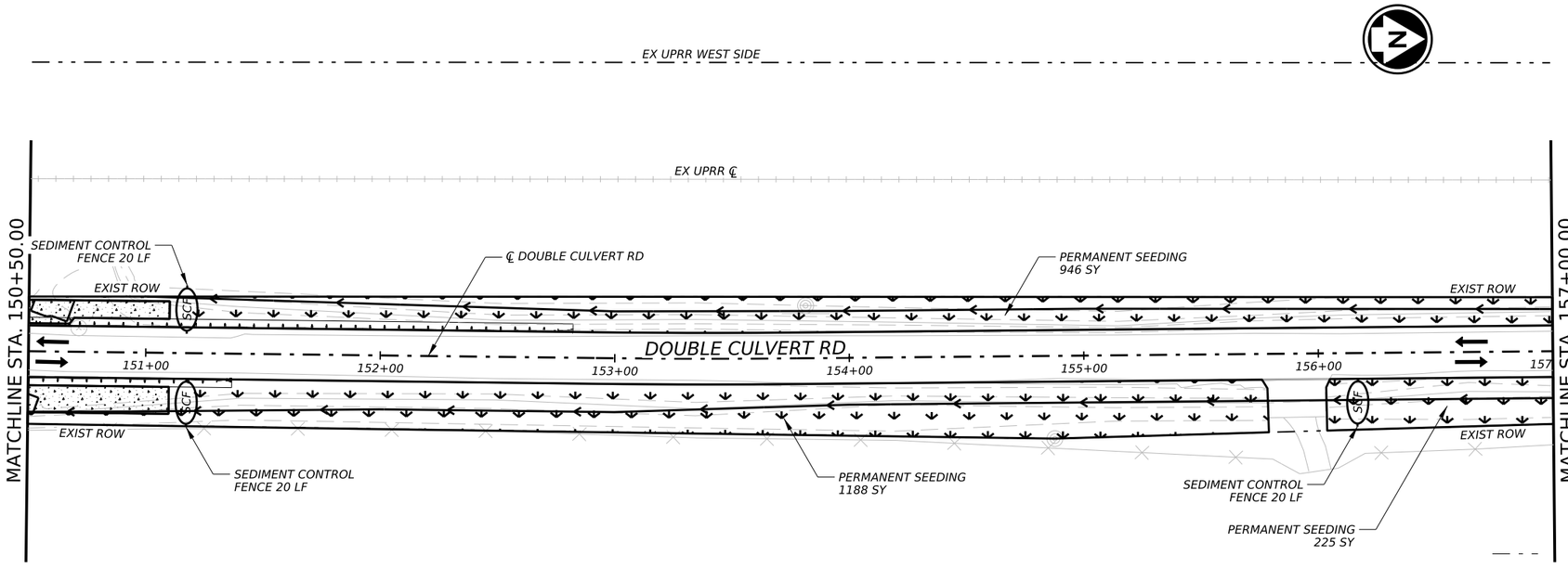

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SCALE: 1" = 60'

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- RFD1 — ROCK FILTER DAM TYPE 1
- EXISTING DITCH FLOWLINE
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ENGINEERING DEPARTMENT

EROSION CONTROL
DOUBLE CULVERT RD

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	WALLER		176

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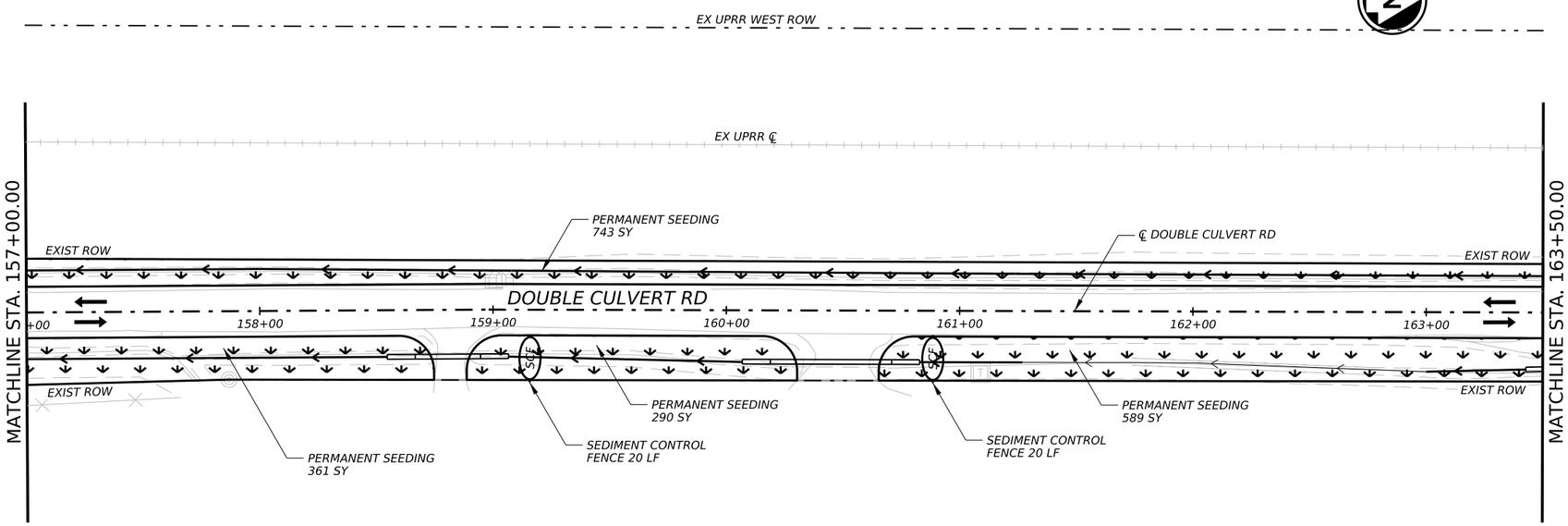

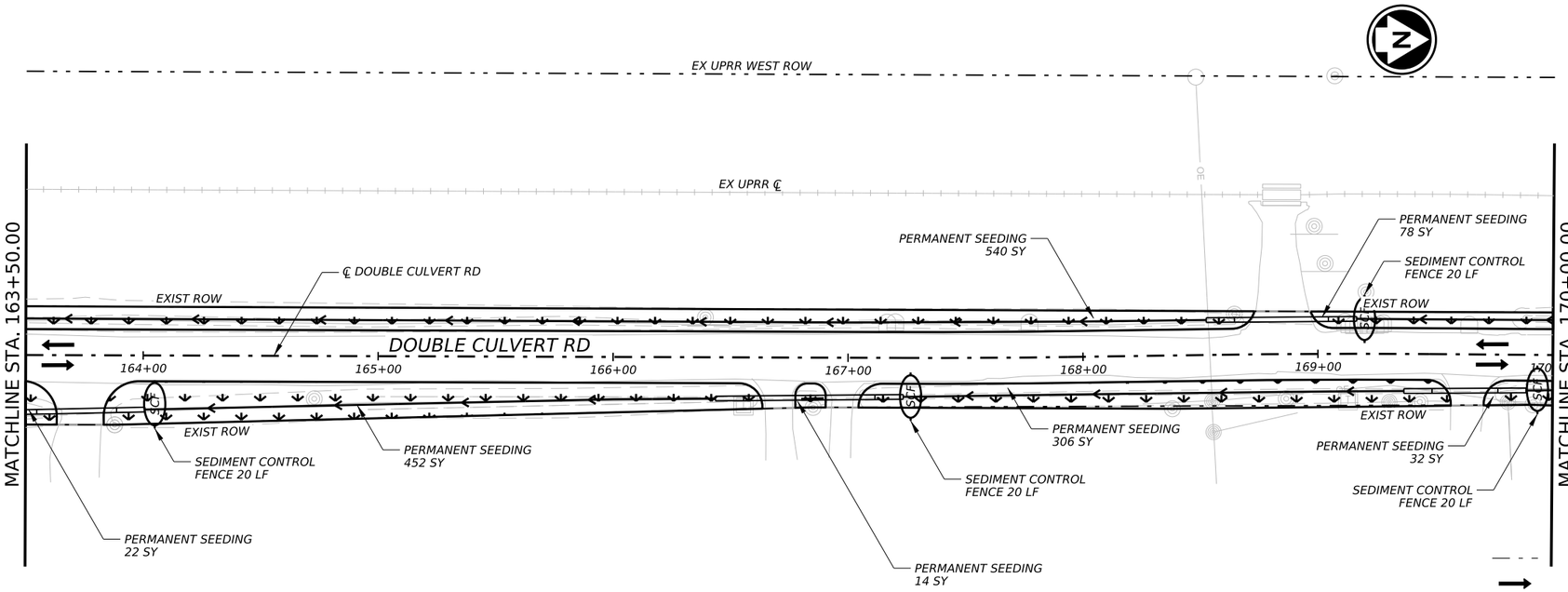

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9. PRIOR TO FINAL ACCEPTANCE AND/OR OPENING ROADWAY TO TRAFFIC, ALL DISTURBED AREAS SHALL BE STABILIZED.
10. SEE GENERAL NOTES SHEET FOR EROSION CONTROL REQUIREMENTS.

0 30' 60'
SCALE: 1" = 60'

LEGEND

- EXISTING ROW
- PROPOSED DIRECTION OF TRAFFIC
- SEEDING WITH 4" TOPSOIL
- SCF — SEDIMENT CONTROL FENCE
- RFD1 — ROCK FILTER DAM TYPE 1
- EXISTING DITCH FLOWLINE
- PROPOSED DITCH FLOWLINE

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY M. DILL
84626
LICENSED PROFESSIONAL ENGINEER

R. M. Dill, P.E.
7/21/2026

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

EROSION CONTROL
DOUBLE CULVERT RD

STA 157+50.00 TO STA 170+00.00
SHEET 4 OF 6

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		177

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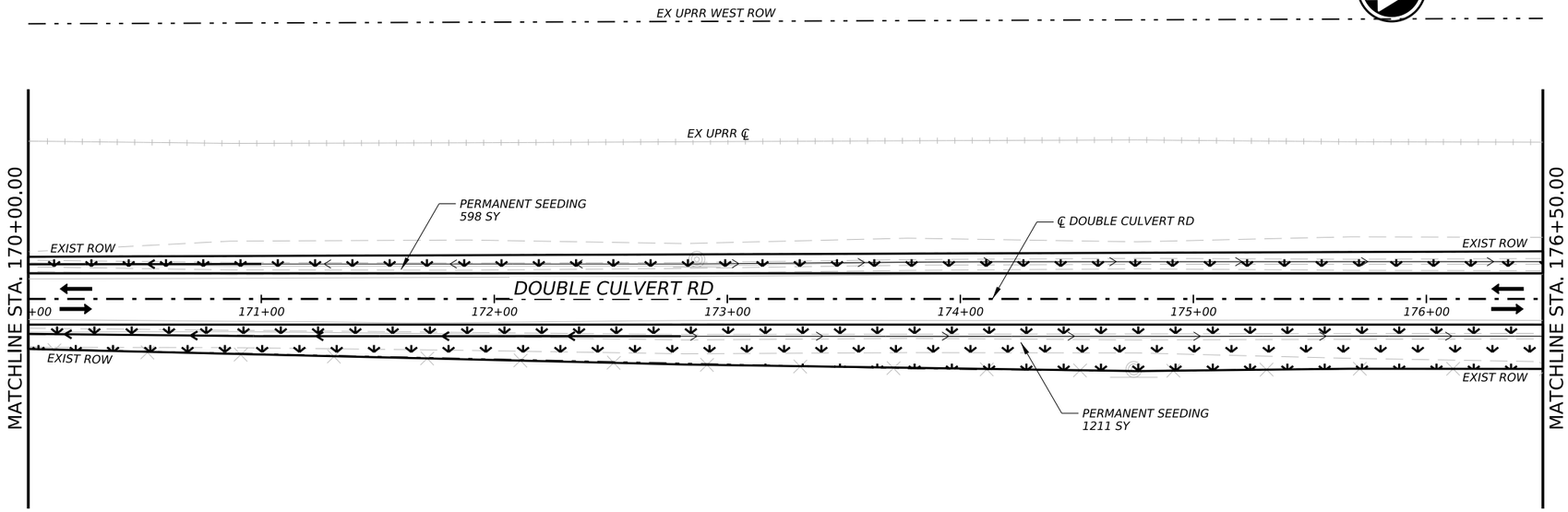

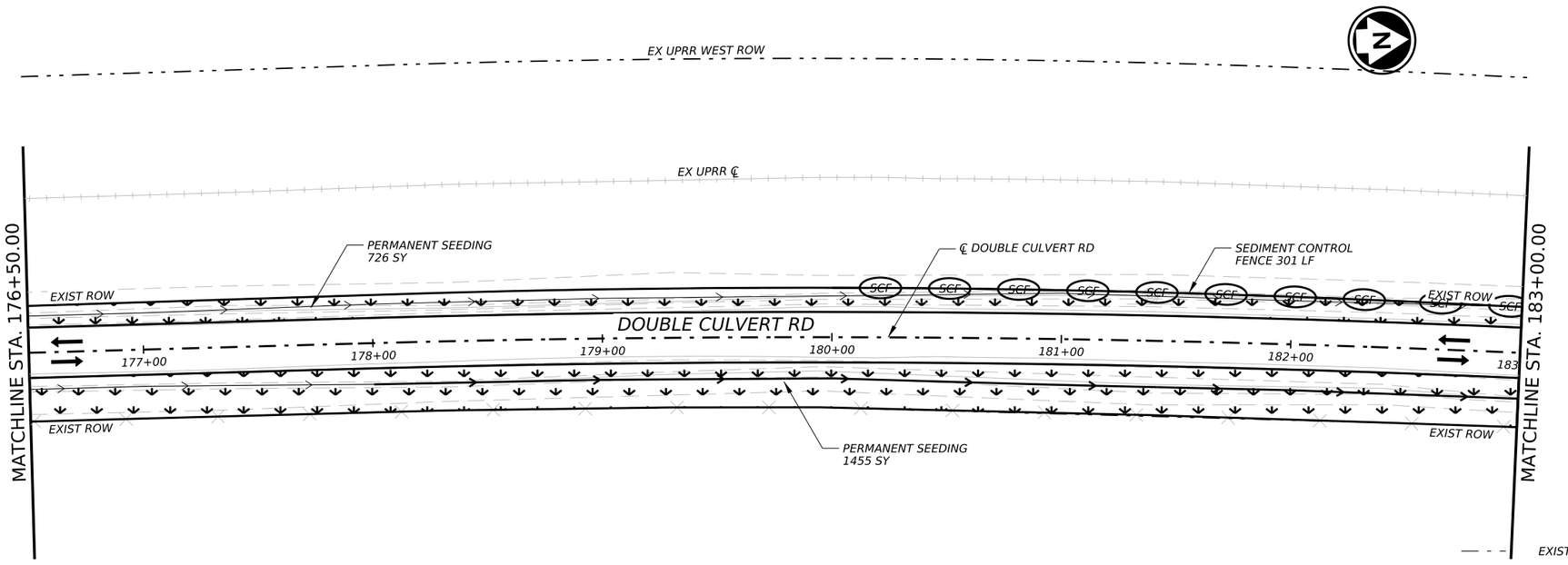

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0 30' 60'
SCALE: 1" = 60'

LEGEND

- EXISTING ROW
- PROPOSED DIRECTION OF TRAFFIC
- SEEDING WITH 4" TOPSOIL
- SCF — SEDIMENT CONTROL FENCE
- RFD1 — ROCK FILTER DAM TYPE 1
- EXISTING DITCH FLOWLINE
- PROPOSED DITCH FLOWLINE

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY M. DILL
84626
LICENSED PROFESSIONAL ENGINEER

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7/21/2026

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TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

EROSION CONTROL
DOUBLE CULVERT RD

STA 170+00.00 TO STA 183+50.00
SHEET 5 OF 6

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		178

DATE: 7/21/2026 3:34:03 PM
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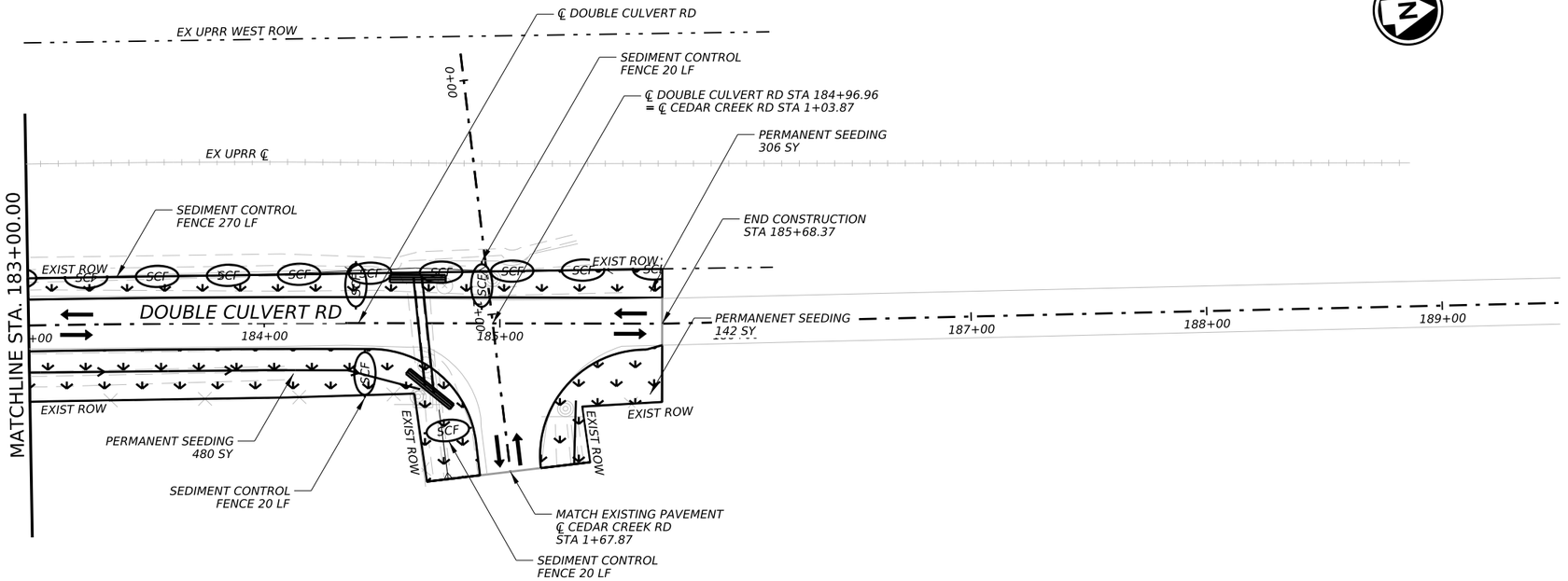

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0 30' 60'
SCALE: 1" = 60'

LEGEND

- EXISTING ROW
- PROPOSED DIRECTION OF TRAFFIC
- SEEDING WITH 4" TOPSOIL
- SCF — SEDIMENT CONTROL FENCE
- RFD1 — ROCK FILTER DAM TYPE 1
- EXISTING DITCH FLOWLINE
- PROPOSED DITCH FLOWLINE

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

EROSION CONTROL DOUBLE CULVERT RD

STA 183+50.00 TO END

SHEET 6 OF 6

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		179

DATE: 7/21/2026 3:28:03 PM
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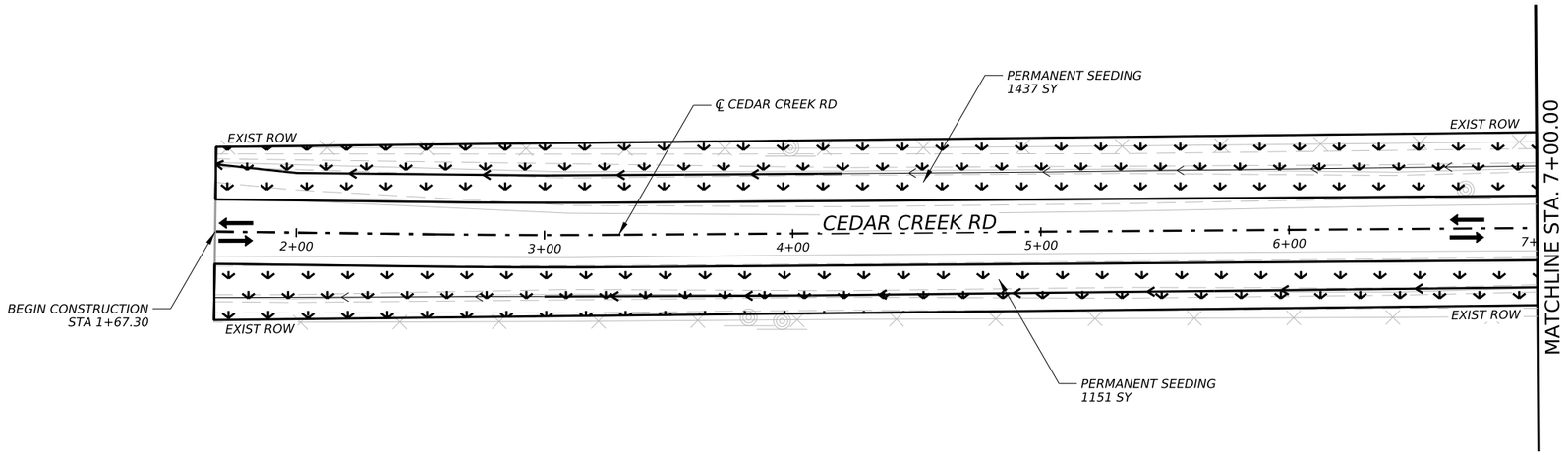

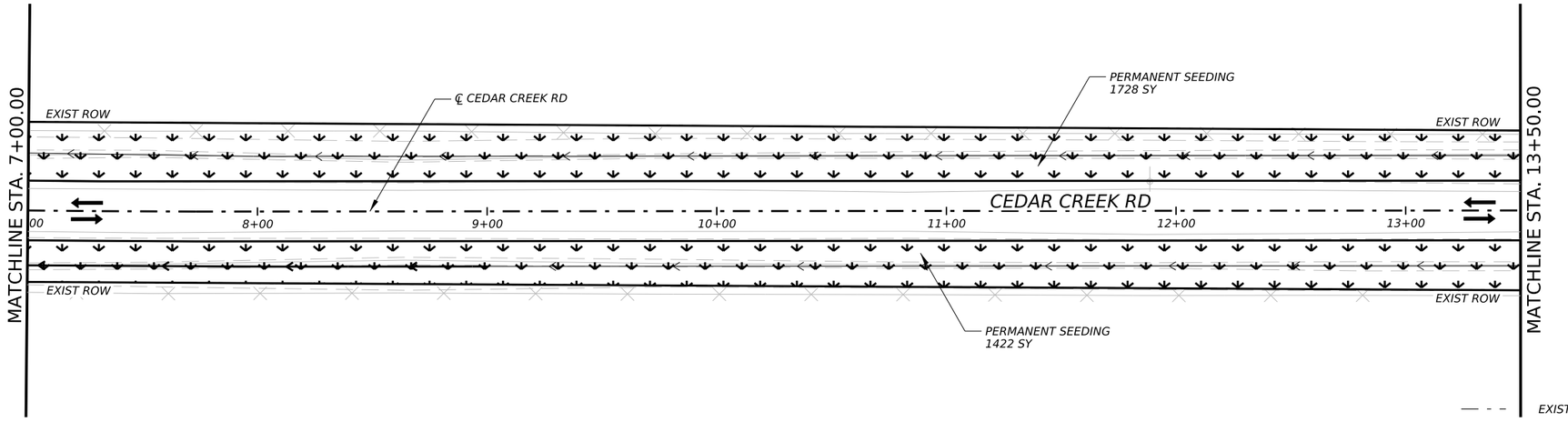

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0 30' 60'
SCALE: 1" = 60'

LEGEND

- *EXISTING ROW*
- *PROPOSED DIRECTION OF TRAFFIC*
- *SEEDING WITH 4" TOPSOIL*
- *SCF — SEDIMENT CONTROL FENCE*
- *RFD1 — ROCK FILTER DAM TYPE 1*
- *EXISTING DITCH FLOWLINE*
- *PROPOSED DITCH FLOWLINE*

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY M. DILL
84626
LICENSED PROFESSIONAL ENGINEER

R. M. Dill, P.E.
7/21/2026

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TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

EROSION CONTROL
CEDAR CREEK RD

BEGIN TO STA 13+50.00
SHEET 1 OF 4

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		180

DATE: 7/21/2026 3:27:52 PM
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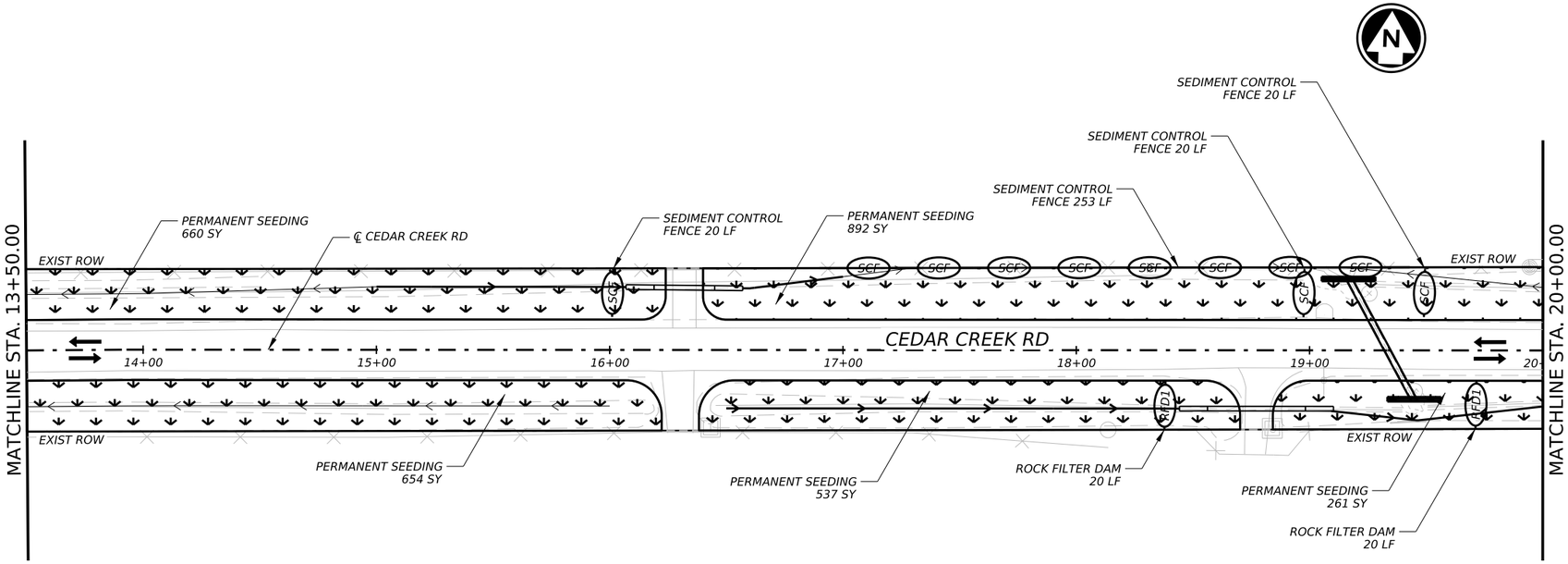

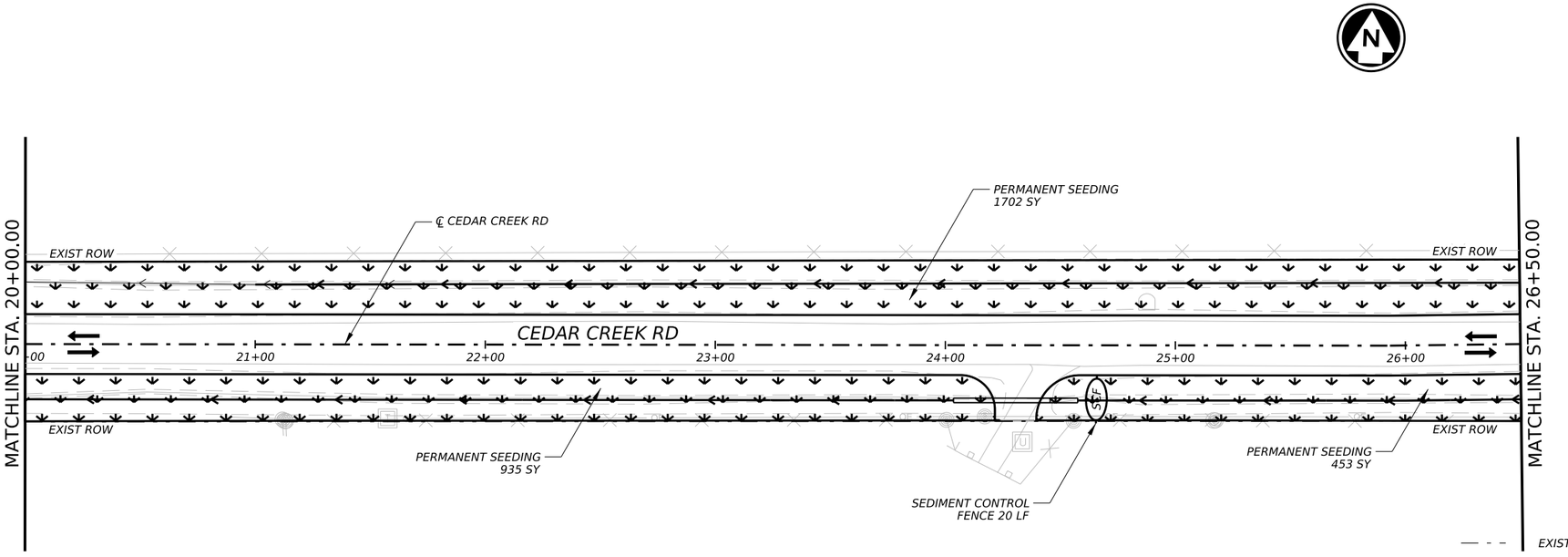

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0 30' 60'
SCALE: 1" = 60'

LEGEND

- EXISTING ROW
- PROPOSED DIRECTION OF TRAFFIC
- SEEDING WITH 4" TOPSOIL
- SCF — SEDIMENT CONTROL FENCE
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NO.	DATE	REVISION	APPROV.

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FIRM REGISTRATION NUMBER: 17252

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THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

EROSION CONTROL
CEDAR CREEK RD

STA 13+50.00 TO STA 26+00.00
SHEET 2 OF 4

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		181

DATE: 7/21/2026 3:34:17 PM
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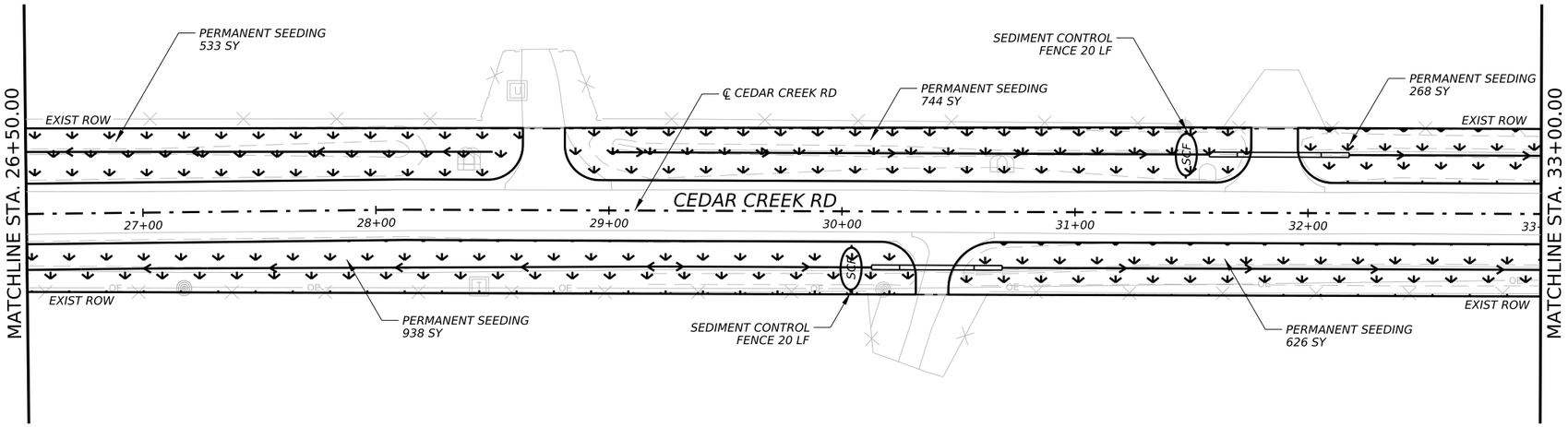

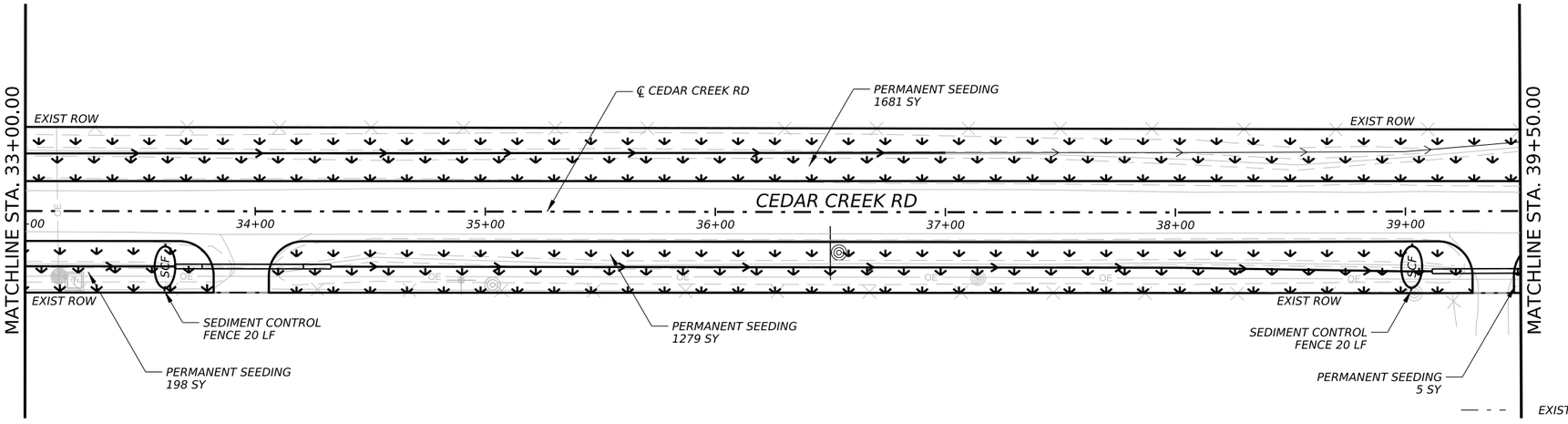

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SCALE: 1" = 60'

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- SCF — SEDIMENT CONTROL FENCE
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WALLER COUNTY
ENGINEERING DEPARTMENT

EROSION CONTROL
CEDAR CREEK RD

STA 26+00.00 TO STA 39+50.00

SHEET 3 OF 4

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		182

DATE: 7/21/2026 3:34:18 PM
FILE: \\civcorpw11ics01\ICS pdf work dir\12009\149521 9IC DCR 4ESW103.dgn

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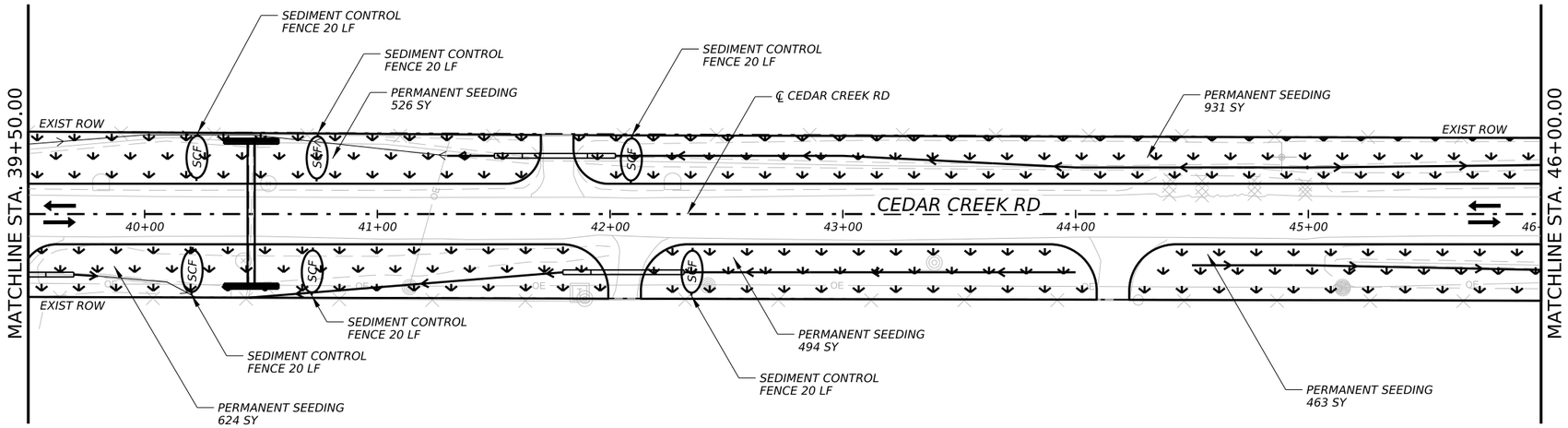

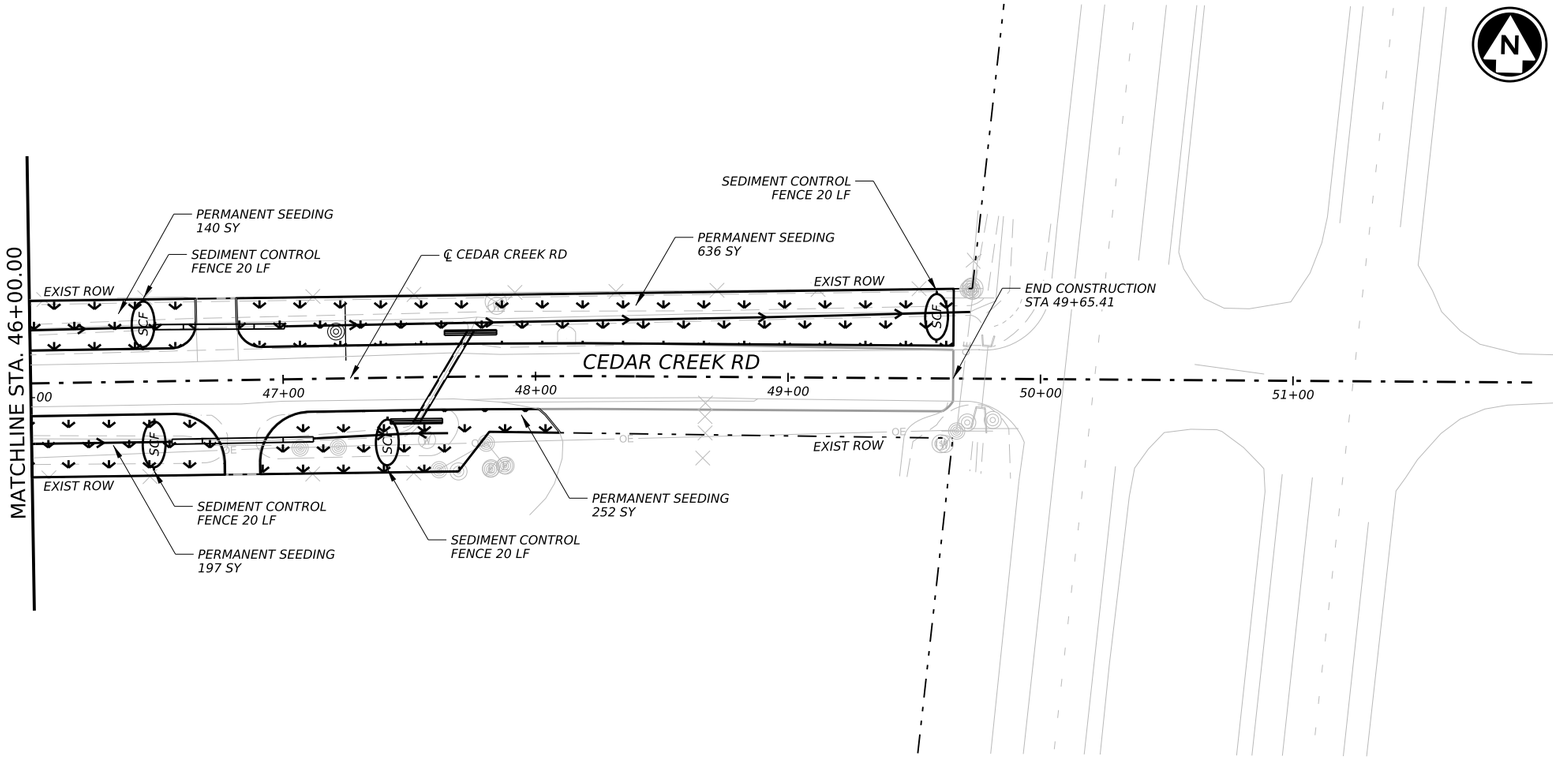

NOTES:

1. EROSION CONTROL DEVICES AS SHOWN ON THE EROSION CONTROL PLAN FOR THE PROJECT SHALL BE INSTALLED PRIOR TO THE START OF LAND DISTURBING ACTIVITIES ON THE PROJECT.
2. ALL EROSION CONTROL DEVICES ARE TO BE INSTALLED DURING SITE PREP IN ACCORDANCE WITH THE APPROVED PLANS AND SPECIFICATIONS FOR THE PROJECT.
3. CONTRACTOR SHALL MINIMIZE THE REMOVAL OF GRASS COVER UNTIL ACTUAL WORK PHASE BEGINS.
4. IF THE EROSION CONTROL PLAN AS APPROVED CANNOT CONTROL EROSION AND OFF-SITE SEDIMENTATION FROM THE PROJECT, THE EROSION CONTROL PLAN WILL BE REQUIRED TO BE REVISED AND/OR ADDITIONAL EROSION CONTROL DEVICES WILL BE REQUIRED (NO SEPARATE PAY).
5. OFF SITE SOIL BORROW AND SPOIL AREAS ARE CONSIDERED AS PART OF THE PROJECT SITE AND MUST ALSO COMPLY WITH THE EROSION CONTROL REQUIREMENTS FOR THIS PROJECT. THIS INCLUDES THE INSTALLATION OF BMP'S TO CONTROL OFFSITE SEDIMENTATION AND THE ESTABLISHMENT OF PERMANENT GROUND COVER ON DISTURBED AREAS PRIOR TO FINAL APPROVAL OF THE PROJECT.
6. INSPECTIONS SHALL BE MADE WEEKLY AND AFTER RAIN STORM EVENTS TO INSURE THAT THE DEVICES ARE FUNCTIONING PROPERLY.
7. CONTRACTOR SHALL BE RESPONSIBLE FOR IDENTIFYING APPROPRIATE CONSTRUCTION ENTRANCE. WHEN SEDIMENT OR MUD HAS CLOGGED THE VOID SPACES BETWEEN STONES OR MUD IS BEING TRACKED ONTO A PUBLIC ROADWAY, THE STABILIZED CONSTRUCTION ENTRANCE AGGREGATE PAD MUST BE WASHED DOWN OR REPLACED. RUNOFF FROM THE WASHDOWN OPERATIONAL SHALL NOT BE ALLOWED TO DRAIN DIRECTLY OFF SITE SEDIMENTATION. PERIODIC RE-GRADING OR THE ADDITION OF NEW STONE MAY BE REQUIRED TO MAINTAIN THE EFFICIENCY OF THE INSTALLATION.
8. CONTRACTOR SHALL BE RESPOSIBLE FOR SUBMITTAL OF N.O.I., N.O.T. AND ANY ADDITIONAL INFORMATION REQUIRED BY THE E.P.A. CONTRACTOR SHALL COMPLY WITH ALL E.P.A. STORMWATER POLLUTION PREVENTION REQUIREMENTS.
9. PRIOR TO FINAL ACCEPTANCE AND/OR OPENING ROADWAY TO TRAFFIC, ALL DISTURBED AREAS SHALL BE STABILIZED.
10. SEE GENERAL NOTES SHEET FOR EROSION CONTROL REQUIREMENTS.

0 30' 60'
SCALE: 1" = 60'

LEGEND

- EXISTING ROW
- PROPOSED DIRECTION OF TRAFFIC
- SEEDING WITH 4" TOPSOIL
- SCF — SEDIMENT CONTROL FENCE
- RFD1 — ROCK FILTER DAM TYPE 1
- EXISTING DITCH FLOWLINE
- PROPOSED DITCH FLOWLINE

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY M. DILL
84626
LICENSED PROFESSIONAL ENGINEER

R. M. Dill, P.E.
7/21/2026

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

EROSION CONTROL
CEDAR CREEK RD

STA 39+50.00 TO END

SHEET 4 OF 4

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		183

DATE: 7/21/2026 3:27:27 PM
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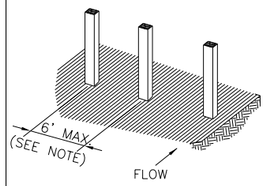
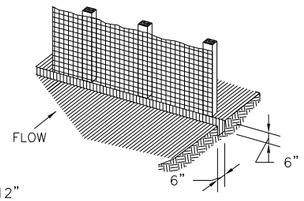
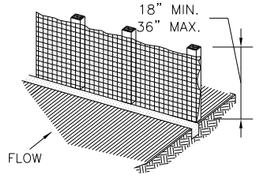
1. SET POSTS AT REQUIRED SPACING

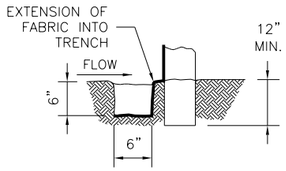


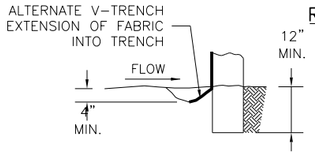
2. EXCAVATE A 6"x6" TRENCH UPSLOPE ALONG THE LINE OF POSTS AND SECURE WIRE FENCE TO POSTS.



3. ATTACH FILTER FABRIC TO POSTS AND EXTEND IT INTO THE TRENCH. BACKFILL AND COMPACT THE EXCAVATED SOIL.





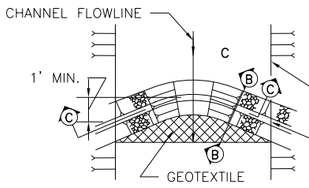


REINFORCED FILTER FABRIC BARRIER

RFB
SYMBOL

GENERAL NOTES:

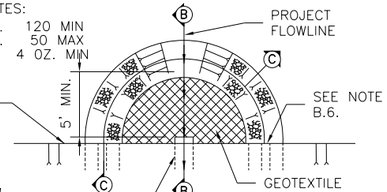
1. SECURELY FASTEN MESH FENCING TO POSTS WITH STAPLES OR TIE WIRES.
2. SECURELY FASTEN FILTER FABRIC TO MESH FENCING.
3. WHEN TWO SECTIONS OF FILTER FABRIC ADJOIN EACH OTHER, OVERLAP 6 INCHES AT A POST, FOLD TOGETHER, AND ATTACH TO A POST.
4. REMOVE SEDIMENT DEPOSITS WHEN SILT REACHES ONE-THIRD OF THE HEIGHT OF THE FENCE IN DEPTH.
5. SILT FENCE MINIMUM 2' BEHIND CURB.



IN-CHANNEL FILTER DAM
PLAN

GEOTEXTILE NOTES:

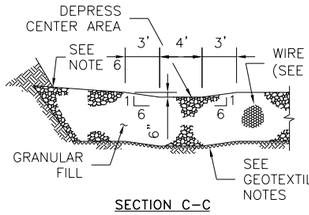
MIN. AOS	SIEVE NO.	120 MIN
MAX. AOS	SIEVE NO.	50 MAX
WEIGHT	OZ/SY	4 OZ. MIN



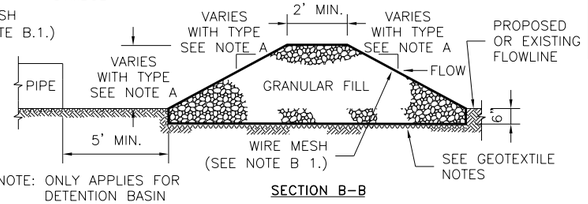
FILTER DAM

RFD-TYPE
SYMBOL

FILTER DAM AT DETENTION BASIN OUTFALL PIPE
PLAN



SECTION C-C



NOTE: ONLY APPLIES FOR DETENTION BASIN OUTFALL PIPE PROTECTION.

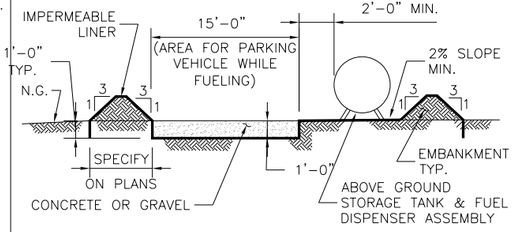
SECTION B-B

A. TYPES OF FILTER DAMS

1. TYPE 1 (NON-REINFORCED)
   a. HEIGHT - 18-24 INCHES. MEASURE VERTICALLY FROM EXISTING GROUND TO TOP OF FILTER DAM.
   b. TOP WIDTH - 2 FEET (MINIMUM)
   c. SLOPES - 2:1 (MAXIMUM).
2. TYPE 2 (REINFORCED).
   a. HEIGHT - 18-36 INCHES. MEASURE VERTICALLY FROM EXISTING GROUND TO TOP OF FILTER DAM.
   b. TOP WIDTH - 2 FEET (MINIMUM).
   c. SLOPES - 2:1 (MAXIMUM).
3. TYPE 3 (REINFORCED)
   a. HEIGHT - 36-48 INCHES. MEASURE VERTICALLY FROM EXISTING GROUND TO TOP OF FILTER DAM.
   b. TOP WIDTH - 2 FEET (MINIMUM).
   c. SLOPES - 3:1 (MAXIMUM).
4. TYPE 4 (GABION)
   a. HEIGHT - 30 INCHES (MINIMUM). MEASURE VERTICALLY FROM EXISTING GROUND TO TOP OF FILTER DAM.
   b. TOP WIDTH - 2 FEET (MINIMUM).
5. TYPE 5. AS SHOWN ON THE PLANS.

B. CONSTRUCT FILTER DAMS ACCORDING TO THE FOLLOWING CRITERIA UNLESS SHOWN OTHERWISE ON THE PLANS.

1. TYPE 2 AND 3 FILTER DAMS: SECURE WITH 20 GAUGE GALVANIZED WOVEN WIRE MESH WITH 1 INCH DIAMETER HEXAGONAL OPENINGS.
2. PLACE GRANULAR FILL ON THE WIRE MESH TO HEIGHT AND SLOPES SHOWN ON PLANS OR AS SPECIFIED BY THE ENGINEER.
   a. 3-5 INCHES FOR ROCK FILTER DAM TYPES 1, 2 AND 4.
   b. 4-8 INCHES FOR ROCK FILTER DAM TYPE REFER TO GRANULAR FILL IN SPECIFICATION SECTION No. 02378 RIPRAP AND GRANULAR FILL.
3. FOLD WIRE MESH AT UPSTREAM SIDE OVER GRANULAR FILL AND TIGHTLY SECURED TO ITSELF ON THE DOWNSTREAM SIDE USING WIRE TIES OR HOG RINGS.
4. IN STREAMS: SECURE OR STAKE MESH TO STREAM BED PRIOR TO AGGREGATE PLACEMENT.
5. SEE HCFCD SPECIFICATION SECTION NO. 02364-FILTER DAMS.
6. EMBED ONE FOOT MINIMUM INTO SLOPE AND RAISE ONE FOOT HIGHER THAN CENTER OF DEPRESSED AREA AT SLOPE.

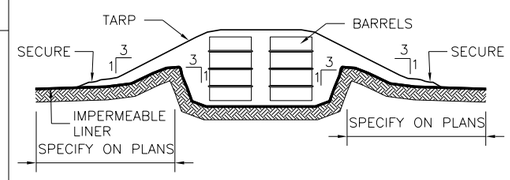


ABOVE GROUND TEMP. VEHICLE & EQUIPMENT FUELING AREA WITH TANK

TFA
SYMBOL

GENERAL NOTES:

1. THE SIZE OF TANK FOUNDATION AREA DEPENDS ON THE SIZE OF ABOVE GROUND STORAGE TANK AND DISPENSER ASSEMBLY.
2. PROVIDE A MINIMUM SLOPE OF 2 % TOWARD THE SUMP PIT.
3. INSTALL IMPERMEABLE LINER AS PER MANUFACTURER'S RECOMMENDATIONS.

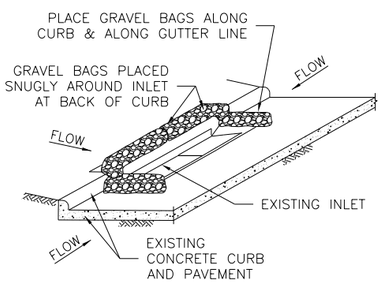


BARREL STORAGE AREA

BSA
SYMBOL

GENERAL NOTES:

1. ALTERNATIVELY, STORE BARRELS IN AN ENCLOSED BUILDING OR SHED.
2. INSTALL IMPERMEABLE LINER AS PER MANUFACTURER'S RECOMMENDATIONS. 60 mil MINIMUM.
3. CONSTRUCT BERMED AREA WITH VOLUME GREATER THAN OR EQUAL TO 110% VOLUME OF BARRELS.

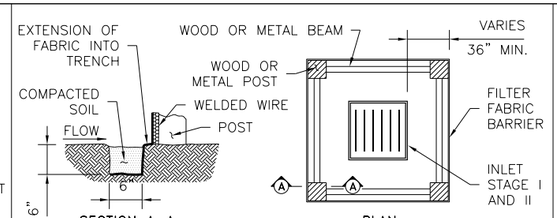


INLET PROTECTION BARRIERS FOR STAGE II INLETS

IPB-II
SYMBOL

GENERAL NOTES:

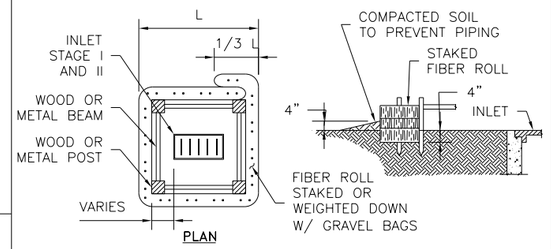
1. REMOVE SEDIMENT DEPOSIT WHEN THE SEDIMENT HAS ACCUMULATED TO ONE-THIRD THE HEIGHT OF THE BARRIER.
2. GRAVEL BAGS SHALL NOT BLOCK THROAT OF INLET UNLESS DIRECTED BY ENGINEER.



SECTION A-A

PLAN

INLET PROTECTION BARRIER WITH REINFORCED FILTER FABRIC



PLAN

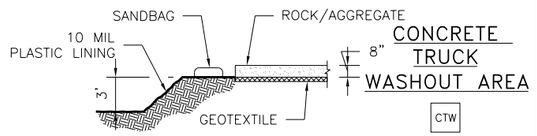
INLET PROTECTION BARRIER WITH FILTER ROLLS

GENERAL NOTES:

1. FIBER ROLLS WILL BE UTILIZED ONLY WHEN SITE CONDITIONS DO NOT PERMIT THE USE OF FILTER FABRIC BARRIER, AND AS APPROVED BY THE ENGINEER.

INLET PROTECTION BARRIERS FOR STAGE I INLETS

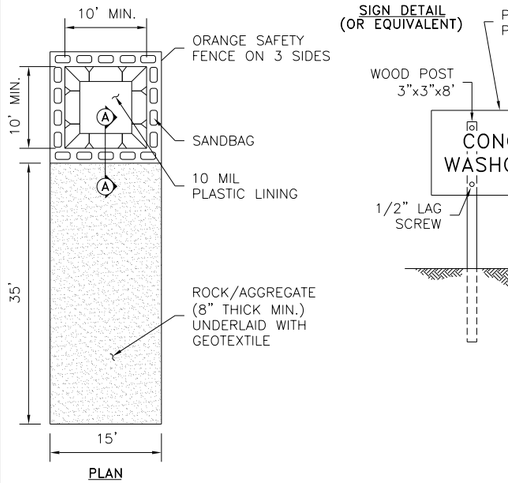
IPB
SYMBOL



SECTION A-A

CONCRETE TRUCK WASHOUT AREA

CTW
SYMBOL

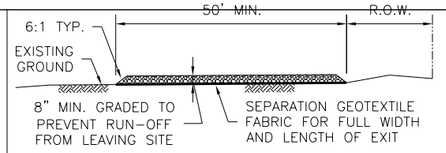


PLAN

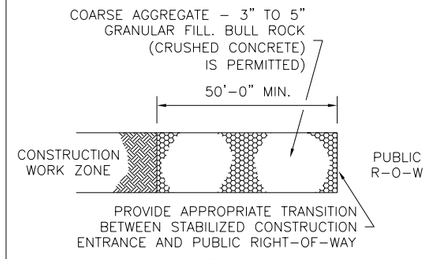
SIGN DETAIL (OR EQUIVALENT)

GENERAL NOTES:

1. POST A SIGN READING "CONCRETE WASHOUT PIT" NEXT TO THE PIT.
2. VERBALLY INSTRUCT THE CONCRETE TRUCK DRIVERS WHERE THE PIT IS AND TO WASHOUT THEIR TRUCKS IN THE PIT AND NOWHERE ELSE.
3. UPON THE CONCRETE SETTING UP (CURING, DRYING OUT), THE CONCRETE WASTE SHALL BE REMOVED FROM THE PROJECT SITE AND DISPOSED OF PROPERLY BY THE CONTRACTOR. AFTER REMOVAL OF THE CONCRETE WASTE, THE WASHOUT PIT SHALL BE FILLED WITH CLEAN FILL MATERIAL AND COMPACTED TO IN-SITU CONDITIONS, OR AS DIRECTED BY THE PROJECT SPECIFICATIONS.
4. CONCRETE WASHOUT PITS SHALL NOT BE LOCATED DIRECTLY ADJACENT TO, NOR AT ANY TIME DRAIN INTO THE STORM SEWER SYSTEM OR ANY OTHER SWALE, DITCH, OR WATERWAY.
5. CONSTRUCT ENTRY ROAD AND BOTTOM OF WASHOUT AREA TO SUPPORT EXPECTED LOADINGS FROM TRUCKS EQUIPMENT.



PROFILE



PLAN

STABILIZED CONSTRUCTION ACCESS

SC-1
SYMBOL

GENERAL NOTES:

1. MINIMUM LENGTH IS AS SHOWN ON CONSTRUCTION DRAWINGS OR 50 FEET, WHICHEVER IS MORE.
2. CONSTRUCT AND MAINTAIN CONSTRUCTION EXIT WITH CONSTANT WIDTH ACROSS ITS LENGTH, INCLUDING ALL POINTS OF INGRESS OR EGRESS.
3. UNLESS SHOWN ON THE CONSTRUCTION DRAWINGS, STABILIZATION FOR OTHER AREAS WILL HAVE THE SAME AGGREGATE THICKNESS AND WIDTH REQUIREMENTS AS THE STABILIZED CONSTRUCTION EXIT.
4. WHEN SHOWN ON THE CONSTRUCTION DRAWINGS, WIDEN OR LENGTHEN STABILIZED AREA TO ACCOMMODATE A TRUCK WASHING AREA. PROVIDE OUTLET SEDIMENT TRAP FOR THE TRUCK WASHING AREA.
5. PROVIDE PERIODIC TOP DRESSING WITH ADDITIONAL COARSE AGGREGATE TO MAINTAIN THE REQUIRED DEPTH OR WHEN SURFACE BECOMES PACKED WITH MUD.
6. PERIODICALLY TURN AGGREGATE TO EXPOSE A CLEAN DRIVING SURFACE.
7. MINIMUM 14' WIDTH FOR ONE WAY TRAFFIC AND 20' WIDTH FOR TWO WAY TRAFFIC.

NO.	REVISIONS	DATE	NAME
1			
2			
3			
4			
5			

WALLER COUNTY ENGINEERING DEPARTMENT

CivilCorp an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

EROSION CONTROL STANDARD DETAILS

PROJECT TITLE: DOUBLE CULVERT RD AND CEDAR CREEK RD

DRAWN BY:

CK'D BY:

SHEET DESCRIPTION: STORM WATER POLLUTION PREVENTION PLAN DETAILS

WCED STANDARD

SCALE:

DATE:

APPROVED BY:

SHEET NO: 184/244

100% SUBMITTAL

STATION	110		132	
	EXCAVATION (ROADWAY)	ACCUMULATED EXCAVATION	EMBANKMENT (ROADWAY)	ACCUMULATED EMBANKMENT
	CY	CY	CY	CY
118+45.00	0	0	0.0	0
119+00.00	46	46	7.3	7
120+00.00	108	154	9.6	17
121+00.00	111	265	6.3	23
122+00.00	108	373	2.3	26
123+00.00	96	469	1.4	27
124+00.00	62	530	4.1	31
125+00.00	60	591	6.9	38
126+00.00	83	674	6.8	45
127+00.00	102	777	3.8	49
128+00.00	101	878	2.2	51
129+00.00	78	957	4.2	55
130+00.00	67	1023	5.9	61
131+00.00	80	1103	4.1	65
132+00.00	46	1149	1.1	66
133+00.00	0	1149	0.0	66
134+00.00	0	1149	0.0	66
135+00.00	40	1189	6.2	72
136+00.00	73	1262	13.6	86
137+00.00	56	1318	12.7	99
138+00.00	44	1362	12.6	111
139+00.00	66	1428	10.6	122
140+00.00	97	1526	4.3	126
141+00.00	94	1620	1.0	127
142+00.00	75	1695	2.1	129
143+00.00	90	1785	2.1	131
144+00.00	126	1911	0.0	131
145+00.00	144	2055	0.5	132
146+00.00	147	2202	2.5	135
147+00.00	132	2335	9.7	144
148+00.00	91	2426	18.9	163
149+00.00	51	2476	21.1	184
150+00.00	58	2535	44.9	229
151+00.00	55	2589	99.7	329
152+00.00	38	2627	107.6	436
153+00.00	58	2686	64.9	501
154+00.00	75	2761	40.7	542
155+00.00	84	2845	32.4	574
156+00.00	241	3086	13.7	588
157+00.00	267	3352	20.5	609
158+00.00	139	3491	20.9	630
159+00.00	112	3603	2.8	632
160+00.00	83	3686	7.1	639
161+00.00	77	3763	8.1	648
162+00.00	76	3839	9.2	657
163+00.00	81	3920	9.6	666
164+00.00	101	4021	6.4	673
165+00.00	100	4121	5.3	678
166+00.00	89	4210	2.9	681
167+00.00	98	4308	0.2	681
168+00.00	87	4395	1.7	683
169+00.00	89	4484	2.8	686
170+00.00	93	4577	1.5	687
171+00.00	70	4647	3.4	690
172+00.00	57	4704	6.4	697
173+00.00	45	4749	7.2	704
174+00.00	39	4789	8.4	712
175+00.00	41	4830	7.8	720
176+00.00	50	4880	7.2	727
177+00.00	54	4934	7.7	735
178+00.00	44	4978	12.3	747
179+00.00	26	5004	25.2	773
180+00.00	31	5035	29.3	802
181+00.00	58	5093	19.8	822
182+00.00	85	5178	9.1	831
183+00.00	89	5267	6.0	837
184+00.00	66	5333	12.3	849
185+00.00	72	5405	9.1	858
185+68.86	32	5437	0.7	859
DOUBLE CULVERT RD TOTAL	5437		859	

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY M. DILL
84626
LICENSED PROFESSIONAL ENGINEER

R. M. Dill, P.E.
7/22/2026

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

DOUBLE CULVERT RD EARTHWORK TABLE

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		185

DATE: 7/22/2026 3:16:51 PM
FILE: \\civcorpw11ics01\ICS pdf work dir\12023\149510 43IC DCR 4GEW001.dgn

100% SUBMITTAL

STATION	110		132	
	EXCAVATION (ROADWAY)	ACCUMULATED EXCAVATION	EMBANKMENT (FINAL) (ORD COMP) (TY C)	ACCUMULATED EMBANKMENT
	CY	CY	CY	CY
1+67.300	0	0	0.0	0
2+00.000	42	42	0.1	0
3+00.000	147	188	5.8	6
4+00.000	163	352	6.5	12
5+00.000	146	498	6.5	19
6+00.000	110	608	14.2	33
7+00.000	85	693	18.8	52
8+00.000	83	776	16.6	68
9+00.000	115	891	11.2	80
10+00.000	130	1020	7.1	87
11+00.000	118	1138	4.9	92
12+00.000	98	1235	8.2	100
13+00.000	67	1302	19.7	119
14+00.000	49	1351	30.5	150
15+00.000	60	1412	34.4	184
16+00.000	86	1497	25.3	210
17+00.000	67	1564	36.1	246
18+00.000	38	1602	60.0	306
19+00.000	59	1661	37.2	343
20+00.000	55	1716	23.8	367
21+00.000	43	1758	29.9	397
22+00.000	100	1858	12.7	409
23+00.000	209	2067	0.6	410
24+00.000	263	2329	0.0	410
25+00.000	193	2522	0.5	410
26+00.000	71	2593	20.7	431
27+00.000	5	2598	73.7	505
28+00.000	18	2616	67.4	572
29+00.000	115	2731	13.9	586
30+00.000	191	2922	0.0	586
31+00.000	157	3079	0.2	586
32+00.000	142	3221	2.9	589
33+00.000	170	3390	2.7	592
34+00.000	276	3666	0.0	592
35+00.000	355	4021	0.0	592
36+00.000	306	4328	0.0	592
37+00.000	213	4540	1.1	593
38+00.000	101	4642	27.8	621
39+00.000	53	4695	52.8	674
40+00.000	73	4768	57.0	731
41+00.000	89	4857	46.4	777
42+00.000	115	4972	21.8	799
43+00.000	159	5131	15.2	814
44+00.000	147	5278	10.4	824
45+00.000	172	5450	3.4	828
46+00.000	202	5652	3.0	831
47+00.000	162	5813	1.8	832
48+00.000	135	5948	0.6	833
49+00.000	112	6061	0.0	833
49+65.409	67	6128	0.1	833
CEDAR CREEK RD TOTAL	6128		833	

NO.	DATE	REVISION	APPROV.

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY M. DILL
84626
LICENSED PROFESSIONAL ENGINEER

R. M. Dill, P.E.
7/22/2026

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

THE STATE OF TEXAS WALLER COUNTY

WALLER COUNTY ROAD BOND

WALLER COUNTY
ENGINEERING DEPARTMENT

CEDAR CREEK RD EARTHWORK TABLE

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
		23103	DOUBLE CULVERT RD
DIST	COUNTY		SHEET NO.
	WALLER		186

DATE: 7/22/2026 3:16:34 PM
FILE: \\civcorpw11ics01\ICS pdf work dir\120331149510 44IC_DCR_4GEW101.dgn

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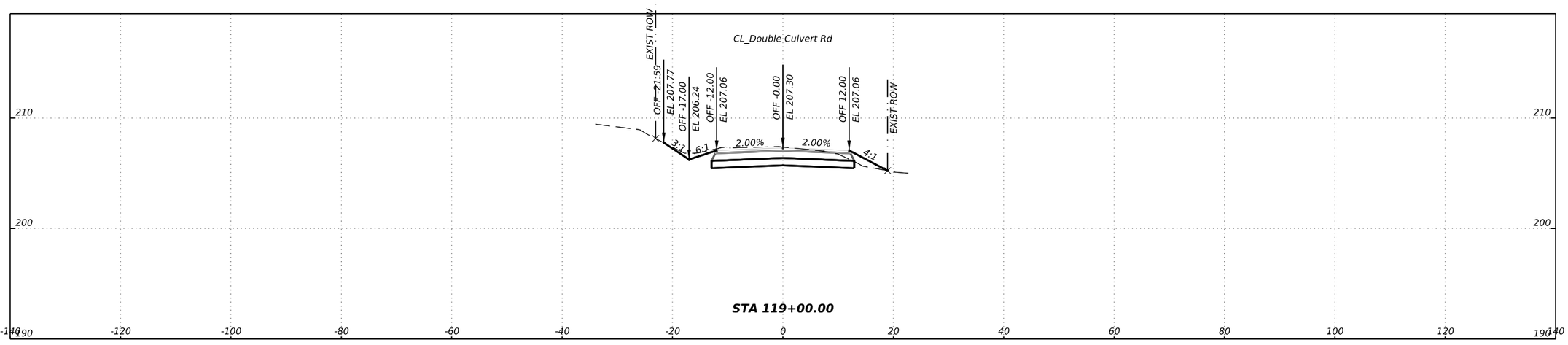

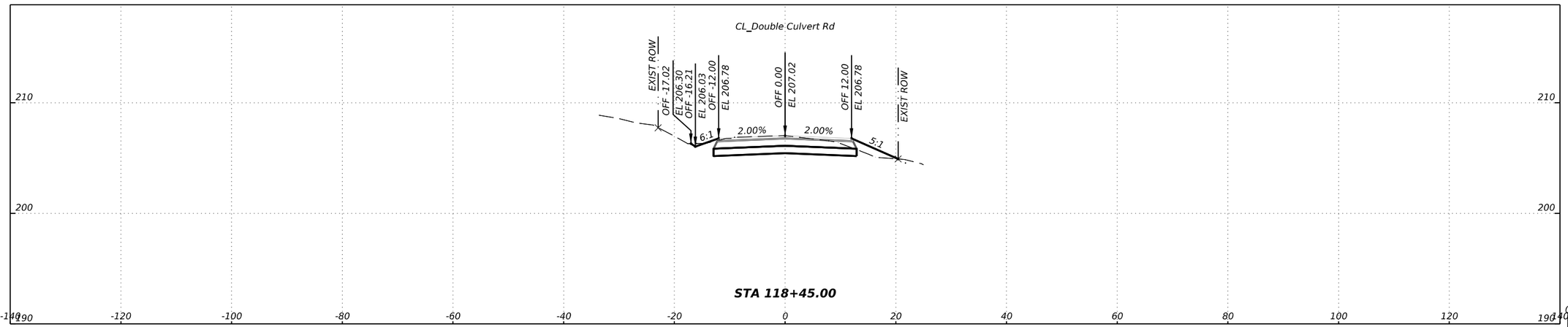

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SCALE: 1" = 20' H
1" = 10' V

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DATE: $DATE$
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WALLER COUNTY ENGINEERING DEPARTMENT

THE STATE OF TEXAS
WALLER COUNTY

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
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CROSS SECTIONS
DOUBLE CULVERT RD

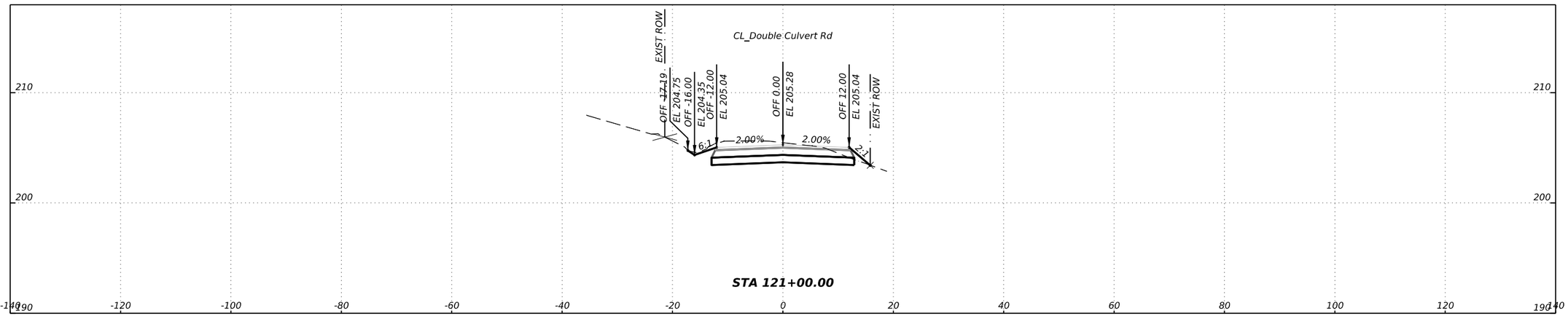
CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

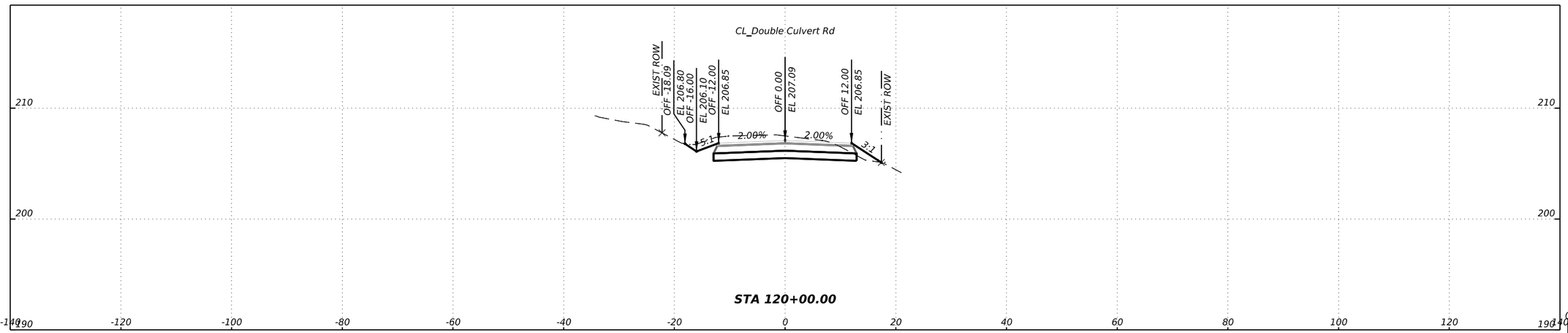
STATE OF TEXAS
RAY N. BILL
84626
LICENSED
PROFESSIONAL ENGINEER

R. N. Bill, P.E.
$DATE$

SHEET NO:
187 / 244

100% SUBMITTAL





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DOUBLE CULVERT RD

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
RAY N. HILL
84626
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R. N. Hill, P.E.
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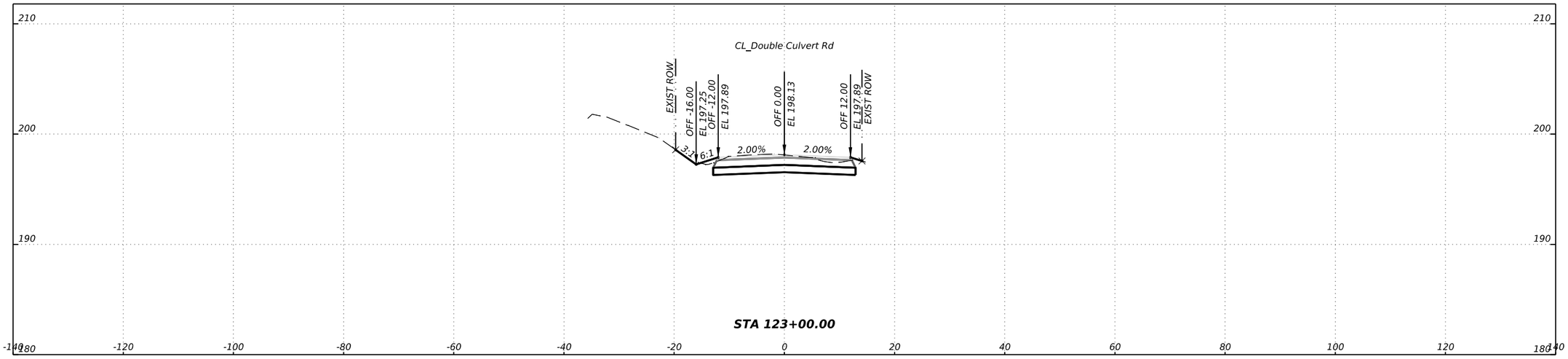

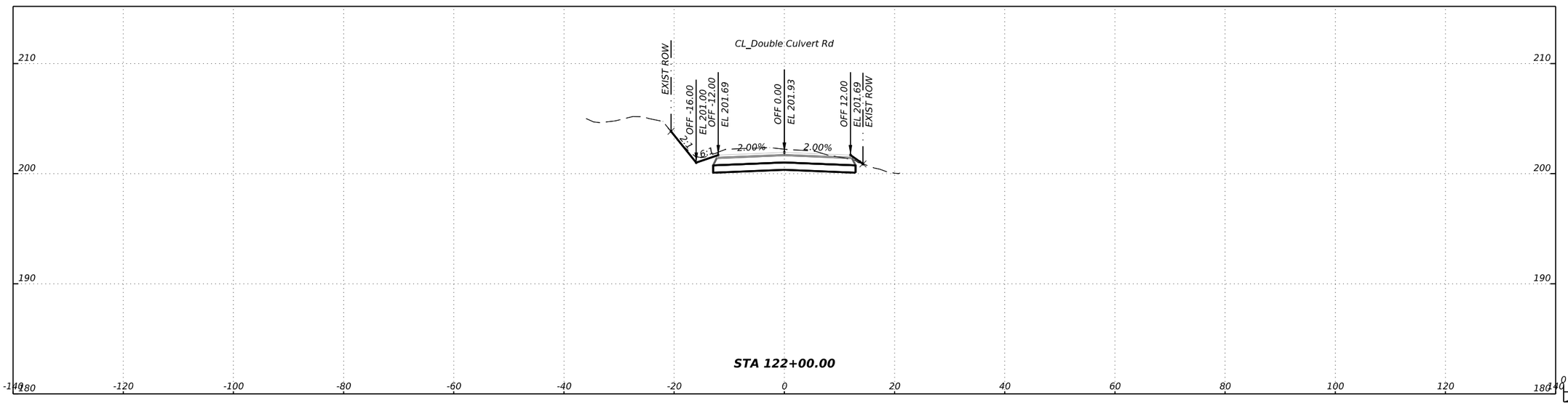

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CROSS SECTIONS
DOUBLE CULVERT RD

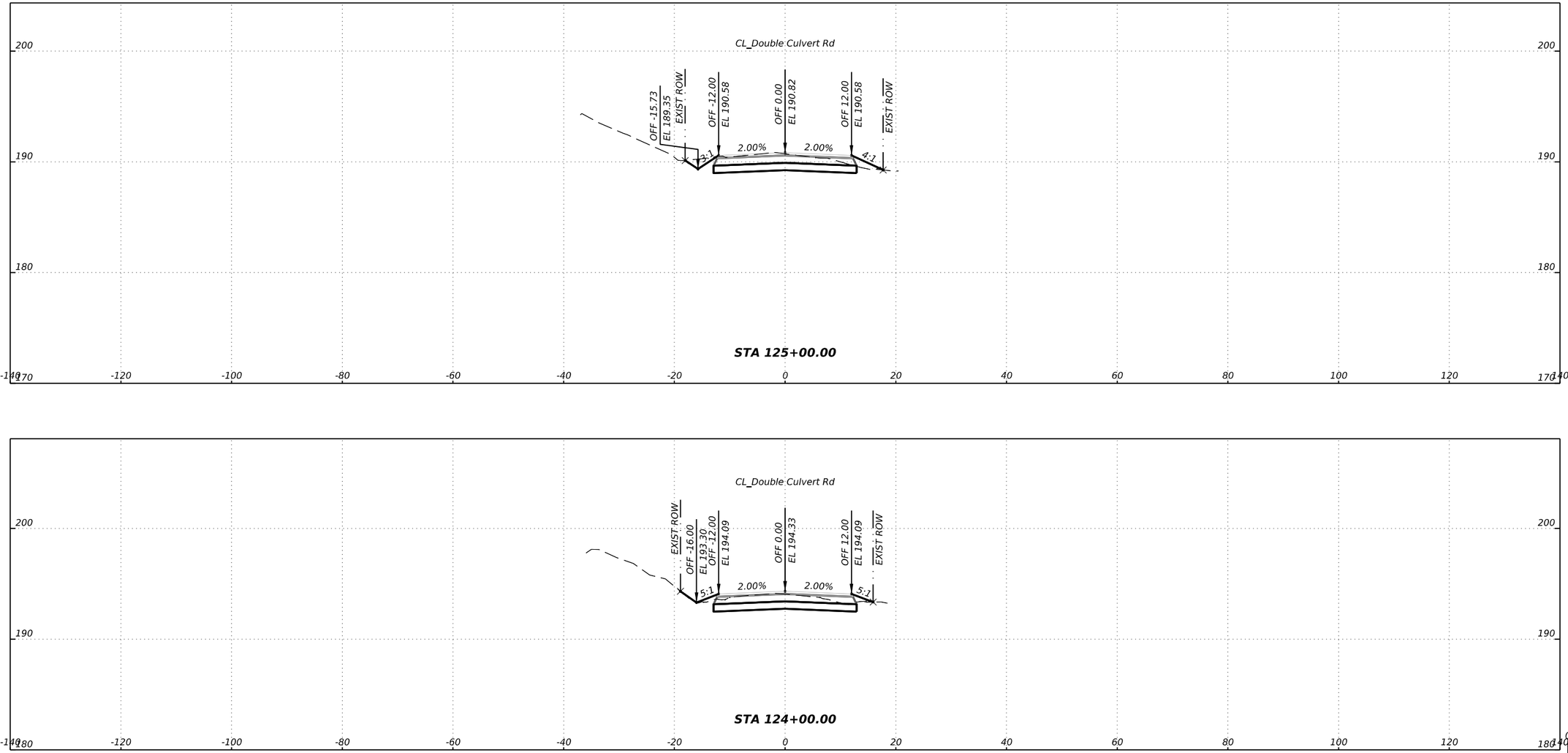
CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY W. BILL
84626
LICENSED
PROFESSIONAL ENGINEER

R. W. Bill, P.E.
$DATE$

SHEET NO:
189 / 244

100% SUBMITTAL



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CROSS SECTIONS
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STATE OF TEXAS
ROY N. BILL
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@DATE@

SHEET NO:
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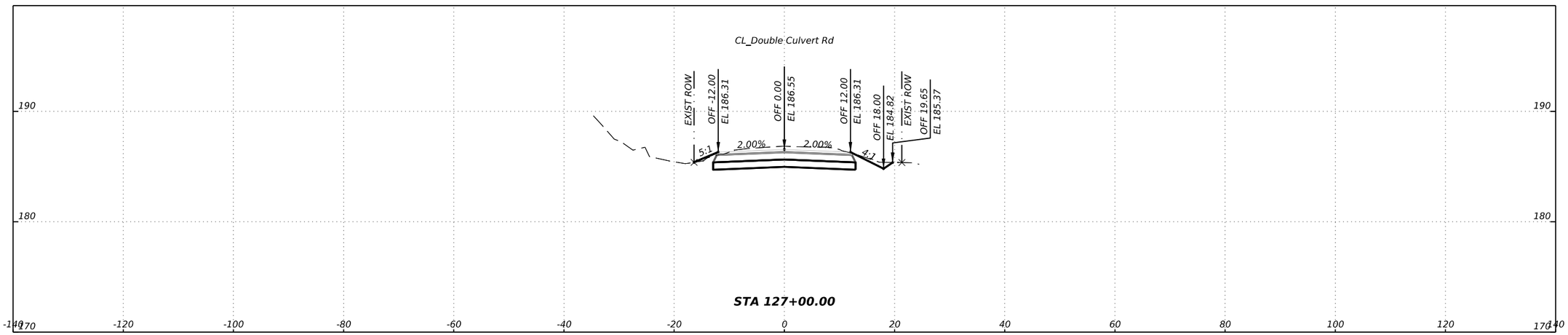

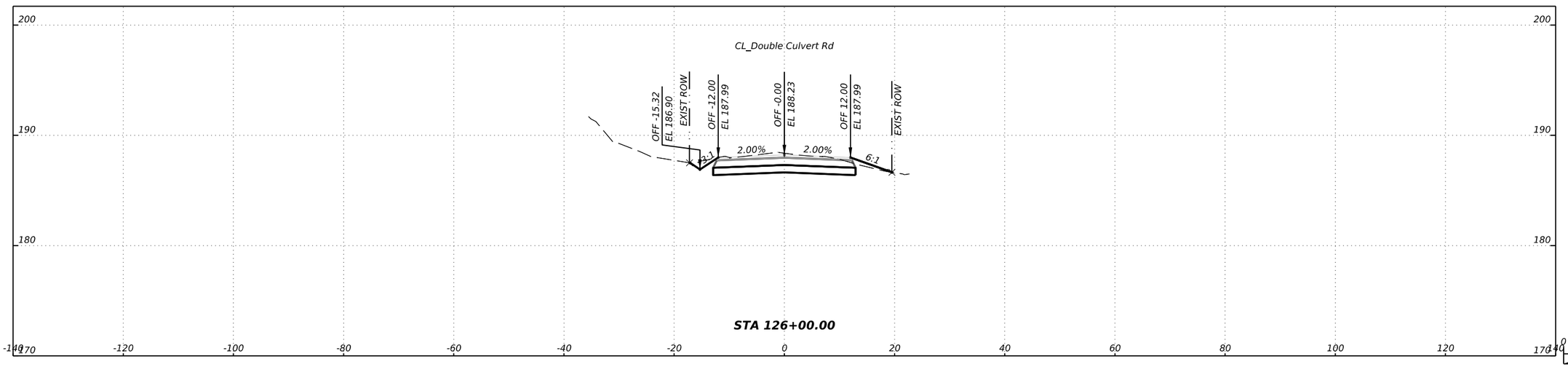

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CROSS SECTIONS
DOUBLE CULVERT RD

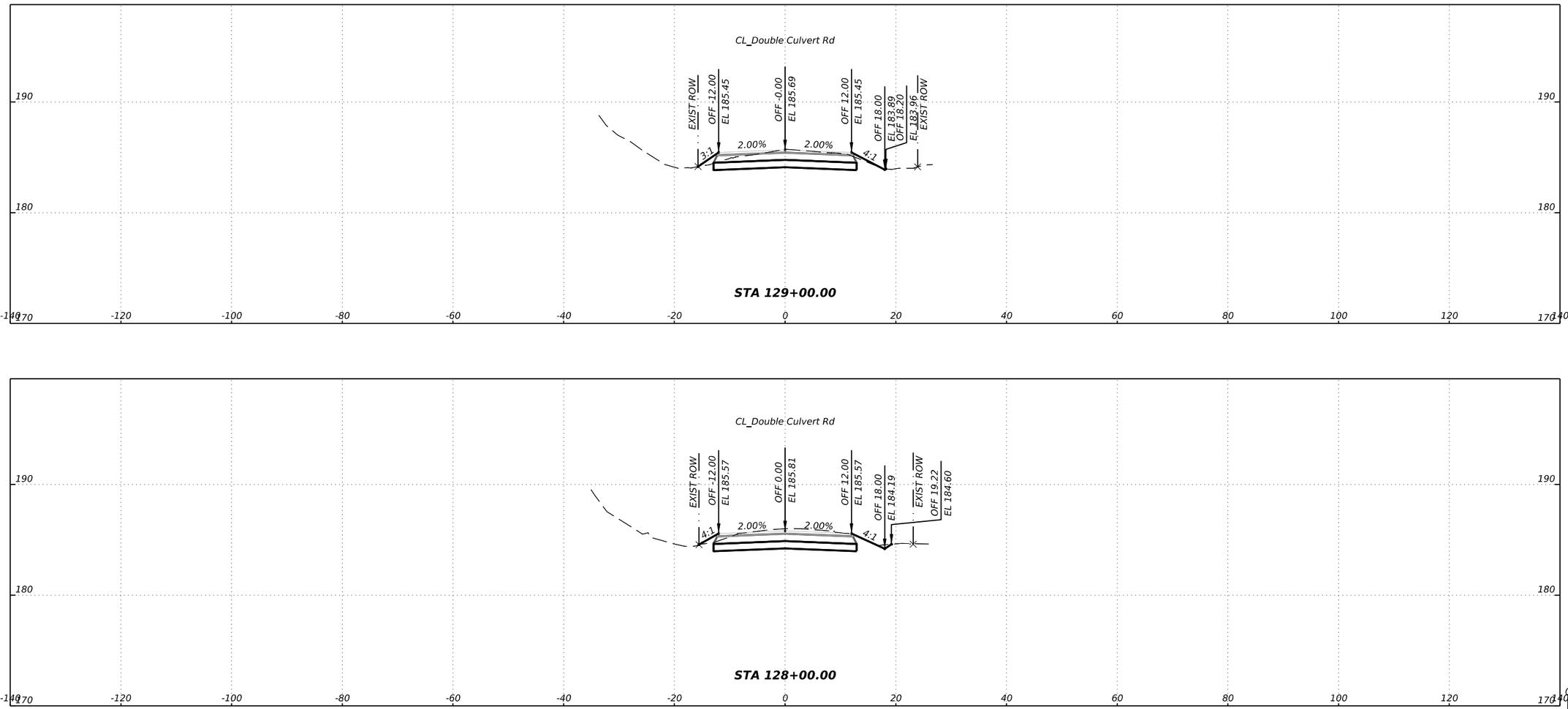
CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
RAY N. HILL
84626
LICENSED
PROFESSIONAL ENGINEER

R. N. Hill, P.E.
$DATE$

SHEET NO:
191/244

100% SUBMITTAL



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WALLER COUNTY ENGINEERING DEPARTMENT

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WALLER COUNTY

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CROSS SECTIONS
DOUBLE CULVERT RD

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY N. HILL
84626
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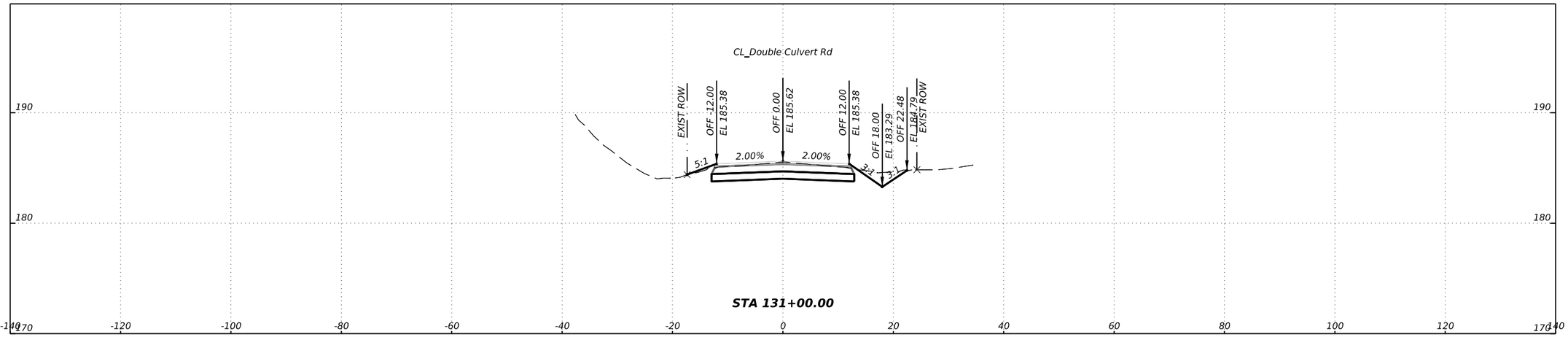
R. N. Hill, P.E.
@DATE@

SHEET NO:
192 / 244

100% SUBMITTAL



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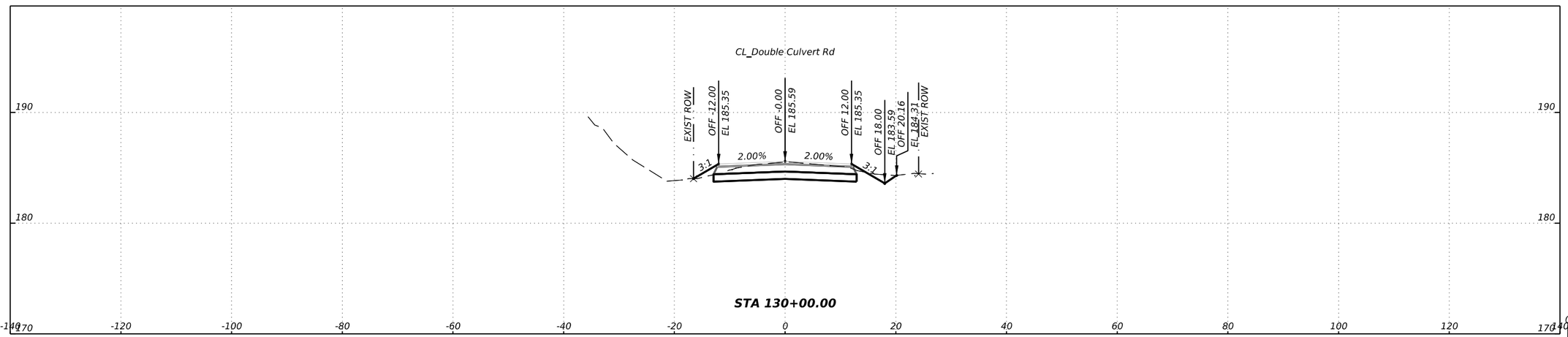

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0 10' 20'

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

$TIME$

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DATE: $DATE$
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WALLER COUNTY ENGINEERING DEPARTMENT

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CROSS SECTIONS
DOUBLE CULVERT RD

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
RAY N. BILL
84626
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PROFESSIONAL ENGINEER

R. N. Bill, P.E.
$DATE$

SHEET NO:
193 / 244

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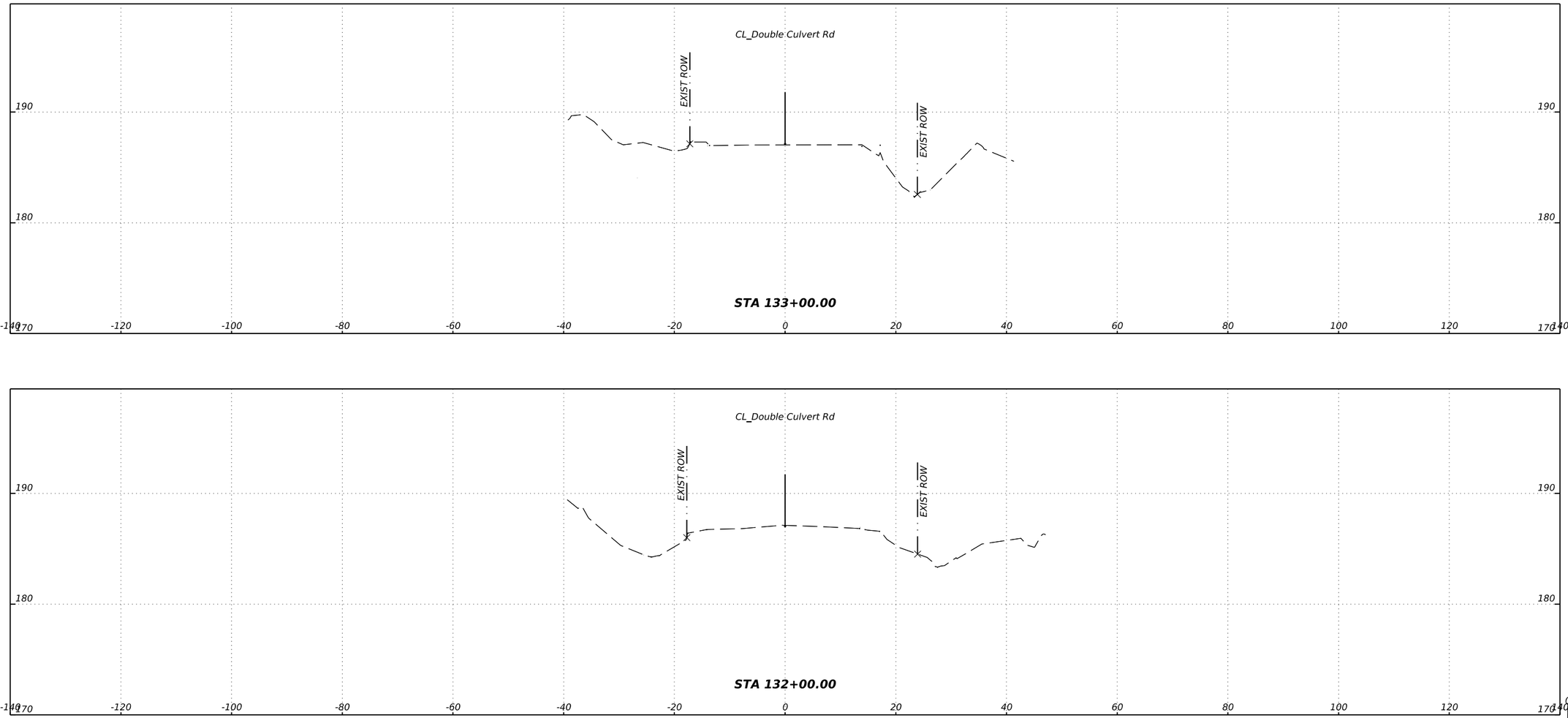

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WALLER COUNTY ENGINEERING DEPARTMENT

THE STATE OF TEXAS
WALLER COUNTY

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

CROSS SECTIONS DOUBLE CULVERT RD

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY M. HILL
84626
LICENSED
PROFESSIONAL ENGINEER

R. M. Hill, P.E.
@DATE@

SHEET NO:
194 / 244

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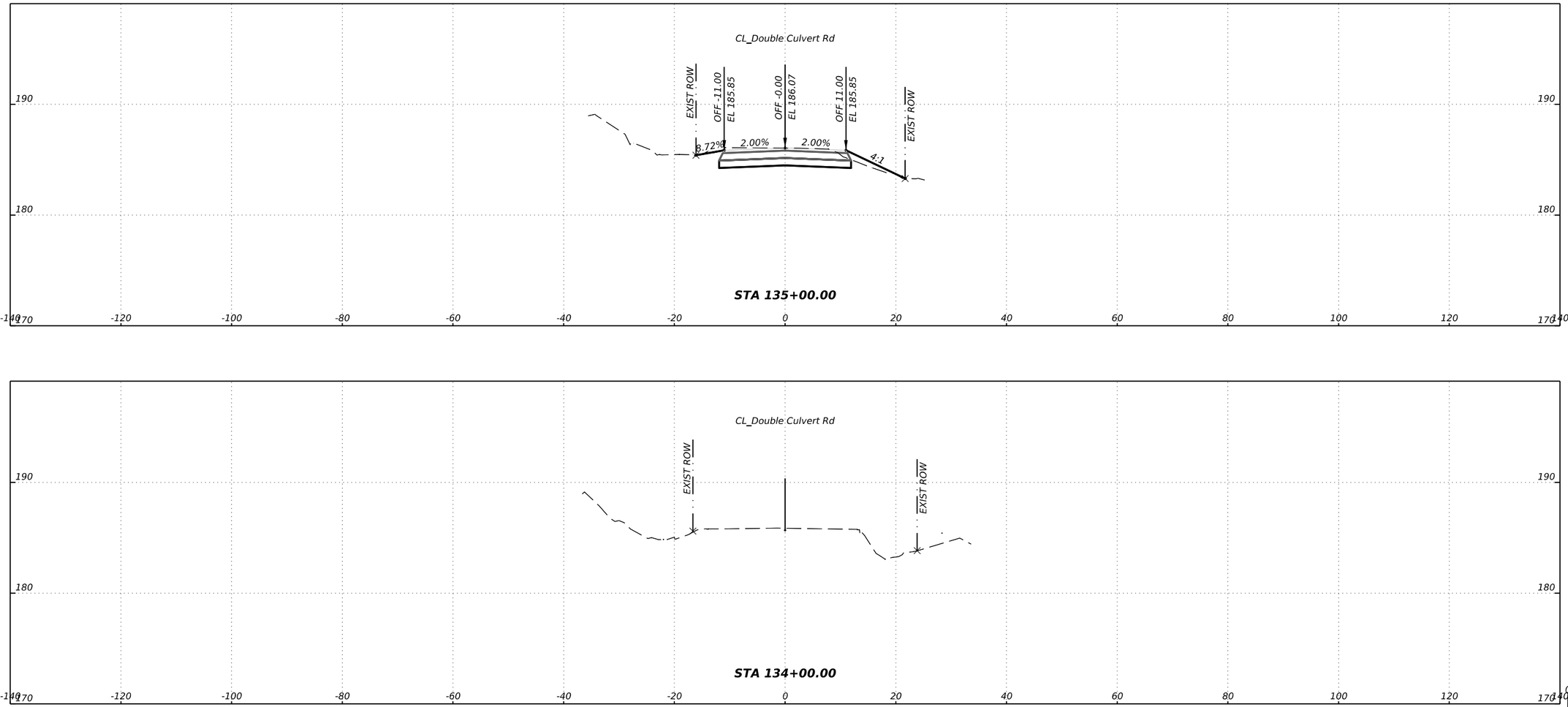

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WALLER COUNTY
ENGINEERING DEPARTMENT

THE STATE OF TEXAS
WALLER COUNTY

CivilCorp
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29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

CROSS SECTIONS
DOUBLE CULVERT RD

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY N. BILL
84626
LICENSED
PROFESSIONAL ENGINEER

R. N. Bill, P.E.
@DATE@

SHEET NO:
195 / 244

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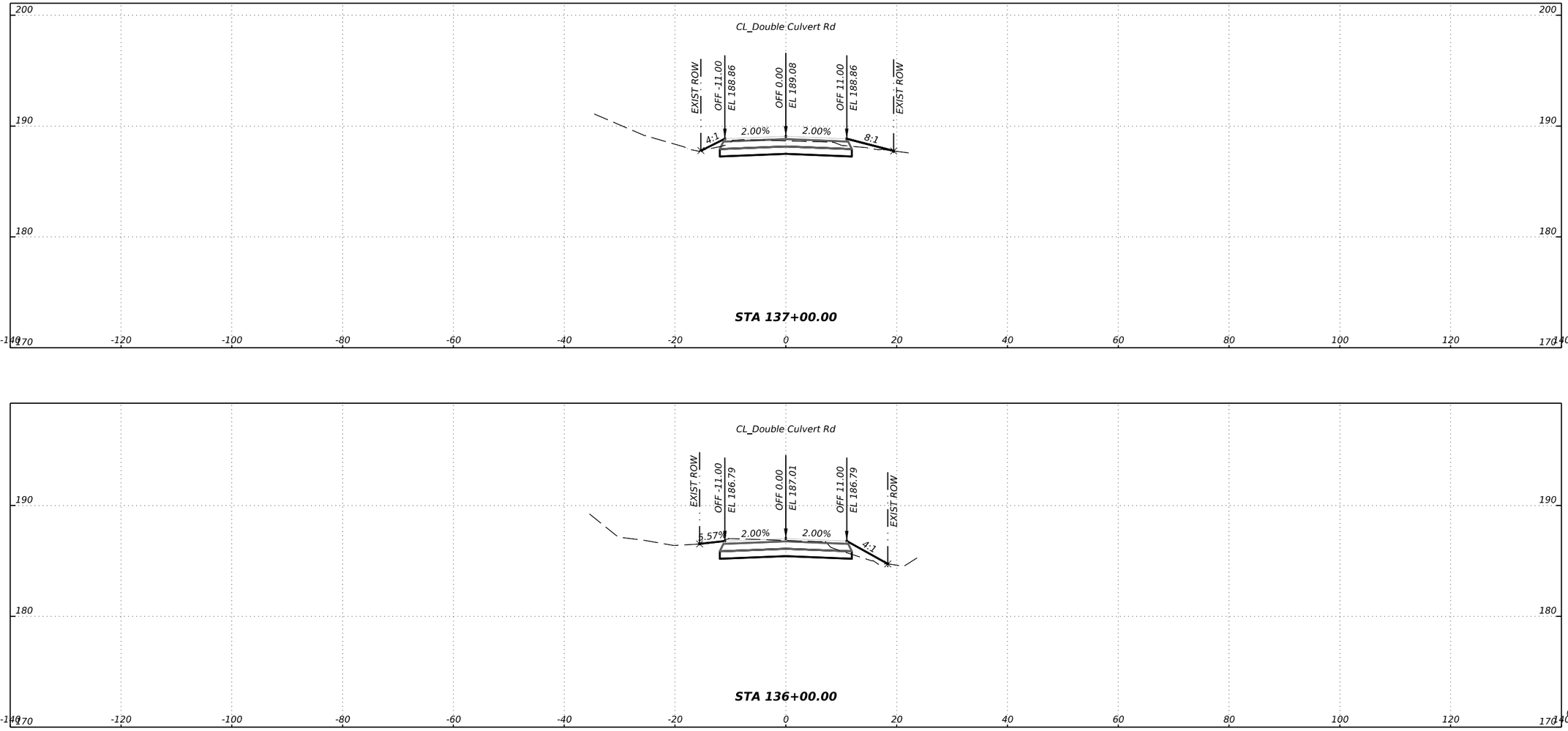

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WALLER COUNTY ENGINEERING DEPARTMENT

THE STATE OF TEXAS
WALLER COUNTY

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CROSS SECTIONS
DOUBLE CULVERT RD

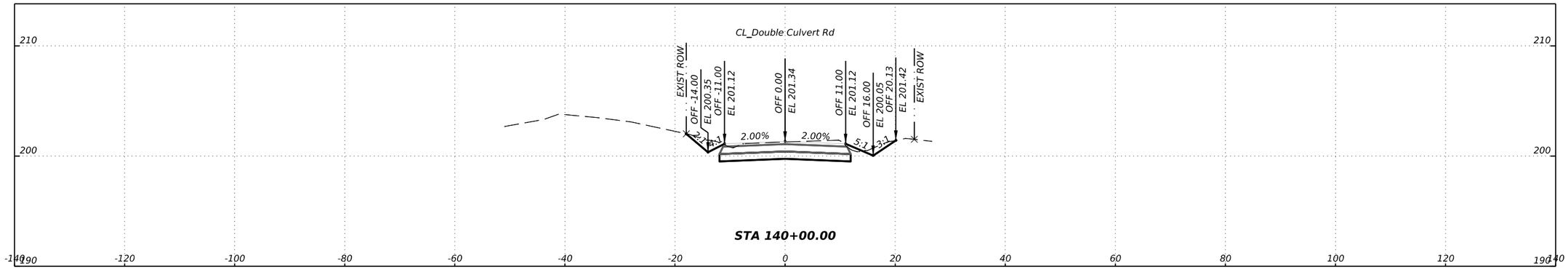
CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

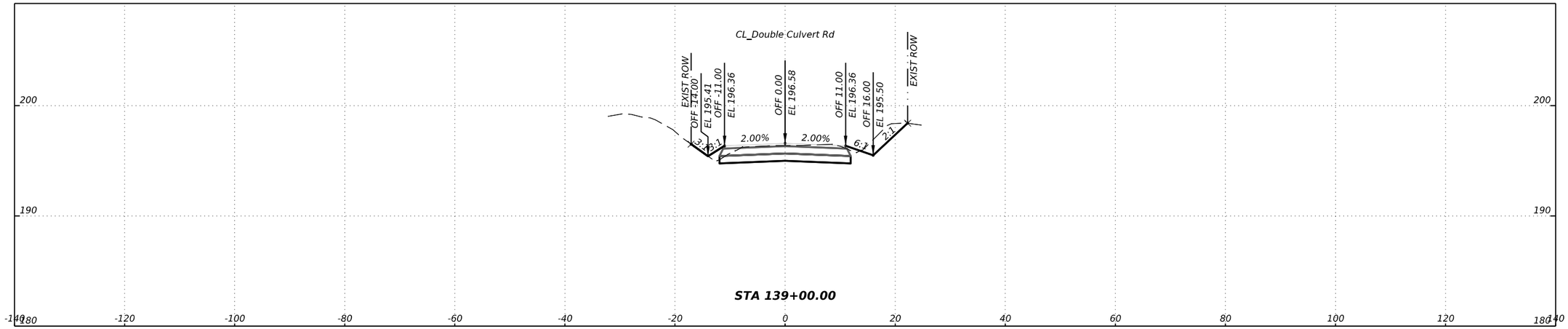
STATE OF TEXAS
RAY N. BILL
84626
LICENSED
PROFESSIONAL ENGINEER

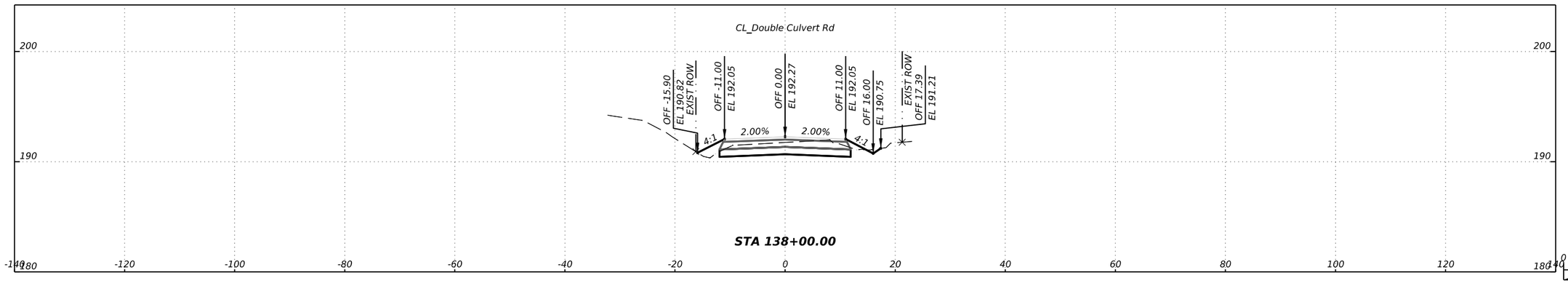
R. N. Bill, P.E.
$DATE$

SHEET NO:
196 / 244

100% SUBMITTAL







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

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NO.	REVISIONS	DATE	NAME
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WALLER COUNTY
ENGINEERING DEPARTMENT

THE STATE OF TEXAS
WALLER COUNTY

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an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

CROSS SECTIONS
DOUBLE CULVERT RD

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
RAY N. HILL
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197 / 244

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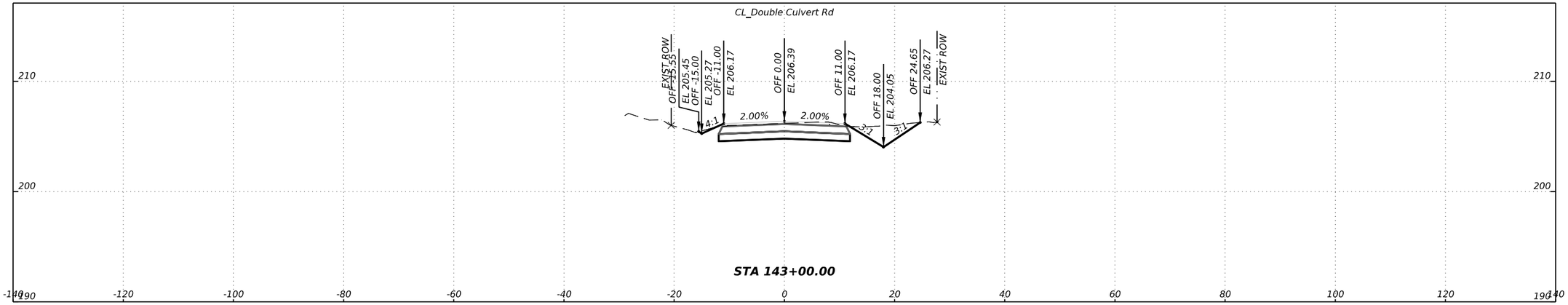

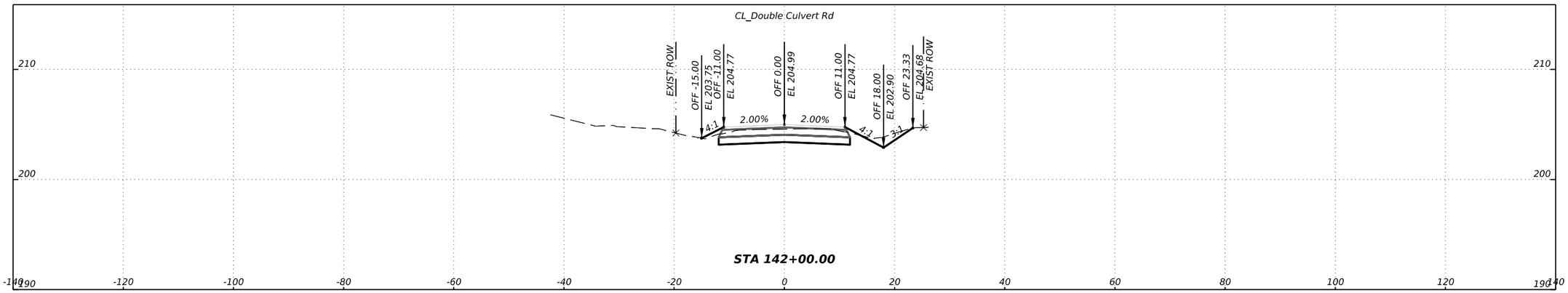

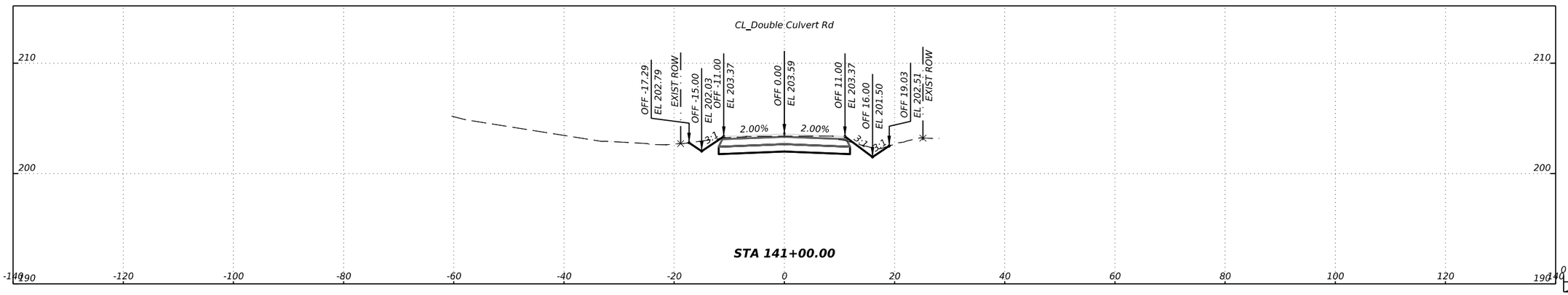

0 10' 20'

SCALE: 1" = 20' H
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$TIME$

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WALLER COUNTY ENGINEERING DEPARTMENT

THE STATE OF TEXAS · WALLER COUNTY

CivilCorp
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29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

CROSS SECTIONS
DOUBLE CULVERT RD

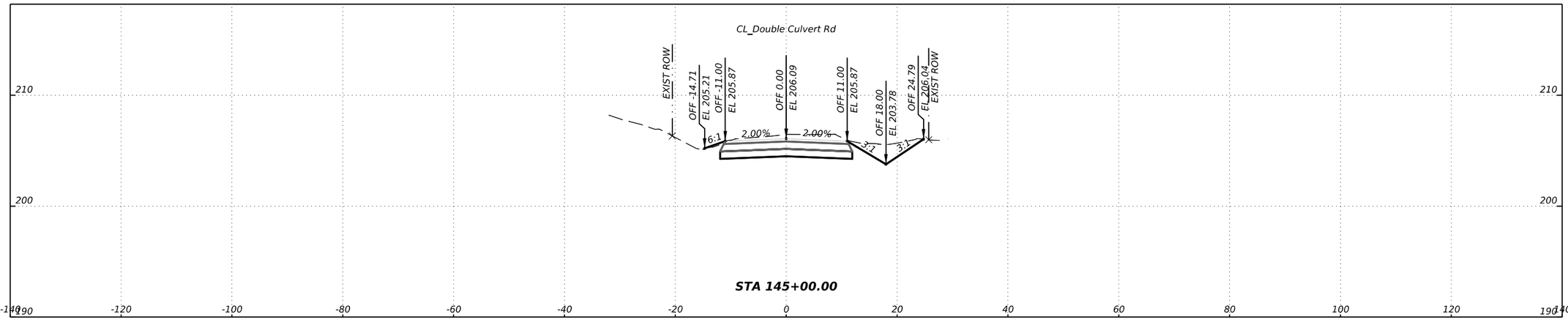
CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS · ROY N. BILL · 84626 · LICENSED · PROFESSIONAL ENGINEER

R. N. Bill, P.E.
$DATE$

SHEET NO:
198 / 244

100% SUBMITTAL



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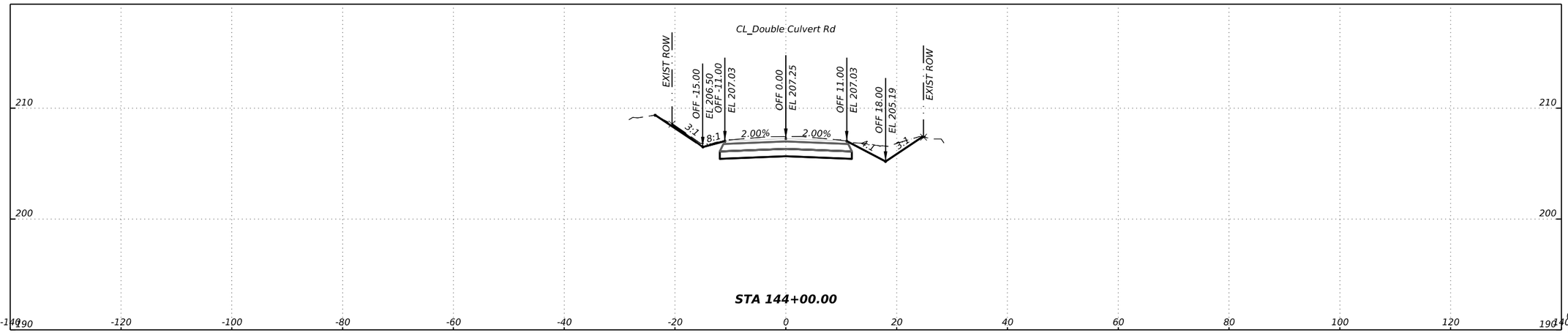

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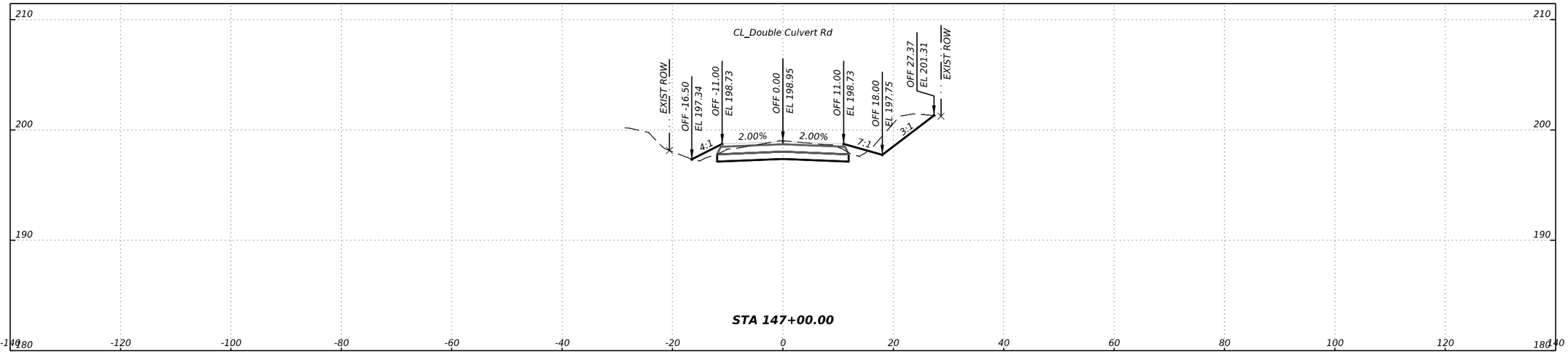

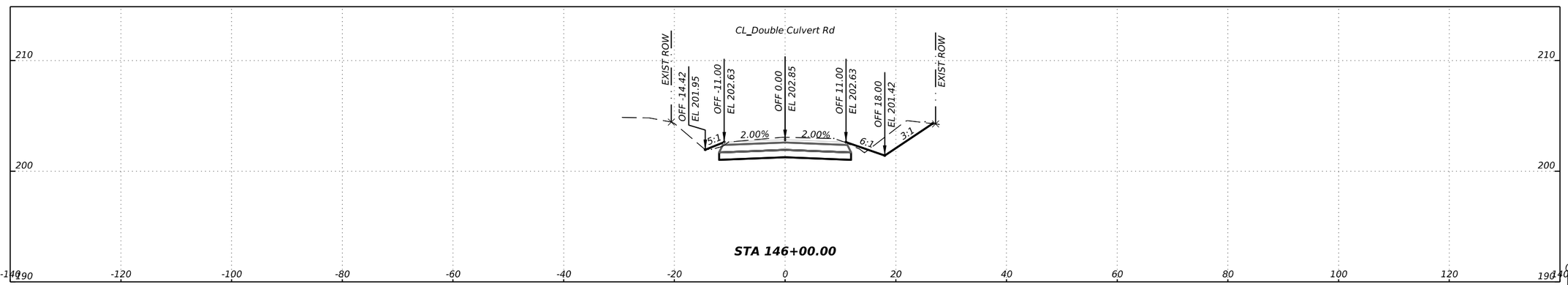

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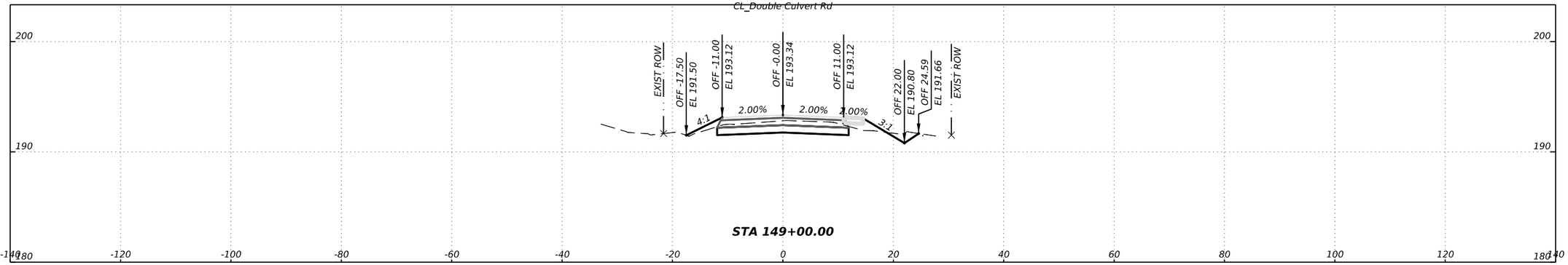
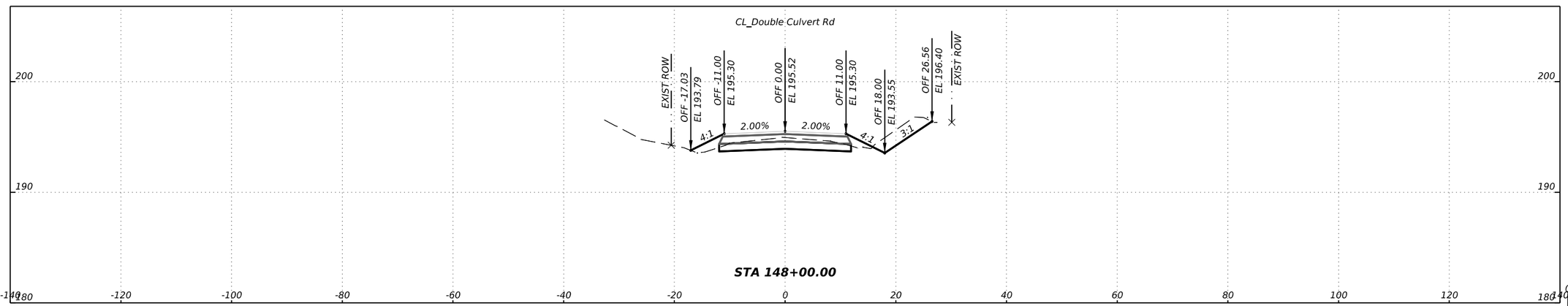
STATE OF TEXAS · RAY N. BILL · 84626 · LICENSED · PROFESSIONAL ENGINEER

R. N. Bill, P.E.
$DATE$

SHEET NO:
200 / 244

100% SUBMITTAL





0 10' 20'

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

$TIME$

DATE: $DATE$
FILE: $FILE$

NO.	REVISIONS	DATE	NAME
1			
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WALLER COUNTY
ENGINEERING DEPARTMENT

THE STATE OF TEXAS
WALLER COUNTY

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

CROSS SECTIONS
DOUBLE CULVERT RD

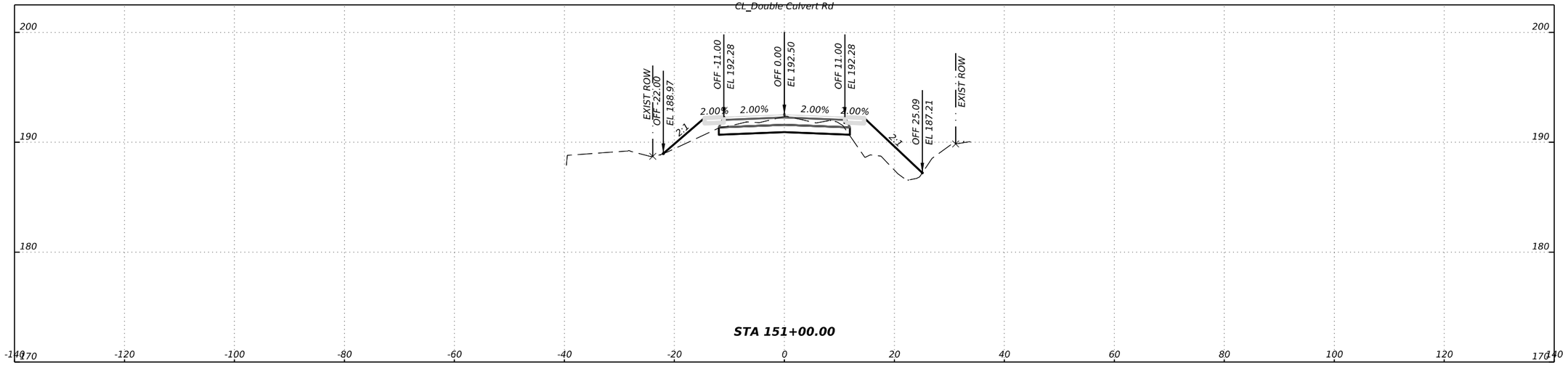
CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY N. BILL
84626
LICENSED
PROFESSIONAL ENGINEER

R. N. Bill, P.E.
@DATE@

SHEET NO:
201/244

100% SUBMITTAL



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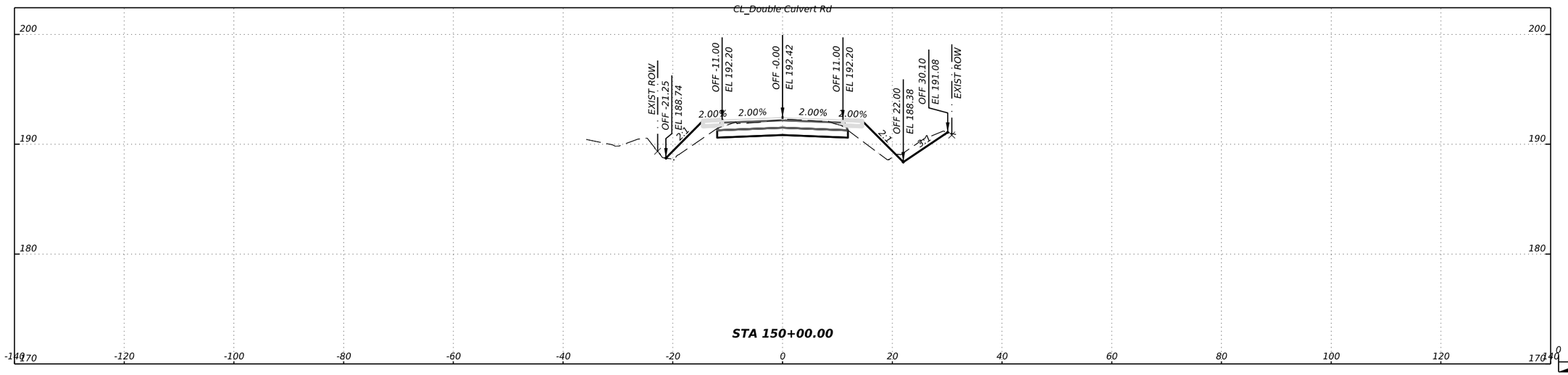

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0 10' 20'

SCALE: 1" = 20' H
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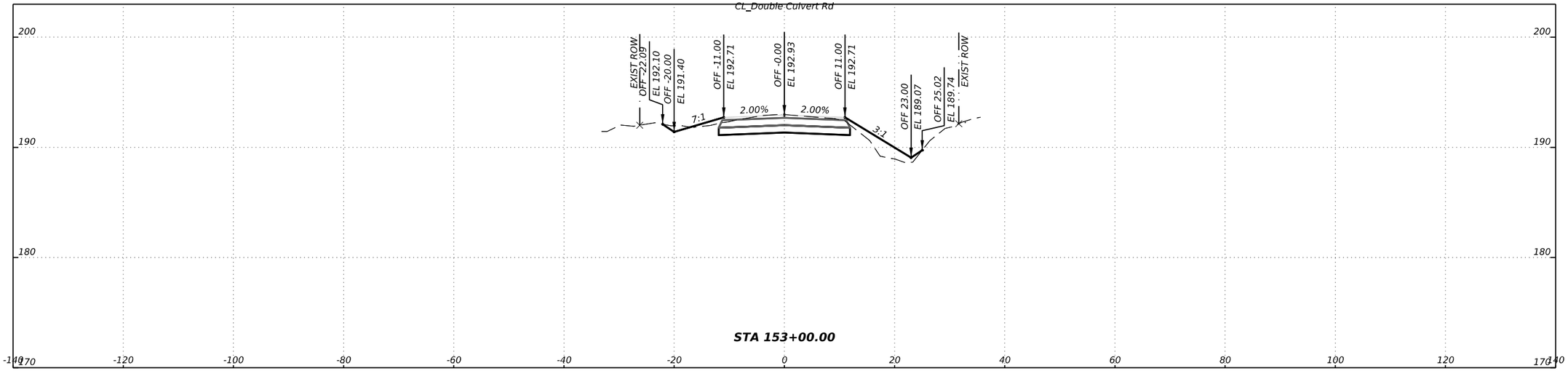
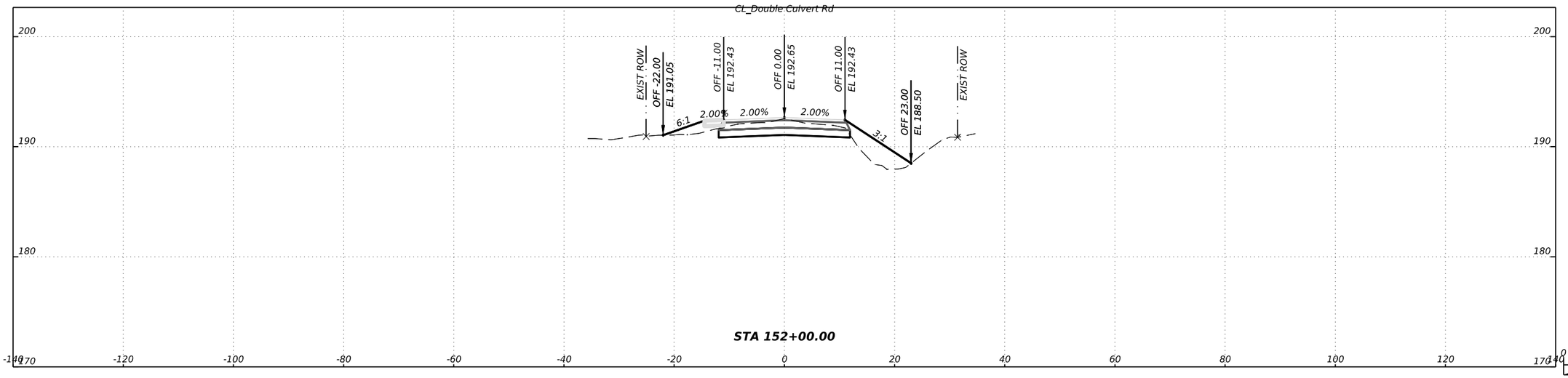
CROSS SECTIONS
DOUBLE CULVERT RD

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252
STATE OF TEXAS
ROY M. DILL
84626
LICENSED
PROFESSIONAL ENGINEER
R. M. Dill, P.E.
$DATE$

SHEET NO:
202 / 244

100% SUBMITTAL





0 10' 20'

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DOUBLE CULVERT RD

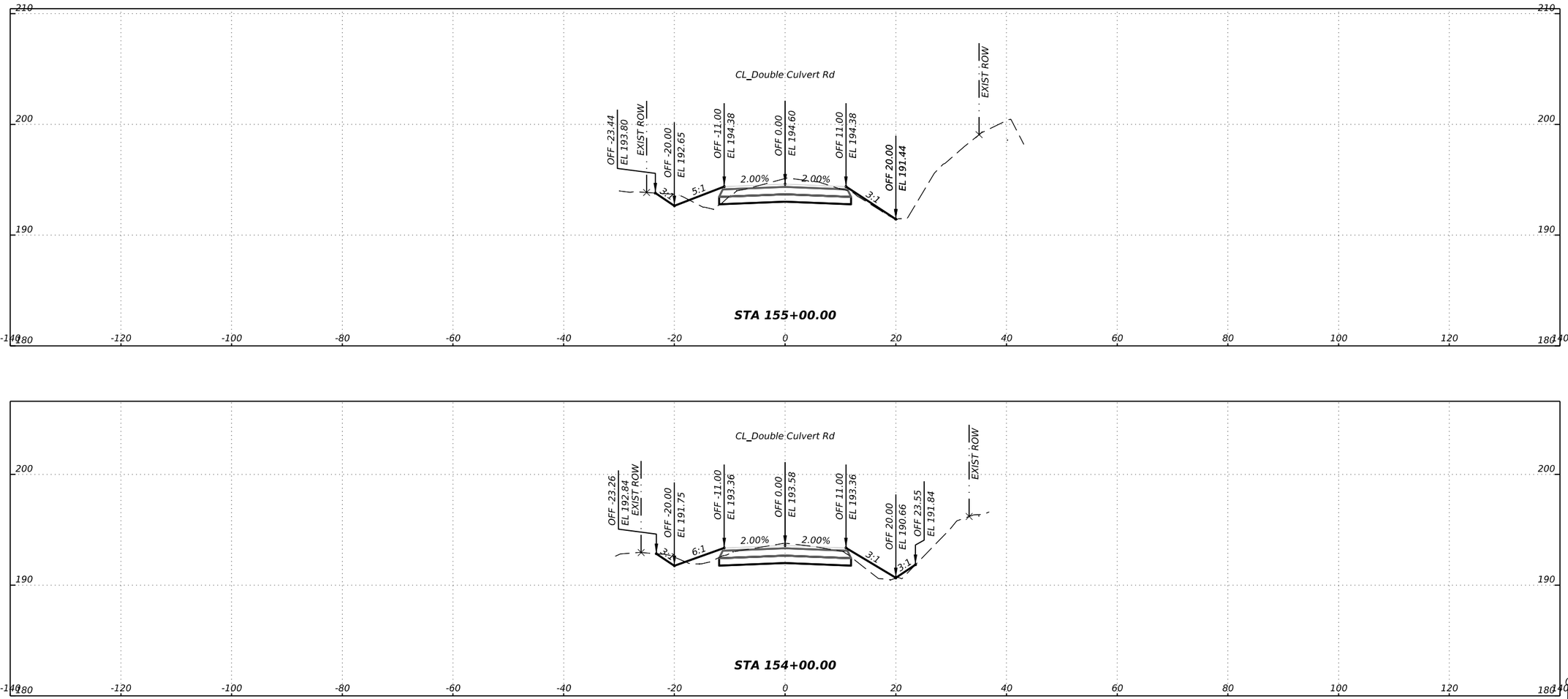
CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY N. HILL
84626
LICENSED
PROFESSIONAL ENGINEER

R. N. Hill, P.E.
@DATE@

SHEET NO:
203 / 244

100% SUBMITTAL



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STATE OF TEXAS
ROY N. HILL
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R. N. Hill, P.E.
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204 / 244

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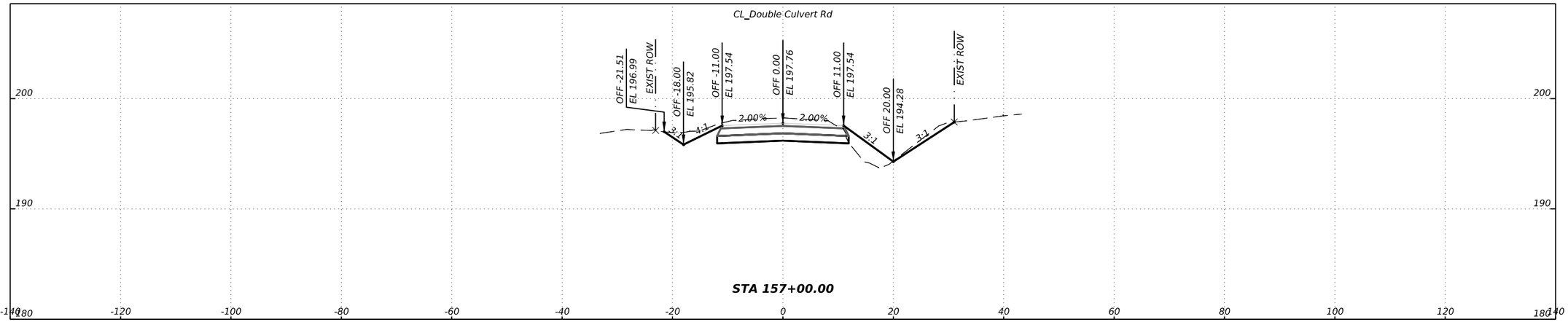

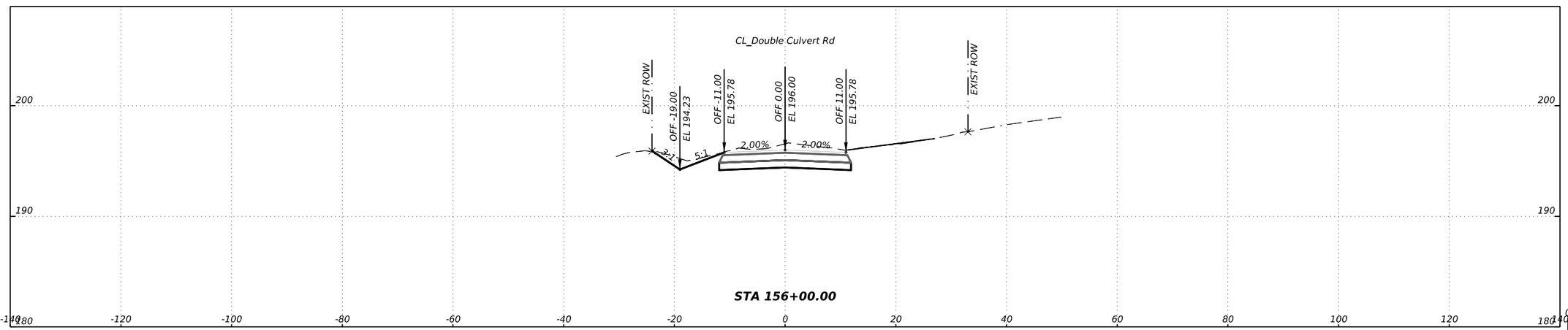

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CROSS SECTIONS DOUBLE CULVERT RD

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FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
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205 / 244

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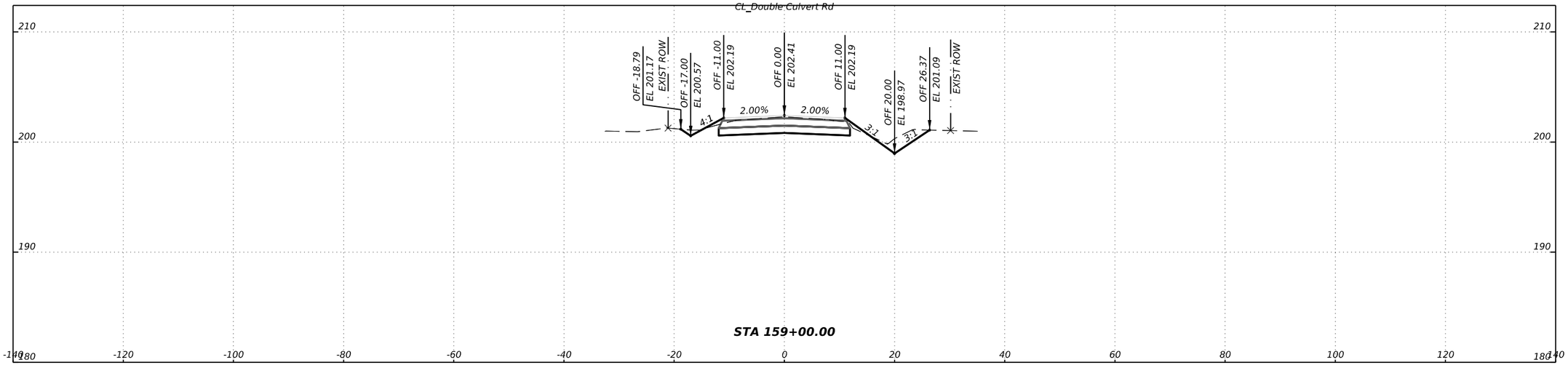

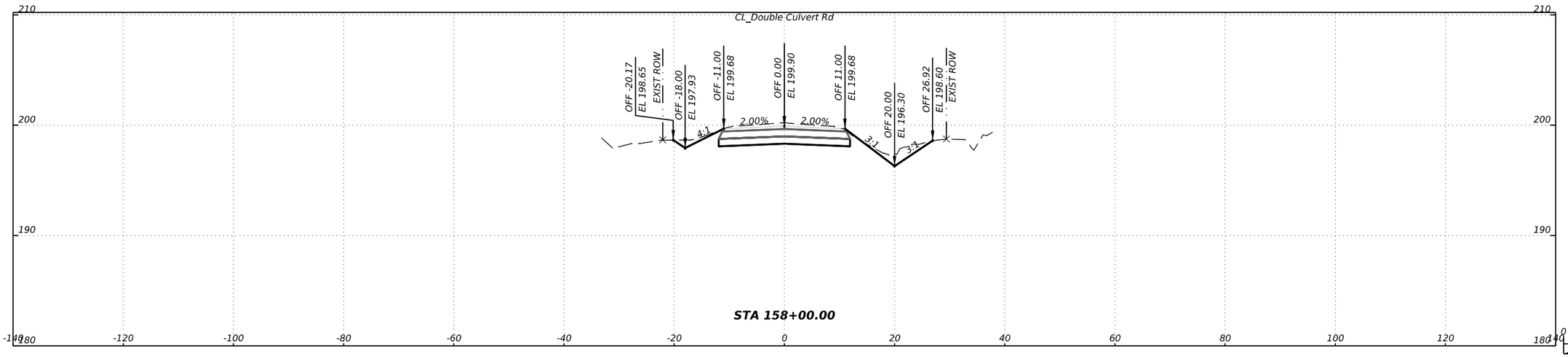

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CROSS SECTIONS
DOUBLE CULVERT RD

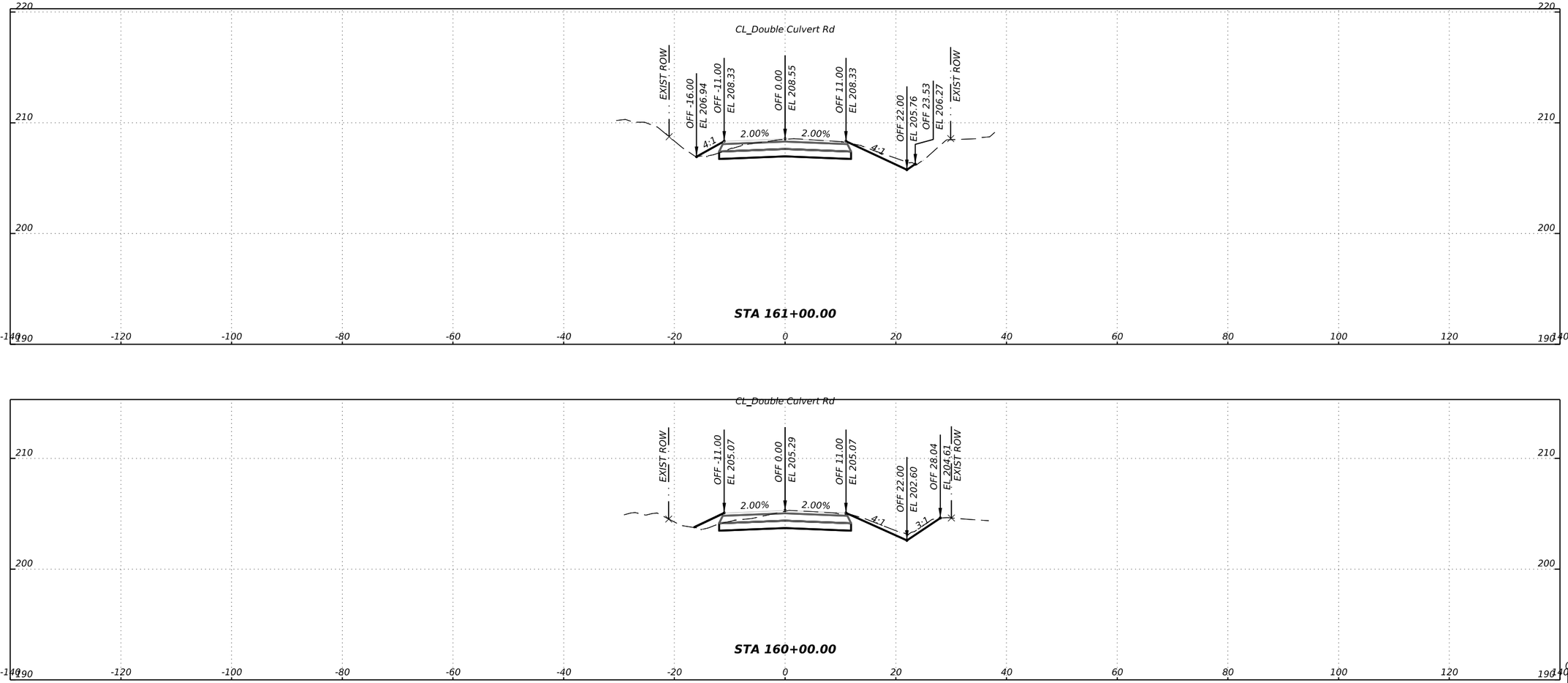
CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

THE STATE OF TEXAS
ROY W. BILL
84626
LICENSED
PROFESSIONAL ENGINEER

R. W. Bill, P.E.
$DATE$

SHEET NO:
206 / 244

100% SUBMITTAL



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WALLER COUNTY
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CROSS SECTIONS
DOUBLE CULVERT RD

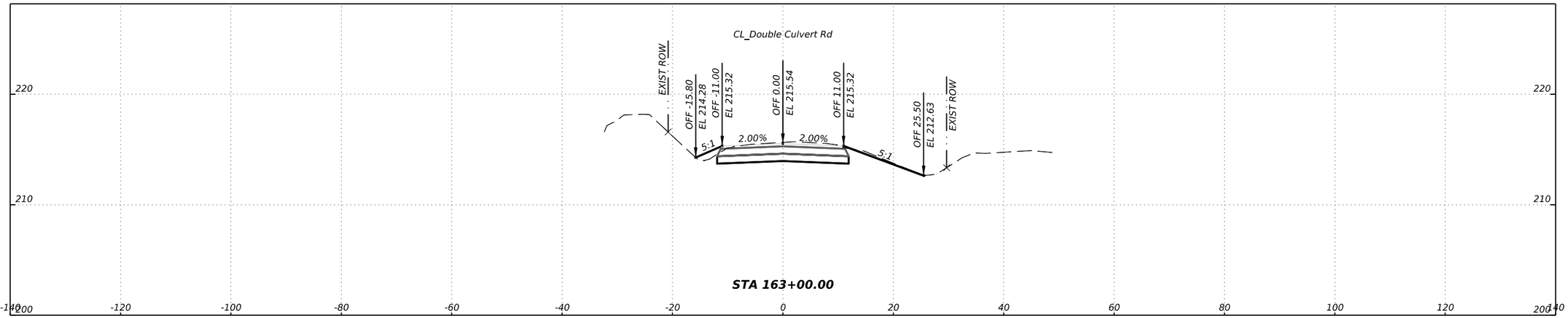
CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

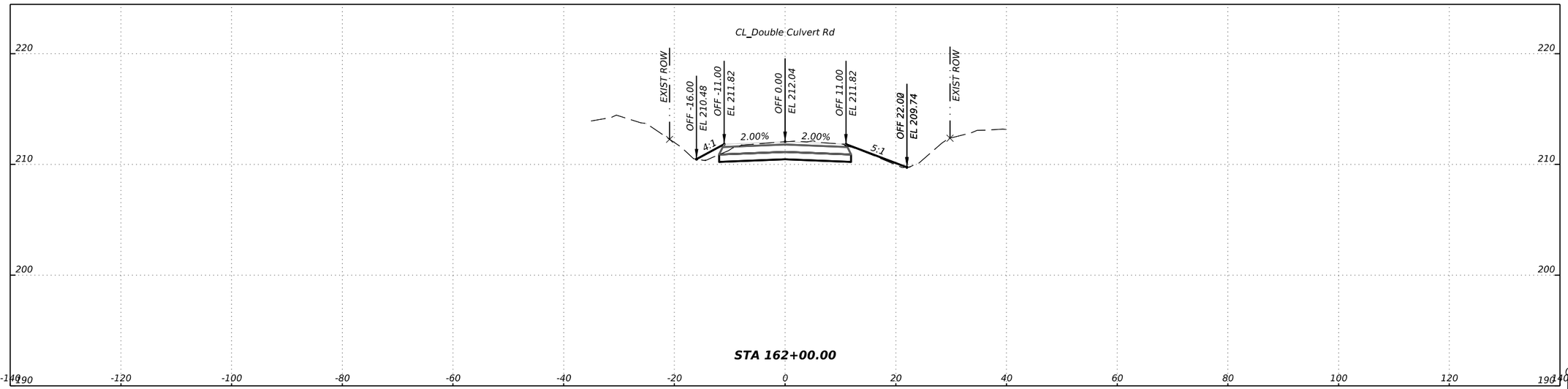
STATE OF TEXAS
ROY N. BILL
84626
LICENSED
PROFESSIONAL ENGINEER

R. N. Bill, P.E.
@DATE@

SHEET NO:
207 / 244

100% SUBMITTAL





0 10' 20'

SCALE: 1" = 20' H
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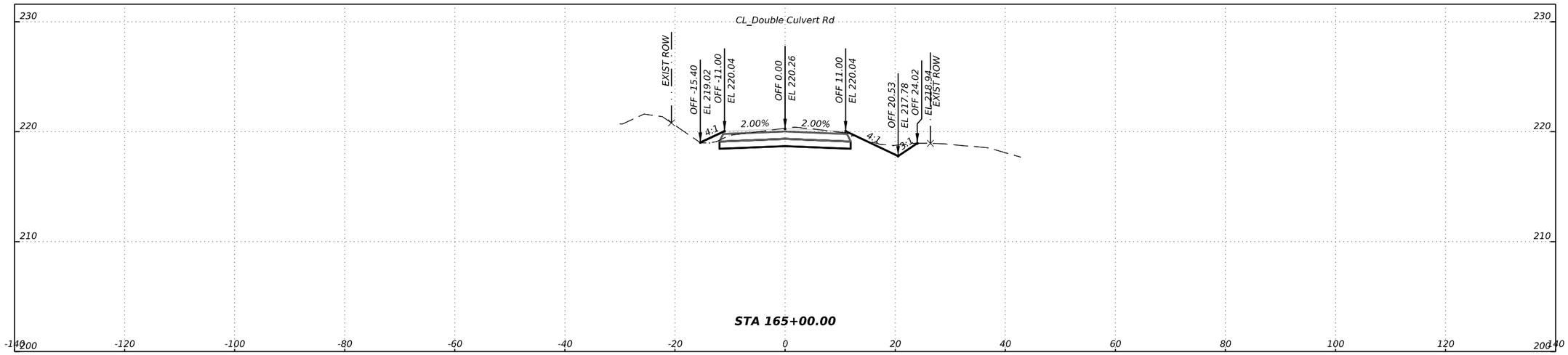
CROSS SECTIONS
DOUBLE CULVERT RD

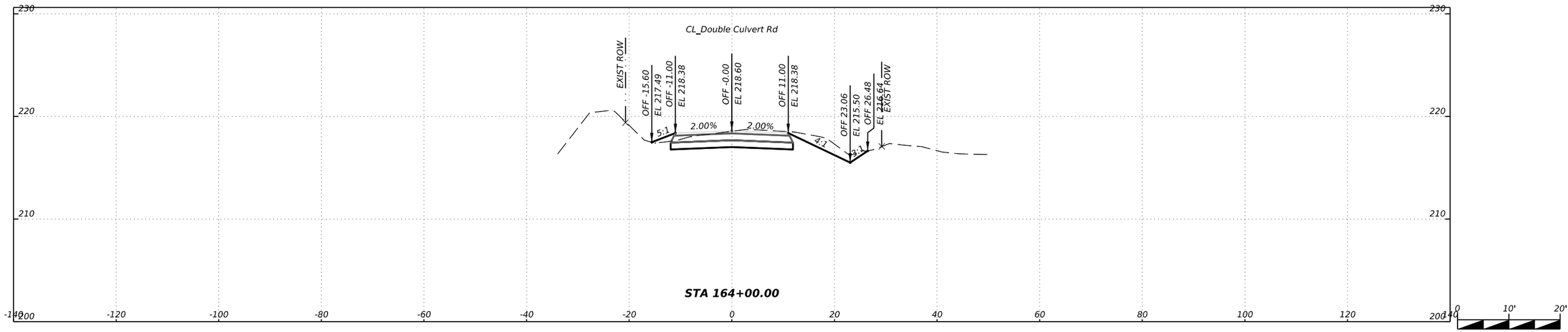
CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
RAY N. HILL
84626
LICENSED
PROFESSIONAL ENGINEER

R. N. Hill, P.E.
$DATE$

100% SUBMITTAL





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CROSS SECTIONS
DOUBLE CULVERT RD

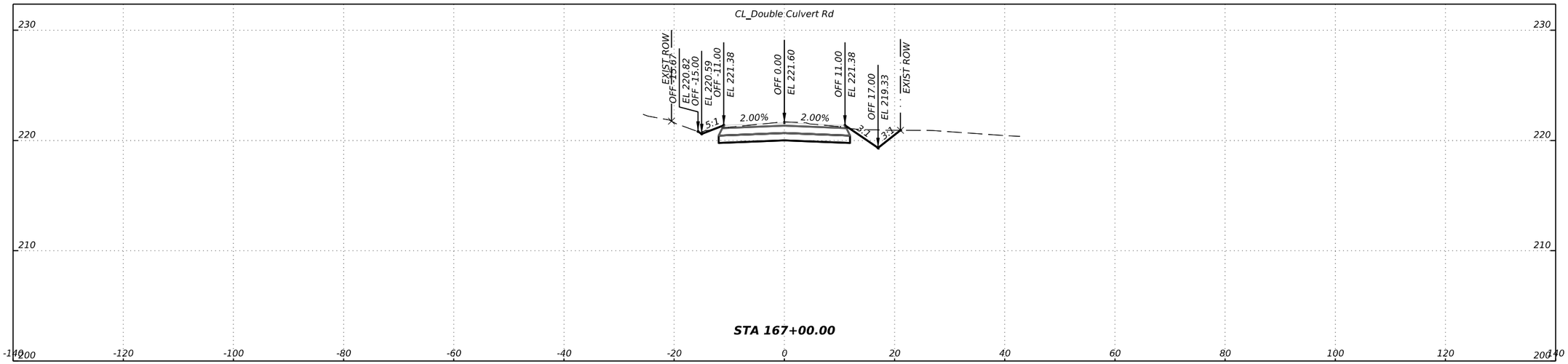
CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

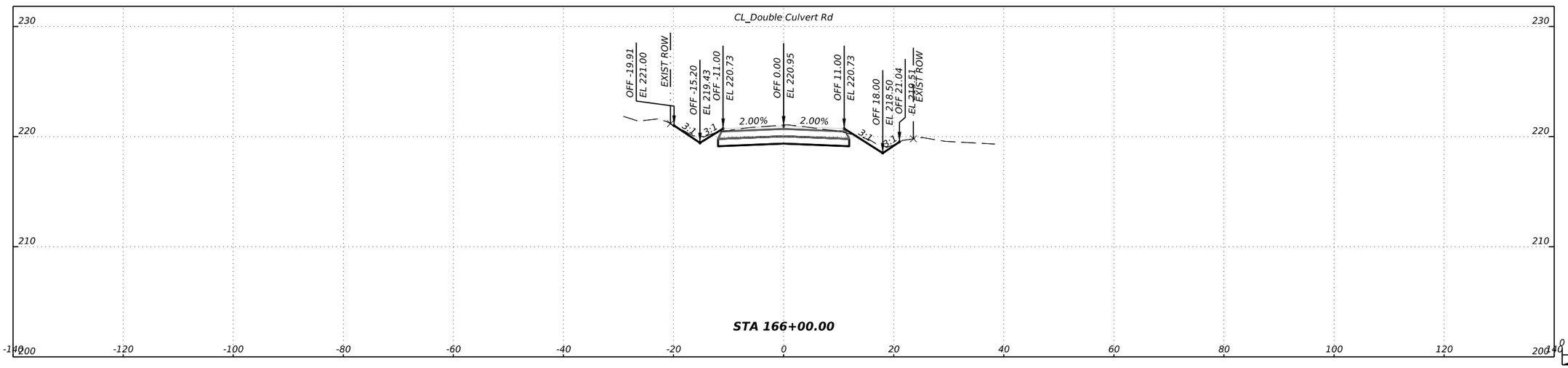


R. N. Bill, P.E.
$DATE$

SHEET NO:
209 / 244

100% SUBMITTAL





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WALLER COUNTY ENGINEERING DEPARTMENT

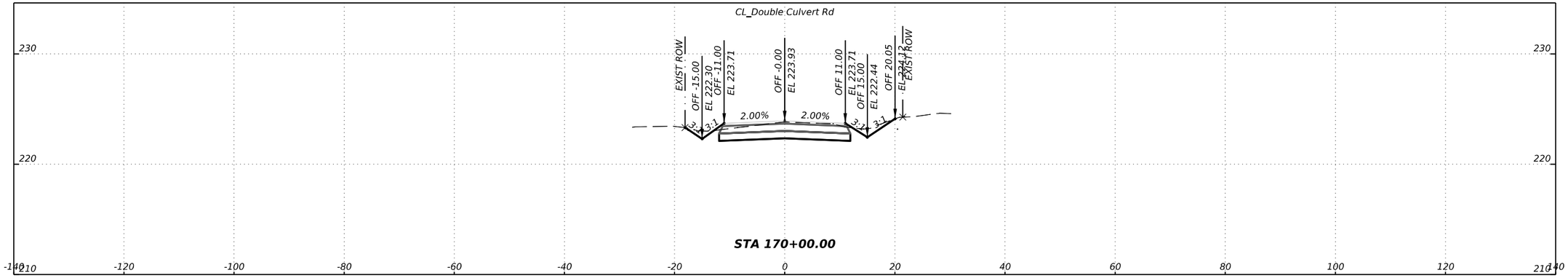
CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

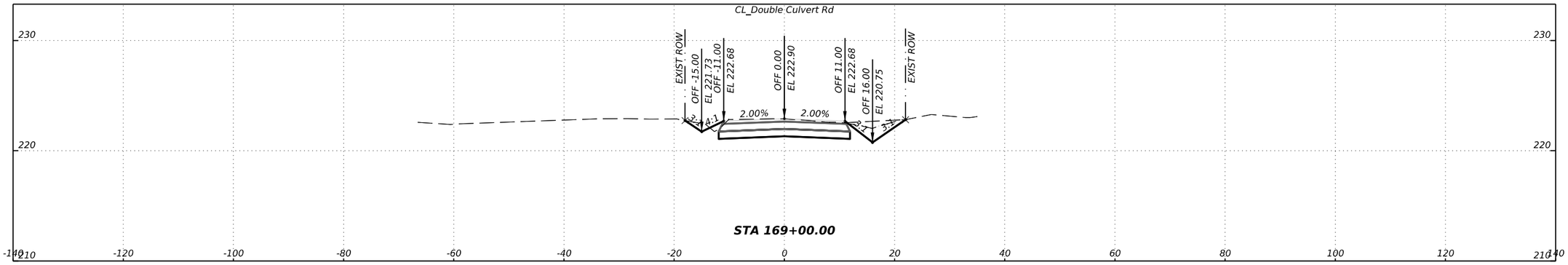
CROSS SECTIONS
DOUBLE CULVERT RD

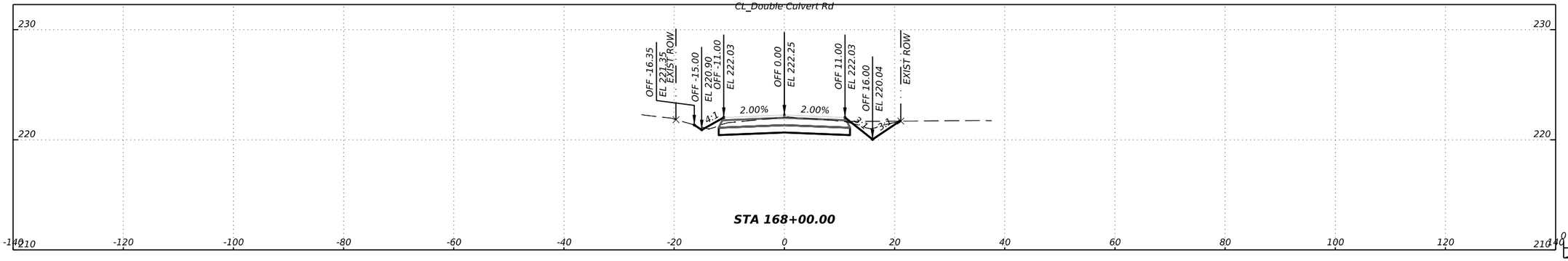
CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252
STATE OF TEXAS
RAY N. DILL
84626
LICENSED
PROFESSIONAL ENGINEER
R. N. Dill, P.E.
$DATE$

SHEET NO:
210 / 244

100% SUBMITTAL







0 10' 20'

SCALE: 1" = 20' H
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WALLER COUNTY
ENGINEERING DEPARTMENT

THE STATE OF TEXAS
WALLER COUNTY

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CROSS SECTIONS
DOUBLE CULVERT RD

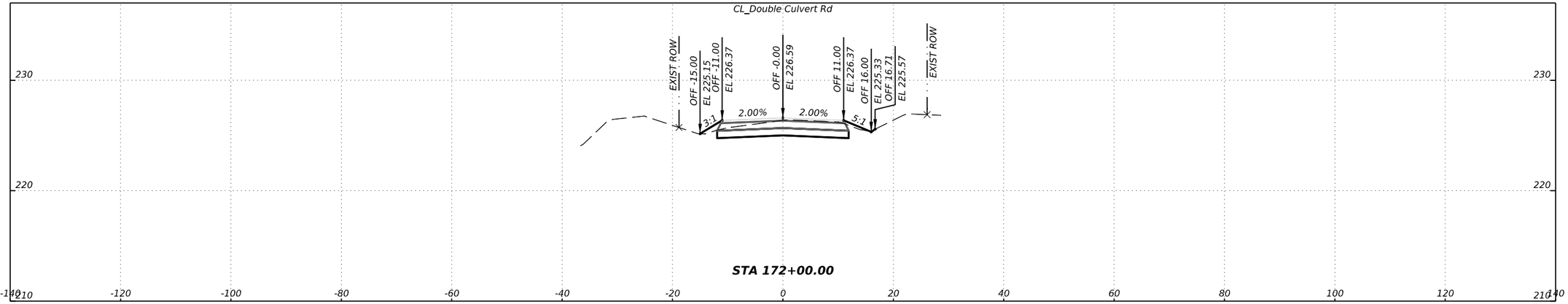
CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

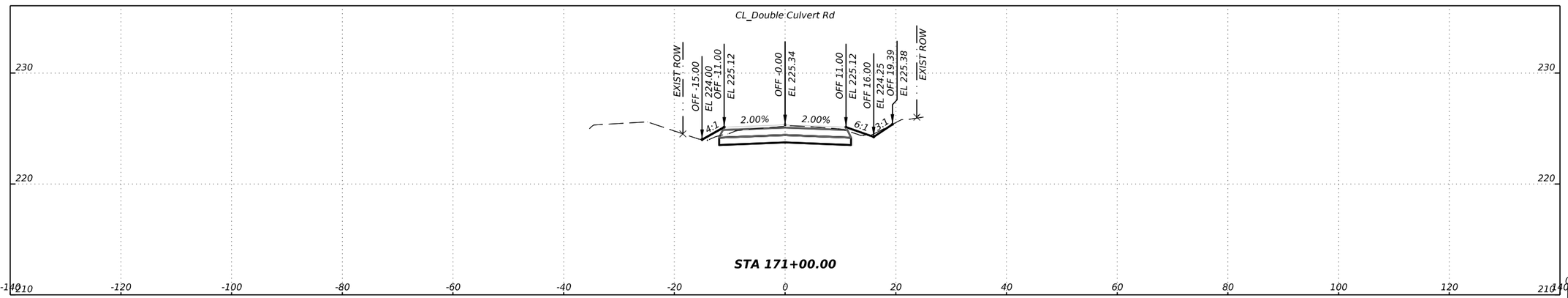
STATE OF TEXAS
ROY N. HILL
84626
LICENSED
PROFESSIONAL ENGINEER

R. N. Hill, P.E.
@DATE@

SHEET NO:
211/244

100% SUBMITTAL





0 10' 20'
SCALE: 1" = 20' H
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$TIME$

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WALLER COUNTY ENGINEERING DEPARTMENT

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CROSS SECTIONS
DOUBLE CULVERT RD

CIVILCORP, LLC
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STATE OF TEXAS
ROY N. BILL
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LICENSED
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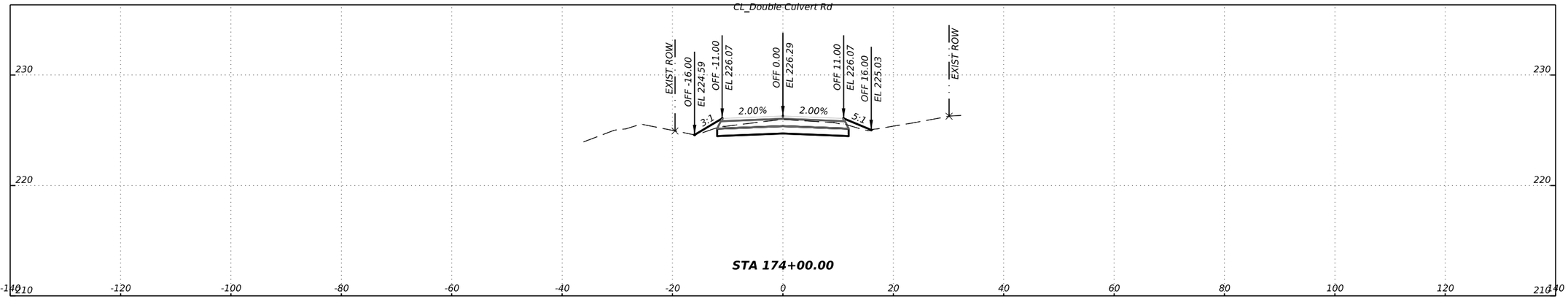
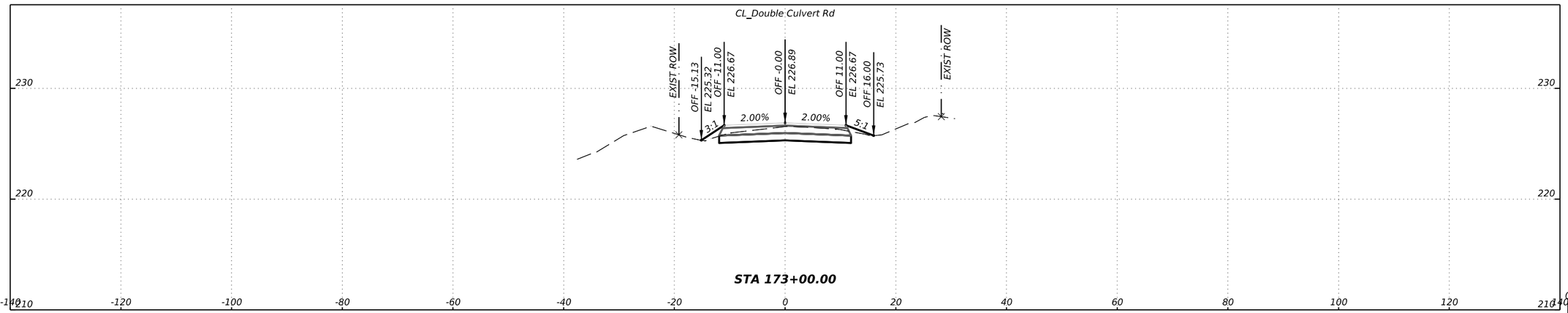
R. N. Bill, P.E.
@DATE@

SHEET NO:
212 / 244

100% SUBMITTAL





0 10' 20'

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WALLER COUNTY ENGINEERING DEPARTMENT

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CROSS SECTIONS
DOUBLE CULVERT RD

CIVILCORP, LLC
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STATE OF TEXAS
RAY M. DILL
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R. M. Dill, P.E.
@DATE@

SHEET NO:
213 / 244

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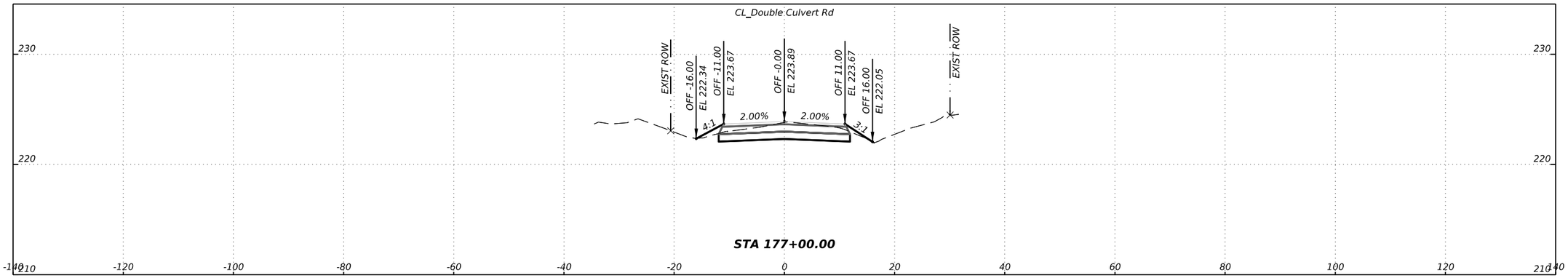

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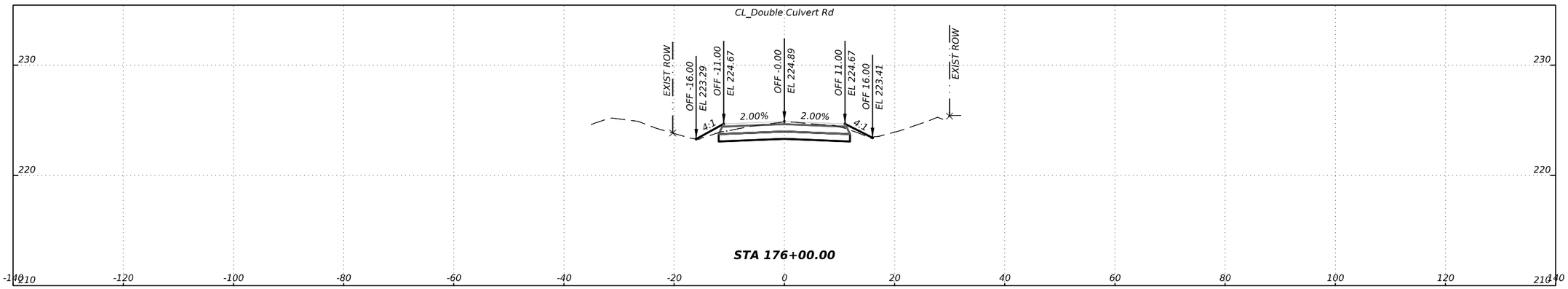

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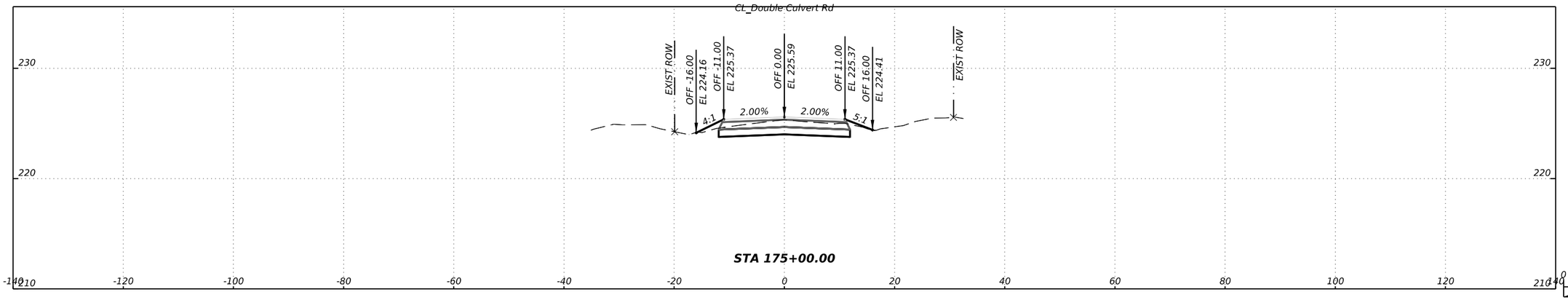

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0 10' 20'

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STATE OF TEXAS
MAY N. BILL
84626
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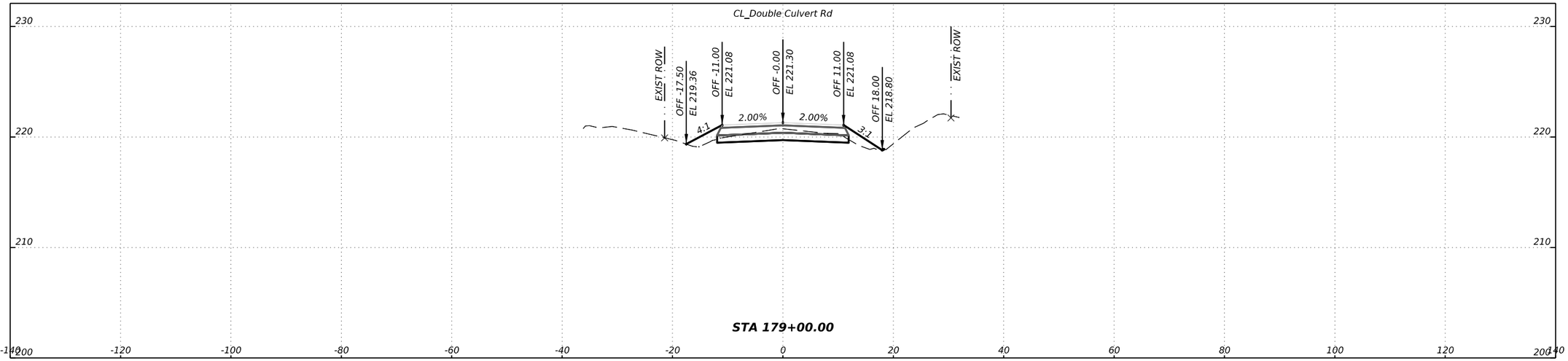
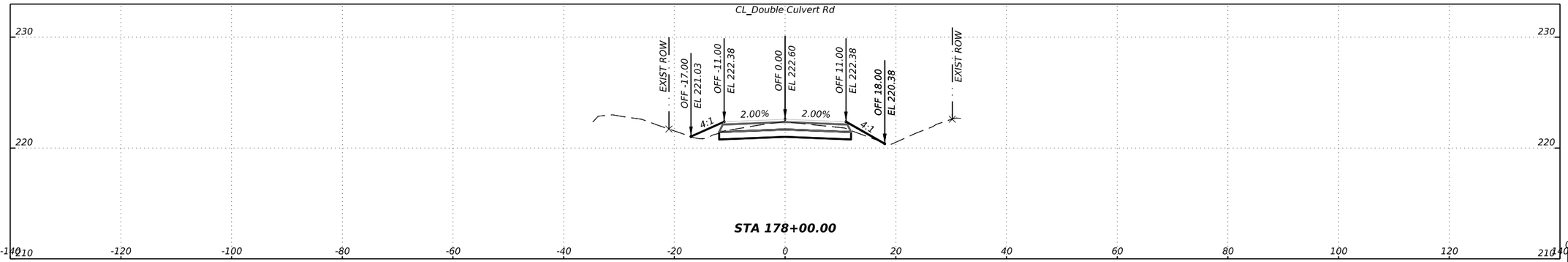
$DATE$

R. M. Bill, P.E.

SHEET NO:
214 / 244

100% SUBMITTAL





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SHEET NO:
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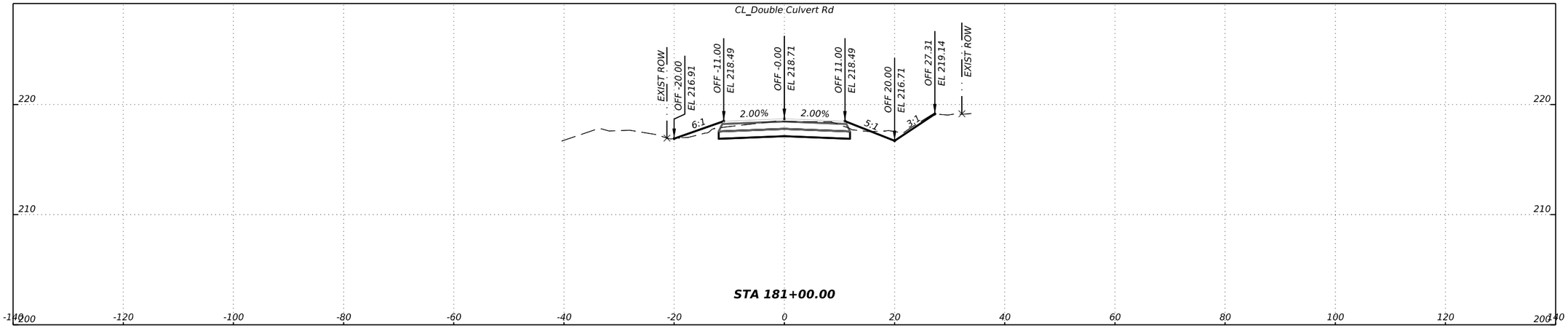
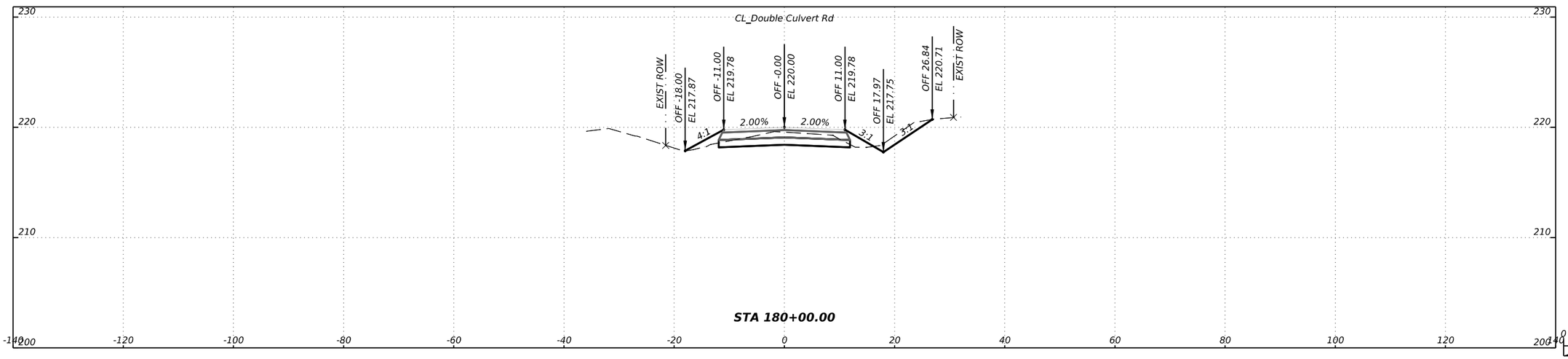
100% SUBMITTAL





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FILE: $FILE$

NO.	REVISIONS	DATE	NAME
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WALLER COUNTY
ENGINEERING DEPARTMENT

THE STATE OF TEXAS
WALLER COUNTY

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

CROSS SECTIONS
DOUBLE CULVERT RD

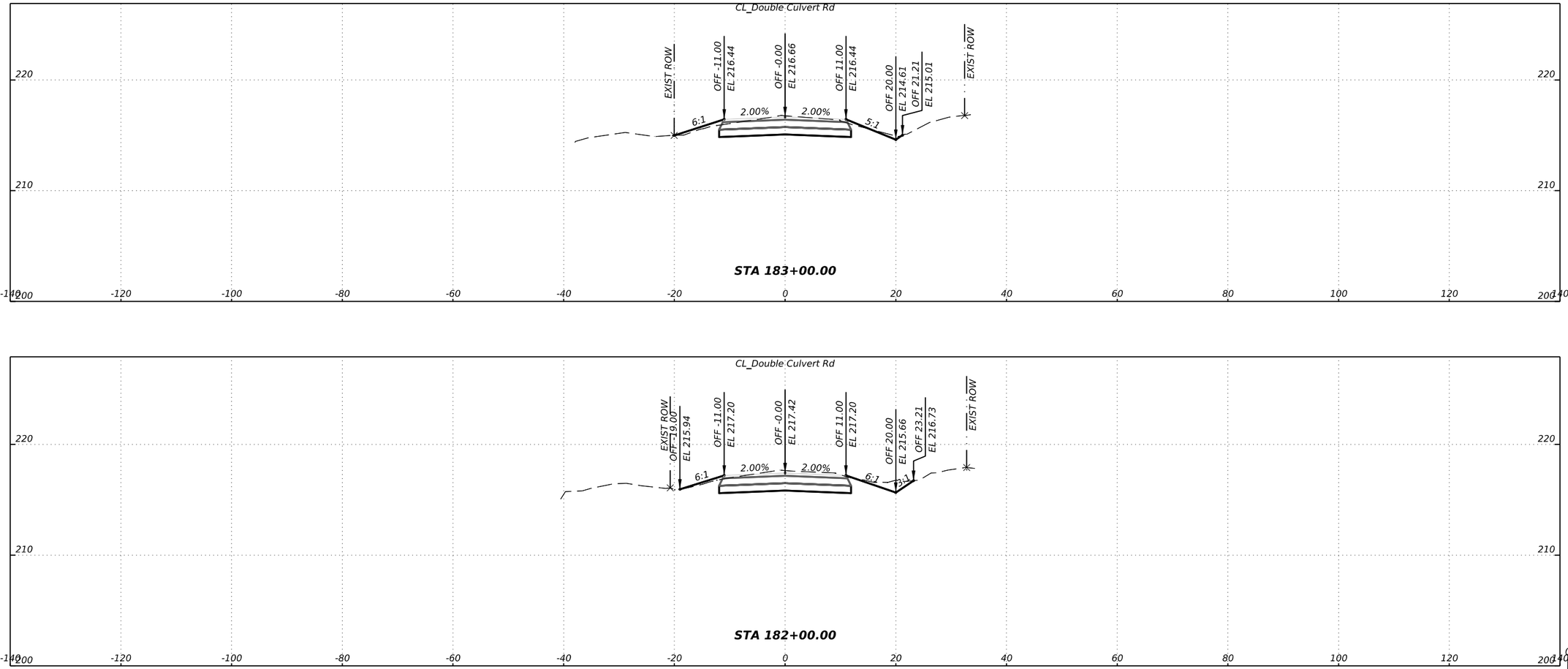
CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY N. BILL
84626
LICENSED
PROFESSIONAL ENGINEER

R. N. Bill, P.E.
@DATE@

SHEET NO:
216 / 244

100% SUBMITTAL



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STATE OF TEXAS
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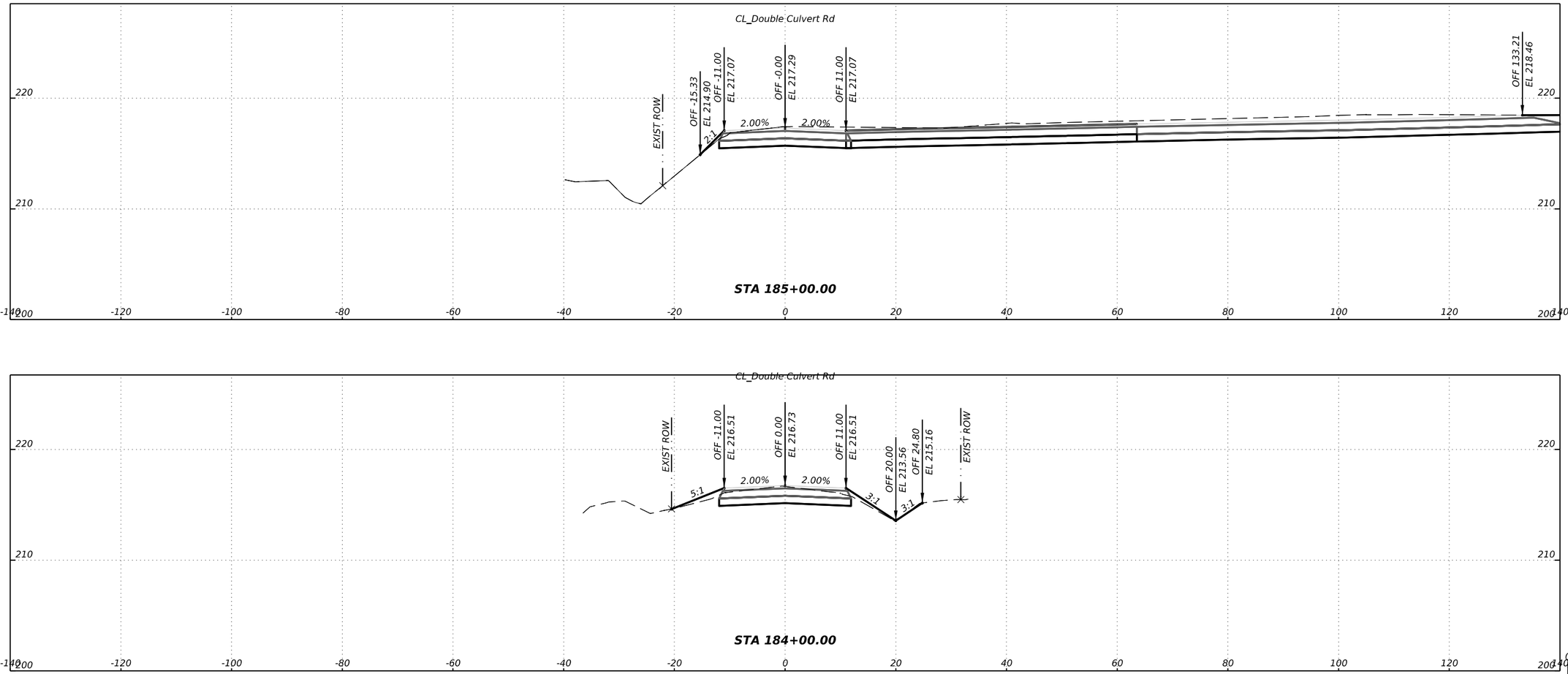
84626
LICENSED
PROFESSIONAL ENGINEER

R. N. Bill, P.E.
@DATE@

SHEET NO:
217 / 244

100% SUBMITTAL



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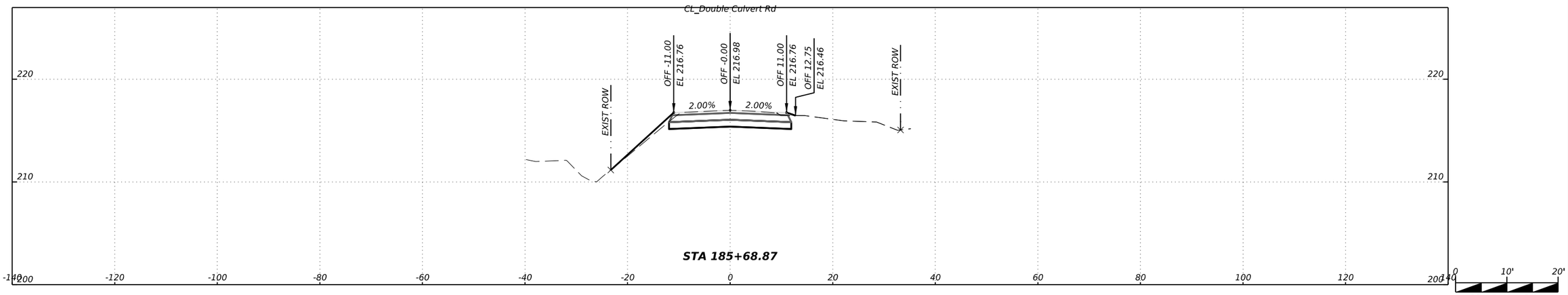
DOUBLE CULVERT RD

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
RAY N. HILL
84626
LICENSED
PROFESSIONAL ENGINEER

R. N. Hill, P.E.
@DATE@

100% SUBMITTAL



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DOUBLE CULVERT RD

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252
STATE OF TEXAS
ROY N. HILL
84626
LICENSED
PROFESSIONAL ENGINEER
R. N. Hill, P.E.
@DATE@

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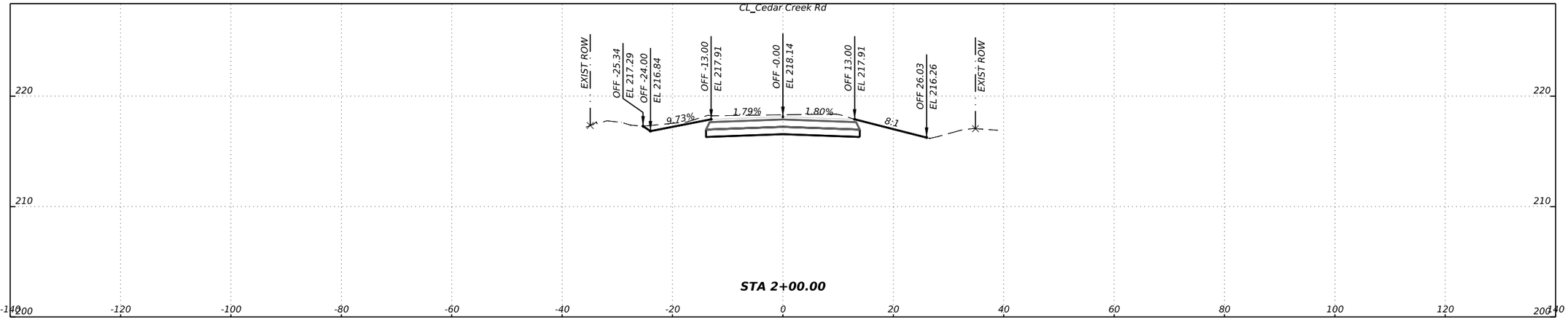

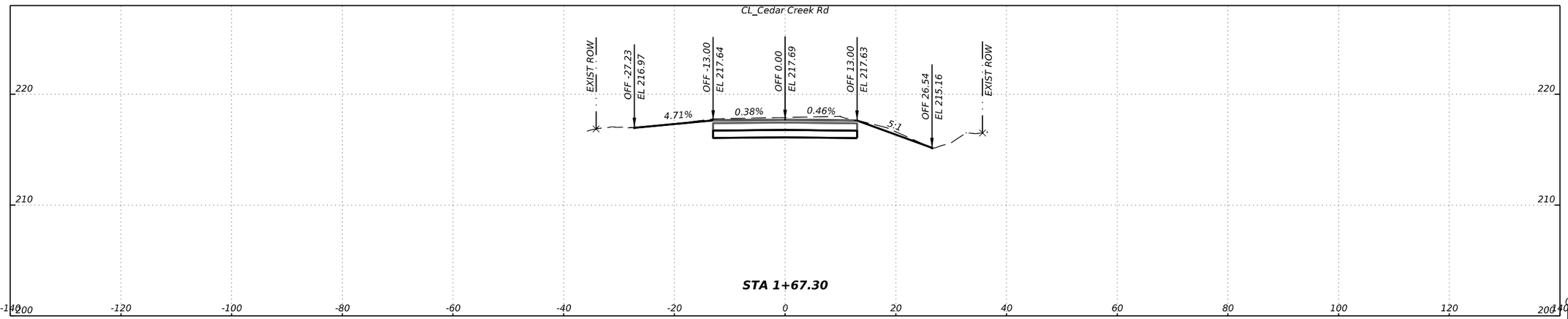

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CROSS SECTIONS
CEDAR CREEK RD

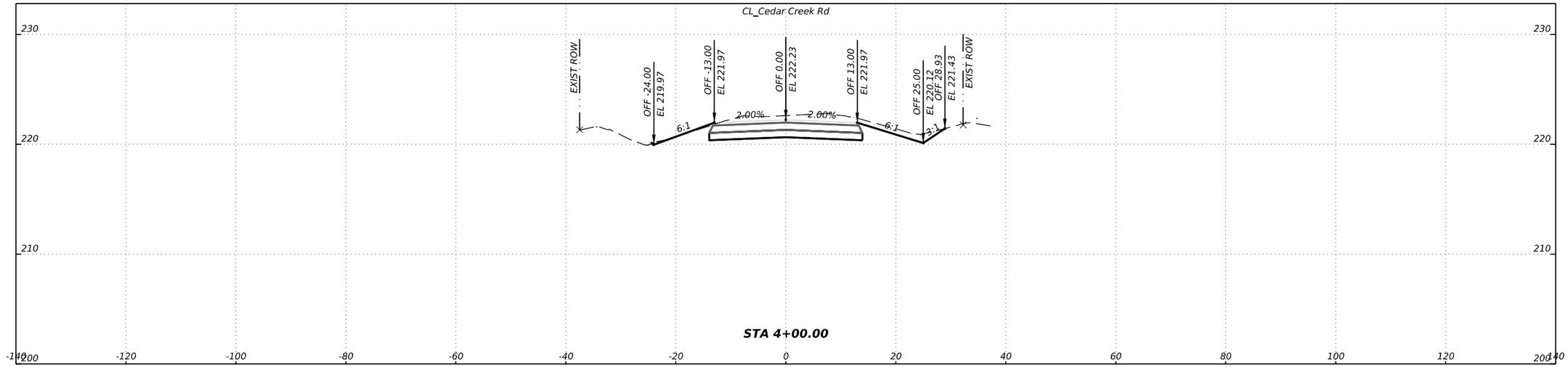
CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

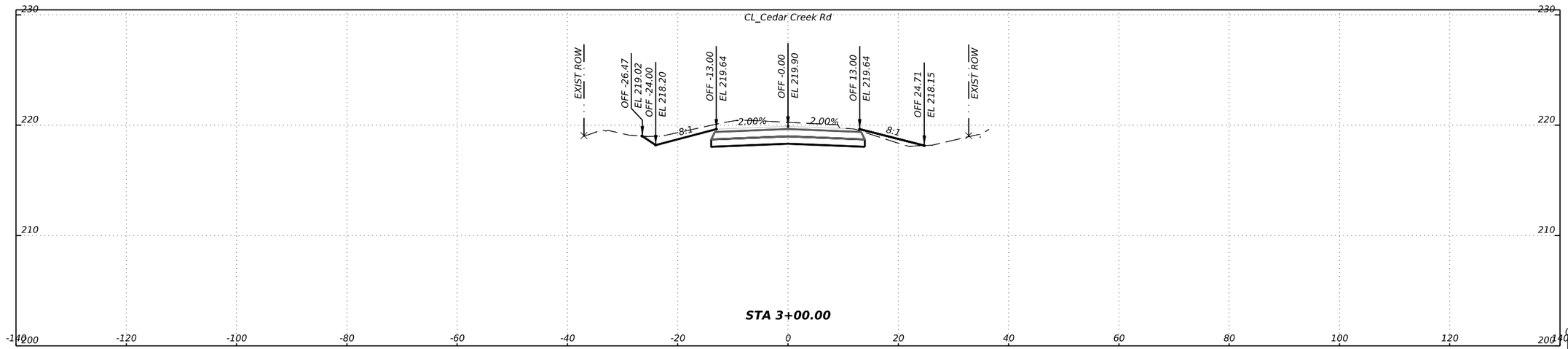
STATE OF TEXAS
RAY M. DILL
84626
LICENSED
PROFESSIONAL ENGINEER

R. M. Dill, P.E.
@DATE@

SHEET NO:
220 / 244

100% SUBMITTAL





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WALLER COUNTY ENGINEERING DEPARTMENT

THE STATE OF TEXAS
WALLER COUNTY

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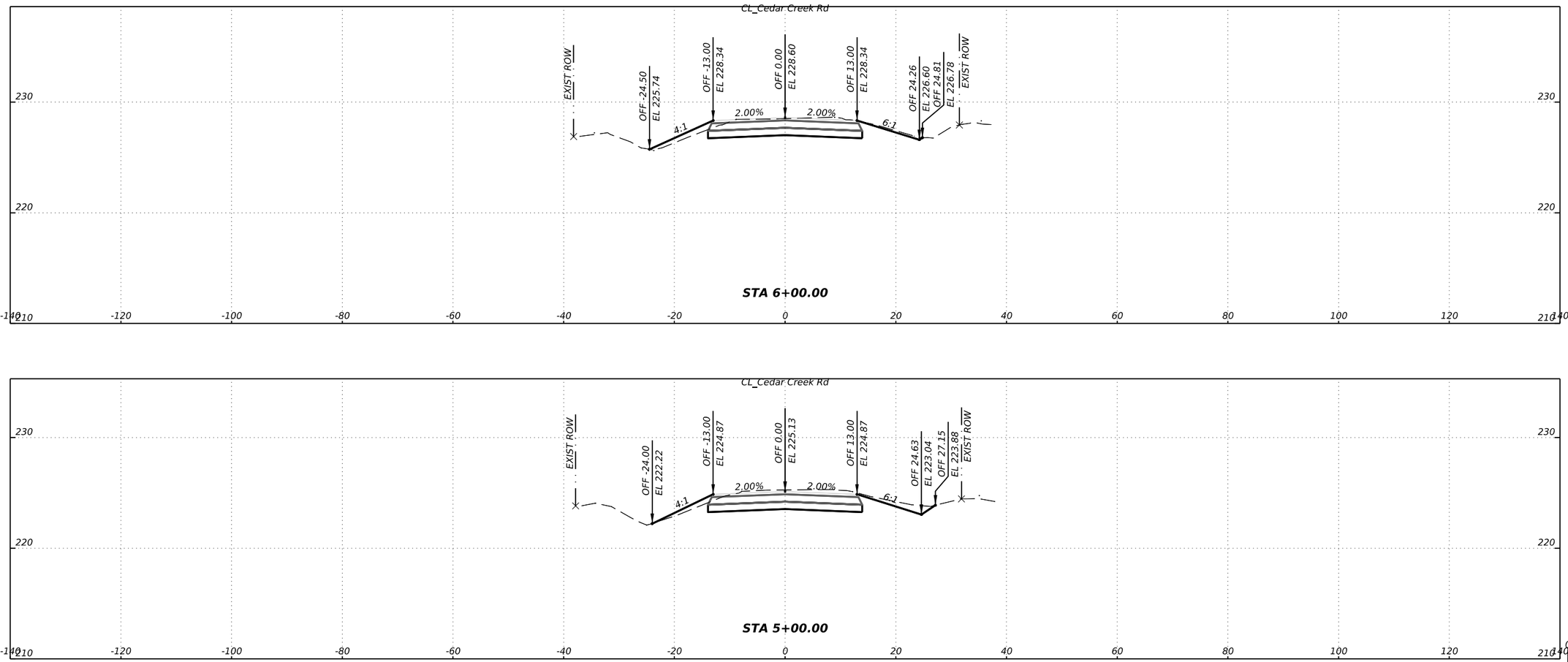
CROSS SECTIONS
CEDAR CREEK RD

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252
STATE OF TEXAS
ROY W. BILL
84626
LICENSED
PROFESSIONAL ENGINEER
R. W. Bill, P.E.
@DATE@

100% SUBMITTAL



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WALLER COUNTY
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CROSS SECTIONS
CEDAR CREEK RD

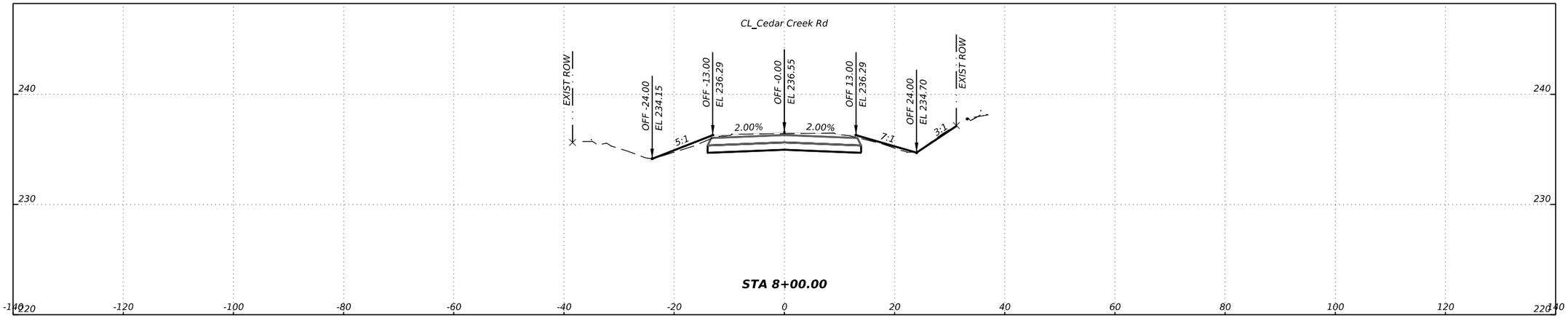
CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

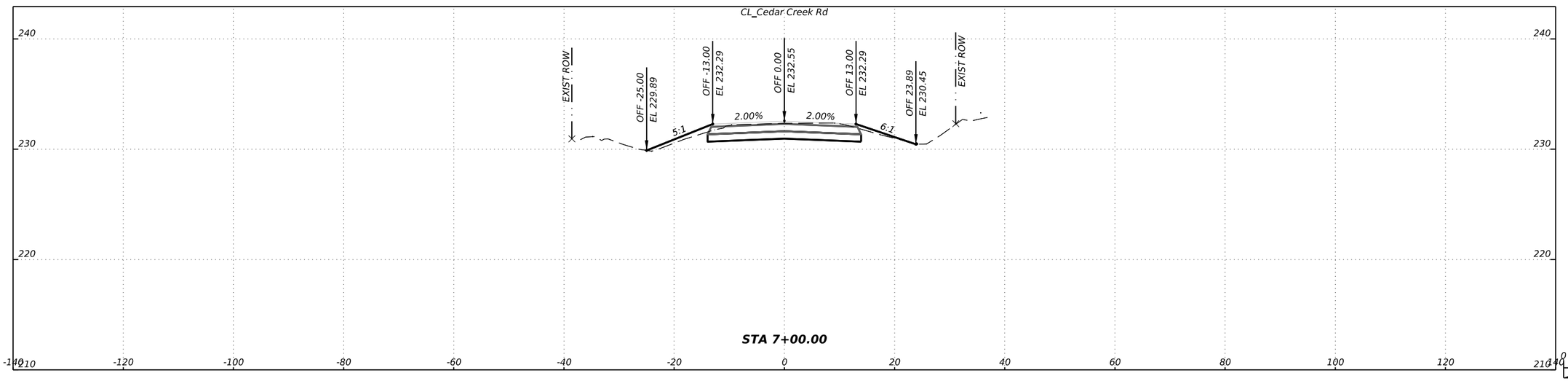
STATE OF TEXAS
ROY N. HILL
84626
LICENSED
PROFESSIONAL ENGINEER

R. N. Hill, P.E.
@DATE@

SHEET NO:
222 / 244

100% SUBMITTAL





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WALLER COUNTY ENGINEERING DEPARTMENT

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

CROSS SECTIONS
CEDAR CREEK RD

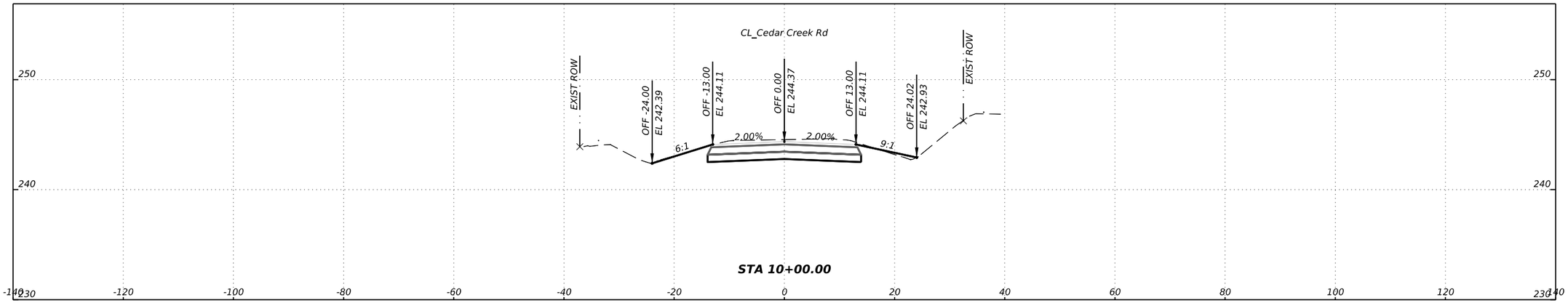
CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

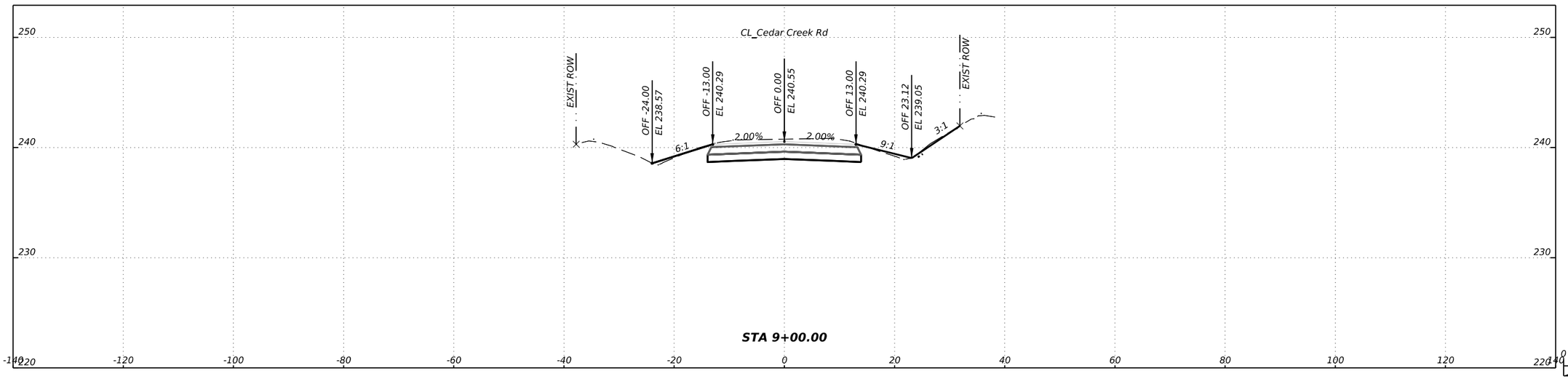
STATE OF TEXAS
MAY W. HILL
84626
LICENSED
PROFESSIONAL ENGINEER

R. M. Hill, P.E.
@DATE@

SHEET NO:
223 / 244

100% SUBMITTAL





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WALLER COUNTY ENGINEERING DEPARTMENT

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CROSS SECTIONS
CEDAR CREEK RD

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252
THE STATE OF TEXAS
MAY W. HILL
84626
LICENSED PROFESSIONAL ENGINEER
R. M. Hill, P.E.
@DATE@

SHEET NO:
224 / 244

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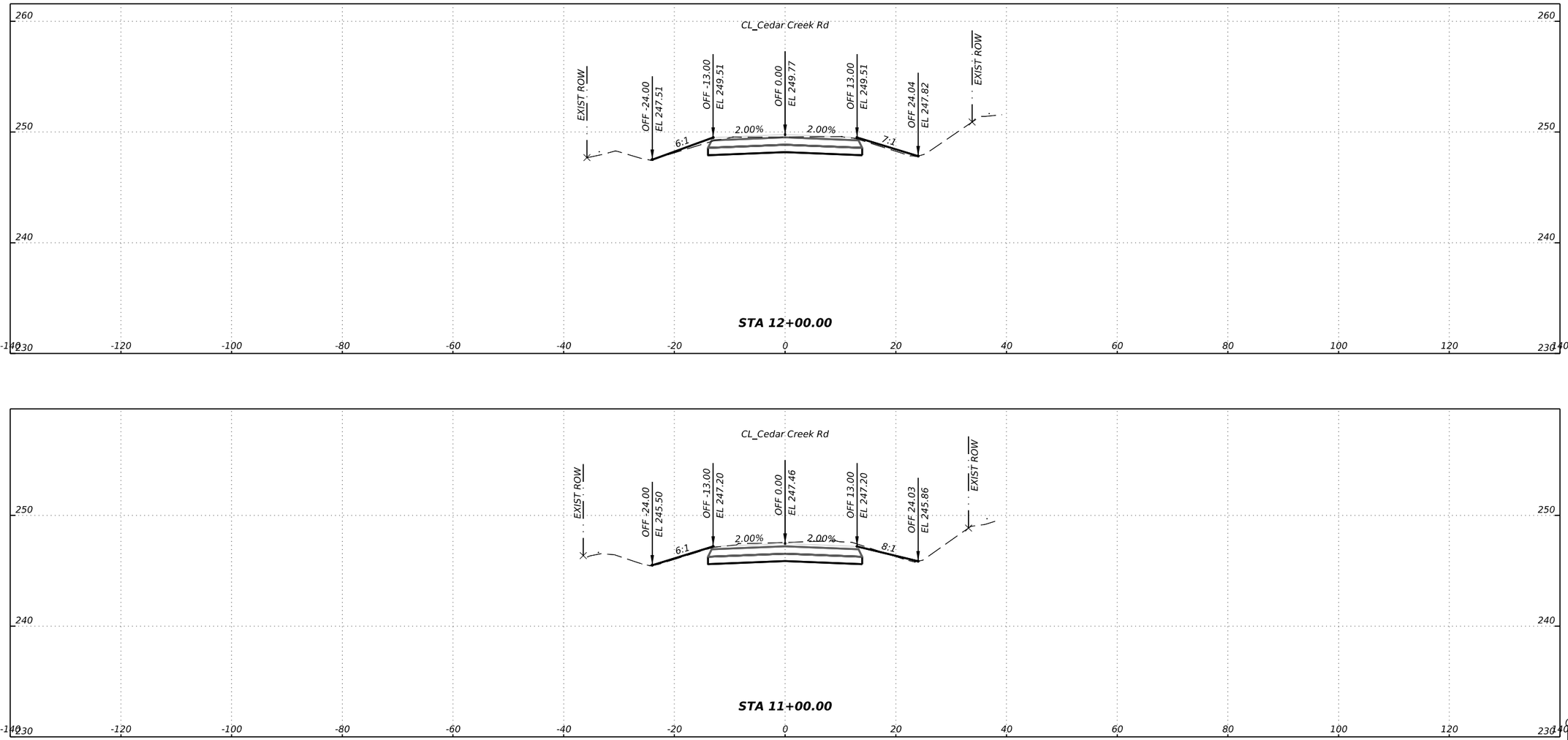

$TIME$

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DATE: $DATE$
FILE: $FILE$

WALLER COUNTY ENGINEERING DEPARTMENT

THE STATE OF TEXAS
WALLER COUNTY

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

CROSS SECTIONS
CEDAR CREEK RD

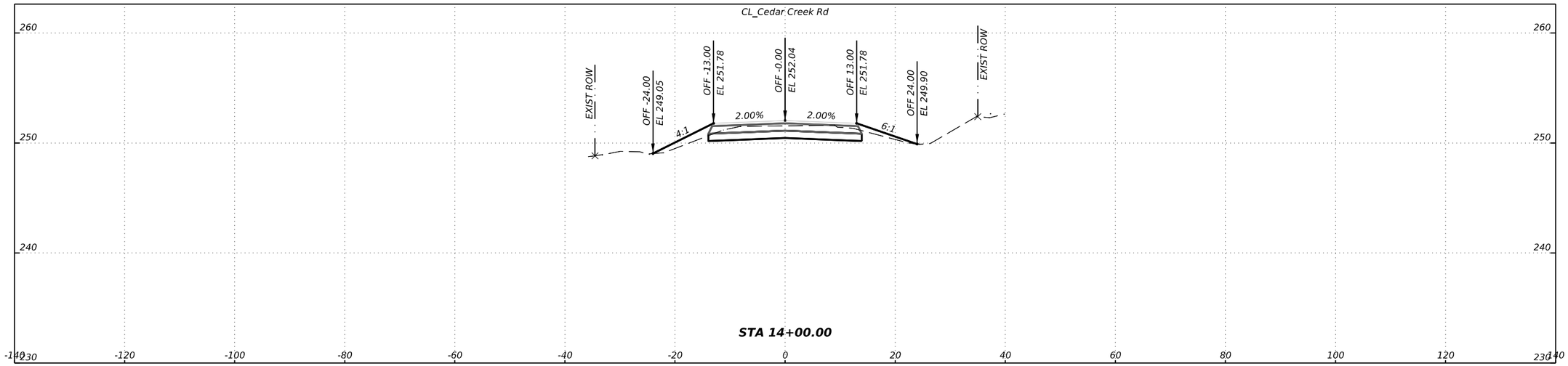
CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
RAY N. BILL
84626
LICENSED
PROFESSIONAL ENGINEER

R. N. Bill, P.E.
$DATE$

SHEET NO:
225 / 244

100% SUBMITTAL



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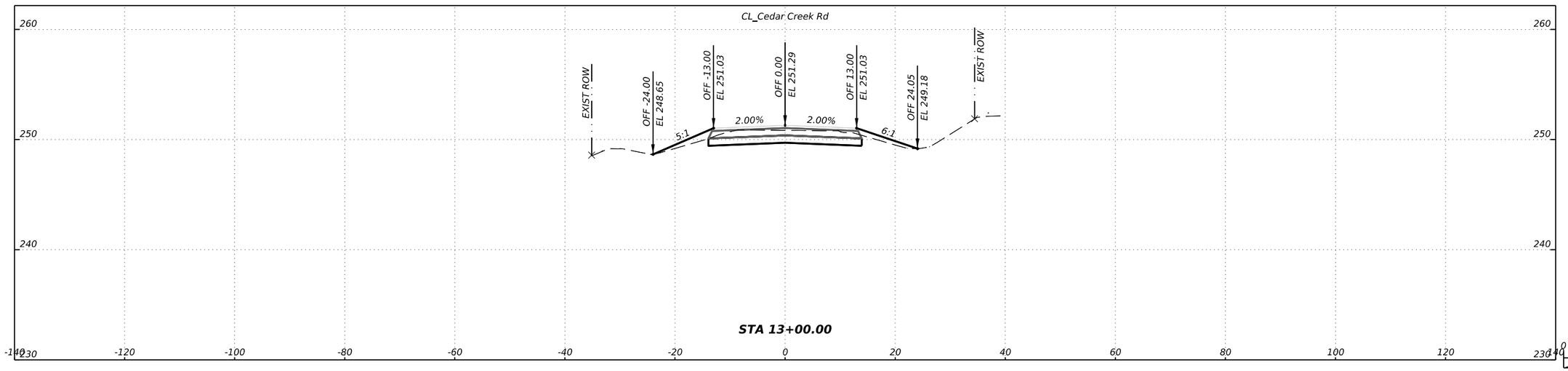

STA 13+00.00

0 10' 20'

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

$TIME$

DATE: $DATE$
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NO.	REVISIONS	DATE	NAME
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WALLER COUNTY ENGINEERING DEPARTMENT

THE STATE OF TEXAS
WALLER COUNTY

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

CROSS SECTIONS
CEDAR CREEK RD

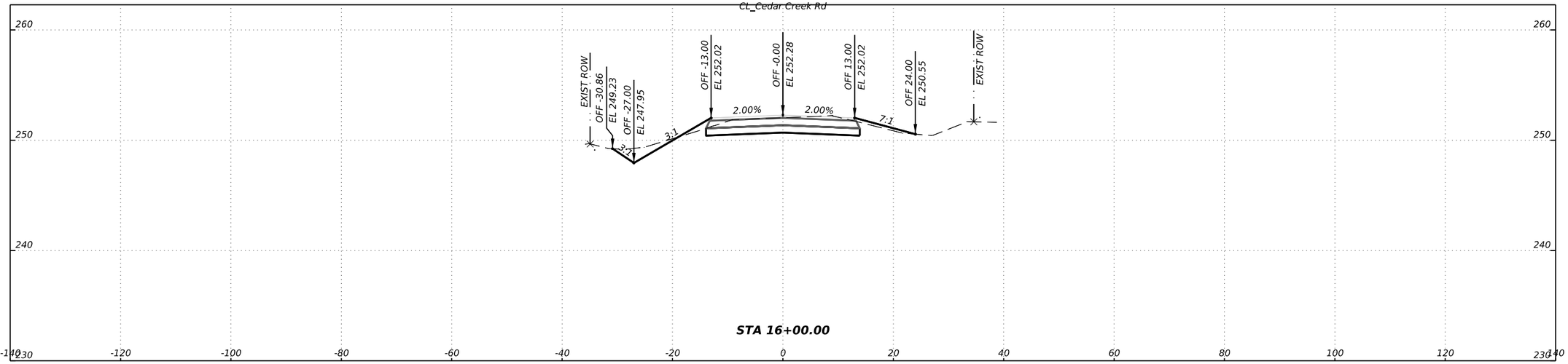
CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

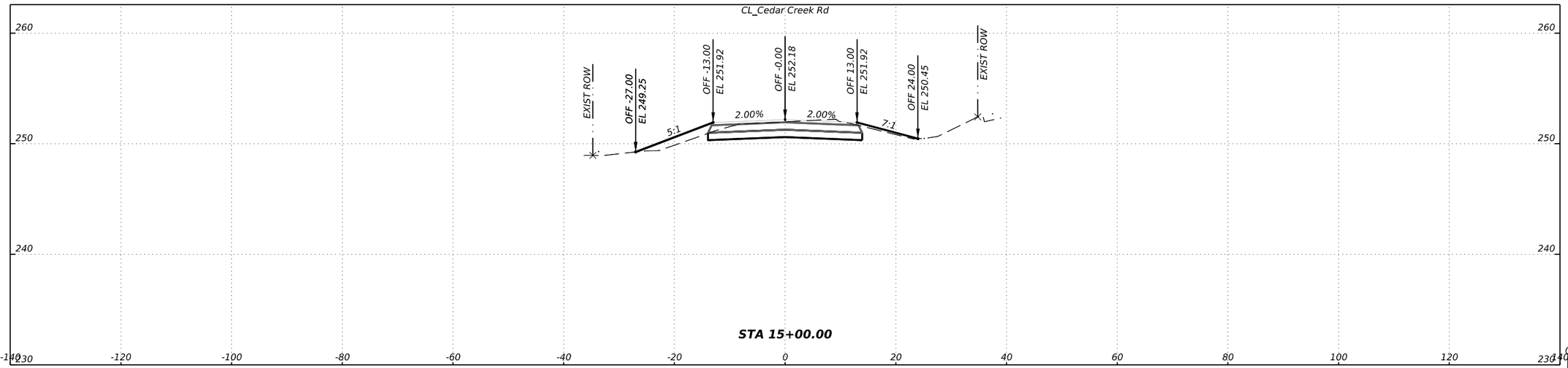
THE STATE OF TEXAS
ROY W. BILL
84626
LICENSED
PROFESSIONAL ENGINEER
$DATE$

R. W. Bill, P.E.

SHEET NO:
226 / 244

100% SUBMITTAL





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WALLER COUNTY
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THE STATE OF TEXAS
WALLER COUNTY

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29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
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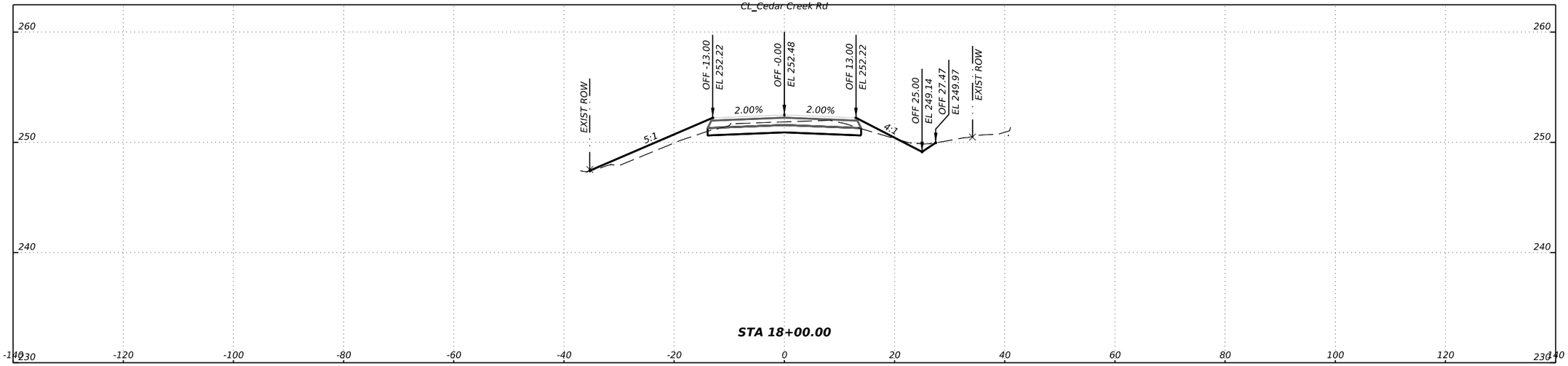
CROSS SECTIONS
CEDAR CREEK RD

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252
STATE OF TEXAS
ROY N. HILL
84626
LICENSED
PROFESSIONAL ENGINEER
R. N. Hill, P.E.
@DATE@

SHEET NO:
227 / 244

100% SUBMITTAL



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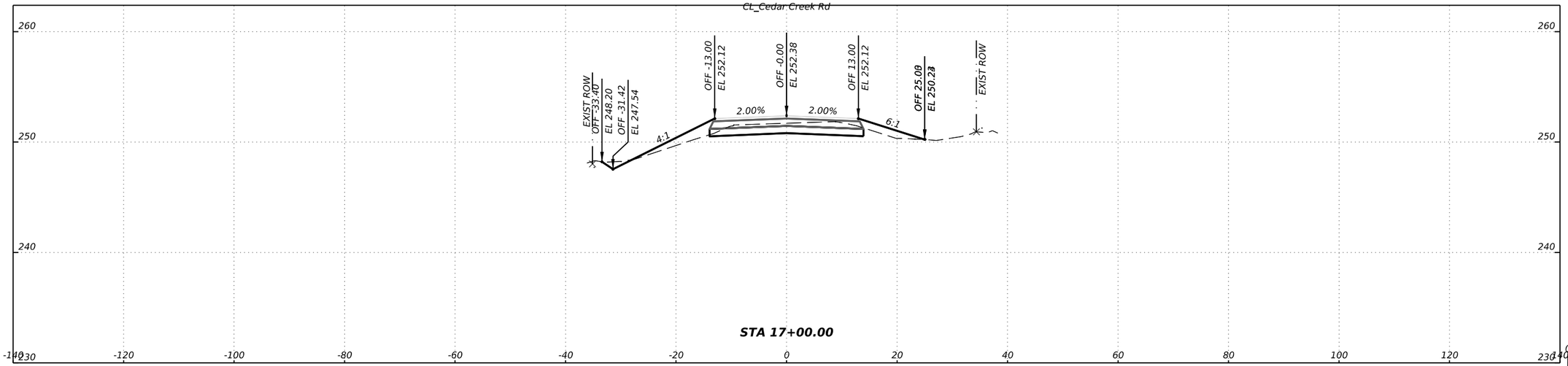

STA 17+00.00

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

$TIME$

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FILE: $FILE$

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WALLER COUNTY
ENGINEERING DEPARTMENT

THE STATE OF TEXAS
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CROSS SECTIONS
CEDAR CREEK RD

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY M. DILL
84626
LICENSED
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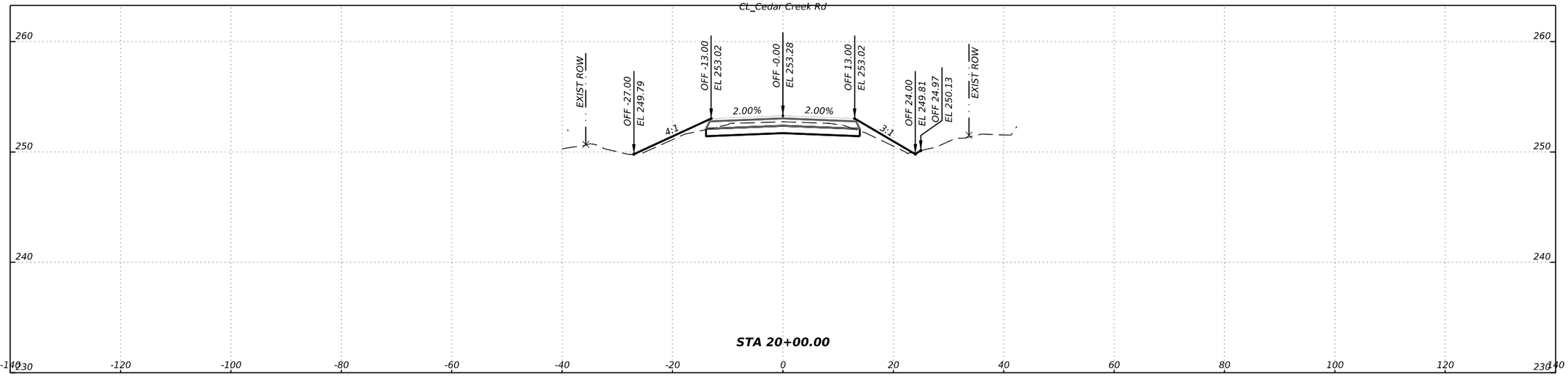
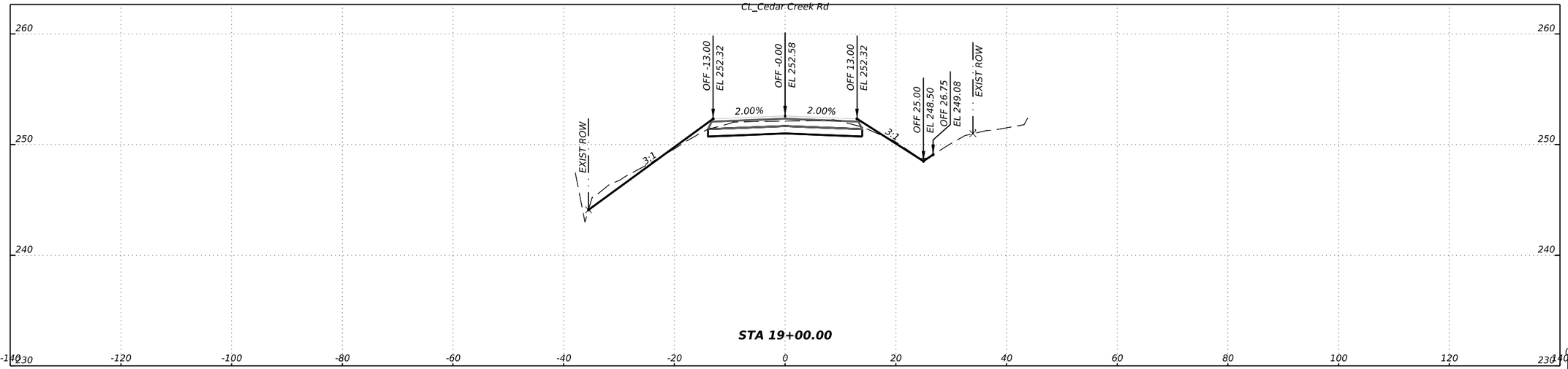
R. M. Dill, P.E.
@DATE@

SHEET NO:
228 / 244

100% SUBMITTAL





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WALLER COUNTY
ENGINEERING DEPARTMENT

THE STATE OF TEXAS
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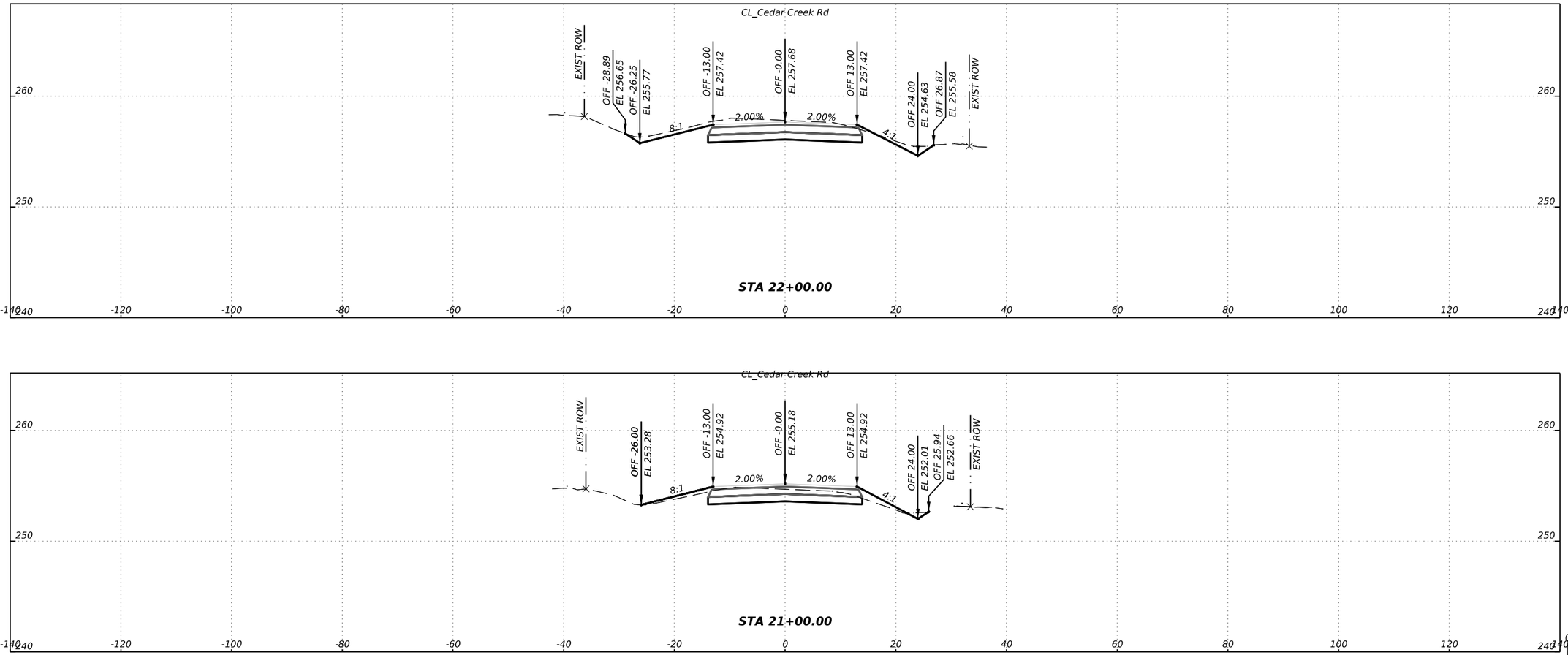
CROSS SECTIONS
CEDAR CREEK RD

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

STATE OF TEXAS
ROY N. HILL
84626
LICENSED
PROFESSIONAL ENGINEER
R. N. Hill, P.E.
@DATE@

SHEET NO:
229 / 244

100% SUBMITTAL



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CEDAR CREEK RD

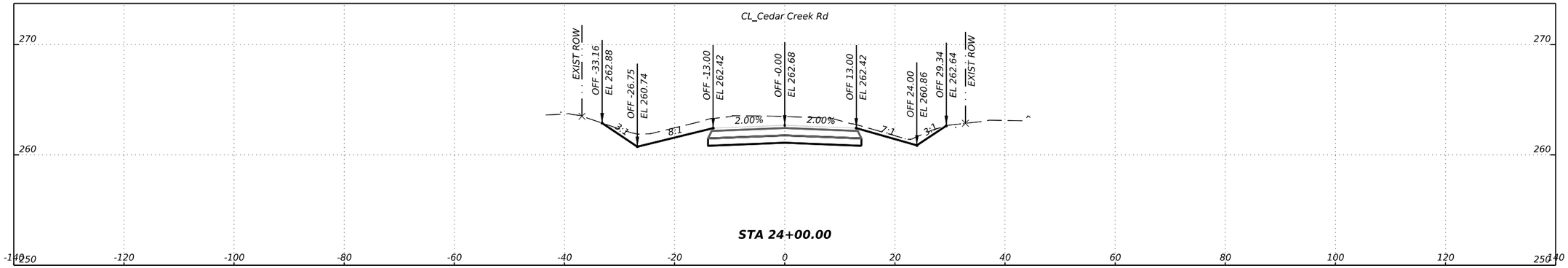
CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

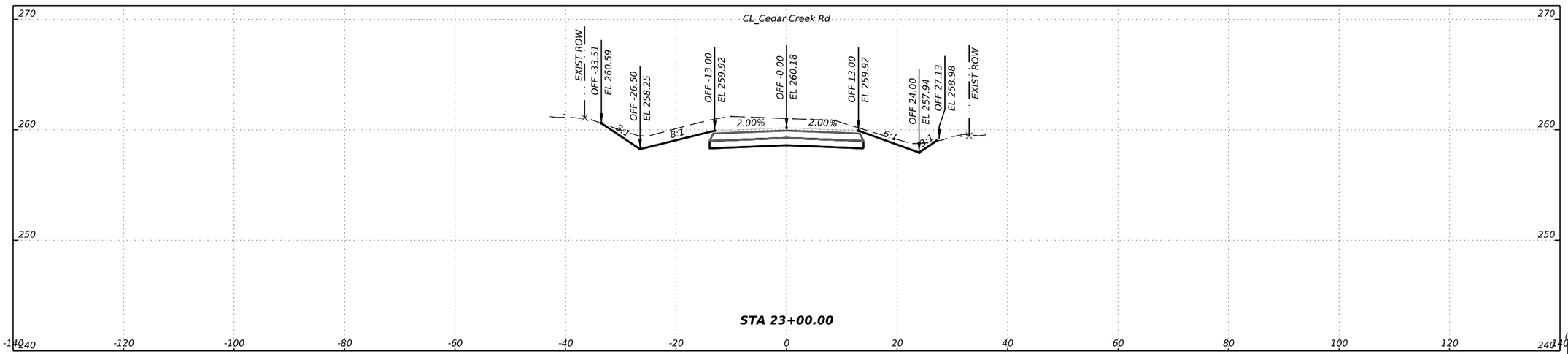
STATE OF TEXAS
ROY N. BILL
84626
LICENSED
PROFESSIONAL ENGINEER

R. N. Bill, P.E.
$DATE$

SHEET NO:
230 / 244

100% SUBMITTAL





0 10' 20'

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

$TIME$

DATE: $DATE$
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CEDAR CREEK RD

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STATE OF TEXAS
ROY W. BILL
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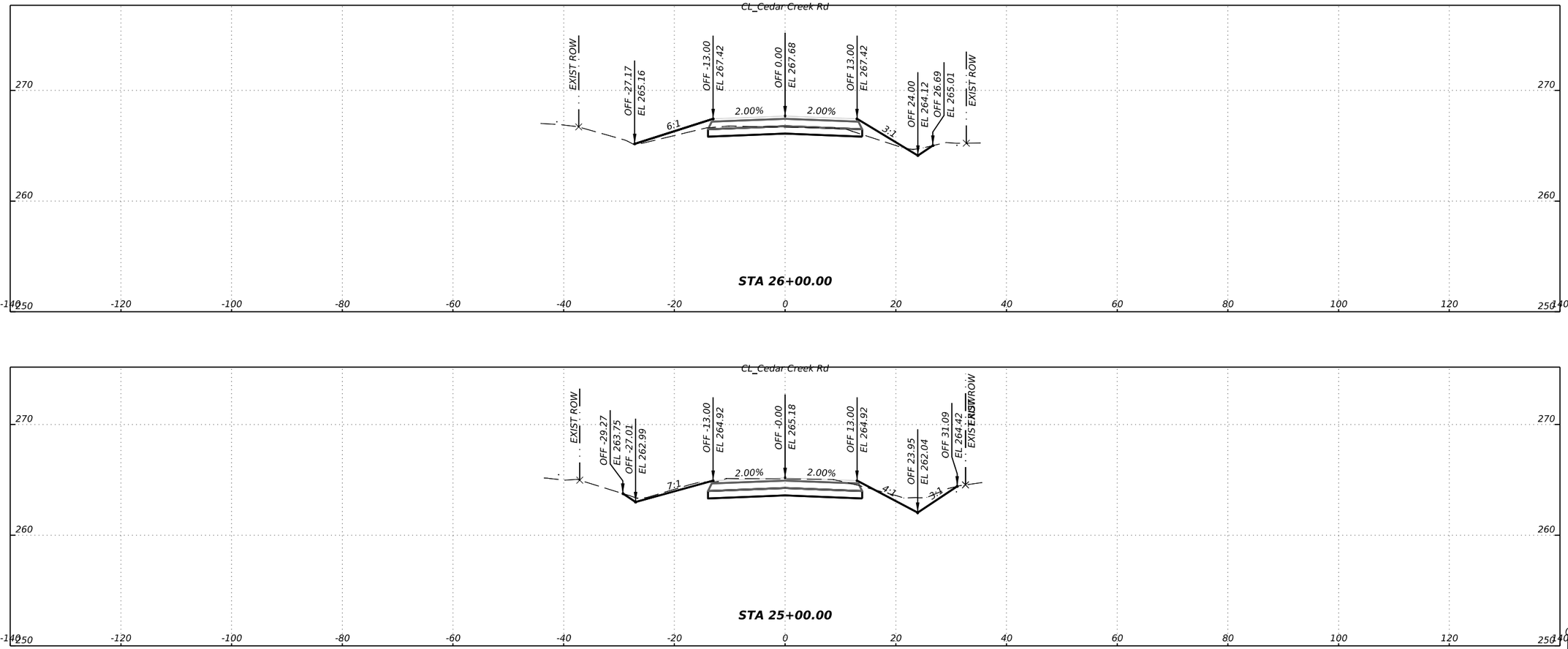
R. W. Bill, P.E.
$DATE$

SHEET NO:
231/244

100% SUBMITTAL



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CROSS SECTIONS
CEDAR CREEK RD

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STATE OF TEXAS
RAY N. BILL
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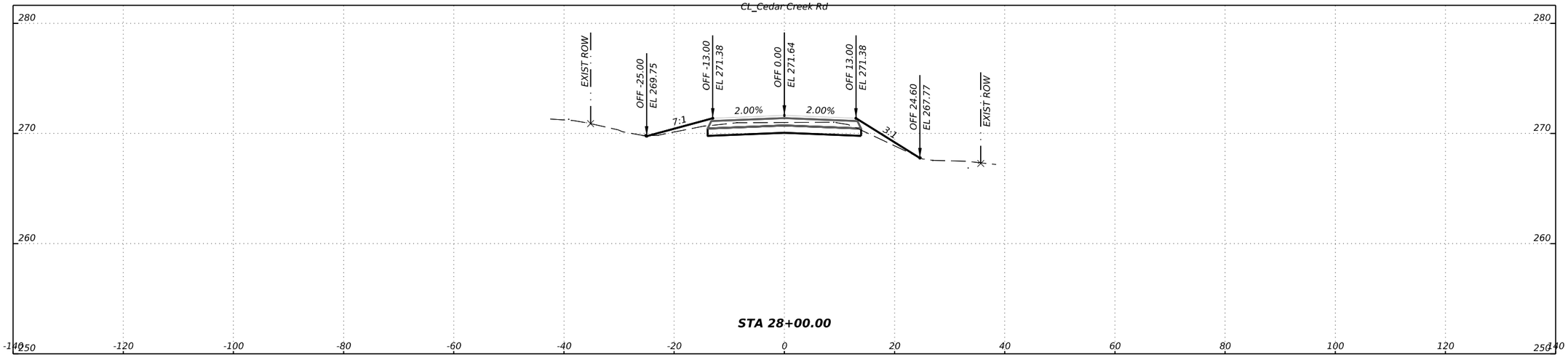
SHEET NO:
232 / 244

100% SUBMITTAL



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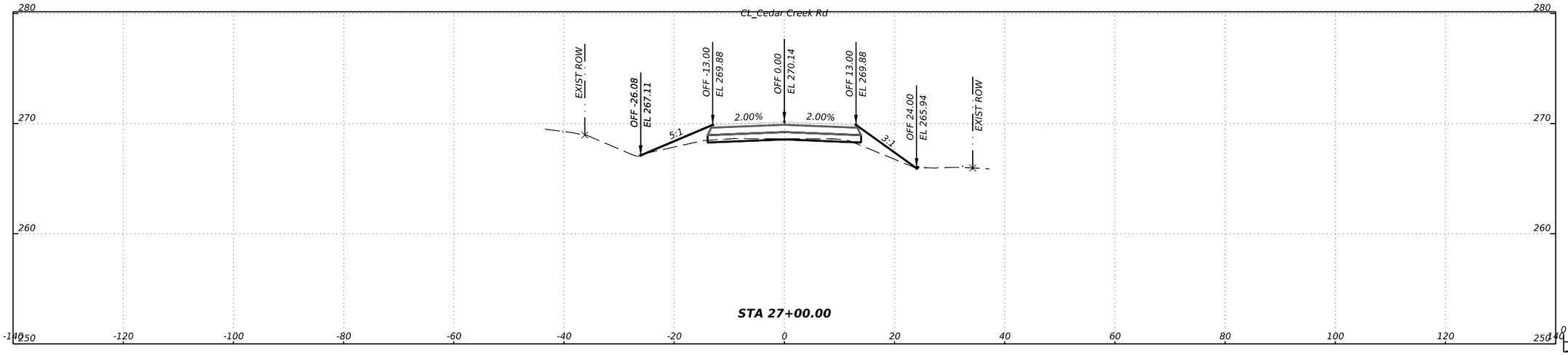

STA 27+00.00

0 10' 20'

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

$TIME$

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DATE: $DATE$
FILE: $FILE$

WALLER COUNTY ENGINEERING DEPARTMENT

THE STATE OF TEXAS
WALLER COUNTY

CivilCorp
an ESP COMPANY
29255 FM 1093, SUITE 7A, FULSHEAR, TEXAS 77441
TEL: 832-252-8100 FAX: 832-252-8103 TBPE F-17252

CROSS SECTIONS
CEDAR CREEK RD

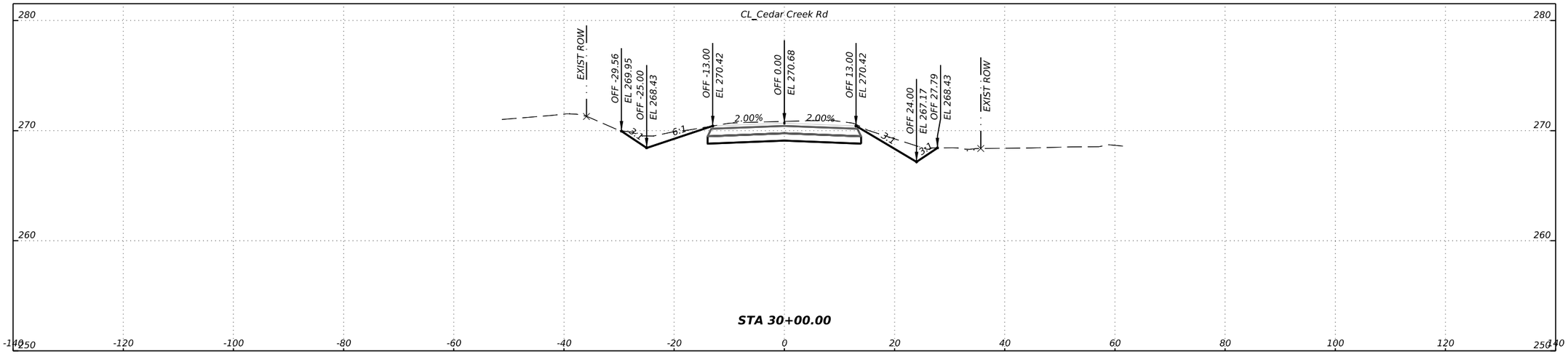
CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 17252

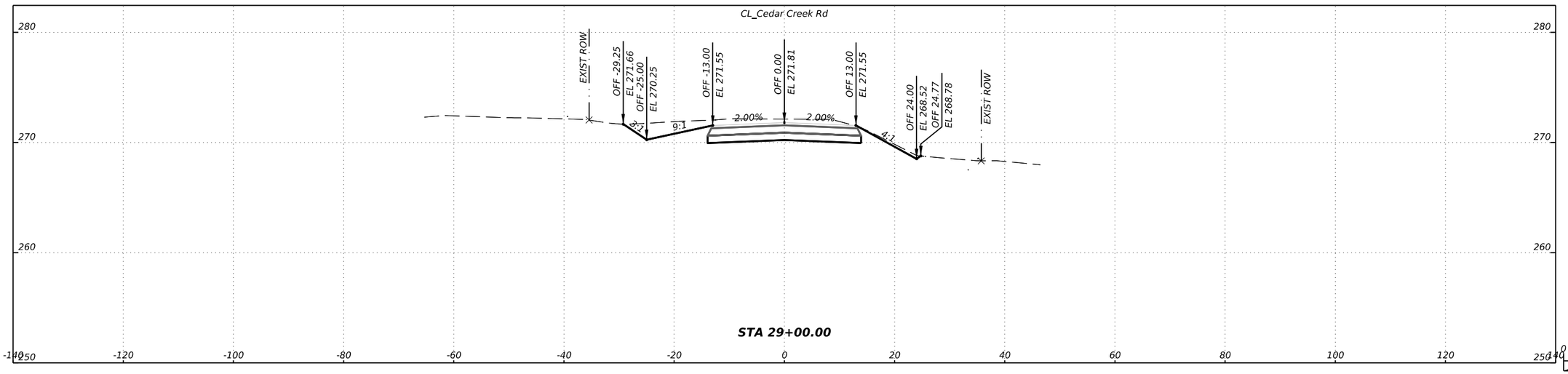
STATE OF TEXAS
MAY W. HILL
84626
LICENSED PROFESSIONAL ENGINEER

R. M. Hill, P.E.
$DATE$

SHEET NO:
233 / 244

100% SUBMITTAL





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CIVILCORP, LLC
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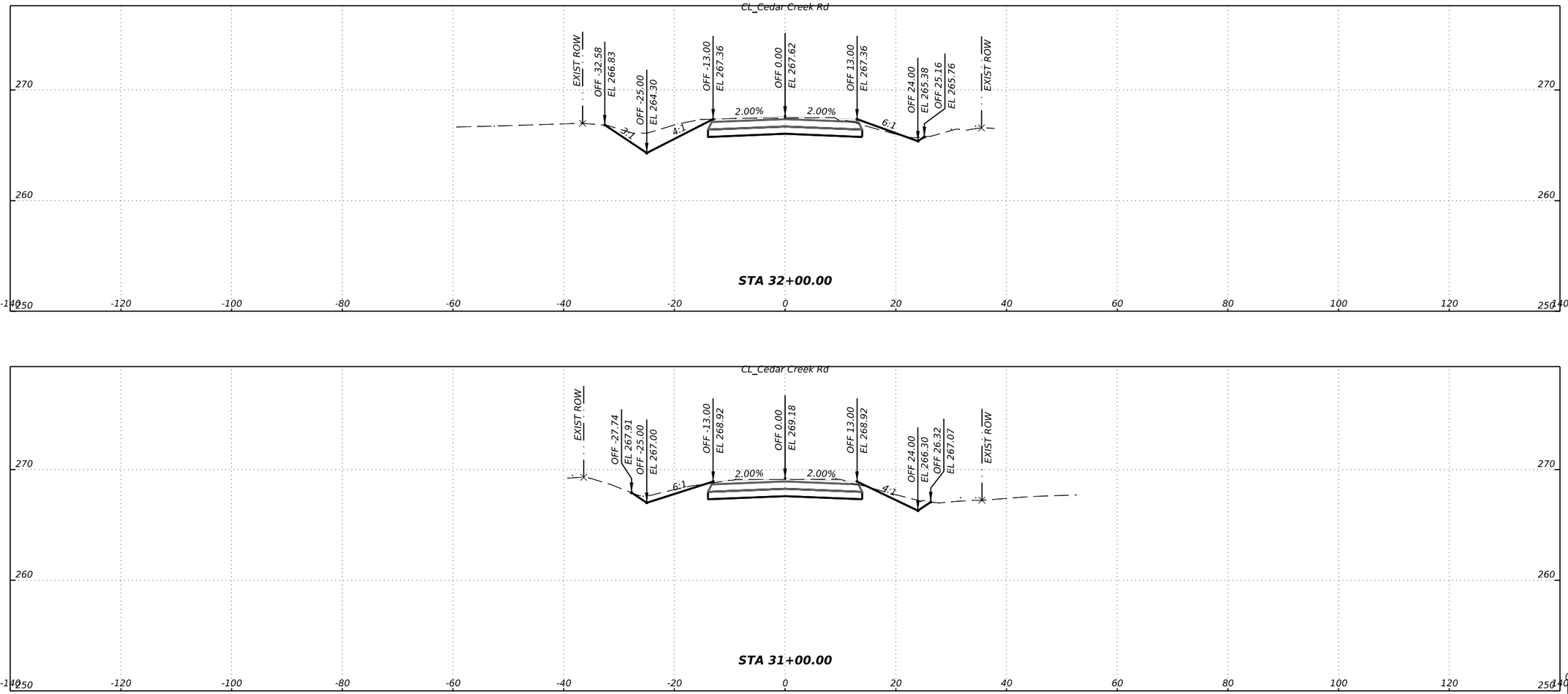
STATE OF TEXAS
ROY M. DILL
84626
LICENSED
PROFESSIONAL ENGINEER
R. M. Dill, P.E.
@DATE@

SHEET NO:
234 / 244

100% SUBMITTAL



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STATE OF TEXAS
ROY N. BILL
84626
LICENSED
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R. N. Bill, P.E.
@DATE@

SHEET NO:
235 / 244

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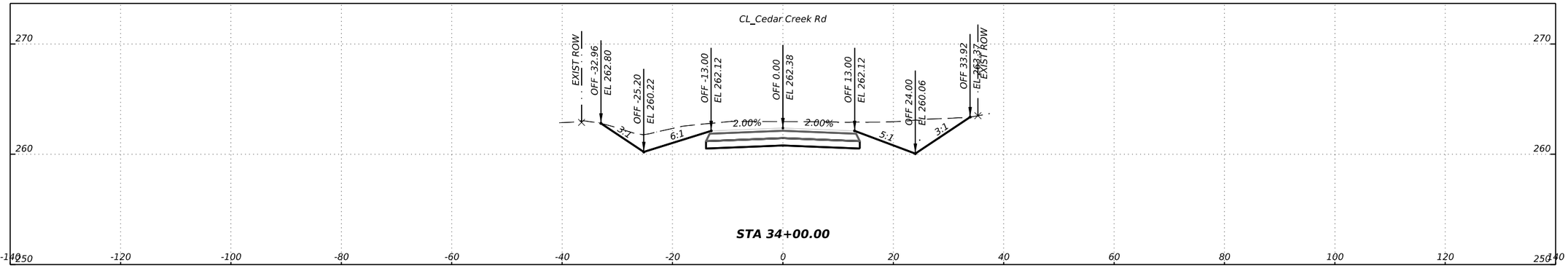

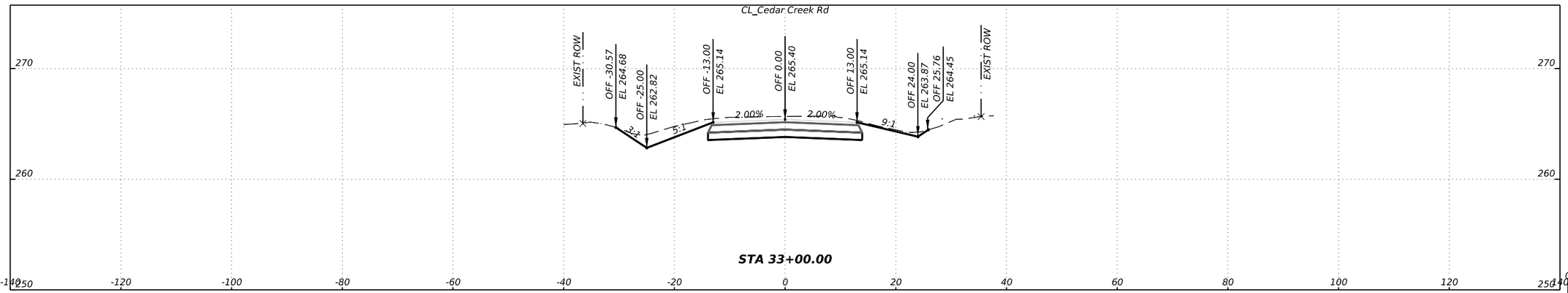

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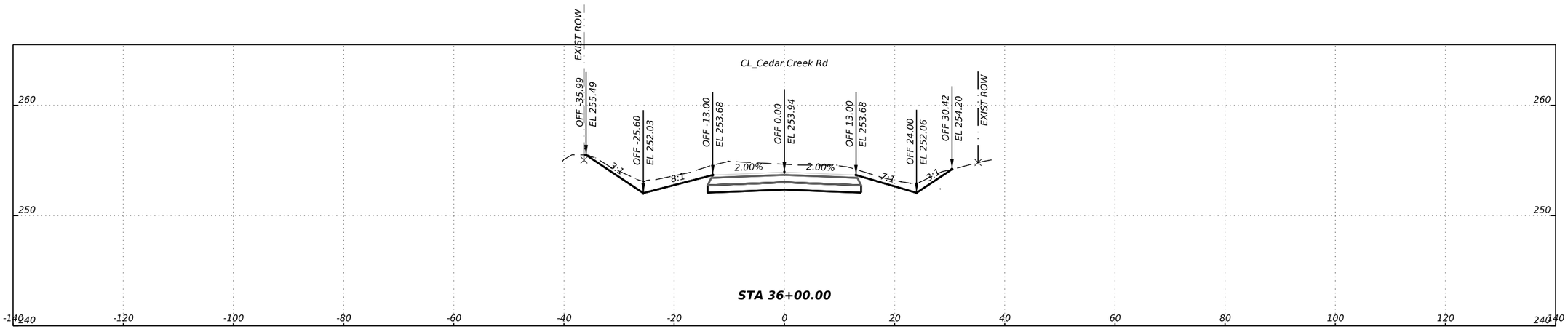

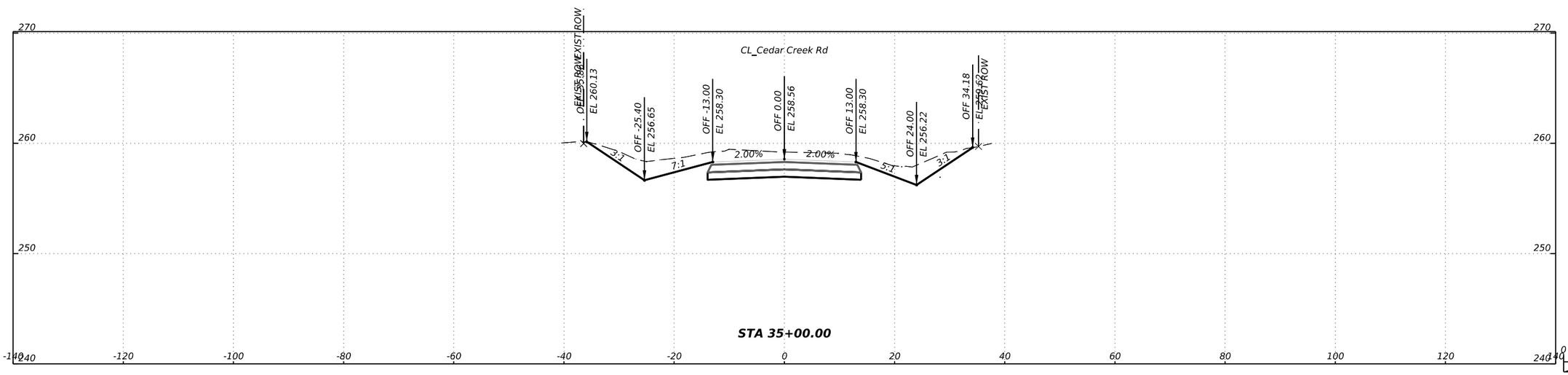

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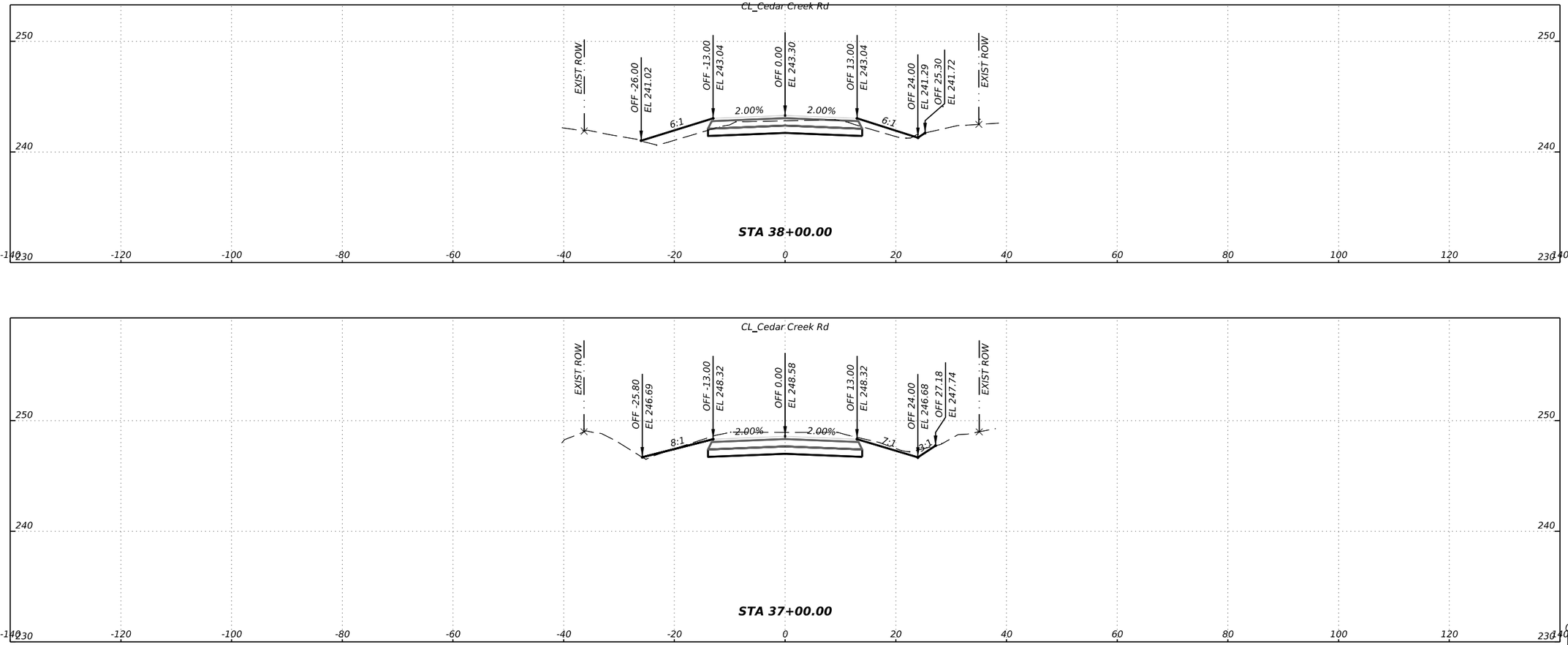

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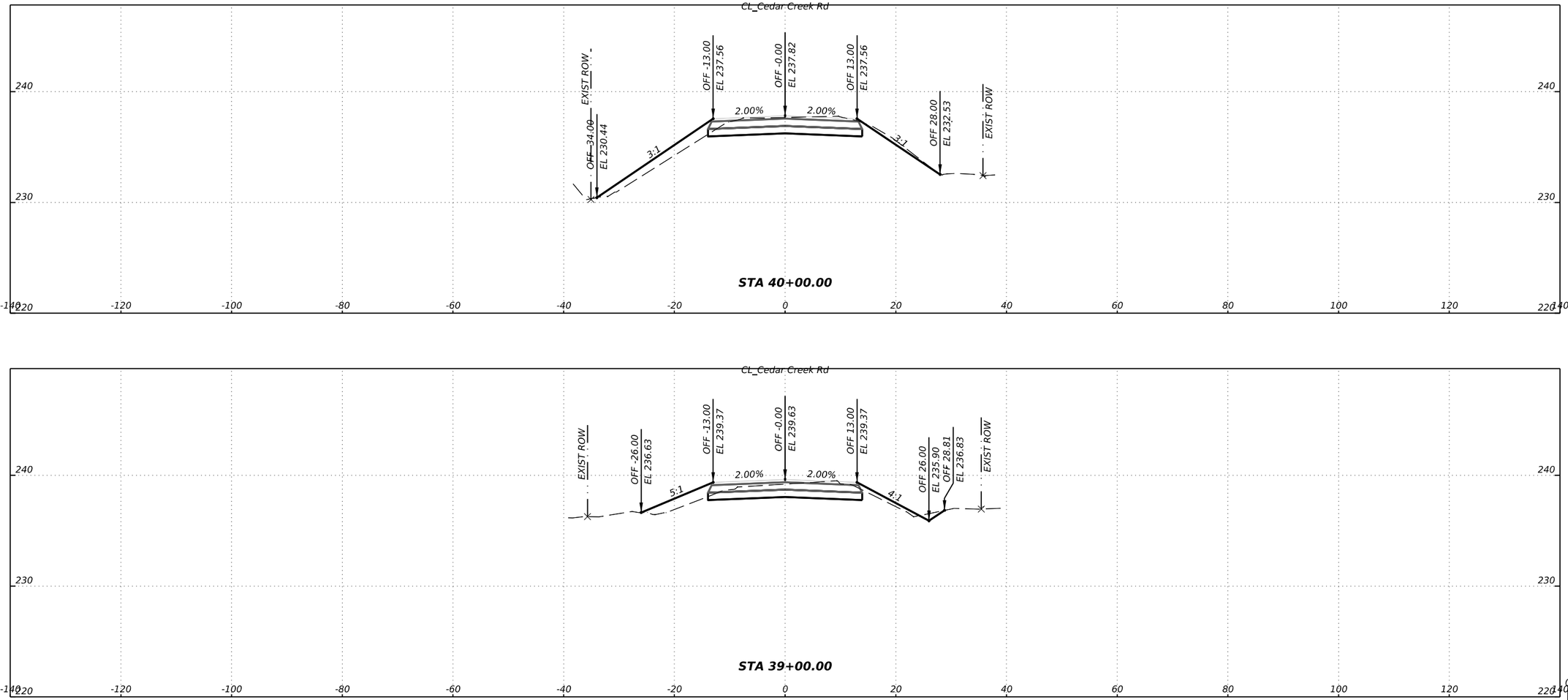

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STATE OF TEXAS
RAY N. BILL
84626
LICENSED
PROFESSIONAL ENGINEER

R. N. Bill, P.E.
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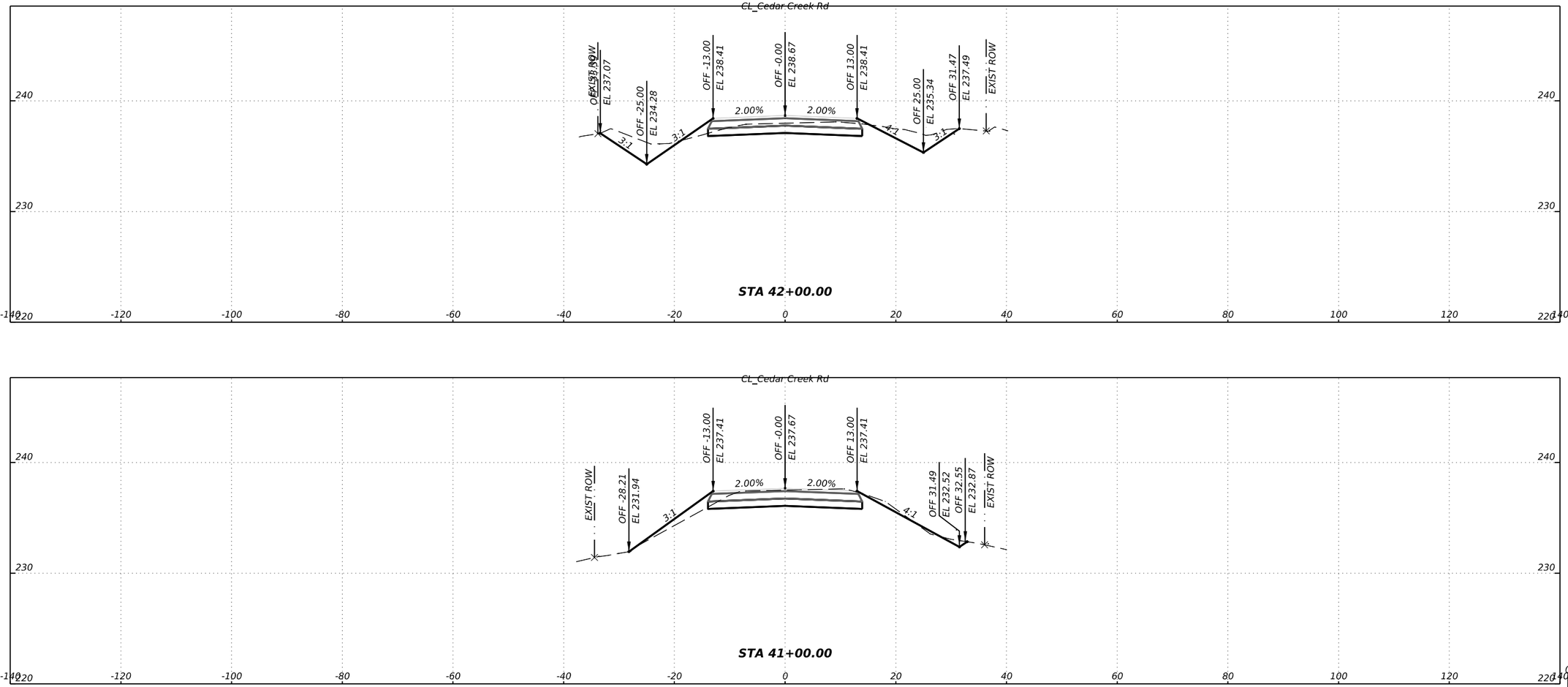

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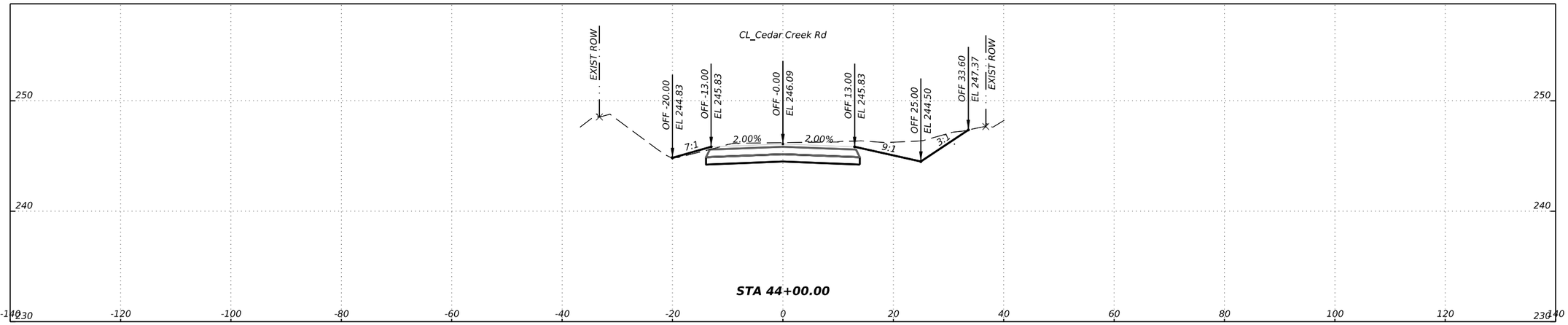

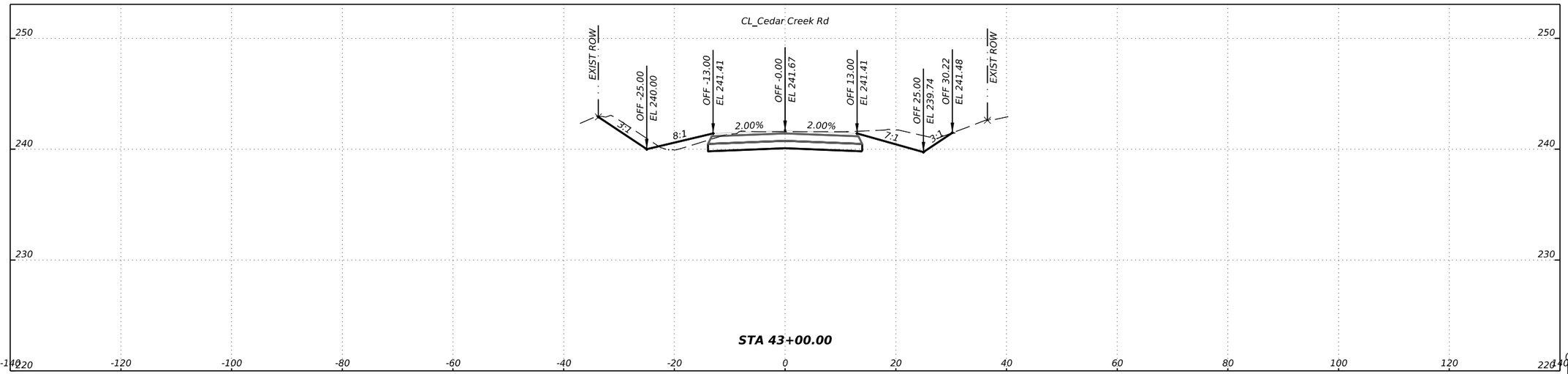

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THE STATE OF TEXAS · ROY W. BILL · 84626 · LICENSED PROFESSIONAL ENGINEER

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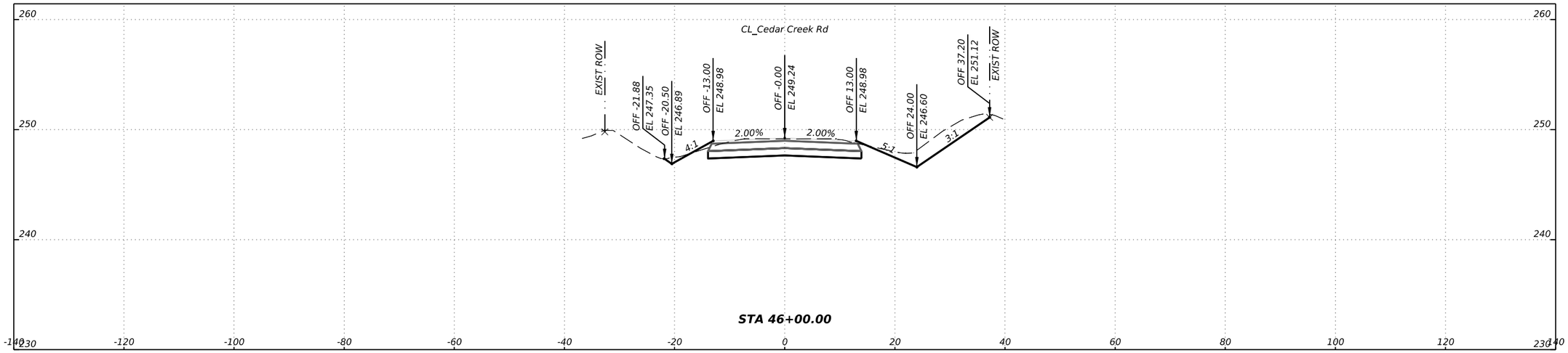

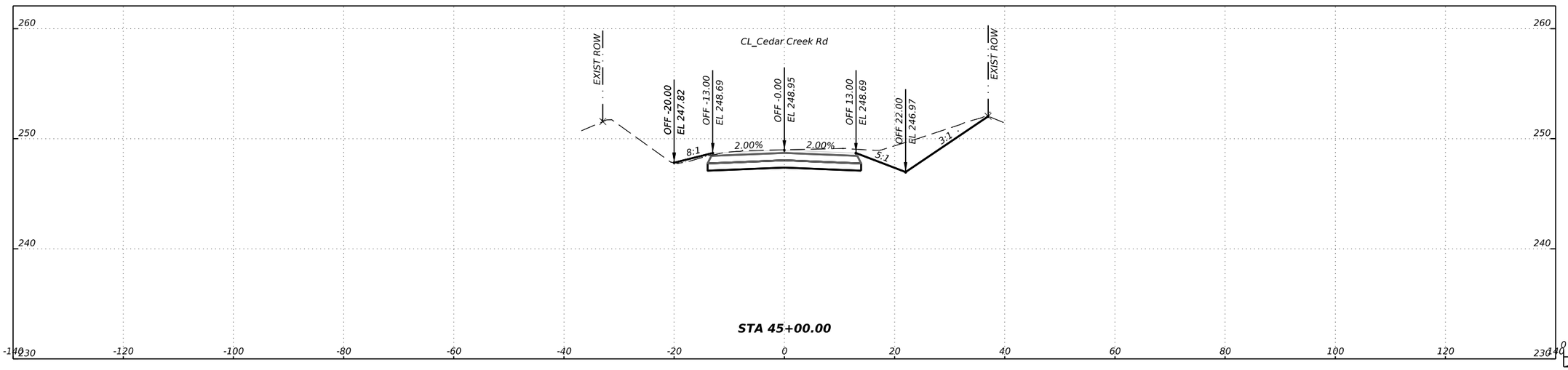

0 10' 20'

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84626
LICENSED
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R. W. Bill, P.E.
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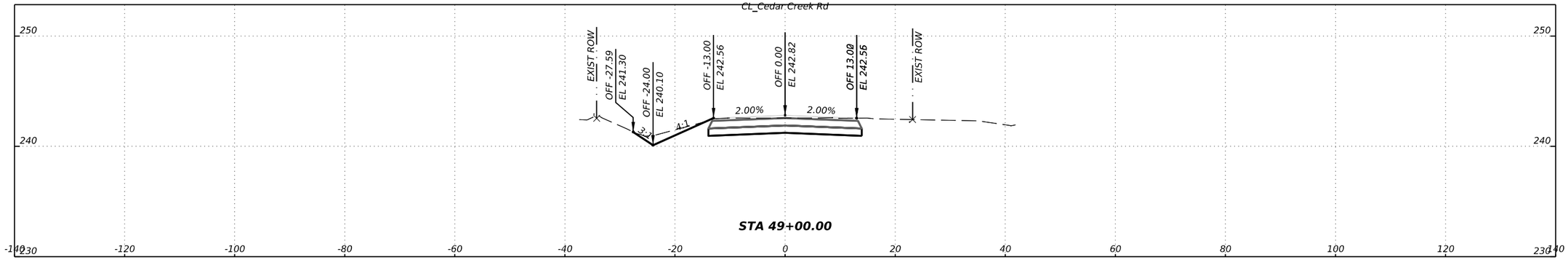

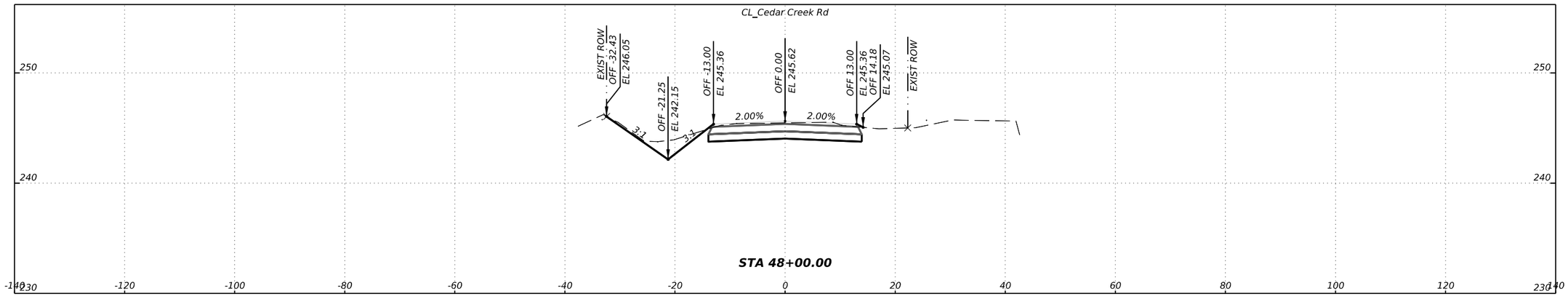

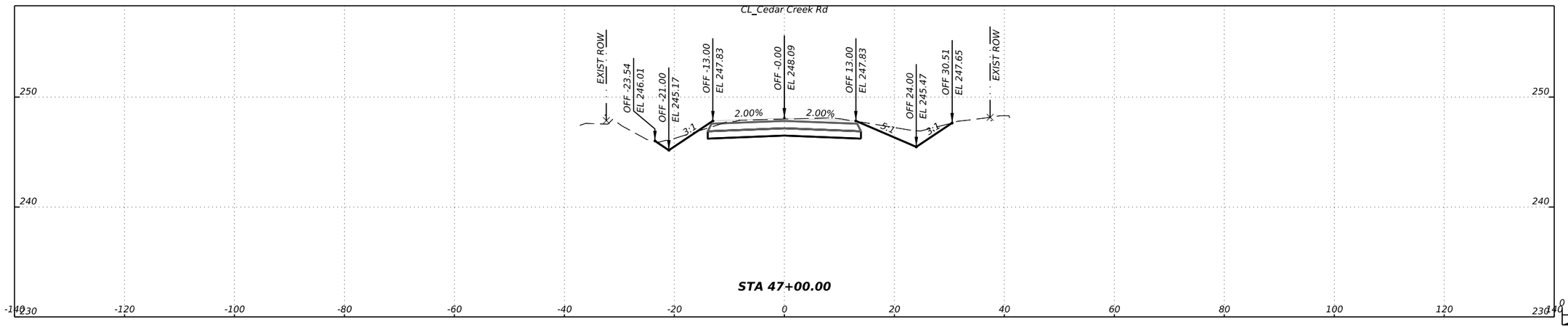

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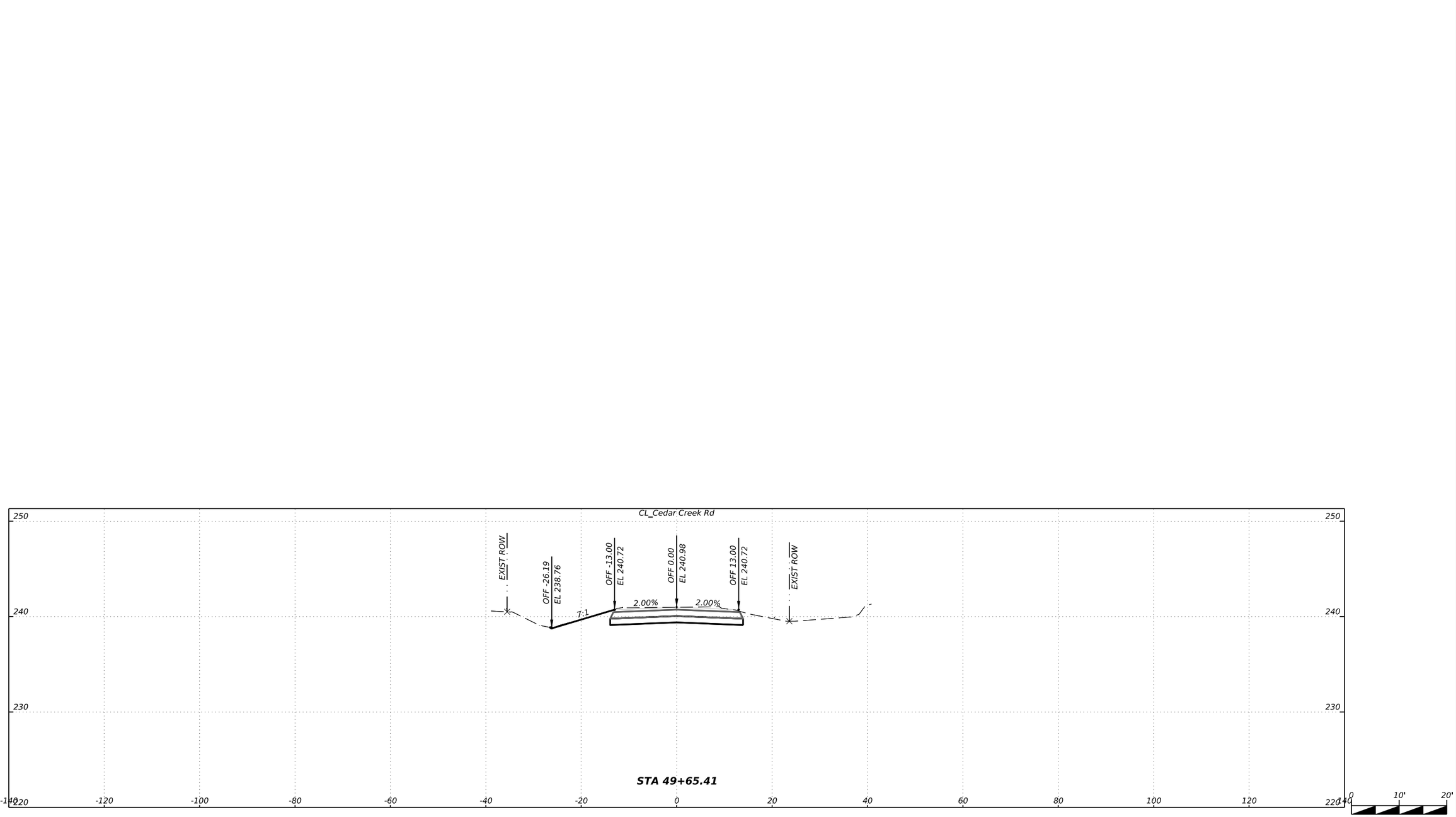

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