

*Fort Bend County, Texas
Invitation for Bid*



*Belknap Road Pavement and Drainage Improvements
for Fort Bend County Mobility Bond Project No. 17211
BID 24-017*

SUBMIT BIDS TO:

Fort Bend County
Purchasing Department
Travis Annex
301 Jackson, Suite 201
Richmond, TX 77469

Note: All correspondence must include the term
“Purchasing Department” in address to assist in
proper delivery

SUBMIT NO LATER THAN:

Tuesday, March 5, 2024
2:00 PM (Central)

LABEL ENVELOPE:

BID 24-017
Belknap Road

***ALL BIDS MUST BE RECEIVED IN AND TIME/DATE STAMPED BY THE PURCHASING OFFICE
OF FORT BEND COUNTY ON OR BEFORE THE SPECIFIED TIME/DATE STATED ABOVE.***

BIDS RECEIVED AS REQUIRED WILL THEN BE OPENED AND PUBLICLY READ.

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:
Brooke Lindemann
Senior Buyer
Brooke.Lindemann@fortbendcountytx.gov

Vendor Responsibilities:

- Download and complete any addendums. (Addendums will be posted on the Fort Bend County website no
Later than 48 hours prior to bid opening)
- Submit response in accordance with requirements stated on the cover of this document.
- DO NOT submit responses via email or fax.



COUNTY PURCHASING AGENT
Fort Bend County, Texas

Vendor Information

Jaime Kovar
Purchasing Agent

Office (281) 341-8640

Legal Company Name (top line of W9)				
Business Name (if different from legal name)				
Type of Business	Corporation/LLC Sole Proprietor/Individual	Partnership Tax Exempt	Age in Business?	
Federal ID # or S.S. #		SAM.gov Unique Entity ID #		
SAM.gov CAGE / NCAGE				
Publicly Traded Business	___ No ___ Yes Ticker Symbol _____			
Remittance Address				
City/State/Zip				
Physical Address				
City/State/Zip				
Phone Number				
E-mail				
Contact Person				
Check all that apply to the company listed above and provide certification number.	DBE-Disadvantaged Business Enterprise ___	Certification # _____	<u>Cert Date</u>	<u>Exp Date</u>
	SBE-Small Business Enterprise ___	Certification # _____	_____	_____
	HUB-Texas Historically Underutilized Business ___	Certification # _____	_____	_____
	WBE-Women's Business Enterprise ___	Certification # _____	_____	_____
Company's gross annual receipts	<\$500,000 _____	\$500,000-\$4,999,999 _____		
	\$5,000,000-\$16,999,999 ___	\$17,000,000-\$22,399,999 _____	>\$22,400,000 _____	
NAICs codes (Please enter all that apply)				
Signature of Authorized Representative				
Printed Name				
Title				
Date				

THIS FORM MUST BE SUBMITTED WITH THE SOLICITATION RESPONSE

1.0 GENERAL REQUIREMENTS:

- 1.1 Read this entire document carefully. Follow all instructions. You are responsible for fulfilling all requirements and specifications. Be sure you understand them.
- 1.2 General Requirements apply to all advertised bids; however, these may be superseded, 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 Fort Bend County may request and rely on advice, decisions and opinions of the Attorney General of Texas and the County Attorney concerning any portion of these requirements.
- 1.4 Bid Form Completion: Fill out, sign, and return to the Fort Bend County Purchasing Department one (1) complete bid form. An authorized representative of the bidder must sign the Contract Sheet. The Contract will be binding only when signed by the County Judge, Fort Bend 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 error and initial each change.
- 1.5 Bid Returns: Bidders must return all completed bids to the Fort Bend County Purchasing Department at 301 Jackson, Suite 201 Richmond Texas no later than 2:00 P.M. on the date specified. Late bids will not be accepted. Bids must be submitted in a sealed envelope, addressed as follows: Fort Bend County Purchasing Agent, Travis Annex, 301 Jackson, Suite 201 Richmond, Texas 77469.
- 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 Brooke Lindemann, Senior Buyer, 301, Jackson, Suite 201, Richmond, Texas, 77469, E-mail: Brooke.Lindemann@fortbendcountytexas.gov. 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 Fort Bend County's website. Addenda will **ONLY** be issued by the Fort Bend County Purchasing Agent. 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 it in the returned bid package. Deadline for submission of questions and/or clarification is no later than **Tuesday, February 27, 2024 at 9:30AM (central)** 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

Initials of Bidder: _____

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 Fort Bend County, or a Bid Bond in the same amount issued by a surety, acceptable to Fort Bend 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. Unsuccessful bidder's Cashier's Check or Certified Check will be returned only after a written request to do so have been received in the Office of the Fort Bend County Purchasing Agent.
- 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 Fort Bend 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 the Fort Bend County Purchasing Department. 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 this Contract and shall be stated on the bid sheet. Prices shall be all inclusive. No price changes, additions, or subsequent qualifications will be honored during the course of the Contract. All prices must be written in ink or typewritten. If there are any additional charges of any kind, other than those mentioned above, specified or unspecified, bidder **MUST** indicate the items required and attendant costs or forfeit the right to payment for such items.
- 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: Fort Bend 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. Fort Bend 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 Fort Bend 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 Fort Bend County Purchasing Department and recommendation to Fort Bend 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 for making a recommendation. The Fort Bend County Purchasing Department reserves the right to contact any bidder, at any time, to clarify, verify or request information with regard to any bid.

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- 1.14 Disqualification of Bidder: Upon signing this bid document, a bidder offering to sell supplies, materials, services, or equipment to Fort Bend 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 or all bids may be rejected if Fort Bend County believes that collusion exists among the bidders. Bids in which the prices are obviously 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: Fort Bend County reserves the right to award this Contract on the basis of lowest and best bid in accordance with the laws of the State of Texas, to waive any formality or irregularity, to make awards to more than one bidder, to reject any or all bids. In the event the lowest dollar bidder meeting specifications is not awarded a contract, the bidder may appear before the Commissioners Court and present evidence concerning its responsibility.
- 1.16 Contract Obligation: Fort Bend County Commissioners Court must award the Contract and the County Judge or other person authorized by the Fort Bend County Commissioners Court must sign the Contract before it becomes binding on Fort Bend County or the bidders. Department heads are not authorized to sign agreements for Fort Bend County. Binding agreements shall remain in effect until all products and/or services covered by this purchase have been satisfactorily delivered and accepted.

2.0 SCOPE:

It is the intent of Fort Bend County to contract with one (1) vendor for all materials, supplies, equipment, tools, services, labor and supervision necessary to complete the Belknap Road Pavement and Drainage Improvements, hereinafter referred to as the "Project," as specified herein.

- 2.1 *Work* means the procurement, delivery and proper construction and/or installation of all materials and facilities and associated appurtenances necessary to fulfill the winning bidder's obligations (hereinafter the "Contractor") under the Contract as awarded for the Project specified herein, including the coordination and administration of all services necessary for Contractor, and/or its agents and/or subcontractors, to fulfill Contractor's obligations under the Contract.

3.0 PRE-BID CONFERENCE:

A pre-bid conference will be conducted on **Tuesday, February 20, 2024 at 9:30 AM (CST)**. The pre-bid conference will be held at the Fort Bend County Purchasing Department located in the

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Travis Annex at 301 Jackson, Suite 201, Richmond, Texas 77469. All bidders are encouraged to attend.

4.0 LIQUIDATED DAMAGES:

The County and the Contractor recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by the County if the work is not complete on time. Accordingly, instead of requiring any such proof, the County and the Contractor agree that as liquidated damages for delay (but not as a penalty) the Contractor shall pay the County \$1,500.00 for each day that expires after the time specified herein for completion until the Work is complete, unless contract time has been adjusted by extension of time approved by Commissioner's Court.

The Contractor will be placed on one (1) year probation if liquidated damages are accrued. During the probation period, if the Contractor accrues liquidated damages on another project, they will be disqualified from being awarded any County work for two (2) years.

5.0 COMPLETION TIME & PAYMENT:

- 5.1 Fort Bend County shall pay the Contractor in current funds for the Contractor's performance of the Contract the contract sum, as stated herein, after receipt of notice to proceed and a purchase order issued by the Fort Bend County Purchasing Agent.
- 5.2 Based upon Applications for payment submitted to the County Auditor, Fort Bend County shall make progress payments on account of the contract sum to the Contractor as provided below and elsewhere in the contract documents.
 - 5.2.1 The period covered by each application for payment shall be one calendar month ending on the last day of the month.
 - 5.2.2 Provided a customary, accurate and complete application for payment is received by the County Auditor not later than the 15th day of a month, Fort Bend County shall make payment of all undisputed amounts to the Contractor not later than the 15th day of the next month. If an application for payment is received by the County Auditor after the application deadline fixed above, payment shall be made by Fort Bend County not later than 30 days after the County Auditor receives the application for payment.
 - 5.2.3 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.
 - 5.2.4 Subject to the provisions of the contract documents, the amount of each progress payment shall be computed as follows:

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

5.2.4.2 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 Fort Bend County, suitably stored off the site at a location agreed upon in writing), less retainage of ten percent (10%).

5.2.4.3 Subtract the aggregate of previous payments made by Fort Bend County.

5.2.4.4 The progress payment amount as determined in above shall be further modified under the following circumstances:

Upon substantial completion of the Project, add a sum sufficient to increase the total payments to one hundred percent (100%) of the contract sum, less such amounts as Fort Bend County shall determine should be deducted for incomplete work and unsettled claims.

5.2.4.5 Final payment, constituting the entire unpaid undisputed balance of the contract sum, shall be made by Fort Bend County to the Contractor when Fort Bend County and the Contractor agree that the Contract has been fully performed by the Contractor.

5.3 Before the first application for payment, the Contractor shall submit to the Facilities Management and Planning Department a schedule of values allocated to various portions of the work, prepared in such form and supported by such data to substantiate its accuracy as the Facilities Management and Planning Department may require. This schedule, unless objected to by the Facilities Management and Planning Department shall be used as a basis for reviewing the Contractor's application for payment.

5.4 Contractor must provide with each application for payment a contractor's affidavit certifying bills against the Contractor for labor, material and expendable equipment employed in the performance of Contractor have been paid in full prior to acceptance of final payment from Fort Bend County.

5.5 The Contractor will permit Fort Bend County, or any duly authorized agent of Fort Bend County, to inspect and examine the books and records of the Contractor for the purpose of verifying the amount of work performed under the Contract. Fort Bend County's right to inspect survives the termination of the Contract for a period of five years.

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6.0 LIMIT OF APPROPRIATION:

Prior to the execution of this Contract, Contractor has been advised by County, and Contractor clearly understands and agrees, such understanding and agreement being of the absolute essence to this Contract, that County shall have available only those funds specifically allocated in this Contract to fully discharge any and all liabilities which may be incurred by County in bringing this Project to an absolute conclusion, resulting in a complete, fully furnished, fully equipped and fully usable facility, and that the total of any and all basic construction costs, costs of providing the required services and materials, all fees and compensation of any sort to the Contractor, and any and all costs for any and all things or purposes coming inuring under or out of this Contract, irrespective of the nature thereof, shall not exceed said specifically allocated sum, notwithstanding any word, statement or thing contained in or inferred from the preceding provision of this Contract which might in any light by any person be interpreted to the contrary.

7.0 RIGHT TO ASSURANCE:

Whenever Fort Bend County in good faith has reason to question the Contractor's intent or ability to perform, Fort Bend County may demand that the Contractor give written assurance of its intent to perform and its plan to properly continue performance, including a reasonably detailed timeline. In the event that a demand is made and no assurance is given within five (5) business days, Fort Bend County may treat this failure as an anticipatory repudiation of the Contract.

8.0 PERFORMANCE & PAYMENT BONDS:

Performance and Payment Bonds: In the event the total accepted bid price exceeds \$25,000 the Contractor must provide to the Office of the County Purchasing Agent, a performance bond and a payment bond, each in the amount of 100% of the total contract sum within ten (10) calendar days after receipt of notification of bid award. Such bonds shall be executed by a corporate surety duly authorized and admitted 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" or better. Fort Bend County reserves the right to accept or reject any surety company proposed by the Contractor. In the event Fort Bend 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 Fort Bend County.

9.0 POWER OF ATTORNEY:

An attorney-in-fact 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.

10.0 INSURANCE:

10.1 All respondents shall submit, with response, a current certificate of insurance indicating coverage in the amounts stated below. In lieu of submitting a certificate of insurance, respondents may submit, with response, a notarized

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statement from an Insurance company, authorized to conduct business in the State of Texas, and acceptable to Fort Bend County, guaranteeing the issuance of an insurance policy, with the coverage stated below, to the firm named therein, if successful, upon award of this Contract.

- 10.2 At contract execution, contractor shall furnish County with properly executed certificates of insurance which shall evidence all insurance required and provide that such insurance shall not be canceled, except on 30 days prior written notice to County. Contractor shall provide certified copies of insurance endorsements and/or policies if requested by County. Contractor shall maintain such insurance coverage from the time Services commence until Services are completed and provide replacement certificates, policies and/or endorsements for any such insurance expiring prior to completion of Services. Contractor shall obtain such insurance written on an Occurrence form (or a Claims Made form for Professional Liability insurance) from such companies having Best's rating of A/VII or better, licensed or approved to transact business in the State of Texas, and shall obtain such insurance of the following types and minimum limits:
 - 10.2.1 Workers' Compensation insurance. Substitutes to genuine Workers' Compensation Insurance will not be allowed.
 - 10.2.2 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.
 - 10.2.3 Commercial 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 policyholder.
 - 10.2.4 Business Automobile Liability coverage with a combined Bodily Injury/Property Damage limit of not less than \$1,000,000 each accident. The policy shall cover liability arising from the operation of licensed vehicles by policyholder.
- 10.3 County and the members of Commissioners Court shall be named as additional insured to all required coverage except for Workers' Compensation and Professional Liability (if required). All Liability policies including Workers' Compensation written on behalf of contractor, excluding Professional Liability, shall contain a waiver of subrogation in favor of County and members of Commissioners Court.
- 10.4 If required coverage is written on a claims-made basis, contractor warrants that any retroactive date applicable to coverage under the policy precedes the effective date of the contract; and that continuous coverage will be maintained or an

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extended discovery period will be exercised for a period of two (2) years beginning from the time that work under the agreement is completed.

- 10.5 Contractor shall not commence any portion of the work under this Contract until it has obtained the insurance required herein and certificates of such insurance have been filed with and approved by Fort Bend County.
- 10.6 No cancellation of or changes to the certificates, or the policies, may be made without sixty (60) days prior, written notification to Fort Bend County.
- 10.7 Approval of the insurance by Fort Bend County shall not relieve or decrease the liability of the Contractor.

11.0 INDEMNIFICATION:

Respondent shall save harmless County from and against all claims, liability, and expenses, including reasonable attorney's fees, arising from activities of respondent, its agents, servants or employees, performed under this agreement that result from the negligent act, error, or omission of respondent or any of respondent's agents, servants or employees.

- 11.1 Respondent shall timely report all such matters to Fort Bend County and shall, upon the receipt of any such claim, demand, suit, action, proceeding, lien or judgment, not later than the fifteenth day of each month; provide Fort Bend County with a written report on each such matter, setting forth the status of each matter, the schedule or planned proceedings with respect to each matter and the cooperation or assistance, if any, of Fort Bend County required by Respondent in the defense of each matter.
- 11.2 Respondent's duty to defend, indemnify and hold Fort Bend County harmless shall be absolute. It shall not abate or end by reason of the expiration or termination of any contract unless otherwise agreed by Fort Bend County in writing. The provisions of this section shall survive the termination of the contract and shall remain in full force and effect with respect to all such matters no matter when they arise.
- 11.3 In the event of any dispute between the parties as to whether a claim, demand, suit, action, proceeding, lien or judgment appears to have been caused by or appears to have arisen out of or in connection with acts or omissions of Respondent, Respondent shall never-the-less fully defend such claim, demand, suit, action, proceeding, lien or judgment until and unless there is a determination by a court of competent jurisdiction that the acts and omissions of Respondent are not at issue in the matter.
- 11.4 Respondent's indemnification shall cover, and Respondent agrees to indemnify Fort Bend County, in the event Fort Bend County is found to have been negligent for having selected Respondent to perform the work described in this request.

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- 11.5 The provision by Respondent of insurance shall not limit the liability of Respondent under an agreement.
- 11.6 Respondent shall cause all trade contractors and any other contractor who may have a contract to perform construction or installation work in the area where work will be performed under this request, to agree to indemnify Fort Bend County and to hold it harmless from all claims for bodily injury and property damage that may arise from said Respondent's operations. Such provisions shall be in form satisfactory to Fort Bend County.
- 11.7 Loss Deduction Clause - Fort Bend County shall be exempt from, and in no way liable for, any sums of money which may represent a deductible in any insurance policy. The payment of deductibles shall be the sole responsibility of Respondent and/or trade contractor providing such insurance.

12.0 PREVAILING WAGES:

This project is subject to the prevailing wage rate requirements of Chapter 2258 of the Government Code. All persons employed by Contractor shall be compensated at not less than the rates shown below. Contractor shall keep detailed records of each of its workers and said records shall be made available to County for inspection at all reasonable times. The Contractor shall pay Fort Bend County sixty dollars (\$60.00) 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: TX20240038 01/05/2024
Superseded General Decision Number: TX20230038

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.

HIGHWAY CONSTRUCTION PROJECTS (excluding tunnels, building structures in rest area projects & railroad construction; bascule, suspension & spandrel arch bridges designed for commercial navigation, bridges involving marine construction; and other major bridges).

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022, Executive Order 14026 generally

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applies to the contract. The contractor must pay all covered workers at least \$17.20 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2024.

If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022, Executive Order 13658 generally applies to the contract. The contractor must pay all covered workers at least \$12.90 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2024.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at www.dol.gov/whd/govcontracts.

Modification Number Publication Date
 0 01/05/2024

SUTX2011-013 08/10/2011

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER (Paving and Structures)	\$ 12.98	**
ELECTRICIAN	\$ 27.11	
FORM BUILDER/FORM SETTER		
Paving & Curb	\$ 12.34	**
Structures	\$ 12.23	**
LABORER		
Asphalt Raker	\$ 12.36	**
Flagger	\$ 10.33	**
Laborer, Common	\$ 11.02	**
Laborer, Utility	\$ 11.73	**
Pipelayer	\$ 12.12	**
Work Zone Barricade Servicer	\$ 11.67	**
PAINTER (Structures)	\$ 18.62	
POWER EQUIPMENT OPERATOR:		
Asphalt Distributor	\$ 14.06	**

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Asphalt Paving Machine	\$ 14.32 **
Broom or Sweeper	\$ 12.68 **
Concrete Pavement Finishing Machine	\$ 13.07 **
Concrete Paving, Curing, Float, Texturing Machine	\$ 11.71 **
Concrete Saw	\$ 13.99 **
Crane, Hydraulic 80 Tons or less	\$ 13.86 **
Crane, Lattice boom 80 tons or less	\$ 14.97 **
Crane, Lattice boom over 80 Tons	\$ 15.80 **
Crawler Tractor	\$ 13.68 **
Excavator, 50,000 pounds or less	\$ 12.71 **
Excavator, Over 50,000 pounds	\$ 14.53 **
Foundation Drill, Crawler Mounted	\$ 17.43
Foundation Drill, Truck Mounted	\$ 15.89 **
Front End Loader 3 CY or Less	\$ 13.32 **
Front End Loader, Over 3 CY	\$ 13.17 **
Loader/Backhoe	\$ 14.29 **
Mechanic	\$ 16.96 **
Milling Machine	\$ 13.53 **
Motor Grader, Fine Grade	\$ 15.69 **
Motor Grader, Rough	\$ 14.23 **
Off Road Hauler	\$ 14.60 **
Pavement Marking Machine	\$ 11.18 **
Piledriver	\$ 14.95 **
Roller, Asphalt	\$ 11.95 **
Roller, Other	\$ 11.57 **
Scraper	\$ 13.47 **
Spreader Box	\$ 13.58 **
Servicer	\$ 13.97 **
Steel Worker	
Reinforcing Steel	\$ 15.15 **
Structural Steel Welder	\$ 12.85 **
Structural Steel	\$ 14.39 **
TRUCK DRIVER	
Low Boy Float	\$ 16.03 **
Single Axle	\$ 11.46 **
Single or Tandem Axle Dump	\$ 11.48 **
Tandem Axle Tractor w/Semi Trailer	\$ 12.27 **

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

** Workers in this classification may be entitled to a higher minimum wage under Executive Order 14026 (\$17.20) or 13658 (\$12.90). Please see the Note at the top of the wage

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determination for more information. Please also note that the minimum wage requirements of Executive Order 14026 are not currently being enforced as to any contract or subcontract to which the states of Texas, Louisiana, or Mississippi, including their agencies, are a party.

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/whd/govcontracts.

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 cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average 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 07/01/2014. 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. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

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

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates.

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Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of 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. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

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

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

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

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2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write 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 by 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

4.) All decisions by the Administrative Review Board are final.

13.0 PERMITS:

It shall be the sole responsibility of the successful bidder to obtain all required permits in the name of Fort Bend County.

14.0 CONTRACTOR'S RESPONSIBILITY FOR WORK:

14.1 Preconstruction Work. Contractor shall do (or cause to be done) the following as preconstruction work:

14.1.1 On written demand as requested by Fort Bend County, cause the Contractor's personnel to meet with Fort Bend County and the Engineer to discuss the status of the Project.

14.1.2 On written demand as requested by Fort Bend County, review drawings and specifications with the Engineer to permit the Contractor and the Engineer to determine the compliance of the proposed facility with applicable building codes.

14.2 Construction Work. Contractor shall do (or cause to be done) the following as construction work:

14.2.1 Perform (or cause to be performed) all preparatory work at the construction site required herein, including (without limitation) soil and

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concrete testing and demolition of improvements existing at the construction site and all actions necessary for compliance with all laws and regulations as to actions to be taken by owners or contractors before construction begins, including without limitation those in regard to archaeological and environmental requirements.

14.2.2 Construct and install (or cause to be constructed and installed) the Project on the construction site in accordance with this Contract and the drawings and specifications approved by Fort Bend County.

14.2.3 Furnish (or cause to be furnished) all materials, supplies, equipment, tools, labor, supervision, utilities, transportation, and other materials and services necessary to complete the Project described herein.

14.2.4 Materials testing necessary for the Project and required by laws and regulations, construction industry standards as approved by Fort Bend County and this Contract; the frequency of testing shall be approved by Fort Bend County. **It is the contractor's responsibility to engage a material testing laboratory to perform testing on the structural concrete to be used for foundation work in this project. The cost of testing shall be incidental to bid item for drill shaft foundation. Testing of concrete shall comply with current TXDOT criteria. Contractor has to submit the name of the testing laboratory, intended to be used by the contractor for this project, for County's approval.**

14.3 Standards for Review and Approval. Fort Bend County acknowledges that in order to meet the deadlines for the completion of the Project, and in order to accomplish the efficient completion of the Project, the Contractor may submit matters to Fort Bend County in stages for approval or consent. Upon receipt of any matter submitted by the Contractor for review and approval, Fort Bend County shall review the same and shall diligently and promptly (but in any event within 14 calendar days for any such matter, other than a proposed change order, and within 28 calendar days for a proposed change order) give the Contractor notice of Fort Bend County's approval or disapproval, setting forth in detail all reasons for any disapproval. Fort Bend County's right to disapprove any such matter submitted (other than a proposed change order) shall be limited to the elements thereof (a) which do not conform substantially to matters previously approved, (b) which are new elements not previously presented and approved and the Contractor is unable to demonstrate that such new element is reasonably necessary for completion of the Project, or (c) which depict matters that are violations of this Contract or applicable laws and regulations.

14.3.1 If Fort Bend County disapproves of a particular matter or Proposed Change Order, the Contractor shall have the right to resubmit such matter or Proposed Change Order to Fort Bend County, altered to satisfy Fort Bend County's basis for disapproval. Any resubmission shall be subject to review and approval by Fort Bend County.

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14.3.2 Fort Bend County and the Contractor shall attempt in good faith to resolve any disputes concerning the approval of any aspect of the Project expeditiously, so as not to delay the completion of the Project in accordance with this Contract.

14.3.3 Expedited Approvals. Fort Bend County recognizes the importance of expeditious action upon all matters submitted to Fort Bend County for review and approval and of expeditious response to those aspects of the Project requiring approval by governmental authorities having jurisdiction there over. Fort Bend County agrees to exercise its rights of review and approval hereunder with due diligence, reasonableness, and good faith. Fort Bend County shall use its reasonable efforts to expedite any required review of the Project or other matters by any governmental authority.

14.4 Changes.

14.4.1 General. Fort Bend County may make changes to the Project by altering, adding to, or deducting from the Project. All changes in the Project which (a) require an adjustment in the contract sum or an adjustment in the final completion date or (b) involve a material change in the overall scope or function of the Project shall be requested and authorized before commencing such changes by use of written change order notices, Proposed Change Orders and Change Orders, which change order procedure shall be the exclusive means to effect such changes in the Project.

14.4.2 Change Order Procedure. If at any time Fort Bend County desires to make any change in the Project requiring the issuance of a Change Order, Fort Bend County shall so advise the Contractor in writing by delivery to the Contractor of a written notice describing the change. Upon receipt of such notice initiated by Fort Bend County, the Contractor shall within a reasonable period of time advise Fort Bend County of the Contractor's proposal for the adjustments, if any, in the contract sum, the schedule of values, and the final completion date attributable to such change by delivering a written notice thereof (the "Proposed Change Order") to Fort Bend County. Such Proposed Change Order shall contain a description of the proposed change and shall set forth the Contractor's estimate of the increase or decrease, if any, in the contract sum and the change, if any, in the schedule of values and the final completion date attributable to such change. If the Contractor desires to make a change in the Project requiring the issuance of a change order, the Contractor shall deliver to Fort Bend County a Proposed Change Order. Upon execution by Fort Bend County, a Proposed Change Order shall constitute (and be defined herein as) a "Change Order" for purposes of this Contract. The Contractor shall forthwith perform the work as changed 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. All Proposed Change Orders

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shall be submitted for approval by Fort Bend County. No action, acquiescence or inaction by Fort Bend County or any representative of Fort Bend County shall be construed to be a waiver of requirements set forth in this Contract in regard to Change Orders or ratification of a violation of such requirements, and all acts in violation of this provision shall be considered void.

14.4.3 Change Order Authorization. Each Change Order shall be signed by Fort Bend County and an authorized representative of the Contractor.

14.4.4 Contract Sum Adjustments. The contract sum 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. The Contractor shall not be entitled to an adjustment in the contract sum (or a Change Order permitting such adjustment) or to damages as a result of any delays in the Project caused by the acts or omissions of Fort Bend County, provided that this sentence is not applicable to delays that constitute more than 90 days in any 365-day period or cause the Project to be interrupted for a continuous period of 45 days through no fault of the Contractor.

14.4.5 When Fort Bend County and the Contractor agree upon the adjustments in the contract sum, the schedule of values, and the final completion date attributable to such adjustment, such agreement will be documented by preparation and if approved by the Fort Bend County Commissioners Court, execution of an appropriate Change Order.

14.5 Site Access. Prior to the transfer date, Fort Bend County and the Contractor shall have uninterrupted access to the construction site. Subsequent to the transfer date, Fort Bend County will permit the Contractor, the Engineer, and their representatives and subcontractors to enter upon the Project at times reasonably necessary to complete the punch list items.

14.6 Applicable Laws and Regulations. Contractor shall in its performance of the Project comply with all applicable laws and regulations. Any delays in the prosecution of the Project caused by any changes in the laws and regulations or the application or enforcement of the laws and regulations may entitle the Contractor to an extension of time.

14.7 Familiarity with Project. The Contractor represents and accepts that it has: (a) visited the property(ies), (b) taken such other steps as may be necessary to ascertain the nature and location of the Project and the general and local conditions which affect the Project or the cost thereof, (c) investigated the labor situation as regards to the Project, (d) examined the property(ies), the obstacles which may be encountered and all other observable conditions having a bearing upon the performance of the Project, the superintendence of the Project, the time of completion and all other relevant matters, and (e) reported to Fort Bend County

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the results of all of the foregoing. The Contractor represents that it is familiar with all phases of the Project and the matters that may affect the Project or its prosecution under this Contract.

- 14.8 Standard of Performance. The Contractor shall prosecute (or cause to be prosecuted) the Project in accordance with the best efforts for the construction and development of projects similar to the Project in the State of Texas, using qualified, careful, and efficient contractors and workers and in conformity with the provisions of this Contract. The Contractor shall perform the work in a good and workmanlike manner.
- 14.9 Warranty of Contractor. The Contractor warrants to Fort Bend County that: (i) the Contractor possesses the skill and knowledge ordinarily possessed by well-informed members of its trade or profession and the Contractor will use its best efforts to ensure that the services provided under this Contract will be performed, delivered, and conducted in accordance with the best professional standards and in accordance with industry standards, and (ii) the Contractor is fully experienced and properly qualified to perform the class of work provided for herein, and that it is properly equipped, organized and financed to perform such work, and (iii) following the date of acceptance of this Contract, the services provided by the Contractor to Fort Bend County will conform to the representations contained in this Contract, including all attachments, schedules and exhibits. All warranties provided by the Contractor in this Contract shall be cumulative, shall be deemed consistent and not in conflict, are intended to be given full force and effect and to be interpreted expansively to give the broadest warranty protection to Fort Bend County.
- 14.10 Contractor's Personnel. Contractor shall employ only competent, skilled personnel for the Project. Prior to the final completion date, the Contractor shall maintain a superintendent who shall be authorized to act on behalf of the Contractor and with whom Fort Bend County may consult at all reasonable times. The superintendent shall not be transferred from the Project without Fort Bend County's consent (which shall not be unreasonably withheld or delayed); provided, however, the superintendent shall not 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 unavailable to Fort Bend County. However, such obligation to furnish the superintendent and such staff personnel shall not be construed (a) to preclude the promotion within the Contractor's organization of any person assigned to the Project or (b) to give rise to any liability of the Contractor if any person assigned to the Project (including, without limitation, the superintendent) leaves the Contractor's employment. If the superintendent is transferred from the Project, Fort Bend County shall have the right to approve the replacement superintendent (which approval will not be unreasonably withheld or delayed). The Contractor, the Architect, and the other subcontractors shall comply with all applicable health, safety, and loss prevention rules of applicable governmental authorities. The

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Contractor shall, at its own expense, remove from the Project any person who fails to comply with such rules and instructions. The Contractor shall at all times enforce strict discipline and good order among its employees and shall not employ on the Project any unfit person or anyone not skilled in the work assigned to him. Fort Bend County may, upon written notice to the Contractor, require the Contractor to remove an individual immediately from providing services for the following reasons: violation of the terms and conditions of this Contract; violation of Fort Bend County's or the Contractor's work rules and regulations; criminal activity; or violation of state, federal, or municipal statutes. Fort Bend County may, upon thirty (30) days written notice to the Contractor, require the removal of any individual from providing services without cause.

- 14.11 Inspection. The Project and all parts thereof shall be subject to inspection from time to time by inspectors designated by Fort Bend 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 or any provision of this Contract shall be construed to imply an acceptance of such work or to relieve the Contractor of any of its obligations hereunder. Fort Bend 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.
- 14.12 Protection Against Risks. The Contractor shall take all precautions which are necessary and adequate, against conditions created during the progress of the Project which involve a risk of bodily harm 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. 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 being performed. 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.
- 14.13 Equipment. Except as expressly provided herein to the contrary, the Contractor shall furnish (or cause to be furnished) all construction, transportation, installation, tools, and other equipment and facilities required for the performance of the Project within the times specified herein. Such equipment and facilities shall be serviceable and kept fit for the uses intended. Defective items shall be removed from the construction site promptly and at the Contractor's cost. The Contractor shall schedule (or cause to be scheduled) its other operations so as to not interfere with its duty to timely furnish the necessary equipment and facilities and personnel to operate the same at the times necessary for the orderly completion of the Project.

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- 14.14 Materials. Except as may be specifically provided otherwise in the Contract or approved in advance by Fort Bend County, the Contractor shall provide Fort Bend County with copies of material testing reports and to cause all materials, equipment, and fabricated items incorporated in the Project to be new and of a suitable grade of their respective kinds for their intended use.
- 14.15 Delay, Disruption or Hindrance Damages. Contractor and the 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 and stipulate that an extension of the Contract Time shall be the sole remedy of Contractor for delays in performance of the Work, whether or not such delays are foreseeable, except for delays caused solely by acts of the County that constitute fraud, intentional misrepresentation, gross negligence, intentional arbitrary or capricious acts and/or omissions or intentional interference with Contractor's performance of the Work and then only to the extent such acts continue after Contractor notifies Owner in writing of such conduct. For delays caused by any act(s) other than fraud, intentional misrepresentation, gross negligence, intentional arbitrary or capricious acts and/or omissions or intentional interference with Contractor's performance of the Work Contractor shall not be entitled to any compensation or recovery of any damages including, without limitation, those damages prohibited or limited in Sections 14.15.1 – 14.15.8 below. 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, in response to any breach or failure by the Contractor to comply with the terms of the Contract Documents or the Contractor's obligations arising therefrom, shall not be construed as intentional interference with Contractor's performance of the Work regardless of the extent or frequency of the County's exercise of such rights or remedies.

Without limiting the foregoing, except as otherwise expressly provided in this Agreement in calculating the amount of any claim recoverable by Contractor, the following limitations on the recovery of damages shall apply:

14.15.1 No indirect or consequential damages will be allowed.

14.15.2 No recovery shall be based on a comparison of planned expenditures to

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total actual expenditures, or on estimated losses of labor efficiency, or on a comparison of planned manloading to actual manloading, or any other analysis that is used to show damages indirectly.

- 14.15.3 Damages, to the extent recoverable, are limited to the additional, actual costs specifically shown to have been directly incurred by the Contractor and solely caused by the proven wrong.
- 14.15.4 No damages will be allowed for home office overhead or other home office charges.
- 14.15.5 No exemplary damages or unjust enrichment damages shall be recoverable.
- 14.15.6 No recovery of attorney's fees shall be recoverable except as expressly permitted under the Agreement.
- 14.15.7 No profit will be allowed on any damage claim, except as expressly recoverable under the Agreement as Fee on Cost of the Work incurred.
- 14.15.8 Notwithstanding any other damage limitation herein the County and the Contractor recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by the Contractor if the County is found to have intentionally interfered with Contractor's performance of the Work by fraud, misrepresentation, gross negligence, or intentional arbitrary or capricious acts and/or omissions. Accordingly, instead of requiring any such proof, the County and the Contractor agree that as liquidated damages (in lieu of any other remedy or damages) for delay, disruption or hindrance (but not as a penalty) the County shall pay the Contractor \$1,500.00 for each day that a court of competent jurisdiction finds the County's conduct referenced in Section 14.15 (above) is the sole cause of Contractor's delay in completing the Work.

15.0 TERMINATION:

- 15.1 Fort Bend County may terminate the Contract for cause if the Contractor:
 - 15.1.1 Persistently or repeatedly refuses or fails to supply enough properly skilled workers or proper materials.
 - 15.1.2 Fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractor.

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- 15.1.3 Persistently disregards laws, ordinances, or rules, regulations or orders of a public authority having jurisdiction.
- 15.1.4 Otherwise commits substantial breach of a provision of the Contract Documents.
- 15.2 When any of the above reasons exists, Fort Bend County may, without prejudice to any other rights or remedies of Fort Bend County and after giving the Contractor and the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:
 - 15.2.1 Take possession of the site and of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor.
 - 15.2.2 Finish the Project by whatever reasonable method Fort Bend County may deem expedient.
 - 15.2.3 When Fort Bend County terminates the Contract for one of the reasons stated in this section, the Contractor shall not be entitled to receive further payment until the Project is finished. Therefore, the Contractor shall be promptly paid for all work actually and satisfactorily completed.

15.3 **Termination for Convenience of Fort Bend County**

Fort Bend County reserves the right, without breach, to terminate the Contract prior to, or during the performance of the Work, for any reason. Upon such an occurrence, the following shall apply.

- 15.3.1 The County will notify Contractor in writing of the county's determination to terminate the contract for convenience and the effective date of the Contract termination. The notice may also contain instructions necessary for the protection, storage or decommissioning of incomplete work or systems, and for safety.
- 15.3.2 Upon receipt of the notice of termination, Contractor shall immediately proceed with the following obligations, regardless of any dispute in determining or adjusting any amounts due at that point in the Contract:
 - 15.3.2.1 Stop all work.
 - 15.3.2.2 Place no further subcontracts or orders for materials or services.
 - 15.3.2.3 Terminate all subcontracts for convenience.
 - 15.3.2.4 Cancel all materials and equipment orders as applicable.

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

15.3.2.6 When the Contract is terminated for Owner's convenience, Contractor may recover from Owner payment for all Work executed. Contractor may not claim lost profits or lost business opportunities.

15.4 Settlement on Termination. When the Contract is terminated by the County under 15.3, at any time prior to one hundred eighty (180) days after the effective date of termination, Contractor shall submit a final termination settlement proposal to the County based upon recoverable costs as provided under the Contract. If Contractor fails to submit the proposal within the time allowed, the County may unilaterally determine the amount due to Contractor because of the termination and pay the determined amount to Contractor.

16.0 COMPLETION, TRANSFER, & ACCEPTANCE:

16.1 Final Completion. Upon the occurrence of the final completion date, the punch list items shall be promptly commenced and thereafter completed within thirty (30) days after final completion.

16.2 Transfer and Acceptance. Upon the occurrence of final completion, care, custody and control of the Project shall pass to Fort Bend County. As referenced herein, the "Transfer Date" shall mean the date on which the care, custody and control of the Project passes to Fort Bend County. Subsequent to the Transfer Date all risk of loss with respect to the Project shall be by Fort Bend County and the Contractor shall be thereafter obligated to cover the Project with their Insurance.

17.0 SUSPENSION BY FORT BEND COUNTY FOR CONVENIENCE:

17.1 Fort Bend County may, without cause, order the Contractor in writing to suspend, delay or interrupt the Project in whole or in part for such period of time as Fort Bend County may determine.

17.2 An adjustment shall be made for increase in the cost of performance, caused by suspension, delay or interruption. No adjustment shall be made to the extent:

17.2.1 That performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible.

17.2.2 That an equitable adjustment is made or denied under another provision of this Contract.

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- 17.3 Adjustments made in the cost of performance may have a mutually agreed fixed or percentage fee.

18.0 INDEPENDENT CONTRACTOR:

The Contractor shall be an independent contractor and any provisions of this Contract that may appear to give Fort Bend County the right to direct the Contractor as to the details of the manner of doing the Project shall be deemed to mean that the Contractor shall follow the desires of Fort Bend County in the results of the Project only and not in the means whereby the Project is to be accomplished. The Contractor shall be responsible as to the details of completing the Project. Neither the agents, representatives, nor employees of the Contractor, shall be deemed to be the agents, representatives, or employees of Fort Bend County. The Contractor further represents that it accepts a fiduciary role and responsibility with respect to Fort Bend County and will, to its best abilities, act in the best interests of Fort Bend County and the timely completion of the Project. The Contractor agrees and understands that neither it nor any of its agents or employees may act in the name of Fort Bend County except and unless specifically authorized in writing by Fort Bend County to do so. The Contractor shall furnish construction administration and management services and use the Contractor's best efforts to complete the Project in an expeditious and economical manner consistent with the interests of Fort Bend County.

19.0 NOTICE

- 19.1 All written notices, demands, and other papers or documents to be delivered to Fort Bend County under this Contract shall be delivered to the Engineering Department, 301 Jackson, Richmond, Texas 77469, or at such other place or places as Fort Bend County may from time to time designate by written notice delivered to the Contractor. For purposes of notice under this Contract, a copy of any notice or communication hereunder shall also be forwarded to the following address: Fort Bend County, 301 Jackson Street, Richmond, Texas 77469, Attention: County Judge.

- 19.2 All written notices, demands, and other papers or documents to be delivered to the Contractor under this Contract shall be delivered to the Authorized Representative identified in the Contract documents or such other place or places as the Contractor may designate by written notice delivered to Fort Bend County.

20.0 RECORDS:

- 20.1 Fort Bend County shall be the absolute and unqualified owner of all drawings, preliminary layouts, record drawings, sketches and other documents prepared pursuant to the Contract by Contractor.
- 20.2 The Contractor agrees to maintain and preserve for a period of at least five years after the earlier of the expiration of the defects period or termination of this Contract, accurate and complete records relating to the performance of the

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Project. The Contractor agrees to, upon request, provide Fort Bend County with such records.

21.0 SUCCESSORS & ASSIGNS:

- 21.1 Fort Bend County and the Contractor bind themselves and their successors, executors, administrators and assigns to the other party of this Contract and to the successors, executors, administrators and assigns of such other party, in respect to all covenants of this Contract.
- 21.2 Neither Fort Bend County nor the Contractor shall assign, sublet or transfer its interest in this Contract without the prior written consent of the other.
- 21.3 Nothing herein shall be construed as creating any personal liability on the part of any officer or agent of any public and/or governmental body that may be a party hereto.

22.0 PUBLIC CONTACT:

Contact with the news media, citizens of Fort Bend County or governmental agencies shall be the sole responsibility of Fort Bend County. Under no circumstances, whatsoever, shall Contractor release any material or information developed in the performance of its services hereunder without the express written permission of Fort Bend County, except where required to do so by law.

23.0 MODIFICATIONS:

This instrument contains the entire Contract between the parties relating to the rights herein granted and obligations herein assumed. Any oral or written representations or modifications concerning this instrument shall be of no force and effect excepting a subsequent written modification signed by both parties hereto.

24.0 SILENCE OF SPECIFICATIONS:

The apparent silence of specifications as to any detail, or the apparent omission from it 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 to commercial trade and shall be of the highest quality as to materials used and workmanship. Manufacturer furnishing these items shall be experienced in design and construction of such items and shall be an established supplier of the item bid.

25.0 SEVERABILITY:

In the event one or more of the provisions contained in these requirements or the specifications shall for any reason be held to be invalid, illegal or unenforceable in any respect, such invalidity,

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illegality, or unenforceability shall not affect any other provision hereof and these requirements or the specifications shall be construed as if such invalid, illegal, or unenforceable provision had never been contained herein.

26.0 GOVERNING FORMS:

In the event of any conflict between the terms and provisions of these requirements and the specifications, the specifications shall govern. In the event of any conflict of interpretation of any part of this overall document, Fort Bend County's interpretation shall govern.

27.0 TAX EXEMPT:

Fort Bend County is exempt from state and local sales and use taxes under Section 151.309 of the Texas Tax Code. This Contract is deemed to be a separate contract for Texas tax purposes, and as such, Fort Bend County hereby issues its Texas Exemption for the purchase of any items qualifying for exemption under this Contract. Contractor is to issue its Texas Resale Certificate to vendors and subcontractors for such items qualifying for this exemption, and further, contractor should state these items at cost.

28.0 ENTIRE AGREEMENT:

The Parties agree that this Contract contains all of the terms and conditions of the understanding of the parties relating to the subject matter hereof. All prior negotiations, discussions, correspondence and preliminary understandings between the parties and others relating hereto are superseded by 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.

29.0 APPLICABLE LAW & VENUE

This Contract shall be construed under and in accord with the laws of the State of Texas, and all obligations of the parties created hereunder are performable in Fort Bend County, Texas, and that venue for any litigation arising out of or related to this Contract shall lie solely in the court of appropriate jurisdiction located in Fort Bend County, Texas.

30.0 ENCLOSURE:

The following being incorporated herein by reference for all purposes as though fully set forth herein word for word.

Enclosure #1 – Specifications and Plans

31.0 PRICING: Complete excel unit pricing form.

32.0 PROJECT DURATION:

Bidder agrees, if awarded the contract, to complete all work required by the contract documents **within _____ calendar days (maximum 548 days)** after issuance of a purchase order by the

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County Purchasing Agent and notice to proceed by the Engineering Department.

33.0 AWARD:

This contract will be awarded to the overall lowest and best bid.

34.0 TEXAS ETHICS COMMISSION FORM 1295:

34.1 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", per the new Government Code Statute §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/>

34.2 On-line instructions:

34.2.1 Name of governmental entity is to read: Fort Bend County.

34.2.2 Identification number used by the governmental entity is: B24-017.

34.2.3 Description is the title of the solicitation: Belknap Road Pavement and Drainage Improvements.

34.3 Apparent low bidder(s) will be required to provide the Form 1295 within three (3) calendar days from notification; however, if your company is publicly traded you are not required to complete this form.

35.0 STATE LAW REQUIREMENTS FOR CONTRACTS:

The contents of this section are required by Texas Law and are included by County regardless of content.

35.1 Agreement to Not Boycott Israel Chapter 2271 Texas Government Code: Contractor verifies that if Contractor employs ten (10) or more full-time employees and this Agreement has a value of \$100,000 or more, Contractor does not boycott Israel and will not boycott Israel during the term of this Agreement.

35.2 Texas Government Code Section 2251.152 Acknowledgment: By signature on vendor form, Contractor represents pursuant to Section 2252.152 of the Texas Government Code, that Contractor is not listed on the website of the Comptroller of the State of Texas concerning the listing of companies that are identified under Section 806.051, Section 807.051 or Section 2253.153.

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36.0 HUMAN TRAFFICKING:

By acceptance of this contract, Contractor acknowledges that Fort Bend County is opposed to human trafficking and that no County funds will be used in support of services or activities that violate human trafficking laws

37.0 INDEMNITY FOR BODILY INJURY OR DEATH CLAIMS

Indemnity for certain bodily injury or death claims. To the fullest extent permitted by law, contractor shall indemnify, defend and hold harmless the county 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 alleged to have been caused by the sole or partial negligence, fault or strict liability of any indemnitee.

Indemnity for all other claims. For all claims not addressed in the preceding section or section 11.0 above , including, without limitation, claims for damage to or loss of use of property and claims for bodily injury to or death of any person other than that addressed in the immediately preceding section, to the fullest extent permitted by law, contractor shall indemnify, defend and hold harmless the county from and against all claims, losses, expenses, costs, demands, suits, causes of action, and damages, including without limitation, attorneys' fees and expenses, of any nature whatsoever arising out of or related to this contract or the work to be performed under this contract, but only to the extent of the negligence or other fault of the contractor, its agents, representatives, employees or subcontractors of any tier.

38.0 AGREEMENT TO ARBITRATE UNDER THE FEDERAL ARBITRATION ACT

To the maximum extent allowed by law, any controversy or claim arising out of or relating to this contract, or the breach thereof, shall be settled by arbitration under the Federal Arbitration Act, 9 U.S.C. § 1, et seq. administered by the American Arbitration Association under its Construction Industry Arbitration Rules, and judgment on the award rendered by the arbitrator(s) may be entered in any court having jurisdiction thereof. For cases in which the amount in controversy is less than \$250,000, there shall be no discovery other than an expeditious and complete exchange of documents relative to the dispute. For cases in which the amount in controversy is between \$250,000 and \$1,000,000, there shall be no discovery except for an expeditious and complete exchange of such documentary information and up to three (3) depositions per side (including expert depositions, if any). For cases in which the amount in controversy exceeds \$1,000,000, there shall be no discovery except for an expeditious and complete exchange of such documentary information up to five (5) depositions per side (including expert depositions, if any). No formal interrogatories, request for admissions or formal request for production of documents shall be allowed in the arbitration process. The hearing on the merits will be completed no later than ninety (90) days after the initial demand for arbitration is made for disputes involving amounts in controversy of up to \$250,000; no later than no later than one hundred twenty (120) days after the initial demand for arbitration is made for disputes involving amounts in controversy of between \$250,000 and \$1,000,000; and, no

Initials of Bidder: _____

later than three hundred sixty five (365) days after the initial demand for arbitration is made for disputes involving amounts in controversy of over \$1,000,000.

39.0 ADDITIONAL REQUIRED FORMS:

All vendors submitting are required to complete and return with submission:

- 39.1 Vendor Form
- 39.2 W9 Form
- 39.3 Tax Form/Debt/Residence Certification
- 39.4 Contractor Acknowledgement of Stormwater Management Program

Initials of Bidder: _____

**Contract Sheet
Bid 24-017**

**THE STATE OF TEXAS
COUNTY OF FORT BEND**

This memorandum of agreement made and entered into on the _____ day of _____, 20____, by and between Fort Bend County in the State of Texas (hereinafter designated County), acting herein by County Judge KP George, by virtue of an order of Fort Bend County Commissioners Court, and _____ (hereinafter designated Contractor).

(company name)

WITNESSETH:

The Contractor and the County agree that the bid and specifications for the **Belknap Road Pavement and Drainage Improvements for Fort Bend County Mobility Bond Project No. 17211** which are hereto attached and made a part hereof, together with this instrument and the bond (when required) shall constitute the full agreement and contract between parties and for furnishing the items set out and described; the County agrees to pay the prices stipulated in the accepted bid.

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.

Executed at Richmond, Texas this _____ day of _____, 20_____.

Fort Bend County, Texas

By: _____
County Judge, KP George

By: _____
Signature of Contractor

By: _____
Printed Name and Title

Request for Taxpayer Identification Number and Certification

**Give Form to the
 requester. Do not
 send to the IRS.**

Print or type See Specific Instructions on page 2.	1 Name (as shown on your income tax return). Name is required on this line; do not leave this line blank.	
	2 Business name/disregarded entity name, if different from above	
	3 Check appropriate box for federal tax classification; check only one of the following seven boxes: <input type="checkbox"/> Individual/sole proprietor or single-member LLC <input type="checkbox"/> C Corporation <input type="checkbox"/> S Corporation <input type="checkbox"/> Partnership <input type="checkbox"/> Trust/estate <input type="checkbox"/> Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=partnership) ▶ _____ Note. For a single-member LLC that is disregarded, do not check LLC; check the appropriate box in the line above for the tax classification of the single-member owner. <input type="checkbox"/> Other (see instructions) ▶ _____	4 Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3): Exempt payee code (if any) _____ Exemption from FATCA reporting code (if any) _____ <i>(Applies to accounts maintained outside the U.S.)</i>
	5 Address (number, street, and apt. or suite no.)	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 Part I instructions on page 3. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN* on page 3.

Social security number									
				-			-		
or									
Employer identification number									
				-					

Note. If the account is in more than one name, see the instructions for line 1 and the chart on page 4 for guidelines on whose number to enter.

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 on page 3.

Sign Here	Signature of U.S. person ▶	Date ▶
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General Instructions

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

Future developments. Information about developments affecting Form W-9 (such as legislation enacted after we release it) is at www.irs.gov/fw9.

Purpose of Form

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) which may be your social security number (SSN), individual taxpayer identification number (ITIN), adoption taxpayer identification number (ATIN), or employer identification number (EIN), to report on an information return the amount paid to you, or other amount reportable on an information return. Examples of information returns include, but are not limited to, the following:

- Form 1099-INT (interest earned or paid)
- Form 1099-DIV (dividends, including those from stocks or mutual funds)
- Form 1099-MISC (various types of income, prizes, awards, or gross proceeds)
- Form 1099-B (stock or mutual fund sales and certain other transactions by brokers)
- Form 1099-S (proceeds from real estate transactions)
- Form 1099-K (merchant card and third party network transactions)

- Form 1098 (home mortgage interest), 1098-E (student loan interest), 1098-T (tuition)
- Form 1099-C (canceled debt)
- Form 1099-A (acquisition or abandonment of secured property)

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN.

If you do not return Form W-9 to the requester with a TIN, you might be subject to backup withholding. See What is backup withholding? on page 2.

By signing the filled-out form, you:

1. Certify that the TIN you are giving is correct (or you are waiting for a number to be issued),
2. Certify that you are not subject to backup withholding, or
3. Claim exemption from backup withholding if you are a U.S. exempt payee. If applicable, you are also certifying that as a U.S. person, your allocable share of any partnership income from a U.S. trade or business is not subject to the withholding tax on foreign partners' share of effectively connected income, and
4. Certify that FATCA code(s) entered on this form (if any) indicating that you are exempt from the FATCA reporting, is correct. See *What is FATCA reporting?* on page 2 for further information.

Note. If you are a U.S. person and a requester gives you a form other than Form W-9 to request your TIN, you must use the requester's form if it is substantially similar to this Form W-9.

Definition of a U.S. person. For federal tax purposes, you are considered a U.S. person if you are:

- An individual who is a U.S. citizen or U.S. resident alien;
- A partnership, corporation, company, or association created or organized in the United States or under the laws of the United States;
- An estate (other than a foreign estate); or
- A domestic trust (as defined in Regulations section 301.7701-7).

Special rules for partnerships. Partnerships that conduct a trade or business in the United States are generally required to pay a withholding tax under section 1446 on any foreign partners' share of effectively connected taxable income from such business. Further, in certain cases where a Form W-9 has not been received, the rules under section 1446 require a partnership to presume that a partner is a foreign person, and pay the section 1446 withholding tax. Therefore, if you are a U.S. person that is a partner in a partnership conducting a trade or business in the United States, provide Form W-9 to the partnership to establish your U.S. status and avoid section 1446 withholding on your share of partnership income.

In the cases below, the following person must give Form W-9 to the partnership for purposes of establishing its U.S. status and avoiding withholding on its allocable share of net income from the partnership conducting a trade or business in the United States:

- In the case of a disregarded entity with a U.S. owner, the U.S. owner of the disregarded entity and not the entity;
- In the case of a grantor trust with a U.S. grantor or other U.S. owner, generally, the U.S. grantor or other U.S. owner of the grantor trust and not the trust; and
- In the case of a U.S. trust (other than a grantor trust), the U.S. trust (other than a grantor trust) and not the beneficiaries of the trust.

Foreign person. If you are a foreign person or the U.S. branch of a foreign bank that has elected to be treated as a U.S. person, do not use Form W-9. Instead, use the appropriate Form W-8 or Form 8233 (see Publication 515, Withholding of Tax on Nonresident Aliens and Foreign Entities).

Nonresident alien who becomes a resident alien. Generally, only a nonresident alien individual may use the terms of a tax treaty to reduce or eliminate U.S. tax on certain types of income. However, most tax treaties contain a provision known as a "saving clause." Exceptions specified in the saving clause may permit an exemption from tax to continue for certain types of income even after the payee has otherwise become a U.S. resident alien for tax purposes.

If you are a U.S. resident alien who is relying on an exception contained in the saving clause of a tax treaty to claim an exemption from U.S. tax on certain types of income, you must attach a statement to Form W-9 that specifies the following five items:

1. The treaty country. Generally, this must be the same treaty under which you claimed exemption from tax as a nonresident alien.
2. The treaty article addressing the income.
3. The article number (or location) in the tax treaty that contains the saving clause and its exceptions.
4. The type and amount of income that qualifies for the exemption from tax.
5. Sufficient facts to justify the exemption from tax under the terms of the treaty article.

Example. Article 20 of the U.S.-China income tax treaty allows an exemption from tax for scholarship income received by a Chinese student temporarily present in the United States. Under U.S. law, this student will become a resident alien for tax purposes if his or her stay in the United States exceeds 5 calendar years. However, paragraph 2 of the first Protocol to the U.S.-China treaty (dated April 30, 1984) allows the provisions of Article 20 to continue to apply even after the Chinese student becomes a resident alien of the United States. A Chinese student who qualifies for this exception (under paragraph 2 of the first protocol) and is relying on this exception to claim an exemption from tax on his or her scholarship or fellowship income would attach to Form W-9 a statement that includes the information described above to support that exemption.

If you are a nonresident alien or a foreign entity, give the requester the appropriate completed Form W-8 or Form 8233.

Backup Withholding

What is backup withholding? Persons making certain payments to you must under certain conditions withhold and pay to the IRS 28% of such payments. This is called "backup withholding." Payments that may be subject to backup withholding include interest, tax-exempt interest, dividends, broker and barter exchange transactions, rents, royalties, nonemployee pay, payments made in settlement of payment card and third party network transactions, and certain payments from fishing boat operators. Real estate transactions are not subject to backup withholding.

You will not be subject to backup withholding on payments you receive if you give the requester your correct TIN, make the proper certifications, and report all your taxable interest and dividends on your tax return.

Payments you receive will be subject to backup withholding if:

1. You do not furnish your TIN to the requester,
2. You do not certify your TIN when required (see the Part II instructions on page 3 for details),

3. The IRS tells the requester that you furnished an incorrect TIN,

4. The IRS tells you that you are subject to backup withholding because you did not report all your interest and dividends on your tax return (for reportable interest and dividends only), or

5. You do not certify to the requester that you are not subject to backup withholding under 4 above (for reportable interest and dividend accounts opened after 1983 only).

Certain payees and payments are exempt from backup withholding. See *Exempt payee code* on page 3 and the separate Instructions for the Requester of Form W-9 for more information.

Also see *Special rules for partnerships* above.

What is FATCA reporting?

The Foreign Account Tax Compliance Act (FATCA) requires a participating foreign financial institution to report all United States account holders that are specified United States persons. Certain payees are exempt from FATCA reporting. See *Exemption from FATCA reporting code* on page 3 and the Instructions for the Requester of Form W-9 for more information.

Updating Your Information

You must provide updated information to any person to whom you claimed to be an exempt payee if you are no longer an exempt payee and anticipate receiving reportable payments in the future from this person. For example, you may need to provide updated information if you are a C corporation that elects to be an S corporation, or if you no longer are tax exempt. In addition, you must furnish a new Form W-9 if the name or TIN changes for the account; for example, if the grantor of a grantor trust dies.

Penalties

Failure to furnish TIN. If you fail to furnish your correct TIN to a requester, you are subject to a penalty of \$50 for each such failure unless your failure is due to reasonable cause and not to willful neglect.

Civil penalty for false information with respect to withholding. If you make a false statement with no reasonable basis that results in no backup withholding, you are subject to a \$500 penalty.

Criminal penalty for falsifying information. Willfully falsifying certifications or affirmations may subject you to criminal penalties including fines and/or imprisonment.

Misuse of TINs. If the requester discloses or uses TINs in violation of federal law, the requester may be subject to civil and criminal penalties.

Specific Instructions

Line 1

You must enter one of the following on this line; **do not** leave this line blank. The name should match the name on your tax return.

If this Form W-9 is for a joint account, list first, and then circle, the name of the person or entity whose number you entered in Part I of Form W-9.

a. **Individual.** Generally, enter the name shown on your tax return. If you have changed your last name without informing the Social Security Administration (SSA) of the name change, enter your first name, the last name as shown on your social security card, and your new last name.

Note. ITIN applicant: Enter your individual name as it was entered on your Form W-7 application, line 1a. This should also be the same as the name you entered on the Form 1040/1040A/1040EZ you filed with your application.

b. **Sole proprietor or single-member LLC.** Enter your individual name as shown on your 1040/1040A/1040EZ on line 1. You may enter your business, trade, or "doing business as" (DBA) name on line 2.

c. **Partnership, LLC that is not a single-member LLC, C Corporation, or S Corporation.** Enter the entity's name as shown on the entity's tax return on line 1 and any business, trade, or DBA name on line 2.

d. **Other entities.** Enter your name as shown on required U.S. federal tax documents on line 1. This name should match the name shown on the charter or other legal document creating the entity. You may enter any business, trade, or DBA name on line 2.

e. **Disregarded entity.** For U.S. federal tax purposes, an entity that is disregarded as an entity separate from its owner is treated as a "disregarded entity." See Regulations section 301.7701-2(c)(2)(iii). Enter the owner's name on line 1. The name of the entity entered on line 1 should never be a disregarded entity. The name on line 1 should be the name shown on the income tax return on which the income should be reported. For example, if a foreign LLC that is treated as a disregarded entity for U.S. federal tax purposes has a single owner that is a U.S. person, the U.S. owner's name is required to be provided on line 1. If the direct owner of the entity is also a disregarded entity, enter the first owner that is not disregarded for federal tax purposes. Enter the disregarded entity's name on line 2, "Business name/disregarded entity name." If the owner of the disregarded entity is a foreign person, the owner must complete an appropriate Form W-8 instead of a Form W-9. This is the case even if the foreign person has a U.S. TIN.

Line 2

If you have a business name, trade name, DBA name, or disregarded entity name, you may enter it on line 2.

Line 3

Check the appropriate box in line 3 for the U.S. federal tax classification of the person whose name is entered on line 1. Check only one box in line 3.

Limited Liability Company (LLC). If the name on line 1 is an LLC treated as a partnership for U.S. federal tax purposes, check the "Limited Liability Company" box and enter "P" in the space provided. If the LLC has filed Form 8832 or 2553 to be taxed as a corporation, check the "Limited Liability Company" box and in the space provided enter "C" for C corporation or "S" for S corporation. If it is a single-member LLC that is a disregarded entity, do not check the "Limited Liability Company" box; instead check the first box in line 3 "Individual/sole proprietor or single-member LLC."

Line 4, Exemptions

If you are exempt from backup withholding and/or FATCA reporting, enter in the appropriate space in line 4 any code(s) that may apply to you.

Exempt payee code.

- Generally, individuals (including sole proprietors) are not exempt from backup withholding.
- Except as provided below, corporations are exempt from backup withholding for certain payments, including interest and dividends.
- Corporations are not exempt from backup withholding for payments made in settlement of payment card or third party network transactions.
- Corporations are not exempt from backup withholding with respect to attorneys' fees or gross proceeds paid to attorneys, and corporations that provide medical or health care services are not exempt with respect to payments reportable on Form 1099-MISC.

The following codes identify payees that are exempt from backup withholding. Enter the appropriate code in the space in line 4.

- 1—An organization exempt from tax under section 501(a), any IRA, or a custodial account under section 403(b)(7) if the account satisfies the requirements of section 401(f)(2)
- 2—The United States or any of its agencies or instrumentalities
- 3—A state, the District of Columbia, a U.S. commonwealth or possession, or any of their political subdivisions or instrumentalities
- 4—A foreign government or any of its political subdivisions, agencies, or instrumentalities
- 5—A corporation
- 6—A dealer in securities or commodities required to register in the United States, the District of Columbia, or a U.S. commonwealth or possession
- 7—A futures commission merchant registered with the Commodity Futures Trading Commission
- 8—A real estate investment trust
- 9—An entity registered at all times during the tax year under the Investment Company Act of 1940
- 10—A common trust fund operated by a bank under section 584(a)
- 11—A financial institution
- 12—A middleman known in the investment community as a nominee or custodian
- 13—A trust exempt from tax under section 664 or described in section 4947

The following chart shows types of payments that may be exempt from backup withholding. The chart applies to the exempt payees listed above, 1 through 13.

IF the payment is for . . .	THEN the payment is exempt for . . .
Interest and dividend payments	All exempt payees except for 7
Broker transactions	Exempt payees 1 through 4 and 6 through 11 and all C corporations. S corporations must not enter an exempt payee code because they are exempt only for sales of noncovered securities acquired prior to 2012.
Barter exchange transactions and patronage dividends	Exempt payees 1 through 4
Payments over \$600 required to be reported and direct sales over \$5,000 ¹	Generally, exempt payees 1 through 5 ²
Payments made in settlement of payment card or third party network transactions	Exempt payees 1 through 4

¹ See Form 1099-MISC, Miscellaneous Income, and its instructions.

² However, the following payments made to a corporation and reportable on Form 1099-MISC are not exempt from backup withholding: medical and health care payments, attorneys' fees, gross proceeds paid to an attorney reportable under section 6045(f), and payments for services paid by a federal executive agency.

Exemption from FATCA reporting code. The following codes identify payees that are exempt from reporting under FATCA. These codes apply to persons submitting this form for accounts maintained outside of the United States by certain foreign financial institutions. Therefore, if you are only submitting this form for an account you hold in the United States, you may leave this field blank. Consult with the person requesting this form if you are uncertain if the financial institution is subject to these requirements. A requester may indicate that a code is not required by providing you with a Form W-9 with "Not Applicable" (or any similar indication) written or printed on the line for a FATCA exemption code.

A—An organization exempt from tax under section 501(a) or any individual retirement plan as defined in section 7701(a)(37)

B—The United States or any of its agencies or instrumentalities

C—A state, the District of Columbia, a U.S. commonwealth or possession, or any of their political subdivisions or instrumentalities

D—A corporation the stock of which is regularly traded on one or more established securities markets, as described in Regulations section 1.1472-1(c)(1)(i)

E—A corporation that is a member of the same expanded affiliated group as a corporation described in Regulations section 1.1472-1(c)(1)(i)

F—A dealer in securities, commodities, or derivative financial instruments (including notional principal contracts, futures, forwards, and options) that is registered as such under the laws of the United States or any state

G—A real estate investment trust

H—A regulated investment company as defined in section 851 or an entity registered at all times during the tax year under the Investment Company Act of 1940

I—A common trust fund as defined in section 584(a)

J—A bank as defined in section 581

K—A broker

L—A trust exempt from tax under section 664 or described in section 4947(a)(1)

M—A tax exempt trust under a section 403(b) plan or section 457(g) plan

Note. You may wish to consult with the financial institution requesting this form to determine whether the FATCA code and/or exempt payee code should be completed.

Line 5

Enter your address (number, street, and apartment or suite number). This is where the requester of this Form W-9 will mail your information returns.

Line 6

Enter your city, state, and ZIP code.

Part I. Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. If you are a resident alien and you do not have and are not eligible to get an SSN, your TIN is your IRS individual taxpayer identification number (ITIN). Enter it in the social security number box. If you do not have an ITIN, see *How to get a TIN* below.

If you are a sole proprietor and you have an EIN, you may enter either your SSN or EIN. However, the IRS prefers that you use your SSN.

If you are a single-member LLC that is disregarded as an entity separate from its owner (see *Limited Liability Company (LLC)* on this page), enter the owner's SSN (or EIN, if the owner has one). Do not enter the disregarded entity's EIN. If the LLC is classified as a corporation or partnership, enter the entity's EIN.

Note. See the chart on page 4 for further clarification of name and TIN combinations.

How to get a TIN. If you do not have a TIN, apply for one immediately. To apply for an SSN, get Form SS-5, Application for a Social Security Card, from your local SSA office or get this form online at www.ssa.gov. You may also get this form by calling 1-800-772-1213. Use Form W-7, Application for IRS Individual Taxpayer Identification Number, to apply for an ITIN, or Form SS-4, Application for Employer Identification Number, to apply for an EIN. You can apply for an EIN online by accessing the IRS website at www.irs.gov/businesses and clicking on Employer Identification Number (EIN) under Starting a Business. You can get Forms W-7 and SS-4 from the IRS by visiting IRS.gov or by calling 1-800-TAX-FORM (1-800-829-3676).

If you are asked to complete Form W-9 but do not have a TIN, apply for a TIN and write "Applied For" in the space for the TIN, sign and date the form, and give it to the requester. For interest and dividend payments, and certain payments made with respect to readily tradable instruments, generally you will have 60 days to get a TIN and give it to the requester before you are subject to backup withholding on payments. The 60-day rule does not apply to other types of payments. You will be subject to backup withholding on all such payments until you provide your TIN to the requester.

Note. Entering "Applied For" means that you have already applied for a TIN or that you intend to apply for one soon.

Caution: A disregarded U.S. entity that has a foreign owner must use the appropriate Form W-8.

Part II. Certification

To establish to the withholding agent that you are a U.S. person, or resident alien, sign Form W-9. You may be requested to sign by the withholding agent even if items 1, 4, or 5 below indicate otherwise.

For a joint account, only the person whose TIN is shown in Part I should sign (when required). In the case of a disregarded entity, the person identified on line 1 must sign. Exempt payees, see *Exempt payee code* earlier.

Signature requirements. Complete the certification as indicated in items 1 through 5 below.

- 1. Interest, dividend, and barter exchange accounts opened before 1984 and broker accounts considered active during 1983.** You must give your correct TIN, but you do not have to sign the certification.
- 2. Interest, dividend, broker, and barter exchange accounts opened after 1983 and broker accounts considered inactive during 1983.** You must sign the certification or backup withholding will apply. If you are subject to backup withholding and you are merely providing your correct TIN to the requester, you must cross out item 2 in the certification before signing the form.
- 3. Real estate transactions.** You must sign the certification. You may cross out item 2 of the certification.
- 4. Other payments.** You must give your correct TIN, but you do not have to sign the certification unless you have been notified that you have previously given an incorrect TIN. "Other payments" include payments made in the course of the requester's trade or business for rents, royalties, goods (other than bills for merchandise), medical and health care services (including payments to corporations), payments to a nonemployee for services, payments made in settlement of payment card and third party network transactions, payments to certain fishing boat crew members and fishermen, and gross proceeds paid to attorneys (including payments to corporations).
- 5. Mortgage interest paid by you, acquisition or abandonment of secured property, cancellation of debt, qualified tuition program payments (under section 529), IRA, Coverdell ESA, Archer MSA or HSA contributions or distributions, and pension distributions.** You must give your correct TIN, but you do not have to sign the certification.

What Name and Number To Give the Requester

For this type of account:	Give name and SSN of:
1. Individual	The individual
2. Two or more individuals (joint account)	The actual owner of the account or, if combined funds, the first individual on the account ¹
3. Custodian account of a minor (Uniform Gift to Minors Act)	The minor ²
4. a. The usual revocable savings trust (grantor is also trustee) b. So-called trust account that is not a legal or valid trust under state law	The grantor-trustee ¹ The actual owner ¹
5. Sole proprietorship or disregarded entity owned by an individual	The owner ³
6. Grantor trust filing under Optional Form 1099 Filing Method 1 (see Regulations section 1.671-4(b)(2)(i)(A))	The grantor*
For this type of account:	Give name and EIN of:
7. Disregarded entity not owned by an individual	The owner
8. A valid trust, estate, or pension trust	Legal entity ⁴
9. Corporation or LLC electing corporate status on Form 8832 or Form 2553	The corporation
10. Association, club, religious, charitable, educational, or other tax-exempt organization	The organization
11. Partnership or multi-member LLC	The partnership
12. A broker or registered nominee	The broker or nominee
13. Account with the Department of Agriculture in the name of a public entity (such as a state or local government, school district, or prison) that receives agricultural program payments	The public entity
14. Grantor trust filing under the Form 1041 Filing Method or the Optional Form 1099 Filing Method 2 (see Regulations section 1.671-4(b)(2)(i)(B))	The trust

¹ List first and circle the name of the person whose number you furnish. If only one person on a joint account has an SSN, that person's number must be furnished.

² Circle the minor's name and furnish the minor's SSN.

³ You must show your individual name and you may also enter your business or DBA name on the "Business name/disregarded entity" name line. You may use either your SSN or EIN (if you have one), but the IRS encourages you to use your SSN.

⁴ List first and circle the name of the trust, estate, or pension trust. (Do not furnish the TIN of the personal representative or trustee unless the legal entity itself is not designated in the account title.) Also see *Special rules for partnerships* on page 2.

*Note. Grantor also must provide a Form W-9 to trustee of trust.

Note. If no name is circled when more than one name is listed, the number will be considered to be that of the first name listed.

Secure Your Tax Records from Identity Theft

Identity theft occurs when someone uses your personal information such as your name, SSN, or other identifying information, without your permission, to commit fraud or other crimes. An identity thief may use your SSN to get a job or may file a tax return using your SSN to receive a refund.

To reduce your risk:

- Protect your SSN,
- Ensure your employer is protecting your SSN, and
- Be careful when choosing a tax preparer.

If your tax records are affected by identity theft and you receive a notice from the IRS, respond right away to the name and phone number printed on the IRS notice or letter.

If your tax records are not currently affected by identity theft but you think you are at risk due to a lost or stolen purse or wallet, questionable credit card activity or credit report, contact the IRS Identity Theft Hotline at 1-800-908-4490 or submit Form 14039.

For more information, see Publication 4535, Identity Theft Prevention and Victim Assistance.

Victims of identity theft who are experiencing economic harm or a system problem, or are seeking help in resolving tax problems that have not been resolved through normal channels, may be eligible for Taxpayer Advocate Service (TAS) assistance. You can reach TAS by calling the TAS toll-free case intake line at 1-877-777-4778 or TTY/TDD 1-800-829-4059.

Protect yourself from suspicious emails or phishing schemes. Phishing is the creation and use of email and websites designed to mimic legitimate business emails and websites. The most common act is sending an email to a user falsely claiming to be an established legitimate enterprise in an attempt to scam the user into surrendering private information that will be used for identity theft.

The IRS does not initiate contacts with taxpayers via emails. Also, the IRS does not request personal detailed information through email or ask taxpayers for the PIN numbers, passwords, or similar secret access information for their credit card, bank, or other financial accounts.

If you receive an unsolicited email claiming to be from the IRS, forward this message to phishing@irs.gov. You may also report misuse of the IRS name, logo, or other IRS property to the Treasury Inspector General for Tax Administration (TIGTA) at 1-800-366-4484. You can forward suspicious emails to the Federal Trade Commission at: spam@uce.gov or contact them at www.ftc.gov/idtheft or 1-877-IDTHEFT (1-877-438-4338).

Visit IRS.gov to learn more about identity theft and how to reduce your risk.

Privacy Act Notice

Section 6109 of the Internal Revenue Code requires you to provide your correct TIN to persons (including federal agencies) who are required to file information returns with the IRS to report interest, dividends, or certain other income paid to you; mortgage interest you paid; the acquisition or abandonment of secured property; the cancellation of debt; or contributions you made to an IRA, Archer MSA, or HSA. The person collecting this form uses the information on the form to file information returns with the IRS, reporting the above information. Routine uses of this information include giving it to the Department of Justice for civil and criminal litigation and to cities, states, the District of Columbia, and U.S. commonwealths and possessions for use in administering their laws. The information also may be disclosed to other countries under a treaty, to federal and state agencies to enforce civil and criminal laws, or to federal law enforcement and intelligence agencies to combat terrorism. You must provide your TIN whether or not you are required to file a tax return. Under section 3406, payers must generally withhold a percentage of taxable interest, dividend, and certain other payments to a payee who does not give a TIN to the payer. Certain penalties may also apply for providing false or fraudulent information.

Job No.: _____

TAX FORM/DEBT/ RESIDENCE CERTIFICATION
(for Advertised Projects)

Taxpayer Identification Number (T.I.N.): _____

Company Name submitting Bid/Proposal: _____

Mailing Address: _____

Are you registered to do business in the State of Texas? Yes No

If you are an individual, list the names and addresses of any partnership of which you are a general partner or any assumed name(s) under which you operate your business

I. Property: List all taxable property in Fort Bend County owned by you or above partnerships as well as any d/b/a names. Include real and personal property as well as mineral interest accounts. (Use a second sheet of paper if necessary.)

<u>Fort Bend County Tax Acct. No.*</u>	<u>Property address or location**</u>
_____	_____
_____	_____
_____	_____
_____	_____

* *This is the property account identification number assigned by the Fort Bend County Appraisal District.*
 ** *For real property, specify the property address or legal description. For business personal property, specify the address where the property is located. For example, office equipment will normally be at your office, but inventory may be stored at a warehouse or other location.*

II. Fort Bend County Debt - Do you owe any debts to Fort Bend County (taxes on properties listed in I above, tickets, fines, tolls, court judgments, etc.)?
 Yes No If yes, attach a separate page explaining the debt.

III. Residence Certification - Pursuant to Texas Government Code §2252.001 *et seq.*, as amended, Fort Bend County requests Residence Certification. §2252.001 *et seq.* of the Government Code provides some restrictions on the awarding of governmental contracts; pertinent provisions of §2252.001 are stated below:

- (3) "Nonresident bidder" refers to a person who is not a resident.
- (4) "Resident bidder" refers to a person whose principal place of business is in this state, including a contractor whose ultimate parent company or majority owner has its principal place of business in this state.

I certify that _____ is a Resident Bidder of Texas as defined in Government Code §2252.001.
 [Company Name]

I certify that _____ is a Nonresident Bidder as defined in Government Code §2252.001 and our principal place of business is _____.
 [City and State]

Mandatory Form



Contractor Acknowledgement of Storm Water Management Program

I hereby acknowledge that I am aware of the stormwater management program and standard operating procedures developed by Fort Bend County in compliance with the TPDES General Permit No. TXR040000. I agree to comply with all applicable best management practices and standard operating procedures while conducting my services for Fort Bend County. I agree to conduct all services in a manner that does not introduce illicit discharges of pollutants to streets, stormwater inlets, drainage ditches or any portion of the drainage system. The following materials and/or pollutant sources must not be discharged to the drainage system as a result of any services provided:

1. Grass clippings, leaves, mulch, rocks, sand, dirt or other waste materials resulting from landscaping activities, (except those materials resulting from ditch mowing or maintenance activities)
2. Herbicides, pesticides and/or fertilizers, (except those intended for aquatic use)
3. Detergents, fuels, solvents, oils and/or lubricants, other equipment and/or vehicle fluids,
4. Other hazardous materials including paints, thinners, chemicals or related waste materials,
5. Uncontrolled dewatering discharges, equipment and/or vehicle wash waters,
6. Sanitary waste, trash, debris, or other waste products
7. Wastewater from wet saw machinery,
8. Other pollutants that degrade water quality or pose a threat to human health or the environment.

Furthermore, I agree to notify Fort Bend County immediately of any issue caused by or identified by:

(Company/Contractor)

that is believed to be an immediate threat to human health or the environment.

Contractor Signature

Date

Printed Name

Title

**BELKNAP ROAD PAVEMENT AND
DRAINAGE IMPROVEMENTS
WEST BELLFORT
TO 300 FEET NORTH OF HARRIS COUNTY LINE**



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X	SUMMARY OF WOK
X	GEOTECHNICAL REPORT

**BELKNAP ROAD PAVEMENT AND
DRAINAGE IMPROVEMENTS
WEST BELLFORT
TO 300 FEET NORTH OF HARRIS COUNTY LINE**



The following Specifications have been chosen as applicable to this project.

**CIVIL WORK
LIST OF PROJECT SPECIFICATIONS**

Harris County Specifications

Item No.	Description
100	TxDOT Preparing Right-Of-Way
102	Clearing And Grubbing
104	Remove Old Concrete
110	TxDOT Excavation
130	Borrow
162	Sodding for Erosion Control
164	Seeding And Erosion Control Blanket
220	Lime Treatment Stabilized Subgrade
221	Hydrated Lime and Lime Slurry
360	Concrete Pavement
416	TxDOT Drill Shaft Foundations
420	TxDOT Concrete Substructures
421	HC Hydraulic Cement Concrete
423	TxDOT Retaining Walls
425	TxDOT Precast Prestressed Concrete Structural Members
427	TxDOT Surface Finishes for Concrete
429	HC Trench Safety System
433	HC Cement Stabilized Sand (6" Thick)
450	HC Railing
460	HC Reinforced Concrete Pipe
463	HC Safety End Treatment
465	HC Concrete Manholes and Junction Boxes
466	HC Inlets
471	HC Precast Concrete Manhole and Junction Boxes
472	HC Inlets
473	HC Adjusting Manholes and Inlets
491	HC Reinforced Concrete Slope Paving

Harris County Specifications

Item No.		Description
495	HC	Removing Old Structures
500	HC	Miscellaneous Construction
506		BIODEG EROSN CONT LOGS (INSTL) (8")
516	HC	Flex Beam Guardrail (12 Gauge) Including Mowing Strip
530	HC	Concrete, Curb, concrete Curb and Gutter, Sidewalk and Driveways
531	TxDOT	Sidewalks
536	HC	Concrete Medians and Directional Islands
540	HC	Remove And Dispose Of Existing Asphaltic Surface And Base Material (All Depths)
550	HC	Remove and Salvage Fence (All Types)
561	HC	Video Recording Construction
618	TxDOT	Conduit
620	TxDOT	Electrical Conductors
621	TxDOT	Tray Cable
624	TxDOT	Ground Boxes
660	HC	Reflectorized Pavement Markings
663	HC	Traffic Buttons and Pavement Markers
664	HC	Reflectorized Pavement Marking Type II-C-R (4")
665	HC	Work Zone Pavement Markings
671	HC	Traffic Control
673	HC	Constructing Detours (8" Black Base)
674	HC	Eliminate Existing Pavement Marking & Marker
680	TxDOT	Highway Traffic Signals
682	TxDOT	Vehicle and Pedestrian Signal Heads
684	TxDOT	Traffic signal Cables
687	TxDOT	Pedestal Pole Assemblies
688	TxDOT	Pedestrian Detectors and Vehicle Loop Detectors

Harris County Specifications

Item No.		Description
696	HC	Barricade
713	HC	Reinforced Filter Fabric Barrier (60% of unit cost for furnish and installation and 40% of unit cost for removal)
719	HC	Cleaning and Sealing Joints and Cracks (Concrete Pavement)
724	HC	Stabilized Construction Access (Type 1-Rock; 60% of unit cost for furnish and installation, and 40% of unit cost for removal))
750	HC	Rock Filter Dam (Type 2; 60% of unit cost for furnish and installation, and 40% of unit cost for removal)
751	TxDOT	Landscape Maintenance
6001	TxDOT	BBU system (EXTERNAL BATT CABINET)
686	TxDOT	Taffic Signal Pole Assemblies (Steel)
628	TxDOT	Electrical Services
DWG	HC	Offset Drainage (All Pipes and All Sizes)
SS901	HC	Detectable Warning 2' Wide (Red Brick Truncated Dome)



GEOTECHNICAL ENGINEERING STUDY

FOR

**PROJECT 2-11– BELKNAP ROAD
FORT BEND COUNTY PRECINCT 2
FORT BEND COUNTY, TEXAS**

Project No. AHA18-045-00
August 14, 2018

Mr. Max Bhatti, P.E., Senior Project Manager/Office Manager
EJES, Inc.
6161 Savoy Drive, Suite 830
Houston, Texas 77036

P 713.996.8990 F 713.996.8993
Toll Free 866.996.8990
TBPE Firm – F-3257

**RE: Geotechnical Engineering Study
2017 Mobility Bond Program
Fort Bend County Precinct 2
Project 2-11 – Belknap Road
From West Bellfort Boulevard to Harris County Line
Fort Bend County, Texas**


Dear Mr. Bhatti:

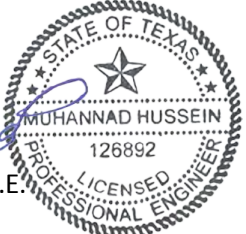
Raba Kistner Consultants, Inc. (RKCI) is pleased to submit the final report of our Geotechnical Engineering Study for the above-referenced project. This study was performed in accordance with **RKCI** Proposal No. PHA18-051-00, dated March 20, 2018. Written authorization to proceed with this study was received by our office via subcontract agreement on June 5, 2018. The purpose of this study was to explore subsurface conditions within the limits of the subject project and to provide foundation and pavement recommendations for the design and construction of a new bridge structure, rigid pavement and associated storm drainage.


The following report contains our design recommendations and considerations based on our current understanding of the design tolerances and pavement loads. If any of these parameters change, there may be alternatives for value engineering of the pavement systems, and **RKCI** recommends that a meeting be held with EJES, Inc. (CLIENT) and the design team to evaluate these alternatives.

We appreciate the opportunity to be of professional service to you on this project and look forward to receiving your comments. Should you have any questions about the information presented in this report, please call.

Very truly yours,
RABA KISTNER CONSULTANTS, INC.


Muhannad Hussein, P.E.
Project Engineer




John D. Brown, P.E.
Manager, Geotechnical Services

MH/JDB/dar
Attachments
Copies Submitted: Above (1-Electronic)

GEOTECHNICAL ENGINEERING STUDY

For

**PROJECT 2-11 – BELKNAP ROAD
FORT BEND COUNTY PRECINCT 2
FORT BEND COUNTY, TEXAS**

Prepared for

EJES, INC.
Houston, Texas

Prepared by

RABA KISTNER CONSULTANTS, INC.
Houston, Texas

PROJECT NO. AHA18-045-00

August 14, 2018

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- Site/Boring Location Map
- Log of Boring
- Key to Terms and Symbols
- Results of Soil Sample Analyses
- Important Information About Your Geotechnical Engineering Report
- Appendix A WinCore Data

INTRODUCTION

Raba Kistner Consultants, Inc. (RKCI) has completed the authorized subsurface exploration and pavement thickness design and construction recommendations for the proposed existing Belknap Road in Fort Bend County, Texas. This report briefly describes the procedures utilized during this study and presents our findings along with our recommendations for bridge foundations, pavement thickness design and construction considerations.

PROJECT DESCRIPTION

The overall project scope includes a study, design, and bid phase engineering services to be provided by CLIENT to develop the project's PS&E package for the reconstruction of an approximately 4,450-foot long, existing 2-lane asphalt roadway without shoulders into a new, 4-lane concrete pavement boulevard with associated curb & gutter and storm drainage project to be located along Belknap Road, From West Bellfort Boulevard to the Harris County line. The project will also include new bridge structures (dual bridge) over Keegan's Bayou.

The purpose of our geotechnical engineering study will be to determine subsurface conditions along the existing road alignment and to develop geotechnical engineering recommendations for the design of new rigid pavement and storm drainage (anticipated trench depths to be about 15 ft to 20 ft below grade), as well as to provide foundation recommendations for a new bridge structure over Keegan's Bayou. The Equivalent Single Axle Load (ESAL) value will be calculated based on Ft. Bend County's standard pavement design consisting of 8 inches of concrete underlain by 8 inches of lime-treated subgrade.

LIMITATIONS

This engineering report has been prepared in accordance with accepted Geotechnical Engineering practices in the Houston area by Geotechnical firms conducting similar work under similar circumstances and is meant for the use of the CLIENT and its representatives for design purposes. This report may not contain sufficient information for purposes of other parties or other uses and is not intended for use in determining construction means and methods.

The recommendations submitted in this report are based on the data obtained from eleven borings drilled at the designated work site and our understanding of the project information provided to us by the CLIENT. If the project information described in this report is incorrect, is altered, or if new information is available, we should be retained to review and modify our recommendations.

This report may not reflect the actual variations of the subsurface conditions across the site. The nature and extent of variations across the site may not become evident until construction commences. The construction process itself may also alter subsurface conditions. If variations appear evident at the time of construction, it may be necessary to reevaluate our recommendations after performing on-site observations and tests to establish the engineering impact of the variations.

The scope of our Geotechnical Engineering Study does not include an environmental assessment of the air, soil, rock, or water conditions either on or adjacent to the site. No environmental opinions are

presented in this report. **RKCI**'s scope of work does not include the investigation, detection, or design related to the prevention of any biological pollutants. The term "biological pollutants" includes, but is not limited to, mold, fungi, spores, bacteria, and viruses, and the byproduct of any such biological organisms.

BORING AND LABORATORY TESTS

Subsurface conditions at the site were evaluated by 11 borings (designated as B-1 through B-11) drilled at the locations shown on the Boring Location Map, Figure 1. The boring locations are approximate and were located in the field by an **RKCI** representative by using a measuring tape, pacing, and reference to known landmarks. The GPS coordinates at the boring locations, as shown on Figure 1 and on the boring logs, are approximate and are referenced to Google Earth. The coordinates are shown on the Boring Location Map and on the boring logs.

Existing pavement at the boring locations was cored with a 6-inch diameter core barrel in order to measure existing pavement section thickness and to access the underlying soils. A listing of the existing pavement thickness and composition of subgrade immediately beneath pavement at the borehole locations is presented in the table under the proceeding report subsection entitled "Existing Pavement Structures".

Pavement borings B-3 through B-11 were spaced at approximately 500-ft intervals along the roadway alignment and drilled to a depth of 20-ft below the ground surface elevation existing at the time of our study using a buggy-mounted drilling rig. Bridge borings B-1 and B-2 were located on the north and south sides, respectively, of Keegan's Bayou and completed to depths of 100 feet each. The borings were drilled utilizing a straight flight auger and mud rotary and were backfilled with the auger cuttings generated during the drilling activities. The core holes in the pavement were then sealed with bitumen. During drilling operations, the following samples were collected:

Type of Sample	Number Collected
Undisturbed Shelby Tube (ST)	59
Split-Spoon w/ Standard Penetration Test (SPT)	3
Grab Sample	47

The ST and SPT samples were obtained in general accordance with accepted standard practices. The SPT results are noted as "blows per foot" on the boring logs. The term "blows per foot" refers to the number of blows by a 30-inch free falling 140-lb hammer required for 12-inches of penetration into the subsurface materials. Grab samples were obtained from the auger cuttings generated during the drilling activities. Representative portions of the samples were sealed in containers to reduce moisture loss, labeled, packaged, and transported to our laboratory for subsequent testing and classification.

The Texas Cone Penetrometer (TCP) was used in Borings B-1 and B-2 (100-ft deep bridge borings), in general accordance with the Texas Department of Transportation (TxDOT) Tex-132-E. soil samples for laboratory testing purposes were collected from borings B-1 and B-2 by utilizing Shelby tube sampling techniques or from the auger cuttings (grab samples) in between each TCP sampling event. Representative portions of the samples were sealed, identified, packaged, and transported to our laboratory for subsequent testing and classification.

In the laboratory, each sample was evaluated and visually classified by a member of our Geotechnical Engineering staff in general accordance with the Unified Soil Classification System (USCS). The geotechnical engineering properties of the strata were evaluated by the laboratory tests tabulated in the table on the following page:

Type of Test	Number Conducted
Natural Moisture Content	109
Atterberg Limits	41
Percent Passing a No. 200 Sieve	42
Sieve Analysis including Hydrometer	2
Unconfined Compression	8
Corrosivity (Including pH, Electrical Resistivity, and Sulfate and Chloride Content Determinations)	1

With the exception of the corrosivity laboratory test results (including pH, electrical resistivity, and chloride and sulfate content determinations) and sieve analysis test results, the laboratory tests are presented in graphical or numerical form on the boring logs illustrated on Figures 2 through 12. A key to the classification of terms and symbols used on the logs is presented on Figure 13. The results of the laboratory and field testing are also tabulated on Figure 14 for ease of reference. The particle size distribution curves are presented on Figure 15.

The corrosion potential of the subsurface soils to concrete and uncoated steel was preliminarily evaluated by conducting laboratory analyses (pH, electrical resistivity, and sulfate and chloride content tests) on a selected specimen. These tests were conducted on an in-situ soil sample obtained from the subgrade soils within the proposed building footprint area. The laboratory test results are presented and discussed in a subsequent section of this report.

Samples will be retained in our laboratory for 30 days after submittal of this report. Other arrangements may be provided at the request of the CLIENT.

GENERAL SITE CONDITIONS

SITE DESCRIPTION

The project site is currently two-lane asphalt pavement without shoulders.

GEOLOGY

The Bureau of Economic Geology, Geologic Atlas of Texas, Houston Sheet (Revised 1982) shows the subject site to be located on the Beaumont Formation. The Beaumont Formation is the youngest coast-parallel Pleistocene unit in the Texas Gulf Coast. Most of the Beaumont Formation was deposited as an overlapping group of fluvial or deltaic plains by ancestors of modern streams now draining into the Gulf of Mexico. The Beaumont formation is comprised of clay, silt, and sand; includes mainly stream channel, point-bar, natural levee, backswamp, and to a lesser extent coastal marsh and mud-flat deposits;

concretions of calcium carbonate, iron oxide, and iron-manganese oxides in zone of weathering; surface almost featureless, characterized by relict river channels shown by meander patterns and pimple mounds on meanderbelt ridges, separated by areas of low, relatively smooth, featureless backswamp deposits without pimple mounds; formation thickness is +/- 100 ft.

SEISMIC COEFFICIENTS

On the basis of the soil borings conducted for this investigation, the upper 100 feet of soil may be characterized as stiff soil and a **Class D** Site Class Definition (Chapter 20 of ASCE 7) has been assigned to this site.

On the basis of the United States Geological Survey (USGS) website¹ which utilizes the International Building Code (IBC) and U.S. Seismic Design Maps to develop seismic design parameters, the following seismic considerations are associated with this site.

- **$S_s = 0.070g$**
- **$S_1 = 0.037g$**
- **$S_{ms} = 0.113g$**
- **$S_{m1} = 0.090g$**
- **$S_{DS} = 0.075g$**
- **$S_{D1} = 0.060g$**

Based on the parameters listed above as well as Tables 1613.3.5(1) and 1613.3.5(2) of the 2012 IBC, the Seismic Design Category for both short period and 1 second response accelerations is **A**. As part of the assumptions required to complete the calculations, a Risk Category of "I or II or III" was selected.

STRATIGRAPHY

The subsurface conditions encountered at the boring locations are shown on the boring logs, Figures 2 through 6. The boring logs should be consulted for boring specific (detailed) stratigraphic information. These boring logs represent our interpretation of the subsurface conditions based on the field logs, visual examination of field samples by our personnel, and laboratory test results of selected field samples. Each stratum has been designated by grouping soils that possess similar physical and engineering characteristics. The lines designating the interfaces between strata on the boring logs represent approximate boundaries. Transitions between strata may be gradual.

The subsurface stratigraphy at this site can be broken in to two generalized stratum, as follows:

Stratum I soils consist of cohesive, low plasticity to high plasticity, very soft to hard consistency, reddish brown to yellowish brown to brown to gray, sandy lean clay (CL), lean clay w/ sand (CL), sandy fat clay (CH), fat clay and fat clay with sand (CH). Roots, sand and silt seams, and ferrous and calcareous nodules were noted at varying depths within the stratum I soils. Measured moisture contents range from 9 to 39 percent. Measured plasticity indices (PI) range from 8 to 62. Based on grain size analyses, the

¹ <http://geohazards.usgs.gov/designmaps/us/application.php>

percentage of fines (percent passing a No. 200 sieve) within this stratum ranges from 58 to 97 percent. Based on unconfined compression test results, undrained shear strength values range from 0.19 to 1.09 tsf. The tested samples measured dry unit weights ranging from 83 to 102 pcf. Texas Cone Penetration (TCP) values ranging from 7 to over 100 blows per foot were recorded. The stratum I clays were the predominant soils encountered during drilling. Boring B-11 is comprised entirely of stratum I soils.

Stratum II soils consist of granular, loose to dense relative density, brown to reddish brown to yellowish brown to gray, cohesionless poorly graded sand with silt (SP-SM), poorly graded sand with gravel (SP), and silty sand (SM), and semi-cohesive, low plasticity, silty clayey sand (SC-SM) and clayey sand (SC). Measured moisture contents range from 4 to 28 percent. Measured plasticity indices (PI) range from 5 to 31. Based on grain size analysis, the percentage of fines (percent passing a No. 200 sieve) within this stratum ranges from 11 to 49 percent. SPT N-values ranging from 9 to 14 blows per foot were recorded. Texas Cone Penetration (TCP) values ranging from 17 to 87 blows per foot were recorded within stratum II soils.

SIEVE ANALYSIS

Sieve analysis was performed on soil samples recovered from depths of 18-ft and 28-ft in Bridge borings B-1 and B-2, respectively. The particle size distribution curves are presented on Figure 15.

EXISTING PAVEMENT

The existing pavement was cored at borings B-3 through B-10. The measured pavement section, thicknesses and the soil types immediately beneath the pavements are tabulated as follows:

Boring No.	Pavement Thickness and Description	Soil Immediately Beneath The Pavement
B-3	6-in. Asphalt	Clayey Sand
B-4	8-in. Asphalt	Sandy Lean Clay
B-5	10-in. Asphalt	Clayey Sand
B-6	10-in. Asphalt	Poorly Graded Sand w/ Silt
B-7	10-in. Asphalt	Clayey Sand
B-8	10-in. Asphalt	Clayey Sand
B-9	10-in. Asphalt	Clayey Sand
B-10	8-in. Asphalt	Poorly Graded Sand w/ Gravel

GROUNDWATER

Groundwater was observed in bridge borings B-1 and B-2 during drilling. Groundwater depth readings for these borings are listed in the following table:

Boring No.	Depth Groundwater Encountered (ft)	Water Level Depth after 15 Minutes (ft)
B-1	13.4	12.7
B-2	11.9	11.0

Groundwater was not observed in the remaining borings, either during or immediately upon completion of the drilling operations. These borings remained dry during the field exploration phase.

It should be noted that depth-to-water levels may fluctuate at any given time due to seasonal variations in rainfall and surface runoff, especially during extended periods of heavy rainfall or dry weather. Surface runoff may be controlled using temporary earthen berms or swales and conventional sump-and-pump dewatering methods.

CORROSIVITY POTENTIAL

Steel and concrete elements in contact with soil are subject to degradation from corrosion or chemical attack. The corrosivity characteristics of the upper soils were preliminarily evaluated using pH, electrical resistivity, sulfate content, and chloride content laboratory tests.

Corrosion of Steel

The measurable soil properties that indicate the corrosion potential for steel in contact with soil are soil pH, chloride ion concentration, and soil electrical resistivity. Corrosion of steel is most likely to occur in environments that have chloride ions, even in low concentrations, very low or very high pH, and/or low resistivity.

The following table presents general guidelines concerning the corrosion potential of a soil as a function of chloride ion concentration, pH, and electrical resistivity. Each of the columns on this table should be used independently of the others when evaluating corrosion potential. For instance, it is not necessary to have an electrical resistivity of less than 1,000 ohm-cm and a pH of less than 4.0 to indicate a *Very High* potential for corrosion.

Soil Corrosion Potential

Electrical Resistivity Ohm-cm ⁽¹⁾	Chloride Content, ppm	pH ⁽²⁾	Corrosion Potential
< 1,000			Very High
1,000 - 3,000	> 500	<4 or >10	High
3,000 - 10,000	< 500		Moderate
> 10,000		>4 or < 10	Mild

(1)After Roberge, 2000

(2)After DOE-HDBK-1015/1-93

Soil pH, chloride and sulfate content, and electrical resistivity laboratory tests were conducted on a relatively undisturbed cohesive soil sample obtained from bridge Boring B-1 from a depth of about 0-ft to 2-ft below the ground surface elevation existing at the time of our study. The laboratory test results are shown in the table below.

Chemical and Electrical Resistivity Test Results

Boring No.	Sampling Interval (ft)	Soil Type	pH	Ion Concentration Chloride (ppm)	Ion Concentration Sulfate (ppm)	Electrical Resistivity (ohm-cm)
B-1	0 – 2	Sandy Fat Clay	7.92	BRL*	BRL*	3920

*Below Recordable Limit

Based on the chemical and electrical resistivity laboratory test results and the general guidelines from the table titled “Soil Corrosion Potential”, the shallow natural soils appear to have a “Moderate” potential for corrosion of unprotected steel.

Degradation of Concrete

The degradation of concrete is caused by chemical agents in the soil or groundwater that react with concrete to either dissolve the cement paste or precipitate larger compounds which cause cracking and flaking. The concentration of water-soluble sulfates in the soils is a good indicator of the potential for chemical attack of concrete. Sulfate concentrations in soil can be used to evaluate the need for protection of concrete based on the general guidelines shown in the table on the following page.

Sulfate Attack Potential

Sulfate Ion Concentration, ppm or mg/kg	Aggressiveness ⁽¹⁾
>20,000	Very Severe
2,000 to 20,000	Severe
1,000 to 2,000	Moderate
< 1,000	Negligible

(1)ACI 318-05/ACI 318R-05

On the basis of soil sulfate concentration data shown on the table titled “Chemical and Electrical Resistivity Test Results” and the general guidelines from the “Sulfate Attack Potential” table, the soils have a “negligible” potential for attacking concrete. Based on the measured soil sulfate concentration, the American Concrete Institute (ACI) Committee Report 201.2R indicates that special requirements for sulfate resistance are not needed (that is, American Society for Testing and Materials (ASTM) C 150 Types I and II are applicable).

Degradation of concrete can also be advanced by the aggregates selected for the concrete mixtures. Alkali-silica reactivity (ASR), a chemical reaction between Portland cement concrete and certain aggregates, can directly cause expansion damage in concrete structures or can expedite other reactions that in turn cause damage, such as rebar corrosion.

Three requirements must be met for ASR expansion to occur: (1) reactive forms of silica or silicate in the aggregate; (2) sufficient alkali (sodium and potassium) primarily from the cement; and (3) sufficiently available moisture in the concrete. If one of the three requirements is not met, expansion due to ASR cannot occur. The concrete aggregates should be checked for ASR characteristics.

FOUNDATION RECOMMENDATIONS

It is our understanding that the project will also include new bridge structures (dual bridge) over Keegan’s Bayou. The new bridge will be supported on drilled, cast-in-place concrete shafts. Recommendations regarding drilled shaft and driven pile design and construction are given in the following sections.

DRILLED SHAFTS AND DRIVEN PILES

Drilled shaft capacities for various diameter shafts were computed using the procedures described in the TxDOT Geotechnical Manual dated March 2018. Drilled shafts may be designed for both skin friction and end bearing.

The design capacities are based on having a complete soil cover around the full length of the shaft. It is Houston District practice to disregard the frictional resistance of the soils in the upper 10-ft depth (from finished grade). Soil cover for the pilings to support the bridge crossing Keegan’s Bayou should be disregarded to the potential scour depth. Scour depth at the ditch crossing is not known at this time.

It is Houston District practice to disregard end bearing for drilled shafts less than or equal to 24-in. in diameter. Allowable unit end bearing for drilled shafts is assumed to be a maximum of 2 tsf for shaft diameters between 24-in. and 48-in. End bearing for drilled shaft diameter sizes greater than 48-in. may be computed as described in the TxDOT Geotechnical Manual. Allowable end bearing for drilled shaft diameter sizes greater than 48-in. is limited to 5.3 tsf due to restriction placed on TCP values when computing allowable end bearing capacity. The following tables summarize the recommended allowable end bearing values for drilled shaft foundations for the two proposed bridge structures:

Allowable Drilled Shaft End Bearing Values for B-1

Boring No.	Depth (ft)	Drilled Shaft Diameter Sizes Between 24 and 48 inches ^(*)	Drilled Shaft Diameter Sizes Greater Than 48 inches
B-1	0 – 5	Ignored	Ignored
	5 – 15	0.9 tsf	0.9 tsf
	15 – 33	2.0 tsf	2.9 tsf
	33 – 41	0.7 tsf	0.7 tsf
	41 – 55	1.4 tsf	1.4 tsf
	55 – 80	2.0 tsf	2.7 tsf
	80 – 90	1.8 tsf	1.8 tsf
	90 – 100	1.7 tsf	1.7 tsf

^(*) End bearing is limited to 2 tsf for drilled shaft diameter sizes between 24 and 48 inches.

Allowable Drilled Shaft End Bearing Values for B-2

Boring No.	Depth (ft)	Drilled Shaft Diameter Sizes Between 24 and 48 inches ^(*)	Drilled Shaft Diameter Sizes Greater Than 48 inches
B-2	0 – 5	Ignored	Ignored
	5 – 7	0.7 tsf	0.7 tsf
	7 – 13	1.4 tsf	1.4 tsf
	13 – 18	1.7 tsf	1.7 tsf
	18 – 30	2.0 tsf	2.7 tsf
	30 – 41	2.0 tsf	2.1 tsf
	41 – 73	2.0 tsf	2.6 tsf
	73 – 97	2.0 tsf	2.2 tsf
	97 – 100	2.0 tsf	2.7 tsf

^(*) End bearing is limited to 2 tsf for drilled shaft diameter sizes between 24 and 48 inches.

The allowable unit skin friction plots for the proposed bridges, presented in the TxDOT developed WinCore version 3.1 format similar to TxDOT Form 1190 for drilled shaft and driven pile foundation design, are presented in Appendix A. The capacities are for gravity loads on individual foundation units with a minimum center-to-center spacing of three shaft diameters. The soil design parameters were developed based on laboratory undrained triaxial shear strength test data in clay soils and the TxDOT cone penetrometer blow counts. A soil reduction factor of 0.7 was used to obtain the skin friction curves for the drilled shafts. The following tables summarize the recommended allowable unit skin friction values for drilled shaft foundations for the two proposed bridge structures:

Allowable Drilled Shaft Skin Friction Values for B-1

Boring No.	Depth (ft)	Soil Factor	TCP N Value	TCP Unit Friction (tsf)	Accumulative Friction (t/f)
B-1	0 – 2.5	50	7	0.10	0.25
	2.5 – 8	50	24	0.34	2.08
	8 – 13	80	17	0.15	2.82
	13 – 16	80	23	0.20	3.43
	16 – 21	80	49	0.43	5.57
	21 – 26	80	55	0.48	7.98
	26 – 31	80	72	0.63	11.13
	31 – 38	80	74	0.65	15.66
	38 – 41	50	13	0.18	16.21
	41 – 46	50	32	0.45	18.45
	46 – 53	50	400	1.25	27.20
	53 – 56	80	27	0.24	27.91
	56 – 63	80	77	0.67	32.62
	63 – 66	50	53	0.74	34.85
	66 – 71	50	58	0.81	38.91
	71 – 76	50	53	0.74	42.62
	76 – 81	50	54	0.76	46.40
81 – 86	50	62	0.87	50.74	
86 – 91	50	34	0.48	53.12	
91 – 96	50	34	0.48	55.50	
96 – 90	50	32	0.45	57.29	

Allowable Drilled Shaft Skin Friction Values for B-2

Boring No.	Depth (ft)	Soil Factor	TCP N Value	TCP Unit Friction (tsf)	Accumulative Friction (t/f)
B-2	0 – 2.5	50	19	0.27	0.68
	2.5 – 6.5	50	14	0.20	1.45
	6.5 – 13	50	26	0.36	3.82
	13 – 18	80	31	0.27	5.17
	18 – 21	80	45	0.39	6.36
	21 – 26	80	70	0.61	9.42
	26 – 31	80	64	0.56	12.22
	31 – 38	80	51	0.45	15.34
	38 – 41	50	41	0.57	17.06
	41 – 46	50	58	0.81	21.12
	46 – 51	50	54	0.76	24.90
	51 – 58	50	51	0.71	29.90
	58 – 63	80	47	0.41	31.96
	63 – 66	50	58	0.81	34.39
	66 – 71	50	70	0.88	38.77
	71 – 76	50	50	0.70	42.27
	76 – 81	50	61	0.85	46.54
	81 – 86	50	44	0.62	49.62
86 – 91	50	46	0.64	52.84	
91 – 96	50	42	0.59	55.78	
96 – 90	50	51	0.71	58.64	

The aspect ratio of a drilled shaft, or its length divided by its diameter (L/D), should not exceed about 30 (O’Neill and Reese, 1999, pg 11). If allowable end bearing values are added to the allowable friction values to design the size of a drilled shaft, then the maximum drilled shaft embedment depth should be limited to within three drilled shaft diameters above the maximum depth of the borings.

Scour depth was not known while calculating drilled shaft and pile capacities for the bridge over Keegan’s Bayou, and should be taken into consideration by the project engineer during the design process.

LATERAL LOAD ANALYSES

It is necessary to design the foundation unit to resist both vertical and lateral loads. The foundations will be subjected to lateral loading from wind forces and other sources. The lateral forces generated from those sources will be taken by mobilization of resistance in the surrounding soils as the unit deflects, and by the structural capacity of the foundation section.

We understand that lateral loading for the proposed bridge structures is not of a concern. We will be glad to provide lateral load capacities to aid the design when the foundation depth, type, and size have been selected if this becomes a design concern.

FOUNDATION SETTLEMENTS

Post-construction vertical movements due to design loads are anticipated to be less than 0.5 in. for drilled shafts installed using proper construction techniques. Movement consists of elastic shortening of the foundation unit and deformation at the foundation tip.

DRILLED SHAFT CONSTRUCTION RECOMMENDATIONS

Drilled shaft construction and installation should follow TxDOT Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges, June 2004 Edition, Item 416. The ACI 336.1-01 Specifications can be used in the absence of TxDOT Specifications. The TxDOT Specifications shall always supersede any other specifications. Presented below are a few specific recommendations.

1. Drilled shaft excavations should be inspected for verticality and side sloughing. Verticality is specified at one inch in ten feet of the shaft length, and should be checked to the full depth of dry augering prior to introducing drilling mud.
2. Slurry should contain four to eight percent by weight of bentonite additive and should satisfy the slurry specification set forth in TxDOT Standard Specification Item 416.2 or ACI 336.1-01 Table 2.6. Note that the ACI requirements are more stringent than TxDOT Standard Specification Item 416.2. The slurry specifications are required to assure suspension of detritus from the drilling operations, and to assure adequate cleaning of the slurry prior to concreting. Cleaning of the slurry is important to prevent deposition of detritus on reinforcement cages and ensure that inclusions of detritus will not be formed within the concrete mass.
3. Before placing concrete, the shaft bottoms should be cleaned out with a drilling bucket in order to remove any sediments which may not be displaced by the concrete. The shaft bottoms should be cleaned with a "clean-out" bucket until rotation on the bottom without crowd (i.e. penetration under force) produces little spoil. Probing after clean-out is essential to verify the condition of the base of the shaft.
4. Concrete should conform to the requirements of TxDOT Standard Specification Item 421 or ACI 336.1-01 Section 2.4.
5. Concrete placement should be accomplished as directed in TxDOT Standard Specification Item 416.3.F. The tremie pipe diameter should be at least eight times as large as the largest concrete aggregate size.
6. A computation of the final concrete volume for each shaft should be made. Shafts taking an unreasonably high or low volume of concrete should be cored to check their integrity.
7. If casing is used it should be pulled out slowly and smoothly with a vibratory hammer. The casing should always remain at least one foot below the level of the concrete during placement. Our analyses assume no casing will be left in place. We should be informed if casing would be left in place so we may provide revised shaft capacity calculations.

Shaft excavations should not be made within three shaft diameters (edge to edge) of shafts, which have been concreted within the last 24 hours. If it is deemed necessary to verify the design charts provided in Appendix A and B, then prior to the start of the construction, a load test may be performed on the selected drilled shaft type. The shaft subjected to the load test should be drilled to the design drilled shaft

tip elevation. The pile load test should be performed in accordance with TxDOT Standard Specification Item 405 and ASTM D 1143.

UNDERGROUND UTILITY RECOMMENDATIONS

It is our understanding that new storm sewer lines will be installed to replace the existing roadside ditches. The following sections provide our recommendations for bedding and backfill for new storm sewer installation.

BEDDING AND BACKFILL

Bedding and backfill recommendations for the proposed water, sanitary, and storm sewer lines should be in accordance with HCPID-ED criteria items 400, 402, and 433.

Bedding

Bedding is the material used along the bottom of the trench that provides uniform support for the buried pipe. Bedding may be compacted or uncompacted, depending on the recommendations of the design engineer. Bedding that is uncompacted allows the pipe to sink into the bedding soil allowing for a more uniform distribution of stress on the bottom of the pipe.

Under installed conditions, the vertical load on a pipe is distributed over its width and the reaction is distributed in accordance with the type of bedding. When the pipe strength used in design has been determined by controlled laboratory testing, a factor must be applied that relates the in-place supporting strength to that obtained in the lab. We recommend the pipe designer use a bedding factor to account for the width of the soil reaction at the bottom of the pipe.

Foundation

The bottoms of trench excavations should expose strong competent soils and should be dry and free of loose, soft, or disturbed soil. If fill soils are encountered at the base of trench excavations, their competency should be verified through probing and density testing. Soft, wet, weak, or deleterious materials should be over-excavated to expose strong competent soils.

At locations where soft or weak soils extend for some depth, overexcavation to stronger soils may prove infeasible and/or uneconomical. In the event of these areas are encountered, we recommend that the bottom of the trench excavation be over-excavated by 1 to 2 feet, and replaced with an open-graded aggregate that will allow for drainage of water, as well as provide a stable working platform.

Materials

The bedding materials should be selected to ensure the most uniform contact between the pipe and the foundation as possible. Granular soils such as bank run sand, concrete sand, gem sand, pea gravel, crushed limestone, or cement treated sand may be used as the bedding material. It is essential that

bedding materials are placed (i.e., thickness of layer and compactive effort) in conformance with HCPID-ED criteria with respect to soil type and compactive effort.

Backfill

We recommend backfill materials and placement be in accordance with *HCPID-ED item 400 – Structural Excavation and Backfill*. In addition, backfill for trenches should not be started until the waterline or sewerline is properly bedded in accordance with the above recommendations. Materials removed from the trench excavations will generally be suitable as backfill above the bedding, provided they are not saturated and do not contain organic matter, debris, or other deleterious material.

To reduce potential settlements of the ground surface resulting from consolidation of the trench backfill, we recommend that trench backfill be placed in 6-in. thick loose lifts and compacted to at least 95 percent of the maximum dry density as determined by ASTM D 698. We further recommend that utility trenches that cross or encroach upon the proposed roadways be backfilled with cement treated sand to within 18-in. of pavement subgrade, followed by select fill placed and compacted as per HCPID-ED requirements.

PAVEMENT SUBGRADE PREPARATION

GENERAL

It is our understanding that the existing two-lane asphalt roadway with open ditches will be converted into a four-lane concrete roadway with curbs along both sides.

SITE PREPARATION

The asphalt roadway should be stripped of all asphalt and other deleterious materials. After stripping and grubbing, the exposed subgrade should be thoroughly proofrolled in order to locate and densify any weak, compressible zones. A minimum of 5 passes of a fully-loaded dump truck or a similar heavily-loaded piece of construction equipment should be used for planning purposes. Proofrolling operations should be observed by the Geotechnical Engineer or his representative to document subgrade condition and preparation. Weak or soft areas identified during proofrolling should be removed and replaced with suitable, compacted on-site clays, free of organics, oversized materials, and degradable or deleterious materials.

FILL PLACEMENT

Fill required for grading at roadways may be on site material or imported gravel base material, free of organic matter and excessive silt. Fill should be placed at maximum 8-in. thick loose lifts and compacted to at least 95% of the maximum dry density at moisture content within two percentage points of the optimum moisture content. The laboratory-measured maximum dry density and optimum moisture content should be determined in accordance with standard Proctor test (ASTM D 698).

LIME TREATMENT OF COHESIVE SUBGRADE

In cohesive soils, lime may be used to treat the subgrade soils. Lime treatment of the cohesive subgrade soils should be in accordance with the *Harris County Specifications, Item 220*. A sufficient quantity of hydrated lime should be mixed with the subgrade soils to reduce the soil-lime mixture plasticity index to 10 or less. For estimating purposes, we recommend that 6 to 7 percent hydrated lime by dry soil weight be assumed for treatment. Prior to construction, we recommend that the optimum lime content of the subgrade soils be determined by appropriate laboratory testing. Lime-treated subgrade soils should be compacted to a minimum of 95 percent of the maximum dry density at a moisture content within the range of optimum moisture content to 3 percentage points above the optimum moisture content as determined by ASTM D698.

Recommendations provided herein include the use of lime treatment as a method to improve pavement subgrade conditions. We also recommend performing additional laboratory testing to determine the concentration of soluble sulfates in the subgrade soils, in order to investigate the potential for a recently reported adverse reaction to lime in certain sulfate-containing soils. The adverse reaction, referred to as sulfate-induced heave, has been known to cause cohesive subgrade soils to swell in short periods of time, resulting in pavement heaving and possible failure.

PAVEMENT CONSTRUCTION AND DESIGN RECOMMENDATIONS

RIGID PAVEMENT DESIGN GUIDELINES

It is our understanding that Belknap Road is classified as a Principal Thoroughfare, based on the county's standard pavement design, rigid pavement thickness of 8-inches with 8-inches of lime stabilized subgrade. Pavement design criteria should be in accordance with "*Regulations of Harris County, Texas for the Approval and Acceptance of Infrastructure*" Section 7 – *Paving*, amended May 1, 2011. Minimum design pavement section thickness for 30-year design life is presented in table 7-2 of the HCPID-ED infrastructure design manual and tabulated as follows.

Roadway Classification	Calculated 18-kip ESAL Application	Concrete Pavement Thickness, in.	28-day Compressive Strength, f'c, psi	Minimum Required Depth of Stabilization, in.
Principal Thoroughfare ¹	4 million	8 ²	4,500	8

Reinforcing for Local, Collector, and Thoroughfares shall meet the size, strength, and spacing shown in table 7.3 in "*Regulations of Harris County, Texas for the Approval and Acceptance of Infrastructure*" Section 7 – *Paving*.

Rigid pavement design was performed in accordance with the *AASHTO Guide for Design of Pavement Structures*, 1993. The parameters used for estimating 18-kip ESAL for 8-inch thick concrete pavement over 8-inch thick lime treated subgrade are listed in the following table.

² For Principal thoroughfares in excess of 30,000 VPD.

Design Parameter	Value
Load Transfer Coefficient (J)	3.2
Drainage coefficient (C_d)	1.2
Modulus of Rupture of Pavement (S'_c)	710 psi
Standard Deviation - Performance Prediction (S_o)	0.35
Reliability (R)	95 %
Initial Serviceability Index (p_o)	4.5
Terminal Serviceability Index (p_t)	2.5
Elastic Modulus of Pavement (E_c)	4.2×10^6 psi
Effective Modulus of Subgrade Reaction (k)	100 pci

CONCRETE PAVEMENT REINFORCEMENT

Reinforcement steel should consist of reinforcing bars running in both directions. HCED *Concrete Pavement Details, Precinct 3*, require #5 bars spaced 9-inches, center-to-center in the longitudinal direction and #5 bars spaced 36-inches, center-to-center in the transverse direction.

Horizontal dowels or saw cutting to expose existing steel are required to create a minimum 24 diameter overlap of reinforcing steel when making a connection of a proposed street to an existing concrete street or drive. When an existing street has no exposed steel, 1-inch diameter dowels of 30-inches in length should be embedded 15-inches into the existing pavement, epoxied, and spaced at 24-inches, center-to-center.

CONCRETE PAVEMENT JOINT REQUIREMENTS

Transverse expansion and contraction (sawed) joints should have a maximum spacing of 160 and 20 feet, respectively. Longitudinal joint spacing for 25-ft wide pavement (two lanes) is 12 feet.

PAVEMENT CONSTRUCTION CONSIDERATIONS

SITE PREPARATION

The pavement areas should be prepared in accordance with the recommendations presented in the *Subgrade Preparation* section of this report.

DRAINAGE CONSIDERATIONS

As with any soil-supported structure, the satisfactory performance of a pavement system is contingent on the provision of adequate surface and subsurface drainage. Insufficient drainage which allows saturation of the pavement subgrade and/or the supporting granular pavement materials will greatly reduce the performance and service life of the pavement systems.

Surface and subsurface drainage considerations crucial to the performance of pavements at this site include (but are not limited to) the following:

- any known natural or man-made subsurface seepage at the site which may occur at sufficiently shallow depths as to influence moisture contents within the subgrade should be intercepted by drainage ditches or below grade French drains;
- final site grading should eliminate isolated depressions adjacent to curbs which may allow surface water to pond and infiltrate into the underlying soils. Curbs should be installed to sufficient depth to reduce infiltration of water beneath the curbs, and;
- pavement surfaces should be maintained to help reduce surface ponding and to provide rapid sealing of any developing cracks. These measures will help reduce infiltration of surface water downward through the pavement section.

PORTLAND CEMENT CONCRETE

Concrete shall meet the requirements outlined in "Harris County Specifications, Item No. 360". The PCC used for pavements should be air-entrained to result in a 4 percent plus/minus 1 percent air, a maximum slump of 6 inches, and a minimum 28-day compressive strength of 4,500 psi. A liquid membrane-forming curing compound should be applied as soon as practical after broom finishing the concrete surface. The curing compound will help reduce the loss of water from the concrete. The reduction in the rapid loss in water will help reduce shrinkage cracking of the concrete.

CONSTRUCTION RELATED SERVICES

CONSTRUCTION MATERIALS TESTING AND OBSERVATION SERVICES

As presented in the attachment to this report, *Important Information About Your Geotechnical Engineering Report*, subsurface conditions can vary across a project site. The conditions described in this report are based on interpolations derived from a limited number of data points. Variations will be encountered during construction, and only the geotechnical design engineer will be able to determine if these conditions are different than those assumed for design.

Construction problems resulting from variations or anomalies in subsurface conditions are among the most prevalent on construction projects and often lead to delays, changes, cost overruns, and disputes. These variations and anomalies can best be addressed if the geotechnical engineer of record, **RKCI**, is retained to perform construction observation and testing services during the construction of the project. This is because:

- **RKCI** has an intimate understanding of the geotechnical engineering report's findings and recommendations. **RKCI** understands how the report should be interpreted and can provide such interpretations on site, on the CLIENT's behalf.
- **RKCI** knows what subsurface conditions are anticipated at the site.

- **RKCI** is familiar with the goals of the CLIENT and project design professionals, having worked with them in the development of the geotechnical work scope. This enables **RKCI** to suggest remedial measures (when needed) which help meet the CLIENT's and the design teams' requirements.
- **RKCI** has a vested interest in client satisfaction, and thus assigns qualified personnel whose principal concern is client satisfaction. This concern is exhibited by the manner in which contractors' work is tested, evaluated and reported, and in selection of alternative approaches when such may become necessary.
- **RKCI** cannot be held accountable for problems which result due to misinterpretation of our findings or recommendations when we are not on hand to provide the interpretation which is required.

BUDGETING FOR CONSTRUCTION TESTING

Appropriate budgets need to be developed for the required construction testing and observation activities. At the appropriate time before construction, we advise that **RKCI** and the project designers meet and jointly develop the testing budgets, as well as review the testing specifications as it pertains to this project. Once the construction testing budget and scope of work are finalized, we encourage a preconstruction meeting with the selected contractor to review the scope of work to make sure it is consistent with the construction means and methods proposed by the contractor. **RKCI** looks forward to the opportunity to provide continued support on this project, and would welcome the opportunity to meet with the Project Team to develop both a scope and budget for these services.

* * * * *

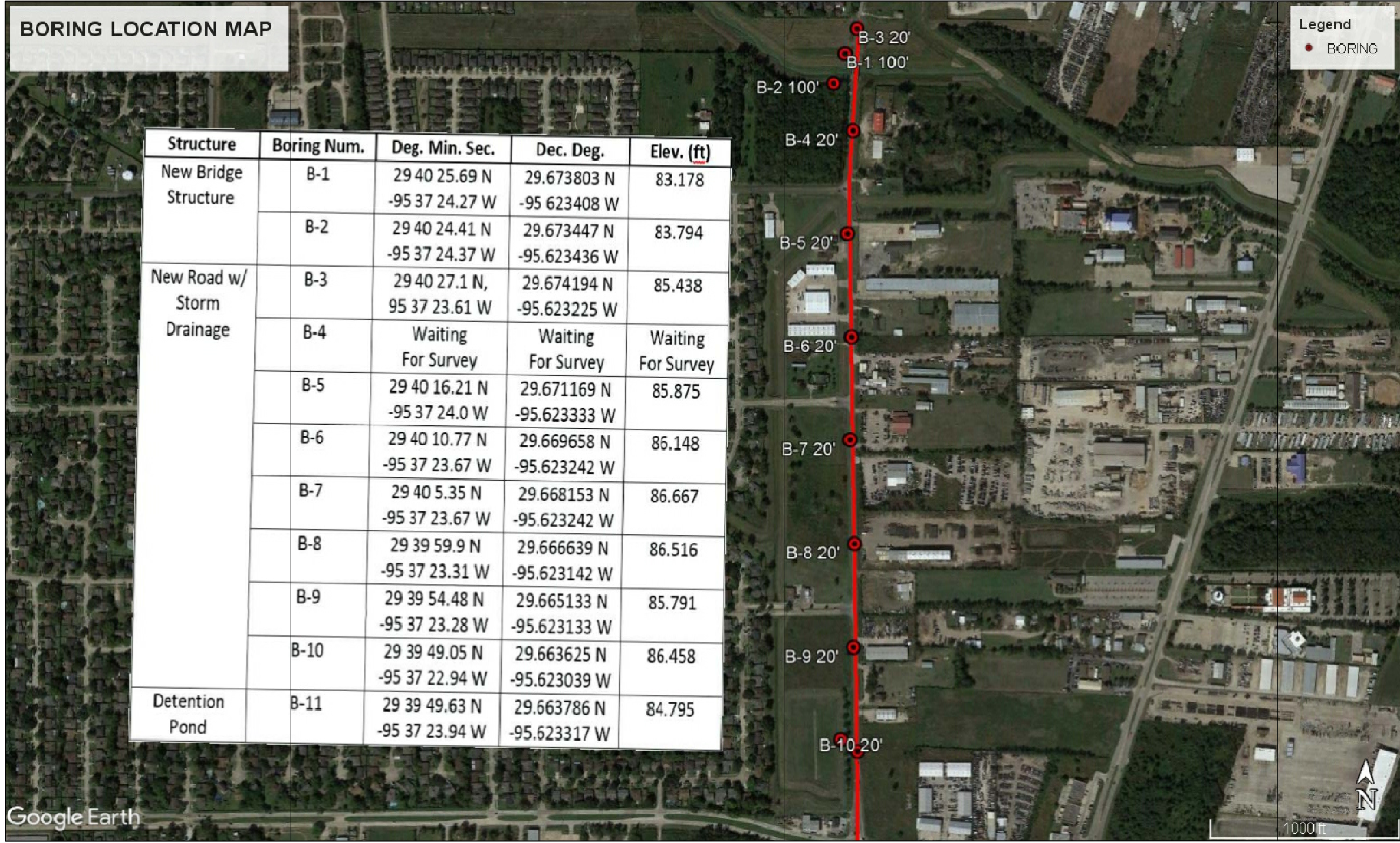
The following figures are attached and complete this report:

Figure 1	Site/Boring Location Map
Figures 2 through 12	Logs of Borings
Figure 13	Key to Terms and Symbols
Figure 14	Results of Soil Sample Analyses
Figure 15	Sieve Analysis
Appendix A	WinCore Data

ATTACHMENTS

BORING LOCATION MAP

Structure	Boring Num.	Deg. Min. Sec.	Dec. Deg.	Elev. (ft)
New Bridge Structure	B-1	29 40 25.69 N -95 37 24.27 W	29.673803 N -95.623408 W	83.178
	B-2	29 40 24.41 N -95 37 24.37 W	29.673447 N -95.623436 W	83.794
New Road w/ Storm Drainage	B-3	29 40 27.1 N, 95 37 23.61 W	29.674194 N -95.623225 W	85.438
	B-4	Waiting For Survey	Waiting For Survey	Waiting For Survey
	B-5	29 40 16.21 N -95 37 24.0 W	29.671169 N -95.623333 W	85.875
	B-6	29 40 10.77 N -95 37 23.67 W	29.669658 N -95.623242 W	86.148
	B-7	29 40 5.35 N -95 37 23.67 W	29.668153 N -95.623242 W	86.667
	B-8	29 39 59.9 N -95 37 23.31 W	29.666639 N -95.623142 W	86.516
	B-9	29 39 54.48 N -95 37 23.28 W	29.665133 N -95.623133 W	85.791
	B-10	29 39 49.05 N -95 37 22.94 W	29.663625 N -95.623039 W	86.458
Detention Pond	B-11	29 39 49.63 N -95 37 23.94 W	29.663786 N -95.623317 W	84.795



**BORING LOCATION MAP
PROJECT 2-11-BELKNAP ROAD
FORT BEND COUNTY PRECINCT 2
FORT BEND COUNTY, TEXAS**

REVISIONS:

No.	DATE	DESCRIPTION

PROJECT No.:
AHA18-045-00

ISSUE DATE:	07-20-18
DRAWN BY:	MH
CHECKED BY:	JDB
REVIEWED BY:	JDB

**FIGURE
1a**

LOG OF BORING NO. B-1

Project 2-11 - Belknap Road
Belknap Road
Sugarland, TX



DRILLING METHOD: Straight Flight Auger & Mud Rotary

LOCATION: N 29.67382; W 95.62342

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT ²				PLASTICITY INDEX	% -200	
						0.5	1.0	1.5	2.0			2.5
SURFACE ELEVATION: 83.178 ft												
0			SANDY FAT CLAY (CH), very soft to stiff, gray and brown -w/ silt seams from 0 ft to 2 ft -w/ roots from 0 ft to 4 ft	7								
5			-yellowish brown w/ sand seams from 4 ft to 8 ft	24							40	60
10			CLAYEY SAND (SC), loose, reddish brown	17							15	42
15			POOR GRADED SAND w/ SILT (SP-SM), slightly compact, brown	23								6
20			SILTY SAND (SM), compact, brown	49								25
25				55								
30			POOR GRADED SAND w/ SILT (SP-SM), compact, brown	72								10
35				74								
40			FAT CLAY (CH), soft to hard, reddish brown, w/ calcareous and ferrous nodules -w/ sand seams from 38 ft to 43 ft	13								
DEPTH DRILLED:			100.0 ft	DEPTH TO WATER:			11.0 ft	PROJ. No.:		AHA18-045-00		
DATE DRILLED:			6/22/2018	DATE MEASURED:			6/22/18	FIGURE:		2a		

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. B-1

Project 2-11 - Belknap Road
Belknap Road
Sugarland, TX



DRILLING METHOD: Straight Flight Auger & Mud Rotary

LOCATION: N 29.67382; W 95.62342

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT ²			PLASTICITY INDEX	% -200	
						0.5	1.0	1.5			2.0
			SURFACE ELEVATION: 83.178 ft								
			FAT CLAY (CH), soft to hard, reddish brown, w/ calcareous and ferrous nodules -w/ sand seams from 38 ft to 43 ft <i>(continued)</i>							34	95
45			-yellowish brown and gray from 43 ft to 48 ft	32							
50			-reddish brown and gray w/ sand seams and silt from 48 ft to 53 ft	100/3							
55			POOR GRADED SAND w/ SILT (SP-SM), slightly compact, brown	27							6
60			CLAYEY SAND (SC), compacted, brown and gray	77						11	40
65			FAT CLAY (CH), very stiff, reddish brown	53							
70			LEAN CLAY w/ SAND (CL), very stiff, reddish brown	58						8	85
75				53							
			FAT CLAY (CH), very stiff to stiff, reddish brown	54						29	88

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

DEPTH DRILLED: 100.0 ft DATE DRILLED: 6/22/2018	DEPTH TO WATER: 11.0 ft DATE MEASURED: 6/22/18	PROJ. No.: AHA18-045-00 FIGURE: 2b
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LOG OF BORING NO. B-1

Project 2-11 - Belknap Road
Belknap Road
Sugarland, TX



DRILLING METHOD: Straight Flight Auger & Mud Rotary

LOCATION: N 29.67382; W 95.62342

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT ²						PLASTICITY INDEX	%-200
						0.5	1.0	1.5	2.0	2.5	3.0		
			SURFACE ELEVATION: 83.178 ft										
			FAT CLAY (CH), very stiff to stiff, reddish brown (continued)										
85				62								37	
			-gray from 88 ft to 93 ft	34									
90													
			-gray and reddish brown w/ calcareous nodules from 93 ft to 100 ft	34									
95													
				32									
100			Boring terminated at a depth of about 100 ft										
			NOTES: Free-water was encountered at a depth of 11.9 ft and rose to a depth of 11.0 ft after 15 minutes										
105													
110													
115													
DEPTH DRILLED:		100.0 ft		DEPTH TO WATER:		11.0 ft		PROJ. No.:		AHA18-045-00			
DATE DRILLED:		6/22/2018		DATE MEASURED:		6/22/18		FIGURE:		2c			

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. B-2

Project 2-11 - Belknap Road
Belknap Road
Sugarland, TX



DRILLING METHOD: Straight Flight Auger & Mud Rotary

LOCATION: N 29.67339; W 95.62360

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT ²				PLASTICITY INDEX	% -200	
						0.5	1.0	1.5	2.0			2.5
SURFACE ELEVATION: 83.794 ft												
0 - 5		●	SANDY LEAN CLAY (CL), soft, gray and brown -w/ roots and silt seams from 0 ft to 4 ft -w/ sand seams from 0 ft to 6 ft	19		●	●	●	●	●	30	59
5 - 10		●	FAT CLAY (CH), stiff, brown w/ sand seams from 6 ft to 8 ft	14		●	●	●	●	●	45	
10 - 15		●	SILTY CLAYEY SAND (SC-SM), slightly compact, yellowish brown	26		●	●	●	●	●	5	30
15 - 20		●	POOR GRADED SAND w/ SILT (SP-SM), compact, brown and gray	31		●	●	●	●	●	7	
20 - 30		●	SILTY SAND (SM), compact, brown and gray	45		●	●	●	●	●	20	
30 - 35		●	SANDY LEAN CLAY (CL), very stiff, reddish brown and gray	64		●	●	●	●	●	27	68
35 - 41		●		51		●	●	●	●	●		
41 - 45		●		41		●	●	●	●	●		

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

DEPTH DRILLED: 100.0 ft	DEPTH TO WATER: 12.7 ft	PROJ. No.: AHA18-045-00
DATE DRILLED: 6/24/2018	DATE MEASURED: 6/24/18	FIGURE: 3a

LOG OF BORING NO. B-2

Project 2-11 - Belknap Road
Belknap Road
Sugarland, TX



DRILLING METHOD: Straight Flight Auger & Mud Rotary

LOCATION: N 29.67339; W 95.62360

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT ²				PLASTICITY INDEX	% -200
						0.5	1.0	1.5	2.0		
						PLASTIC LIMIT WATER CONTENT LIQUID LIMIT X-----X ●-----● X-----X 10 20 30 40 50 60 70 80					
			SURFACE ELEVATION: 83.794 ft								
			SANDY LEAN CLAY (CL), very stiff, reddish brown and gray (continued)								
45				58							
50				54							
55				61						17	68
60			CLAYEY SAND (SC), dense, brown	87							49
65			LEAN CLAY w/ SAND (CL), very stiff, reddish brown and gray	58						15	83
70			SANDY LEAN CLAY (CL), very stiff, reddish brown	70							
75			FAT CLAY (CH), very stiff, reddish brown and gray	50						40	90
				61							

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

DEPTH DRILLED: 100.0 ft	DEPTH TO WATER: 12.7 ft	PROJ. No.: AHA18-045-00
DATE DRILLED: 6/24/2018	DATE MEASURED: 6/24/18	FIGURE: 3b

LOG OF BORING NO. B-2

Project 2-11 - Belknap Road
Belknap Road
Sugarland, TX



DRILLING METHOD: Straight Flight Auger & Mud Rotary

LOCATION: N 29.67339; W 95.62360

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT ²			PLASTICITY INDEX	%-200
						0.5	1.0	1.5		
			SURFACE ELEVATION: 83.794 ft							
			FAT CLAY (CH), very stiff, reddish brown and gray (continued)							
			-w/ ferrous nodules from 83 ft to 93 ft	44						
85			-gray from 85 ft to 90 ft			1.5	2.0	3.5	38	
			-w/ calcareous nodules from 88 ft to 93 ft	46						
90						1.0	2.5			
				42		1.5	3.0	7.0	46	
95										
				51						
100			Boring terminated at a depth of about 100 ft							
			NOTES: Free-water was encountered at a depth of 13.4 ft and rose to a depth of 12.7 ft after 15 minutes							
105										
110										
115										
DEPTH DRILLED: 100.0 ft			DEPTH TO WATER: 12.7 ft			PROJ. No.: AHA18-045-00				
DATE DRILLED: 6/24/2018			DATE MEASURED: 6/24/18			FIGURE: 3c				

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. B-3

Project 2-11 - Belknap Road
Belknap Road
Sugarland, TX



DRILLING METHOD: Straight Flight Auger

LOCATION: N 29.67418; W 95.62323

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT ²				PLASTICITY INDEX	% -200
						0.5	1.0	1.5	2.0		
SURFACE ELEVATION: 85.438 ft											
			ASPHALT (6-inches)								
			CLAYEY SAND (SC), loose, gray and brown, w/ silt seams w/ gravel from 0.5 ft to 2 ft			●	●	⊗			24
5			SANDY FAT CLAY (CH), stiff to very stiff, gray and brown w/ sand seams -yellowish brown w/ calcareous and ferrous nodules from 6 ft to 13 ft				●	●	⊗		36
10				102		⊗	●	●			62
15			SILTY SAND (SM), medium dense to loose, brown	14			●				NP
20			Boring terminated at a depth of about 20 ft	9			●				29

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

DEPTH DRILLED: 20.0 ft	DEPTH TO WATER: Dry	PROJ. No.: AHA18-045-00
DATE DRILLED: 6/19/2018	DATE MEASURED: 6/19/2018	FIGURE: 4

LOG OF BORING NO. B-4

Project 2-11 - Belknap Road
Belknap Road
Sugarland, TX



DRILLING METHOD: Straight Flight Auger

LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT ²				PLASTICITY INDEX	%-200		
						0.5	1.0	1.5	2.0			2.5	3.0
0			ASPHALT (8-inches)										
0			SANDY LEAN CLAY (CL), gray and brown, w/ gravel and silt seams								18	58	
5			FAT CLAY (CH), firm to very stiff, gray and brown, w/ sand seams -yellowish brown from 4 ft to 6 ft	86									
10			-w/ calcareous and ferrous nodules from 8 ft to 13 ft								55		
15			CLAYEY SAND (SC), medium dense to loose, brown -w/ sand layers from 13 ft to 15 ft								18	48	
20			Boring terminated at a depth of about 20 ft	10									

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

DEPTH DRILLED: 20.0 ft	DEPTH TO WATER: Dry	PROJ. No.: AHA18-045-00
DATE DRILLED: 6/19/2018	DATE MEASURED: 6/19/2018	FIGURE: 5

LOG OF BORING NO. B-5

Project 2-11 - Belknap Road
Belknap Road
Sugarland, TX



DRILLING METHOD: Straight Flight Auger

LOCATION: N 29.67116; W 95.62333

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT ²				PLASTICITY INDEX	%-200	
						0.5	1.0	1.5	2.0			2.5
			SURFACE ELEVATION: 85.875 ft									
			ASPHALT (10-inches)									
			CLAYEY SAND (SC), gray and brown w/ gravel and silt seams								31	29
			FAT CLAY, very stiff to stiff, gray and brown									
5				92								
			-yellowish brown w/ calcareous and ferrous nodules from 8 ft to 13 ft								44	
10												
			- reddish brown from 13 ft to 18 ft								43	
15												
			FAT CLAY with SAND (CH), hard, yellowish brown and gray w/ sand seams									77
20			Boring terminated at a depth of about 20 ft									
25												
30												
35												

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

DEPTH DRILLED: 20.0 ft DATE DRILLED: 6/20/2018	DEPTH TO WATER: Dry DATE MEASURED: 6/20/2018	PROJ. No.: AHA18-045-00 FIGURE: 6
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LOG OF BORING NO. B-6

Project 2-11 - Belknap Road
Belknap Road
Sugarland, TX



DRILLING METHOD: Straight Flight Auger

LOCATION: N 29.66969; W 95.62323

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT ²				PLASTICITY INDEX	%-200	
						0.5	1.0	1.5	2.0			2.5
			SURFACE ELEVATION: 86.148 ft									
	▲▲▲▲▲		ASPHALT (10-inches)									
			BASE: POORLY GRADED SAND w/ SILT (SP-SM), gray and brown w/ gravel									10
	/ / / / /		FAT CLAY (CH), stiff to very stiff, gray									
5			-w/ sand seams from 4 ft to 13 ft		91						50	91
10			-yellowish brown and gray from 8 ft to 13 ft -w/ calcareous and ferrous nodules from 8 ft to 20 ft									
15			- reddish brown and gray from 13 ft to 18 ft								45	
20			-yellowish brown and gray from 18 ft to 20 ft									
			Boring terminated at a depth of about 20 ft									
25												
30												
35												

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

DEPTH DRILLED: 20.0 ft	DEPTH TO WATER: Dry	PROJ. No.: AHA18-045-00
DATE DRILLED: 6/21/2018	DATE MEASURED: 6/21/2018	FIGURE: 7

LOG OF BORING NO. B-7

Project 2-11 - Belknap Road
Belknap Road
Sugarland, TX



DRILLING METHOD: Straight Flight Auger

LOCATION: N 29.66814; W 95.62323

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT ²			PLASTICITY INDEX	%-200
						0.5	1.0	1.5		
			SURFACE ELEVATION: 86.667 ft							
	▲▲▲▲		ASPHALT (10-inches)							18
			BASE: CLAYEY SAND (SC), gray and brown w/ gravel and silt							
	/ / / /		FAT CLAY (CH), very stiff, yellowish brown w/ sand seams						61	93
5			-w/ ferrous nodules from 6 ft to 13 ft		86					
			-w/ calcareous nodules from 8 ft to 13 ft							
10			- reddish brown and gray from 13 ft to 18 ft						35	
15			-yellowish brown and gray from 18 ft to 20 ft							
20			Boring terminated at a depth of about 20 ft							
25										
30										
35										

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

DEPTH DRILLED: 20.0 ft	DEPTH TO WATER: Dry	PROJ. No.: AHA18-045-00
DATE DRILLED: 6/20/2018	DATE MEASURED: 6/20/2018	FIGURE: 8

LOG OF BORING NO. B-8

Project 2-11 - Belknap Road
Belknap Road
Sugarland, TX



DRILLING METHOD: Straight Flight Auger

LOCATION: N 29.66663; W 95.62313

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT ²				PLASTICITY INDEX	%-200	
						0.5	1.0	1.5	2.0			2.5
			SURFACE ELEVATION: 86.516 ft									
			ASPHALT (10-inches)									
			BASE: CLAYEY SAND (SC), brown w/ gravel and silt seams								12	33
			FAT CLAY (CH), firm to hard, gray and brown									
5			-w/ sand seams from 4 ft to 13 ft								59	94
			-yellowish brown from 6 ft to 13 ft									
10			-w/ calcareous and ferrous nodules from 8 ft to 13 ft		84							
			-reddish brown and gray from 13 ft to 18 ft								46	94
20			-yellowish brown from 18 ft to 20 ft									
			Boring terminated at a depth of about 20 ft									
25												
30												
35												

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

DEPTH DRILLED: 20.0 ft	DEPTH TO WATER: Dry	PROJ. No.: AHA18-045-00
DATE DRILLED: 6/21/2018	DATE MEASURED: 6/21/2018	FIGURE: 9

LOG OF BORING NO. B-9

Project 2-11 - Belknap Road
Belknap Road
Sugarland, TX



DRILLING METHOD: Straight Flight Auger

LOCATION: N 29.66512; W 95.62313

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT ²			PLASTICITY INDEX	% -200
						0.5	1.0	1.5		
			SURFACE ELEVATION: 85.791 ft							
			ASPHALT (10-inches)							
			BASE: CLAYEY SAND (SC), gray and brown w/ gravel and silt seams							16
			FAT CLAY w/ SAND (CH), very stiff to stiff, gray							54
5			-w/ sand seams from 4 ft to 6 ft		87					85
			FAT CLAY (CH), very stiff, brown and gray, w/ ferrous nodules from 6 ft to 13 ft							
10			-reddish brown and gray w/ sand seams and calcareous nodules from 8 ft to 20 ft							54
15										42
20			Boring terminated at a depth of about 20 ft							
25										
30										
35										

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

DEPTH DRILLED: 20.0 ft DATE DRILLED: 6/20/2018	DEPTH TO WATER: Dry DATE MEASURED: 6/20/2018	PROJ. No.: AHA18-045-00 FIGURE: 10
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LOG OF BORING NO. B-10

Project 2-11 - Belknap Road
Belknap Road
Sugarland, TX



DRILLING METHOD: Straight Flight Auger

LOCATION: N 29.66363; W 95.62303

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT ²						PLASTICITY INDEX	%-200			
						0.5	1.0	1.5	2.0	2.5	3.0			3.5	4.0	
						PLASTIC LIMIT		WATER CONTENT		LIQUID LIMIT						
						10	20	30	40	50	60	70	80			
SURFACE ELEVATION: 86.458 ft																
			ASPHALT (8-inches)													
			BASE: POORLY GRADED SAND w/ GRAVEL (SP), gray and brown w/ silt seams												4	
			FAT CLAY w/ SAND (CH), very stiff, brown and gray w/ sand seams												49	75
5			FAT CLAY (CH), very stiff, gray, w/ sand seams													
			-reddish brown from 8 ft to 13 ft -w/ calcareous nodules from 8 ft to 20 ft		83										51	
10			yellowish brown from 13 ft to 20 ft												43	97
15																
20			Boring terminated at a depth of about 20 ft													
25																
30																
35																

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

DEPTH DRILLED: 20.0 ft	DEPTH TO WATER: Dry	PROJ. No.: AHA18-045-00
DATE DRILLED: 6/20/2018	DATE MEASURED: 6/20/2018	FIGURE: 11

LOG OF BORING NO. B-11

Project 2-11 - Belknap Road
Belknap Road
Sugarland, TX



DRILLING METHOD: Straight Flight Auger

LOCATION: N 29.66377; W 95.62330

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT ²				PLASTICITY INDEX	% -200			
						0.5	1.0	1.5	2.0			2.5	3.0	3.5
			SURFACE ELEVATION: 84.795 ft											
			FAT CLAY (CH), gray and brown w/ roots and silt seams				●	×				58	91	
5			FAT CLAY w/ SAND (CH), very stiff, gray and brown -w/ roots from 2 ft to 4 ft				●	×	●			92	62	81
10			FAT CLAY (CH), hard to very stiff, yellowish brown and gray -w/ calcareous nodules from 6 ft to 8 ft -w/ ferrous nodules from 6 ft to 20 ft -reddish brown and gray from 8 ft to 18 ft				●		●	⊗				
15							●	⊗				45	97	
20			-yellowish brown and gray from 18 ft to 20 ft				●	⊗						
20			Boring terminated at a depth of about 20 ft											
25														
30														
35														

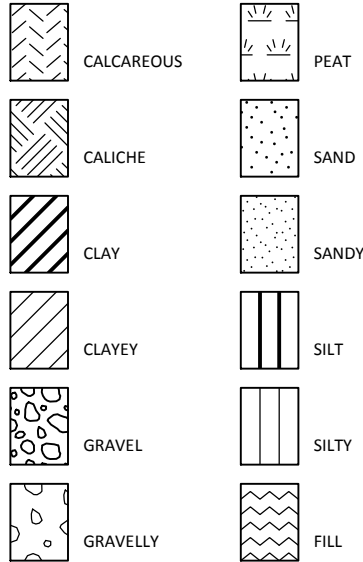
NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

DEPTH DRILLED: 20.0 ft DATE DRILLED: 6/21/2018	DEPTH TO WATER: Dry DATE MEASURED: 6/21/2018	PROJ. No.: AHA18-045-00 FIGURE: 12
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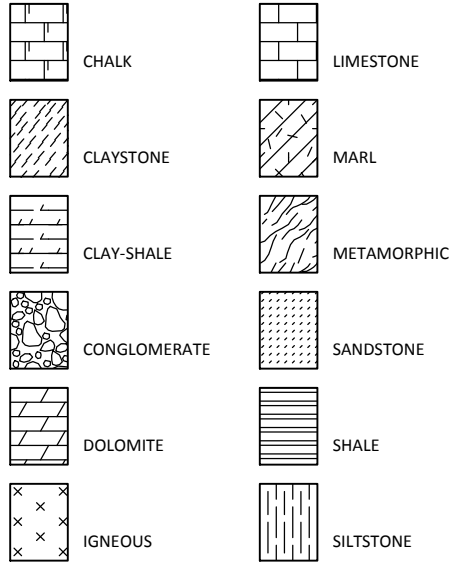
KEY TO TERMS AND SYMBOLS

MATERIAL TYPES

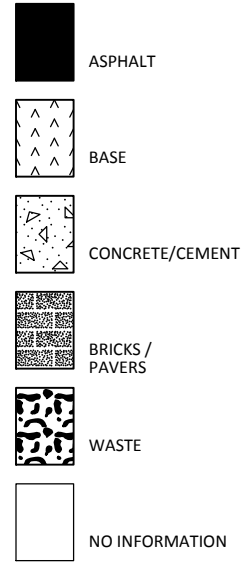
SOIL TERMS



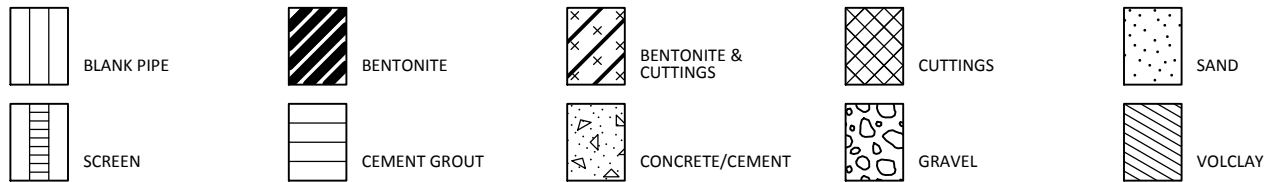
ROCK TERMS



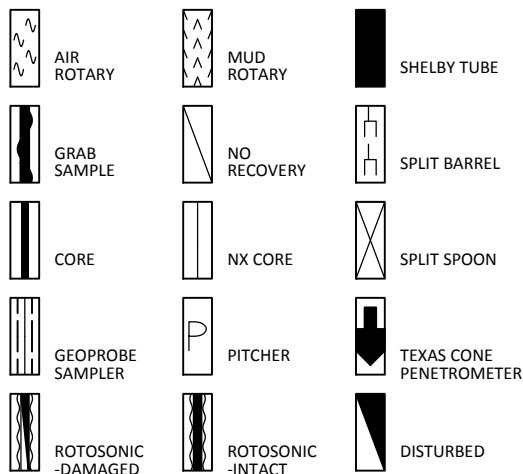
OTHER



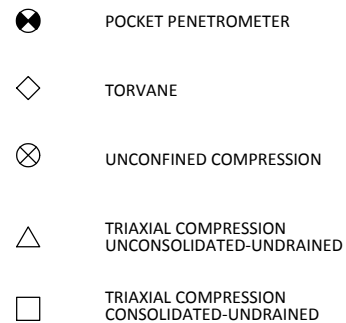
WELL CONSTRUCTION AND PLUGGING MATERIALS



SAMPLE TYPES



STRENGTH TEST TYPES



NOTE: VALUES SYMBOLIZED ON BORING LOGS REPRESENT SHEAR STRENGTHS UNLESS OTHERWISE NOTED

PROJECT NO. AHA18-045-00

KEY TO TERMS AND SYMBOLS (CONT'D)

TERMINOLOGY

Terms used in this report to describe soils with regard to their consistency or conditions are in general accordance with the discussion presented in Article 45 of SOILS MECHANICS IN ENGINEERING PRACTICE, Terzaghi and Peck, John Wiley & Sons, Inc., 1967, using the most reliable information available from the field and laboratory investigations. Terms used for describing soils according to their texture or grain size distribution are in accordance with the UNIFIED SOIL CLASSIFICATION SYSTEM, as described in American Society for Testing and Materials D2487-06 and D2488-00, Volume 04.08, Soil and Rock; Dimension Stone; Geosynthetics; 2005.

The depths shown on the boring logs are not exact, and have been estimated to the nearest half-foot. Depth measurements may be presented in a manner that implies greater precision in depth measurement, i.e 6.71 meters. The reader should understand and interpret this information only within the stated half-foot tolerance on depth measurements.

RELATIVE DENSITY

COHESIVE STRENGTH

PLASTICITY

<u>Penetration Resistance Blows per ft</u>	<u>Relative Density</u>	<u>Resistance Blows per ft</u>	<u>Consistency</u>	<u>Cohesion TSF</u>	<u>Plasticity Index</u>	<u>Degree of Plasticity</u>
0 - 4	Very Loose	0 - 2	Very Soft	0 - 0.125	0 - 5	None
4 - 10	Loose	2 - 4	Soft	0.125 - 0.25	5 - 10	Low
10 - 30	Medium Dense	4 - 8	Firm	0.25 - 0.5	10 - 20	Moderate
30 - 50	Dense	8 - 15	Stiff	0.5 - 1.0	20 - 40	Plastic
> 50	Very Dense	15 - 30	Very Stiff	1.0 - 2.0	> 40	Highly Plastic
		> 30	Hard	> 2.0		

ABBREVIATIONS

B = Benzene	Qam, Qas, Qal = Quaternary Alluvium	Kef = Eagle Ford Shale
T = Toluene	Qat = Low Terrace Deposits	Kbu = Buda Limestone
E = Ethylbenzene	Qbc = Beaumont Formation	Kdr = Del Rio Clay
X = Total Xylenes	Qt = Fluvial Terrace Deposits	Kft = Fort Terrett Member
BTEX = Total BTEX	Qao = Seymour Formation	Kgt = Georgetown Formation
TPH = Total Petroleum Hydrocarbons	Qle = Leona Formation	Kep = Person Formation
ND = Not Detected	Q-Tu = Uvalde Gravel	Kek = Kainer Formation
NA = Not Analyzed	Ewi = Wilcox Formation	Kes = Escondido Formation
NR = Not Recorded/No Recovery	Emi = Midway Group	Kew = Walnut Formation
OVA = Organic Vapor Analyzer	Mc = Catahoula Formation	Kgr = Glen Rose Formation
ppm = Parts Per Million	EI = Laredo Formation	Kgru = Upper Glen Rose Formation
	Kknm = Navarro Group and Marlbrook Marl	Kgrl = Lower Glen Rose Formation
	Kpg = Pecan Gap Chalk	Kh = Hensell Sand
	Kau = Austin Chalk	

PROJECT NO. AHA18-045-00

KEY TO TERMS AND SYMBOLS (CONT'D)

TERMINOLOGY

SOIL STRUCTURE

Slickensided	Having planes of weakness that appear slick and glossy.
Fissured	Containing shrinkage or relief cracks, often filled with fine sand or silt; usually more or less vertical.
Pocket	Inclusion of material of different texture that is smaller than the diameter of the sample.
Parting	Inclusion less than 1/8 inch thick extending through the sample.
Seam	Inclusion 1/8 inch to 3 inches thick extending through the sample.
Layer	Inclusion greater than 3 inches thick extending through the sample.
Laminated	Soil sample composed of alternating partings or seams of different soil type.
Interlayered	Soil sample composed of alternating layers of different soil type.
Intermixed	Soil sample composed of pockets of different soil type and layered or laminated structure is not evident.
Calcareous	Having appreciable quantities of carbonate.
Carbonate	Having more than 50% carbonate content.

SAMPLING METHODS

RELATIVELY UNDISTURBED SAMPLING

Cohesive soil samples are to be collected using three-inch thin-walled tubes in general accordance with the Standard Practice for Thin-Walled Tube Sampling of Soils (ASTM D1587) and granular soil samples are to be collected using two-inch split-barrel samplers in general accordance with the Standard Method for Penetration Test and Split-Barrel Sampling of Soils (ASTM D1586). Cohesive soil samples may be extruded on-site when appropriate handling and storage techniques maintain sample integrity and moisture content.

STANDARD PENETRATION TEST (SPT)

A 2-in.-OD, 1-3/8-in.-ID split spoon sampler is driven 1.5 ft into undisturbed soil with a 140-pound hammer free falling 30 in. After the sampler is seated 6 in. into undisturbed soil, the number of blows required to drive the sampler the last 12 in. is the Standard Penetration Resistance or "N" value, which is recorded as blows per foot as described below.

SPLIT-BARREL SAMPLER DRIVING RECORD

<u>Blows Per Foot</u>	<u>Description</u>
25	25 blows drove sampler 12 inches, after initial 6 inches of seating.
50/7"	50 blows drove sampler 7 inches, after initial 6 inches of seating.
Ref/3"	50 blows drove sampler 3 inches during initial 6-inch seating interval.

NOTE: To avoid damage to sampling tools, driving is limited to 50 blows during or after seating interval.

RESULTS OF SOIL SAMPLE ANALYSES

PROJECT NAME: Project 2-11 - Belknap Road
 Belknap Road
 Sugarland, TX

FILE NAME: AHA18-045-00.GPJ

7/20/2018

Boring No.	Sample Depth (ft)	Blows per ft	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	USCS	Dry Unit Weight (pcf)	% -200 Sieve	Shear Strength (tsf)	Strength Test	
B-1	0.0 to 1.5	7	22									
	2.0 to 4.0		17	58	18	40	CH		60			
	4.0 to 5.5	24	18									
	6.0 to 8.0		15									
	8.0 to 9.5	17	14	32	17	15	SC		42			
	9.5 to 11.0											
	13.0 to 14.5	23	21						6			
	14.5 to 16.0											
	18.0 to 19.5	49	21						25			
	19.5 to 21.0											
	23.0 to 24.5	55	24									
	24.5 to 26.0											
	28.0 to 29.5	72	20						10			
	29.5 to 31.0											
	33.0 to 34.5	74	20									
	34.5 to 36.0											
	38.0 to 39.5	13										
	39.5 to 41.0			27	64	30	34	CH		95	2.25	PP
	43.0 to 44.5	32										
	44.5 to 46.0			19							2.00	PP
	48.0 to 49.5	100/3		28								
	49.5 to 51.0											
	53.0 to 54.5	27		19						6		
	54.5 to 56.0											
	58.0 to 59.5	77		28	25	14	11	SC		40		
	59.5 to 61.0											
	63.0 to 64.5	53		19								
	64.5 to 66.0											
	68.0 to 69.5	58										
	69.5 to 71.0			20	27	19	8	CL		85	1.25	PP
	73.0 to 74.5	53		29								
	74.5 to 76.0											
78.0 to 79.5	54		19	50	21	29	CH		88			
79.5 to 81.0												
83.0 to 84.5	62		23	64	27	37						
84.5 to 86.0												
88.0 to 89.5	34		26									
89.5 to 91.0												
93.0 to 94.5	34		25									

PP = Pocket Penetrometer TV = Torvane UC = Unconfined Compression FV = Field Vane UU = Unconsolidated Undrained Triaxial
 CU = Consolidated Undrained Triaxial

PROJECT NO. AHA18-045-00

RESULTS OF SOIL SAMPLE ANALYSES

PROJECT NAME: Project 2-11 - Belknap Road
 Belknap Road
 Sugarland, TX

FILE NAME: AHA18-045-00.GPJ

7/20/2018

Boring No.	Sample Depth (ft)	Blows per ft	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	USCS	Dry Unit Weight (pcf)	% -200 Sieve	Shear Strength (tsf)	Strength Test
B-1	94.5 to 96.0									2.25	PP
	98.0 to 99.5	32	26								
	99.5 to 101.0									2.25	PP
B-2	0.0 to 1.5	19	15	46	16	30	CL		59		
	2.0 to 4.0		14								
	4.0 to 5.5	14	14								
	6.0 to 8.0		20	65	20	45					
	8.0 to 9.5	26	18								
	9.5 to 11.0										
	13.0 to 14.5	31	24	24	19	5	SC-SM		30		
	14.5 to 16.0										
	18.0 to 19.5	45	22						7		
	19.5 to 21.0										
	23.0 to 24.5	70	10								
	24.5 to 26.0										
	28.0 to 29.5	64	23						20		
	29.5 to 31.0										
	33.0 to 34.5	51	28								
	34.5 to 36.0										
	38.0 to 39.5	41	20	48	21	27	CL		68		
	39.5 to 41.0										
	43.0 to 44.5	58									
	44.5 to 46.0			19							2.00
48.0 to 49.5	54	27									
49.5 to 51.0											
53.0 to 54.5	61	31	35	18	17	CL		68			
54.5 to 56.0											
58.0 to 59.5	87	25						49			
59.5 to 61.0											
63.0 to 64.5	58	17	32	17	15	CL		83			
64.5 to 66.0											
68.0 to 69.5	70										
69.5 to 71.0			20							1.00	PP
73.0 to 74.5	50	39	65	25	40	CH		90			
74.5 to 76.0											
78.0 to 79.5	61	26									
79.5 to 81.0											
83.0 to 84.5	44										
84.5 to 86.0			24	66	28	38				2.00	PP

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PROJECT NO. AHA18-045-00

RESULTS OF SOIL SAMPLE ANALYSES

PROJECT NAME: Project 2-11 - Belknap Road
 Belknap Road
 Sugarland, TX

FILE NAME: AHA18-045-00.GPJ

7/20/2018

Boring No.	Sample Depth (ft)	Blows per ft	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	USCS	Dry Unit Weight (pcf)	% -200 Sieve	Shear Strength (tsf)	Strength Test
B-2	88.0 to 89.5	46									
	89.5 to 91.0		20						2.25	PP	
	93.0 to 94.5	51	30	70	24	46					
	94.5 to 96.0										
	98.0 to 99.5		35								
B-3	99.5 to 101.0										
	0.0 to 0.5										
	0.5 to 2.5		16	39	15	24	SC		31		
	2.0 to 4.0		16							0.75	PP
	4.0 to 6.0		22							1.00	PP
	6.0 to 8.0		23	53	17	36	CH		62	1.25	PP
	8.0 to 10.0		22					102		0.50	UC
	13.5 to 15.0	14	24	NP	NP	NP	SM		29		
B-4	18.5 to 20.0	9	27								
	0.0 to 0.7										
	0.7 to 2.7										
	1.0		8	34	16	18	CL		58		
	2.0 to 4.0		32					86		0.49	UC
	4.0 to 6.0		33							0.75	PP
	6.0 to 8.0		33	79	24	55				1.13	PP
	8.0 to 10.0		30							1.25	PP
	13.0 to 15.0		18	34	16	18	SC		48	1.00	PP
	18.0 to 20.0	10	21								
B-5	0.0 to 0.8										
	0.8 to 2.8										
	1.0		21	48	17	31	SC		29		
	2.0 to 4.0		28							1.25	PP
	4.0 to 6.0		28					92		0.89	UC
	6.0 to 8.0		26	66	22	44				0.88	PP
	8.0 to 10.0		27							0.75	PP
	13.0 to 15.0		27	69	26	43				2.00	PP
B-6	18.0 to 20.0		20						77	2.13	PP
	0.0 to 0.8										
	0.8 to 2.8										
	1.0		4						10		
	2.0 to 4.0		29							0.75	PP
	4.0 to 6.0		28	71	21	50	CH	91	91	0.61	UC
	6.0 to 8.0		30							1.00	PP
8.0 to 10.0		30							1.25	PP	

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PROJECT NO. AHA18-045-00

RESULTS OF SOIL SAMPLE ANALYSES

PROJECT NAME: Project 2-11 - Belknap Road
 Belknap Road
 Sugarland, TX

FILE NAME: AHA18-045-00.GPJ

7/20/2018

Boring No.	Sample Depth (ft)	Blows per ft	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	USCS	Dry Unit Weight (pcf)	% -200 Sieve	Shear Strength (tsf)	Strength Test
B-6	13.0 to 15.0		26	67	22	45				1.75	PP
	18.0 to 20.0		24							1.75	PP
B-7	0.0 to 0.8										
	0.8 to 2.8										
	1.0		13						18		
	2.0 to 4.0		34	90	29	61	CH		93	1.50	PP
	4.0 to 6.0		33					86		1.10	UC
	6.0 to 8.0		35							1.75	PP
	8.0 to 10.0		31							1.50	PP
	13.0 to 15.0		26	59	24	35				1.00	PP
B-8	18.0 to 20.0		16							1.25	PP
	0.0 to 0.8										
	0.8 to 2.8										
	1.0		6	26	14	12	SC		33		
	2.0 to 4.0		28							1.50	PP
	4.0 to 6.0		30	84	25	59	CH		94	1.25	PP
	6.0 to 8.0		32							1.25	PP
	8.0 to 10.0		34					84		0.38	UC
B-9	13.0 to 15.0		29	74	28	46	CH		94	1.75	PP
	18.0 to 20.0		16							2.13	PP
	0.0 to 2.0										
	1.0		14						16		
	2.0 to 4.0		33	83	29	54	CH		85	1.25	PP
	4.0 to 6.0		32					87		0.52	UC
	6.0 to 8.0		35							1.00	PP
	8.0 to 10.0		33	85	31	54	CH		93	1.25	PP
B-10	13.0 to 15.0		28	67	25	42				1.50	PP
	18.0 to 20.0		20								
	0.0 to 0.7										
	0.7 to 2.7										
	1.0		5						4		
	2.0 to 4.0		35	81	32	49	CH		75	1.25	PP
	4.0 to 6.0		35							1.50	PP
	6.0 to 8.0		37					83		0.19	UC
B-11	8.0 to 10.0		35	80	29	51				1.50	PP
	13.0 to 15.0		31	73	30	43	CH		97	1.50	PP
	18.0 to 20.0		20							1.25	PP
	0.0 to 2.0		21	85	27	58	CH		91		
	2.0 to 4.0		26	92	30	62	CH		81	2.00	PP

PP = Pocket Penetrometer TV = Torvane UC = Unconfined Compression FV = Field Vane UU = Unconsolidated Undrained Triaxial
 CU = Consolidated Undrained Triaxial

PROJECT NO. AHA18-045-00

RESULTS OF SOIL SAMPLE ANALYSES

PROJECT NAME: Project 2-11 - Belknap Road
 Belknap Road
 Sugarland, TX

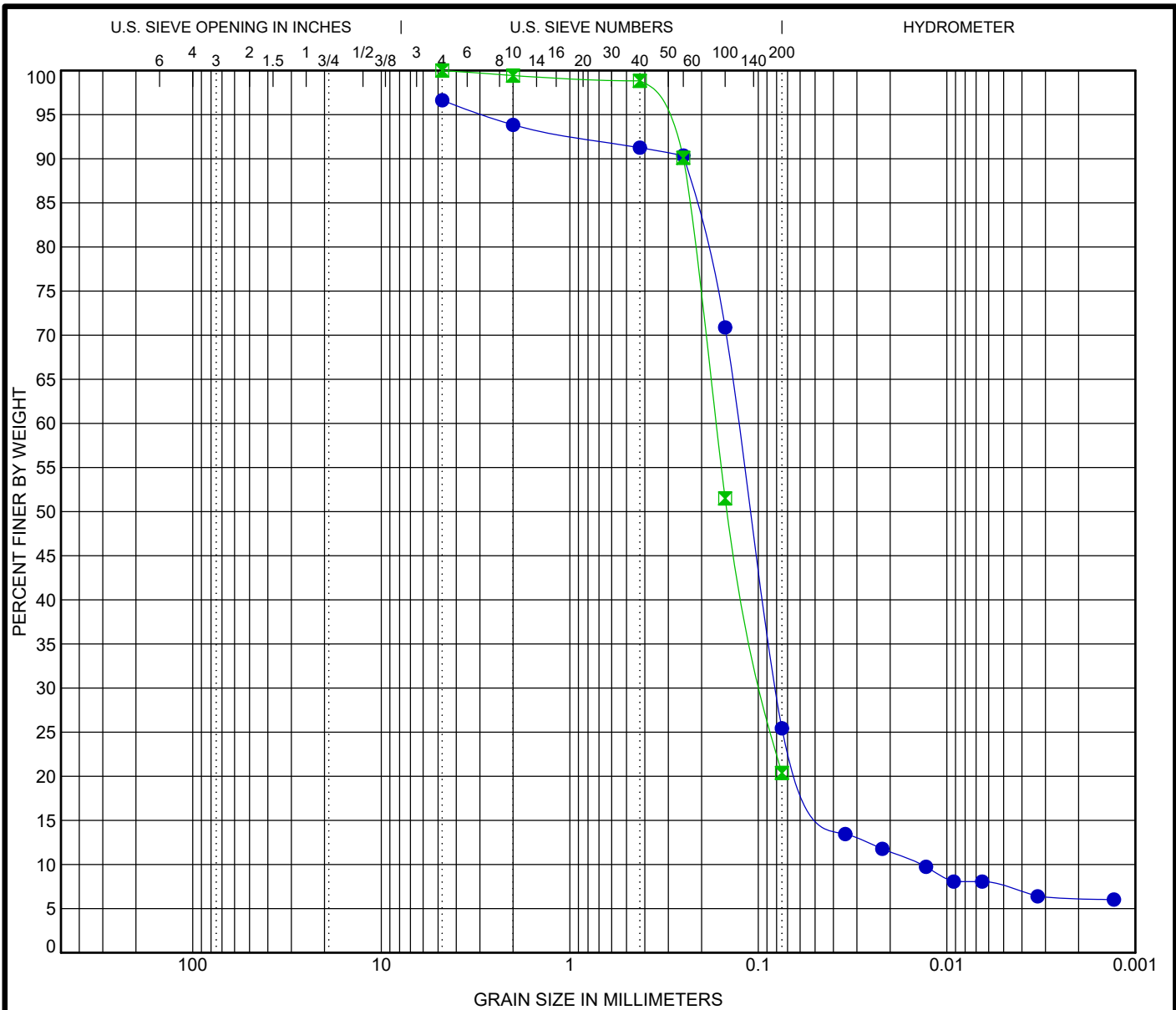
FILE NAME: AHA18-045-00.GPJ

7/20/2018

Boring No.	Sample Depth (ft)	Blows per ft	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	USCS	Dry Unit Weight (pcf)	% -200 Sieve	Shear Strength (tsf)	Strength Test
B-11	4.0 to 6.0		26							2.00	PP
	6.0 to 8.0		31							2.25	PP
	8.0 to 10.0		25							2.25	PP
	13.0 to 15.0		27	71	26	45	CH		97	1.75	PP
	18.0 to 20.0		21							1.50	PP

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PROJECT NO. AHA18-045-00



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● B-1 18.0					3.68	9.20
■ B-2 28.0						
▲						
★						
◎						

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-1 18.0	4.75	0.127	0.08	0.014	0.0	71.2	18.0	7.4
■ B-2 28.0	4.75	0.168	0.093		0.0	79.6	20.4	
▲								
★								
◎								

 <p>Raba Kistner TBPE Firm Registration No. F-3257</p>	<p>3602 Westchase Houston, Texas 77042 (713) 996-8990 (713) 996-8993 fax www.rkci.com</p>	GRAIN SIZE DISTRIBUTION	
		<p>Project 2-11 - Belknap Road Belknap Road Sugarland, TX</p>	

TEMP - R-K GRAIN SIZE_AHA18-045-00.GPJ RKCI.GDT 7/20/18

FIGURE 15

APPENDIX A – WINCORE FIGURES



DRILLING LOG

WinCore
Version 3.3

County Fort Bend County
Highway Belknap Road
CSJ

Hole B1
Structure Bridge
Station
Offset

District Houston
Date 6/22/2018
Grnd. Elev. 83.00 ft
GW Elev. 72.00 ft

Elev. (ft)	LOG	Texas Cone Penetrometer 3 (6) 4 (6)	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Deviator Press. (psi)	Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
75.		12 (6) 12 (6)	CLAY, very soft to stiff, gray and brown (CH)				59	40		%-200 = 60
5		7 (6) 10 (6)								
70.		10 (6) 13 (6)	SAND, loose, reddish brown				32.06		15	%-200 = 42
15		25 (6) 24 (6)	SAND, slightly compacted, brown							
20		29 (6) 26 (6)								
25		33 (6) 39 (6)								
30		38 (6) 36 (6)								
35		5 (6) 8 (6)								
45.		4 (6) 28 (6)	CLAY, soft to hard, reddish brown w/ calcareous and ferrous nodules, w/ sand seams from 38 ft to 43 ft (CH)				64	34		%-200 = 95
45		50 (2) 50 (1)								
50		12 (6) 15 (6)								
30.		35 (6) 42 (6)	SAND, slightly compacted, brown, and gray				24.98		11	%-200 = 40
55		23 (6) 30 (6)								
60		31 (6) 27 (6)	CLAY, very stiff to stiff, reddish brown. (CH)				28	8		%-200 = 85
20.		28 (6) 25 (6)								
65										
70										
75										

Remarks:

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: _____ Logger: _____ Organization: _____

DRILLING LOG



WinCore
Version 3.3

County Fort Bend County
Highway Belknap Road
CSJ

Hole B1
Structure Bridge
Station
Offset

District Houston
Date 6/22/2018
Grnd. Elev. 83.00 ft
GW Elev. 72.00 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Deviator Press. (psi)	Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
80		27 (6) 27 (6)	CLAY, very stiff to stiff, reddish brown. (CH)							% -200 = 88
						49.61				
85		29 (6) 33 (6)							29	
						64.38				
90		18 (6) 16 (6)							37	
95		16 (6) 18 (6)								
100		15 (6) 17 (6)								
105										
110										
115										
120										
125										
130										
135										
140										
145										
150										

Remarks:

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: _____ **Logger:** _____ **Organization:** _____



DRILLING LOG

WinCore
Version 3.3

County Fort Bend County
Highway Belknap Road
CSJ

Hole B2
Structure Bridge
Station
Offset

District Houston
Date 6/24/2018
Grnd. Elev. 83.00 ft
GW Elev. 70.30 ft

Elev. (ft)	LOG	Texas Cone Penetrometer 7 (6) 12 (6)	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Deviator Press. (psi)	Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
5		8 (6) 6 (6)	CLAY, soft, gray and brown, w/ roots and silt seams from 0 ft to 4 ft, w/ sand seams from 0 ft to 8 ft. (CH)				45	30		% -200 = 59
10		14 (6) 12 (6)					64	45		
15		15 (6) 16 (6)								
20		20 (6) 25 (6)	SAND, slightly compacted, yellowish brown .				23	5		% -200 = 30
25		39 (6) 31 (6)	SAND, compacted, brown and gray							
30		31 (6) 33 (6)								
35		25 (6) 26 (6)								
40		20 (6) 21 (6)								
45		31 (6) 27 (6)	CLAY, very stiff, reddish brown and gray (CH)				49	27		% -200 = 68
50		40 (6) 14 (6)								
55		30 (6) 21 (6)								
60		2 (2) 45 (6)	SAND, dense, brown				34	17		% -200 = 68
65		28 (6) 30 (6)								
70		39 (6) 31 (6)	CLAY, very stiff, reddish brown and gray (CH)				32	15		% -200 = 83
75		21 (6) 29 (6)								
							65	40		% -200 = 90

Remarks:

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: _____ Logger: _____ Organization: _____



DRILLING LOG

WinCore
Version 3.3

County Fort Bend County
Highway Belknap Road
CSJ

Hole B2
Structure Bridge
Station
Offset

District Houston
Date 6/24/2018
Grnd. Elev. 83.00 ft
GW Elev. 70.30 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Deviator Press. (psi)	Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
80		23 (6) 38 (6)	CLAY, very stiff, reddish brown and gray (CH)							
85		18 (6) 26 (6)				66	38			
90		24 (6) 22 (6)								
95		22 (6) 20 (6)				70	46			
100		26 (6) 25 (6)								
105										
110										
115										
120										
125										
130										
135										
140										
145										
150										

Remarks:

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: _____ **Logger:** _____ **Organization:** _____

POINT BEARING DESIGN

WinCore
Version 3.3

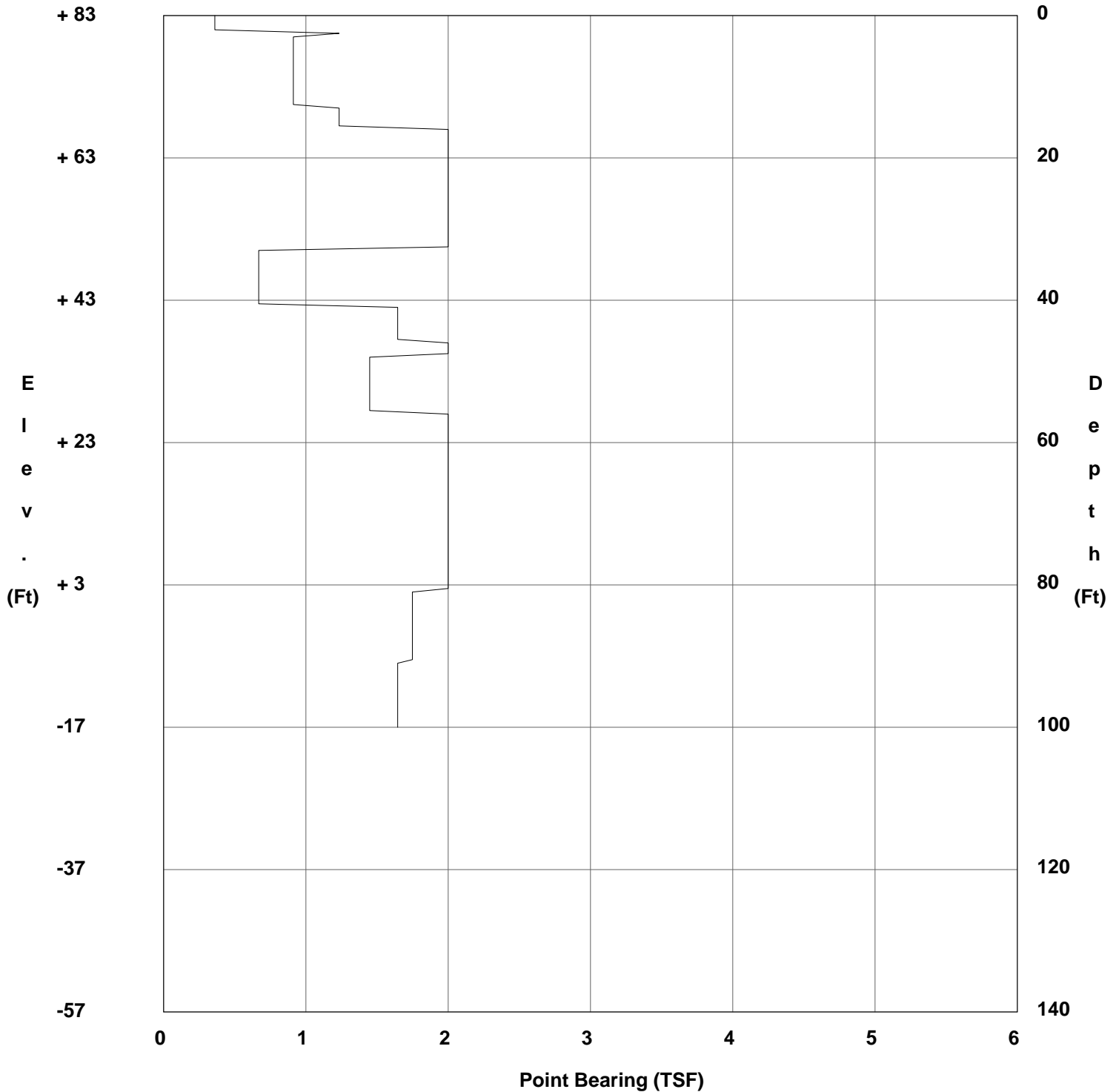
County Fort Bend County
Highway Belknap Road
Control

Hole B1
Structure Bridge
Station
Offset

District Houston
Date 6/22/2018
Grnd. Elev. 83.00 ft
GW Elev. 72.00 ft

Diameters Below Tip Checked = 2

TCP Bearing Values Used



POINT BEARING DESIGN

WinCore
Version 3.3

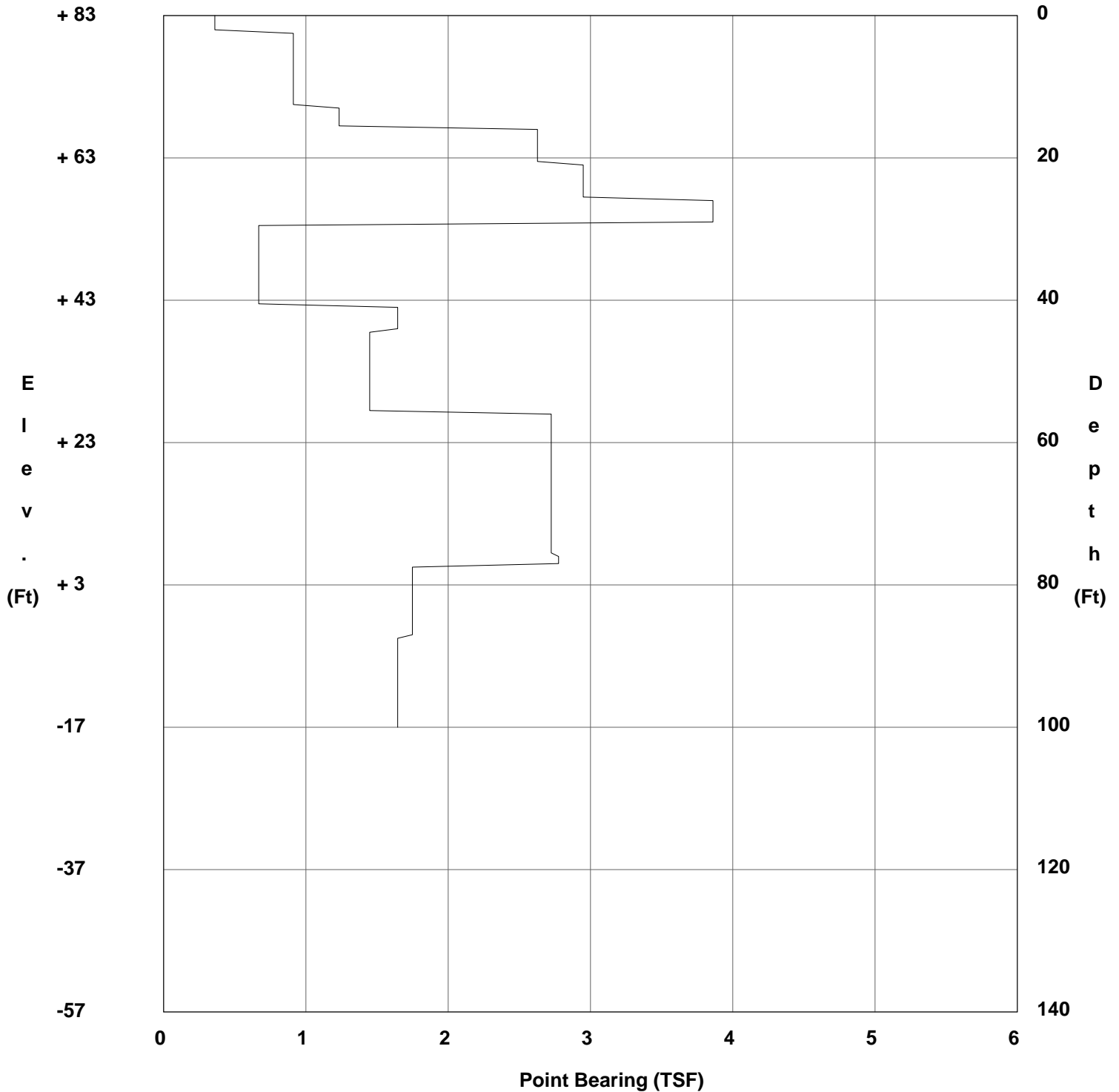
County Fort Bend County
Highway Belknap Road
Control

Hole B1
Structure Bridge
Station
Offset

District Houston
Date 6/22/2018
Grnd. Elev. 83.00 ft
GW Elev. 72.00 ft

Diameters Below Tip Checked = 2

TCP Bearing Values Used



POINT BEARING DESIGN

WinCore
Version 3.3

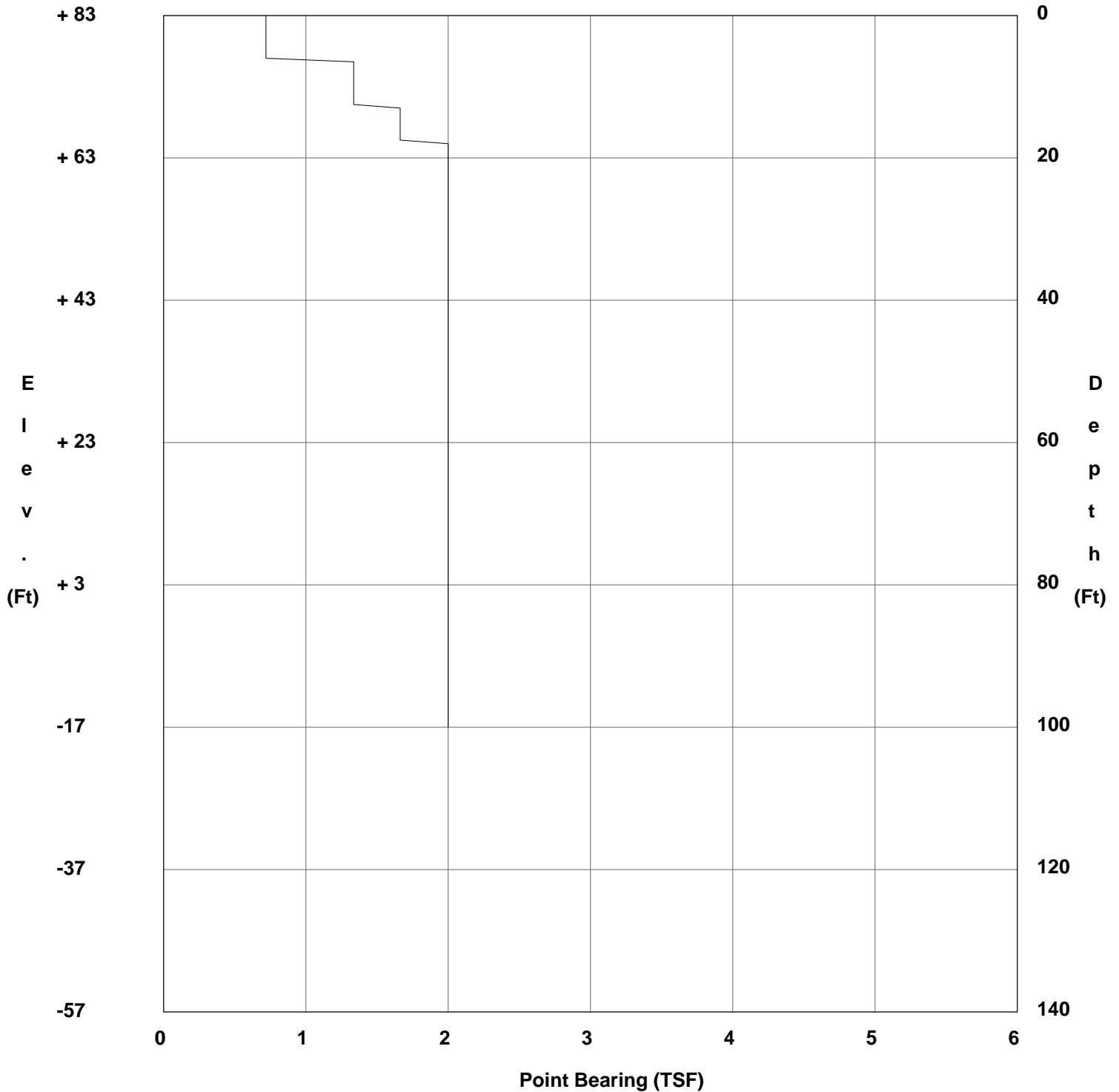
County Fort Bend County
Highway Belknap Road
Control

Hole B2
Structure Bridge
Station
Offset

District Houston
Date 6/24/2018
Grnd. Elev. 83.00 ft
GW Elev. 70.30 ft

Diameters Below Tip Checked = 2

TCP Bearing Values Used



POINT BEARING DESIGN

WinCore
Version 3.3

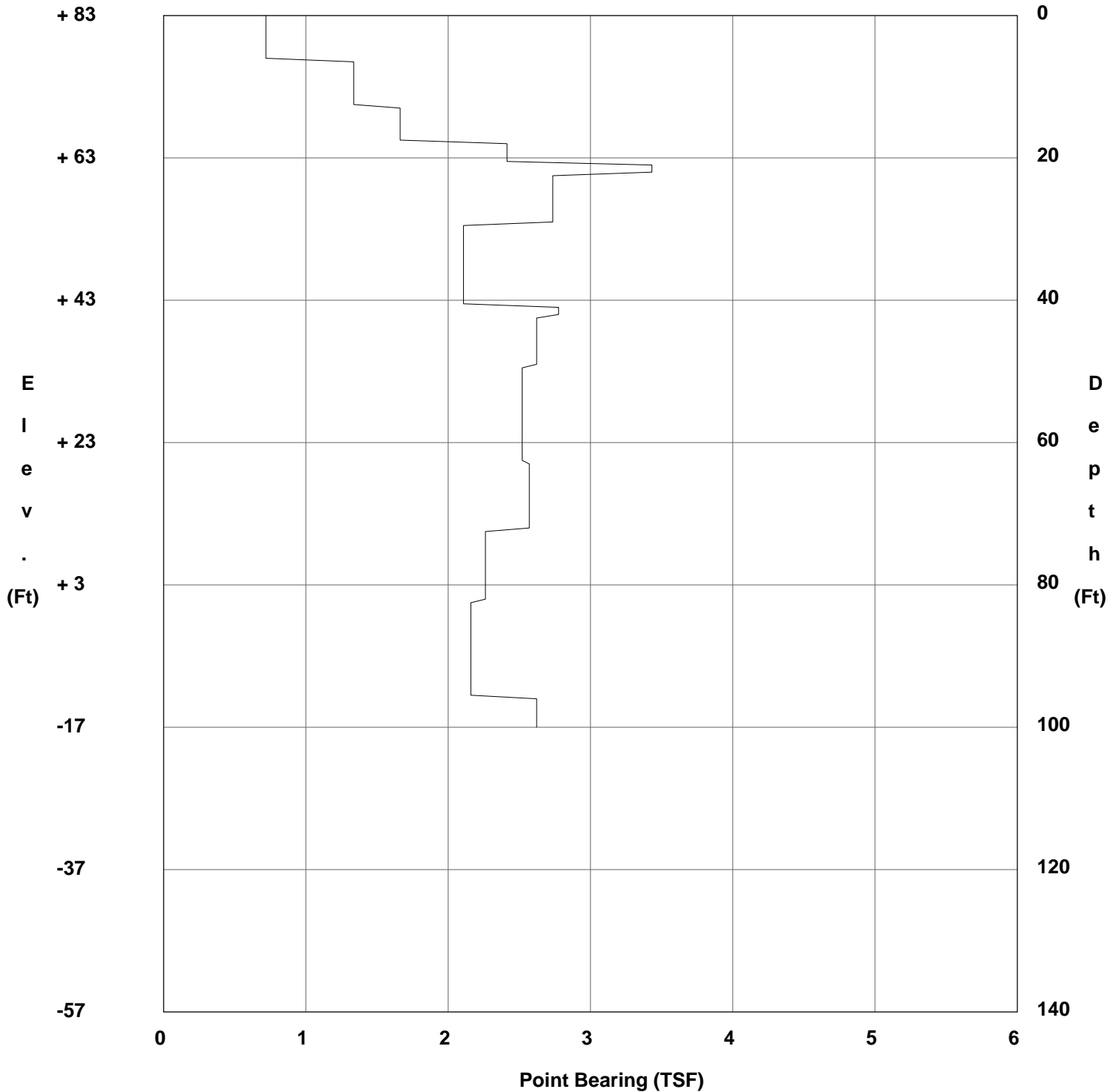
County Fort Bend County
Highway Belknap Road
Control

Hole B2
Structure Bridge
Station
Offset

District Houston
Date 6/24/2018
Grnd. Elev. 83.00 ft
GW Elev. 70.30 ft

Diameters Below Tip Checked = 2

TCP Bearing Values Used



SKIN FRICTION DESIGN

WinCore
Version 3.3

County Fort Bend County
Highway Belknap Road
Control

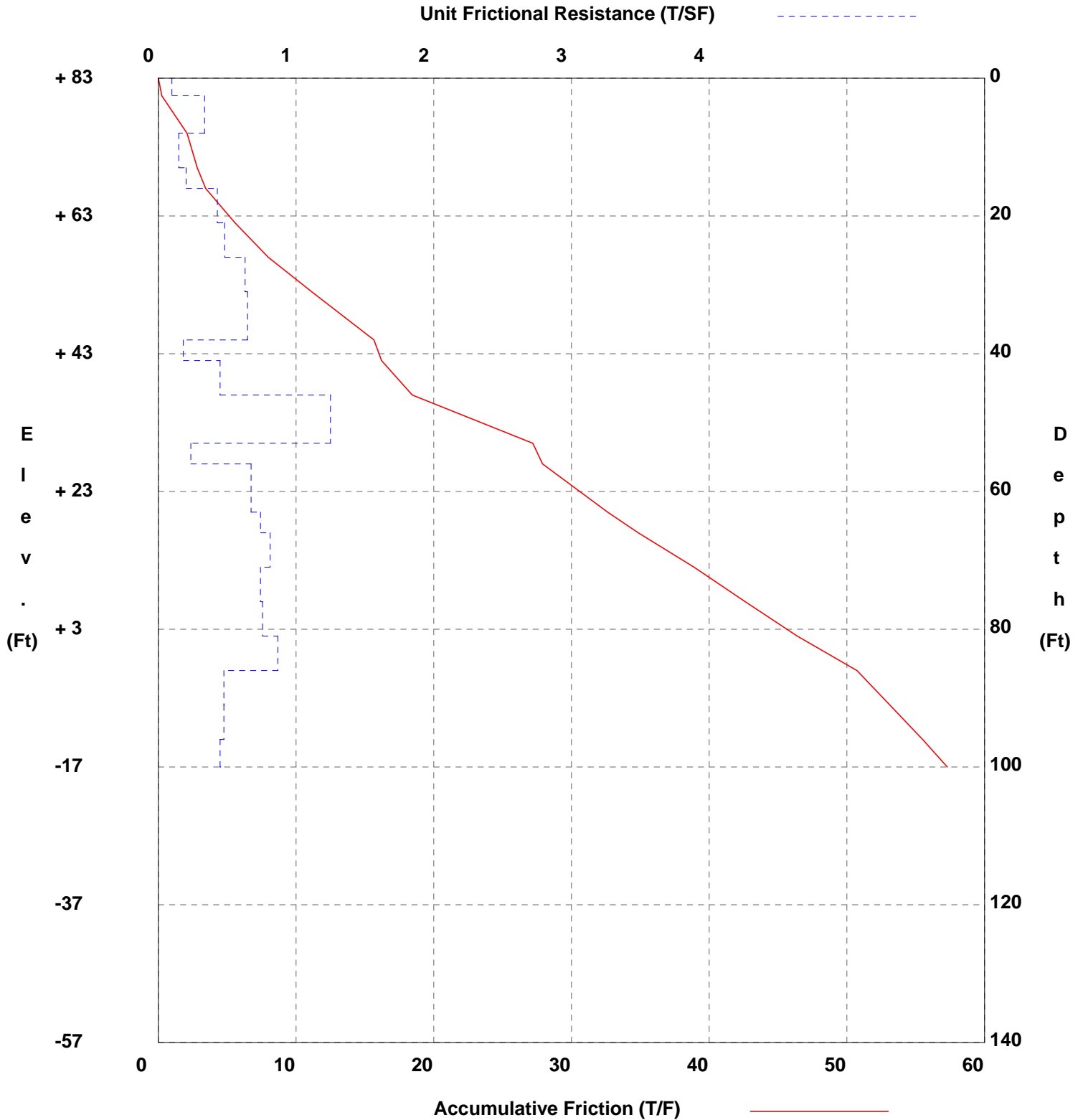
Hole B1
Structure Bridge
Station
Offset

District Houston
Date 6/22/2018
Grnd. Elev. 83.00 ft
GW Elev. 72.00 ft

Drilled Shaft Design: Soil Reduction Factor = 0.7

TCP Friction Values Used

Skin Friction Limit = 1.3 tsf



SKIN FRICTION DESIGN

WinCore
Version 3.3

County Fort Bend County
Highway Belknap Road
Control

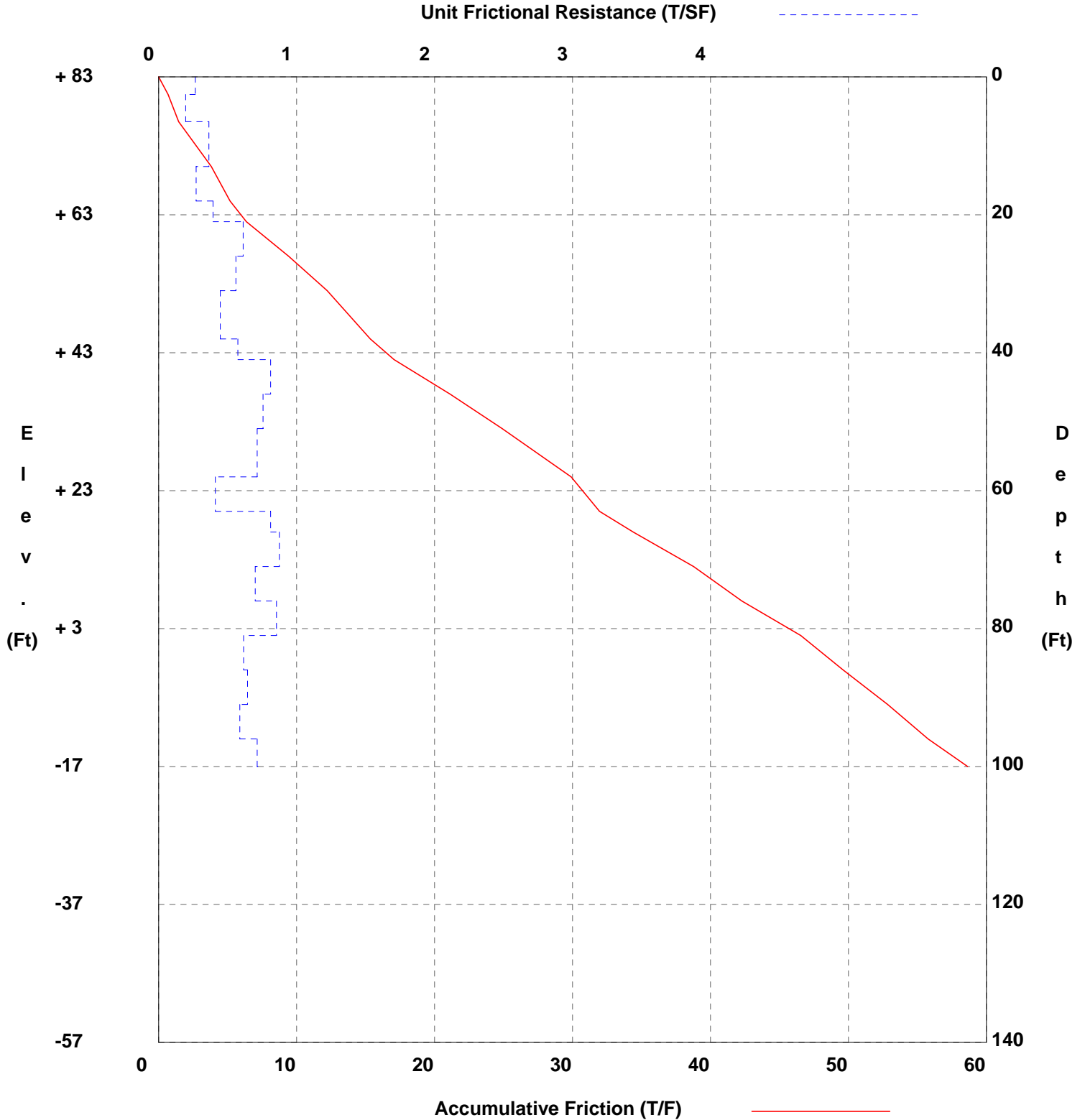
Hole B2
Structure Bridge
Station
Offset

District Houston
Date 6/24/2018
Grnd. Elev. 83.00 ft
GW Elev. 70.30 ft

Drilled Shaft Design: Soil Reduction Factor = 0.7

TCP Friction Values Used

Skin Friction Limit = 1.3 tsf



Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a civil engineer may not fulfill the needs of a constructor — a construction contractor — or even another civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. No one except you should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you — should apply this report for any purpose or project except the one originally contemplated.*

Read the Full Report

Serious problems have occurred because those relying on a geotechnical-engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

Geotechnical Engineers Base Each Report on a Unique Set of Project-Specific Factors

Geotechnical engineers consider many unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk-management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical-engineering report that was:

- not prepared for you;
- not prepared for your project;
- not prepared for the specific site explored; or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical-engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an

assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical-engineering report is based on conditions that existed at the time the geotechnical engineer performed the study. *Do not rely on a geotechnical-engineering report whose adequacy may have been affected by:* the passage of time; man-made events, such as construction on or adjacent to the site; or natural events, such as floods, droughts, earthquakes, or groundwater fluctuations. *Contact the geotechnical engineer before applying this report to determine if it is still reliable.* A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ — sometimes significantly — from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide geotechnical-construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are Not Final

Do not overrely on the confirmation-dependent recommendations included in your report. *Confirmation-dependent recommendations are not final*, because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations *only* by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's confirmation-dependent recommendations if that engineer does not perform the geotechnical-construction observation required to confirm the recommendations' applicability.*

A Geotechnical-Engineering Report Is Subject to Misinterpretation

Other design-team members' misinterpretation of geotechnical-engineering reports has resulted in costly

problems. Confront that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Constructors can also misinterpret a geotechnical-engineering report. Confront that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing geotechnical construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical-engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make constructors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give constructors the complete geotechnical-engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise constructors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure constructors have sufficient time* to perform additional study. Only then might you be in a position to give constructors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and constructors fail to recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help

others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Environmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform an *environmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold-prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, many mold-prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical-engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; *none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.*

Rely, on Your GBC-Member Geotechnical Engineer for Additional Assistance

Membership in the Geotechnical Business Council of the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project. Confer with your GBC-Member geotechnical engineer for more information.



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ENGINEERING • ENVIRONMENTAL • INFRASTRUCTURE • PROJECT CONTROL

Austin, TX

▶ San Antonio, TX

Lake Worth, FL

Brownsville, TX

Houston, TX

Lincoln, NE

Dallas, TX

McAllen, TX

Salt Lake City, UT

Freeport, TX

New Braunfels, TX

Mexico

FORT BEND COUNTY ENGINEERING DEPARTMENT

BELKNAP ROAD PAVEMENT AND DRAINAGE IMPROVEMENTS

WEST BELLFORT

TO 300 FEET NORTH OF HARRIS COUNTY LINE

FINAL SUBMITTAL

PROJECT NO. 17211

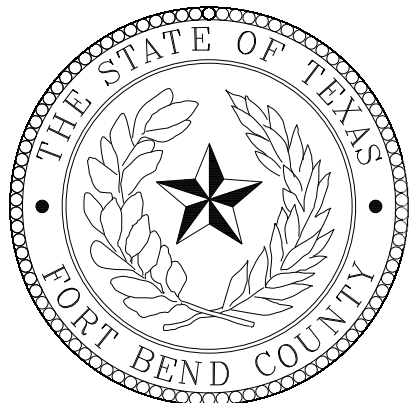
VINCENT M. MORALES, JR.
COMMISSIONER PRECINCT 1

ANDY MEYERS
COMMISSIONER PRECINCT 3

GRADY PRESTAGE
COMMISSIONER PRECINCT 2

KP GEORGE
COUNTY JUDGE

DEXTER L. MCCOY
COMMISSIONER PRECINCT 4



NOVEMBER 2023
 PRECINCT #3
 Fort Bend County, Texas

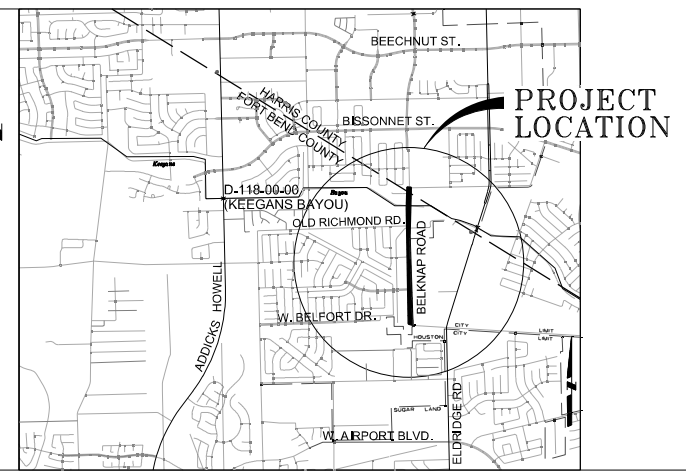
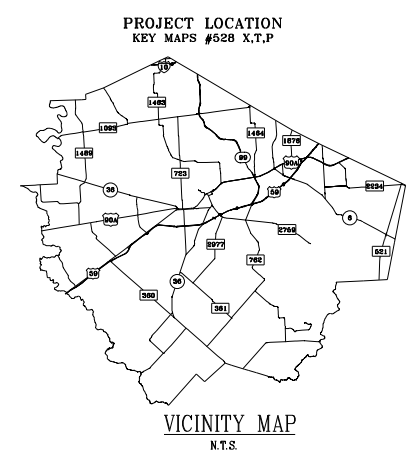


14-Nov-2023



Texas PE Firm Reg. #F-929

575 N. Dairy Ashford, Suite 700, Houston, Texas 77079
 T +1 281 589 7257 E usinfrastructure@rpsgroup.com



APPROVED: *J. Slawinski* 02/06/2024
COUNTY ENGINEER
J. STACY SLAWINSKI, P.E. DATE

1/24/2024 3:52:26 PM c:\pwworkingdir\rpsgroup-pw-bentley.com\rpsgroup-pw-01\yvonne_youni's\dms22928\8169_SHEET_INDEX.dgn yvonne_youni's

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THE STANDARD SHEETS IDENTIFIED HEREON (DENOTED BY '*1') HAVE BEEN SELECTED BY ME, OR UNDER MY RESPONSIBLE SUPERVISION, AS BEING APPLICABLE TO THIS PROJECT.

Ronald J. Thomas 14-Nov-2023
RONALD J. THOMAS, PE DATE

THE STANDARD SHEETS IDENTIFIED HEREON (DENOTED BY '*4') HAVE BEEN SELECTED BY ME, OR UNDER MY RESPONSIBLE SUPERVISION, AS BEING APPLICABLE TO THIS PROJECT.

Gabriel J. Odreman 02/06/2024
GABRIEL J. ODREMAN, PE DATE

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THE STANDARD SHEETS IDENTIFIED HEREON (DENOTED BY '*3') HAVE BEEN SELECTED BY ME, OR UNDER MY RESPONSIBLE SUPERVISION, AS BEING APPLICABLE TO THIS PROJECT.

Hung N. Nguyen 11/8/2023
HUNG N. NGUYEN, PE DATE

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02/06/2024

Table with 4 columns: NO, DATE, REVISION, APPROVED

RPS logo and address: 575 N. Dairy Ashford, Suite 700, Houston, Texas 77079

FORT BEND COUNTY, TEXAS
BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

INDEX OF SHEETS table with columns: CNTY PROJ, RPS PROJ, DATE, SCALE, SHEET NO

PROJECT NOTES

- THIS PROJECT WAS INITIALLY UNDER CONTRACT BETWEEN FORT BEND COUNTY AS THE OWNER/CLIENT AND EJES, INC. AS THE ENGINEERING CONSULTANT. THAT CONTRACT WAS CANCELLED AND RPS INFRASTRUCTURE, INC. REPLACED EJES, INC. AS THE ENGINEERING CONSULTANT IN ORDER TO COMPLETE THE PLANS FOR CONSTRUCTION. EJES, INC. PROVIDED THEIR WORK PRODUCTS TO FORT BEND COUNTY AND RPS INFRASTRUCTURE, INC. AS EJES, INC. HAD BEEN COMPENSATED FOR PREPARING THESE WORK PRODUCTS. RPS INFRASTRUCTURE, INC. HAS RELIED UPON THESE WORK PRODUCTS AND HAS VISUALLY CHECKED THE INFORMATION IN THE FIELD.
THESE WORK PRODUCTS INCLUDE:
a. TOPOGRAPHIC SURVEYING
b. EXISTING UTILITIES
- THE INFORMATION SHOWN HEREON FOR OLD RICHMOND ROAD (WEST OF BELKNAP ROAD) WAS TAKEN FROM THE INFORMATION FOR FORT BEND COUNTY PROJECT 17208 BY HUITT-ZOLLARS, INC. AND HAS NOT BEEN FIELD VERIFIED. THE CONTRACTOR MAY HAVE TO MAKE FIELD ADJUSTMENTS FOR DEVIATIONS BETWEEN THE INFORMATION SHOWN HEREON AND THE ACTUAL CONSTRUCTION ON OLD RICHMOND ROAD.
- THE INFORMATION SHOWN HEREON FOR THE DRIVEWAY (LEFT) AT STA 49+48.21 AND THE DRIVEWAY (RIGHT) AT STA 52+40.04 WAS TAKEN FROM INFORMATION PROVIDED BY COBB, FENDLEY & ASSOCIATES, INC. FOR THE PROPOSED SCHOOL SITE IN THE NORTHWEST CORNER OF BELKNAP ROAD AND OLD RICHMOND ROAD AND HAS NOT BEEN FIELD VERIFIED. THE CONTRACTOR MAY HAVE TO MAKE FIELD ADJUSTMENTS FOR DEVIATIONS BETWEEN THE INFORMATION SHOWN HEREON AND THE ACTUAL CONSTRUCTION ON THE SCHOOL SITE.
- THE INFORMATION SHOWN HEREON FOR THE DRIVEWAY (RIGHT) STA 6+12.97 AND DRIVEWAY (LEFT) STA 40+93.29 WAS TAKEN FROM INFORMATION PROVIDED BY ADJACENT DEVELOPMENT ENGINEERS AND WERE NOT CONSTRUCTED AT THE TIME OF THESE PLANS. THE CONTRACTOR MAY HAVE TO MAKE FIELD ADJUSTMENTS FOR DEVIATIONS BETWEEN THE INFORMATION SHOWN HEREON AND THE ACTUAL CONSTRUCTION ON THESE ADJACENT SITES.
- THE LOCATION OF THE EXISTING POWER POLES MAY NOT BE ADEQUATELY REFLECTED IN THESE PLANS. THE CONTRACTOR IS TO ADJUST THE PROPOSED SIDEWALK LOCATIONS TO AVOID RELOCATION OF THE EXISTING POWER POLES. THIS ADJUSTMENT WORK WILL NOT BE PAID FOR DIRECTLY BUT WILL BE SUBSIDIARY TO THE PAY ITEM FOR THE PROPOSED SIDEWALK CONSTRUCTION.
- THE LIMITS AND TYPE OF CONSTRUCTION NORTH OF THE PROPOSED BRIDGES ARE CONTINGENT UPON THE RE-NEGOTIATION OF AN ENCROACHMENT AGREEMENT BETWEEN FORT BEND COUNTY AND CENTERPOINT ENERGY. IF THE ENCROACHMENT AGREEMENT IS RE-NEGOTIATED BY THE TIME CONSTRUCTION BEGINS, THE CONTRACTOR IS TO CONSTRUCT THE WORK SHOWN IN THESE PLANS; MOREOVER, THIS OPTION IS REFERRED TO AS THE "WIDE" OPTION. IF THE ENCROACHMENT AGREEMENT IS NOT RE-NEGOTIATED BY THE TIME CONSTRUCTION BEGINS, THE CONTRACTOR IS TO LIMIT CONSTRUCTION TO THE WIDTH OF THE PREVIOUS ENCROACHMENT AGREEMENT; MOREOVER, THIS OPTION IS REFERRED TO AS THE "NARROW" OPTION. THE "NARROW" OPTION OMITTS THE CONSTRUCTION OF THE TRAIL FACILITY ADJACENT TO THE CENTERPOINT ENERGY PROPERTY AND MODIFIES THE FRONT SLOPES OF THE ROADWAY. HOWEVER, THE TRAIL FACILITIES WITHIN KEEGAN'S BAYOU ARE TO BE CONSTRUCTED AS SHOWN IN THESE PLANS EVEN IN THE "NARROW" OPTION. PLEASE SEE THE "NARROW" OPTION PROPOSED TYPICAL SECTION FOR ADDITIONAL INFORMATION.

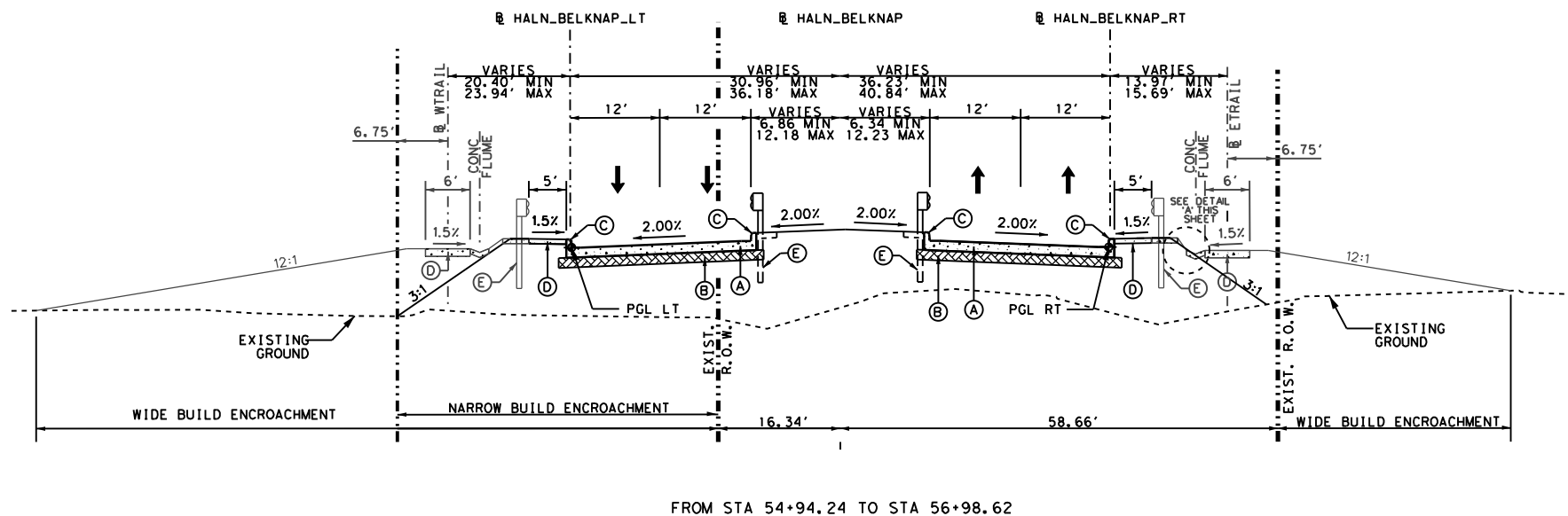
ROADWAY SHEET	H00110000 HARRIS COUNTY SPEC USED SPEC NO. 110 EXCAVATION (CY)	H00130003 HARRIS COUNTY SPEC USED SPEC NO. 130 BORROW (CY)	H00530001 HARRIS COUNTY SPEC USED SPEC NO. 530 REINFORCED CONCRETE SIDEWALK (4-1/2") (SY)
FORT BEND COUNTY			
1 OF 26			307.0
2 OF 26			424.9
3 OF 26			416.3
4 OF 26			386.0
5 OF 26			433.1
6 OF 26			377.0
7 OF 26			402.0
8 OF 26			357.7
9 OF 26			383.9
10 OF 26			28.2
11 OF 26			127.1
12 OF 26	* 846.1	* 675.0	119.0
13 OF 26	* 48.3	* 2,471.8	113.2
15 OF 26			149.9
16 OF 26			154.6
17 OF 26			101.3
20 OF 26			0.0
21 OF 26			0.0
22 OF 26			105.8
24 OF 26			* 0.0
25 OF 26			* 0.0
26 OF 26			* 0.0
SUBTOTAL	894.4	3,146.8	4,387.0
HARRIS			
13 OF 26	* 330.8	* 550.7	32.6
14 OF 26	* 500.7	* 27.1	0.0
17 OF 26			117.0
18 OF 26			46.4
19 OF 26			0.0
23 OF 26			0.0
SUBTOTAL	831.6	577.8	196.0
TOTALS	* 1,726.0	* 3,724.6	* 4,583.0

LEGEND

- (A) 8" REINFORCED CONCRETE PAVEMENT
- (B) 8" LIME TREATED SUBGRADE
- (C) CONCRETE CURB
- (D) 4 1/2" REINFORCED CONCRETE SIDEWALK
- (E) METAL BEAM GUARDRAIL
- (F) CAST IN PLACE CONCRETE RETAINING WALL
- (G) BLOCK SODDING
- (H) 10" REINFORCED CONCRETE PAVEMENT

* THESE QUANTITIES ARE FOR NARROW BUILD SECTION. SEE ROADWAY QUANTITIES FOR WIDE BUILD SECTION.

* THE WORK TO BE PERFORMED AND THE RESULTING QUANTITIES WILL DEPEND UPON WHETHER THE NARROW BUILD OPTION OR THE WIDE BUILD OPTION ARE CHOSEN BY THE COUNTY.



FROM STA 54+94.24 TO STA 56+98.62



14-Nov-2023

NO.	DATE	REVISION	APPROVED
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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
 W BELLFORT BLVD TO OAK BEND FOREST DR

PROJECT NOTES

CNTY PROJ *	RPS PROJ *	DATE	SCALE	SHEET NO
17-2-11	008169	2023		3
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RPS	RPS	RPS	RPS	

CONSTRUCTION

1. FORT BEND COUNTY MUST BE INVITED TO THE PRE-CONSTRUCTION MEETING.
2. CONTRACTOR SHALL NOTIFY FORT BEND COUNTY ENGINEERING DEPARTMENT 48 HOURS PRIOR TO COMMENCING CONSTRUCTION AND 48 HOUR NOTICE TO ANY CONSTRUCTION ACTIVITY WITHIN THE LIMITS OF THE PAVING AT CONSTRUCTION@FBCTX.GOV.
3. CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL PERMITS REQUIRED FROM FORT BEND COUNTY PRIOR TO COMMENCING CONSTRUCTION OF ANY IMPROVEMENTS WITHIN COUNTY ROAD RIGHT OF WAYS.
4. ALL PAVING IMPROVEMENTS SHALL BE CONSTRUCTED IN ACCORDANCE WITH FORT BEND COUNTY "RULES, REGULATIONS AND REQUIREMENTS" RELATING TO THE APPROVAL AND ACCEPTANCE OF IMPROVEMENTS IN SUBDIVISIONS AS CURRENTLY AMENDED.
5. ALL ROAD WIDTHS, CURB RADII AND CURB ALIGNMENT SHOWN INDICATES BACK OF CURB.
6. A CONTINUOUS LONGITUDINAL REINFORCING BAR SHALL BE USED IN THE CURBS.
7. ALL CONCRETE PAVEMENT SHALL BE 5½ SACK CEMENT WITH A MINIMUM COMPRESSIVE STRENGTH OF 3500 PSI AT 28 DAYS. TRANSVERSE EXPANSION JOINTS SHALL BE INSTALLED AT EACH CURB RETURN AND AT A MAXIMUM SPACING OF 60 FEET.
8. ALL WEATHER ACCESS TO ALL EXISTING STREETS AND DRIVEWAYS SHALL BE MAINTAINED AT ALL TIMES.
9. 4" X 12" REINFORCED CONCRETE CURB SHALL BE PLACED IN FRONT OF SINGLE FAMILY LOTS ONLY. ALL OTHER AREAS SHALL BE 6" REINFORCED CONCRETE CURB.
10. CURB HEADERS ARE REQUIRED AT CURB CONNECTIONS TO HANDICAP RAMPS, WITH NO CONSTRUCTION JOINT WITHIN 5' OF RAMPS.
11. 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.
12. ALL R1-1 STOP SIGNS SHALL BE A MINIMUM OF 36"x36" WITH DIAMOND GRADE SHEETING PER TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
13. 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.
14. A BLUE DOUBLE REFLECTORIZED BUTTON SHALL BE PLACED AT ALL FIRE HYDRANT LOCATIONS. THE BUTTON SHALL BE PLACED 12 INCHES OFF OF THE CENTERLINE OF THE STREET ON THE SAME SIDE AS THE HYDRANT.
15. THE PROJECT AND ALL PARTS THEREOF SHALL BE SUBJECT TO INSPECTION FROM TIME TO TIME BY INSPECTORS DESIGNATED BY FORT BEND 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 FORT BEND 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.
16. 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.
17. CONTRACTOR TO PROVIDE MONTHLY SCHEDULE UPDATES AND WEEKLY LOOK AHEAD.

NOTE: FORT BEND COUNTY NOTES SUPERSEDE ANY CONFLICTING NOTES.

NO.	REVISIONS	DATE	NAME
1	ORIGINAL STANDARD ISSUED	3-1-22	RJS
1	ADDED NOTE 17	3-1-23	RJS

FORT BEND COUNTY
ENGINEERING DEPARTMENT



PROJECT TITLE: BELKNAP ROAD		FBCED STANDARD
DRAWN BY: INIT	SHEET DESCRIPTION: CONSTRUCTION GENERAL NOTES	02
CK'D BY: INIT		SHEET NO: 4 /
SCALE: NONE	APPROVED BY:	
DATE: 3-1-23		

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GENERAL

1. THE CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS BEFORE BEGINNING CONSTRUCTION.
2. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING SECURITY TO PROTECT THE PROJECT SITE, CONTRACTOR PROPERTY, EQUIPMENT, AND WORK.
3. THE CONTRACTOR IS RESPONSIBLE FOR CLEANING STREETS OF CONSTRUCTION DIRT AND DEBRIS AT CLOSE OF EACH WORK DAY.
4. THE CONDITION OF THE ROAD AND/OR RIGHT-OF-WAY, UPON COMPLETION OF THE JOB SHALL BE AS GOOD AS OR BETTER THAN PRIOR TO STARTING WORK.
5. PRIOR TO CONSTRUCTION, THE CONTRACTOR, ALONG WITH CONCURRENCE FROM THE FIELD ENGINEER, SHALL DETERMINE HIS/HER LAY-DOWN AND/OR STAGING AREA LOCATIONS.
6. THE CONTRACTOR SHALL NOTIFY ALL PROPERTY OWNERS A MINIMUM OF 24 HOURS PRIOR TO BLOCKING DRIVEWAYS OR ENTERING UTILITY EASEMENTS.
7. TRAFFIC INGRESS AND EGRESS FOR DRIVEWAYS AND PEDESTRIAN ACCESS FACILITIES SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION WITH ALL WEATHER SURFACES.
8. 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. NOTE: PRIOR TO CONSTRUCTION, THE PROPERTY OWNER WAS PAID TO RELOCATE OR REPLACE THESE ITEMS OUTSIDE OF THE COUNTY'S RIGHT-OF-WAY. IF THE OWNER HAS FAILED TO DO SO, THE CONTRACTOR WILL REPLACE THEM WITH THE MINIMUM LEVEL OF QUALITY NEEDED TO SECURE THE PROPERTY AND/OR MAINTAIN MAIL DELIVERY. IN THAT CASE, PAYMENT FOR THESE INSTALLATIONS WILL BE INCLUDED AS EXTRA WORK ITEMS OR AS OVERRUNS TO EXISTING PAY ITEMS.

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. NO SEPARATE PAY.
9. PAVED SURFACES, PAVEMENT MARKERS AND MARKINGS SHALL BE PROTECTED FROM DAMAGE BY TRACKED EQUIPMENT.
10. IRON RODS DISTURBED DURING CONSTRUCTION ARE TO BE REPLACED BY A REGISTERED PROFESSIONAL LAND SURVEYOR FOR THE ORIGINAL PROPERTY OWNER AT NO SEPARATE PAY.
11. CONSTRUCTION STAKING WILL BE PROVIDED BY THE CONTRACTOR. TWO COPIES OF STAKING NOTES TO BE PROVIDED TO THE ENGINEER PRIOR TO CONSTRUCTION.
12. THE COUNTY OR THE COUNTY'S SURVEYOR SHALL PROVIDE A BENCHMARK OR TEMPORARY BENCHMARK AND SURVEY CONTROLS.
13. THE CONTRACTOR SHALL MAINTAIN UPDATED RED-LINED RECORD DRAWINGS ON SITE FOR INSPECTION BY THE ENGINEER.
14. MOWING, MAINTENANCE, AND CLEAN-UP OF THE PROJECT SHALL MEET THE REQUIREMENT OF SPECIFICATION ITEM 560 (NO SEPARATE PAY). 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 NO SEPARATE PAYMENT SHALL BE MADE.
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 FORT BEND 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. MANHOLES, JUNCTION BOXES, INLETS, AND RISERS ARE TO BE PRE-CAST OR CAST IN PLACE.
18. THE FOLLOWING DETAILS ARE MINIMUM REQUIREMENTS AND MAY BE SUPERSEDED BY GEOTECHNICAL ENGINEER RECOMMENDATIONS OR MORE STRINGENT REQUIREMENTS FROM THE CITY'S ETJ PROJECT IS WITHIN.
19. POP UP DRAINS ARE NOT ALLOWED IN FORT BEND COUNTY RIGHT OF WAY.
20. WHEN CONSTRUCTING TEMPORARY PAVEMENT ON OAK BEND FOREST DRIVE, THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING WITH THE WATER LINE OPERATOR (RANDY DAVILA) AT +1(832)256-3411. THE CONTRACTOR SHALL USE STEEL PLATES ON TOP OF WATER VALVES FOR PROTECTION.

TRAFFIC SIGNAL

1. ALL ITEMS RELATING TO THE CONSTRUCTION OF TRAFFIC SIGNAL INSTALLATIONS, EXCEPT FOR PUNCHLIST ITEMS, SHALL BE COMPLETED PRIOR TO THE ACTIVATION OF THE SIGNAL SYSTEM(S), UNLESS OTHERWISE REQUIRED BY THE CONTRACT.
2. THE CONTRACTOR SHALL MEET WITH THE FORT BEND COUNTY TRAFFIC SIGNAL MAINTENANCE GROUPS FIELD INSPECTOR, HEREAFTER REFERRED TO AS THE TRAFFIC INSPECTOR, ONE-WEEK PRIOR TO THE DESIRED ACTIVATION OF ANY NEW TRAFFIC SIGNALS. THE CONTRACTOR SHALL OBTAIN VERBAL CONCURRENCE FROM THE TRAFFIC INSPECTOR THAT ADEQUATE PROGRESS HAS BEEN ACHIEVED AND THAT ADEQUATE PREPARATIONS ARE IN PLACE TO SCHEDULE A PRE-"TURN ON" WALK-THROUGH INSPECTION MEETING. IF IN THE OPINION OF THE TRAFFIC INSPECTOR, REQUIRED PROGRESS AND ADEQUATE PREPARATIONS ARE NOT COMPLETE, THE PRE-"TURN ON" WALK-THROUGH INSPECTION MEETING WILL BE POSTPONED TO ALLOW ADEQUATE TIME FOR INCOMPLETE CONSTRUCTION ITEMS AND PREPARATIONS TO BE COMPLETED. AFTER THE CONTRACTOR HAS COMPLETED ALL INCOMPLETE ITEMS AND PREPARATIONS, THE CONTRACTOR SHALL REQUEST THE TRAFFIC INSPECTOR REVIEW AND APPROVE ITEMS PREVIOUSLY IDENTIFIED. IF, IN THE OPINION OF THE TRAFFIC INSPECTOR, ALL ITEMS HAVE BEEN ADDRESSED SATISFACTORILY, THE DATE OF THE PRE-"TURN ON" WALK-THROUGH INSPECTION SHALL BE ESTABLISHED. TIME EXTENSIONS TO THE CONTRACT TIME WILL NOT BE GRANTED FOR DELAYS CAUSED BY INCOMPLETE CONSTRUCTION OR INADEQUATE CONTRACTOR PREPARATIONS REQUIRED TO COMPLETE TRAFFIC SIGNAL SYSTEM WITHIN THE TIMEFRAME SET FORTH IN THE CONTRACT.
3. PRIOR TO ACTIVATING A NEW TRAFFIC SIGNAL, THE CONTRACTOR SHALL REQUEST A PRE-TURN ON WALK-THROUGH INSPECTION MEETING, IN ACCORDANCE WITH ITEM 2. THE PURPOSE OF THE MEETING WILL BE TO ESTABLISH THAT THE TRAFFIC SIGNAL SYSTEM HAS BEEN CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT, AND IN A MANNER THAT DOES NOT ADVERSELY IMPACT PUBLIC SAFETY. THIS MEETING SHALL BE ATTENDED BY THE TRAFFIC INSPECTOR, THE ENGINEER OF RECORD, AND THE CONTRACTOR. AS A MINIMUM, ANY DEFICIENCIES THAT ADVERSELY IMPACT PUBLIC SAFETY WILL BE IDENTIFIED FOR CORRECTION PRIOR TO ESTABLISHING THE "TURN ON" DATE FOR THE TRAFFIC SIGNAL SYSTEM. ITEMS THAT HAVE AN IMPACT ON PUBLIC SAFETY INCLUDE, BUT ARE NOT LIMITED TO: PAVEMENT MARKINGS AND SIGNAGE, PROPER AND ACCEPTABLE BONDING OF EARTH GROUNDS, PROPERLY ALIGNED TRAFFIC SIGNALS, FULLY OPERATIONAL VEHICULAR AND PEDESTRIAN DETECTION, COMPLETED CABINET-TO-FIELD WIRING, AND PROPERLY TERMINATED ELECTRICAL SERVICE CONDUCTORS. FAILURE TO ADDRESS THE PUNCHLIST ITEMS IDENTIFIED AS BEING CRITICAL TO PUBLIC SAFETY PRIOR TO THE PRE-TURN ON WALK-THROUGH MEETING WILL RESULT IN THE "TURN ON" BEING POSTPONED TO ALLOW ADEQUATE TIME FOR THE INCOMPLETE ITEMS TO BE COMPLETED. AT SUCH TIME AS MEETING ATTENDEES AGREE THAT THE TRAFFIC SIGNAL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT, AND THAT THE TRAFFIC SIGNAL, AS IT EXISTS, IS NOT A THREAT TO PUBLIC SAFETY, A "TURN ON" DATE WILL BE ESTABLISHED.
4. THE CONTRACTOR SHALL HAVE 10 DAYS FROM THE DATE THE TRAFFIC SIGNAL SYSTEM IS TURNED ON TO COMPLETE ANY PUNCHLIST ITEMS IDENTIFIED AT THE PRE-"TURN ON" WALK-THROUGH MEETING OR AT THE TIME THE SIGNAL SYSTEM IS ACTIVATED THAT ARE NOT OTHERWISE ADDRESSED PRIOR TO ACTIVATION OF THE TRAFFIC SIGNAL SYSTEM.
5. THE CONTRACTOR'S ATTENTION IS DIRECTED TO STANDARD SPECIFICATION ITEM 1000, TRAFFIC SIGNAL INSTALLATION AND MODIFICATION, WHICH INCLUDES PROCEDURES AND REQUIREMENTS REGARDING ACTIVATION OF TRAFFIC SIGNAL CONTROL SYSTEMS. THE PROJECT MANUAL MAY INCLUDE SPECIAL SPECIFICATIONS AND/OR SPECIAL PROVISIONS RELATED TO PROPOSED TRAFFIC CONTROL SIGNAL SYSTEM INSTALLATION(S) AND MODIFICATION(S) REQUIRING THE CONTRACTOR'S ADHERENCE TO DEFINED CHECKLISTS, PROCEDURES AND/OR REPORTS AT NO ADDITIONAL COST TO THE COUNTY BEYOND THE ESTABLISHED BID ITEMS OF THE CONTRACT.
6. ALL SIGNAL ALTERATIONS MUST BE APPROVED AND COORDINATED THROUGH FBC ENGINEERING AND ROAD & BRIDGE.

TRAFFIC CONTROL

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. THE CONTRACTOR SHALL MAINTAIN AT LEAST ONE LANE OF TRAFFIC IN EACH DIRECTION DURING WORKING HOURS EXCEPT DURING FLAGGING OPERATION
3. LANE CLOSURES SHALL BE DURING OFF-PEAK HOURS ONLY (MONDAY THROUGH FRIDAY 9 A.M. TO 4 P.M.) UNIFORMED PEACE OFFICERS OR FLAGGERS IN RADIO CONTACT ARE REQUIRED TO DIRECT TRAFFIC DURING LANE CLOSURES.
4. DETOURS REQUIRE PRIOR APPROVAL OF THE FIELD ENGINEER AND PRECINCT. 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 FIELD ENGINEER) HIGH EARLY STRENGTH CONCRETE AND OTHER RELATED 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.
5. 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.
6. 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.
7. 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, HE/SHE SHALL PREPARE AND SUBMIT THE ALTERNATIVE TCP 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 FORT BEND 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.
8. ALL TEMPORARY PAVEMENT MARKINGS ON PERMANENT PAVEMENT SHOULD BE RPMS OR TABS.
9. TRAFFIC PATTERN CHANGES REQUIRE CHANGEABLE MESSAGE BOARDS PLACED AT LEAST 2 WEEKS IN ADVANCE OF PROPOSED CHANGE. QUANTITY, PLACEMENT AND WORDING TBD BY FBC.

NO.	REVISIONS	DATE	NAME
△	ORIGINAL STANDARD ISSUED	3-1-22	RJS
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FORT BEND COUNTY
ENGINEERING DEPARTMENT



PROJECT TITLE:		
DRAWN BY: INIT		FBCD STANDARD
CR'D BY: INIT	SHEET DESCRIPTION: PUBLIC WORKS AND SUBDIVISION	03
SCALE: NONE	GENERAL NOTES	SHEET NO:
DATE: 3-1-22	APPROVED BY:	5 /

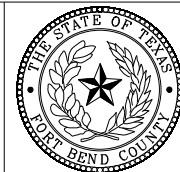
TRAFFIC SIGNAL

1. INSTALL SIGNS AND SIGNALS HORIZONTALLY ON MAST ARM 17 FT-6 IN MINIMUM ABOVE THE ROADWAY.
2. FURNISH BLACK HOUSING FOR VEHICLE SIGNALS WITH 12-IN LENS AND BLACK BACKPLATES.
3. TRAFFIC SIGNAL STRAIN POLES AND MAST ARMS SHALL BE STANDARD GALVANIZED. (SIGNAL POLES AND MAST ARMS SHALL BE POWDER-COATED IN BLACK POLES UNLESS OTHER ENTITY IS PAYING FOR UPGRADES.)
4. FURNISH VEHICLE AND COUNTDOWN PEDESTRIAN SIGNALS WITH LIGHT EMITTING DIODE (LED) SIGNAL LAMP UNITS.
5. SYMBOLIC PEDESTRIAN SIGNAL HEAD SHALL BE LED AUDIBLE PEDESTRIAN AND 12-IN COUNTDOWN.
6. USE DIAMOND GRADE RETROREFLECTIVE SHEETING FOR SIGNS MOUNTED UNDER OR ADJACENT TO THE SIGNAL HEADS.
7. FURNISH SYMBOL TYPE PEDESTRIAN COUNTDOWN SIGNALS. INSTALL USING MOUNTING HEIGHT IN ACCORDANCE WITH THE LATEST "TEXAS MANUAL ON UNIFORM CONTROL DEVICES."
8. FURNISH MATERIALS NECESSARY TO INSTALL ACCESSIBLE PEDESTRIAN UNITS (SEE FBC APPROVED TRAFFIC SIGNAL EQUIPMENT LIST) AS SHOWN IN THE PLANS. INSTALL PUSH BUTTON AT 3 FT-6 IN. TO 4 FT.-0 IN ABOVE THE SIDEWALK OR CONCRETE WALKWAY.
9. ROUTE CABLE FOR LUMINAIRES (4/C NO. 12 TRAY CABLE) TO THE SERVICE ENCLOSURE. SEE ELECTRICAL DETAILS SHEET.
10. INSTALL FULL-ACTUATED, ETHERNET-CAPABLE CONTROLLER WITH INTERNAL TIME BASED COORDINATION UNIT AND COMMUNICATION IN A BASE MOUNTED CABINET. SEE FBC APPROVED TRAFFIC SIGNAL EQUIPMENT LIST.
11. LOCATE CONTROLLERS, STEEL POLES, DETECTION ZONES AS APPROVED BY FORT BEND COUNTY IN THE FIELD.
12. REPAIR OR REPLACE PAVEMENT AND SIDEWALKS DAMAGED BY THE CONTRACTOR'S FORCES DURING CONSTRUCTION AT NO COST TO THE COUNTY.
13. FURNISH AND INSTALL DUCT SEAL TO ENCLOSE THE ENDS OF EACH CONDUIT CONTAINING SIGNAL CABLE.
14. THE CONTRACTOR SHALL INSTALL A CLOSED NIPPLE WITH LOCK NUT AND BUSHING (SIZE AS REQUIRED) TO PREVENT ABRASION TO SIGNAL CABLE WHERE THE CABLE ENTERS THE UPPER PORTION OF THE SIGNAL POLE.
15. DO NOT PLACE SIGNAL HEADS OVER THE ROADWAY UNTIL ALL NECESSARY MATERIALS ARE ON HAND AS APPROVED.
16. INSTALL TWO SET SCREWS ON ALL VEHICLE SIGNAL HEAD MOUNTING HARDWARE FITTINGS.
17. WRAP SIGNAL HEADS WITH DARK PLASTIC OR SUITABLE MATERIAL TO CONCEAL THE SIGNAL FACES FROM THE ITEM OF INSTALLATION UNTIL PLACING INTO OPERATION. DO NOT USE BURLAP.
18. INSTALL A 5/8-IN (MINIMUM) EYE BOLT FOR THE POINT OF ATTACHMENT BELOW THE SERVICE ENTRANCE WEATHERHEAD FOR THE SERVICE DROP (120/240 VOLT SERVICE) TO STEEL POLE.
19. LUMINAIRES MOUNTED ON TRAFFIC SIGNAL POLES SHALL BE IN COMPLIANCE WITH TXDOT STANDARDS.
20. PROVIDE LIGHT-EMITTING DIODE (LED) LUMINAIRES EQUIVALENT TO "250 WATT HIGH PRESSURE SODIUM" LUMINAIRES, OPERATING AT 240 VOLTS.
21. GROUND STEEL MAST ARM POLE ASSEMBLIES IN ACCORDANCE WITH REQUIREMENTS SHOWN ON THE LATEST TXDOT TRAFFIC SIGNAL POLE FOUNDATION STANDARD. USE THE GROUNDING LUG ON THE POLE TO GROUND THE POLE TO THE GROUND CONDUCTORS FROM THE CONDUITS.
22. VERIFY THE CORRECT MAST ARM POLE LENGTHS FOR THE ULTIMATE CONFIGURATION OF THIS SIGNALIZED INTERSECTION PRIOR TO ORDERING THE EQUIPMENT.
23. ELECTRICAL POWER TO OPERATE THE TRAFFIC SIGNAL INSTALLATION WILL BE PLACED IN THE COUNTY'S NAME. THIS INCLUDES ALL POWER TO OPERATE THE SIGNAL DURING THE VARIOUS PHASES OF CONSTRUCTION AND DURING THE TEST PERIOD PRIOR TO ACCEPTANCE OF THE WORK BY FORT BEND COUNTY.
24. INSTALL PEDESTRIAN SIGNAL POLES WITH SCREW-IN ANCHOR FOUNDATION.
25. THE ENGINEER WILL PROVIDE PHASING AND TIMINGS FOR TEMPORARY AND PERMANENT TRAFFIC SIGNALS.
26. EXISTING STOP SIGNS AND SCHOOL CROSSING ASSEMBLIES AT THE INTERSECTION SHALL BE REMOVED AND RETURNED TO FORT BEND COUNTY.
27. ALL EXISTING EQUIPMENT THAT WILL NOT BE INSTALLED ON THE SIGNAL POLES AND/OR MAST ARMS SHALL BE RETURNED TO FORT BEND COUNTY.
28. ALL TRAFFIC SIGNAL POLE FOUNDATION LOCATIONS SHALL BE APPROVED BY THE ENGINEER OR REPRESENTATIVE IN THE FIELD PRIOR TO DRILLING.
29. FURNISH VIDEO IMAGING VEHICLE DETECTION SYSTEM (VIVDS) CABLE RECOMMENDED BY MANUFACTURER OR PURCHASE CABLE FROM THE SAME MANUFACTURER THAT SUPPLIED/PROVIDED THE VIVDS EQUIPMENT.
30. THE LOCATION OF THE VIVDS DETECTION ZONE IS APPROXIMATE. THE EXACT LOCATION WILL BE DETERMINED BY THE ENGINEER AND/OR FORT BEND COUNTY ROAD AND BRIDGE SIGNAL TECHNICIANS.
31. THE VENDORS' REPRESENTATIVES OF THE VIVDS EQUIPMENT SUPPLIED FOR THIS PROJECT MUST SUPERVISE THE INSTALLATION, SETUP AND TESTING. THE REPRESENTATIVE MUST BE ON SITE DURING THIS TIME. ANY EQUIPMENT REQUIRED FOR SETUP AND OPERATION OF THE VIVDS DEVICES MUST BE PROVIDED TO THE COUNTY UPON COMPLETION.

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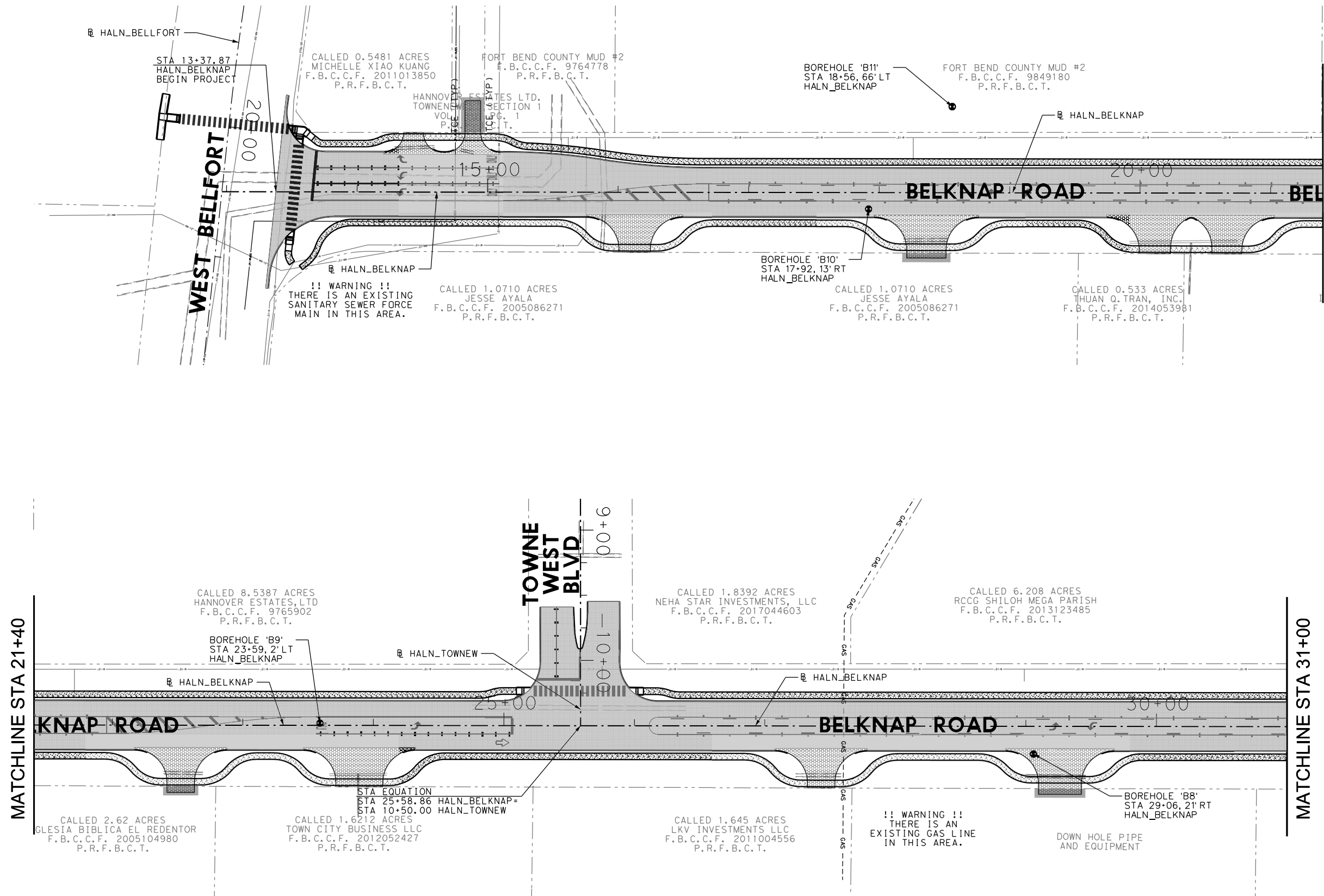
FORT BEND COUNTY
ENGINEERING DEPARTMENT



PROJECT TITLE:		
DRAWN BY: INIT		FBCED STANDARD
CK'D BY: INIT	SHEET DESCRIPTION: TRAFFIC SIGNAL NOTES	04
SCALE: NONE		SHEET NO:
DATE: 3-1-22	APPROVED BY:	6 /

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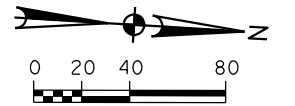
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MATCHLINE STA 21+40

MATCHLINE STA 31+00



CAUTION!!!!
OVERHEAD ELECTRIC,
LOCATIONS ARE APPROXIMATE

CALL BEFORE YOU DIG!
TEXAS ONE CALL PARTICIPANTS REQUEST
48 HOURS NOTICE BEFORE YOU DIG, DRILL,
OR BLAST - STOP CALL
Texas One Call System
1-800-DIG-TESS



14-Nov-2023

NO	DATE	REVISION	APPROVED



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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

PROJECT LAYOUT
BEGIN TO STA 31+00

SHEET 1 OF 3

CNTY PROJ	RPS PROJ	DATE	SCALE	SHEET NO
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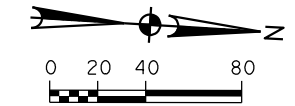
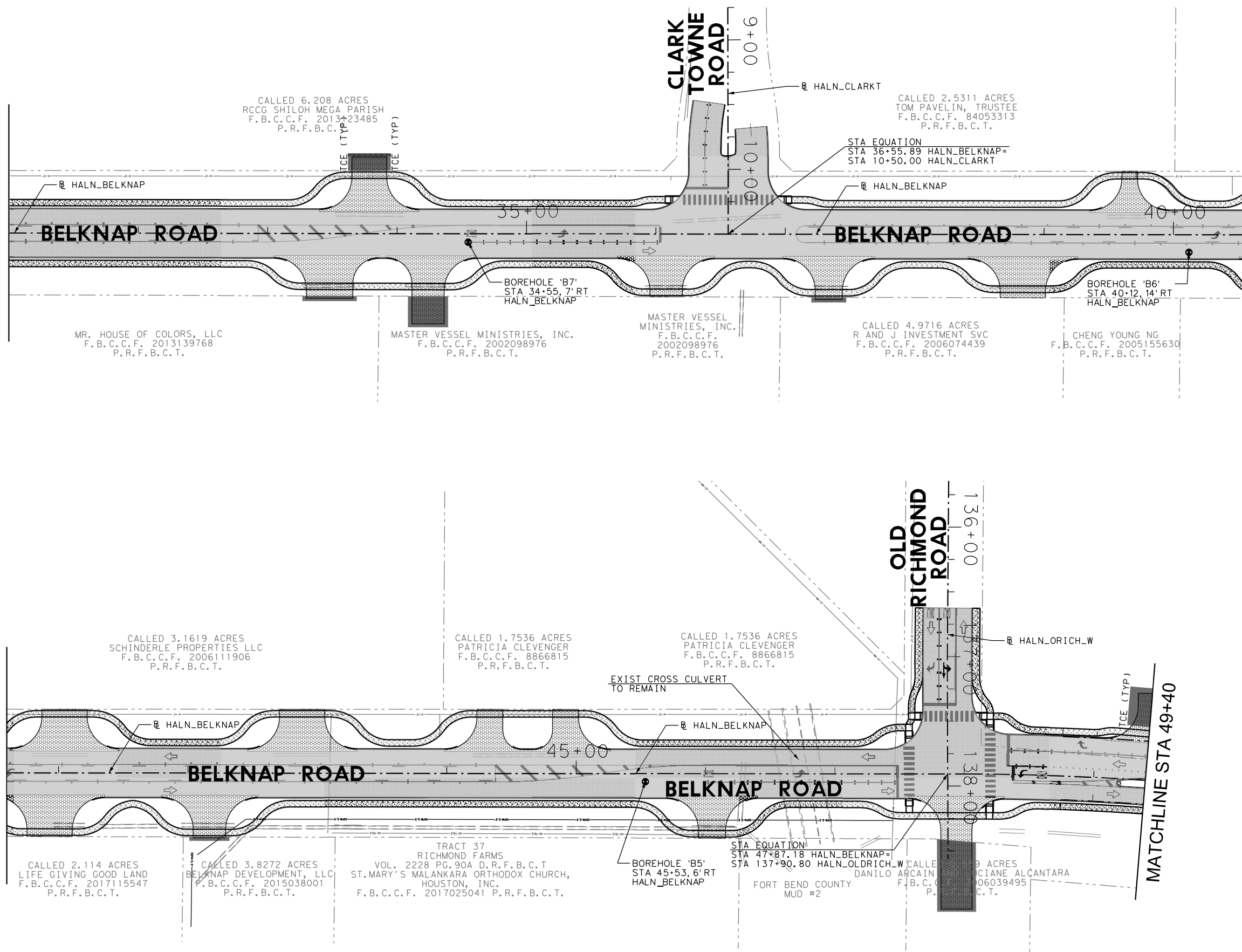
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MATCHLINE STA 31+00

MATCHLINE STA 40+60

MATCHLINE STA 40+60

MATCHLINE STA 49+40



CAUTION!!!!
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CALL BEFORE YOU DIG!
TEXAS ONE CALL PARTICIPANTS REQUEST
48 HOURS NOTICE BEFORE YOU DIG, DRILL,
OR BLAST - STOP CALL
Texas One Call System
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14-Nov-2023

NO.	DATE	REVISION	APPROVED

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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

PROJECT LAYOUT
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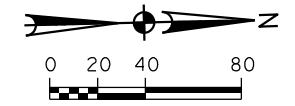
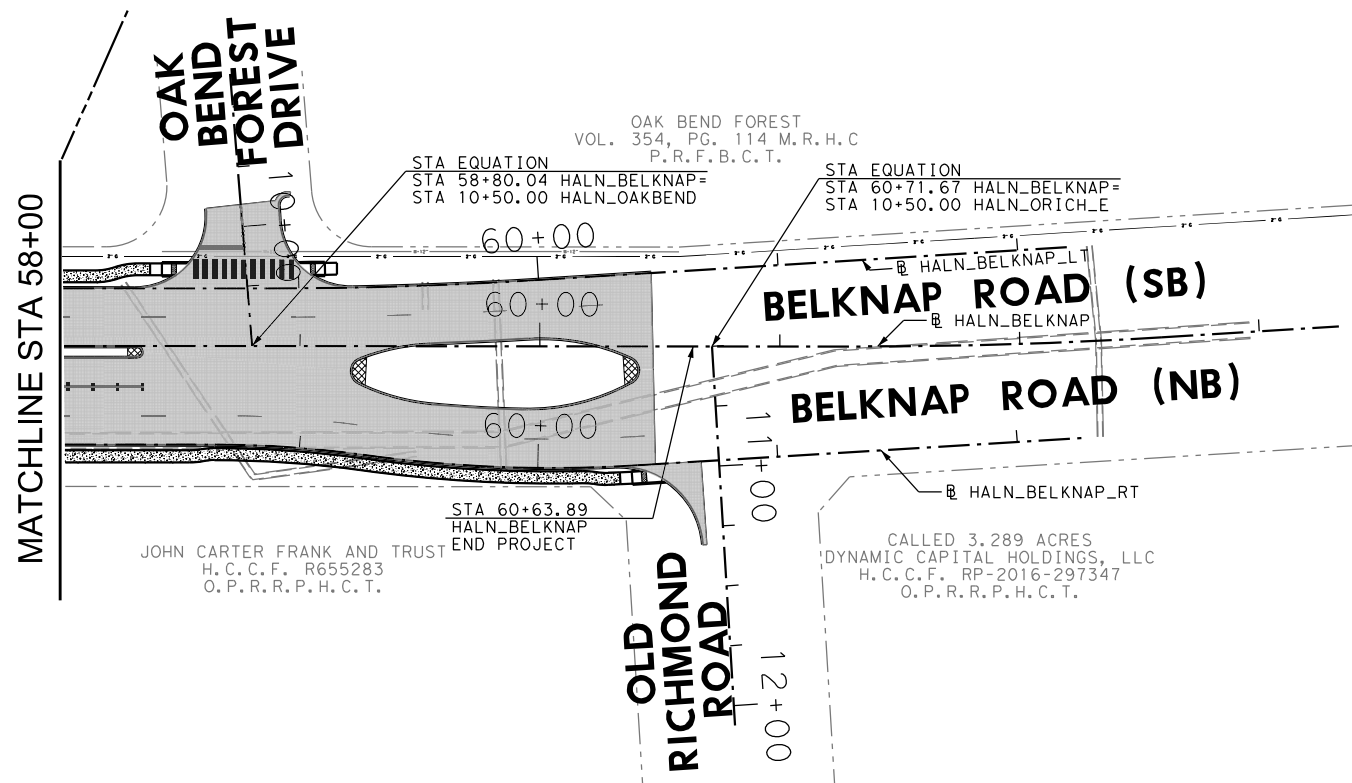
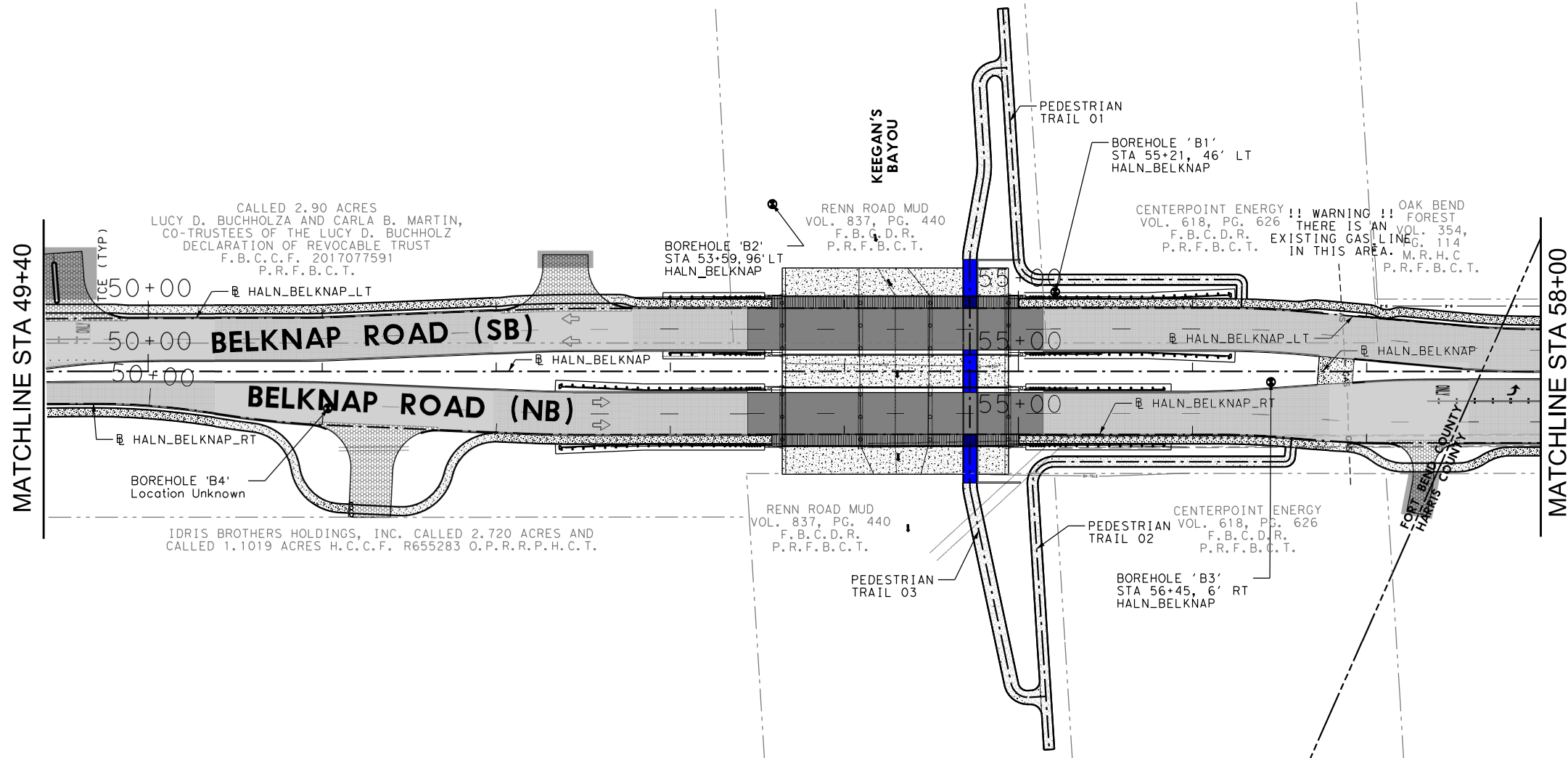
SHEET 2 OF 3

CNTY	PROJ	RPS PROJ	DATE	SCALE	SHEET NO
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14-Nov-2023

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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
 W BELLFORT BLVD TO OAK BEND FOREST DR

PROJECT LAYOUT
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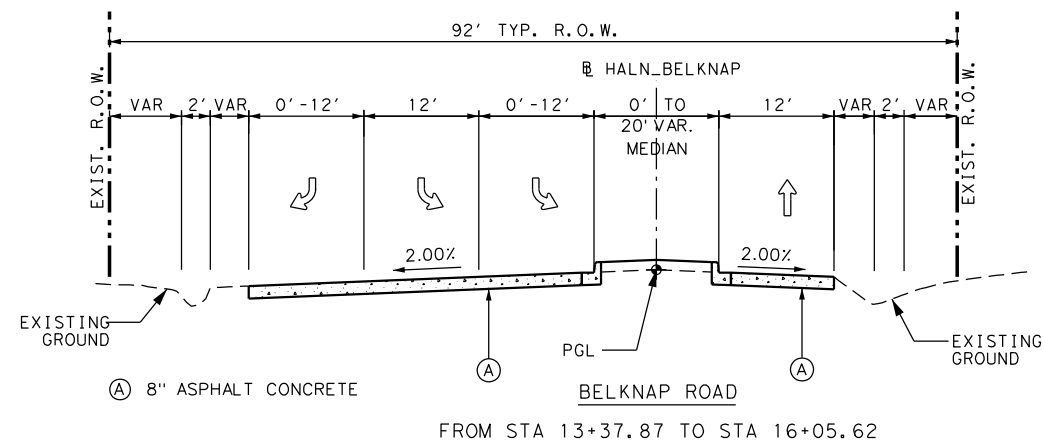
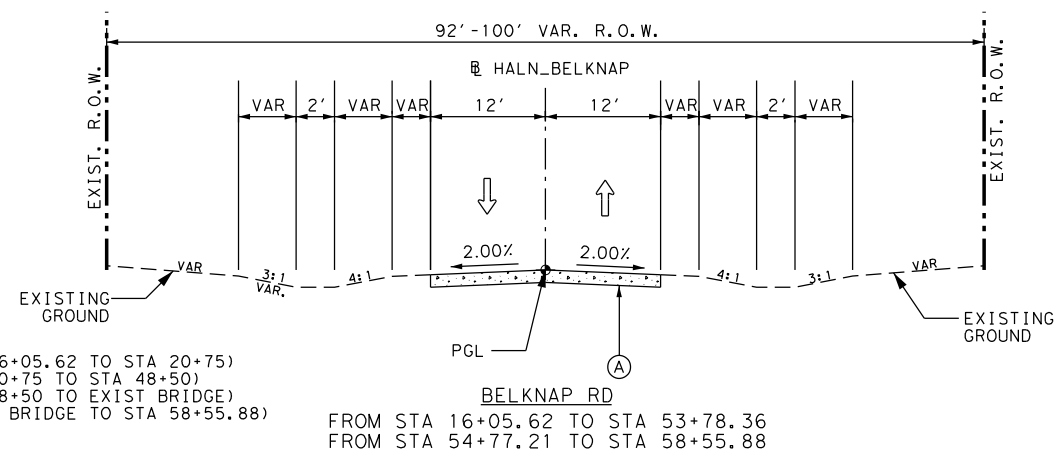
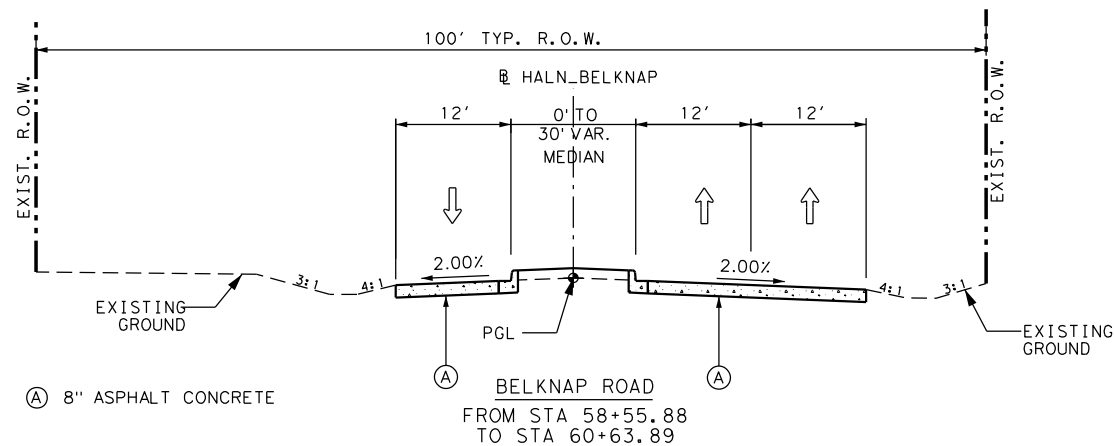
SHEET 3 OF 3

CNTY PROJ *	RPS PROJ *	DATE	SCALE	SHEET NO
17-2-11	008169	2023		9
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SEE BRIDGE PLANS FOR EXISTING
BRIDGE TYPICAL SECTIONS

BELKNAP RD
FROM STA 53+78.36 TO STA 54+77.21
EXISTING BRIDGE



14-Nov-2023

NO.	DATE	REVISION	APPROVED



Texas PE Firm Reg. #F-929

575 N. Dairy Ashford, Suite 700, Houston, Texas 77079
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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

TYPICAL SECTIONS
EXISTING

SHEET 1 OF 2

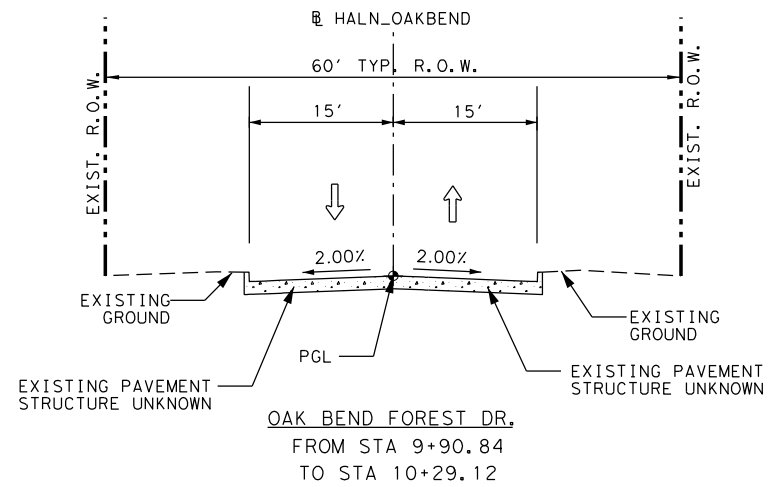
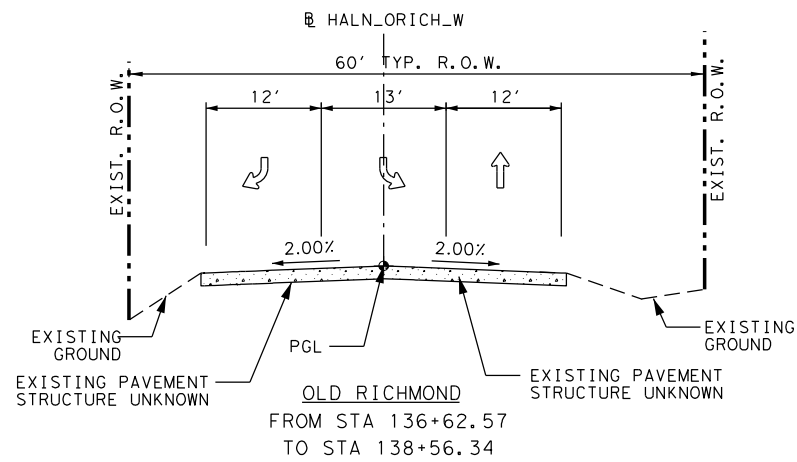
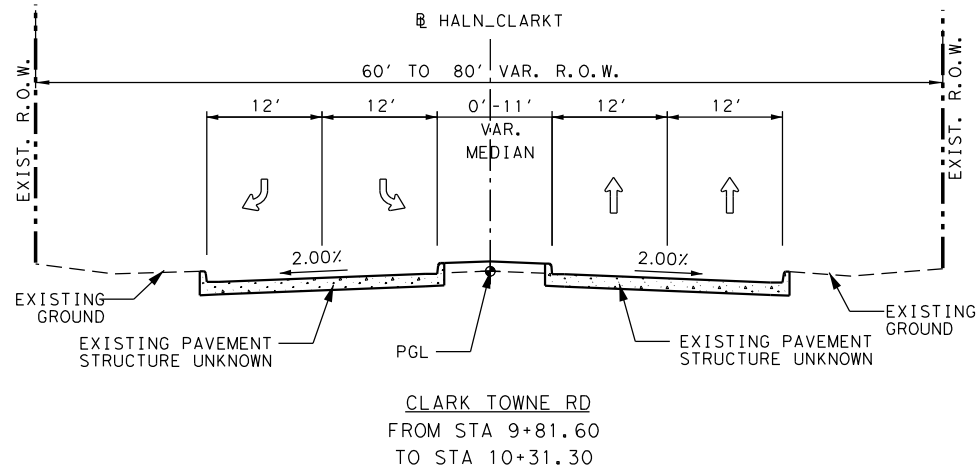
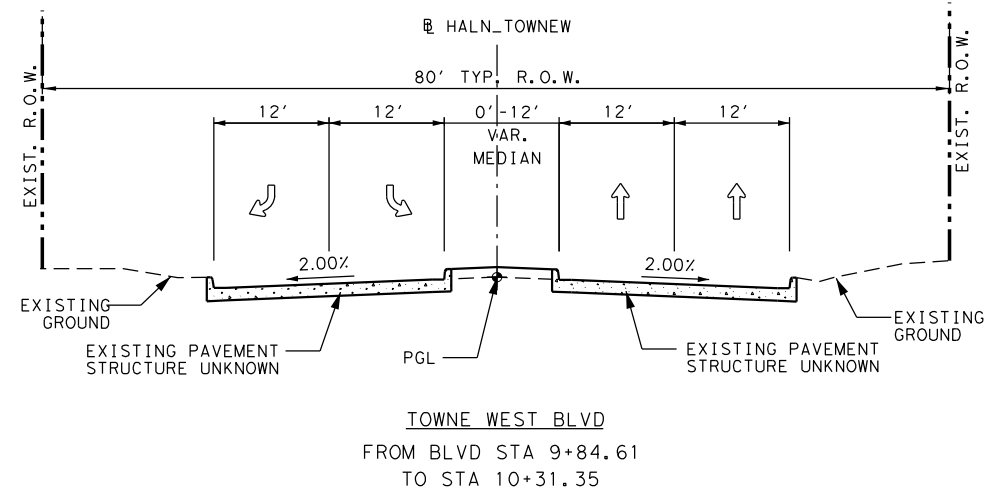
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DESIGNED BY	RPS	DRAWN BY	RPS	CHECKED BY	RPS

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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

TYPICAL SECTIONS
EXISTING

CNTY	PROJ	RPS PROJ	DATE	SCALE	SHEET NO
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DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY		
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SHEET 2 OF 2

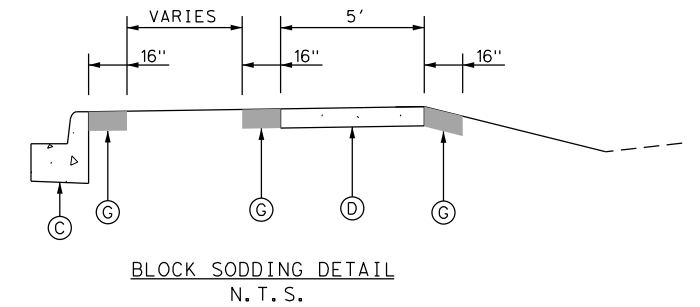
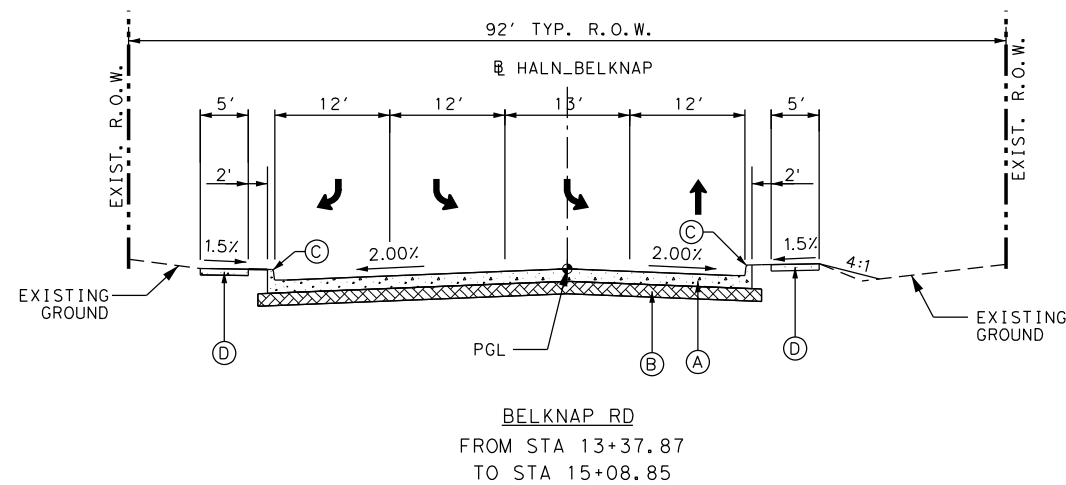
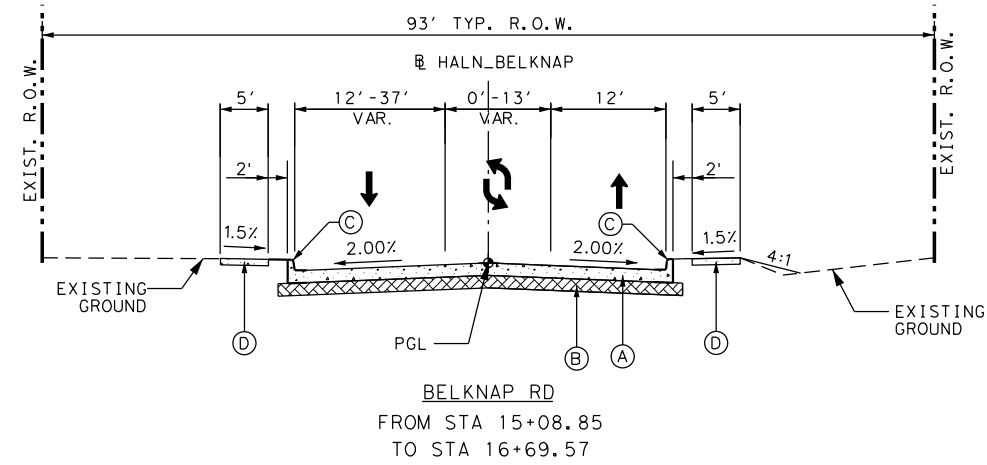
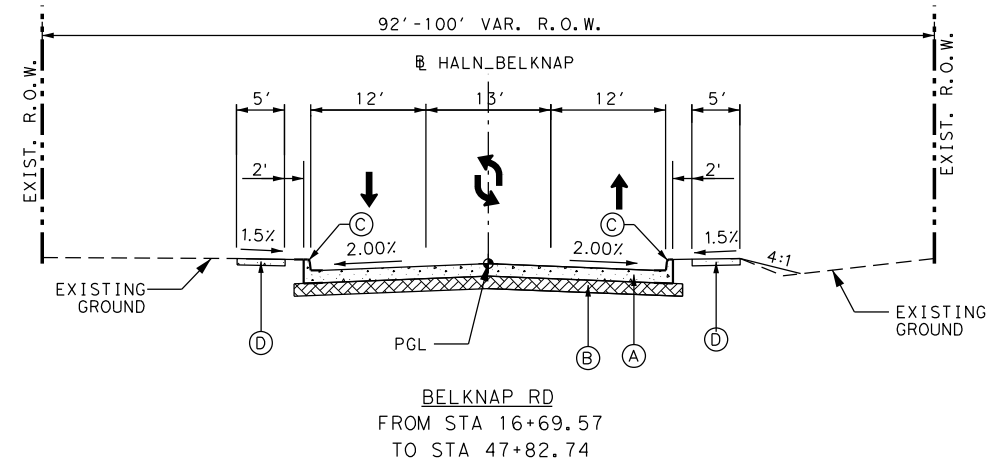
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LEGEND

- (A) 8" REINFORCED CONCRETE PAVEMENT
- (B) 8" LIME TREATED SUBGRADE
- (C) CONCRETE CURB
- (D) 4 1/2" REINFORCED CONCRETE SIDEWALK
- (E) METAL BEAM GUARDRAIL
- (G) BLOCK SODDING
- (H) 10" REINFORCED CONCRETE PAVEMENT



14-Nov-2023

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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

TYPICAL SECTIONS
PROPOSED

CNTY PROJ *	RPS PROJ *	DATE	SCALE	SHEET NO
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SHEET 1 OF 4

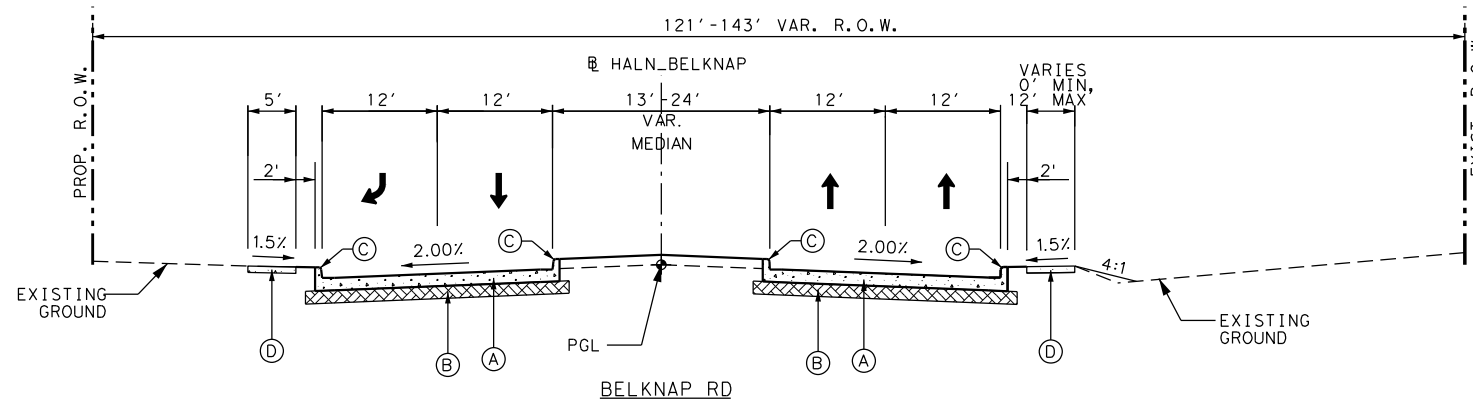
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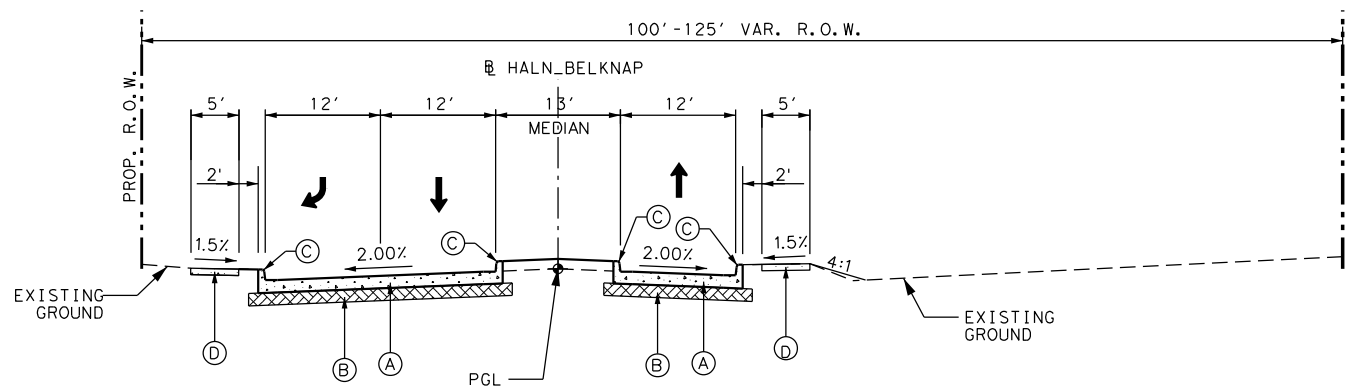
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SEE BRIDGE PLANS FOR
PROPOSED BRIDGE
TYPICAL SECTIONS

BELKNAP RD
FROM STA 53+64.24 TO STA 54+94.24
PROPOSED BRIDGE



BELKNAP RD
FROM STA 48+28.71 TO STA 53+64.24



BELKNAP RD
FROM STA 47+82.74
TO STA 48+28.71

LEGEND

- (A) 8" REINFORCED CONCRETE PAVEMENT
- (B) 8" LIME TREATED SUBGRADE
- (C) CONCRETE CURB
- (D) 4 1/2" REINFORCED CONCRETE SIDEWALK
- (E) METAL BEAM GUARDRAIL
- (G) BLOCK SODDING
- (H) 10" REINFORCED CONCRETE PAVEMENT



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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

TYPICAL SECTIONS
PROPOSED

SHEET 2 OF 4

CNTY	PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	2023			13
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY		
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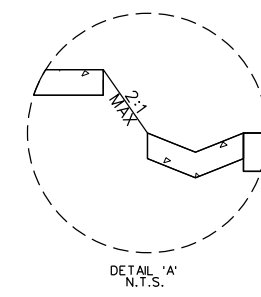
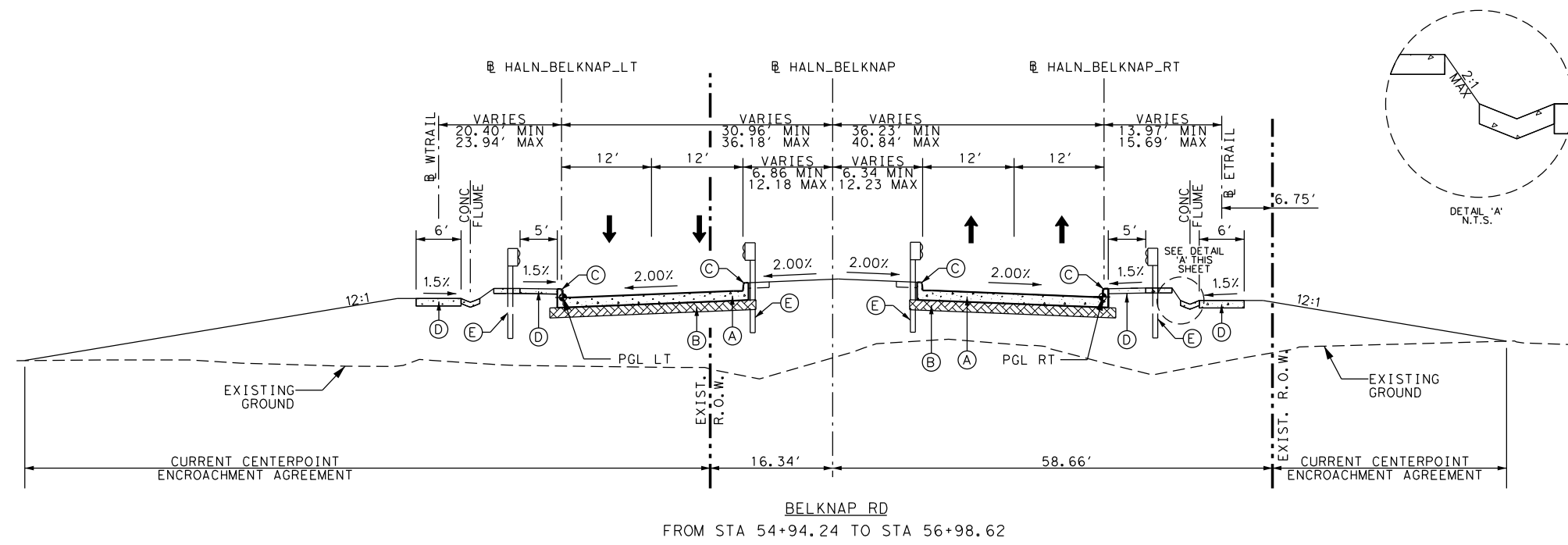
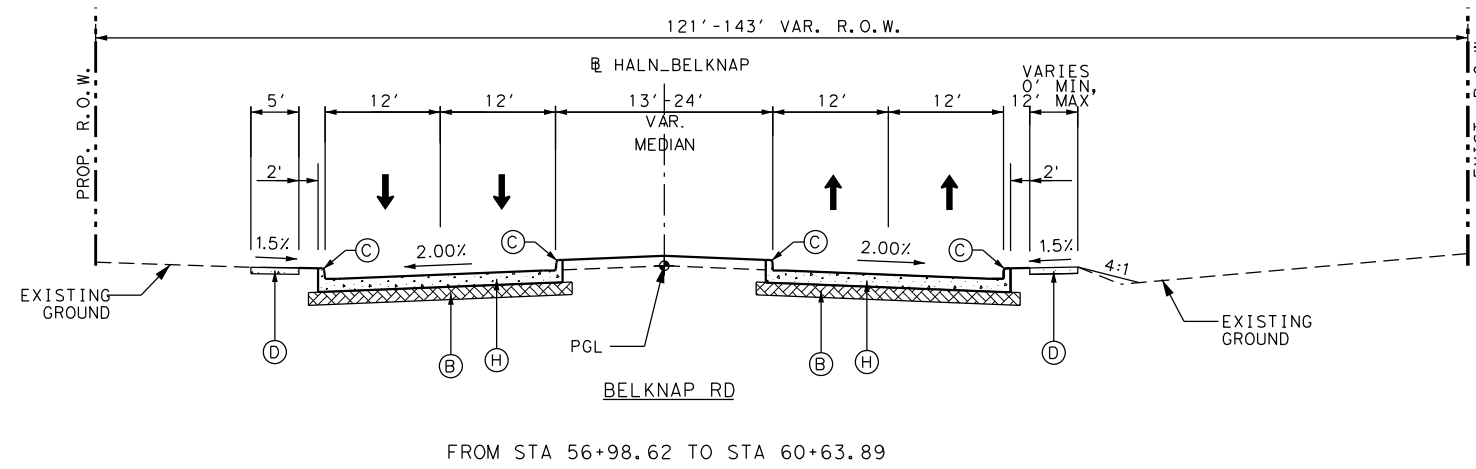
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LEGEND

- (A) 8" REINFORCED CONCRETE PAVEMENT
- (B) 8" LIME TREATED SUBGRADE
- (C) CONCRETE CURB
- (D) 4 1/2" REINFORCED CONCRETE SIDEWALK
- (E) METAL BEAM GUARDRAIL
- (G) BLOCK SODDING
- (H) 10" REINFORCED CONCRETE PAVEMENT

NOTE:
SEE PROJECT NOTES FOR ADDITIONAL INFORMATION.



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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

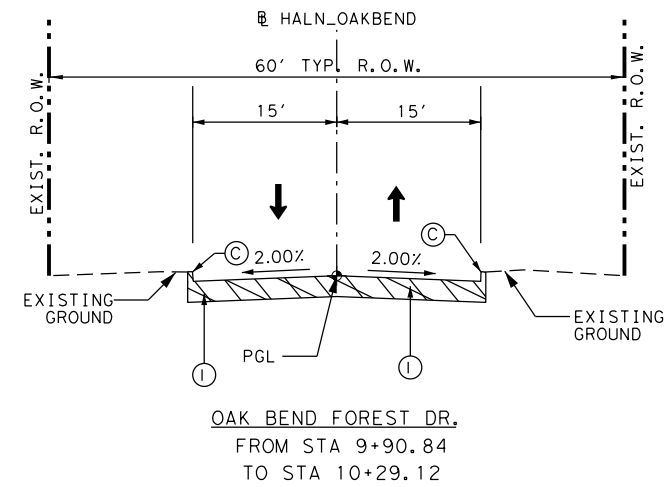
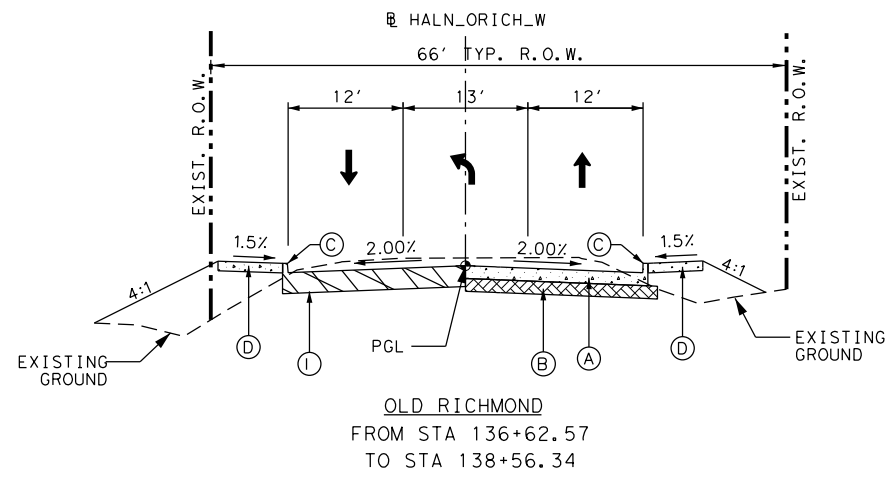
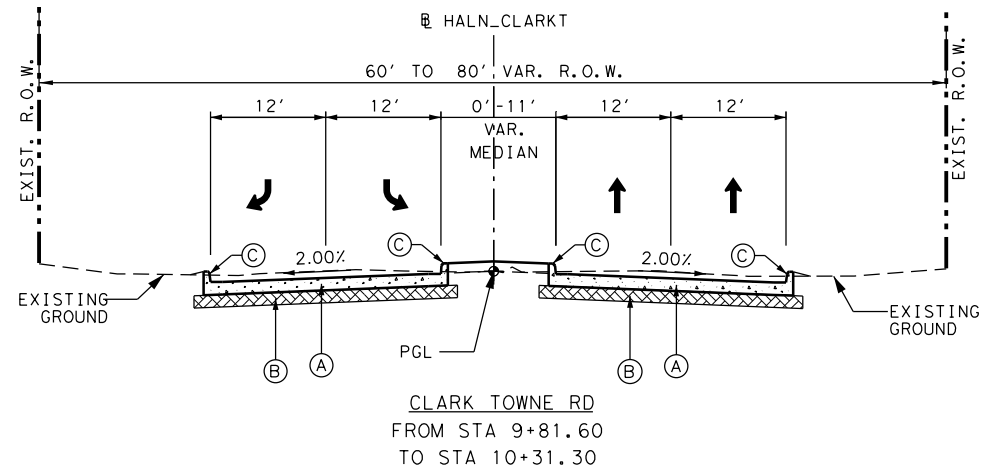
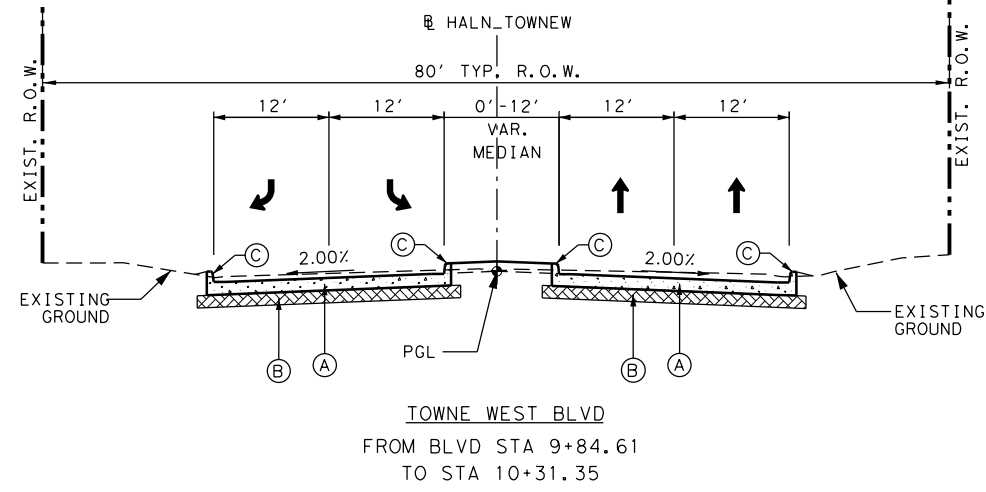
TYPICAL SECTIONS
PROPOSED

SHEET 3 OF 4

CNTY PROJ	RPS PROJ	DATE	SCALE	SHEET NO
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DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
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LEGEND

- (A) 8" REINFORCED CONCRETE PAVEMENT
- (B) 8" LIME TREATED SUBGRADE
- (C) CONCRETE CURB
- (D) 4 1/2" REINFORCED CONCRETE SIDEWALK
- (E) METAL BEAM GUARDRAIL
- (G) BLOCK SODDING
- (H) 10" REINFORCED CONCRETE PAVEMENT
- (I) PROPOSED 13" (FAST TRACK)



02/06/2024

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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
 W BELLFORT BLVD TO OAK BEND FOREST DR

TYPICAL SECTIONS
 PROPOSED

SHEET 4 OF 4

CNTY PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	2023		15
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
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Curve Data

Curve CENTER1007
P.I. Station 56+39.83 N 13,809,935.7939 E 3,040,983.6859
Delta = 5° 06' 02" (RT)
Degree = 9° 58' 55"
Tangent = 25.5663
Length = 51.0989
Radius = 574.0000
External = 0.5691
Long Chord = 51.0820
Mid. Ord. = 0.5685
P.C. Station 56+14.26 N 13,809,910.2344 E 3,040,983.0939
P.T. Station 56+65.36 N 13,809,961.1995 E 3,040,986.5480
C.C. N 13,809,896.9416 E 3,041,556.9399
Back = N 1° 19' 37" E
Ahead = N 6° 25' 39" E
Chord Bear = N 3° 52' 38" E

Course from PT CENTER1007 to PC CENTER1008 N 6° 25' 39" E Dist 92.3208

Curve Data

Curve CENTER1008
P.I. Station 57+77.72 N 13,810,072.8504 E 3,040,999.1261
Delta = 5° 05' 56" (LT)
Degree = 12° 43' 57"
Tangent = 20.0363
Length = 40.0462
Radius = 450.0000
External = 0.4458
Long Chord = 40.0330
Mid. Ord. = 0.4454
P.C. Station 57+57.68 N 13,810,052.9400 E 3,040,996.8831
P.T. Station 57+97.73 N 13,810,092.8813 E 3,040,999.5907
C.C. N 13,810,103.3164 E 3,040,549.7117
Back = N 6° 25' 39" E
Ahead = N 1° 19' 44" E
Chord Bear = N 3° 52' 41" E

Course from PT CENTER1008 to PC CENTER1009 N 1° 19' 44" E Dist 88.4007

Curve Data

Curve CENTER1009
P.I. Station 59+42.18 N 13,810,237.2956 E 3,041,002.9405
Delta = 3° 34' 02" (LT)
Degree = 3° 10' 59"
Tangent = 56.0524
Length = 112.0687
Radius = 1,800.0000
External = 0.8725
Long Chord = 112.0506
Mid. Ord. = 0.8721
P.C. Station 58+86.13 N 13,810,181.2583 E 3,041,001.6407
P.T. Station 59+98.20 N 13,810,293.3053 E 3,041,000.7511
C.C. N 13,810,222.9986 E 3,039,202.1247
Back = N 1° 19' 44" E
Ahead = N 2° 14' 19" W
Chord Bear = N 0° 27' 18" W

Course from PT CENTER1009 to CENTER1010 N 2° 14' 19" W Dist 225.4349

Point CENTER1010 N 13,810,518.5682 E 3,040,991.9458 Sta 62+23.63

=====
Ending chain HALN_BELKNAP_LT description
=====

BELKNAP ROAD BASELINE (RIGHT)

Chain HALN_BELKNAP_RT contains:
CUR CENTER2002 CUR CENTER2003 CUR CENTER2004 CUR CENTER2005 CENTER2006 CENTER2-007 CUR CENTER2008 CUR CENTER2009 CUR CENTER2010 CUR CENTER2011 CENTER2012

Beginning chain HALN_BELKNAP_RT description
=====

Curve Data

Curve CENTER2002
P.I. Station 49+21.48 N 13,809,217.1474 E 3,041,021.5726
Delta = 2° 40' 57" (RT)
Degree = 2° 53' 30"
Tangent = 46.3931
Length = 92.7692
Radius = 1,981.5000
External = 0.5430
Long Chord = 92.7607
Mid. Ord. = 0.5429
P.C. Station 48+75.09 N 13,809,170.7660 E 3,041,022.6144
P.T. Station 49+67.86 N 13,809,263.5267 E 3,041,022.7026
C.C. N 13,809,215.2629 E 3,043,003.6147
Back = N 1° 17' 12" W
Ahead = N 1° 23' 45" E
Chord Bear = N 0° 03' 16" E

Curve Data

Curve CENTER2003
P.I. Station 50+03.86 N 13,809,299.5152 E 3,041,023.5794
Delta = 9° 08' 52" (RT)
Degree = 12° 43' 57"
Tangent = 35.9992
Length = 71.8454
Radius = 450.0000
External = 1.4376
Long Chord = 71.7691
Mid. Ord. = 1.4331
P.C. Station 49+67.86 N 13,809,263.5267 E 3,041,022.7026
P.T. Station 50+39.70 N 13,809,334.9067 E 3,041,030.1665
C.C. N 13,809,252.5660 E 3,041,472.5691
Back = N 1° 23' 45" E
Ahead = N 10° 32' 36" E
Chord Bear = N 5° 58' 10" E

Course from PT CENTER2003 to PC CENTER2004 N 6° 25' 39" E Dist 92.3208

Curve Data

Curve CENTER2004
P.I. Station 50+72.25 N 13,809,366.9046 E 3,041,036.1221
Delta = 6° 46' 24" (LT)
Degree = 10° 25' 03"
Tangent = 32.5475
Length = 65.0192
Radius = 550.0000
External = 0.9622
Long Chord = 64.9813
Mid. Ord. = 0.9605
P.C. Station 50+39.70 N 13,809,334.9067 E 3,041,030.1665
P.T. Station 51+04.72 N 13,809,399.3817 E 3,041,038.2621
C.C. N 13,809,435.5453 E 3,040,489.4523
Back = N 10° 32' 36" E
Ahead = N 3° 46' 12" E
Chord Bear = N 7° 09' 24" E

Course from PT CENTER2004 to PC CENTER2005 N 3° 46' 12" E Dist 115.0599

Curve Data

Curve CENTER2005
P.I. Station 52+32.02 N 13,809,526.4055 E 3,041,046.6323
Delta = 2° 26' 35" (LT)
Degree = 9° 58' 55"
Tangent = 12.2393
Length = 24.4749
Radius = 574.0000
External = 0.1305
Long Chord = 24.4731
Mid. Ord. = 0.1304
P.C. Station 52+19.78 N 13,809,514.1926 E 3,041,045.8275
P.T. Station 52+44.26 N 13,809,538.6415 E 3,041,046.9157
C.C. N 13,809,551.9343 E 3,040,473.0697
Back = N 3° 46' 12" E
Ahead = N 1° 19' 37" E
Chord Bear = N 2° 32' 55" E

Course from PT CENTER2005 to CENTER2006 N 1° 19' 37" E Dist 120.0000

Point CENTER2006 N 13,809,658.6093 E 3,041,049.6947 Sta 53+64.26

Course from CENTER2006 to CENTER2007 N 1° 19' 37" E Dist 130.0000

Point CENTER2007 N 13,809,788.5745 E 3,041,052.7053 Sta 54+94.26

Course from CENTER2007 to PC CENTER2008 N 1° 19' 37" E Dist 120.0152

Curve Data

Curve CENTER2008
P.I. Station 56+36.20 N 13,809,930.4763 E 3,041,055.9923
Delta = 5° 34' 43" (RT)
Degree = 12° 43' 57"
Tangent = 21.9246
Length = 43.8146
Radius = 450.0000
External = 0.5338
Long Chord = 43.7973
Mid. Ord. = 0.5332
P.C. Station 56+14.27 N 13,809,908.5575 E 3,041,055.4846
P.T. Station 56+58.09 N 13,809,952.2418 E 3,041,058.6284
C.C. N 13,809,898.1364 E 3,041,505.3639
Back = N 1° 19' 37" E
Ahead = N 6° 54' 20" E
Chord Bear = N 4° 06' 59" E



NO	DATE	REVISION	APPROVED

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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

COORDINATE GEOMETRY

SHEET 2 OF 10

CNTY	PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	2023			17
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				VERIFIED BY	RPS

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Curve Data

Curve CENTER2009
P.I. Station 56+86.05 N 13,809,979.9962 E 3,041,061.9898
Delta = 5° 34' 37" (LT)
Degree = 9° 58' 55"
Tangent = 27.9572
Length = 55.8702
Radius = 574.0000
External = 0.6804
Long Chord = 55.8481
Mid. Ord. = 0.6796
P.C. Station 56+58.09 N 13,809,952.2418 E 3,041,058.6284
P.T. Station 57+13.96 N 13,810,007.9459 E 3,041,062.6381
C.C. N 13,810,021.2564 E 3,040,488.7925
Back = N 6° 54' 20" E
Ahead = N 1° 19' 44" E
Chord Bear = N 4° 07' 02" E

Course from PT CENTER2009 to PC CENTER2010 N 1° 19' 44" E Dist 150.6124

Curve Data

Curve CENTER2010
P.I. Station 58+95.66 N 13,810,189.5976 E 3,041,066.8516
Delta = 7° 54' 14" (RT)
Degree = 12° 43' 57"
Tangent = 31.0882
Length = 62.0778
Radius = 450.0000
External = 1.0726
Long Chord = 62.0286
Mid. Ord. = 1.0700
P.C. Station 58+64.57 N 13,810,158.5178 E 3,041,066.1307
P.T. Station 59+26.65 N 13,810,220.2831 E 3,041,071.8396
C.C. N 13,810,148.0827 E 3,041,516.0097
Back = N 1° 19' 44" E
Ahead = N 9° 13' 58" E
Chord Bear = N 5° 16' 51" E

Course from PT CENTER2010 to PC CENTER2011 S 9° 13' 58" W Dist 0.0543

Curve Data

Curve CENTER2011
P.I. Station 59+84.28 N 13,810,277.0583 E 3,041,081.0684
Delta = 11° 27' 21" (LT)
Degree = 9° 58' 55"
Tangent = 57.5747
Length = 114.7655
Radius = 574.0000
External = 2.8803
Long Chord = 114.5744
Mid. Ord. = 2.8659
P.C. Station 59+26.70 N 13,810,220.2295 E 3,041,071.8308
P.T. Station 60+41.47 N 13,810,334.5896 E 3,041,078.8352
C.C. N 13,810,312.3252 E 3,040,505.2672
Back = N 9° 13' 58" E
Ahead = N 2° 13' 23" W
Chord Bear = N 3° 30' 18" E

Course from PT CENTER2011 to CENTER2012 N 2° 13' 23" W Dist 187.2320

Point CENTER2012 N 13,810,521.6807 E 3,041,071.5728 Sta 62+28.70

Ending chain HALN_BELKNAP_RT description

TOWNE WEST BOULEVARD BASELINE

Chain HALN_TOWNEW contains:
CENTER0101 CENTER0102

Beginning chain HALN_TOWNEW description

Point CENTER0101 N 13,806,842.9416 E 3,040,888.0834 Sta 7+99.98

Course from CENTER0101 to CENTER0102 N 86° 31' 45" E Dist 250.0152

Point CENTER0102 N 13,806,858.0776 E 3,041,137.6400 Sta 10+50.00

Ending chain HALN_TOWNEW description

TOWNE WEST BOULEVARD BASELINE LEFT

Chain HALN_TOWNEW_L contains:
CENTER3000 CENTER3001 CENTER3002

Beginning chain HALN_TOWNEW_L description

Point CENTER3000 N 13,806,866.7073 E 3,040,986.8823 Sta 9+00.00

Course from CENTER3000 to CENTER3001 N 86° 35' 31" E Dist 75.0000

Point CENTER3001 N 13,806,871.1660 E 3,041,061.7497 Sta 9+75.00

Course from CENTER3001 to CENTER3002 N 86° 35' 31" E Dist 175.0000

Point CENTER3002 N 13,806,881.5695 E 3,041,236.4401 Sta 11+50.00

Ending chain HALN_TOWNEW_L description

TOWNE WEST BOULEVARD BASELINE RIGHT

Chain HALN_TOWNEW_R contains:
CENTER3100 CENTER3101 CENTER3102

Beginning chain HALN_TOWNEW_R description

Point CENTER3100 N 13,806,830.7395 E 3,040,988.9791 Sta 9+00.00

Course from CENTER3100 to CENTER3101 N 86° 38' 06" E Dist 75.0000

Point CENTER3101 N 13,806,835.1416 E 3,041,063.8498 Sta 9+75.00

Course from CENTER3101 to CENTER3102 N 86° 38' 06" E Dist 175.0000

Point CENTER3102 N 13,806,845.4132 E 3,041,238.5481 Sta 11+50.00

Ending chain HALN_TOWNEW_R description

CLARK TOWNE ROAD BASELINE

Chain HALN_CLARKT contains:
CENTER0201 CENTER0202

Beginning chain HALN_CLARKT description

Point CENTER0201 N 13,807,932.7714 E 3,040,741.4198 Sta 7+17.00

Course from CENTER0201 to CENTER0202 N 86° 28' 26" E Dist 333.0032

Point CENTER0202 N 13,807,953.2522 E 3,041,073.7926 Sta 10+50.00

Ending chain HALN_CLARKT description

CLARK TOWNE ROAD BASELINE LEFT

Chain HALN_CLARKT_L contains:
CENTER4000 CUR HALN_CLARKT_L1 CENTER4001

Beginning chain HALN_CLARKT_L description

Point CENTER4000 N 13,807,957.2560 E 3,040,948.8073 Sta 9+25.00

Course from CENTER4000 to PC HALN_CLARKT_L1 N 77° 58' 47" E Dist 27.9528

Curve Data

Curve HALN_CLARKT_L1
P.I. Station 9+71.19 N 13,807,966.8757 E 3,040,993.9859
Delta = 8° 41' 02" (RT)
Degree = 23° 51' 07"
Tangent = 18.2385
Length = 36.4071
Radius = 240.2143
External = 0.6914
Long Chord = 36.3723
Mid. Ord. = 0.6894
P.C. Station 9+52.95 N 13,807,963.0774 E 3,040,976.1473
P.T. Station 9+89.36 N 13,807,967.9372 E 3,041,012.1934
C.C. N 13,807,728.1301 E 3,041,026.1739
Back = N 77° 58' 47" E
Ahead = N 86° 39' 49" E
Chord Bear = N 82° 19' 18" E



14-Nov-2023

Table with 4 columns: NO, DATE, REVISION, APPROVED

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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

COORDINATE GEOMETRY

Table with 5 columns: CNTY PROJ, RPS PROJ, DATE, SCALE, SHEET NO. Includes values for 17-2-11, 008169, 2023, and SHEET 3 OF 10.

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Course from PT HALN_CLARKT_L1 to CENTER4001 N 86° 39' 49" E Dist 160.6401
 Point CENTER4001 N 13,807,977.2865 E 3,041,172.5612 Sta 11+50.00
 =====
 Ending chain HALN_CLARKT_L description

CLARK TOWNE ROAD BASELINE RIGHT

Chain HALN_CLARKT_R contains:
 CENTER4100 CUR HALN_CLARKT_R1 CENTER4101
 Beginning chain HALN_CLARKT_R description
 =====
 Point CENTER4100 N 13,807,934.4302 E 3,040,950.0627 Sta 9+25.00
 Course from CENTER4100 to PC HALN_CLARKT_R1 S 85° 31' 58" E Dist 31.0583

	Curve Data			

Curve HALN_CLARKT_R1				
P.I. Station	9+72.44	N	13,807,930.7350	E 3,040,997.3609
Delta	= 7° 48' 13"	(LT)		
Degree	= 23° 51' 07"			
Tangent	= 16.3840			
Length	= 32.7173			
Radius	= 240.2143			
External	= 0.5581			
Long Chord	= 32.6920			
Mid. Ord.	= 0.5568			
P.C. Station	9+56.06	N	13,807,932.0111	E 3,040,981.0267
P.T. Station	9+88.78	N	13,807,931.6885	E 3,041,013.7170
C.C.		N	13,808,171.4956	E 3,040,999.7366
Back	= S 85° 31' 58"	E		
Ahead	= N 86° 39' 49"	E		
Chord Bear	= S 89° 26' 05"	E		

Course from PT HALN_CLARKT_R1 to CENTER4101 N 86° 39' 49" E Dist 161.2287
 Point CENTER4101 N 13,807,941.0720 E 3,041,174.6725 Sta 11+50.00
 =====
 Ending chain HALN_CLARKT_R description

OLD RICHMOND ROAD (WEST) BASELINE

Chain HALN_ORICH_W contains:
 CENTER0301 CENTER0302
 Beginning chain HALN_ORICH_W description
 =====
 Point CENTER0301 N 13,809,060.3231 E 3,040,655.9085 Sta 6+97.25
 Course from CENTER0301 to CENTER0302 N 87° 05' 47" E Dist 352.7543
 Point CENTER0302 N 13,809,078.1915 E 3,041,008.2099 Sta 10+50.00
 =====
 Ending chain HALN_ORICH_W description

OAK BEND FOREST DRIVE BASELINE

Chain HALN_OAKBEND contains:
 CENTER0401 CENTER0402
 Beginning chain HALN_OAKBEND description
 =====
 Point CENTER0401 N 13,810,168.5550 E 3,040,911.9618 Sta 9+36.28
 Course from CENTER0401 to CENTER0402 N 86° 41' 10" E Dist 113.7193
 Point CENTER0402 N 13,810,175.1287 E 3,041,025.4910 Sta 10+50.00
 =====
 Ending chain HALN_OAKBEND description

OLD RICHMOND ROAD (EAST) BASELINE

Chain HALN_ORICH_E contains:
 CENTER0501 CENTER0502
 Beginning chain HALN_ORICH_E description
 =====
 Point CENTER0501 N 13,810,366.7086 E 3,041,029.9662 Sta 10+50.00
 Course from CENTER0501 to CENTER0502 N 87° 48' 27" E Dist 158.3198
 Point CENTER0502 N 13,810,372.7657 E 3,041,188.1700 Sta 12+08.32
 =====
 Ending chain HALN_ORICH_E description

DRIVEWAY HORIZONTAL ALIGNMENTS

DRIVEWAY (LEFT) STA 14+43

Chain DRIVELT1443 contains:
 DRIVE0010 DRIVE0011
 Beginning chain DRIVELT1443 description
 =====
 Point DRIVE0010 N 13,805,738.4102 E 3,041,102.7455 Sta 1+50.00
 Course from DRIVE0010 to DRIVE0011 N 86° 39' 48.60" E Dist 118.5000
 Point DRIVE0011 N 13,805,745.3069 E 3,041,221.0446 Sta 2+68.50
 =====
 Ending chain DRIVELT1443 description

DRIVEWAY (LEFT) STA 14+88

Chain DRIVELT1488 contains:
 DRIVE0020 DRIVE0021
 Beginning chain DRIVELT1488 description
 =====
 Point DRIVE0020 N 13,805,783.7669 E 3,041,100.1012 Sta 1+50.00
 Course from DRIVE0020 to DRIVE0021 N 86° 39' 48.60" E Dist 118.5000
 Point DRIVE0021 N 13,805,790.6636 E 3,041,218.4004 Sta 2+68.50
 =====
 Ending chain DRIVELT1488 description

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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
 W BELLFORT BLVD TO OAK BEND FOREST DR

**COORDINATE
 GEOMETRY**

CNTY PROJ *	RPS PROJ *	DATE	SCALE	SHEET NO
17-2-11	008169	2023		19
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RPS	RPS	RPS	RPS	

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DRIVEWAY (LEFT) STA 33+78

Chain DRIVELT3378 contains:
DRIVE0030 DRIVE0031

Beginning chain DRIVELT3378 description

Point DRIVE0030 N 13,807,670.4543 E 3,040,990.1096 Sta 1+50.00

Course from DRIVE0030 to DRIVE0031 N 86° 39' 48.60" E Dist 118.5000

Point DRIVE0031 N 13,807,677.3510 E 3,041,108.4087 Sta 2+68.50

Ending chain DRIVELT3378 description

DRIVEWAY (LEFT) STA 39+65

Chain DRIVELT3965 contains:
DRIVE0040 CUR DRIVELT39651 CUR DRIVELT39652 DRIVE0041

Beginning chain DRIVELT3965 description

Point DRIVE0040 N 13,808,259.5736 E 3,040,955.8326 Sta 1+50.00

Course from DRIVE0040 to PC DRIVELT39651 N 87° 42' 05.05" E Dist 3.2621

Curve Data

Curve DRIVELT39651
P.I. Station 1+56.25 N 13,808,259.8244 E 3,040,962.0803
Delta = 1° 42' 48.12" (RT)
Degree = 28° 38' 52.40"
Tangent = 2.9906
Length = 5.9808
Radius = 200.0000
External = 0.0224
Long Chord = 5.9806
Mid. Ord. = 0.0224
P.C. Station 1+53.26 N 13,808,259.7045 E 3,040,959.0921
P.T. Station 1+59.24 N 13,808,259.8549 E 3,040,965.0708
C.C. N 13,808,059.8654 E 3,040,967.1136
Back = N 87° 42' 05.02" E
Ahead = N 89° 24' 53.14" E
Chord Bear = N 88° 33' 29.08" E

Course from PT DRIVELT39651 to PC DRIVELT39652 N 89° 24' 53.14" E Dist 52.2001

Curve Data

Curve DRIVELT39652
P.I. Station 2+16.25 N 13,808,260.4372 E 3,041,022.0707
Delta = 2° 45' 04.54" (LT)
Degree = 28° 38' 52.40"
Tangent = 4.8028
Length = 9.6037
Radius = 200.0000
External = 0.0577
Long Chord = 9.6028
Mid. Ord. = 0.0576
P.C. Station 2+11.44 N 13,808,260.3881 E 3,041,017.2682
P.T. Station 2+21.05 N 13,808,260.7167 E 3,041,026.8653
C.C. N 13,808,460.3777 E 3,041,015.2253
Back = N 89° 24' 53.14" E
Ahead = N 86° 39' 48.60" E
Chord Bear = N 88° 02' 20.87" E

Course from PT DRIVELT39652 to DRIVE0041 N 86° 39' 48.60" E Dist 47.4533

Point DRIVE0041 N 13,808,263.4785 E 3,041,074.2382 Sta 2+68.50

Ending chain DRIVELT3965 description

DRIVEWAY (LEFT) STA 41+04

Chain DRIVELT4104 contains:
DRIVE0050 DRIVE0051

Beginning chain DRIVELT4104 description

Point DRIVE0050 N 13,808,395.3298 E 3,040,947.8502 Sta 1+50.00

Course from DRIVE0050 to DRIVE0051 N 86° 39' 48.60" E Dist 118.5000

Point DRIVE0051 N 13,808,402.2265 E 3,041,066.1493 Sta 2+68.50

Ending chain DRIVELT4104 description

DRIVEWAY (LEFT) STA 42+88

Chain DRIVELT4288 contains:
DRIVE0060 DRIVE0061

Beginning chain DRIVELT4288 description

Point DRIVE0060 N 13,808,578.6439 E 3,040,937.1632 Sta 1+50.00

Course from DRIVE0060 to DRIVE0061 N 86° 39' 48.60" E Dist 118.5000

Point DRIVE0061 N 13,808,585.5406 E 3,041,055.4623 Sta 2+68.50

Ending chain DRIVELT4288 description

DRIVEWAY (LEFT) STA 44+33

Chain DRIVELT4433 contains:
DRIVE0070 DRIVE0071

Beginning chain DRIVELT4433 description

Point DRIVE0070 N 13,808,723.4560 E 3,040,928.7208 Sta 1+50.00

Course from DRIVE0070 to DRIVE0071 N 86° 39' 48.60" E Dist 118.5000

Point DRIVE0071 N 13,808,730.3527 E 3,041,047.0199 Sta 2+68.50

Ending chain DRIVELT4433 description

DRIVEWAY (LEFT) STA 44+91

Chain DRIVELT4491 contains:
DRIVE0080 DRIVE0081

Beginning chain DRIVELT4491 description

Point DRIVE0080 N 13,808,781.8601 E 3,040,925.3159 Sta 1+50.00

Course from DRIVE0080 to DRIVE0081 N 86° 39' 48.60" E Dist 118.5000

Point DRIVE0081 N 13,808,788.7568 E 3,041,043.6151 Sta 2+68.50

Ending chain DRIVELT4491 description

DRIVEWAY (LEFT) STA 49+48

Chain DRIVELT4948 contains:
DRIVE0090 CUR DRIVELT49481 DRIVE0091

Beginning chain DRIVELT4948 description

Point DRIVE0090 N 13,809,240.8222 E 3,040,903.8997 Sta 1+50.00

Course from DRIVE0090 to PC DRIVELT49481 N 87° 05' 47.36" E Dist 62.4670

Curve Data

Curve DRIVELT49481
P.I. Station 2+14.09 N 13,809,244.0685 E 3,040,967.9056
Delta = 3° 42' 51.13" (RT)
Degree = 114° 35' 29.61"
Tangent = 1.6212
Length = 3.2413
Radius = 50.0000
External = 0.0263
Long Chord = 3.2407
Mid. Ord. = 0.0263
P.C. Station 2+12.47 N 13,809,243.9864 E 3,040,966.2865
P.T. Station 2+15.71 N 13,809,244.0456 E 3,040,969.5266
C.C. N 13,809,194.0506 E 3,040,968.8192
Back = N 87° 05' 47.36" E
Ahead = S 89° 11' 21.51" E
Chord Bear = N 88° 57' 12.92" E

Course from PT DRIVELT49481 to DRIVE0091 S 89° 11' 21.51" E Dist 34.2917

Point DRIVE0091 N 13,809,243.5604 E 3,041,003.8149 Sta 2+50.00

Ending chain DRIVELT4948 description

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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

COORDINATE GEOMETRY

Table with 5 columns: CNTY PROJ, RPS PROJ, DATE, SCALE, SHEET NO
17-2-11 008169 2023
DESIGNED BY RPS DRAWN BY RPS CHECKED BY RPS VERIFIED BY RPS SHEET 5 OF 10 20

DRIVEWAY (LEFT) STA 52+40

Chain DRIVELT5240 contains:
DRIVE0100 DRIVE0101 DRIVE0102

Beginning chain DRIVELT5240 description

```

Point DRIVE0100      N 13,809,537.3293 E   3,040,910.5667 Sta   1+50.00
Course from DRIVE0100 to DRIVE0101 S 88° 35' 07.53" E Dist 52.3027
Point DRIVE0101      N 13,809,536.0381 E   3,040,962.8535 Sta   2+02.30
Course from DRIVE0101 to DRIVE0102 S 89° 07' 10.73" E Dist 47.6973
Point DRIVE0102      N 13,809,535.3053 E   3,041,010.5451 Sta   2+50.00
=====
Ending chain DRIVELT5240 description
    
```

DRIVEWAY (RIGHT) STA 16+13

Chain DRIVERT1613 contains:
DRIVE1000 CUR DRIVERT16131 DRIVE1001

Beginning chain DRIVERT1613 description

```

Point DRIVE1000      N 13,805,910.8837 E   3,041,142.7754 Sta   2+00.00
Course from DRIVE1000 to PC DRIVERT16131 N 86° 39' 48.60" E Dist 78.8638
    
```

Curve Data

```

Curve DRIVERT16131
P.I. Station      2+82.47 N   13,805,915.6832 E   3,041,225.1007
Delta             =      1° 22' 31.89" (RT)
Degree            =      19° 05' 54.94"
Tangent           =      3.6013
Length            =      7.2022
Radius            =     300.0000
External          =      0.0216
Long Chord        =      7.2021
Mid. Ord.         =      0.0216
P.C. Station      2+78.86 N   13,805,915.4736 E   3,041,221.5055
P.T. Station      2+86.07 N   13,805,915.8064 E   3,041,228.6999
C.C.              N   13,805,615.9821 E   3,041,238.9655
Back              = N 86° 39' 48.60" E
Ahead             = N 88° 02' 20.48" E
Chord Bear        = N 87° 21' 04.54" E
    
```

```

Course from PT DRIVERT16131 to DRIVE1001 N 88° 02' 20.48" E Dist 63.9340
Point DRIVE1001      N 13,805,917.9942 E   3,041,292.5964 Sta   3+50.00
=====
Ending chain DRIVERT1613 description
    
```

DRIVEWAY (RIGHT) STA 18+36

Chain DRIVERT1836 contains:
DRIVE0210 DRIVE0211

Beginning chain DRIVERT1836 description

```

Point DRIVE0210      N 13,806,134.0148 E   3,041,129.7671 Sta   2+00.00
Course from DRIVE0210 to DRIVE0211 N 86° 39' 48.60" E Dist 150.0000
Point DRIVE0211      N 13,806,142.7448 E   3,041,279.5128 Sta   3+50.00
=====
Ending chain DRIVERT1836 description
    
```

DRIVEWAY (RIGHT) STA 20+11

Chain DRIVERT2011 contains:
DRIVE0220 DRIVE0221

Beginning chain DRIVERT2011 description

```

Point DRIVE0220      N 13,806,308.5724 E   3,041,119.5906 Sta   2+00.00
Course from DRIVE0220 to DRIVE0221 N 86° 39' 48.60" E Dist 150.0000
Point DRIVE0221      N 13,806,317.3024 E   3,041,269.3363 Sta   3+50.00
=====
Ending chain DRIVERT2011 description
    
```

DRIVEWAY (RIGHT) STA 20+66

Chain DRIVERT2066 contains:
DRIVE0230 DRIVE0231

Beginning chain DRIVERT2066 description

```

Point DRIVE0230      N 13,806,363.5620 E   3,041,116.3848 Sta   2+00.00
Course from DRIVE0230 to DRIVE0231 N 86° 39' 48.60" E Dist 131.2091
Point DRIVE0231      N 13,806,371.1983 E   3,041,247.3715 Sta   3+31.21
=====
Ending chain DRIVERT2066 description
    
```

DRIVEWAY (RIGHT) STA 22+52

Chain DRIVERT2252 contains:
DRIVE0240 DRIVE0241

Beginning chain DRIVERT2252 description

```

Point DRIVE0240      N 13,806,549.2534 E   3,041,105.5592 Sta   2+00.00
Course from DRIVE0240 to DRIVE0241 N 86° 39' 48.60" E Dist 150.0000
Point DRIVE0241      N 13,806,557.9834 E   3,041,255.3049 Sta   3+50.00
=====
Ending chain DRIVERT2252 description
    
```

DRIVEWAY (RIGHT) STA 23+89

Chain DRIVERT2389 contains:
DRIVE0250 DRIVE0251

Beginning chain DRIVERT2389 description

```

Point DRIVE0250      N 13,806,685.9108 E   3,041,097.5922 Sta   2+00.00
Course from DRIVE0250 to DRIVE0251 N 86° 39' 48.60" E Dist 123.8219
Point DRIVE0251      N 13,806,693.1173 E   3,041,221.2042 Sta   3+23.82
=====
Ending chain DRIVERT2389 description
    
```

DRIVEWAY (RIGHT) STA 27+43

Chain DRIVERT2743 contains:
DRIVE0260 DRIVE0261

Beginning chain DRIVERT2743 description

```

Point DRIVE0260      N 13,807,039.1310 E   3,041,076.9999 Sta   2+00.00
Course from DRIVE0260 to DRIVE0261 N 86° 39' 48.60" E Dist 138.4400
Point DRIVE0261      N 13,807,047.1882 E   3,041,215.2053 Sta   3+38.44
=====
Ending chain DRIVERT2743 description
    
```

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NO	DATE	REVISION	APPROVED

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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
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SHEET 6 OF 10

CNTY PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	2023		21
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RPS	RPS	RPS	RPS	

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DRIVEWAY (RIGHT) STA 29+26

Chain DRIVERT2926 contains:
DRIVE0270 DRIVE0271

Beginning chain DRIVERT2926 description

Point DRIVE0270 N 13,807,221.8084 E 3,041,066.3500 Sta 2+00.00

Course from DRIVE0270 to DRIVE0271 N 86° 39' 48.60" E Dist 146.4000

Point DRIVE0271 N 13,807,230.3288 E 3,041,212.5019 Sta 3+46.40

Ending chain DRIVERT2926 description

DRIVEWAY (RIGHT) STA 33+47

Beginning chain DRIVERT3347 description

Point DRIVE0280 N 13,807,642.8513 E 3,041,041.8037 Sta 2+00.00

Course from DRIVE0280 to DRIVE0281 N 86° 39' 48.60" E Dist 149.3731

Point DRIVE0281 N 13,807,651.5449 E 3,041,190.9236 Sta 3+49.37

Ending chain DRIVERT3347 description

DRIVEWAY (RIGHT) STA 34+23

Chain DRIVERT3423 contains:
DRIVE0290 DRIVE0291

Beginning chain DRIVERT3423 description

Point DRIVE0290 N 13,807,718.7755 E 3,041,037.3774 Sta 2+00.00

Course from DRIVE0290 to DRIVE0291 N 86° 39' 48.60" E Dist 142.6302

Point DRIVE0291 N 13,807,727.0766 E 3,041,179.7658 Sta 3+42.63

Ending chain DRIVERT3423 description

DRIVEWAY (RIGHT) STA 36+07

Chain DRIVERT3607 contains:
DRIVE0300 DRIVE0301

Beginning chain DRIVERT3607 description

Point DRIVE0300 N 13,807,902.4732 E 3,041,026.6680 Sta 2+00.00

Course from DRIVE0300 to DRIVE0301 N 86° 39' 48.60" E Dist 131.1717

Point DRIVE0301 N 13,807,910.1073 E 3,041,157.6174 Sta 3+31.17

Ending chain DRIVERT3607 description

DRIVEWAY (RIGHT) STA 37+33

Chain DRIVERT3733 contains:
DRIVE0310 DRIVE0311

Beginning chain DRIVERT3733 description

Point DRIVE0310 N 13,808,028.0130 E 3,041,019.3492 Sta 2+00.00

Course from DRIVE0310 to DRIVE0311 N 86° 39' 48.60" E Dist 112.9861

Point DRIVE0311 N 13,808,034.5888 E 3,041,132.1438 Sta 3+12.99

Ending chain DRIVERT3733 description

DRIVEWAY (RIGHT) STA 38+83

Chain DRIVERT3883 contains:
DRIVE0320 DRIVE0321

Beginning chain DRIVERT3883 description

Point DRIVE0320 N 13,808,177.7250 E 3,041,010.6212 Sta 2+00.00

Course from DRIVE0320 to DRIVE0321 N 86° 39' 48.60" E Dist 128.1256

Point DRIVE0321 N 13,808,185.1819 E 3,041,138.5296 Sta 3+28.13

Ending chain DRIVERT3883 description

DRIVEWAY (RIGHT) STA 40+93

Chain DRIVERT4093 contains:
DRIVE2000 DRIVE2001 DRIVE2002

Beginning chain DRIVERT4093 description

Point DRIVE2000 N 13,808,386.9988 E 3,040,998.4208 Sta 2+00.00

Course from DRIVE2000 to DRIVE2001 N 86° 39' 48.60" E Dist 84.0860

Point DRIVE2001 N 13,808,391.8926 E 3,041,082.3642 Sta 2+84.09

Course from DRIVE2001 to DRIVE2002 N 87° 26' 31.13" E Dist 57.3008

Point DRIVE2002 N 13,808,394.4500 E 3,041,139.6080 Sta 3+41.39

Ending chain DRIVERT4093 description

DRIVEWAY (RIGHT) STA 42+16

Chain DRIVERT4216 contains:
DRIVE0340 DRIVE0341

Beginning chain DRIVERT4216 description

Point DRIVE0340 N 13,808,510.0842 E 3,040,991.2450 Sta 2+00.00

Course from DRIVE0340 to DRIVE0341 N 86° 39' 48.60" E Dist 143.2619

Point DRIVE0341 N 13,808,518.4220 E 3,041,134.2641 Sta 3+43.26

Ending chain DRIVERT4216 description

DRIVEWAY (RIGHT) STA 46+05

Chain DRIVERT4605 contains:
DRIVE0350 DRIVE0351

Beginning chain DRIVERT4605 description

Point DRIVE0350 N 13,808,897.9093 E 3,040,968.6353 Sta 2+00.00

Course from DRIVE0350 to DRIVE0351 N 86° 39' 48.60" E Dist 129.9063

Point DRIVE0351 N 13,808,905.4699 E 3,041,098.3214 Sta 3+29.91

Ending chain DRIVERT4605 description

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14-Nov-2023

NO	DATE	REVISION	APPROVED

RPS Texas PE Firm Reg. #F-929
 575 N. Dalry Ashford, Suite 700, Houston, Texas 77079
 T +1 281 589 7257 E us@infrastructure@rpsgroup.com

FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

COORDINATE GEOMETRY

SHEET 7 OF 10

CNTY	PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	2023			22
DESIGNED BY	RPS	DRAWN BY	RPS	CHECKED BY	RPS
				VERIFIED BY	RPS

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DRIVEWAY (RIGHT) STA 47+93

Chain DRIVERT4793 contains:
DRIVE0360 DRIVE0361

Beginning chain DRIVERT4793 description

Point DRIVE0360 N 13,809,086.4565 E 3,040,957.6432 Sta 2+00.00

Course from DRIVE0360 to DRIVE0361 N 86° 39' 48.60" E Dist 155.3902

Point DRIVE0361 N 13,809,095.5002 E 3,041,112.7700 Sta 3+55.39

Ending chain DRIVERT4793 description

DRIVEWAY (RIGHT) STA 51+30

Chain DRIVERT5130 contains:
DRIVE0370 DRIVE0371

Beginning chain DRIVERT5130 description

Point DRIVE0370 N 13,809,429.3272 E 3,040,958.1009 Sta 2+00.00

Course from DRIVE0370 to DRIVE0371 S 86° 13' 47.89" E Dist 161.5160

Point DRIVE0371 N 13,809,418.7072 E 3,041,119.2674 Sta 3+61.52

Ending chain DRIVERT5130 description

DRIVEWAY (RIGHT) STA 57+32

Chain DRIVERT5732 contains:
DRIVE0380 CUR DRIVERT57321 DRIVE0381

Beginning chain DRIVERT5732 description

Point DRIVE0380 N 13,810,028.8448 E 3,040,972.0602 Sta 2+00.00

Course from DRIVE0380 to PC DRIVERT57321 S 88° 40' 16.48" E Dist 110.0719

Curve Data

Curve DRIVERT57321
P.I. Station = 3+11.98 N 13,810,026.2481 E 3,041,084.0119
Delta = 10° 54' 34.30" (RT)
Degree = 286° 28' 44.03"
Tangent = 1.9098
Length = 3.8081
Radius = 20.0000
External = 0.0910
Long Chord = 3.8024
Mid. Ord. = 0.0906
P.C. Station = 3+10.07 N 13,810,026.2924 E 3,041,082.1026
P.T. Station = 3+13.88 N 13,810,025.8433 E 3,041,085.8783
C.C. = N 13,810,006.2978 E 3,041,081.6388
Back = S 88° 40' 16.48" E
Ahead = S 77° 45' 42.18" E
Chord Bear = S 83° 12' 59.33" E

Course from PT DRIVERT57321 to DRIVE0381 S 77° 45' 42.18" E Dist 32.8989

Point DRIVE0381 N 13,810,018.8694 E 3,041,118.0296 Sta 3+46.78

Ending chain DRIVERT5732 description

PEDESTRIAN TRAIL HORIZONTAL ALIGNMENTS

PEDESTRIAN TRAIL 01

Chain WTRAIL contains:
WTRAIL1 CUR WTRAIL_3 CUR WTRAIL_6 WTRAIL9 WTRAIL10

Beginning chain WTRAIL description
Feature: Geom_Secondary

Point WTRAIL1 N 13,809,924.0467 E 3,040,983.5802 Sta 20+50.00

Course from WTRAIL1 to PC WTRAIL_3 N 87° 17' 36.26" W Dist 13.4958

Curve Data

Curve WTRAIL_3
P.I. Station = 20+66.57 N 13,809,924.8291 E 3,040,967.0299
Delta = 91° 22' 40.22" (LT)
Degree = 1909° 51' 33.54"
Tangent = 3.0730
Length = 4.7845
Radius = 3.0000
External = 1.2946
Long Chord = 4.2933
Mid. Ord. = 0.9043
P.C. Station = 20+63.50 N 13,809,924.6840 E 3,040,970.0995
P.T. Station = 20+68.28 N 13,809,921.7569 E 3,040,966.9587
C.C. = N 13,809,921.6874 E 3,040,969.9579
Back = N 87° 17' 36.26" W
Ahead = S 1° 19' 43.52" W
Chord Bear = S 47° 01' 03.63" W

Course from PT WTRAIL_3 to PC WTRAIL_6 S 1° 19' 43.52" W Dist 112.7924

Curve Data

Curve WTRAIL_6
P.I. Station = 21+92.82 N 13,809,797.2543 E 3,040,964.0708
Delta = 86° 25' 35.09" (RT)
Degree = 458° 21' 58.45"
Tangent = 11.7437
Length = 18.8553
Radius = 12.5000
External = 4.6512
Long Chord = 17.1179
Mid. Ord. = 3.3899
P.C. Station = 21+81.07 N 13,809,808.9949 E 3,040,964.3431
P.T. Station = 21+99.93 N 13,809,796.7943 E 3,040,952.3361
C.C. = N 13,809,809.2847 E 3,040,951.8465
Back = S 1° 19' 43.52" W
Ahead = S 87° 45' 18.61" W
Chord Bear = S 44° 32' 31.06" W

Course from PT WTRAIL_6 to WTRAIL9 S 87° 45' 18.61" W Dist 9.1888

Point WTRAIL9 N 13,809,796.4344 E 3,040,943.1544 Sta 22+09.12

Course from WTRAIL9 to WTRAIL10 S 87° 44' 09.61" W Dist 134.9572

Point WTRAIL10 N 13,809,791.1031 E 3,040,808.3025 Sta 23+44.07

Ending chain WTRAIL description

PEDESTRIAN TRAIL 02

Chain ETRAIL contains:
ETRAIL1 CUR ETRAIL_3 CUR ETRAIL_6 ETRAIL8

Beginning chain ETRAIL description
Feature: Geom_Secondary

Point ETRAIL1 N 13,809,951.2338 E 3,041,058.5075 Sta 30+50.00

Course from ETRAIL1 to PC ETRAIL_3 S 83° 13' 25.08" E Dist 10.9938



14-Nov-2023

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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

COORDINATE GEOMETRY

SHEET 8 OF 10

CNTY PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	2023		23
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RPS	RPS	RPS	RPS	

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Curve Data

urve ETRAIL_3
.I. Station = 30+63.72 N 13,809,949.6148 E 3,041,072.1329
Delta = 84° 33' 08.60" (RT)
Degree = 1909° 51' 33.54"
Tangent = 2.7275
Length = 4.4272
Radius = 3.0000
External = 1.0545
Long Chord = 4.0362
Mid. Ord. = 0.7803
.P.C. Station = 30+60.99 N 13,809,949.9366 E 3,041,069.4244
.T. Station = 30+65.42 N 13,809,946.8880 E 3,041,072.0696
.C.C. Station = 30+65.42 N 13,809,946.9576 E 3,041,069.0705
Back = S 83° 13' 25.08" E
Ahead = S 1° 19' 43.52" W
Chord Bear = S 40° 56' 50.78" E

Course from PT ETRAIL_3 to PC ETRAIL_6 S 1° 19' 43.52" W Dist 132.3598

Curve Data

urve ETRAIL_6
.I. Station = 32+11.09 N 13,809,801.2624 E 3,041,068.6918
Delta = 93° 34' 24.91" (LT)
Degree = 458° 21' 58.45"
Tangent = 13.3050
Length = 20.4146
Radius = 12.5000
External = 5.7558
Long Chord = 18.2203
Mid. Ord. = 3.9411
.P.C. Station = 31+97.78 N 13,809,814.5638 E 3,041,069.0003
.T. Station = 32+18.20 N 13,809,801.7835 E 3,041,081.9866
.C.C. Station = 32+18.20 N 13,809,814.2739 E 3,041,081.4970
Back = S 1° 19' 43.52" W
Ahead = N 87° 45' 18.61" E
Chord Bear = S 45° 27' 28.94" E

Course from PT ETRAIL_6 to ETRAIL8 N 87° 45' 18.61" E Dist 152.2223

oint ETRAIL8 N 13,809,807.7460 E 3,041,234.0921 Sta 33+70.42

ending chain ETRAIL description

EDESTRIAN TRAIL 03

Chain HALN_PEDTRL03 contains:
PEDTRL0300 CUR HALN_PEDTRL031 CUR HALN_PEDTRL032 PEDTRL0301 CUR HALN_PEDTRL033-
CUR HALN_PEDTRL034 PEDTRL0302 CUR HALN_PEDTRL035 PEDTRL0303

eginning chain HALN_PEDTRL03 description

oint PEDTRL0300 N 13,809,792.4428 E 3,040,842.1883 Sta 40+50.00

Course from PEDTRL0300 to PC HALN_PEDTRL031 S 2° 15' 50.51" E Dist 6.1758

Curve Data

urve HALN_PEDTRL031
.I. Station = 40+66.18 N 13,809,776.2796 E 3,040,842.8273
Delta = 89° 59' 59.88" (LT)
Degree = 572° 57' 28.06"
Tangent = 10.0000
Length = 15.7080
Radius = 10.0000
External = 4.1421
Long Chord = 14.1421
Mid. Ord. = 2.9289
.P.C. Station = 40+56.18 N 13,809,786.2718 E 3,040,842.4322
.T. Station = 40+71.88 N 13,809,776.6746 E 3,040,852.8195
.C.C. Station = 40+71.88 N 13,809,786.6668 E 3,040,852.4244
Back = S 2° 15' 50.51" E
Ahead = N 87° 44' 09.61" E
Chord Bear = S 47° 15' 50.45" E

Course from PT HALN_PEDTRL031 to PC HALN_PEDTRL032 N 87° 44' 09.61" E Dist 41.6918

Curve Data

Curve HALN_PEDTRL032
P.I. Station = 41+19.54 N 13,809,778.5572 E 3,040,900.4371
Delta = 13° 36' 07.73" (RT)
Degree = 114° 35' 29.61"
Tangent = 5.9631
Length = 11.8701
Radius = 50.0000
External = 0.3543
Long Chord = 11.8423
Mid. Ord. = 0.3518
.P.C. Station = 41+13.58 N 13,809,778.3216 E 3,040,894.4787
.P.T. Station = 41+25.45 N 13,809,777.3848 E 3,040,906.2838
.C.C. Station = 41+25.45 N 13,809,728.3606 E 3,040,896.4539
Back = N 87° 44' 09.61" E
Ahead = S 78° 39' 42.66" E
Chord Bear = S 85° 27' 46.53" E

Course from PT HALN_PEDTRL032 to PEDTRL0301 S 78° 39' 42.65" E Dist 21.2949

Point PEDTRL0301 N 13,809,773.1983 E 3,040,927.1631 Sta 41+46.74

Course from PEDTRL0301 to PC HALN_PEDTRL033 S 78° 39' 42.66" E Dist 20.0000

Curve Data

Curve HALN_PEDTRL033
P.I. Station = 41+69.28 N 13,809,768.7665 E 3,040,949.2656
Delta = 10° 01' 14.03" (LT)
Degree = 197° 34' 17.95"
Tangent = 2.5424
Length = 5.0719
Radius = 29.0000
External = 0.1112
Long Chord = 5.0654
Mid. Ord. = 0.1108
.P.C. Station = 41+66.74 N 13,809,769.2663 E 3,040,946.7728
.P.T. Station = 41+71.81 N 13,809,768.7080 E 3,040,951.8074
.C.C. Station = 41+71.81 N 13,809,797.7003 E 3,040,952.4742
Back = S 78° 39' 42.66" E
Ahead = S 88° 40' 56.69" E
Chord Bear = S 83° 40' 19.68" E

Course from PT HALN_PEDTRL033 to PC HALN_PEDTRL034 S 88° 40' 56.69" E Dist 128.4114

Curve Data

Curve HALN_PEDTRL034
P.I. Station = 43+03.27 N 13,809,765.6853 E 3,041,083.2268
Delta = 11° 58' 45.97" (LT)
Degree = 197° 34' 17.95"
Tangent = 3.0428
Length = 6.0633
Radius = 29.0000
External = 0.1592
Long Chord = 6.0523
Mid. Ord. = 0.1583
.P.C. Station = 43+00.22 N 13,809,765.7553 E 3,041,080.1848
.P.T. Station = 43+06.29 N 13,809,766.2483 E 3,041,086.2170
.C.C. Station = 43+06.29 N 13,809,794.7476 E 3,041,080.8516
Back = S 88° 40' 56.69" E
Ahead = N 79° 20' 17.34" E
Chord Bear = N 85° 19' 40.32" E

Course from PT HALN_PEDTRL034 to PEDTRL0302 N 79° 20' 17.33" E Dist 20.0000

Point PEDTRL0302 N 13,809,769.9485 E 3,041,105.8717 Sta 43+26.29

Course from PEDTRL0302 to PC HALN_PEDTRL035 N 79° 20' 17.34" E Dist 91.5083



14-Nov-2023

Table with 3 columns: NO, DATE, REVISION, APPROVED

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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

COORDINATE GEOMETRY

Table with 5 columns: CNTY PROJ, RPS PROJ, DATE, SCALE, SHEET NO. Includes sheet number 24.

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Curve Data

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Curve HALN_PEDTRL035
P.I. Station      44+26.42  N   13,809,788.4752  E   3,041,204.2804
Delta            =      81° 34' 58.73" (LT)
Degree           =      572° 57' 28.06"
Tangent          =              8.6292
Length           =             14.2389
Radius           =             10.0000
External         =              3.2084
Long Chord       =             13.0662
Mid. Ord.        =              2.4291
P.C. Station     44+17.80  N   13,809,786.8787  E   3,041,195.8002
P.T. Station     44+32.03  N   13,809,797.0977  E   3,041,203.9424
C.C.             = N 79° 20' 17.34" E   3,041,193.9501
Back             = N 2° 14' 41.39" W
Ahead            = N 38° 32' 47.97" E
Chord Bear

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Course from PT HALN_PEDTRL035 to PEDTRL0303 N 2° 14' 41.39" W Dist 9.4592

Point PEDTRL0303 N 13,809,806.5497 E 3,041,203.5719 Sta 44+41.49

=====
Ending chain HALN_PEDTRL03 description

KEEGAN BAYOU BASELINE

Chain HALN_KEEGAN contains:
KEEGAN001 KEEGAN002 KEEGAN003 KEEGAN004 KEEGAN005 KEEGAN006 KEEGAN007 KEEGAN008

Beginning chain HALN_KEEGAN description
=====

Point KEEGAN001 N 13,809,733.7671 E 3,041,355.1404 Sta 7+09.07

Course from KEEGAN001 to KEEGAN002 S 89° 26' 54.21" W Dist 93.3935

Point KEEGAN002 N 13,809,732.8680 E 3,041,261.7513 Sta 8+02.46

Course from KEEGAN002 to KEEGAN003 S 83° 09' 49.10" W Dist 99.3290

Point KEEGAN003 N 13,809,721.0444 E 3,041,163.1285 Sta 9+01.79

Course from KEEGAN003 to KEEGAN004 N 88° 14' 18.43" W Dist 148.2082

Point KEEGAN004 N 13,809,725.6004 E 3,041,014.9903 Sta 10+50.00

Course from KEEGAN004 to KEEGAN005 N 88° 14' 18.44" W Dist 6.6064

Point KEEGAN005 N 13,809,725.8034 E 3,041,008.3870 Sta 10+56.61

Course from KEEGAN005 to KEEGAN006 S 79° 02' 00.66" W Dist 126.6568

Point KEEGAN006 N 13,809,701.7089 E 3,040,884.0432 Sta 11+83.26

Course from KEEGAN006 to KEEGAN007 S 86° 20' 58.55" W Dist 92.7582

Point KEEGAN007 N 13,809,695.8031 E 3,040,791.4732 Sta 12+76.02

Course from KEEGAN007 to KEEGAN008 N 82° 40' 03.63" W Dist 82.8320

Point KEEGAN008 N 13,809,706.3745 E 3,040,709.3185 Sta 13+58.85

=====
Ending chain HALN_KEEGAN description



14-Nov-2023



Texas PE Firm Reg. #F-929

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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

**COORDINATE
GEOMETRY**

SHEET 10 OF 10

CNTY PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	2023		
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RPS	RPS	RPS	RPS	25


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TRAFFIC CONTROL SHEET	H00665003 HARRIS COUNTY SPEC USED SPEC NO. 665 WORK ZONE PAVEMENT MARKINGS 4" WHITE/SOLID (REMOVABLE) FURNISHED - APPLIED, REMOVED LF	H00665006 HARRIS COUNTY SPEC USED SPEC NO. 665 WORK ZONE PAVEMENT MARKINGS 4" YELLOW/SOLID (REMOVABLE) FURNISHED - APPLIED, REMOVED LF	H00665011 HARRIS COUNTY SPEC USED SPEC NO. 665 WORK ZONE PAVEMENT MARKINGS 24" WHITE/SOLID (REMOVABLE) FURNISHED - APPLIED, REMOVED LF	H00665016 HARRIS COUNTY SPEC USED SPEC NO. 665 WORK ZONE PAVEMENT MARKINGS (REFL) TYPE II A-A (REMOVABLE) FURNISHED - APPLIED, REMOVED EA	H00665017 HARRIS COUNTY SPEC USED SPEC NO. 665 WORK ZONE PAVEMENT MARKINGS (WHITE) BUTTON - (REMOVABLE) FURNISHED - APPLIED & REMOVED EA	H00665018 HARRIS COUNTY SPEC USED SPEC NO. 665 WORK ZONE PAVEMENT MARKINGS (YELLOW) BUTTON - (REMOVABLE) FURNISHED - APPLIED & REMOVED EA	H00665020 HARRIS COUNTY SPEC USED SPEC NO. 665 WORK ZONE PVMT MKGS - REMOV (W) (ARROW) EA	H00665021 HARRIS COUNTY SPEC USED SPEC NO. 665 WORK ZONE PVMT MKGS - REMOV (W) (WORD) EA	H00671003 HARRIS COUNTY SPEC USED SPEC NO. 671 TRAFFIC CONTROL - BARRICADES, BARRIERS, BARRELS, CONES, AND SIGNING MONTH	H00671005 HARRIS COUNTY SPEC USED SPEC NO. 671 FORT BEND PROJECT SIGN EA	H00671005 HARRIS COUNTY SPEC USED SPEC NO. 671 HARRIS COUNTY PROJECT SIGN EA	H00673001 HARRIS COUNTY SPEC USED SPEC NO. 673 CONSTRUCTING DETOURS (8" BLACK BASE) SY	H00696001 HARRIS COUNTY SPEC USED SPEC NO. 696 LOW PROFILE CONCRETE BARRIER - TYPE 1 (FURNISH & INSTALL) LF	H00696002 HARRIS COUNTY SPEC USED SPEC NO. 696 LOW PROFILE CONCRETE BARRIER - TYPE 2 (FURNISH & INSTALL) LF	H00696003 HARRIS COUNTY SPEC USED SPEC NO. 696 LOW PROFILE CONCRETE BARRIER (REMOVE) LF	H00696004 HARRIS COUNTY SPEC USED SPEC NO. 696 LOW PROFILE CONCRETE BARRIER (RELOCATE) LF	
ALL PHASES									18	2	2						
PHASE 1 STEP 1	1 OF 1											279					
PHASE 1 STEP 2	1 OF 8												119	20			
PHASE 1 STEP 2	2 OF 8												788	20			
PHASE 1 STEP 2	3 OF 8												1,092	40			
PHASE 1 STEP 2	4 OF 8												915	120			
PHASE 1 STEP 2	5 OF 8	30			100			1	1			18	899	80			
PHASE 1 STEP 2	6 OF 8				87			1	1								
PHASE 1 STEP 2	7 OF 8			19													
PHASE 1 STEP 2	8 OF 8	153	198														
PHASE 2	1 OF 7															139	
PHASE 2	2 OF 7											50				5	134
PHASE 2	3 OF 7											52					38
PHASE 2	4 OF 7	28			90			1	1			158				31	13
PHASE 2	5 OF 7				87			1	1								
PHASE 2	6 OF 7					45	21										
PHASE 2	7 OF 7					37	35										
PHASE 3	1 OF 8																
PHASE 3	2 OF 8												182	80	181	627	
PHASE 3	3 OF 8												80	144	968		
PHASE 3	4 OF 8												20	13	1,036		
PHASE 3	5 OF 8														363	144	
PHASE 3	6 OF 8					95		1	1								
PHASE 3	7 OF 8																
PHASE 3	8 OF 8																
PHASE 4	1 OF 1												352		3,931		
TOTALS	153	493	19	364	82	151	5	5	18	2	2	557	4,347	460	4,807	2,960	



02/06/2024

NO.	DATE	REVISION	APPROVED



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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

SUMMARY OF QUANTITIES TRAFFIC CONTROL

SHEET 1 OF 1

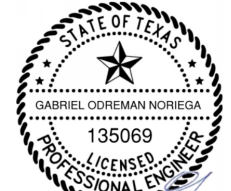
CNTY PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	2023		26
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RPS	RPS	RPS	RPS	

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REMOVALS SHEET	T00100001 TXDOT SPEC USED SPEC NO. 100 PREPARING RIGHT-OF-WAY STA	H00104001 HARRIS COUNTY SPEC USED SPEC NO. 104 REMOVE OLD CONCRETE (PAVEMENT) SY	H00104002 HARRIS COUNTY SPEC USED SPEC NO. 104 REMOVE OLD CONCRETE (CURB) LF	H00104003 HARRIS COUNTY SPEC USED SPEC NO. 104 REMOVE OLD CONCRETE (SLOPE PAVING) SY	H00104005 HARRIS COUNTY SPEC USED SPEC NO. 104 REMOVING OLD CONCRETE (SIDEWALK) SY	H00465002 HARRIS COUNTY SPEC USED SPEC NO. 465 REMOVE EXISTING 18" RCP LF	H00465003 HARRIS COUNTY SPEC USED SPEC NO. 465 REMOVE EXISTING 24" RCP LF	HARRIS COUNTY SPEC USED SPEC NO. 465 REMOVE EXISTING 30" RCP LF	H00465004 HARRIS COUNTY SPEC USED SPEC NO. 465 REMOVE EXISTING 36" RCP LF	H00465006 HARRIS COUNTY SPEC USED SPEC NO. 465 REMOVE EXISTING 48" RCP LF
FORT BEND COUNTY										
1	OF 5	8	619	360	19	124	70			48
2	OF 5	10	93	77		75	85			
3	OF 5	10	995				220	77		
4	OF 5	10	876				108	106	83	
5	OF 5	6	70		624		13			
SUBTOTAL										
44										
2,653										
437										
624										
19										
199										
496										
183										
83										
48										
HARRIS COUNTY										
5	OF 5	3	937	274			315			
SUBTOTAL										
3										
937										
274										
0										
0										
0										
315										
0										
0										
0										
TOTALS										
47										
3,590										
711										
624										
19										
199										
811										
183										
83										
48										

REMOVALS SHEET	H00495001 HARRIS COUNTY SPEC USED SPEC NO. 495 REMOVING OLD STRUCTURES - FLEX BEAM GUARD RAIL LF	H00495003 HARRIS COUNTY SPEC USED SPEC NO. 495 REMOVE OLD STRUCTURES (PIPES) LF	H00495003 HARRIS COUNTY SPEC USED SPEC NO. 495 REMOVE OLD STRUCTURES - INLETS (ALL DEPTHS) EA	H00495005 HARRIS COUNTY SPEC USED SPEC NO. 495 REMOVE OLD STRUCTURES - SAFETY END TREATMENTS EA	H00500001 HARRIS COUNTY SPEC USED SPEC NO. 500 REMOVE & RELOCATE MAIL BOX EA	H00500002 HARRIS COUNTY SPEC USED SPEC NO. 500 REMOVE & RELOCATE SIGNS EA	H00500003 HARRIS COUNTY SPEC USED SPEC NO. 500 REMOVE EXISTING ROADWAY SIGN EA	H00540001 HARRIS COUNTY SPEC USED SPEC NO. 540 REMOVE AND DISPOSE OF EXISTING ASPHALTIC SURFACE AND BASE MATERIAL (ALL DEPTHS) SY
FORT BEND COUNTY								
1	OF 5		1		2		3	2,691
2	OF 5				1	2		3,518
3	OF 5	130		2	5		2	3,307
4	OF 5	151		6	4	2	1	3,670
5	OF 5	203	61	1		2	4	1,611
SUBTOTAL								
203								
342								
2								
8								
12								
6								
10								
14,797								
HARRIS COUNTY								
5	OF 5		5			4	1	1,119
SUBTOTAL								
0								
0								
5								
0								
0								
4								
1								
1,119								
TOTALS								
203								
342								
7								
8								
12								
10								
11								
15,916								

REMOVALS SHEET	H00550003 HARRIS COUNTY SPEC USED SPEC NO. 550 REMOVE AND SALVAGE FENCE (ALL TYPES) LF	H00674008 TXDOT SPEC USED SPEC NO. 674 REMOVE PAVEMENT MARKINGS (ANY BUTTON) EA	H00674009 HARRIS COUNTY SPEC USED SPEC NO. 674 REMOVAL OF ALL STRIPING AND PAVEMENT MARKINGS SF
FORT BEND COUNTY			
1	OF 5	41	
2	OF 5	159	
3	OF 5	464	
4	OF 5	126	
5	OF 5		
SUBTOTAL			
790			
0			
0			
HARRIS COUNTY			
5	OF 5		336
SUBTOTAL			
0			
336			
6,446			
TOTALS			
790			
336			
6,446			



02/06/2024



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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

SUMMARY OF QUANTITIES REMOVALS

SHEET 1 OF 1	
CNTY PROJ	RPS PROJ
17-2-11	008169
DESIGNED BY	DRAWN BY
RPS	RPS
DATE	SCALE
2023	
CHECKED BY	VERIFIED BY
RPS	RPS
27	

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ROADWAY SHEET	H00220002 HARRIS COUNTY SPEC USED SPEC NO. 220 LIME TREATMENT (8" DEPTH) (SY)	H00221001 HARRIS COUNTY SPEC USED SPEC NO. 221 HYDRATED LIME (SLURRY) OR COMMERCIAL LIME SLURRY (TON)	H00360001 HARRIS COUNTY SPEC USED SPEC NO. 360 CONCRETE PAVEMENT (8") (SY)	H00360001 HARRIS COUNTY SPEC USED SPEC NO. 360 CONCRETE PAVEMENT (10") (SY)	T003606043 TXDOT SPEC USED SPEC NO. 360 CONC PVMT (CONT REINF) (FAST TRK) (13") (SY)	H00433003 HARRIS COUNTY SPEC USED SPEC NO. 433 CEMENT STABILIZED SAND (6" THICK) (SY)	H0051001 HARRIS COUNTY SPEC USED SPEC NO. 516 FLEX BEAM GUARDRAIL (12 GAUGE) INCLUDING MOWING STRIP (LF)	H00516002 HARRIS COUNTY SPEC USED SPEC NO. 516 SINGLE GUARDRAIL TERMINAL 12 GAUGE (ET-2000 PLUS OR SKT 350) WITH MOWING STRIP (EA)	H00516003 HARRIS COUNTY SPEC USED SPEC NO. 516 METAL BEAM GUARD FENCE TRANS (TL2) (EA)	H00516004 HARRIS COUNTY SPEC USED SPEC NO. 516 FLEXIBLE BEAM GUARDRAIL TURNDOWN SECTION (12 GAUGE) (EA)	H00530001 HARRIS COUNTY SPEC USED SPEC NO. 530 REINFORCED CONCRETE SIDEWALK (4-1/2") (SY)	H00530006 HARRIS COUNTY SPEC USED SPEC NO. 530 CONCRETE CURB AND GUTTER (MONOLITHIC) (LF)	H00530007 HARRIS COUNTY SPEC USED SPEC NO. 530 REINFORCED CONCRETE CURB - MOUNTABLE (LF)	H005300016 HARRIS COUNTY SPEC USED SPEC NO. 530 ADA RAMP TYPE 7 (EA)	H00530009 HARRIS COUNTY SPEC USED SPEC NO. 530 REINFORCED CONCRETE DRIVEWAY (8") (SY)	H00536001 HARRIS COUNTY SPEC USED SPEC NO. 536 COLORING CONCRETE FOR MEDIAN NOSES (6" THICK) (SY)	
FORT BEND COUNTY																	
1 OF 26	1,838	36.4	1,699.9			230.0					307.0	586			2	230.0	
2 OF 26	1,781	35.3	1,636.9			220.0					424.9	672				220.0	
3 OF 26	1,773	35.1	1,642.3			384.0					416.3	639				384.0	
4 OF 26	2,374	47.0	2,197.9			109.0					386.0	874			2	109.0	
5 OF 26	1,830	36.2	1,670.4			166.0					433.1	737				166.0	
6 OF 26	1,975	39.1	1,856.1			705.0					377.0	606			1	705.0	
7 OF 26	2,076	41.1	1,940.1			359.0					402.0	747			1	359.0	
8 OF 26	1,709	33.8	1,610.1			721.0					357.7	507				721.0	
9 OF 26	1,756	34.8	1,506.6		167.8	487.0					383.9	617			6	487.0	
10 OF 26	140	2.8	126.0		14						28.2	50					
11 OF 26	862	17.1	826.4			172.0					127.1	495				172.0	2.0
12 OF 26	708	14.0	523.1	99		130.0	50		2		119.0	405				130.0	
13 OF 26	697	13.8		608			100		2	2	113.2	378	40				
15 OF 26	649	12.8	535.5			180.0					149.9	497				180.0	
16 OF 26	734	14.5	536.0	99			100		2	2	154.6	454					
17 OF 26	769	15.2		685		66.0	100		2	2	101.3	345	40			66.0	
20 OF 26																	
21 OF 26																	
22 OF 26	279	5.5	251.6			287.5					105.8	148					
24 OF 26											192.4						
25 OF 26											* 209.9						
26 OF 26											* 231.1						
SUBTOTAL HARRIS COUNTY	21,950	434.5	18,558.9	1,492.0	469.3	3,929.0	350	4	8	4	5,020.4	8,758	80	12		3,929.0	2.0
13 OF 26	426	8.4		377.2	345.5						32.6	272		2			2.0
14 OF 26	342	6.8		299.7								96					
17 OF 26	807	16.0		756.3		7.0					117.0	308				7.0	
18 OF 26	390	7.7		339.7							46.4	122		2			
19 OF 26				0.0								257					12.0
23 OF 26																	
SUBTOTAL	1,965	38.9	0.0	1,772.9	345.5	7.0	0	0	0	0	196.0	1,055	0	4		7.0	14.0
TOTALS	23,915	473.4	18,558.9	3,264.9	814.7	3,936.0	350	4	8	4	5,216.4	9,813	80	16		3,936.0	16.0

- NOTE:
- SEE PROJECT NOTES FOR ADDITIONAL INFORMATION.
 - THE QUANTITIES SHOWN HEREON ARE FOR WIDE BUILD OPTION.
 - THE VALUES DENOTED BY (*) ARE DIFFERENT FOR NARROW BUILD OPTION.



02/06/2024

NO.	DATE	REVISION	APPROVED



Texas PE Firm Reg. #F-929

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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

SUMMARY OF QUANTITIES ROADWAY

CNTY PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	2023		28
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RPS	RPS	RPS	RPS	

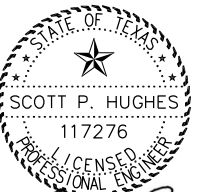
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STORM SEWER SHEET	HARRIS COUNTY SPEC USED SPEC NO. 421&DWG CONCRETE COLLAR (PER DETAILS IN PLANS) (EA)	HARRIS COUNTY SPEC USED SPEC NO. 429 TRENCH SAFETY SYSTEM (5' TO 10') (LF)	HARRIS COUNTY SPEC USED SPEC NO. 429 TRENCH SAFETY SYSTEM (10' TO 15') (LF)	HARRIS COUNTY SPEC USED SPEC NO. 460 RE INFORCED CONCRETE PIPE, C76, CLASS III, RUBBER GASKET (24") (LF)	HARRIS COUNTY SPEC USED SPEC NO. 460 RE INFORCED CONCRETE PIPE, C76, CLASS III, RUBBER GASKET (30") (LF)	HARRIS COUNTY SPEC USED SPEC NO. 460 RE INFORCED CONCRETE PIPE, C76, CLASS III, RUBBER GASKET (36") (LF)	HARRIS COUNTY SPEC USED SPEC NO. 460 RE INFORCED CONCRETE PIPE, C76, CLASS III, RUBBER GASKET (42") (LF)	HARRIS COUNTY SPEC USED SPEC NO. 460 RE INFORCED CONCRETE PIPE, C76, CLASS III, RUBBER GASKET (48") (LF)	HARRIS COUNTY SPEC USED SPEC NO. 460 RE INFORCED CONCRETE PIPE, C76, CLASS III, RUBBER GASKET (54") (LF)	HARRIS COUNTY SPEC USED SPEC NO. 460&DWG PROPOSED RCP STUB-IN (PER DETAILS IN PLANS) (EA)	HARRIS COUNTY SPEC USED SPEC NO. 463 SET (TYPE II) (24") (RCP) (4:1) (C) (EA)
FORT BEND COUNTY											
1 OF 26	6	89	59	65		59		24		1	
2 OF 26		215	298	122		298					
3 OF 26		518		447		71					
4 OF 26		257		257							
5 OF 26		491		307			217				
6 OF 26	1	553		196			395				
7 OF 26		367	229	209			35	333	19		
8 OF 26		148	391	148					391		1
9 OF 26		235		215					200	1	
10 OF 26		25		25							
11 OF 26		286		286							
12 OF 26		165		165							
13 OF 26											
15 OF 26		107		141							
16 OF 26		144		178							
17 OF 26		118		118							
20 OF 26											
21 OF 26											
22 OF 26											
23 OF 26											
24 OF 26		139		139							
25 OF 26		131		131							
26 OF 26											
SUBTOTAL	7	3,988	977	3,149	164	357	647	357	610	2	1
HARRIS COUNTY											
13 OF 26		116		116							
14 OF 26		99		99							
17 OF 26		119		119							
18 OF 26		70		70							
19 OF 26											
23 OF 26											
SUBTOTAL	0	404	0	404	0	0	0	0	0	0	0
TOTALS	7	4,392	977	3,553	164	357	647	357	610	2	1

NO.	DATE	REVISION	APPROVED



SCOTT P. HUGHES
117276
PROFESSIONAL ENGINEER

Scott Hughes
11/8/2023

CivilTech Engineering, Inc. 11821 Telge Road
Cypress, Texas 77429
PH: (281) 304-0200 - FX: (281) 304-0210
Firm Registration No. F-382

FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

**SUMMARY OF QUANTITIES
STORM SEWER**

SHEET 1 OF 2

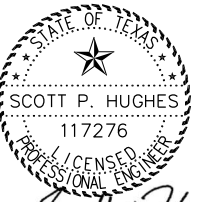
CNTY PROJ *	RPS PROJ *	DATE	SCALE	SHEET NO
17-2-11	008169	XXX 2022		29
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
CR	DA	CW	PB	

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STORM SEWER SHEET	HARRIS COUNTY SPEC USED SPEC NO. 471 PRECAST CONCRETE STANDARD MANHOLE (5 FT<DEPTH<10 FT) (EA)	HARRIS COUNTY SPEC USED SPEC NO. 471 PRECAST CONCRETE EXTRA DEPTH MANHOLE (DEPTH>10 FT) (EA)	HARRIS COUNTY SPEC USED SPEC NO. 472 TYPE A INLET (EA)	HARRIS COUNTY SPEC USED SPEC NO. 472 TYPE C INLET (EA)	HARRIS COUNTY SPEC USED SPEC NO. 472 TYPE C-1 INLET (EA)	HARRIS COUNTY SPEC USED SPEC NO. 473 ADJUSTING MANHOLES AND INLETS (EA)	HARRIS COUNTY SPEC USED SPEC NO. 473 CAPPING MANHOLES (EA)	HARRIS COUNTY SPEC USED SPEC NO. 473 CAPPING INLETS (EA)	HARRIS COUNTY SPEC USED SPEC NO. 491 REINFORCED CONCRETE SLOPE PAVING (5") (SY)	HARRIS COUNTY SPEC USED SPEC NO. DWG OFFSITE DRAINAGE (ALL PIPES AND ALL SIZES) (LF)
FORT BEND COUNTY										
1 OF 26	1	2	1		2	2		1		
2 OF 26			3	4						83
3 OF 26			3	4						87
4 OF 26			1	4						
5 OF 26			3	6					60	
6 OF 26	1		2		2					
7 OF 26	1		5	2	2				60	
8 OF 26			3	4			1			
9 OF 26	1			4		1	1			
10 OF 26										
11 OF 26			1	2						
12 OF 26				2						
13 OF 26										
15 OF 26			1	1	1					
16 OF 26			1	2			1			
17 OF 26			1	1						
20 OF 26										
21 OF 26										
22 OF 26										
23 OF 26										
24 OF 26			2					1		
25 OF 26			2					1		
26 OF 26										
SUBTOTAL	4	2	29	36	7	3	3	3	120	170
HARRIS COUNTY										
13 OF 26				1						
14 OF 26			1		1					
17 OF 26			1	1					190	
18 OF 26	1				1	1			20	
19 OF 26										
23 OF 26										
SUBTOTAL	1	0	2	2	2	1	0	0	210	0
TOTALS	5	2	31	38	9	4	3	3	330	170

NO.	DATE	REVISION	APPROVED
 <i>Scott Hughes</i> 11/8/2023			
CivilTech Engineering, Inc.		11821 Telge Road Cypress, Texas 77429 PH: (281) 304-0200 - FX: (281) 304-0210 Firm Registration No. F-382	
FORT BEND COUNTY, TEXAS			
BELKNAP ROAD IMPROVEMENTS W BELLFORT BLVD TO OAK BEND FOREST DR			
SUMMARY OF QUANTITIES STORM SEWER			
SHEET 2 OF 2			
CNTY PROJ	RPS PROJ	DATE	SCALE
17-2-11	008169	XXX 2022	
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY
CR	DA	CW	PB
			30


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SIGNING AND PAVEMENT MARKINGS SHEET	H00624001 HARRIS COUNTY SPEC USED SPEC NO. 624 ALUMINUM SIGNS (GROUND MOUNTED) - FURNISH & INSTALL (EA)	H00660001 HARRIS COUNTY SPEC USED SPEC NO. 660 PAINTED CURB (YELLOW) (LF)	H00660002 HARRIS COUNTY SPEC USED SPEC NO. 660 REFLECTORIZED PAVEMENT MARKINGS TYPE I (THERMOPLASTIC) 4" WHITE/DASHED FURNISH & APPLIED (15' OVER 40') (LF)	H00660005 HARRIS COUNTY SPEC USED SPEC NO. 660 REFLECTORIZED PAVEMENT MARKINGS TYPE I (THERMOPLASTIC) 4" YELLOW/DASHED FURNISH & APPLIED (LF)	H00660006 HARRIS COUNTY SPEC USED SPEC NO. 660 REFLECTORIZED PAVEMENT MARKINGS TYPE I (THERMOPLASTIC) 4" YELLOW/SOLID FURNISH & APPLIED (LF)	H00660009 HARRIS COUNTY SPEC USED SPEC NO. 660 REFLECTORIZED PAVEMENT MARKINGS TYPE I (THERMOPLASTIC) 8" WHITE/DOT FURNISH & APPLIED (LF)	H00660010 HARRIS COUNTY SPEC USED SPEC NO. 660 REFLECTORIZED PAVEMENT MARKINGS TYPE I (THERMOPLASTIC) 8" WHITE/SOLID FURNISH & APPLIED (LF)	H00660013 HARRIS COUNTY SPEC USED SPEC NO. 660 REFLECTORIZED PAVEMENT MARKINGS TYPE I (THERMOPLASTIC) 24" WHITE/SOLID FURNISH & APPLIED (LF)
FORT BEND COUNTY								
1 OF 6	4			193	1,585		285	343
2 OF 6	6		22	232	1,849		210	189
3 OF 6	5		22	232	1,849		63	177
4 OF 6	5	61	68	116	1,377	17	284	
5 OF 6	3		480				24	
6 OF 6					150		75	341
SUBTOTAL	23	61	592	773	6,810	17	941	1,050
HARRIS COUNTY								
5 OF 6	4	185	202		36		91	107
SUBTOTAL	4	185	202		36		91	107
TOTALS	27	246	794	773	6,846	17	1,032	1,157

SIGNING AND PAVEMENT MARKINGS SHEET	H00660014 HARRIS COUNTY SPEC USED SPEC NO. 660 REFLECTORIZED PAVEMENT MARKINGS TYPE I (THERMOPLASTIC) 24" YELLOW/SOLID FURNISHED & APPLIED (LF)	H00660015 HARRIS COUNTY SPEC USED SPEC NO. 660 REFLECTORIZED PAVEMENT MARKINGS TYPE I (THERMOPLASTIC) SINGLE ARROW-LEFT FURNISH & APPLIED (EA)	H00660016 HARRIS COUNTY SPEC USED SPEC NO. 660 REFLECTORIZED PAVEMENT MARKINGS TYPE I (THERMOPLASTIC) SINGLE ARROW-RIGHT FURNISH & APPLIED (EA)	H00660018 HARRIS COUNTY SPEC USED SPEC NO. 660 REFLECTORIZED PAVEMENT MARKINGS TYPE I (THERMOPLASTIC) WORD "ONLY" FURNISH & APPLIED (EA)	H00663003 HARRIS COUNTY SPEC USED SPEC NO. 663 REFLECTORIZED PAVEMENT MARKERS TYPE II-A-A FURNISH & INSTALL (EA)	H00663006 HARRIS COUNTY SPEC USED SPEC NO. 663 REFLECTORIZED PAVEMENT MARKERS TYPE I-C FURNISH & INSTALL (EA)	H00663006 HARRIS COUNTY SPEC USED SPEC NO. 663 REFLECTORIZED PAVEMENT MARKERS TYPE II-C-R FURNISH & INSTALL (EA)	H00663005 HARRIS COUNTY SPEC USED SPEC NO. 663 4" SQUARE 4-WAY BLUE REFLECTORIZED RAISED TRAFFIC MARKERS (TYPE II) - FURNISH AND INSTALL (EA)
FORT BEND COUNTY								
1 OF 6	78	4	1	3	114	56		2
2 OF 6	78	3		1	135	42		4
3 OF 6	78	2			131	44	2	3
4 OF 6	95	1	1	3	141	56	8	1
5 OF 6				1		4	36	
6 OF 6		1	1	2	6	14		1
SUBTOTAL	329	11	3	10	527	216	48	11
HARRIS COUNTY								
5 OF 6		1			4	18	15	1
SUBTOTAL		1			4	18	15	1
TOTALS	329	12	3	10	531	234	63	12



02/06/2024



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FORT BEND COUNTY, TEXAS

 BELKNAP ROAD IMPROVEMENTS
 W BELLFORT BLVD TO OAK BEND FOREST DR

 SUMMARY OF QUANTITIES
 PAVEMENT MARKING
 AND SIGNAGE

SHEET 1 OF 1
 CNTY PROJ • RPS PROJ • DATE SCALE SHEET NO
 17-2-11 008169 2023
 DESIGNED BY DRAWN BY CHECKED BY VERIFIED BY
 RPS RPS RPS RPS

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EROSION CONTROL SHEET	H00162001 HARRIS COUNTY SPEC USED SPEC NO. 162 SODDING FOR EROSION CONTROL (VARIOUS WIDTHS)	H00164003 HARRIS COUNTY SPEC USED SPEC NO. 164 SEEDING AND EROSION CONTROL BLANKET	H00166001 HARRIS COUNTY SPEC USED SPEC NO. 166 FERTILIZER	H00713001 HARRIS COUNTY SPEC USED SPEC NO. 713 REINFORCED FILTER FABRIC BARRIER (60% OF UNIT COST FOR FURNISH AND INSTALLATION AND 40% OF UNIT COST FOR REMOVAL)	H00724001 HARRIS COUNTY SPEC USED SPEC NO. 724 STABILIZED CONSTRUCTION ACCESS (TYPE 1-ROCK 60% OF UNIT COST FOR FURNISH AND INSTALLATION AND 40% OF UNIT COST FOR	H00719001 HARRIS COUNTY SPEC USED SPEC NO. 719 INLET PROTECTION BARRIER (STAGE 1, WITH FIBER ROLLS) FURNISH, INSTALL, AND REMOVE	H00750002 HARRIS COUNTY SPEC USED SPEC NO. 750 ROCK FILTER DAM (TYPE 2) 60% OF UNIT COST FOR FURNISH AND INSTALLATION AND 40% OF UNIT COST FOR REMOVAL)	H00751001 HARRIS COUNTY SPEC USED SPEC NO. 751 SWPPP INSPECTION AND MAINTENANCE	5066040 TXDOT SPEC USED SPEC NO. 506 BIODEG EROSN CONT LOGS (INSTL) (8") INSPECTION AND MAINTENANCE
	(SY)	(SY)	(LB)	(LF)	(SY)	(EA)	(EA)	(MO)	(LF)
FORT BEND									
PHASE 1 & 2									
1 OF 8	312.7	1,351.3	167.5	703	111	6	2	9	30
2 OF 8	368.2	2,157.3	267.4			7	3		
3 OF 8	186.2	1,925.5	238.7			7	4		
4 OF 8	431.4	1,698.4	210.5	204		10	1		
5 OF 8	318.0	840.0	104.1			3			
6 OF 8						4			
7 OF 8						5			
8 OF 8				462		2			
PHASE 3 & 4									
1 OF 8	329.2	1,333.4	165.3		111	8	1	9	
2 OF 8	405.3	2,149.4	266.5			9	2		
3 OF 8	415.8	1,489.5	184.6			8	2		
4 OF 8	446.9	3,183.9	394.7	207		10	2		
5 OF 8	281.0	1,234.1	153.0			5			
6 OF 8									
7 OF 8	206.9								
8 OF 8				408		1			
SUBTOTAL	3,701.6	17,362.8	2,152.4	1,984	222	85	17	18	30
HARRIS COUNTY									
PHASE 1 & 2									
5 OF 8	81.7	413.3	51.2			4			
7 OF 8									
PHASE 3 & 4									
5 OF 8	159.8	572.8	71.0			4	4		
7 OF 8									
SUBTOTAL	241.5	986.1	122.2			8	4		
TOTALS	3,943.1	18,348.9	2,274.7	1,984	222	93	21	18	30

NOTES:

1. A FERTILIZER APPLICATION RATE OF 600 lbs/acre FOR THE HYDROMULCHED GRASSING AND SEEDING AREA WAS ASSUMED FOR THIS PROJECT. THIS IS FOR CONTRACTORS INFORMATION ONLY. FERTILIZER SHALL NOT BE PAID FOR SEPERATLY.
2. THE CONTRACTOR IS TO INSTALL THE STABILIZED CONSTRUCTION ACCESS IN LOCATIONS APPROVED BY FORT BEND COUNTY. THE ABOVE QUANTITIES ASSUME THAT THE ACCESS WILL BE 50' LONG BY 20' WIDE.

NO.	DATE	REVISION	APPROVED

RPS Texas PE Firm Reg. #F-929
 575 N. Dairy Ashford, Suite 700, Houston, Texas 77079
 T +1 281 589 7257 E us@infrastructure@rpsgroup.com

FORT BEND COUNTY, TEXAS
BELKNAP ROAD IMPROVEMENTS
 W BELLFORT BLVD TO OAK BEND FOREST DR
SUMMARY OF QUANTITIES
EROSION CONTROL

CNTY PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	2023		32
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RPS	RPS	RPS	RPS	

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End Area Volume Report

Report Created: 10/23/2023
Time: 9:43am

Cross Section Set Name: PSE_20231022
Alignment Name: HALN_BELKNAP
Input Grid Factor: 1 **Note:** All units in this report are in feet, square feet and cubic

Baseline Station	----- Station Quantities -----							
	----- Cut -----				----- Fill -----			
	Factor	Area	Volume	Adjusted	Factor	Area	Volume	Adjusted
13+37.87 R1	1	151.99	0	0				
14+00.00 R1	1	73.63	259.59	259.59	1	5.45	6.27	6.27
15+00.00 R1	1	43.44	216.79	216.79	1	15.69	39.16	39.16
16+00.00 R1	1	29.83	135.69	135.69	1	86.7	189.62	189.62
17+00.00 R1	1	66.29	178.01	178.01	1	37.19	229.42	229.42
18+00.00 R1	1	81.03	272.83	272.83	1	46.43	154.85	154.85
19+00.00 R1	1	93.66	323.5	323.5	1	14.23	112.34	112.34
20+00.00 R1	1	129.72	413.66	413.66	1	8.77	42.59	42.59
21+00.00 R1	1	112.98	449.44	449.44	1	13.5	41.24	41.24
22+00.00 R1	1	87.66	371.55	371.55	1	4.35	33.07	33.07
23+00.00 R1	1	92.4	333.43	333.43	1	9.47	25.59	25.59
24+00.00 R1	1	84.98	328.48	328.48	1	18.59	51.95	51.95
25+00.00 R1	1	59.6	267.73	267.73	1	10.86	54.54	54.54
26+00.00 R1	1	53.2	208.89	208.89	1	15.3	48.45	48.45
27+00.00 R1	1	71.69	231.28	231.28	1	28.59	81.28	81.28
28+00.00 R1	1	112.84	341.73	341.73	1	6.07	64.2	64.2
29+00.00 R1	1	160.33	505.87	505.87	1	1.61	14.23	14.23
30+00.00 R1	1	214.67	694.43	694.43	1	0	2.99	2.99
31+00.00 R1	1	198.3	764.75	764.75	1	0.02	0.03	0.03
32+00.00 R1	1	157.43	658.75	658.75	1	1.18	2.22	2.22
33+00.00 R1	1	122.67	518.69	518.69	1	5.78	12.9	12.9
34+00.00 R1	1	163.65	530.21	530.21	1	27.59	61.8	61.8
35+00.00 R1	1	123.97	532.63	532.63	1	6.8	63.69	63.69
36+00.00 R1	1	86.11	389.03	389.03	1	35.14	77.68	77.68
37+00.00 R1	1	44.22	241.34	241.34	1	83.18	219.11	219.11
38+00.00 R1	1	81.67	233.13	233.13	1	29.86	209.32	209.32
39+00.00 R1	1	75.67	291.38	291.38	1	26.29	103.97	103.97
40+00.00 R1	1	35.88	206.58	206.58	1	66.74	172.28	172.28
41+00.00 R1	1	97.77	247.5	247.5	1	54.22	224	224
42+00.00 R1	1	38.27	251.92	251.92	1	61.2	213.75	213.75
43+00.00 R1	1	80.51	219.95	219.95	1	29.27	167.55	167.55
44+00.00 R1	1	43.47	229.59	229.59	1	57.03	159.81	159.81
45+00.00 R1	1	86.85	241.33	241.33	1	6.05	116.81	116.81
46+00.00 R1	1	74.45	298.7	298.7	1	25.68	58.75	58.75
47+00.00 R1	1	27.15	188.14	188.14	1	19.77	84.16	84.16
48+00.00 R1	1	161.97	350.21	350.21	1	44.42	118.86	118.86
49+00.00 R1	1	127.53	536.1	536.1	1	46.76	168.86	168.86
50+00.00 R1	1	197.67	602.21	602.21	1	19.26	122.26	122.26
51+00.00 R1	1	96.73	545.18	545.18	1	25.47	82.82	82.82
52+00.00 R1	1	80.72	328.62	328.62	1	197.24	412.41	412.41
53+00.00 R1	1	56.26	253.68	253.68	1	292.61	907.12	907.12
54+00.00 R1	1	432.26	904.66	904.66	1	0	541.87	541.87

Grand Total: 15097.2 15097.17 5493.81 5493.81



14-Nov-2023

NO	DATE	REVISION	APPROVED



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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
 W BELLFORT BLVD TO OAK BEND FOREST DR

SUMMARY OF QUANTITIES
EARTHWORK

CNTY PROJ *	RPS PROJ *	DATE	SCALE	SHEET NO
17-2-11	008169	2023		33
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RPS	RPS	RPS	RPS	

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End Area Volume Report

Report Created: 10/23/2023
Time: 9:49am

Cross Section Set Name: PSE_231022
Alignment Name: HALN_BELKNAP
Input Grid Factor: 1 **Note:** All units in this report are in feet, square feet and cubic yards unless

Baseline Station	----- Station Quantities -----							
	----- Cut -----				----- Fill -----			
	Factor	Area	Volume	Adjusted	Factor	Area	Volume	Adjusted
54+00.00 R1	1	432.26	0	0	1	0	0	0
55+00.00 R1	1	251.64	1266.48	1266.48	1	799.504	1480.56	1480.56
56+00.00 R1	1	0	466.00	466.00	1	573.29	2542.21	2542.21
57+00.00 R1	1	0	0.00	0.00	1	289.4	1597.57	1597.57
57+66.12 R1	1	32.54	39.84	39.84	1	55.27	422.03	422.03
58+00.00 R1	1	51.52	52.74	52.74	1	44.17	62.39	62.39
59+00.00 R1	1	87.59	257.61	257.61	1	10.64	101.50	101.50
60+00.00 R1	1	73.18	297.72	297.72	1	2.68	24.67	24.67
60+48.00 R1	1	155.19	203.00	203.00	1	0	2.39	2.39
Grand Total:			2583.39	2583.39			6233.32	6233.32

End Area Volume Report - Narrow Build

Report Created: 10/23/2023
Time: 9:49am

Cross Section Set Name: PSE_231022
Alignment Name: HALN_BELKNAP
Input Grid Factor: 1 **Note:** All units in this report are in feet, square feet and cubic yards unless

Baseline Station	----- Station Quantities -----							
	----- Cut -----				----- Fill -----			
	Factor	Area	Volume	Adjusted	Factor	Area	Volume	Adjusted
54+00.00 R1	1	432.26	0	0	1	0	0	0
55+00.23 R1	1	24.61	846.06	846.06	1	364.51	675.02	675.02
56+00.00 R1	1	0.46	46.43	46.43	1	389.59	1396.48	1396.48
57+00.00 R1	1	0.57	1.91	1.91	1	191.07	1075.30	1075.30
57+66.12 R1	1	32.54	40.54	40.54	1	55.27	301.63	301.63
58+00.00 R1	1	51.52	32.68	32.68	1	44.17	147.59	147.59
59+00.00 R1	1	87.59	257.61	257.61	1	10.64	101.50	101.50
60+00.00 R1	1	73.18	297.72	297.72	1	2.68	24.67	24.67
60+48.00 R1	1	155.19	203.00	203.00	1	0	2.39	2.39
Grand Total:			1725.94	1725.94			3724.57	3724.57



14-Nov-2023

NO	DATE	REVISION	APPROVED

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 575 N. Dairy Ashford, Suite 700, Houston, Texas 77079
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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
 W BELLFORT BLVD TO OAK BEND FOREST DR

SUMMARY OF QUANTITIES
EARTHWORK

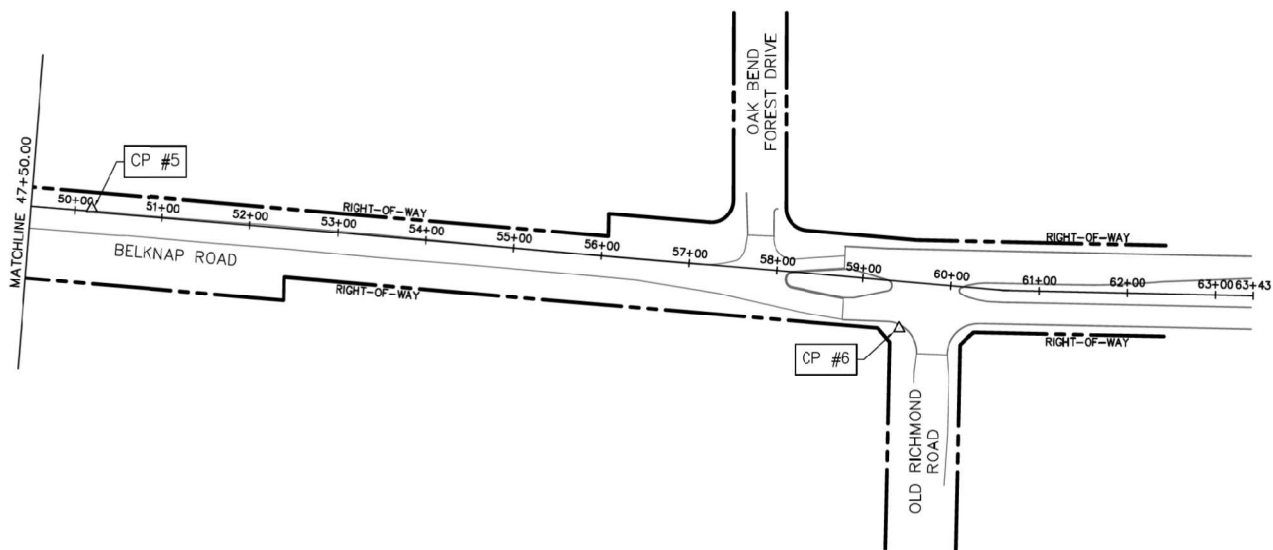
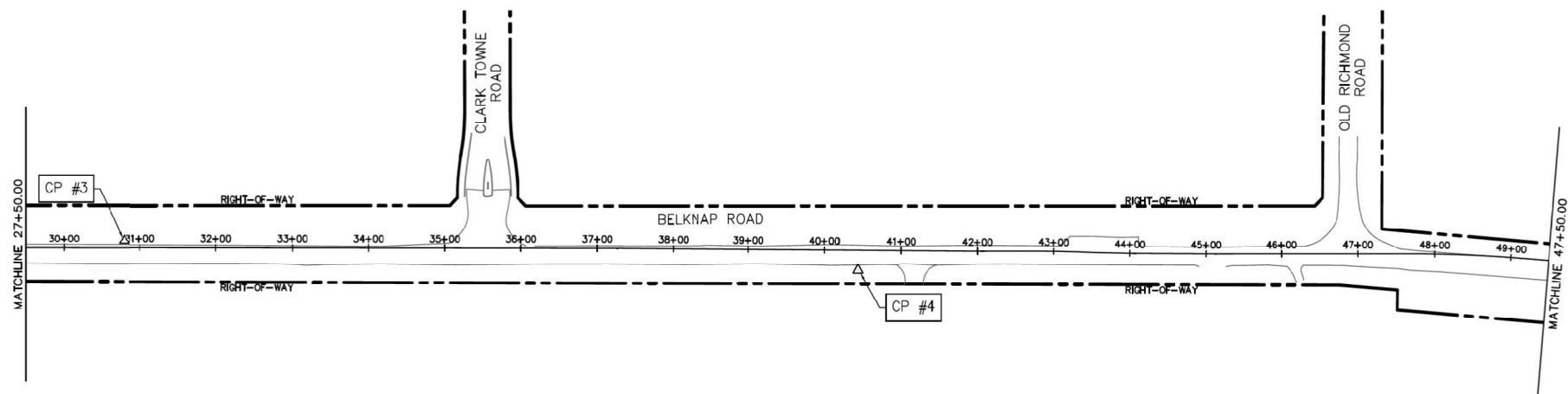
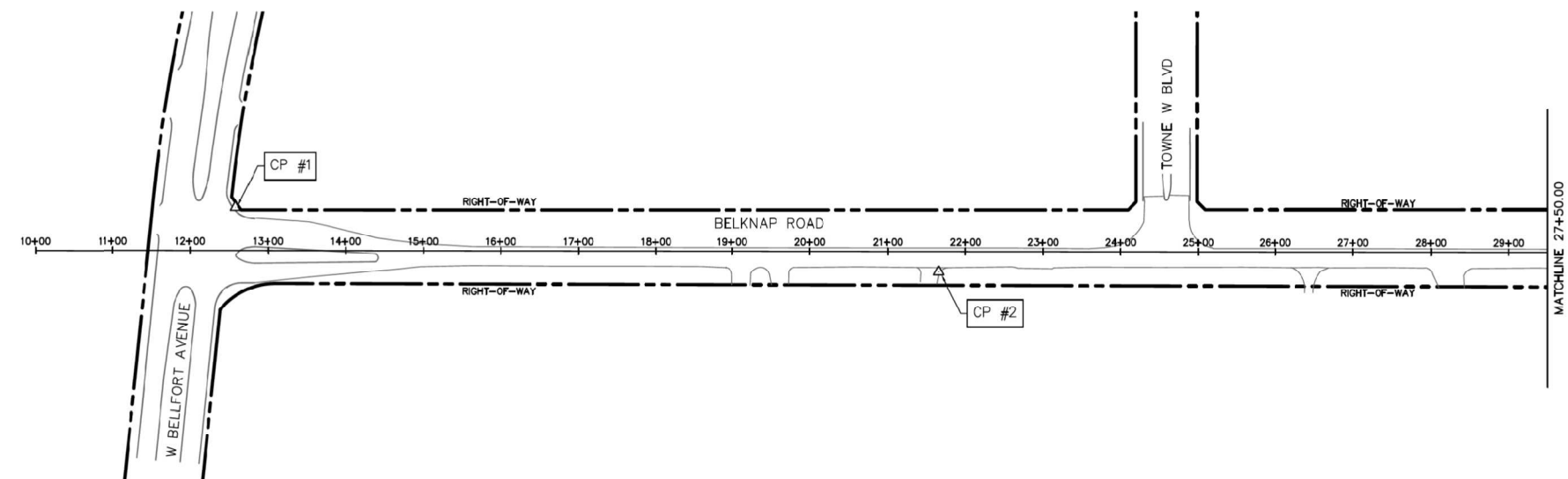
SHEET 2 OF 2

CNTY	PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	2023			34
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY		
RPS	RPS	RPS	RPS		

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- NOTES:
1. THE COORDINATES SHOWN HEREON ARE REFERENCED TO THE TEXAS STATE PLANE COORDINATE SYSTEM OF 1983, SOUTH CENTRAL ZONE. ALL SURFACE VALUES SHOWN MAY BE CONVERTED TO GRID BY APPLYING A COMBINED SCALE FACTOR OF 1.00013.
 2. THE ELEVATIONS SHOWN HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) 2001 ADJUSTMENT AND ARE REFERENCED TO NATIONAL GEODETIC SURVEY MONUMENTS AW2130 AND AJ6410, NAVD88, 2001 ADJUSTMENT. THE ELEVATION ADJUSTMENT WAS DETERMINED AS A RESULT OF AN ON-THE-GROUND SURVEY COMPLETED IN AUGUST 2018.

David Powell Brister
 DAVID POWELL BRISTER
 TEXAS REGISTERED PROFESSIONAL LAND SURVEYOR
 NO. 6537



NO	DATE	REVISION

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 www.mbcengineering.com

FORT BEND COUNTY, TEXAS

**BELKNAP ROAD IMPROVEMENTS
 W BELFORT BLVD TO OAK BEND FOREST DR**

**HORIZONTAL & VERTICAL
 SURVEY CONTROL**

POINT #	RAW DESCRIPTION	ELEVATION	NORTHING	EASTING	STATION	OFFSET
1	PK NAIL	84.52	13805656.17	3041158.84	12+58.08	-53.49
2	PK NAIL	85.41	13806566.50	3041185.19	21+65.34	25.81
3	5/8 IRON ROD w/ CAP	85.10	13807476.93	3041097.48	30+79.33	-8.77
4	5/8 IRON ROD w/ CAP	85.60	13808441.34	3041077.54	40+43.44	25.41
5	5/8 IRON ROD w/ CAP	84.16	13809414.23	3041009.46	50+18.71	-3.53
6	5/8 IRON ROD w/ CAP	83.99	13810339.51	3041086.27	59+45.52	51.81

CNTY PROJ #	ELES PROJ #	DATE	SCALE	SHEET NO.
17-2-11	226-01	06-02-21	1"=20'	35
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
	SS	SP		

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TRAFFIC CONTROL NARRATIVE

GENERAL

1. THE CONTRACTOR SHALL FOLLOW THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TxMUTCD) FOR THE TRAFFIC CONTROL ASPECTS OF THIS PROJECT.
2. THE CONTRACTOR MAY SUBMIT REVISIONS TO THE TRAFFIC CONTROL PLAN SHOWN IN THESE PLANS OR MAY SUBMIT A NEW TRAFFIC CONTROL PLAN FOR APPROVAL BY FORT BEND COUNTY. ANY REVISIONS TO THESE TRAFFIC CONTROL PLANS OR ANY NEW TRAFFIC CONTROL PLANS SHALL BE SIGNED BY AN ENGINEER LICENSED TO PRACTICE IN THE STATE OF TEXAS.
3. THE CONTRACTOR SHALL MAINTAIN INGRESS AND EGRESS TO PROPERTIES ADJACENT TO THE PROJECT UNLESS OTHERWISE SHOWN IN THESE PLANS.
4. DUE TO THE SPACE LIMITATIONS OF THE PROJECT SITE, THE CONTRACTOR WILL HAVE TO CONSTRUCT THE PROPOSED ELEMENTS IN SEPARATE PHASES PLACING TRAFFIC ON EXISTING PAVEMENT, TEMPORARY PAVEMENT, AND THE CONSTRUCTED PROPOSED PAVEMENT.
5. THE TRAFFIC CONTROL PLAN SHOWN IN THESE PLANS ARE BASED UPON A CONSTRUCTION SPEED LIMIT OF 35 mph.
6. THE CONTRACTOR SHALL USE REMOVABLE LANE MARKINGS FOR ALL TEMPORARY LANE MARKINGS ON CONSTRUCTED PROPOSED PAVEMENT OR EXISTING PAVEMENT THAT IS TO REMAIN IN PLACE. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR CORRECTING ANY DEFECTS IN THE CONSTRUCTED PROPOSED PAVEMENT OR EXISTING PAVEMENT THAT IS TO REMAIN IN PLACE CAUSED BY REMOVAL OF THE TEMPORARY LANE MARKINGS.
7. THE CONSTRUCTION DETOURS ON BELKNAP ROAD SHALL HAVE A WORK ZONE SPEED LIMIT OF 15 MPH. THE TRAFFIC CONTROL WORK ON BELLFORT BOULEVARD SHALL NOT HAVE A WORK ZONE SPEED REDUCTION.
8. THE CONTRACTOR SHALL FOLLOW TXDOT STANDARDS TCP(2-4)-18, TCP(3-1)-13 AND TCP(3-3)-14 FOR PERFORMING STRIPING IN THIS PROJECT.

ADVANCED WARNING SIGNS

1. THE CONTRACTOR SHALL INSTALL THE ADVACED WARNING SIGNS SHOWN IN THESE PLANS PRIOR TO COMMENCING ANY CONSTRUCTION ACTIVITIES.
2. THE CONTRACTOR SHALL NOT REMOVE THE ADVANCED WARNING SIGNS WITHOUT THE APPROVAL OF FORT BEND COUNTY.

PHASE 1, STEP 1

*PROPOSED TEMPORARY PAVEMENT, NORTH END OF BELKNAP ROAD

1. THE CONTRACTOR SHALL CONSTRUCT THE PROPOSED TEMPORARY PAVEMENT ELEMENTS ALONG THE PROPOSED BELKNAP ROAD AS SHOWN ON THESE PLANS.
2. THE CONTRACTOR SHALL MAINTAIN THE EXISTING TRAFFIC PATTERNS NORTHBOUND AND SOUTHBOUND OF BELKNAP ROAD AS SHOWN ON THESE PLANS.

PHASE 1, STEP 2

*PROPOSED SOUTHBOUND BELKNAP ROAD
 *PROPOSED EASTBOUND TOWNE WEST BOULEVARD
 *PROPOSED WESTBOUND CLARK TOWNE ROAD
 *PROPOSED EASTBOUND OLD RICHMOND ROAD
 *PROPOSED WESTBOUND OAK BEND FOREST ROAD

1. INSTALL DETOUR SIGNAGE.
2. THE CONTRACTOR SHALL TEMPORARILY CLOSE THE SOUTHBOUND LANES OF BELKNAP ROAD TO THE LIMITS SHOWN ON THESE PLANS.
3. THE CONTRACTOR SHALL CONSTRUCT THE PROPOSED ELEMENTS (EXCEPT FOR SIGNING AND STRIPING) ALONG THE PROPOSED SOUTHBOUND BELKNAP ROAD AS SHOWN ON THESE PLANS.
4. THE CONTRACTOR SHALL TEMPORARILY CLOSE THE EASTBOUND LANES OF TOWNE WEST BOULEVARD TO THE LIMITS SHOWN ON THESE PLANS.
5. THE CONTRACTOR SHALL CONSTRUCT THE PROPOSED ELEMENTS (EXCEPT FOR SIGNING AND STRIPING) ALONG THE PROPOSED EASTBOUND TOWNE WEST BOULEVARD AS SHOWN ON THESE PLANS.
6. THE CONTRACTOR SHALL TEMPORARILY CLOSE THE WESTBOUND LANES OF CLARK TOWNE ROAD TO THE LIMITS SHOWN ON THESE PLANS.
7. THE CONTRACTOR SHALL CONSTRUCT THE PROPOSED ELEMENTS (EXCEPT FOR SIGNING AND STRIPING) ALONG THE PROPOSED WESTBOUND CLARK TOWNE ROAD AS SHOWN ON THESE PLANS.
8. THE CONTRACTOR SHALL TEMPORARILY CLOSE THE EASTBOUND LANES OF OLD RICHMOND ROAD TO THE LIMITS SHOWN ON THESE PLANS.
9. THE CONTRACTOR SHALL CONSTRUCT THE PROPOSED ELEMENTS (EXCEPT FOR SIGNING AND STRIPING) ALONG THE PROPOSED EASTBOUND OLD RICHMOND ROAD AS SHOWN ON THESE PLANS.
10. THE CONTRACTOR SHALL TEMPORARILY CLOSE THE WESTBOUND LANES OF OAK BEND FOREST ROAD TO THE LIMITS SHOWN ON THESE PLANS.
11. THE CONTRACTOR SHALL CONSTRUCT THE PROPOSED ELEMENTS (EXCEPT FOR SIGNING AND STRIPING) ALONG THE PROPOSED WESTBOUND OAK BEND FOREST ROAD AS SHOWN ON THESE PLANS.

PHASE 2

*PROPOSED WESTBOUND TOWNE WEST BOULEVARD
 *PROPOSED EASTBOUND CLARK TOWNE ROAD
 *PROPOSED WESTBOUND OLD RICHMOND ROAD
 *PROPOSED EASTBOUND OAK BEND FOREST ROAD

1. INSTALL DETOUR SIGNAGE.
2. THE CONTRACTOR SHALL TEMPORARILY CLOSE THE SOUTHBOUND LANES OF BELKNAP ROAD TO THE LIMITS SHOWN ON THESE PLANS.
3. THE CONTRACTOR SHALL TEMPORARILY CLOSE THE WESTBOUND LANES OF TOWNE WEST BOULEVARD TO THE LIMITS SHOWN ON THESE PLANS.
4. THE CONTRACTOR SHALL CONSTRUCT THE PROPOSED ELEMENTS (EXCEPT FOR SIGNING AND STRIPING) ALONG THE PROPOSED WESTBOUND TOWNE WEST BOULEVARD AS SHOWN ON THESE PLANS.
5. THE CONTRACTOR SHALL TEMPORARILY CLOSE THE EASTBOUND LANES OF CLARK TOWNE ROAD TO THE LIMITS SHOWN ON THESE PLANS.
6. THE CONTRACTOR SHALL CONSTRUCT THE PROPOSED ELEMENTS (EXCEPT FOR SIGNING AND STRIPING) ALONG THE PROPOSED EASTBOUND CLARK TOWNE ROAD AS SHOWN ON THESE PLANS.
7. THE CONTRACTOR SHALL TEMPORARILY CLOSE THE WESTBOUND LANES OF OLD RICHMOND ROAD TO THE LIMITS SHOWN ON THESE PLANS.
8. THE CONTRACTOR SHALL CONSTRUCT THE PROPOSED ELEMENTS (EXCEPT FOR SIGNING AND STRIPING) ALONG THE PROPOSED WESTBOUND OLD RICHMOND ROAD AS SHOWN ON THESE PLANS AND OPEN TO TRAFFIC.
9. THE CONTRACTOR SHALL TEMPORARILY CLOSE THE EASTBOUND LANES OF OAK BEND FOREST ROAD TO THE LIMITS SHOWN ON THESE PLANS.
10. THE CONTRACTOR SHALL CONSTRUCT THE PROPOSED ELEMENTS (EXCEPT FOR SIGNING AND STRIPING) ALONG THE PROPOSED EASTBOUND OAK BEND FOREST ROAD AS SHOWN ON THESE PLANS.

PHASE 3

*PROPOSED NORTHBOUND BELKNAP ROAD

1. INSTALL DETOUR SIGNAGE.
2. THE CONTRACTOR SHALL TEMPORARILY CLOSE THE NORTHBOUND LANES OF BELKNAP ROAD TO THE LIMITS SHOWN ON THESE PLANS.
3. THE CONTRACTOR SHALL CONSTRUCT THE PROPOSED ELEMENTS (EXCEPT FOR SIGNING AND STRIPING) ALONG THE PROPOSED NORTHBOUND BELKNAP ROAD AS SHOWN ON THESE PLANS.
4. THE CONTRACTOR SHALL TEMPORARILY CLOSE THE INSIDE EASTBOUND LANE OF TOWNE WEST BOULEVARD TO THE LIMITS SHOWN ON THESE PLANS.
5. THE CONTRACTOR SHALL TEMPORARILY CLOSE THE INSIDE WESTBOUND LANE OF TOWNE WEST BOULEVARD TO THE LIMITS SHOWN ON THESE PLANS.
6. THE CONTRACTOR SHALL TEMPORARILY CLOSE THE INSIDE EASTBOUND LANE OF CLARK TOWNE ROAD TO THE LIMITS SHOWN ON THESE PLANS.
7. THE CONTRACTOR SHALL TEMPORARILY CLOSE THE INSIDE WESTBOUND LANE OF CLARK TOWNE ROAD TO THE LIMITS SHOWN ON THESE PLANS.
8. THE CONTRACTOR SHALL TEMPORARILY CLOSE THE CENTER LANE OF OLD RICHMOND ROAD TO THE LIMITS SHOWN ON THESE PLANS.
9. THE CONTRACTOR SHALL TEMPORARILY SHIFT THE TRAFFIC PATTERN ON THE OUTSIDE SOUTHBOUND LANE OF BELKNAP ROAD FROM REDHILL DRIVE TO EAST OLD RICHMOND ROAD TO THE LIMITS SHOWN ON THESE PLANS.
10. THE CONTRACTOR SHALL TEMPORARILY SHIFT THE TRAFFIC PATTERN ON THE OUTSIDE EASTBOUND LANE OF EAST OLD RICHMOND ROAD TO THE LIMITS SHOWN ON THESE PLANS.
11. INSTALL PERMANENT SIGNING AND PAVEMENT MARKING SOUTH OF OAK BEND FOREST DRIVE.

PHASE 4

*PROPOSED BELKNAP MEDIAN, NORTH OF BELKNAP

1. THE CONTRACTOR SHALL TEMPORARILY CLOSE THE NORTHBOUND OUTSIDE LANE OF BELKNAP ROAD TO THE LIMITS SHOWN ON THESE PLANS.
2. THE CONTRACTOR SHALL TEMPORARILY SHIFT THE TRAFFIC PATTERN ON THE OUTSIDE SOUTHBOUND LANE OF BELKNAP ROAD FROM REDHILL DRIVE TO EAST OLD RICHMOND ROAD TO THE LIMITS SHOWN ON THESE PLANS.
3. THE CONTRACTOR SHALL TEMPORARILY CLOSE THE SOUTHBOUND OUTSIDE LANE OF BELKNAP ROAD TO THE LIMITS SHOWN ON THESE PLANS.
4. THE CONTRACTOR SHALL CONSTRUCT THE PROPOSED MEDIAN ALONG BELKNAP ROAD AS SHOWN ON THESE PLANS.
5. INSTALL REMAINING PERMANENT SIGNING AND PAVEMENT MARKINGS NORTH OF OAK BEND FOREST DRIVE.
6. REMOVE EXISTING PAVEMENT MARKING OUTSIDE LANE ONLY FROM BL HALN_BELKNAP STA 61+47.26 LT TO RED HILL DRIVE.

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02/06/2024

NO	DATE	REVISION	APPROVED

rps Texas PE Firm Reg. #F-929
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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
 W BELLFORT BLVD TO OAK BEND FOREST DR

TRAFFIC CONTROL PLANS
 NARRATIVE

CNTY PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	2023		37
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RPS	RPS	RPS	RPS	

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PHASE 1 STEP 1 CHANNELIZING DEVICES					
BASLINE		BEGIN STATION	END STATION	MAXIMUM DEVICE	DEVICE TYPE
TCP_DET_01	RIGHT	0+71	2+07	35	VERTICAL PANELS
TCP_DET_01	LEFT	0+71	2+07	35	VERTICAL PANELS

PHASE 1 STEP 2 CHANNELIZING DEVICES					
BASLINE		BEGIN STATION	END STATION	MAXIMUM DEVICE SPACING	DEVICE TYPE
HALN_BELKNAP	RIGHT	19+23	20+63	N/A	LOW PROFILE CONCRETE BARRIER
HALN_BELKNAP	LEFT	21+15	22+96	35	CONSTRUCTION BARREL
HALN_BELKNAP	LEFT	13+28	13+68	10	CONSTRUCTION BARREL
HALN_BELKNAP	LEFT	15+42	25+46	N/A	LOW PROFILE CONCRETE BARRIER
HALN_BELKNAP	LEFT	25+87	33+65	N/A	LOW PROFILE CONCRETE BARRIER
HALN_BELKNAP	LEFT	33+92	36+26	N/A	LOW PROFILE CONCRETE BARRIER
HALN_BELKNAP	LEFT	36+72	39+60	N/A	LOW PROFILE CONCRETE BARRIER
HALN_BELKNAP	LEFT	39+72	40+87	N/A	LOW PROFILE CONCRETE BARRIER
HALN_BELKNAP	LEFT	41+22	42+71	N/A	LOW PROFILE CONCRETE BARRIER
HALN_BELKNAP	LEFT	43+06	44+23	N/A	LOW PROFILE CONCRETE BARRIER
HALN_BELKNAP	LEFT	44+43	44+82	N/A	LOW PROFILE CONCRETE BARRIER
HALN_BELKNAP	LEFT	45+02	47+77	N/A	LOW PROFILE CONCRETE BARRIER
HALN_BELKNAP	LEFT	48+10	49+30	N/A	LOW PROFILE CONCRETE BARRIER
HALN_BELKNAP	LEFT	49+64	52+27	N/A	LOW PROFILE CONCRETE BARRIER
HALN_BELKNAP	LEFT	52+53	56+87	N/A	LOW PROFILE CONCRETE BARRIER
HALN_BELKNAP	LEFT	56+99	58+34	N/A	LOW PROFILE CONCRETE BARRIER
HALN_BELKNAP	LEFT	61+10	62+06	70	CONSTRUCTION BARREL
HALN_TOWNEW	LEFT	9+45	10+50	10	CONSTRUCTION BARREL
HALN_TOWNEW	LEFT	10+19	10+50	10	CONSTRUCTION BARREL
HALN_TOWNEW	RIGHT	8+00	N/A	10	CONSTRUCTION BARREL
HALN_CLARKT	RIGHT	10+27	10+50	10	CONSTRUCTION BARREL
HALN_CLARKT	RIGHT	9+72	10+50	10	CONSTRUCTION BARREL
HALN_CLARKT	RIGHT	9+72	N/A	10	CONSTRUCTION BARREL
HALN_ORICH_W	RIGHT	136+51	N/A	10	CONSTRUCTION BARREL
HALN_ORICH_W	LEFT	136+51	138+00	10	VERTICAL PANELS
HALN_ORICH_W	LEFT	137+47	138+00	10	CONSTRUCTION BARREL
HALN_OAKBEND	LEFT	9+84	N/A	10	CONSTRUCTION BARREL
HALN_OAKBEND	RIGHT	9+84	10+50	10	VERTICAL PANELS
HALN_OAKBEND	RIGHT	10+38	10+50	10	CONSTRUCTION BARREL
TCP_DET_01	LEFT	0+44	1+02	10	VERTICAL PANELS
TCP_DET_01	LEFT	1+02	1+85	30	VERTICAL PANELS
TCP_DET_01	LEFT	1+85	2+80	15	VERTICAL PANELS
TCP_DET_01	RIGHT	0+56	2+03	30	CONSTRUCTION BARREL
TCP_DET_02	LEFT	1+47	2+95	30	CONSTRUCTION BARREL

PHASE 2 CHANNELIZING DEVICES					
BASLINE		BEGIN STATION	END STATION	MAXIMUM DEVICE SPACING	DEVICE TYPE
HALN_BELKNAP	RIGHT	13+58	13+63	10	CONSTRUCTION BARREL
HALN_BELKNAP	LEFT	15+42	25+24	N/A	LOW PROFILE CONCRETE BARRIER
HALN_BELKNAP	LEFT	25+70	33+65	N/A	LOW PROFILE CONCRETE BARRIER
HALN_BELKNAP	LEFT	33+92	36+45	N/A	LOW PROFILE CONCRETE BARRIER
HALN_BELKNAP	LEFT	36+91	39+60	N/A	LOW PROFILE CONCRETE BARRIER
HALN_BELKNAP	LEFT	39+72	40+87	N/A	LOW PROFILE CONCRETE BARRIER
HALN_BELKNAP	LEFT	41+22	42+71	N/A	LOW PROFILE CONCRETE BARRIER
HALN_BELKNAP	LEFT	43+06	44+23	N/A	LOW PROFILE CONCRETE BARRIER
HALN_BELKNAP	LEFT	44+43	44+82	N/A	LOW PROFILE CONCRETE BARRIER
HALN_BELKNAP	LEFT	45+02	47+64	N/A	LOW PROFILE CONCRETE BARRIER
HALN_BELKNAP	LEFT	47+95	49+30	N/A	LOW PROFILE CONCRETE BARRIER
HALN_BELKNAP	LEFT	49+64	52+27	N/A	LOW PROFILE CONCRETE BARRIER
HALN_BELKNAP	LEFT	52+53	56+87	N/A	LOW PROFILE CONCRETE BARRIER
HALN_BELKNAP	LEFT	56+99	58+65	N/A	LOW PROFILE CONCRETE BARRIER
HALN_BELKNAP	LEFT	58+65	58+82	10	VERTICAL PANELS
HALN_BELKNAP	LEFT	61+10	62+06	35	CONSTRUCTION BARREL
HALN_TOWNEW	RIGHT	10+16	10+50	10	CONSTRUCTION BARREL
HALN_TOWNEW	RIGHT	9+86	10+50	10	CONSTRUCTION BARREL
HALN_TOWNEW	LEFT	9+75	N/A	10	CONSTRUCTION BARREL
HALN_CLARKT	LEFT	9+81	10+50	10	CONSTRUCTION BARREL
HALN_CLARKT	LEFT	10+17	10+50	10	CONSTRUCTION BARREL
HALN_CLARKT	RIGHT	9+69	N/A	10	CONSTRUCTION BARREL
HALN_ORICH_W	RIGHT	137+58	138+00	10	CONSTRUCTION BARREL
HALN_ORICH_W	RIGHT	136+53	138+00	10	VERTICAL PANELS
HALN_ORICH_W	LEFT	136+53	N/A	10	CONSTRUCTION BARREL
HALN_OAKBEND	RIGHT	9+82	10+50	10	VERTICAL PANELS
HALN_OAKBEND	RIGHT	9+82	N/A	10	CONSTRUCTION BARREL
HALN_OAKBEND	LEFT	9+99	10+50	10	CONSTRUCTION BARREL
TCP_DET_01	LEFT	0+71	1+39	10	VERTICAL PANELS
TCP_DET_01	LEFT	1+39	1+85	30	VERTICAL PANELS
TCP_DET_01	LEFT	1+85	2+80	15	VERTICAL PANELS
TCP_DET_01	RIGHT	0+75	2+02	30	CONSTRUCTION BARREL
TCP_DET_00	LEFT	1+67	2+98	30	CONSTRUCTION BARREL

PHASE 3 CHANNELIZING DEVICES					
BASLINE		BEGIN STATION	END STATION	MAXIMUM DEVICE SPACING	DEVICE TYPE
HALN_BELKNAP	RIGHT	56+58	58+35	35	CONSTRUCTION BARREL
HALN_BELKNAP	RIGHT	56+58	58+35	35	CONSTRUCTION BARREL
HALN_BELKNAP	RIGHT	59+11	60+51	N/A	LOW PROFILE CONCRETE BARRIER
HALN_BELKNAP	LEFT	59+20	60+43	N/A	LOW PROFILE CONCRETE BARRIER
HALN_BELKNAP	LEFT	61+10	63+19	35	CONSTRUCTION BARREL
HALN_BELKNAP	LEFT	61+10	63+19	35	CONSTRUCTION BARREL
TCP_DET_04	RIGHT	0+87	2+93	35	CONSTRUCTION BARREL

PHASE 4 CHANNELIZING DEVICES					
BASLINE		BEGIN STATION	END STATION	MAXIMUM DEVICE SPACING	DEVICE TYPE
HALN_BELKNAP	RIGHT	56+58	58+35	35	CONSTRUCTION BARREL
HALN_BELKNAP	RIGHT	56+58	58+35	35	CONSTRUCTION BARREL
HALN_BELKNAP	RIGHT	59+11	60+51	N/A	LOW PROFILE CONCRETE BARRIER
HALN_BELKNAP	LEFT	59+20	60+43	N/A	LOW PROFILE CONCRETE BARRIER
HALN_BELKNAP	LEFT	61+10	63+19	35	CONSTRUCTION BARREL
HALN_BELKNAP	LEFT	61+10	63+19	35	CONSTRUCTION BARREL
TCP_DET_04	RIGHT	0+87	2+93	35	CONSTRUCTION BARREL

NOTES:

- DRIVEWAY CHANNELIZING DEVICES SHALL BE SPACED TO 10 FT MAXIMUM UNLESS OTHERWISE SHOWN IN PLANS.
- THE FIRST 20 FT OF LOW PROFILE CONCRETE BARRIER FACING APPROACHING TRAFFIC SHALL BE TYPE 2 LOW PROFILE CONCRETE BARRIER.



NO.	DATE	REVISION	APPROVED
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FORT BEND COUNTY, TEXAS
BELKNAP ROAD IMPROVEMENTS
 W BELLFORT BLVD TO OAK BEND FOREST DR
TRAFFIC CONTROL PLANS
CHANNELIZING DEVICES

CNTY PROJ *	RPS PROJ *	DATE	SCALE	SHEET NO
17-2-11	008169	2023		38
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RPS	RPS	RPS	RPS	

SHEET 1 OF 1

TRAFFIC CONTROL PLAN HORIZONTAL ALIGNMENTS

TCP DETOUR 01

Chain TCP_DET_01 contains:
167 CUR TCP_DET_01_3 CUR TCP_DET_01_4 168

Beginning chain TCP_DET_01 description
Feature: Geom_Secondary

Point 167 N 13,810,129.3167 E 3,041,037.9245 Sta 0+00.00

Course from 167 to PC TCP_DET_01_3 N 1° 20' 17" E Dist 185.8476

Curve Data

Curve TCP_DET_01_3
P.I. Station 2+11.51 N 13,810,340.7648 E 3,041,042.8638
Delta = 35° 21' 28" (LT)
Degree = 71° 10' 30"
Tangent = 25.6582
Length = 49.6773
Radius = 80.5000
External = 3.9902
Long Chord = 48.8928
Mid. Ord. = 3.8017
P.C. Station 1+85.85 N 13,810,315.1137 E 3,041,042.2646
P.T. Station 2+35.52 N 13,810,362.0315 E 3,041,028.5087
C.C. = N 1° 20' 17" E
Back = N 34° 01' 11" W
Ahead = N 34° 01' 11" W
Chord Bear = N 16° 20' 27" W

Curve Data

Curve TCP_DET_01_4
P.I. Station 2+58.43 N 13,810,381.0150 E 3,041,015.6947
Delta = 31° 45' 50" (RT)
Degree = 71° 10' 30"
Tangent = 22.9035
Length = 44.6278
Radius = 80.5000
External = 3.1948
Long Chord = 44.0585
Mid. Ord. = 3.0729
P.C. Station 2+35.52 N 13,810,362.0315 E 3,041,028.5087
P.T. Station 2+80.15 N 13,810,403.9007 E 3,041,014.7931
C.C. = N 13,810,407.0694 E 3,041,095.2308
Back = N 34° 01' 11" W
Ahead = N 2° 15' 21" W
Chord Bear = N 18° 08' 16" W

Course from PT TCP_DET_01_4 to 168 N 2° 15' 21" W Dist 50.0000

Point 168 N 13,810,453.8620 E 3,041,012.8251 Sta 3+30.15

Ending chain TCP_DET_01 description

TCP DETOUR 02

Chain TCP_DET_02 contains:
165 CUR TCP_DET_02_3 CUR TCP_DET_02_6 166

Beginning chain TCP_DET_02 description
Feature: Geom_Secondary

Point 165 N 13,810,035.8761 E 3,041,044.8411 Sta 0+00.00

Course from 165 to PC TCP_DET_02_3 N 4° 09' 08" E Dist 73.2529

Curve Data

Curve TCP_DET_02_3
P.I. Station 0+96.64 N 13,810,132.2609 E 3,041,051.8382
Delta = 5° 11' 41" (RT)
Degree = 11° 06' 53"
Tangent = 23.3855
Length = 46.7389
Radius = 515.5000
External = 0.5302
Long Chord = 46.7229
Mid. Ord. = 0.5296
P.C. Station 0+73.25 N 13,810,108.9368 E 3,041,050.1450
P.T. Station 1+19.99 N 13,810,155.3359 E 3,041,055.6363
C.C. = N 13,810,071.6120 E 3,041,564.2920
Back = N 4° 09' 08" E
Ahead = N 9° 20' 49" E
Chord Bear = N 6° 44' 58" E

Course from PT TCP_DET_02_3 to PC TCP_DET_02_6 N 9° 20' 49" E Dist 40.8750

Curve Data

Curve TCP_DET_02_6
P.I. Station 1+87.05 N 13,810,221.5038 E 3,041,066.5274
Delta = 5° 56' 31" (LT)
Degree = 11° 21' 25"
Tangent = 26.1832
Length = 52.3196
Radius = 504.5000
External = 0.6790
Long Chord = 52.2961
Mid. Ord. = 0.6781
P.C. Station 1+60.87 N 13,810,195.6682 E 3,041,062.2749
P.T. Station 2+13.19 N 13,810,247.6408 E 3,041,068.0826
C.C. = N 13,810,277.6054 E 3,040,564.4732
Back = N 9° 20' 49" E
Ahead = N 3° 24' 18" E
Chord Bear = N 6° 22' 34" E

Course from PT TCP_DET_02_6 to 166 N 3° 24' 18" E Dist 85.2223

Point 166 N 13,810,332.7127 E 3,041,073.1443 Sta 2+98.41

Ending chain TCP_DET_02 description

TCP DETOUR 03

Chain TCP_DET_03 contains:
238 239 240

Beginning chain TCP_DET_03 description
Feature: Geom_Secondary

Point 238 N 13,810,180.9469 E 3,040,947.2546 Sta 9+57.91

Course from 238 to 239 N 87° 11' 48" E Dist 46.0457

Point 239 N 13,810,183.1988 E 3,040,993.2452 Sta 10+03.95

Course from 239 to 240 N 87° 11' 48" E Dist 46.0457

Point 240 N 13,810,185.4508 E 3,041,039.2358 Sta 10+50.00

Ending chain TCP_DET_03 description

TCP DETOUR 04

Chain TCP_DET_04 contains:
151 CUR TCP_DET_04_3 CUR TCP_DET_04_4 152

Beginning chain TCP_DET_04 description
Feature: Geom_Secondary

Point 151 N 13,810,518.8298 E 3,040,997.8982 Sta 0+00.00

Course from 151 to PC TCP_DET_04_3 N 2° 11' 41" W Dist 34.5261

Curve Data

Curve TCP_DET_04_3
P.I. Station 0+77.27 N 13,810,596.0390 E 3,040,994.9484
Delta = 8° 47' 29" (RT)
Degree = 10° 18' 18"
Tangent = 42.7394
Length = 85.3110
Radius = 556.0000
External = 1.6403
Long Chord = 85.2274
Mid. Ord. = 1.6354
P.C. Station 0+34.53 N 13,810,553.3306 E 3,040,996.5761
P.T. Station 1+19.84 N 13,810,638.4944 E 3,040,999.8673
C.C. = N 13,810,574.5047 E 3,041,552.1727
Back = N 2° 10' 57" W
Ahead = N 6° 36' 32" E
Chord Bear = N 2° 12' 47" E

Curve Data

Curve TCP_DET_04_4
P.I. Station 1+56.40 N 13,810,674.8175 E 3,041,004.0756
Delta = 9° 10' 10" (LT)
Degree = 12° 33' 54"
Tangent = 36.5661
Length = 72.9760
Radius = 456.0000
External = 1.4637
Long Chord = 72.8982
Mid. Ord. = 1.4591
P.C. Station 1+19.84 N 13,810,638.4944 E 3,040,999.8673
P.T. Station 1+92.81 N 13,810,711.3471 E 3,041,002.4420
C.C. = N 13,810,690.9751 E 3,040,546.8973
Back = N 6° 36' 32" E
Ahead = N 2° 33' 38" W
Chord Bear = N 2° 01' 27" E

Course from PT TCP_DET_04_4 to 152 N 2° 33' 38" W Dist 100.0000

Point 152 N 13,810,811.2472 E 3,040,997.9745 Sta 2+92.81

Ending chain TCP_DET_04 description



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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

**TRAFFIC CONTROL PLANS
GEOMETRIC DATA
ALL PHASES**

CNTY PROJ *	RPS PROJ *	DATE	SCALE	SHEET NO
17-2-11	008169	2023		39
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RPS	RPS	RPS	RPS	

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TCP DETOUR 05

Chain TCP_DET_05 contains:
CUR TCP_DET_05_1 CUR TCP_DET_05_2 CUR TCP_DET_05_3 148

Beginning chain TCP_DET_05 description
Feature: Geom_Secondary

Curve TCP_DET_05_1
 P.I. Station = 0+25.00 N 13,809,233.7258 E 3,040,991.0441
 Delta = 1° 25' 25" (RT)
 Degree = 2° 50' 49"
 Tangent = 25.0013
 Length = 50.0000
 Radius = 2,012.5000
 External = 0.1553
 Long Chord = 49.9987
 Mid. Ord. = 0.1553
 P.C. Station = 0+00.00 N 13,809,208.7246 E 3,040,991.1253
 P.T. Station = 0+50.00 N 13,809,258.7212 E 3,040,991.5840
 C.C. = N 0° 11' 10" W
 Back = N 1° 14' 14" E
 Ahead = N 0° 31' 32" E
 Chord Bear = N 0° 31' 32" E

Curve TCP_DET_05_2
 P.I. Station = 0+90.20 N 13,809,298.9168 E 3,040,992.4522
 Delta = 8° 54' 38" (LT)
 Degree = 11° 06' 14"
 Tangent = 40.2050
 Length = 80.2478
 Radius = 516.0000
 External = 1.5639
 Long Chord = 80.1670
 Mid. Ord. = 1.5592
 P.C. Station = 0+50.00 N 13,809,258.7212 E 3,040,991.5840
 P.T. Station = 1+30.25 N 13,809,338.7618 E 3,040,987.0839
 C.C. = N 1° 14' 14" E
 Back = N 7° 40' 24" W
 Ahead = N 3° 13' 05" W
 Chord Bear = N 3° 13' 05" W

Curve TCP_DET_05_3
 P.I. Station = 1+59.43 N 13,809,367.6786 E 3,040,983.1879
 Delta = 6° 37' 36" (RT)
 Degree = 11° 22' 06"
 Tangent = 29.1780
 Length = 58.2910
 Radius = 504.0000
 External = 0.8439
 Long Chord = 58.2585
 Mid. Ord. = 0.8425
 P.C. Station = 1+30.25 N 13,809,338.7618 E 3,040,987.0839
 P.T. Station = 1+88.54 N 13,809,396.8517 E 3,040,982.6550
 C.C. = N 7° 40' 24" W
 Back = N 1° 02' 48" W
 Ahead = N 4° 21' 36" W
 Chord Bear = N 4° 21' 36" W

Course from PT TCP_DET_05_3 to 148 N 1° 02' 48" W Dist 50.0000

Point 148 N 13,809,446.8434 E 3,040,981.7417 Sta 2+38.54

Ending chain TCP_DET_05 description

TCP DETOUR 06

Chain TCP_DET_06 contains:
149 CUR TCP_DET_06_3 CUR TCP_DET_06_4 150

Beginning chain TCP_DET_06 description
Feature: Geom_Secondary

Point 149 N 13,810,373.2332 E 3,041,112.1622 Sta 0+00.00

Course from 149 to PC TCP_DET_06_3 N 87° 22' 10" E Dist 51.7913

Curve TCP_DET_06_3
 P.I. Station = 0+82.98 N 13,810,377.0418 E 3,041,195.0573
 Delta = 10° 20' 49" (RT)
 Degree = 16° 37' 54"
 Tangent = 31.1912
 Length = 62.2128
 Radius = 344.5000
 External = 1.4092
 Long Chord = 62.1283
 Mid. Ord. = 1.4034
 P.C. Station = 0+51.79 N 13,810,375.6102 E 3,041,163.8989
 P.T. Station = 1+14.00 N 13,810,372.8538 E 3,041,225.9660
 C.C. = N 87° 22' 10" E
 Back = S 82° 17' 01" E
 Ahead = S 87° 27' 26" E
 Chord Bear = S 87° 27' 26" E

Curve Data

Curve TCP_DET_06_4
 P.I. Station = 1+48.85 N 13,810,368.1754 E 3,041,260.4936
 Delta = 11° 11' 44" (LT)
 Degree = 16° 07' 01"
 Tangent = 34.8431
 Length = 69.4644
 Radius = 355.5000
 External = 1.7034
 Long Chord = 69.3539
 Mid. Ord. = 1.6953
 P.C. Station = 1+14.00 N 13,810,372.8538 E 3,041,225.9660
 P.T. Station = 1+83.47 N 13,810,370.2899 E 3,041,295.2725
 C.C. = N 13,810,725.1347 E 3,041,273.6987
 Back = S 82° 17' 01" E
 Ahead = N 86° 31' 15" E
 Chord Bear = S 87° 52' 53" E

Course from PT TCP_DET_06_4 to 150 N 86° 31' 15" E Dist 118.0699

Point 150 N 13,810,377.4551 E 3,041,413.1248 Sta 3+01.54

Ending chain TCP_DET_06 description

TCP DETOUR 07

Chain TCP_DET_07 contains:
241 242 243

Beginning chain TCP_DET_07 description
Feature: Geom_Secondary

Point 241 N 13,809,060.9822 E 3,040,860.6555 Sta 8+81.69

Course from 241 to 242 N 87° 00' 31" E Dist 93.0564

Point 242 N 13,809,065.8385 E 3,040,953.5851 Sta 9+74.75

Course from 242 to 243 N 87° 00' 31" E Dist 75.2522

Point 243 N 13,809,069.7656 E 3,041,028.7348 Sta 10+50.00

Ending chain TCP_DET_07 description

TCP DETOUR 08

Chain TCP_DET_08 contains:
244 245 246

Beginning chain TCP_DET_08 description
Feature: Geom_Secondary

Point 244 N 13,807,972.8585 E 3,040,983.3213 Sta 9+40.86

Course from 244 to 245 N 86° 39' 49" E Dist 55.0000

Point 245 N 13,807,976.0595 E 3,041,038.2281 Sta 9+95.86

Course from 245 to 246 N 86° 39' 49" E Dist 54.1768

Point 246 N 13,807,979.2126 E 3,041,092.3131 Sta 10+50.03

Ending chain TCP_DET_08 description

TCP DETOUR 09

Chain TCP_DET_09 contains:
247 248 249

Beginning chain TCP_DET_09 description
Feature: Geom_Secondary

Point 247 N 13,806,828.5662 E 3,041,055.7560 Sta 9+46.54

Course from 247 to 248 N 86° 31' 45" E Dist 61.5215

Point 248 N 13,806,832.2907 E 3,041,117.1646 Sta 10+08.06

Course from 248 to 249 N 86° 31' 45" E Dist 41.9415

Point 249 N 13,806,834.8298 E 3,041,159.0292 Sta 10+50.00

Ending chain TCP_DET_09 description



14-Nov-2023

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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

TRAFFIC CONTROL PLANS
GEOMETRIC DATA
ALL PHASES

SHEET 2 OF 3













CNTY	PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	2023			40
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY		
RPS	RPS	RPS	RPS		

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LEGEND

-  EXISTING TRAFFIC PATTERN TO REMAIN
-  EXISTING TRAFFIC PATTERN TO TEMPORARILY CLOSE
-  PROPOSED TEMPORARY TRAFFIC PATTERN
-  PAVEMENT CONSTRUCTED IN PREVIOUS PHASE
-  PAVEMENT CONSTRUCTED IN THIS PHASE
-  TEMPORARY PAVEMENT
-  TEMPORARY LANE CLOSURE
-  TEMPORARY BARRELS
-  TEMPORARY VERTICAL PANELS
-  LOW PROFILE CONCRETE BARRIER
-  TYPE III BARRICADE
-  PROPOSED BRIDGE CONSTRUCTION

NOTES:

1. SEE CHANNELIZATION TABLES FOR DEVICE TYPE AND SPACING TO ALL PHASES.
2. THE FULL DEPTH SAW CUT, CURB REMOVAL AND MEDIAN NOSE REMOVAL ARE ACCOUNTED FOR IN THE REMOVAL PLANS AND SHALL NOT BE PAID FOR UNDER THE TRAFFIC CONTROL PLANS. THE INFORMATION REGARDING THE REMOVAL IS SHOWN FOR THE CONTRACTOR INFORMATION ONLY.

CAUTION!!!!
OVERHEAD ELECTRIC,
LOCATIONS ARE APPROXIMATE

CALL BEFORE YOU DIG!
TEXAS ONE CALL PARTICIPANTS REQUEST
48 HOURS NOTICE BEFORE YOU DIG, DRILL,
OR BLAST - STOP CALL

 **Texas One Call System**
1-800-DIG-TESS



14-Nov-2023

NO.	DATE	REVISION	APPROVED

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575 N. Dalry Ashford, Suite 700, Houston, Texas 77079
T +1 281 589 7257 E usinfrastructure@rpsgroup.com

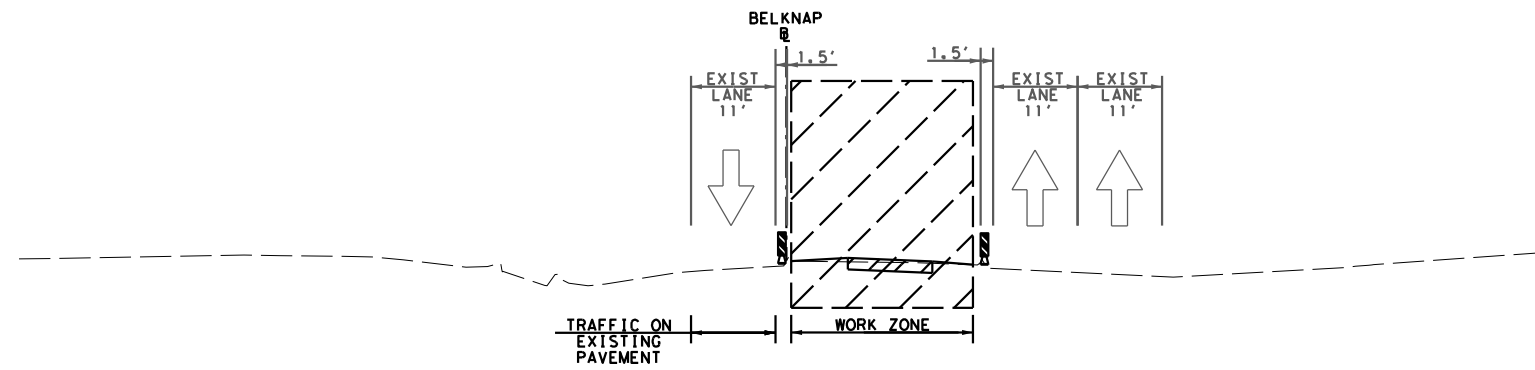
FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

TRAFFIC CONTROL PLANS
TYPICAL SECTIONS
PHASE 1 STEP 1

SHEET 1 OF 1

CNTY	PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	2023			41
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY		
RPS	RPS	RPS	RPS		

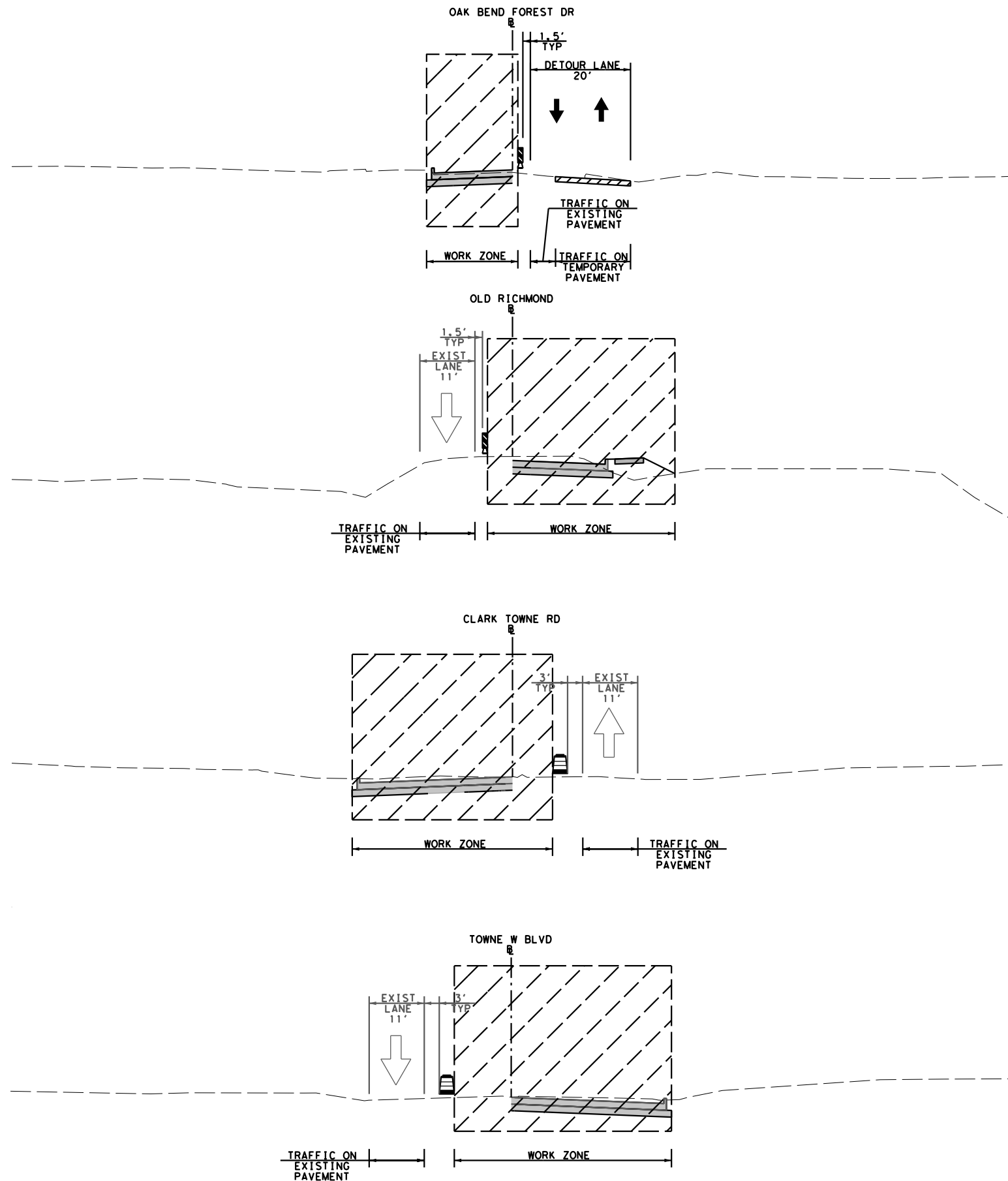


BELKNAP
FROM STA 59+05.25
TO STA 60+40.99

- CONSTRUCT TEMPORARY PAVEMENT ALONG EXISTING MEDIAN.
- TRAFFIC ON EXISTING LANES ON THE EXISTING PAVEMENT.

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OAK BEND FOREST DR FROM STA 9+83.86 TO STA 10+50.00

- TRAFFIC ON EXISTING EASTBOUND LANE ON THE EXISTING PAVEMENT.
- CONSTRUCT THE PROPOSED WESTBOUND PAVEMENT WITHIN THE SHOWN LIMITS.

OLD RICHMOND RD FROM STA 136+62.57 TO STA 137+90.80

- TRAFFIC ON EXISTING WESTBOUND LANE ON THE EXISTING PAVEMENT.
- CONSTRUCT THE PROPOSED EASTBOUND PAVEMENT WITHIN THE SHOWN LIMITS.

CLARK TOWNE RD FROM STA 9+81.58 TO STA 10+50.00

- TRAFFIC ON EXISTING EASTBOUND LANE ON THE EXISTING PAVEMENT.
- CONSTRUCT THE PROPOSED WESTBOUND PAVEMENT WITHIN THE SHOWN LIMITS.

TOWNE WEST BLVD FROM STA 9+85.78 TO STA 10+50.00

- TRAFFIC ON EXISTING WESTBOUND LANE ON THE EXISTING PAVEMENT.
- CONSTRUCT THE PROPOSED EASTBOUND PAVEMENT WITHIN THE SHOWN LIMITS.

LEGEND

- EXISTING TRAFFIC PATTERN TO REMAIN
- EXISTING TRAFFIC PATTERN TO TEMPORARILY CLOSE
- PROPOSED TEMPORARY TRAFFIC PATTERN
- PAVEMENT CONSTRUCTED IN PREVIOUS PHASE
- PAVEMENT CONSTRUCTED IN THIS PHASE
- TEMPORARY PAVEMENT
- TEMPORARY LANE CLOSURE
- TEMPORARY BARRELS
- TEMPORARY VERTICAL PANELS
- LOW PROFILE CONCRETE BARRIER
- TYPE III BARRICADE
- PROPOSED BRIDGE CONSTRUCTION
- PROPOSED 13" (FAST TRACK)

NOTES:

- SEE CHANNELIZATION TABLES FOR DEVICE TYPE AND SPACING TO ALL PHASES.
- THE FULL DEPTH SAW CUT, CURB REMOVAL AND MEDIAN NOSE REMOVAL ARE ACCOUNTED FOR IN THE REMOVAL PLANS AND SHALL NOT BE PAID FOR UNDER THE TRAFFIC CONTROL PLANS. THE INFORMATION REGARDING THE REMOVAL IS SHOWN FOR THE CONTRACTOR INFORMATION ONLY.

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02/06/2024

NO.	DATE	REVISION	APPROVED

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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

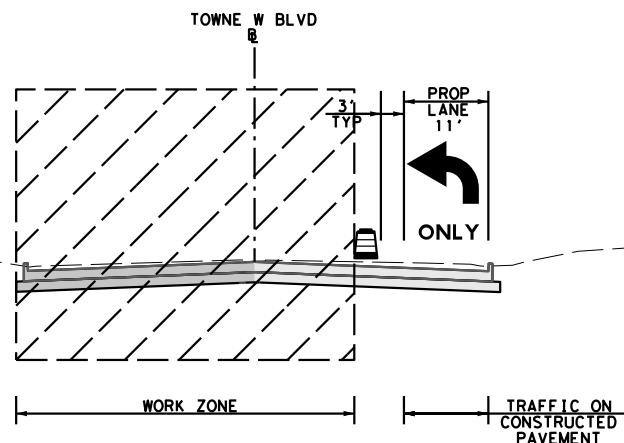
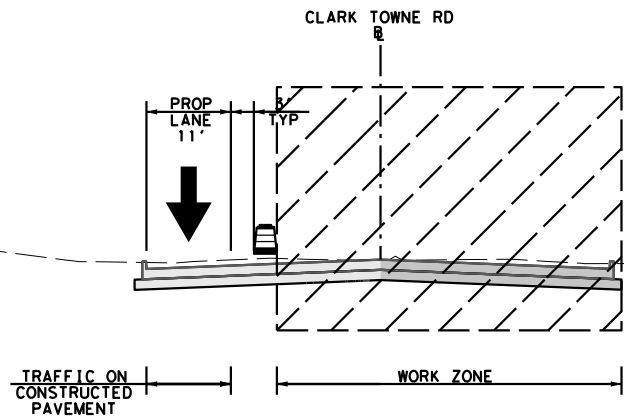
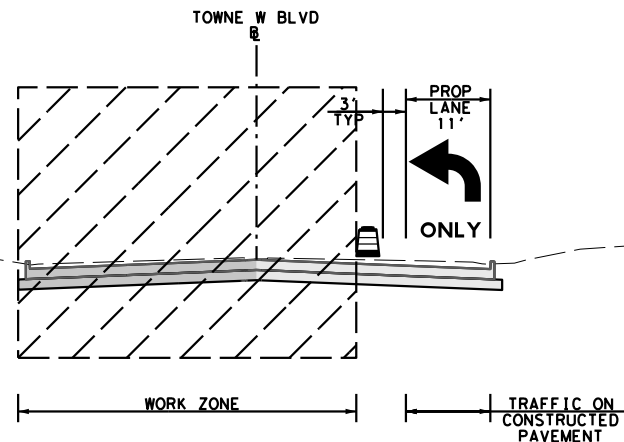
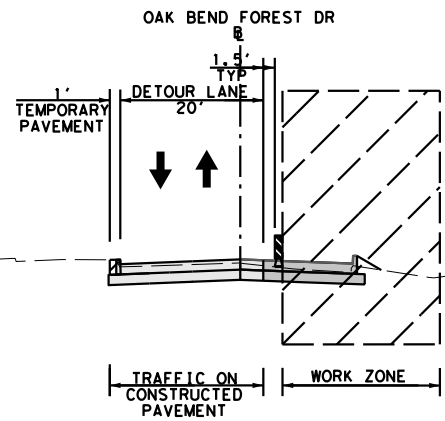
TRAFFIC CONTROL PLANS
TYPICAL SECTIONS
PHASE 1 STEP 2

CNTY PROJ	RPS PROJ	DATE	SCALE	SHEET NO
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DESIGNED BY RPS	DRAWN BY RPS	CHECKED BY RPS	VERIFIED BY RPS	

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OAK BEND FOREST DR FROM STA 9+82.34 TO STA 10+50.00

- TRAFFIC ON PROPOSED WESTBOUND LANE ON THE PROPOSED PAVEMENT.
- CONSTRUCT THE PROPOSED EASTBOUND PAVEMENT WITHIN THE SHOWN LIMITS.

OLD RICHMOND RD FROM STA 136+62.60 TO STA 137+90.80

- TRAFFIC ON PROPOSED EASTBOUND LANE ON THE PROPOSED PAVEMENT.
- CONSTRUCT THE PROPOSED WESTBOUND PAVEMENT WITHIN THE SHOWN LIMITS.

CLARK TOWNE RD FROM STA 9+81.92 TO STA 10+50.00

- TRAFFIC ON PROPOSED WESTBOUND LANE ON THE PROPOSED PAVEMENT.
- CONSTRUCT THE PROPOSED EASTBOUND PAVEMENT WITHIN THE SHOWN LIMITS.

TOWNE WEST BLVD FROM STA 9+84.62 TO STA 10+50.00

- TRAFFIC ON PROPOSED EASTBOUND LANE ON THE PROPOSED PAVEMENT.
- CONSTRUCT THE PROPOSED WESTBOUND PAVEMENT WITHIN THE SHOWN LIMITS.

NO WORK ON BELKNAP RD DURING THIS PHASE

LEGEND

- EXISTING TRAFFIC PATTERN TO REMAIN
- EXISTING TRAFFIC PATTERN TO TEMPORARILY CLOSE
- PROPOSED TEMPORARY TRAFFIC PATTERN
- PAVEMENT CONSTRUCTED IN PREVIOUS PHASE
- PAVEMENT CONSTRUCTED IN THIS PHASE
- TEMPORARY PAVEMENT
- TEMPORARY LANE CLOSURE
- TEMPORARY BARRELS
- TEMPORARY VERTICAL PANELS
- LOW PROFILE CONCRETE BARRIER
- TYPE III BARRICADE
- PROPOSED BRIDGE CONSTRUCTION
- PROPOSED 13" (FAST TRACK)

NOTES:

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- THE FULL DEPTH SAW CUT, CURB REMOVAL AND MEDIAN NOSE REMOVAL ARE ACCOUNTED FOR IN THE REMOVAL PLANS AND SHALL NOT BE PAID FOR UNDER THE TRAFFIC CONTROL PLANS. THE INFORMATION REGARDING THE REMOVAL IS SHOWN FOR THE CONTRACTOR INFORMATION ONLY.

CAUTION!!!!
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LOCATIONS ARE APPROXIMATE

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48 HOURS NOTICE BEFORE YOU DIG, DRILL,
OR BLAST - STOP CALL
 Texas One Call System
1-800-DIG-TESS

NO.	DATE	REVISION	APPROVED

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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

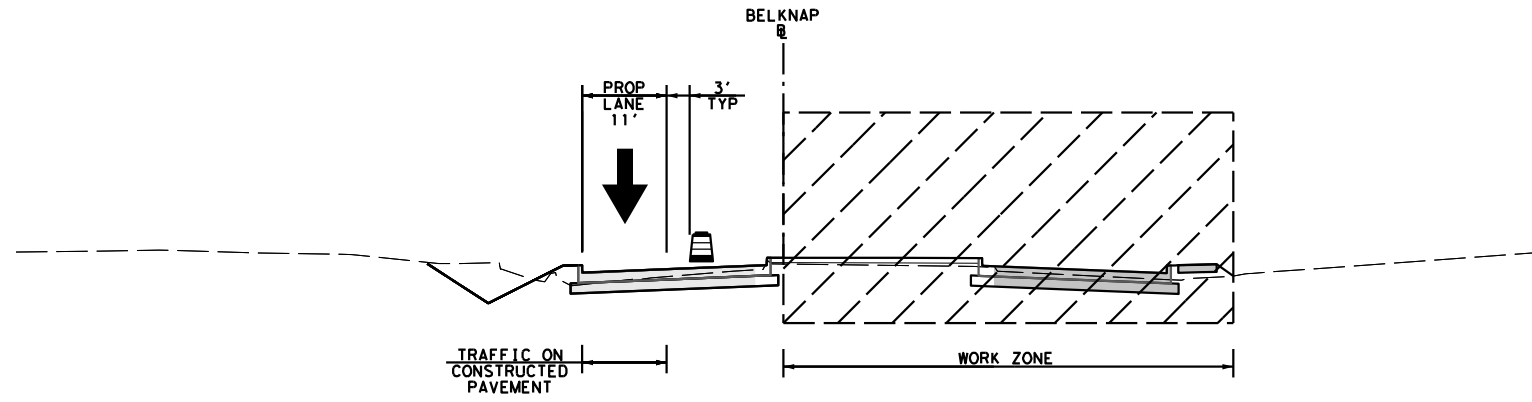
TRAFFIC CONTROL PLANS
TYPICAL SECTIONS
PHASE 2

CNTY	PROJ	RPS PROJ	DATE	SCALE	SHEET NO
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DESIGNED BY	RPS	DRAWN BY	RPS	CHECKED BY	RPS

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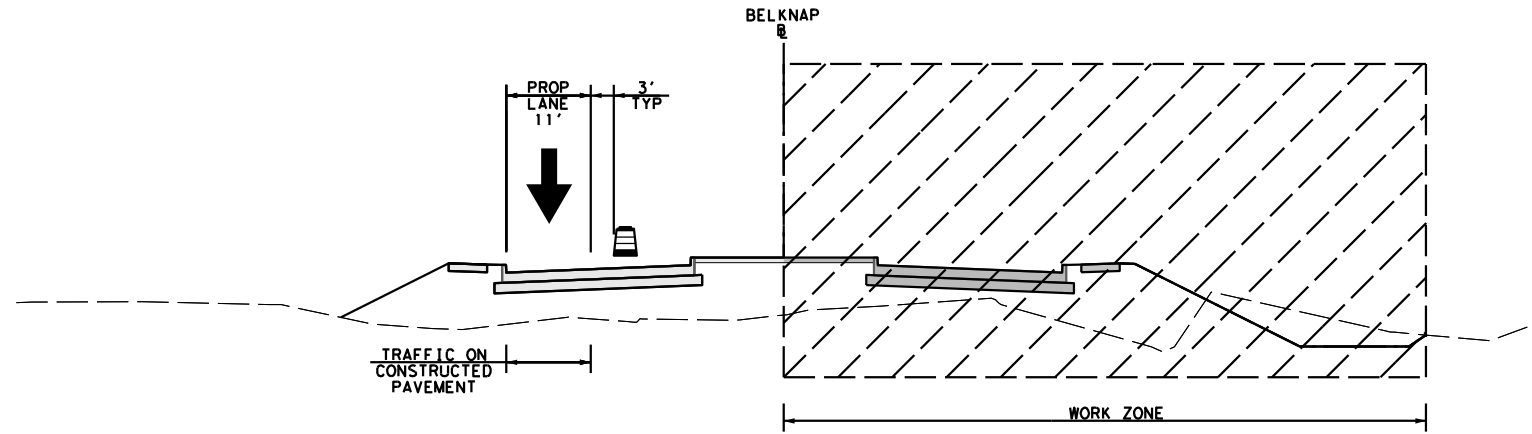
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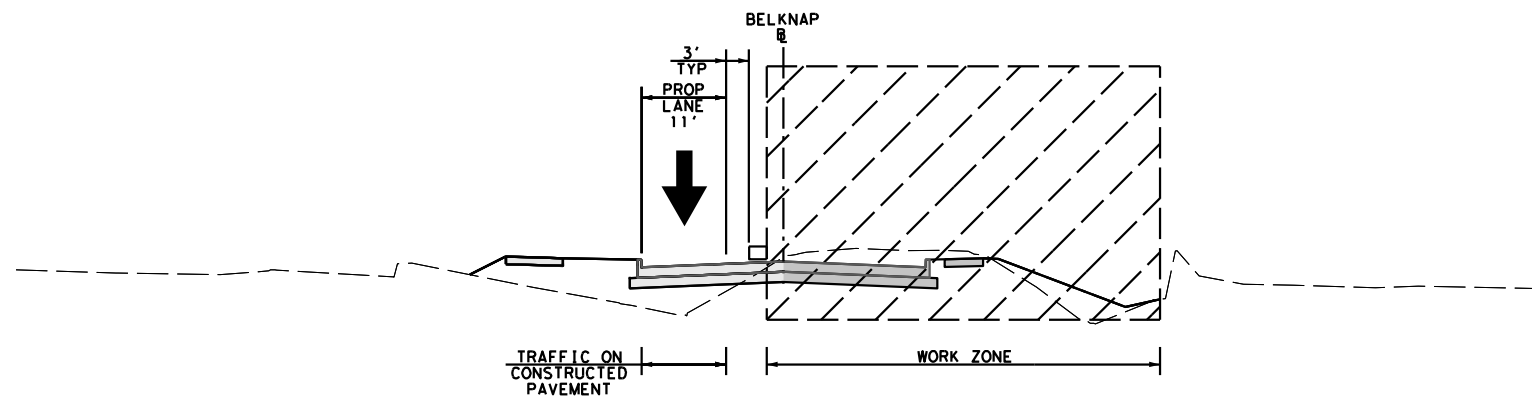
BELKNAP
 FROM STA 59+19.22
 TO STA 60+63.89

- TRAFFIC ON PROPOSED SOUTHBOUND LANE ON THE PROPOSED PAVEMENT.
- CONSTRUCT THE PROPOSED NORTHBOUND PAVEMENT WITHIN THE SHOWN LIMITS.



BELKNAP
 FROM STA 48+86.96
 TO STA 59+19.22

- TRAFFIC ON PROPOSED SOUTHBOUND LANE ON THE PROPOSED PAVEMENT.
- CONSTRUCT THE PROPOSED NORTHBOUND PAVEMENT WITHIN THE SHOWN LIMITS.



BELKNAP
 FROM STA 13+37.87
 TO STA 48+86.96

- TRAFFIC ON PROPOSED SOUTHBOUND LANE ON THE PROPOSED PAVEMENT.
- CONSTRUCT THE PROPOSED NORTHBOUND PAVEMENT WITHIN THE SHOWN LIMITS.

NO WORK ON TOWNE WEST,
 CLARK TOWNE, OLD RICHMOND
 AND OAK BEND FOREST
 DURING THIS PHASE.

LEGEND

- EXISTING TRAFFIC PATTERN TO REMAIN
- EXISTING TRAFFIC PATTERN TO TEMPORARILY CLOSE
- PROPOSED TEMPORARY TRAFFIC PATTERN
- PAVEMENT CONSTRUCTED IN PREVIOUS PHASE
- PAVEMENT CONSTRUCTED IN THIS PHASE
- TEMPORARY PAVEMENT
- TEMPORARY LANE CLOSURE
- TEMPORARY BARRELS
- TEMPORARY VERTICAL PANELS
- LOW PROFILE CONCRETE BARRIER
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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
 W BELLFORT BLVD TO OAK BEND FOREST DR

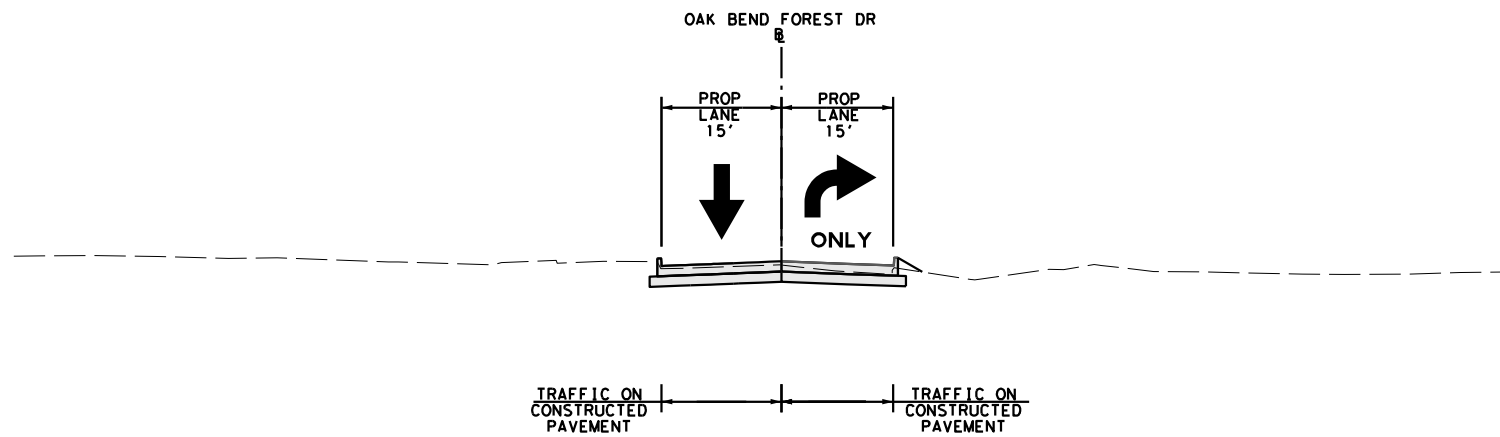
TRAFFIC CONTROL PLANS
TYPICAL SECTIONS
PHASE 3

CNTY	PROJ	RPS PROJ	DATE	SCALE	SHEET NO
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DESIGNED BY	RPS	DRAWN BY	RPS	CHECKED BY	RPS
VERIFIED BY	RPS				

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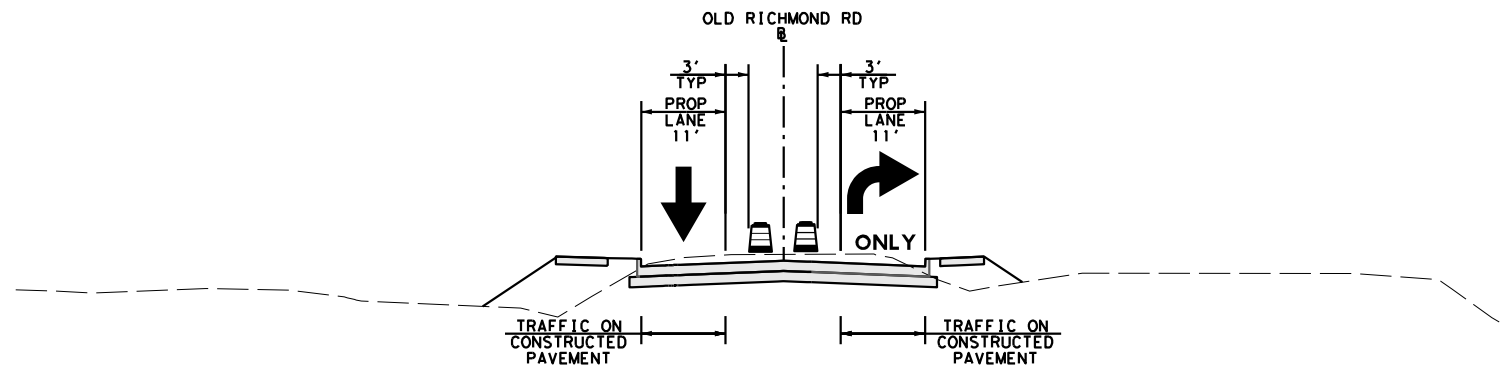
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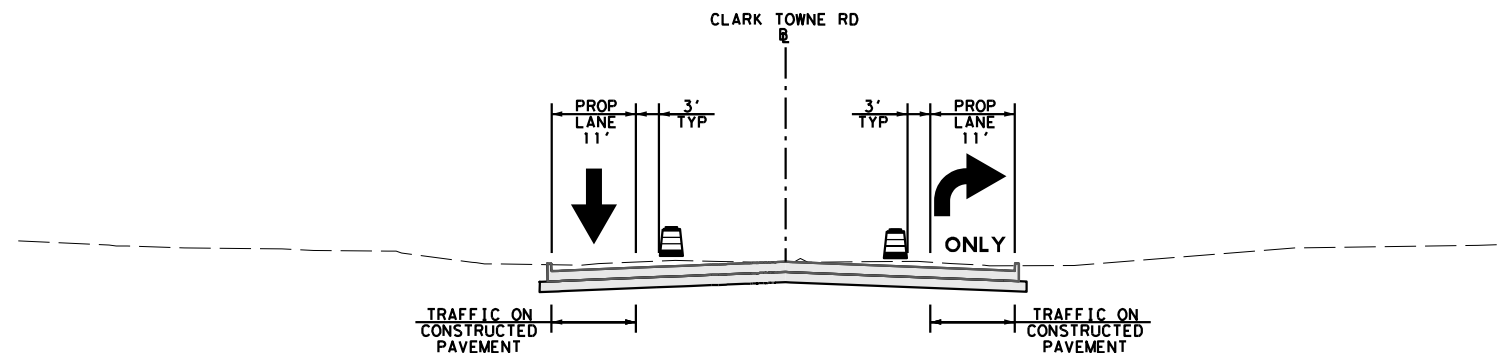
OAK BEND FOREST DR.
 FROM STA 9+90.84
 TO STA 10+50.00

• TRAFFIC ON CONSTRUCTED PAVEMENT.



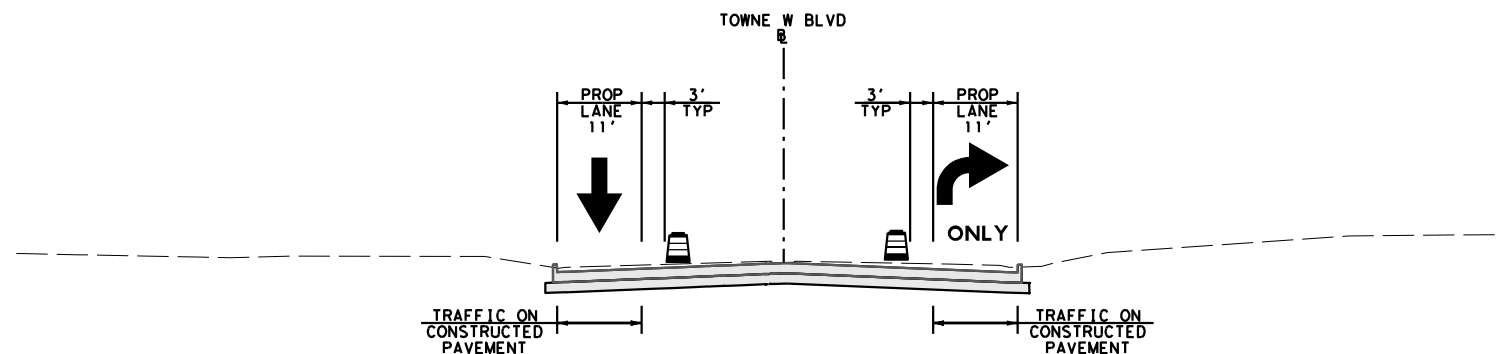
OLD RICHMOND RD
 FROM STA 136+62.60
 TO STA 137+90.80

• TRAFFIC ON CONSTRUCTED PAVEMENT.



CLARK TOWNE RD
 FROM STA 9+81.92
 TO STA 10+50.00

• TRAFFIC ON CONSTRUCTED PAVEMENT.



TOWNE WEST BLVD
 FROM STA 9+84.62
 TO STA 10+50.00

• TRAFFIC ON CONSTRUCTED PAVEMENT.

LEGEND

- EXISTING TRAFFIC PATTERN TO REMAIN
- EXISTING TRAFFIC PATTERN TO TEMPORARILY CLOSE
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- PAVEMENT CONSTRUCTED IN PREVIOUS PHASE
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 Texas One Call System
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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
 W BELLFORT BLVD TO OAK BEND FOREST DR

TRAFFIC CONTROL PLANS
 TYPICAL SECTIONS
 PHASE 3

SHEET 2 OF 2

CNTY	PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169		2023		46
DESIGNED BY	RPS	DRAWN BY	RPS	CHECKED BY	RPS
		VERIFIED BY	RPS		

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LEGEND

- EXISTING TRAFFIC PATTERN TO REMAIN
- EXISTING TRAFFIC PATTERN TO TEMPORARILY CLOSE
- PROPOSED TEMPORARY TRAFFIC PATTERN
- PAVEMENT CONSTRUCTED IN PREVIOUS PHASE
- PAVEMENT CONSTRUCTED IN THIS PHASE
- TEMPORARY PAVEMENT
- TEMPORARY LANE CLOSURE
- TEMPORARY BARRELS
- TEMPORARY VERTICAL PANELS
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FORT BEND COUNTY, TEXAS

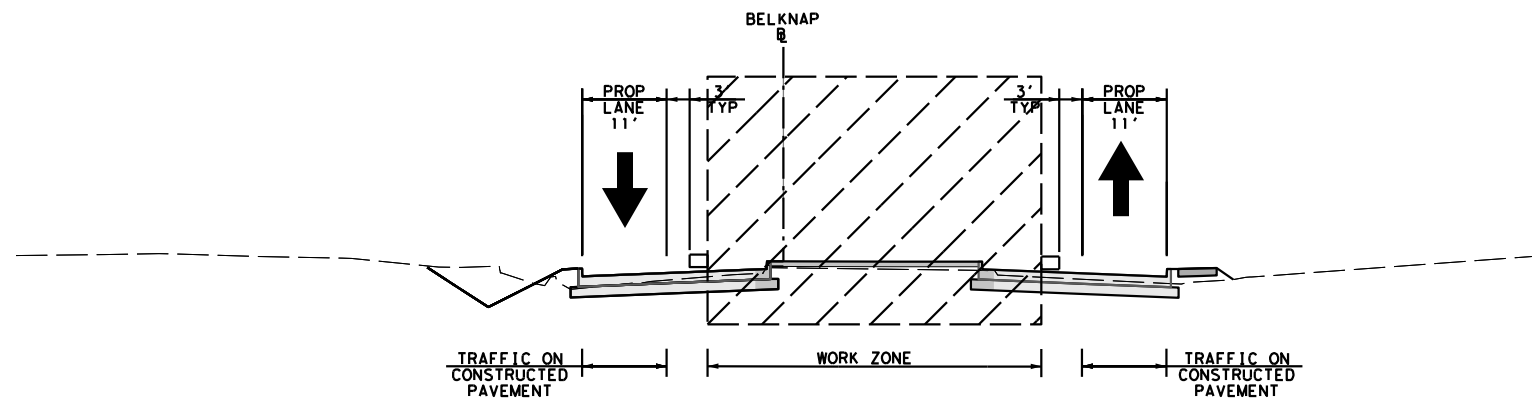
BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

TRAFFIC CONTROL PLANS
TYPICAL SECTIONS
PHASE 4

CNTY	PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	2023			47
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY		
RPS	RPS	RPS	RPS		

BELKNAP
FROM STA 59+19.22
TO STA 60+42.86

- TRAFFIC ON CONSTRUCTED PAVEMENT.
- CONSTRUCT PROPOSED CURB AND MEDIAN.

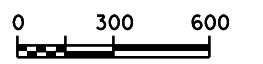
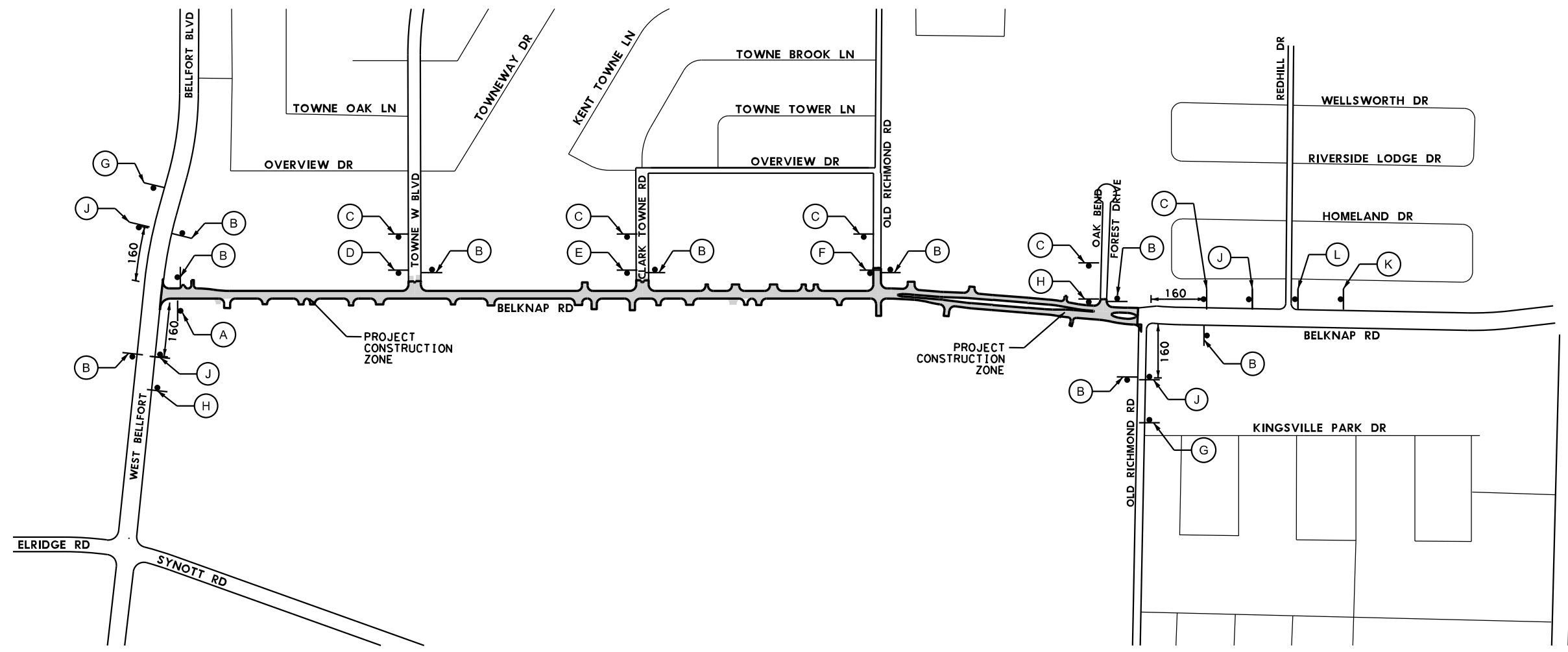


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NOTES

- 1. SEE THE PROJECT NOTES AND GENERAL NOTES FOR ADDITIONAL INFORMATION.
- 2. THE SIGNS SHOWN HEREON SHALL CONFORM TO THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (CURRENT EDITION) AND THE STANDARD DETAILS INCLUDED IN THESE PLANS.
- 3. UNLESS OTHERWISE SHOWN HEREON, THE ADVANCED WARNING SIGN SPACING IS BASED UPON THE ROADWAY POSTED SPEED LIMIT.

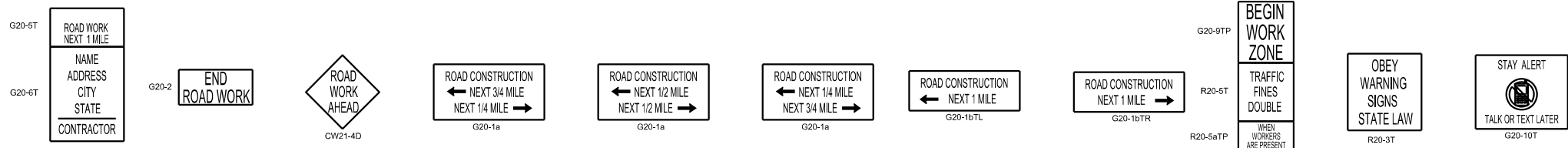


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14-Nov-2023



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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

TRAFFIC CONTROL PLANS
ADVANCED WARNING SIGNS

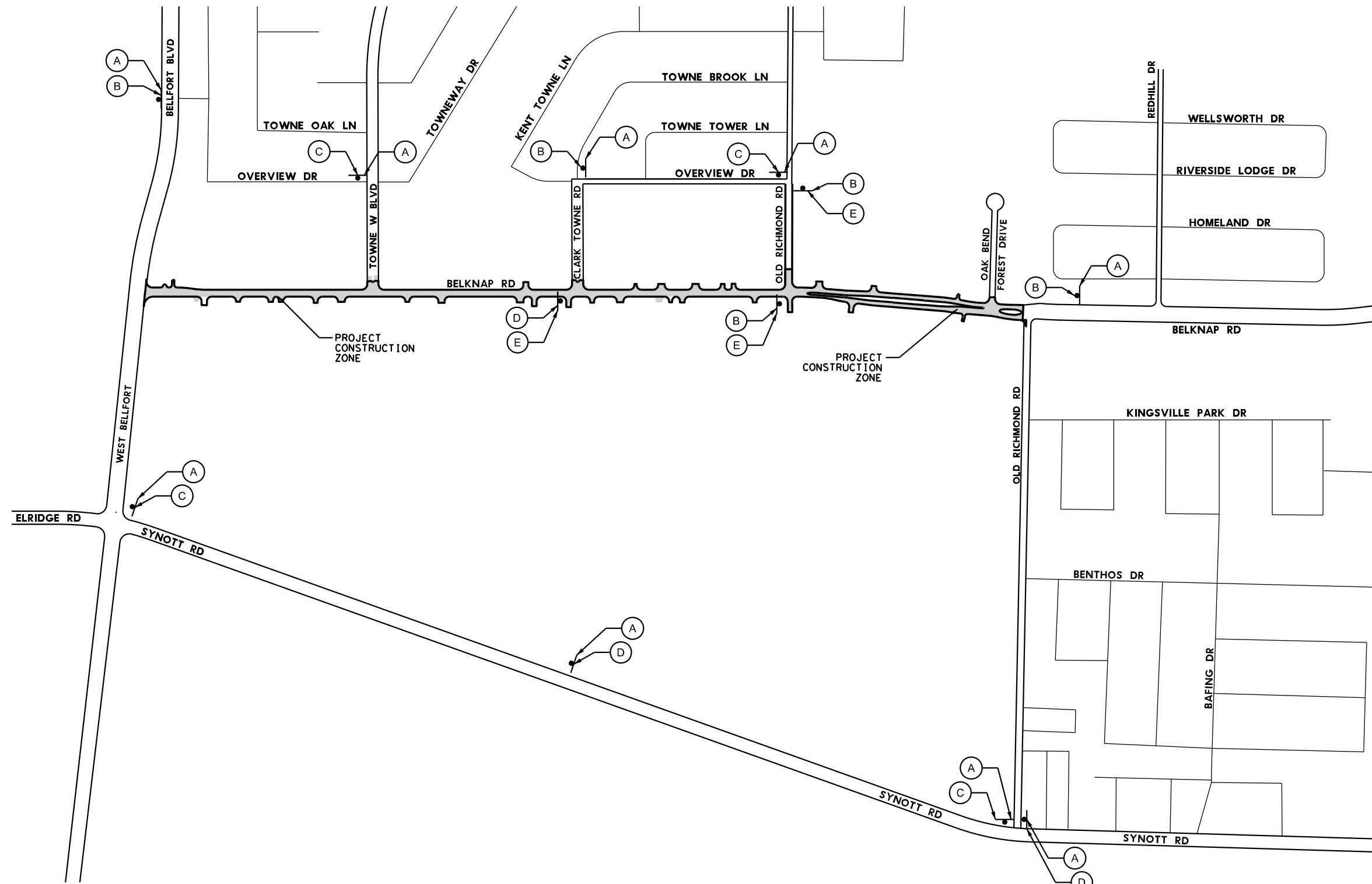
SHEET 1 OF 1

CNTY PROJ	RPS PROJ	DATE	SCALE	SHEET NO
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DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RPS	RPS	RPS	RPS	

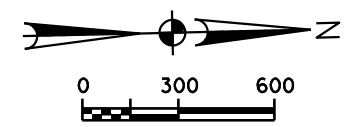
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- NOTES**
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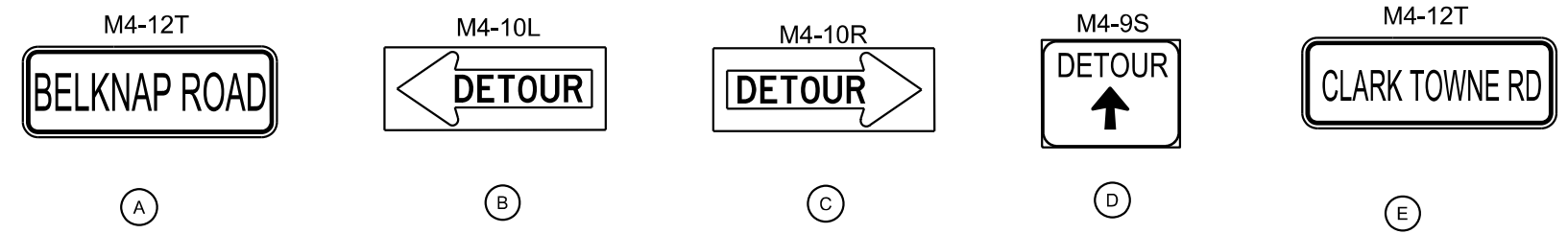
FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

TRAFFIC CONTROL PLANS
DETOUR PHASE 1
STEP 2

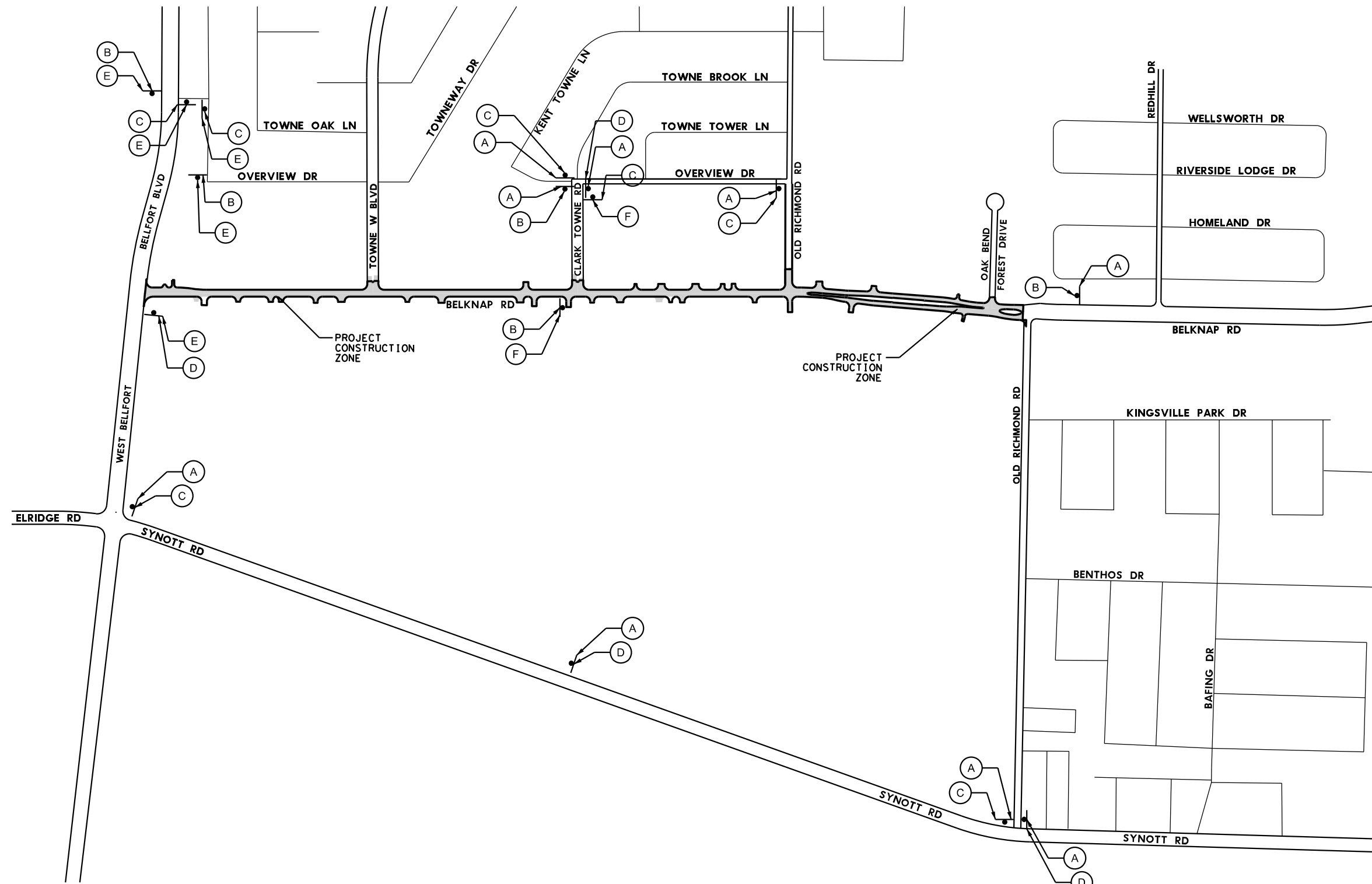
SHEET 1 OF 1

CNTY PROJ	RPS PROJ	DATE	SCALE	SHEET NO
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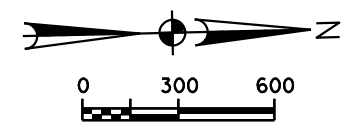


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1-800-DIG-TESS



NO	DATE	REVISION	APPROVED

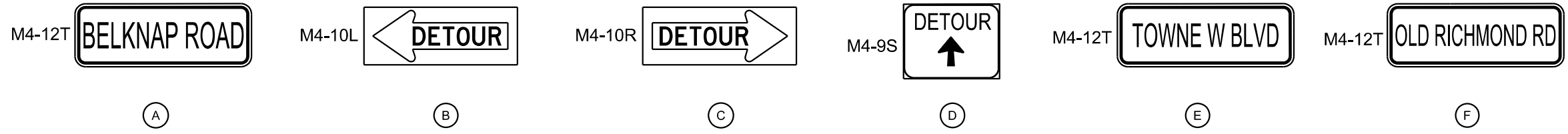
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575 N. Dairy Ashford, Suite 700, Houston, Texas 77079
T +1 281 589 7257 E usinfrastructure@rpsgroup.com

FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

TRAFFIC CONTROL PLANS
DETOUR PHASE 2

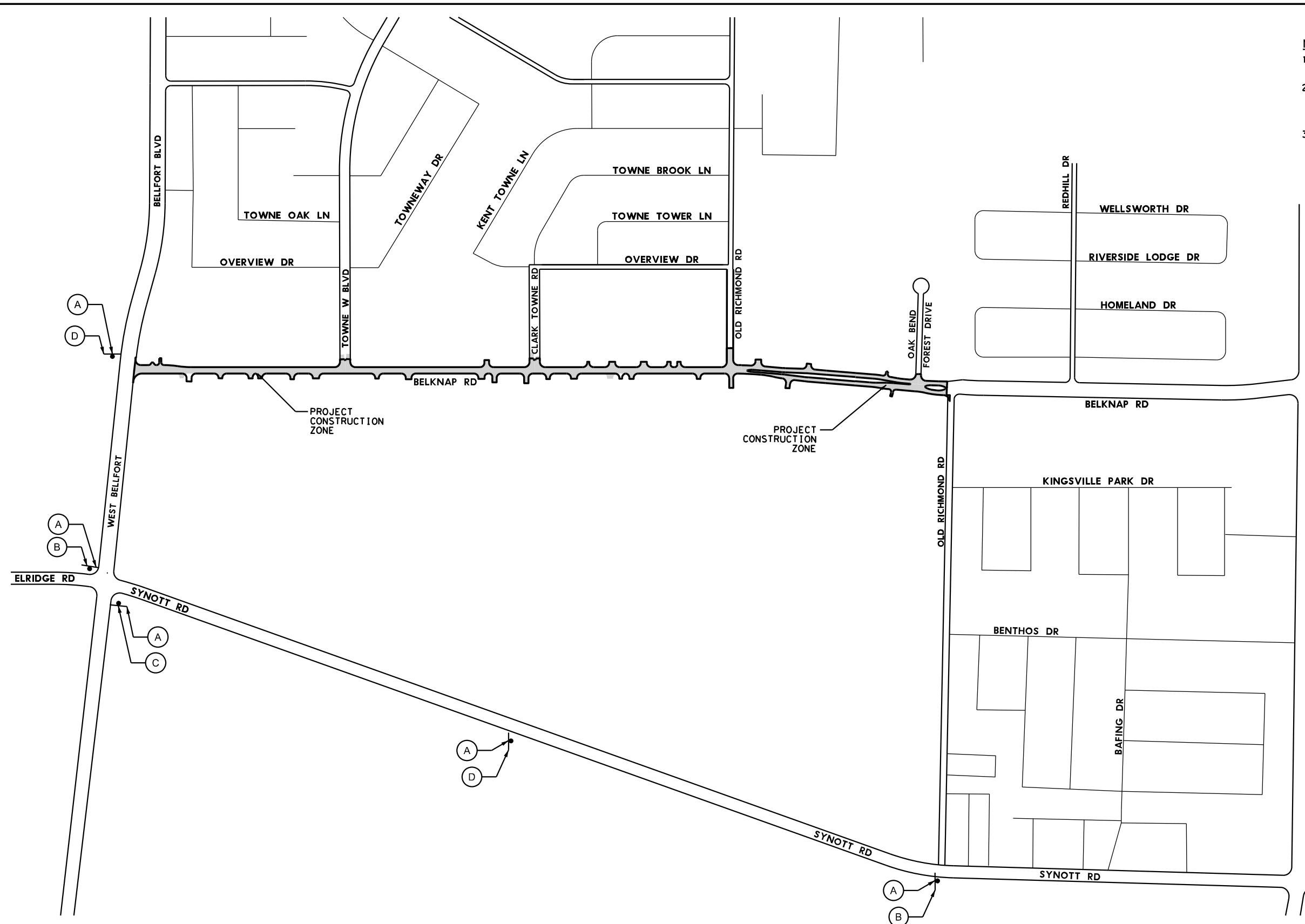
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17-2-11	008169	2023		50
DESIGNED BY RPS	DRAWN BY RPS	CHECKED BY RPS	VERIFIED BY RPS	



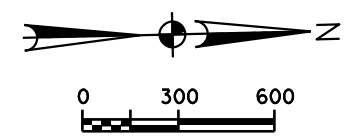
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- NOTES**
1. SEE THE PROJECT NOTES AND GENERAL NOTES FOR ADDITIONAL INFORMATION.
 2. THE SIGNS SHOWN HEREON SHALL CONFORM TO THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (CURRENT EDITION) AND THE STANDARD DETAILS INCLUDED IN THESE PLANS.
 3. UNLESS OTHERWISE SHOWN HEREON, THE ADVANCED WARNING SIGN SPACING IS BASED UPON THE ROADWAY POSTED SPEED LIMIT.



CAUTION!!!!
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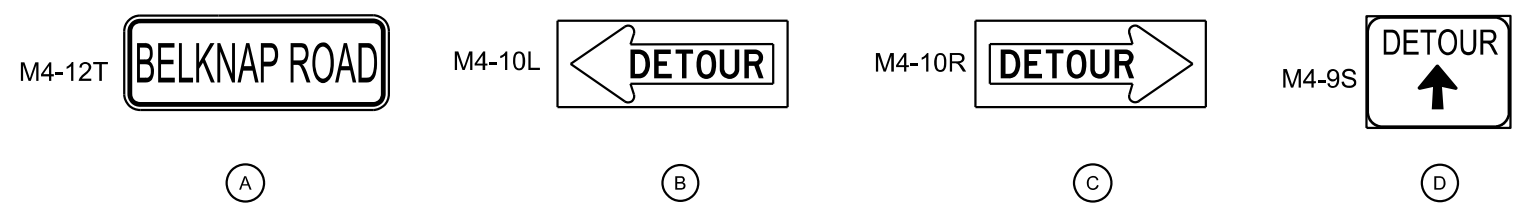
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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

TRAFFIC CONTROL PLANS
DETOUR PHASE 3

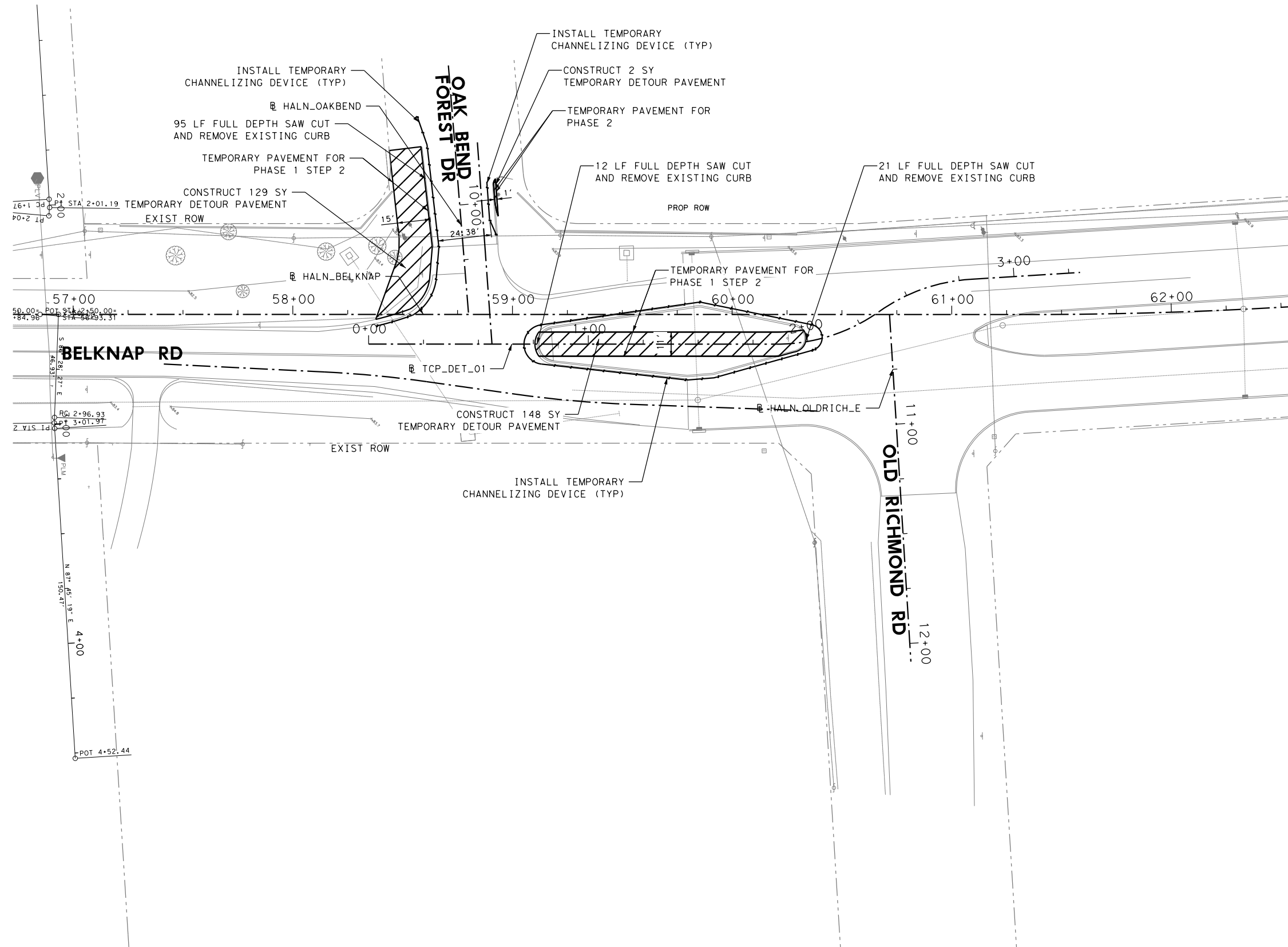


SHEET 1 OF 1

CNTY	PROJ	RPS PROJ	DATE	SCALE	SHEET NO
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DESIGNED BY	RPS	DRAWN BY	RPS	CHECKED BY	RPS
				VERIFIED BY	RPS

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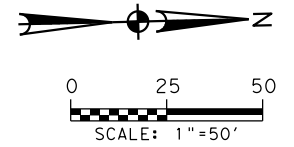


LEGEND

- EXISTING TRAFFIC PATTERN TO REMAIN
- EXISTING TRAFFIC PATTERN TO TEMPORARILY CLOSE
- PROPOSED TEMPORARY TRAFFIC PATTERN
- PAVEMENT CONSTRUCTED IN PREVIOUS PHASE
- PAVEMENT CONSTRUCTED IN THIS PHASE
- TEMPORARY PAVEMENT
- TEMPORARY LANE CLOSURE
- TEMPORARY BARRELS
- TEMPORARY VERTICAL PANELS
- LOW PROFILE CONCRETE BARRIER
- TYPE III BARRICADE
- PROPOSED BRIDGE CONSTRUCTION
- PROPOSED 13" (FAST TRACK)

NOTES:

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2. THE FULL DEPTH SAW CUT, CURB REMOVAL AND MEDIAN NOSE REMOVAL ARE ACCOUNTED FOR IN THE REMOVAL PLANS AND SHALL NOT BE PAID FOR UNDER THE TRAFFIC CONTROL PLANS. THE INFORMATION REGARDING THE REMOVAL IS SHOWN FOR THE CONTRACTOR INFORMATION ONLY.



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135069
LICENSED PROFESSIONAL ENGINEER

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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

TRAFFIC CONTROL PLANS
PHASE 1 STEP 1

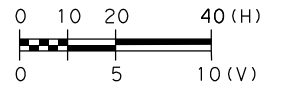
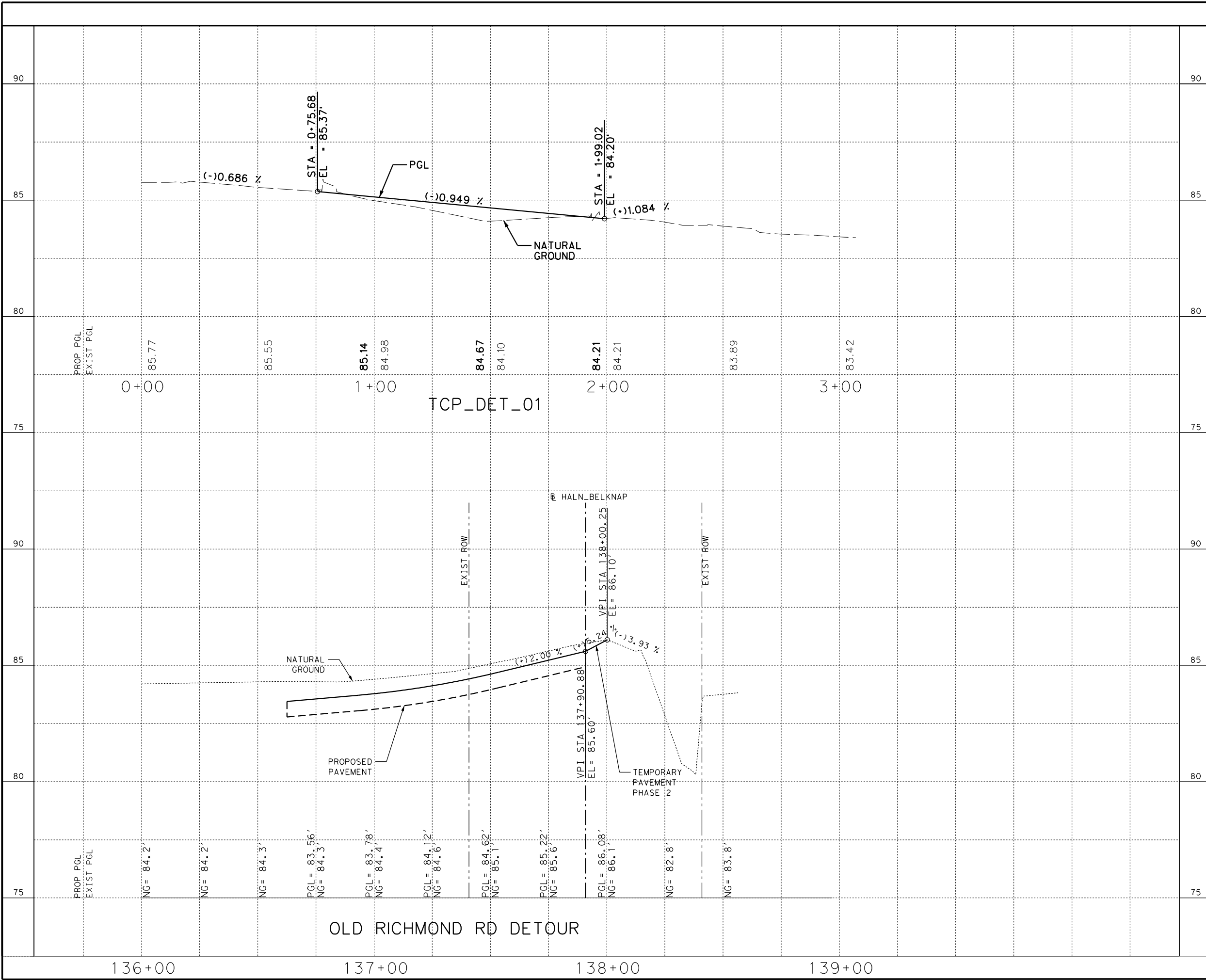
SHEET 1 OF 1

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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

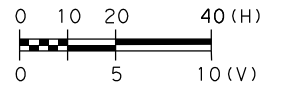
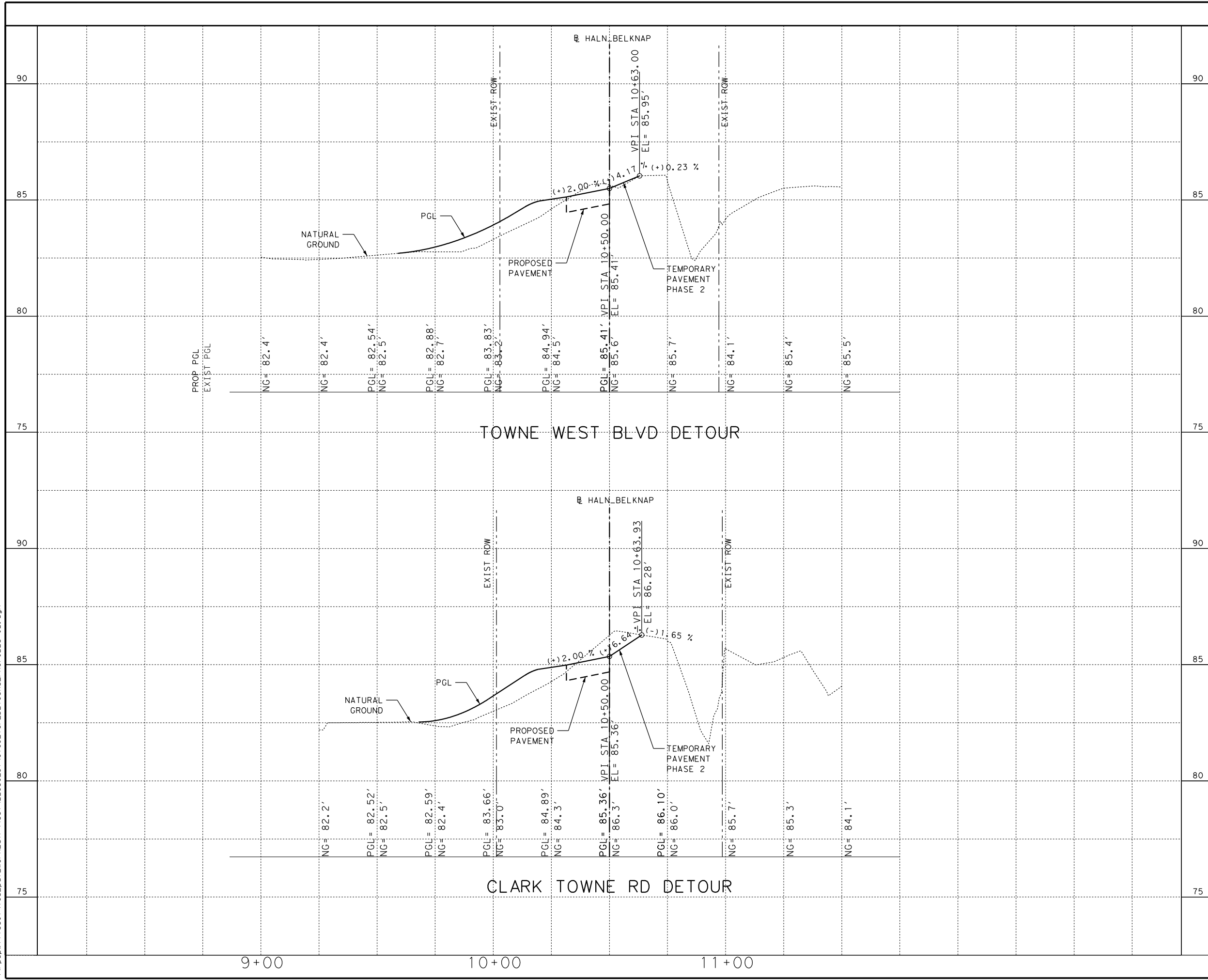
TRAFFIC CONTROL PLANS
TCP DETOUR PROFILES

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DESIGNED BY RPS	DRAWN BY RPS	CHECKED BY RPS	VERIFIED BY RPS	

SHEET 1 OF 2

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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

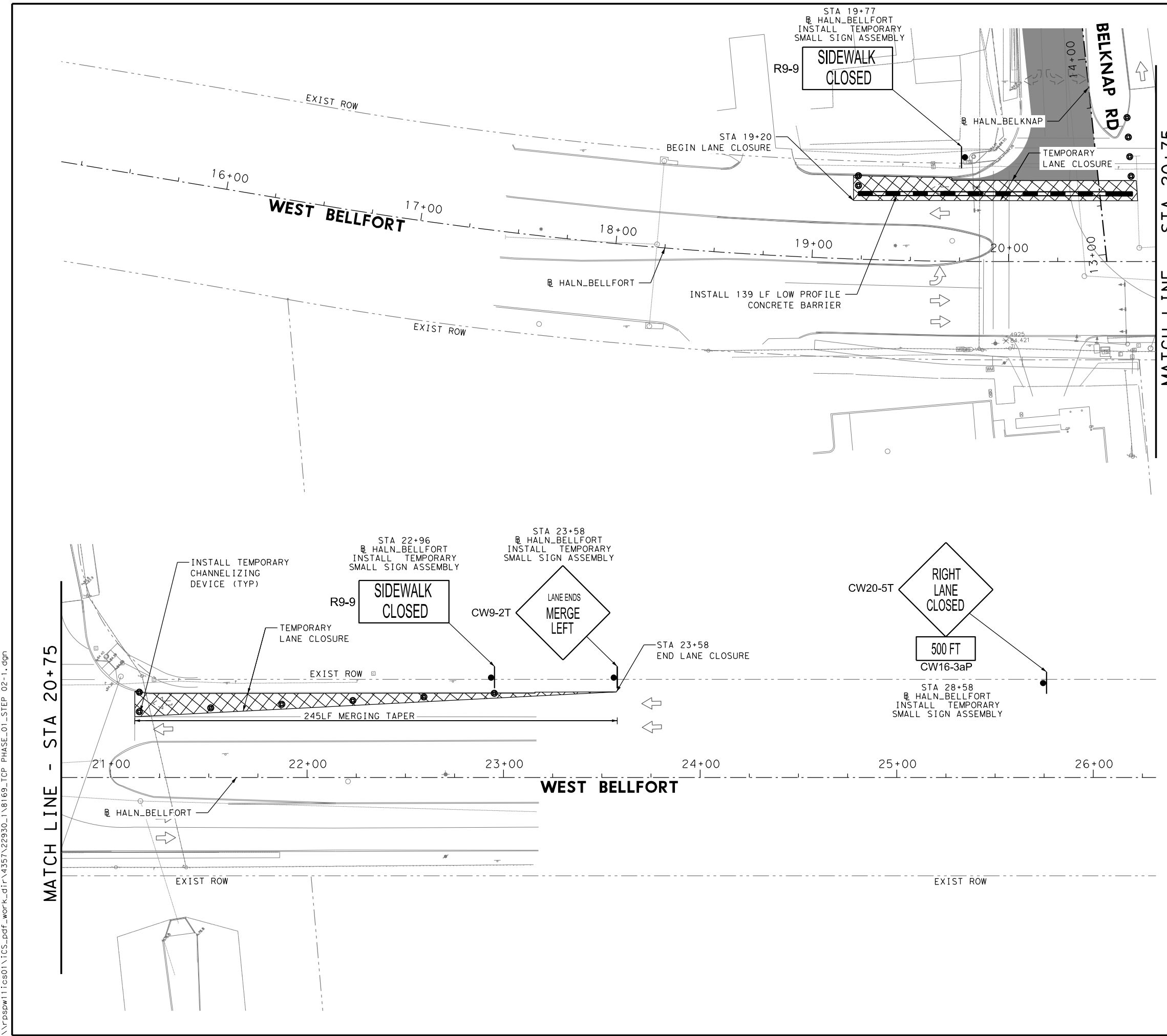
**TRAFFIC CONTROL PLANS
TCP DETOUR PROFILES**

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RPS	RPS	RPS	RPS	

SHEET 2 OF 2

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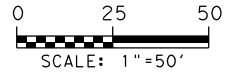
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LEGEND

- EXISTING TRAFFIC PATTERN TO REMAIN
- EXISTING TRAFFIC PATTERN TO TEMPORARILY CLOSE
- PROPOSED TEMPORARY TRAFFIC PATTERN
- PAVEMENT CONSTRUCTED IN PREVIOUS PHASE
- PAVEMENT CONSTRUCTED IN THIS PHASE
- TEMPORARY PAVEMENT
- TEMPORARY LANE CLOSURE
- TEMPORARY BARRELS
- TEMPORARY VERTICAL PANELS
- LOW PROFILE CONCRETE BARRIER
- TYPE III BARRICADE
- PROPOSED BRIDGE CONSTRUCTION

- NOTES:
1. SEE CHANNELIZATION TABLES FOR DEVICE TYPE AND SPACING TO ALL PHASES.
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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

TRAFFIC CONTROL PLANS
PHASE 1 STEP 2

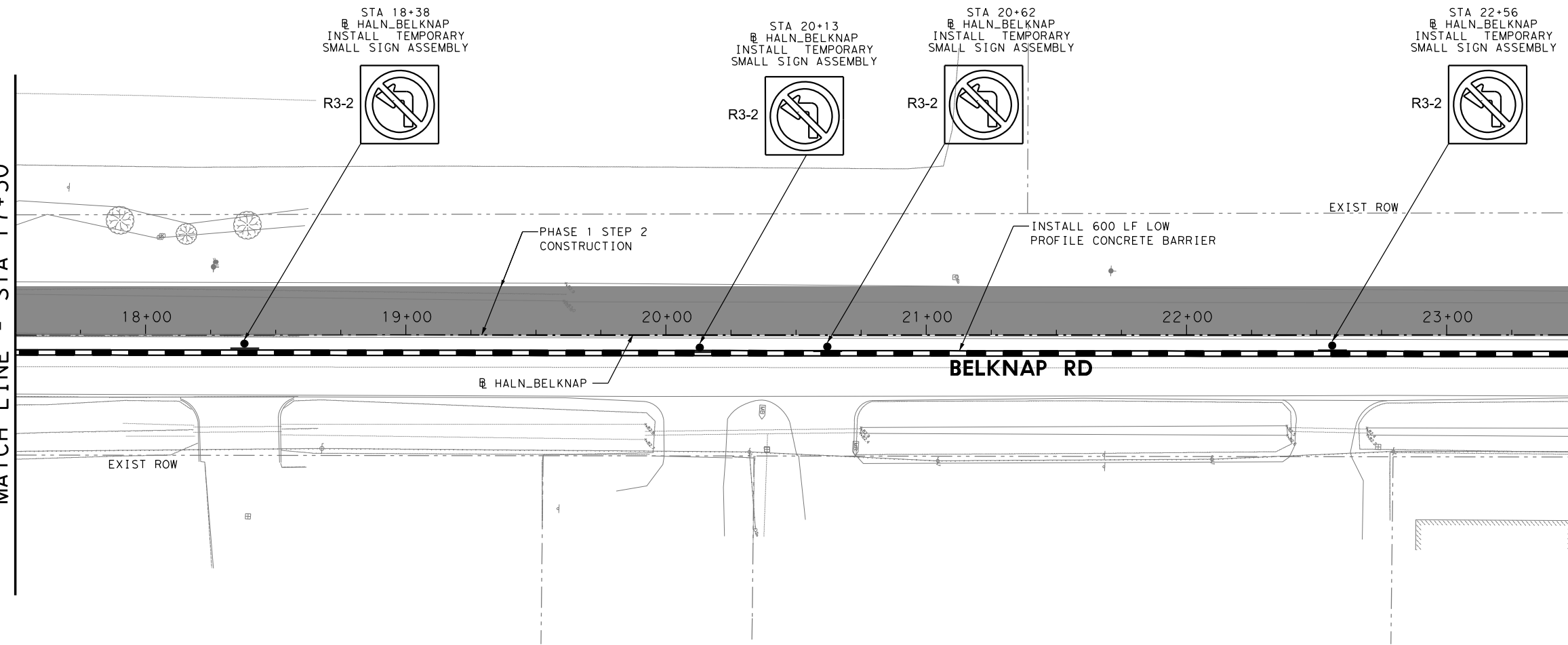
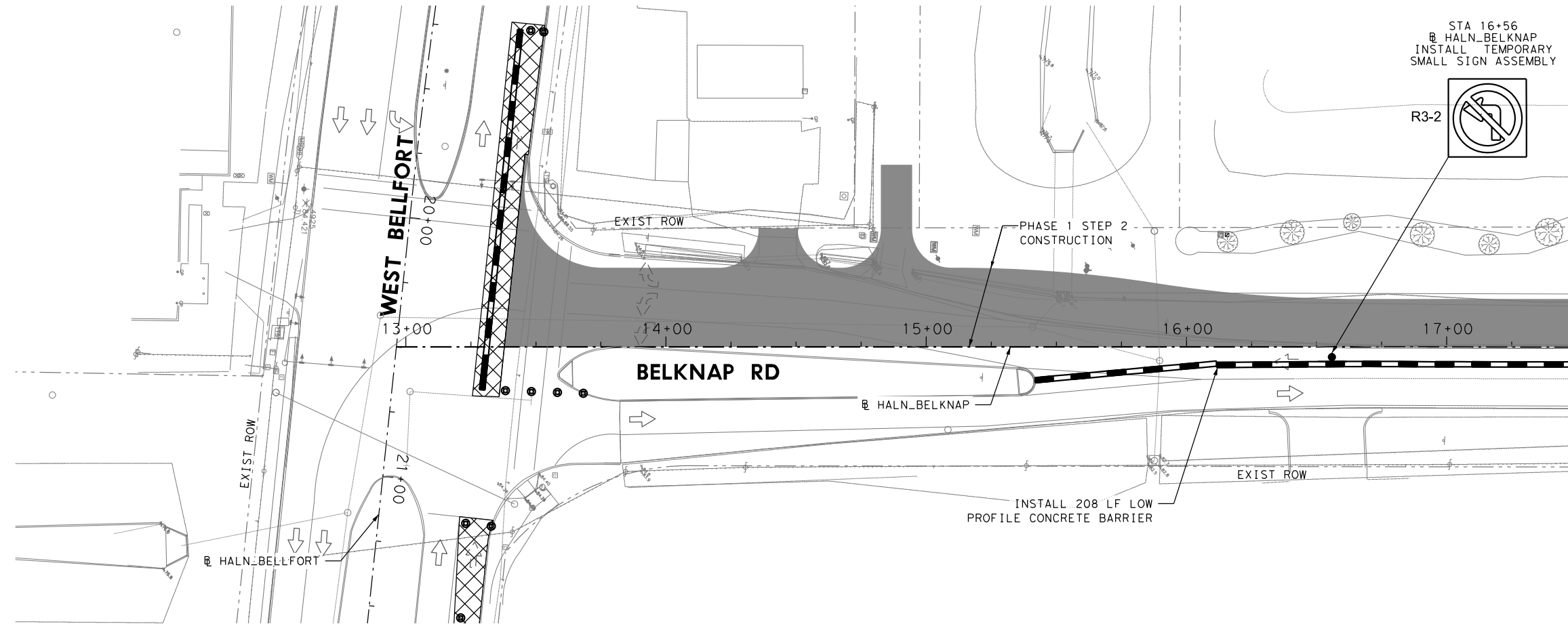
SHEET 1 OF 8

CNTY PROJ	RPS PROJ	DATE	SCALE	SHEET NO
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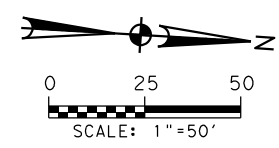
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- LEGEND**
- EXISTING TRAFFIC PATTERN TO REMAIN
 - EXISTING TRAFFIC PATTERN TO TEMPORARILY CLOSE
 - PROPOSED TEMPORARY TRAFFIC PATTERN
 - PAVEMENT CONSTRUCTED IN PREVIOUS PHASE
 - PAVEMENT CONSTRUCTED IN THIS PHASE
 - TEMPORARY PAVEMENT
 - TEMPORARY LANE CLOSURE
 - TEMPORARY BARRELS
 - TEMPORARY VERTICAL PANELS
 - LOW PROFILE CONCRETE BARRIER
 - TYPE III BARRICADE
 - PROPOSED BRIDGE CONSTRUCTION

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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

TRAFFIC CONTROL PLANS
PHASE 1 STEP 2

SHEET 2 OF 8

CNTY PROJ	RPS PROJ	DATE	SCALE	SHEET NO
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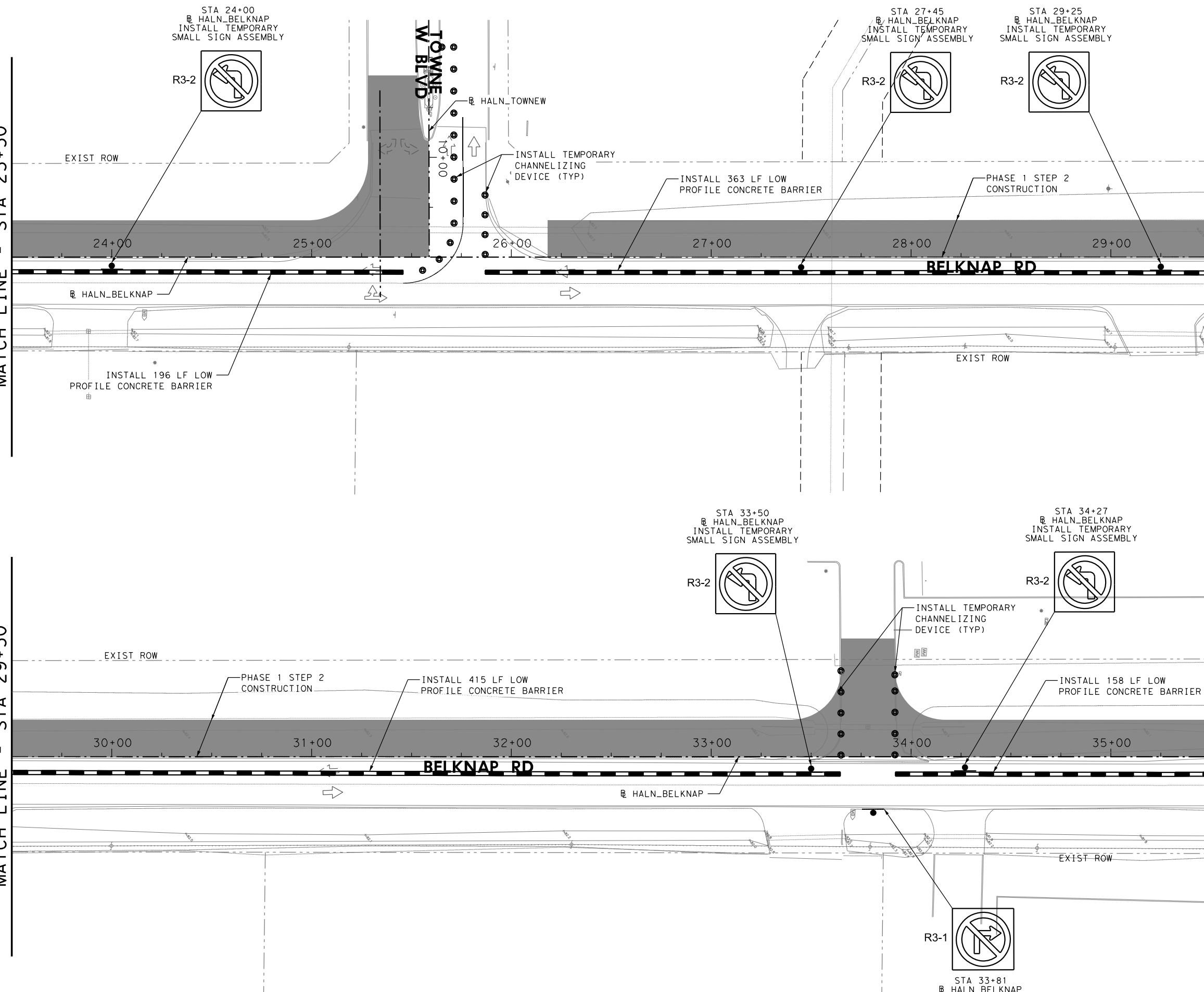
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MATCH LINE - STA 23+50

MATCH LINE - STA 29+50

MATCH LINE - STA 29+50

MATCH LINE - STA 35+50

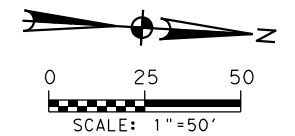


LEGEND

- EXISTING TRAFFIC PATTERN TO REMAIN
- EXISTING TRAFFIC PATTERN TO TEMPORARILY CLOSE
- PROPOSED TEMPORARY TRAFFIC PATTERN
- PAVEMENT CONSTRUCTED IN PREVIOUS PHASE
- PAVEMENT CONSTRUCTED IN THIS PHASE
- TEMPORARY PAVEMENT
- TEMPORARY LANE CLOSURE
- TEMPORARY BARRELS
- TEMPORARY VERTICAL PANELS
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BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

TRAFFIC CONTROL PLANS
PHASE 1 STEP 2

CNTY PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	2023		57
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RPS	RPS	RPS	RPS	

SHEET 3 OF 8

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MATCH LINE - STA 47+50

MATCH LINE - STA 53+50

MATCH LINE - STA 53+50

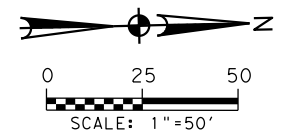
MATCH LINE - STA 59+50

LEGEND

- ↑ EXISTING TRAFFIC PATTERN TO REMAIN
- ↑↑ EXISTING TRAFFIC PATTERN TO TEMPORARILY CLOSE
- ↑ PROPOSED TEMPORARY TRAFFIC PATTERN
- ▨ PAVEMENT CONSTRUCTED IN PREVIOUS PHASE
- ▩ PAVEMENT CONSTRUCTED IN THIS PHASE
- ▧ TEMPORARY PAVEMENT
- ⊗ TEMPORARY LANE CLOSURE
- ⊙ TEMPORARY BARRELS
- TEMPORARY VERTICAL PANELS
- LOW PROFILE CONCRETE BARRIER
- TYPE III BARRICADE
- ▨ PROPOSED BRIDGE CONSTRUCTION
- ▨ PROPOSED 13" (FAST TRACK)

NOTES:

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GABRIEL ODREMAN NORIEGA
135069
LICENSED PROFESSIONAL ENGINEER
02/06/2024

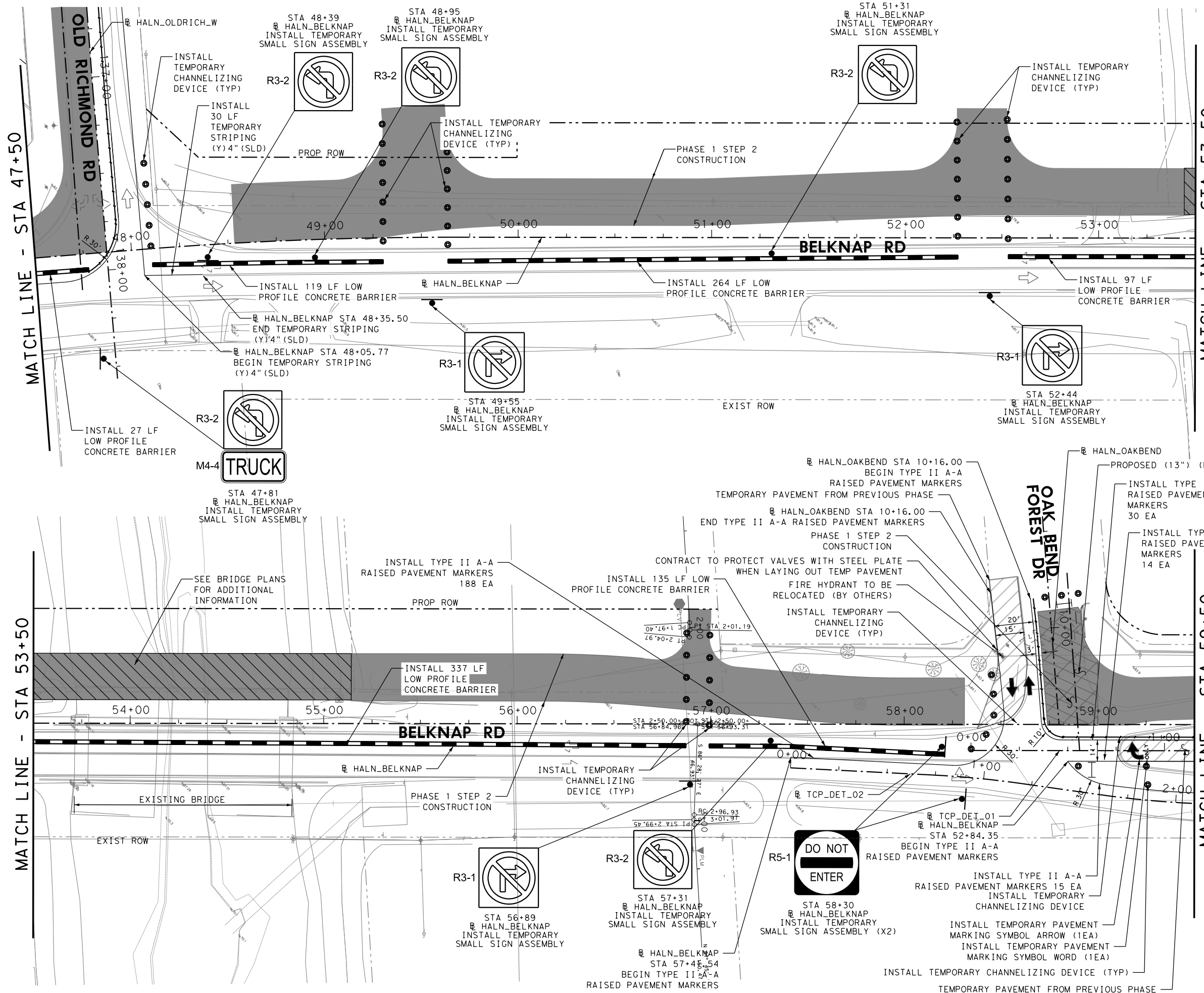
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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

TRAFFIC CONTROL PLANS
PHASE 1 STEP 2

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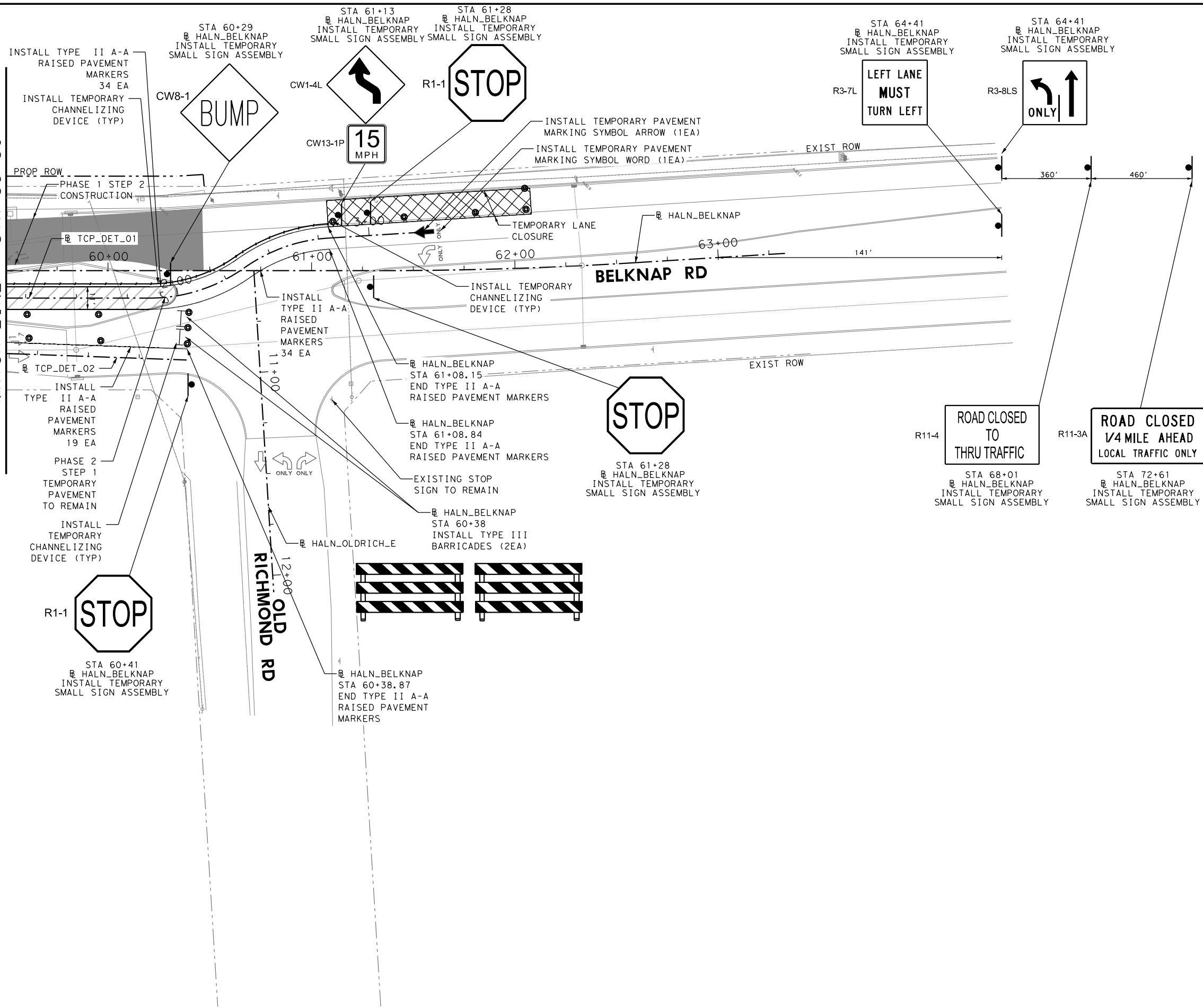


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MATCH LINE - STA 59+50

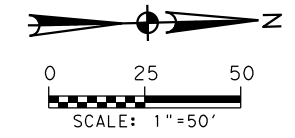


LEGEND

- EXISTING TRAFFIC PATTERN TO REMAIN
- EXISTING TRAFFIC PATTERN TO TEMPORARILY CLOSE
- PROPOSED TEMPORARY TRAFFIC PATTERN
- PAVEMENT CONSTRUCTED IN PREVIOUS PHASE
- PAVEMENT CONSTRUCTED IN THIS PHASE
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- TEMPORARY BARRELS
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- TYPE III BARRICADE
- PROPOSED BRIDGE CONSTRUCTION

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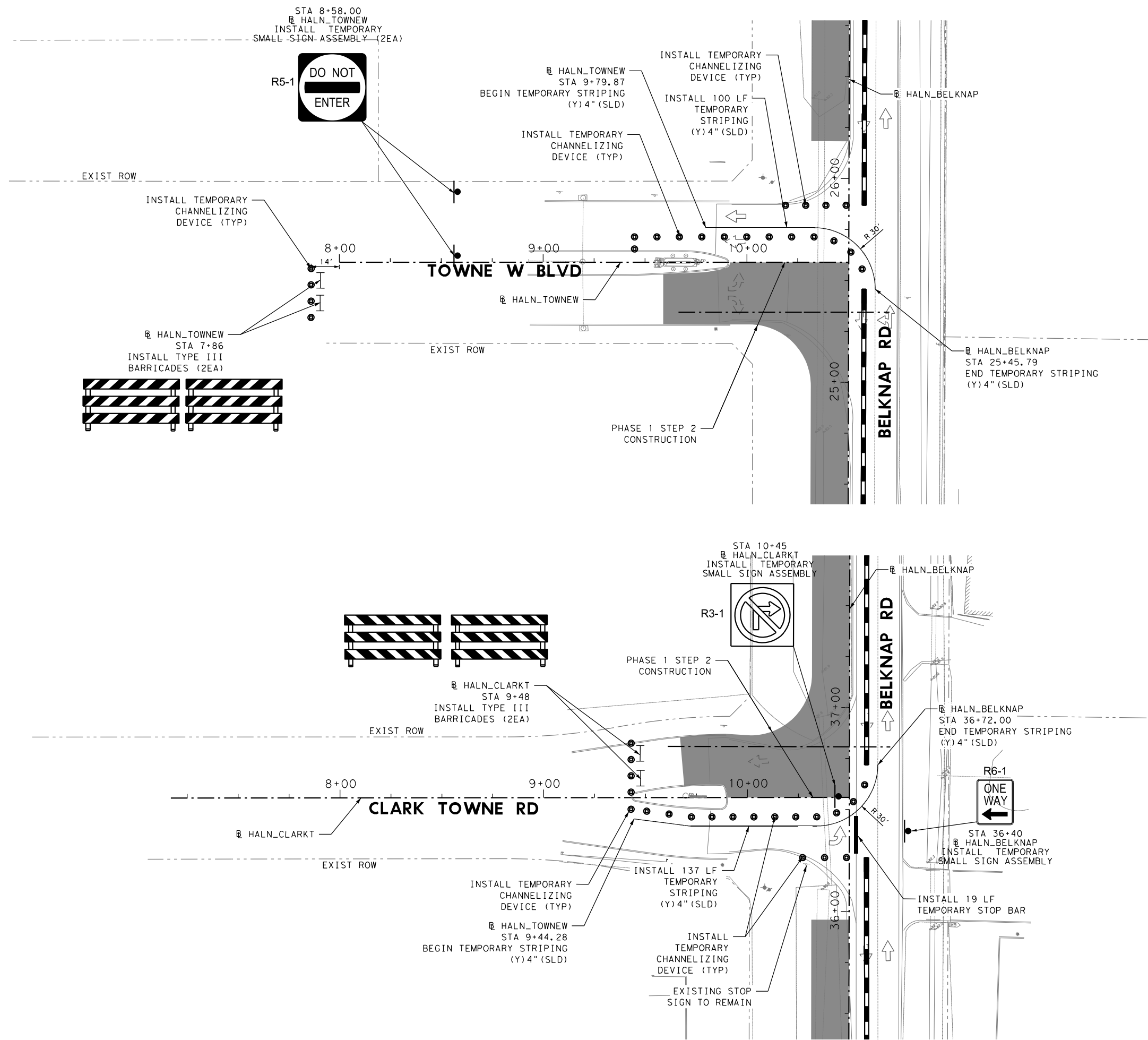
BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

TRAFFIC CONTROL PLANS
PHASE 1 STEP 2

SHEET 6 OF 8

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17-2-11	008169	2023		60
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- LEGEND**
- EXISTING TRAFFIC PATTERN TO REMAIN
 - EXISTING TRAFFIC PATTERN TO TEMPORARILY CLOSE
 - PROPOSED TEMPORARY TRAFFIC PATTERN
 - PAVEMENT CONSTRUCTED IN PREVIOUS PHASE
 - PAVEMENT CONSTRUCTED IN THIS PHASE
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0 25 50
SCALE: 1"=50'

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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
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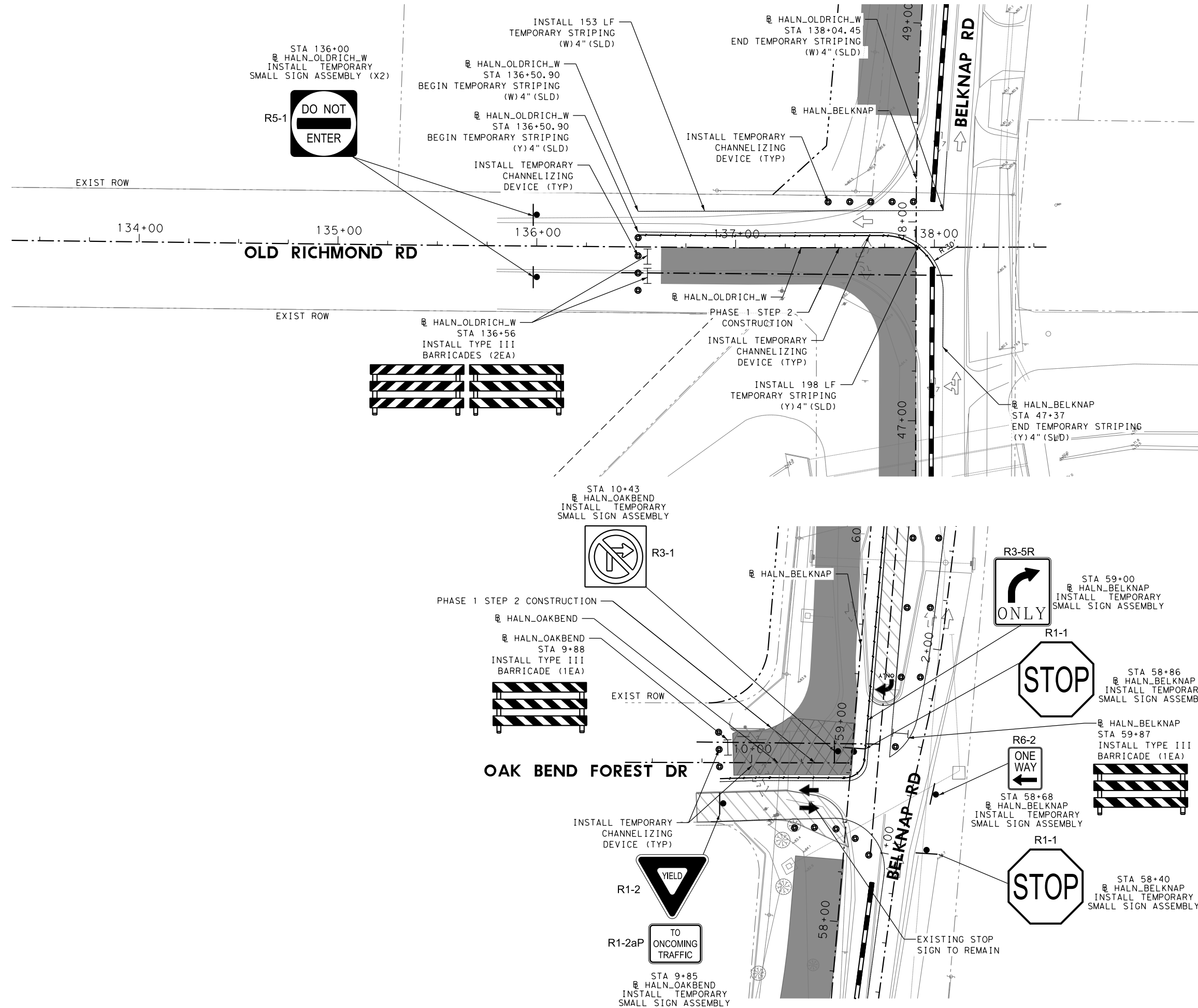
TRAFFIC CONTROL PLANS
PHASE 1 STEP 2

SHEET 7 OF 8

CNTY PROJ *	RPS PROJ *	DATE	SCALE	SHEET NO
17-2-11	008169	2023		61
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RPS	RPS	RPS	RPS	

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LEGEND

- ↑ EXISTING TRAFFIC PATTERN TO REMAIN
- ↑↑ EXISTING TRAFFIC PATTERN TO TEMPORARILY CLOSE
- ↑ PROPOSED TEMPORARY TRAFFIC PATTERN
- ▨ PAVEMENT CONSTRUCTED IN PREVIOUS PHASE
- ▩ PAVEMENT CONSTRUCTED IN THIS PHASE
- ▧ TEMPORARY PAVEMENT
- ⊗ ⊗ TEMPORARY BARRELS
- TEMPORARY VERTICAL PANELS
- LOW PROFILE CONCRETE BARRIER
- TYPE III BARRICADE
- ▨ PROPOSED BRIDGE CONSTRUCTION
- ▨ PROPOSED 13" (FAST TRACK)

- NOTES:
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STATE OF TEXAS
GABRIEL ODREMAN NORIEGA
135069
PROFESSIONAL ENGINEER
02/06/2024

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575 N. Dairy Ashford, Suite 700, Houston, Texas 77079
T +1 281 589 7257 E usinfrastructure@rpsgroup.com

FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

TRAFFIC CONTROL PLANS
PHASE 1 STEP 2

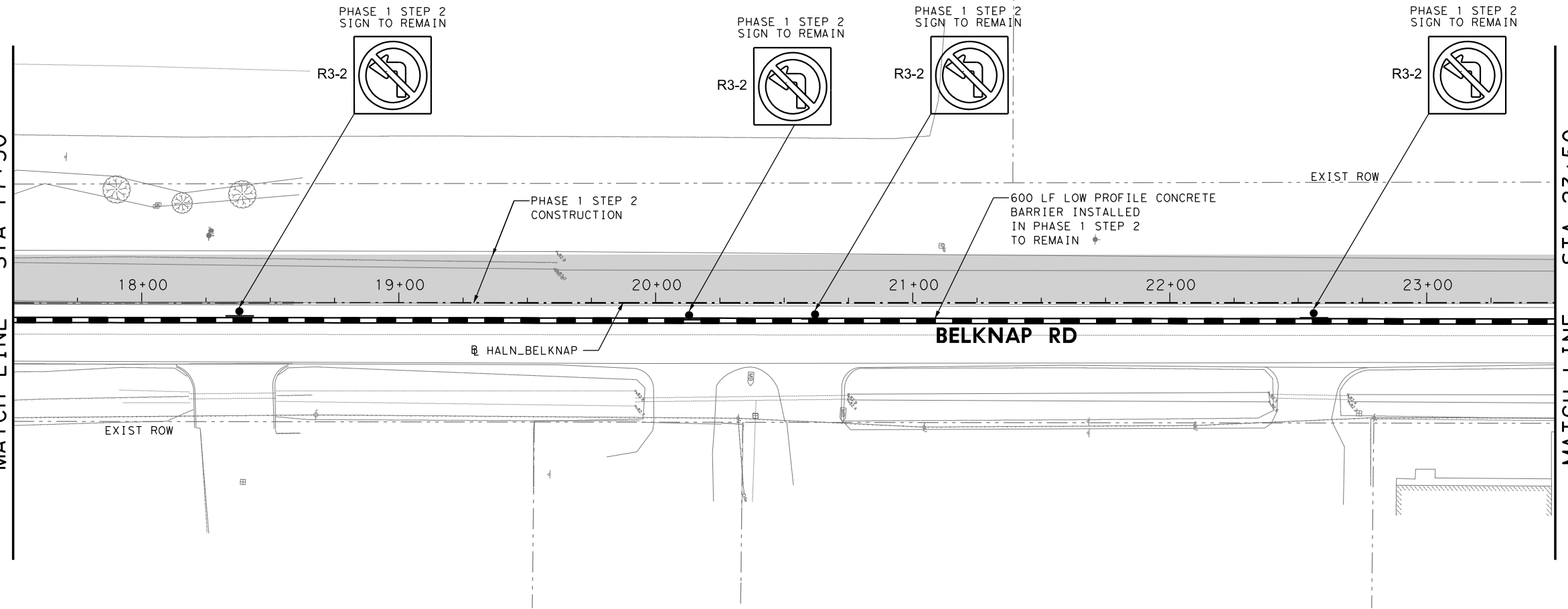
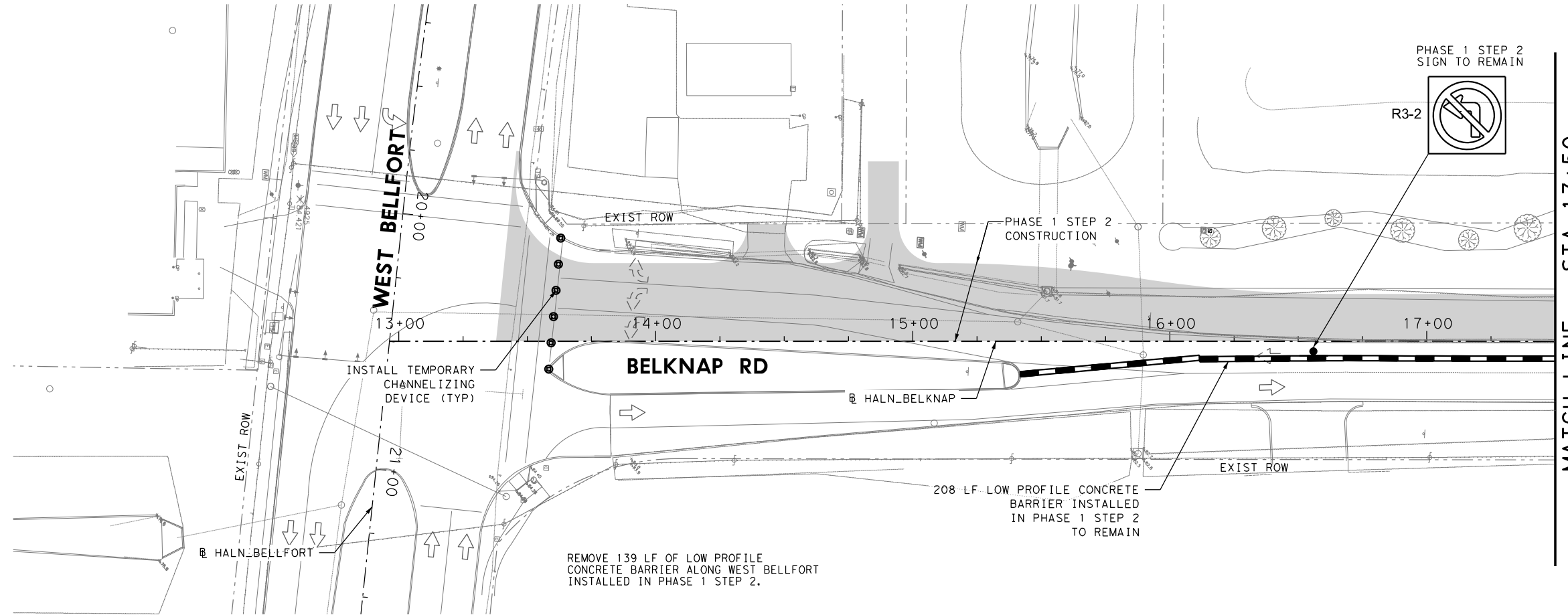
SHEET 8 OF 8

CNTY	PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	2023			62

DESIGNED BY: RPS DRAWN BY: RPS CHECKED BY: RPS VERIFIED BY: RPS

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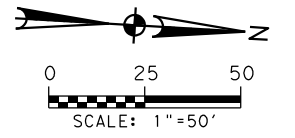


LEGEND

- EXISTING TRAFFIC PATTERN TO REMAIN
- EXISTING TRAFFIC PATTERN TO TEMPORARILY CLOSE
- PROPOSED TEMPORARY TRAFFIC PATTERN
- PAVEMENT CONSTRUCTED IN PREVIOUS PHASE
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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

TRAFFIC CONTROL PLANS
PHASE 2

SHEET 1 OF 7

CNTY PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	2023		63
DESIGNED BY RPS	DRAWN BY RPS	CHECKED BY RPS	VERIFIED BY RPS	

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MATCH LINE - STA 23+50

MATCH LINE - STA 29+50

MATCH LINE - STA 29+50

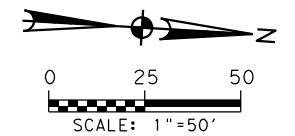
MATCH LINE - STA 35+50

LEGEND

- EXISTING TRAFFIC PATTERN TO REMAIN
- EXISTING TRAFFIC PATTERN TO TEMPORARILY CLOSE
- PROPOSED TEMPORARY TRAFFIC PATTERN
- PAVEMENT CONSTRUCTED IN PREVIOUS PHASE
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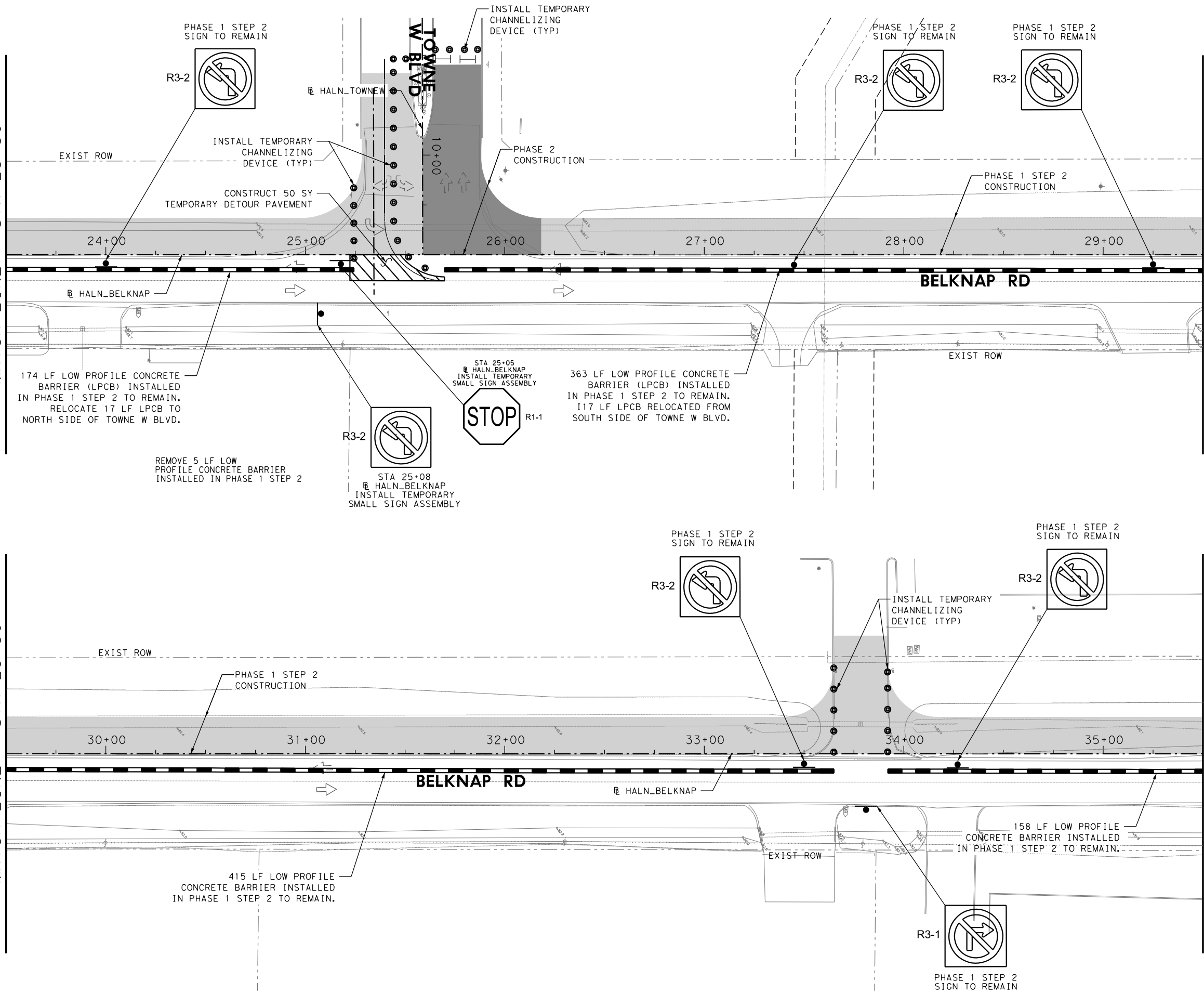
FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

TRAFFIC CONTROL PLANS
PHASE 2

CNTY	PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	2023			64
DESIGNED BY	RPS	DRAWN BY	RPS	CHECKED BY	RPS

SHEET 2 OF 7



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MATCH LINE - STA 35+50

MATCH LINE - STA 41+50

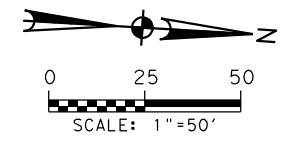
MATCH LINE - STA 41+50

MATCH LINE - STA 47+50

LEGEND

- EXISTING TRAFFIC PATTERN TO REMAIN
- EXISTING TRAFFIC PATTERN TO TEMPORARILY CLOSE
- PROPOSED TEMPORARY TRAFFIC PATTERN
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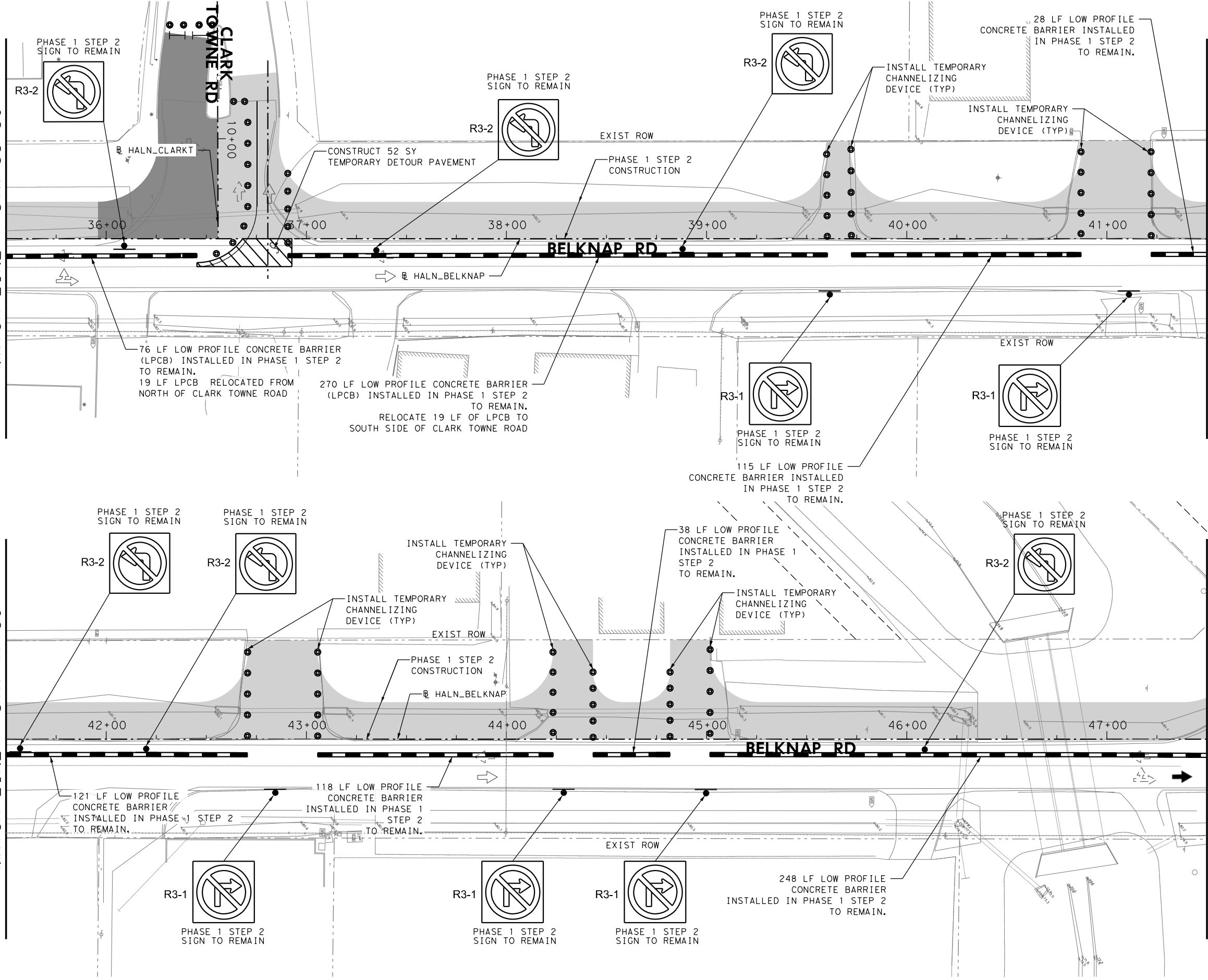
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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

TRAFFIC CONTROL PLANS
PHASE 2

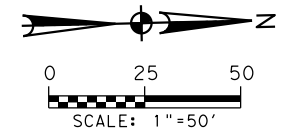
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17-2-11	008169	2023			65
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY		
RPS	RPS	RPS	RPS		



LEGEND

- EXISTING TRAFFIC PATTERN TO REMAIN
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 LICENSED PROFESSIONAL ENGINEER
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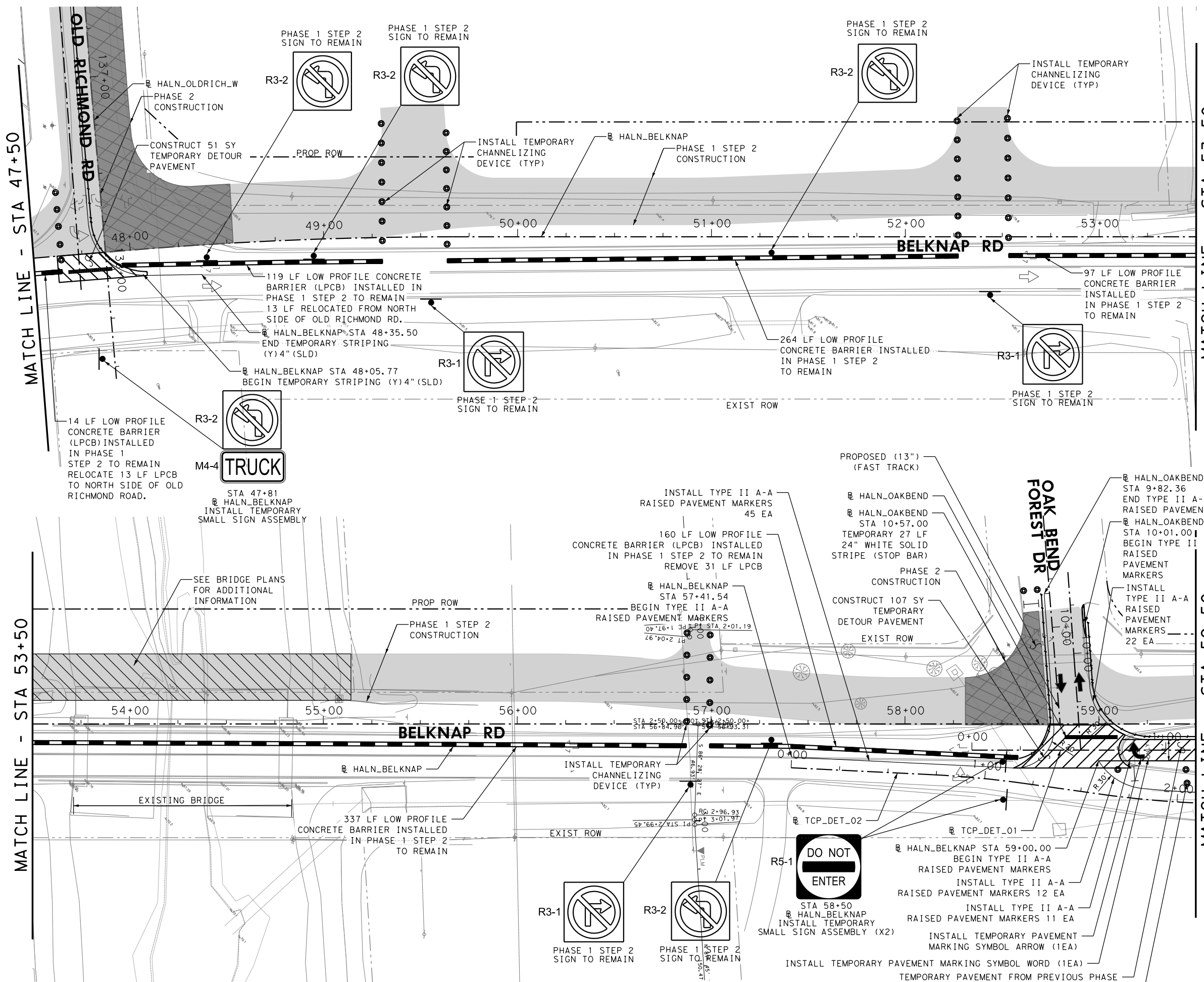
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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
 W BELLFORT BLVD TO OAK BEND FOREST DR

TRAFFIC CONTROL PLANS
 PHASE 2

CNTY PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	2023		66
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RPS	RPS	RPS	RPS	

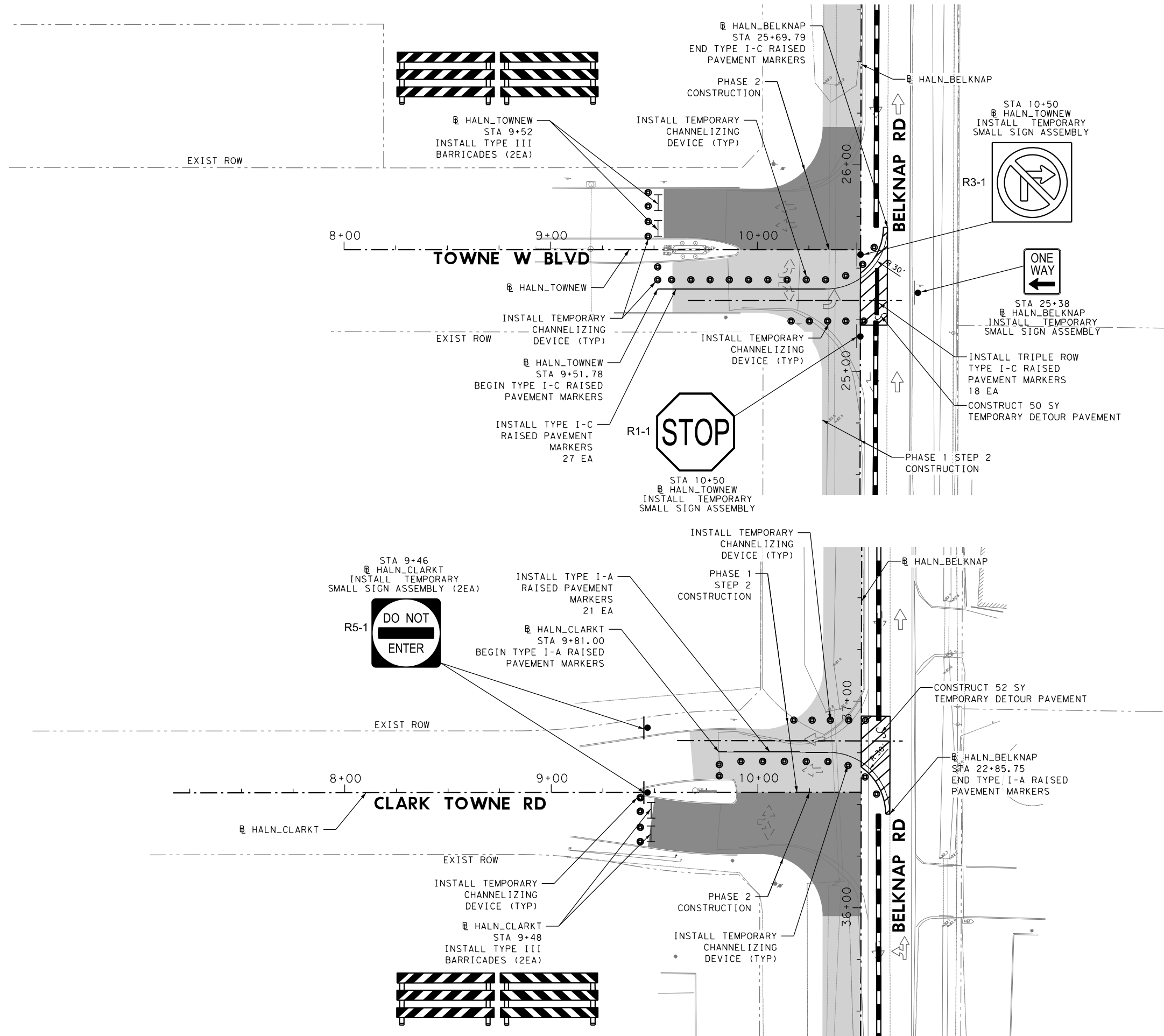


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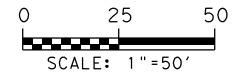


LEGEND

- EXISTING TRAFFIC PATTERN TO REMAIN
- EXISTING TRAFFIC PATTERN TO TEMPORARILY CLOSE
- PROPOSED TEMPORARY TRAFFIC PATTERN
- PAVEMENT CONSTRUCTED IN PREVIOUS PHASE
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FORT BEND COUNTY, TEXAS

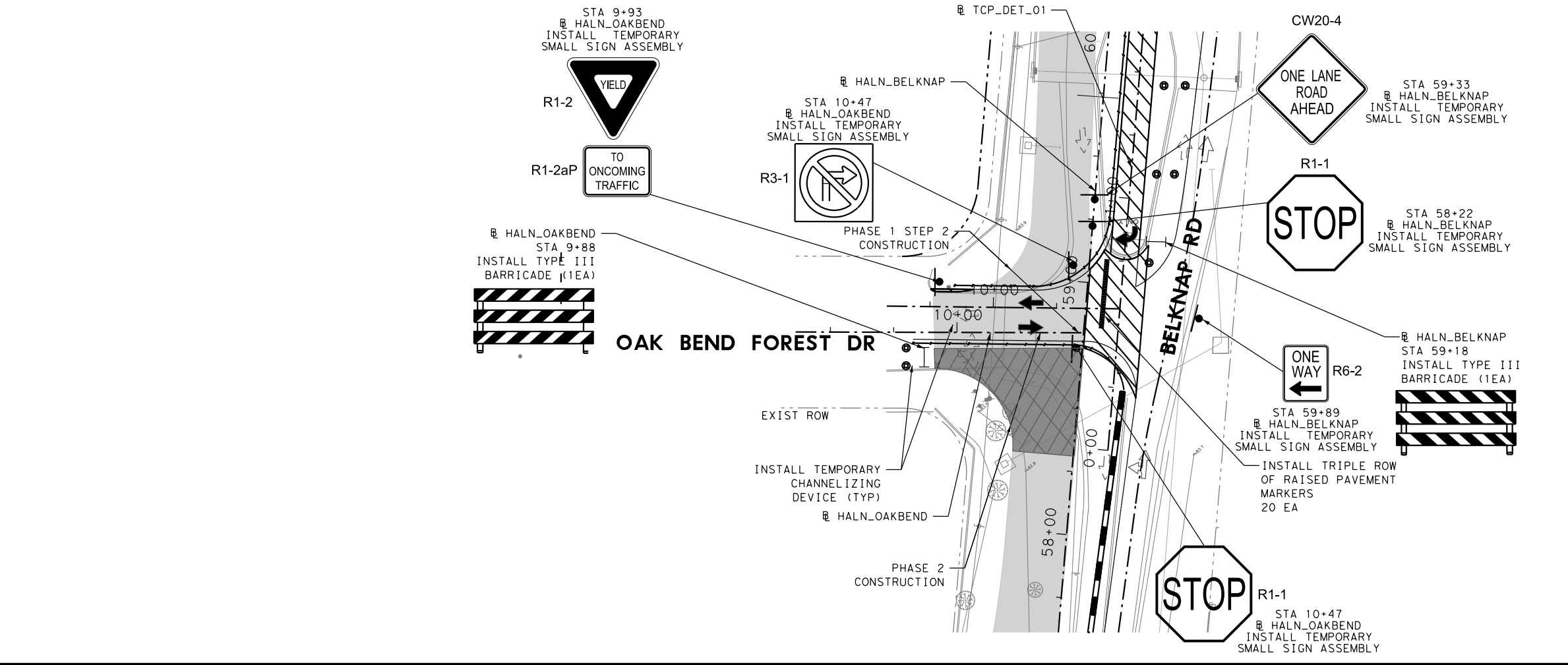
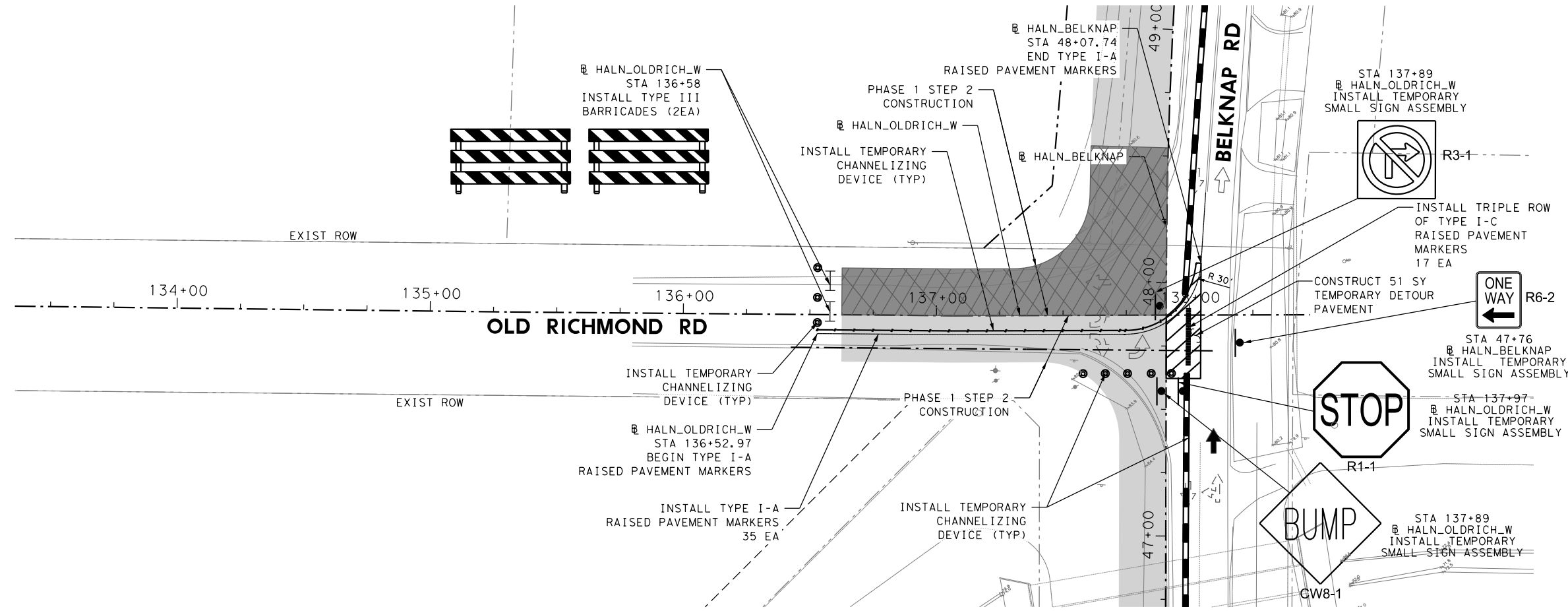
BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

TRAFFIC CONTROL PLANS
PHASE 2

CNTY	PROJ	RPS PROJ	DATE	SCALE	SHEET NO
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RPS	RPS	RPS	RPS		68

SHEET 6 OF 7

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LEGEND

- EXISTING TRAFFIC PATTERN TO REMAIN
- EXISTING TRAFFIC PATTERN TO TEMPORARILY CLOSE
- PROPOSED TEMPORARY TRAFFIC PATTERN
- PAVEMENT CONSTRUCTED IN PREVIOUS PHASE
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0 25 50
SCALE: 1"=50'

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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

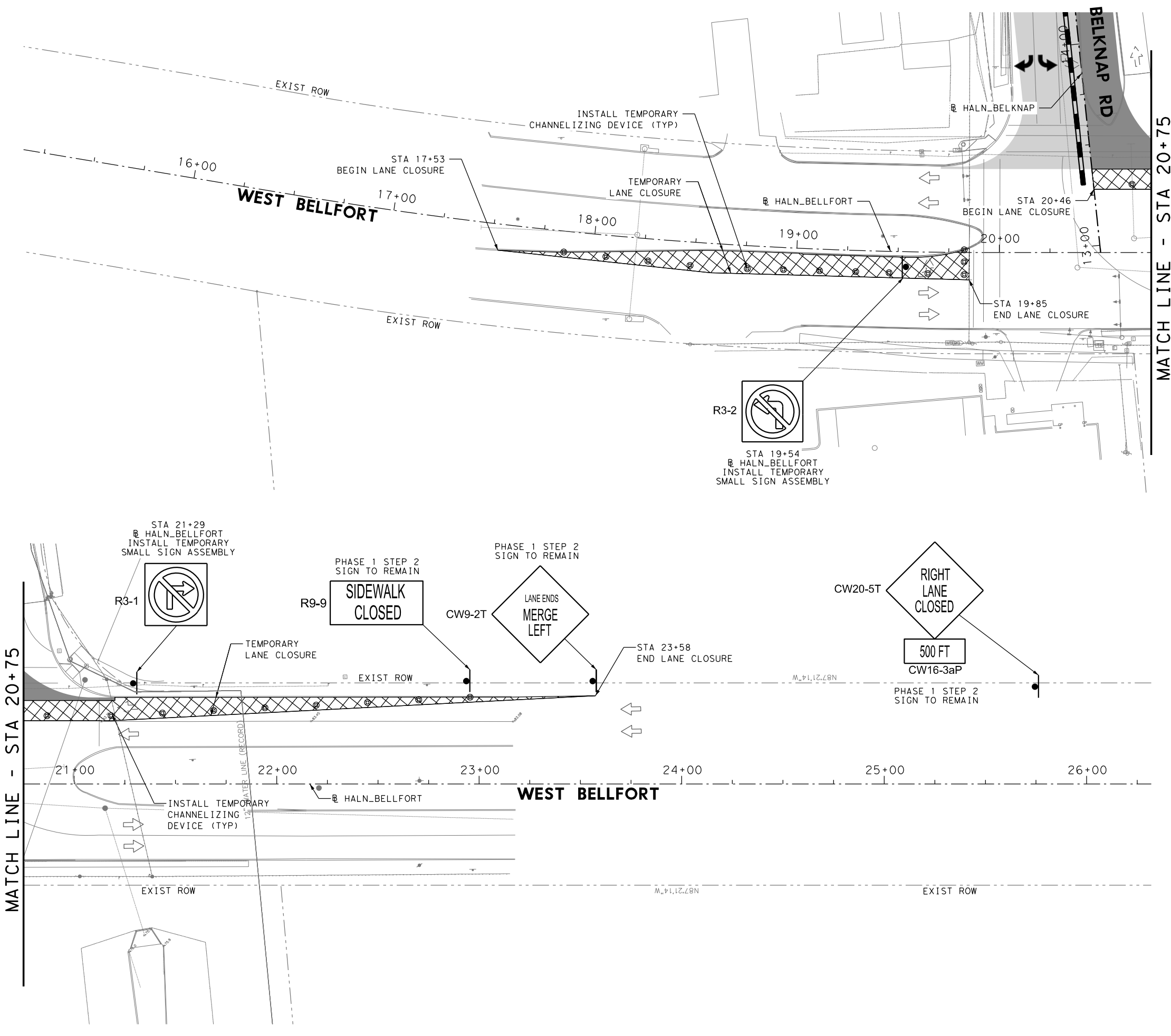
TRAFFIC CONTROL PLANS
PHASE 2

SHEET 7 OF 7

CNTY	PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	2023			69

DESIGNED BY: RPS DRAWN BY: RPS CHECKED BY: RPS VERIFIED BY: RPS

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- LEGEND**
- EXISTING TRAFFIC PATTERN TO REMAIN
 - EXISTING TRAFFIC PATTERN TO TEMPORARILY CLOSE
 - PROPOSED TEMPORARY TRAFFIC PATTERN
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0 25 50
SCALE: 1"=50'

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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

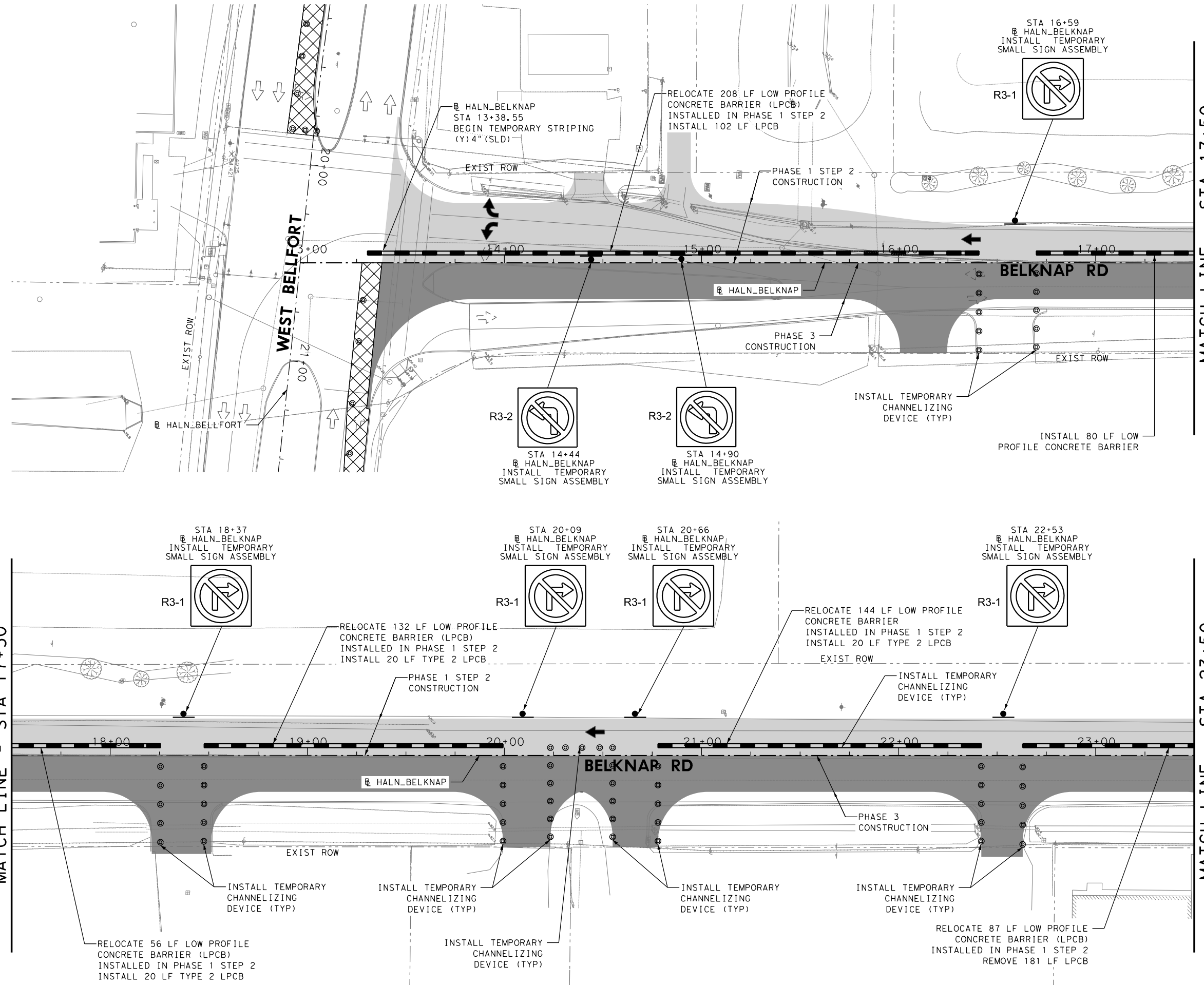
TRAFFIC CONTROL PLANS
PHASE 3

SHEET 1 OF 8

CNTY PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	2023		70
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RPS	RPS	RPS	RPS	

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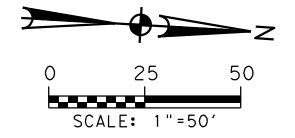


LEGEND

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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
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TRAFFIC CONTROL PLANS
PHASE 3

SHEET 2 OF 8

CNTY PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	2023		71

DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY
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MATCH LINE - STA 23+50

MATCH LINE - STA 29+50

MATCH LINE - STA 29+50

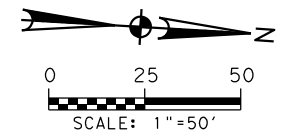
MATCH LINE - STA 35+50

LEGEND

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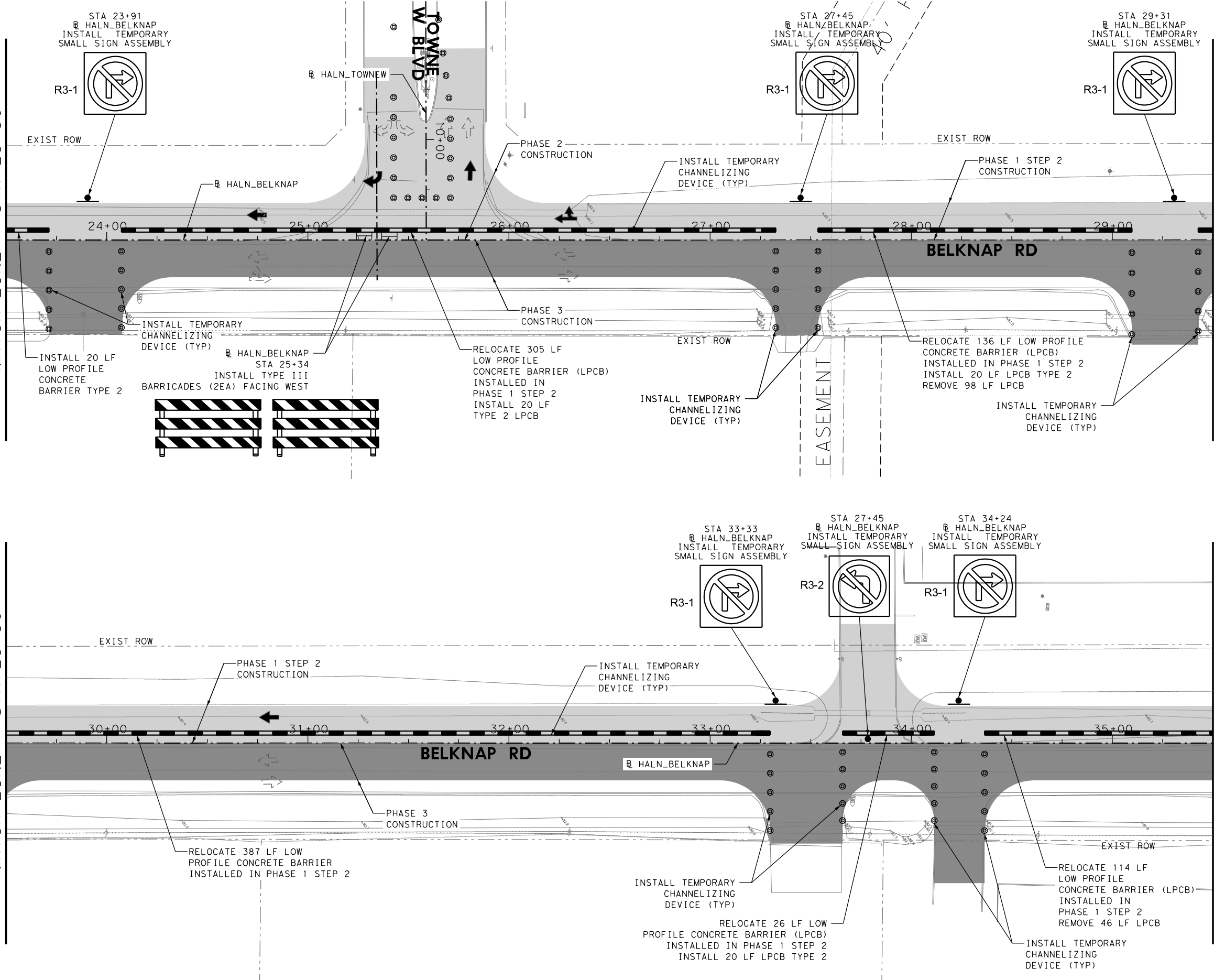
FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

TRAFFIC CONTROL PLANS
PHASE 3

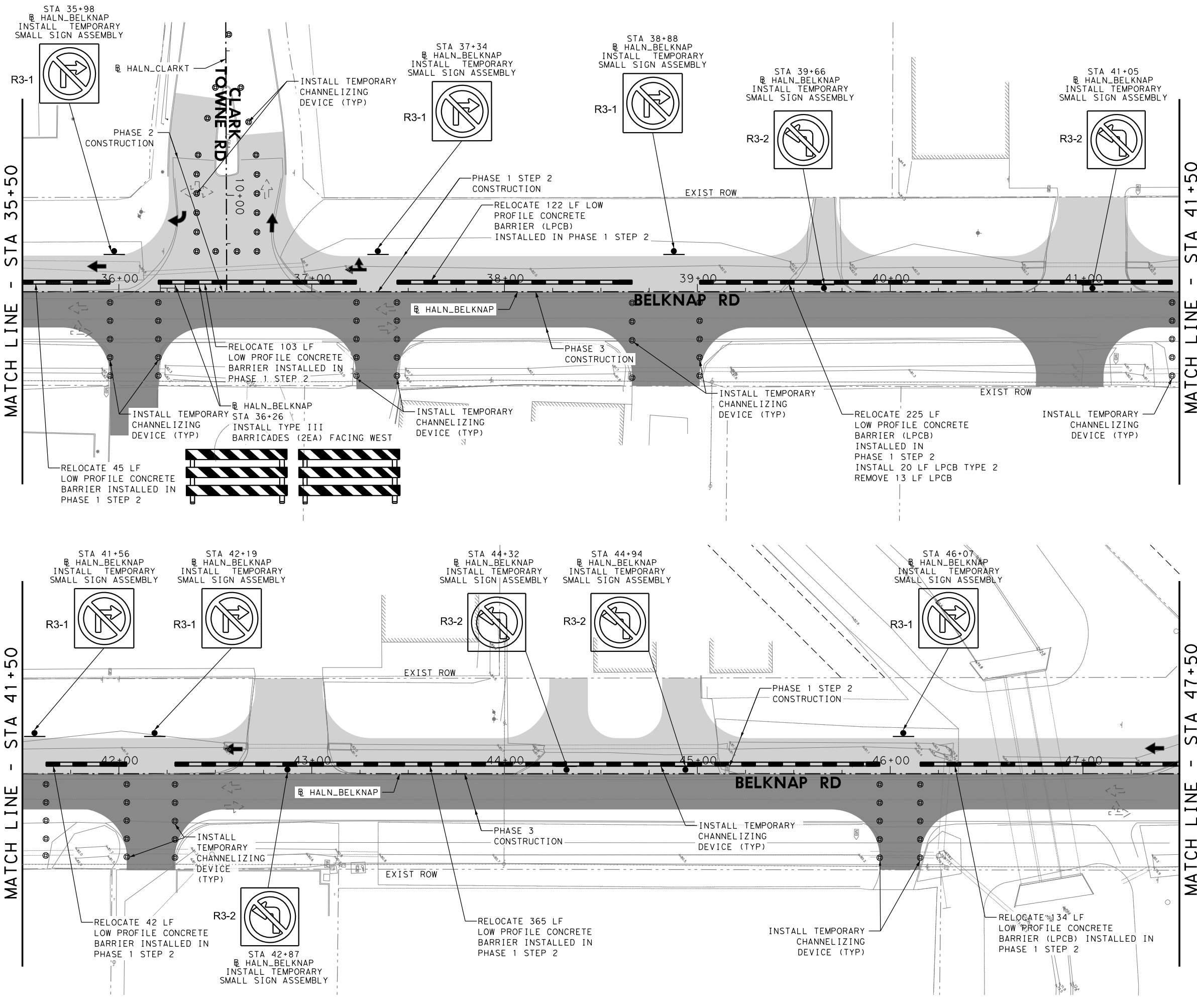
SHEET 3 OF 8

CNTY	PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	2023	2023		72
DESIGNED BY	RPS	DRAWN BY	RPS	CHECKED BY	RPS
				VERIFIED BY	RPS



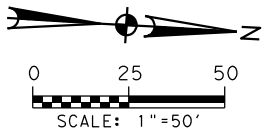
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- LEGEND**
- EXISTING TRAFFIC PATTERN TO REMAIN
 - EXISTING TRAFFIC PATTERN TO TEMPORARILY CLOSE
 - PROPOSED TEMPORARY TRAFFIC PATTERN
 - PAVEMENT CONSTRUCTED IN PREVIOUS PHASE
 - PAVEMENT CONSTRUCTED IN THIS PHASE
 - TEMPORARY PAVEMENT
 - TEMPORARY LANE CLOSURE
 - TEMPORARY BARRELS
 - TEMPORARY VERTICAL PANELS
 - LOW PROFILE CONCRETE BARRIER
 - TYPE III BARRICADE
 - PROPOSED BRIDGE CONSTRUCTION

- NOTES:**
1. SEE CHANNELIZATION TABLES FOR DEVICE TYPE AND SPACING TO ALL PHASES.
 2. THE FULL DEPTH SAW CUT, CURB REMOVAL AND MEDIAN NOSE REMOVAL ARE ACCOUNTED FOR IN THE REMOVAL PLANS AND SHALL NOT BE PAID FOR UNDER THE TRAFFIC CONTROL PLANS. THE INFORMATION REGARDING THE REMOVAL IS SHOWN FOR THE CONTRACTOR INFORMATION ONLY.



CAUTION!!!!
OVERHEAD ELECTRIC,
LOCATIONS ARE APPROXIMATE

CALL BEFORE YOU DIG!
TEXAS ONE CALL PARTICIPANTS REQUEST
48 HOURS NOTICE BEFORE YOU DIG, DRILL,
OR BLAST - STOP CALL
 Texas One Call System
1-800-DIG-TESS



14-Nov-2023

NO.	DATE	REVISION	APPROVED

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575 N. Dairy Ashford, Suite 700, Houston, Texas 77079
T+1 281 589 7257 E us@infrastructure@rpsgroup.com

FORT BEND COUNTY, TEXAS

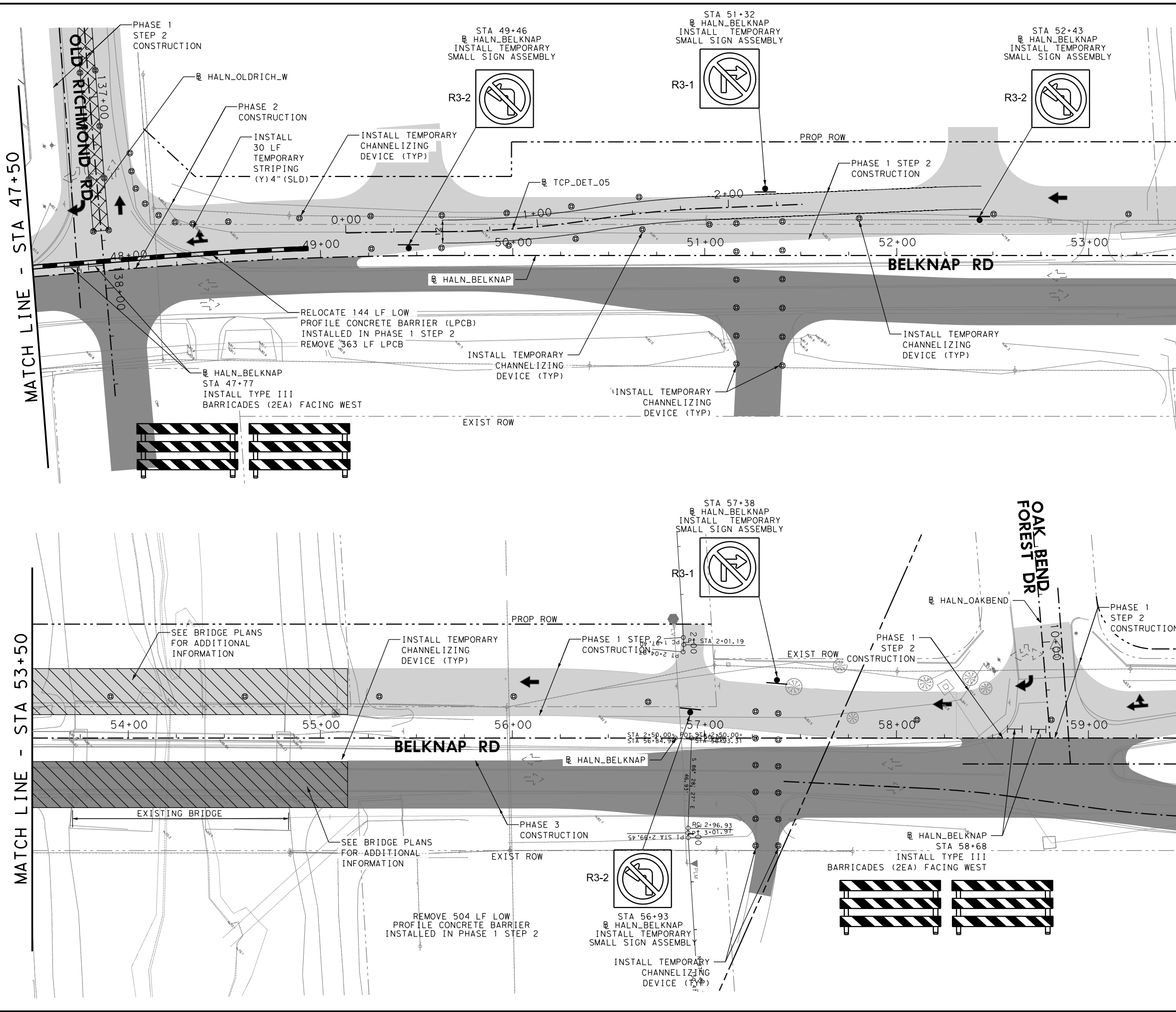
BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

TRAFFIC CONTROL PLANS
PHASE 3

CNTY	PROJ	RPS PROJ	DATE	SCALE	SHEET NO
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY		
RPS	RPS	RPS	RPS		73

SHEET 4 OF 8

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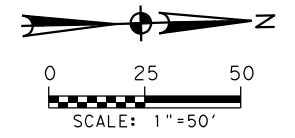


LEGEND

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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

TRAFFIC CONTROL PLANS
PHASE 3

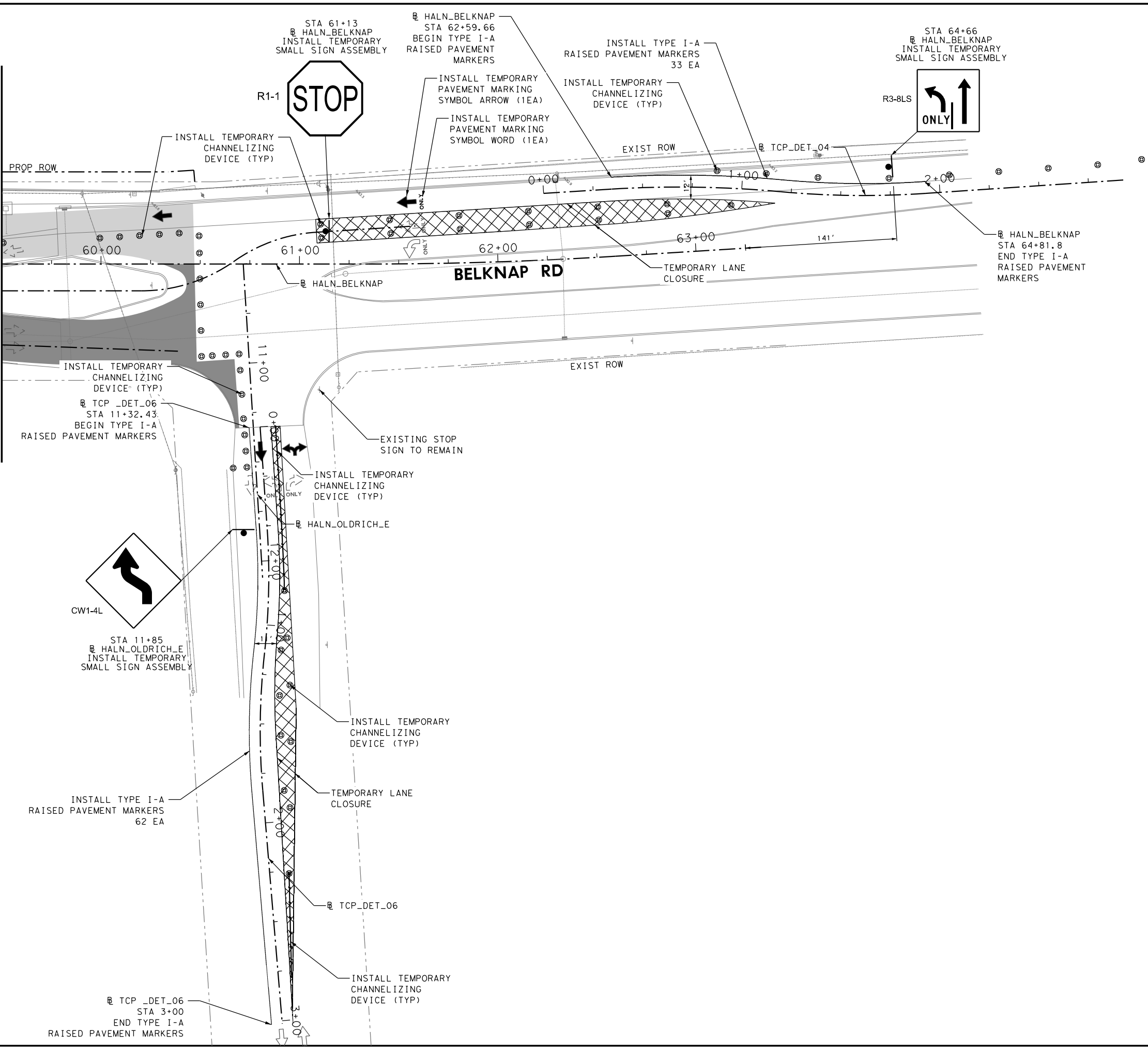
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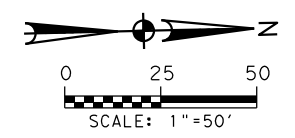


LEGEND

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FORT BEND COUNTY, TEXAS

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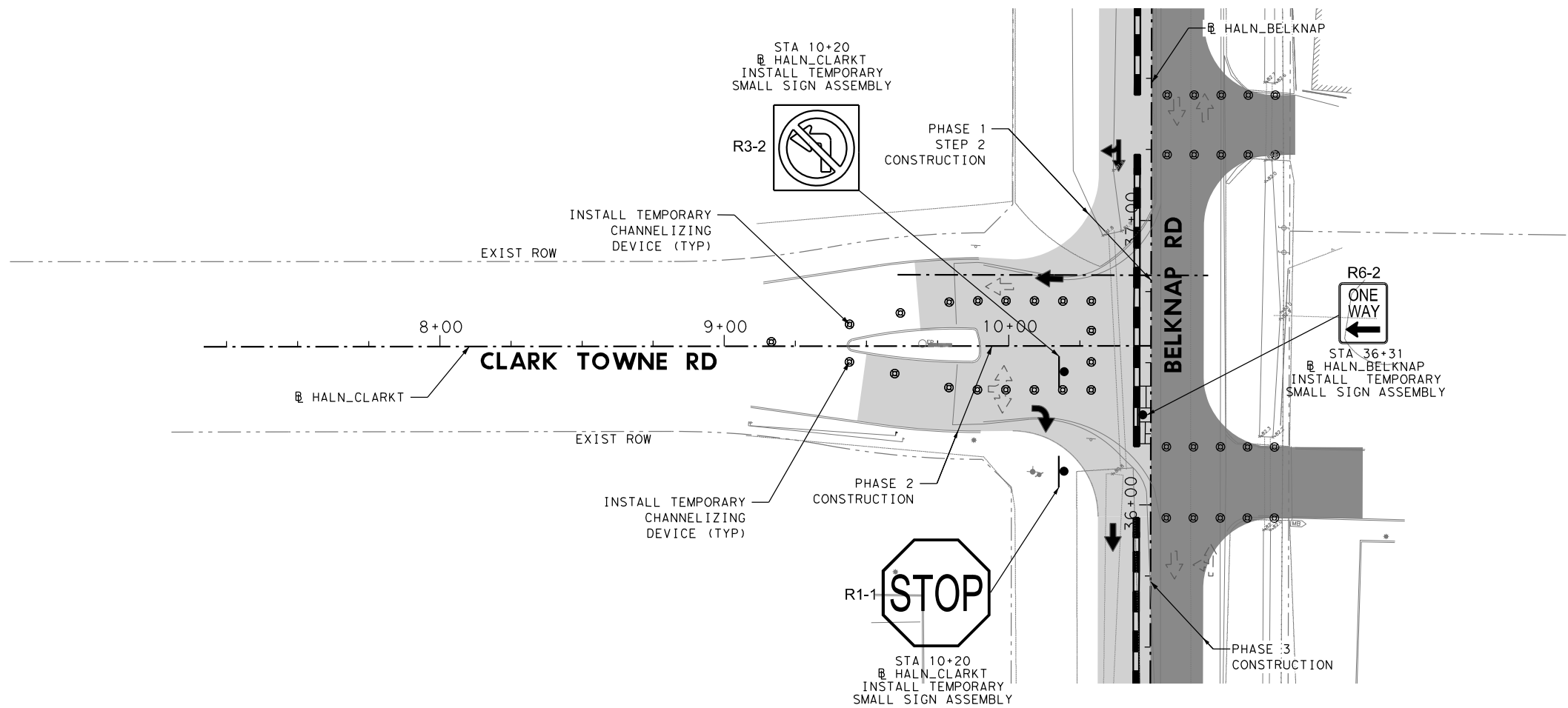
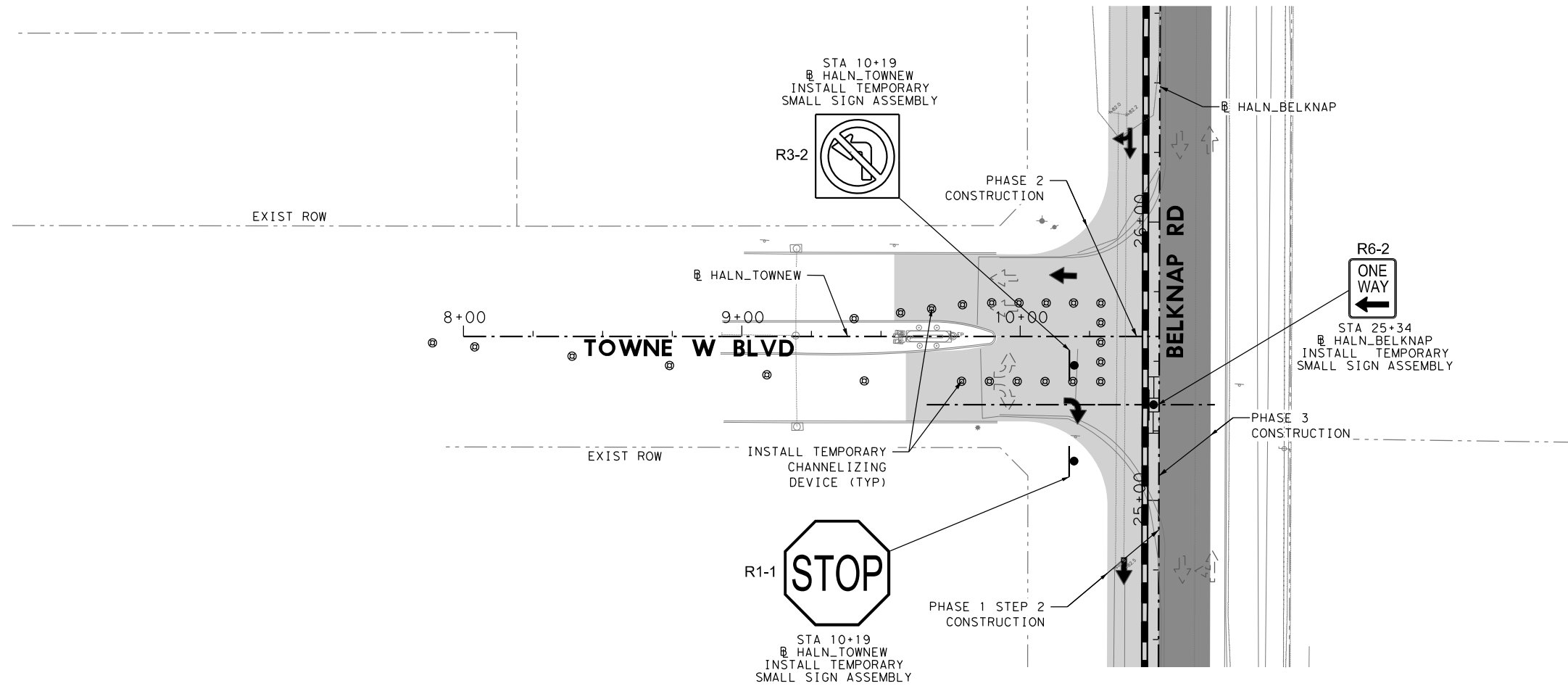
TRAFFIC CONTROL PLANS
PHASE 3

SHEET 6 OF 8

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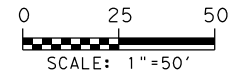


LEGEND

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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

TRAFFIC CONTROL PLANS
PHASE 3

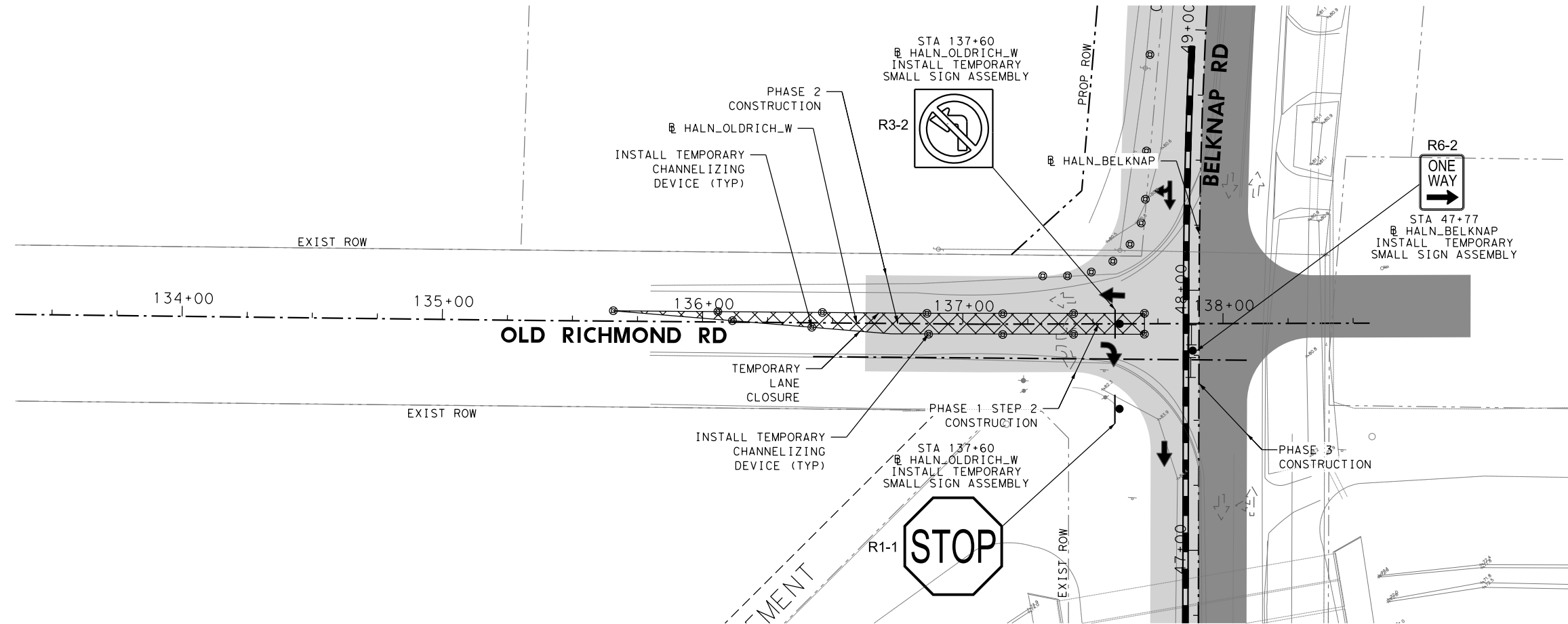
SHEET 7 OF 8

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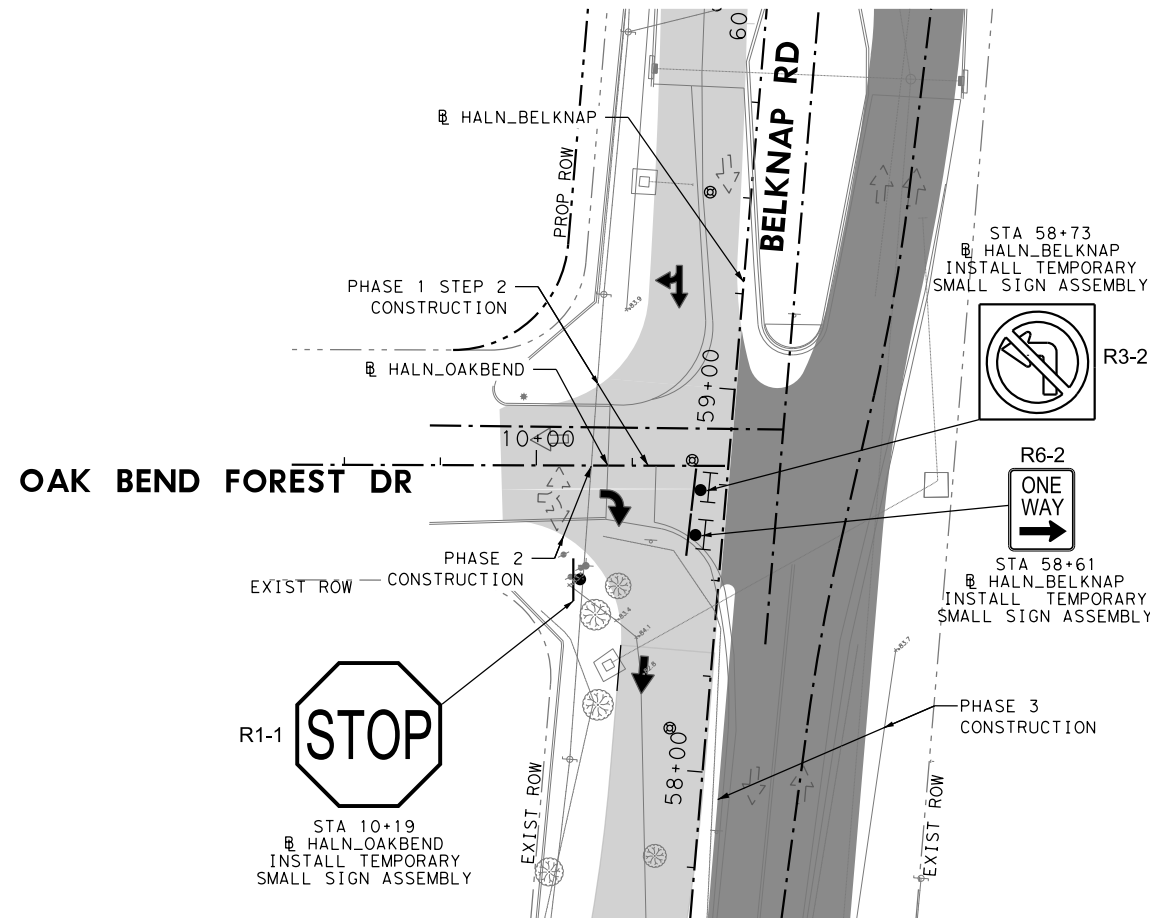
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- PROPOSED 13" (FAST TRACK)

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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
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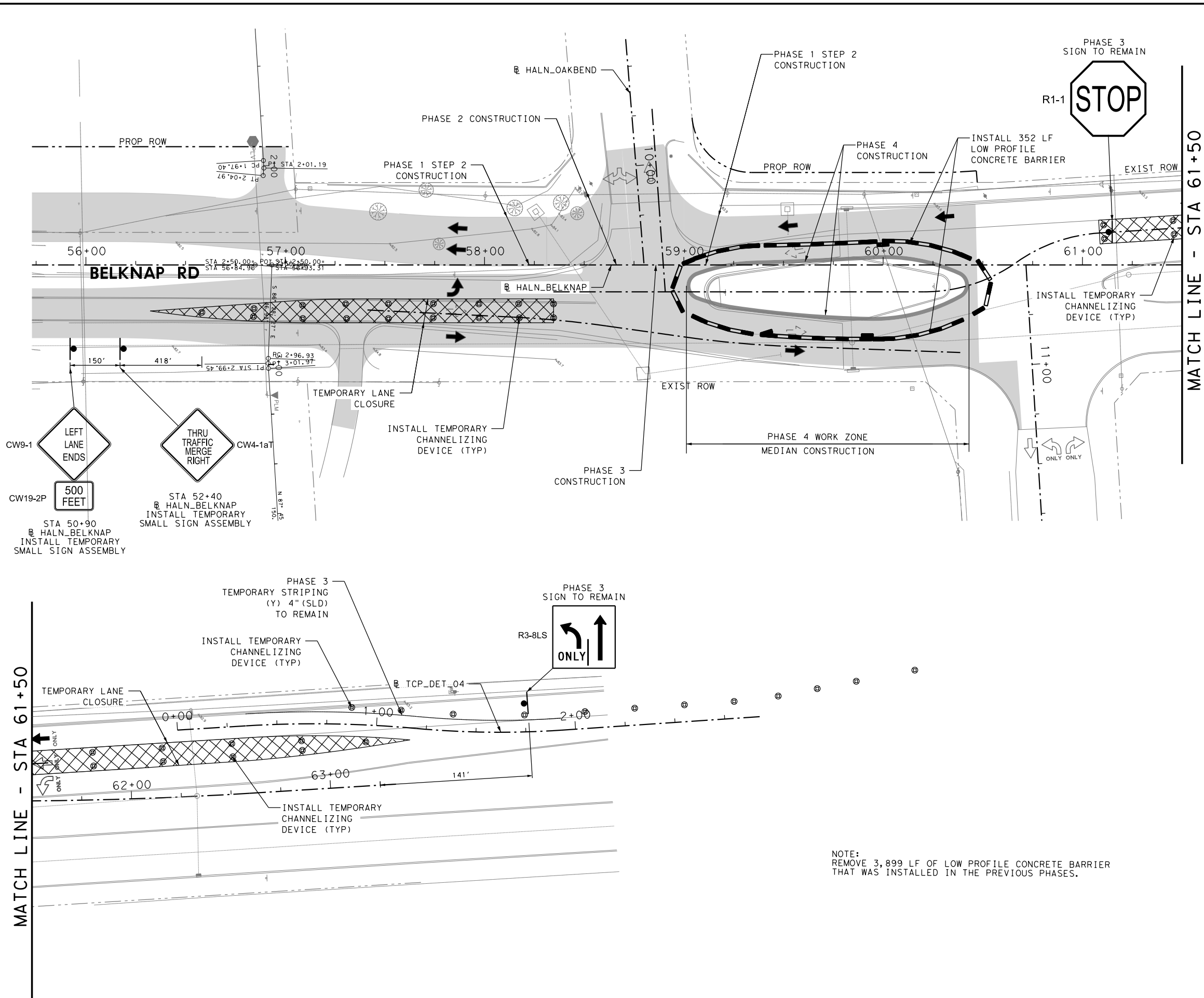
TRAFFIC CONTROL PLANS
PHASE 3

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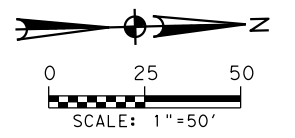
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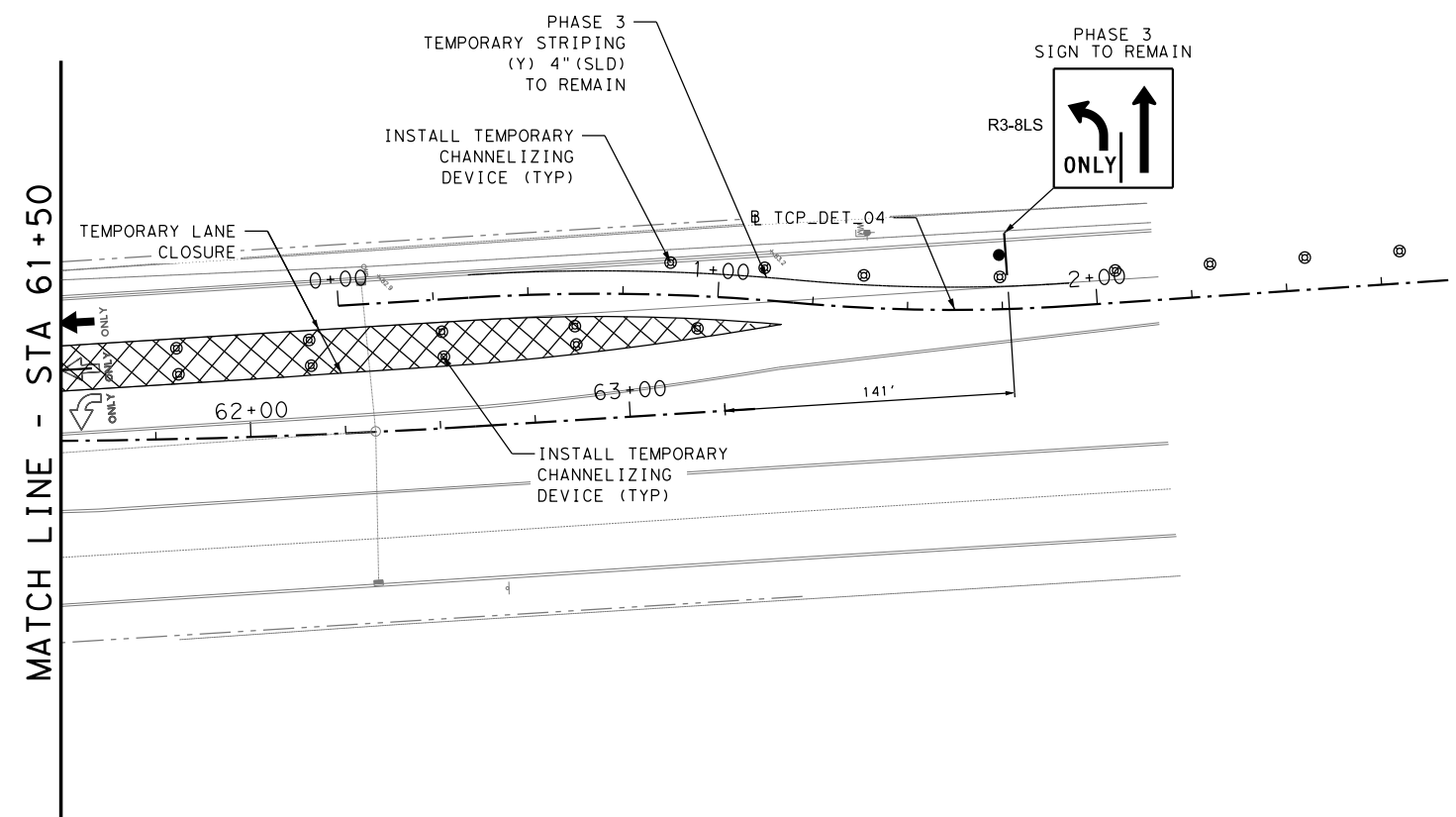
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1-800-DIG-TESS



NOTE:
REMOVE 3,899 LF OF LOW PROFILE CONCRETE BARRIER
THAT WAS INSTALLED IN THE PREVIOUS PHASES.

02/06/2024

NO.	DATE	REVISION	APPROVED

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575 N. Dairy Ashford, Suite 700, Houston, Texas 77079
T+1 281 589 7257 E usinfrastructure@rpsgroup.com

FORT BEND COUNTY, TEXAS

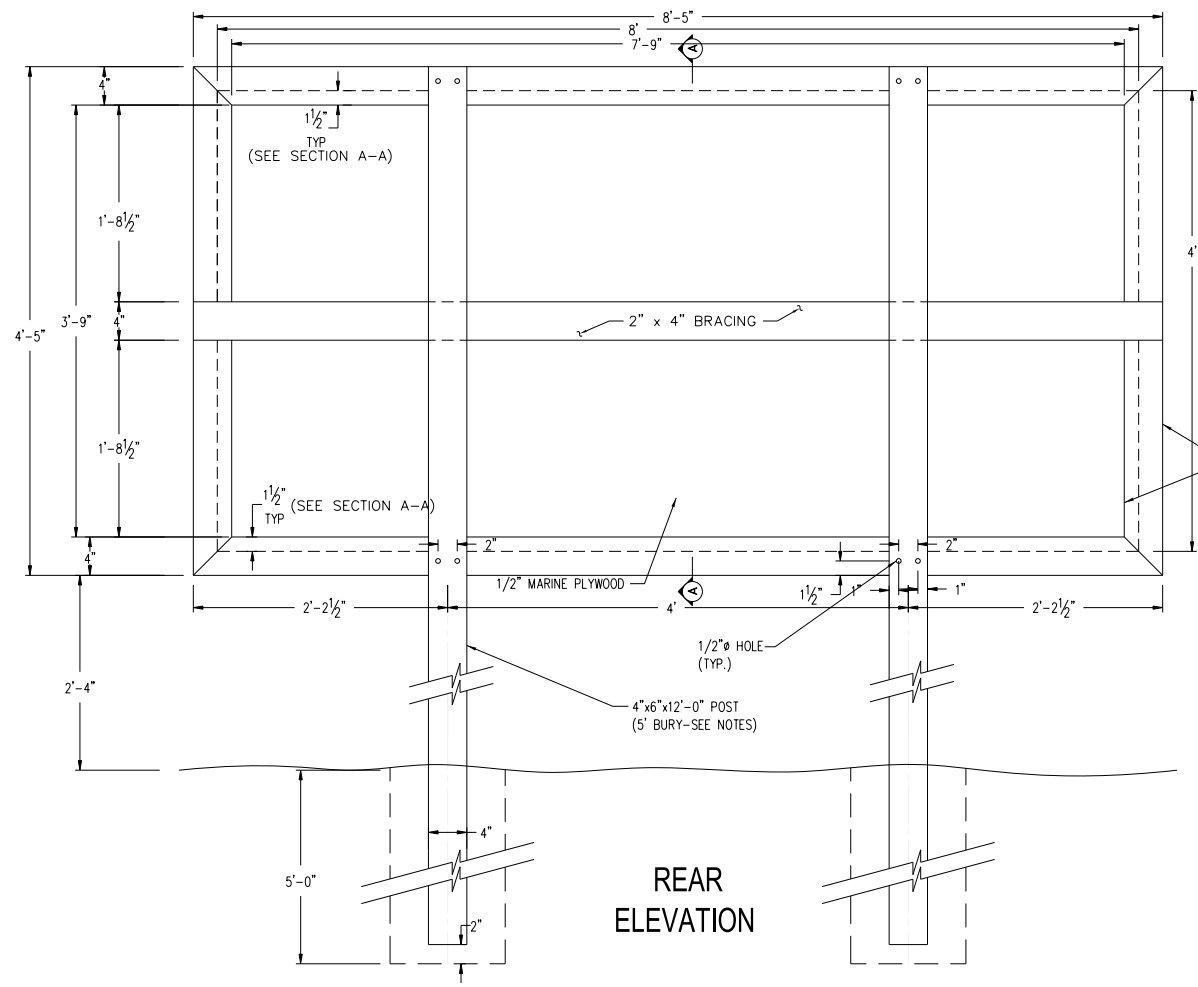
BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

TRAFFIC CONTROL PLANS
PHASE 4

SHEET 1 OF 1

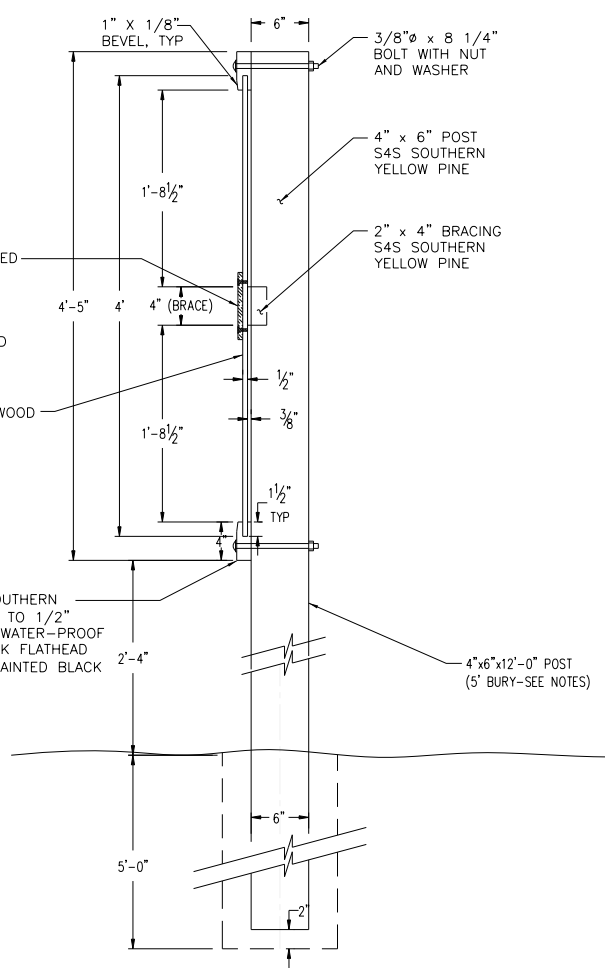
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17-2-11	008169	2023		78
DESIGNED BY RPS	DRAWN BY RPS	CHECKED BY RPS	VERIFIED BY RPS	

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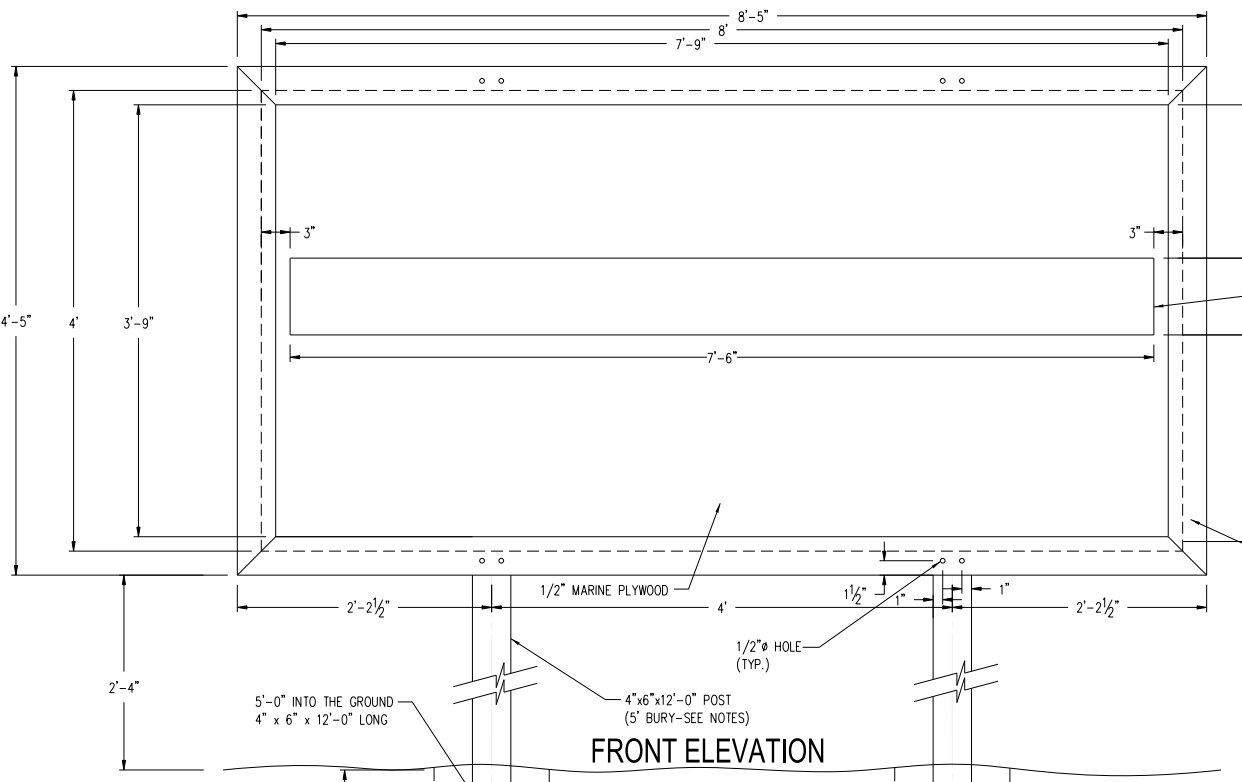


2" x 4" FRAME S4S SOUTHERN YELLOW PINE FASTENED TO 1/2" MARINE PLYWOOD WITH WATER-PROOF GLUE AND COUNTERSUNK FLATHEAD SCREWS @ 15" C-C, PAINTED BLACK

1/2" THICK REMOVABLE PANEL FASTENED WITH COUNTERSUNK FLATHEAD SCREWS 18" C-C AT TOP AND BOTTOM EDGE (LOCATION & HEIGHT OF REMOVABLE PANEL IS UNIQUE TO SIGN TYPE, SEE SIGN TYPE DETAILS FOR LETTERING AND LOCATION OF REMOVABLE PANEL)



- 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.



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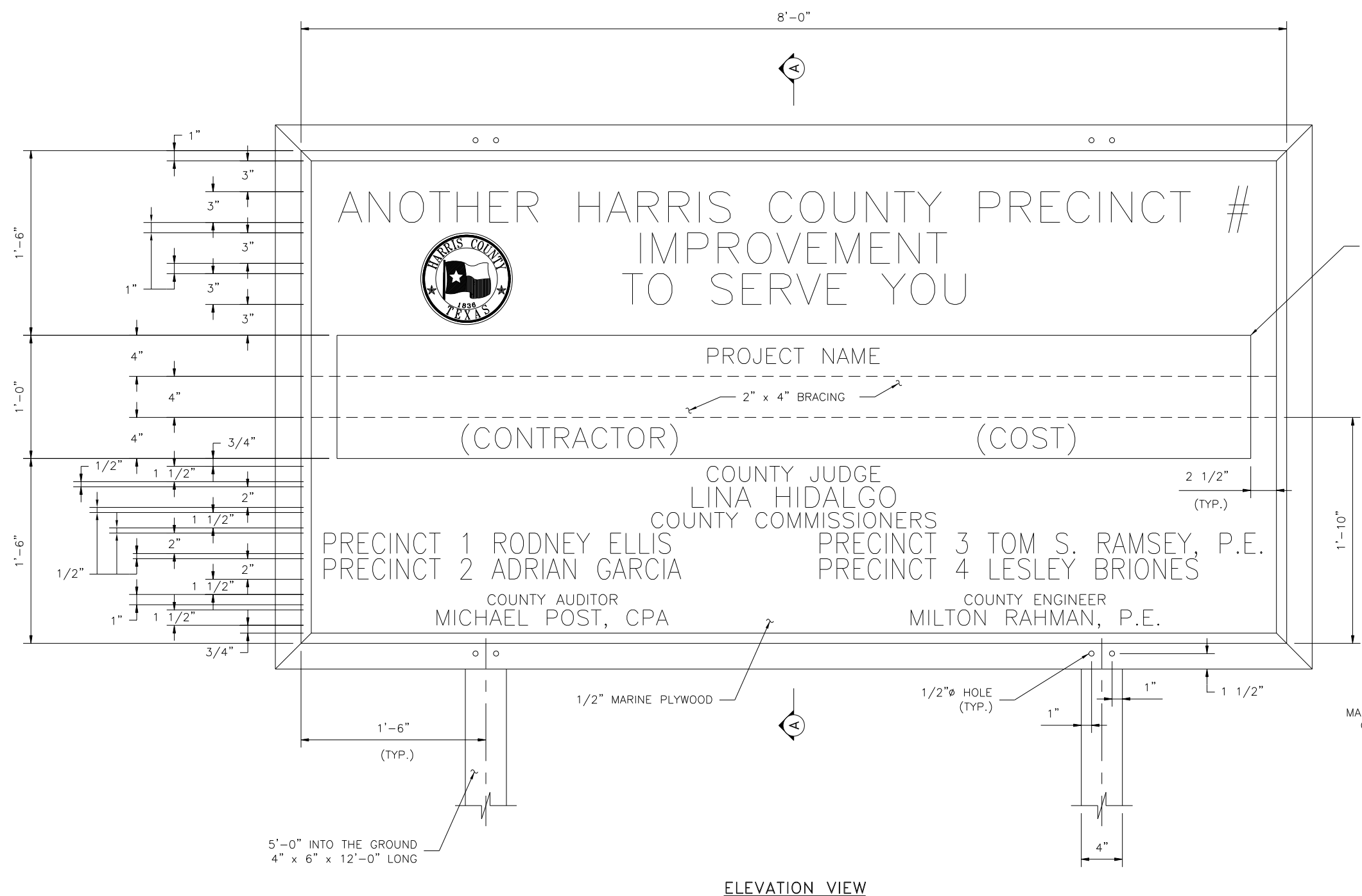
NO.	REVISIONS	DATE	NAME
1	ORIGINAL STANDARD ISSUED	3-1-22	RJS

FORT BEND COUNTY
ENGINEERING DEPARTMENT

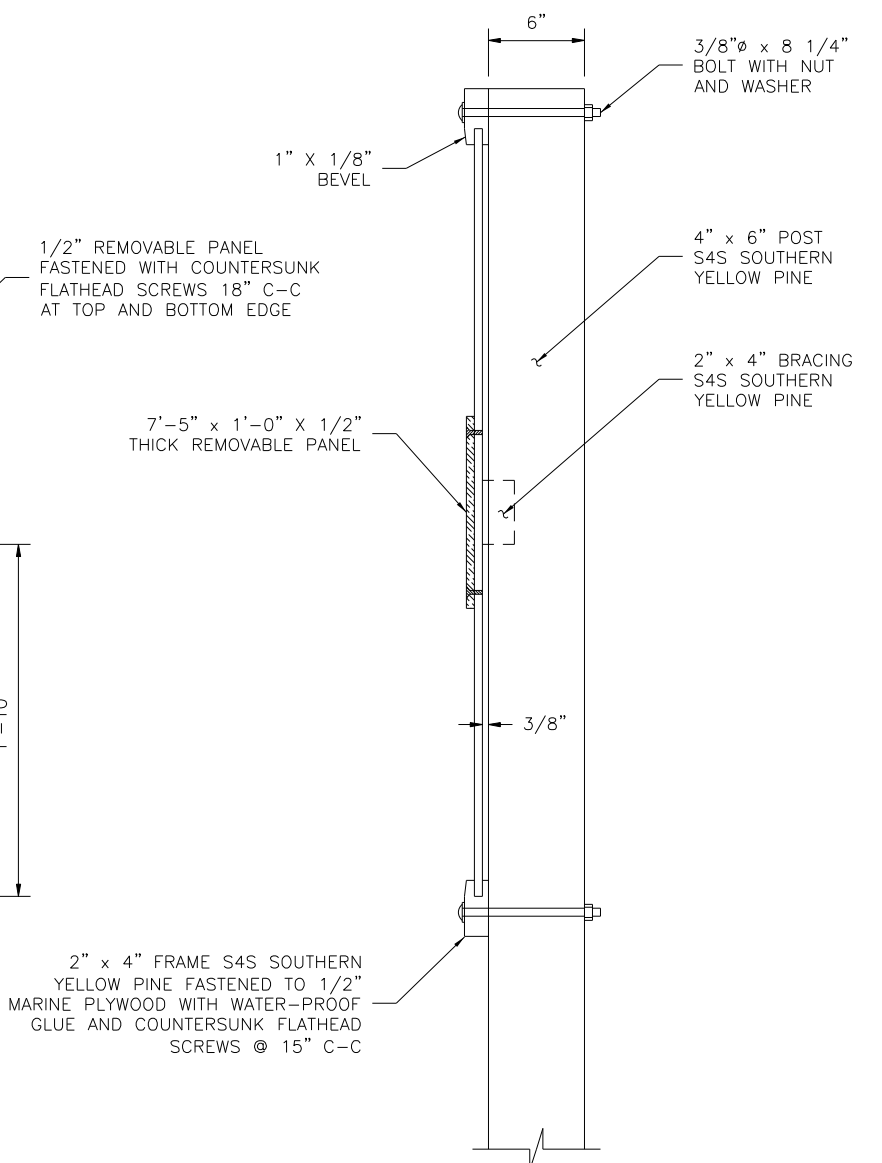


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DRAWN BY:	INIT	35
CK'D BY:	INIT	SHEET DESCRIPTION: PROJECT SIGN DETAILS
SCALE:	NONE	SHEET 1 OF 4
DATE:	3-1-22	APPROVED BY:
		79/

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ELEVATION VIEW



SECTION A-A

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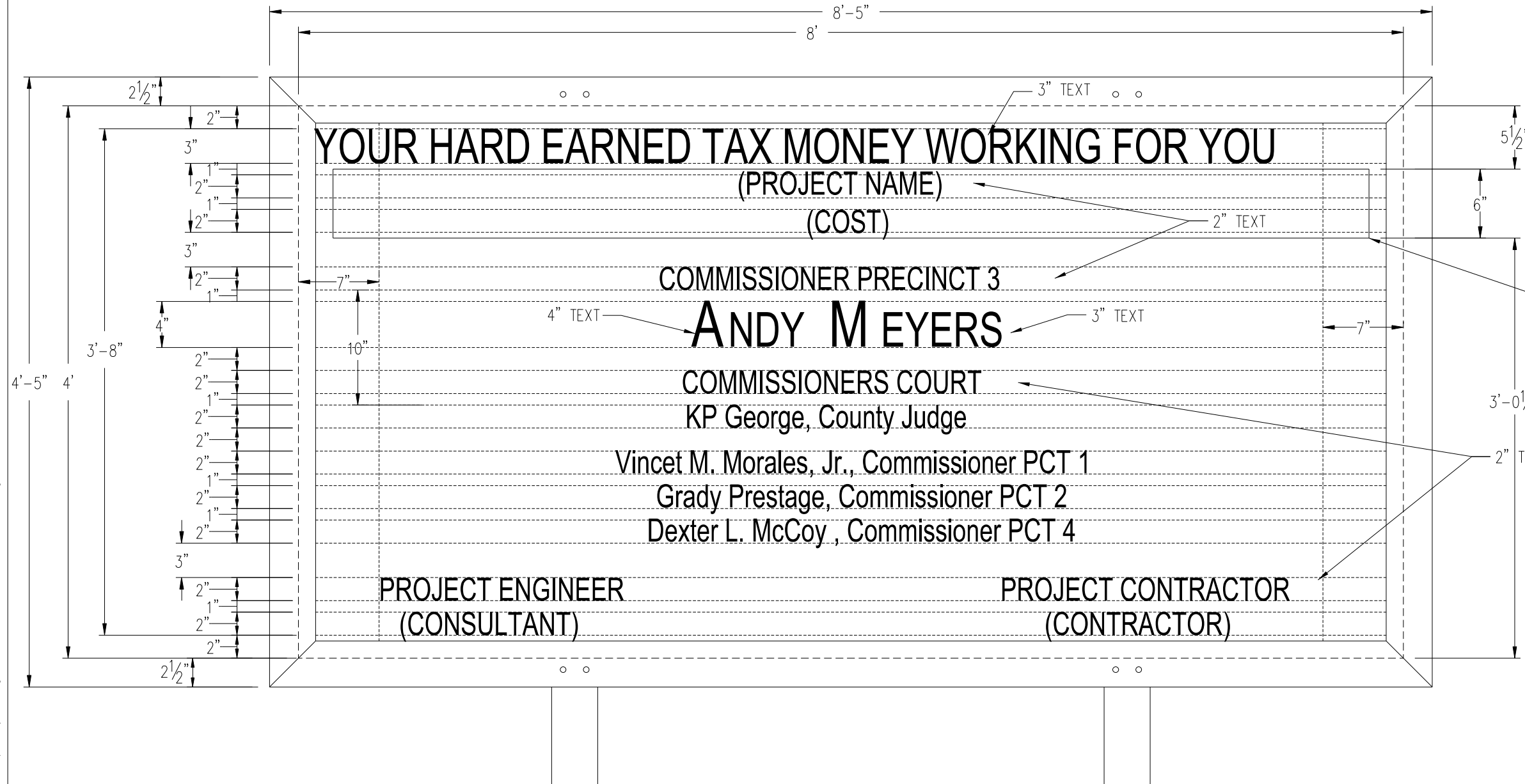
NO.	REVISIONS	DATE	NAME

HARRIS COUNTY
ENGINEERING DEPARTMENT



PROJECT TITLE:		CIVIL STANDARD
SHEET DESCRIPTION: PROJECT SIGN FOR PRECINCT 1,		PS-134
DRAWN BY: JDZ	PRECINCT 3, AND PRECINCT 4	DATE: 01/01/23
CK'D BY: PDG	SCALE: 1" = 6"	SHEET NO: 80

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1/2" THICK REMOVABLE PANEL FASTENED WITH COUNTERSUNK FLATHEAD SCREWS 18" C-C AT TOP AND BOTTOM EDGE (LOCATION & HEIGHT OF REMOVABLE PANEL IS UNIQUE TO SIGN TYPE, SEE SIGN TYPE DETAILS FOR LETTERING AND LOCATION OF REMOVABLE PANEL)

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NO.	REVISIONS	DATE	NAME
△	ORIGINAL STANDARD ISSUED	3-1-22	RJS
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FORT BEND COUNTY
ENGINEERING DEPARTMENT



PROJECT TITLE:		FBCED STANDARD
DRAWN BY: INIT	SHEET DESCRIPTION: COUNTY FUNDED PROJECT SIGN (FOR PCNT. 3) SHEET 3 OF 4	37
CK'D BY: INIT		SHEET NO: 81/
SCALE:	APPROVED BY:	
DATE: 3-1-22		

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

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SHEET 1 OF 12



**BARRICADE AND CONSTRUCTION
GENERAL NOTES
AND REQUIREMENTS**

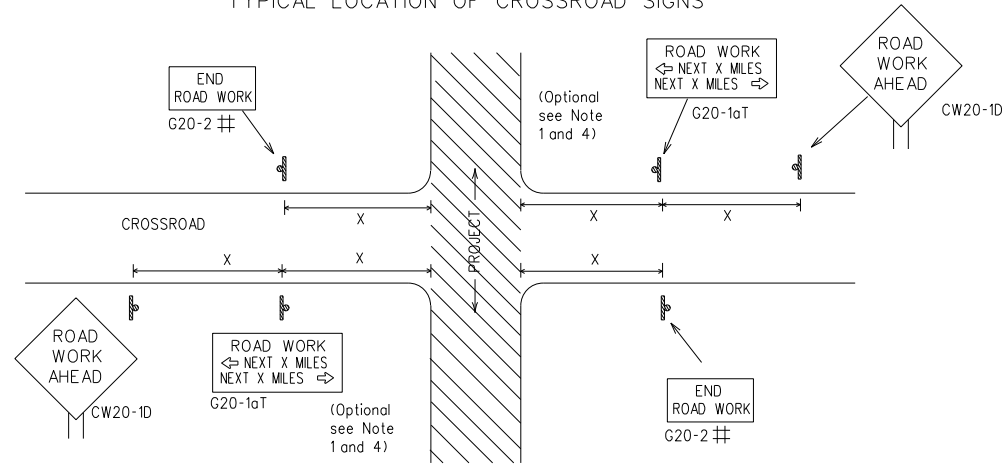
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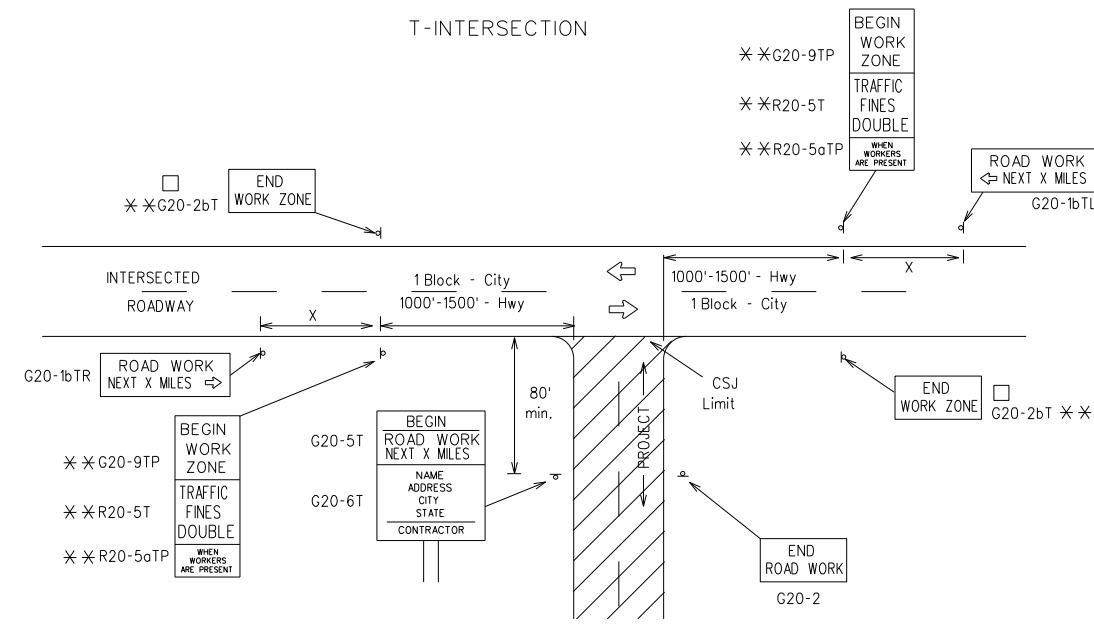
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TYPICAL LOCATION OF CROSSROAD SIGNS



- ## May be mounted on back of "ROAD WORK AHEAD"(CW20-1D) sign with approval of Engineer. (See note 2 below)
- 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.
 - 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.
 - 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.
 - 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.
 - Additional traffic control devices may be shown elsewhere in the plans for higher volume crossroads.
 - 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

- 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.
- 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

Sign Number or Series	SIZE		SPACING	
	Conventional Road	Expressway/Freeway	Posted Speed MPH	Sign Spacing "X" Feet (Apprx.)
CW20 ⁴	48" x 48"	48" x 48"	30	120
CW21			35	160
CW23			40	240
CW25			45	320
CW1, CW2, CW7, CW8, CW9, CW11, CW14	36" x 36"	48" x 48"	50	400
CW3, CW4, CW5, CW6, CW8-3, CW10, CW12	48" x 48"	48" x 48"	60	600 ²
			65	700 ²
			70	800 ²
			75	900 ²
			80	1000 ²
*			*	*

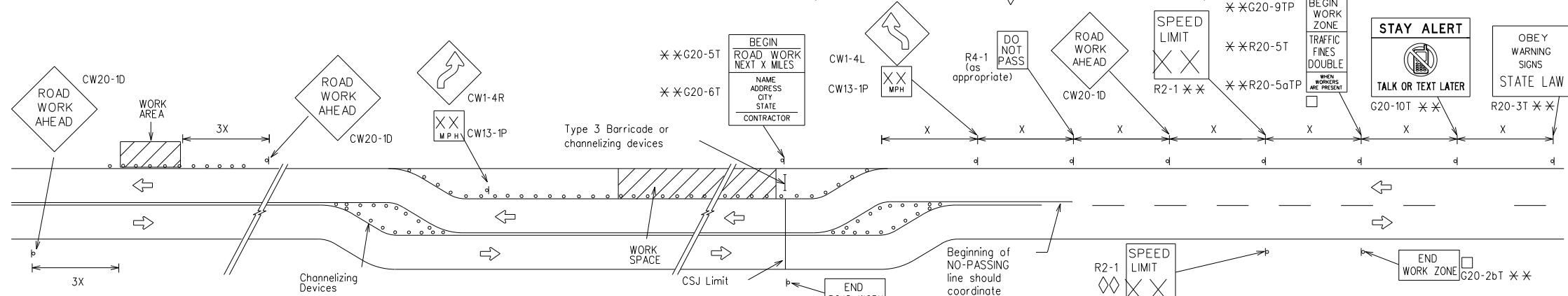
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

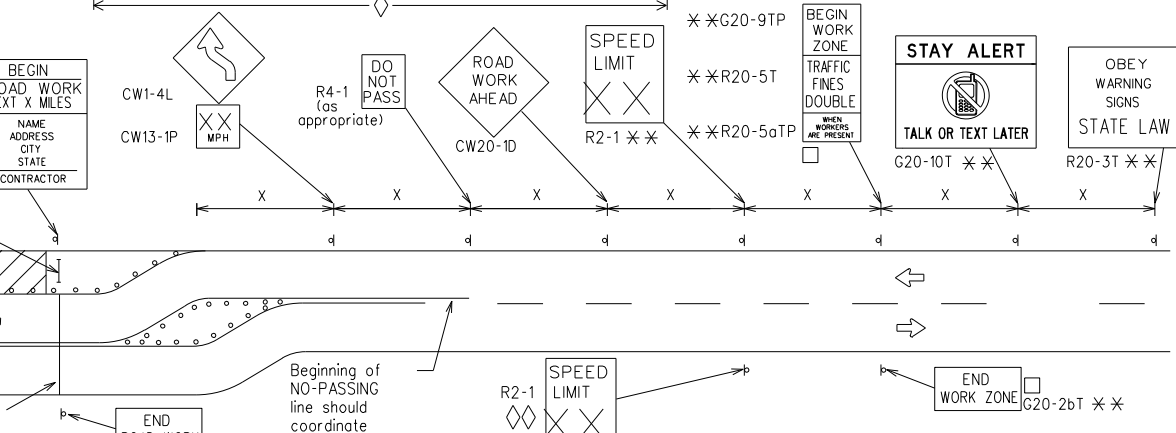
- Special or larger size signs may be used as necessary.
- Distance between signs should be increased as required to have 1500 feet advance warning.
- Distance between signs should be increased as required to have 1/2 mile or more advance warning.
- 36" x 36" "ROAD WORK AHEAD" (CW20-1D) signs may be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

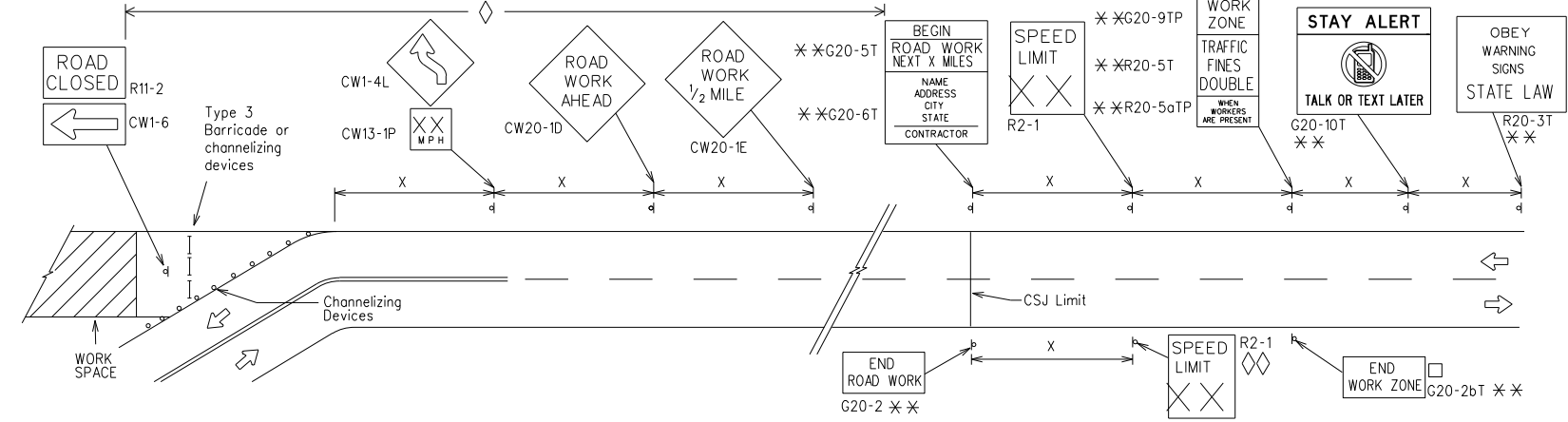
SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



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.

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



LEGEND

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

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BARRICADE AND CONSTRUCTION PROJECT LIMIT

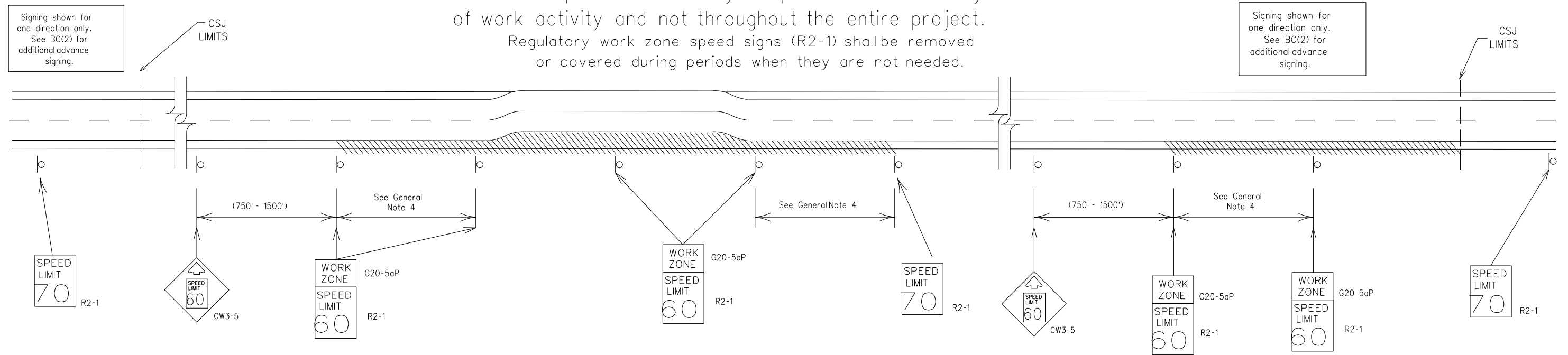
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TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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:

- rough road or damaged pavement surface
- substantial alteration of roadway geometrics (diversions)
- construction detours
- grade
- width
- 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

- Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
- Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
- Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
- 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
- Regulatory speed limit signs shall have black legend and border on a white reflective background (See "Reflective Sheeting" on BC(4)).
- 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.
- Turning signs from view, laying signs over or down will not be allowed, unless as otherwise noted under "REMOVING OR COVERING" on BC(4).
- Techniques that may help reduce traffic speeds include but are not limited to:
 - Law enforcement.
 - Flagger stationed next to sign.
 - Portable changeable message sign (PCMS).
 - Low-power (drone) radar transmitter.
 - Speed monitor trailers or signs.
- Speeds shown on details above are for illustration only. Work Zone Speed Limits should only be posted as approved for each project.
- 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.

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BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

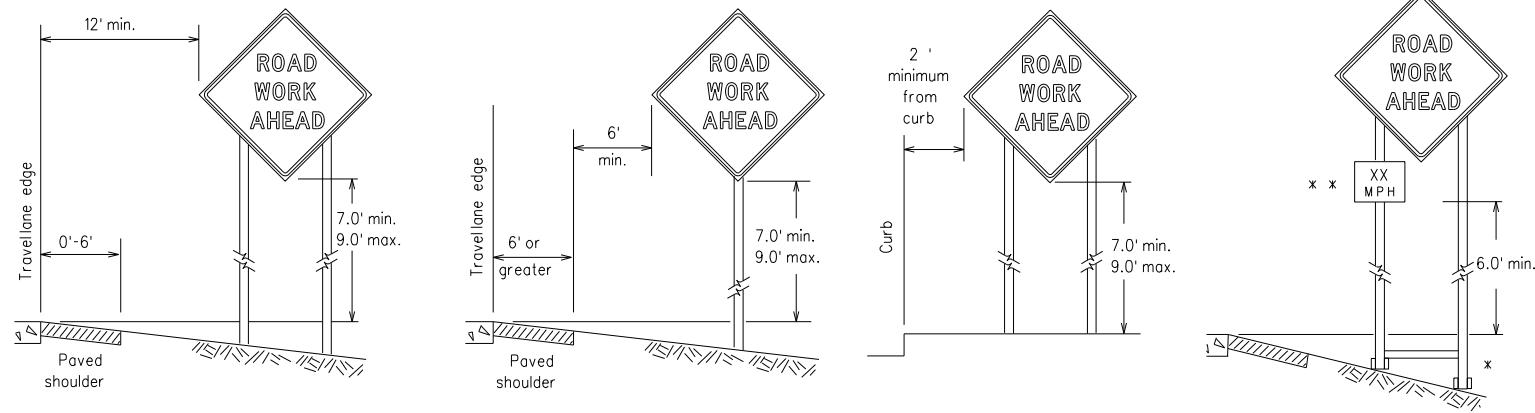
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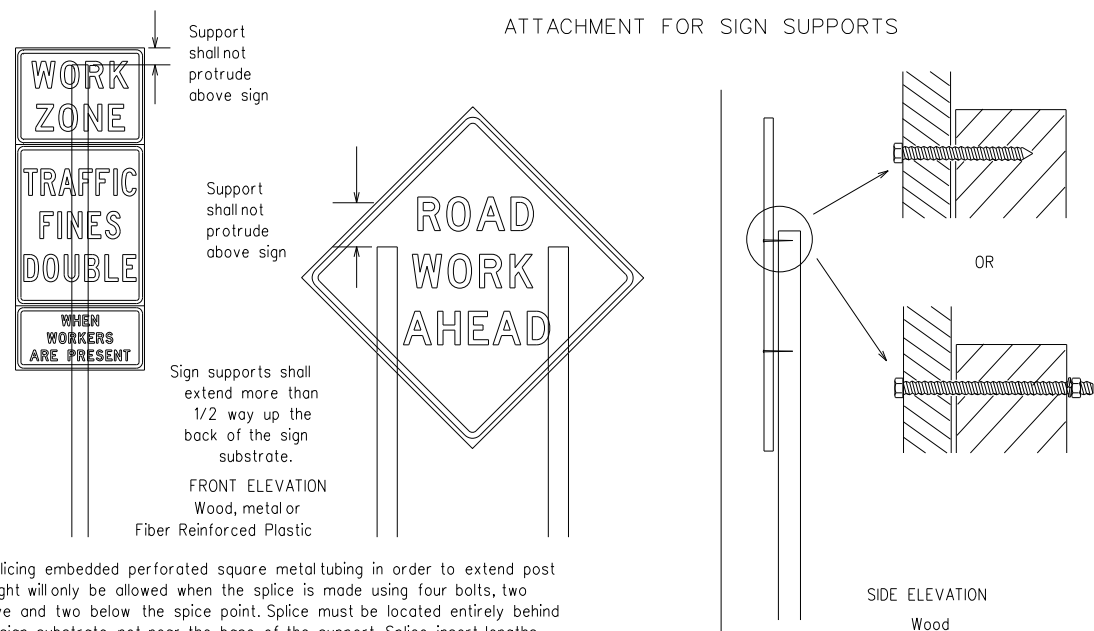
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



* 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 travellane. Supplemental plaques (advisory or distance) should not cover the surface of the parent sign.

ATTACHMENT FOR SIGN SUPPORTS

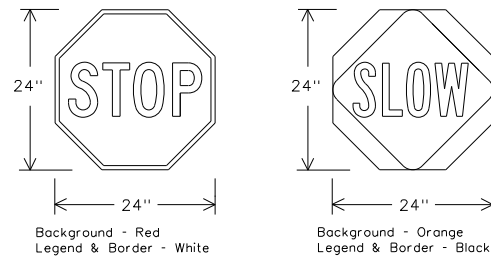


Nails shall NOT be allowed. Each sign shall be attached directly to the sign support. Multiple signs shall not be joined or spliced by any means. Wood supports shall not be extended or repaired by splicing or other means.

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 splice 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

- STOP/SLOW paddles are the primary method to control traffic by flaggers. The STOP/SLOW paddle size should be 24" x 24".
- STOP/SLOW paddles shall be retroreflectORIZED when used at night.
- STOP/SLOW paddles may be attached to a staff with a minimum length of 6' to the bottom of the sign.
- 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

- 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.
- 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.
- When existing permanent signs are moved and relocated due to construction purposes, they shall be visible to motorists at all times.
- 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.
- 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.
- 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

- Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer.
- Wooden sign posts shall be painted white.
- Barricades shall NOT be used as sign supports.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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)

- 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.
 - Long-term stationary - work that occupies a location more than 3 days.
 - 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.
 - Short-term stationary - daytime work that occupies a location for more than 1 hour in a single daylight period.
 - Short, duration - work that occupies a location up to 1 hour.
 - Mobile - work that moves continuously or intermittently (stopping for up to approximately 15 minutes.)

SIGN MOUNTING HEIGHT

- 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.
- 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.
- Long-term/Intermediate-term Signs may be used in lieu of Short-term/Short Duration signing.
- 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.
- 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

- 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

- 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.
- "Mesh" type materials are NOT an approved sign substrate, regardless of the tightness of the weave.
- 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

- 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).
- White sheeting, meeting the requirements of DMS-8300 Type A, shall be used for signs with a white background.
- Orange sheeting, meeting the requirements of DMS-8300 Type B or Type C, shall be used for rigid signs with orange backgrounds.

SIGN LETTERS

- 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

- When sign messages may be confusing or do not apply, the signs shall be removed or completely covered.
- 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.
- 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.
- 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.
- Burlap shall NOT be used to cover signs.
- Duct tape or other adhesive material shall NOT be affixed to a sign face.
- Signs and anchor stubs shall be removed and holes backfilled upon completion of work.

SIGN SUPPORT WEIGHTS

- Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
- The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
- Rock, concrete, iron, steel or other solid objects shall not be permitted for use as sign support weights.
- 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.
- 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.
- 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.
- Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

FLAG ON SIGNS

- 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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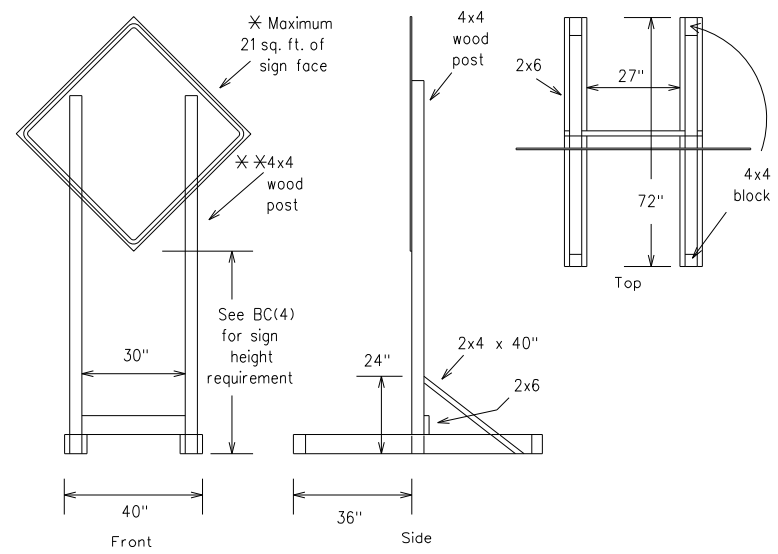
BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

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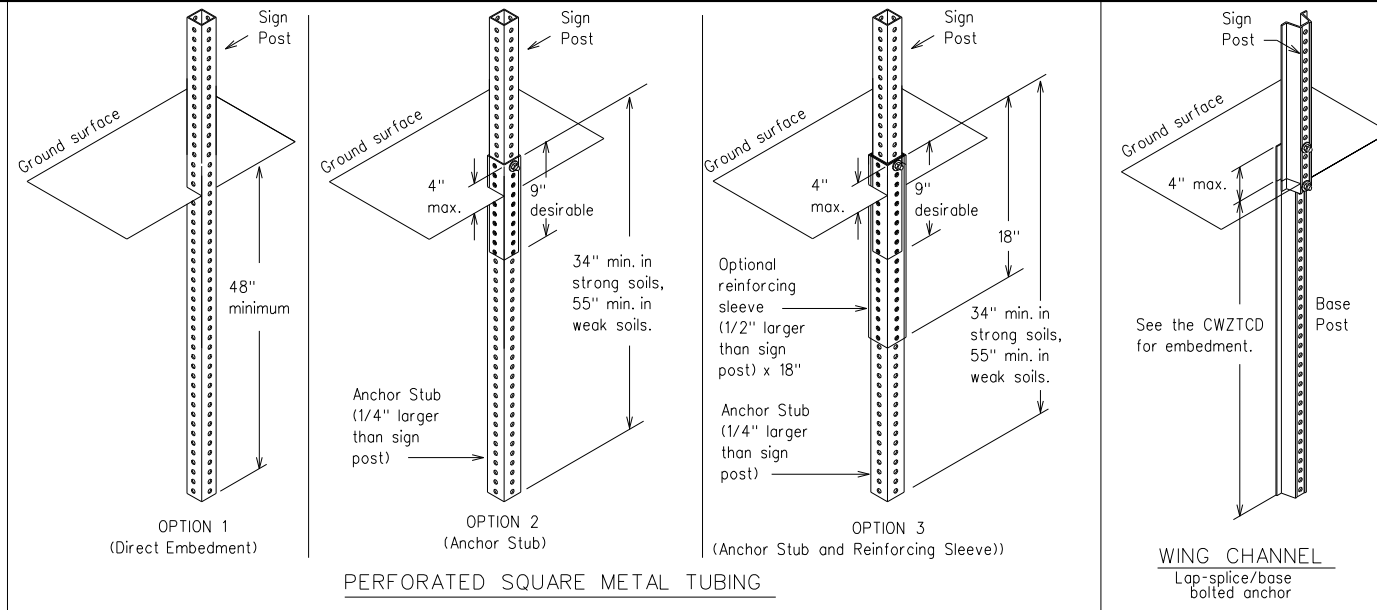
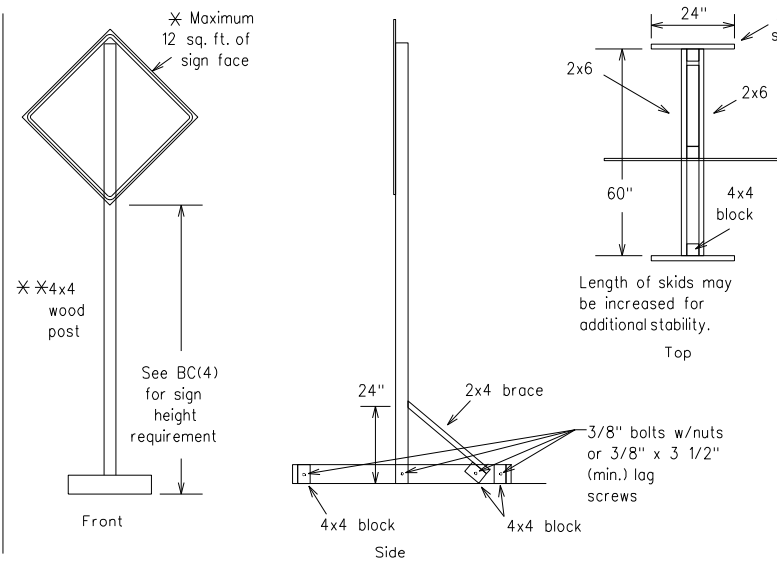
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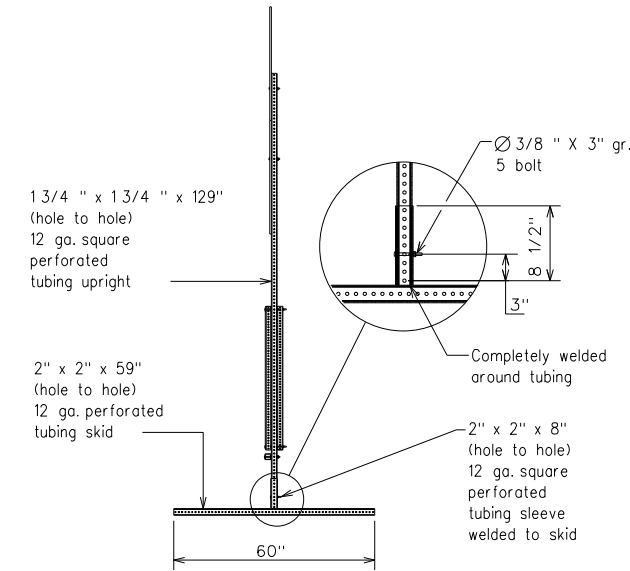
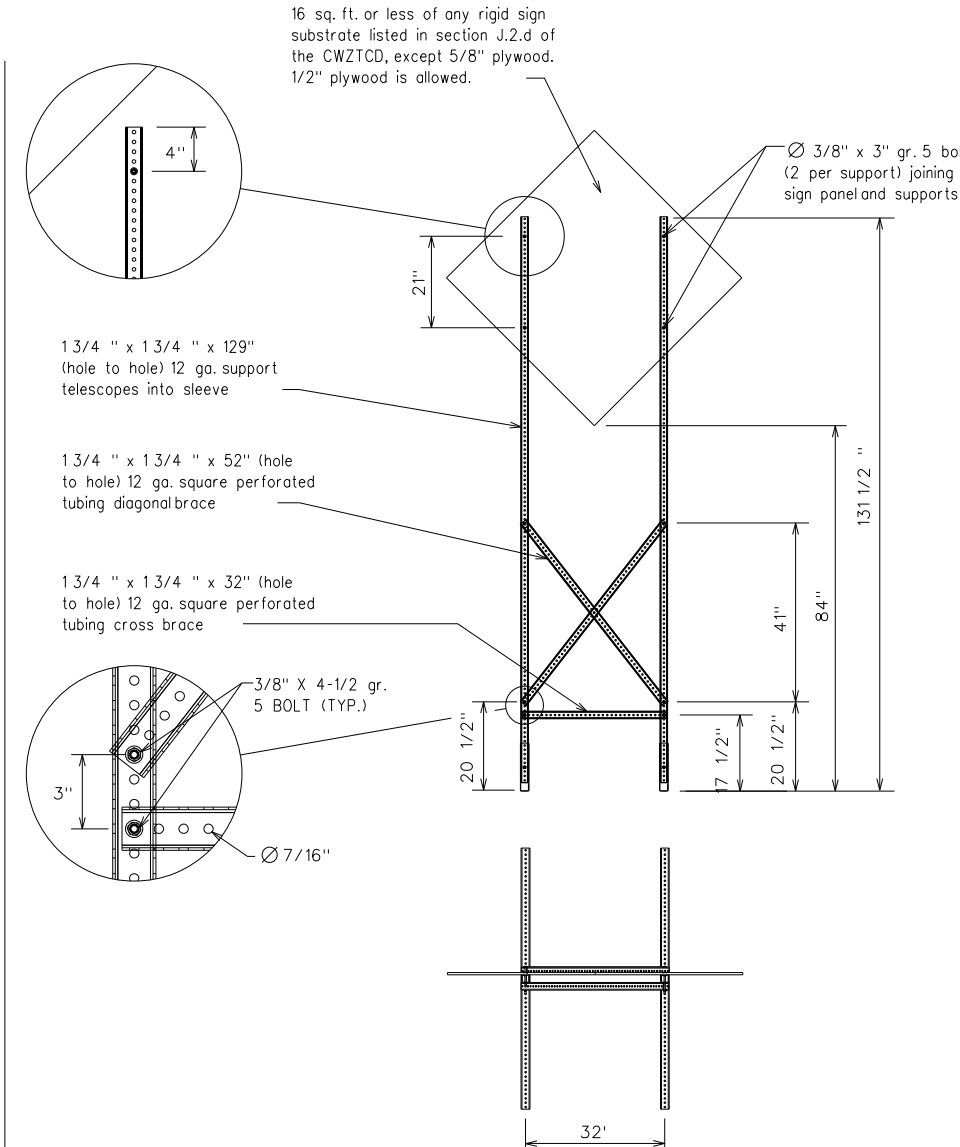
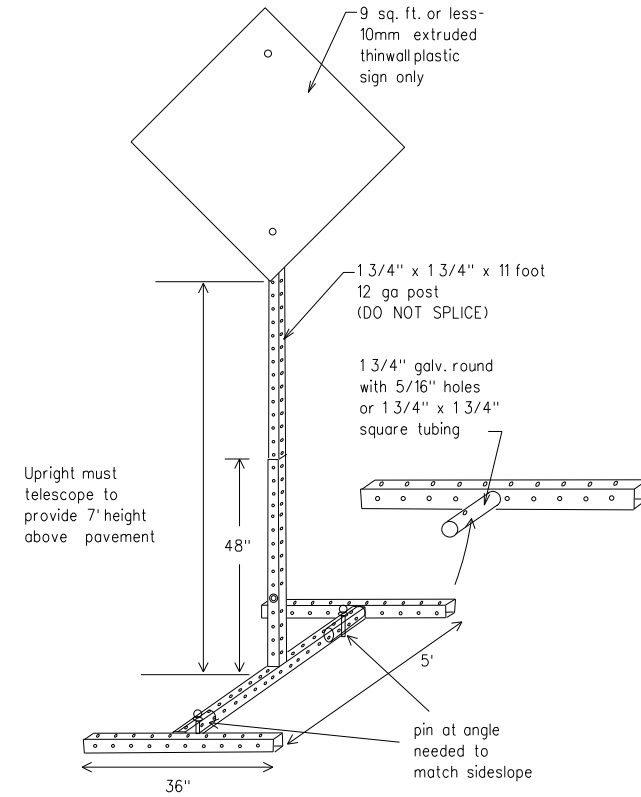
SKID MOUNTED WOOD SIGN SUPPORTS

* 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

- 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.
- No more than 2 sign posts shall be placed within a 7 ft. circle, except for specific materials noted on the CWZTCD List.
- 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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BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

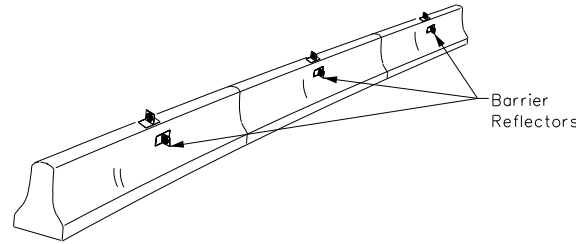
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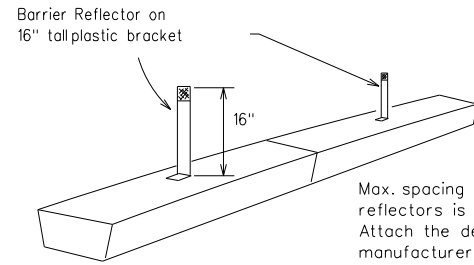
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- Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
- Color of Barrier Reflectors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



CONCRETE TRAFFIC BARRIER (CTB)

- 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.
- 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.
- When CTB separates traffic traveling in the same direction, no barrier reflectors will be required on top of the CTB.
- Barrier Reflector units shall be yellow or white in color to match the edgeline being supplemented.
- Maximum spacing of Barrier Reflectors is forty (40) feet.
- Pavement markers or temporary flexible-reflective roadway marker tabs shall NOT be used as CTB delineation.
- Attachment of Barrier Reflectors to CTB shall be per manufacturer's recommendations.
- Missing or damaged Barrier Reflectors shall be replaced as directed by the Engineer.
- Single slope barriers shall be delineated as shown on the above detail.



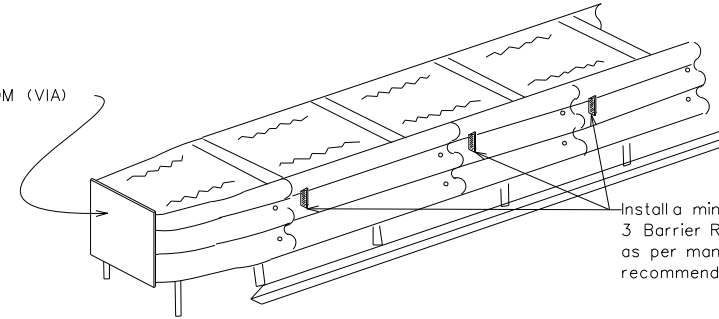
LOW PROFILE CONCRETE BARRIER (LPCB)

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

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

See D & OM (VIA)



DELINEATION OF END TREATMENTS

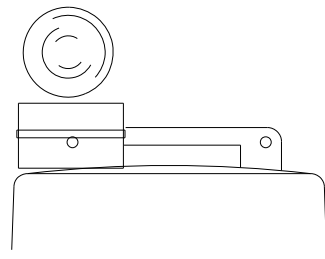
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS

WARNING LIGHTS

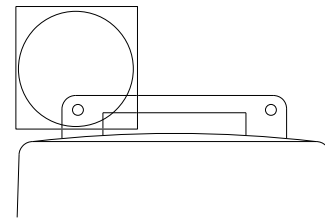
- Warning lights shall meet the requirements of the TMUTCD.
- Warning lights shall NOT be installed on barricades.
- Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet 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 or C sheeting meeting the requirements of Departmental Material Specification DMS-8300.
- 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".
- The Engineer/Inspector or the plans shall specify the location and type of warning lights to be installed on the traffic control devices.
- 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.
- 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.
- The location of warning lights and warning reflectors on drums shall be as shown elsewhere in the plans.



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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

- Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
- Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
- 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.
- 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.
- Type A, Type C and Type D warning lights shall be installed at locations as detailed on other sheets in the plans.
- Warning lights shall not be installed on a drum that has a sign, chevron or vertical panel.
- The maximum spacing for warning lights on drums should be identical to the channelizing device spacing.



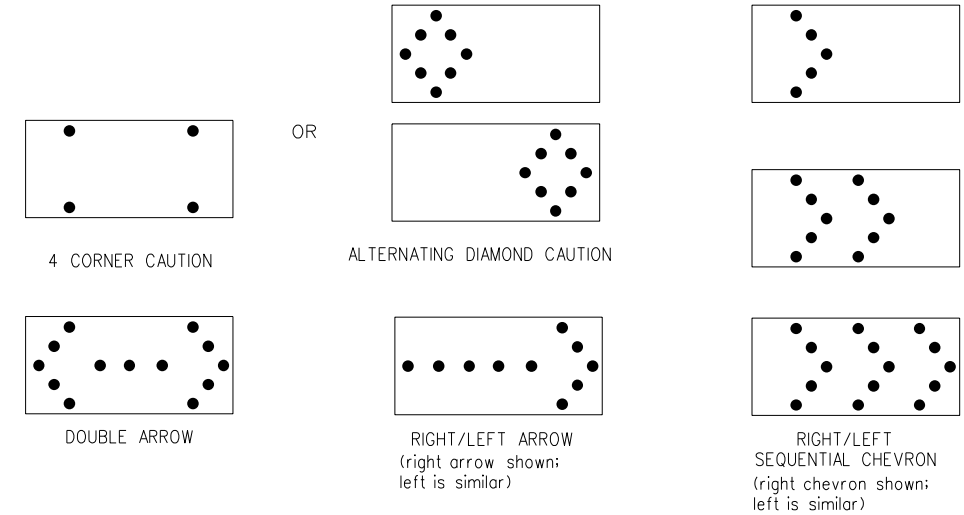
Warning reflector may be round or square. Must have a yellow reflective surface area of at least 30 square inches

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

- 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.
- 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.
- The warning reflector shall have a minimum retroreflective surface area (one-side) of 30 square inches.
- Round reflectors shall be fully reflectorized, including the area where attached to the drum.
- 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.
- 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.
- When used near two-way traffic, both sides of the warning reflector shall be reflectorized.
- The warning reflector should be mounted on the side of the handle nearest approaching traffic.
- 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.

- 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.
- 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.
- 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.
- The Flashing Arrow Board should be able to display the following symbols:



- The "CAUTION" display consists of four corner lamps flashing simultaneously, or the Alternating Diamond Caution mode as shown.
- The straight line caution display is NOT ALLOWED.
- 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.
- 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.
- The sequential arrow display is NOT ALLOWED.
- The flashing arrow display is the TxDOT standard; however, the sequential chevron display may be used during daylight operations.
- The Flashing Arrow Board shall be mounted on a vehicle, trailer or other suitable support.
- A Flashing Arrow Board SHALL NOT BE USED to laterally shift traffic.
- 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.
- 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

- Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the Manual for Assessing Safety Hardware (MASH).
- Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
- Refer to the CWZTCD for a list of approved TMAs.
- TMAs are required on freeways unless otherwise noted in the plans.
- 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.
- 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.

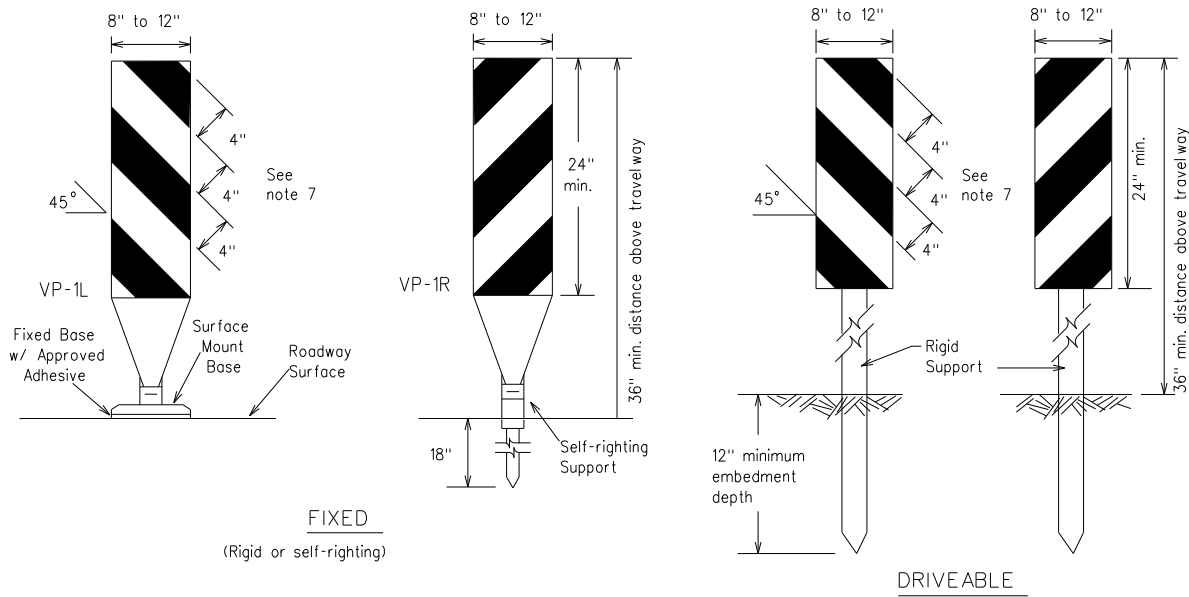
BARRICADE AND CONSTRUCTION ARROW PANEL, REFLECTORS, WARNING LIGHTS & ATTENUATOR

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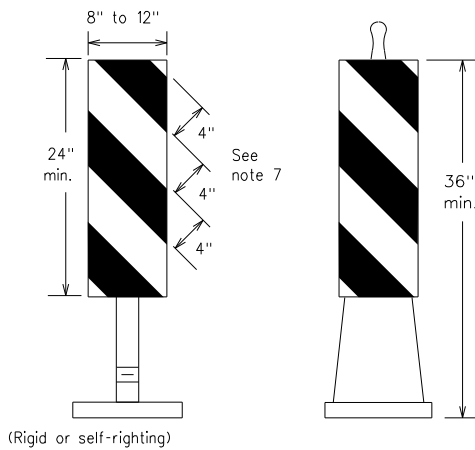
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FIXED
(Rigid or self-righting)

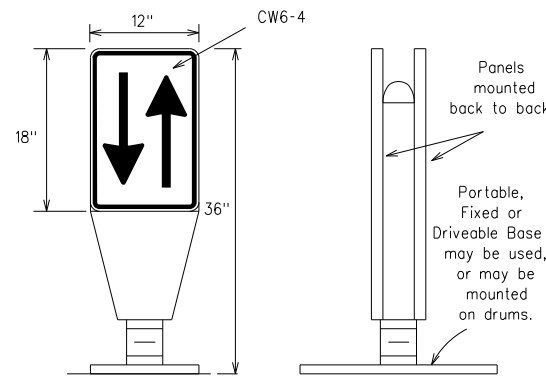
DRIVEABLE



PORTABLE

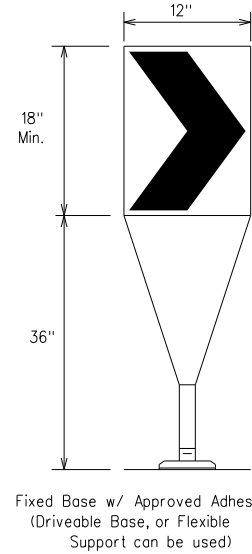
VERTICAL PANELS (VPs)

- Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
- 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.
- 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.
- VP's used on expressways and freeways or other high speed roadways, may have more than 270 square inches of retroreflective area facing traffic.
- Self-righting supports are available with portable base. See "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
- Sheeting for the VP's shall be retroreflective Type A or Type B conforming to Departmental Material Specification DMS-8300, unless noted otherwise.
- Where the height of reflective material on the vertical panel is 36 inches or greater, a panel stripe of 6 inches shall be used.



OPPOSING TRAFFIC LANE DIVIDERS (OTLD)

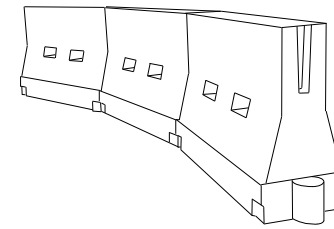
- Opposing Traffic Lane Dividers (OTLD) are delineation devices designed to convert a normal one-way roadway section to two-way operation. OTLD's are used on temporary centerlines. The upward and downward arrows on the sign's face indicate the direction of traffic on either side of the divider. The base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



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

- The chevron shall be a vertical rectangle with a minimum size of 12 by 18 inches.
- 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.
- 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.
- To be effective, the chevron should be visible for at least 500 feet.
- Chevrons shall be orange with a black nonreflective legend. Sheeting for the chevron shall be retroreflective Type B or Type C conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.
- 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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

- 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.
- LCDs may be used instead of a line of cones or drums.
- LCDs shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
- LCDs should not be used to provide positive protection for obstacles, pedestrians or workers.
- LCDs shall be supplemented with retroreflective delineation as required for temporary barriers on BC(7) when placed roughly parallel to the travel lanes.
- 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

- 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.
- 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.
- 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.
- 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.
- 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

GENERAL NOTES

- 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).
- 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.
- 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).
- 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.
- Portable bases shall be fabricated from virgin and/or recycled rubber. The portable bases shall weigh a minimum of 30 lbs.
- 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.
- 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.

Posted Speed	Formula	Minimum Desirable Taper Lengths x x			Suggested Maximum Spacing of Channelizing Devices	
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent
30	L = WS ² / 60	150'	165'	180'	30'	60'
35		205'	225'	245'	35'	70'
40	L = WS	265'	295'	320'	40'	80'
45		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'	

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12



BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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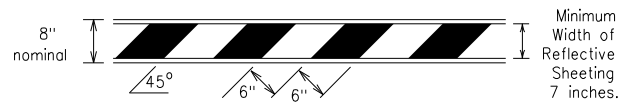
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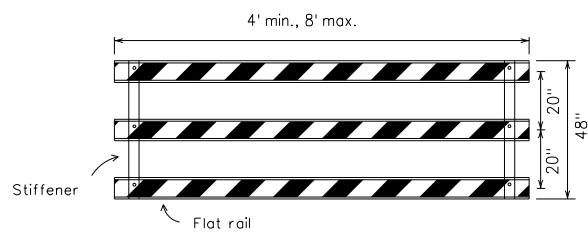
TYPE 3 BARRICADES

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 stocked 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.



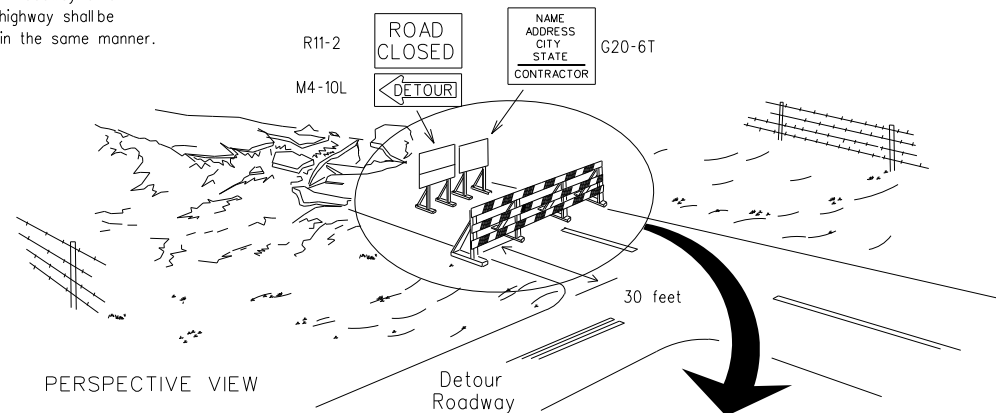
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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.

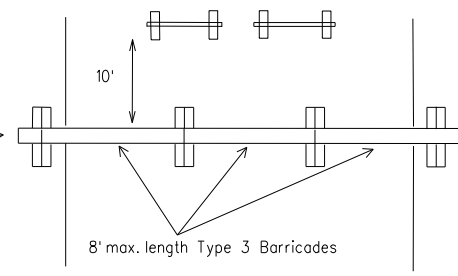


PERSPECTIVE VIEW

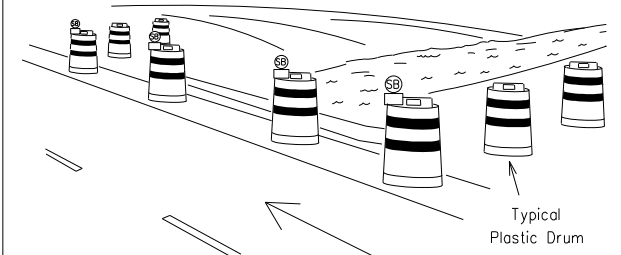
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic. Barricade striping should slant downward in the direction of detour.

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.

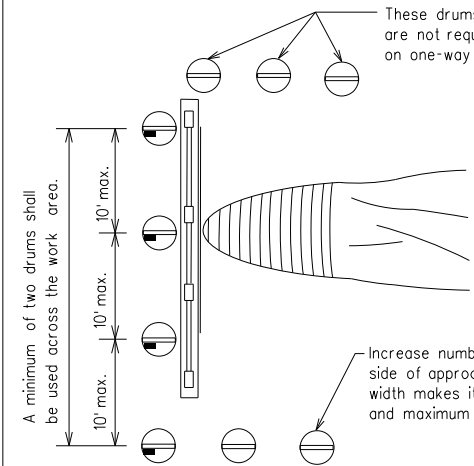
TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PLAN VIEW



PERSPECTIVE VIEW



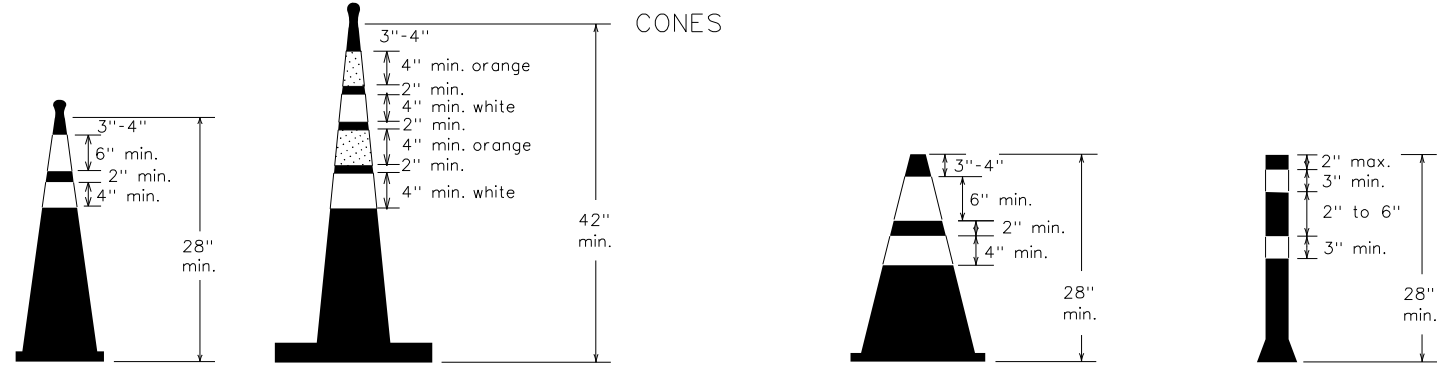
PLAN VIEW

Increase number of plastic drums on the side of approaching traffic if the crown width makes it necessary. (minimum of 2 and maximum of 4 drums)

1. Where positive redirection 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
	Steady burn warning light or yellow warning reflector

CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



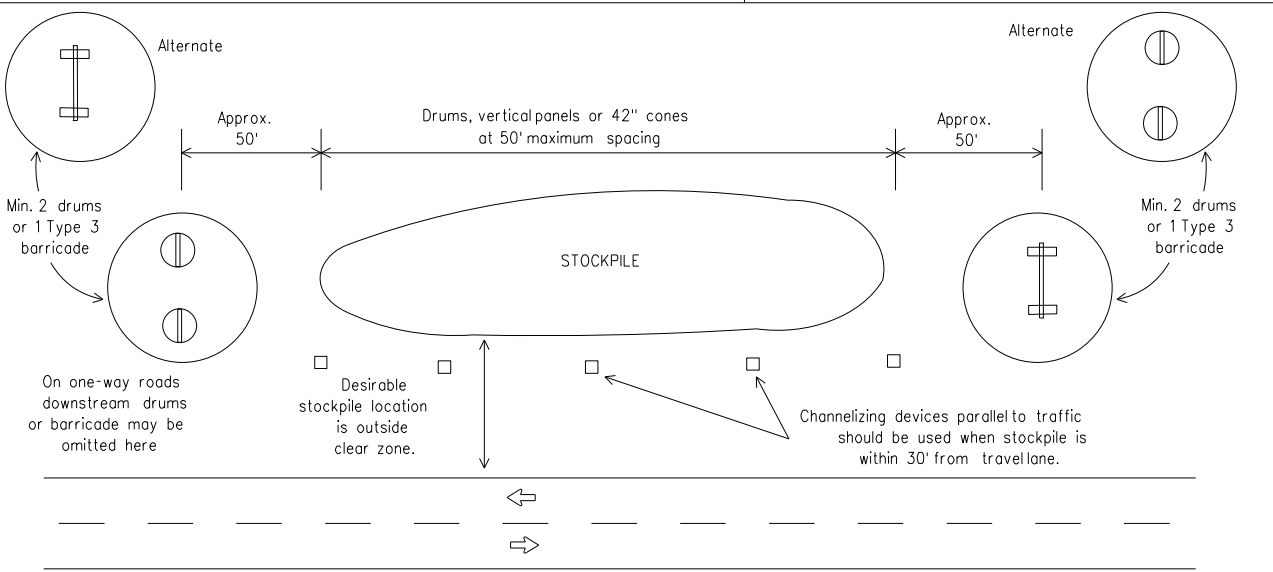
Two-Piece cones

One-Piece cones

Tubular Marker

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

1. Traffic cones and tubular markers shall be predominantly orange, and meet the height and weight requirements shown above.
2. One-piece cones have the body and base of the cone molded in one consolidated unit. Two-piece cones have a cone shaped body and a separate rubber base, or ballast, that is added to keep the device upright and in place.
3. Two-piece cones may have a handle or loop extending up to 8" above the minimum height shown, in order to aid in retrieving the device.
4. Cones or tubular markers shall have white or white and orange reflective bands as shown above. The reflective bands shall have a smooth, sealed outer surface and meet the requirements of Departmental Material Specification DMS-8300 Type A or Type B.
5. 28" cones and tubular markers are generally suitable for short duration and short-term stationary work as defined in 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



BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

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9-07	8-14			
7-13	5-21			
DIST	COUNTY	SHEET NO.		90

WORK ZONE PAVEMENT MARKINGS

GENERAL

- 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.
- Color, patterns and dimensions shall be in conformance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
- Additional supplemental pavement marking details may be found in the plans or specifications.
- Pavement markings shall be installed in accordance with the TMUTCD and as shown on the plans.
- 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).
- 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.
- All work zone pavement markings shall be installed in accordance with Item 662, "Work Zone Pavement Markings."

RAISED PAVEMENT MARKERS

- Raised pavement markers are to be placed according to the patterns on BC(12).
- 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

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

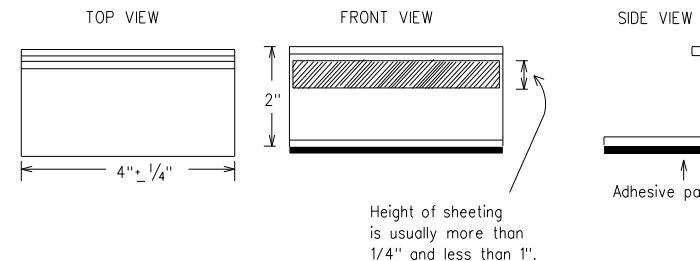
MAINTAINING WORK ZONE PAVEMENT MARKINGS

- The Contractor will be responsible for maintaining work zone pavement markings within the work limits.
- 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.
- 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.
- 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

- 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.
- 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.
- 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".
- The removal of pavement markings may require resurfacing or seal coating portions of the roadway as described in Item 677.
- Subject to the approval of the Engineer, any method that proves to be successful on a particular type pavement may be used.
- Blast cleaning may be used but will not be required unless specifically shown in the plans.
- Over-painting of the markings SHALL NOT BE permitted.
- Removal of raised pavement markers shall be as directed by the Engineer.
- 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.
- 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

- Temporary flexible-reflective roadway marker tabs used as guidemarks shall meet the requirements of DMS-8242.
- 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.
 - 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.
 - 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.
- Small design variances may be noted between tab manufacturers.
- 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

- Raised pavement markers used as guidemarks shall be from the approved product list, and meet the requirements of DMS-4200.
- All temporary construction raised pavement markers provided on a project shall be of the same manufacturer.
- 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).

SHEET 11 OF 12



BARRICADE AND CONSTRUCTION
PAVEMENT MARKINGS

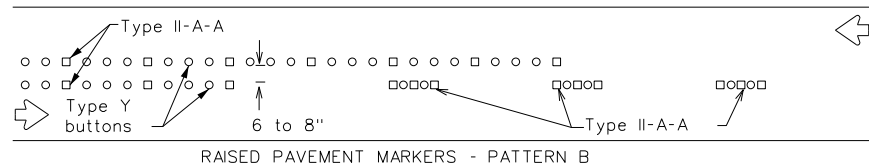
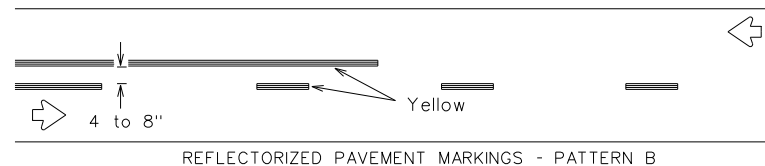
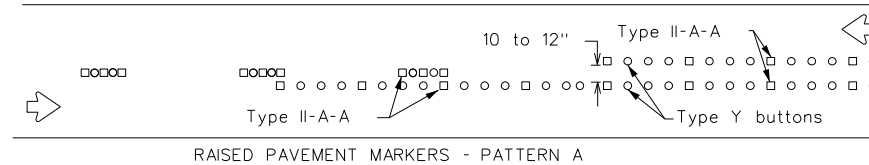
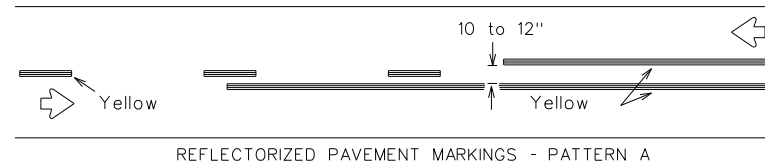
BC(11)-21

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© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS				
2-98	9-07	5-21		
1-02	7-13			
11-02	8-14			
	DIST	COUNTY	SHEET NO.	
			91	

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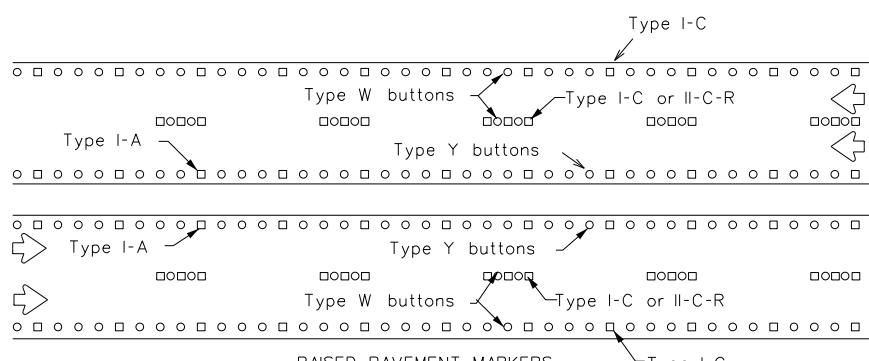
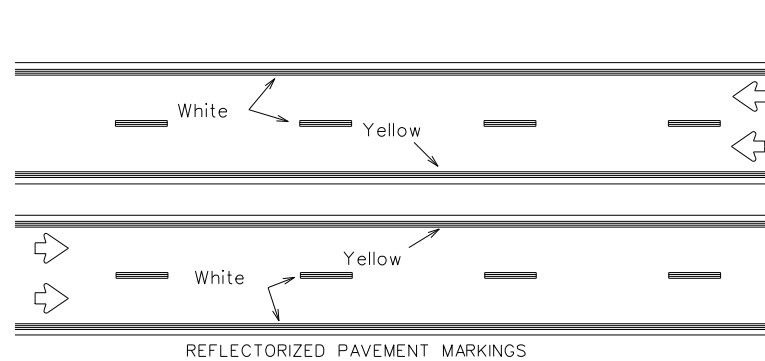
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PAVEMENT MARKING PATTERNS



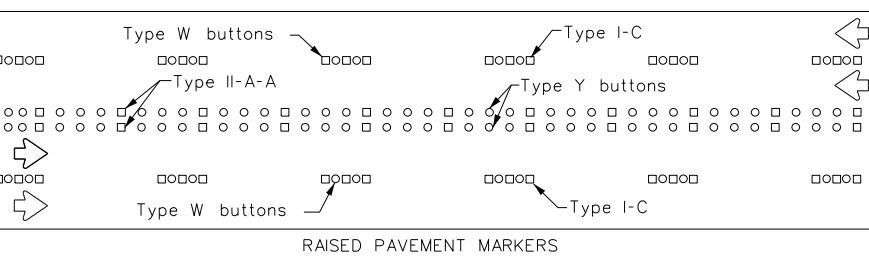
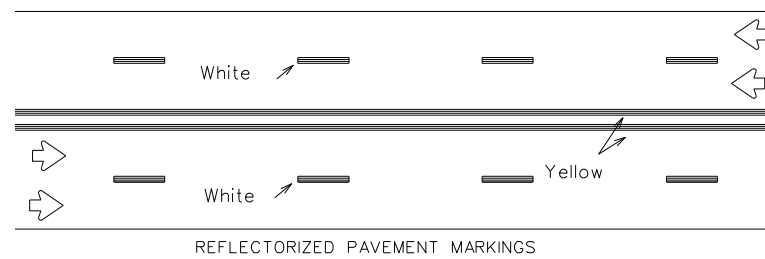
Pattern A is the TxDOT Standard, however Pattern B may be used if approved by the Engineer. Prefabricated markings may be substituted for reflectorized pavement markings.

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



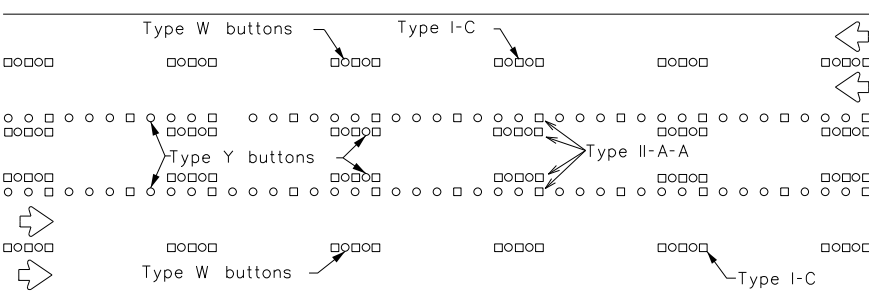
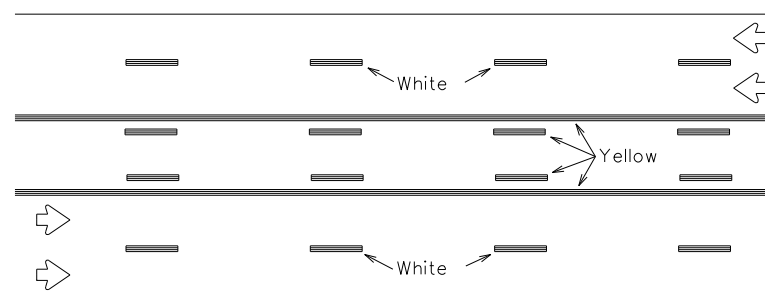
Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



Prefabricated markings may be substituted for reflectorized pavement markings.

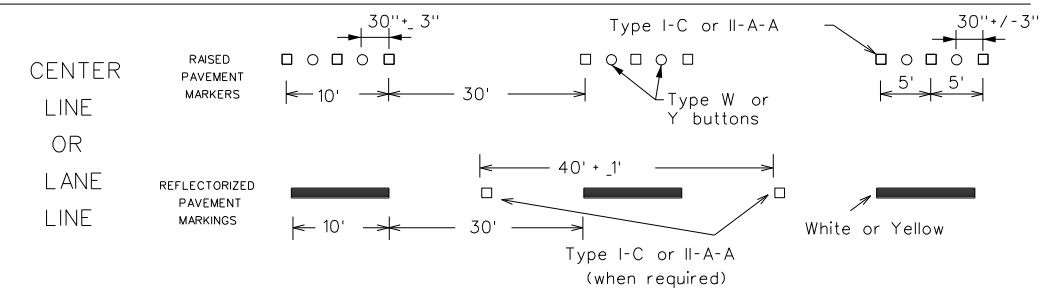
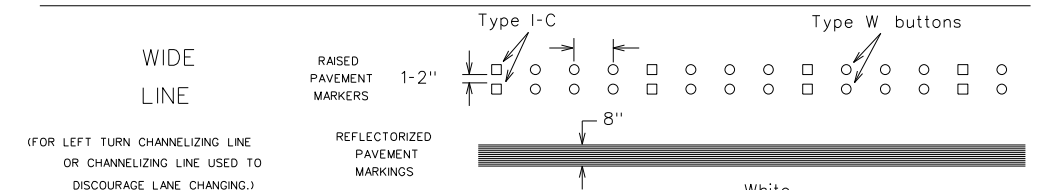
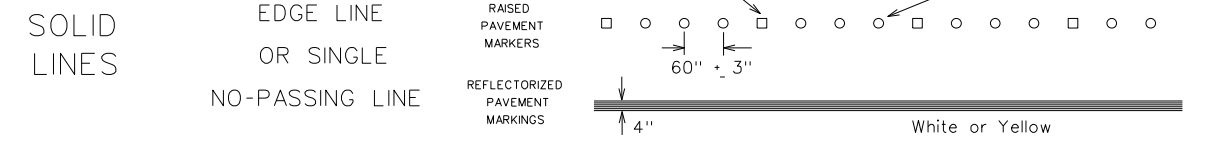
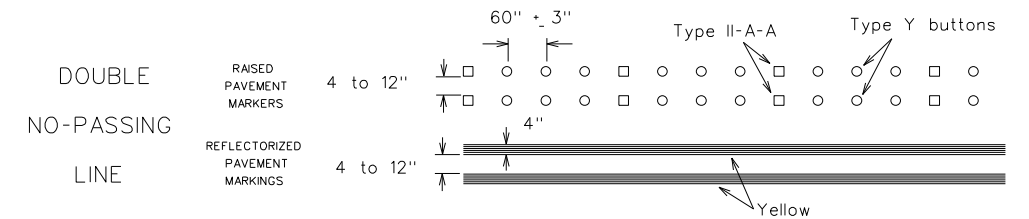
LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



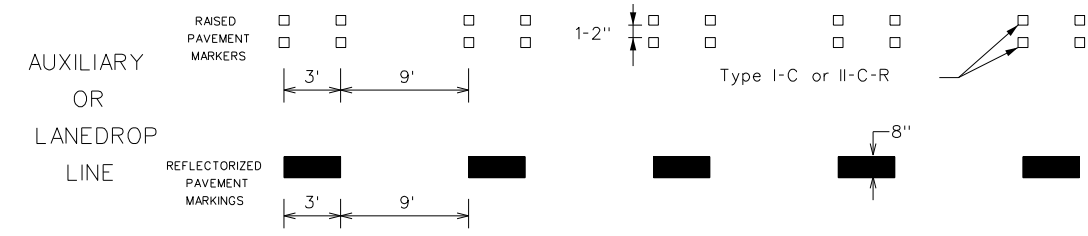
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

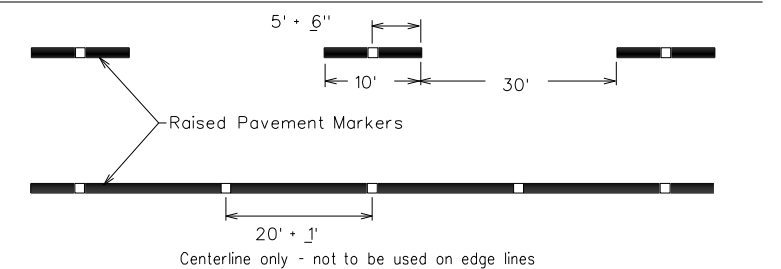


BROKEN LINES



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.



SHEET 12 OF 12



BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

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."

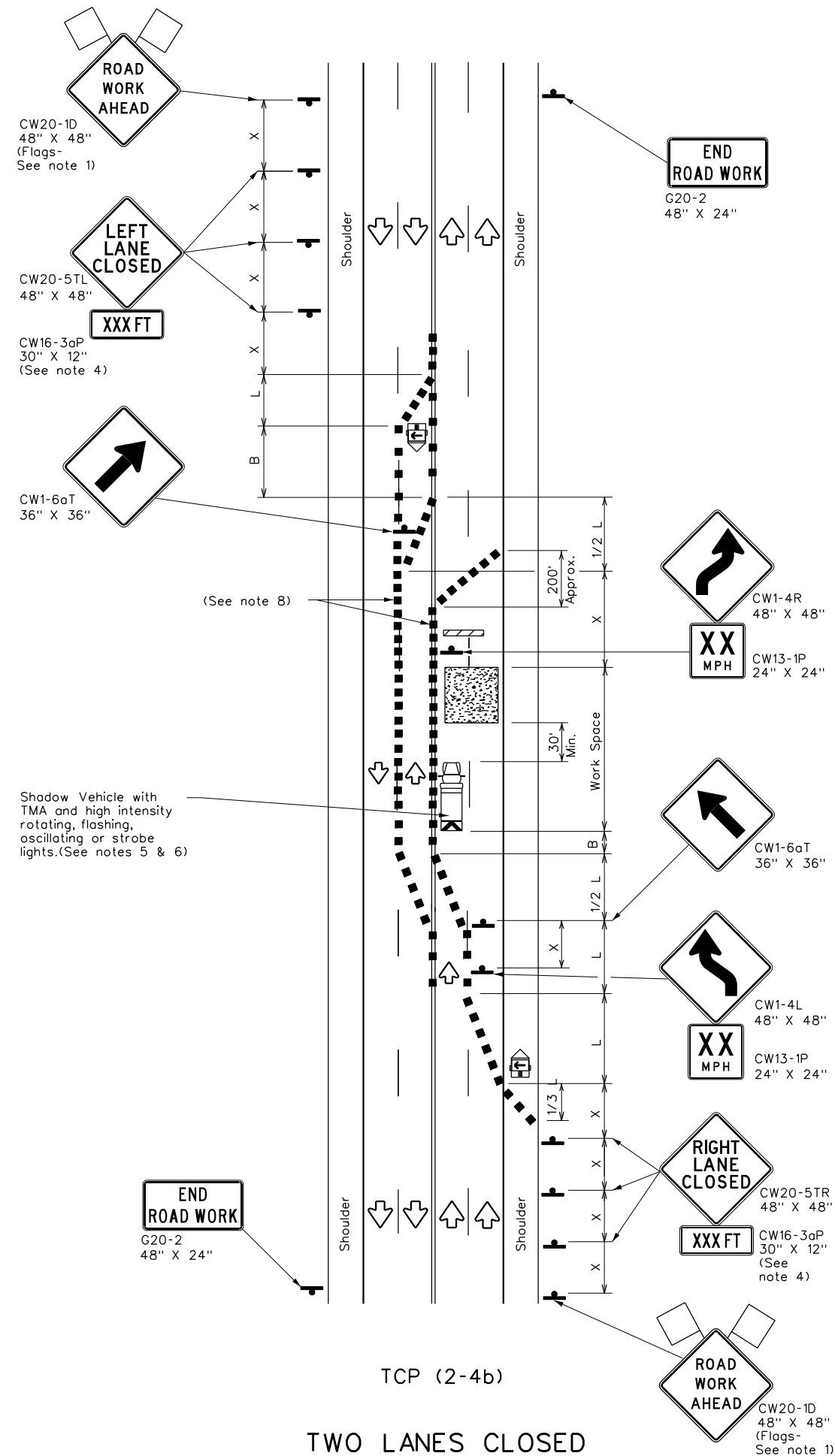
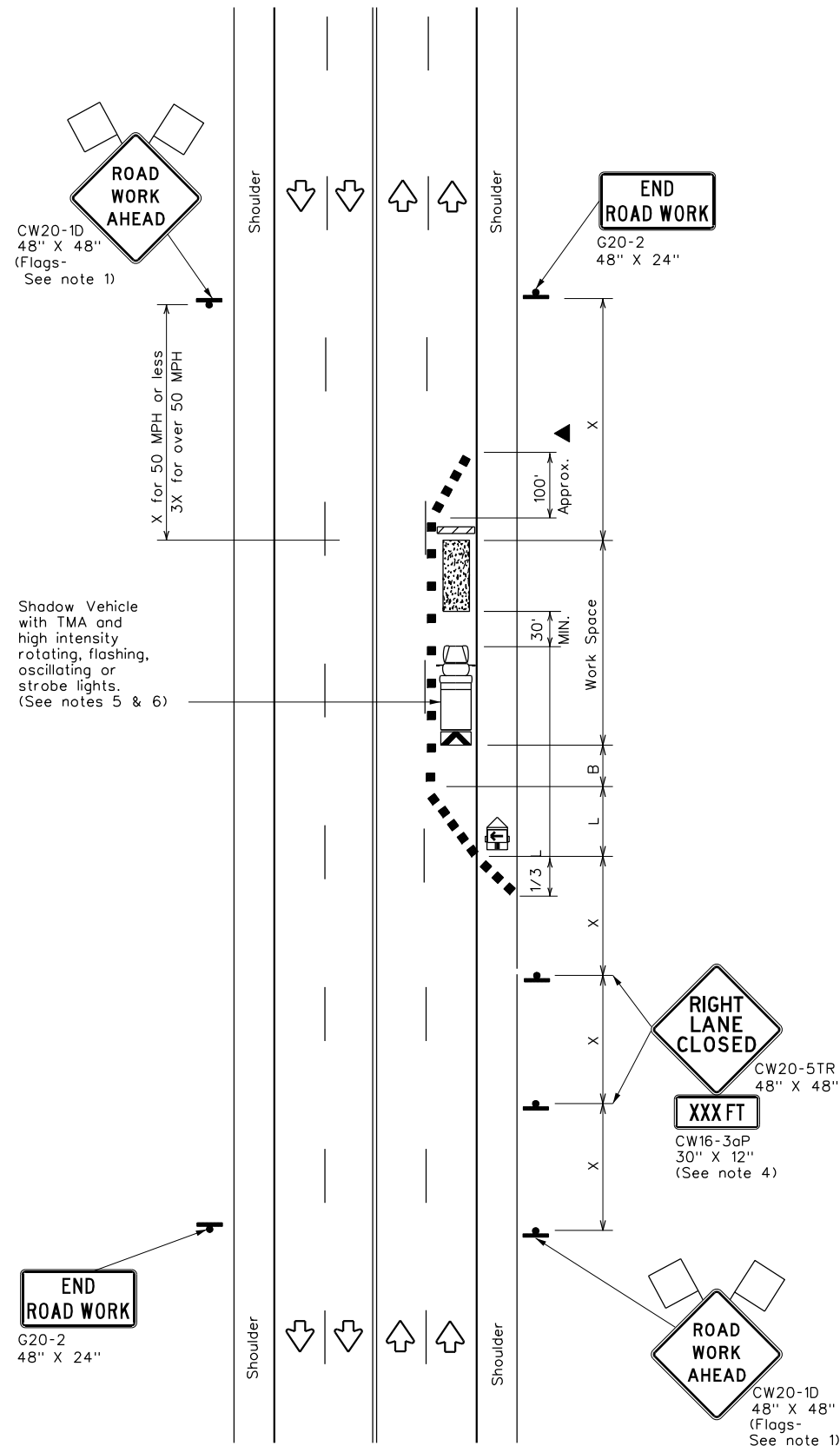
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© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS				
1-97 9-07 5-21				
2-98 7-13				
11-02 8-14				
DIST	COUNTY		SHEET NO.	
106			92	

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DATE: FILE:



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

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

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

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

- GENERAL NOTES**
- Flags attached to signs where shown, are REQUIRED.
 - 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.
 - The downstream taper is optional. When used, it should be 100 feet minimum length per lane.
 - For short term applications, when post mounted signs are not used, the distance legend may be shown on the sign face rather than on a CW16-3aP supplemental plaque.
 - 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.
 - Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-4a)

7. If this TCP is used for a left lane closure, CW20-5TL "LEFT LANE CLOSED" signs shall be used and channelizing devices shall be placed on the centerline to protect the work space from opposing traffic with the arrow board placed in the closed lane near the end of the merging taper.

TCP (2-4b)

8. 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 devices spacing is intended for the area of conflicting markings, not the entire work zone.

Texas Department of Transportation *Traffic Operations Division Standard*

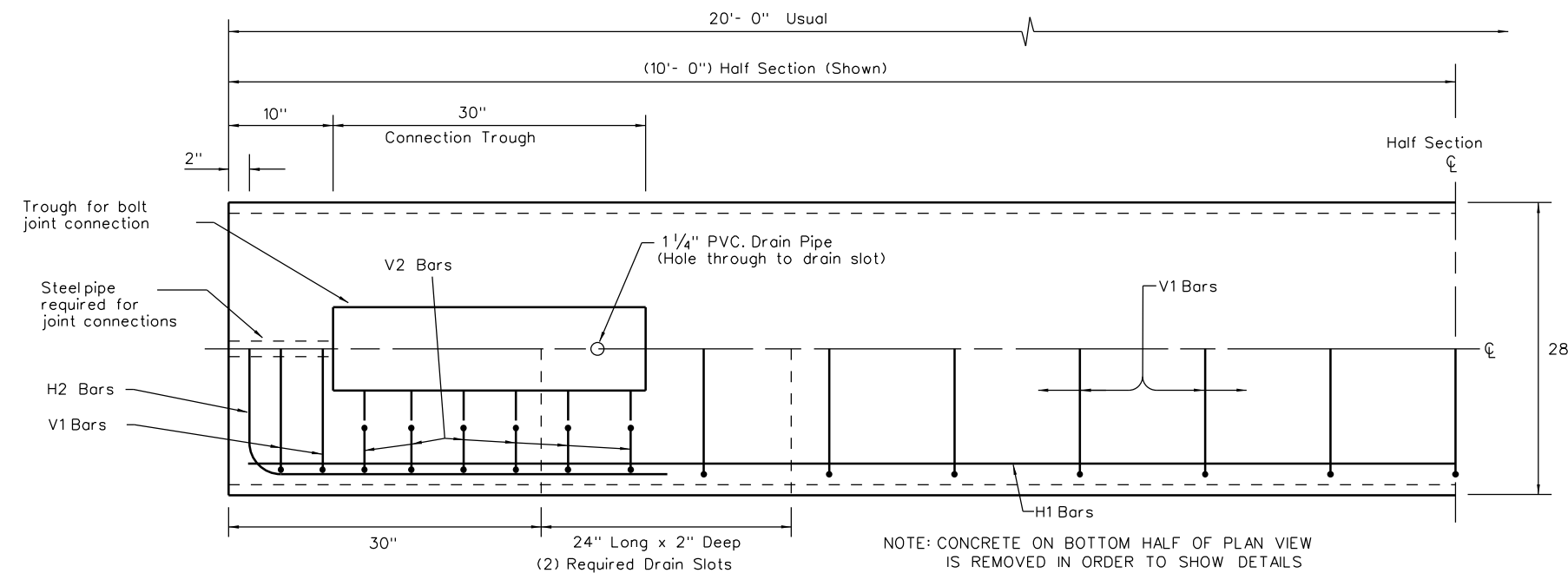
TRAFFIC CONTROL PLAN
LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(2-4)-18

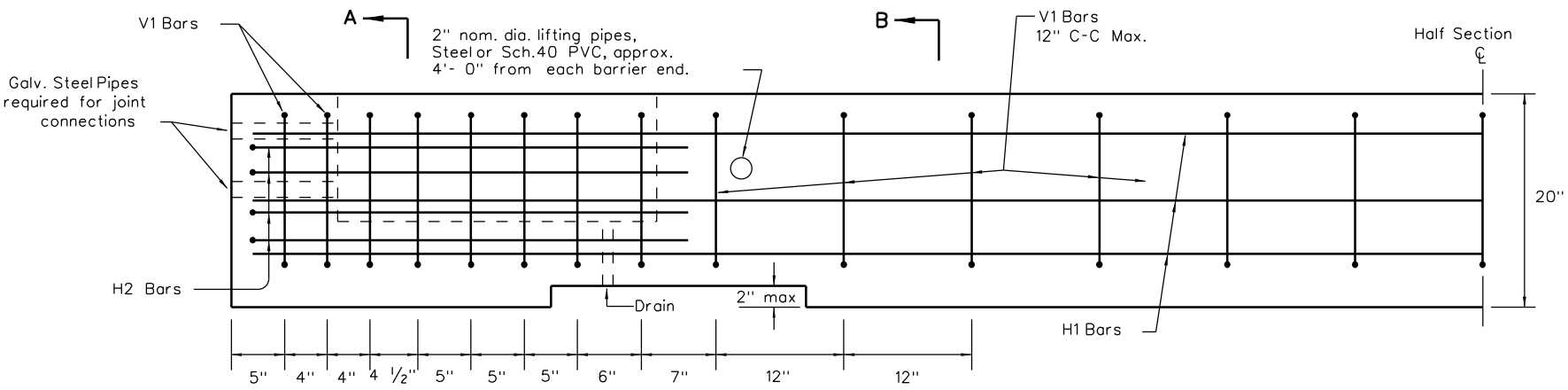
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1-97 2-12				
4-98 2-18				
	DIST	COUNTY	SHEET NO.	
			93	

164

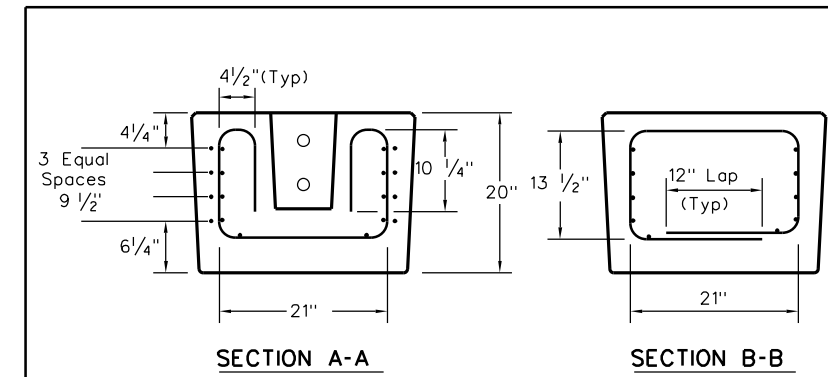
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PLAN
(TYPE 1) BARRIER SEGMENT
(SYMMETRICAL ABOUT CENTER LINES)



ELEVATION
(TYPE 1) BARRIER SEGMENT
(SYMMETRICAL ABOUT CENTER LINES)



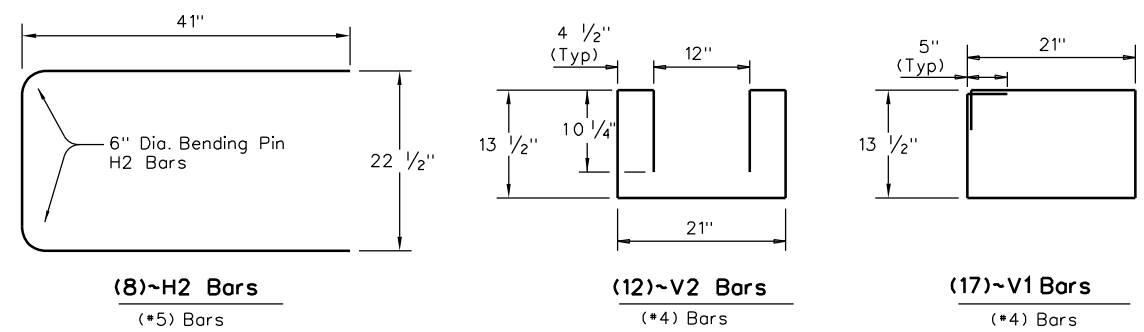
WELDED WIRE REINFORCEMENT (WWR) - OPTIONAL REINFORCING

(WWR) GENERAL NOTES

1. Deformed Welded Wire Reinforcement shall conform to ASTM A497.
2. Welded wire cage may be cut or bent, if necessary, but must be approved by the Engineer.
3. Combinations of reinforcing steel and WWR are permitted, as directed by the Engineer. The dimensions from the end of the barrier section to the first wire shall not exceed 3".

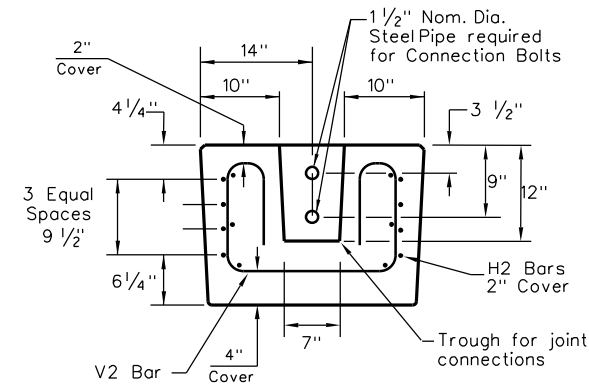
REQUIRED (WWR) WIRE DESIGN

- 8 ~ (D31) Horizontal Wires (Equally spaced)
- 10 ~ (D20) Horizontal Wires (Equally spaced)
- 29 ~ (D20) Vertical Wires (Spaced as shown in Elevation View)

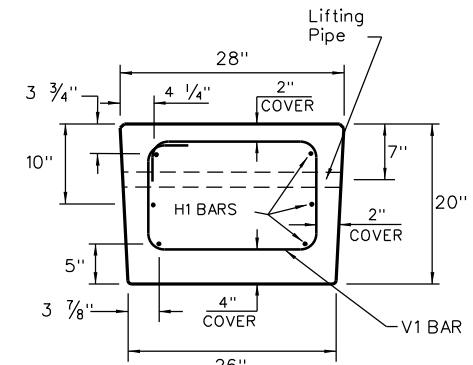


REINFORCING STEEL DETAILS
TYPE 1 - BARRIER SEGMENT

Note: Use 2" Dia. Bending Pin, unless otherwise shown



SECTION A-A



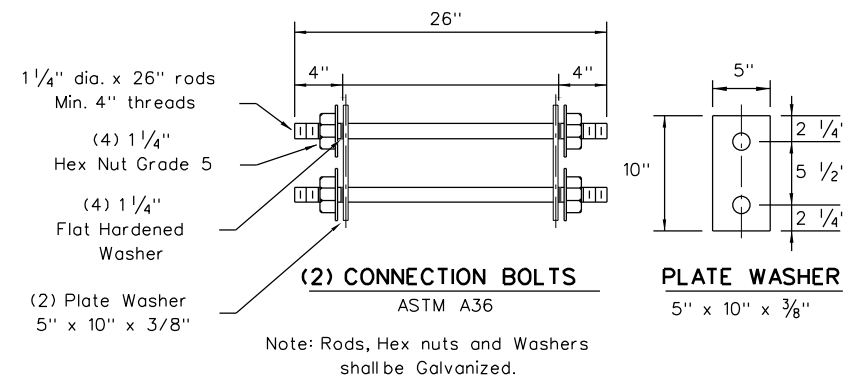
SECTION B-B

GENERAL NOTES

1. Low Profile Concrete Barrier (LPCB), is approved for use in temporary work zone locations, where the posted speed is 45 mph, or less.
2. Concrete shall be Class H for precast barrier with a minimum compressive strength of 3,600 psi.
3. Where used, rebar reinforcement shall be Grade 60 and conform to ASTM A615.
4. Precast LPCB barrier length shall be 20 ft.
5. All barrier edges shall have 3/4" chamfer or a tooled radius.
6. Joint connection hardware shall be in accordance with Item 449, "Anchor Bolts," and is considered subsidiary.
7. Steelpipe required for joint connection bolts shall be galvanized in accordance with Item 445, "Galvanizing."
8. Welded wire reinforcement (WWR) may be used in lieu of conventional reinforcement for Type 1 barrier, and shall meet the requirements shown.

FOR CONTRACTORS INFORMATION ONLY

(TYPE 1) APPROX. QUANTITIES 20 FT. SECTION		
CONCRETE	CY	2.6
REINFORCING STEEL	LBS	330
TOTAL BARRIER WT.	LBS	11000



SHEET 1 OF 2

Texas Department of Transportation Design Division Standard

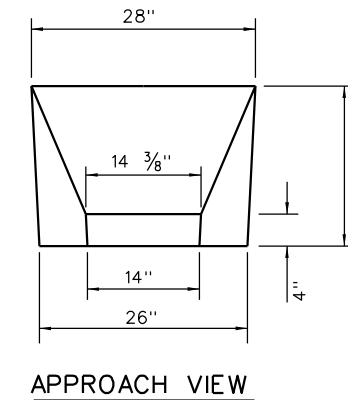
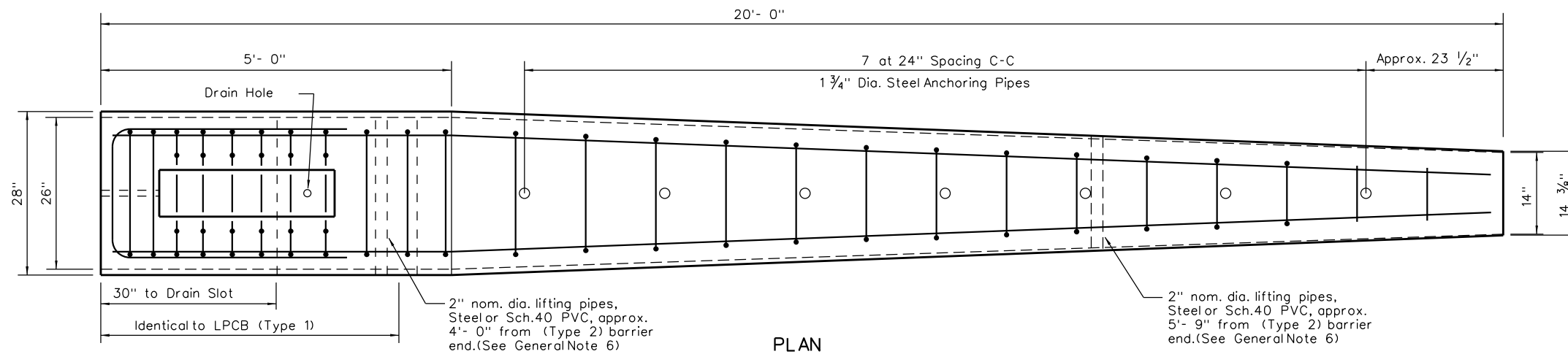
LOW PROFILE CONCRETE BARRIER PRECAST BARRIER (TYPE 1) LPCB-13

FILE: lpcb13.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
© TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS				
DIST	COUNTY			SHEET NO.

94

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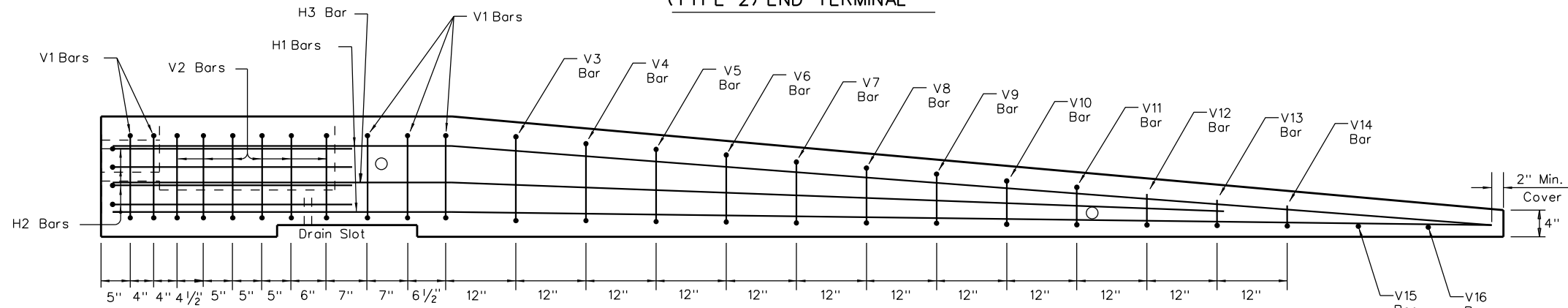
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APPROACH VIEW

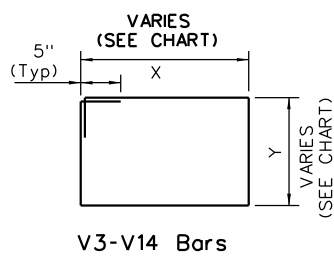
TYPE 2 - NOTES

1. Welded wire reinforcement (WWR) is "not" an option for Type 2 Barrier.
2. Type 2 Barrier shall be used as an end treatment for the Type 1 barrier segments, when applicable.
3. The end treatment can be used without the anchor pins in locations that can accommodate approximately 4 ft. of lateral displacement of the end treatment. The use of non-pinned end treatment does not affect the performance or the deflection of the Low-Profile barrier system.
4. The anchor pins are all the same length and are to be driven flush with the top of the (Type 2) barrier surface.
5. The bends in the H3 and H1 bars are slight, no formal bend is necessary.
6. The Type 2 barrier segment must be lifted from the rear first, to prevent cracking of sloped section.
7. See LPCB sheet 1 for additional information.



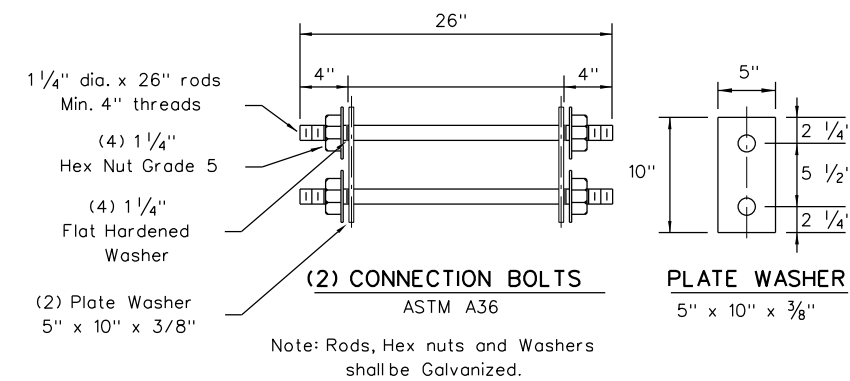
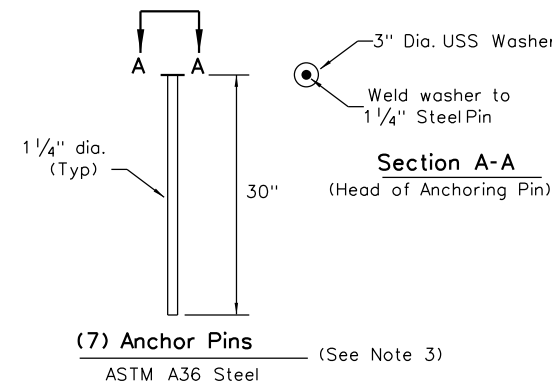
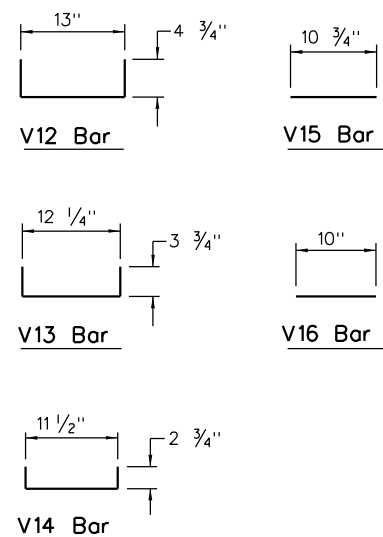
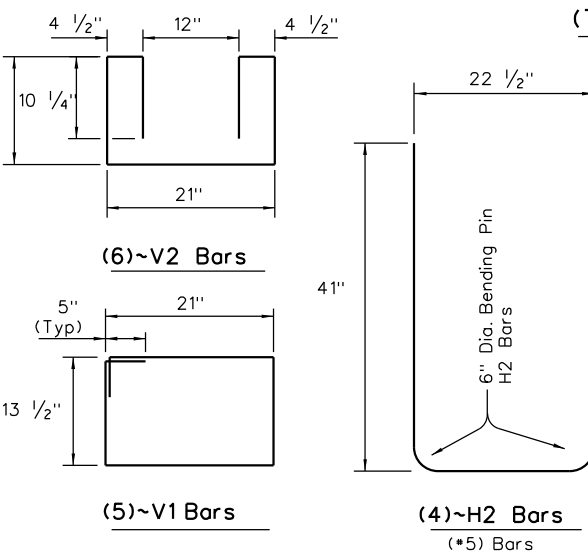
ELEVATION (TYPE 2) END TERMINAL

Note: Anchoring pipes not shown in Elevation View



BAR (#)	X (IN.)	Y (IN.)
V3 BAR	20 1/4	14 1/2
V4 BAR	19 1/2	13 1/2
V5 BAR	18 1/2	12 1/4
V6 BAR	17 1/2	11 1/4
V7 BAR	17	10 1/4
V8 BAR	16 1/4	9
V9 BAR	15 1/2	8
V10 BAR	14 1/2	7
V11 BAR	13 3/4	6

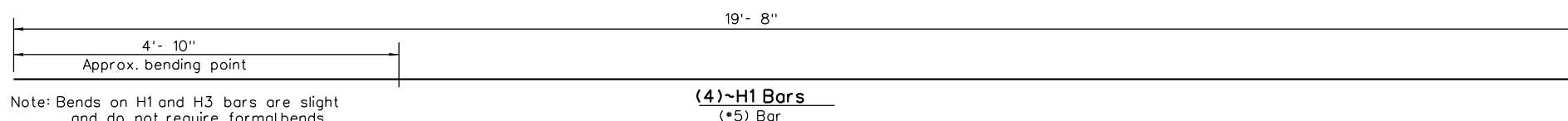
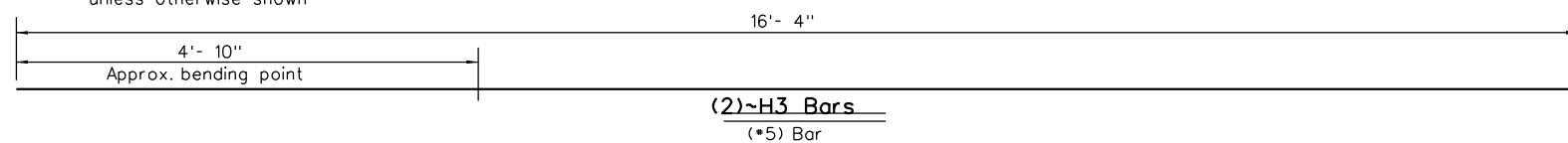
REINFORCING STEEL DETAILS
TYPE 2 - END TERMINAL



FOR CONTRACTORS INFORMATION ONLY

(TYPE 2)		
APPROX. QUANTITIES 20 FT. SECTION		
CONCRETE	CY	1.65
REINFORCING STEEL	LBS	240
TOTAL BARRIER WT.	LBS	7000

Note: Use 2" Dia. Bending Pin, unless otherwise shown



Note: Bends on H1 and H3 bars are slight and do not require formal bends.

Note: All V Bars are (#4)



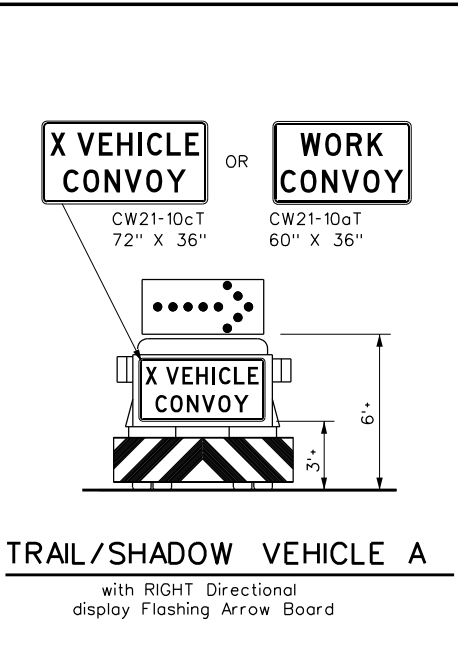
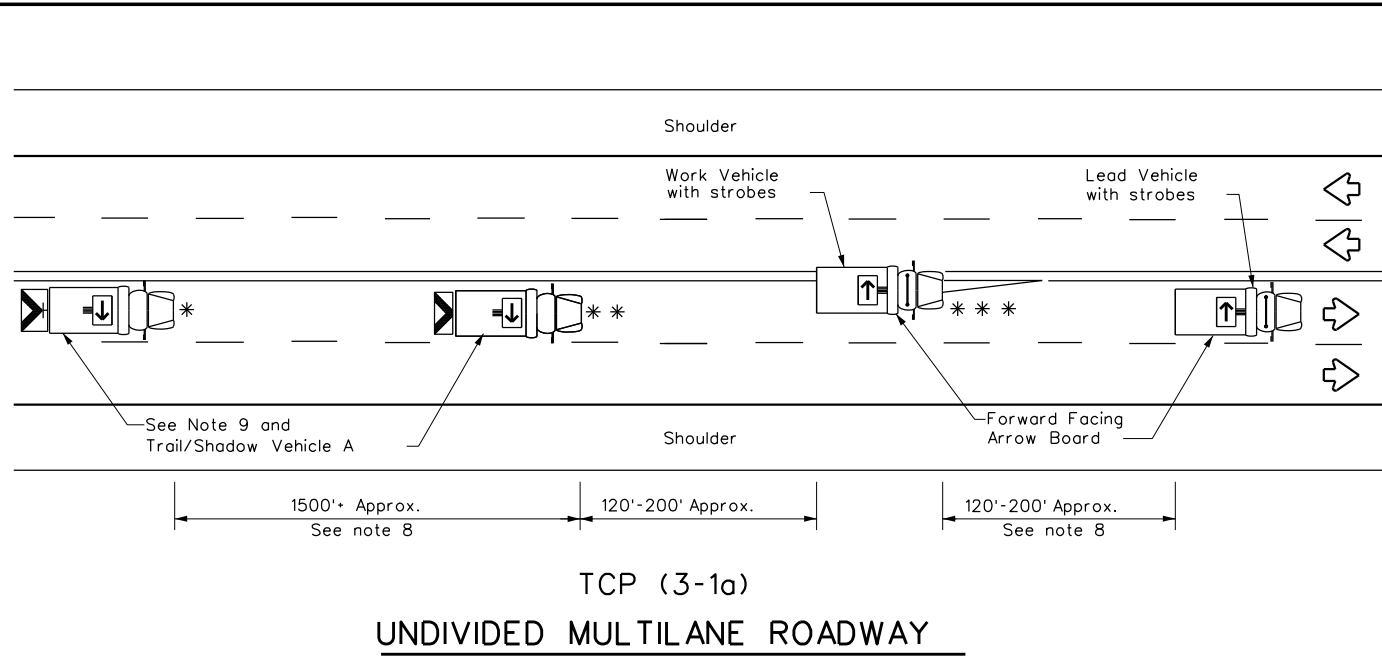
LOW PROFILE CONCRETE BARRIER PRECAST BARRIER (TYPE 2) LPCB-13

FILE: lpcb13.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
© TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS		DIST	COUNTY	SHEET NO.
				95

DATE: FILE:

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DATE:
FILE:

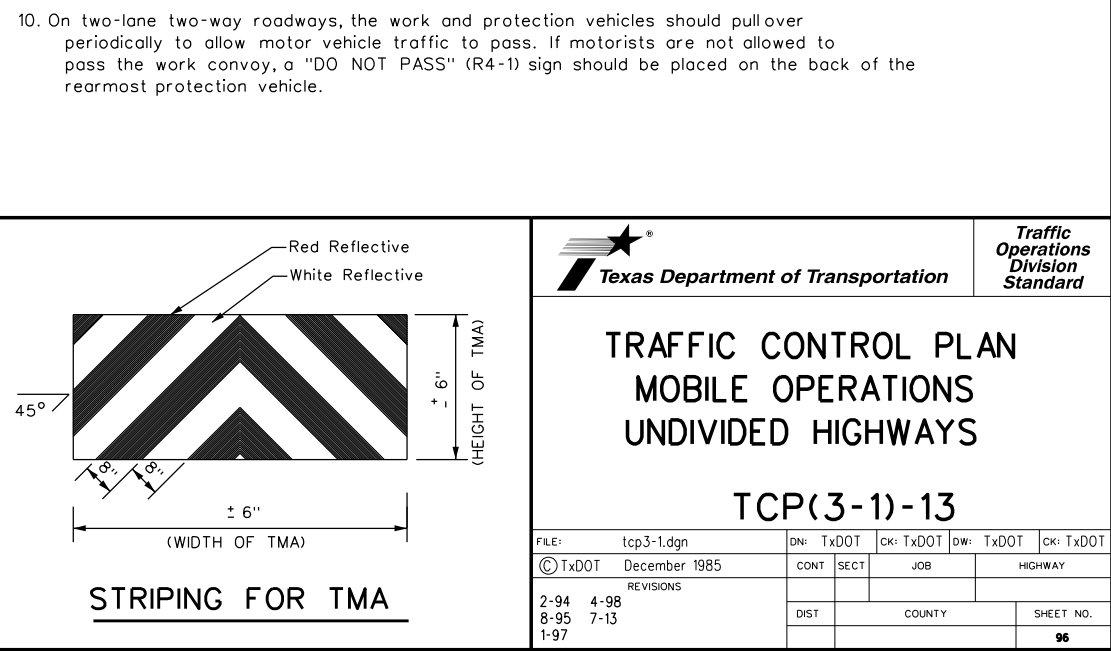
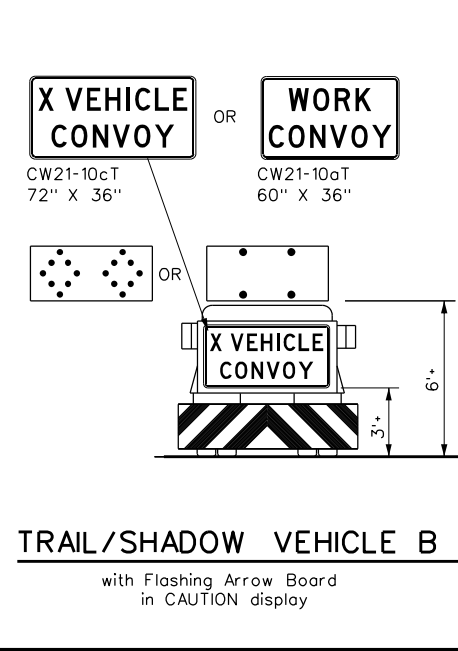
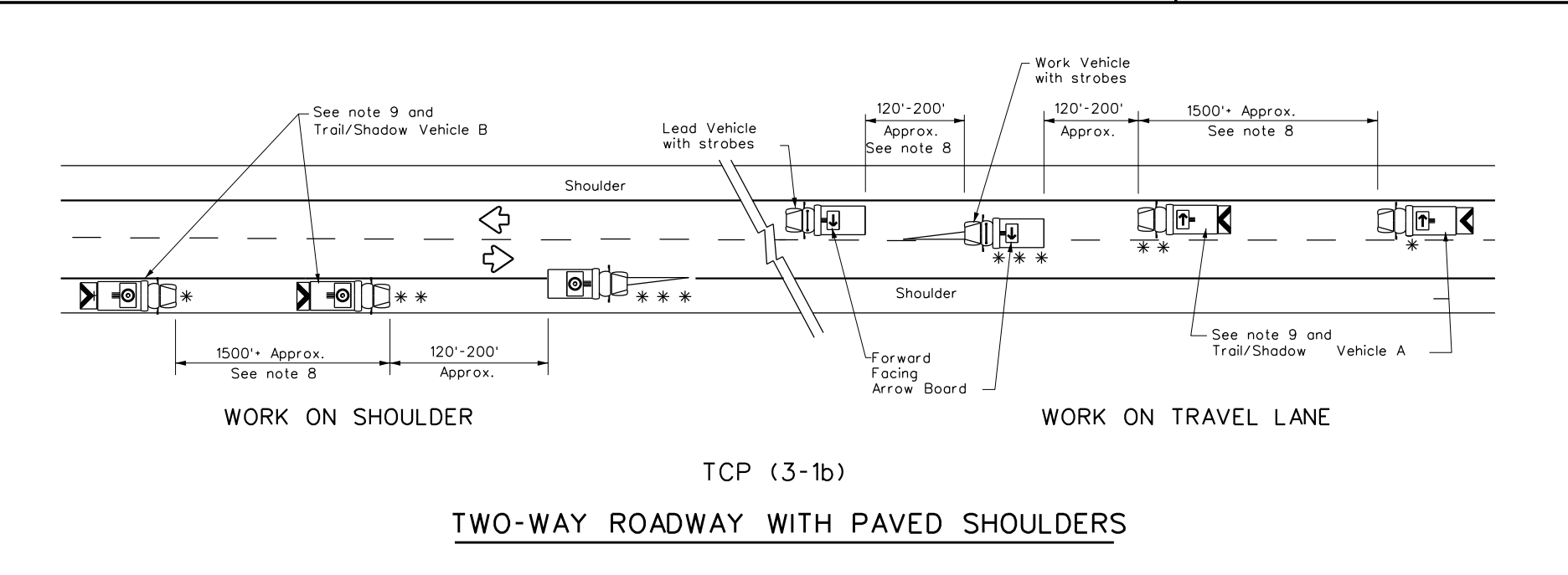


LEGEND			
*	Trail Vehicle	ARROW BOARD DISPLAY	
**	Shadow Vehicle		
***	Work Vehicle		RIGHT Directional
	Heavy Work Vehicle		LEFT Directional
	Truck Mounted Attenuator (TMA)		Double Arrow
	Traffic Flow		CAUTION (Alternating Diamond or 4 Corner Flash)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

GENERAL NOTES

- 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.
- 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.
- The use of truck mounted attenuators (TMA) on the SHADOW VEHICLE and TRAIL VEHICLE are required.
- 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.
- 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.
- Each vehicle shall have two-way radio communication capability.
- When work convoys must change lanes, the TRAIL VEHICLE should change lanes first to shadow the other convoy vehicles.
- 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.
- "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.
- On two-lane two-way roadways, the work and protection vehicles should pull over periodically to allow motor vehicle traffic to pass. If motorists are not allowed to pass the work convoy, a "DO NOT PASS" (R4-1) sign should be placed on the back of the rearmost protection vehicle.



Texas Department of Transportation
Traffic Operations Division Standard

**TRAFFIC CONTROL PLAN
MOBILE OPERATIONS
UNDIVIDED HIGHWAYS**

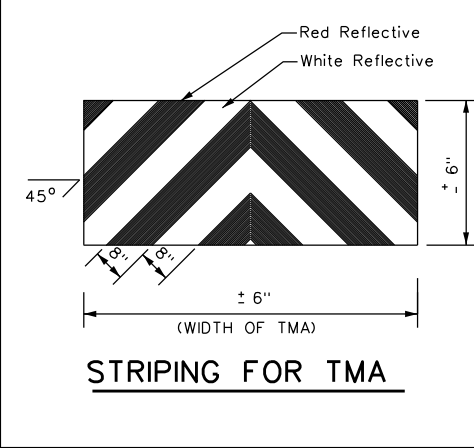
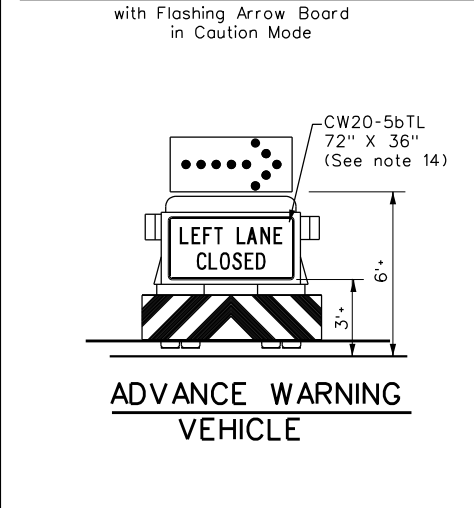
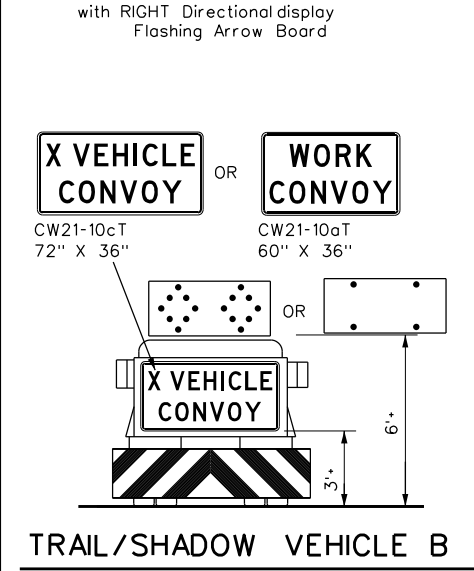
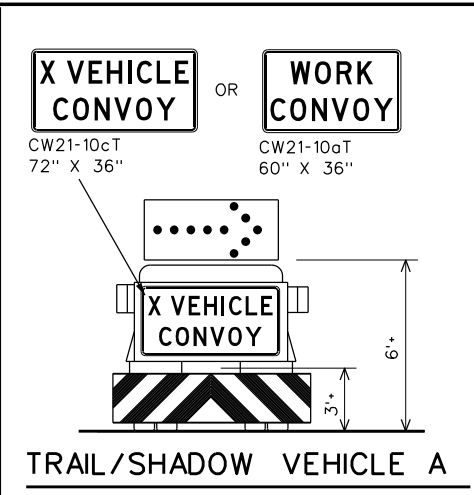
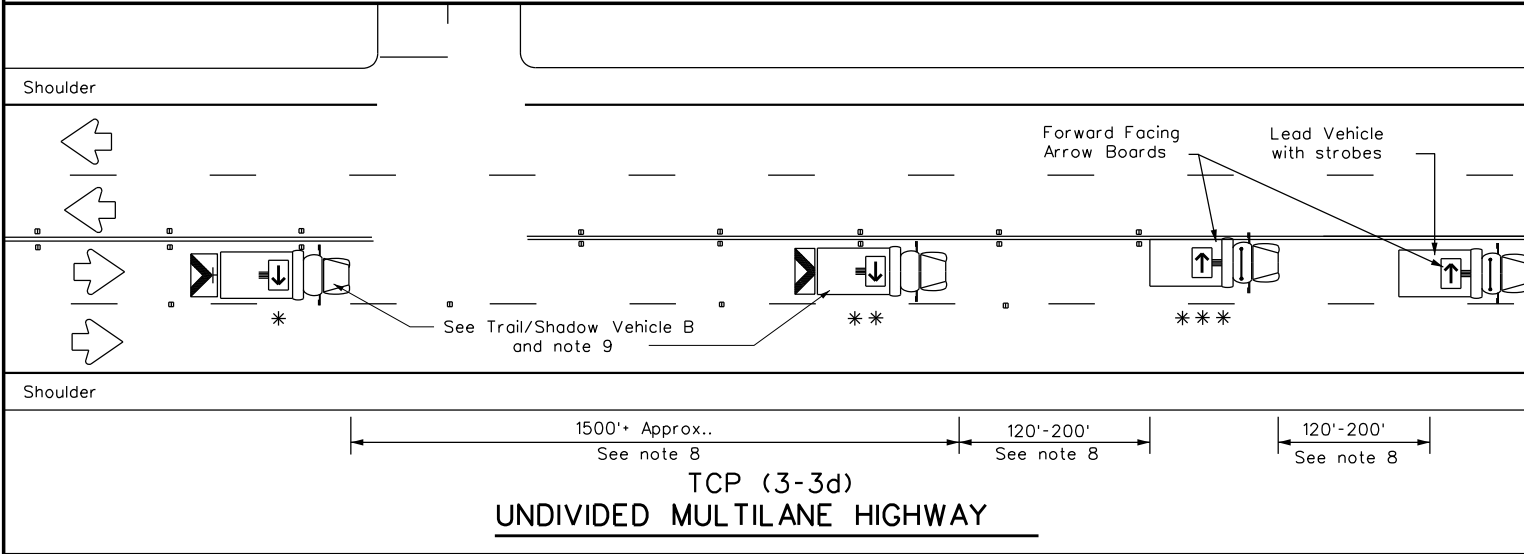
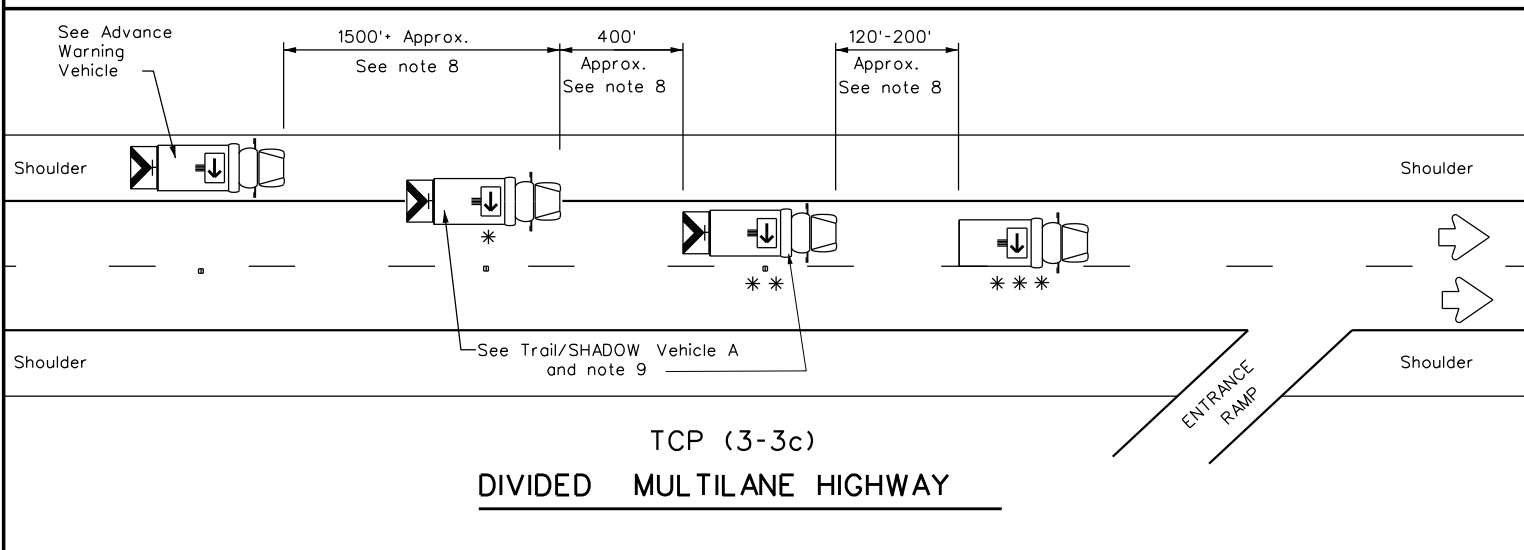
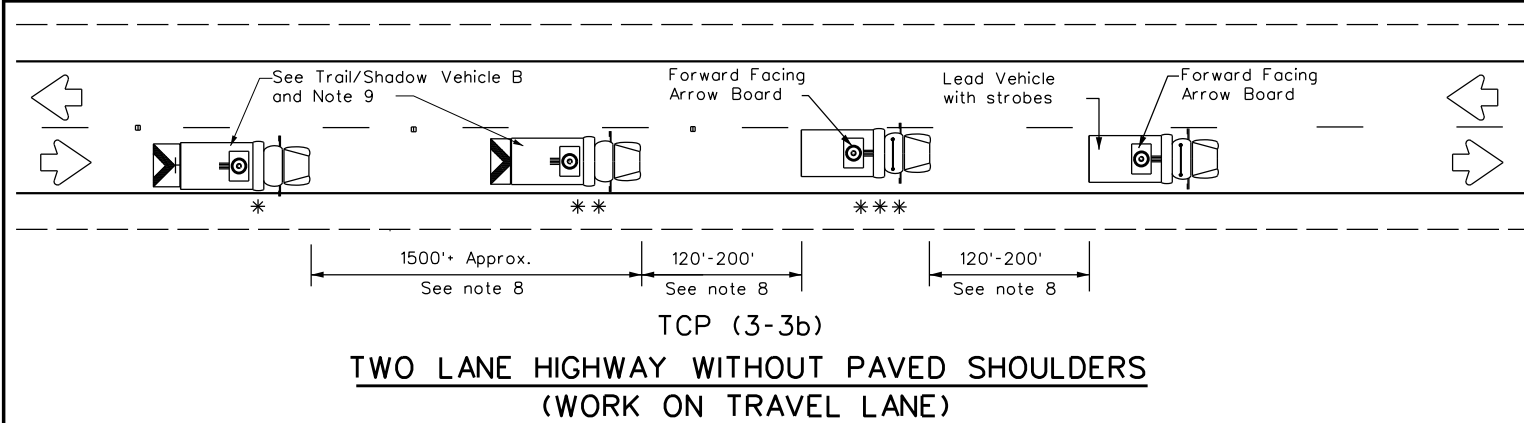
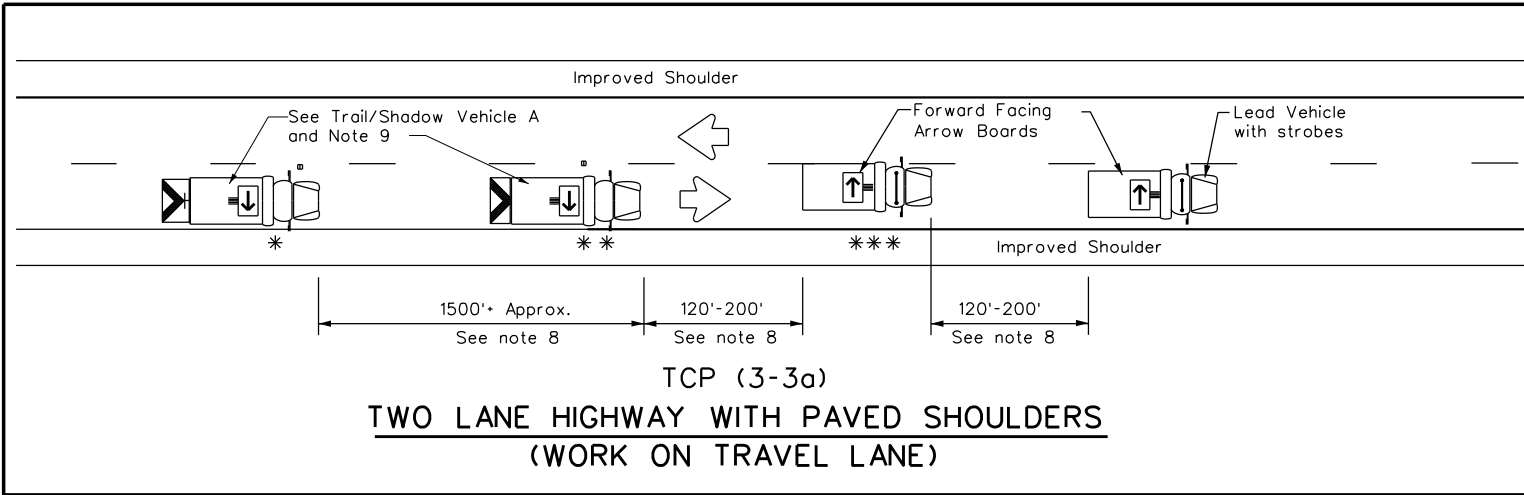
TCP(3-1)-13

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.
				96

175

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DATE: FILE:



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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

**TRAFFIC CONTROL PLAN
MOBILE OPERATIONS
RAISED PAVEMENT
MARKER INSTALLATION/
REMOVAL
TCP(3-3)-14**

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

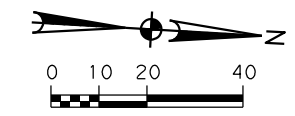
NOTE:
SEE SHEET "CURB RAMP PAVING
PLAN AT W BELLFORT" FOR
REMOVALS ON THE SOUTH SIDE
OF WEST BELLFORT.

LEGEND

- CONCRETE PAVEMENT
- CONCRETE DRIVEWAY
- ASPHALT PAVEMENT
- ASPHALT DRIVEWAY
- REMOVE TREE

NOTES:

1. THE FULL DEPTH SAWCUT IS SUBSIDIARY TO ITEM 104- REMOVE OLD CONCRETE (PAVEMENT) AND IS SHOWN FOR CONTRACTOR'S INFORMATION ONLY.
2. THE DISTRICT OPERATOR WILL PERFORM ALL WATERLINE MODIFICATIONS IN FORT BEND COUNTY MUD.No. 2. CONTACT REBECCA MACUCCI, MUNICIPAL SERVICES @ 218-923-7538, 48 HOURS BEFORE MODIFICATIONS NEED TO BE MADE. CONTACT THE DISTRICT OPERATOR FOR ANY WATER METER NEED DURING CONSTRUCTION.
3. CONTRACTOR SHALL COORDINATE WITH PRIVATE UTILITY COMPANY TO ADJUST APPURTENANCES. UTILITIES ARE SHOWN IN AN APPROXIMATE LOCATION ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION PRIOR TO COMMENCING WORK.



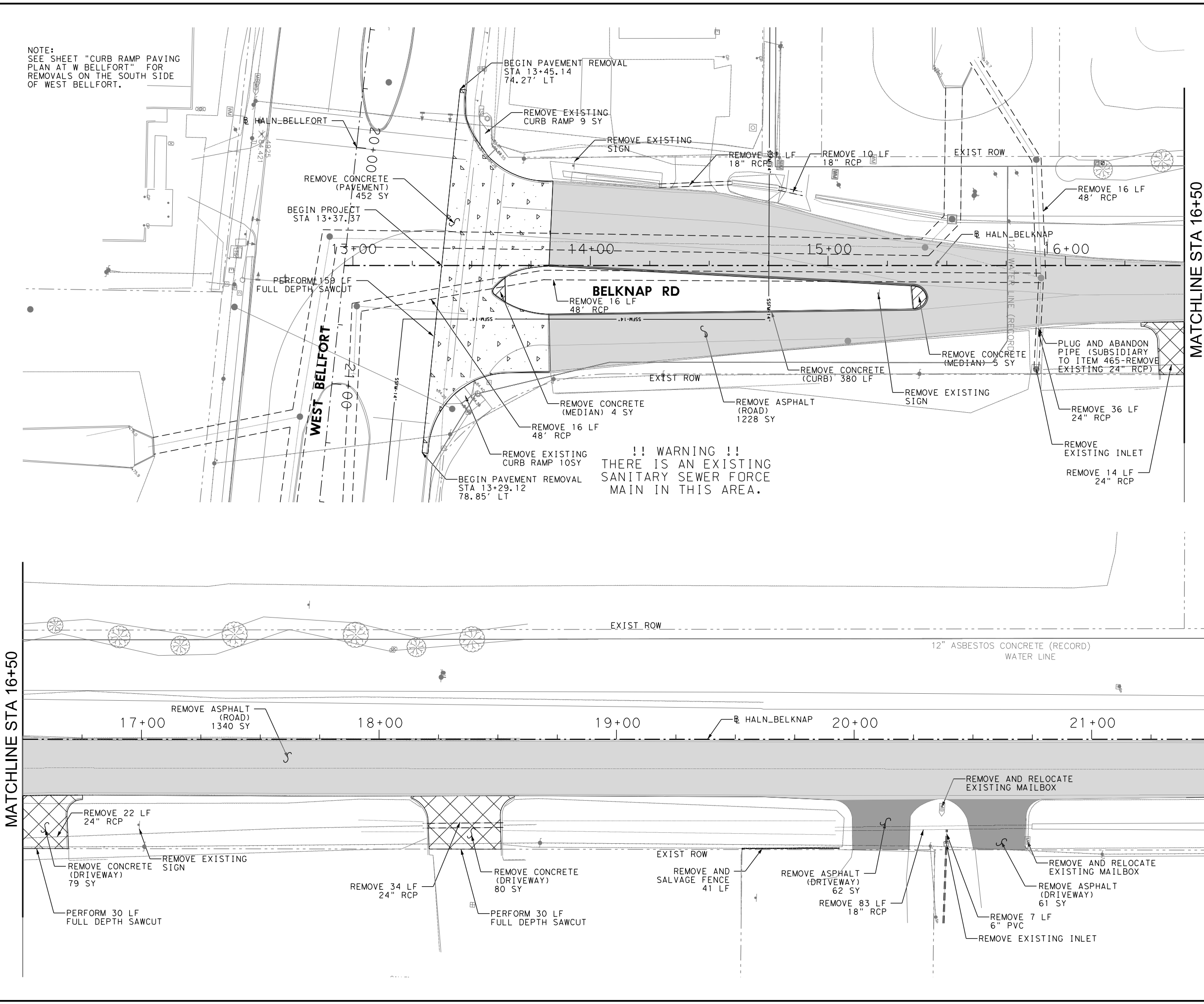
CAUTION!!!!
OVERHEAD ELECTRIC,
LOCATIONS ARE APPROXIMATE

CALL BEFORE YOU DIG!
TEXAS ONE CALL PARTICIPANTS REQUEST
48 HOURS NOTICE BEFORE YOU DIG, DRILL,
OR BLAST - STOP CALL
Texas One Call System
1-800-DIG-TESS

!! WARNING !!
THERE IS AN EXISTING
SANITARY SEWER FORCE
MAIN IN THIS AREA.

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575 N. Dairy Ashford, Suite 700, Houston, Texas 77079
T +1 281 589 7257 E usinfrastructure@rpsgroup.com

FORT BEND COUNTY, TEXAS
BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

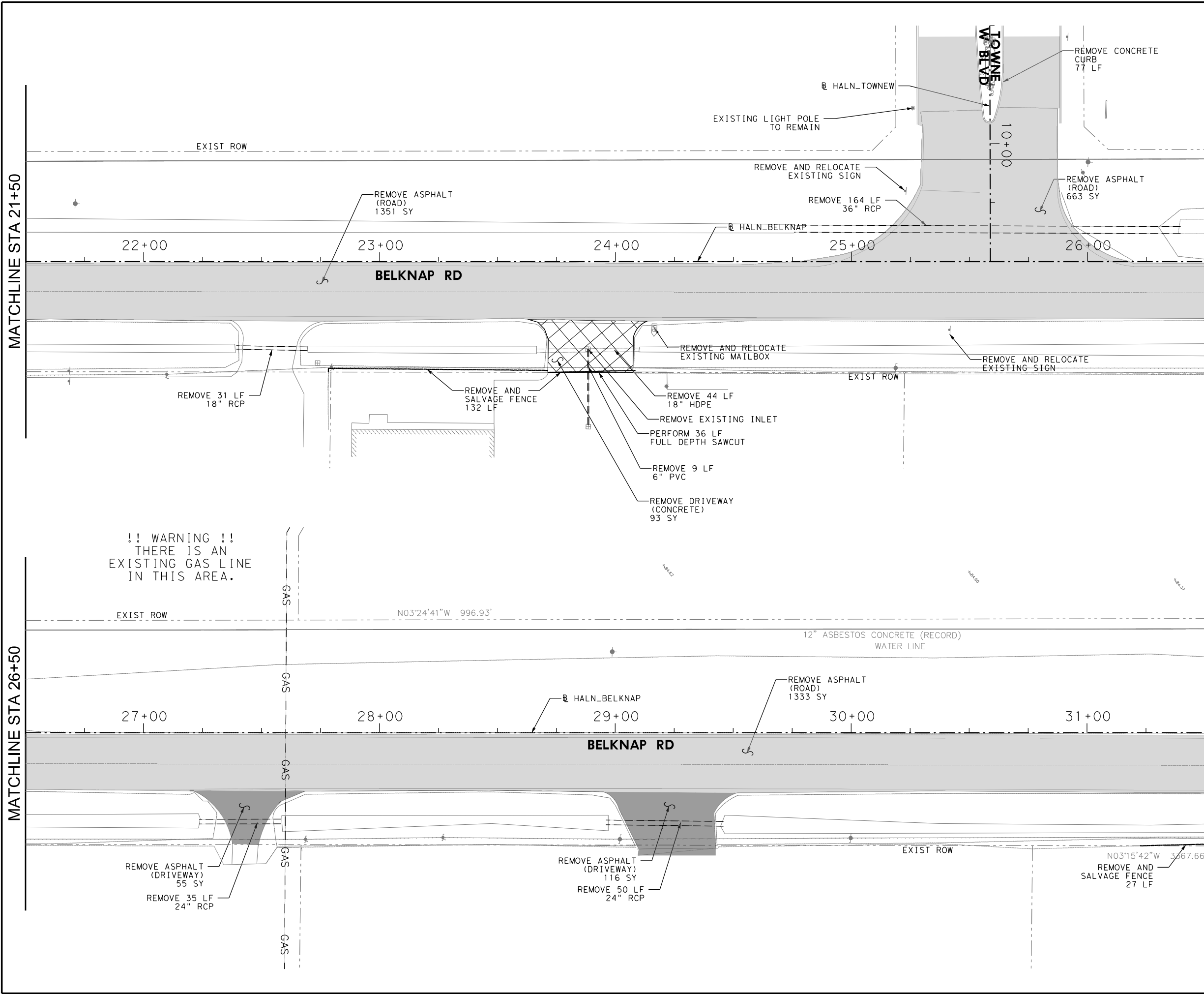
REMOVAL
PLAN

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DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RPS	RPS	RPS	RPS	

SHEET 1 OF 5

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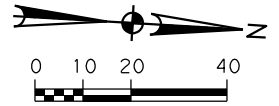


LEGEND

- CONCRETE PAVEMENT
- CONCRETE DRIVEWAY
- ASPHALT PAVEMENT
- ASPHALT DRIVEWAY
- REMOVE TREE

NOTES:

1. THE FULL DEPTH SAWCUT IS SUBSIDIARY TO ITEM 104- REMOVE OLD CONCRETE (PAVEMENT) AND IS SHOWN FOR CONTRACTOR'S INFORMATION ONLY.
2. THE DISTRICT OPERATOR WILL PERFORM ALL WATERLINE MODIFICATIONS IN FORT BEND COUNTY MUD.No. 2. CONTACT REBECCA MACUCCI, MUNICIPAL SERVICES @ 218-923-7538, 48 HOURS BEFORE MODIFICATIONS NEED TO BE MADE. CONTACT THE DISTRICT OPERATOR FOR ANY WATER METER NEED DURING CONSTRUCTION.
3. CONTRACTOR SHALL COORDINATE WITH PRIVATE UTILITY COMPANY TO ADJUST APPURTENANCES. UTILITIES ARE SHOWN IN AN APPROXIMATE LOCATION ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION PRIOR TO COMMENCING WORK.



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LOCATIONS ARE APPROXIMATE

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OR BLAST - STOP CALL
 Texas One Call System
1-800-DIG-TESS



14-Nov-2023

NO	DATE	REVISION	APPROVED

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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

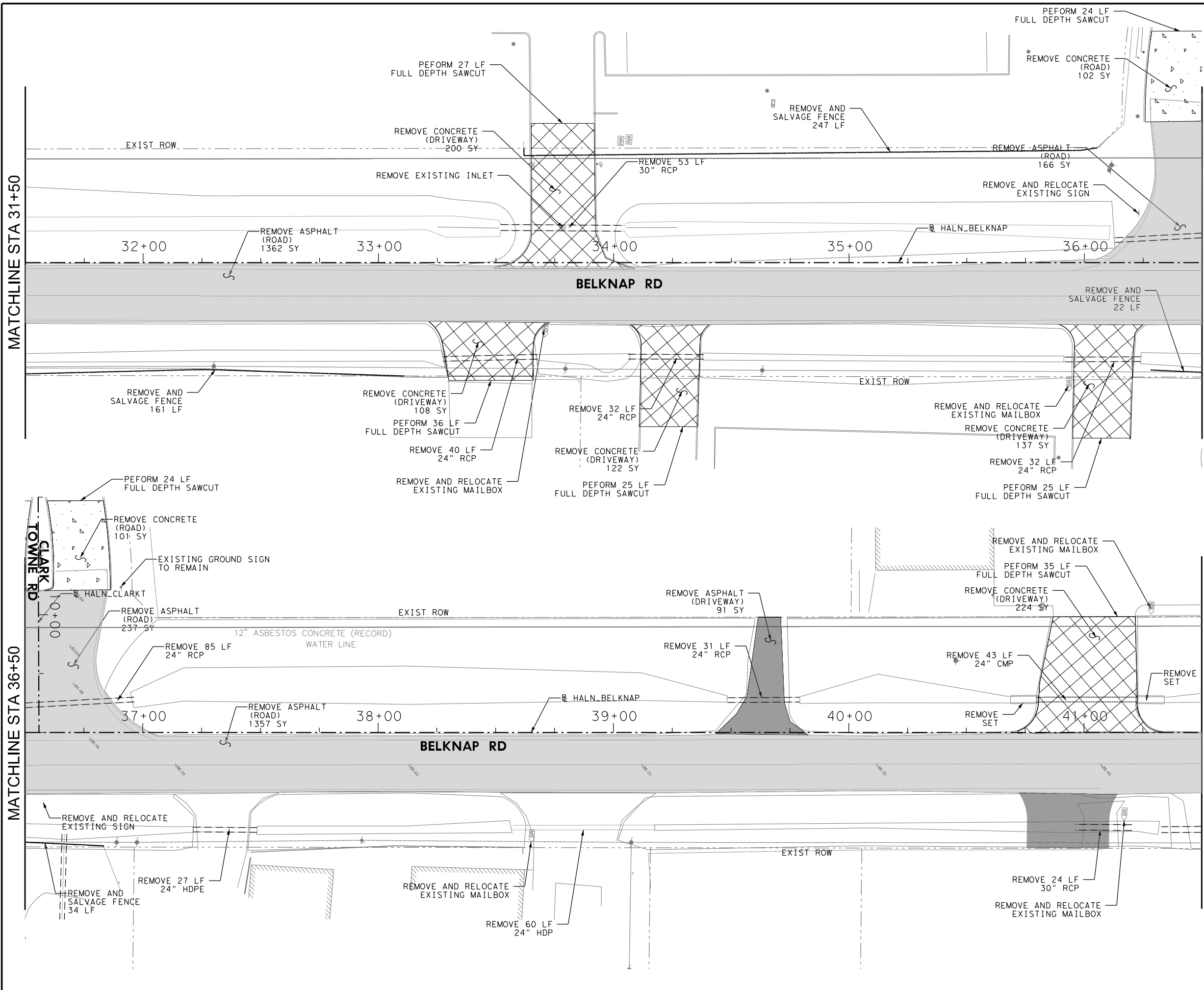
REMOVAL
PLAN

SHEET 2 OF 5

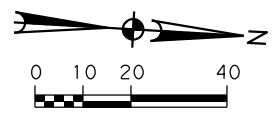
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DESIGNED BY	RPS	DRAWN BY	RPS	CHECKED BY	RPS
				VERIFIED BY	RPS

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- LEGEND**
- CONCRETE PAVEMENT
 - CONCRETE DRIVEWAY
 - ASPHALT PAVEMENT
 - ASPHALT DRIVEWAY
 - REMOVE TREE
- NOTES:**
1. THE FULL DEPTH SAWCUT IS SUBSIDIARY TO ITEM 104- REMOVE OLD CONCRETE (PAVEMENT) AND IS SHOWN FOR CONTRACTOR'S INFORMATION ONLY.
 2. THE DISTRICT OPERATOR WILL PERFORM ALL WATERLINE MODIFICATIONS IN FORT BEND COUNTY MUD.No. 2. CONTACT REBECCA MACUCCI, MUNICIPAL SERVICES @ 218-923-7538, 48 HOURS BEFORE MODIFICATIONS NEED TO BE MADE. CONTACT THE DISTRICT OPERATOR FOR ANY WATER METER NEED DURING CONSTRUCTION.
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48 HOURS NOTICE BEFORE YOU DIG, DRILL,
OR BLAST - STOP CALL
 Texas One Call System
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FORT BEND COUNTY, TEXAS
BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

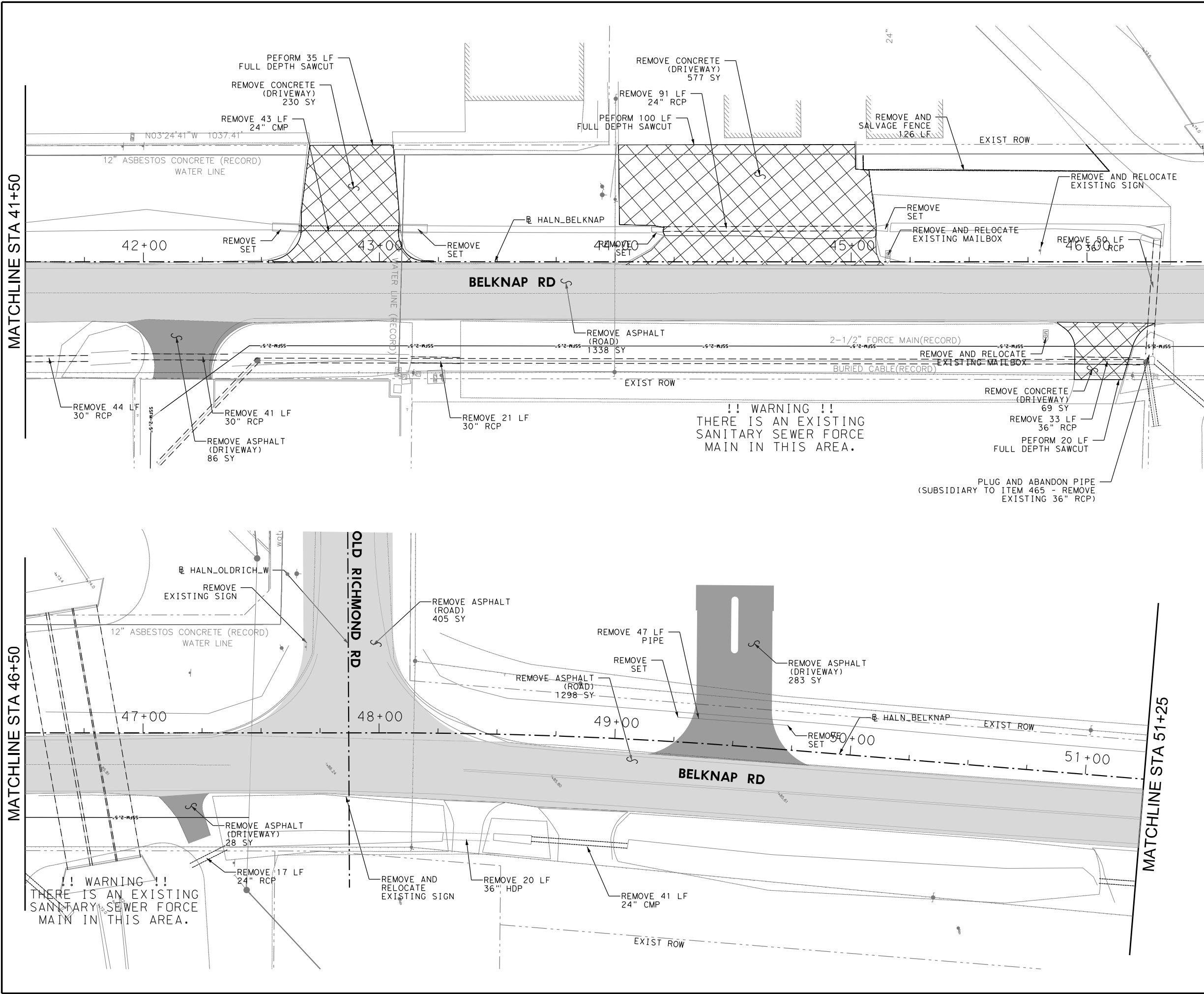
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SHEET 3 OF 5

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DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RPS	RPS	RPS	RPS	

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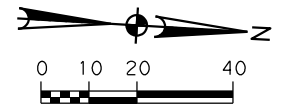


LEGEND

- CONCRETE PAVEMENT
- CONCRETE DRIVEWAY
- ASPHALT PAVEMENT
- ASPHALT DRIVEWAY
- REMOVE TREE

NOTES:

1. THE FULL DEPTH SAWCUT IS SUBSIDIARY TO ITEM 104- REMOVE OLD CONCRETE (PAVEMENT) AND IS SHOWN FOR CONTRACTOR'S INFORMATION ONLY.
2. THE DISTRICT OPERATOR WILL PERFORM ALL WATERLINE MODIFICATIONS IN FORT BEND COUNTY MUD.No. 2. CONTACT REBECCA MACUCCI, MUNICIPAL SERVICES @ 218-923-7538, 48 HOURS BEFORE MODIFICATIONS NEED TO BE MADE. CONTACT THE DISTRICT OPERATOR FOR ANY WATER METER NEED DURING CONSTRUCTION.
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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

REMOVAL
PLAN

SHEET 4 OF 5

CNTY	PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	2023			101
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY		
RPS	RPS	RPS	RPS		

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MATCHLINE STA 51+25

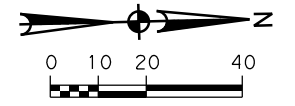
MATCHLINE STA 56+25

LEGEND

- CONCRETE PAVEMENT
- CONCRETE DRIVEWAY
- ASPHALT PAVEMENT
- ASPHALT DRIVEWAY
- REMOVE TREE

NOTES:

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CAUTION!!!!
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LOCATIONS ARE APPROXIMATE

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48 HOURS NOTICE BEFORE YOU DIG, DRILL,
OR BLAST - STOP CALL
Texas One Call System
1-800-DIG-TESS

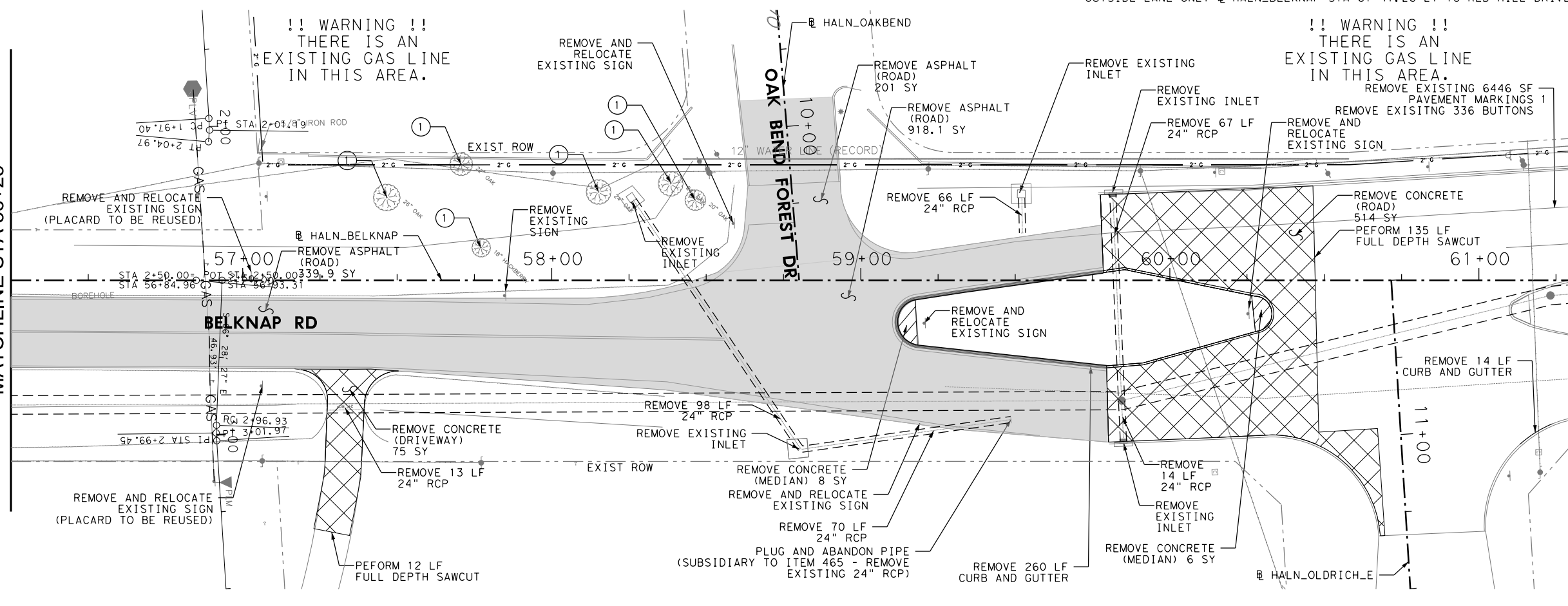
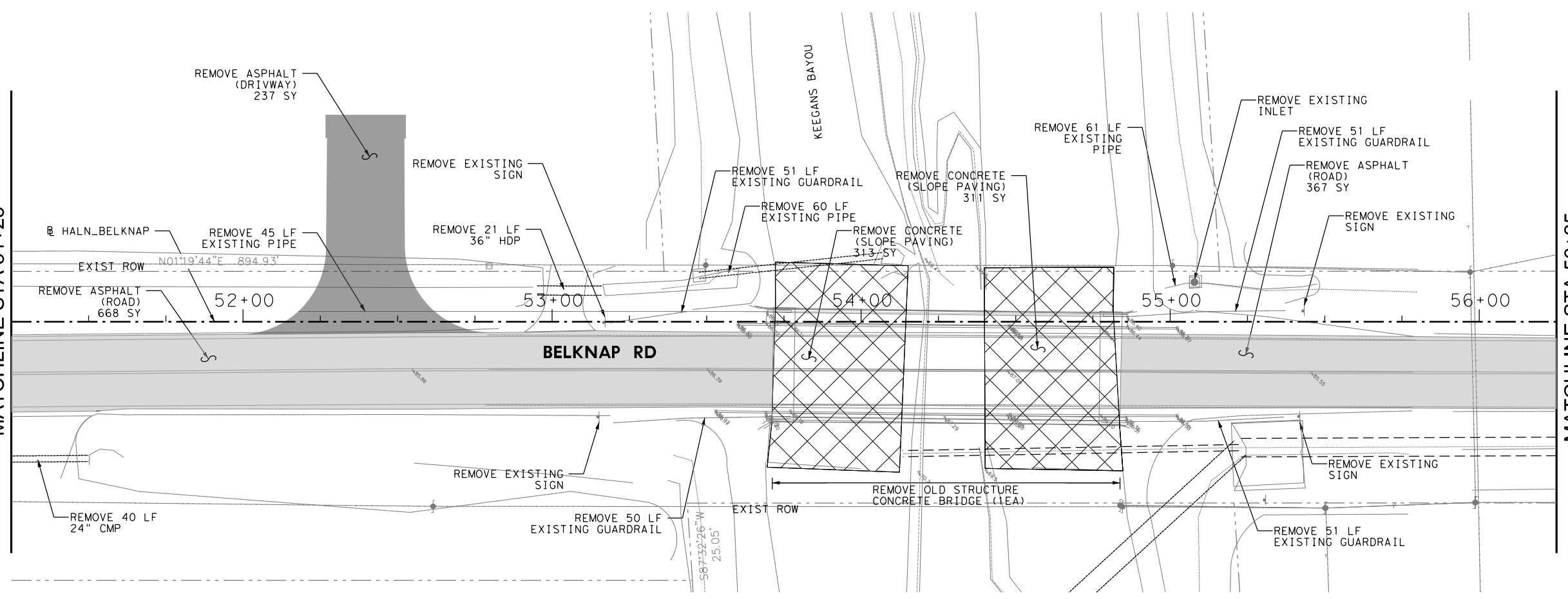
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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

REMOVAL
PLAN

CNTY	PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169		2023		102
DESIGNED BY	RPS	DRAWN BY	RPS	CHECKED BY	RPS
VERIFIED BY	RPS				



1 REMOVE EXISTING PAVEMENT MARKING (DROP LANE) HATCHING AND BUTTONS FROM OUTSIDE LANE ONLY @ HALN_BELKNAP STA 61+47.26 LT TO RED HILL DRIVE.

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11/7/2023 2:03:57 PM \\rpsdw11cs01\ics01\ics_pdf\work_dir\4357\22934_8\8169_SHEET_ROAD_01.dgn

NOTE: SEE THE PROJECT PEDESTRIAN RAMP DETAIL SHEET FOR THE PEDESTRIAN RAMPS ON THE SOUTH SIDE OF WEST BELLFORT AND AT THE NORTHWEST CORNER OF WEST BELLFORT AND BELKNAP.

NOTE: TO INSTALL PROP MANHOLES (A-OFF-2, A16-2, A16-3), REMOVE 16 LF EXIST 48" RCP. USE PROP CONC COLLAR TO CONNECT 4 LF PROP 48" RCP TO EXIST 48" RCP ON EITHER SIDE OF PROP MANHOLE.

WEST BELLFORT

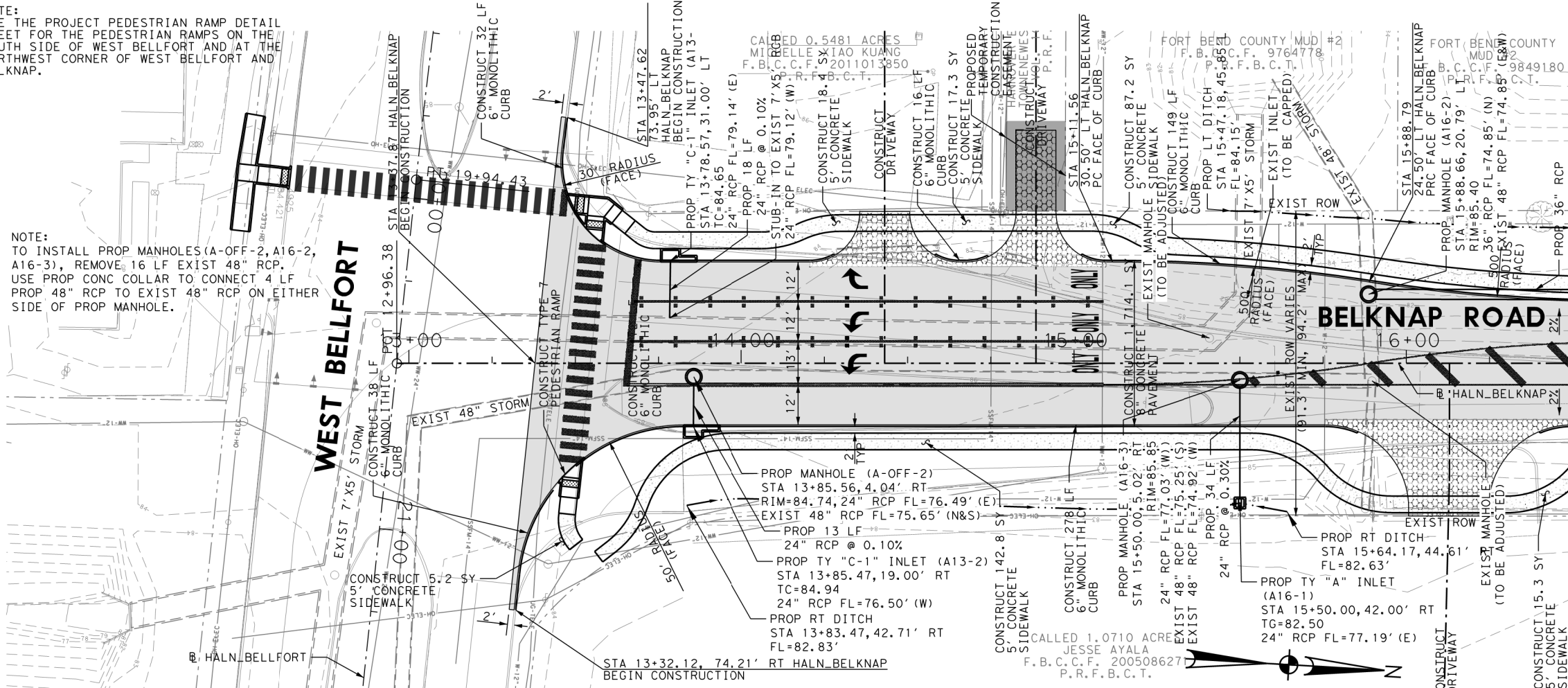
MATCH LINE - STA 16+50

- LEGEND**
- PROP REINFORCED CONC PAVEMENT
 - PROP. 4.5" REINFORCED CONC SIDEWALK (5' WIDE)
 - PROP 8" REINFORCED CONC DRIVEWAY
 - PROP CAST-IN PLACE CONC MEDIAN NOSE

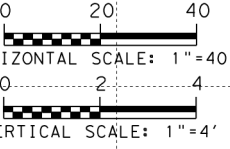
- NOTES:**
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CALL BEFORE YOU DIG!
 TEXAS ONE CALL PARTICIPANTS REQUEST 48 HOURS NOTICE BEFORE YOU DIG, DRILL OR BLAST - STOP CALL
Texas One Call System
 1-800-DIG-TESS

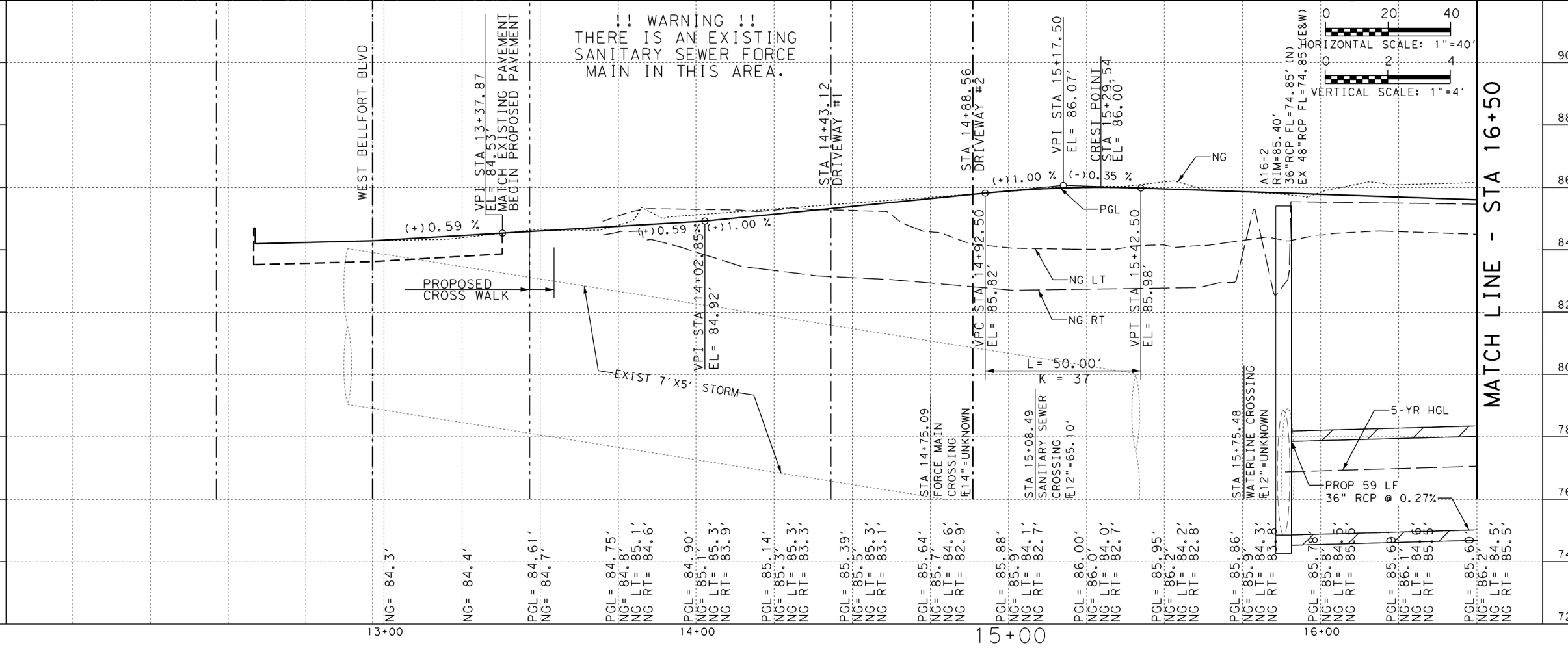
CAUTION!!!!
 OVERHEAD ELECTRIC. LOCATIONS ARE APPROXIMATE



!! WARNING !!
 THERE IS AN EXISTING SANITARY SEWER FORCE MAIN IN THIS AREA.



MATCH LINE - STA 16+50

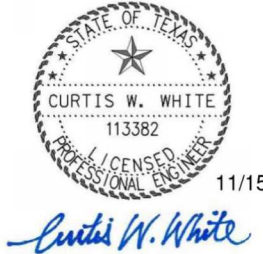


NO	DATE	REVISION	APPROVED



14-Nov-2023

RPS
 Texas PE Firm Reg. #F-929
 5810 Tennyson Parkway, Suite 280, Plano, Texas 75024
 T +1 972 202 4242 E usinfr@rpsgroup.com



11/15/2023

CivilTech Engineering, Inc.
 11821 Telge Road
 Cypress, Texas 77429
 PH: (281) 304-0200 - FX: (281) 304-0200
 Firm Registration No. F-382

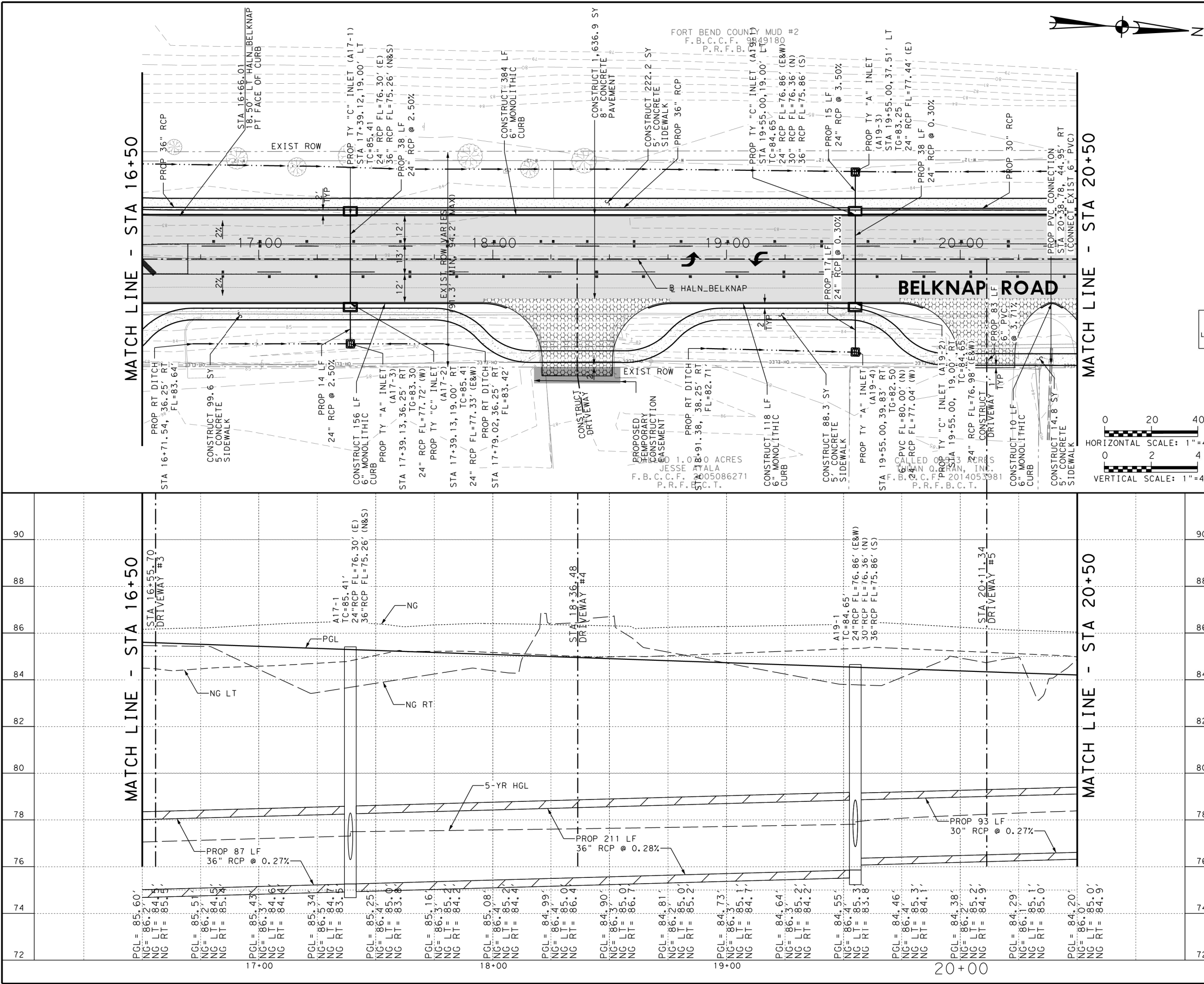
FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

BELKNAP RD
PLAN AND PROFILE

CNTY	PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	XXX	2023		103
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY		
RPS	RPS	RPS	RPS		

SHEET 1 OF 10



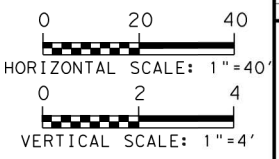
- LEGEND**
- PROP REINFORCED CONC PAVEMENT
 - PROP. 4.5" REINFORCED CONC SIDEWALK (5' WIDE)
 - PROP 8" REINFORCED CONC DRIVEWAY
 - PROP CAST-IN PLACE CONC MEDIAN NOSE

- NOTES:**
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Texas One Call System
1-800-DIG-TESS



NO.	DATE	REVISION	APPROVED

Ronald J. Thomas
14-Nov-2023

RPS Texas PE Firm Reg. #F-929
5810 Tennyson Parkway, Suite 280, Plano, Texas 75024
T +1 972 202 4242 E us@infrastructure@rpsgroup.com

Curtis W. White
11/15/2023

CivilTech Engineering, Inc. 11821 Telge Road
Cypress, Texas 77429
PH: (281) 304-0200 - FX: (281) 304-0200
Firm Registration No. F-382

FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

BELKNAP RD
PLAN AND PROFILE

SHEET 2 OF 10

CNTY	PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	XXX	2023		104
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY		
RPS	RPS	RPS	RPS		

rpsdw11cs01s

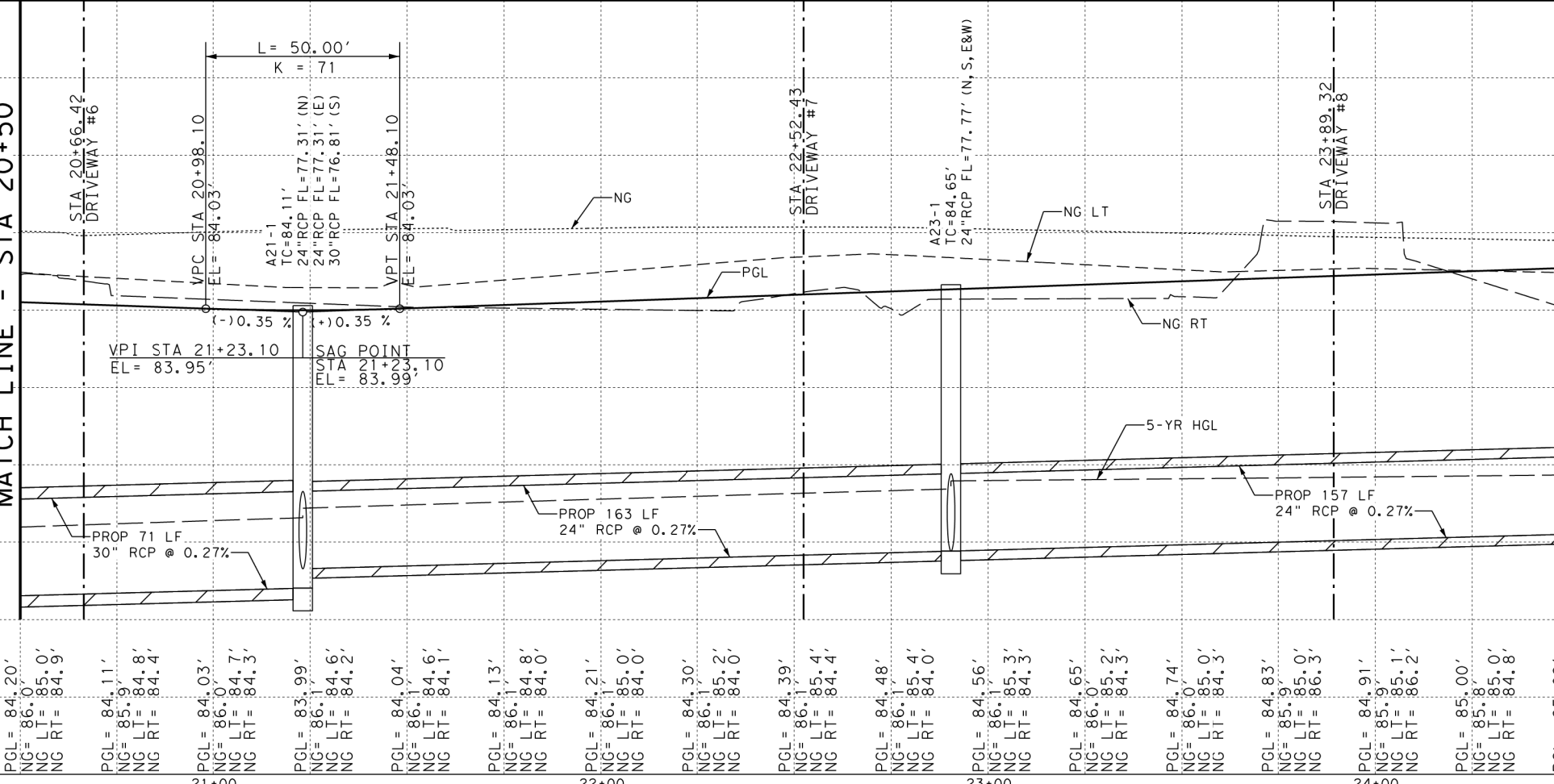
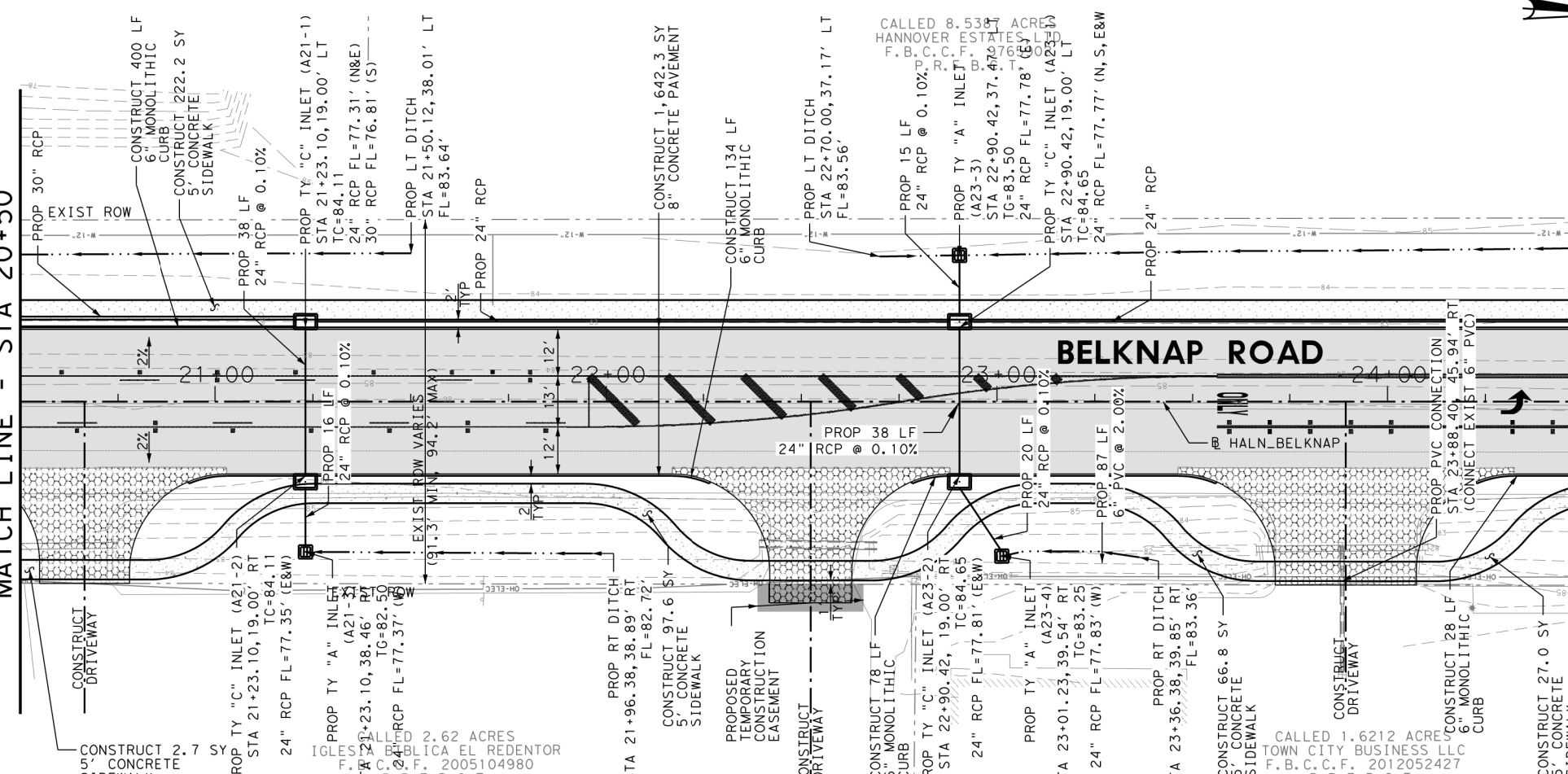
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MATCH LINE - STA 20+50

MATCH LINE - STA 20+50

MATCH LINE - STA 24+50

MATCH LINE - STA 24+50



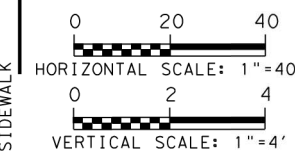
- LEGEND**
- PROP REINFORCED CONC PAVEMENT
 - PROP. 4.5" REINFORCED CONC SIDEWALK (5' WIDE)
 - PROP 8" REINFORCED CONC DRIVEWAY
 - PROP CAST-IN PLACE CONC MEDIAN NOSE

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Texas One Call System
1-800-DIG-TESS



NO.	DATE	REVISION	APPROVED

Ronald J. Thomas
14-Nov-2023

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5810 Tennyson Parkway, Suite 280, Plano, Texas 75024
T +1 972 202 4242 E usinfrastructure@rpsgroup.com

Curtis W. White
11/15/2023

CivilTech Engineering, Inc. 11821 Telge Road
Cypress, Texas 77429
PH: (281) 304-0200 - FX: (281) 304-0200
Firm Registration No. F-382

FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

BELKNAP RD
PLAN AND PROFILE

SHEET 3 OF 10

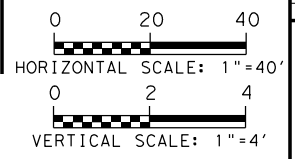
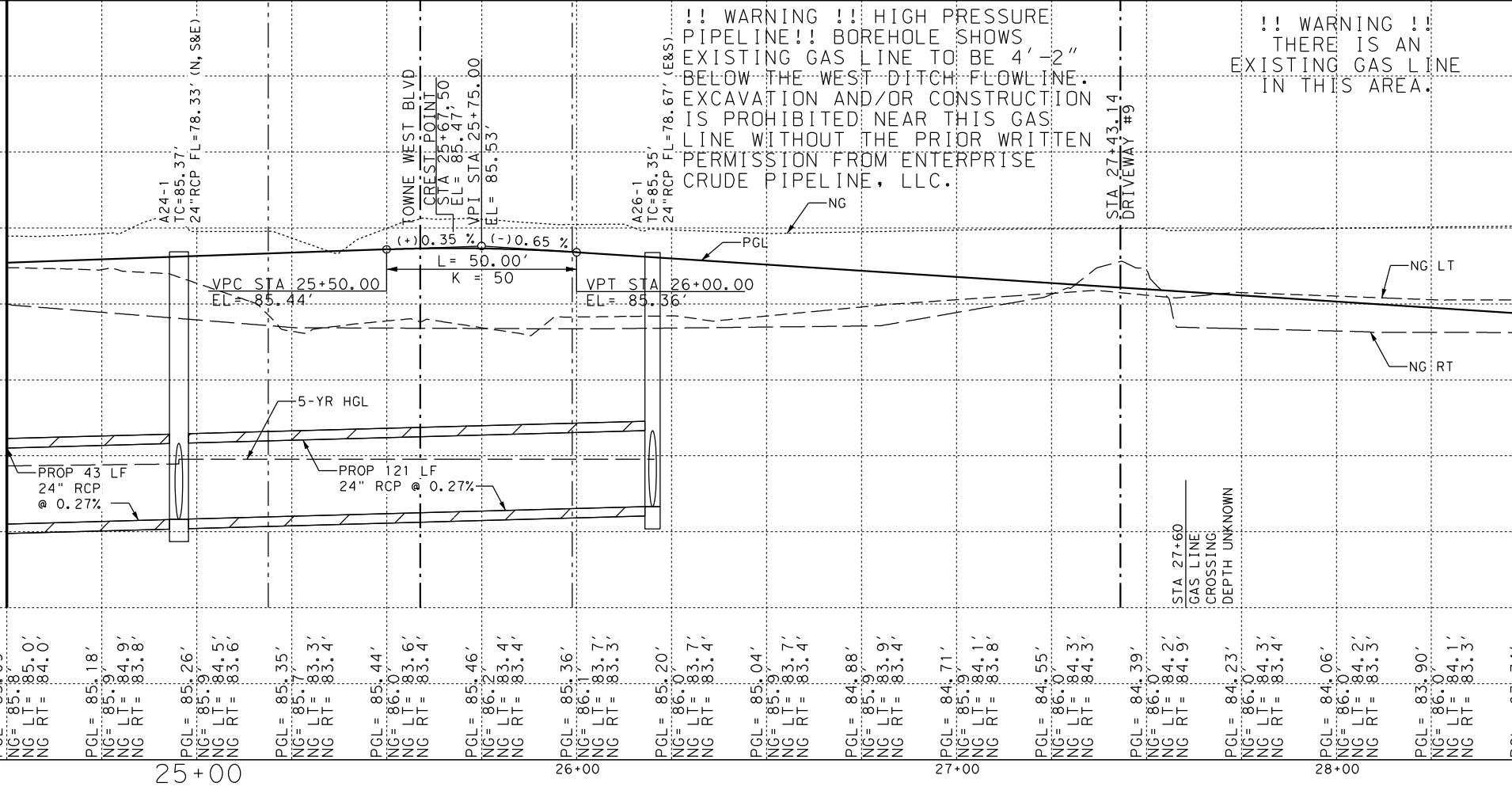
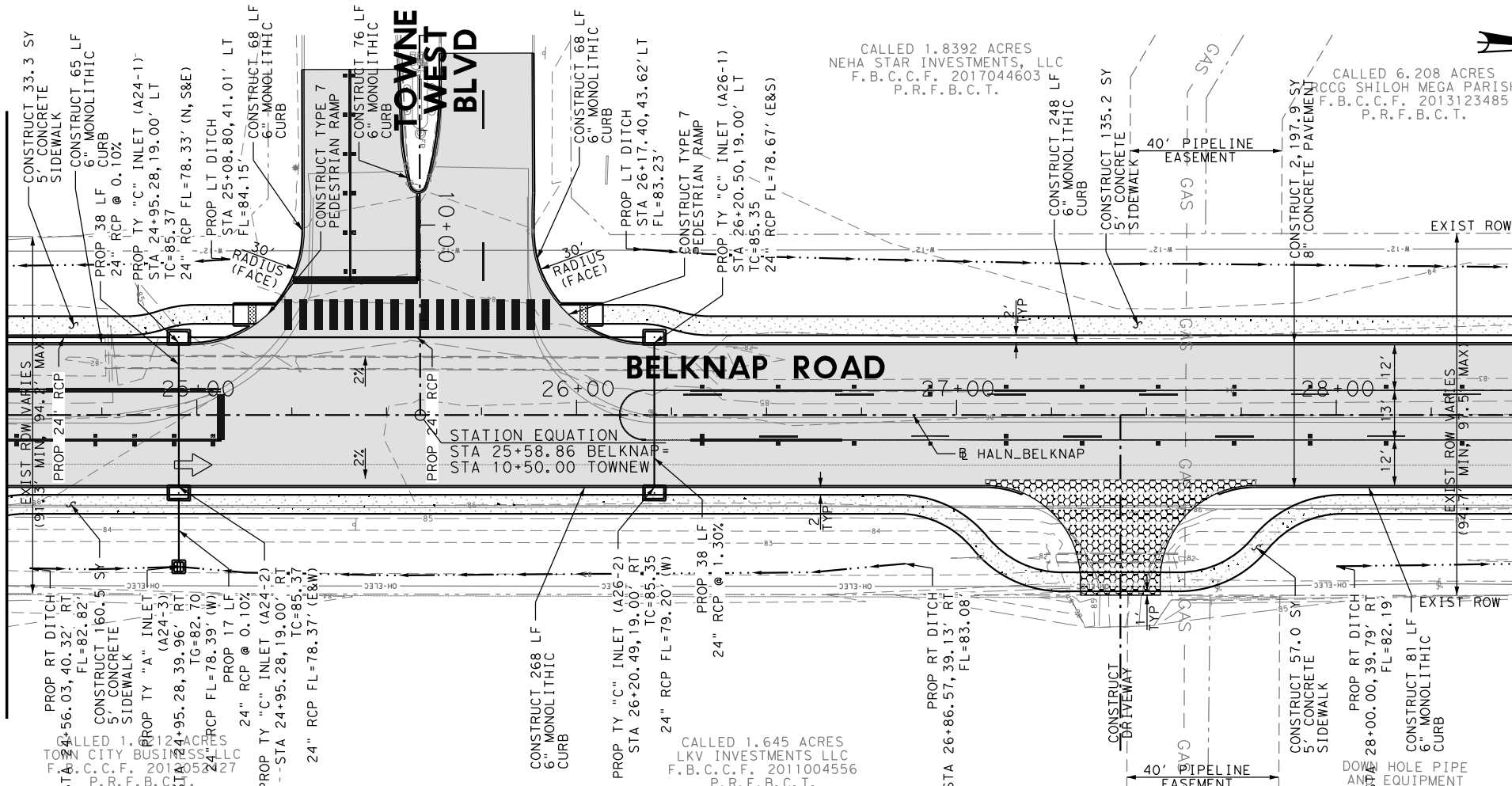
CNTY PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	XXX 2023		105
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RPS	RPS	RPS	RPS	

MATCH LINE - STA 24+50

MATCH LINE - STA 24+50

MATCH LINE - STA 28+50

MATCH LINE - STA 28+50



- LEGEND**
- PROP REINFORCED CONC PAVEMENT
 - PROP. 4.5" REINFORCED CONC SIDEWALK (5' WIDE)
 - PROP 8" REINFORCED CONC DRIVEWAY
 - PROP CAST-IN PLACE CONC MEDIAN NOSE
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Texas One Call System
1-800-DIG-TESS

NO	DATE	REVISION	APPROVED

STATE OF TEXAS
RONALD J. THOMAS
89495
LICENSED PROFESSIONAL ENGINEER
14-Nov-2023

RPS
Texas PE Firm Reg. #F-929
5810 Tennyson Parkway, Suite 280, Plano, Texas 75024
T+1 972 202 4242 E us@infrastructure@rpsgroup.com

STATE OF TEXAS
CURTIS W. WHITE
113382
LICENSED PROFESSIONAL ENGINEER
11/15/2023

CivilTech Engineering, Inc.
11821 Telge Road
Cypress, Texas 77429
PH: (281) 304-0200 - FX: (281) 304-0200
Firm Registration No. F-382

FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

BELKNAP RD
PLAN AND PROFILE

SHEET 4 OF 10

CNTY PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	XXX 2023		106

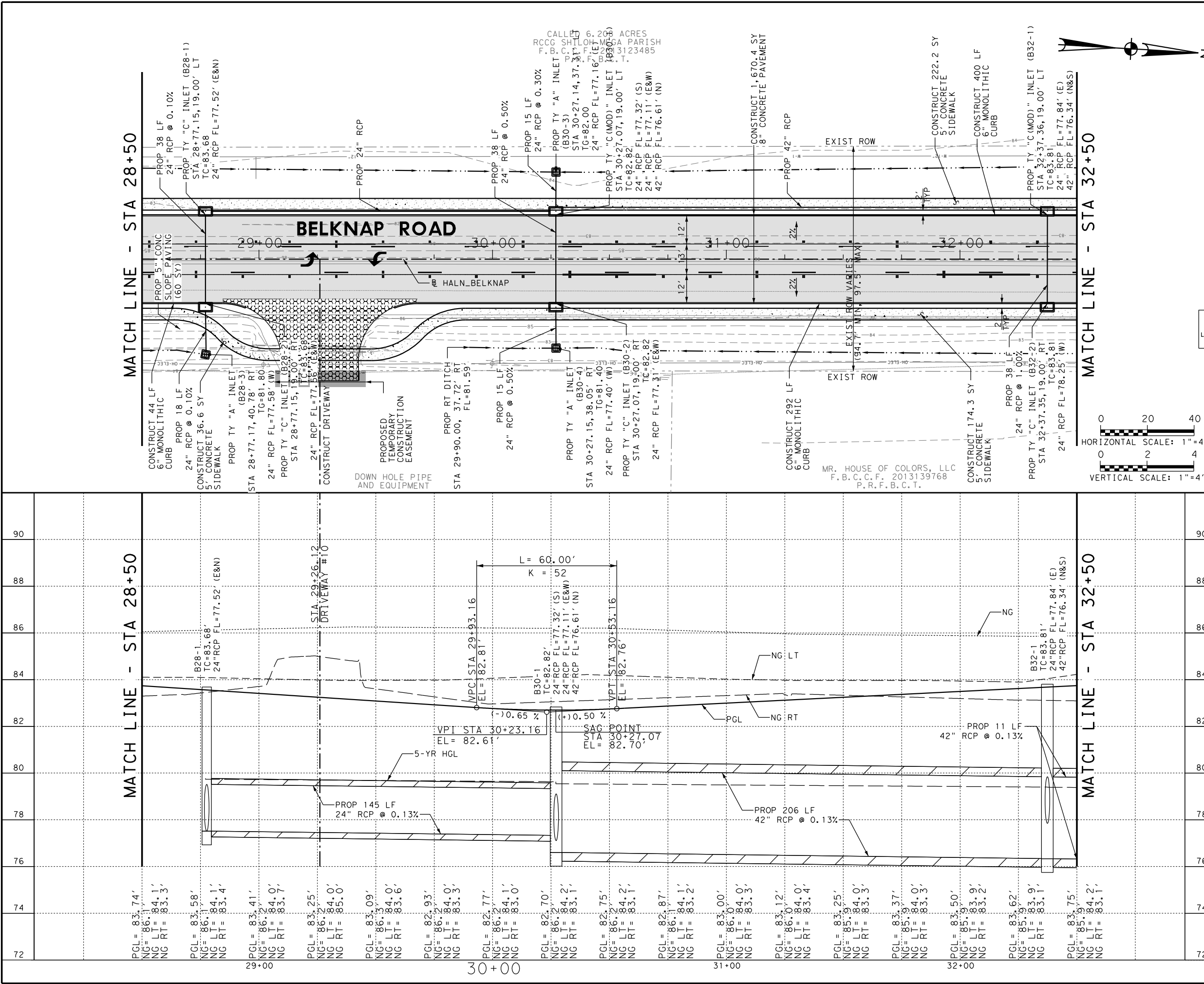
DESIGNED BY: RPS
DRAWN BY: RPS
CHECKED BY: RPS
VERIFIED BY: RPS

!! WARNING !! HIGH PRESSURE PIPELINE!! BOREHOLE SHOWS EXISTING GAS LINE TO BE 4' - 2" BELOW THE WEST DITCH FLOWLINE. EXCAVATION AND/OR CONSTRUCTION IS PROHIBITED NEAR THIS GAS LINE WITHOUT THE PRIOR WRITTEN PERMISSION FROM ENTERPRISE CRUDE PIPELINE, LLC.

!! WARNING !! THERE IS AN EXISTING GAS LINE IN THIS AREA.

rpsdw11cs01\$

11/7/2023 2:04:35 PM \\rpsdw11cs01\1cs_pdf\work_dir\4357\22934_13\8169_SHEET_ROAD_05.dgn



LEGEND

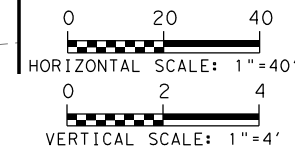
- PROP REINFORCED CONC PAVEMENT
- PROP. 4.5" REINFORCED CONC SIDEWALK (5' WIDE)
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- PROP CAST-IN PLACE CONC MEDIAN NOSE

NOTES:

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1-800-DIG-TESS



NO.	DATE	REVISION	APPROVED

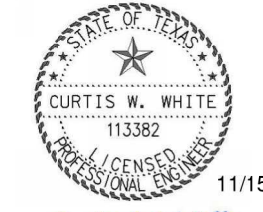


14-Nov-2023



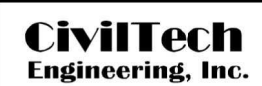
Texas PE Firm Reg. #F-929

5810 Tennyson Parkway, Suite 280, Plano, Texas 75024
T +1 972 202 4242 E us@infrastructure@rpsgroup.com



11/15/2023

Curtis W. White



11821 Telge Road
Cypress, Texas 77429
PH: (281) 304-0200 - FX: (281) 304-0200
Firm Registration No. F-382

FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

BELKNAP RD
PLAN AND PROFILE

SHEET 5 OF 10

CNTY	PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	XXX	2023		107
DESIGNED BY	RPS	DRAWN BY	RPS	CHECKED BY	RPS
				VERIFIED BY	RPS

rpsdw11cs01s

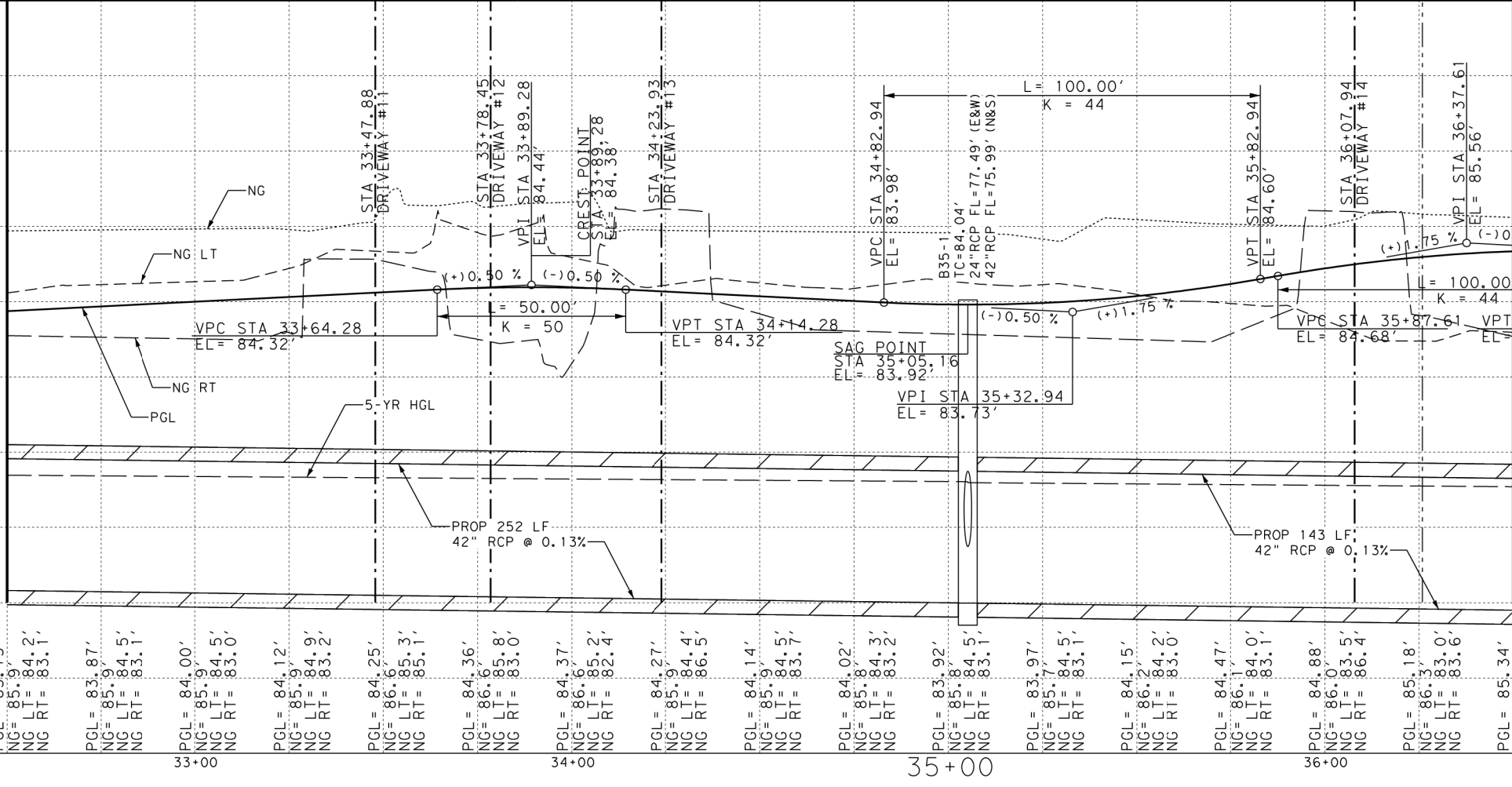
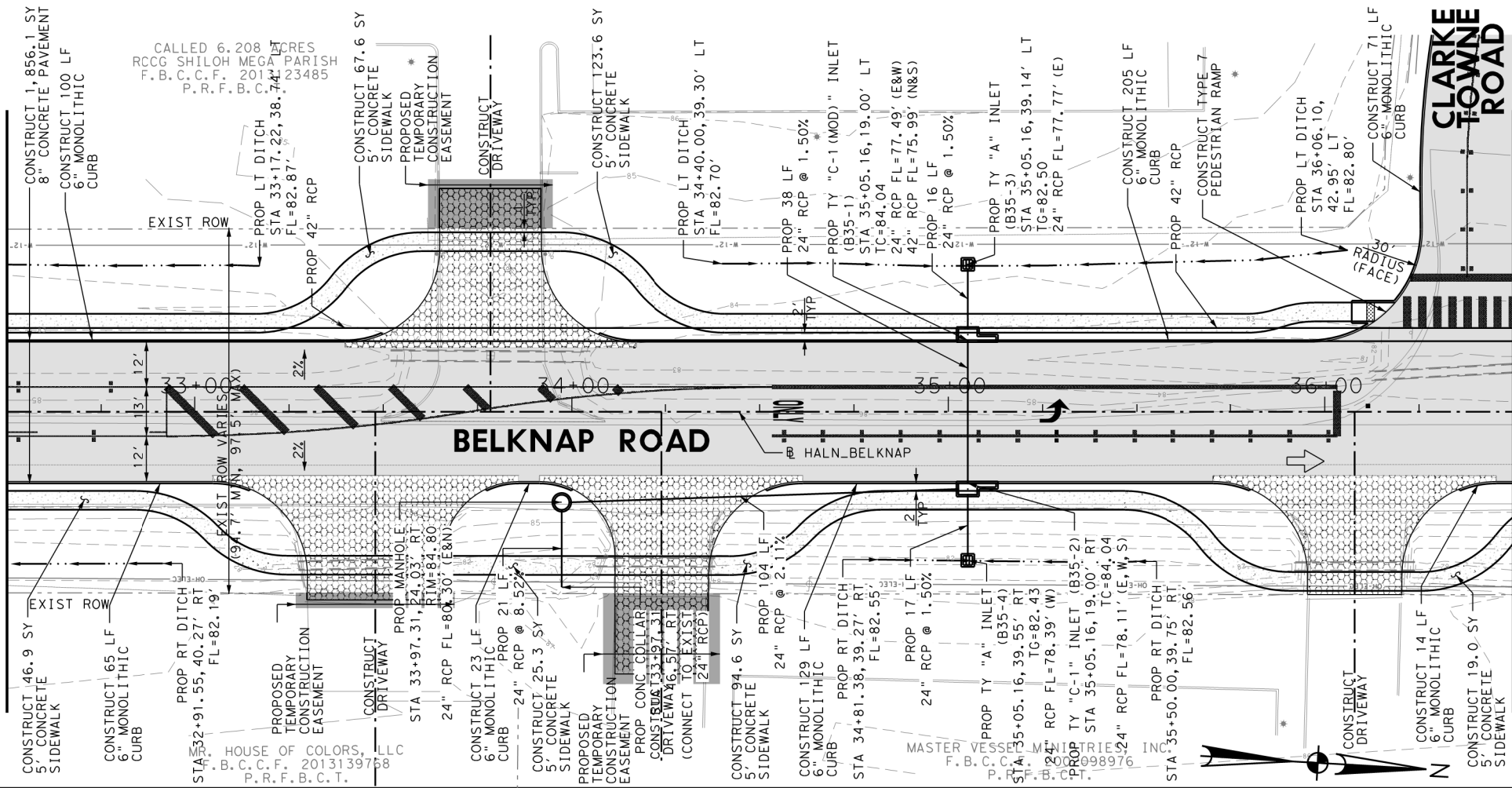
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MATCH LINE - STA 32+50

MATCH LINE - STA 32+50

MATCH LINE - STA 36+50

MATCH LINE - STA 36+50



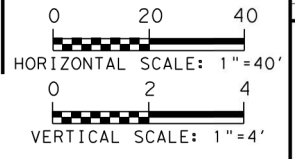
- LEGEND**
- PROP REINFORCED CONC PAVEMENT
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1-800-DIG-TESS

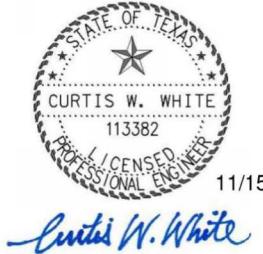


NO.	DATE	REVISION	APPROVED



14-Nov-2023

RPS Texas PE Firm Reg. #F-929
5810 Tennyson Parkway, Suite 280, Plano, Texas 75024
T +1 972 202 4242 E usinfrastructure@rpsgroup.com



11/15/2023

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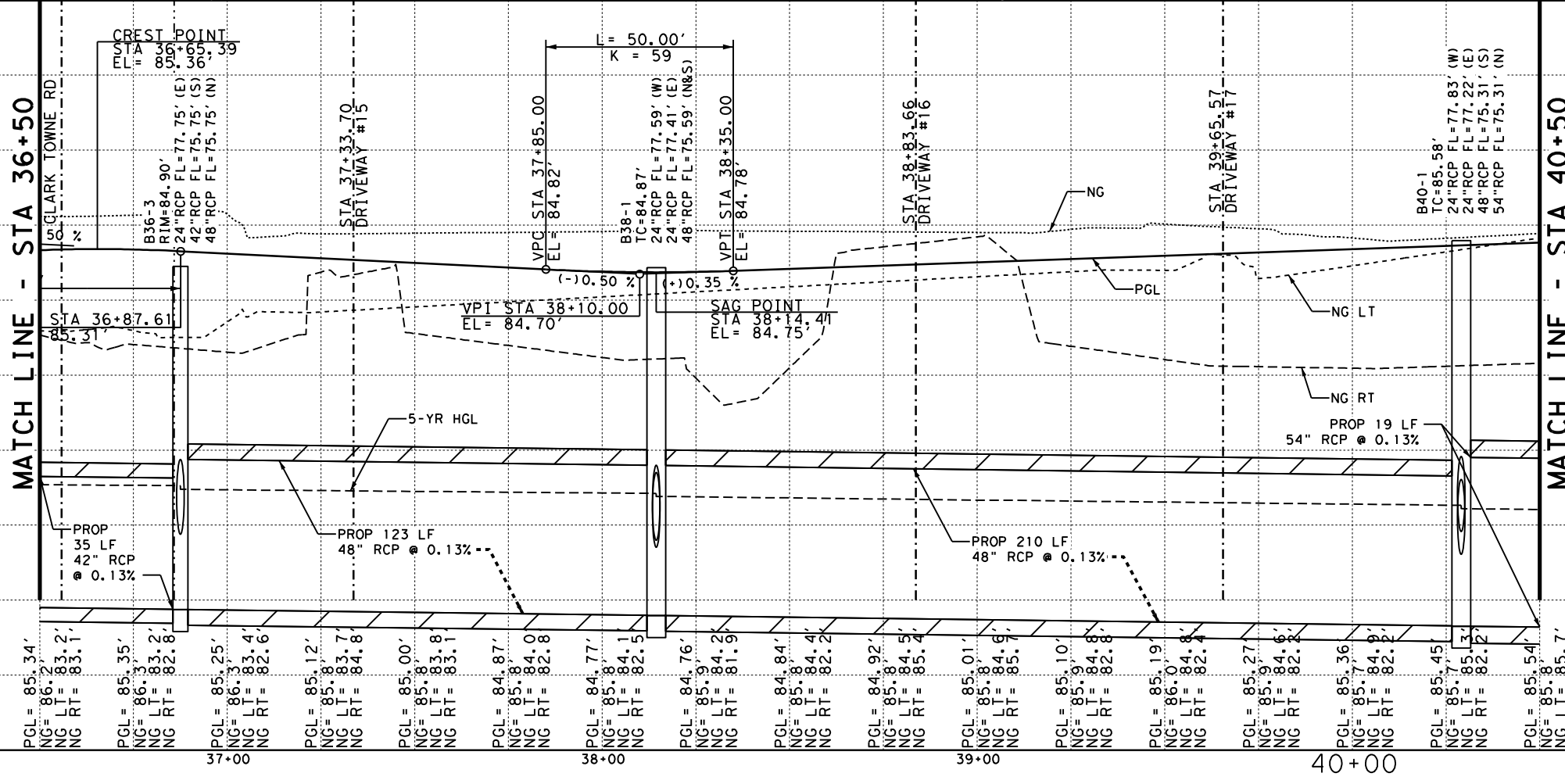
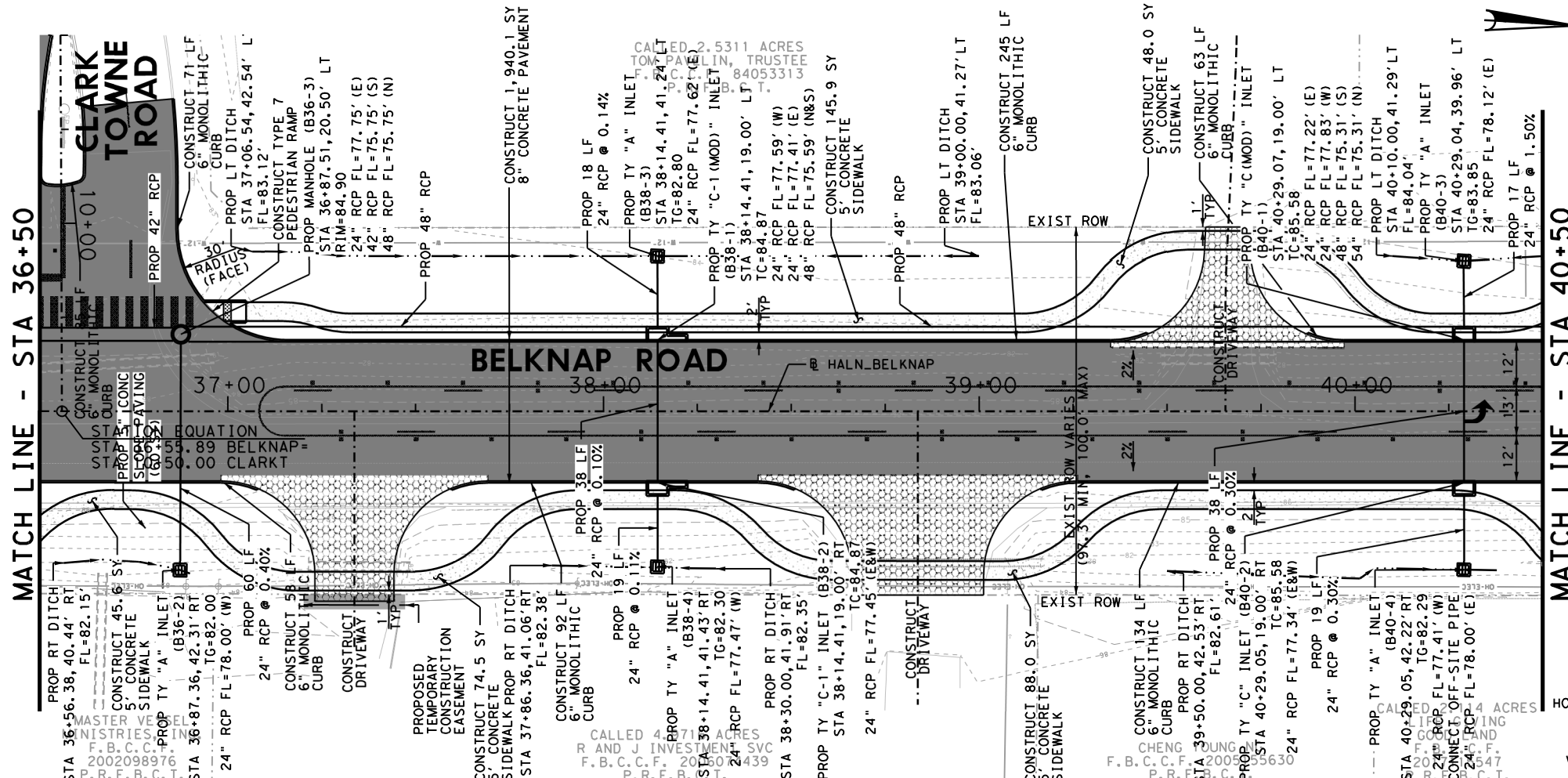
FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

BELKNAP RD PLAN AND PROFILE

SHEET 6 OF 10

CNTY PROJ *	RPS PROJ *	DATE	SCALE	SHEET NO
17-2-11	008169	XXX 2023		108
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RPS	RPS	RPS	RPS	



LEGEND

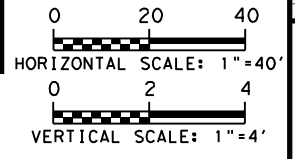
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Texas One Call System
 1-800-DIG-TESS



NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
 RONALD J. THOMAS
 89495
 LICENSED PROFESSIONAL ENGINEER
Ronald J. Thomas
 11-Dec-2023

RPS Texas PE Firm Reg. #F-929
 5810 Tennyson Parkway, Suite 280, Plano, Texas 75024
 T +1 972 202 4242 E usinfrastructure@rpsgroup.com

STATE OF TEXAS
 CURTIS W. WHITE
 113382
 LICENSED PROFESSIONAL ENGINEER
Curtis W. White
 12/11/2023

CivilTech Engineering, Inc. 11821 Telge Road
 Cypress, Texas 77429
 PH: (281) 304-0200 - FX: (281) 304-0210
 Firm Registration No. F-382

FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
 W BELLFORT BLVD TO OAK BEND FOREST DR

BELKNAP RD
 PLAN AND PROFILE

SHEET 7 OF 10

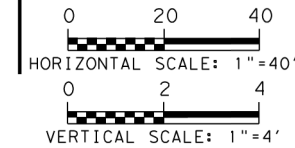
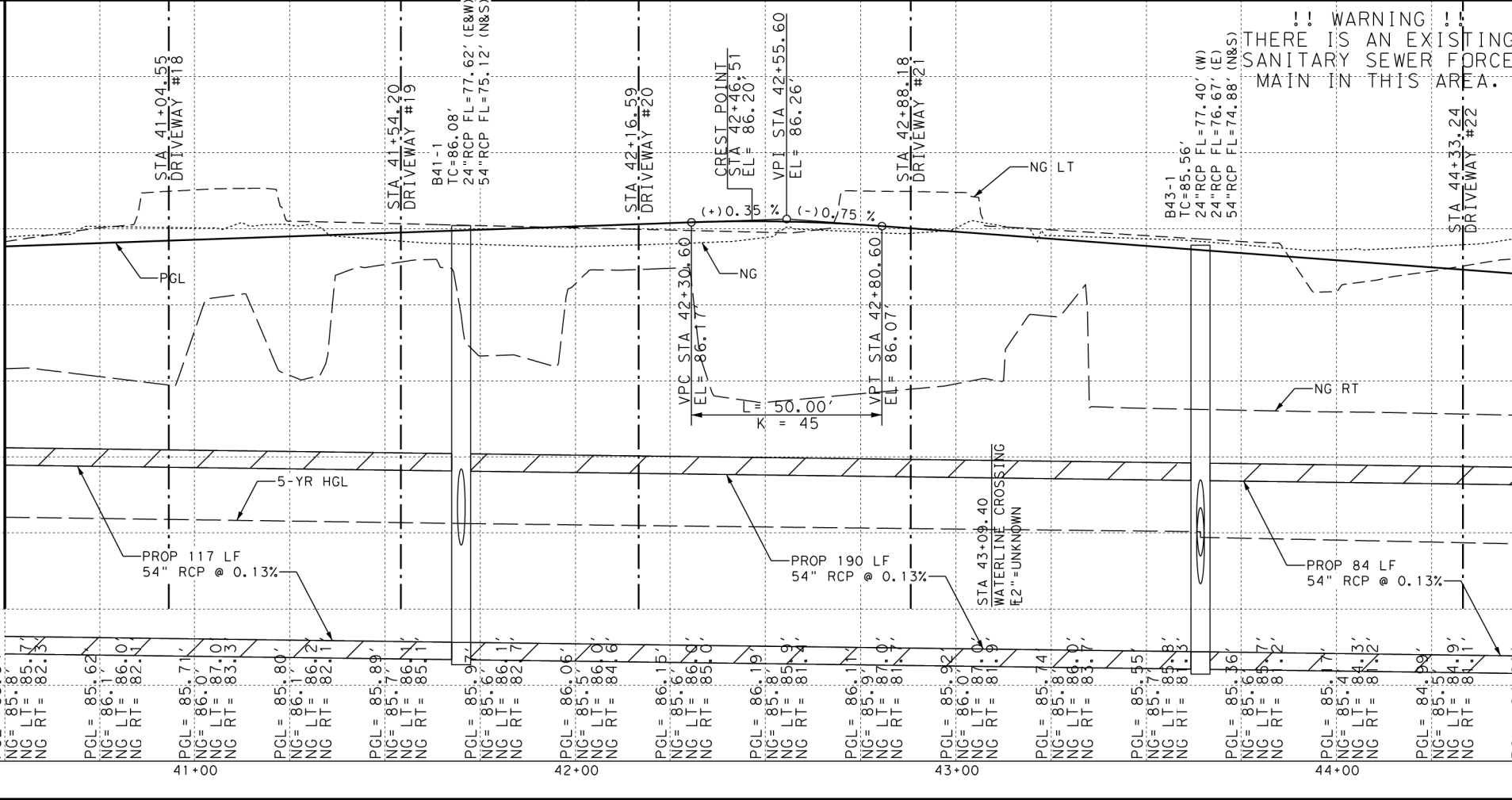
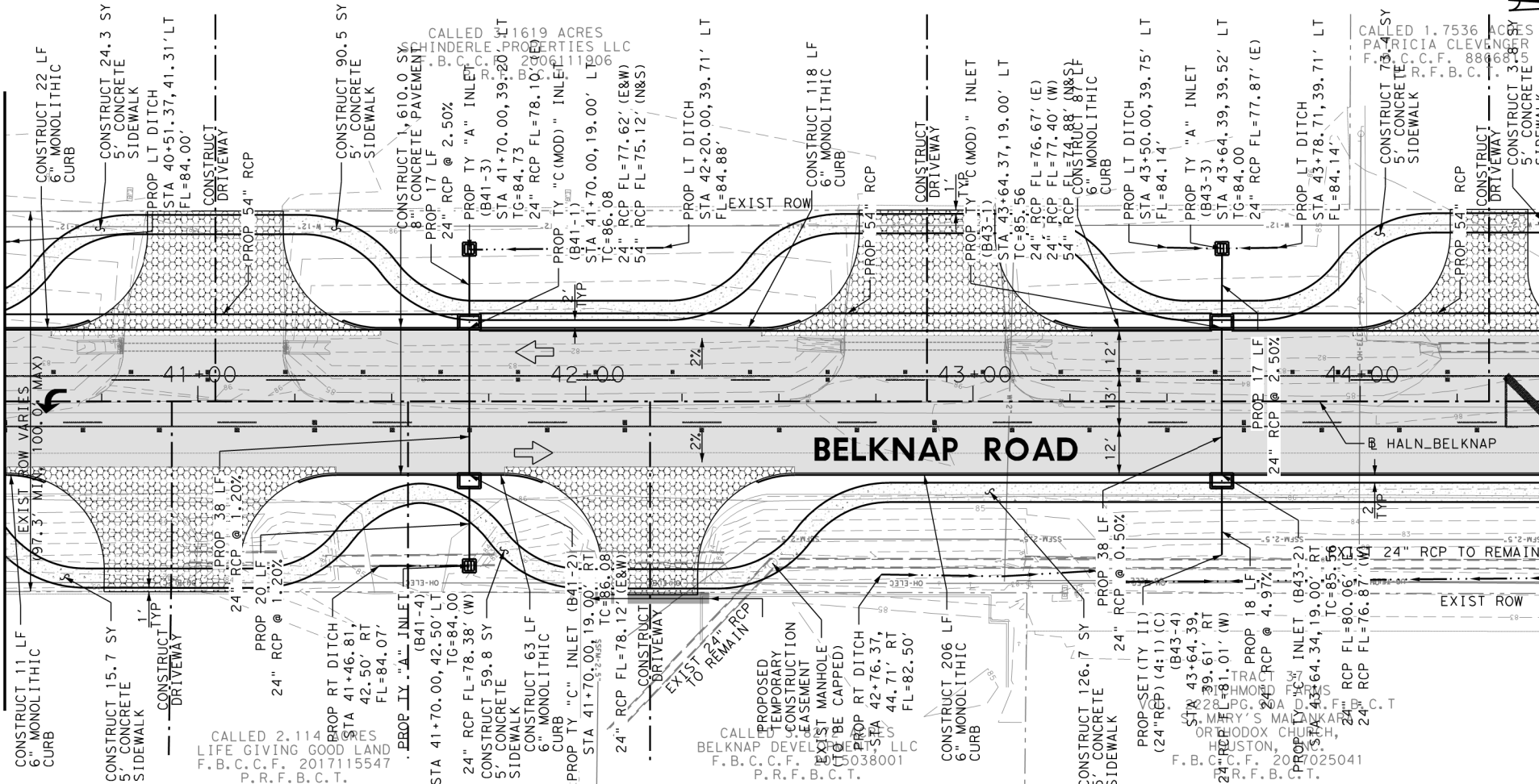
CNTY PROJ *	RPS PROJ *	DATE	SCALE	SHEET NO
17-2-11	008169	XXX 2023		109
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RPS	RPS	RPS	RPS	

MATCH LINE - STA 40+50

MATCH LINE - STA 40+50

MATCH LINE - STA 44+50

MATCH LINE - STA 44+50



LEGEND

	PROP REINFORCED CONC PAVEMENT
	PROP. 4.5" REINFORCED CONC SIDEWALK (5' WIDE)
	PROP 8" REINFORCED CONC DRIVEWAY
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Texas One Call System
1-800-DIG-TESS

NO	DATE	REVISION	APPROVED

STATE OF TEXAS
RONALD J. THOMAS
89495
LICENSED PROFESSIONAL ENGINEER
14-Nov-2023

rps Texas PE Firm Reg. #F-929
5810 Tennyson Parkway, Suite 280, Plano, Texas 75024
T+1 972 202 4242 E usinfrastructure@rpsgroup.com

STATE OF TEXAS
CURTIS W. WHITE
113382
LICENSED PROFESSIONAL ENGINEER
11/15/2023

CivilTech Engineering, Inc. 11821 Telge Road
Cypress, Texas 77429
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Firm Registration No. F-382

FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

BELKNAP RD
PLAN AND PROFILE

SHEET 8 OF 10

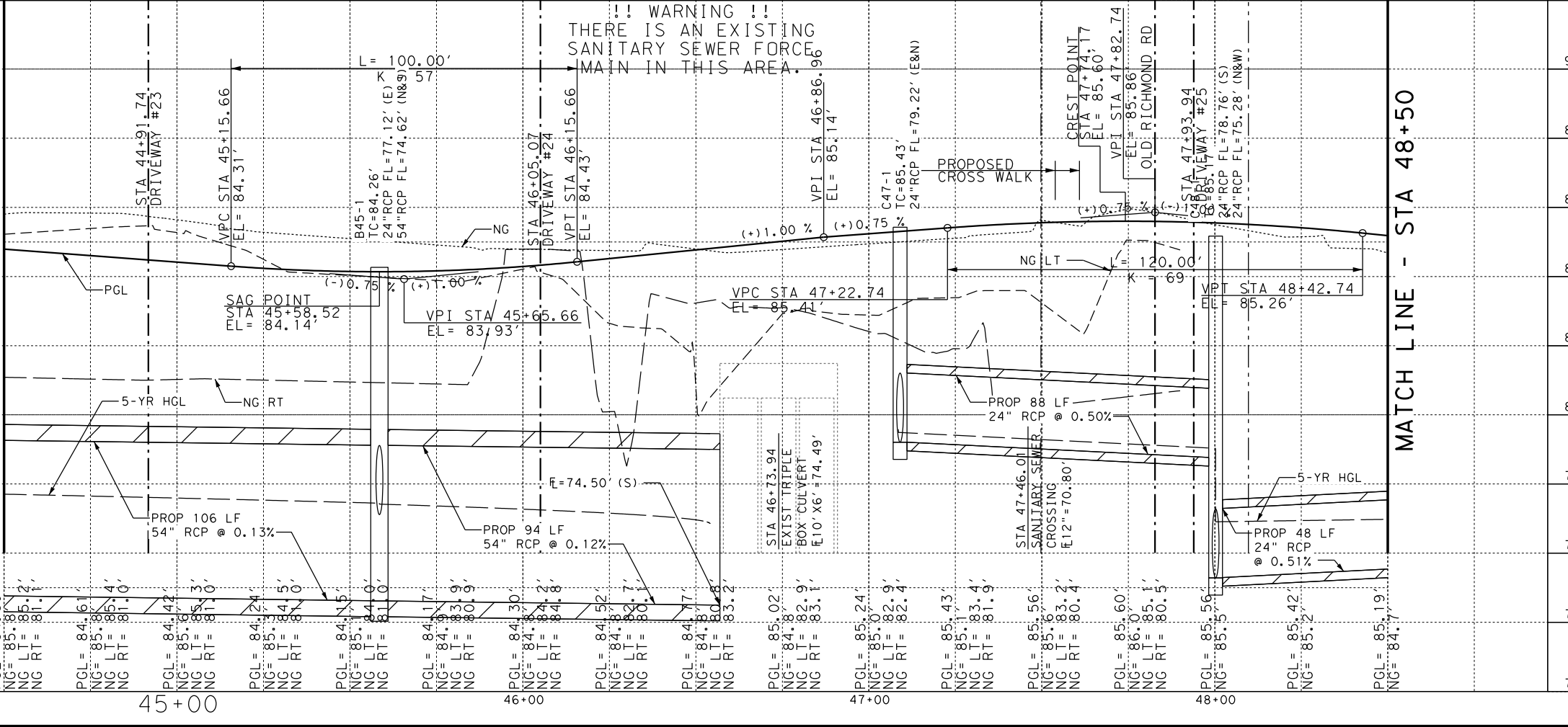
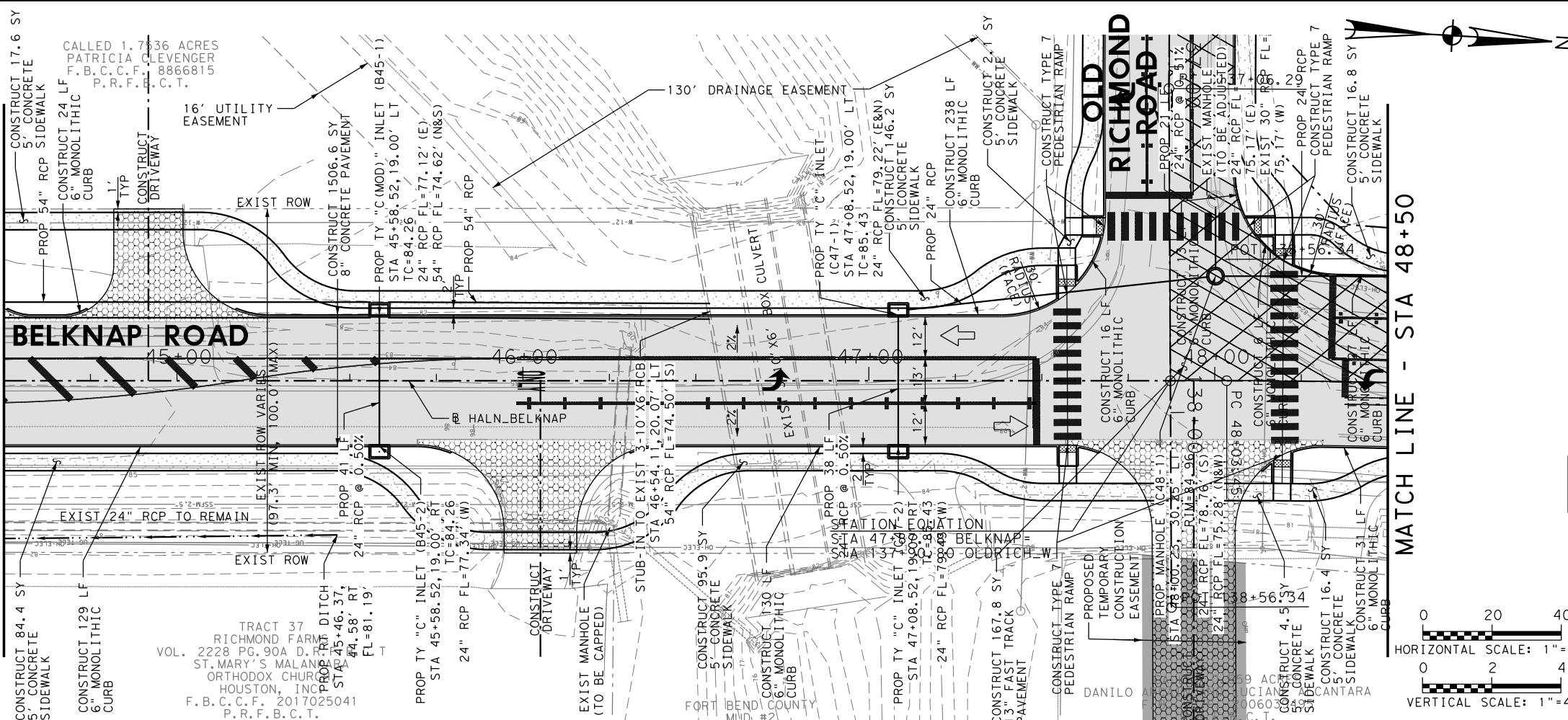
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17-2-11	008169	XXX 2023		110
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RPS	RPS	RPS	RPS	

MATCH LINE - STA 44+50

MATCH LINE - STA 44+50

MATCH LINE - STA 48+50

MATCH LINE - STA 48+50



LEGEND

- PROP REINFORCED CONC PAVEMENT
- PROP. 4.5" REINFORCED CONC SIDEWALK (5' WIDE)
- PROP 8" REINFORCED CONC DRIVEWAY
- PROP CAST-IN PLACE CONC MEDIAN NOSE
- PROPOSED 13" (FAST TRACK)

NOTES:

- SEE GENERAL NOTES SHEETS AND PROJECT NOTES SHEETS FOR ADDITIONAL INFORMATION.
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CAUTION!!!!
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CALL BEFORE YOU DIG!
TEXAS ONE CALL PARTICIPANTS REQUEST 48 HOURS NOTICE BEFORE YOU DIG. DRILL OR BLAST - STOP CALL

Texas One Call System
1-800-DIG-TESS

NO	DATE	REVISION	APPROVED

STATE OF TEXAS
GABRIEL ODREMAN NORIEGA
135069
PROFESSIONAL ENGINEER
02/06/2024

rps
Texas PE Firm Reg. #F-929
5810 Tennyson Parkway, Suite 280, Plano, Texas 75024
T+1 972 202 4242 E usinfrastructure@rpsgroup.com

STATE OF TEXAS
CURTIS W. WHITE
113382
PROFESSIONAL ENGINEER
02/06/2024

CivilTech Engineering, Inc.
11821 Telge Road
Cypress, Texas 77429
PH: (281) 304-0200 - FX: (281) 304-0200
Firm Registration No. F-382

FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

BELKNAP RD
PLAN AND PROFILE

SHEET 9 OF 10

CNTY PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	XXX 2023		111

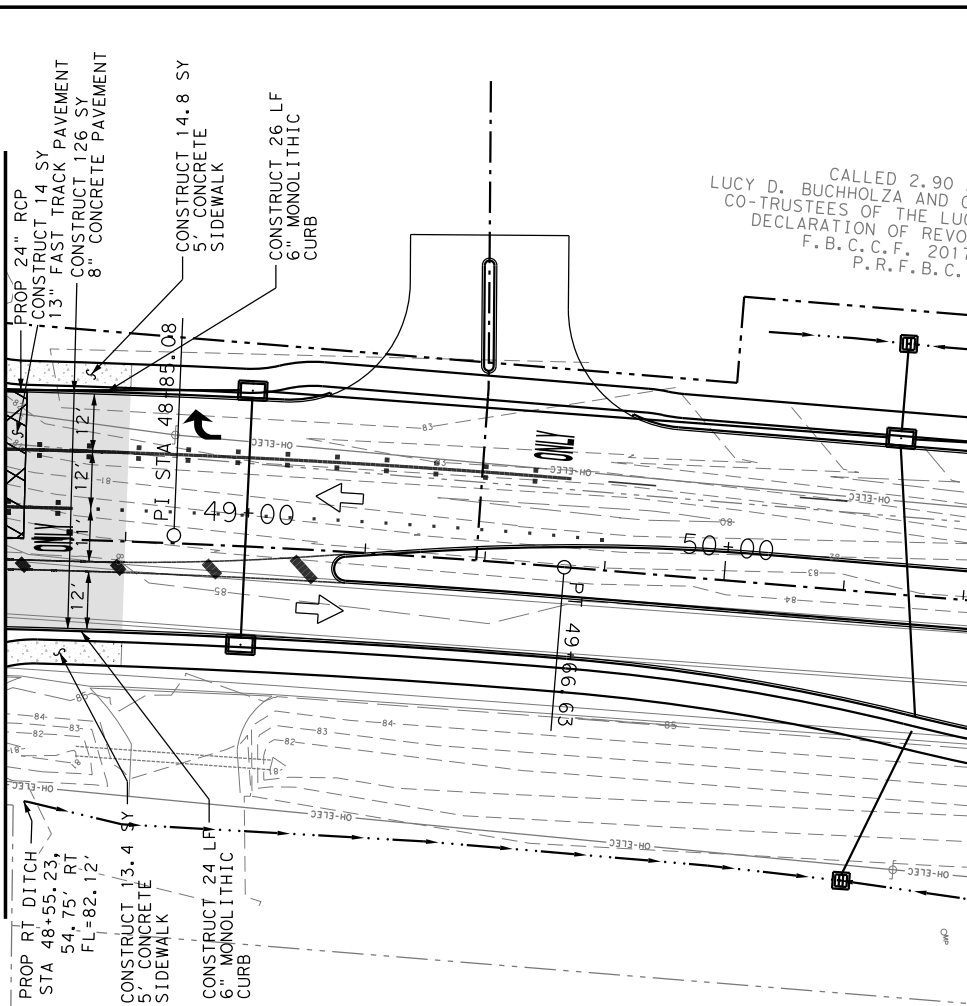
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DRAWN BY: RPS
CHECKED BY: RPS
VERIFIED BY: RPS

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MATCH LINE - STA 48+50

MATCH LINE - STA 48+50



NOTE:
THE SINGLE PGL ENDS AT STA 48+75 HALN_BELKNAP. SEE THE SPLIT PGL SHEETS FOR ADDITIONAL INFORMATION.



LEGEND

- PROP REINFORCED CONC PAVEMENT
- PROP. 4.5" REINFORCED CONC SIDEWALK (5' WIDE)
- PROP 8" REINFORCED CONC DRIVEWAY
- PROP CAST-IN PLACE CONC MEDIAN NOSE
- PROPOSED 13" (FAST TRACK)

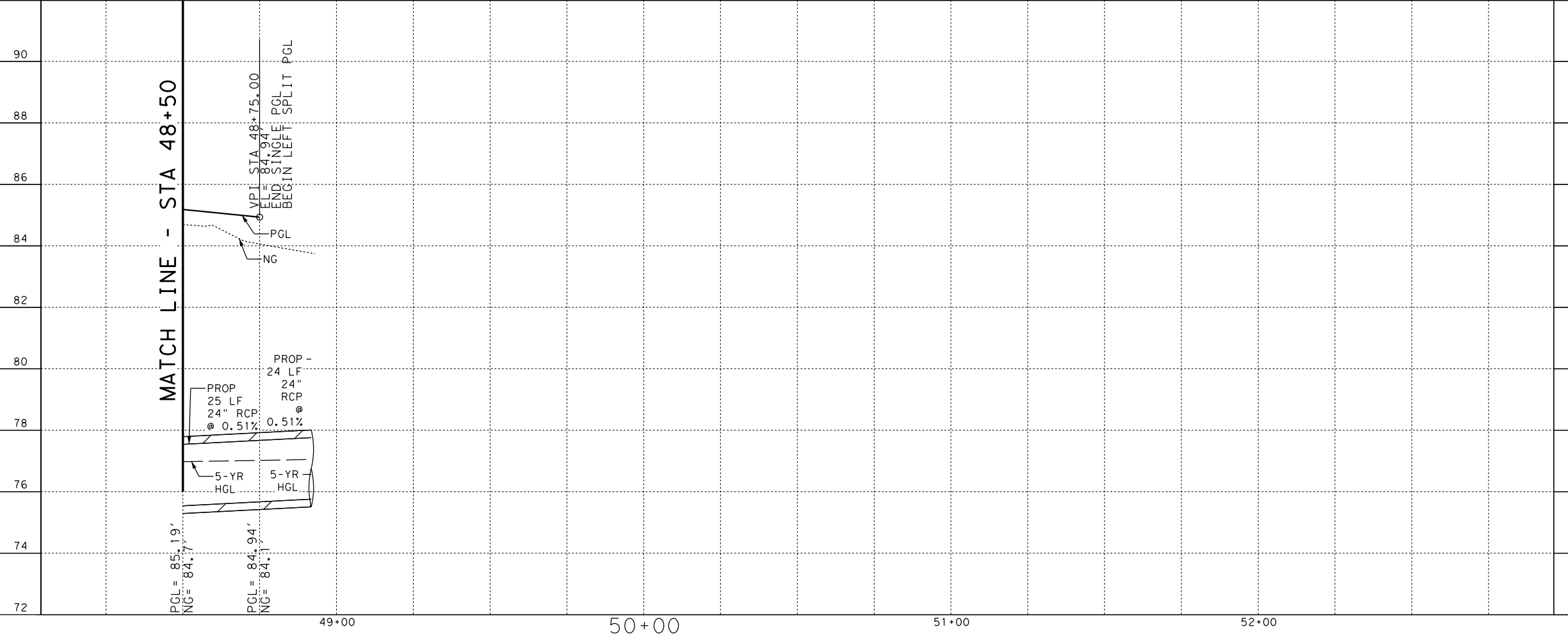
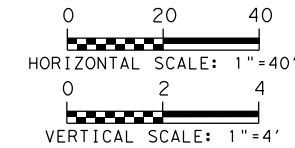
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Texas One Call System
1-800-DIG-TESS



NO	DATE	REVISION	APPROVED

GABRIEL ODREMAN NORIEGA
135069
PROFESSIONAL ENGINEER
02/06/2024

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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

**BELKNAP RD
PLAN AND PROFILE**

CNTY	PROJ *	RPS PROJ *	DATE	SCALE	SHEET NO

DESIGNED BY: RPS DRAWN BY: RPS CHECKED BY: RPS VERIFIED BY: RPS

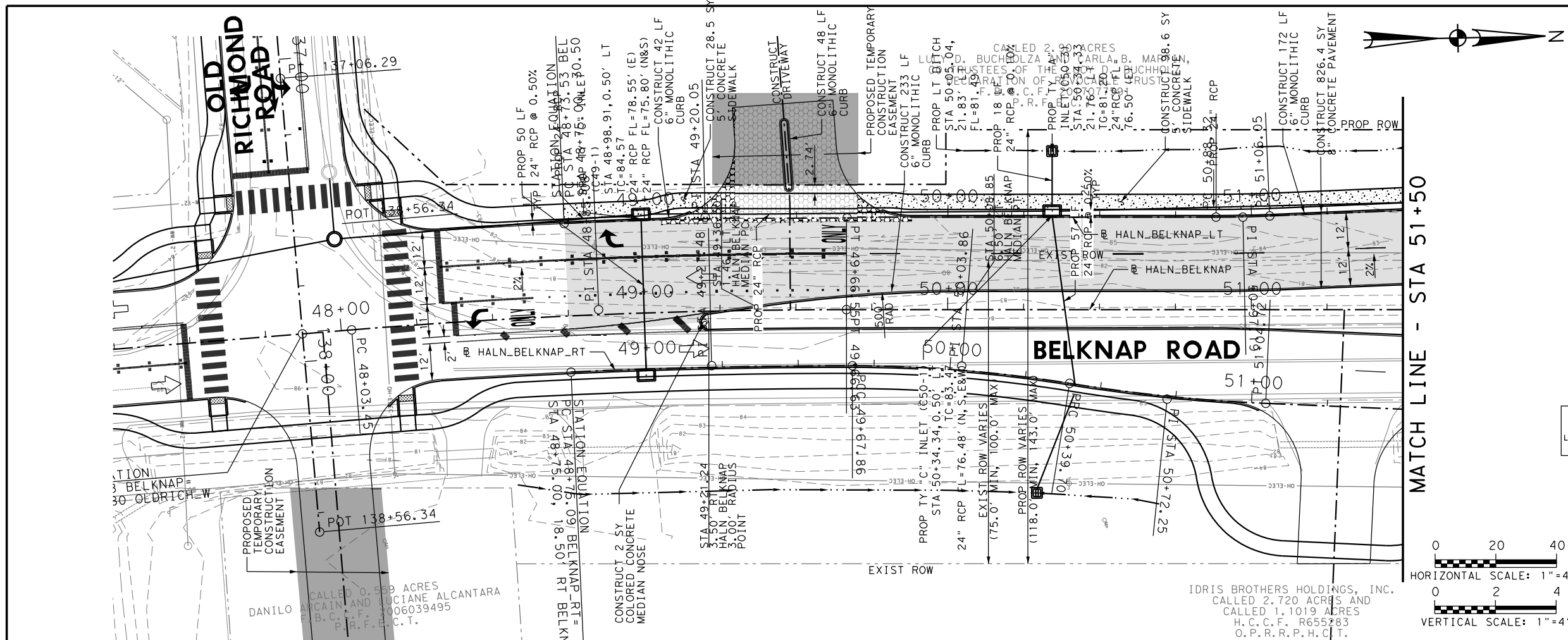
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SHEET 10 OF 10

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LEGEND

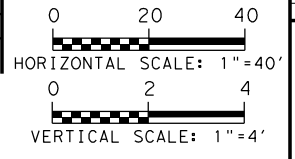
- PROP REINFORCED CONC PAVEMENT
- PROP. 4.5" REINFORCED CONC SIDEWALK (5' WIDE)
- PROP 8" REINFORCED CONC DRIVEWAY
- PROP CAST-IN PLACE CONC MEDIAN NOSE

NOTES:

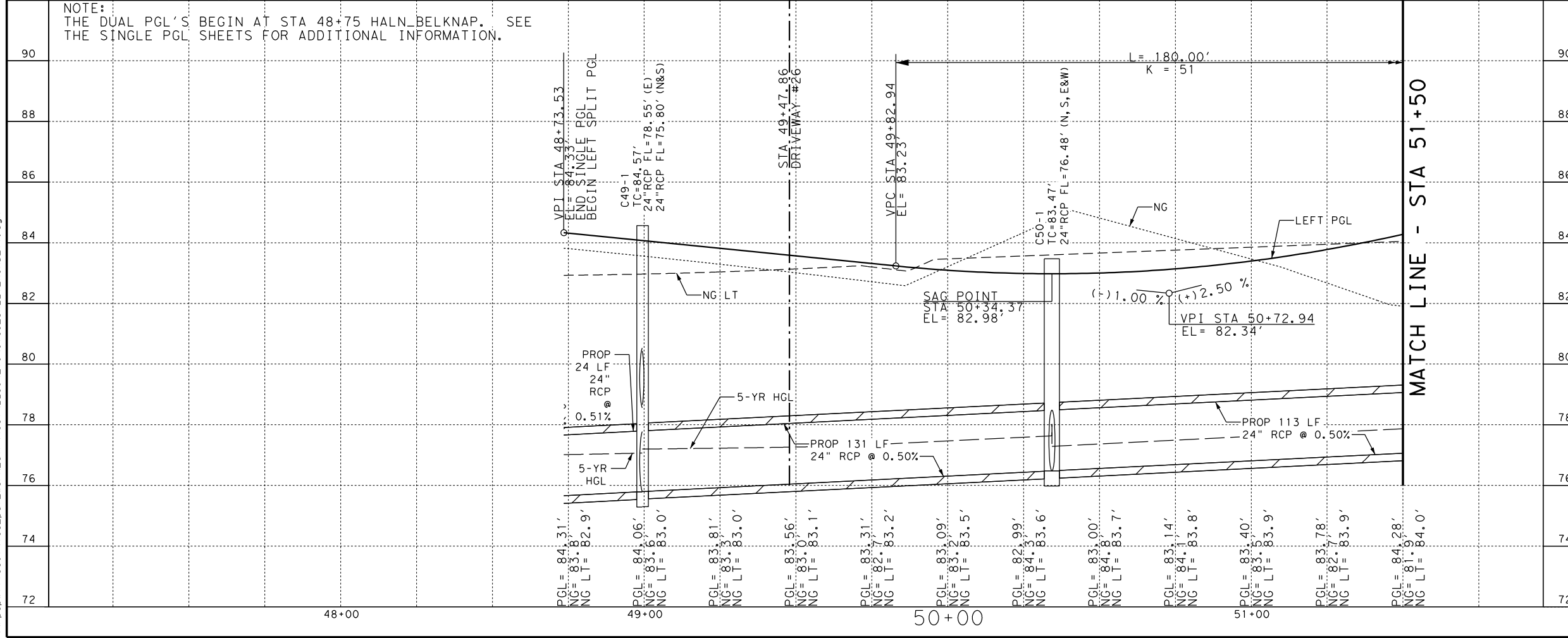
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Texas One Call System
1-800-DIG-TESS



NOTE:
THE DUAL PGL'S BEGIN AT STA 48+75 HALN_BELKNAP. SEE THE SINGLE PGL SHEETS FOR ADDITIONAL INFORMATION.



NO	DATE	REVISION	APPROVED

14-Nov-2023

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5810 Tennyson Parkway, Suite 280, Plano, Texas 75024
T +1 972 202 4242 E usinfrastructure@rpsgroup.com

11/15/2023

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PH: (281) 304-0200 - FX: (281) 304-0200
Firm Registration No. F-382

FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

BELKNAP RD LEFT PLAN AND PROFILE

SHEET 1 OF 4

CNTY PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	XXX 2023		113

DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY
RPS	RPS	RPS	RPS

rpsdw11cs01\$

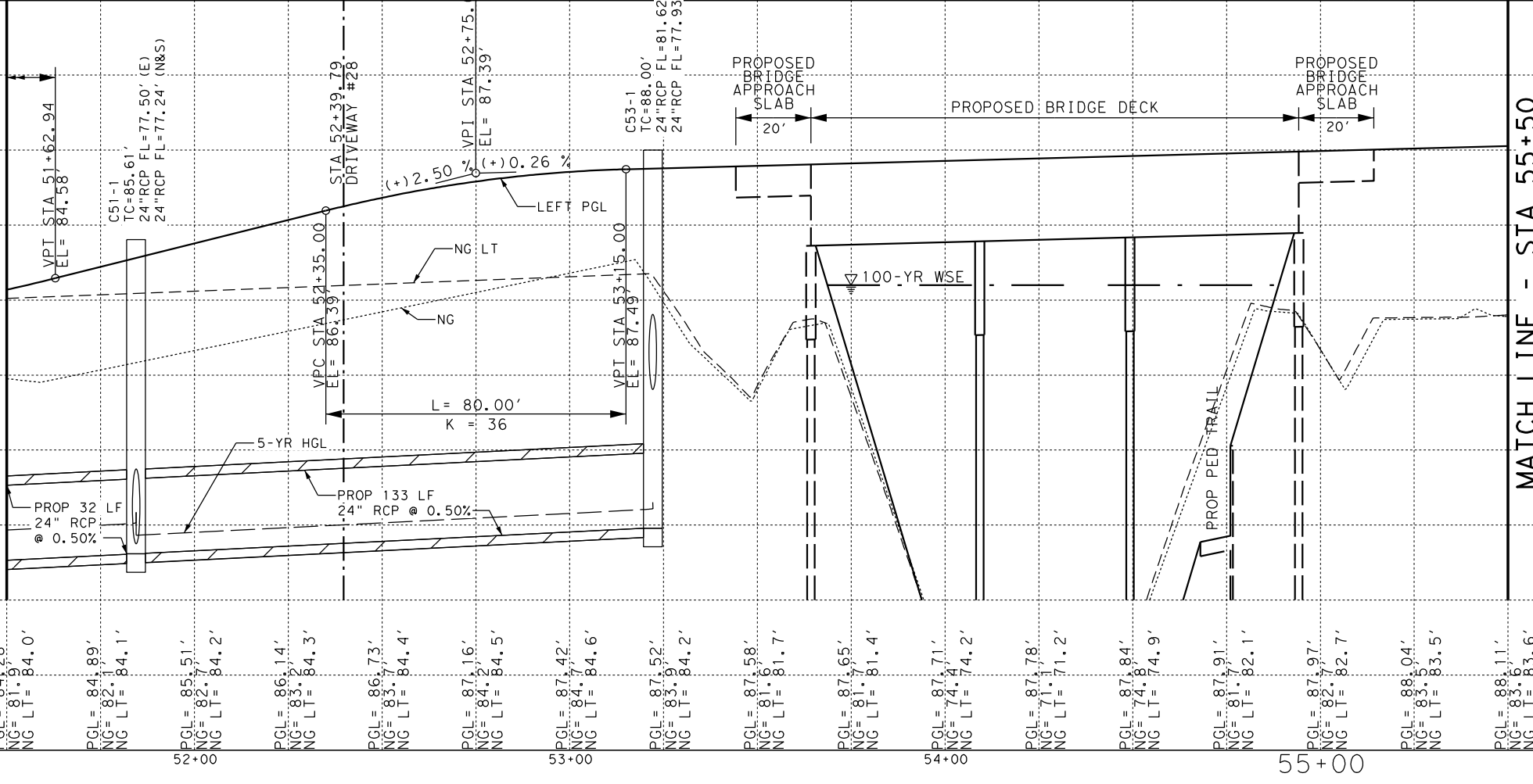
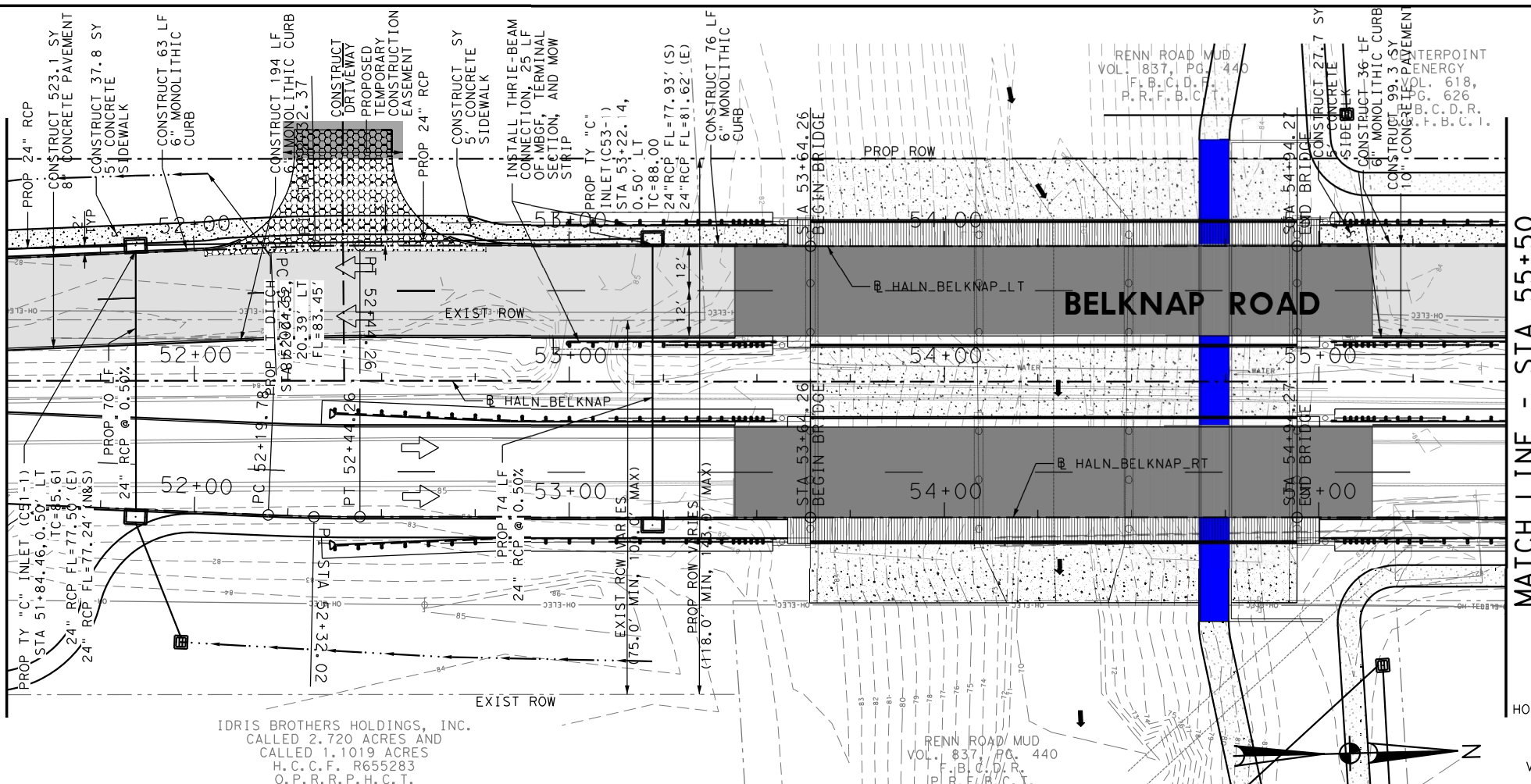
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MATCH LINE - STA 51+50

MATCH LINE - STA 51+50

MATCH LINE - STA 55+50

MATCH LINE - STA 55+50



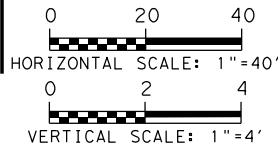
- LEGEND**
- PROP REINFORCED CONC PAVEMENT
 - PROP. 4.5" REINFORCED CONC SIDEWALK (5' WIDE)
 - PROP 8" REINFORCED CONC DRIVEWAY
 - PROP CAST-IN PLACE CONC MEDIAN NOSE

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Texas One Call System
1-800-DIG-TESS



NO.	DATE	REVISION	APPROVED

14-Nov-2023

RPS Texas PE Firm Reg. #F-929
5810 Tennyson Parkway, Suite 280, Plano, Texas 75024
T+1 972 202 4242 E usinfrastructure@rpsgroup.com

11/15/2023

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Cypress, Texas 77429
PH: (281) 304-0200 - FX: (281) 304-0200
Firm Registration No. F-382

FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

BELKNAP RD LEFT PLAN AND PROFILE

SHEET 2 OF 4

CNTY PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	XXX 2023		114
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RPS	RPS	RPS	RPS	

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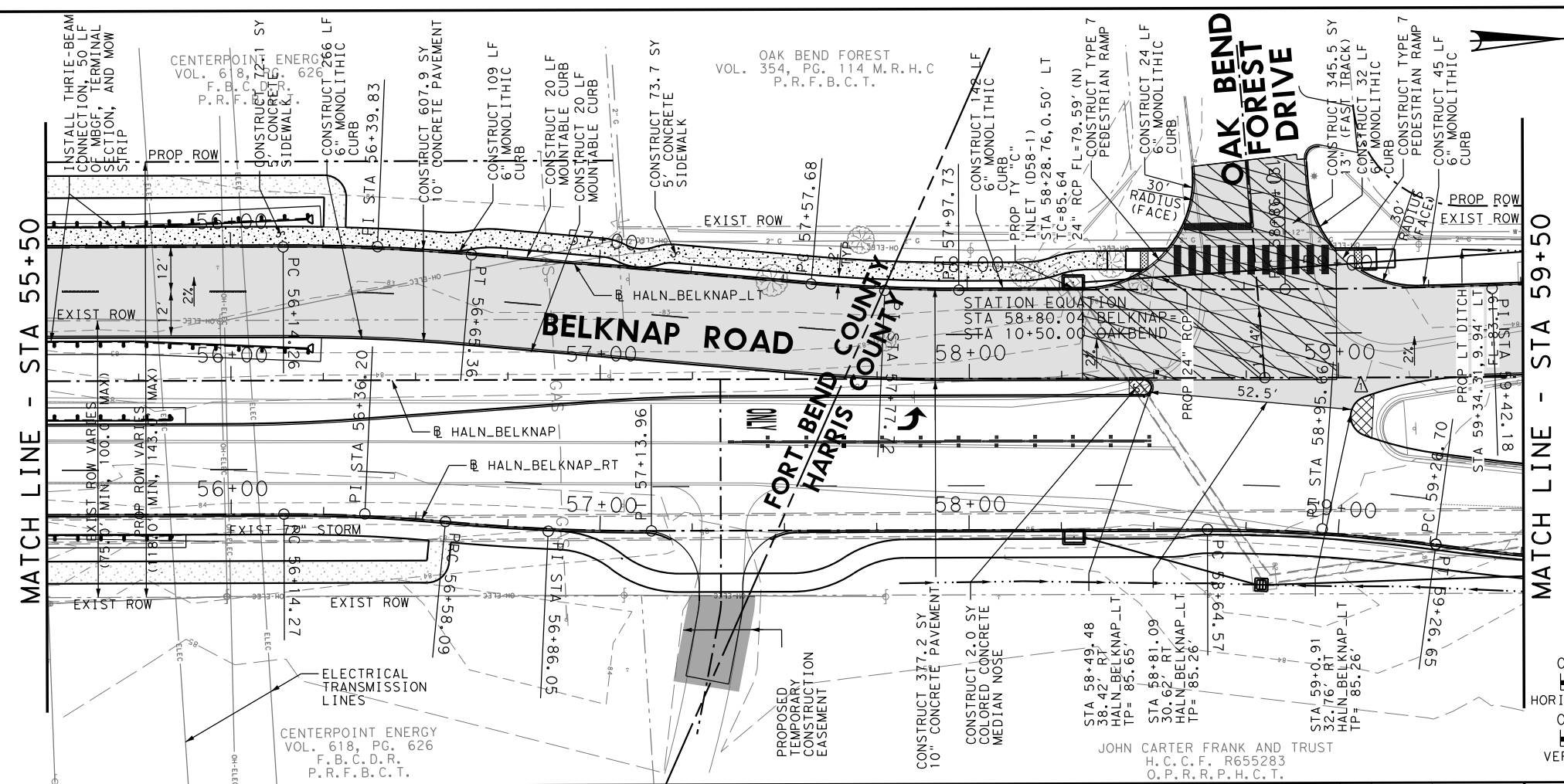
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MATCH LINE - STA 55+50

MATCH LINE - STA 55+50

MATCH LINE - STA 59+50

MATCH LINE - STA 59+50



LEGEND

- PROP REINFORCED CONC PAVEMENT
- PROP. 4.5" REINFORCED CONC SIDEWALK (5' WIDE)
- PROP 8" REINFORCED CONC DRIVEWAY
- PROP CAST-IN PLACE CONC MEDIAN NOSE
- PROPOSED 13" (FAST TRACK)

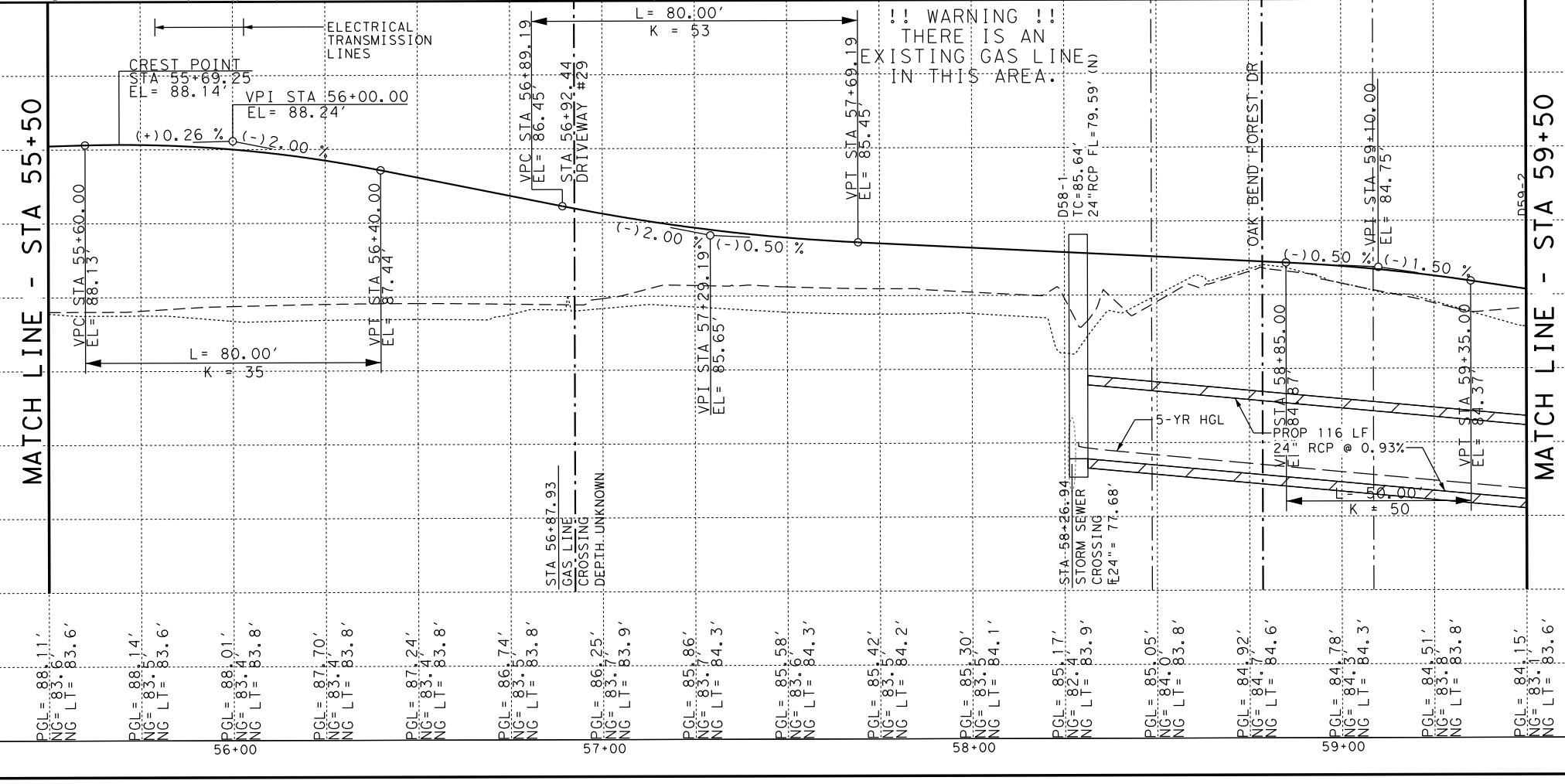
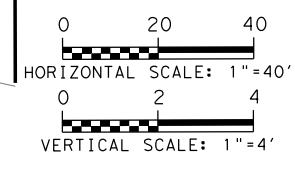
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CAUTION!!!!
OVERHEAD ELECTRIC, LOCATIONS ARE APPROXIMATE

Texas One Call System
1-800-DIG-TESS

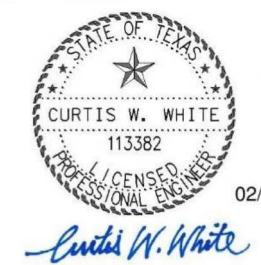


NO.	DATE	REVISION	APPROVED



02/06/2024

rps Texas PE Firm Reg. #F-929
5810 Tennyson Parkway, Suite 280, Plano, Texas 75024
T+1 972 202 4242 E usinfrastructure@rpsgroup.com



02/06/2024

CivilTech Engineering, Inc. 11821 Telge Road
Cypress, Texas 77429
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Firm Registration No. F-382

FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

BELKNAP RD LEFT
PLAN AND PROFILE

CNTY	PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	XXX 2023			115
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY		
RPS	RPS	RPS	RPS		

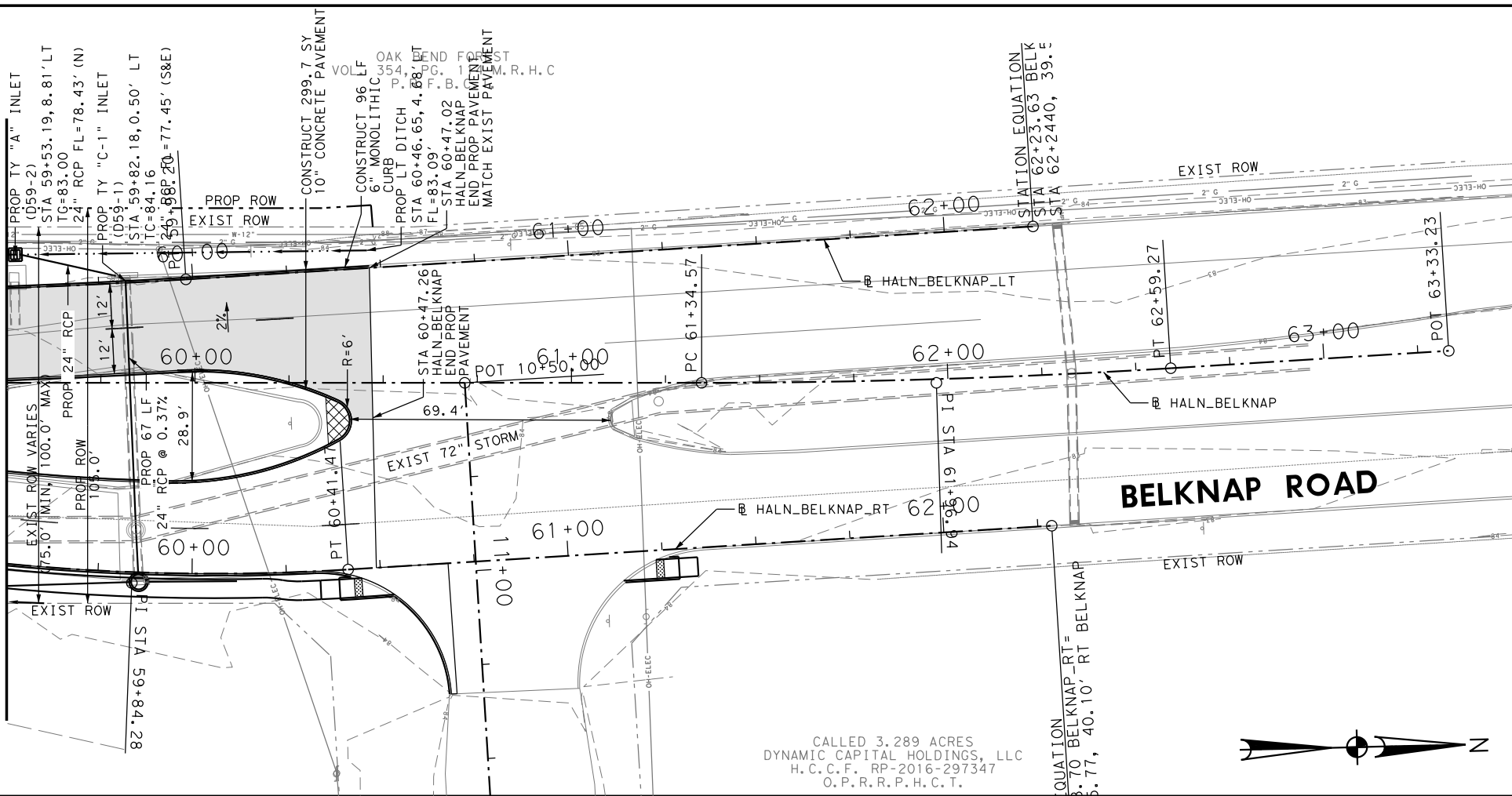
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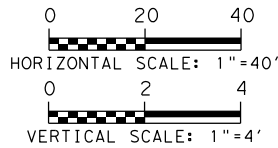
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MATCH LINE - STA 59+50

MATCH LINE - STA 59+50



CALLED 3.289 ACRES
 DYNAMIC CAPITAL HOLDINGS, LLC
 H. C. C. F. RP-2016-297347
 O. P. R. P. H. C. T.



LEGEND

- PROP REINFORCED CONC PAVEMENT
- PROP. 4.5" REINFORCED CONC SIDEWALK (5' WIDE)
- PROP 8" REINFORCED CONC DRIVEWAY
- PROP CAST-IN PLACE CONC MEDIAN NOSE
- PROPOSED 13" (FAST TRACK)

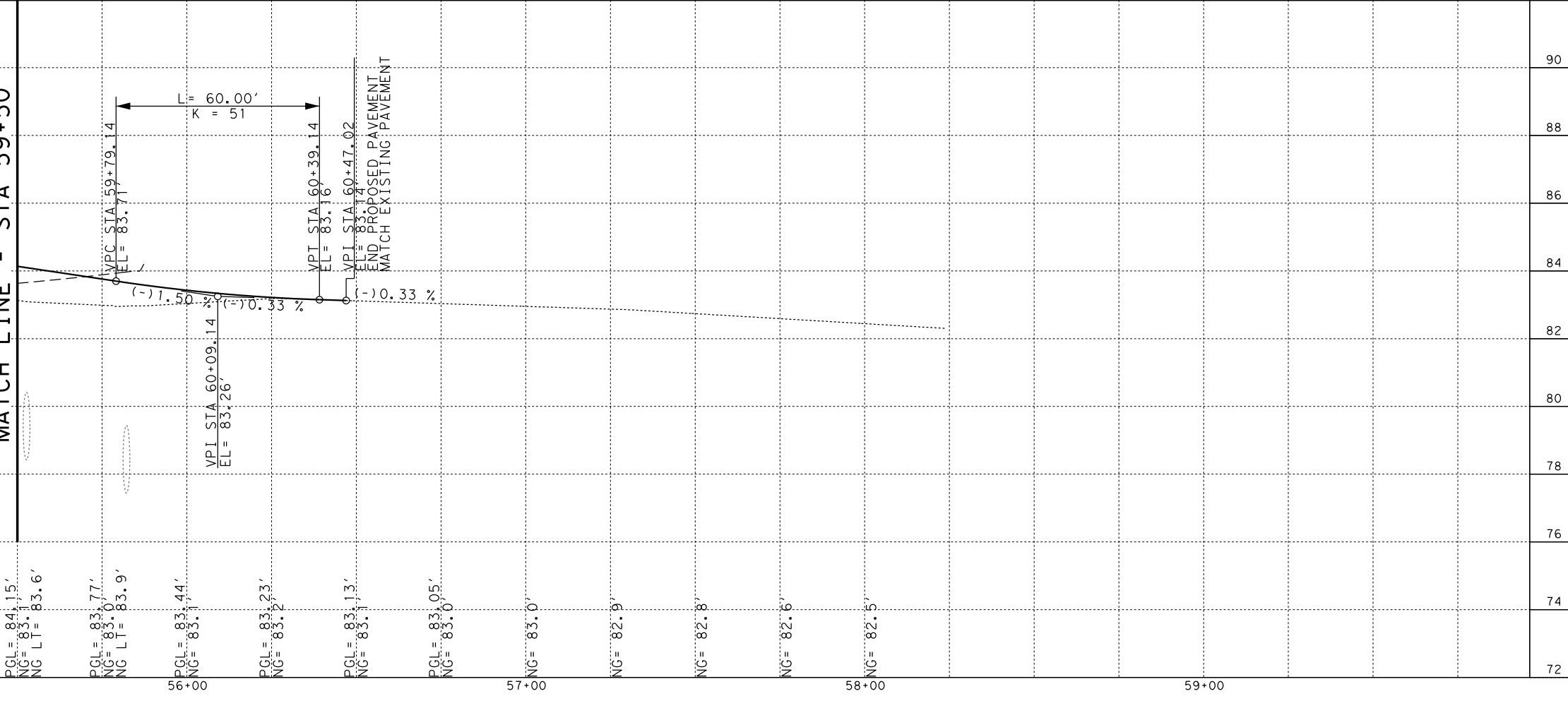
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Texas One Call System
 1-800-DIG-TESS



NO	DATE	REVISION	APPROVED

STATE OF TEXAS
 GABRIEL ODREMAN NORIEGA
 135069
 LICENSED PROFESSIONAL ENGINEER
 02/06/2024

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STATE OF TEXAS
 CURTIS W. WHITE
 113382
 LICENSED PROFESSIONAL ENGINEER
 02/06/2024

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 Firm Registration No. F-382

FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
 W BELLFORT BLVD TO OAK BEND FOREST DR

BELKNAP RD LEFT PLAN AND PROFILE

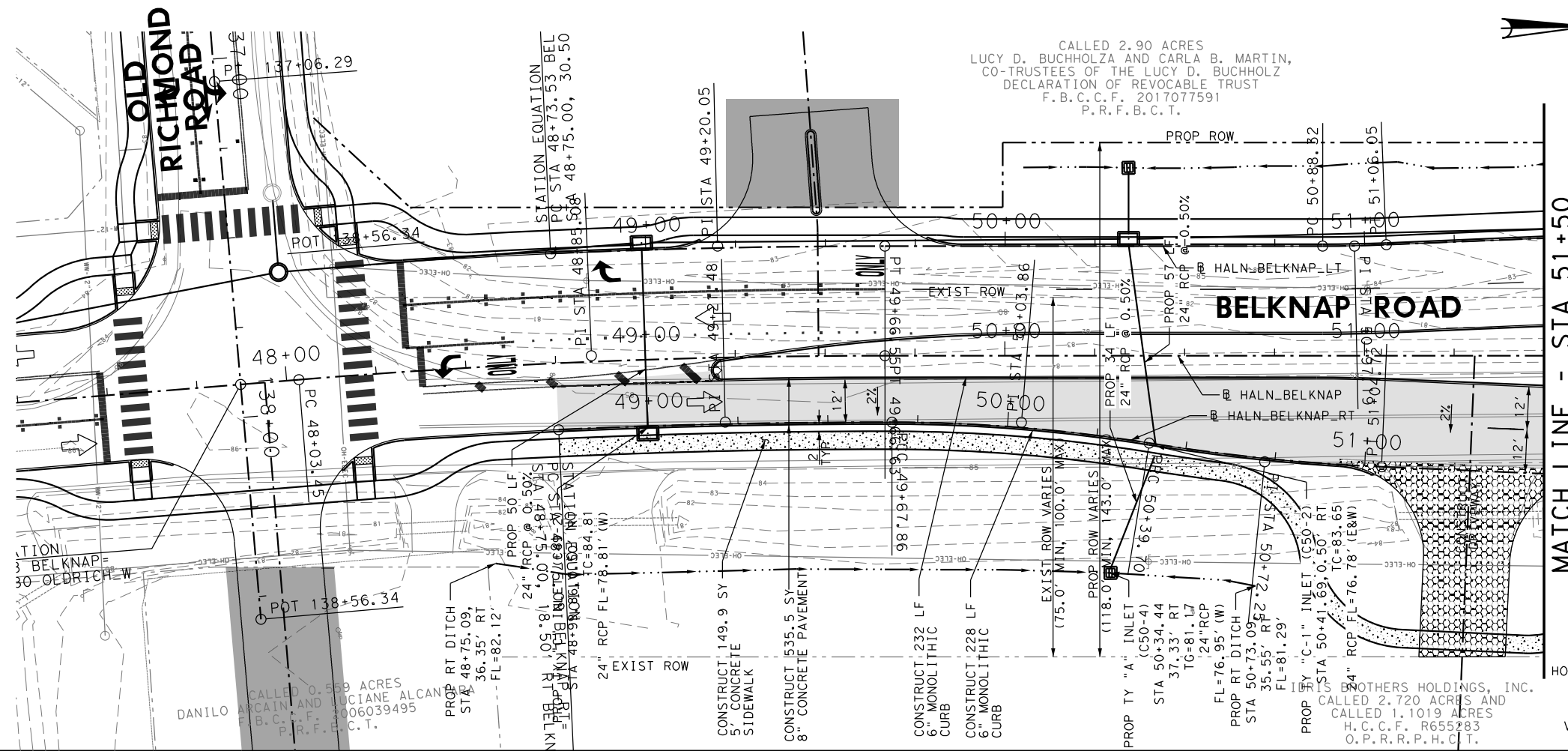
SHEET 4 OF 4

CNTY PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	XXX 2023		116

DESIGNED BY: RPS DRAWN BY: RPS CHECKED BY: RPS VERIFIED BY: RPS

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LEGEND

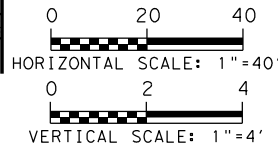
- PROP REINFORCED CONC PAVEMENT
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- PROP CAST-IN PLACE CONC MEDIAN NOSE

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1-800-DIG-TESS



NOTE:
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NO.	DATE	REVISION	APPROVED



14-Nov-2023



Texas PE Firm Reg. #F-929

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T +1 972 202 4242 E usinfrastructure@rpsgroup.com



11/15/2023



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PH: (281) 304-0200 - FX: (281) 304-0200
Firm Registration No. F-382

FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

BELKNAP RD RIGHT PLAN AND PROFILE

SHEET 1 OF 4

CNTY PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	XXX 2023		117
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RPS	RPS	RPS	RPS	

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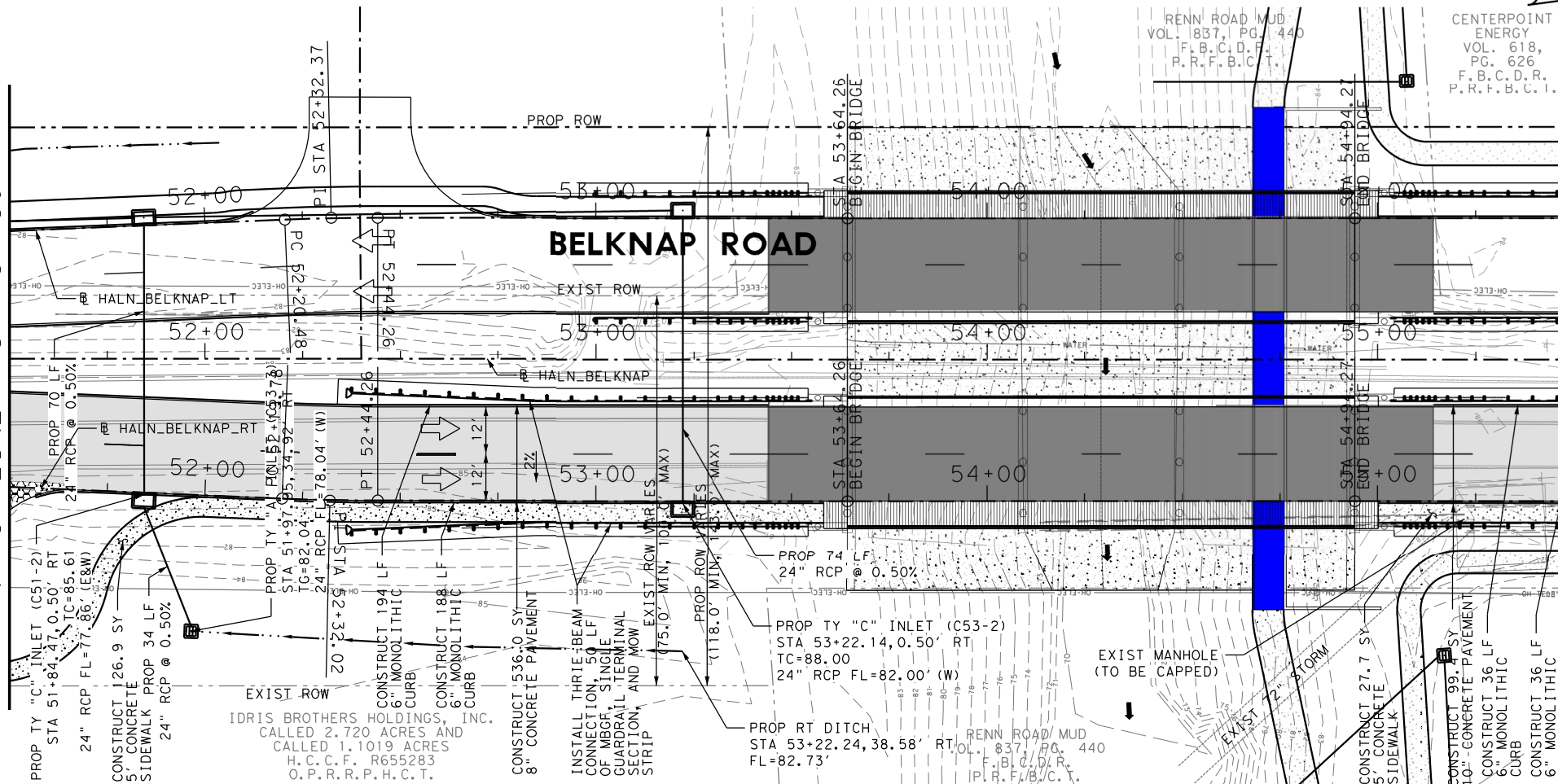
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MATCH LINE - STA 51+50

MATCH LINE - STA 51+50

MATCH LINE - STA 55+50

MATCH LINE - STA 55+50



LEGEND

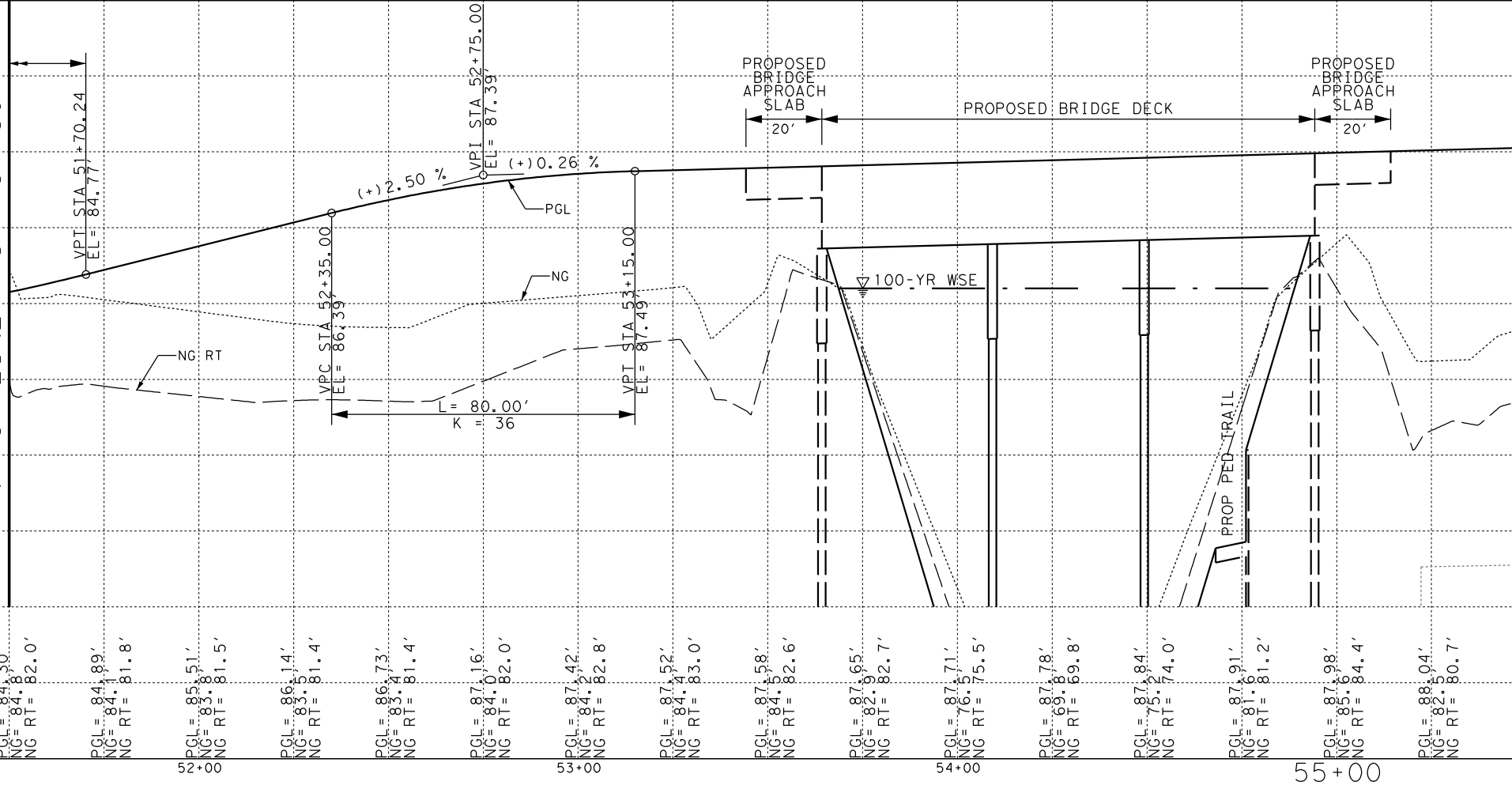
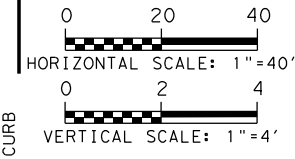
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	PROP. 4.5" REINFORCED CONC SIDEWALK (5' WIDE)
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	PROP CAST-IN PLACE CONC MEDIAN NOSE

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Texas One Call System
1-800-DIG-TESS



NO	DATE	REVISION	APPROVED

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RPS Texas PE Firm Reg. #F-929
5810 Tennyson Parkway, Suite 280, Plano, Texas 75024
T+1 972 202 4242 E usinfrastructure@rpsgroup.com

11/15/2023

CivilTech Engineering, Inc. 11821 Telge Road
Cypress, Texas 77429
PH: (281) 304-0200 - FX: (281) 304-0200
Firm Registration No. F-382

FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

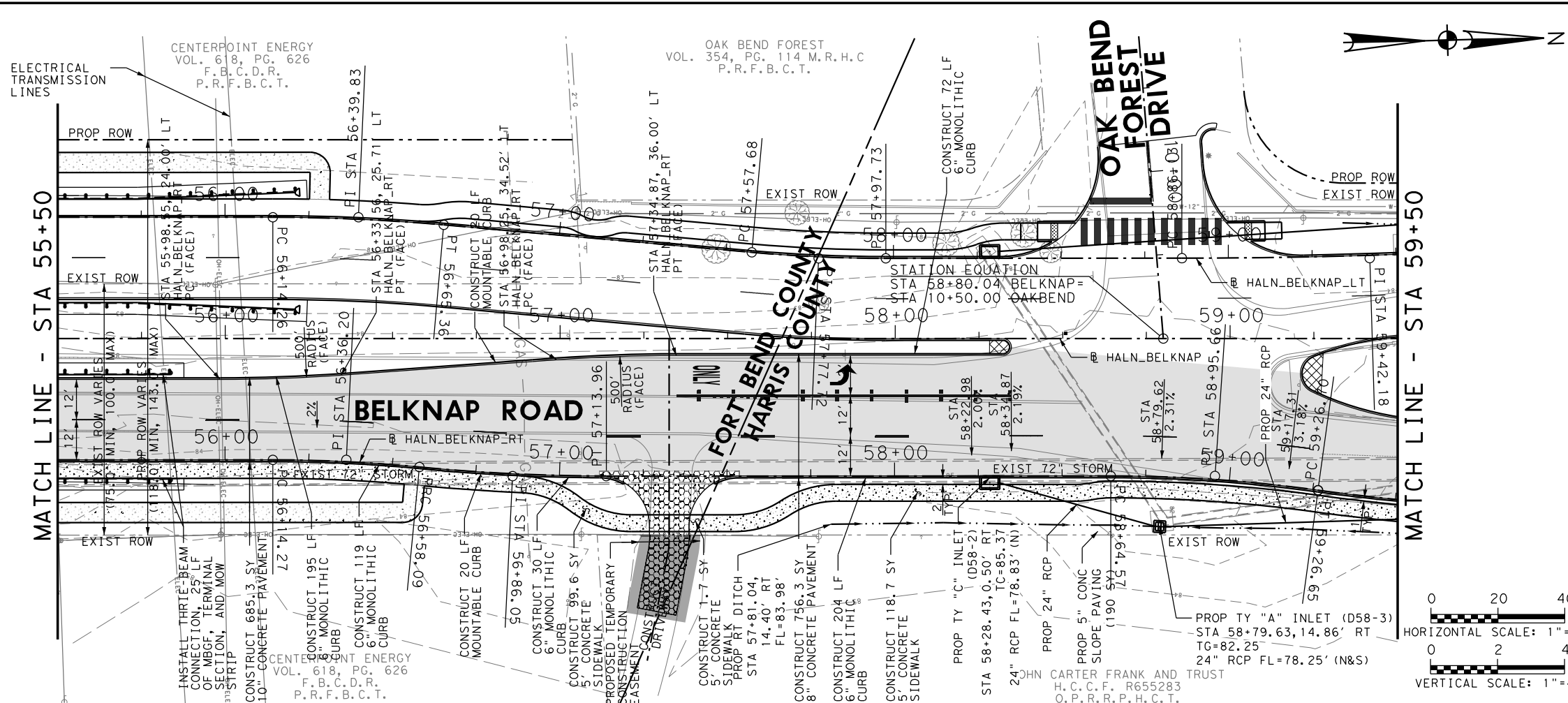
BELKNAP RD RIGHT PLAN AND PROFILE

SHEET 2 OF 4

CNTY PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	XXX 2023		118
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RPS	RPS	RPS	RPS	

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LEGEND

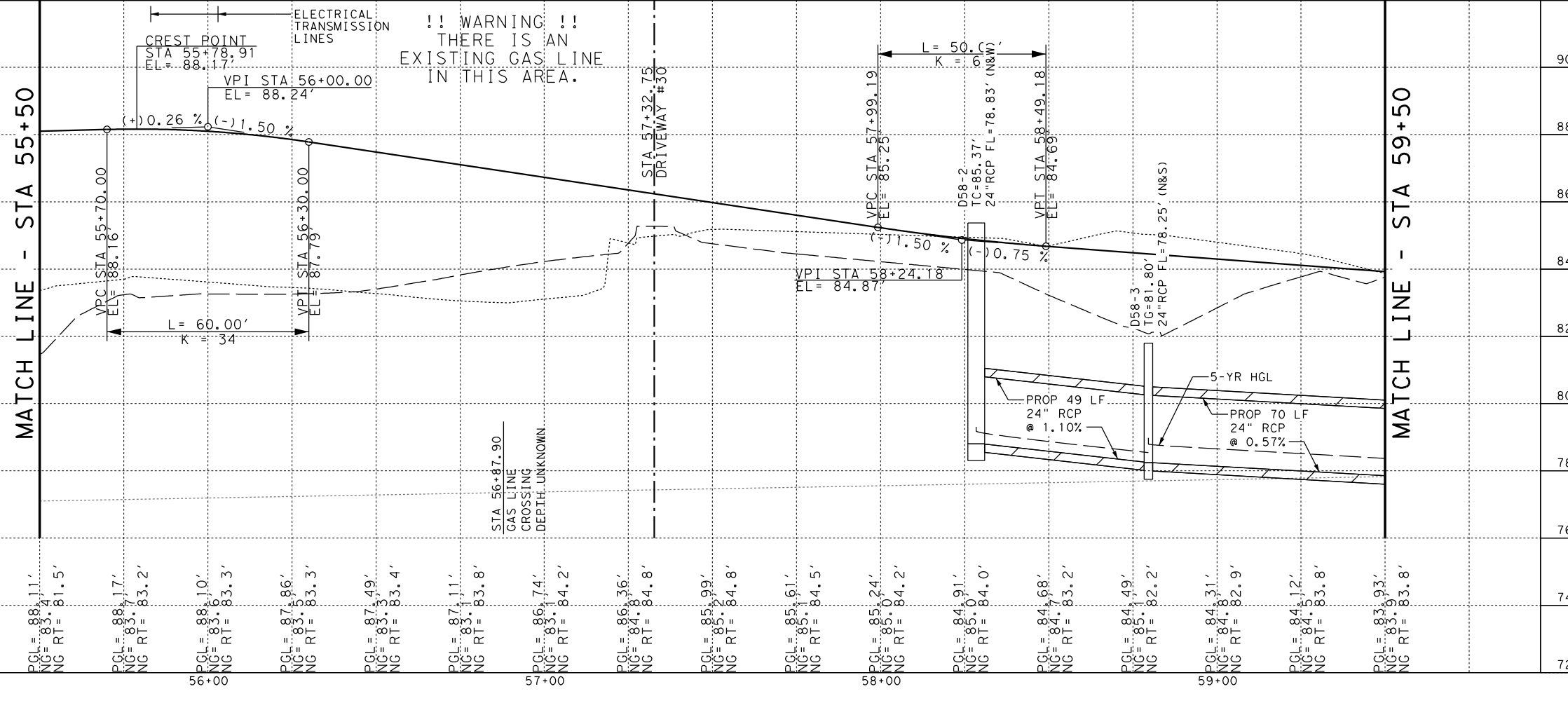
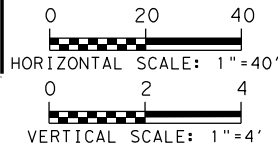
- PROP REINFORCED CONC PAVEMENT
- PROP. 4.5" REINFORCED CONC SIDEWALK (5' WIDE)
- PROP 8" REINFORCED CONC DRIVEWAY
- PROP CAST-IN PLACE CONC MEDIAN NOSE

NOTES:

1. SEE GENERAL NOTES AND PROJECT NOTES SHEETS FOR ADDITIONAL INFORMATION.
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CAUTION!!!!
OVERHEAD ELECTRIC LOCATIONS ARE APPROXIMATE

CALL BEFORE YOU DIG!
TEXAS ONE CALL PARTICIPANTS REQUEST 48 HOURS NOTICE BEFORE YOU DIG, DRILL OR BLAST - STOP CALL
Texas One Call System
1-800-DIG-TESS



NO.	DATE	REVISION	APPROVED

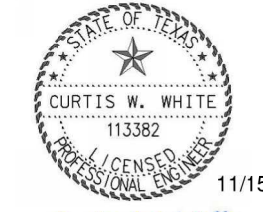


14-Nov-2023



Texas PE Firm Reg. #F-929

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T +1 972 202 4242 E usinfrastructure@rpsgroup.com



11/15/2023

Curtis W. White

CivilTech Engineering, Inc.
11821 Telge Road
Cypress, Texas 77429
PH: (281) 304-0200 - FX: (281) 304-0200
Firm Registration No. F-382

FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

BELKNAP RD RIGHT
PLAN AND PROFILE

CNTY PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	XXX 2023		119
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RPS	RPS	RPS	RPS	

SHEET 3 OF 4

OAK BEND FOREST
 VOL. 354, PG. 114 M.R.H.C
 P.R.F.B.C.T.

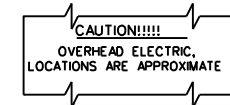


LEGEND

- PROP REINFORCED CONC PAVEMENT
- PROP. 4.5" REINFORCED CONC SIDEWALK (5' WIDE)
- PROP 8" REINFORCED CONC DRIVEWAY
- PROP CAST-IN PLACE CONC MEDIAN NOSE

NOTES:

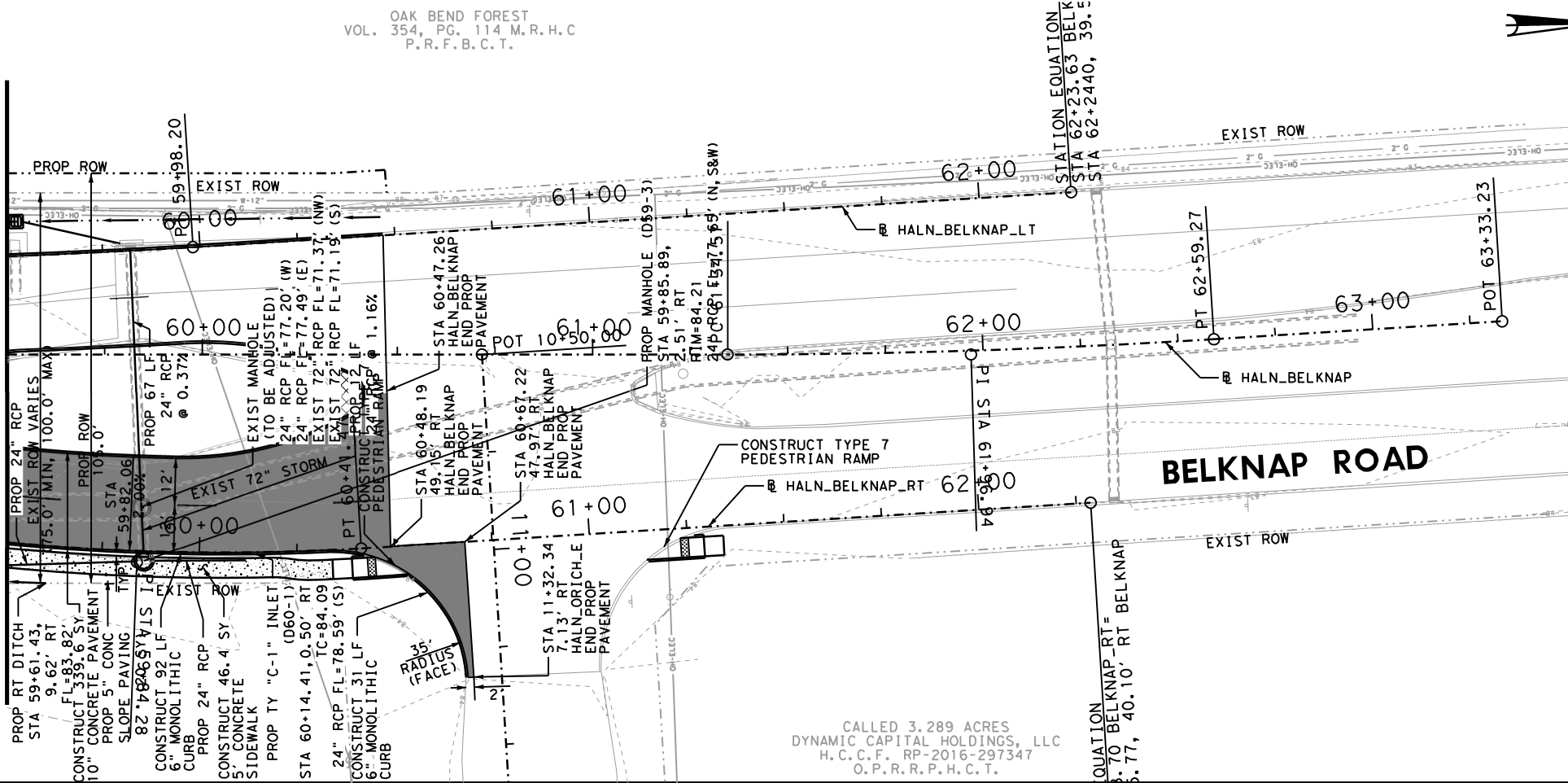
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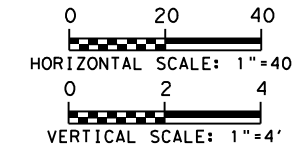
CALL BEFORE YOU DIG!
 TEXAS ONE CALL PARTICIPANTS REQUEST 48 HOURS NOTICE BEFORE YOU DIG, DRILL OR BLAST - STOP CALL
 Texas One Call System
 1-800-DIG-TESS

MATCH LINE - STA 59+50

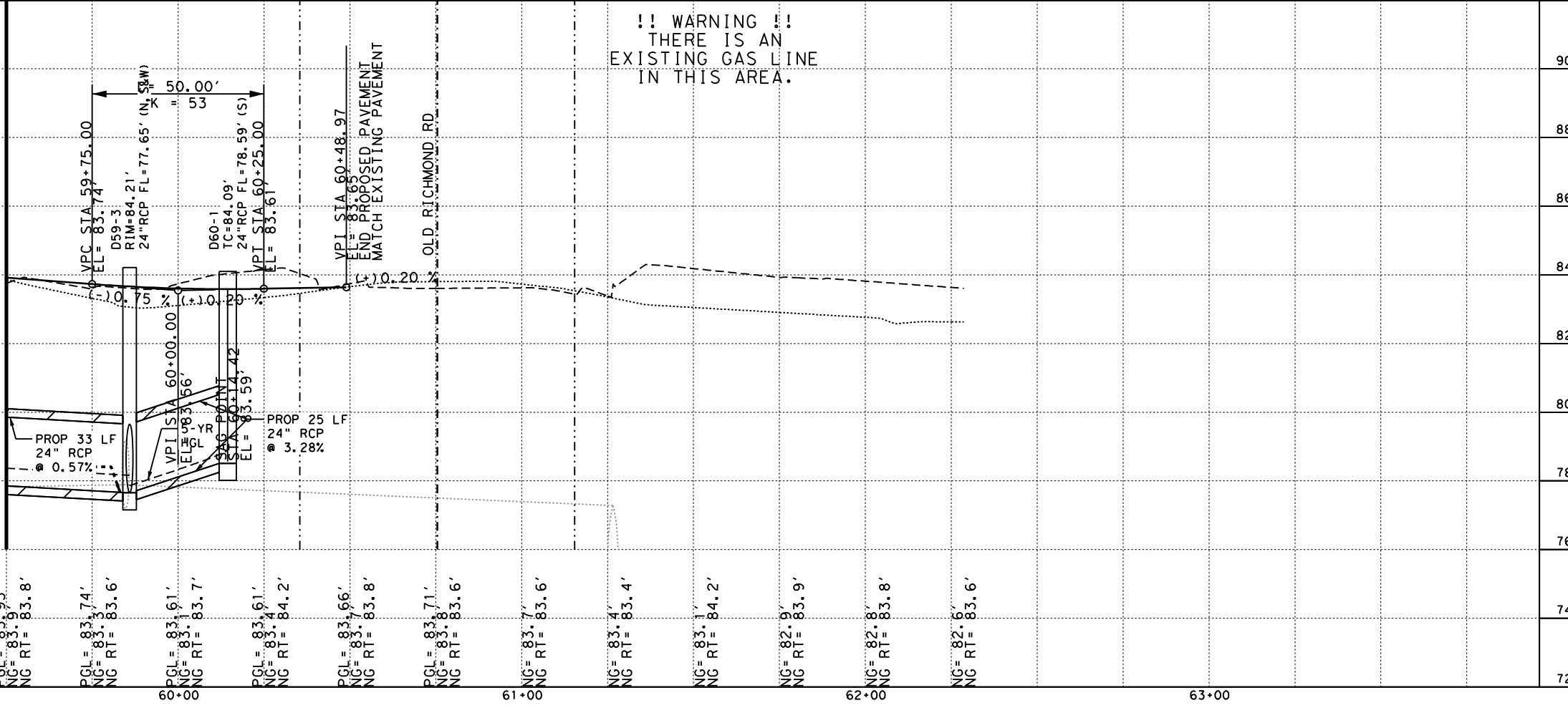
MATCH LINE - STA 59+50



CALLED 3.289 ACRES
 DYNAMIC CAPITAL HOLDINGS, LLC
 H.C.C.F. RP-2016-297347
 O.P.R.R.P.H.C.T.



!! WARNING !!
 THERE IS AN
 EXISTING GAS LINE
 IN THIS AREA.



NO.	DATE	REVISION	APPROVED

Ronald J. Thomas
 11-Dec-2023

Curtis W. White
 12/11/2023

rps Texas PE Firm Reg. #F-929
 5810 Tennyson Parkway, Suite 280, Plano, Texas 75024
 T+1 972 202 4242 E us@infrastructure@rpsgroup.com

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 PH: (281) 304-0200 - FX: (281) 304-0210
 Firm Registration No. F-382

FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
 W BELLFORT BLVD TO OAK BEND FOREST DR

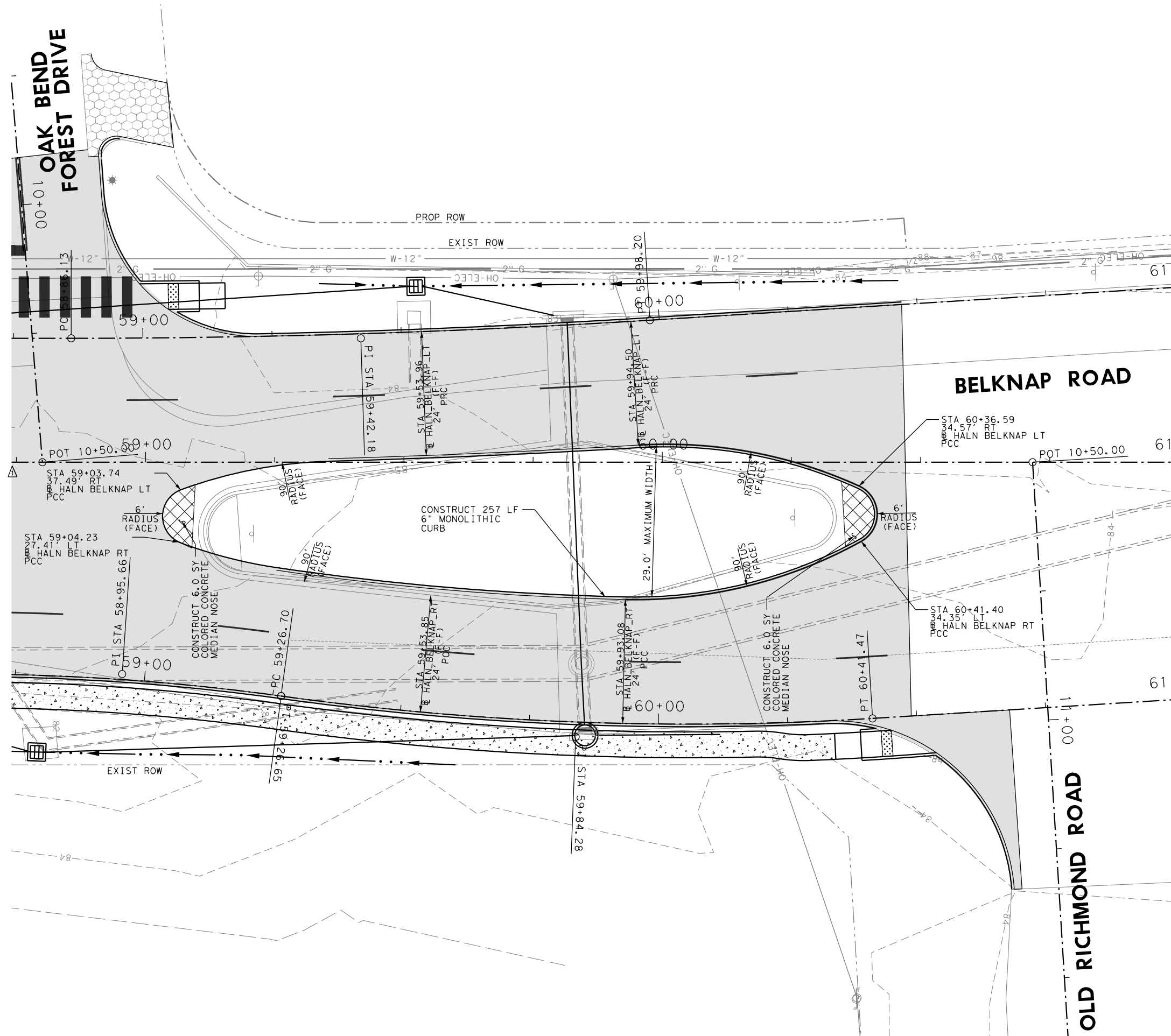
BELKNAP RD RIGHT PLAN AND PROFILE

CNTY PROJ *	RPS PROJ *	DATE	SCALE	SHEET NO
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DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RPS	RPS	RPS	RPS	

SHEET 4 OF 4

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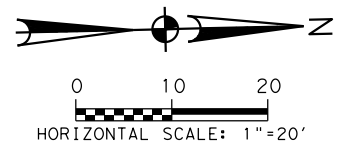


LEGEND

- PROP 8" REINFORCED CONC PAVEMENT
- PROP. 4.5" REINFORCED CONC SIDEWALK (5' WIDE)
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48 HOURS NOTICE BEFORE YOU DIG, DRILL,
OR BLAST - STOP CALL
 Texas One Call System
1-800-DIG-TESS



02/06/2024

NO	DATE	REVISION	APPROVED
1	01/22/24	OAK BEND FOREST DRIVE INTERSECTION	G.O.

FORT BEND COUNTY, TEXAS

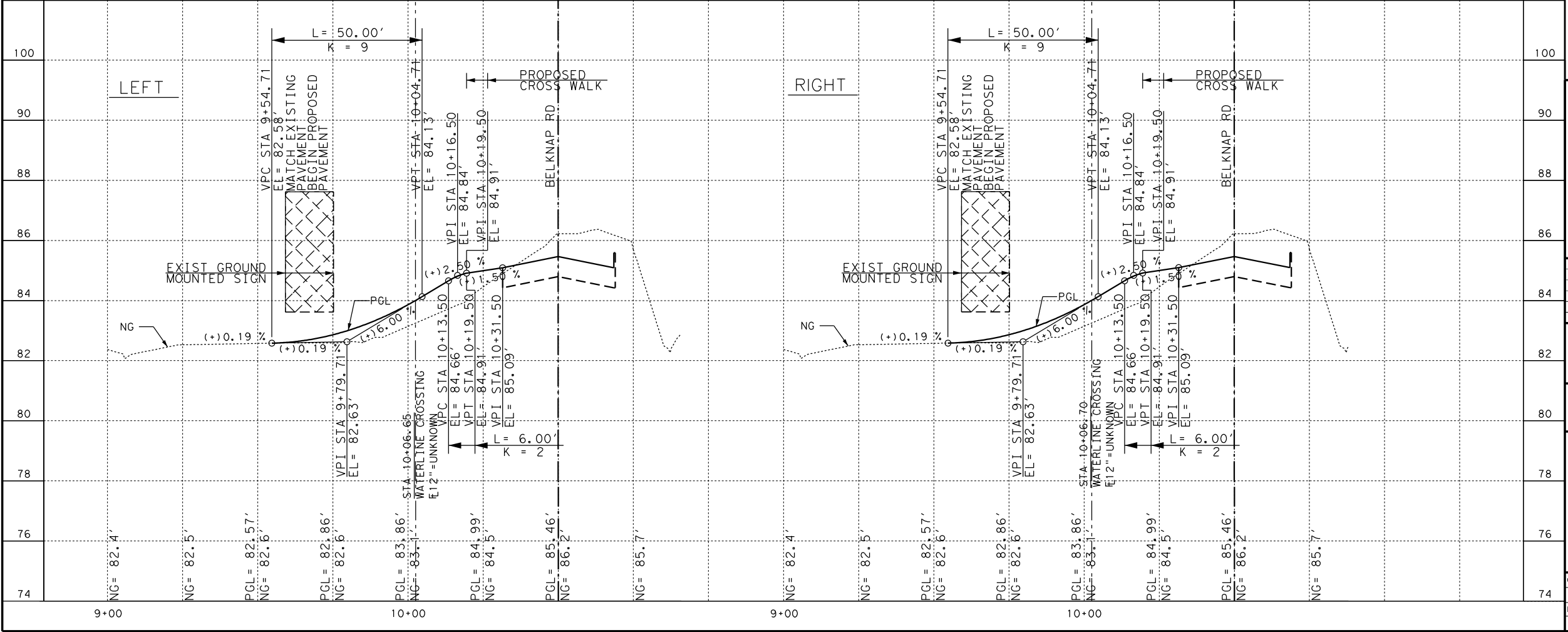
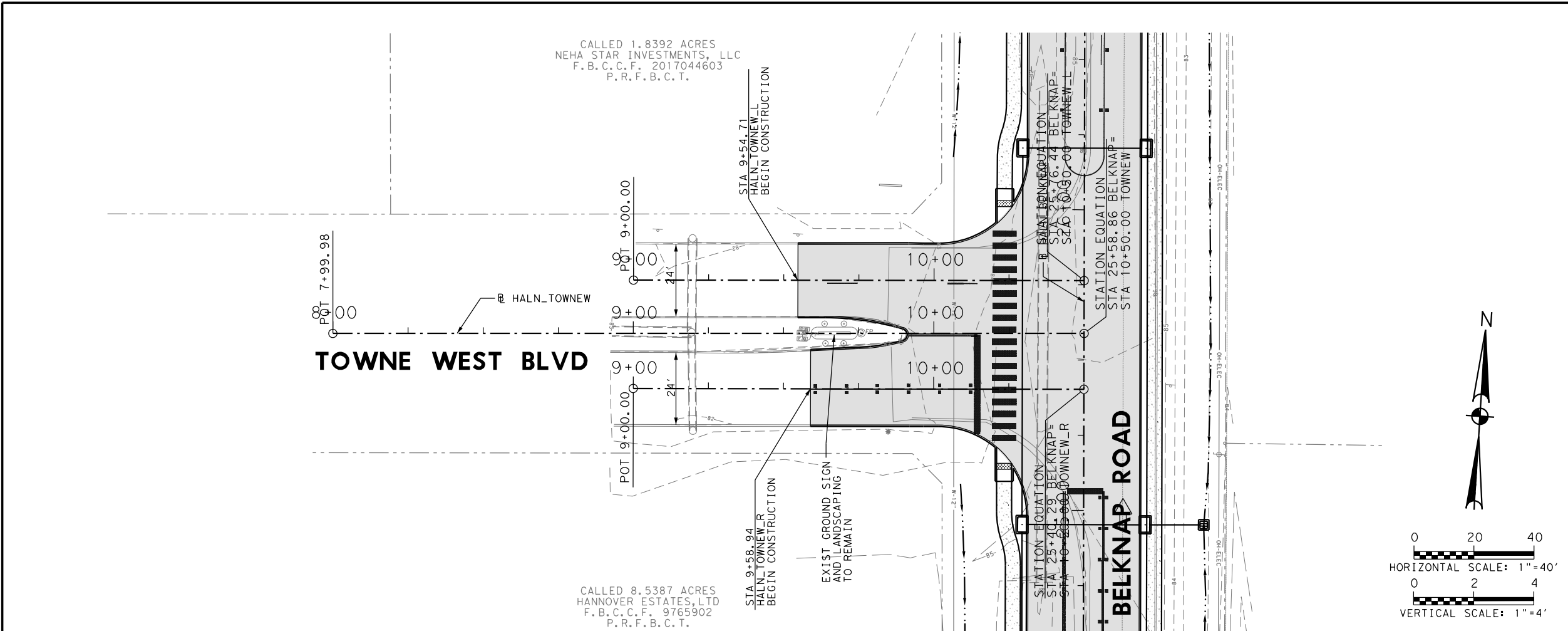
BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

BELKNAP RD MEDIAN
ISLAND DETAIL

SHEET 1 OF 1

CNTY PROJ	RPS PROJ	DATE	SCALE	SHEET NO
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DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RPS	RPS	RPS	RPS	

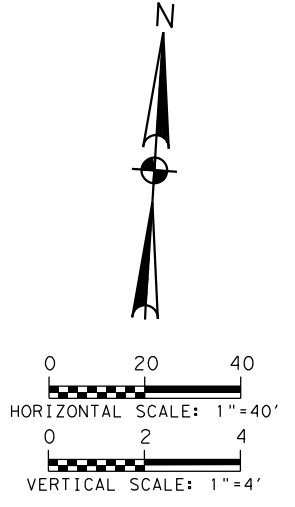
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LEGEND

	PROP 8" REINFORCED CONC PAVEMENT
	PROP. 4.5" REINFORCED CONC SIDEWALK (5' WIDE)
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Texas One Call System
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14-Nov-2023

rps Texas PE Firm Reg. #F-929
575 N. Dairy Ashford, Suite 700, Houston, Texas 77079
T +1 281 589 7257 E usinfrastructure@rpsgroup.com

FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

TOWNE WEST PLAN AND PROFILE

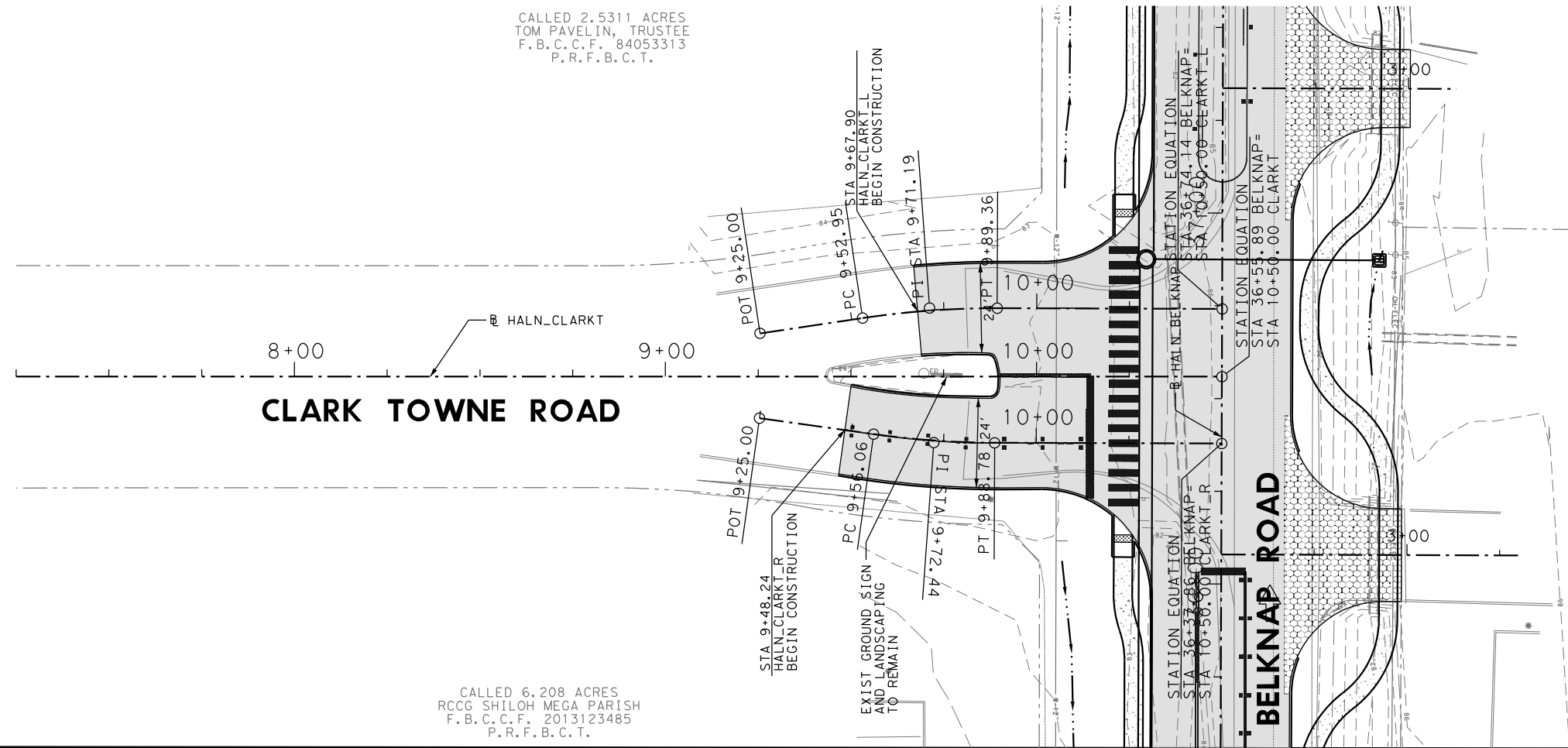
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17	2-11	008169	2023		122
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY		
RPS	RPS	RPS	RPS		

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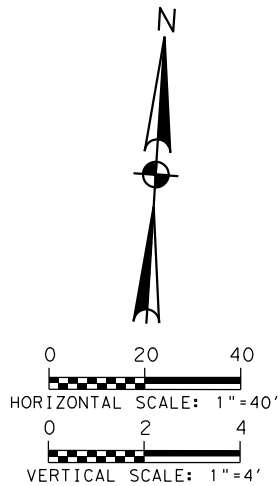
CALLED 2.5311 ACRES
TOM PAVELIN, TRUSTEE
F.B.C.C.F. 84053313
P.R.F.B.C.T.

CALLED 6.208 ACRES
RCCG SHILOH MEGA PARISH
F.B.C.C.F. 2013123485
P.R.F.B.C.T.



- LEGEND**
- PROP 8" REINFORCED CONC PAVEMENT
 - PROP. 4.5" REINFORCED CONC SIDEWALK (5' WIDE)
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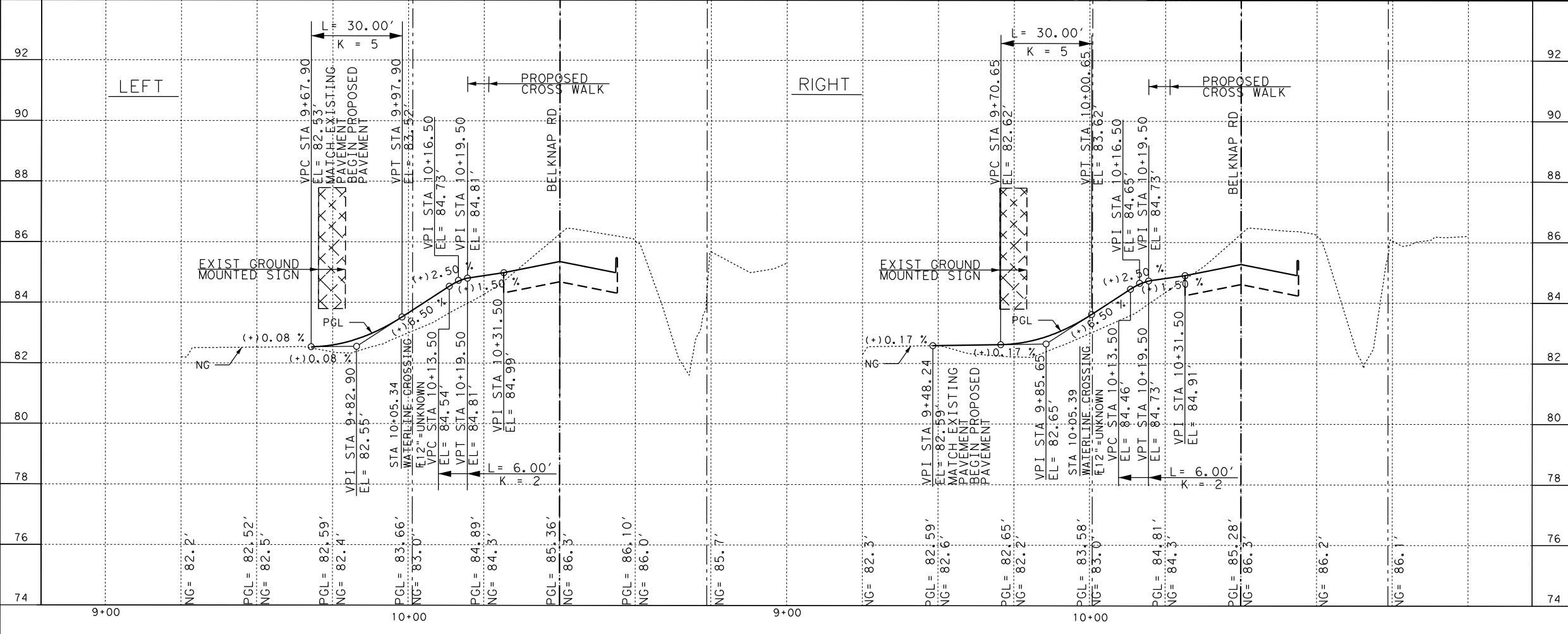


CAUTION!!!!
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 Texas One Call System
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14-Nov-2023



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575 N. Dalry Ashford, Suite 700, Houston, Texas 77079
T+1 281 589 7257 E usinfrastructure@rpsgroup.com

FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

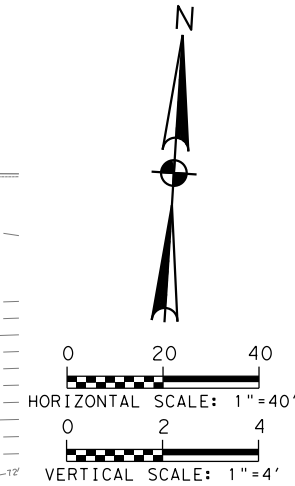
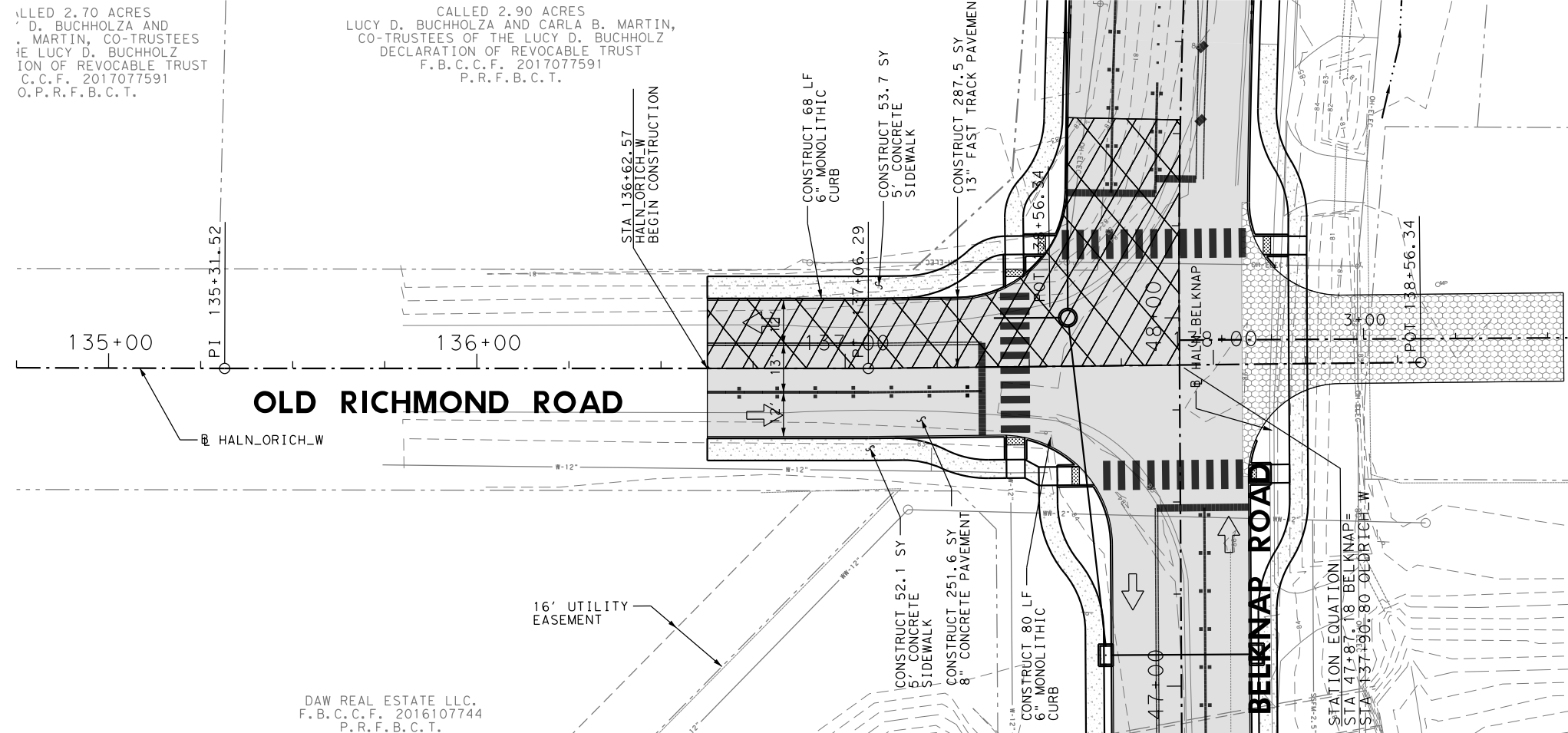
CLARK TOWNE
PLAN AND PROFILE

CNTY PROJ *	RPS PROJ *	DATE	SCALE	SHEET NO
17-2-11	008169	2023		123
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RPS	RPS	RPS	RPS	

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LEGEND

	PROP 8" REINFORCED CONC PAVEMENT
	PROP. 4.5" REINFORCED CONC SIDEWALK (5' WIDE)
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	PROPOSED 13" (FAST TRACK)

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Texas One Call System
1-800-DIG-TESS

STATE OF TEXAS
GABRIEL ODREMAN NORIEGA
135069
LICENSED PROFESSIONAL ENGINEER
02/06/2024

NO	DATE	REVISION	APPROVED

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575 N. Dairy Ashford, Suite 700, Houston, Texas 77079
T +1 281 589 7257 E us@infrastructure@rpsgroup.com

FORT BEND COUNTY, TEXAS

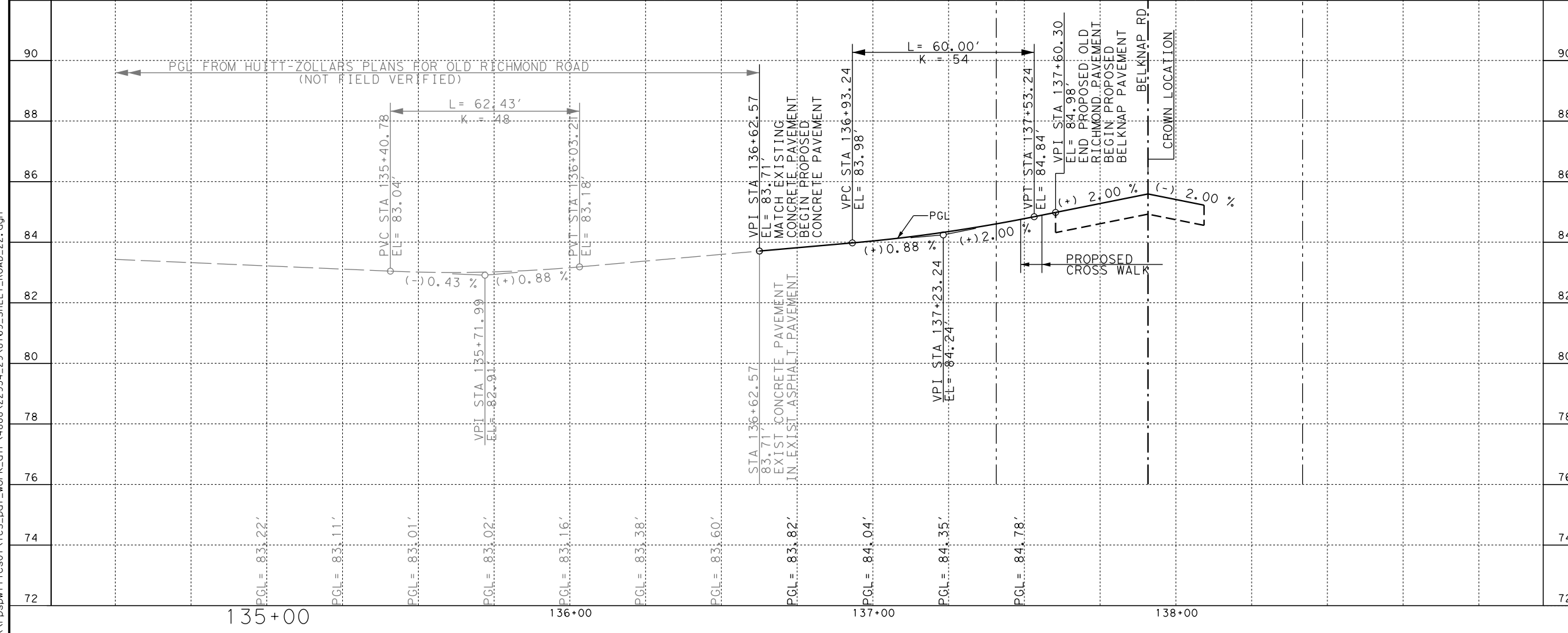
BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

OLD RICHMOND PLAN AND PROFILE

SHEET 1 OF 1

CNTY	PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169		2023		124

DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY
RPS	RPS	RPS	RPS



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OAK BEND FOREST
VOL. 354, PG. 114 M.R.H.C
P.R.F.B.C.T.

OAK BEND
FOREST DRIVE

FORT BEND COUNTY
HARRIS COUNTY

OAK BEND FOREST
VOL. 354, PG. 114 M.R.H.C
P.R.F.B.C.T.

STA 9+90.84
HALN_OAKBEND
BEGIN CONSTRUCTION

POT 9+36.28

10+00

59+00

59+00

BELKNAP ROAD

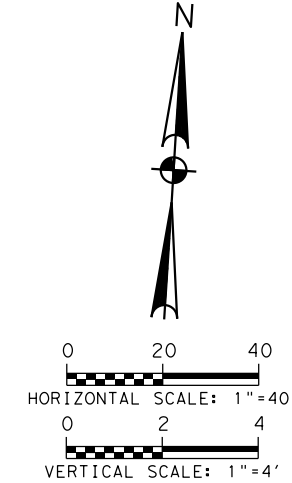
STATION EQUATION
STA 58+80.04 BELKNAP =
STA 10+50.00 OAK-BEND

58+00

58+00

58+00

59+00



LEGEND

- PROP 8" REINFORCED CONC PAVEMENT
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1-800-DIG-TESS



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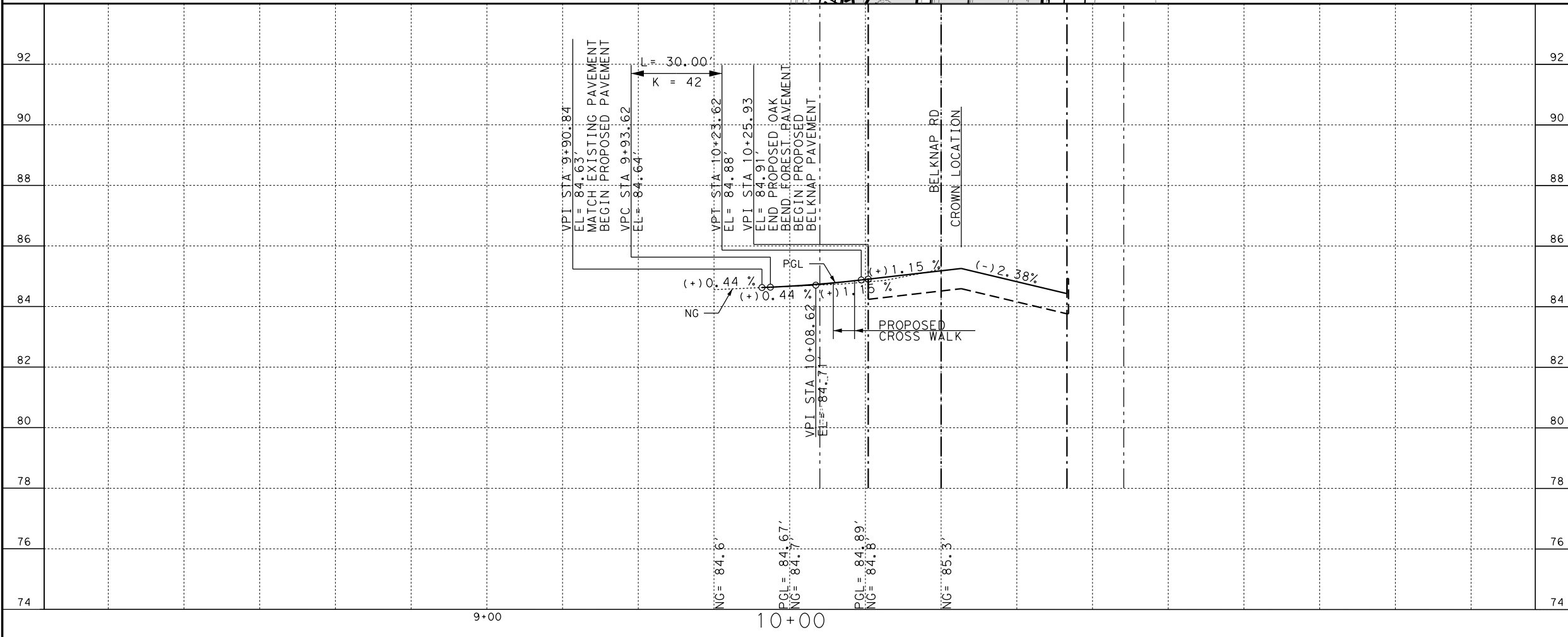
FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

OAK BEND FOREST
PLAN AND PROFILE

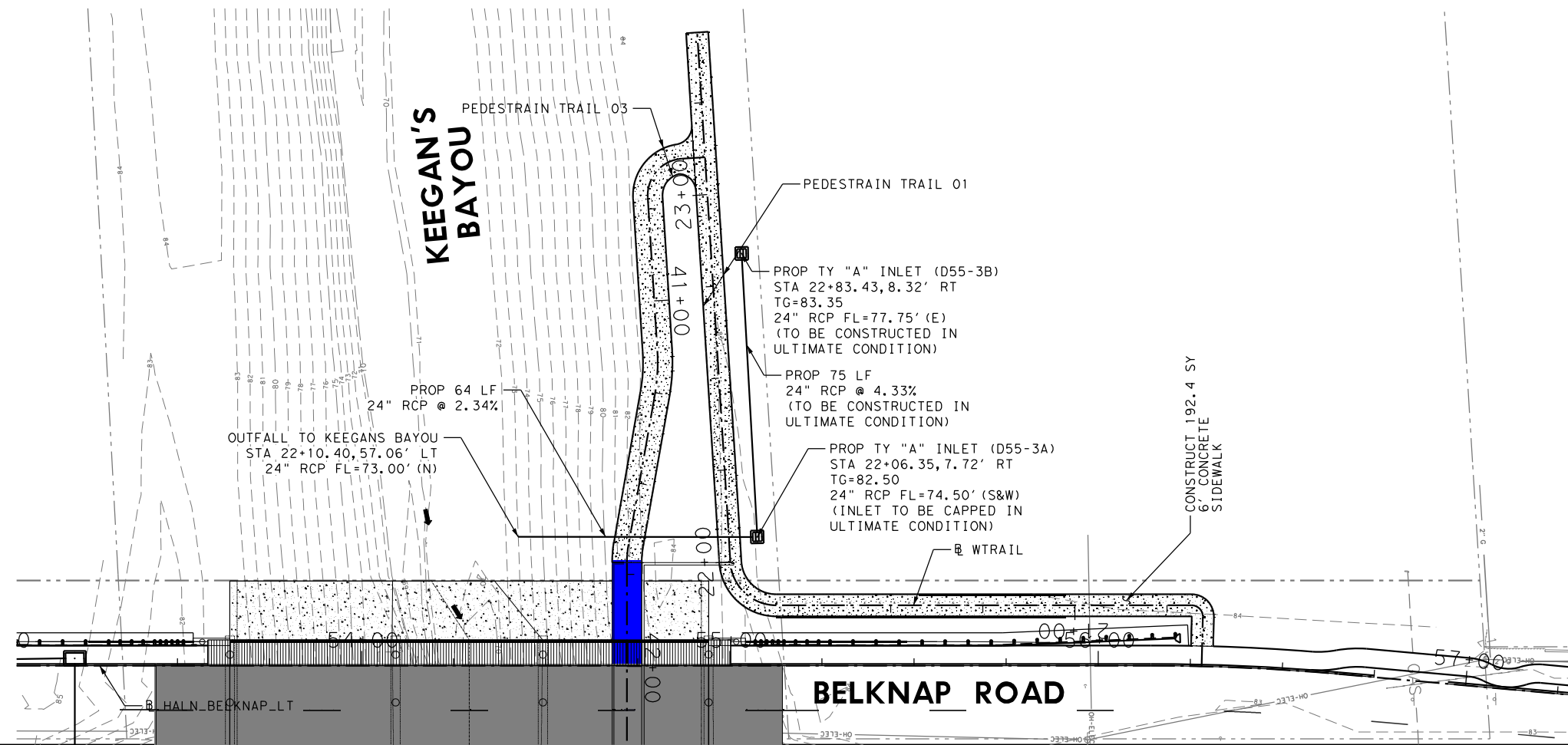
SHEET 1 OF 1

CNTY	PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169		2023		125
DESIGNED BY	RPS	DRAWN BY	RPS	CHECKED BY	RPS
				VERIFIED BY	RPS



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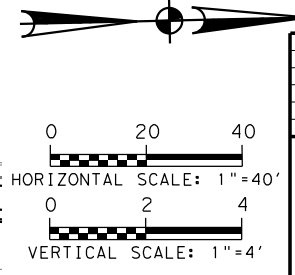
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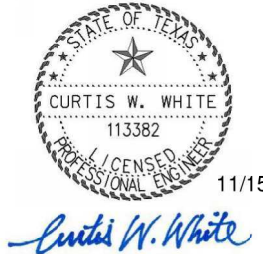


NO.	DATE	REVISION	APPROVED



14-Nov-2023

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T+1 972 202 4242 E usinfrastructure@rpsgroup.com



11/15/2023

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Firm Registration No. F-382

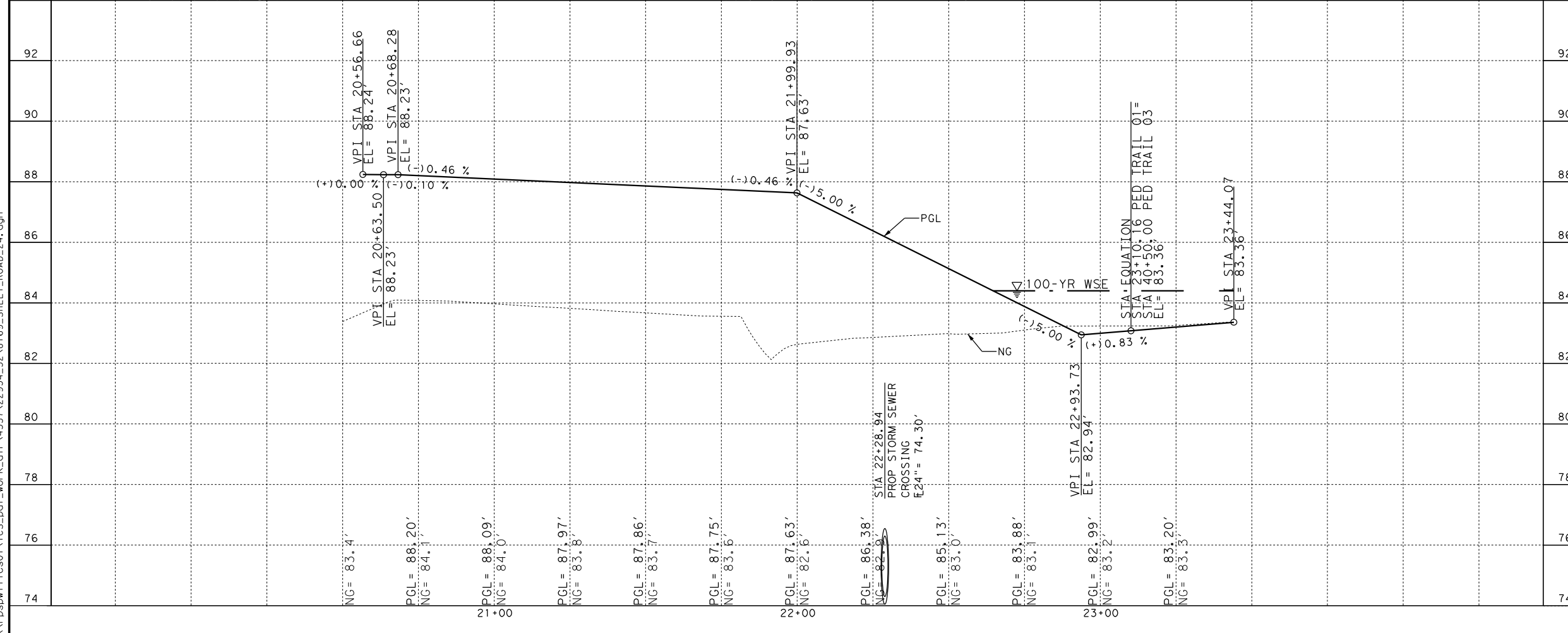
FORT BEND COUNTY, TEXAS

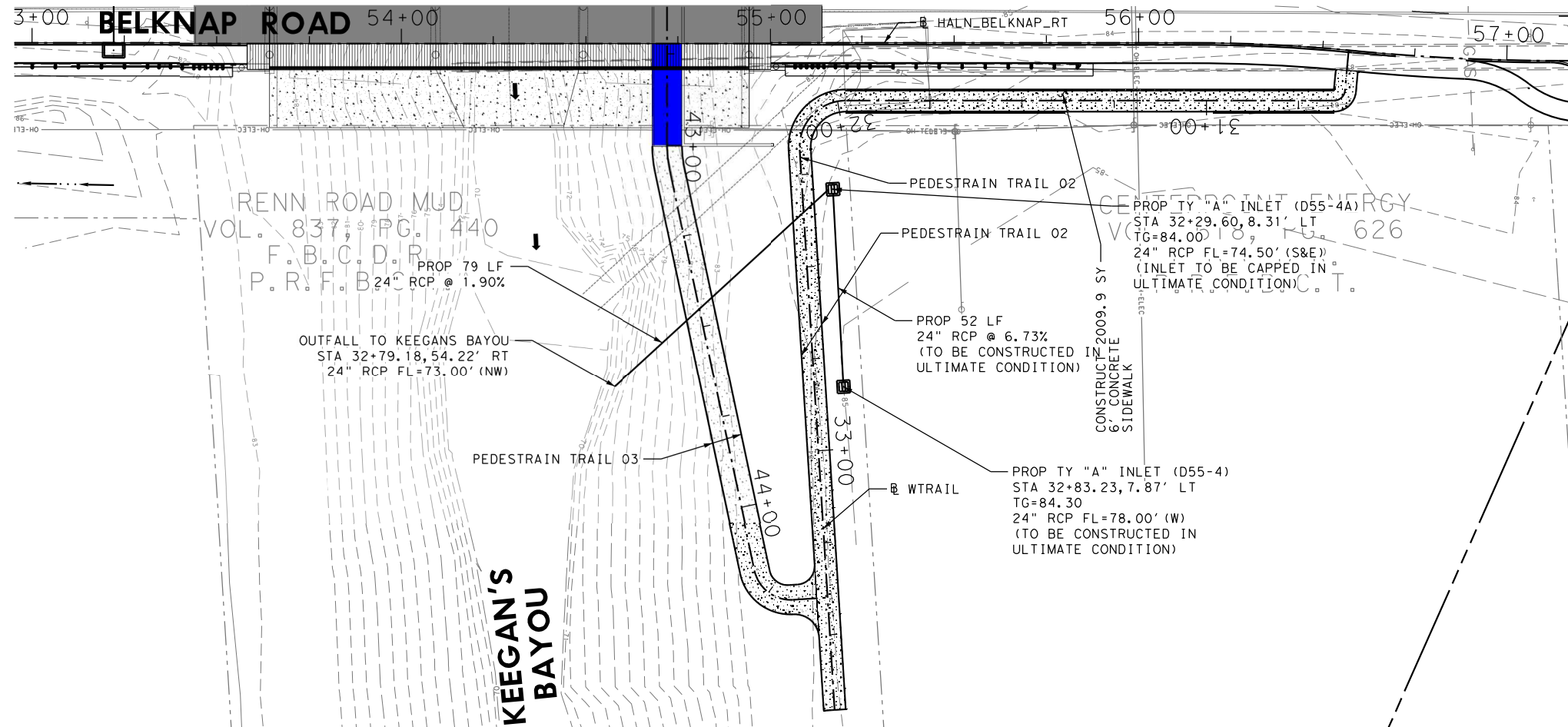
BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

PEDESTRIAN TRAIL 01

SHEET 1 OF 3

CNTY	PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	XXX	2023		126
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY		
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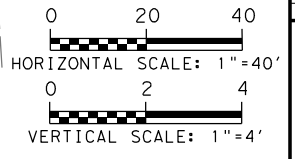


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5810 Tennyson Parkway, Suite 280, Plano, Texas 75024
T +1 972 202 4242 E usinfrastructure@rpsgroup.com



11/15/2023

Curtis W. White



11821 Telge Road
Cypress, Texas 77429
PH: (281) 304-0200 - FX: (281) 304-
Firm Registration No. F-382

FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

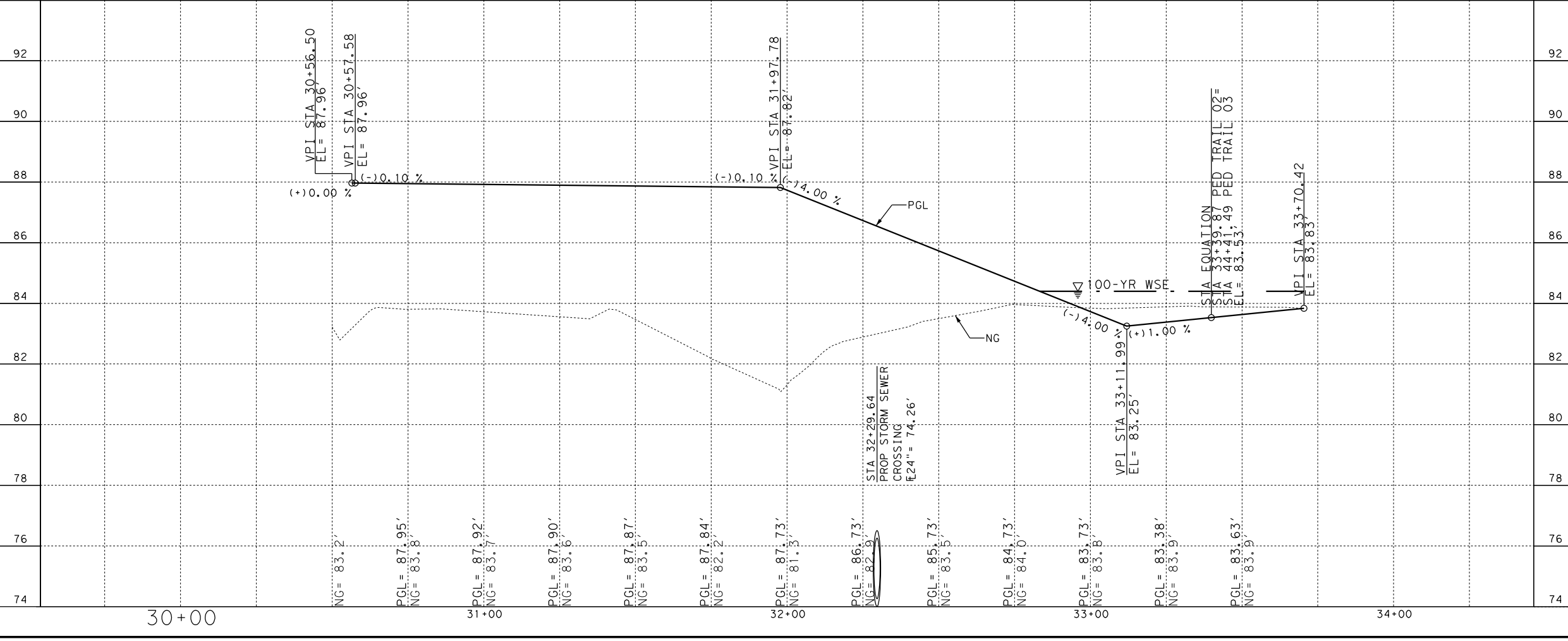
PEDESTRIAN TRAIL 02

SHEET 2 OF 3

CNTY PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	XXX 2023		127
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RPS	RPS	RPS	RPS	

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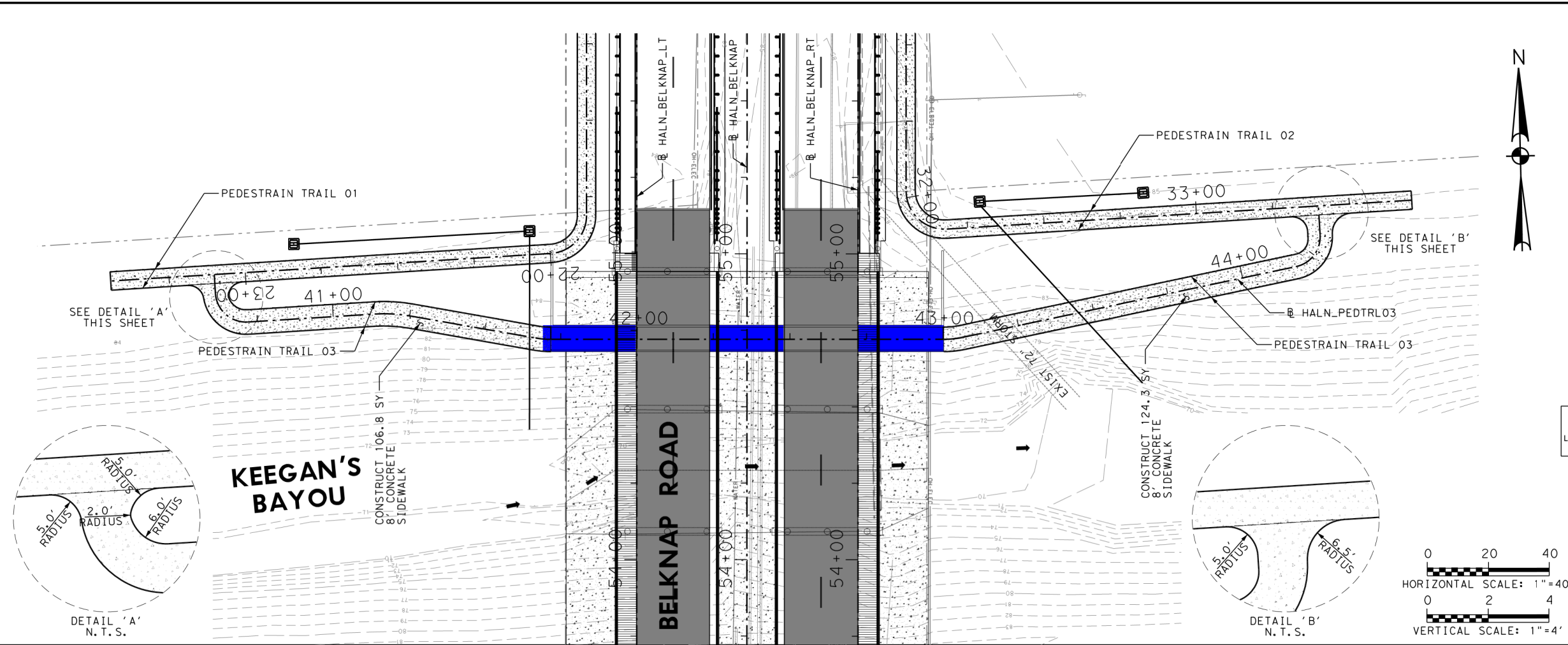
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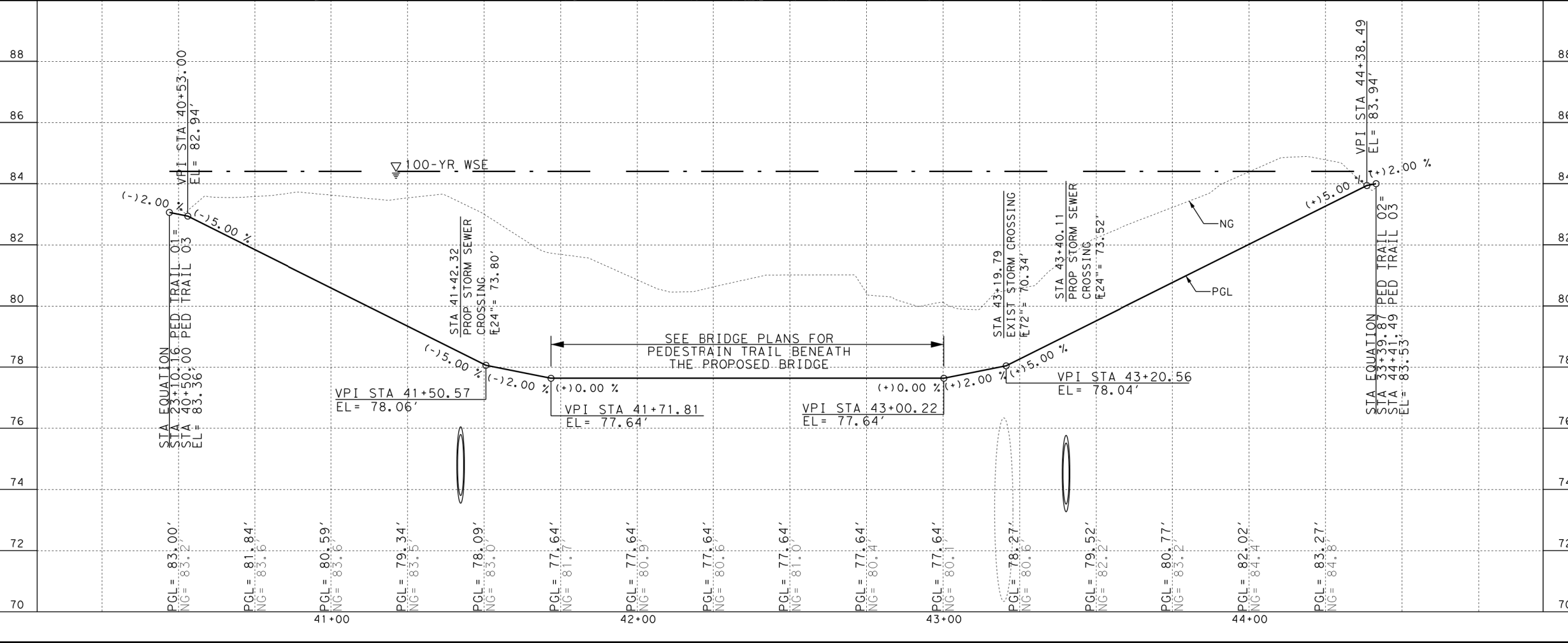


- NOTES:**
- SEE GENERAL NOTES SHEETS AND PROJECT NOTES SHEETS FOR ADDITIONAL INFORMATION.
 - THE UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE AND ARE NOT FIELD VERIFIED. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF THE EXISTING UTILITIES PRIOR TO COMMENCING WORK ON THE PROJECT. THIS WORK WILL NOT BE PAID FOR DIRECTLY BUT WILL BE SUBSIDIARY TO THE VARIOUS BID ITEMS.
 - THE SEAL FOR RONALD J. THOMAS, PE OF RPS APPEARS ON THIS SHEET FOR THE PROPOSED ROADWAY DESIGN (PAVEMENT LIMITS, ALIGNMENTS, UTILITY ADJUSTMENTS, ETC.). THE SEAL FOR CURTIS W. WHITE, PE OF CIVILTECH APPEARS ON THIS SHEET FOR THE PROPOSED DRAINAGE DESIGN (INLETS, STORM SEWER, DITCHES, ETC.).

CAUTION!!!!
OVERHEAD ELECTRIC LOCATIONS ARE APPROXIMATE

CALL BEFORE YOU DIG!
TEXAS ONE CALL PARTICIPANTS REQUEST 48 HOURS NOTICE BEFORE YOU DIG, DRILL OR BLAST - STOP CALL

Texas One Call System
1-800-DIG-TESS



NO.	DATE	REVISION	APPROVED

14-Nov-2023

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11/15/2023

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Firm Registration No. F-382

FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

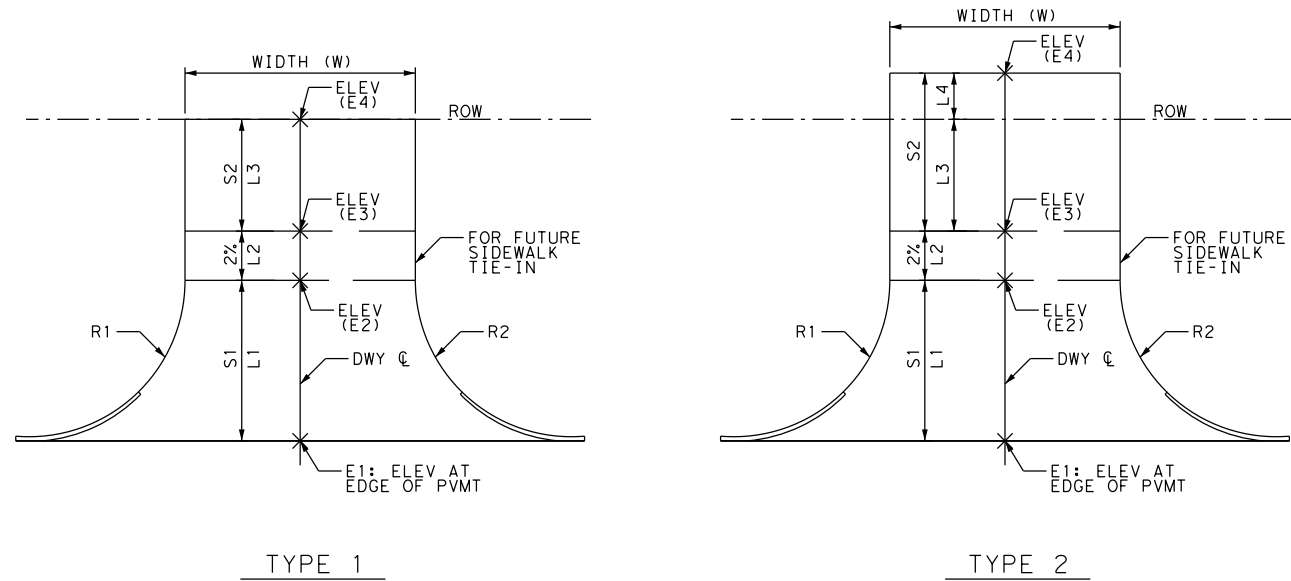
PEDESTRIAN TRAIL 03

CNTY	PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	XXX	2023		128

SHEET 3 OF 3

DRIVEWAY SUMMARY

DRIVEWAY NUMBER	BASELINE	CL STATION	OFFSET DIRECTION	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)	REMARKS
1	HALN_BELKNAP	14+43.12	LT	1	15	9.22	5.00	1.00	-	15	15	84.71	85.19	85.26	85.28	-5.21	-0.84	44	-	-
2	HALN_BELKNAP	14+88.56	LT	2	12	9.28	5.00	1.00	24.32	15	15	85.17	84.98	84.90	84.44	2.00	4.00	71	18x27	-
3	HALN_BELKNAP	16+12.97	RT	1	24	21.42	5.00	1.00	-	25	25	85.36	87.01	87.09	87.10	7.69	-0.95	115	-	-
4	HALN_BELKNAP	18+36.19	RT	2	30	20.71	5.00	2.00	3.77	25	25	84.58	86.23	86.31	86.48	7.97	3.00	149	7x37	-
5	HALN_BELKNAP	20+11.34	RT	1	24	21.94	5.00	1.00	-	25	25	83.97	84.56	84.63	84.65	2.70	5.56	110	-	-
6	HALN_BELKNAP	20+66.42	RT	1	23	22.02	5.00	1.00	-	25	25	83.77	84.71	84.78	84.80	4.27	-0.25	107	-	-
7	HALN_BELKNAP	22+52.43	RT	2	21	22.26	5.00	1.00	4.74	25	25	84.03	83.94	84.02	84.11	-2.0	0.83	119	7x27	LOW POINT STA. 2+81.50 ELEV. 83.88'
8	HALN_BELKNAP	23+89.32	RT	1	36	22.44	5.00	1.00	-	25	25	84.51	86.25	86.32	86.34	7.79	2.01	158	-	-
9	HALN_BELKNAP	27+43.14	RT	1	21	22.90	5.00	1.00	-	25	25	84.06	85.00	85.07	85.09	4.07	-0.35	109	-	-
10	HALN_BELKNAP	29+26.12	RT	2	33	19.85	5.00	4.29	4.36	25	25	82.87	84.24	84.32	84.44	6.89	-0.95	166	7x39	-
11	HALN_BELKNAP	33+47.88	RT	2	36	19.74	5.00	4.95	1.81	20	25	83.87	84.76	84.83	84.92	4.50	2.00	164	4x42	-
12	HALN_BELKNAP	33+78.45	LT	2	27	24.16	5.00	1.00	10.53	25	25	84.00	85.45	85.52	85.56	-6.0	1.35	165	13x33	-
13	HALN_BELKNAP	34+23.93	RT	2	25	19.84	5.00	4.95	21.34	25	20	83.90	85.09	85.17	86.35	6.00	5.79	178	24x31	-
14	HALN_BELKNAP	36+07.94	RT	1	25	24.03	5.00	1.00	-	25	25	84.62	86.36	86.44	86.45	7.24	-0.19	198	-	-
15	HALN_BELKNAP	37+33.70	RT	2	21	25.69	5.00	1.00	1.81	25	25	84.71	84.51	84.47	84.55	-2.0	0.87	116	4x27	LOW POINT STA. 2+86.99 ELEV. 84.39'
16	HALN_BELKNAP	38+83.66	RT	1	35	21.34	5.00	4.05	-	25	25	84.58	85.54	85.61	85.63	3.91	3.04	162	-	-
17	HALN_BELKNAP	39+65.57	LT	1	12	24.52	5.00	1.00	-	25	25	84.87	85.11	85.18	85.20	-0.98	1.15	81	-	-
18	HALN_BELKNAP	40+93.29	RT	1	35	24.66	5.00	1.00	-	25	25	85.32	87.06	87.13	87.15	7.06	-0.34	163	-	-
19	HALN_BELKNAP	41+04.55	LT	1	35	24.69	5.00	1.00	-	25	25	85.36	87.03	87.10	87.12	-6.79	-0.87	163	-	-
20	HALN_BELKNAP	42+16.59	RT	2	25	24.83	5.00	1.00	0.67	25	25	85.75	84.59	84.51	84.50	-4.67	-2.3	130	3x31	-
21	HALN_BELKNAP	42+88+18	LT	1	35	24.93	5.00	1.00	-	25	25	85.64	87.00	87.08	87.09	-5.45	-2.54	164	-	-
22	HALN_BELKNAP	44+33.24	LT	1	20	25.12	5.00	1.00	-	25	15	84.55	85.08	85.15	85.17	-2.1	-3.23	99	-	-
23	HALN_BELKNAP	44+91.74	LT	1	20	25.20	5.00	1.00	-	15	25	84.11	85.51	85.58	85.60	-5.53	-1.9	100	-	-
24	HALN_BELKNAP	46+05.07	RT	1	21	25.33	5.00	1.00	-	25	25	83.96	84.56	84.63	84.65	2.34	-3.17	115	-	-
25	HALN_BELKNAP	47+93.94	RT	2	24	11.19	5.00	16.84	52.79	25	25	85.21	84.98	84.91	84.38	-2.0	-0.1	271	30x56	-
26	HALN_BELKNAP	49+48.21	LT	2	33	3.09	5.00	2.74	26.56	25	25	83.59	83.53	83.46	84.50	1.50	-6.00	172	30x48	LOW POINT STA. 2+09.40 ELEV. 83.44'
27	HALN_BELKNAP	51+30.74	RT	1	24	45.11	5.00	1.80	-	25	25	83.91	84.50	84.58	84.61	1.32	0.25	180	-	-
28	HALN_BELKNAP	52+40.04	LT	2	26	3.60	5.00	15.18	7.71	25	25	86.50	86.45	86.38	86.71	1.50	-3.04	130	10x32	LOW POINT STA. 2+02.65 ELEV. 86.35'
29	HALN_BELKNAP	57+32.55	RT	2	11.79	13.09	5	1	23.22	15	15	86.25	86.01	85.92	85.17	-2.0	-4.0	71	18x25	-
30	HALN_OAKBEND	9+76.27	LT	1	12	16.87	-	-	-	3.5	3.5	84.28	-	-	84.68	-2.4	-2.4	25	-	-



NOTE: ALL PROPOSED DRIVEWAYS FOR THIS PROJECT ARE TO BE 8-IN THICK REINFORCED CONCRETE PAVEMENT UNLESS OTHERWISE DIRECTED BY FORT BEND COUNTY.

02/06/2024

NO	DATE	REVISION	APPROVED

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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
 W BELLFORT BLVD TO OAK BEND FOREST DR

DRIVEWAY SUMMARY

CNTY	PROJ	RPS PROJ	DATE	SCALE	SHEET NO

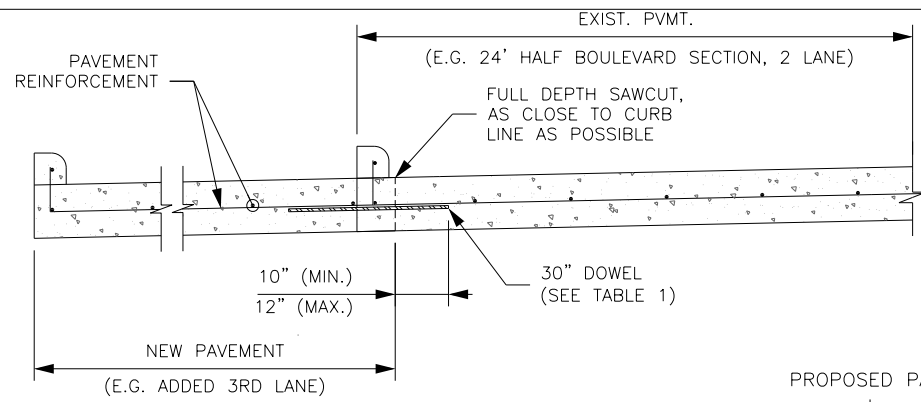
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RPS	RPS	RPS	RPS

129

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TYPICAL CONCRETE ROADWAY WIDENING DETAIL
SCALE: 1" = 1'-6"

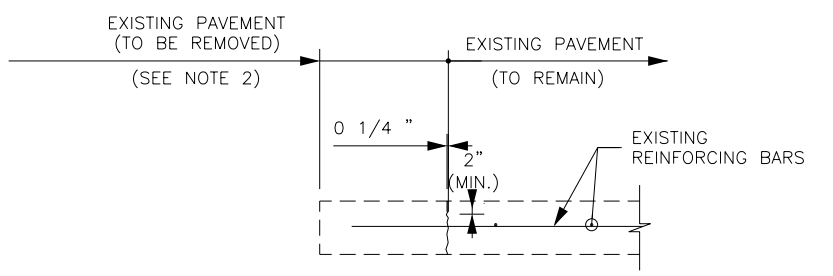
**TABLE 1
(CONSTRUCTION JOINT DOWELS)**

DOWEL SIZE	PAVEMENT DEPTH
#4 BAR	< 6"
#5 BAR	6" ≤ D < 9"
#6 BAR	≥ 9"

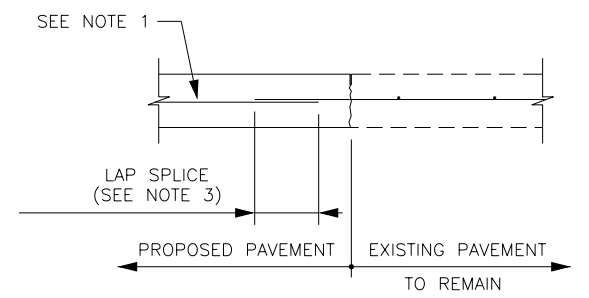
DOWEL SHALL BE DRILLED INTO EXISTING PAVEMENT (MIN. 10", MAX. 12") AND EPOXIED. (SEE ITEM 361.3)

EXPANSION JOINT DOWELS 12" O.C.

PAVEMENT THICKNESS (D)	DOWEL DIA.
6"	3/4"
7"	1"
8"	1"
9" & 10"	1 1/4"



STEP 1 DEMOLITION OF EXISTING PAVEMENT

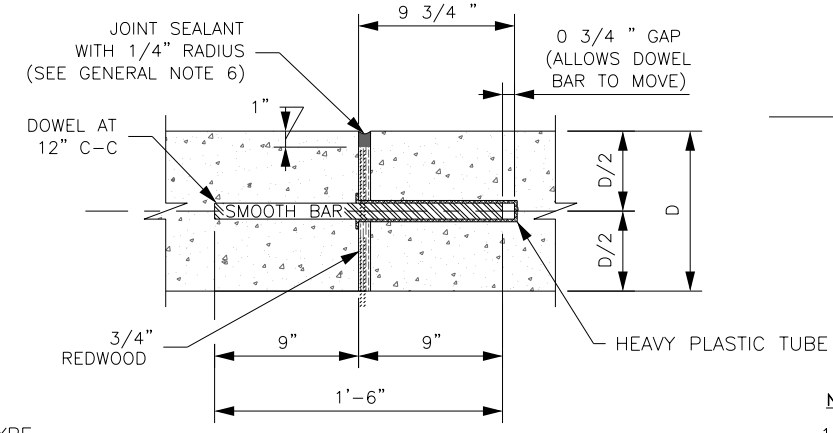
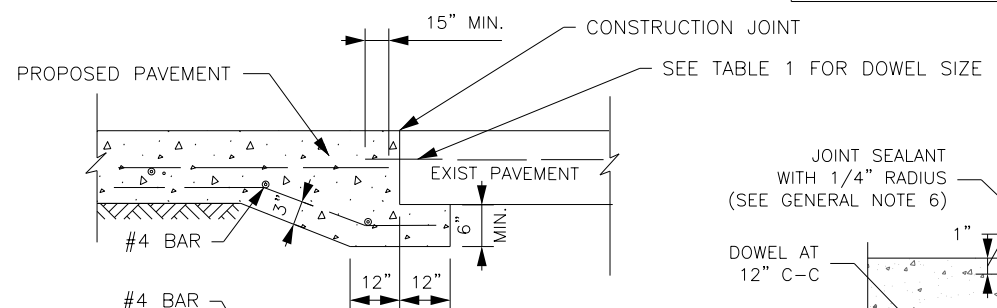


STEP 2 CONSTRUCTION OF NEW PAVEMENT

CONCRETE TO CONCRETE STANDARD PAVEMENT TIE-IN
SCALE: 1" = 1'-6"

NOTES FOR STANDARD PAVEMENT TIE-IN:

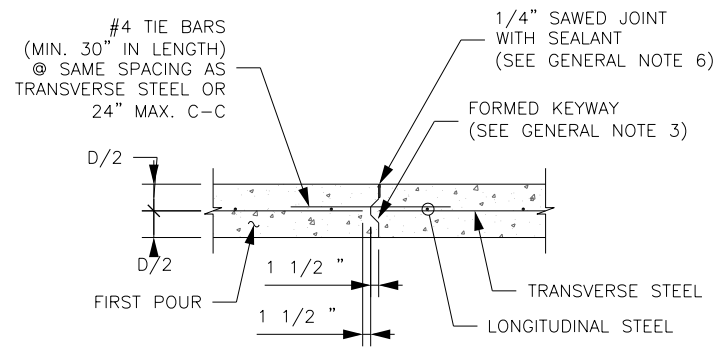
1. REINFORCING CENTERED IN PROPOSED PAVEMENT, 3" CLEAR AT EDGES.
2. ONLY FULL DEPTH SAWCUTS WILL BE ALLOWED
3. USE FULL DEPTH SAWCUT WITH DRILLED IN DOWELS (AS SHOWN IN THE "TYPICAL CONCRETE ROADWAY WIDENING DETAIL" ON THIS SHEET. THE SAWCUTTING AND DOWELS WILL BE AT CONTRACTOR'S EXPENSE.
4. ALL PAVEMENT CONCRETE SHALL BE 5 1/2 SACK PER CY, 3500, PSI AT 28 DAYS
5. SIZE OF DOWEL BARS SHALL CONFORM TO TABLE 1. DOWELS SHALL BE PLACED 24" CENTER TO CENTER OR MATCH EXISTING, IF CLOSER



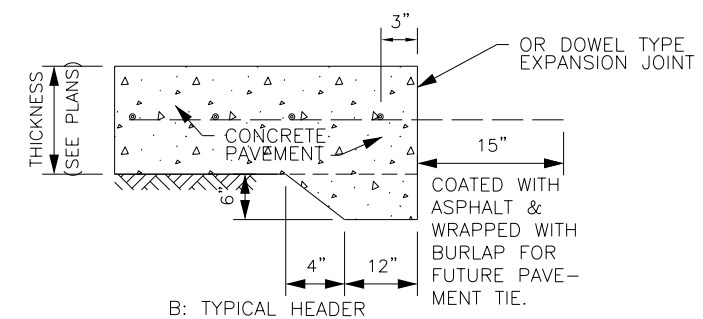
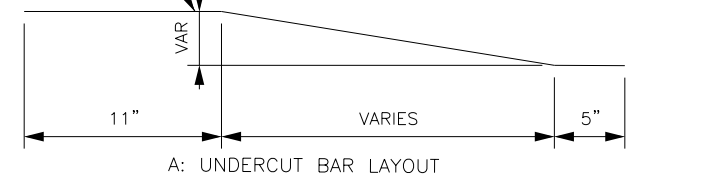
DOWEL TYPE EXPANSION JOINT
SCALE: 1" = 6"

NOTES FOR DOWEL EXPANSION JOINT:

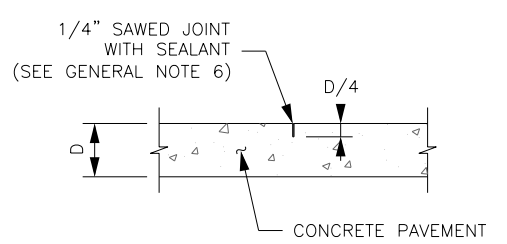
1. EXPANSION JOINT SHALL BE PLACED AT THE END OF EACH CURB RADIUS AND SPACED AT A MAXIMUM DISTANCE OF 60 FEET.
2. CENTER DOWEL HORIZONTALLY ON JOINT.
3. EXPANSION JOINT BARS SHALL BE HELD PARALLEL TO THE FINISHED CONCRETE SURFACE.



LONGITUDINAL CONSTRUCTION JOINT
SCALE: 1" = 1'-6"

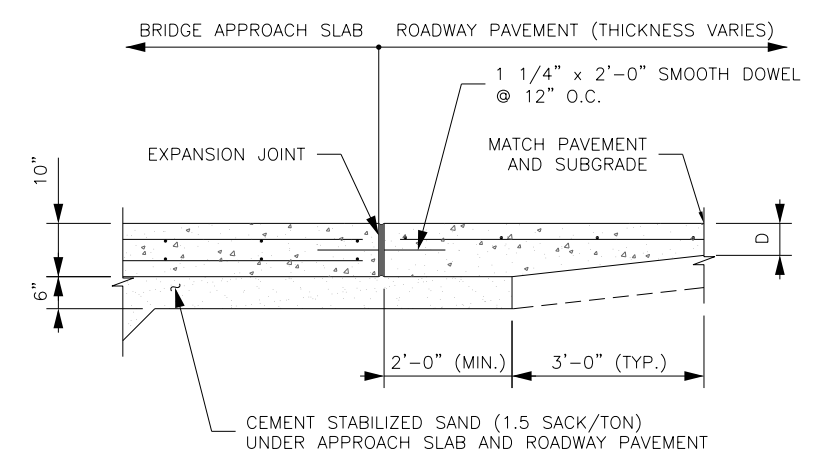


PAVEMENT HEADER/ UNDERCUT
N.T.S.

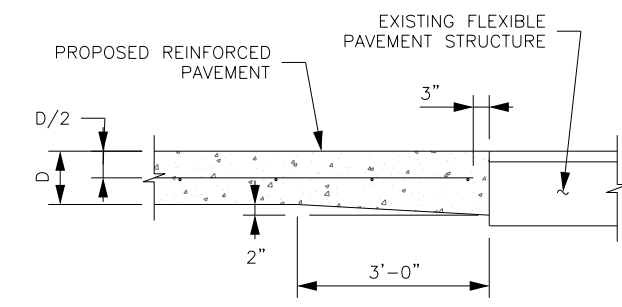


CONTRACTION JOINT (SAWED)
SCALE: 1" = 1'-6"

- NOTE FOR CONTRACTION JOINT:**
1. 20'-0" MAXIMUM SPACING BETWEEN JOINTS.



TYPICAL SECTION PAVING TIE-IN TO BRIDGE APPROACH SLAB
SCALE: 1" = 1'-6"



TYPICAL PAVING HEADER
SCALE: 1" = 1'-6"

NOTES FOR PAVING HEADER:

1. ADDITIONAL CONCRETE FOR PAVING HEADER SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAVING BID ITEMS.
2. DISTURBED MATERIAL IN THE FLEXIBLE PAVEMENT WILL BE BACKFILLED WITH ASPHALT CONCRETE PAVEMENT (ACP). THE ACP WILL BE CONSIDERED INCIDENTAL TO VARIOUS PAVING BID ITEMS.

GENERAL NOTES:

1. FOR FURTHER INFORMATION REGARDING THE PLACEMENT OF CONCRETE AND REINFORCING, REFER TO ITEM 360 HARRIS COUNTY SPECIFICATIONS
2. THE CHAIRS USED TO SUPPORT THE BAR MATS SHALL BE OF SUFFICIENT STRUCTURAL QUALITY AND NUMBER TO HOLD THE MAT WITHIN THE PLACEMENT HEIGHT, AND SHALL BE OF A TYPE APPROVED BY THE ENGINEER. SPACING OF BAR SUPPORT CHAIRS SHALL BE 3'-0" MAXIMUM.
3. SAWED CONTRACTION JOINTS SHALL BE USED FOR LONGITUDINAL JOINTS WHEREVER MORE THAN ONE LANE WIDTH IS PLACED IN A SINGLE POUR. KEYED CONSTRUCTION JOINTS SHALL BE USED AT ALL OTHER JOINTS.
4. ALL SAW CUTTING SHOWN ON THIS DETAIL SHALL BE INCIDENTAL TO ITEM 360 "CONCRETE PAVEMENT".
5. D = THICKNESS OF CONCRETE PAVEMENT.
 - FOR DEVELOPMENT PROJECTS SEE REGULATIONS OF FORT BEND COUNTY, TEXAS FOR THE APPROVAL AND ACCEPTANCE OF INFRASTRUCTURE.
6. ALL CONSTRUCTION JOINTS SHALL BE SEALED. JOINT SEALANT SHALL CONFORM TO THE REQUIREMENTS OF ITEM 360
7. NO TRAFFIC ON CONCRETE PAVEMENT UNTIL 7 DAYS CURE TIME AND 3,500 PSI HAS BEEN REACHED.

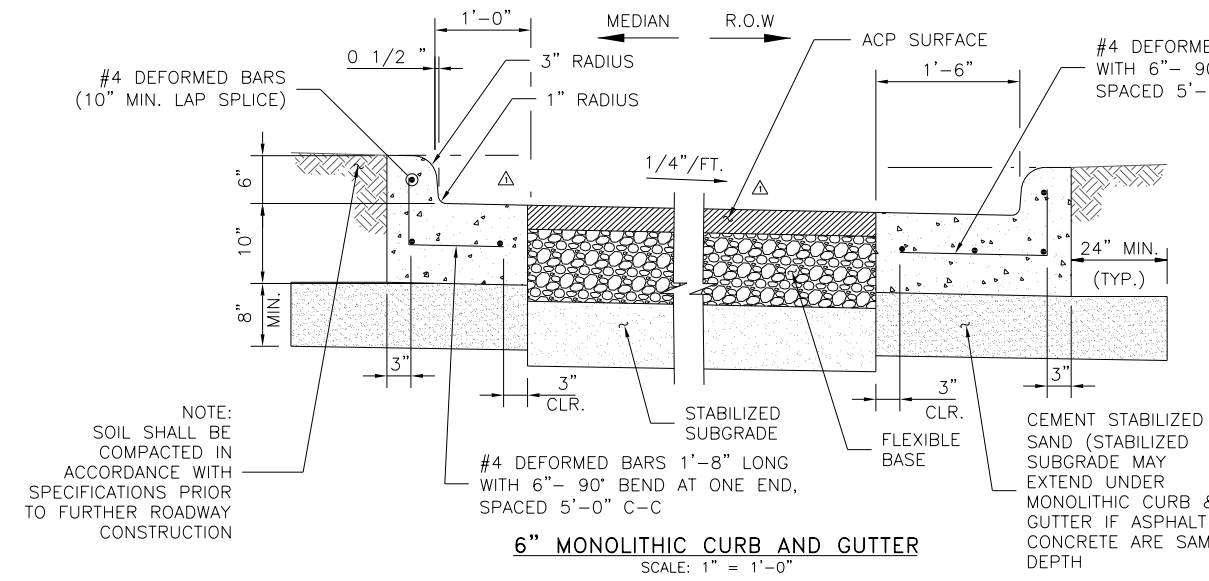
NO.	REVISIONS	DATE	NAME
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FORT BEND COUNTY
ENGINEERING DEPARTMENT

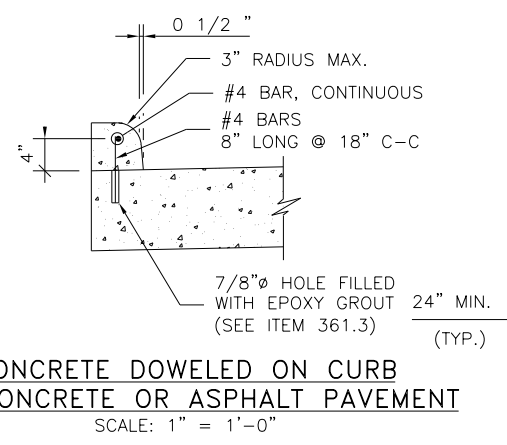
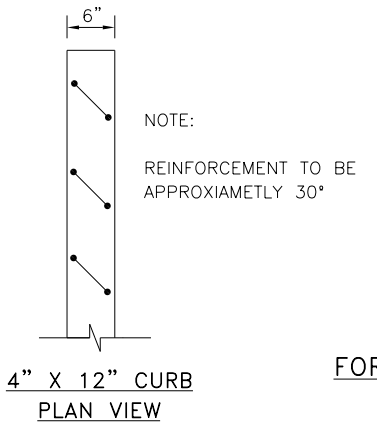
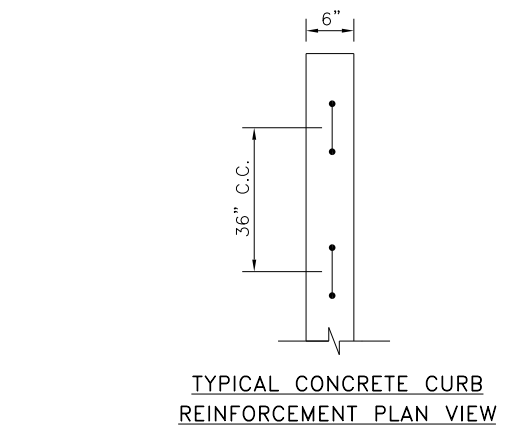
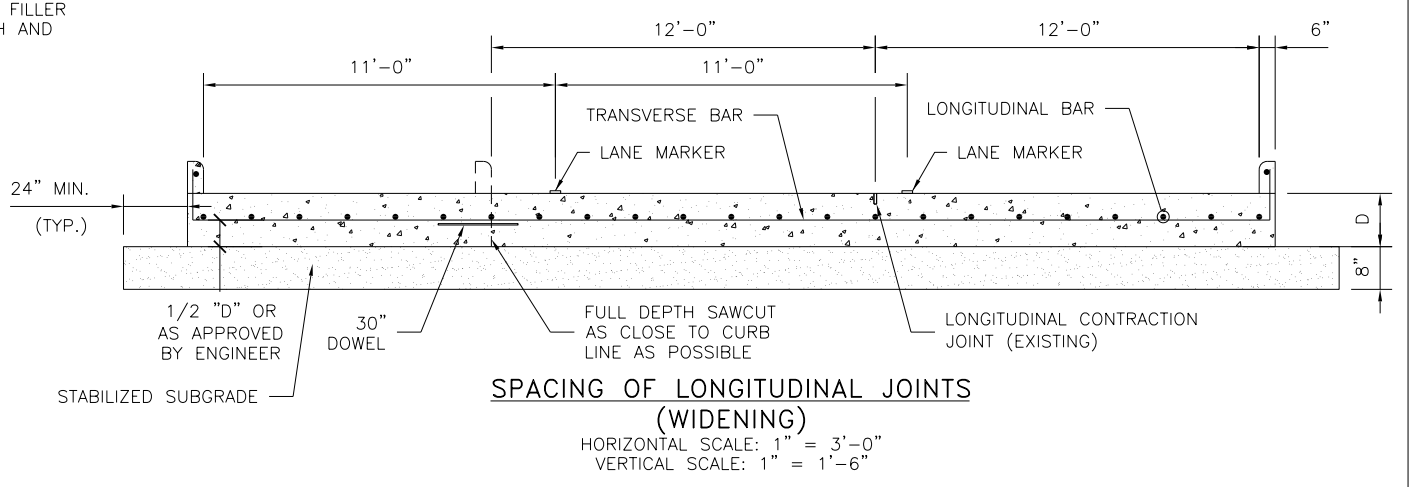
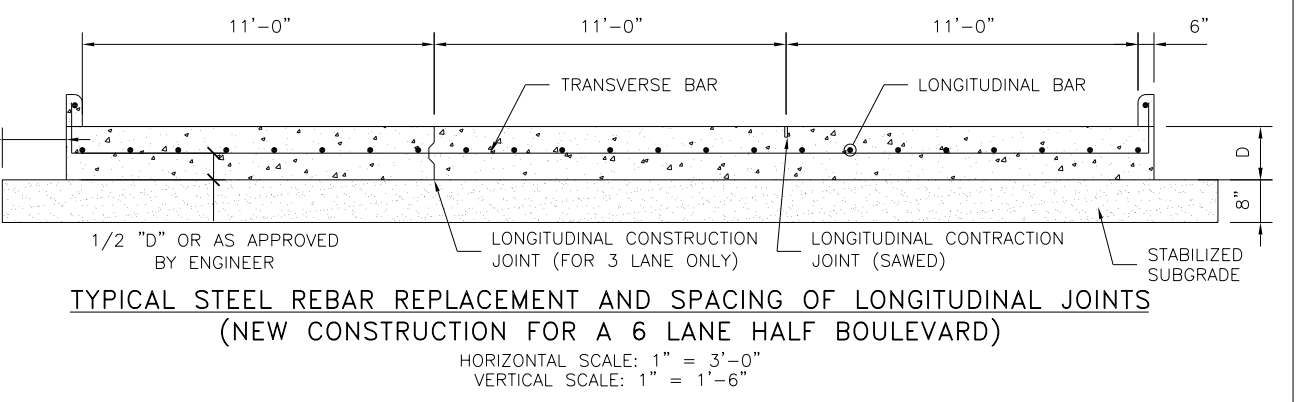
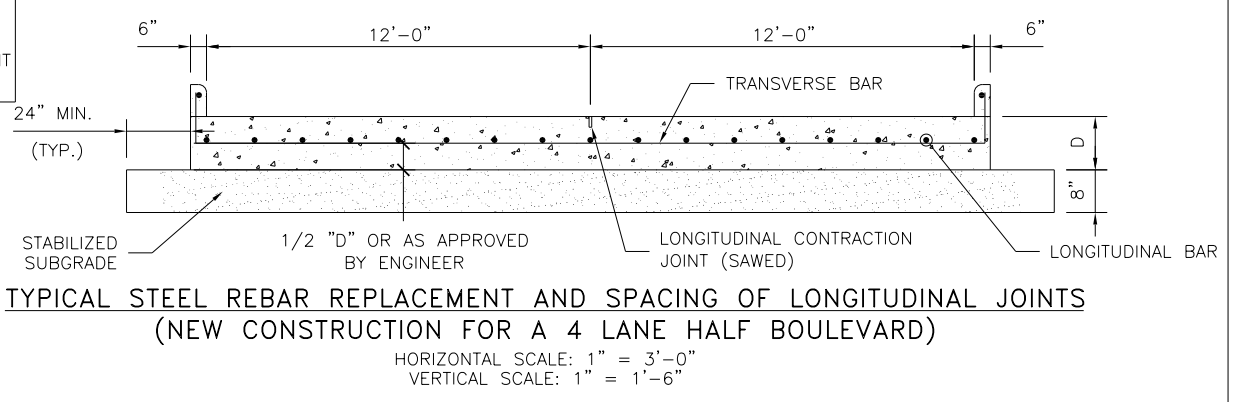
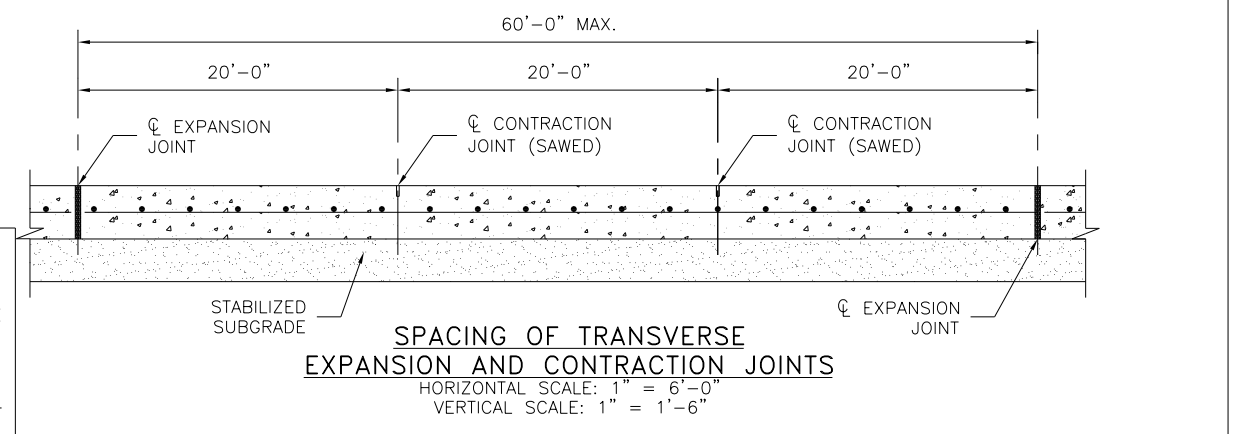


PROJECT TITLE: BELKNAP ROAD		
DRAWN BY: INIT		FBCD STANDARD
CK'D BY: INIT	SHEET DESCRIPTION: CONCRETE PAVEMENT DETAILS	05
SCALE: AS NOTED	SHEET 1 OF 3	SHEET NO:
DATE: 3-1-22	APPROVED BY:	/130

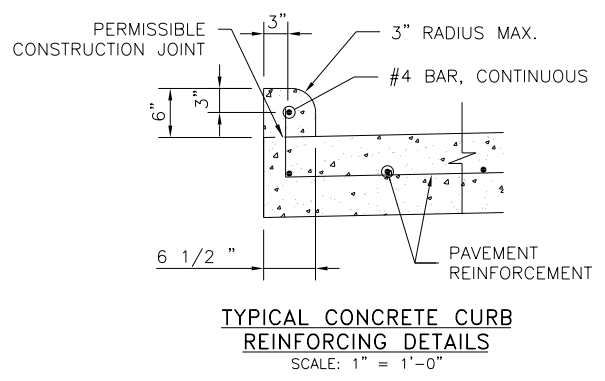
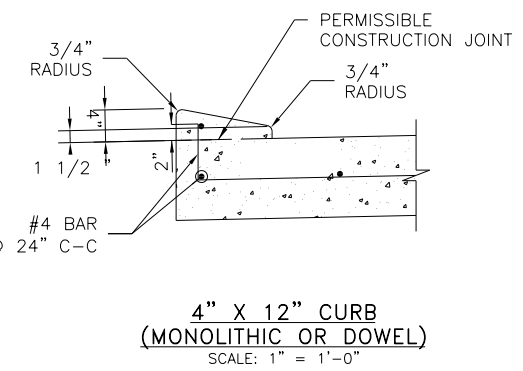
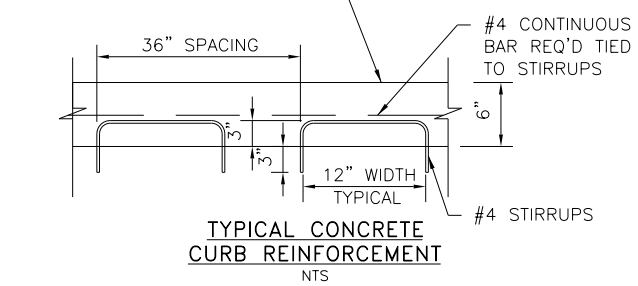
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- SLAB AND REBAR NOTES:**
1. TYPICAL SLAB THICKNESS D=8"
 2. TYPICAL REBAR SIZE AND SPACING ARE:
a. #4 BAR @ 18" C-C LONGITUDINAL
b. #4 BAR @ 18" C-C TRANSVERSE
 3. REBAR SIZE FOR PAVEMENT LESS THAN 8" THICK
a. #4 BAR @ 24" C-C LONGITUDINAL
b. #4 BAR @ 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.

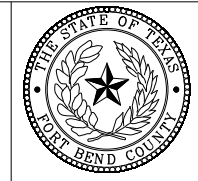


- NOTES FOR CURB:**
1. AT EACH PAVEMENT CONTRACTION JOINT, PROVIDE A 1/4" THICK PRE-MOLDED EXPANSION JOINT AT THE FULL WIDTH AND HEIGHT OF THE CURB.
 2. FOR EACH PAVEMENT EXPANSION JOINT, THE PRE-MOLDED EXPANSION JOINT FILLER MATERIAL SHALL BE THE FULL WIDTH AND HEIGHT OF THE CURB.



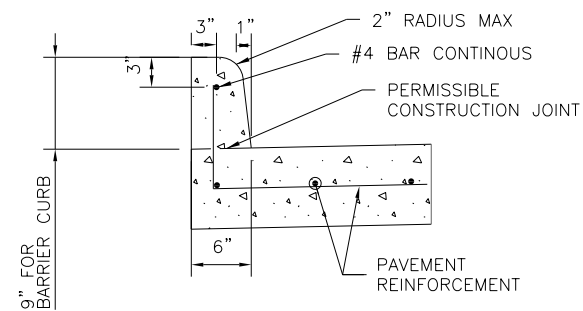
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FORT BEND COUNTY
ENGINEERING DEPARTMENT

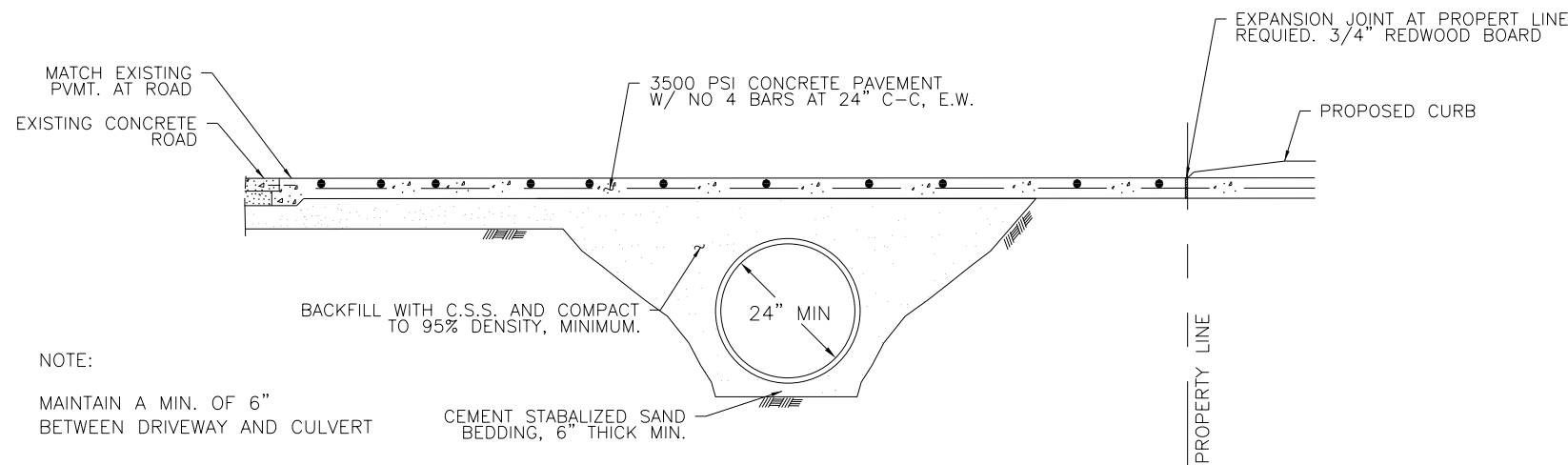


PROJECT TITLE: BELKNAP ROAD		FBCD STANDARD: 06
DRAWN BY: INIT	SHEET DESCRIPTION: CONCRETE PAVEMENT DETAILS	SHEET NO: /131
CK'D BY: INIT		
SCALE: AS NOTED	SHEET 2 OF 3	
DATE: 3-1-22	APPROVED BY:	

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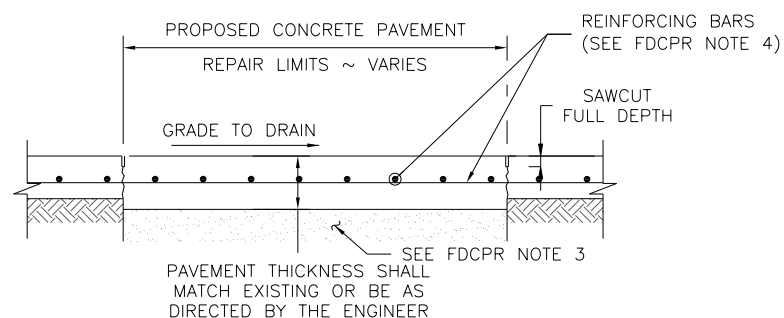
9" BARRIER CURB



NOTE:

MAINTAIN A MIN. OF 6" BETWEEN DRIVEWAY AND CULVERT

CONCRETE APRON DETAIL - DRIVEWAY PROFILE FOR CULVERT DRAINAGE



FULL DEPTH CONCRETE PAVEMENT REPAIR

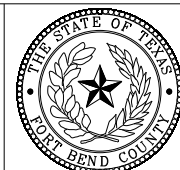
HORIZONTAL SCALE: 1" = 3'-0"
VERTICAL SCALE: 1" = 1'-6"

FULL DEPTH CONCRETE PAVEMENT REPAIR (FDCPR) NOTES:

1. ONLY FULL DEPTH SAWCUTS WILL BE ALLOWED
2. EXISTING CONCRETE VERTICAL FACES SHALL BE CLEANED OF ALL DELETERIOUS LOOSE MATERIAL PRIOR TO CONCRETE PLACEMENT.
3. FOR REPAIR/REPLACE AREAS, A 8" DEPTH BASE SHALL BE REMOVED AND REPLACED WITH CEMENT STABILIZED SAND PER ITEM 433 HARRIS COUNTY SPECIFICATIONS.
4. REINFORCEMENT OF 9"-10" THICK CONCRETE PAVEMENT SHALL BE NO. 5 BARS AT 18" SPACING IN EACH DIRECTION. REFER TO TABLE ON CONCRETE PAVEMENT SHEET 2 OF 2
5. REFER TO FBC STREET ACCEPTANCE GUIDELINES

NO.	REVISIONS	DATE	NAME
▲	ORIGINAL STANDARD ISSUED	3-1-22	RJS
▲			
▲			
▲			

FORT BEND COUNTY
ENGINEERING DEPARTMENT



PROJECT TITLE: BELKNAP ROAD		FBCED STANDARD
DRAWN BY: INIT	SHEET DESCRIPTION: CONCRETE PAVEMENT DETAILS	07
CK'D BY: INIT		SHEET NO:
SCALE: AS NOTED	SHEET 3 OF 3	132
DATE: 3-1-22	APPROVED BY:	

GENERAL NOTES

1. DEFINITION OF TERMS

T_{FS} - FAST TRACK CONCRETE PAVING DEPTH AT INTERSECTIONS AND LEAVE OUTS.
 T - NOMINAL CONCRETE PAVING DEPTH AS SHOWN IN THE PLANS.
 DETERMINE FAST TRACK CONCRETE PAVING DEPTH USING TABLE 1 AND THE NOMINAL CONCRETE PAVING DEPTH "T" SHOWN IN THE PLANS.

2. AT INTERSECTIONS AND LEAVE-OUT LOCATIONS USE THE SAME LONGITUDINAL AND TRANSVERSE BAR SPACING FOR THE FAST TRACK PAVING AREA AS THAT USED FOR THE ADJACENT CONCRETE PAVING DEPTH "T" (EXCEPT BAR SIZE SHALL BE #7 ON SINGLE MAT). FOR SINGLE MAT FAST TRACK PAVING, PLACE THE LONGITUDINAL AND TRANSVERSE BARS FOR THE FAST TRACK PAVING AREA AT THE HORIZONTAL PLANE ELEVATION THAT IS TWO TIE-BAR DIAMETERS LOWER THAN THAT USED FOR THE ADJACENT CONCRETE PAVING DEPTH "T", AS SHOWN IN FIGURE 1. USE SINGLE MAT STEEL IN FAST TRACK PAVING AREAS ADJACENT TO PAVEMENT SLABS WITH SINGLE MAT REINFORCING. USE DOUBLE MAT STEEL IN FAST TRACK PAVING AREAS ADJACENT TO PAVEMENT SLABS WITH DOUBLE MAT REINFORCING.

3. THE REQUIRED FAST TRACK PAVING AREAS WILL BE SHOWN ON THE PLANS. THE CONTRACTOR HAS THE OPTION TO UTILIZE FAST TRACK CONCRETE PAVING AT U-TURNS, AT INTERSECTIONS, AT MINOR STREETS, AND AT DRIVEWAYS WITH FRONTAGE ROAD LEAVE-OUT AREAS THAT ARE NOT SHOWN ON THE PLANS, WITH PRIOR WRITTEN APPROVAL FROM THE ENGINEER. TYPICAL PAVING PLANS FOR THE INTERSECTION OF A MAJOR STREET WITH THE FRONTAGE ROAD ARE SHOWN AS FIGURE 2, AND FOR THE INTERSECTION OF A MINOR STREET OR DRIVEWAY WITH THE FRONTAGE ROAD AS FIGURE 3. FAST TRACK PAVE THE FRONTAGE ROAD FOR THE FULL FRONTAGE ROAD WIDTH AND PLACE IN STAGES AS REQUIRED.

4. USE ADDITIONAL #6 REINFORCING STEEL BARS (MINIMUM 42 INCHES LONG) AND SPACE THEM MIDWAY BETWEEN ALTERNATE LONGITUDINAL BARS ALONG THE TRANSVERSE CONSTRUCTION JOINT FORMED AT THE FAST TRACK PAVING INTERFACE (T_{FS} WITH THE ADJACENT PAVEMENT SLAB (T).

5. SPLICE LENGTH IS A MINIMUM OF 33 TIMES THE NOMINAL STEEL DIAMETER.

6. PLACE THE CONCRETE PLACEMENT AT A UNIFORM DEPTH THROUGHOUT THE FAST TRACK CONCRETE PAVING AREA.

7. FOR CONTINUOUS SECTIONS OF ROADWAY WHERE FAST TRACK PAVING IS THE PRIMARY PAVEMENT TYPE, USE THE BAR SIZE AND SPACING FROM THE CRCP STANDARDS THAT CORRESPONDS TO THE FAST TRACK SLAB THICKNESS.

8. USE LONGITUDINAL TIE-BARS OF THE SAME SIZE DIAMETER AND SPACING AS THE LONGITUDINAL BAR. A SINGLE PIECE TIE-BAR MAY BE USED IF THE 33 TIMES DIAMETER TIE-BAR PROJECTION DOES NOT INTERFERE WITH THE SAFE HANDLING OF TRAFFIC.

9. BASE THE DEPTH OF SAW CUTS FOR SAWED JOINTS ON THE FAST TRACK CONCRETE PAVEMENT THICKNESS.

10. THIS STANDARD IS NOT INTENDED TO REPLACE OTHER STANDARDS EXCEPT WHERE SPECIFICALLY STATED HEREIN. FOR PAVING DETAILS NOT SHOWN ON THIS DRAWING, REFER TO THE STANDARD SHEETS FOR CONTINUOUSLY REINFORCED CONCRETE PAVEMENT SHOWN ELSEWHERE IN THE PLANS.

TABLE 1

EQUIVALENT PAVEMENT THICKNESS	
T^* (IN.)	T_{FS}^{**} (IN.)
<12"	$T+3"$
>12"	15"

* WITH BASE STRUCTURE OF:
 1" ASPHALT STABILIZED BASE
 6" PORTLAND CEMENT TREATED BASE
 6" LIME TREATED SUBGRADE

** ON AS CUT SUBGRADE

*** SEE JOINT SEALING DETAILS ON CRCP STANDARDS

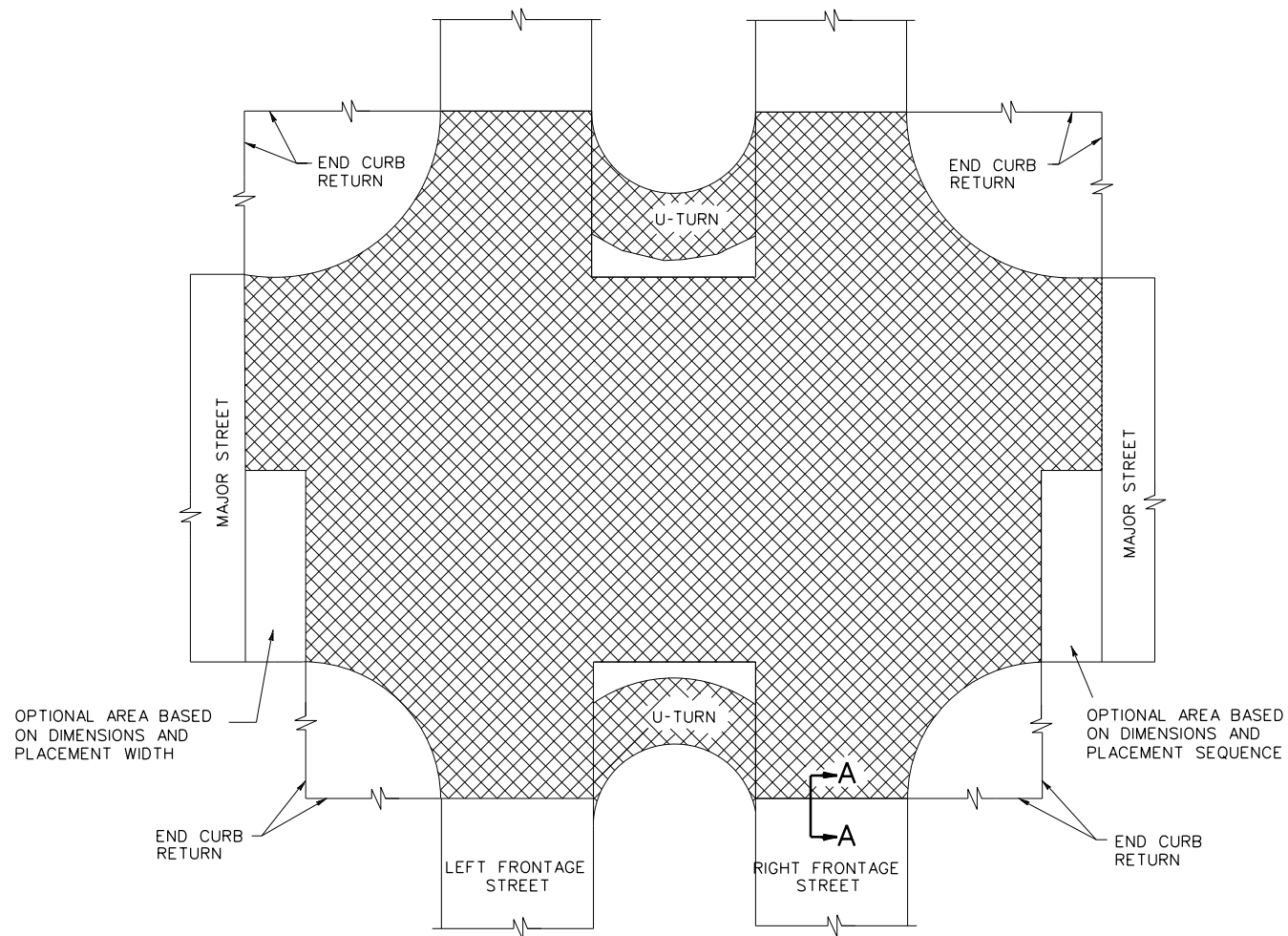


FIGURE 2

INTERSECTION OF MAJOR STREET WITH FRONTAGE STREET

FAST TRACK PAVING AREA

TYPICAL PAVING PLANS

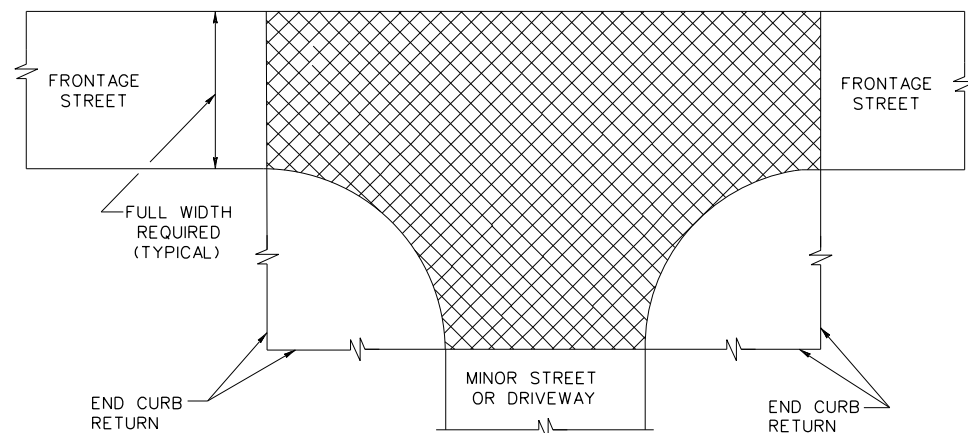
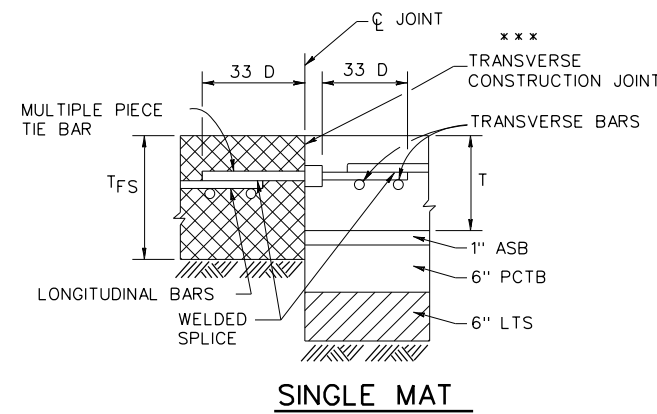


FIGURE 3

INTERSECTION OF MINOR STREET OR DRIVEWAY WITH FRONTAGE STREET



SINGLE MAT

TRANSVERSE CONSTRUCTION JOINTS

SECTION A - A
 FIGURE 1

LEGEND

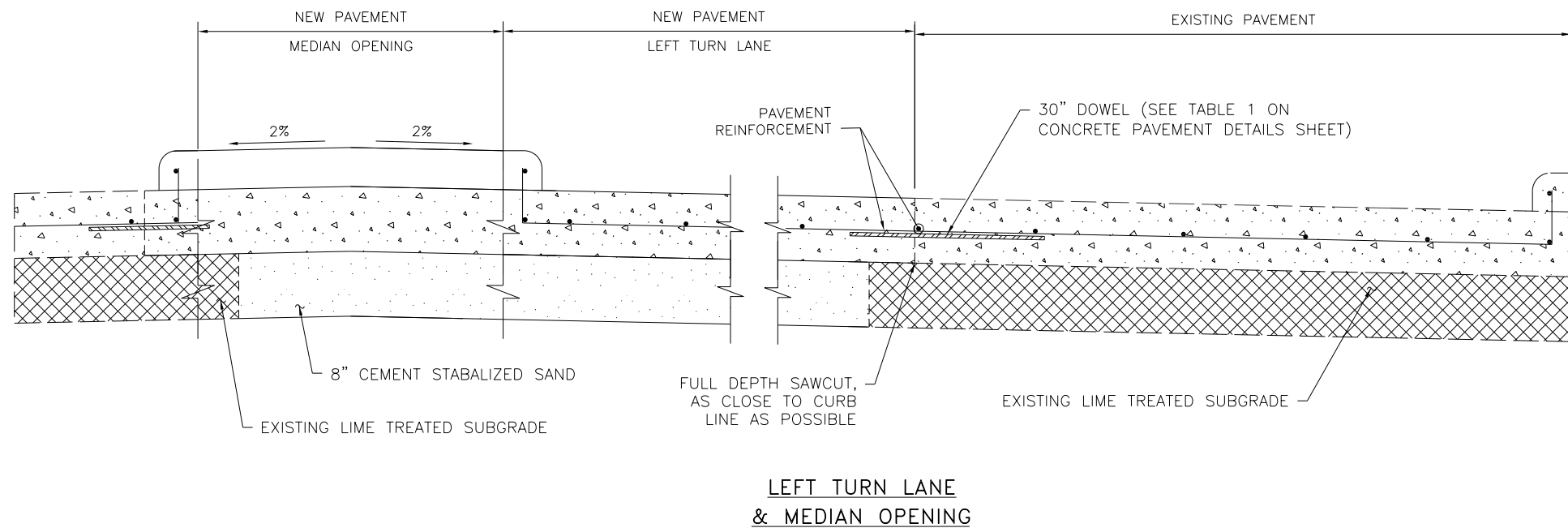
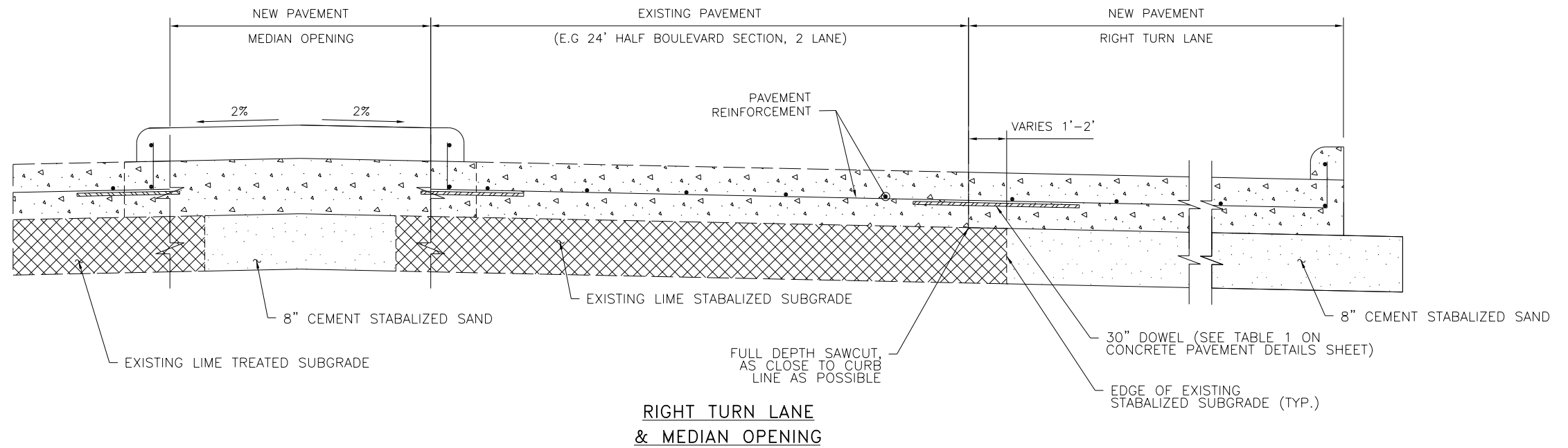
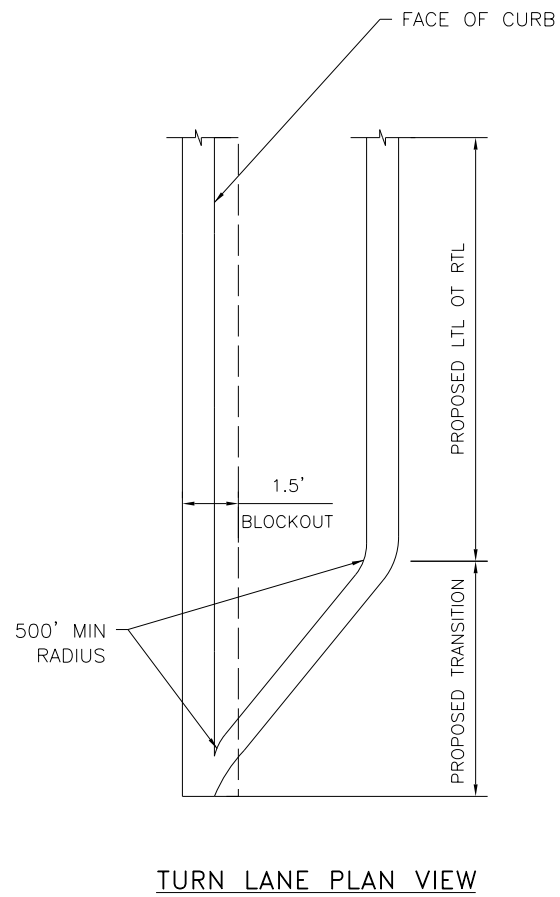
- ASB - ASPHALT STABILIZED BASE
- CRCP - CONTINUOUSLY REINFORCED CONCRETE PAVEMENT
- D - DIAMETER
- LTS - LIME TREATED SUBGRADE
- PCTB - PORTLAND CEMENT TREATED BASE



FAST TRACK CONTINUOUSLY REINFORCED CONCRETE PAVEMENT DETAILS CRCP-FT

FILE: STDB-4.dgn	DN:	CK:	DW:	CK:
© TxDOT DEC. 2009	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS 5/05 2004 SPECS 2/15 2014 SPECS	HOU	6		
	COUNTY	CONTROL	SECT	JOB
				HIGHWAY

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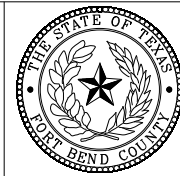


NOTES

- FOR CONCRETE PAVEMENT REINFORCEMENT AND JOINT DETAILS, SEE CONCRETE PAVEMENT DETAILS SHEET

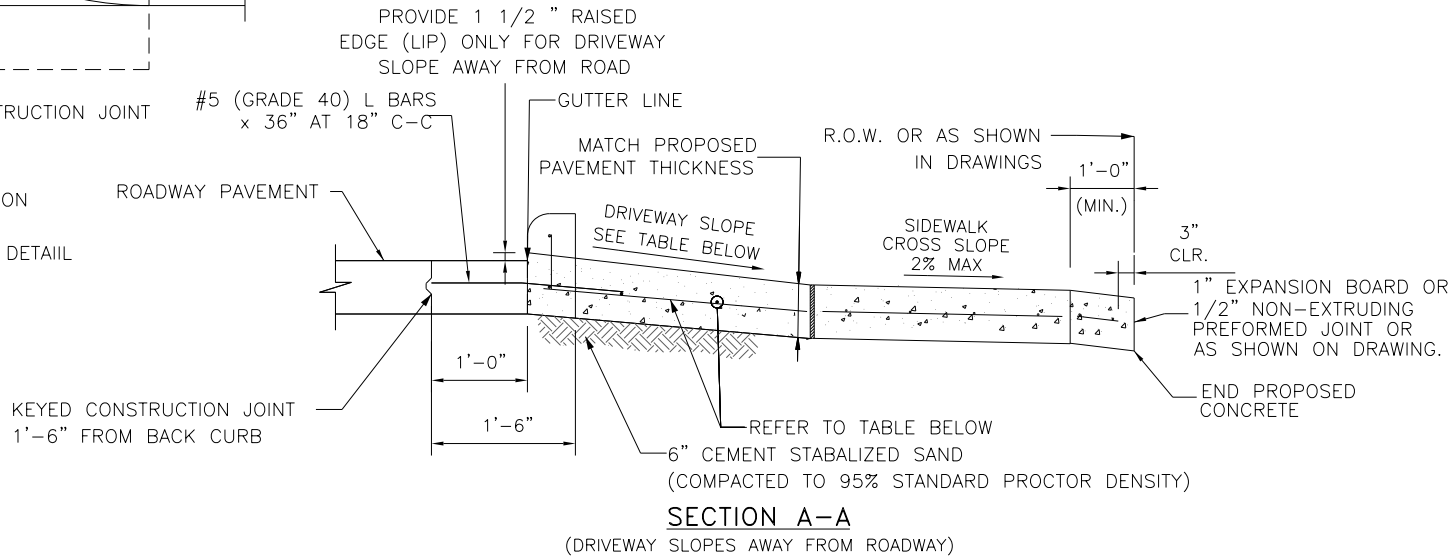
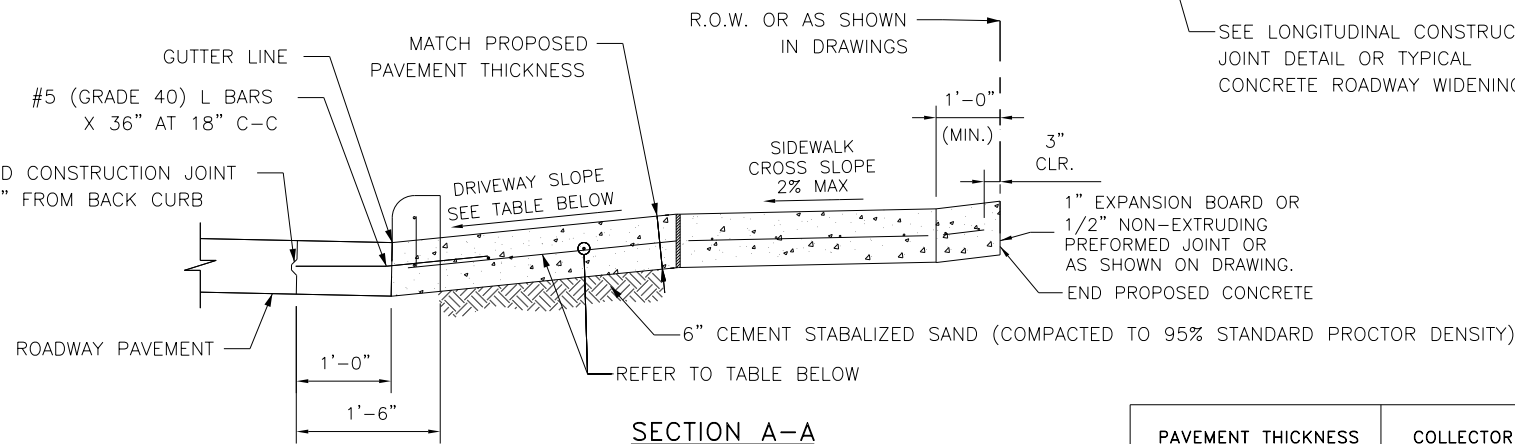
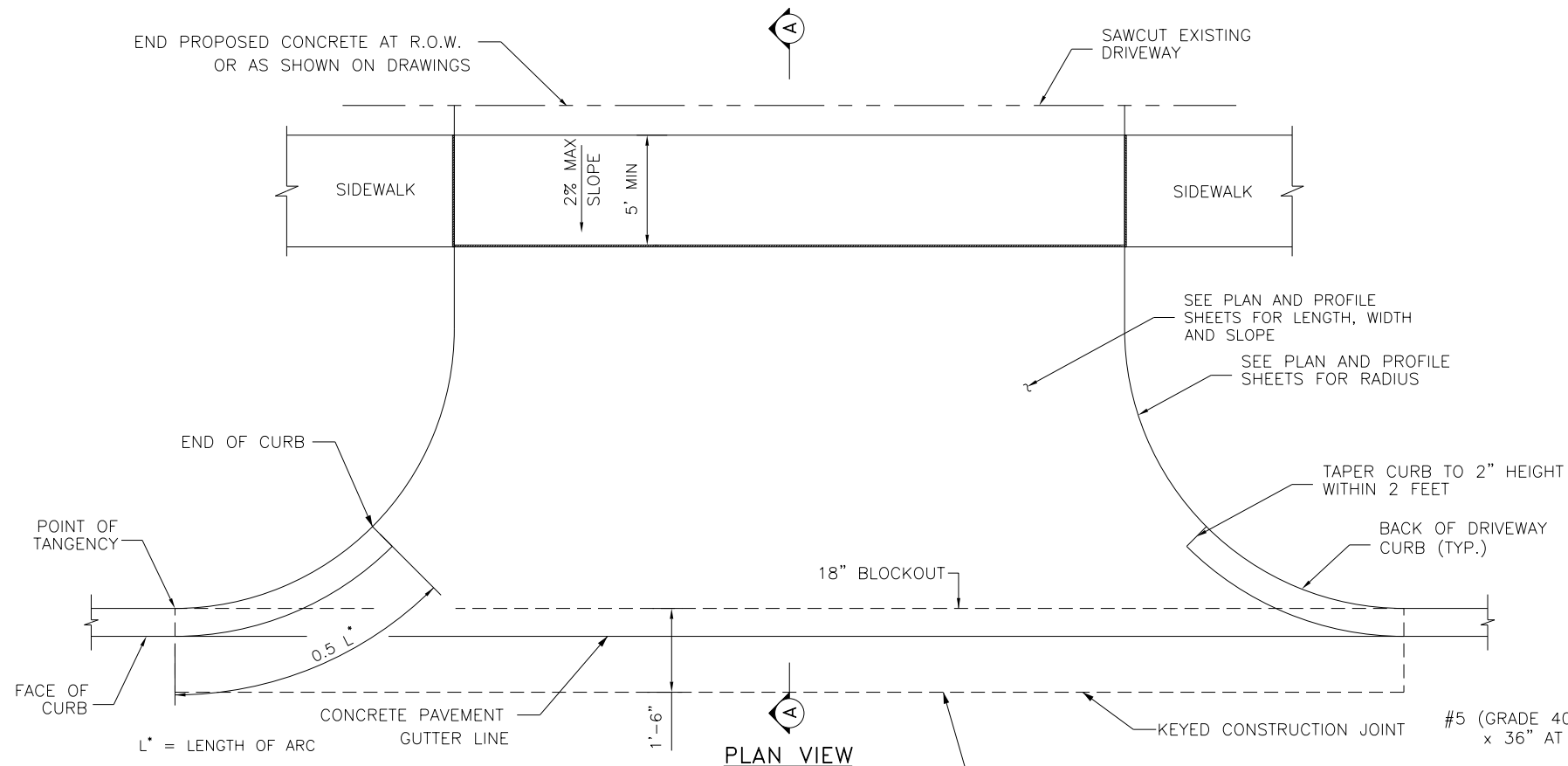
NO.	REVISIONS	DATE	NAME
▲	ORIGINAL STANDARD ISSUED	3-1-22	RJS
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FORT BEND COUNTY
ENGINEERING DEPARTMENT



PROJECT TITLE: BELKNAP ROAD		FBCD STANDARD
DRAWN BY: INIT	SHEET DESCRIPTION: TURN LANE & MEDIAN OPENING DETAIL	08
CK'D BY: INIT		SHEET NO:
SCALE: AS NOTED	APPROVED BY:	133
DATE: 3-1-22		

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NOTES:

1. SAWCUT EXISTING DRIVEWAY AT R.O.W. LINE OR AS SHOWN ON DRAWING AND REMOVE EXISTING DRIVEWAY TO SAWCUT LINE.
2. IF THERE IS EXISTING CURB ON DRIVEWAY, CONNECT PROPOSED CURB TO EXISTING CURB; OTHERWISE TAPER CURB HEIGHT AS SHOWN.
3. SEE PAVEMENT DETAIL SHEET FOR CONCRETE CURB REINFORCEMENT.
4. THIS DRIVEWAY INSTALLATION IS GOVERNED BY HARRIS COUNTY ITEM 360.
5. DRIVEWAY WIDTHS ARE MEASURED AT THE ROW LINE

MINIMUM RADII REQUIREMENTS - DRIVEWAYS

	LOCAL	COLLECTOR	MAJOR
RESIDENTIAL	5'	5'	-
COMMERCIAL	10'	10'	25'

DRIVEWAY WIDTHS

	MINIMUM	MAXIMUM
RESIDENTIAL	10'	25'
COMMERCIAL	20'	40'

SECTION A-A
(DRIVEWAY SLOPES TO ROADWAY)

SECTION A-A
(DRIVEWAY SLOPES AWAY FROM ROADWAY)

	PAVEMENT THICKNESS	COLLECTOR/MAJOR	RESIDENTIAL (MAJOR THOROUGHFARE)	RESIDENTIAL (COLLECTORS AND LOCAL STREETS)
REINFORCEMENT	6"	#4 @ 24" O.C.E.W.	N/A	#4 @ 24" O.C.E.W.
	7"	#4 @ 24" O.C.E.W.	#4 @ 24" O.C.E.W.	#4 @ 24" O.C.E.W.
	8"	#4 @ 18" O.C.E.W.	#4 @ 18" O.C.E.W.	#4 @ 18" O.C.E.W.
	9"-10"	#5 @ 18" O.C.E.W.	#5 @ 18" O.C.E.W.	#5 @ 18" O.C.E.W.
EXPANSION DOWEL JOINT	6"	3/4" DIA. SMOOTH BAR	3/4" DIA. SMOOTH BAR	3/4" DIA. SMOOTH BAR
	7"	1" DIA. SMOOTH BAR	1" DIA. SMOOTH BAR	1" DIA. SMOOTH BAR
	8"	1" DIA. SMOOTH BAR	1" DIA. SMOOTH BAR	1" DIA. SMOOTH BAR
	9"-10"	1 1/2" DIA. SMOOTH BAR	1 1/2" DIA. SMOOTH BAR	1 1/2" DIA. SMOOTH BAR
CONSTRUCTION JOINT DOWEL	ALL	#5 REBAR	#5 REBAR	#5 REBAR
SUBGRADE	ALL	6" CEMENT-STABILIZED SAND	2" BANK SAND	2" BANK SAND
DRIVEWAY SLOPE	ALL	2% TO 4%	2% TO 6%	2% TO 10%*

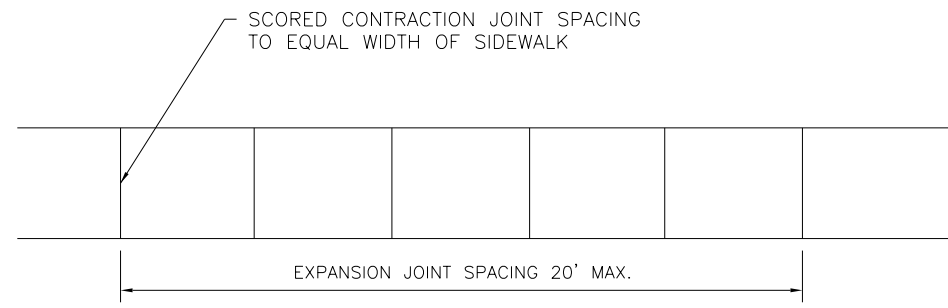
*10% ALLOWABLE ON PRIVATELY CONSTRUCTED PROJECTS
6% MAX ON PUBLIC PROJECTS

NO.	REVISIONS	DATE	NAME
1	ORIGINAL STANDARD ISSUED	3-1-22	RJS

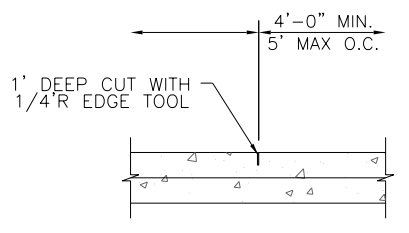
FORT BEND COUNTY
ENGINEERING DEPARTMENT



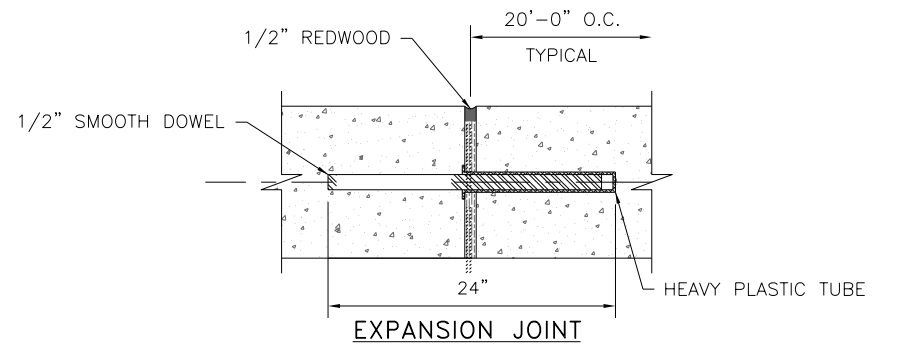
PROJECT TITLE: BELKNAP ROAD		FBCD STANDARD 10
DRAWN BY: INIT	SHEET DESCRIPTION: DRIVEWAY DETAILS FOR	
CK'D BY: INIT	MAJOR ROADWAY CONSTRUCTION	SHEET NO: 134
DATE: 3-1-22	APPROVED BY:	



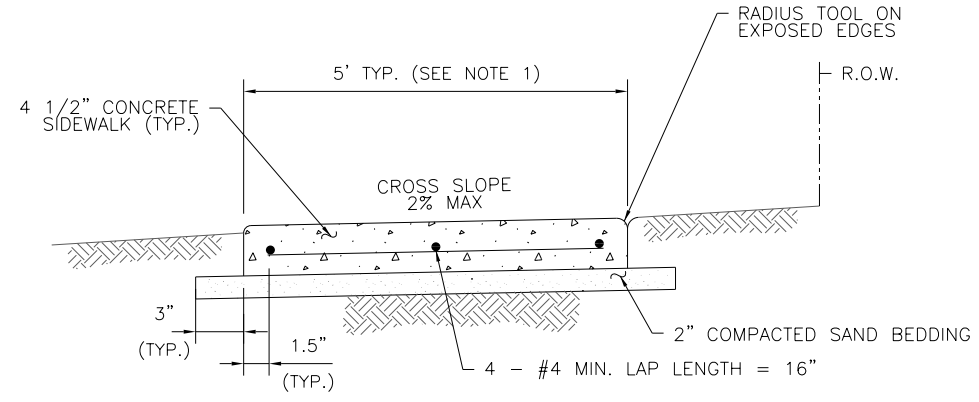
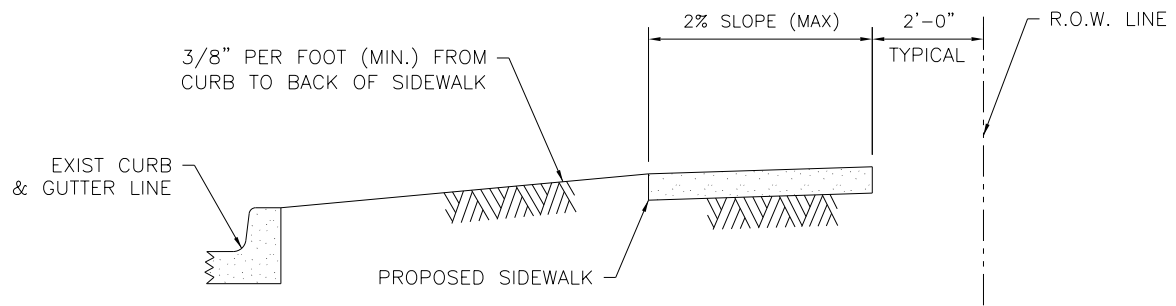
SIDEWALK JOINT DETAILS



CONTRACTION JOINT SEAL



EXPANSION JOINT



SIDEWALK CROSS SECTION

NOTES:

1. TYPICAL SIDEWALK WIDTH IS 5'. SIDEWALKS OF 4' WIDTH ARE ALLOWED IN FRONT OF SINGLE FAMILY HOMES IF ALL DRIVEWAYS PROVIDE A 5' AREA FOR PASSING. SIDEWALKS OF 4' WITH 5' X 5' PASSING ZONES MUST BE SPECIFICALLY APPROVED BY FORT BEND COUNTY
2. THE MAXIMUM WIDTH BETWEEN EXPANSION JOINTS SHALL NOT EXCEED 20'-0"
3. EXPANSION JOINT IS TO BE 1/2" THICK CLEAR HEART REDWOOD DOWELS
4. SCORED CONTRACTION JOINTS SHALL BE EVERY 5' OR EQUAL TO SIDEWALK WIDTH
5. ALL EARTHEN AREAS ARE TO BE SODDED UNLESS SHOWN OTHERWISE ON DRAWINGS.
6. SIDEWALKS ARE TO BE REINFORCED CONCRETE (3500 PSI) WITH #3 BARS, 18 INCHES C-C.
7. USE RADIUS TOOL ON ALL EXPOSED EDGES.
8. MEMBRANE CURING COMPOUND IS REQUIRED AS DESCRIBED IN ITEM 526 IN THE TXDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION
9. SIDEWALK EXPANSION JOINTS SHALL CONFORM TO STREET EXPANSION JOINT STANDARDS

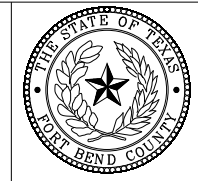
NOTE:

BANK SAND IS DEFINED AS A WELL-GRADED SAND, FREE OF SILT, CLAY, LOAM, FRIABLE OR SOLUBLE MATERIALS AND ORGANIC MATTER, MEETING THE UNIFIED SOILS CLASSIFICATION SYSTEM GROUP SW CRITERIA W/ A PLASTICITY INDEX OF LESS THAN 10, AND NO MORE THAN 12% OF MATERIAL CAN PASS THE NO. 200 SIEVE.

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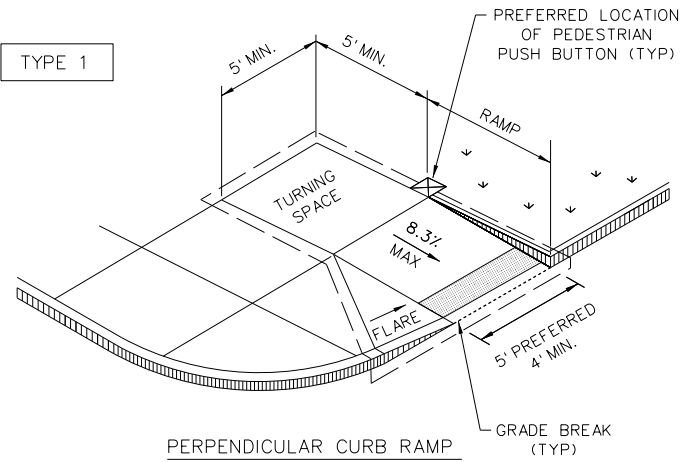
NO.	REVISIONS	DATE	NAME
▲	ORIGINAL STANDARD ISSUED	3-1-22	RJS
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FORT BEND COUNTY
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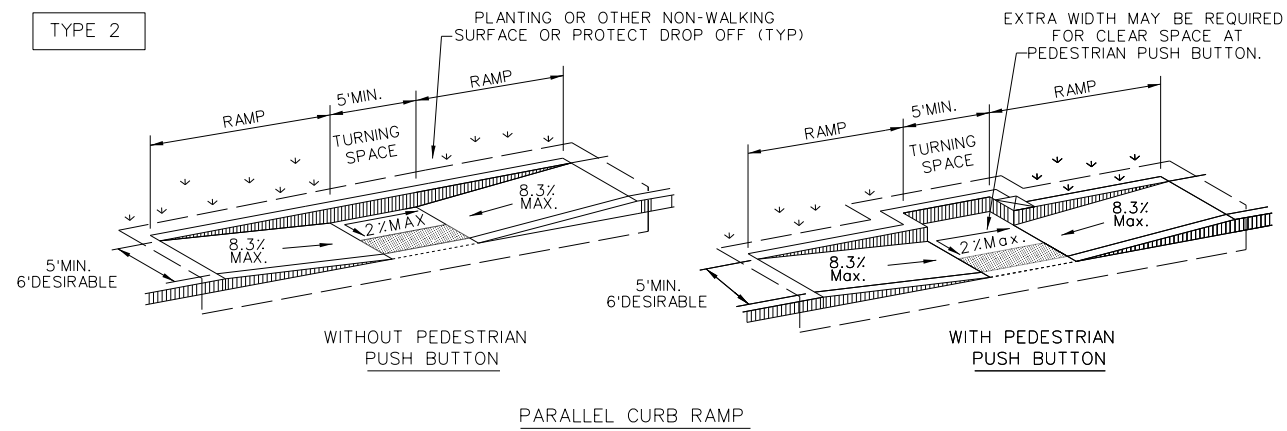
PROJECT TITLE: BELKNAP ROAD		FBCED STANDARD
DRAWN BY: INIT	SHEET DESCRIPTION: SIDEWALK DETAILS	13
CK'D BY: INIT		SHEET NO:
SCALE: AS NOTED	APPROVED BY:	135
DATE: 3-1-22		

TYPE 1



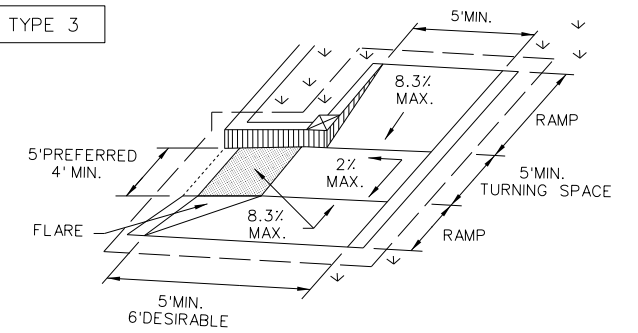
PERPENDICULAR CURB RAMP

TYPE 2

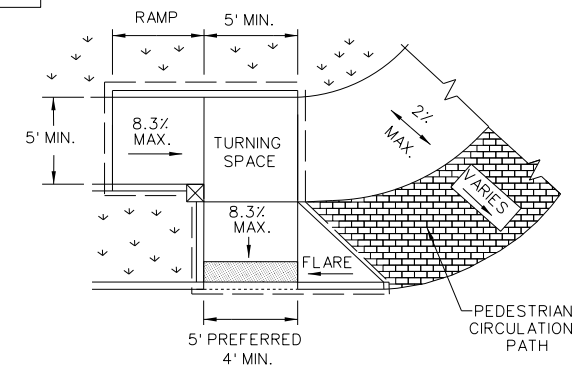


PARALLEL CURB RAMP

TYPE 3

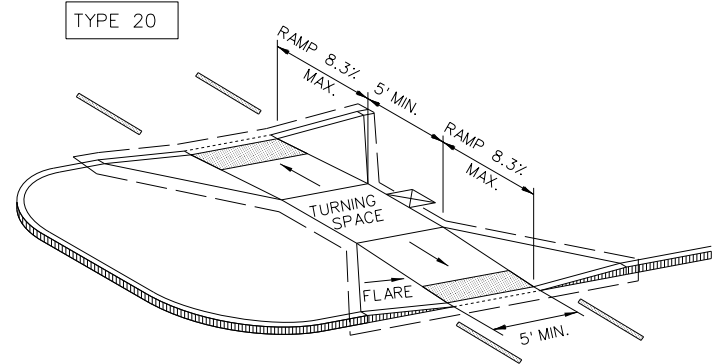


TYPE 6



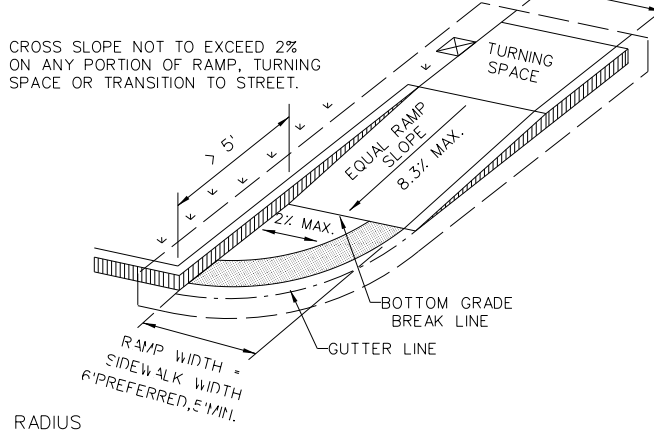
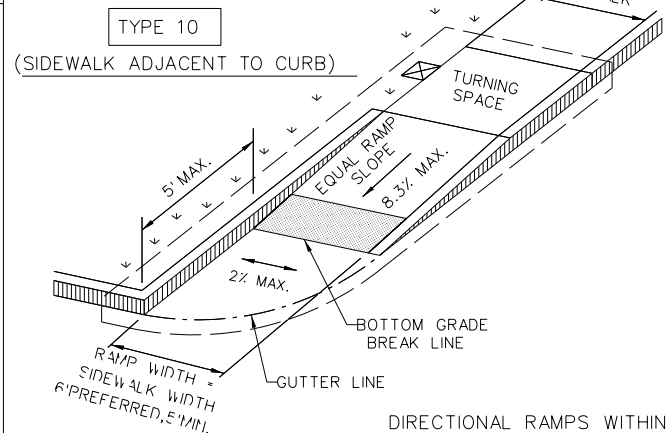
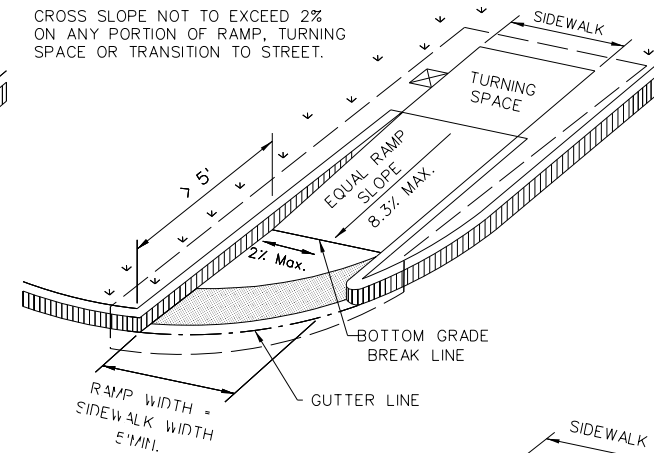
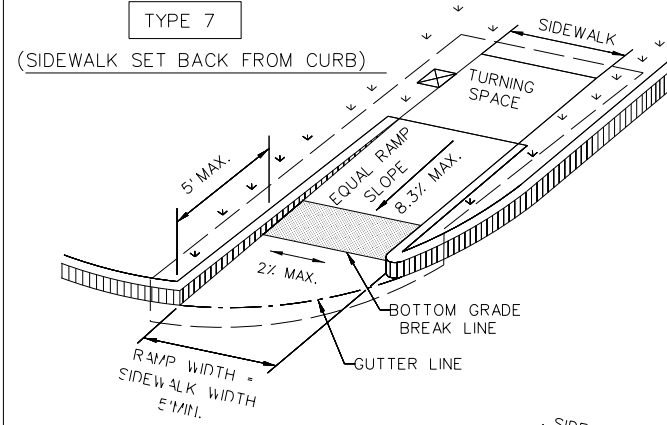
COMBINATION CURB RAMPS

TYPE 20



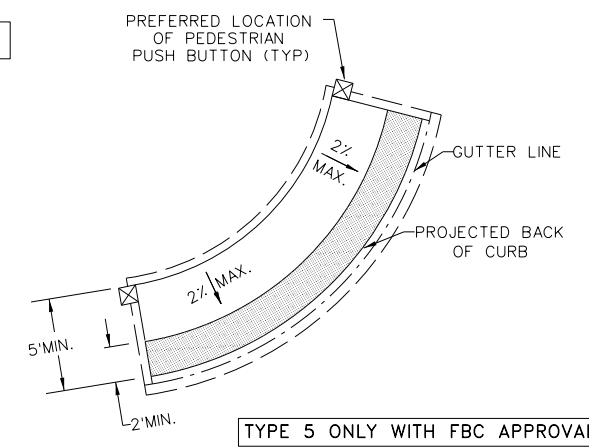
CURB RAMPS AT MEDIAN ISLANDS

TYPE 7



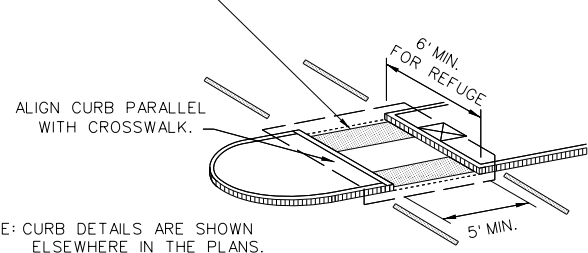
DIRECTIONAL RAMPS WITHIN RADIUS

TYPE 5



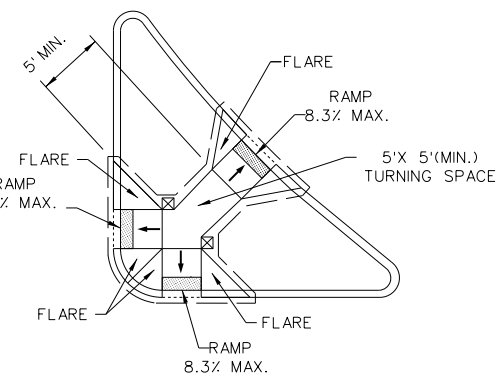
TYPE 5 ONLY WITH FBC APPROVAL

INSTALL DETECTABLE WARNING SURFACE AT EACH END OF THE CUT-THROUGH RAMP WITH A MINIMUM 2' USUAL SIDEWALK SURFACE BETWEEN. IF MEDIAN IS LESS THAN 6' WIDE, ELIMINATE DETECTABLE WARNING SURFACES.

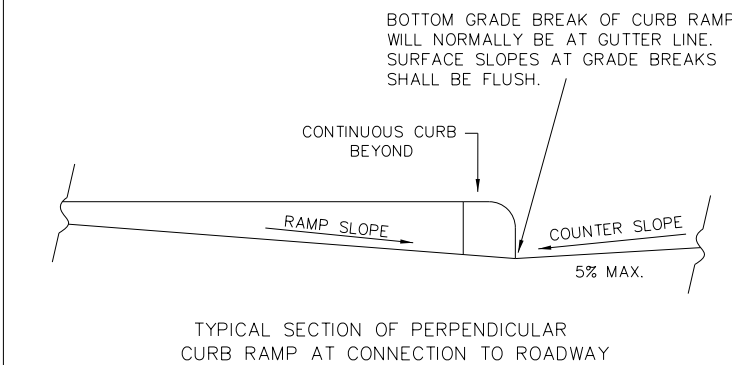


TYPE 21

TYPE 22



COMBINATION ISLAND RAMPS



TYPICAL SECTION OF PERPENDICULAR CURB RAMP AT CONNECTION TO ROADWAY

NOTES / LEGEND:

SEE GENERAL NOTES ON SHEET 2 OF 4 FOR MORE INFORMATION.

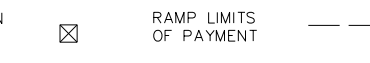
DENOTES PLANTING OR NON-WALKING SURFACE NOT PART OF PEDESTRIAN CIRCULATION PATH.



DETECTABLE WARNING SURFACE



DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON IF APPLICABLE.



NO.	REVISIONS	DATE	NAME
1	ORIGINAL STANDARD ISSUED	3-1-22	RJS
2			
3			
4			

FORT BEND COUNTY
ENGINEERING DEPARTMENT



PROJECT TITLE:		FBCD STANDARD
DRAWN BY: INIT	SHEET DESCRIPTION: PED-18 RAMP DETAILS	14
CK'D BY: INIT	SHEET 1 OF 4	SHEET NO: 136 /
SCALE: 1" = 1'	APPROVED BY:	
DATE: 3-1-22		

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GENERAL NOTES

CURB RAMPS

1. Install a curb ramp or blended transition at each pedestrian street crossing.
2. All slopes shown are maximum allowable. Cross slopes of 1.5% and lesser running should be used. Adjust curb ramp length or grade of approach sidewalks as directed.
3. Maximum allowable cross slope on sidewalk and curb ramp surfaces is 2%.
4. The minimum sidewalk width is 5'. Where the sidewalk is adjacent to the back of curb, a 6' sidewalk width is desirable. Where a 5' sidewalk cannot be provided due to site constraints, sidewalk width may be reduced to 4' for short distances. 5'x 5' passing areas at intervals not to exceed 200' are required.
5. Turning Spaces shall be 5'x 5' minimum. Cross slope shall be maximum 2%.
6. Clear space at the bottom of curb ramps shall be a minimum of 4'x 4' wholly contained within the crosswalk and wholly outside the parallel vehicular travel path.
7. Provide flared sides where the pedestrian circulation path crosses the curb ramp. Flared sides shall be sloped at 10% maximum, measured parallel to the curb. Returned curbs may be used only where pedestrians would not normally walk across the ramp, either because the adjacent surface is planted, substantially obstructed, or otherwise protected.
8. Additional information on curb ramp location, design, light reflective value and texture may be found in the latest draft of the Proposed Guidelines for Pedestrian Facilities in the Public Right of Way (PROWAG) as published by the U.S. Architectural and Transportation Barriers Compliance Board (Access Board).
9. To serve as a pedestrian refuge area, the median should be a minimum of 6' wide, measured from back of curbs. Medians should be designed to provide accessible passage over or through them.
10. Small channelization islands, which do not provide a minimum 5'x 5' landing at the top of curb ramps, shall be cut through level with the surface of the street.
11. Crosswalk dimensions, crosswalk markings and stop bar locations shall be as shown elsewhere in the plans. At intersections where crosswalk markings are not required, curb ramps shall align with theoretical crosswalks unless otherwise directed.
12. Provide curb ramps to connect the pedestrian access route at each pedestrian street crossing. Handrails are not required on curb ramps.
13. Curb ramps and landings shall be constructed and paid for in accordance with Item 531 "Sidewalks".
14. Place concrete at a minimum depth of 5" for ramps, flares and landings, unless otherwise directed.
15. Furnish and install No. 3 reinforcing steel bars at 18" o.c. both ways, unless otherwise directed.
16. Provide a smooth transition where the curb ramps connect to the street.
17. Curbs shown on sheet 1 within the limits of payment are considered part of the curb ramp for payment, whether it is concrete curb, gutter, or combined curb and gutter.
18. Existing features that comply with applicable standards may remain in place unless otherwise shown on the plans.

DETECTABLE WARNING MATERIAL

19. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with PROWAG. The surface must contrast visually with adjoining surfaces, including side flares. Furnish and install an approved cast-in-place dark brown or dark red detectable warning surface material adjacent to uncolored concrete, unless specified elsewhere in the plans.
20. Detectable Warning Materials must meet TxDOT Departmental Materials Specification DMS 4350 and be listed on the Material Producer List. Install products in accordance with manufacturer's specifications.
21. Detectable warning surfaces must be firm, stable and slip resistant.
22. Detectable warning surfaces shall be a minimum of 24 inches in depth in the direction of pedestrian travel, and extend the full width of the curb ramp or landing where the pedestrian access route enters the street.
23. Detectable warning surfaces shall be located so that the edge nearest the curb line is at the back of curb and neither end of that edge is greater than 5 feet from the back of curb. Detectable warning surfaces may be curved along the corner radius.
24. Shaded areas on Sheet 1 of 4 indicate the approximate location for the detectable warning surface for each curb ramp type.

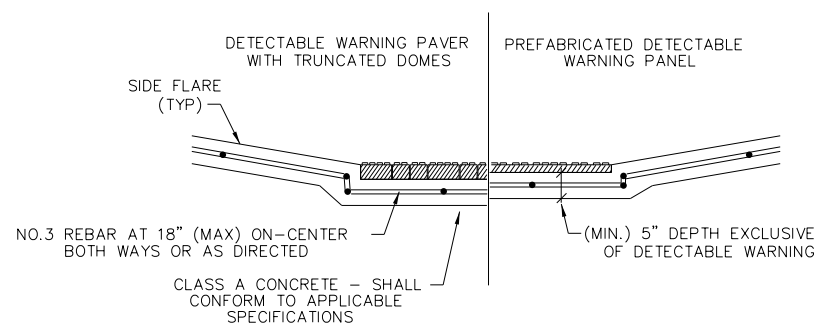
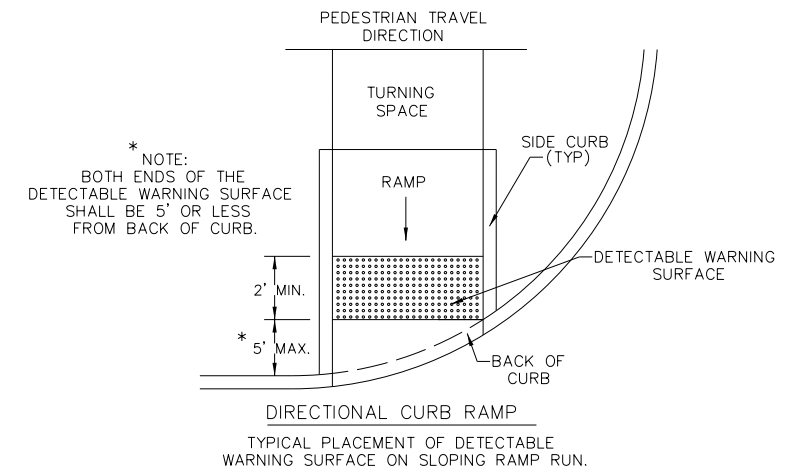
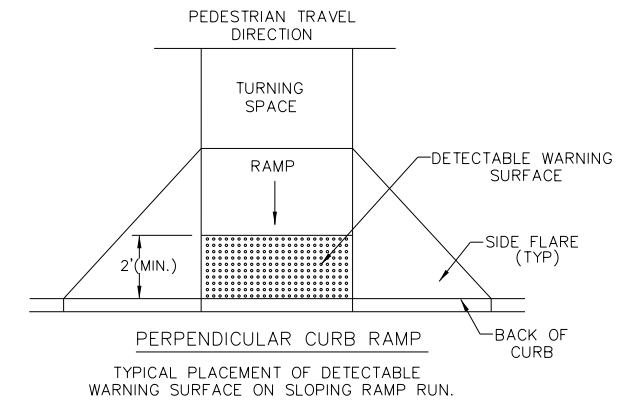
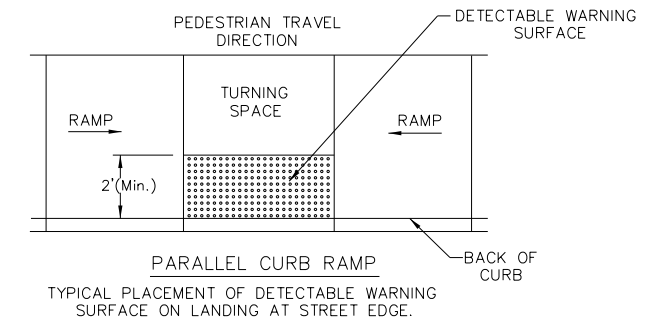
DETECTABLE WARNING PAVERS (IF USED)

25. Furnish detectable warning paver units meeting all requirements of ASTM C-936, C-33. Lay in a two by two unit basket weave pattern or as directed.
26. Lay full-size units first followed by closure units consisting of at least 25 percent (25%) of a full unit. Cut detectable warning paver units using a power saw.

SIDEWALKS

27. Provide clear ground space at operable parts, including pedestrian push buttons. Operable parts shall be placed within unobstructed reach range specified in PROWAG section R406.
28. Place traffic signal or illumination poles, ground boxes, controller boxes, signs, drainage facilities and other items so as not to obstruct the pedestrian access route or clear ground space.
29. Street grades and cross slopes shall be as shown elsewhere in the plans.
30. Changes in level greater than 1/4 inch are not permitted.
31. The least possible grade should be used to maximize accessibility. The running slope of sidewalks and crosswalks within the public right of way may follow the grade of the parallel roadway. Where a continuous grade greater than five percent (5%) must be provided, handrails may be desirable to improve accessibility. Handrails may also be needed to protect pedestrians from potentially hazardous conditions. If provided, handrails shall comply with PROWAG R409.
32. Handrail extensions shall not protrude into the usable landing area or into intersecting pedestrian routes.
33. Driveways and turnouts shall be constructed and paid for in accordance with Item "Intersections, Driveways and Turnouts". Sidewalks shall be constructed and paid for in accordance with Item, "Sidewalks".
34. Sidewalk details are shown elsewhere in the plans.

DETECTABLE WARNING SURFACE DETAILS



SECTION VIEW DETAIL
CURB RAMP AT DETECTABLE WARNINGS

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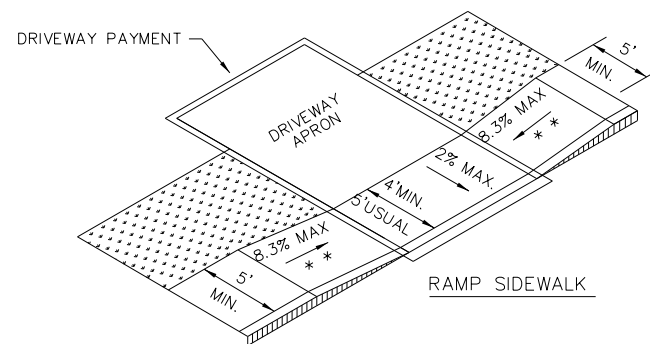
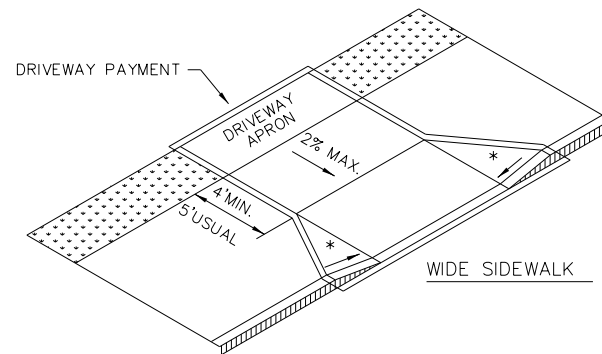
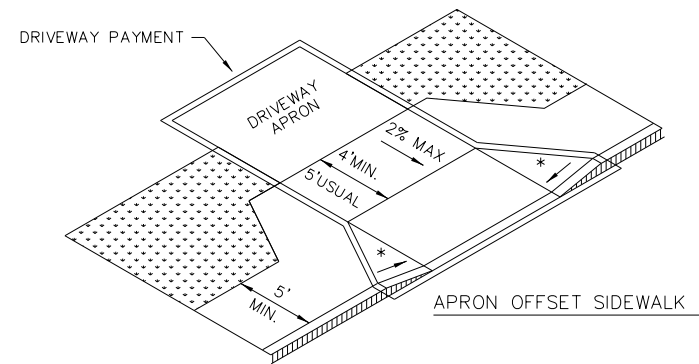
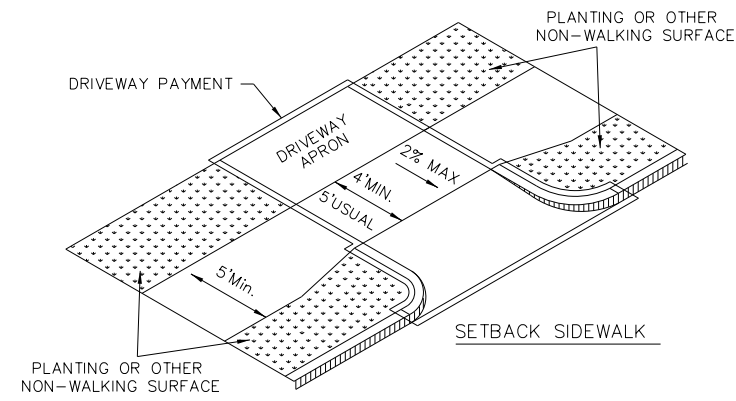
NO.	REVISIONS	DATE	NAME
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FORT BEND COUNTY
ENGINEERING DEPARTMENT

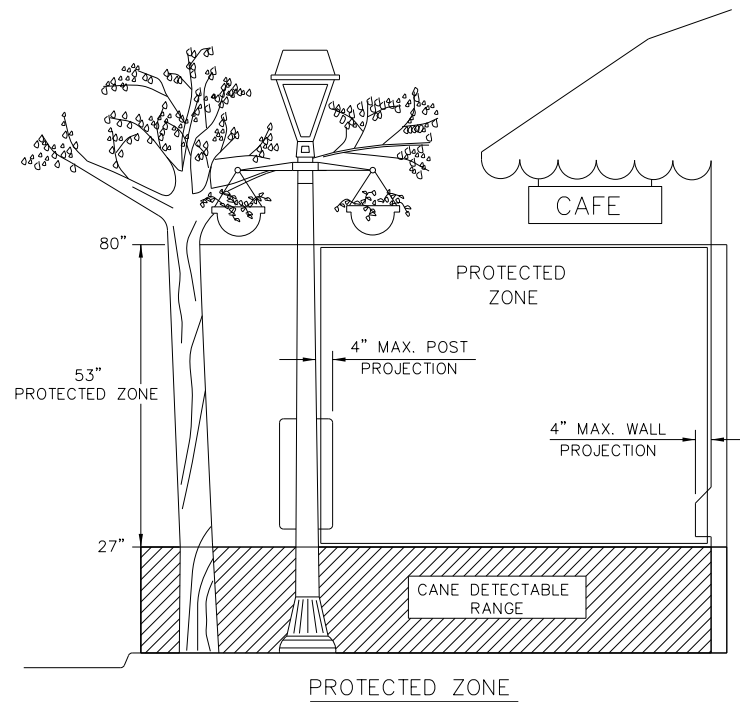


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CK'D BY: INIT	SHEET DESCRIPTION: PED-18 RAMP DETAILS	15
SCALE: 1" = 1'	SHEET 2 OF 4	SHEET NO:
DATE: 3-1-22	APPROVED BY:	137/

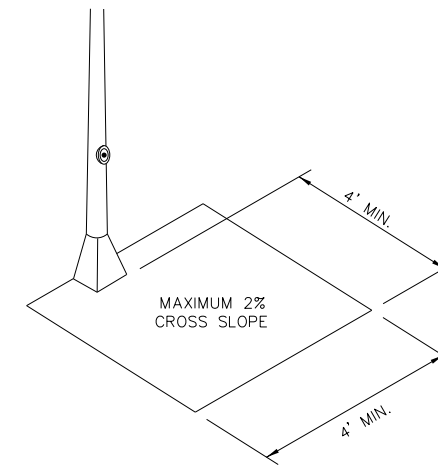
SIDEWALK TREATMENT AT DRIVEWAYS



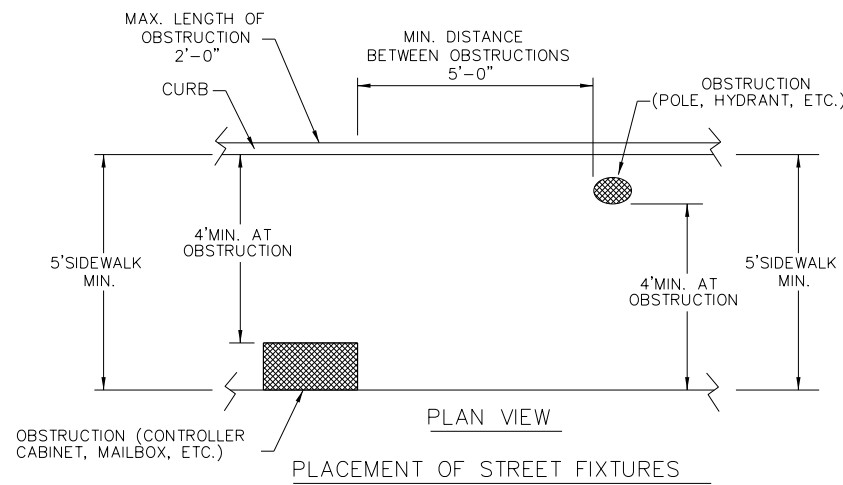
- NOTES:
- * WHERE DRIVEWAYS CROSS THE PEDESTRIAN ROUTE, SIDES SHALL BE FLARED AT 10% MAX SLOPE.
 - ** IF CURB HEIGHT IS GREATER THAN 6 INCHES, USE GRADE LESS THAN OR EQUAL TO 5%. HANDRAIL AND DETECTABLE WARNING ARE NOT REQUIRED.



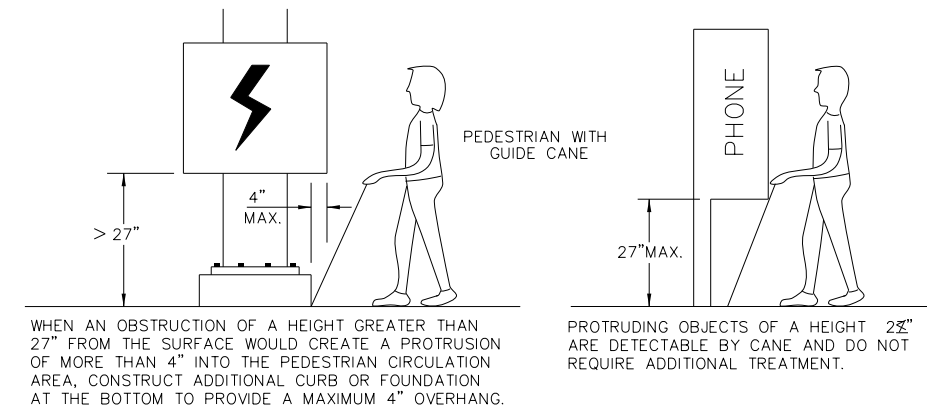
NOTE: IN PEDESTRIAN CIRCULATION AREA, MAXIMUM 4" PROJECTION FOR POST OR WALL MOUNTED OBJECTS BETWEEN 27" AND 80" ABOVE THE SURFACE.



CLEAR SPACE ADJACENT TO PEDESTRIAN PUSH BUTTON



NOTE: ITEMS NOT INTENDED FOR PUBLIC USE. MINIMUM 4' X 4' CLEAR GROUND SPACE REQUIRED AT PUBLIC USE FIXTURES.



DETECTION BARRIER FOR VERTICAL CLEARANCE 80"

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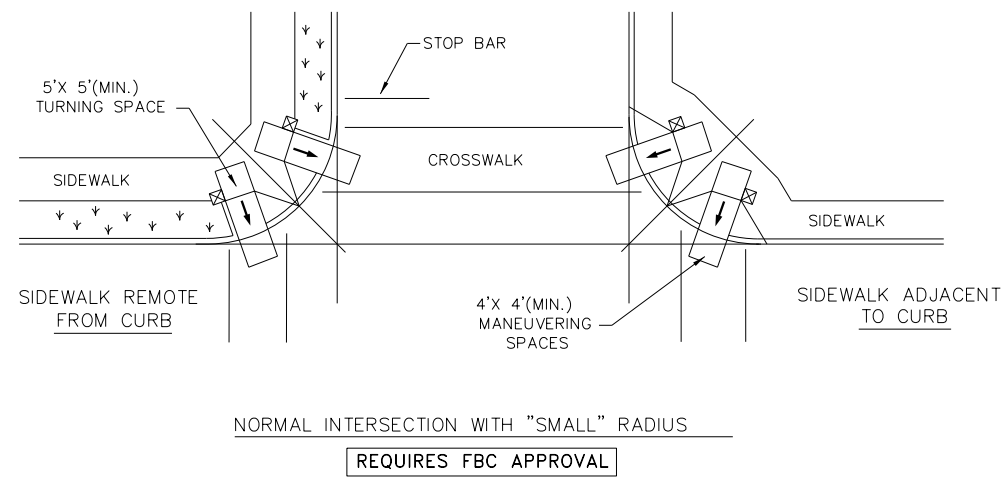
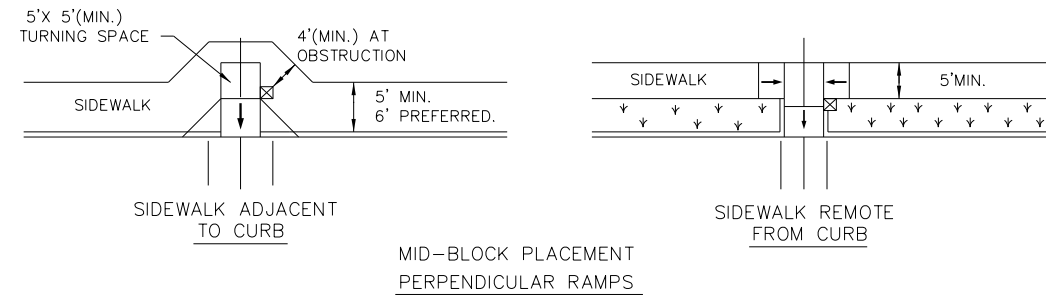
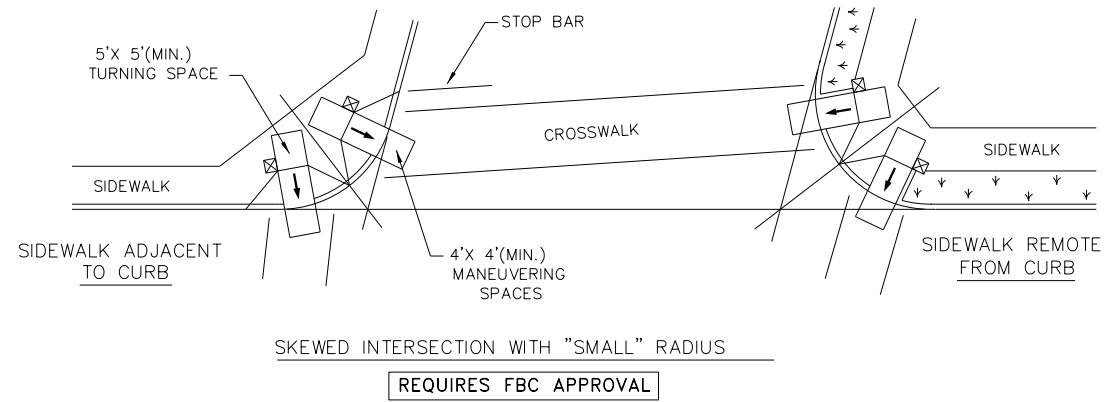
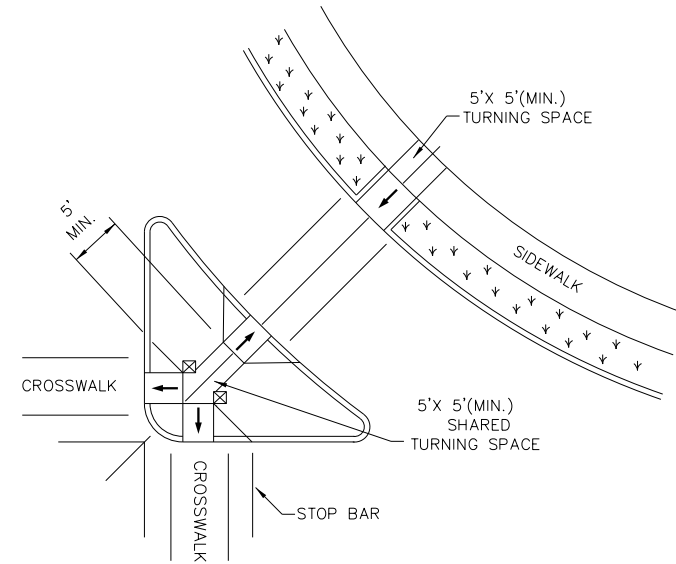
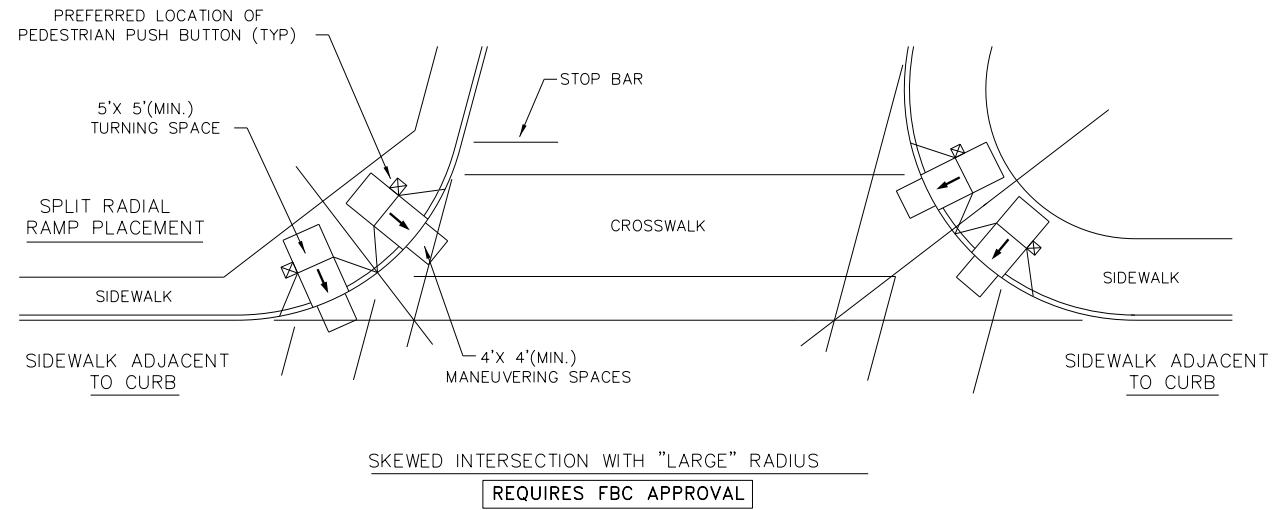
NO.	REVISIONS	DATE	NAME
▲	ORIGINAL STANDARD ISSUED	3-1-22	RJS
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FORT BEND COUNTY
ENGINEERING DEPARTMENT



PROJECT TITLE:		
DRAWN BY: INIT	SHEET DESCRIPTION: PED-18 RAMP DETAILS	FBCD STANDARD 16
CK'D BY: INIT		SHEET NO: 138/
SCALE: 1" = 1'	SHEET 3 OF 4	
DATE: 3-1-22	APPROVED BY:	

TYPICAL CROSSING LAYOUTS
SEE SHEET 1 OF 4 FOR DETAILS AND DIMENSIONS



LEGEND:

SHOWS DOWNWARD SLOPE. →

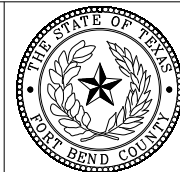
DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON (IF APPLICABLE). ☒

DENOTES PLANTING OR NON-WALKING SURFACE NOT PART OF PEDESTRIAN CIRCULATION PATH. ↙ ↘ ↙ ↘ ↙ ↘

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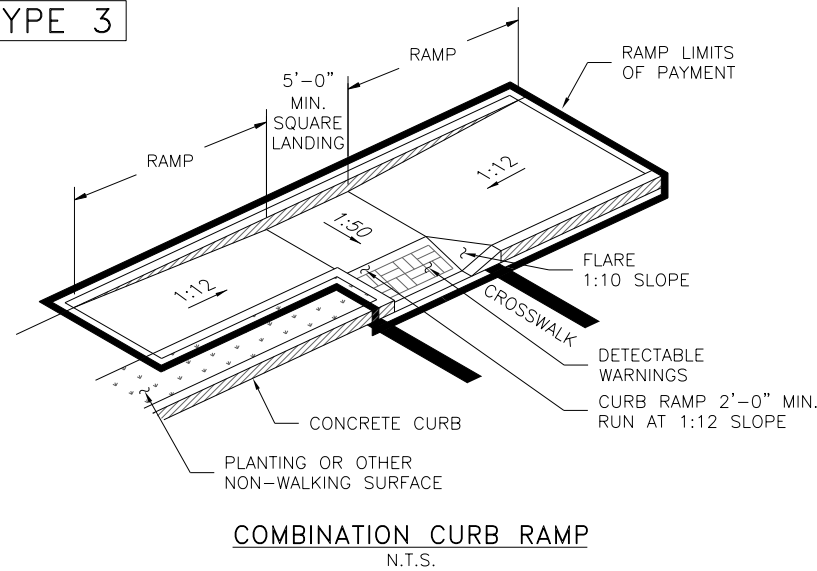
FORT BEND COUNTY
ENGINEERING DEPARTMENT



PROJECT TITLE:		
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SCALE: 1" = 1'	SHEET 4 OF 4	SHEET NO:
DATE: 3-1-22	APPROVED BY:	139/

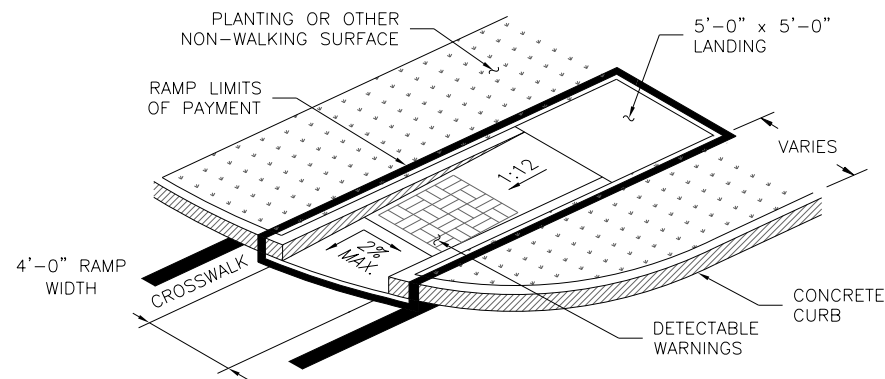
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TYPE 3



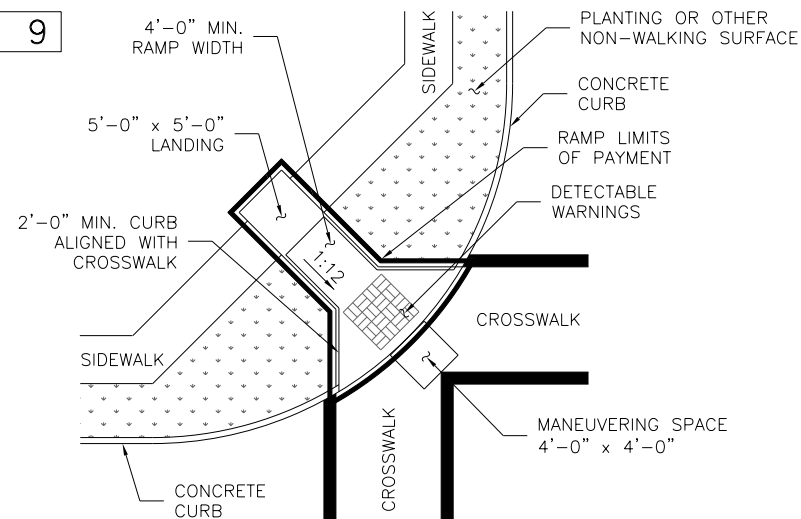
COMBINATION CURB RAMP
N.T.S.

TYPE 7



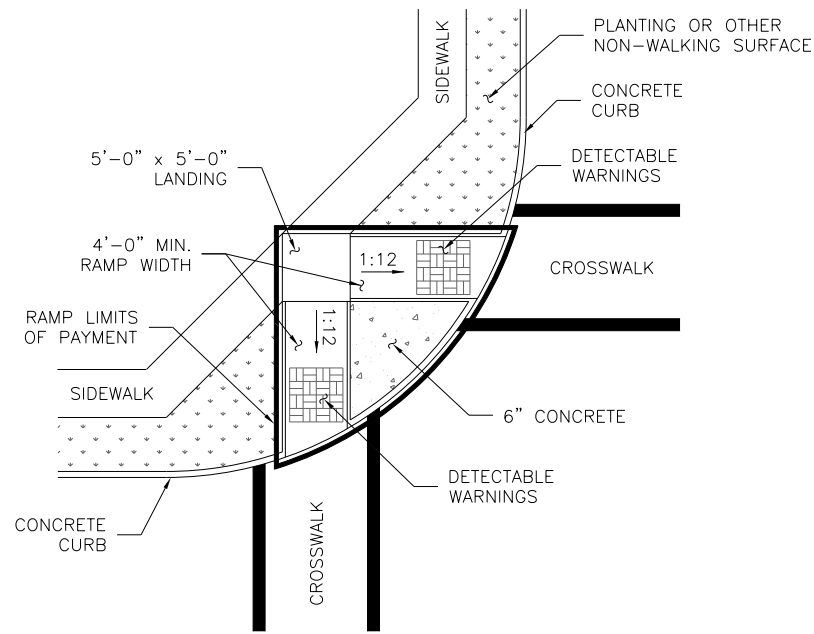
DIRECTIONAL CURB RAMP WITHIN RADIUS
N.T.S.

TYPE 9



DIAGONAL CURB RAMP (RETURNED CURB)
N.T.S.

TYPE 12

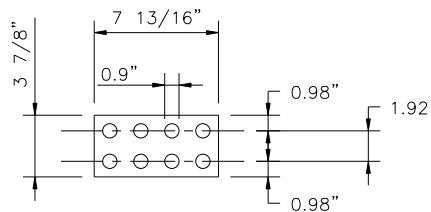


COMBINATION DIRECTIONAL CURB RAMP
N.T.S.

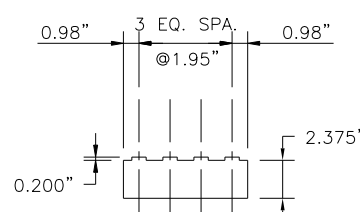
DETECTABLE WARNING GENERAL NOTES:

1. CONCRETE PAVER UNITS ARE REQUIRED FOR USE IN HARRIS COUNTY. ALTERNATIVE DETECTABLE WARNINGS THAT COMPLY WITH TAS AND TDLR GUIDELINES MAY BE SUBMITTED FOR CONSIDERATION TO HARRIS COUNTY PRIOR TO THE FINAL APPROVAL OF DESIGN DRAWINGS.
2. CONCRETE PAVER UNITS SHALL MEET ALL REQUIREMENTS OF ASTM C936, C33, AND SHALL BE LAID IN A TWO BY TWO UNIT BASKET WEAVE PATTERN, UNLESS OTHERWISE SHOWN IN THE PLANS.
3. CONCRETE PAVER UNITS SHALL BE BRICK RED AND HAVE A TRUNCATED DOME TOP SURFACE FOR DETECTABLE WARNING TO PEDESTRIANS.
4. CONCRETE PAVER UNITS SHALL BE SAW CUT ONLY AND ANY CUT UNIT SHALL BE NOT LESS THAN 25 PERCENT OF A FULL UNIT.
5. DETECTABLE WARNING SHALL BE A MINIMUM OF 24" IN DEPTH (IN THE DIRECTION OF PEDESTRIAN TRAVEL), AND EXTEND THE FULL WIDTH OF THE RAMP. (REFER TO TAS AND TDLR GUIDELINES)

TRUNCATED DOME PATTERN



PLAN VIEW
SCALE: 1" = 6"



ELEVATION VIEW
SCALE: 1" = 6"

CONCRETE PAVER WITH TRUNCATED DOME SURFACE

ACCESSIBLE CURB RAMPS AND LANDINGS GENERAL NOTES:

1. THE DESIGN AND CONSTRUCTION OF ALL ELEMENTS OF PEDESTRIAN FACILITIES SHALL MEET THE CRITERIA ESTABLISHED IN THE CURRENT EDITION OF THE TEXAS ACCESSIBILITY STANDARDS (TAS), AS PREPARED AND ADMINISTERED BY THE TEXAS DEPARTMENT OF LICENSING AND REGULATION (TDLR), UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
2. PEDESTRIAN FACILITIES AT SIGNALIZED INTERSECTION SHALL BE IN ACCORDANCE WITH APPLICABLE TRAFFIC SIGNAL DESIGN DRAWINGS.
3. ADJUSTMENT TO SIDEWALKS THAT CONNECT TO WHEELCHAIR RAMPS AND LANDINGS MAY BE NECESSARY TO MATCH BOTH THE GRADE AND THE WIDTH OF THE LANDING. THESE ADJUSTMENTS MAY NOT BE SHOWN ON THE DRAWINGS. WHEN DEEMED NECESSARY BY THE ENGINEER, FIELD ADJUSTMENT TO THE SIDEWALK SHALL BE MADE AS DIRECTED BY THE ENGINEER AND PAID FOR SEPARATELY, AS DIRECTED BY THE ENGINEER.
4. ALL ITEMS NECESSARY FOR THE CONSTRUCTION OF THE WHEELCHAIR RAMPS AND LANDINGS WITHIN THE "LIMITS OF PAYMENT" INDICATED ON APPROPRIATE WHEELCHAIR RAMP DETAILS AND DESIGN DRAWINGS (I.E., SAW CUT OF PAVEMENT, REMOVAL OF MATERIAL, EXCAVATION, DISPOSAL OF MATERIALS, ETC.) SHALL BE CONSIDERED INCIDENTAL TO THE COST OF THE WHEELCHAIR RAMP FOR PROJECTS THAT ARE DESIGNED AND/OR CONSTRUCTED USING HARRIS COUNTY RESOURCES.
5. FLATTER SLOPES THAT WILL STILL DRAIN PROPERLY MAY BE USED WHERE APPROPRIATE, SUBJECT TO THE REQUIREMENT OF NOTES 7, 8, AND 9.
6. RAMPS AND LANDINGS WITH DROP-OFFS GREATER THAT 6 INCHES IN HEIGHT SHALL HAVE CURB, RAILINGS, OR PROJECTING SURFACES. REFER TO TEXAS ACCESSIBILITY STANDARDS (TAS) AND THE ENGINEER.
7. ALL SLOPES SHOWN ARE MAXIMUM ALLOWABLE. THE CROSS SLOPE OF AN ACCESSIBLE ROUTE AND/OR LANDING MUST NOT EXCEED 1:50 (2%). ANY PART OF THE ACCESSIBLE ROUTE WITH A SLOPE GREATER THAN 1:20 (5%) SHALL BE CONSIDERED A RAMP.
8. IF A RAMP HAS A RISE GREATER THAT 6 INCHES, OR A HORIZONTAL PROJECTION GREATER THAT 72 INCHES, THEN IT SHALL HAVE HANDRAILS ON BOTH SIDES. THE ONLY EXCEPTIONS SHALL BE AT CURB RAMPS. HANDRAILS ARE NOT REQUIRED ON CURB RAMPS.
9. RAMP LENGTH OF GRADE OF APPROACH SIDEWALK SHALL BE SUBJECT TO ADJUSTMENT IN THE FIELD BY THE ENGINEER.
10. THE MAXIMUM ALLOWABLE CROSS SLOPE ON A SIDEWALK SHALL BE 2%.
11. THE MINIMUM THICKNESS FOR CURB RAMPS SHALL BE 4-1/2 INCHES.
12. CURB RAMPS WITH RETURN CURB MAY BE USED ONLY WHERE PEDESTRIANS WOULD NOT NORMALLY WALK ACROSS THE RAMP. OTHERWISE, FLARED SIDES SHALL BE PROVIDED.
13. CURB RAMPS AT MARKED CROSSINGS SHALL BE WHOLLY CONTAINED WITHIN THE MARKINGS. FLARED SIDES ASSOCIATED WITH CURB RAMPS ARE EXCLUDED FROM THIS REQUIREMENT.
14. A SMOOTH TRANSITION, IN ACCORDANCE WITH APPROPRIATE CONSTRUCTION DETAILS OR AS DIRECTED BY THE ENGINEER, AND SHALL BE PROVIDED WHERE CURB RAMPS CONNECT TO ADJACENT ROADWAY.
15. MANEUVERING SPACES AT THE BOTTOM OF THE CURB RAMPS SHALL BE A MINIMUM 4 FOOT X 4 FOOT CLEAR AREA, SHALL BE WHOLLY CONTAINED WITHIN THE CROSSWALK OUTSIDE OF THE PARALLEL VEHICULAR TRAVEL PATH.
16. A MINIMUM WIDTH OF 36 INCHES SHALL BE PROVIDED LANDINGS AROUND OBSTRUCTIONS (I.E., SIGN SUPPORTS, SIGNAL SUPPORTS, POLES, ETC.) LOCATED TO ADJACENT TO THE PEDESTRIAN ROUTE.
17. MINIMUM SIDEWALK WIDTH OF 4 FEET UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
18. CROSSWALKS WILL NOT BE REQUIRED AT UNSIGNALIZED INTERSECTIONS, UNLESS DIRECTED BY THE ENGINEER.
19. DETECTABLE WARNINGS ARE PLACED WHERE A PEDESTRIAN ACCESS ROUTE ENTERS THE ROADWAY, CROSSWALK, OR OTHER VEHICULAR AREA.
20. A MINIMUM OF 32 INCHES OF CLEARANCE IS REQUIRED FOR OBSTRUCTIONS LESS THAN 24 INCHES IN LENGTH, AND A MINIMUM OF 36 INCHES OF CLEARANCE IS REQUIRED FOR OBSTRUCTIONS GREATER THAN OR EQUAL TO 24 INCHES IN LENGTH.

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HARRIS COUNTY
ENGINEERING DEPARTMENT

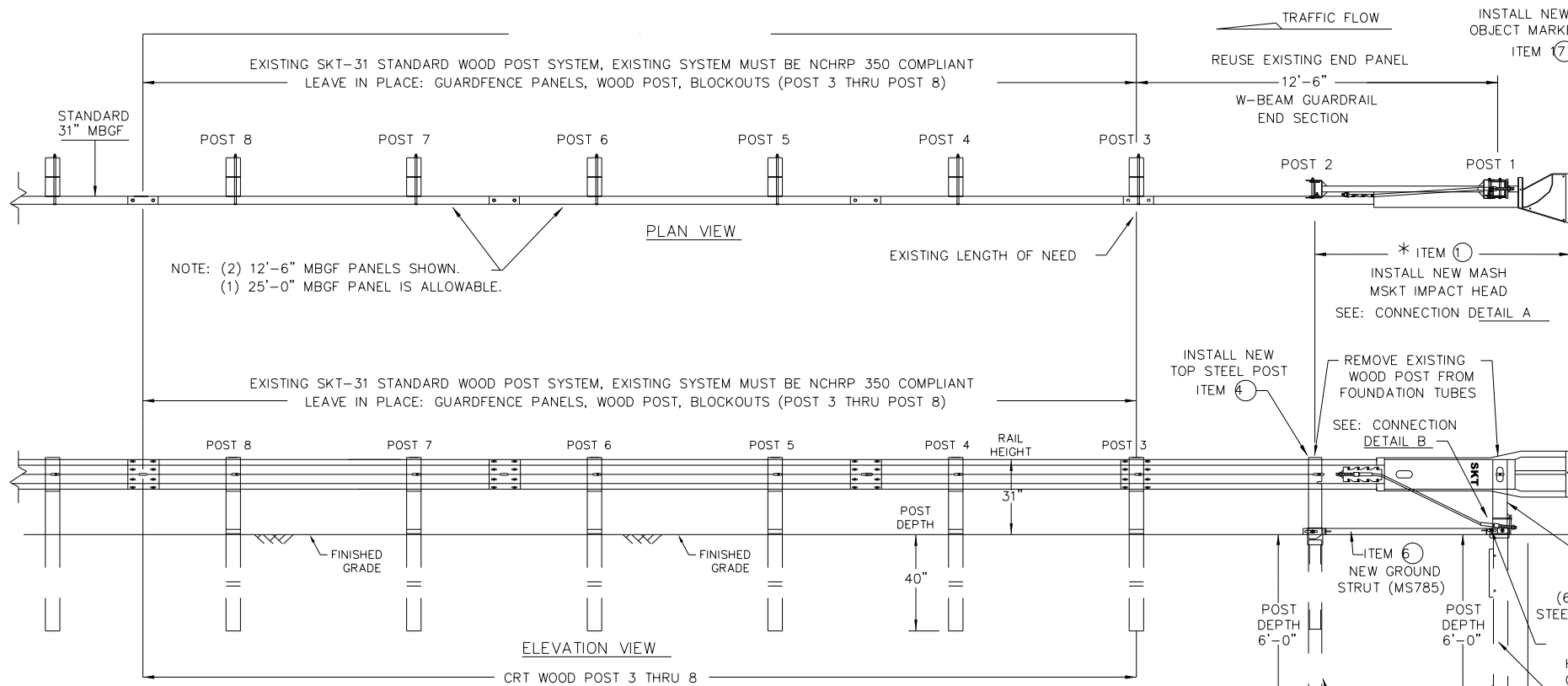


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SHEET DESCRIPTION:		ADAR
DRAWN BY:	DATE:	
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CK'D BY:	SCALE:	SHEET NO:
PDG	AS NOTED	140/

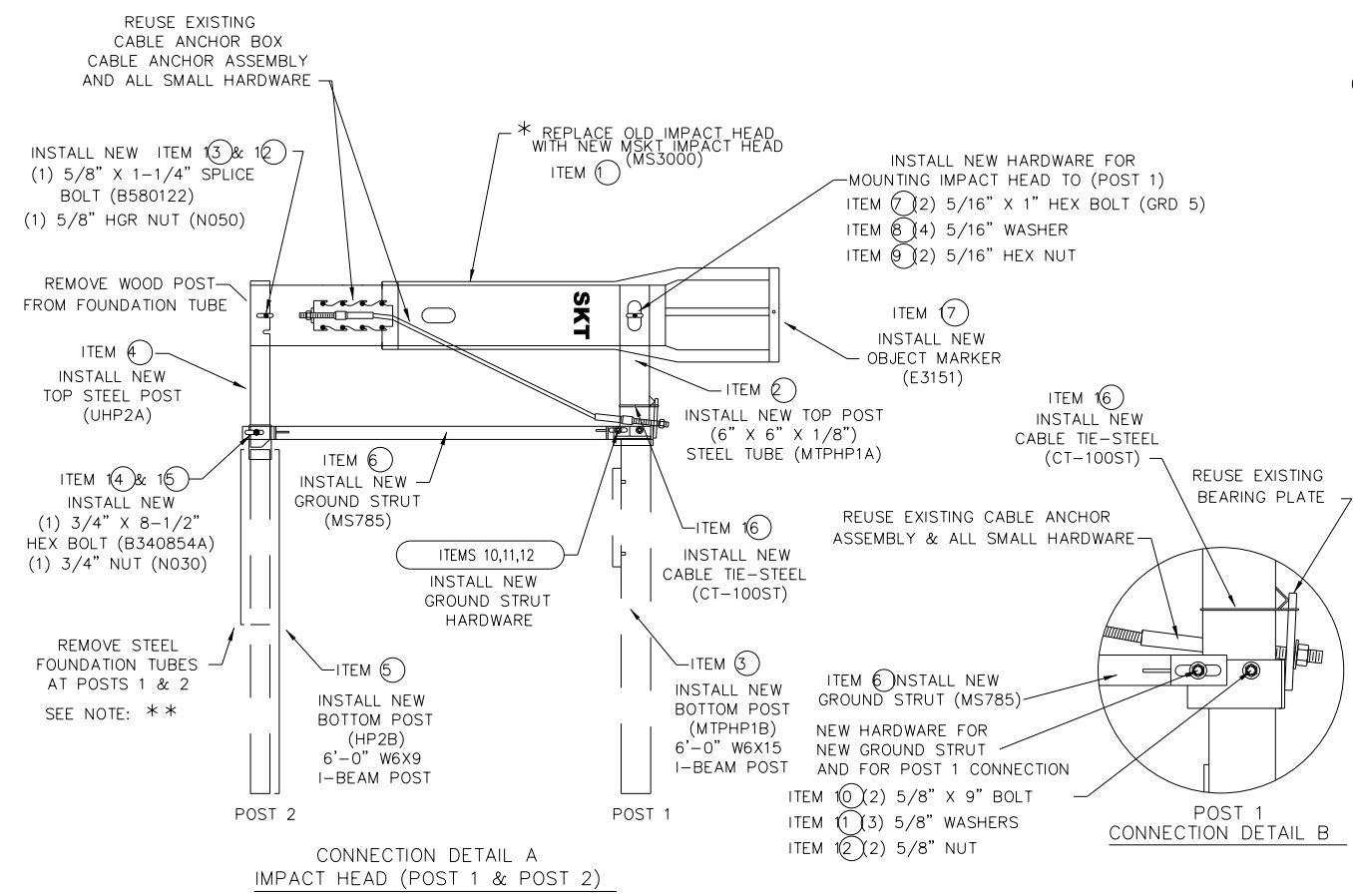
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GENERAL NOTES

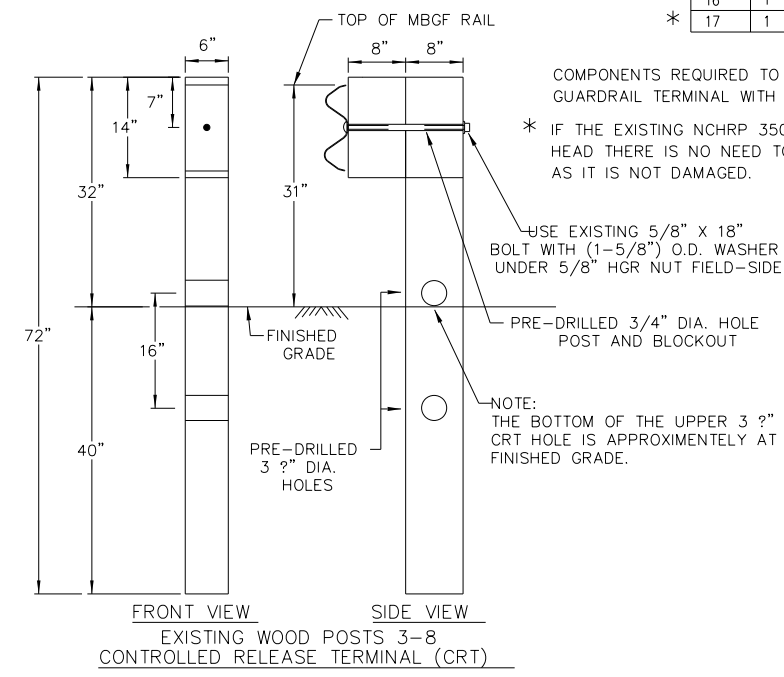
- FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: ROAD SYSTEMS, INC. (432)263-2435. 3616 OLD HOWARD COUNTY AIRPORT, BIG SPRING, TX 79720
- FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO: MSKT END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL (PUBLICATION~062717).
- 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.
- FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
- HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
- 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.
- POSTS SHALL NOT BE SET IN CONCRETE.
- 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.
- UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE MSKT SYSTEM BE CURVED.
- A FLARE RATE OF UP TO 25:1 MAY BE USED TO PREVENT THE TERMINAL HEAD FROM ENCRUCHING ON THE SHOULDER, THE FLARE MAY BE DECREASED OR ELIMINATED FOR SPECIFIC INSTALLATIONS, IF DIRECTED BY THE ENGINEER.
- 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



** NOTE: EXTRA SOIL COMPACTION WILL BE NEEDED AROUND NEW (POSTS 1 & 2) DUE TO THE REMOVAL OF THE STEEL FOUNDATION TUBES.



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	ORIGINAL STANDARD ISSUED	3-1-22	RJS

FORT BEND COUNTY
ENGINEERING DEPARTMENT

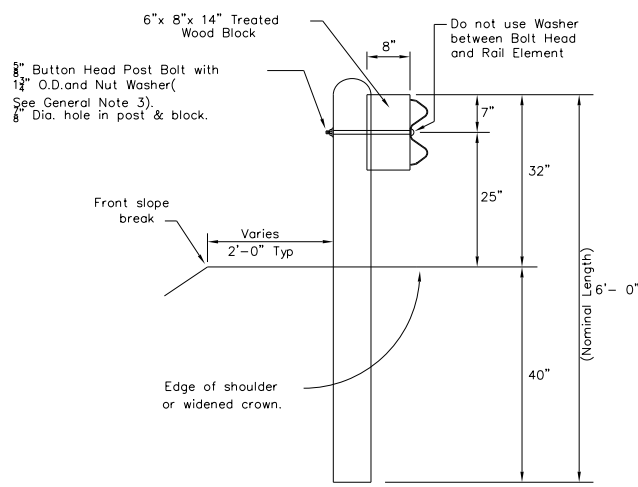


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DRAWN BY: INIT	SHEET DESCRIPTION: SINGLE GUARDRAIL TERMINAL	
SCALE: AS NOTED	SHEET 1 OF 1	SHEET NO: 14/1
DATE: 3-1-22	APPROVED BY:	

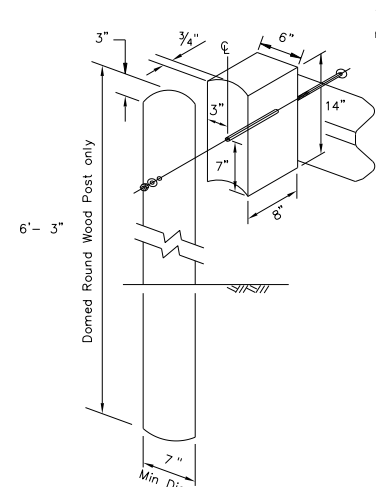
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GENERAL NOTES

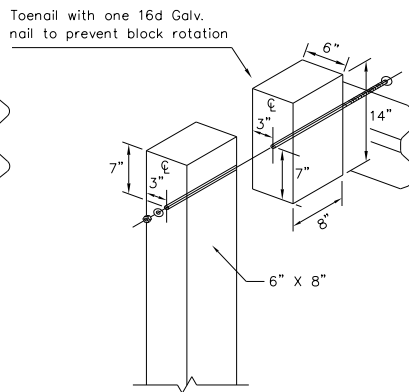
- The type of post (round wood post, rectangular wood post, or steel post) will be as shown in the plans. The exact position of MBGF shall be shown in the plans or as directed by the Engineer. Steel posts to be galvanized in accordance with Item 445, "Galvanizing."
- Rail element shall meet the requirements of Item 540, "Metal Beam Guard Fence" except as modified in the plans. The Contractor may furnish rail elements of 25'-0", or 12'-6" (nom.) lengths. Rail elements may have slotted holes at 3'-12" 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.
- Button head "post" bolts (ASTM A307) shall be of sufficient length to extend through the full thickness of the nut (ASTM A563) and $\frac{1}{8}$ " washer and not more than 1" beyond it. Button head "splice" bolts (ASTM A307) are $\frac{3}{8}$ " x $1\frac{1}{4}$ " (or 2" long at triple rail splices) with a $\frac{7}{8}$ " double recessed nut (ASTM A563). Thrie beam "connection" $\frac{7}{8}$ " dia. (ASTM A325) hex bolts shall be of sufficient length to extend through the full thickness of the rail, washers, and nuts.
- Fittings (bolts, nuts, and washers) shall be galvanized in accordance with Item 445, "Galvanizing." Fittings shall be subsidiary to the bid item.
- Crown shall be widened to accommodate the Metal Beam Guard Fence.
- The lateral approach to the guard fence, shall have a maximum slope of 1V:10H.
- 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.
- 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.
- 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.
- Posts shall not be set in concrete, of any depth.
- Special fabrication will be required at installations having a curvature of less than 150 ft. radius.
- 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.
- 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.



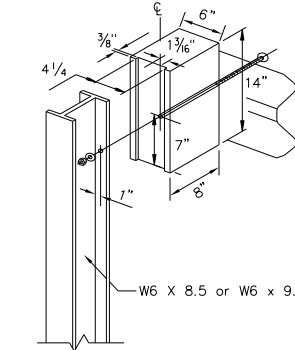
TYPICAL POST



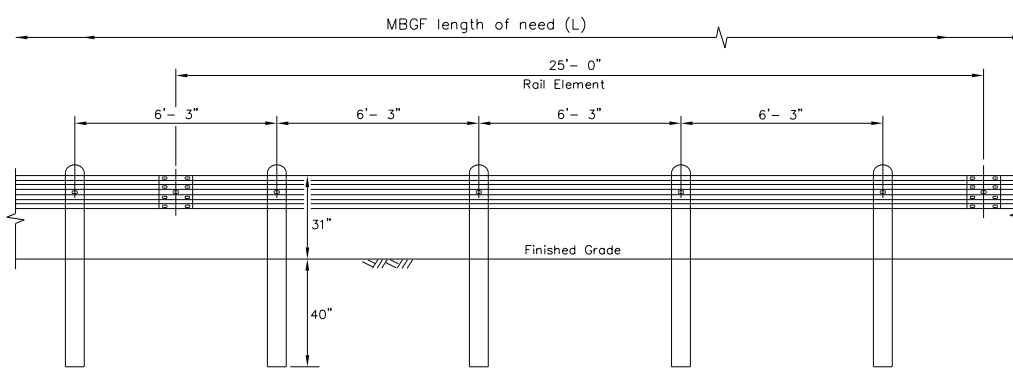
WOOD BLOCK TO ROUND WOOD POST



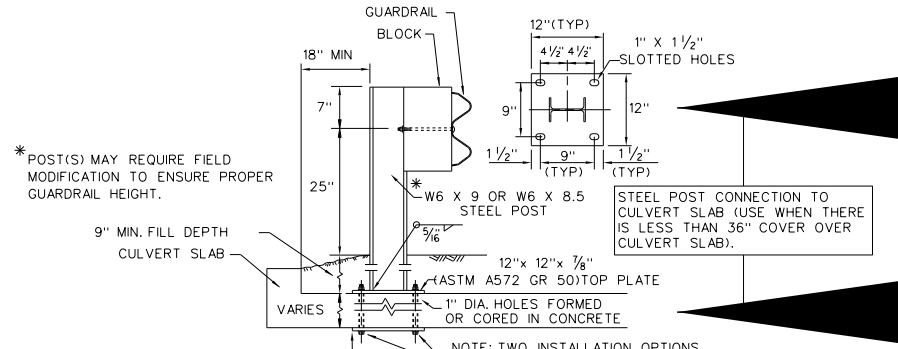
WOOD BLOCK TO RECTANGULAR WOOD POST



WOOD BLOCK TO STEEL POST



ELEVATION MID-SPAN RAIL SPLICE



* POST(S) MAY REQUIRE FIELD MODIFICATION TO ENSURE PROPER GUARDRAIL HEIGHT.

9" MIN. FILL DEPTH CULVERT SLAB

STEEL POST CONNECTION TO CULVERT SLAB (USE WHEN THERE IS LESS THAN 36" COVER OVER CULVERT SLAB).

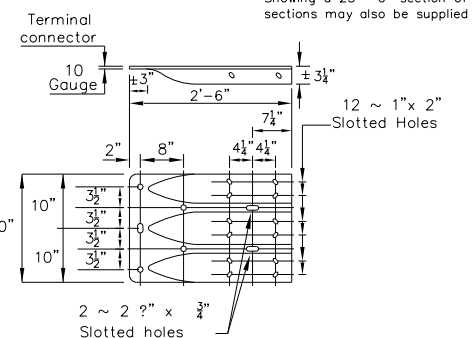
NOTE: TWO INSTALLATION OPTIONS.

1. BOLT-THROUGH OPTION: REQUIRES A 6" MIN. SLAB THICKNESS. $\frac{7}{8}$ " DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED WASHER EACH AND HEAVY HEX NUTS. NOTE: BOLT LENGTH = SLAB PLUS 2 $\frac{1}{4}$ " MIN.

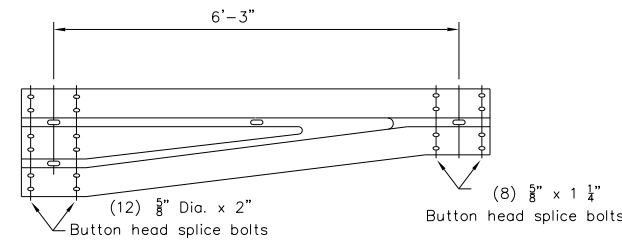
2. EPOXY ANCHOR OPTION: THIS OPTION MAY ONLY BE USED IF THE CULVERT SLAB IS 8" MIN. THICK. THREADED ANCHOR RODS MUST BE $\frac{7}{8}$ " DIA. ASTM A449 OR A193 GRADE B7 WITH HEAVY HEX NUT, AND ONE HARDENED WASHER EACH. EMBED ANCHOR RODS 6" WITH HILTI HIT RE 500 EPOXY ADHESIVE. OTHER TYPE III CLASS C EPOXY 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 $\frac{1}{4}$ " MIN. BEYOND NUT.

LOW FILL CULVERT POST

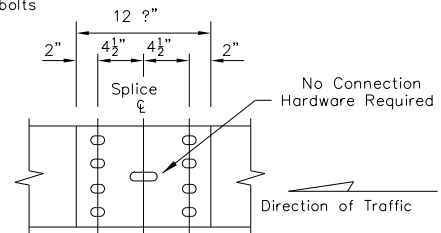
Culverts of 25 ft. or less, see TxDOT GF(31)LS standard for "Long Span" option.



THRIE-BEAM TERMINAL CONNECTION (SEE GENERAL NOTES 9 FOR REQUIRED HARDWARE)

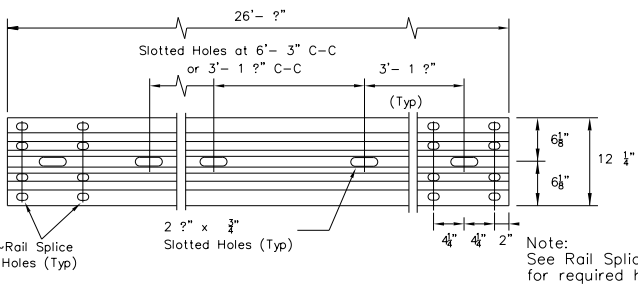


NON-SYMMETRICAL TRANSITION TO W-BEAM (10 GAUGE)

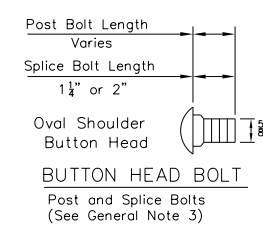


Note: Mid-Span rail splices are required with 6'-3" post spacings.

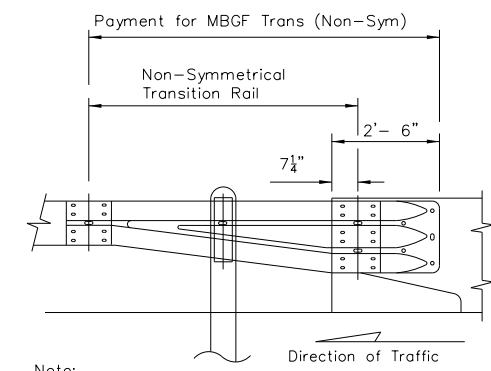
MID-SPAN RAIL SPLICE DETAIL



ELEVATION 25'-0" (NOM.) W-BEAM SECTION 12'-6" RAIL SECTIONS MAY ALSO BE SUPPLIED (SEE GENERAL NOTE 2)

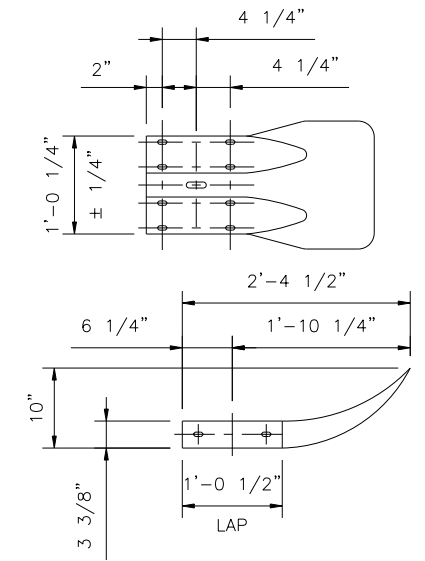


BUTTON HEAD BOLT Post and Splice Bolts (See General Note 3)



Note: All rail elements shall be lapped in the direction of adjacent traffic.

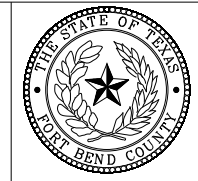
DOWNSTREAM RAIL ATTACHMENT



TERMINAL SECTION

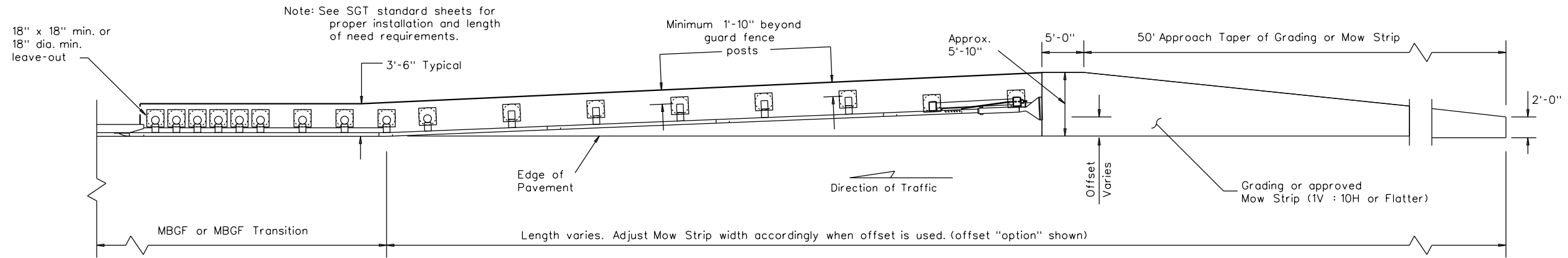
NO.	REVISIONS	DATE	NAME
1	ORIGINAL STANDARD ISSUED	3-1-22	RJS
2			
3			
4			

FORT BEND COUNTY ENGINEERING DEPARTMENT



PROJECT TITLE:		
DRAWN BY: INIT	SHEET DESCRIPTION: METAL BEAM GUARD FENCE	FBCED STANDARD
CK'D BY: INIT		34
SCALE: NONE	SHEET 1 OF 1	SHEET NO:
DATE: 3-1-22	APPROVED BY:	142/

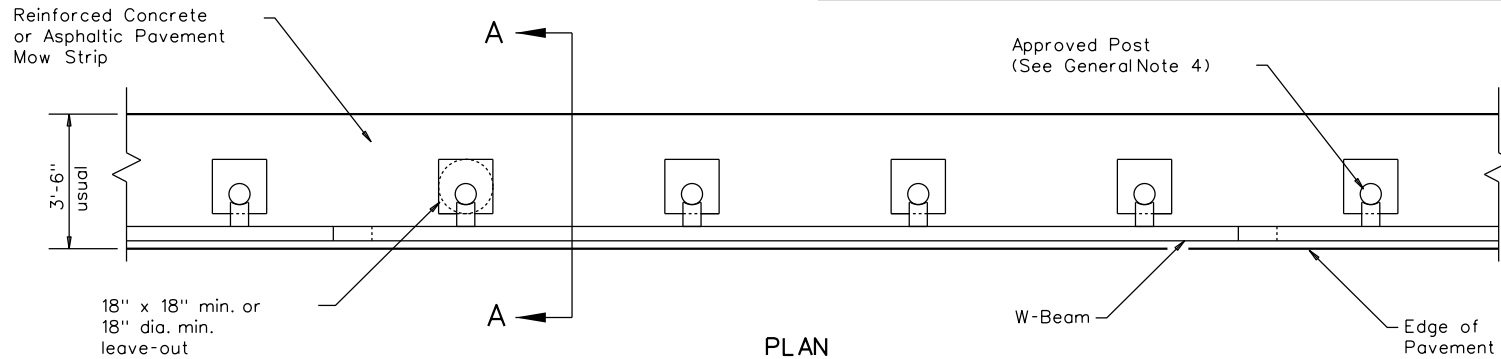
DISCLAIMER: THE USE OF THIS STANDARD IS COVERED BY THE "TEXAS ENGINEERING PRACTICE ACT". NO WARRANTY OF ANY KIND IS MADE BY TXDOT FOR ANY PURPOSE WHATSOEVER. TXDOT ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.



Note: See SGT standard sheets for proper installation and length of need requirements.

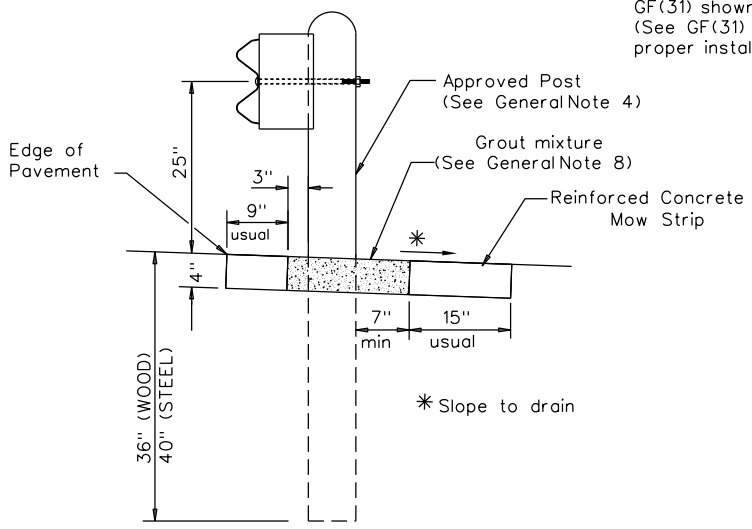
GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS

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.



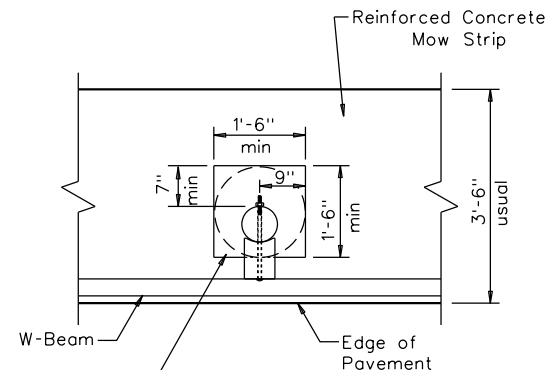
PLAN

GF(31) shown with Mow Strip
 (See GF(31) standard sheet for proper installation)



SECTION A-A

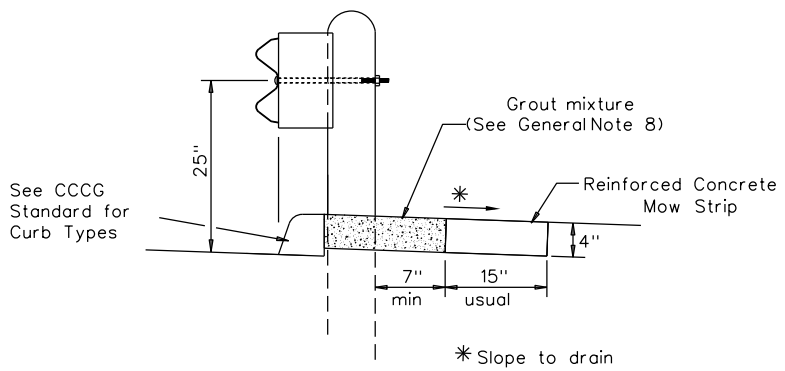
Typical



MOW STRIP DETAIL

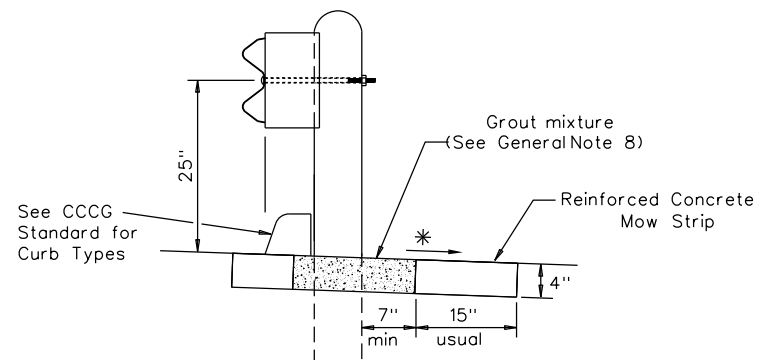
Reinforced Concrete Mow Strip with 18" x 18" Square or 18" Dia. minimum leave-out.

- 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 1/2" 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.



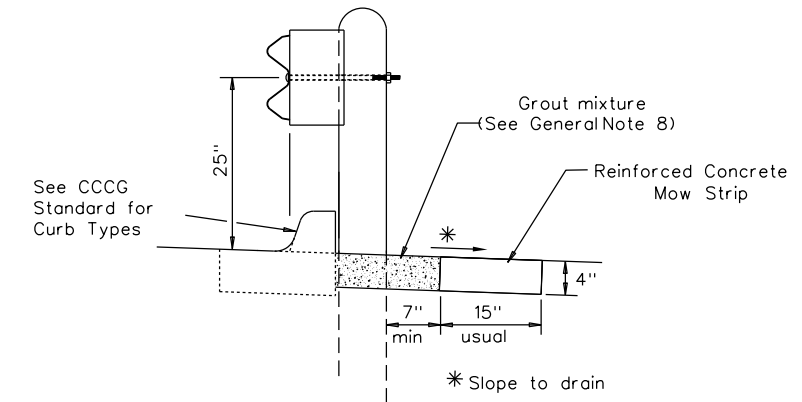
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

				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	AG
© TXDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY	
REVISIONS					
DIST	COUNTY			SHEET NO.	
				143	

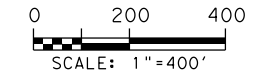
DATE: FILE:

LEGEND

- SYS A DRAINAGE SYSTEM ID
- X.XX AREA (AC)
- PROPOSED DRAINAGE SYSTEM BOUNDARY
- * OUTFALL POINTS (EXISTING/PROPOSED)
- ~ DIRECTION OF FLOW

NOTES

1. DRAINAGE SYSTEMS A, B, C, & D ARE COMPRISED OF PROPOSED DRAINAGE AREAS. FOR MORE DETAILED INFORMATION OF THESE AREAS SEE DRAINAGE AREA MAP SHEETS.



CAUTION!!!!
OVERHEAD ELECTRIC. LOCATIONS ARE APPROXIMATE

CALL BEFORE YOU DIG!
TEXAS ONE CALL PARTICIPANTS REQUEST 48 HOURS NOTICE BEFORE YOU DIG, DRILL, OR BLAST - STOP CALL

Texas One Call System
1-800-DIG-TESS

NO.	DATE	REVISION	APPROVED

SCOTT P. HUGHES
117276
PROFESSIONAL ENGINEER

Scott Hughes
11/7/2023

CivilTech Engineering, Inc. 11821 Telge Road
Cypress, Texas 77429
PH: (281) 304-0200 - FX: (281) 304-0210
Firm Registration No. F-382

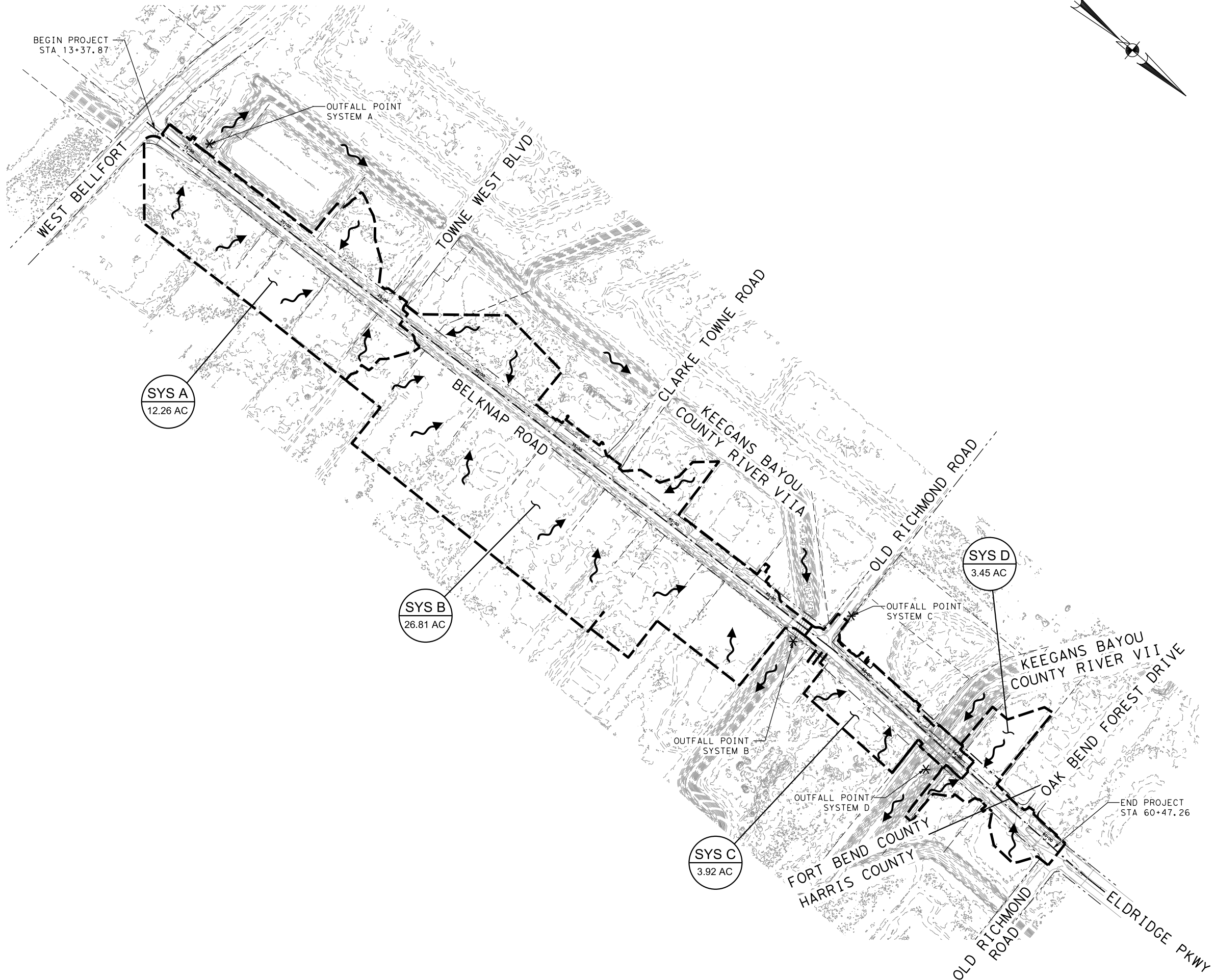
FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

OVERALL DRAINAGE AREA MAP

SHEET 1 OF 1

CNTY PROJ *	RPS PROJ *	DATE	SCALE	SHEET NO
17-2-11	008169	XXX 2022		
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	144
CR	DA	CW	PB	



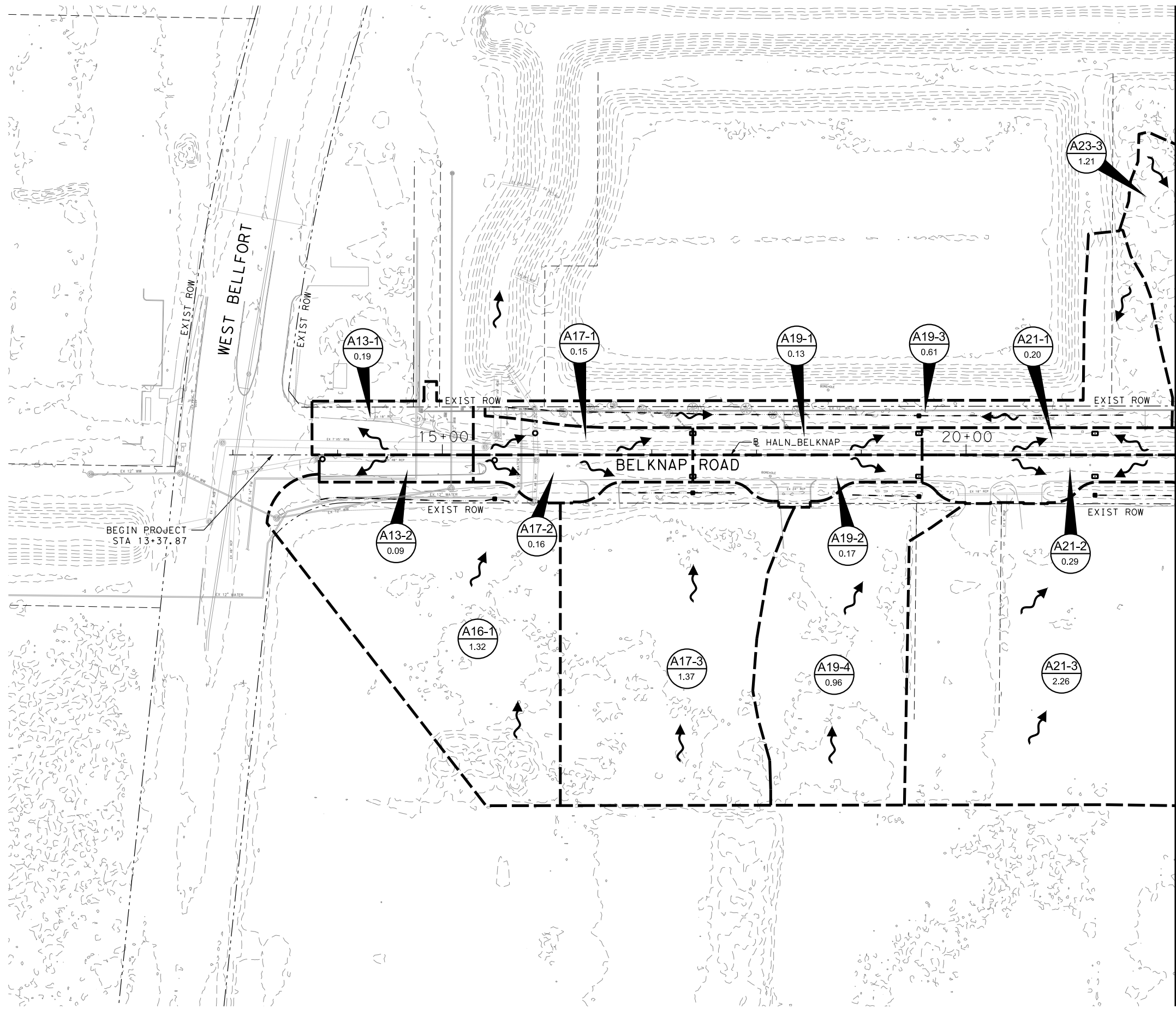
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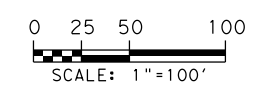
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LEGEND

- DIRECTION OF FLOW
- PROP GRATE INLET
- PROP CURB INLET
- SUB DRAINAGE BOUNDARY
- SYSTEM ID: SUB AREA ID
- ACREAGE



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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

DRAINAGE AREA MAP

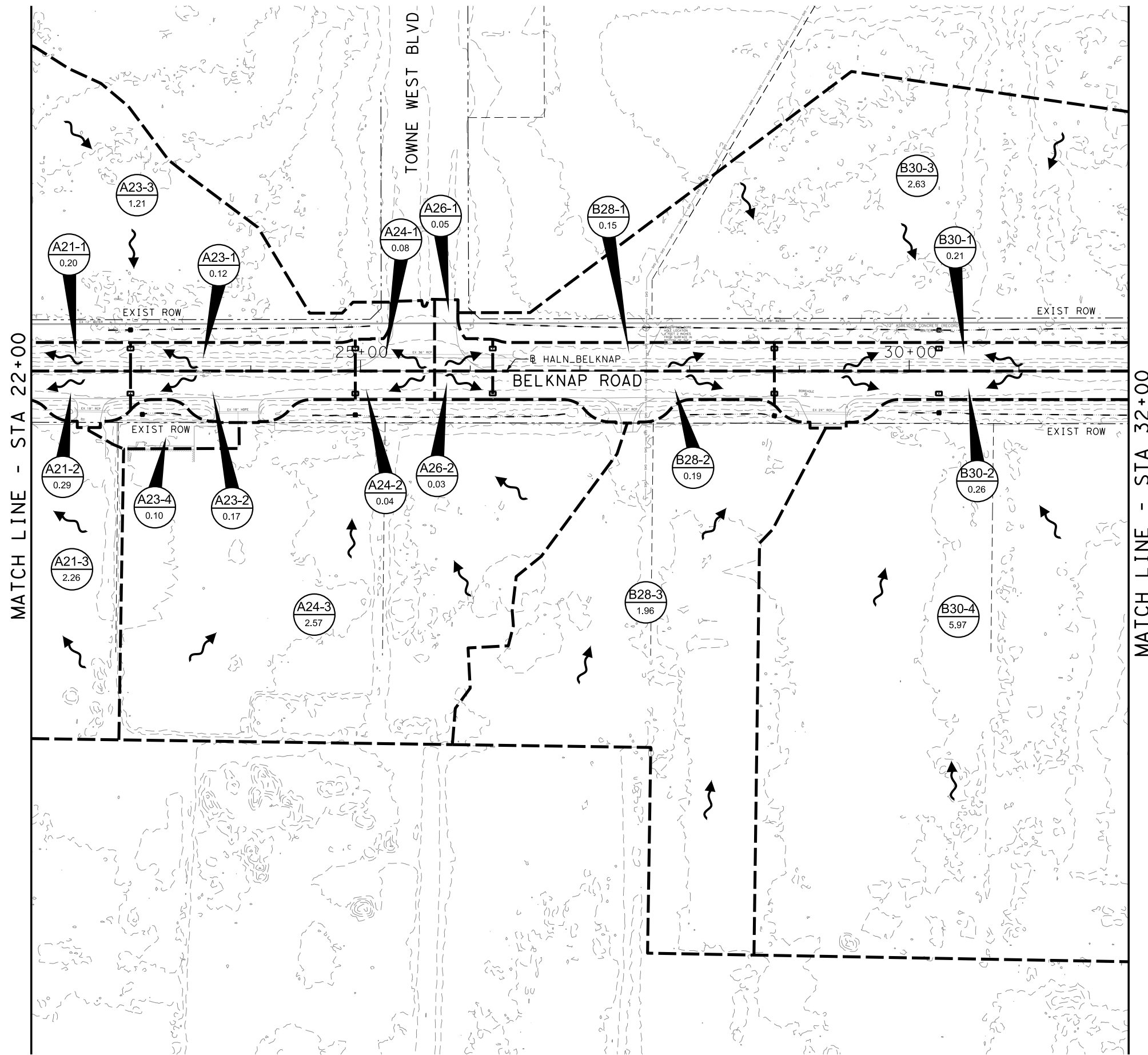
SHEET 1 OF 5

CNTY PROJ	RPS PROJ	DATE	SCALE	SHEET NO
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CR	DA	CW	PB	

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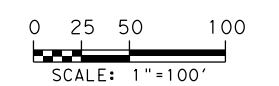
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LEGEND

- DIRECTION OF FLOW
- PROP GRATE INLET
- PROP CURB INLET
- SUB DRAINAGE BOUNDARY

SYSTEM ID: SUB AREA ID: A-1
ACREAGE: X.XX



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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

DRAINAGE AREA MAP

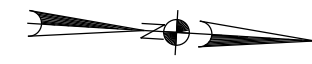
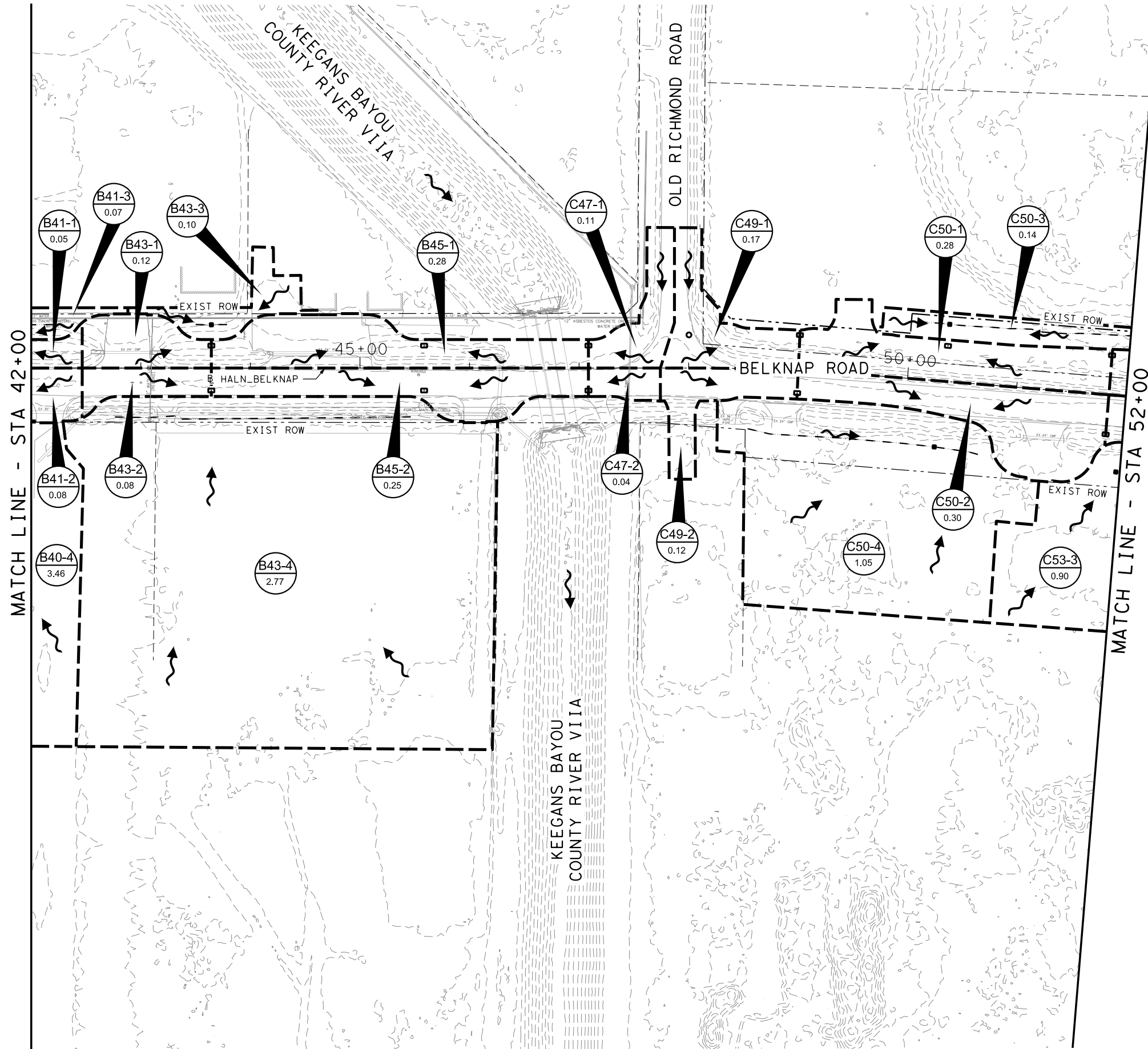
SHEET 2 OF 5

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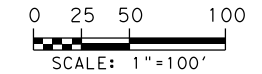
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LEGEND

- DIRECTION OF FLOW
- PROP GRATE INLET
- PROP CURB INLET
- SUB DRAINAGE BOUNDARY

SYSTEM ID: SUB AREA ID: A-1
ACREAGE: X.XX



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BELKNAP ROAD IMPROVEMENTS
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DRAINAGE AREA MAP

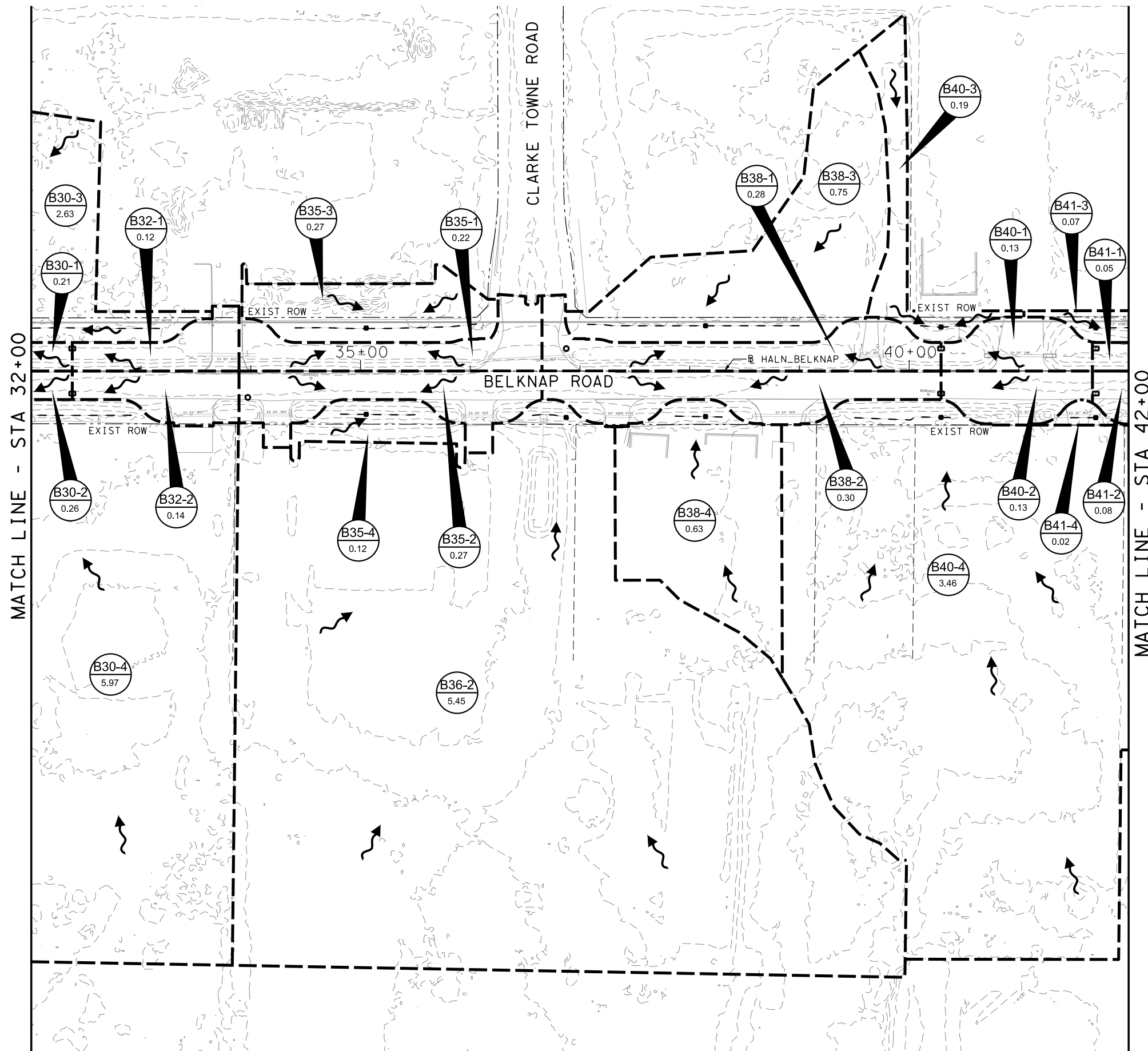
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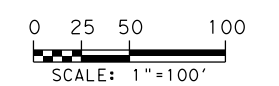
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LEGEND

- DIRECTION OF FLOW
- PROP GRATE INLET
- PROP CURB INLET
- SUB DRAINAGE BOUNDARY
- SYSTEM ID (A-1) SUB AREA ID (X.XX) ACREAGE (X.XX)



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BELKNAP ROAD IMPROVEMENTS
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DRAINAGE AREA MAP

SHEET 3 OF 5

CNTY	PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	XXX	2022		147
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY		
CR	DA	CW	PB		

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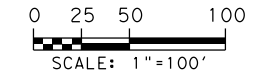
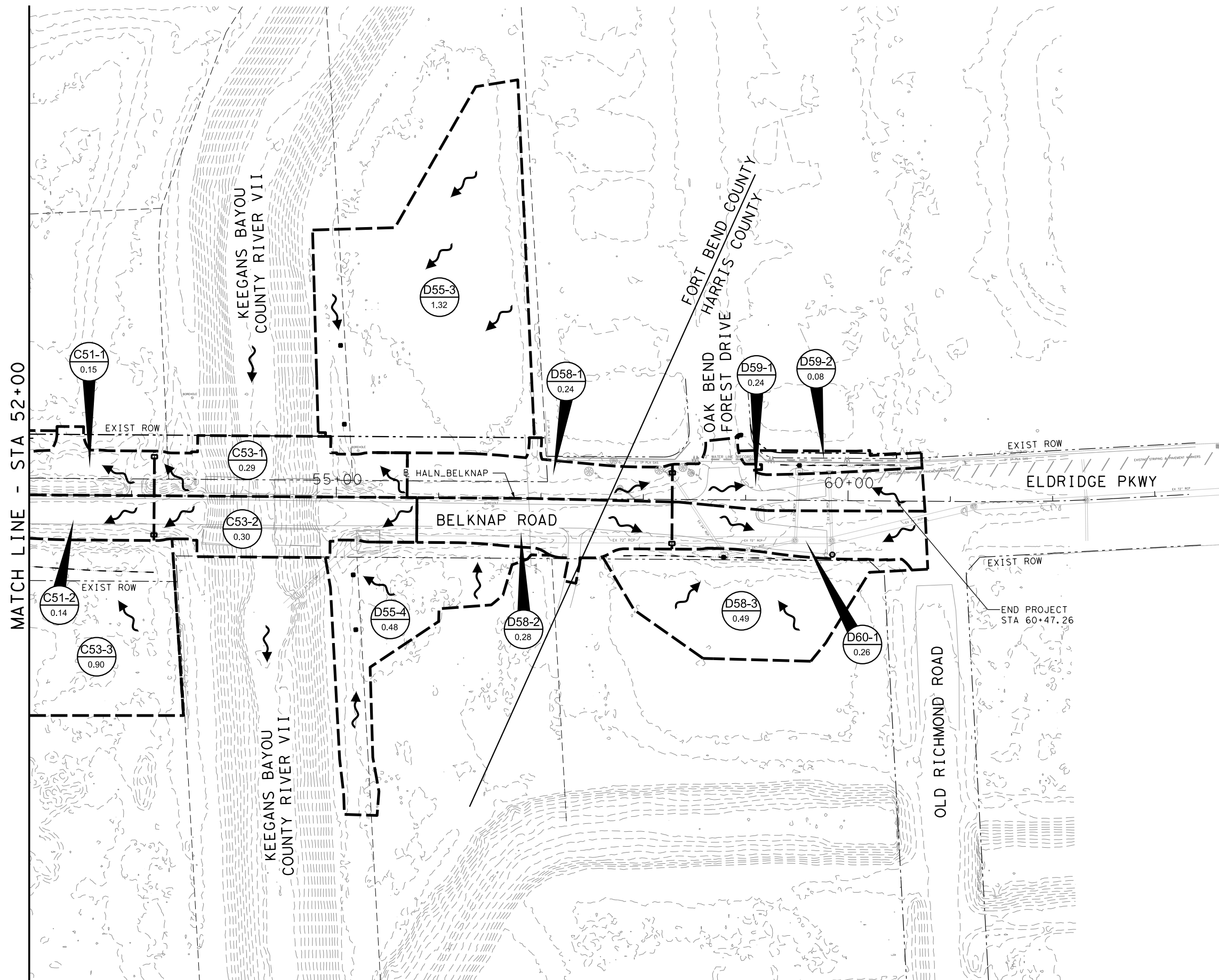
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LEGEND

- DIRECTION OF FLOW
- PROP GRATE INLET
- PROP CURB INLET
- SUB DRAINAGE BOUNDARY

SYSTEM ID: SUB AREA ID: A-1
ACREAGE: X.XX



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BELKNAP ROAD IMPROVEMENTS
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DRAINAGE AREA MAP

SHEET 5 OF 5

CNTY	PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	XXX 2022			149
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY		
CR	DA	CW	PB		

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GEOPAK 2013 Drainage (STORM DRAIN DESIGN)
 Project Name: Belknap Road
 Job Number: 008169
 Project Description: Storm Sewer
 Design Frequency: 5 Year
 Measurement Unit: English
 County: Fort Bend
 Runoff Computations for Design Frequency

SYSTEM A						
ID	Runoff (C)	Drainage Area (acres)	Time of Conc. (min)	Time Used (min)	Intensity (in/hr)	Discharge (cfs)
A13-1	0.78	0.19	22.46	22.46	4.83	0.70
A13-2	0.86	0.09	21.54	21.54	4.93	0.37
A16-1	0.62	1.32	25.50	25.50	4.52	3.72
A17-1	0.85	0.15	22.16	22.16	4.86	0.60
A17-2	0.77	0.16	22.24	22.24	4.85	0.60
A17-3	0.64	1.37	25.57	25.57	4.51	3.96
A19-1	0.86	0.13	21.98	21.98	4.88	0.55
A19-2	0.80	0.17	22.32	22.32	4.84	0.66
A19-3	0.50	0.61	24.17	24.17	4.65	1.41
A19-4	0.64	0.96	24.93	24.93	4.57	2.78
A21-1	0.86	0.20	22.53	22.53	4.82	0.82
A21-2	0.80	0.29	23.04	23.04	4.77	1.11
A21-3	0.64	2.26	26.54	26.54	4.42	6.38
A23-1	0.86	0.12	21.88	21.88	4.89	0.51
A23-2	0.81	0.17	22.32	22.32	4.84	0.65
A23-3	0.54	1.21	25.34	25.34	4.53	2.97
A23-4	0.49	0.10	21.67	21.67	4.92	0.23
A24-1	0.89	0.08	21.41	21.41	4.95	0.36
A24-2	0.86	0.04	20.67	20.67	5.04	0.19
A24-3	0.63	2.57	26.81	26.81	4.40	7.17
A26-1	0.88	0.05	20.90	20.90	5.01	0.24
A26-2	0.86	0.03	20.39	20.39	5.07	0.14

GEOPAK 2013 Drainage (STORM DRAIN DESIGN)
 Project Name: Belknap Road
 Job Number: 008169
 Project Description: Storm Sewer
 Design Frequency: 5 Year
 Measurement Unit: English
 County: Fort Bend
 Runoff Computations for Design Frequency


SYSTEM B						
ID	Runoff (C)	Drainage Area (acres)	Time of Conc. (min)	Time Used (min)	Intensity (in/hr)	Discharge (cfs)
B28-1	0.86	0.15	22.16	22.16	4.86	0.64
B28-2	0.81	0.19	22.46	22.46	4.83	0.75
B28-3	0.55	1.96	26.27	26.27	4.45	4.83
B30-1	0.86	0.21	22.66	22.66	4.81	0.89
B30-2	0.82	0.26	22.89	22.89	4.78	1.03
B30-3	0.54	2.63	26.86	26.86	4.40	6.21
B30-4	0.59	5.97	28.70	28.70	4.24	14.80
B32-1	0.86	0.12	21.88	21.88	4.89	0.52
B32-2	0.80	0.14	22.07	22.07	4.87	0.53
B35-1	0.85	0.22	22.66	22.66	4.81	0.90
B35-2	0.77	0.27	22.94	22.94	4.78	1.00
B35-3	0.35	0.27	22.94	22.94	4.78	0.45
B35-4	0.35	0.12	21.88	21.88	4.89	0.21
B36-2	0.59	5.45	28.48	28.48	4.26	13.59
B38-1	0.83	0.28	22.99	22.99	4.77	1.09
B38-2	0.80	0.30	23.09	23.09	4.76	1.15
B38-3	0.60	0.75	24.51	24.51	4.61	2.08
B38-4	0.49	0.63	24.22	24.22	4.64	1.44
B40-1	0.79	0.13	21.98	21.98	4.88	0.50
B40-2	0.69	0.13	21.98	21.98	4.88	0.43
B40-3	0.35	0.19	22.46	22.46	4.83	0.33
B40-4	0.66	3.46	27.44	27.44	4.34	9.90
B41-1	0.83	0.05	20.90	20.90	5.01	0.21
B41-2	0.76	0.08	21.41	21.41	4.95	0.32
B41-3	0.35	0.07	21.41	21.41	4.95	0.13
B41-4	0.70	0.02	20.02	20.02	5.12	0.08
B43-1	0.79	0.12	21.88	21.88	4.89	0.45
B43-2	0.83	0.08	21.41	21.41	4.95	0.31
B43-3	0.51	0.10	21.67	21.67	4.92	0.25
B43-4	0.67	2.77	26.97	26.97	4.39	8.18
B45-1	0.79	0.28	22.99	22.99	4.77	1.05
B45-2	0.82	0.25	22.83	22.83	4.79	0.96

GEOPAK 2013 Drainage (STORM DRAIN DESIGN)
 Project Name: Belknap Road
 Job Number: 008169
 Project Description: Storm Sewer
 Design Frequency: 5 Year
 Measurement Unit: English
 County: Fort Bend
 Runoff Computations for Design Frequency

SYSTEM C						
ID	Runoff (C)	Drainage Area (acres)	Time of Conc. (min)	Time Used (min)	Intensity (in/hr)	Discharge (cfs)
C47-1	0.83	0.11	21.78	21.78	4.90	0.46
C47-2	0.85	0.04	20.67	20.67	5.04	0.18
C49-1	0.86	0.17	22.32	22.32	4.84	0.69
C49-2	0.87	0.12	21.88	21.88	4.89	0.52
C50-1	0.79	0.28	22.99	22.99	4.77	1.05
C50-2	0.70	0.30	23.09	23.09	4.76	1.01
C50-3	0.35	0.14	22.07	22.07	4.87	0.23
C50-4	0.56	1.05	25.10	25.10	4.56	2.71
C51-1	0.76	0.15	22.16	22.16	4.86	0.56
C51-2	0.73	0.14	22.07	22.07	4.87	0.49
C53-1	0.87	0.29	23.04	23.04	4.77	1.22
C53-2	0.87	0.30	23.09	23.09	4.76	1.26
C53-3	0.60	0.90	24.82	24.82	4.58	2.46

GEOPAK 2013 Drainage (STORM DRAIN DESIGN)
 Project Name: Belknap Road
 Job Number: 008169
 Project Description: Storm Sewer
 Design Frequency: 5 Year
 Measurement Unit: English
 County: Fort Bend/Harris
 Runoff Computations for Design Frequency

SYSTEM D						
ID	Runoff (C)	Drainage Area (acres)	Time of Conc. (min)	Time Used (min)	Intensity (in/hr)	Discharge (cfs)
D55-3	0.51	1.32	25.50	25.50	4.52	3.07
D55-4	0.56	0.48	23.79	23.79	4.69	1.25
D58-1	0.78	0.24	22.78	22.78	4.79	0.89
D58-2	0.78	0.28	22.99	22.99	4.77	1.06
D58-3	0.62	0.49	23.82	23.82	4.68	1.43
D59-1	0.77	0.24	22.78	22.78	4.79	0.88
D59-2	0.35	0.08	21.41	21.41	4.95	0.13
D60-1	0.75	0.26	22.89	22.89	4.78	0.93

NO.	DATE	REVISION	APPROVED
			
CivilTech		11821 Telge Road Cypress, Texas 77429	
Engineering, Inc.		PH: (281) 304-0200 - FX: (281) 304-0210 Firm Registration No. F-382	
FORT BEND COUNTY, TEXAS			
BELKNAP ROAD IMPROVEMENTS			
W BELLFORT BLVD TO OAK BEND FOREST DR			
RUNOFF COMPUTATIONS			
SHEET 1 OF 1			
CNTY PROJ *	RPS PROJ *	DATE	SCALE
17-2-11	008169	XXX 2022	
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY
CR	DA	CW	PB
			150

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GEOPAK 2013 Drainage (STORM DRAIN DESIGN)
 Project Name: Belknap Road
 Job Number: 008169
 Project Description: Storm Sewer
 Design Frequency: 5 Year
 Measurement Unit: English
 County: Fort Bend
 On Grade Inlet Computation Data

SYSTEM A													
ID	Type	Discharge (cfs)	Ponded Width	Ponded Depth	Max Allow Pond Width (ft)	Transverse Slope (%)	Longitudinal Slope %	Length (ft)	Width (ft)	Depr.	Capacity (cfs)	By Pass (cfs)	To Node
A13-1	Curb	0.70	6.46	0.13	8.00	2.00	0.59	10.00	n/a	0.25	0.70	0.00	**
A13-2	Curb	0.37	5.09	0.10	8.00	2.00	0.59	10.00	n/a	0.25	0.37	0.00	**
A17-1	Curb	0.60	6.72	0.13	8.00	2.00	0.35	5.00	n/a	0.25	0.60	0.00	A19-1
A17-2	Curb	0.60	6.71	0.13	8.00	2.00	0.35	5.00	n/a	0.25	0.60	0.00	A19-2
A19-1	Curb	0.55	6.49	0.13	8.00	2.00	0.35	5.00	n/a	0.25	0.55	0.00	A21-1
A19-2	Curb	0.66	6.96	0.14	8.00	2.00	0.35	5.00	n/a	0.25	0.66	0.00	A21-2
A23-1	Curb	0.51	6.34	0.13	8.00	2.00	0.35	5.00	n/a	0.25	0.51	0.00	A21-1
A23-2	Curb	0.65	6.93	0.14	8.00	2.00	0.35	5.00	n/a	0.25	0.65	0.00	A21-2
A24-1	Curb	0.36	5.52	0.11	8.00	2.00	0.35	5.00	n/a	0.25	0.36	0.00	A23-1
A24-2	Curb	0.19	4.34	0.09	8.00	2.00	0.35	5.00	n/a	0.25	0.19	0.00	A23-2
A26-1	Curb	0.24	4.24	0.08	8.00	2.00	0.65	5.00	n/a	0.25	0.24	0.00	B28-1
A26-2	Curb	0.14	3.45	0.07	8.00	2.00	0.65	5.00	n/a	0.25	0.14	0.00	B28-2

GEOPAK 2013 Drainage (STORM DRAIN DESIGN)
 Project Name: Belknap Road
 Job Number: 008169
 Project Description: Storm Sewer
 Design Frequency: 5 Year
 Measurement Unit: English
 County: Fort Bend
 On Grade Inlet Computation Data

SYSTEM B													
ID	Type	Discharge (cfs)	Ponded Width	Ponded Depth	Max Allow Pond Width (ft)	Transverse Slope (%)	Longitudinal Slope %	Length (ft)	Width (ft)	Depr.	Capacity (cfs)	By Pass (cfs)	To Node
B28-1	Curb	0.64	6.13	0.12	8.00	2.00	0.65	5.00	n/a	0.25	0.63	0.01	B30-1
B28-2	Curb	0.75	6.49	0.13	8.00	2.00	0.65	5.00	n/a	0.25	0.71	0.04	B30-2
B32-1	Curb	0.52	5.94	0.12	8.00	2.00	0.50	5.00	n/a	0.25	0.52	0.00	B30-1
B32-2	Curb	0.53	5.98	0.12	8.00	2.00	0.50	5.00	n/a	0.25	0.53	0.00	B30-2
B40-1	Curb	0.50	6.27	0.13	8.00	2.00	0.35	5.00	n/a	0.25	0.50	0.00	B38-1
B40-2	Curb	0.43	5.95	0.12	8.00	2.00	0.35	5.00	n/a	0.25	0.43	0.00	B38-2
B41-1	Curb	0.21	4.54	0.09	8.00	2.00	0.35	5.00	n/a	0.25	0.21	0.00	B40-1
B41-2	Curb	0.32	5.29	0.11	8.00	2.00	0.35	5.00	n/a	0.25	0.32	0.00	B40-2
B43-1	Curb	0.45	5.21	0.10	8.00	2.00	0.75	5.00	n/a	0.25	0.45	0.00	B45-1
B43-2	Curb	0.31	4.55	0.09	8.00	2.00	0.75	5.00	n/a	0.25	0.31	0.00	B45-2

** DRAINS BEYOND PROJECT LIMITS. BY PASS DESIGNED FOR 0.00 CFS.

GEOPAK 2013 Drainage (STORM DRAIN DESIGN)
 Project Name: Belknap Road
 Job Number: 008169
 Project Description: Storm Sewer
 Design Frequency: 5 Year
 Measurement Unit: English
 County: Fort Bend
 On Grade Inlet Computation Data

SYSTEM C													
ID	Type	Discharge (cfs)	Ponded Width	Ponded Depth	Max Allow Pond Width (ft)	Transverse Slope (%)	Longitudinal Slope %	Length (ft)	Width (ft)	Depr.	Capacity (cfs)	By Pass (cfs)	To Node
C47-1	Curb	0.46	5.28	0.11	8.00	2.00	0.75	5.00	n/a	0.25	0.46	0.00	B45-1
C47-2	Curb	0.18	3.70	0.07	8.00	2.00	0.75	5.00	n/a	0.25	0.18	0.00	B45-2
C49-1	Curb	0.69	5.82	0.12	12.00	2.00	1.00	5.00	n/a	0.25	0.64	0.05	C50-1
C49-2	Curb	0.52	5.22	0.10	6.00	2.00	1.00	5.00	n/a	0.25	0.51	0.01	C50-2
C51-1	Curb	0.66	4.82	0.10	12.00	2.00	2.50	5.00	n/a	0.25	0.55	0.11	C50-1
C51-2	Curb	0.60	4.65	0.09	12.00	2.00	2.50	5.00	n/a	0.25	0.52	0.08	C50-2
C53-1	Curb	1.22	9.26	0.19	12.00	2.00	0.26	5.00	n/a	0.25	1.12	0.10	C51-1
C53-2	Curb	1.26	9.36	0.19	12.00	2.00	0.26	5.00	n/a	0.25	1.15	0.11	C51-2

GEOPAK 2013 Drainage (STORM DRAIN DESIGN)
 Project Name: Belknap Road
 Job Number: 008169
 Project Description: Storm Sewer
 Design Frequency: 5 Year
 Measurement Unit: English
 County: Fort Bend/Harris
 On Grade Inlet Computation Data

SYSTEM D													
ID	Type	Discharge (cfs)	Ponded Width	Ponded Depth	Max Allow Pond Width (ft)	Transverse Slope (%)	Longitudinal Slope %	Length (ft)	Width (ft)	Depr.	Capacity (cfs)	By Pass (cfs)	To Node
D58-1	Curb	0.89	7.28	0.15	12.00	2.00	0.50	5.00	n/a	0.25	0.83	0.06	D59-1
D58-2	Curb	1.06	6.76	0.14	12.00	2.00	1.06	5.00	n/a	0.25	0.85	0.21	D60-1
D59-1	Curb	0.94	6.10	0.12	12.00	2.00	1.44	10.00	n/a	0.25	0.94	0.00	**

NO	DATE	REVISION	APPROVED

CivilTech Engineering, Inc.
 11821 Telge Road
 Cypress, Texas 77429
 PH: (281) 304-0200 - FX: (281) 304-0210
 Firm Registration No. F-382

FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
 W BELLFORT BLVD TO OAK BEND FOREST DR

INLET COMPUTATIONS

CNTY	PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	XXX	2022		151
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY		
CR	DA	CW	PB		

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GEOPAK 2013 Drainage (STORM DRAIN DESIGN)
 Project Name: Belknap Road
 Job Number: 008169
 Project Description: Storm Sewer
 Design Frequency: 5 Year
 Measurement Unit: English
 County: Fort Bend
 Sag Inlet Computation Data

ID	Type	Discharge (cfs)	Discharge (cfs)		Ponded Width (ft)		Max Allow Pond Width (ft)	Slope %		Length (ft)	Width (ft)	Depr.	Area (ft)	Per im. (ft)	Capacity (cfs)	Ponded Depth	Transverse Slope (%)
			Left	Right	Left	Right		Left	Right								
			A16-1	Grate	3.72	1.86		1.86	3.58								
A17-3	Grate	3.96	1.98	1.98	3.08	3.39	8.00	0.10	0.10	2.48	2.48	n/a	4.39	8.42	12.71	0.35	25.00
A19-3	Grate	1.41	0.71	0.71	2.17	2.49	10.00	0.10	0.10	2.48	2.48	n/a	4.39	8.42	15.15	0.17	25.00
A19-4	Grate	2.78	1.39	1.39	2.37	1.93	10.00	0.10	0.10	2.48	2.48	n/a	4.39	8.42	6.89	0.27	25.00
A21-1	Curb	0.82	0.41	0.41	5.83	5.83	8.00	0.35	0.35	5.00	n/a	0.25	n/a	n/a	1.13	0.13	2.00
A21-2	Curb	1.11	0.56	0.56	6.53	6.53	8.00	0.35	0.35	5.00	n/a	0.25	n/a	n/a	1.13	0.16	2.00
A21-3	Grate	6.38	3.19	3.19	2.64	4.06	10.00	0.10	0.10	2.48	2.48	n/a	4.39	8.42	6.89	0.47	25.00
A23-3	Grate	2.97	1.49	1.49	3.05	3.05	10.00	0.10	0.10	2.48	2.48	n/a	4.39	8.42	15.15	0.29	25.00
A23-4	Grate	0.23	0.12	0.12	0.93	0.93	10.00	0.10	0.10	2.48	2.48	n/a	4.39	8.42	6.89	0.05	25.00
A24-3	Grate	7.17	3.59	3.59	3.85	4.24	10.00	0.10	0.10	2.48	2.48	n/a	4.39	8.42	11.80	0.51	25.00

GEOPAK 2013 Drainage (STORM DRAIN DESIGN)
 Project Name: Belknap Road
 Job Number: 008169
 Project Description: Storm Sewer
 Design Frequency: 5 Year
 Measurement Unit: English
 County: Fort Bend
 Sag Inlet Computation Data

ID	Type	Discharge (cfs)	Discharge (cfs)		Ponded Width (ft)		Max Allow Pond Width (ft)	Slope %		Length (ft)	Width (ft)	Depr.	Area (ft)	Per im. (ft)	Capacity (cfs)	Ponded Depth	Transverse Slope (%)
			Left	Right	Left	Right		Left	Right								
			B28-3	Grate	4.83	2.42		2.42	2.92								
B30-1	Curb	0.90	0.45	0.45	5.38	5.65	8.00	0.50	0.65	5.00	n/a	0.25	n/a	n/a	1.13	0.14	2.00
B30-2	Curb	1.06	0.53	0.53	5.72	6.01	8.00	0.65	0.50	5.00	n/a	0.25	n/a	n/a	1.13	0.15	2.00
B30-3	Grate	6.21	3.11	3.11	3.41	3.53	10.00	0.10	0.10	2.48	2.48	n/a	4.39	8.42	13.66	0.47	25.00
B30-4	Grate	14.80	7.40	7.40	4.63	4.44	10.00	0.10	0.10	2.48	2.48	n/a	4.39	8.42	9.51	1.57	25.00
B35-1	Curb	0.90	0.45	0.45	5.65	4.47	8.00	1.75	0.50	10.00	n/a	0.25	n/a	n/a	1.87	0.10	2.00
B35-2	Curb	1.00	0.50	0.50	5.86	4.64	8.00	0.50	1.75	10.00	n/a	0.25	n/a	n/a	1.87	0.11	2.00
B35-3	Grate	0.45	0.23	0.23	1.37	1.37	10.00	0.10	0.10	2.48	2.48	n/a	4.39	8.42	14.92	0.08	25.00
B35-4	Grate	0.21	0.11	0.11	1.03	1.03	10.00	0.10	0.10	2.48	2.48	n/a	4.39	8.42	9.06	0.05	25.00
B36-2	Grate	13.59	6.80	6.80	4.90	3.47	10.00	0.10	0.10	2.48	2.48	n/a	4.39	8.42	2.01	1.33	25.00
B38-1	Curb	1.09	0.55	0.55	6.07	6.48	8.00	0.35	0.50	10.00	n/a	0.25	n/a	n/a	1.87	0.11	2.00
B38-2	Curb	1.15	0.58	0.58	6.19	6.62	8.00	0.50	0.35	10.00	n/a	0.25	n/a	n/a	1.87	0.12	2.00
B38-3	Grate	2.08	1.04	1.04	2.67	2.42	10.00	0.10	0.10	2.48	2.48	n/a	4.39	8.42	17.62	0.23	25.00
B38-4	Grate	1.44	0.72	0.72	1.72	1.52	10.00	0.10	0.10	2.48	2.48	n/a	4.39	8.42	6.69	0.18	25.00
B40-3	Grate	0.33	0.17	0.17	1.07	1.07	10.00	0.10	0.10	2.48	2.48	n/a	4.39	8.42	9.87	0.07	25.00
B40-4	Grate	9.90	4.95	4.95	4.53	4.53	10.00	0.10	0.10	2.48	2.48	n/a	4.39	8.42	11.80	0.70	25.00
B41-3	Grate	0.13	0.07	0.07	0.75	0.75	10.00	0.10	0.10	2.48	2.48	n/a	4.39	8.42	6.89	0.04	25.00
B41-4	Grate	0.08	0.04	0.04	0.62	0.62	10.00	0.10	0.10	2.48	2.48	n/a	4.39	8.42	6.89	0.02	25.00
B43-3	Grate	0.25	0.13	0.13	0.96	0.96	10.00	0.10	0.10	2.48	2.48	n/a	4.39	8.42	12.37	0.05	25.00
B45-1	Curb	1.05	0.53	0.53	4.72	4.72	8.00	1.00	0.75	5.00	n/a	0.25	n/a	n/a	1.24	0.15	2.00
B45-2	Curb	0.96	0.48	0.48	4.58	4.58	8.00	0.75	1.00	5.00	n/a	0.25	n/a	n/a	1.13	0.14	2.00

NO.	DATE	REVISION	APPROVED



CivilTech Engineering, Inc.
 11821 Telge Road
 Cypress, Texas 77429
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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
 W BELLFORT BLVD TO OAK BEND FOREST DR

INLET COMPUTATIONS

SHEET 2 OF 3				
CNTY PROJ *	RPS PROJ *	DATE	SCALE	SHEET NO
17-2-11	008169	XXX 2022		152
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
CR	DA	CW	PB	

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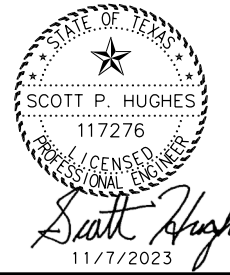
GEOPAK 2013 Drainage (STORM DRAIN DESIGN)
 Project Name: Belknap Road
 Job Number: 008169
 Project Description: Storm Sewer
 Design Frequency: 5 Year
 Measurement Unit: English
 County: Fort Bend
 Sag Inlet Computation Data

ID	Type	Discharge (cfs)	Discharge (cfs)		Ponded Width (ft)		Max Allow Pond Width (ft)	Slope %		Length (ft)	Width (ft)	Depr.	Area (ft)	Perim. (ft)	Capacity (cfs)	Ponded Depth	Transverse Slope (%)
			Left	Right	Left	Right		Left	Right								
			C50-1	Curb	1.21	0.61		0.61	5.53								
C50-2	Curb	1.10	0.55	0.55	5.34	4.69	8.00	1.00	2.50	10.00	n/a	0.25	n/a	n/a	10.33	0.11	2.00
C50-3	Grate	0.23	0.12	0.12	0.94	0.94	10.00	0.10	0.10	2.48	2.48	n/a	4.39	8.42	12.26	0.05	25.00
C50-4	Grate	2.71	1.36	1.36	2.35	2.35	10.00	0.10	0.10	2.48	2.48	n/a	4.39	8.42	14.45	0.27	25.00
C53-3	Grate	2.46	1.23	1.23	2.10	2.10	10.00	0.10	0.10	2.48	2.48	n/a	4.39	8.42	16.68	0.25	25.00

GEOPAK 2013 Drainage (STORM DRAIN DESIGN)
 Project Name: Belknap Road
 Job Number: 008169
 Project Description: Storm Sewer
 Design Frequency: 5 Year
 Measurement Unit: English
 County: Fort Bend/Harris
 Sag Inlet Computation Data

ID	Type	Discharge (cfs)	Discharge (cfs)		Ponded Width (ft)		Max Allow Pond Width (ft)	Slope %		Length (ft)	Width (ft)	Depr.	Area (ft)	Perim. (ft)	Capacity (cfs)	Ponded Depth	Transverse Slope (%)
			Left	Right	Left	Right		Left	Right								
			D55-3	Grate	3.07	1.54		1.54	3.79								
D55-4	Grate	1.25	0.63	0.63	2.71	2.71	10.00	0.10	0.10	2.48	2.48	n/a	4.39	8.42	11.80	0.16	25.00
D58-3	Grate	1.43	0.72	0.72	1.71	1.71	10.00	0.10	0.10	2.48	2.48	n/a	4.39	8.42	16.68	0.18	25.00
D59-2	Grate	0.13	0.07	0.07	0.76	0.95	10.00	0.10	0.10	2.48	2.48	n/a	4.39	8.42	12.26	0.04	25.00
D60-1	Curb	1.14	0.57	0.57	5.72	7.32	12.00	0.75	0.20	10.00	n/a	0.25	n/a	n/a	3.43	0.12	2.00

NO.	DATE	REVISION	APPROVED



CivilTech Engineering, Inc.
 11821 Telge Road
 Cypress, Texas 77429
 PH: (281) 304-0200 - FX: (281) 304-0210
 Firm Registration No. F-382

FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
 W BELLFORT BLVD TO OAK BEND FOREST DR

INLET COMPUTATIONS

SHEET 3 OF 3

CNTY	PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	XXX	2022		153
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY		
CR	DA	CW	PB		

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GEOPAK 2013 Drainage (STORM DRAIN DESIGN)
 Project Name: Belknap Road
 Job Number: 008169
 Project Description: Storm Sewer
 Measurement Unit: English
 County: Fort Bend
 Conveyance Configuration Data

SYSTEM A											
ID	Upstream ID	Downstream ID	Length (ft)	Shape	#	Rise (ft)	Span (ft)	n	Slope %	Upstream Invert (ft)	Downstream Invert (ft)
A13-1	A13-1	A-OFF-1	18	Circular	1	2.00	n/a	0.013	0.10	79.14	79.12
A13-2	A13-2	A-OFF-2	13	Circular	1	2.00	n/a	0.013	0.10	76.50	76.49
A16-1	A16-1	A16-3	34	Circular	1	2.00	n/a	0.013	0.30	77.19	77.03
A16-2	A16-2	A-OFF	22	Circular	1	4.00	n/a	0.013	0.29	74.85	74.78
A17-1	A17-1	A16-2	146	Circular	1	3.00	n/a	0.013	0.27	75.26	74.85
A17-2	A17-2	A17-1	38	Circular	1	2.00	n/a	0.013	2.50	77.33	76.30
A17-3	A17-3	A17-2	14	Circular	1	2.00	n/a	0.013	2.50	77.72	77.33
A19-1	A19-1	A17-1	211	Circular	1	3.00	n/a	0.013	0.28	75.86	75.26
A19-2	A19-2	A19-1	38	Circular	1	2.00	n/a	0.013	0.30	76.98	76.86
A19-3	A19-3	A19-1	15	Circular	1	2.00	n/a	0.013	3.50	77.44	76.86
A19-4	A19-4	A19-2	17	Circular	1	2.00	n/a	0.013	0.30	77.04	76.98
A21-1	A21-1	A19-1	164	Circular	1	2.50	n/a	0.013	0.27	76.81	76.36
A21-2	A21-2	A21-1	38	Circular	1	2.00	n/a	0.013	0.10	77.35	77.31
A21-3	A21-3	A21-2	16	Circular	1	2.00	n/a	0.013	0.10	77.37	77.35
A23-1	A23-1	A21-1	163	Circular	1	2.00	n/a	0.013	0.27	77.77	77.31
A23-2	A23-2	A23-1	38	Circular	1	2.00	n/a	0.013	0.10	77.81	77.77
A23-3	A23-3	A23-1	15	Circular	1	2.00	n/a	0.013	0.10	77.78	77.77
A23-4	A23-4	A23-2	20	Circular	1	2.00	n/a	0.013	0.10	77.83	77.81
A24-1	A24-1	A23-1	200	Circular	1	2.00	n/a	0.013	0.27	78.33	77.77
A24-2	A24-2	A24-1	38	Circular	1	2.00	n/a	0.013	0.10	78.37	78.33
A24-3	A24-3	A24-2	17	Circular	1	2.00	n/a	0.013	0.10	78.39	78.37
A26-1	A26-1	A24-1	121	Circular	1	2.00	n/a	0.013	0.27	78.67	78.33
A26-2	A26-2	A26-1	38	Circular	1	2.00	n/a	0.013	1.30	79.20	78.67

GEOPAK 2013 Drainage (STORM DRAIN DESIGN)
 Project Name: Belknap Road
 Job Number: 008169
 Project Description: Storm Sewer
 Measurement Unit: English
 County: Fort Bend
 Conveyance Configuration Data

SYSTEM B											
ID	Upstream ID	Downstream ID	Length (ft)	Shape	#	Rise (ft)	Span (ft)	n	Slope %	Upstream Invert (ft)	Downstream Invert (ft)
B28-1	B28-1	B30-1	145	Circular	1	2.00	n/a	0.013	0.13	77.52	77.32
B28-2	B28-2	B28-1	38	Circular	1	2.00	n/a	0.013	0.10	77.56	77.52
B28-3	B28-3	B28-2	18	Circular	1	2.00	n/a	0.013	0.10	77.58	77.56
B30-1	B30-1	B32-1	206	Circular	1	3.50	n/a	0.013	0.13	76.61	76.34
B30-2	B30-2	B30-1	38	Circular	1	2.00	n/a	0.013	0.50	77.31	77.11
B30-3	B30-3	B30-1	15	Circular	1	2.00	n/a	0.013	0.30	77.16	77.11
B30-4	B30-4	B30-2	15	Circular	1	2.00	n/a	0.013	0.50	77.40	77.31
B32-1	B32-1	B35-1	263	Circular	1	3.50	n/a	0.013	0.13	76.34	75.99
B32-2	B32-2	B32-1	38	Circular	1	2.00	n/a	0.013	1.00	78.25	77.84
B35-1	B35-1	B36-3	178	Circular	1	3.50	n/a	0.013	0.13	75.99	75.75
B35-2	B35-2	B35-1	38	Circular	1	2.00	n/a	0.013	1.50	78.11	77.49
B35-3	B35-3	B35-1	16	Circular	1	2.00	n/a	0.013	1.50	77.77	77.49
B35-4	B35-4	B35-2	17	Circular	1	2.00	n/a	0.013	1.50	78.39	78.11
B36-2	B36-2	B36-3	60	Circular	1	2.00	n/a	0.013	0.40	78.00	77.75
B36-3	B36-3	B38-1	123	Circular	1	4.00	n/a	0.013	0.13	75.75	75.59
B38-1	B38-1	B40-1	210	Circular	1	4.00	n/a	0.013	0.13	75.59	75.31
B38-2	B38-2	B38-1	38	Circular	1	2.00	n/a	0.013	0.10	77.45	77.41
B38-3	B38-3	B38-1	18	Circular	1	2.00	n/a	0.013	0.14	77.62	77.59
B38-4	B38-4	B38-2	19	Circular	1	2.00	n/a	0.013	0.11	77.47	77.45
B40-1	B40-1	B41-1	136	Circular	1	4.50	n/a	0.013	0.13	75.31	75.12
B40-2	B40-2	B40-1	38	Circular	1	2.00	n/a	0.013	0.30	77.34	77.22
B40-3	B40-3	B40-1	17	Circular	1	2.00	n/a	0.013	1.50	78.12	77.83
B40-4	B40-4	B40-2	19	Circular	1	2.00	n/a	0.013	0.30	77.41	77.34
B41-1	B41-1	B43-1	190	Circular	1	4.50	n/a	0.013	0.13	75.12	74.88
B41-2	B41-2	B41-1	38	Circular	1	2.00	n/a	0.013	1.20	78.12	77.62
B41-3	B41-3	B41-1	17	Circular	1	2.00	n/a	0.013	2.50	78.10	77.62
B41-4	B41-4	B41-2	20	Circular	1	2.00	n/a	0.013	1.20	78.38	78.12
B43-1	B43-1	B45-1	190	Circular	1	4.50	n/a	0.013	0.13	74.88	74.62
B43-2	B43-2	B43-1	38	Circular	1	2.00	n/a	0.013	0.50	76.87	76.67
B43-3	B43-3	B43-1	17	Circular	1	2.00	n/a	0.013	2.50	77.87	77.40
B43-4	B43-4	B43-2	18	Circular	1	2.00	n/a	0.013	4.97	81.01	80.06
B45-1	B45-1	B-OFF	94	Circular	1	4.50	n/a	0.013	0.12	74.62	74.50
B45-2	B45-2	B45-1	41	Circular	1	2.00	n/a	0.013	0.50	77.34	77.12

NO	DATE	REVISION	APPROVED

CivilTech Engineering, Inc.
 11821 Telge Road
 Cypress, Texas 77429
 PH: (281) 304-0200 - FX: (281) 304-0210
 Firm Registration No. F-382

FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
 W BELLFORT BLVD TO OAK BEND FOREST DR

STORM SEWER COMPUTATIONS

SHEET 1 OF 4

CNTY PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	XXX 2022		154
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
CR	DA	CW	PB	

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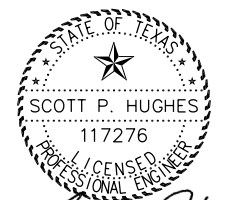
GEOPAK 2013 Drainage (STORM DRAIN DESIGN)
 Project Name: Belknap Road
 Job Number: 008169
 Project Description: Storm Sewer
 Measurement Unit: English
 County: Fort Bend
 Conveyance Configuration Data

SYSTEM C											
ID	Upstream ID	Downstream ID	Length (ft)	Shape	#	Rise (ft)	Span (ft)	n	Slope %	Upstream Invert (ft)	Downstream Invert (ft)
C47-1	C47-1	C48-1	88	Circular	1	2.00	n/a	0.013	0.50	79.22	78.76
C47-2	C47-2	C47-1	38	Circular	1	2.00	n/a	0.013	0.50	79.43	79.22
C48-1	C48-1	C-OFF	21	Circular	1	2.00	n/a	0.013	0.51	75.28	75.17
C49-1	C49-1	C48-1	97	Circular	1	2.00	n/a	0.013	0.51	75.80	75.28
C49-2	C49-2	C49-1	50	Circular	1	2.00	n/a	0.013	0.50	78.81	78.55
C50-1	C50-1	C49-1	131	Circular	1	2.00	n/a	0.013	0.50	76.48	75.80
C50-2	C50-2	C50-1	57	Circular	1	2.00	n/a	0.013	0.50	76.78	76.48
C50-3	C50-3	C50-1	18	Circular	1	2.00	n/a	0.013	0.10	76.50	76.48
C50-4	C50-4	C50-2	34	Circular	1	2.00	n/a	0.013	0.48	76.95	76.78
C51-1	C51-1	C50-1	146	Circular	1	2.00	n/a	0.013	0.50	77.24	76.48
C51-2	C51-2	C51-1	70	Circular	1	2.00	n/a	0.013	0.50	77.86	77.50
C53-1	C53-1	C51-1	133	Circular	1	2.00	n/a	0.013	0.50	77.93	77.24
C53-2	C53-2	C53-1	74	Circular	1	2.00	n/a	0.013	0.50	82.00	81.62
C53-3	C53-3	C51-2	34	Circular	1	2.00	n/a	0.013	0.50	78.04	77.86

GEOPAK 2013 Drainage (STORM DRAIN DESIGN)
 Project Name: Belknap Road
 Job Number: 008169
 Project Description: Storm Sewer
 Measurement Unit: English
 County: Fort Bend/Harris
 Conveyance Configuration Data

SYSTEM D											
ID	Upstream ID	Downstream ID	Length (ft)	Shape	#	Rise (ft)	Span (ft)	n	Slope %	Upstream Invert (ft)	Downstream Invert (ft)
D55-3A	D55-3A	D55-3-OFF	64	Circular	1	2.00	n/a	0.013	2.34	74.50	73.00
D55-3B	D55-3B	D55-3A	75	Circular	1	2.00	n/a	0.013	4.33	77.75	74.50
D55-4A	D55-4A	D55-4-OFF	79	Circular	1	2.00	n/a	0.013	1.90	74.50	73.00
D55-4B	D55-4B	D55-4A	52	Circular	1	2.00	n/a	0.013	6.73	78.00	74.50
D58-1	D58-1	D59-2	121	Circular	1	2.00	n/a	0.013	0.93	79.59	78.43
D58-2	D58-2	D58-3	49	Circular	1	2.00	n/a	0.013	1.10	78.83	78.25
D58-3	D58-3	D59-3	103	Circular	1	2.00	n/a	0.013	0.57	78.25	77.65
D59-1	D59-1	D-OFF-3	67	Circular	1	2.00	n/a	0.013	0.37	77.45	77.20
D59-2	D59-2	D59-1	27	Circular	1	2.00	n/a	0.013	3.29	78.43	77.45
D59-3	D59-3	D-OFF-3	12	Circular	1	2.00	n/a	0.013	1.16	77.65	77.49
D60-1	D60-1	D59-3	25	Circular	1	2.00	n/a	0.013	3.28	78.59	77.65

NO	DATE	REVISION	APPROVED



Scott Hughes
 11/7/2023

CivilTech Engineering, Inc.
 11821 Telge Road
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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
 W BELLFORT BLVD TO OAK BEND FOREST DR

STORM SEWER
 COMPUTATIONS

SHEET 2 OF 4

CNTY PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	XXX 2022		155
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
CR	DA	CW	PB	

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GEOPAK 2013 Drainage (STORM DRAIN DESIGN)
 Project Name: Belknap Road
 Job Number: 008169
 Project Description: Storm Sewer
 Design Frequency: 5 Year
 Measurement Unit: English
 County: Fort Bend
 Conveyance Hydraulic Computations

SYSTEM A												
ID	Upstream ID	Downstream ID	Upstream HGL (ft)	Downstream HGL (ft)	Discharge (cfs)	Capacity (cfs)	Slope %	Loss (ft)	Uniform		Actual	
									Velocity (ft/s)	Depth (ft)	Velocity (ft/s)	Depth (ft)
A13-1	A13-1	A-OFF-1	79.55	79.41	0.70	7.70	0.10	0.05	1.44	0.43	2.53	0.29
A13-2	A13-2	A-OFF-2	76.80	76.70	0.37	7.70	0.10	0.03	1.21	0.31	2.01	0.22
A16-1	A16-1	A16-3	78.13	77.70	3.72	13.33	0.30	0.19	3.47	0.75	3.98	0.68
A16-2	A16-2	A-OFF	76.88	76.35	28.26	83.71	0.29	0.38	5.68	1.67	6.15	1.57
A17-1	A17-1	A16-2	77.50	76.88	28.50	37.41	0.27	0.18	5.48	2.07	5.61	2.03
A17-2	A17-2	A17-1	78.09	76.79	4.51	38.48	2.50	0.02	7.79	0.48	7.45	0.49
A17-3	A17-3	A17-2	78.68	77.82	3.96	38.48	2.50	0.26	7.50	0.45	6.49	0.50
A19-1	A19-1	A17-1	77.91	77.50	24.15	37.70	0.28	0.10	5.29	1.85	4.27	2.24
A19-2	A19-2	A19-1	77.94	77.91	3.40	13.33	0.30	0.01	3.35	0.72	2.02	1.05
A19-3	A19-3	A19-1	78.00	77.12	1.41	45.53	3.50	0.14	6.22	0.25	5.82	0.26
A19-4	A19-4	A19-2	78.01	77.94	2.78	13.33	0.30	0.06	3.18	0.65	1.87	0.96
A21-1	A21-1	A19-1	78.88	77.91	19.50	22.93	0.27	0.25	4.85	1.91	6.06	1.56
A21-2	A21-2	A21-1	78.93	78.88	7.40	7.70	0.10	0.01	2.42	1.88	2.80	1.57
A21-3	A21-3	A21-2	79.04	78.93	6.38	7.70	0.10	0.09	2.48	1.53	2.39	1.58
A23-1	A23-1	A21-1	79.58	78.88	11.82	12.72	0.27	0.21	4.28	1.64	4.48	1.57
A23-2	A23-2	A23-1	79.58	79.58	0.88	7.70	0.10	0.00	1.56	0.47	0.29	1.81
A23-3	A23-3	A23-1	79.60	79.58	2.97	7.70	0.10	0.02	2.23	0.88	0.99	1.81
A23-4	A23-4	A23-2	79.58	79.58	0.23	7.70	0.10	0.00	1.02	0.25	0.08	1.77
A24-1	A24-1	A23-1	79.91	79.58	7.91	12.73	0.27	0.12	4.01	1.20	2.64	1.81
A24-2	A24-2	A24-1	79.96	79.91	7.31	7.70	0.10	0.00	2.39	1.88	2.74	1.58
A24-3	A24-3	A24-2	80.09	79.96	7.17	7.70	0.10	0.11	2.60	1.64	2.68	1.59
A26-1	A26-1	A24-1	79.91	79.91	0.38	12.72	0.27	0.00	1.70	0.25	0.14	1.58
A26-2	A26-2	A26-1	79.91	79.91	0.14	27.75	1.30	0.00	2.18	0.10	0.07	1.24

GEOPAK 2013 Drainage (STORM DRAIN DESIGN)
 Project Name: Belknap Road
 Job Number: 008169
 Project Description: Storm Sewer
 Design Frequency: 5 Year
 Measurement Unit: English
 County: Fort Bend
 Conveyance Hydraulic Computations

SYSTEM B												
ID	Upstream ID	Downstream ID	Upstream HGL (ft)	Downstream HGL (ft)	Discharge (cfs)	Capacity (cfs)	Slope %	Loss (ft)	Uniform		Actual	
									Velocity (ft/s)	Depth (ft)	Velocity (ft/s)	Depth (ft)
B28-1	B28-1	B30-1	79.77	79.62	6.06	8.89	0.13	0.04	2.82	1.29	1.93	2.00
B28-2	B28-2	B28-1	79.80	79.77	5.50	7.70	0.10	0.00	2.57	1.29	1.75	2.00
B28-3	B28-3	B28-2	79.84	79.80	4.83	7.70	0.10	0.04	2.52	1.17	1.54	2.00
B30-1	B30-1	B32-1	79.62	79.39	28.22	38.56	0.13	0.09	4.09	2.36	3.17	3.05
B30-2	B30-2	B30-1	79.82	79.62	15.70	17.21	0.50	0.00	5.78	1.61	5.00	2.00
B30-3	B30-3	B30-1	79.70	79.62	6.21	13.33	0.30	0.06	3.97	1.00	1.98	2.00
B30-4	B30-4	B30-2	80.24	79.82	14.80	17.21	0.50	0.35	5.76	1.53	4.71	2.00
B32-1	B32-1	B35-1	79.39	79.21	28.66	39.13	0.13	0.01	4.15	2.36	3.10	3.22
B32-2	B32-2	B32-1	79.40	79.39	0.53	24.34	1.00	0.00	2.97	0.21	0.20	1.55
B35-1	B35-1	B36-3	79.21	79.04	30.28	39.26	0.13	0.03	4.18	2.46	3.22	3.29
B35-2	B35-2	B35-1	79.21	79.21	1.20	29.80	1.50	0.00	4.40	0.28	0.42	1.72
B35-3	B35-3	B35-1	79.21	79.21	0.45	29.80	1.50	0.00	3.29	0.18	0.16	1.72
B35-4	B35-4	B35-2	79.21	79.21	0.21	29.80	1.50	0.00	2.61	0.12	0.12	1.10
B36-2	B36-2	B36-3	80.09	79.08	13.59	15.35	0.40	0.44	5.18	1.55	6.14	1.33
B36-3	B36-3	B38-1	79.04	78.83	42.74	54.87	0.13	0.10	4.52	2.82	3.91	3.24
B38-1	B38-1	B40-1	78.83	78.52	47.31	56.10	0.13	0.08	4.60	3.05	4.38	3.21
B38-2	B38-2	B38-1	78.85	78.83	2.56	7.70	0.10	0.00	2.10	0.82	1.06	1.43
B38-3	B38-3	B38-1	78.85	78.83	2.08	9.10	0.14	0.02	2.23	0.67	1.01	1.24
B38-4	B38-4	B38-2	78.85	78.85	1.44	8.07	0.11	0.01	1.88	0.59	0.62	1.40
B40-1	B40-1	B41-1	78.52	78.26	56.68	76.23	0.13	0.09	4.96	3.04	4.79	3.14
B40-2	B40-2	B40-1	78.69	78.52	10.27	13.33	0.30	0.01	4.45	1.38	4.75	1.30
B40-3	B40-3	B40-1	78.52	78.52	0.33	29.80	1.50	0.01	2.98	0.15	0.34	0.69
B40-4	B40-4	B40-2	79.10	78.69	9.90	13.33	0.30	0.30	4.39	1.35	4.39	1.35
B41-1	B41-1	B43-1	78.26	78.03	56.80	75.71	0.13	0.00	4.98	3.04	4.76	3.16
B41-2	B41-2	B41-1	78.35	77.80	0.39	26.66	1.20	0.02	2.91	0.18	2.90	0.18
B41-3	B41-3	B41-1	78.30	78.26	0.13	38.48	2.50	0.02	2.68	0.09	0.15	0.64
B41-4	B41-4	B41-2	78.57	78.20	0.08	26.66	1.20	0.01	1.77	0.08	1.77	0.08
B43-1	B43-1	B45-1	78.03	77.45	64.18	76.81	0.13	0.15	4.93	3.43	6.10	2.83
B43-2	B43-2	B43-1	78.06	78.03	8.45	17.21	0.50	0.01	5.15	1.03	3.69	1.37
B43-3	B43-3	B43-1	78.11	77.51	0.25	38.48	2.50	0.04	3.27	0.12	3.26	0.12
B43-4	B43-4	B43-2	82.52	80.70	8.18	54.26	4.97	0.40	11.81	0.54	9.44	0.64
B45-1	B45-1	B-OFF	77.45	76.85	65.09	74.64	0.12	0.03	5.00	3.43	7.75	2.35
B45-2	B45-2	B45-1	77.79	77.45	0.96	17.21	0.50	0.12	2.80	0.33	2.80	0.33

NO.	DATE	REVISION	APPROVED
CivilTech Engineering, Inc.		11821 Telge Road Cypress, Texas 77429 PH: (281) 304-0200 - FX: (281) 304-0210 Firm Registration No. F-382	
FORT BEND COUNTY, TEXAS			
BELKNAP ROAD IMPROVEMENTS W BELLFORT BLVD TO OAK BEND FOREST DR			
STORM SEWER COMPUTATIONS			
SHEET 3 OF 4			
CNTY PROJ	RPS PROJ	DATE	SCALE
17-2-11	008169	XXX 2022	
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY
CR	DA	CW	PB
			156

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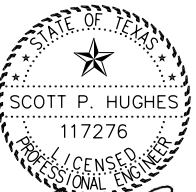
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GEOPAK 2013 Drainage (STORM DRAIN DESIGN)
 Project Name: Belknap Road
 Job Number: 008169
 Project Description: Storm Sewer
 Design Frequency: 5 Year
 Measurement Unit: English
 County: Fort Bend
 Conveyance Hydraulic Computations

SYSTEM C												
ID	Upstream ID	Downstream ID	Upstream HGL (ft)	Downstream HGL (ft)	Discharge (cfs)	Capacity (cfs)	Slope %	Loss (ft)	Uniform		Actual	
									Velocity (ft/s)	Depth (ft)	Velocity (ft/s)	Depth (ft)
C47-1	C47-1	C48-1	79.58	79.03	0.64	17.21	0.50	0.09	2.49	0.27	2.49	0.27
C47-2	C47-2	C47-1	79.64	79.58	0.18	17.21	0.50	0.03	1.70	0.15	0.46	0.36
C48-1	C48-1	C-OFF	76.93	76.42	12.04	17.32	0.51	0.36	5.62	1.29	5.85	1.25
C49-1	C49-1	C48-1	77.23	76.93	11.54	17.38	0.51	0.12	5.60	1.25	4.16	1.65
C49-2	C49-2	C49-1	79.14	78.79	0.52	17.21	0.50	0.08	2.33	0.25	2.33	0.25
C50-1	C50-1	C49-1	78.04	77.23	10.53	17.25	0.50	0.37	5.41	1.19	4.38	1.43
C50-2	C50-2	C50-1	78.07	78.04	3.66	17.21	0.50	0.02	4.11	0.65	1.39	1.56
C50-3	C50-3	C50-1	78.04	78.04	0.23	7.70	0.10	0.00	1.03	0.25	0.09	1.56
C50-4	C50-4	C50-2	78.11	78.07	2.71	16.85	0.47	0.04	3.72	0.57	1.26	1.29
C51-1	C51-1	C50-1	78.37	77.31	5.77	17.28	0.50	0.28	4.69	0.83	4.69	0.83
C51-2	C51-2	C51-1	78.53	78.08	2.91	17.21	0.50	0.07	3.85	0.58	3.85	0.58
C53-1	C53-1	C51-1	78.65	77.76	2.45	17.27	0.50	0.18	3.70	0.53	3.70	0.53
C53-2	C53-2	C53-1	82.52	82.00	1.26	17.21	0.50	0.13	3.05	0.38	3.05	0.38
C53-3	C53-3	C51-2	78.78	78.39	2.46	17.21	0.50	0.19	3.71	0.53	3.71	0.53

GEOPAK 2013 Drainage (STORM DRAIN DESIGN)
 Project Name: Belknap Road
 Job Number: 008169
 Project Description: Storm Sewer
 Design Frequency: 5 Year
 Measurement Unit: English
 County: Fort Bend/Harris
 Conveyance Hydraulic Computations

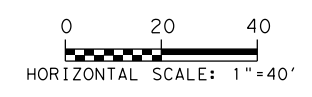
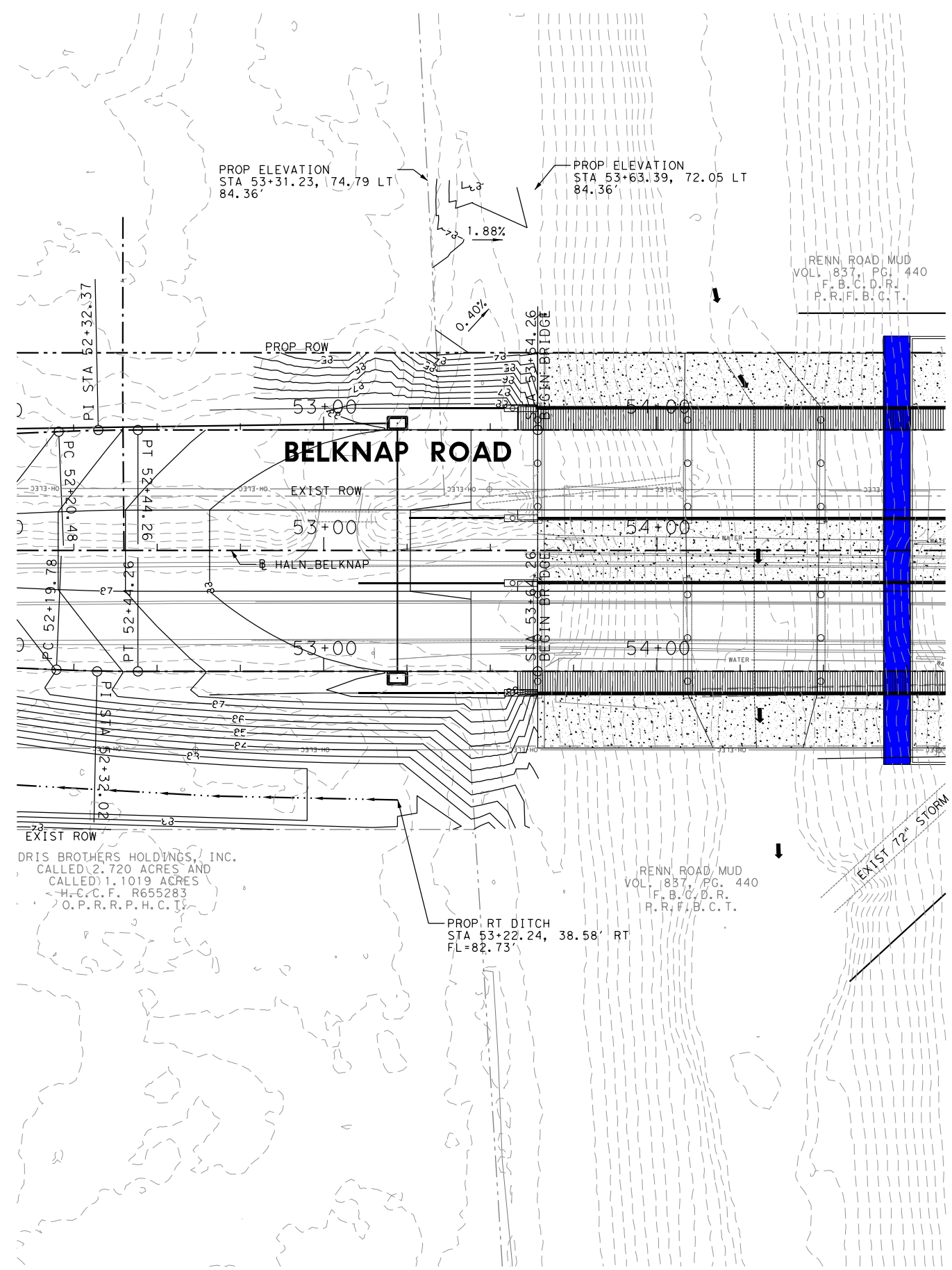
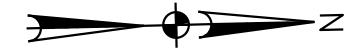
SYSTEM D												
ID	Upstream ID	Downstream ID	Upstream HGL (ft)	Downstream HGL (ft)	Discharge (cfs)	Capacity (cfs)	Slope %	Loss (ft)	Uniform		Actual	
									Velocity (ft/s)	Depth (ft)	Velocity (ft/s)	Depth (ft)
D55-3A	D55-3A	D55-3-OFF	75.27	73.41	3.07	36.99	2.34	0.16	6.78	0.40	6.71	0.41
D55-3B	D55-3B	D55-3A	78.58	74.85	3.07	49.97	4.33	0.22	8.37	0.35	8.34	0.35
D55-4A	D55-4A	D55-4-OFF	74.98	73.28	1.25	33.36	1.90	0.10	4.84	0.27	4.82	0.28
D55-4B	D55-4B	D55-4A	78.52	74.70	1.25	62.17	6.73	0.14	7.47	0.20	7.46	0.20
D58-1	D58-1	D59-2	80.03	78.71	0.89	23.50	0.93	0.11	3.41	0.28	3.41	0.28
D58-2	D58-2	D58-3	79.31	78.54	1.06	25.54	1.10	0.12	3.82	0.29	3.80	0.29
D58-3	D58-3	D59-3	78.98	78.16	2.47	18.32	0.57	0.18	3.88	0.51	3.88	0.51
D59-1	D59-1	D-OFF-3	78.07	77.67	1.87	14.79	0.37	0.12	3.05	0.50	3.28	0.47
D59-2	D59-2	D59-1	78.87	77.67	1.00	44.13	3.29	0.09	5.49	0.22	5.44	0.22
D59-3	D59-3	D-OFF-3	78.49	78.02	3.35	26.19	1.16	0.20	5.42	0.50	5.04	0.53
D60-1	D60-1	D59-3	79.04	77.86	0.93	44.09	3.28	0.11	5.37	0.21	5.30	0.21

NO	DATE	REVISION	APPROVED
 SCOTT P. HUGHES 117276 LICENSED PROFESSIONAL ENGINEER <i>Scott Hughes</i> 11/7/2023			
CivilTech Engineering, Inc. 11821 Telge Road Cypress, Texas 77429 PH: (281) 304-0200 - FX: (281) 304-0210 Firm Registration No. F-382			
FORT BEND COUNTY, TEXAS			
BELKNAP ROAD IMPROVEMENTS W BELLFORT BLVD TO OAK BEND FOREST DR			
STORM SEWER COMPUTATIONS			
SHEET 4 OF 4			
CNTY PROJ	RPS PROJ	DATE	SCALE
17-2-11	008169	XXX 2022	
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY
CR	DA	CW	PB
			157

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CAUTION!!!!
OVERHEAD ELECTRIC.
LOCATIONS ARE APPROXIMATE

CALL BEFORE YOU DIG!
TEXAS ONE CALL PARTICIPANTS REQUEST
48 HOURS NOTICE BEFORE YOU DIG, DRILL,
OR BLAST - STOP CALL

Texas One Call System
1-800-DIG-TESS

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
SCOTT P. HUGHES
117276
PROFESSIONAL ENGINEER
Scott Hughes
11/7/2023

CivilTech Engineering, Inc.
11821 Telge Road
Cypress, Texas 77429
PH: (281) 304-0200 - FX: (281) 304-0210
Firm Registration No. F-382

FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

BELKNAP RD
PROPOSED GRADING PLAN

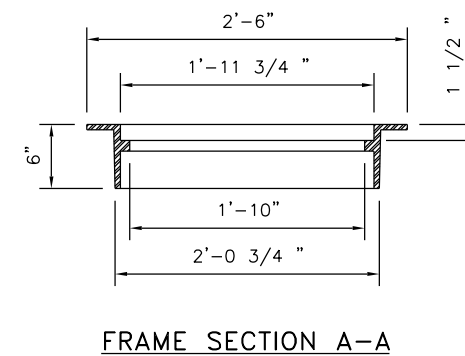
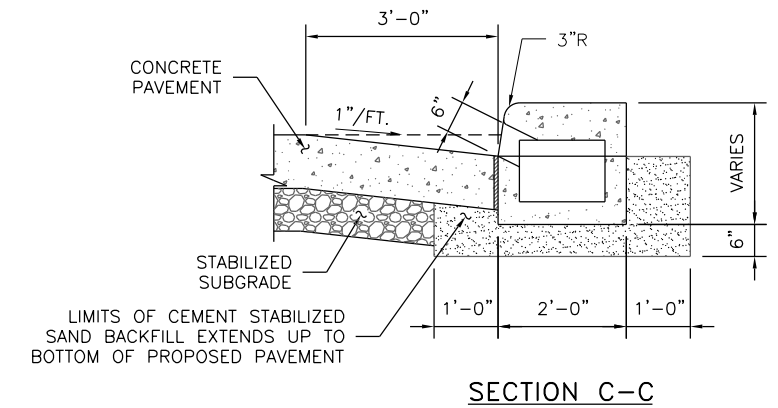
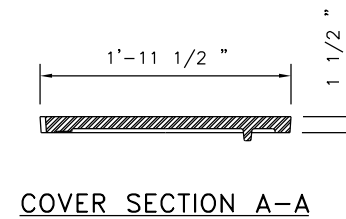
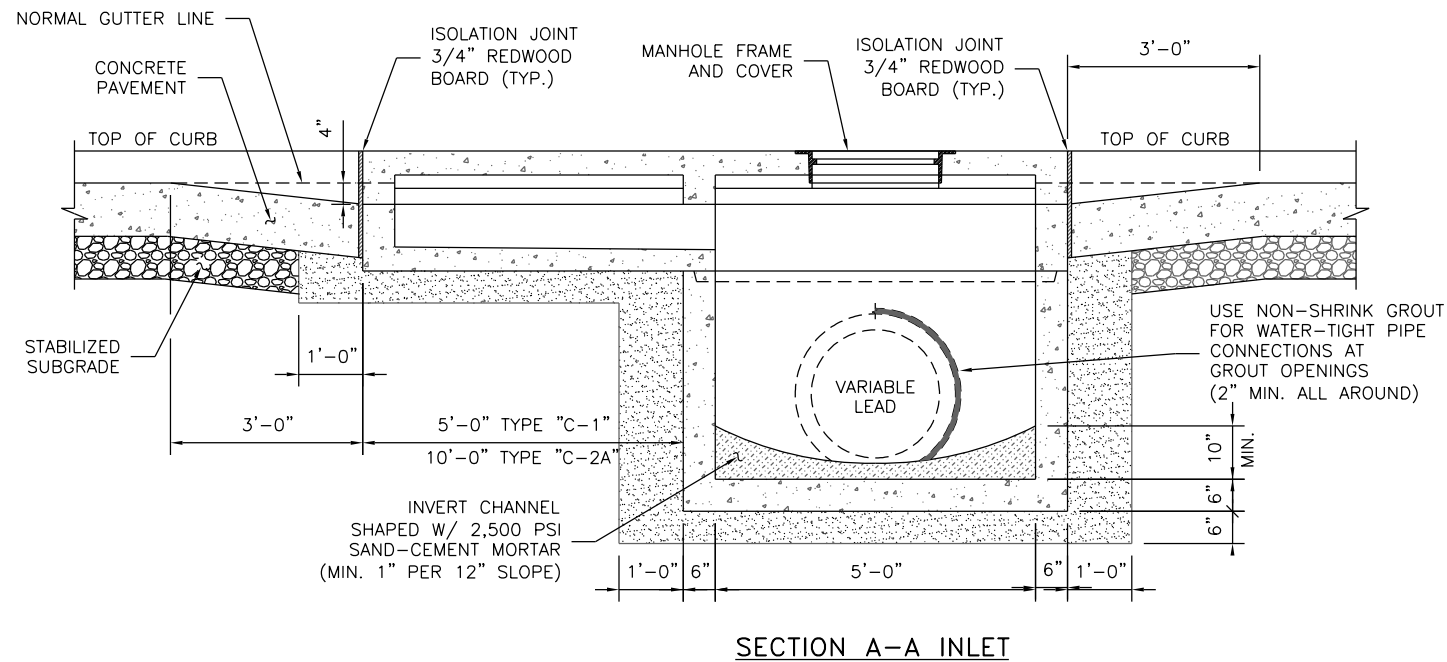
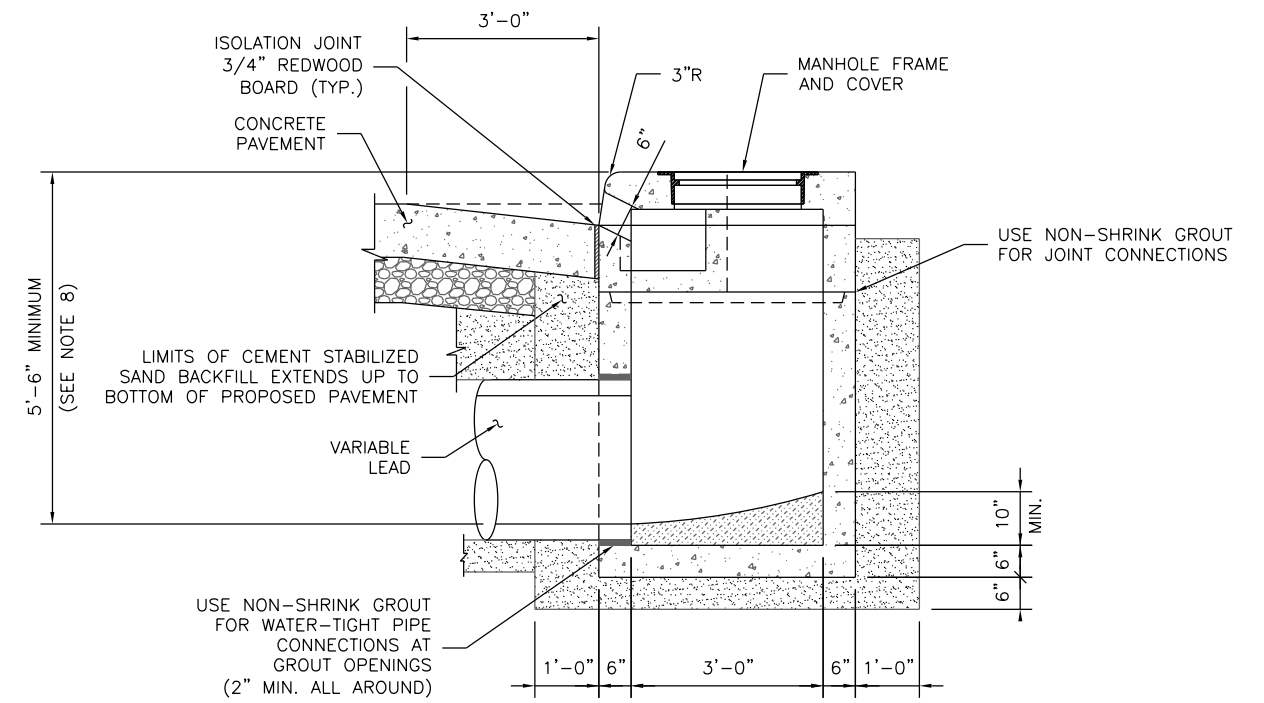
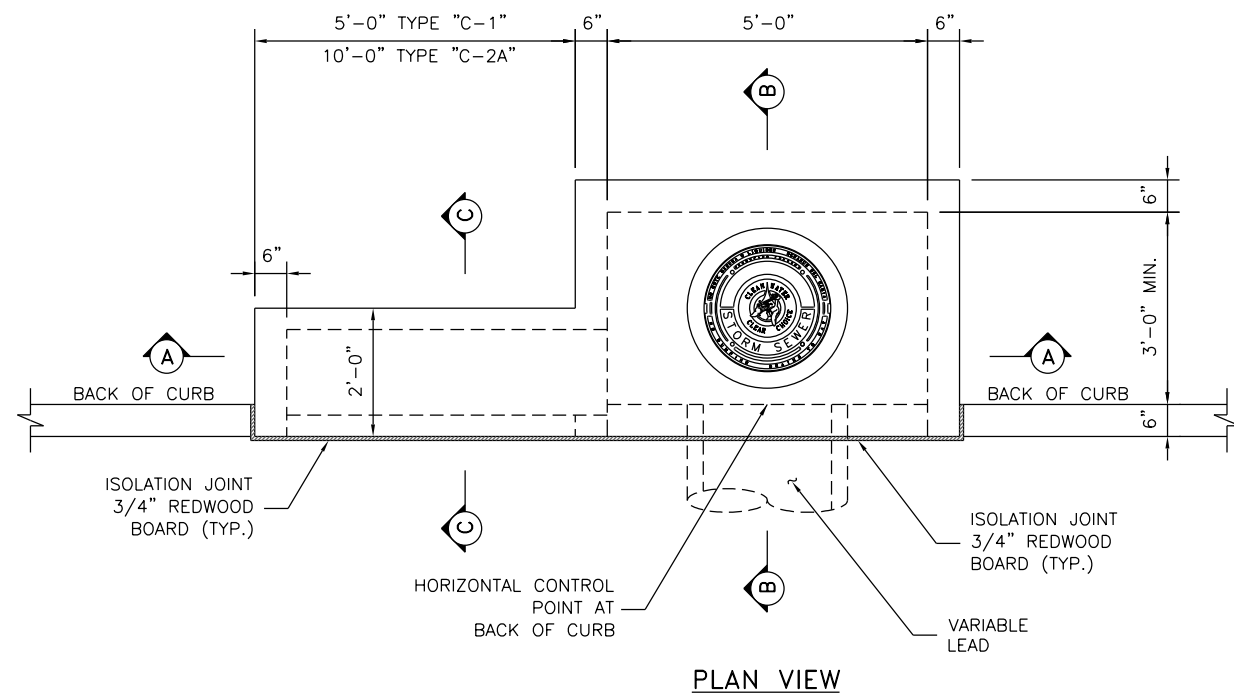
SHEET 1 OF 1

CNTY PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	XXX 2022		
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	157A
CR	DA	CW	PB	

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INLET NOTES:

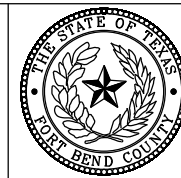
- TYPE "C": INLET ONLY - NO EXTENSION
- TYPE "C-1": INLET WITH ONE EXTENSION (5'-0" LONG)
- TYPE "C-2": INLET WITH ONE EXTENSION (5'-0" LONG) ON EACH SIDE
- TYPE "C-2A": INLET WITH ONE DOUBLE EXTENSION (10'-0" LONG) ON ONE SIDE
- * FOR TYPE "C-2A" INLETS, PROVIDE A CENTER 6"x6" COLUMN IN THE CURB LINE BETWEEN ALL EXTENSIONS.

GENERAL NOTES:

1. CONSTRUCTION AND MATERIALS SHALL MEET REQUIREMENTS OF ITEM 472 "INLETS".
2. CONCRETE FOR INLET: MINIMUM 4,000 PSI IN 28 DAYS
3. PRECAST STRUCTURE TO MEET ASTM C913.
4. FRAME AND COVER SHALL BE EAST JORDAN IRON WORKS MODEL V-1814 FRAME AND V-1418 COVER OR APPROVED EQUAL.
5. IF THE ENGINEER OF RECORD SPECIFIES A CAST-IN-PLACE INLET, HE/SHE SHALL INCORPORATE A DETAILED DRAWING INTO THE CONTRACT DOCUMENTS. HOWEVER, IF THE CONTRACTOR ELECTS TO CONSTRUCT A CAST-IN-PLACE INLET, THE CONTRACTOR WILL BE RESPONSIBLE FOR PROVIDING A DETAILED DRAWING, SIGNED AND SEALED BY A REGISTERED PROFESSIONAL ENGINEER LICENSED TO PRACTICE IN THE STATE OF TEXAS.
6. SHOP DRAWINGS WILL BE REQUIRED FOR THE PRECAST SECTION OF INLET.
7. KNOCK-OUTS ARE NOT PERMISSIBLE FOR THE PRECAST SECTION OF INLET.
8. 5'-6" MINIMUM OR AS SPECIFIED BY THE ENGINEER OF RECORD.

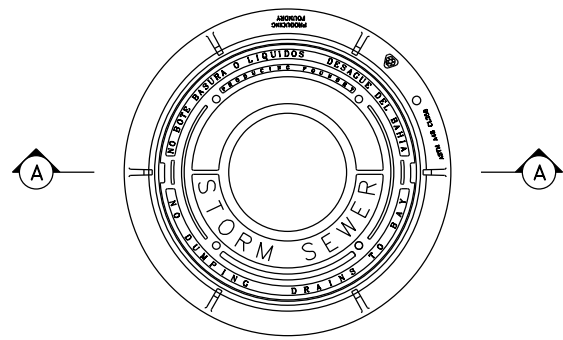
NO.	REVISIONS	DATE	NAME
▲	ORIGINAL STANDARD ISSUED	2-1-22	RJS
▲			
▲			
▲			

FORT BEND COUNTY
ENGINEERING DEPARTMENT



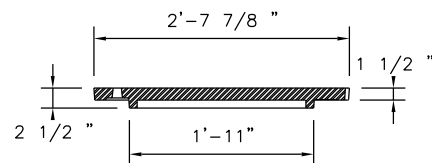
CivilTech
Engineering, Inc.
11821 Telge Road
Cypress, Texas 77429
Ph: (281) 304-0200 - FX: (281) 304-0210
Firm Registration No. F-382

PROJECT TITLE:		BELKNAP ROAD
DRAWN BY:	INIT	FBCEC STANDARD
CK'D BY:	INIT	27
SCALE:	1"=1'-6"	
DATE:	APPROVED BY:	SHEET NO:
2-1-22		158

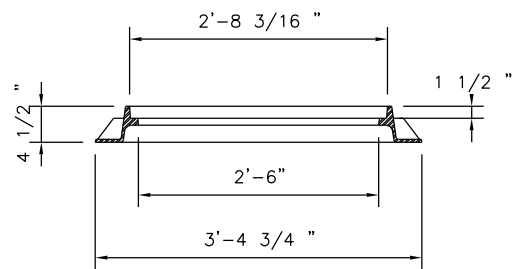


**PLAN VIEW
FRAME AND COVER**
SCALE: 1" = 1'-0"

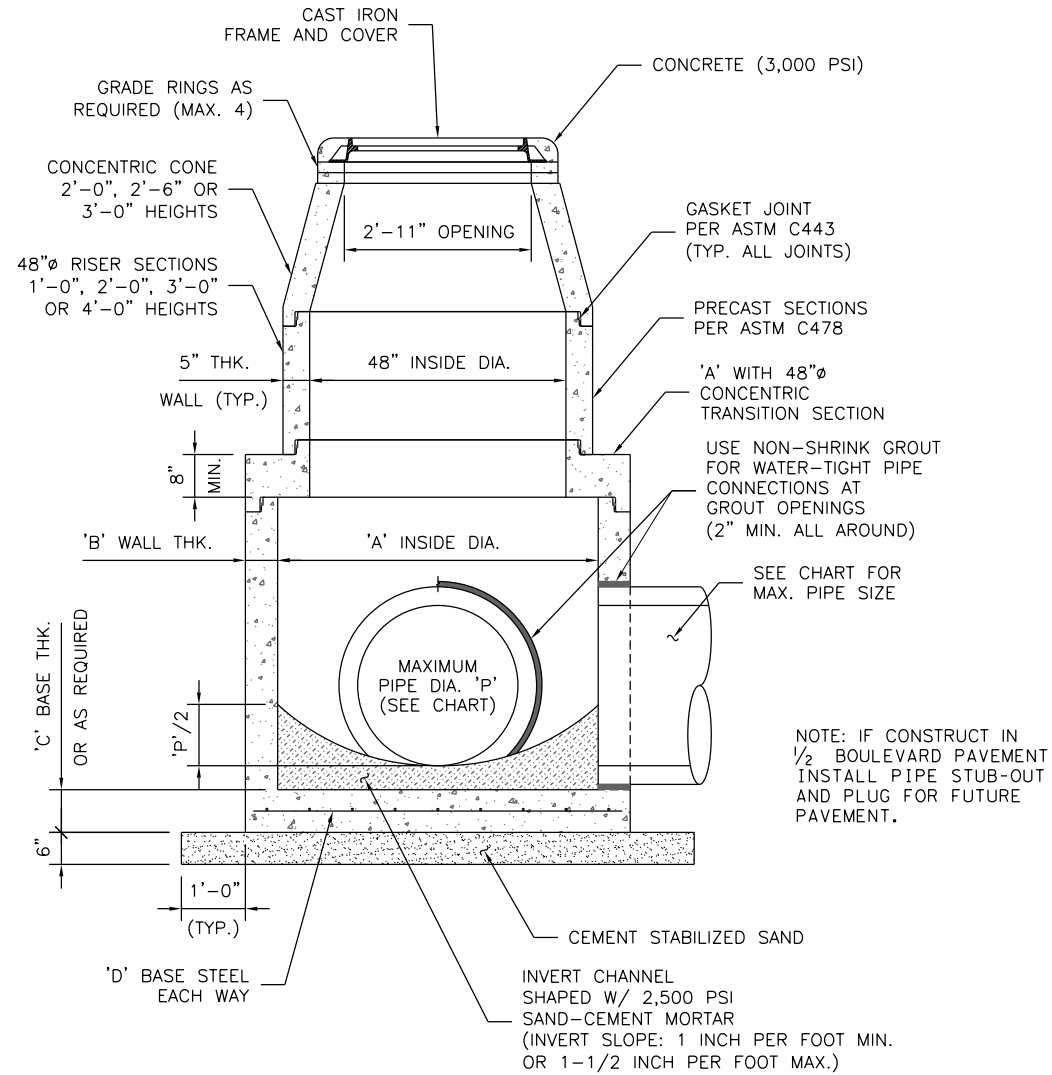
NOTE: IF PROJECT IS WITHIN A CITY ETJ OR CITY LIMITS, USE CITY'S STD MANHOLE COVER



COVER SECTION A-A
SCALE: 1" = 1'-0"

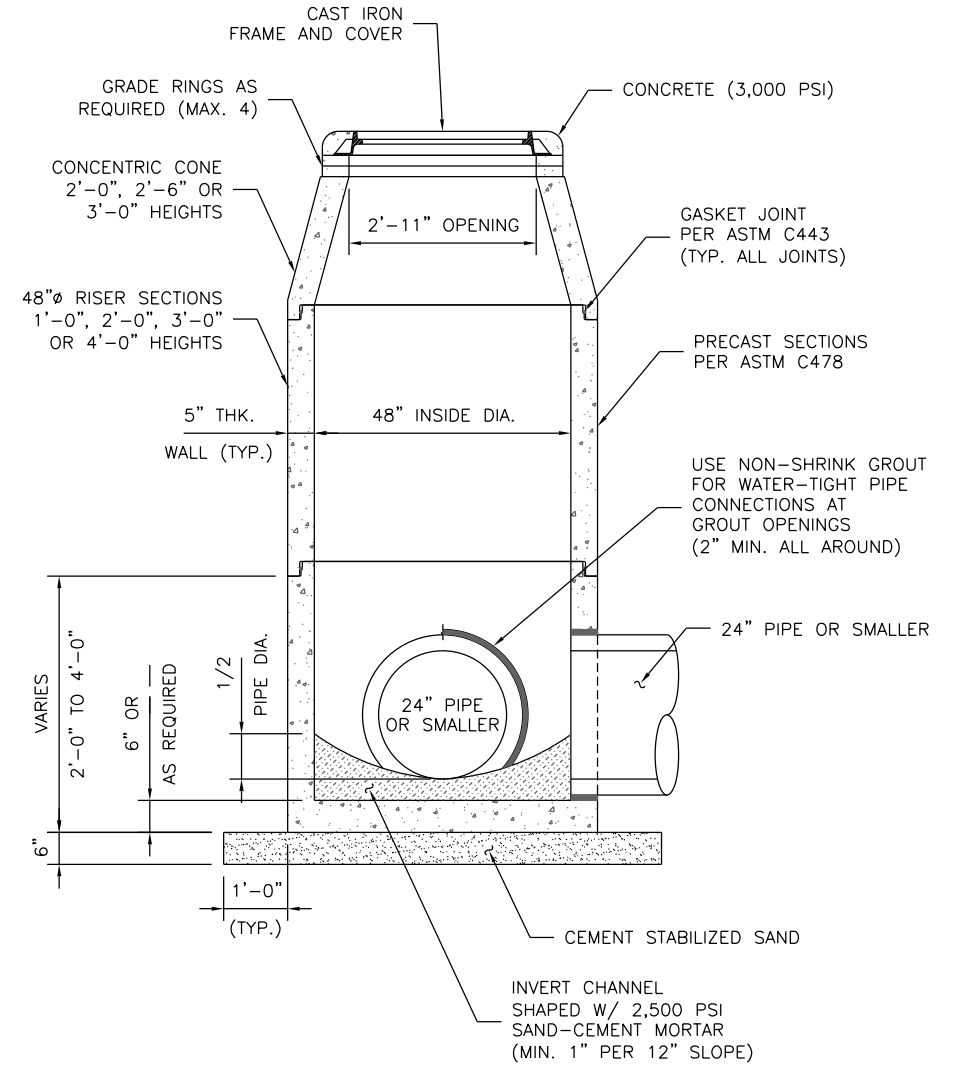


FRAME SECTION A-A
SCALE: 1" = 1'-0"



**PRECAST CONCENTRIC MANHOLE
FOR PIPE SIZES GREATER THAN 24"**
SCALE: 1" = 1'-6"

MAXIMUM PIPE DIA. 'P'	INSIDE DIA. 'A'	WALL THICKNESS 'B'	BASE THICKNESS 'C'	BASE STEEL 'D'
30"	5'-0"	6"	8"	#5 @ 8"
42"	6'-0"	7"	8"	#5 @ 8"
54"	7'-0"	8"	10"	#6 @ 12" (2 LAYERS)
60"	8'-0"	9"	10"	#6 @ 12" (2 LAYERS)



**48"Ø PRECAST CONCENTRIC MANHOLE
FOR PIPE SIZES 24" OR SMALLER**
SCALE: 1" = 1'-6"

GENERAL NOTES:

1. CONSTRUCTION AND MATERIALS SHALL MEET REQUIREMENTS OF ITEM 471 "PRECAST CONCRETE MANHOLES".
2. CONCRETE FOR MANHOLE: MINIMUM 4,000 PSI IN 28 DAYS
3. HS-20 LOADING; MANHOLE DESIGN SHALL MEET OR EXCEED ASTM C478 REQUIREMENTS.
4. GASKET JOINT: PER ASTM C443
5. FRAME AND COVER SHALL BE EAST JORDAN IRON WORKS MODEL V-1420 OR APPROVED EQUAL.
6. SHOP DRAWINGS WITH MANUFACTURER'S CERTIFICATION SHALL BE SUBMITTED FOR ENGINEER'S APPROVAL.

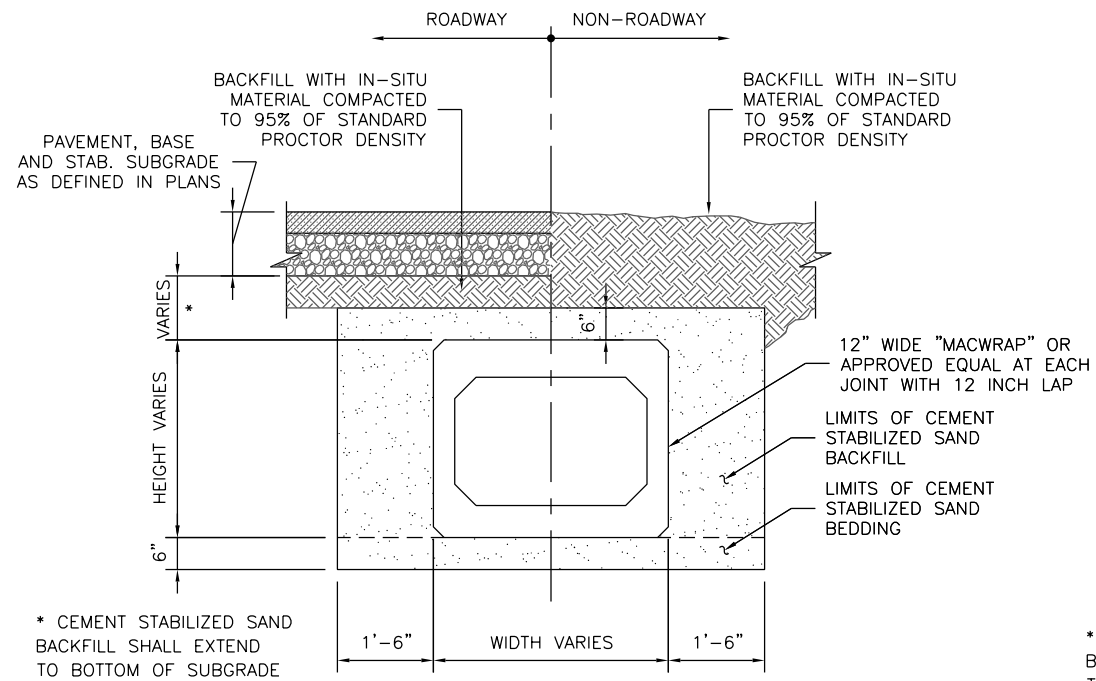
\$TIMES\$
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NO.	REVISIONS	DATE	NAME
1	ORIGINAL STANDARD ISSUED	2-1-22	RJS

FORT BEND COUNTY
ENGINEERING DEPARTMENT

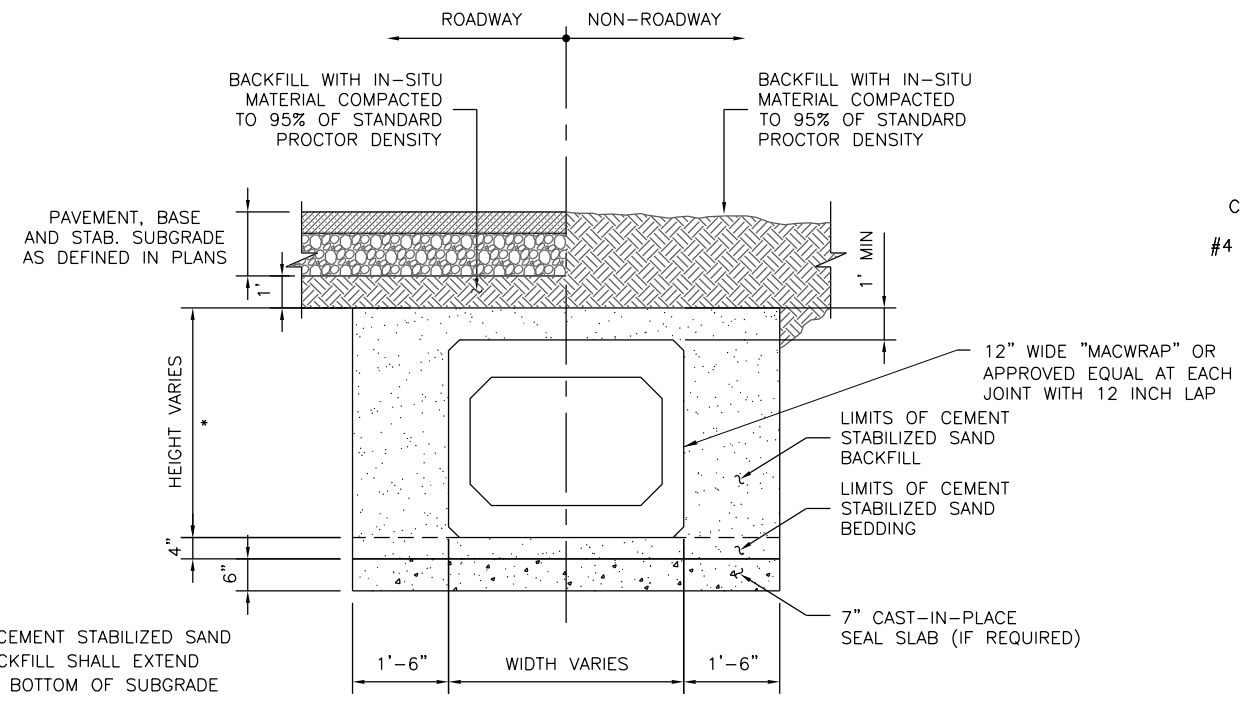


PROJECT TITLE: BELKNAP ROAD		FBCD STANDARD
DRAWN BY: INIT	SHEET DESCRIPTION: PRECAST CONCRETE STORM SEWER	20
CK'D BY: INIT		SHEET NO: 159
SCALE: AS NOTED	MANHOLE DETAILS	
DATE: 2-1-22	APPROVED BY:	



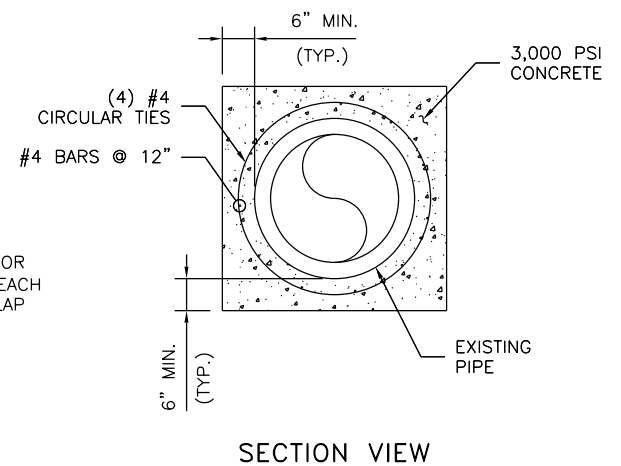
PRECAST REINFORCED CONCRETE BOX

* CEMENT STABILIZED SAND BACKFILL SHALL EXTEND TO BOTTOM OF SUBGRADE ON ALL PIPE OR BOXES UNDERNEATH PAVEMENT OR WITHIN 2' BACK OF CURB.

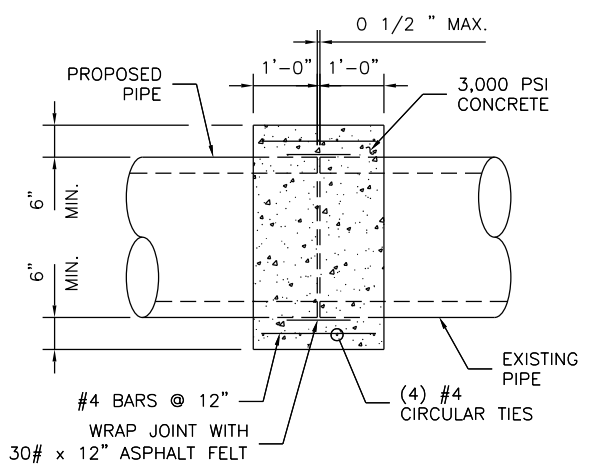


PRECAST REINFORCED CONCRETE BOX WITH SEAL SLAB

* CEMENT STABILIZED SAND BACKFILL SHALL EXTEND TO BOTTOM OF SUBGRADE ON ALL PIPE OR BOXES UNDERNEATH PAVEMENT OR WITHIN 2' BACK OF CURB.

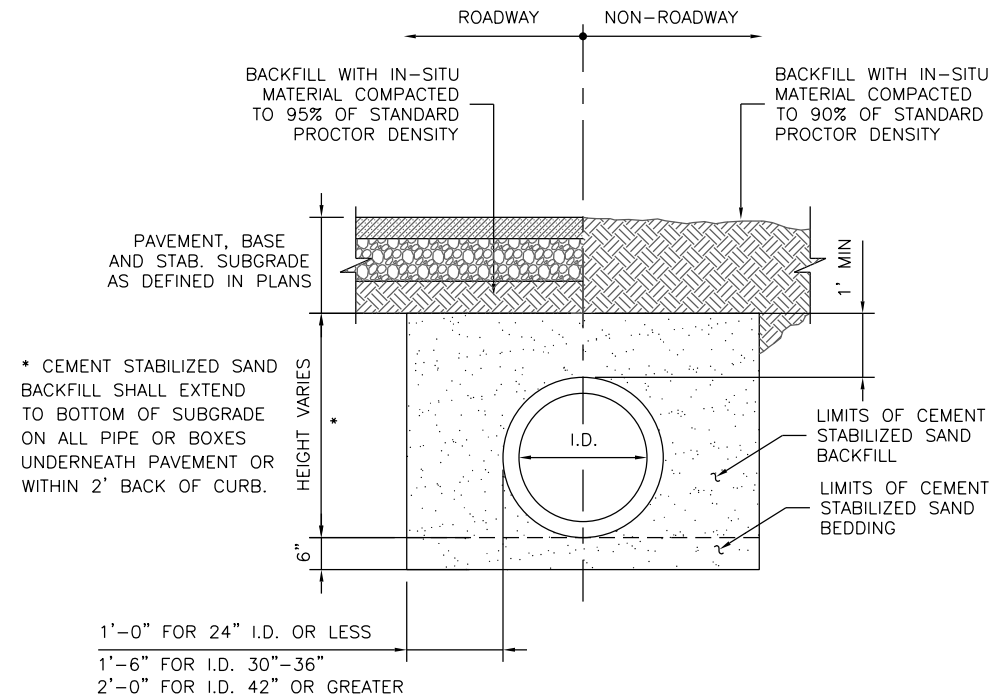


SECTION VIEW



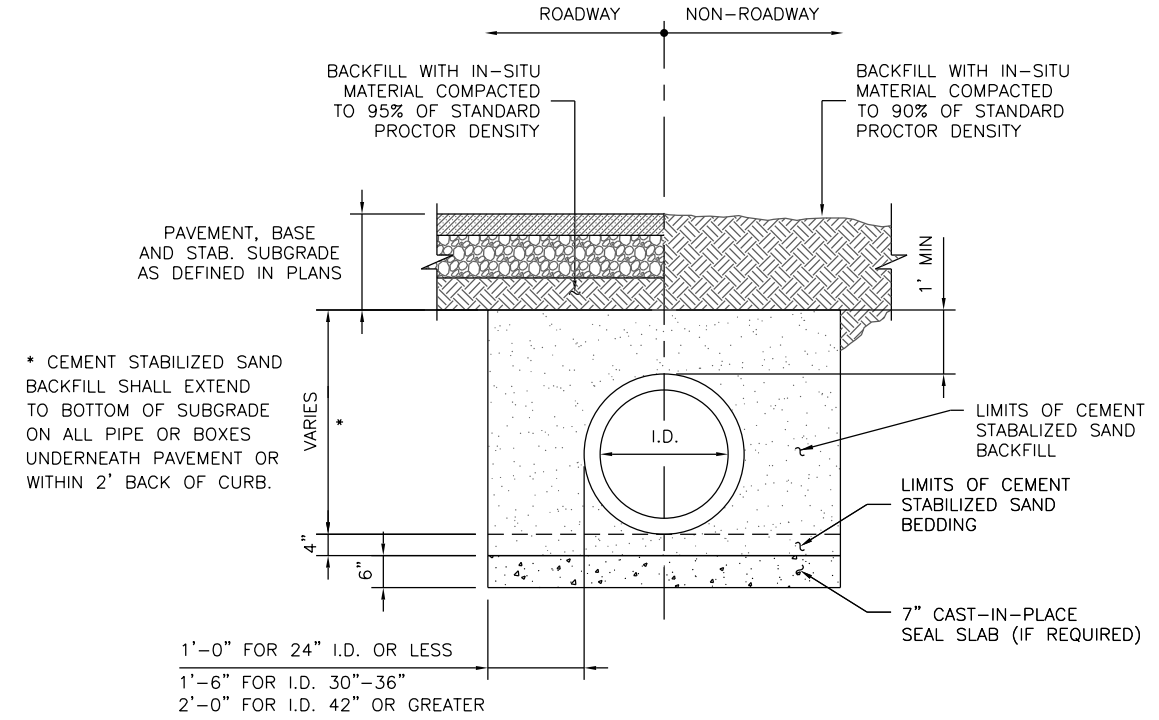
ELEVATION VIEW

TYPICAL CONCRETE COLLAR FOR 36" & SMALLER RCP



REINFORCED CONCRETE PIPE

* CEMENT STABILIZED SAND BACKFILL SHALL EXTEND TO BOTTOM OF SUBGRADE ON ALL PIPE OR BOXES UNDERNEATH PAVEMENT OR WITHIN 2' BACK OF CURB.



REINFORCED CONCRETE PIPE WITH SEAL SLAB

* CEMENT STABILIZED SAND BACKFILL SHALL EXTEND TO BOTTOM OF SUBGRADE ON ALL PIPE OR BOXES UNDERNEATH PAVEMENT OR WITHIN 2' BACK OF CURB.

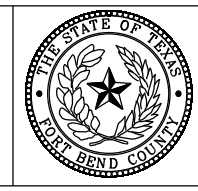
GENERAL NOTES:

- FOR RCP LARGER THAN 36" DIAMETER, CONCRETE COLLARS MUST BE DESIGNED BY THE ENGINEER OF RECORD.
- ALL TRENCHES IN ROW SHALL BE BACKFILLED WITH 1.5 SACK CEMENT STABILIZED SAND TO WITHIN 1' OF SUBGRADE. COMPACTED TO 95% STANDARD PROCTOR DENSITY

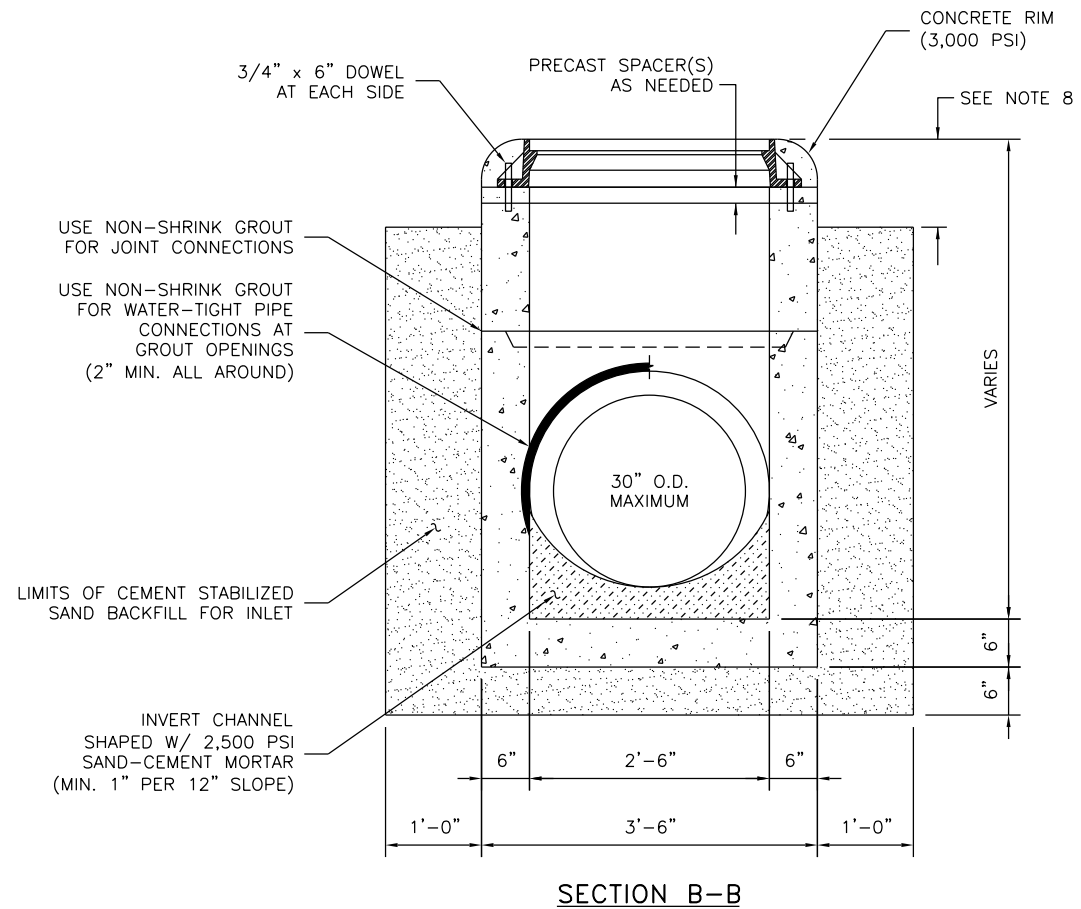
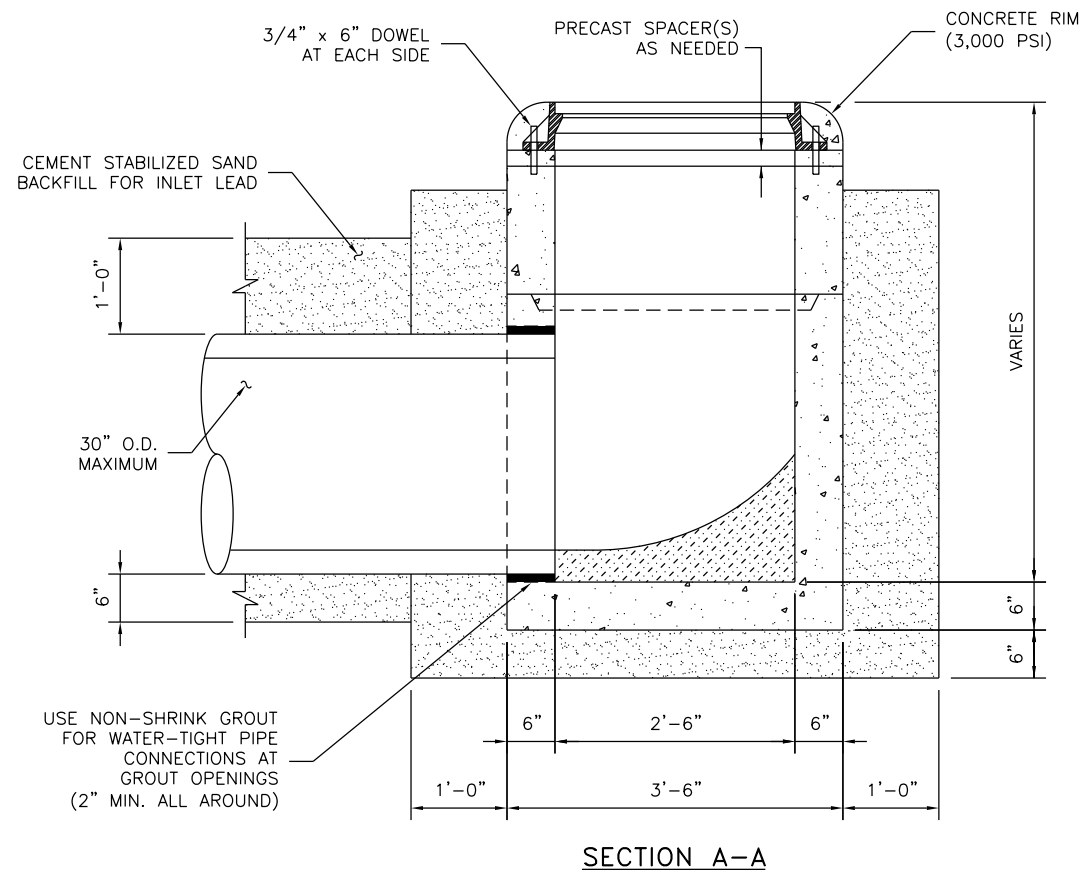
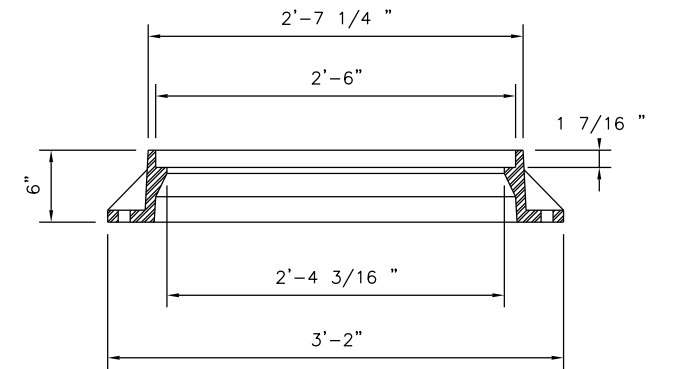
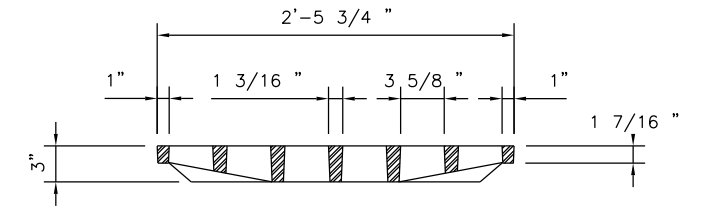
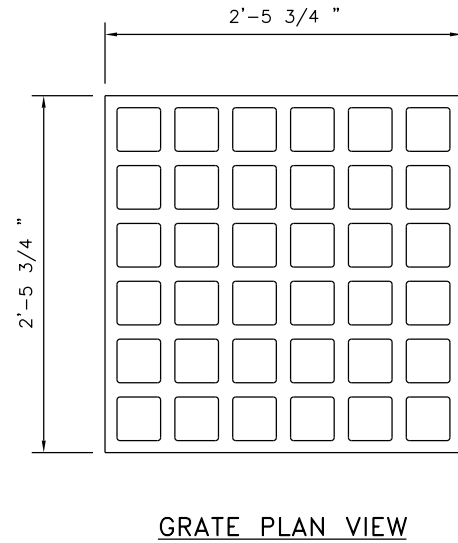
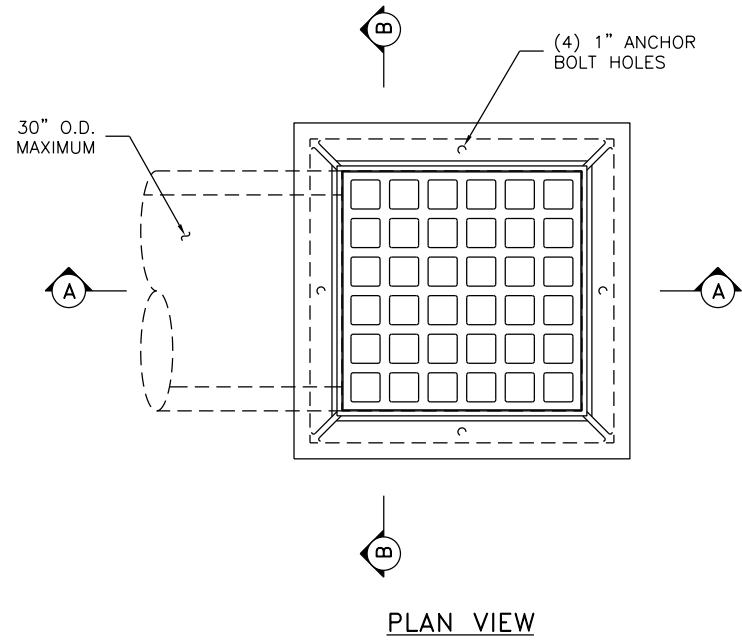
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\$ FILE \$

NO.	REVISIONS	DATE	NAME
1	ORIGINAL STANDARD ISSUED	2-1-22	RJS

FORT BEND COUNTY
ENGINEERING DEPARTMENT



PROJECT TITLE: BELKNAP ROAD		FBCED STANDARD
DRAWN BY: INIT	SHEET DESCRIPTION: STORM SEWER CONSTRUCTION	18
CK'D BY: INIT		SHEET NO: 160
SCALE: 1"=1'-6"	APPROVED BY:	
DATE: 2-1-22		



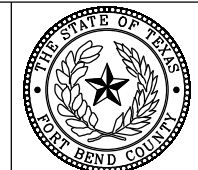
GENERAL NOTES:

1. CONSTRUCTION AND MATERIALS SHALL MEET REQUIREMENTS OF ITEM 472 "INLETS".
2. CONCRETE FOR INLET: MINIMUM 4,000 PSI IN 28 DAYS
3. PRECAST STRUCTURE TO MEET ASTM C913
4. FRAME AND GRATE SHALL BE EAST JORDAN IRON WORKS MODEL V-4880-1 (OPEN AREA 473 SQ. IN.) OR APPROVED EQUAL.
5. IF THE ENGINEER OF RECORD SPECIFIES A CAST-IN-PLACE INLET, HE/SHE SHALL INCORPORATE A DETAILED DRAWING INTO THE CONTRACT DOCUMENTS. HOWEVER, IF THE CONTRACTOR ELECTS TO CONSTRUCT A CAST-IN-PLACE INLET, THE CONTRACTOR WILL BE RESPONSIBLE FOR PROVIDING A DETAILED DRAWING, SIGNED AND SEALED BY A REGISTERED PROFESSIONAL ENGINEER LICENSED TO PRACTICE IN THE STATE OF TEXAS.
6. SHOP DRAWINGS SHALL BE REQUIRED FOR PRECAST CONSTRUCTION OF INLET.
7. KNOCK-OUTS ARE NOT PERMISSIBLE FOR PRECAST CONSTRUCTION OF INLET.
8. CEMENT STABILIZED SAND SHALL EXTEND TO THE BOTTOM OF PAVEMENT OR SLOPE PAVING, OR 12 INCHES BELOW THE SURFACE IF INLET IS LOCATED IN AN UNPAVED AREA.

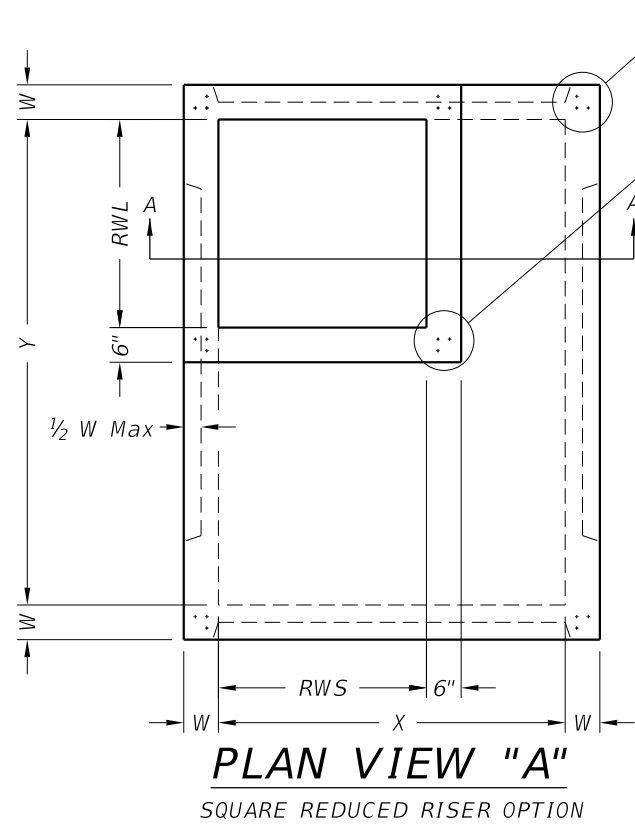
11/7/2023 2:07:19 PM \\fspd\p11\cs01\ics\pdf_work_dir\4357\26463_4\FBC TYPE A INLET DETAILS.dgn

NO.	REVISIONS	DATE	NAME
1	ORIGINAL STANDARD ISSUED	2-1-22	RJS

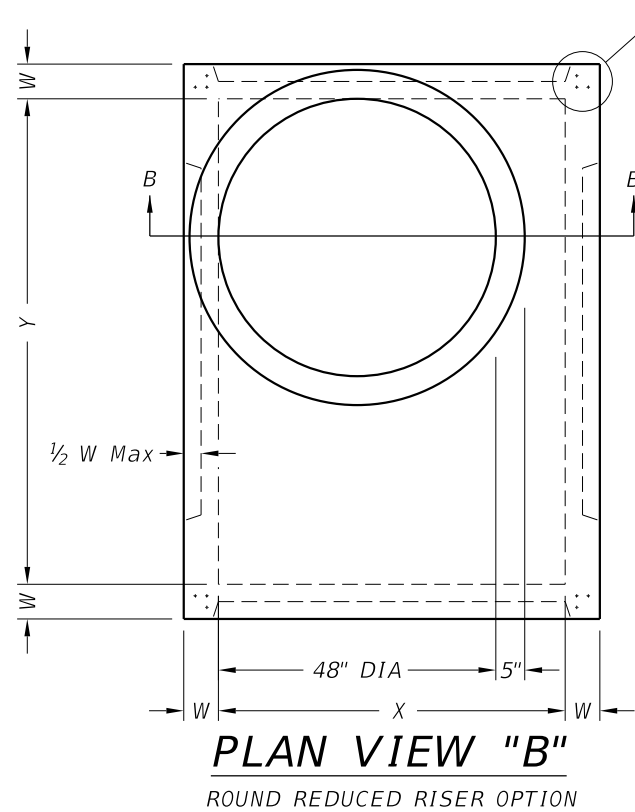
FORT BEND COUNTY
ENGINEERING DEPARTMENT



PROJECT TITLE: BELKNAP ROAD		FBCD STANDARD
DRAWN BY: INIT	SHEET DESCRIPTION: TYPE "A" INLET DETAILS	22
CK'D BY: INIT		SHEET NO:
SCALE: 1"=1'-0"	FOR MAXIMUM 30" O.D. PIPE	161
DATE: 2-1-22	APPROVED BY:	



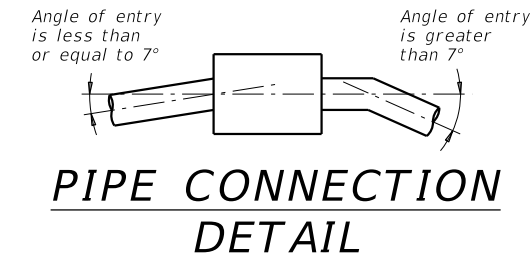
PLAN VIEW "A"
SQUARE REDUCED RISER OPTION



PLAN VIEW "B"
ROUND REDUCED RISER OPTION

(3) VERTICAL REBAR IN BASE & RISERS
#4 @ 2" O.C. EACH CORNER
2" TO CORNER

(3) VERTICAL REBAR IN REDUCED RISERS
#4 @ 2" O.C. EACH CORNER
2" TO CORNER



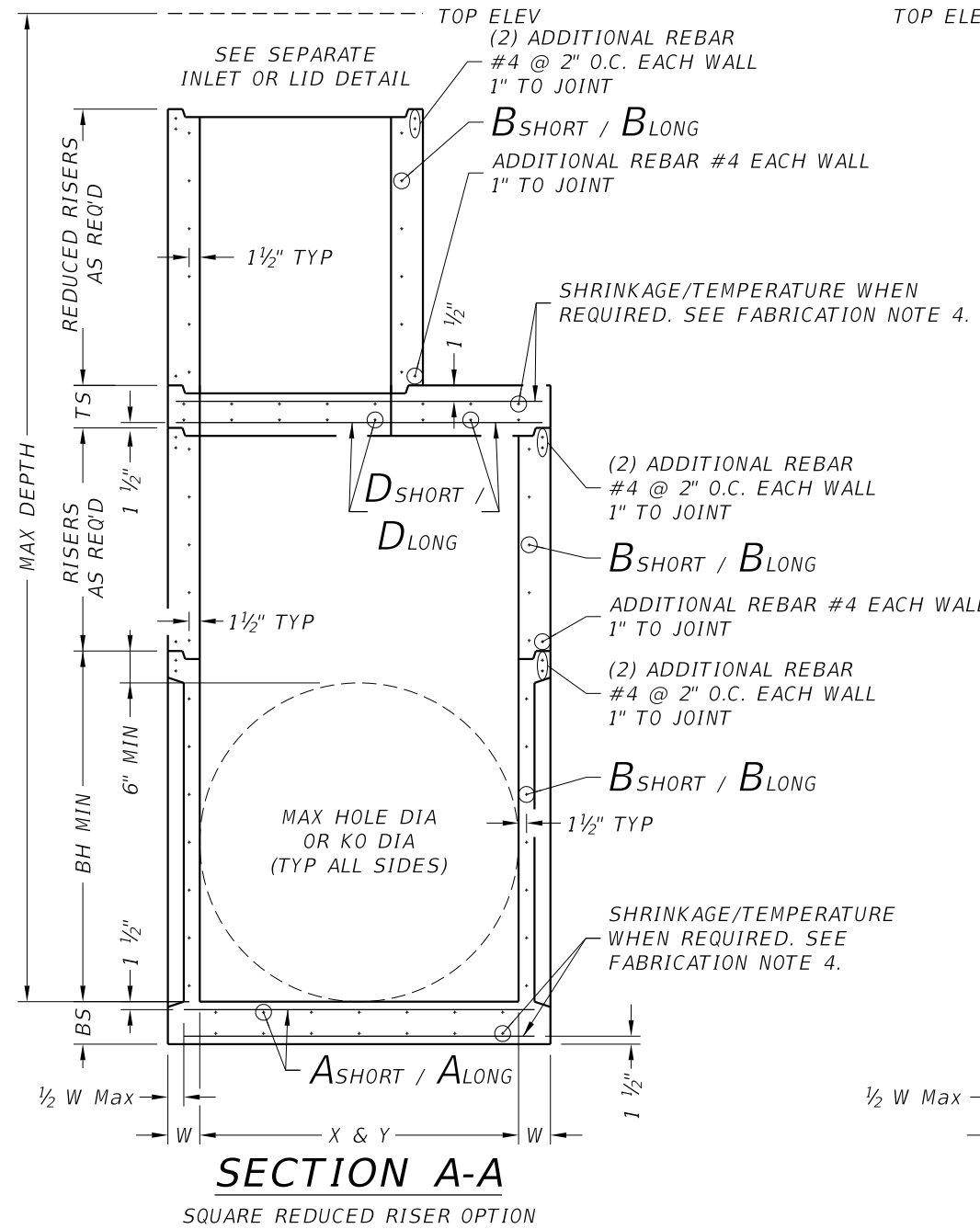
PIPE CONNECTION DETAIL

Connect pipes within 7° of normal to PB wall.
If necessary, use pipe elbow or curved approach alignment to stay within this limit.

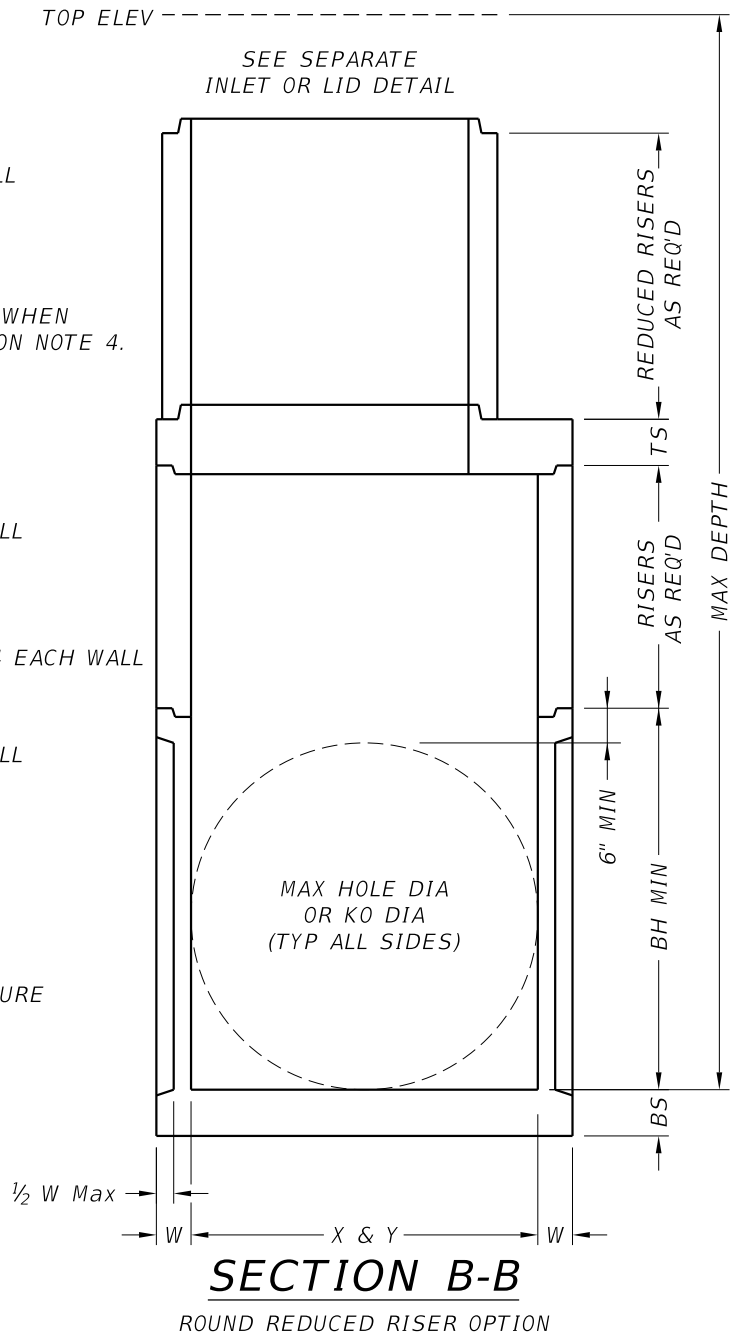
Cover dimensions are clear dimensions, unless noted otherwise.

FABRICATION NOTES:

1. Provide Class "H" concrete in accordance with Item 421 and having a minimum compressive strength of 5,000 psi.
2. Provide Grade 60 reinforcing steel or equivalent area of WWR.
3. Provide typical clear cover of 1 1/2" to reinforcing steel at interior or exterior walls.
4. Walls or slabs with a thickness of 8" or greater require shrinkage and temperature reinforcing steel. Provide steel area = 0.11 in²/ft each way.
5. No substitution is allowed for vertical and horizontal #4 bars in corners.
6. Manufacture base and risers to nearest 3" increment.
7. Design tongue and groove joints for full closure on both shoulders. Minimum spigot depth is 3/4".
8. Provide lifting devices in conformance with Manufacturer's recommendations.
9. See sheet PDD for sizes, dimensions, and reinforcing steel not shown.



SECTION A-A
SQUARE REDUCED RISER OPTION



SECTION B-B
ROUND REDUCED RISER OPTION

INSTALLATION NOTES:

1. If required elsewhere. Inverts (benching) to be provided by Contractor. Concrete or mortar used for invert is subsidiary to specified inlet or manhole.
2. Seal tongue and groove joints with preformed or bulk mastic in conformance with Manufacturer's recommendations. Tongue and groove joints may be grouted no more than 1" between each section, or 1/2 the joint depth, whichever is greater.
3. Do not grout rubber gasket joints without Manufacturer's recommendation.
4. For rigid pipe, cut hole in thin wall panel (KO) 4" Max, 2" Min larger than pipe OD.
5. For flexible pipe, consult boot/seal Manufacturer's specification for placement tolerance and hole size. Center pipe in hole and install boot/seal per Manufacturer's specification.

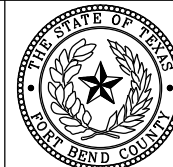
GENERAL NOTES:

1. Precast Base consists of base slab, base unit, risers (as required), reducing slab (as required), and reduced risers (as required). See sheet PDD for sizes.
2. Designed according to ASTM C913.
3. Payment for precast base is subsidiary to the specified inlet, per Item 472, "Inlets."

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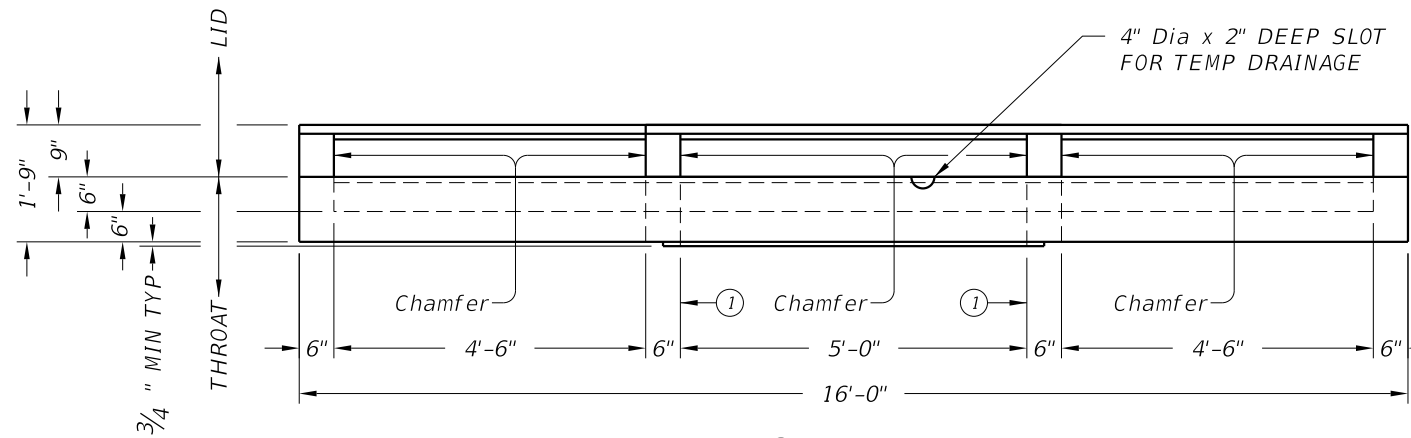
NO.	REVISIONS	DATE	NAME
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FORT BEND COUNTY
ENGINEERING DEPARTMENT

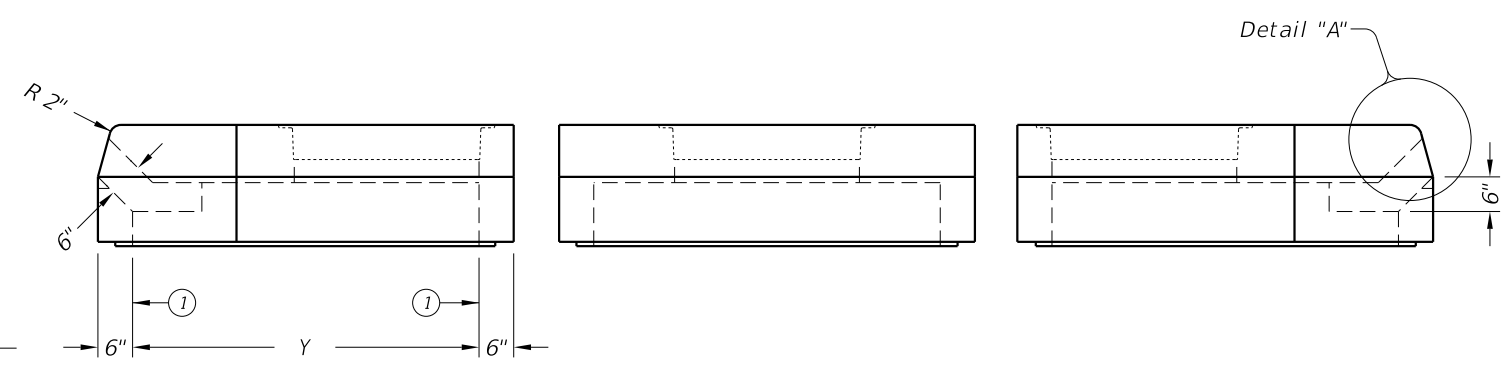


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Firm Registration No. F-382

PROJECT TITLE: HL93 LOADING BELKNAP ROAD		FBCE STANDARD
DRAWN BY:	SHEET DESCRIPTION: PRECAST BASE	
CK'D BY:	APPROVED BY:	SHEET NO: 162
SCALE:	DATE:	



FRONT VIEW
(SHOWING LEFT AND RIGHT EXTENSIONS)

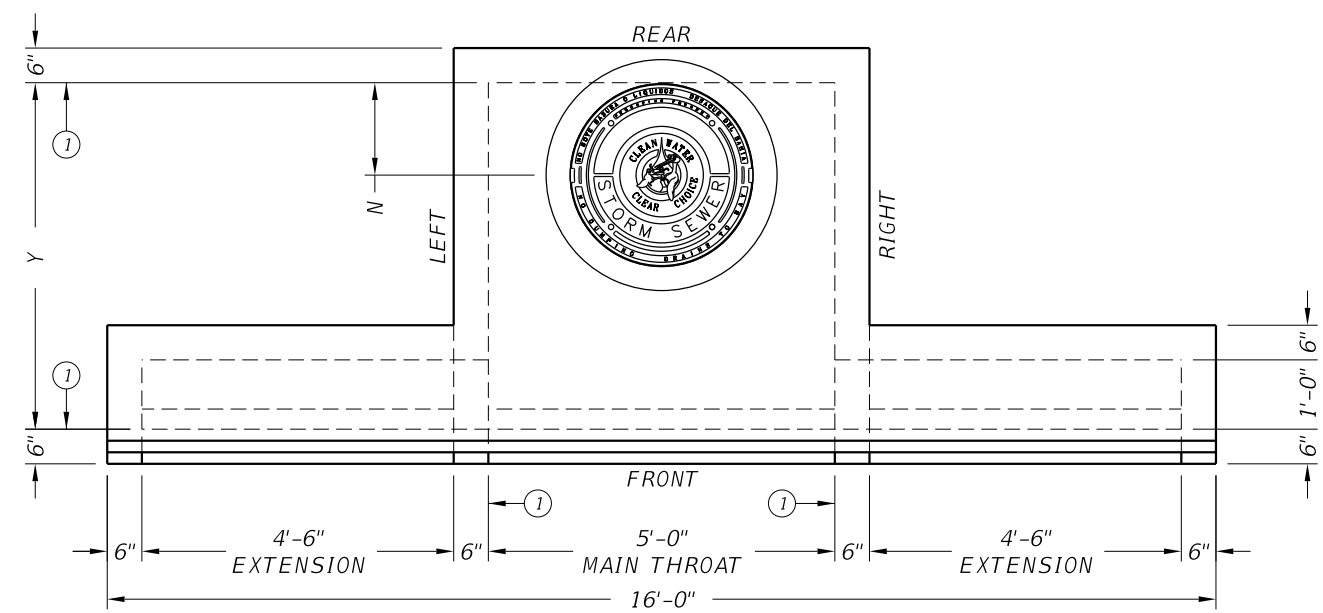


RIGHT VIEW

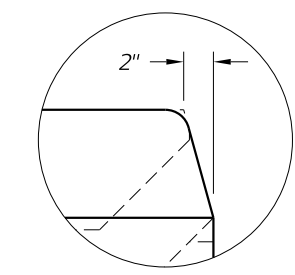
REAR VIEW
(EXTENSIONS NOT SHOWN)

LEFT VIEW

① Matches inside face of wall of precast base or riser below inlet.



PLAN VIEW
(SHOWING LEFT AND RIGHT EXTENSIONS)



DETAIL "A"

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ENGINEERING DEPARTMENT

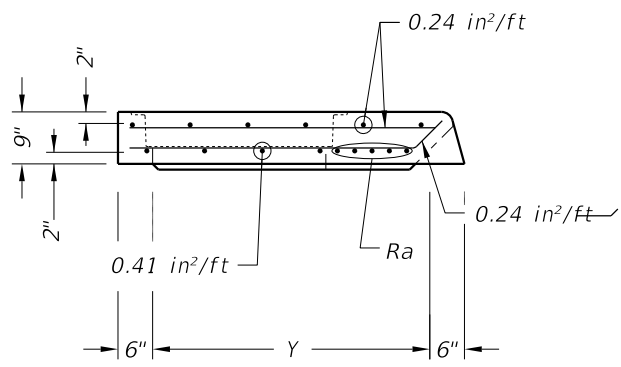


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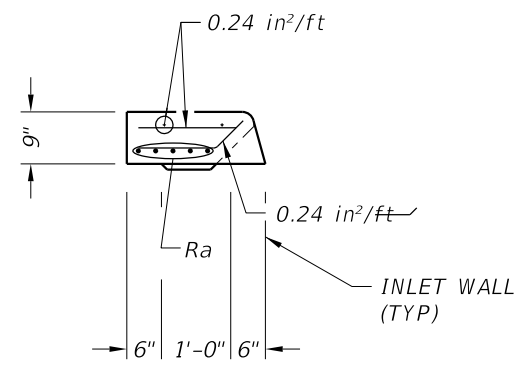
PROJECT TITLE: BELKNAP ROAD		FBCE STANDARD
DRAWN BY:		
CK'D BY:	SHEET DESCRIPTION: PRECAST CURB	SHEET NO: 163
SCALE:	INLET OUTSIDE ROADWAY	
DATE:	APPROVED BY:	

HS20 LOADING

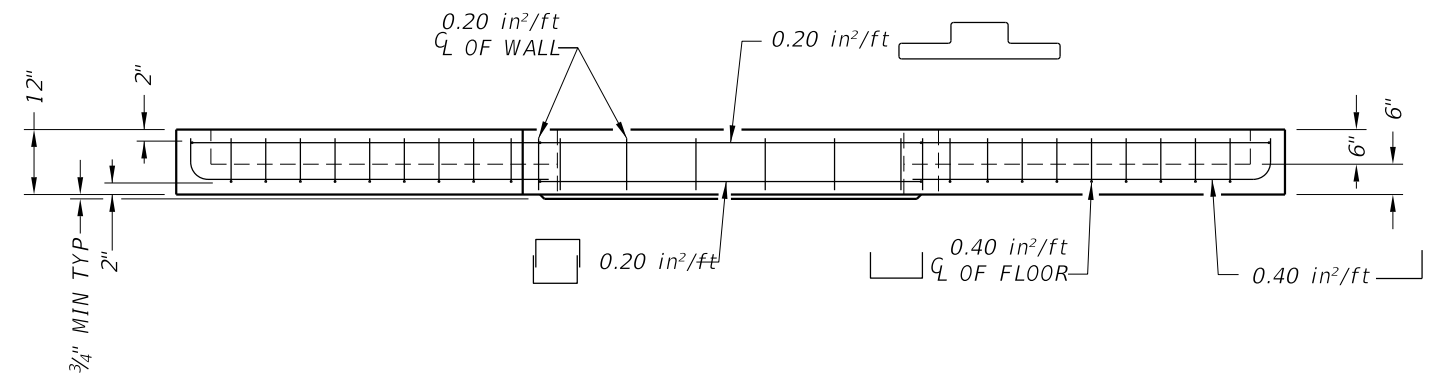
SHEET 1



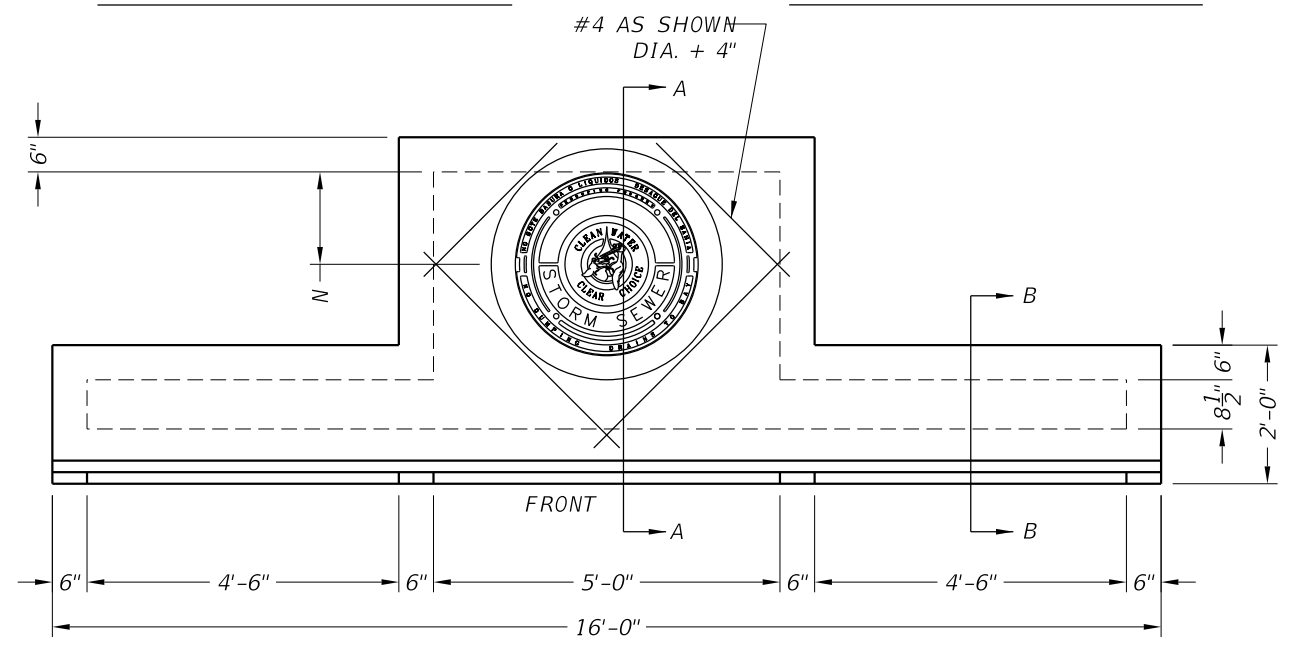
LID SECTION A-A



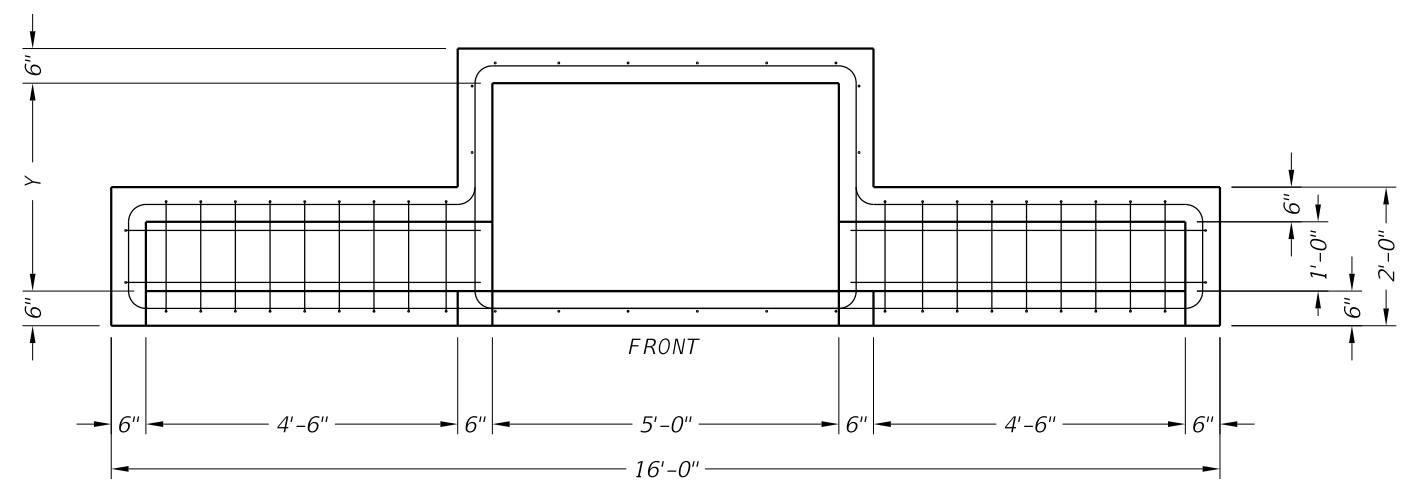
LID SECTION B-B



THROAT ELEVATION VIEW
(SHOWING LEFT AND RIGHT EXTENSIONS)



LID PLAN VIEW
(SHOWING LEFT AND RIGHT EXTENSIONS)



THROAT PLAN VIEW
(SHOWING LEFT AND RIGHT EXTENSIONS)

Cover dimensions are clear dimensions, unless noted otherwise.

FABRICATION NOTES:

1. Provide Class "H" concrete in accordance with Item 421 and having a minimum compressive strength of 5,000 psi.
2. Provide Grade 60 reinforcing steel or equivalent area of WWR.
3. Extensions may be right, left, both or none. Provide extensions as specified elsewhere in the plans.
4. Design tongue and groove joints for full closure on both shoulders. Minimum spigot depth is 3/4". Lid may employ a butt joint with dowels at the Contractor's option.
5. Provide lifting devices in conformance with Manufacturer's recommendations.
6. Provide cast iron solid cover, unless noted otherwise elsewhere in the plans.
7. Chamfer vertical edges of inlet lid 3/4" as shown in Front View, sheet 1.

INSTALLATION NOTES:

1. Inlet throat and lid are not intended for direct traffic. Do not place in roadway.
2. Seal tongue and groove joints and butt joints with preformed or bulk mastic in conformance with Manufacturer's recommendations. Tongue and groove joints may be grouted no more than 1" between each section, or 1/2 the joint depth, whichever is greater.
3. Do not grout rubber gasket joints without Manufacturer's recommendation.

GENERAL NOTES:

1. Designed according to ASTM C913.
2. Open area of main throat = 360 sq in. Open area of one extension throat = 324 sq in.
3. Payment for inlet is per Item 472, "Inlets" by type, size, and extension placement. Extensions are subsidiary to inlet.

SIZE (Y)	N	MH DIA*	Ra
3'	9"	18"	(4) #5 Additional
4'	16"	32"	(4) #5 Additional
5'	16"	32"	(4) #5 Additional
6'	16"	32"	(4) #5 Additional

*Nominal ring and cover size.

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Engineering, Inc.
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Cypress, Texas 77429
PH: (281) 304-0200 - FX: (281) 304-0210
Firm Registration No. F-382

PROJECT TITLE: HS20 LOADING		SHEET 2 OF 2	
DRAWN BY: BELKNAP ROAD		FBCED STANDARD	
CK'D BY:	SHEET DESCRIPTION: PRECAST CURB	SHEET NO: 164	
SCALE: INLET OUTSIDE ROADWAY	APPROVED BY:		
DATE:			

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Size	MAX DEPTH = 15 ft. to top of BASE SLAB											MAX DEPTH = 25 ft. to top of BASE SLAB											Min Height (See Gen Note 3)	Max HOLE DIA (See Fab Note 2)	Max KO DIA (See Fab Note 2)
	Base Slab			Base Unit or Riser Walls			Below Grade Slab (w/PJB) Reducing Slab (w/PB)			Base Slab			Base Unit or Riser Walls			Below Grade Slab (w/PJB) Reducing Slab (w/PB)									
	Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness	Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness	Reduced Riser Size	Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness	Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness	Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness	Reduced Riser Size	Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness					
X x Y	Ashort	Along	BS	Bshort	Blong	W	RWSxRWL or ID	Dshort	Dlong	TS	Ashort	Along	BS	Bshort	Blong	W	RWSxRWL or ID	Dshort	Dlong	TS	BH MIN	HOLE DIA	KO DIA		
ft.	in ² /ft	in ² /ft	in.	in ² /ft	in ² /ft	in.	ft. **	in ² /ft	in ² /ft	in.	in ² /ft	in ² /ft	in.	in ² /ft	in ² /ft	in.	ft. **	in ² /ft	in ² /ft	in.	ft.	in.	in.		
3x3	0.23	0.23	6	0.19	0.19	6	N/A	0.37	0.37	9	0.29	0.29	6	0.24	0.24	6	N/A	0.37	0.37	9	3.5	36	36		
4x4	0.29	0.29	6	0.24	0.24	6	N/A	0.41	0.41	9	0.47	0.47	6	0.38	0.38	6	N/A	0.41	0.41	9	4.5	48	48		
3x5	0.29	0.18	6	0.19	0.35	6	N/A	0.48	0.48	9	0.39	0.18	6	0.23	0.59	6	N/A	0.48	0.48	9	3.5	36/60	36/60		
4x5	0.36	0.18	6	0.22	0.34	6	N/A	0.42	0.42	9	0.53	0.26	6	0.39	0.59	6	N/A	0.42	0.42	9	4.5	48/60	48/60		
5x5	0.36	0.36	6	0.34	0.34	6	N/A	0.43	0.43	9	0.62	0.62	6	0.59	0.59	6	N/A	0.43	0.43	9	5.5	60	60		
5x6	0.27	0.27	9	0.34	0.45	6	N/A	0.48	0.48	9	0.47	0.45	9	0.38	0.54	8	N/A	0.48	0.48	9	5.5	60/72	60/72		
6x6	0.27	0.27	9	0.45	0.45	6	N/A	0.56	0.56	9	0.52	0.52	9	0.54	0.54	8	N/A	0.56	0.56	9	6.5	72	72		
8x8	0.46	0.46	9	0.51	0.51	8	N/A	0.45	0.45	12	0.87	0.87	9	0.59	0.59	10	N/A	0.45	0.45	12	8.5	96	72		
3x3	0.23	0.23	6	0.19	0.19	6	N/A	N/A	N/A	N/A	0.29	0.29	6	0.24	0.24	6	N/A	N/A	N/A	N/A	3.5	36	36		
4x4	0.29	0.29	6	0.24	0.24	6	N/A	N/A	N/A	N/A	0.47	0.47	6	0.38	0.38	6	N/A	N/A	N/A	N/A	4.5	48	48		
3x5	0.29	0.18	6	0.19	0.35	6	3x3	0.30	0.34	9	0.39	0.18	6	0.23	0.59	6	3x3	0.40	0.40	9	3.5	36/60	36/60		
4x5	0.36	0.18	6	0.22	0.34	6	3x3	0.30	0.30	9	0.53	0.26	6	0.39	0.59	6	3x3	0.46	0.37	9	4.5	48/60	48/60		
4x5	0.36	0.18	6	0.22	0.34	6	4x4	0.30	0.30	9	0.53	0.26	6	0.39	0.59	6	4x4	0.39	0.39	9	4.5	48/60	48/60		
4x5	0.36	0.18	6	0.22	0.34	6	48"	0.39	0.39	9	0.53	0.26	6	0.39	0.59	6	48"	0.47	0.47	9	4.5	48/60	48/60		
4x5	0.36	0.18	6	0.22	0.34	6	3x5	0.33	0.40	9	0.53	0.26	6	0.39	0.59	6	3x5	0.48	0.48	9	4.5	48/60	48/60		
5x5	0.36	0.36	6	0.34	0.34	6	3x3	0.34	0.34	9	0.62	0.62	6	0.59	0.59	6	3x3	0.53	0.53	9	5.5	60	60		
5x5	0.36	0.36	6	0.34	0.34	6	4x4	0.36	0.36	9	0.62	0.62	6	0.59	0.59	6	4x4	0.64	0.64	9	5.5	60	60		
5x5	0.38	0.38	6	0.34	0.34	6	48"	0.36	0.36	9	0.62	0.62	6	0.59	0.59	6	48"	0.64	0.64	9	5.5	60	60		
5x5	0.36	0.36	6	0.34	0.34	6	3x5	0.34	0.40	9	0.62	0.62	6	0.59	0.59	6	3x5	0.53	0.53	9	5.5	60	60		
5x6	0.31	0.31	9	0.34	0.45	6	3x3	0.34	0.34	9	0.47	0.45	9	0.38	0.54	8	3x3	0.61	0.50	9	5.5	60/72	60/72		
5x6	0.27	0.27	9	0.34	0.45	6	4x4	0.36	0.45	9	0.47	0.45	9	0.38	0.54	8	4x4	0.74	0.57	9	5.5	60/72	60/72		
5x6	0.29	0.29	9	0.34	0.45	6	48"	0.36	0.45	9	0.47	0.45	9	0.38	0.54	8	48"	0.74	0.57	9	5.5	60/72	60/72		
5x6	0.29	0.29	9	0.34	0.45	6	3x5	0.45	0.45	9	0.47	0.45	9	0.38	0.54	8	3x5	0.61	0.61	9	5.5	60/72	60/72		
6x6	0.29	0.29	9	0.45	0.45	6	3x3	0.41	0.41	9	0.52	0.52	9	0.54	0.54	8	3x3	0.74	0.74	9	6.5	72	72		
6x6	0.27	0.27	9	0.45	0.45	6	4x4	0.45	0.45	9	0.52	0.52	9	0.54	0.54	8	4x4	0.87	0.87	9	6.5	72	72		
6x6	0.29	0.29	9	0.45	0.45	6	48"	0.45	0.45	9	0.52	0.52	9	0.54	0.54	8	48"	0.87	0.87	9	6.5	72	72		
6x6	0.29	0.29	9	0.45	0.45	6	3x5	0.45	0.45	9	0.52	0.52	9	0.54	0.54	8	3x5	0.87	0.87	9	6.5	72	72		
8x8	0.52	0.52	9	0.51	0.51	8	3x3	0.61	0.61	12	0.91	0.91	9	0.70	0.70	10	3x3	0.85	0.85	12	8.5	96	72		
8x8	0.52	0.52	9	0.51	0.51	8	4x4	0.70	0.70	12	0.87	0.87	9	0.70	0.70	10	4x4	1.01	1.01	12	8.5	96	72		
8x8	0.52	0.52	9	0.51	0.51	8	48"	0.70	0.70	12	0.87	0.87	9	0.70	0.70	10	48"	1.01	1.01	12	8.5	96	72		
8x8	0.52	0.52	9	0.51	0.51	8	3x5	0.70	0.85	12	0.87	0.87	9	0.70	0.70	10	3x5	1.01	1.01	12	8.5	96	72		

** Unless otherwise indicated.

FABRICATION NOTES:

- 1. Maximum spacing of reinforcement is 8".
- 2. At manufacturer's option, provide cast or cored holes or thin wall panels (KO) to the maximum diameter shown for each. When no penetration is required, it is acceptable to provide a wall with no sectional reduction.

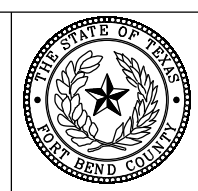
GENERAL NOTES:

- 1. Precast Junction Box consists of base slab, base unit, risers (as required), and below grade slab. See sheet PJB for details.
- 2. Precast Base consists of base slab, base unit, risers (as required), reducing slab (as required), and reduced risers (as required). See sheet PB for details.
- 3. Min Height shown is for stock base units. Use stock base units whenever practical. Smaller height base units can be used in special installation circumstances, when noted elsewhere in the plans. Absolute minimum height of base units is 2'-6".

HL93 LOADING

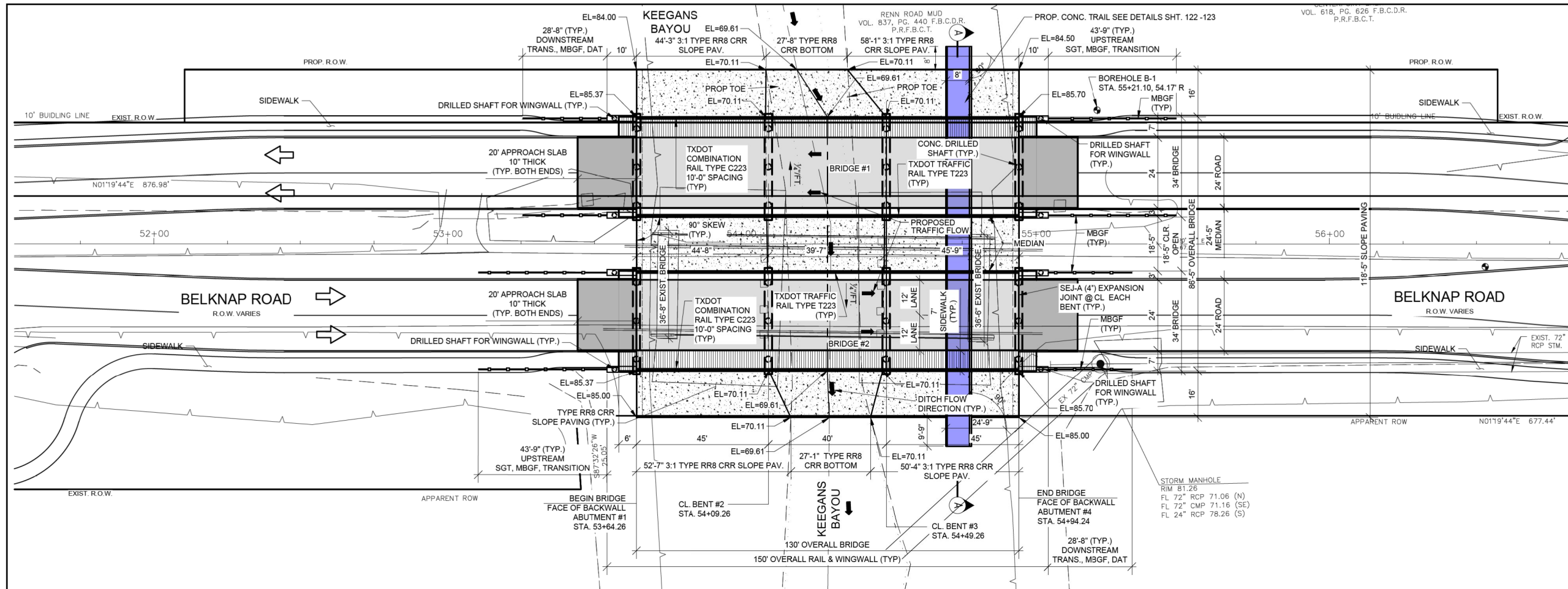
NO.	REVISIONS	DATE	NAME
▲	ORIGINAL STANDARD ISSUED	2-1-22	RJS
▲			
▲			
▲			

FORT BEND COUNTY
ENGINEERING DEPARTMENT



CivilTech
Engineering, Inc.
11821 Telge Road
Cypress, Texas 77429
PH: (281) 304-0200 - FX: (281) 304-0210
Firm Registration No. F-382

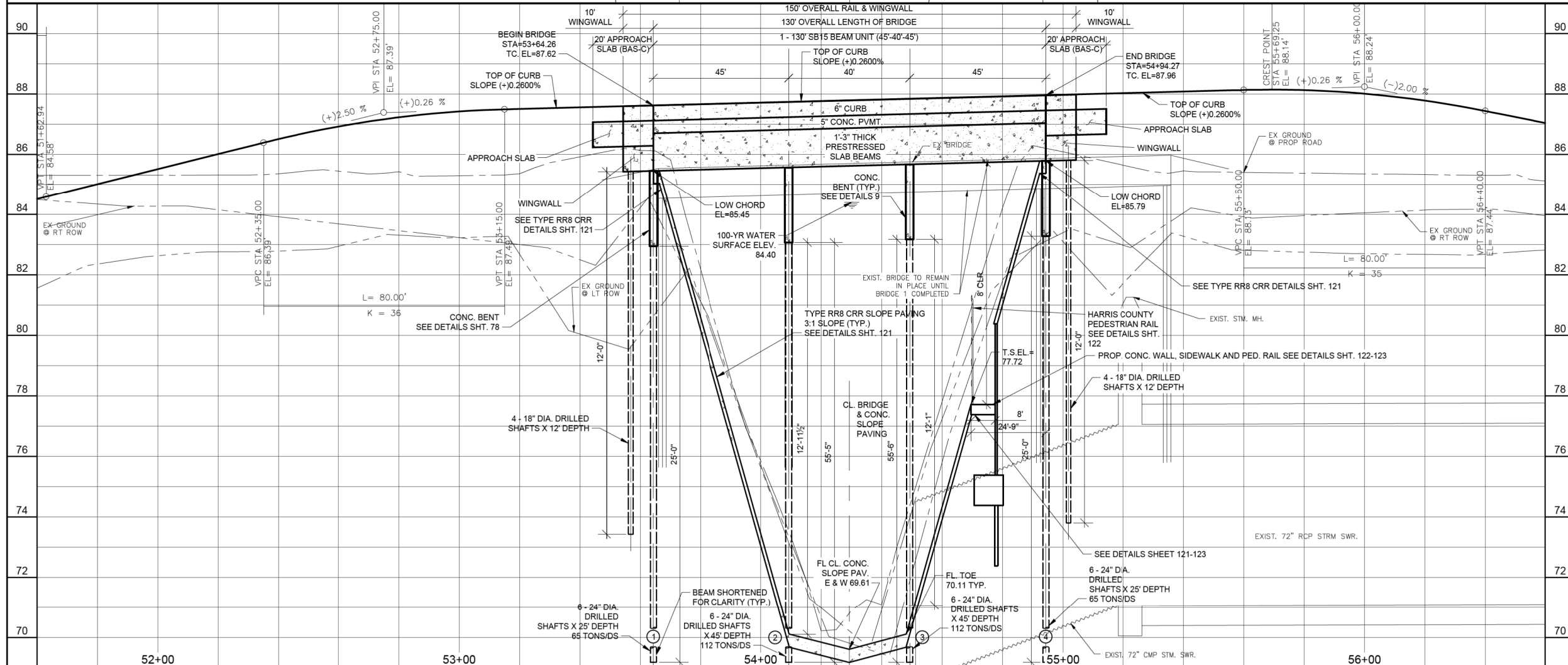
PROJECT TITLE:	BELKNAP ROAD	
DRAWN BY:		FBCEC STANDARD
CK'D BY:	SHEET DESCRIPTION:	
SCALE:	DESIGN DATA FOR	SHEET NO:
DATE:	PRECAST BASE AND JUNCTION BOX	
	APPROVED BY:	165



- GENERAL NOTES:**
- EXISTING BRIDGE TO REMAIN IN PLACE AND UNDISTURBED UNTIL PROPOSED BRIDGE #1 IS COMPLETE AND READY FOR 2-WAY TRAFFIC.
 - DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 6TH EDITION (2012).
 - DRILL SHAFT LENGTHS ARE BASED ON DATA PRESENTED IN GEOTECH REPORT.
 - THE CONTRACTOR SHALL REFER TO THE UTILITY PLANS TO KNOW WHICH UTILITIES TO REMAIN IN PLACE OR BE RELOCATED. THE CONTRACTOR IS RESPONSIBLE FOR IDENTIFYING AND RESOLVING ALL UTILITY CONFLICTS FOUND PRIOR TO CONSTRUCTION.
 - SEE BRIDGE TYPICAL SECTIONS FOR MORE DETAILS
 - BRIDGE SKEW ANGLE IS 90°.
 - SEE PLAN & PROFILE SHEETS FOR EXISTING AND PROPOSED ROAD & R.O.W. DETAILS.

CAUTION!!!!
OVERHEAD ELECTRIC,
LOCATIONS ARE APPROXIMATE

CALL BEFORE YOU DIG!
TEXAS ONE CALL PARTICIPANTS REQUEST
48 HOURS NOTICE BEFORE YOU DIG, DRILL,
OR BLAST - STOP CALL
Texas One Call System
1-800-DIG-TESS



NO.	DATE	REVISION	APPROVED

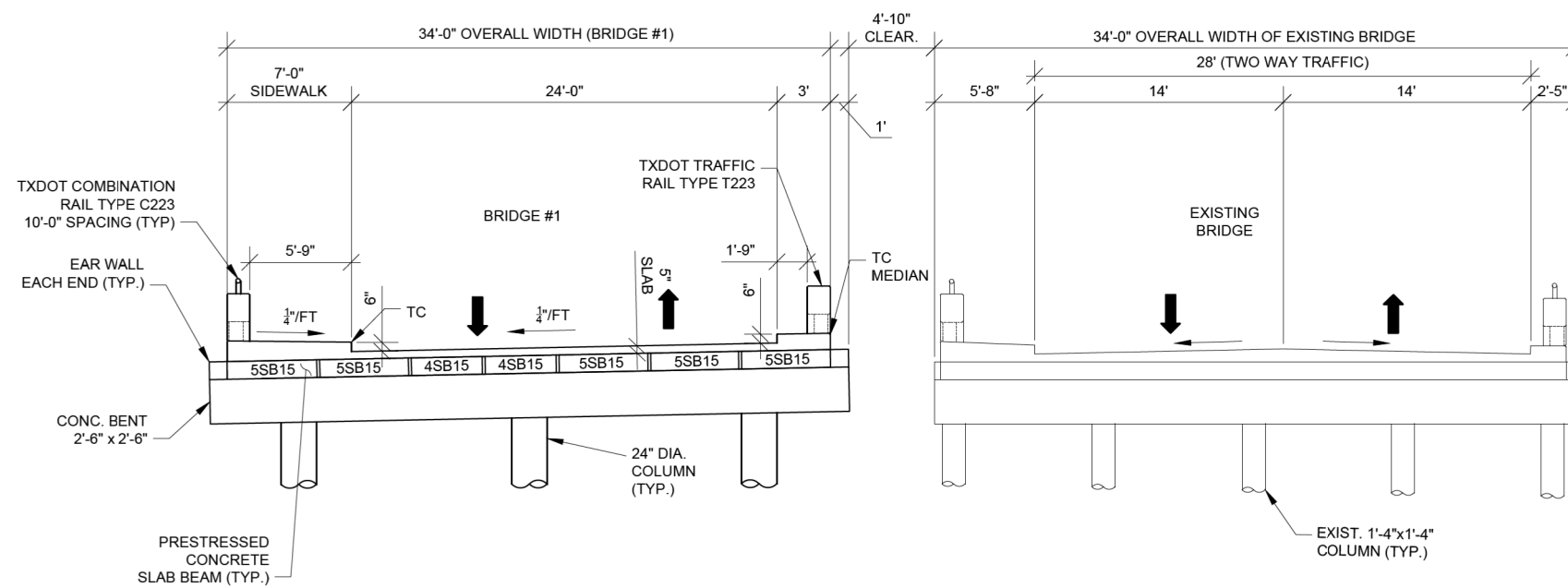
JAYMARK ENGINEERING CORPORATION
3730 CYPRESS CREEK PARKWAY, STE 108, HOUSTON, TEXAS 77068
PH: (346) 316-1181 FAX: (346) 316-1185 www.jaymarkengineering.com
TEXAS REG. ENGINEERING FIRM F-1297

FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

BRIDGE AT KEEGANS BAYOU LAYOUT

CNTY PROJ #	RPS PROJ #	DATE	SCALE	SHEET NO
17-2-11	008169	08.19.2022	H1:40 V1:4	166
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RM	RM	MDT	MDT	



BRIDGE CROSS SECTION PHASE 1
SCALE: 1"=10'

PHASE 1 NOTES:

- EXISTING BRIDGE TO REMAIN IN PLACE AND UNDISTURBED UNTIL PROPOSED BRIDGE #1 IS COMPLETE.
- ONCE BRIDGE #1 IS COMPLETE, IT WILL BE USED FOR 2-WAY TRAFFIC DURING DEMOLITION AND CONSTRUCTION OF BRIDGE #2.
- REF. TO TRAFFIC CONTROL PLANS FOR MORE DETAILS AND PHASING INFO.



NO.	DATE	REVISION	APPROVED

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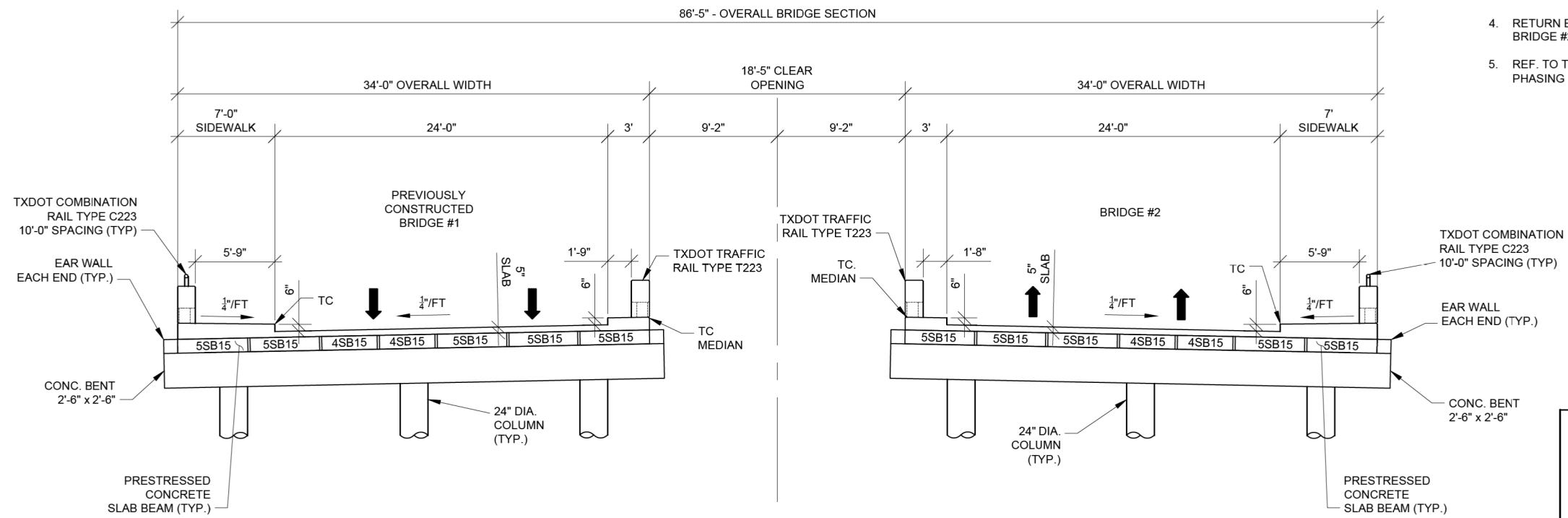
FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
 W BELLFORT BLVD TO OAK BEND FOREST DR

BRIDGE #1 AT KEEGANS BAYOU
TYPICAL SECTIONS

CNTY PROJ #	RPS PROJ #	DATE	SCALE	SHEET NO
17-2-11	008169	08.19.2022	1:5	167
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RM	RM	MDT	MDT	

SHEET 1 OF 1



BRIDGE CROSS SECTION PHASE 2
SCALE: 1"=10'

PHASE 2 NOTES:

1. BEGIN 2-WAY TRAFFIC ON COMPLETED BRIDGE #1
2. DEMOLISH EXISTING BRIDGE WITHOUT DISTURBING BRIDGE #1.
3. CONSTRUCT BRIDGE #2.
4. RETURN BRIDGE #1 TO TWO LANE ONE WAY TRAFFIC ONCE BRIDGE #2 IS COMPLETE.
5. REF. TO TRAFFIC CONTROL PLANS FOR MORE DETAILS AND PHASING INFO.



NO.	DATE	REVISION	APPROVED

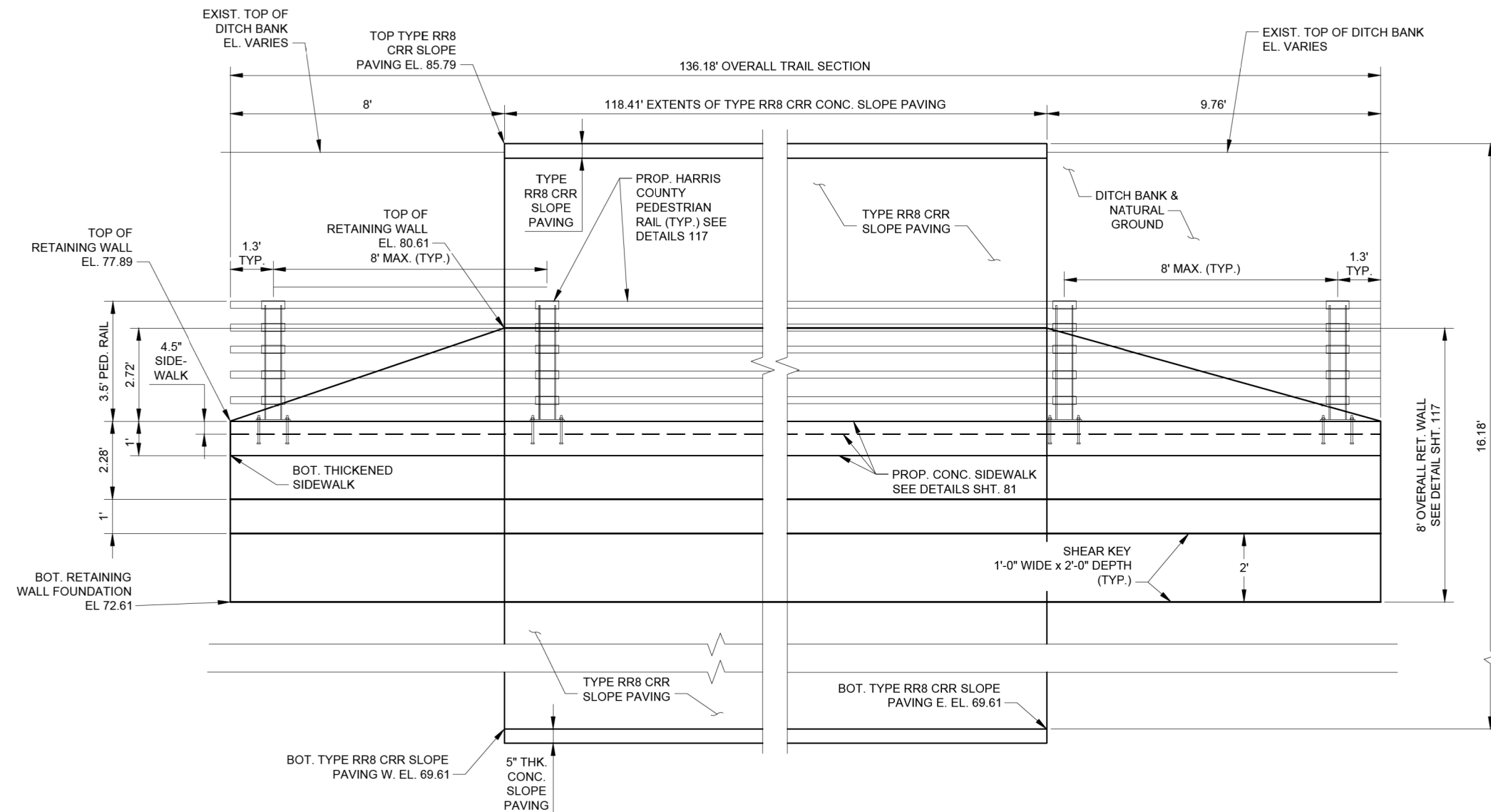
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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
 W BELLFORT BLVD TO OAK BEND FOREST DR

**BRIDGE #1 & #2 AT
 KEEGANS BAYOU
 TYPICAL SECTIONS**

CNTY PROJ #	RPS PROJ #	DATE	SCALE	SHEET NO
17-2-11	008169	08.19.2022	1:10	168
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RM	RM	MDT	MDT	



PEDESTRIAN TRAIL 3 THROUGH RR8 CRR SLOPE PAVING - SECTION A-A

STA. 1+64.33 TO STA. 2+92.74 SEE SHT. SHEET 76

SCALE: 1"=4'



NO.	DATE	REVISION	APPROVED

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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
 W BELLFORT BLVD TO OAK BEND FOREST DR

**PEDESTRIAN TRAIL 3
 THROUGH RR8 CRR SLOPE
 PAVING**

CNTY PROJ #	RPS PROJ #	DATE	SCALE	SHEET NO
17-2-11	008169	08.19.2022	AS NOTED	169
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RM	RM	MDT	MDT	

BRIDGE QUANTITIES				
Fort Bend County Bond Projects - Belknap Road				
ITEM NO.	SPEC.	ITEM DESCRIPTION	UNIT	QTY.
Bridge at Keegan's Bayou				
1	TXDOT 360 TXDOT 422	5" THICK REINFORCED CONCRETE SLAB	SY	763
2	TXDOT 420 TXDOT 432	TYPE RR8 CONCRETE RIPRAP SLOPE PAVING	CY	259
3	TXDOT 420 TXDOT 422	10" THICK BRIDGE APPROACH SLAB	CY	68
4	TXDOT 536	BRIDGE MEDIAN (3 FEET WIDE)	SF	858
5	TXDOT 531	6" THICK REINFORCED CONCRETE BRIDGE SIDEWALK	SF	2,002
6	TXDOT 424 TXDOT 425	PRESTRESSED CONCRETE SLAB BEAM (4SB15)	LF	520
7	TXDOT 424 TXDOT 425	PRESTRESSED CONCRETE SLAB BEAM (5SB15)	LF	1,300
8	TXDOT 420	REINFORCED CONC. ABUTMENT	CY	50
9	TXDOT 420	REINFORCED CONC. BENT	CY	37
10	TXDOT 416	18" DIAMETER DRILLED SHAFT	LF	96
11	TXDOT 416	24" DIAMETER DRILLED SHAFT	LF	840
12	TXDOT 420	24" DIAMETER REINFORCED CONCRETE COLUMN	CY	16
13	TXDOT 450	TXDOT T223 RAIL	LF	260
14	TXDOT 450	TXDOT C223 RAIL	LF	260
15	TXDOT 454	SEALED EXPANSION JOINT (4")(SEJ-A)	LF	256
16	TXDOT 540	METAL BEAM GUARD FENCE (WOOD POST)	LF	120
17	TXDOT 540	METAL BEAM GUARD FENCE TRANS (TL2)	EA	8
18	TXDOT 544	GUARDRAIL END TREATMENT	EA	4
19	TXDOT 110	EXCAVATION (CHANNEL)	CY	1,029
20	TXDOT 423	RETAINING WALL	SF	1,496
21	HC 450	HARRIS COUNTY PEDESTRIAN RAIL	LF	141
22	TXDOT 531	41/2" THICK SIDEWALK THRU SLOPE PAVING	SF	1,130



NO.	DATE	REVISION	APPROVED

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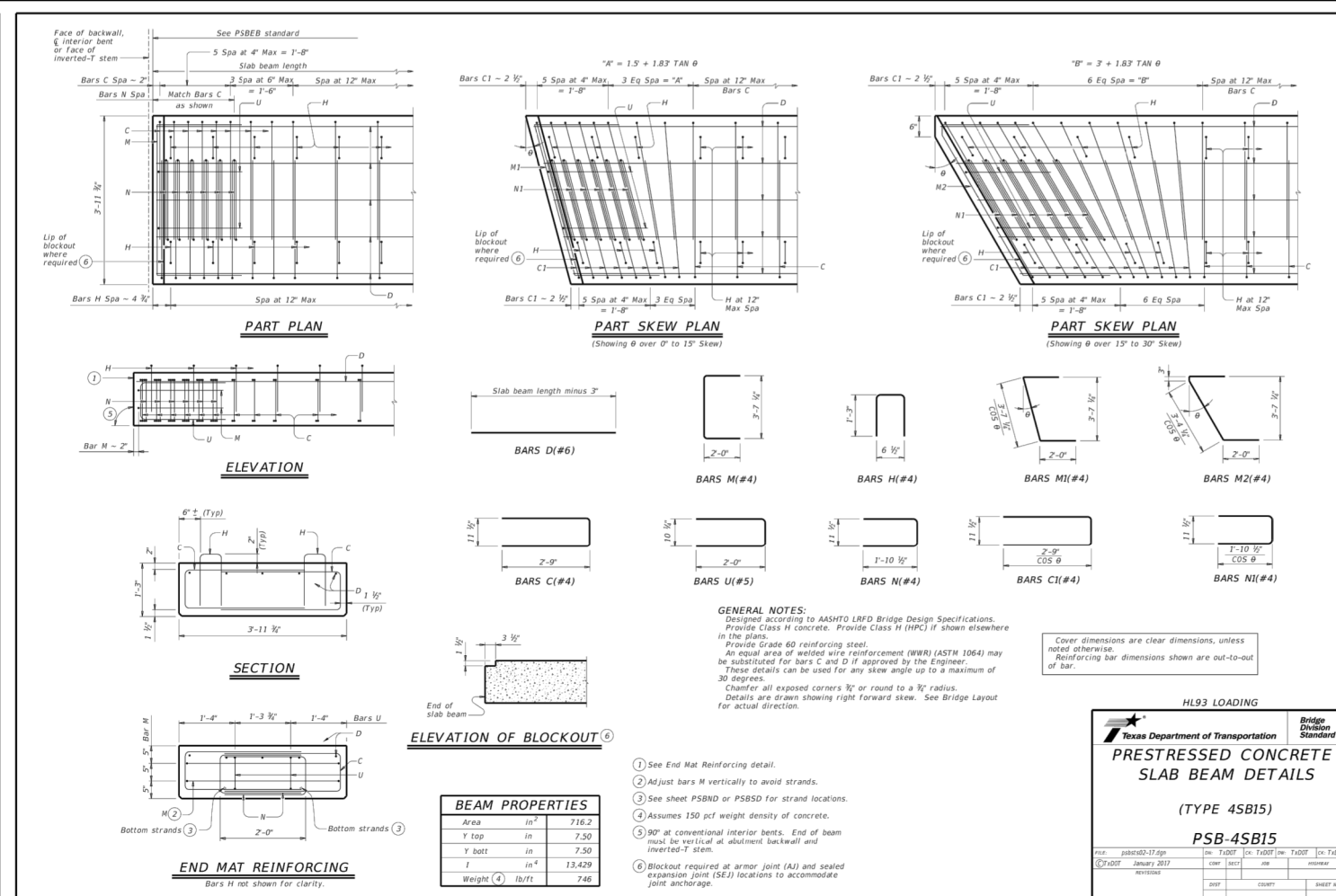
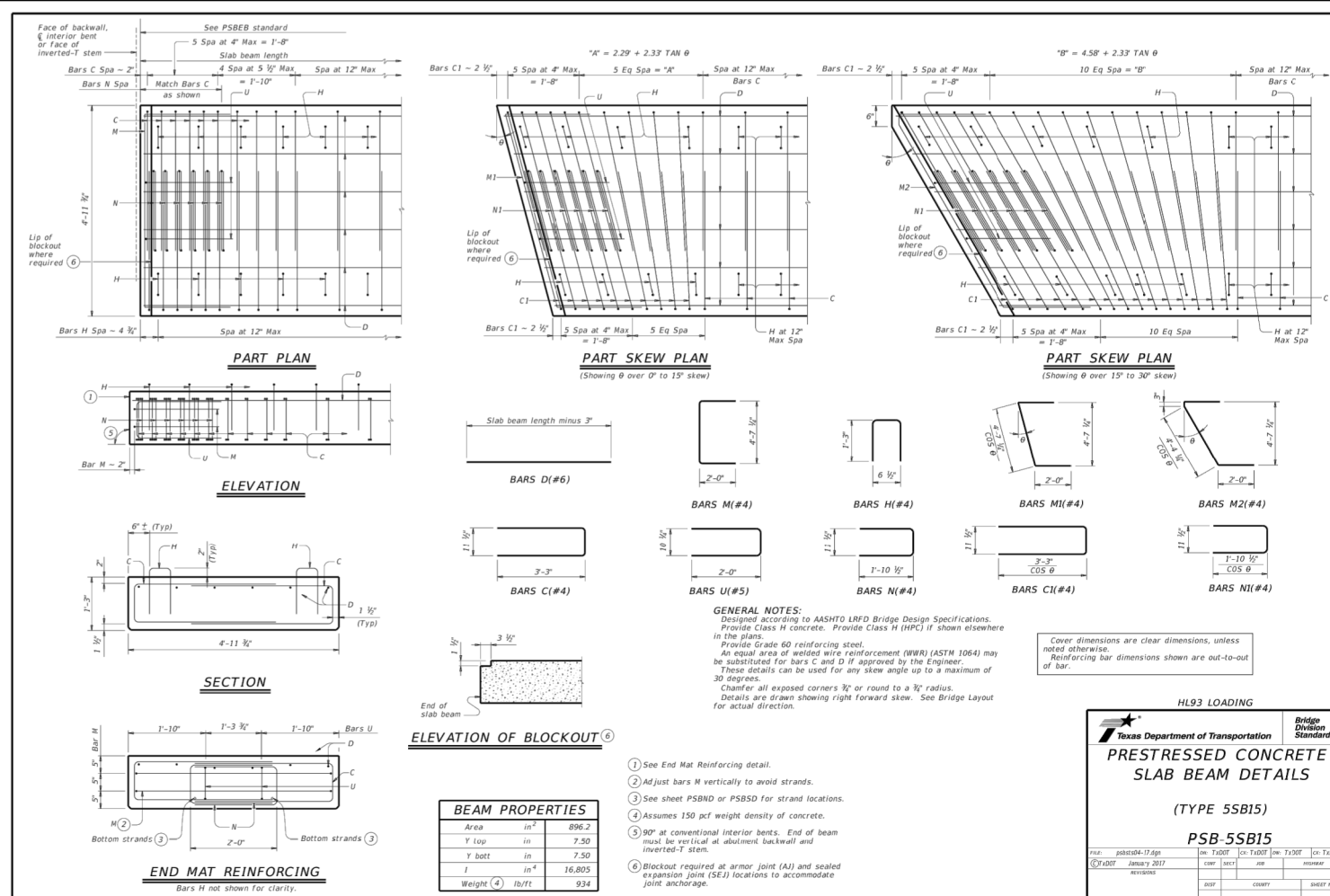
FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
 W BELLFORT BLVD TO OAK BEND FOREST DR

BRIDGE QUANTITIES

CNTY PROJ #	RPS PROJ #	DATE	SCALE	SHEET NO
17-2-11	008169	08.19.2022	N.T.S.	170
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RM	RM	MDT	MDT	

SHEET 1 OF 1



STRUCTURE	DESIGNED BEAMS (STRAIGHT STRANDS)												OPTIONAL DESIGN											
	SPAN LENGTH (ft)	BEAM NO.	BEAM TYPE	PRESTRESSING STRANDS	TOTAL NO.	SIZE	STRENGTH	Y _c	Y _b	TOT. NO. FROM BOTTOM	DIST. FROM BOTTOM (in)	NO. OF STRANDS	DEBONDED STRAND PATTERN PER ROW	CONCRETE	DESIGN	DESIGN	DESIGN	DESIGN	LIVE LOAD DISTRIBUTION					
24' ROADWAY SB12 BEAM	25	ALL	SSB12	8	8	0.6 270	3.50	3.50	0	2.50	8	0	0	0	0	0	0	0	0	0.450	0.450			
	30	ALL	SSB12	10	10	0.6 270	3.50	3.50	0	2.50	10	0	0	0	0	0	0	0	0	0.450	0.450			
	35	ALL	SSB12	14	14	0.6 270	3.50	3.50	0	2.50	14	0	0	0	0	0	0	0	0	0.450	0.450			
	40	ALL	SSB12	18	18	0.6 270	3.50	3.50	0	2.50	18	0	0	0	0	0	0	0	0	0.440	0.440			
24' ROADWAY SB15 BEAM	25	ALL	SSB15	8	8	0.6 270	5.00	5.00	0	2.50	8	0	0	0	0	0	0	0	0	0.450	0.450			
	30	ALL	SSB15	10	10	0.6 270	5.00	5.00	0	2.50	10	0	0	0	0	0	0	0	0	0.450	0.450			
	35	ALL	SSB15	14	14	0.6 270	5.00	5.00	0	2.50	14	0	0	0	0	0	0	0	0	0.440	0.440			
	40	ALL	SSB15	18	18	0.6 270	5.00	5.00	2	2.50	18	2	2	0	0	0	0	0	0	0.440	0.440			
28' ROADWAY SB12 BEAM	25	ALL	SSB12	8	8	0.6 270	3.50	3.50	0	2.50	8	0	0	0	0	0	0	0	0	0.430	0.430			
	30	ALL	SSB12	10	10	0.6 270	3.50	3.50	0	2.50	10	0	0	0	0	0	0	0	0	0.430	0.430			
	35	ALL	SSB12	12	12	0.6 270	3.50	3.50	0	2.50	12	0	0	0	0	0	0	0	0	0.430	0.430			
	40	ALL	SSB12	18	18	0.6 270	3.50	3.50	0	2.50	18	0	0	0	0	0	0	0	0	0.430	0.430			
28' ROADWAY SB15 BEAM	25	ALL	SSB15	8	8	0.6 270	5.00	5.00	0	2.50	8	0	0	0	0	0	0	0	0	0.430	0.430			
	30	ALL	SSB15	10	10	0.6 270	5.00	5.00	0	2.50	10	0	0	0	0	0	0	0	0	0.430	0.430			
	40	ALL	SSB15	14	14	0.6 270	5.00	5.00	0	2.50	14	0	0	0	0	0	0	0	0	0.430	0.430			
	45	ALL	SSB15	18	18	0.6 270	5.00	5.00	2	2.50	18	2	2	0	0	0	0	0	0	0.420	0.420			
30' ROADWAY SB12 BEAM	25	ALL	4SB12	6	6	0.6 270	3.50	3.50	0	2.50	6	0	0	0	0	0	0	0	0	0.340	0.340			
	30	ALL	4SB12	8	8	0.6 270	3.50	3.50	0	2.50	8	0	0	0	0	0	0	0	0	0.340	0.340			
	35	ALL	4SB12	10	10	0.6 270	3.50	3.50	0	2.50	10	0	0	0	0	0	0	0	0	0.340	0.340			
	40	ALL	4SB12	14	14	0.6 270	3.50	3.50	0	2.50	14	0	0	0	0	0	0	0	0	0.340	0.340			
30' ROADWAY SB15 BEAM	25	ALL	4SB15	6	6	0.6 270	5.00	5.00	0	2.50	6	0	0	0	0	0	0	0	0	0.350	0.350			
	30	ALL	4SB15	8	8	0.6 270	5.00	5.00	0	2.50	8	0	0	0	0	0	0	0	0	0.350	0.350			
	35	ALL	4SB15	10	10	0.6 270	5.00	5.00	0	2.50	10	0	0	0	0	0	0	0	0	0.340	0.340			
	40	ALL	4SB15	14	14	0.6 270	5.00	5.00	0	2.50	14	2	2	0	0	0	0	0	0	0.340	0.340			

PSBSD

HL93 LOADING

TxDOT 4SB12 SLAB BEAM TxDOT 5SB12 SLAB BEAM TxDOT 4SB15 SLAB BEAM TxDOT 5SB15 SLAB BEAM

PRESTRESSED CONCRETE SLAB BEAM STD DESIGNS (TY SB12 OR SB15) 24', 28' & 30' ROADWAY

PSBSD

08/19/2022

JAYMARK ENGINEERING CORPORATION

3730 CYPRESS CREEK PARKWAY, STE 108, HOUSTON, TEXAS 77068
PH: (346) 316-1181 FAX: (346) 316-1185 www.jaymarkengineering.com
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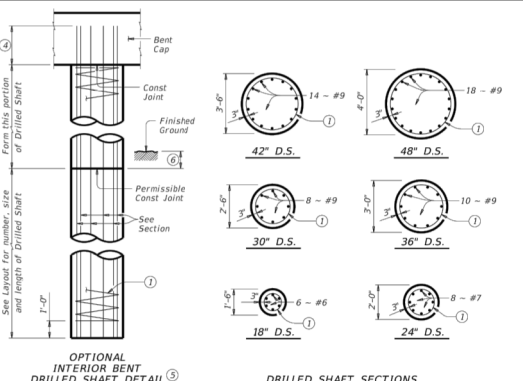
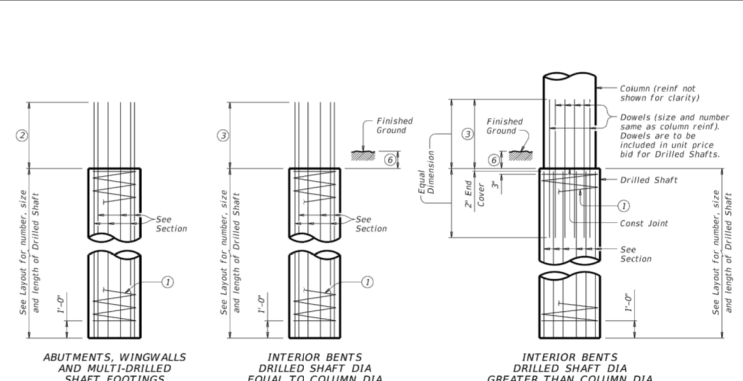
FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

DETAILS 1

SHEET 1 OF 12

CNTY PROJ #	RPS PROJ #	DATE	SCALE	SHEET NO
17-2-11	008169	08.19.2022	N.T.S.	171
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RM	RM	MDT	MDT	



DRILLED SHAFT DETAILS

DRILLED SHAFT SECTIONS

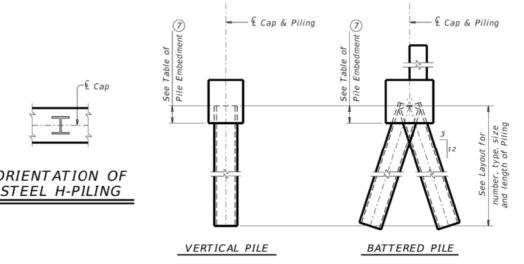
- #3 Spiral at 6" pitch (one and a half flat turns top & bottom).
- Min extension into supported element:
#6 Bars = 1'-0"
#7 Bars = 1'-6"
#9 Bars = 2'-3"
- Min lag with column reinf:
#7 Bars = 2'-0"
#9 Bars = 4'-6"
- Min extension into supported element:
#6 Bars = 1'-0"
#7 Bars = 1'-6"
#9 Bars = 2'-8"
- Drilled Shafts may extend to the bottom of bent caps for 1/4" heights of 6 ft and less (as shown on the Bridge Layout). If approved, this option can only be used when the Drilled Shaft diameter equals the column diameter. Obtain approval of the forming method above the ground line prior to construction. No adjustments in payment will be made if this option is used.
- 1'-0" Min
- Or as shown on plans.

TABLE OF PILE EMBEDMENT

Pile Type	Embedment Depth (ft)
18" Sq Concrete HP14 Steel HP18 Steel	1'-0"
24" Sq Concrete HP18 Steel	1'-0"

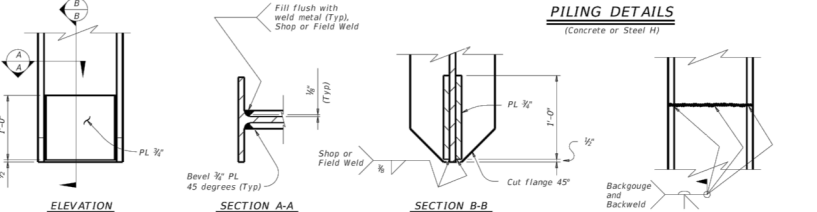
See standard CP for additional details on concrete pile embedment.

ORIENTATION OF STEEL H-PILING



PILING DETAILS

DETAIL "A"



STEEL H-PILE TIP REINFORCEMENT

STEEL H-PILE SPLICE DETAIL

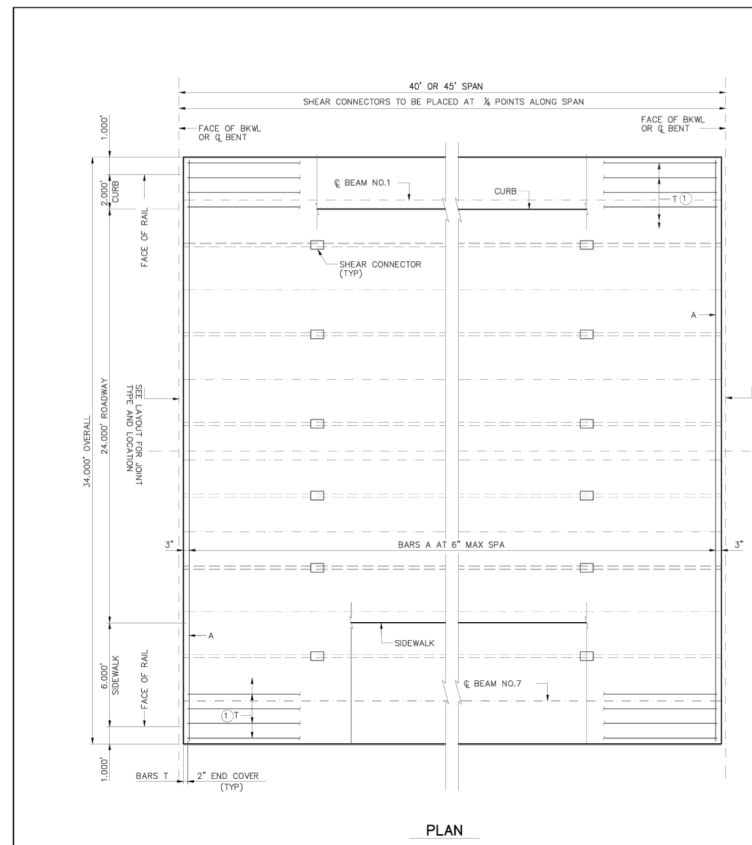
SHEET 1 OF 2

Texas Department of Transportation
Bridge Division Standard

COMMON FOUNDATION DETAILS

FD

REVISED: 01/2007
REVISED: 01/2010
REVISED: 01/2012



PLAN

BAR TABLE

BAR	SIZE
A	# 5
L	# 4
T	# 4
X	# 4
Y	# 5

NOTES TO DESIGN ENGINEER:

A. THESE DRAWINGS ARE CONSIDERED TO BE DESIGN GUIDELINES FOR THE CONSTRUCTION OF HARRIS COUNTY BRIDGES. THEIR INTENDED USE IS TO BE A FRAMEWORK FOR THE DESIGN ENGINEER TO DEVELOP SPECIFIC DETAILS.

B. IT IS THE RESPONSIBILITY OF THE DESIGN ENGINEER TO VERIFY THE COMPLETENESS AND ACCURACY OF THE INFORMATION CONTAINED AND TO ADJUST ACCORDING TO SPECIFIC PROJECT REQUIREMENTS.

C. THE DESIGN ENGINEER SHALL INCORPORATE ONLY THE NECESSARY STANDARD GUIDELINE DRAWINGS AND DETAILS INTO THE PROJECT PLANS, AND SHALL ADJUST PAGE NUMBERS ACCORDINGLY.

D. THE DESIGN ENGINEER SHALL CONSULT THE HARRIS COUNTY DESIGN MANUAL AND SPECIFICATIONS FOR INFORMATION PERTINENT TO THESE DESIGN GUIDELINE DRAWINGS.

E. THE DESIGN ENGINEER SHALL REMOVE THESE NOTES, ALL REFERENCES TO THESE NOTES, AND ANY OTHER EXTRANEOUS INFORMATION FROM THE DESIGN GUIDELINE DRAWINGS. DESIGN ENGINEER SHALL PROVIDE ANY NOTES OR OTHER APPROPRIATE INFORMATION NECESSARY TO COMPLETE THE BRIDGE PLANS.

SLAB NOTES

- DESIGNED ACCORDING TO AASHTO LRFD SPECIFICATIONS.
- ALL CONCRETE SHALL BE CLASS A1 4000 PSI @ 28 DAYS IN ACCORDANCE WITH HARRIS COUNTY SPECIFICATION ITEM 421 FOR STRUCTURAL CONCRETE. ALL EXPOSED CORNERS SHALL BE CHAMFERED 1/4" UNLESS OTHERWISE NOTED.
- ALL REINFORCING STEEL SHALL BE ASTM A615 GRADE 60 STEEL.
- DIMENSIONS RELATING TO REINFORCING STEEL ARE TO CENTER OF BARS, UNLESS OTHERWISE NOTED.
- THE QUANTITIES GIVEN FOR REINFORCING STEEL AND CONCRETE ARE PRESENTED FOR CONTRACTORS INFORMATION ONLY.
- BAR LAPS, WHERE REQUIRED, SHALL BE AS FOLLOWS:
#4 = 1'-3"
#5 = 1'-9"

HARRIS COUNTY ENGINEERING DEPARTMENT

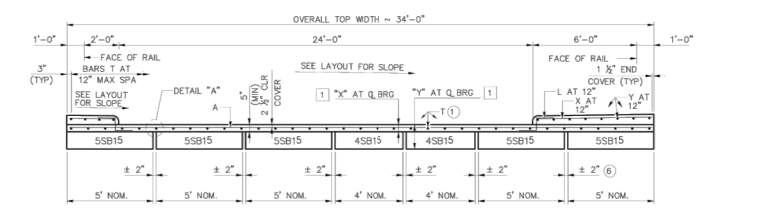


FIRM INFO

SEAL NOTE

DESIGN GUIDELINES
SPAN DETAILS—SLAB BEAMS
HALF BOULEVARD, 0° SKEW
(1 OF 2)

HL93 LOADING



TYPICAL TRANSVERSE SECTION

TABLE OF ESTIMATED QUANTITIES

SPAN LENGTH	CLASS "A1" CONCRETE (SLAB)		CLASS "A1" CONCRETE (SOWK)		PRESTR. CONCRETE SLAB BEAMS (TY 45B15)		PRESTR. CONCRETE SLAB BEAMS (TY 55B15)		SLAB REINF. STEEL (2)		SIDEWALK REINF. STEEL (3)		CURB REINF. STEEL (4)		TOTAL REINF. STEEL	
	FT	CY	FT	CY	LF	LB	LF	LB	LB	LB	LB	LB	LB	LB	LB	LB
40	23.09	6.63	2.17	79.00	197.50	3,808	504	216	4,528							

- WHERE SLAB IS CONTINUOUS OVER INTERIOR BENTS, BARS T SHALL BE CONTINUOUS THROUGH JOINT. SEE "CONTINUOUS SLAB DETAIL".
- REINFORCING STEEL WEIGHT IS BASED ON AN APPROXIMATE FACTOR OF 2.8 LBS PER SQUARE FOOT OF SLAB.
- REINFORCING STEEL WEIGHT IS BASED ON AN APPROXIMATE FACTOR OF 1.8 LBS PER SQUARE FOOT OF SIDEWALK.
- REINFORCING STEEL WEIGHT IS BASED ON AN APPROXIMATE FACTOR OF 1.8 LBS PER SQUARE FOOT OF CURB.
- FABRICATOR SHALL ADJUST BEAM LENGTHS FOR BEAM SLOPES AS REQUIRED.
- GAP WIDTH IS BASED ON NOMINAL BEAM WIDTHS.
- CONNECTOR PLATES ARE INCIDENTAL TO PRESTRESSED BEAM ITEM.
- MATERIAL SHALL BE SELF-LEVELING, COLD-APPLIED, RAPID-CURE, LOW-MODULUS SILICONE RUBBER SEALANT, IN ACCORDANCE WITH ITEM 427 AND SEALANT MANUFACTURER SPECIFICATIONS.
- PROVIDE BROOM FINISH TO TOP OF BRIDGE SLAB WHERE RAISED SIDEWALK OR CURB AREA IS DEFINED.

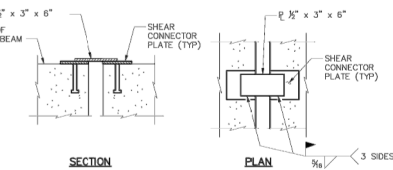
TABLE OF ESTIMATED QUANTITIES

SPAN LENGTH	CLASS "A1" CONCRETE (SLAB)		CLASS "A1" CONCRETE (SOWK)		PRESTR. CONCRETE SLAB BEAMS (TY 45B15)		PRESTR. CONCRETE SLAB BEAMS (TY 55B15)		SLAB REINF. STEEL (2)		SIDEWALK REINF. STEEL (3)		CURB REINF. STEEL (4)		TOTAL REINF. STEEL	
	FT	CY	FT	CY	LF	LB	LF	LB	LB	LB	LB	LB	LB	LB	LB	LB
45	25.97	7.46	2.44	88.50	222.00	4,284	587	243	5,084							

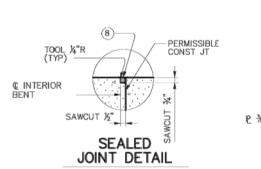
- WHERE SLAB IS CONTINUOUS OVER INTERIOR BENTS, BARS T SHALL BE CONTINUOUS THROUGH JOINT. SEE "CONTINUOUS SLAB DETAIL".
- REINFORCING STEEL WEIGHT IS BASED ON AN APPROXIMATE FACTOR OF 2.8 LBS PER SQUARE FOOT OF SLAB.
- REINFORCING STEEL WEIGHT IS BASED ON AN APPROXIMATE FACTOR OF 1.8 LBS PER SQUARE FOOT OF SIDEWALK.
- REINFORCING STEEL WEIGHT IS BASED ON AN APPROXIMATE FACTOR OF 1.8 LBS PER SQUARE FOOT OF CURB.
- FABRICATOR SHALL ADJUST BEAM LENGTHS FOR BEAM SLOPES AS REQUIRED.
- GAP WIDTH IS BASED ON NOMINAL BEAM WIDTHS.
- CONNECTOR PLATES ARE INCIDENTAL TO PRESTRESSED BEAM ITEM.
- MATERIAL SHALL BE SELF-LEVELING, COLD-APPLIED, RAPID-CURE, LOW-MODULUS SILICONE RUBBER SEALANT, IN ACCORDANCE WITH ITEM 427 AND SEALANT MANUFACTURER SPECIFICATIONS.
- PROVIDE BROOM FINISH TO TOP OF BRIDGE SLAB WHERE RAISED SIDEWALK OR CURB AREA IS DEFINED.

NOTES TO ENGINEER

- THE ENGINEER SHALL DETERMINE SECTION DEPTHS BASED ON THEORETICAL BEAM CAMBER, DEAD LOAD DEFLECTIONS OF 3" CAST-IN-PLACE SLAB AND THE EFFECT OF VERTICAL CURVE.
- THE ENGINEER SHALL DETERMINE BRIDGE CURB HEIGHT.

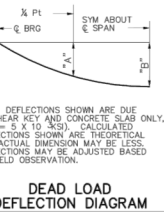


SHEAR CONNECTION DETAIL



SEALED JOINT DETAIL

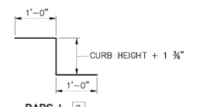
SHEAR CONNECTOR PLATE



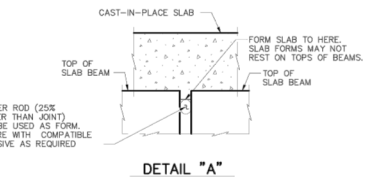
DEAD LOAD DEFLECTION DIAGRAM

TABLE OF VARIABLE VALUES

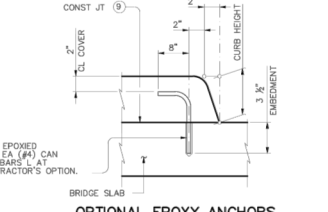
SPAN LENGTH	BEAM TYPE	DEAD LOAD DEFLECTION		SECTION (1)	
		FT	IN	FT/IN	FT/IN
40	45B15	0.013	0.019	5 3/8"	1'-8 1/2"
40	55B15	0.013	0.019	5 3/8"	1'-8 1/2"
45	45B15	0.022	0.033	6 1/2"	1'-9 1/2"
45	55B15	0.022	0.033	6 1/2"	1'-9 1/2"



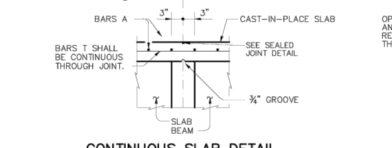
BAR L



DETAIL "A"



OPTIONAL EPOXY ANCHORS



CONTINUOUS SLAB DETAIL

HARRIS COUNTY ENGINEERING DEPARTMENT



FIRM INFO

SEAL NOTE

DESIGN GUIDELINES
SPAN DETAILS—SLAB BEAMS
HALF BOULEVARD, 0° SKEW
(2 OF 2)

HL93 LOADING

NO	DATE	REVISION	APPROVED

JAYMARK ENGINEERING CORPORATION
3730 CYPRESS CREEK PARKWAY, STE 108, HOUSTON, TEXAS 77068
PH: (346) 316-1181 FAX: (346) 316-1185 www.jaymarkengineering.com
TEXAS REG. ENGINEERING FIRM F-1297

FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

DETAILS 2

CNTY PROJ #	RPS PROJ #	DATE	SCALE	SHEET NO
17-2-11	008169	08.19.2022	N.T.S.	172
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RM	RM	MDT	MDT	

SHEET 2 OF 12

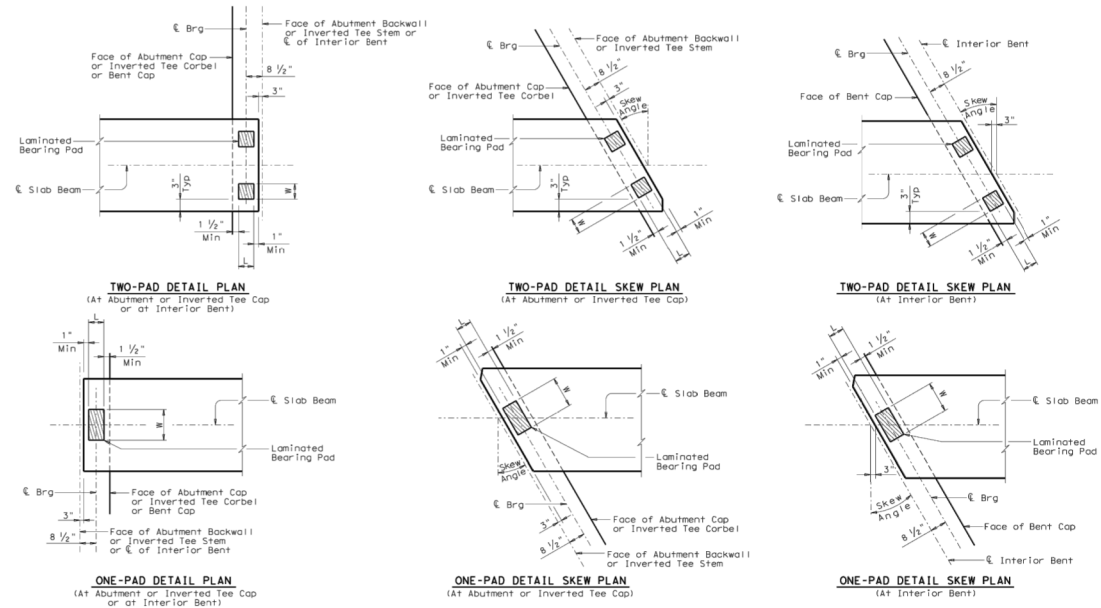


TABLE OF ELASTOMERIC BEARING PAD DIMENSIONS (ALL PRESTR CONC SLAB BM TYPES)

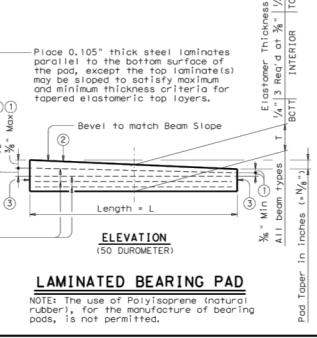
One-Pad (Type SBT-N) (1/2)	Two-Pad (Type SBT-N) (1/2)	One-Pad (Type SBT-N) (1/2)	Two-Pad (Type SBT-N) (1/2)
14"	7"	2"	7"
7"	2"	7"	2"

Pad sizes shown are applicable for the following conditions:
 (1) All one, two and three span units where the minimum span length is not less than 25' and the maximum span is not more than 50'.
 (2) Skews less than or equal to 30'.

GENERAL NOTES:
 Shop drawings for approval are required. A bearing layout which identifies location and orientation of all bearings shall be developed by the bearing fabricator. Permanently mark each bearing in accordance with the bearing layout. A copy of the bearing layout is to be provided to the Engineer.
 Cost of furnishing and installing elastomeric bearings shall be included in unit price bid for "Prestressed Concrete Slab Beams".

ELASTOMERIC BEARING PLACEMENT DIAGRAMS
 Place one bearing at forward station beam end. Place two bearings at back station beam end.

① Maximum and minimum layer thicknesses shown are for elastomer only, on tapered layers.
 ② BEARING TYPE shall be indicated on all pads. For tapered pads, BEARING TYPE shall be located on the high side. The fabricator shall include the value of "N" (amount of taper in 1/8" increments) in this mark.
 Examples: N=0, (for 0" taper)
 N=1, (for 1/8" taper)
 N=2, (for 1/4" taper)
 (etc.)
 Fabricated pad top surface slope shall not vary from plan beam slope by more than 1/8" IN/IN.
 ③ Locate Permanent Mark here.



ELASTOMER THICKNESS
 All beam types at 3/16" - 1/4" (TOP) INTERIOR
 1/4" - 3/8" (BOT) INTERIOR
 3/8" - 1/2" (TOP) EXTERIOR
 1/2" - 5/8" (BOT) EXTERIOR

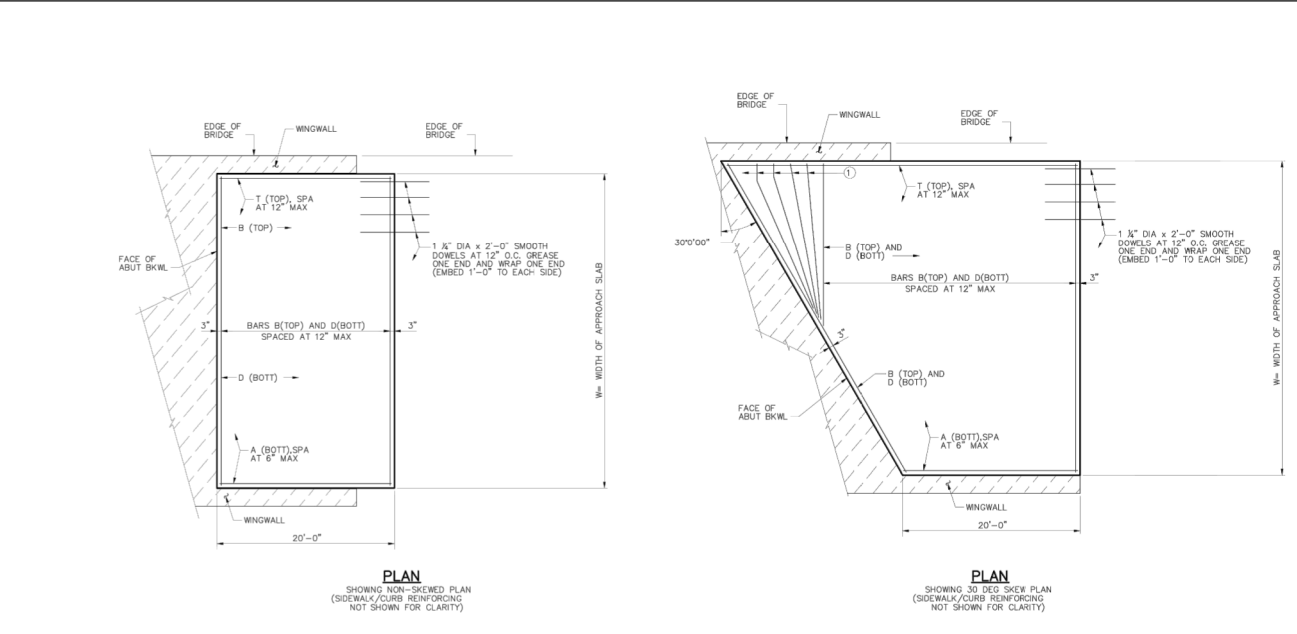
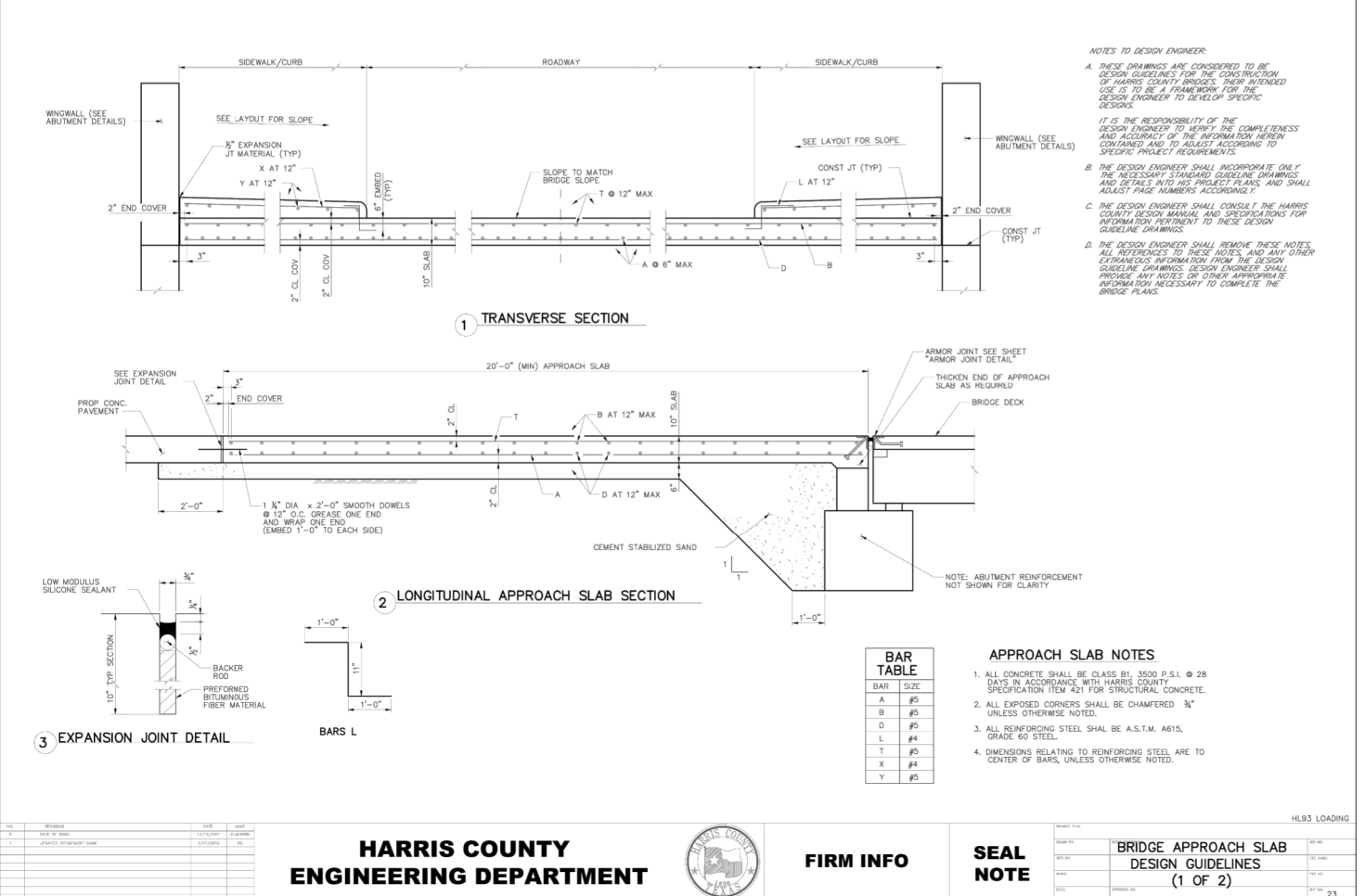
HL93 LOADING

Texas Department of Transportation
 Bridge Division Standard

ELASTOMERIC BEARING DETAILS
 SKEWS FROM 0° TO 30°
 PRESTR CONCRETE SLAB BEAM

PSBEB

NO.	REVISION	DATE	BY	CHKD.
1	ISSUED FOR CONSTRUCTION	08/19/2022	JAYMARK	MARK D. TAYLOR



APPROXIMATE QUANTITIES

REIN' STEEL WEIGHT = 5.2 LBS/SF OF APPROACH SLAB
 AREA OF APPR SLAB = 20W + 0.5W² TAN S (SF)
 W = WIDTH OF APPROACH SLAB (FT)
 S = SKEW ANGLE (DEG)

GENERAL NOTES

- FLARE BARS B & D IN THIS REGION (1'-6" MAX SPA, 3" MIN SPA). MIN FLARED BAR LENGTH = 2'-0". BEND BARS AS NECESSARY.
- FOR CONTRACTORS INFORMATION ONLY. SIDEWALK QUANTITIES NOT INCLUDED.

HARRIS COUNTY ENGINEERING DEPARTMENT

FIRM INFO

SEAL NOTE

BRIDGE APPROACH SLAB DESIGN GUIDELINES (2 OF 2)

MARK D. TAYLOR
 REGISTERED PROFESSIONAL ENGINEER
 57815
 08/19/2022

JAYMARK ENGINEERING CORPORATION
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 PH: (346) 316-1181 FAX: (346) 316-1185 www.jaymarkengineering.com
 TEXAS REG. ENGINEERING FIRM F-1297

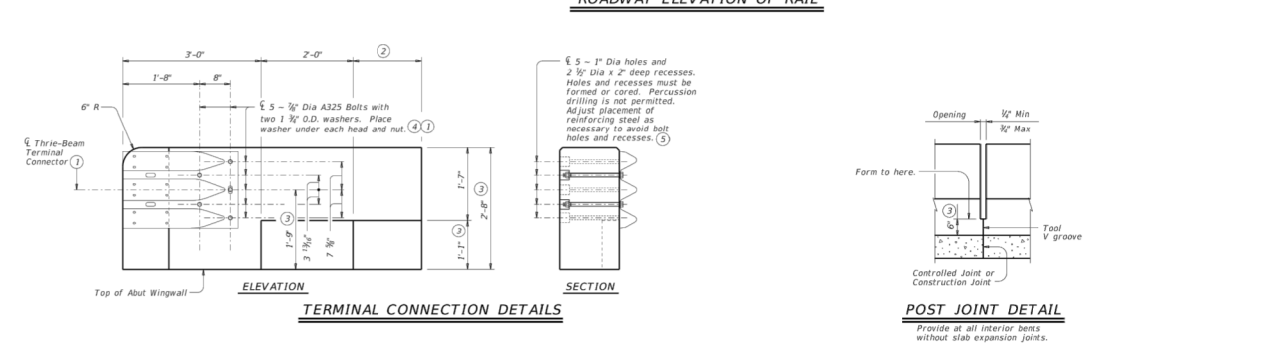
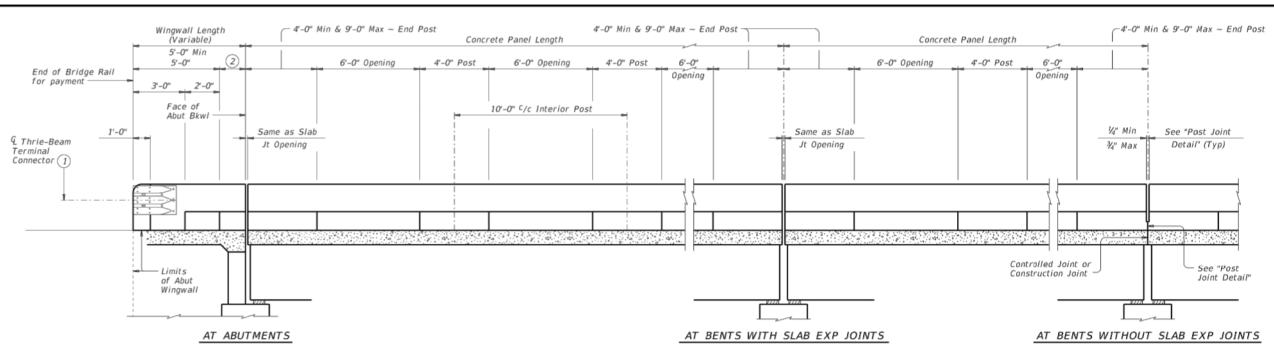
FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
 W BELLFORT BLVD TO OAK BEND FOREST DR

DETAILS 3

CNTY PROJ # 17-2-11 RPS PROJ # 008169 DATE 08.19.2022 SCALE N.T.S. SHEET NO. 173

DESIGNED BY RM DRAWN BY RM CHECKED BY MDT VERIFIED BY MDT



- ① Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.
- ② Wingwall Length minus 5'-0" (Varies)
- ③ Increase 2" for structures with overlay.
- ④ Provide bolts of sufficient length to extend 1/2" to 3/4" beyond nut.
- ⑤ Bolt recesses are only required when pedestrian sidewalks are adjacent to back of rail.

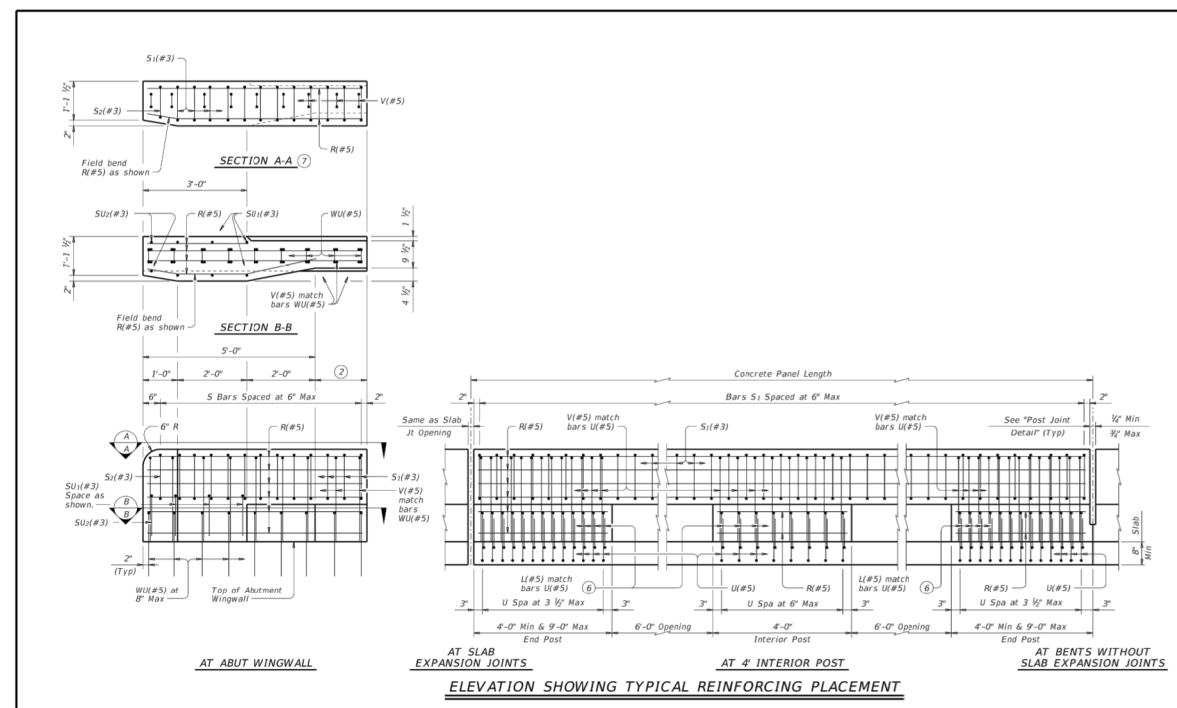
SHEET 1 OF 3

Texas Department of Transportation Bridge Division Standard

TRAFFIC RAIL

TYPE T223

Rev:	rev005.dgn	by:	TJ007	on:	7/10/07	in:	JTB	by:	JTB
①	07/007	July 2014		REVISED					



- ② Wingwall Length minus 5'-0" (Varies)
- ③ Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.
- ④ Bars S(U)(#3), S(L)(#3) and W(U)(#5) not shown for clarity.

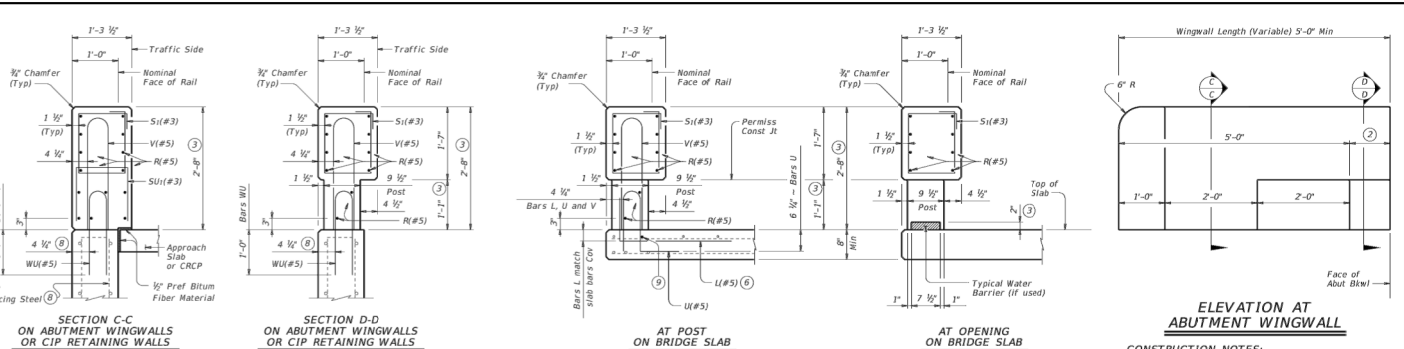
SHEET 2 OF 3

Texas Department of Transportation Bridge Division Standard

TRAFFIC RAIL

TYPE T223

Rev:	rev005.dgn	by:	TJ007	on:	7/10/07	in:	JTB	by:	JTB
①	07/007	July 2014		REVISED					

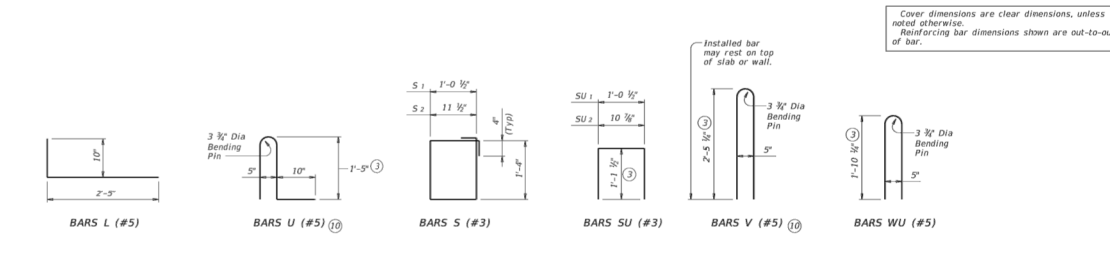


CONSTRUCTION NOTES:
 Face of rail and parapet must be vertical transversely unless otherwise shown in the plans or approved by the Engineer.
 Provide water barriers at openings draining onto undercrossing roadways and sidewalks. They may be cast-in-place or precast in convenient lengths and bonded to the bridge deck with an approved epoxy cement.

MATERIAL NOTES:
 All steel components except reinforcing must be galvanized unless otherwise shown on plans.
 Provide Class "C" concrete. Provide Class "C" (HPC) if required elsewhere. Chamfer all exposed corners.
 Provide Grade 60 reinforcing steel.
 Epoxy coat all rail reinforcement if slab bars are epoxy coated.
 Deformed Welded Wire Reinforcing (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars U, V, and WU unless noted otherwise. Provide the same laps as required for reinforcing bars.
 Provide bar laps, where required, as follows:
 Uncoated - #5 = 1'-0"
 Epoxy coated - #5 = 2'-0"

GENERAL NOTES:
 This rail has been evaluated and accepted to be of equal strength to railings with like geometry, which have been crash tested to meet NCHRP Report 350 TL-4 criteria. This rail can be used for speeds of 50 mph and greater when a TL-2 rated guard fence transition is used. When a TL-2 rated guard fence transition is used, this rail can only be used for speeds of 45 mph and less.
 Do not use this railing on bridges with expansion joints providing more than 5" movement.
 Rail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.
 Shop drawings will not be required for this rail. Average weight of railing with no overlay is 258 pcf.

- ② Wingwall Length minus 5'-0" (Varies)
- ③ Increase 2" for structures with overlay.
- ④ Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.
- ⑤ When vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls on traffic side of wall, move the horizontal wingwall/retaining wall reinforcing to the inside of Bars WU where bars conflict.
- ⑥ Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.
- ⑦ At the Contractor's option, Bars V may be replaced by extending Bars U to 2'-5" above the roadway surface without overlay.



SHEET 3 OF 3

Texas Department of Transportation Bridge Division Standard

TRAFFIC RAIL

TYPE T223

Rev:	rev005.dgn	by:	TJ007	on:	7/10/07	in:	JTB	by:	JTB
①	07/007	July 2014		REVISED					



NO.	DATE	REVISION	APPROVED

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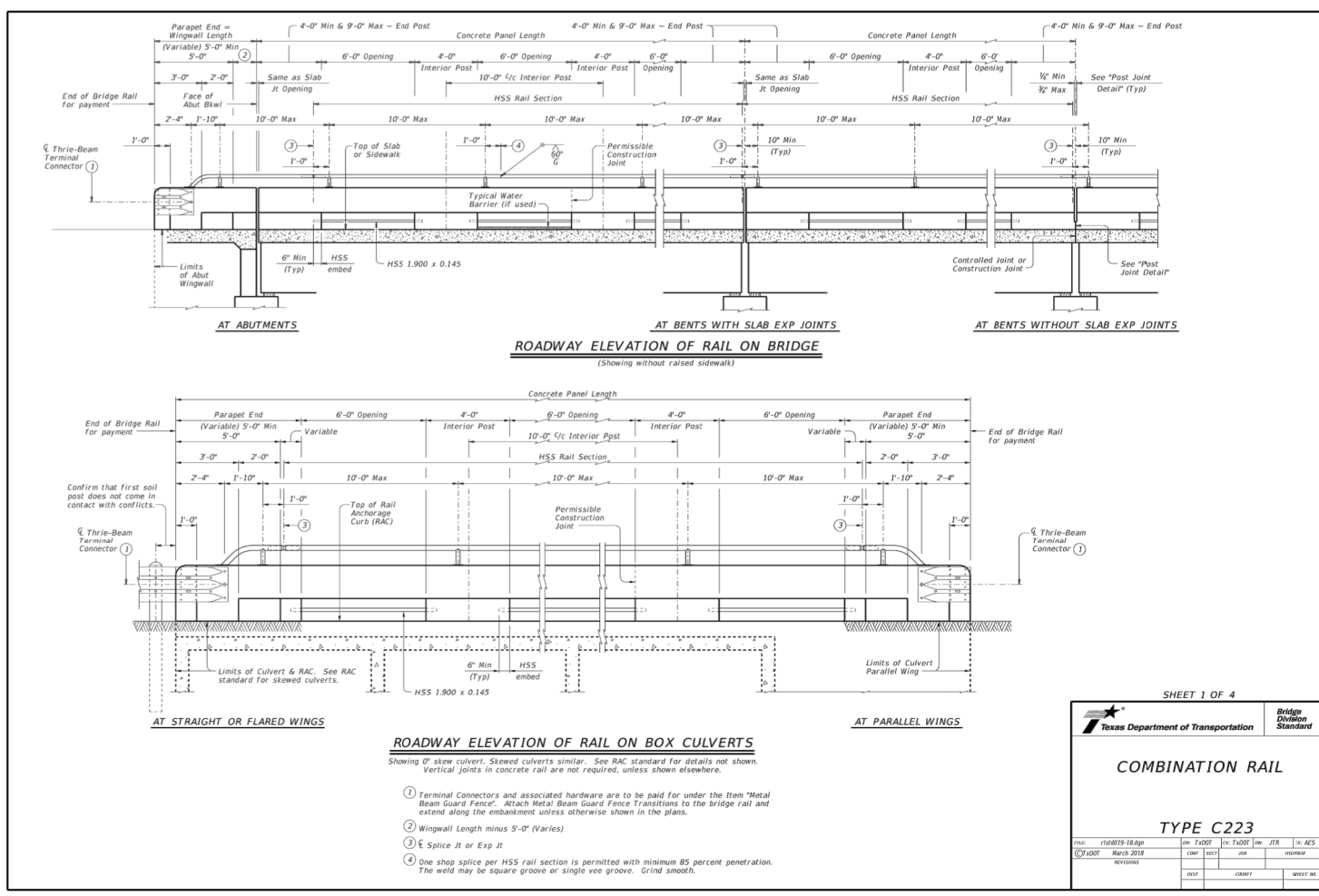
FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
 W BELLFORT BLVD TO OAK BEND FOREST DR

DETAILS 4

SHEET 4 OF 12

CNTY PROJ #	RPS PROJ #	DATE	SCALE	SHEET NO
17-2-11	008169	08.19.2022	N.T.S.	174
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RM	RM	MDT	MDT	



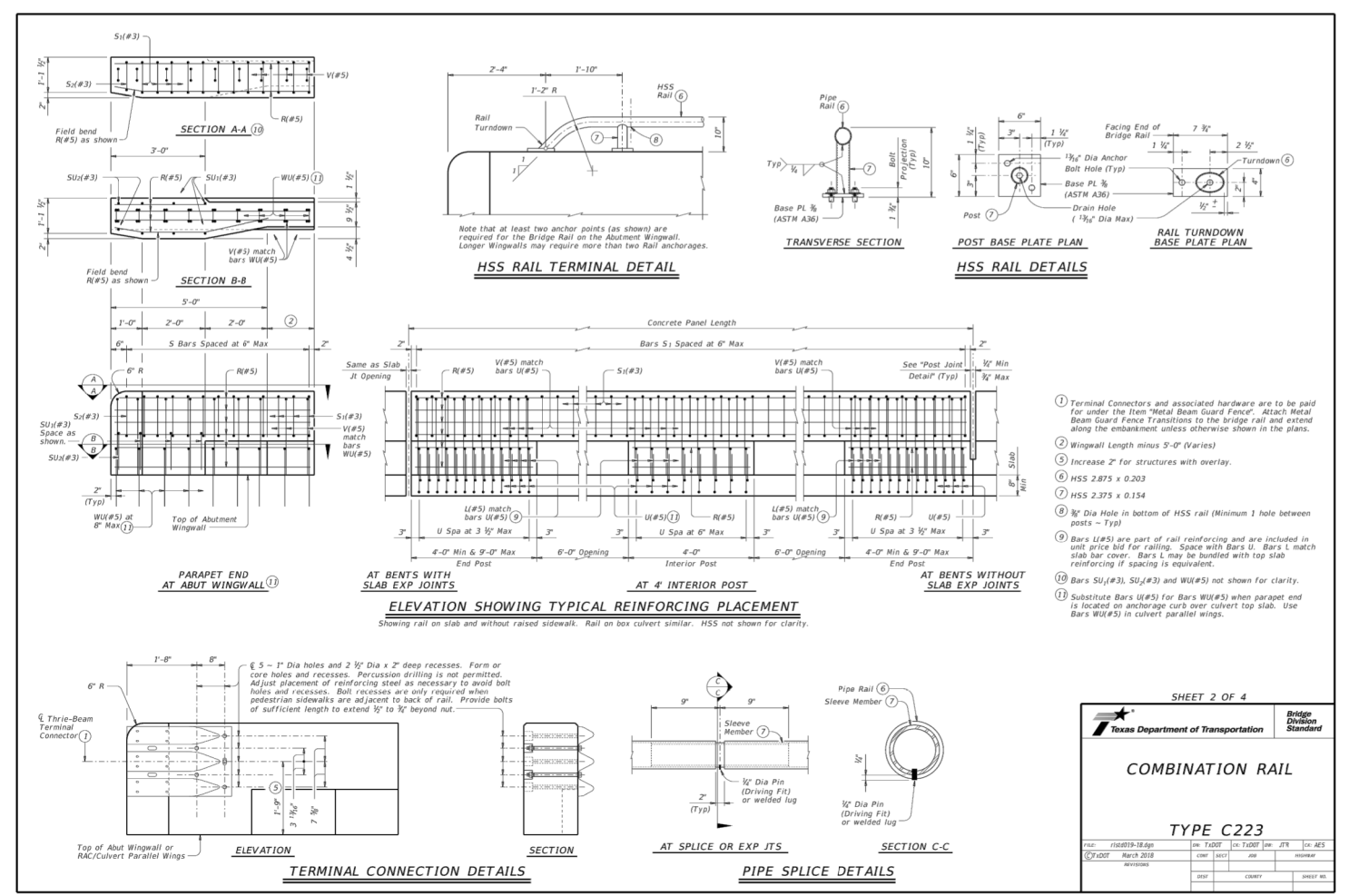
SHEET 1 OF 4

Texas Department of Transportation Bridge Division Standard

COMBINATION RAIL

TYPE C223

REV	DATE	BY	CHKD	APP	DESCRIPTION
01	03/2007	March 2018			



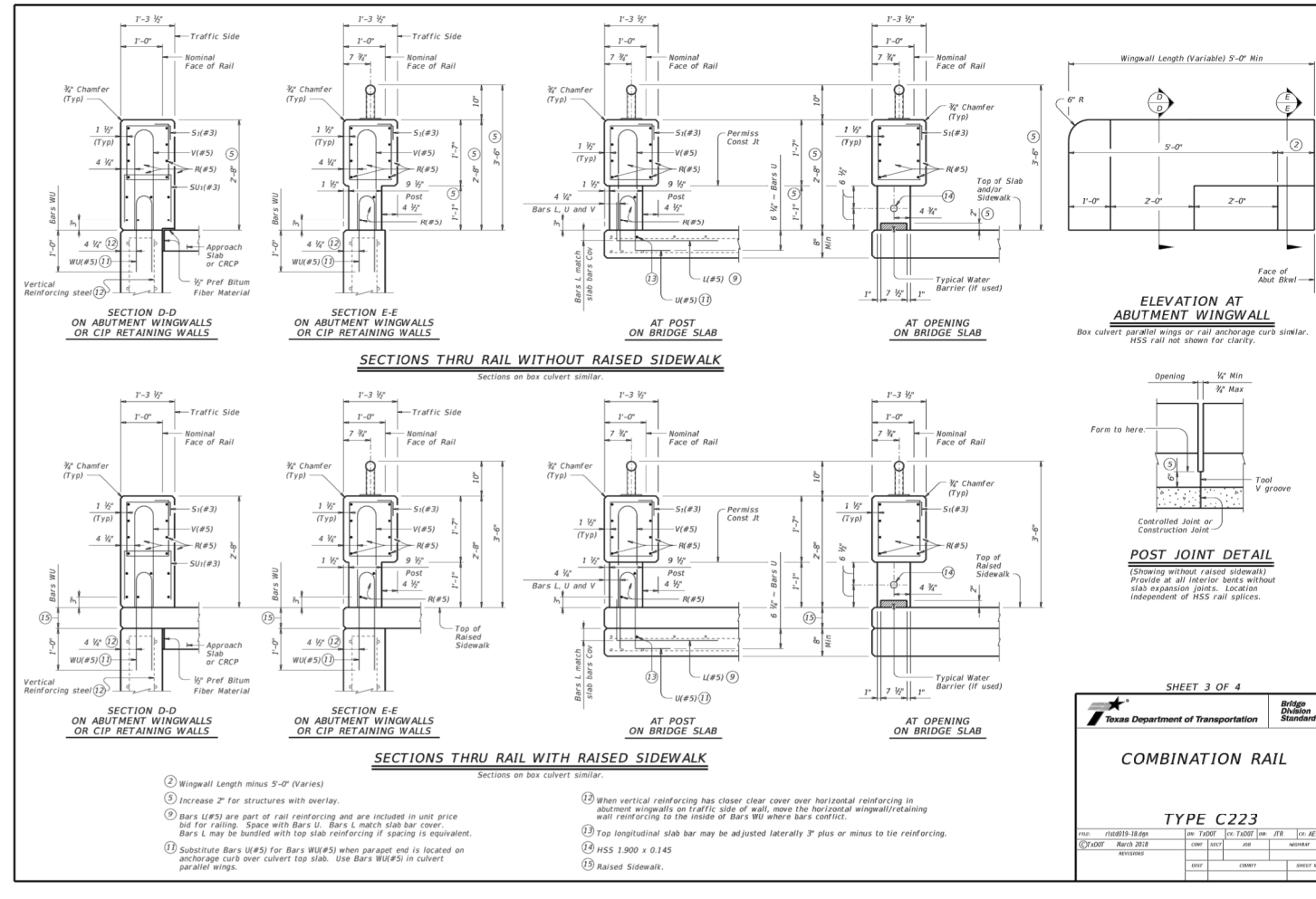
SHEET 2 OF 4

Texas Department of Transportation Bridge Division Standard

COMBINATION RAIL

TYPE C223

REV	DATE	BY	CHKD	APP	DESCRIPTION
01	03/2007	March 2018			



SHEET 3 OF 4

Texas Department of Transportation Bridge Division Standard

COMBINATION RAIL

TYPE C223

REV	DATE	BY	CHKD	APP	DESCRIPTION
01	03/2007	March 2018			



NO	DATE	REVISION	APPROVED
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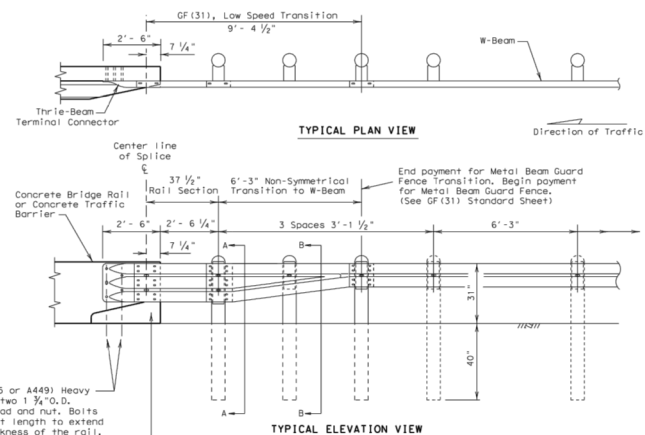
JAYMARK ENGINEERING CORPORATION
3730 CYPRESS CREEK PARKWAY, STE 108, HOUSTON, TEXAS 77068
PH: (346) 316-1181 FAX: (346) 316-1185 www.jaymarkengineering.com
TEXAS REG. ENGINEERING FIRM F-1297

FORT BEND COUNTY, TEXAS
BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

DETAILS 5

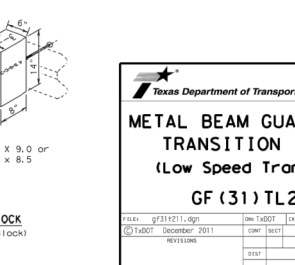
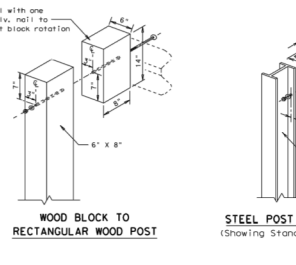
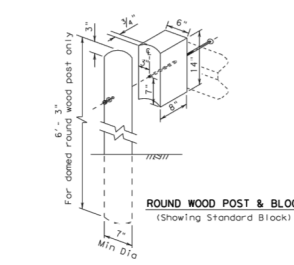
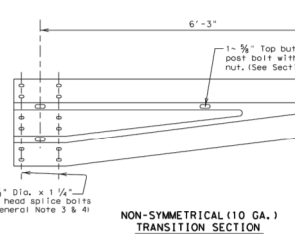
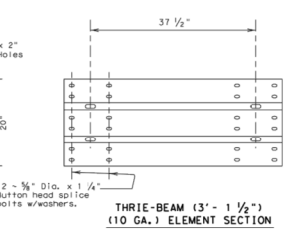
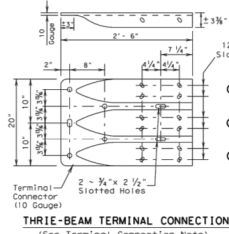
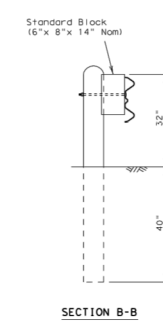
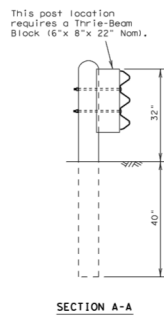
SHEET 5 OF 12

CNTY PROJ #	RPS PROJ #	DATE	SCALE	SHEET NO
17-2-11	008169	08.19.2022	N.T.S.	175
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RM	RM	MDT	MDT	



- GENERAL NOTES**
- The type of post (round wood post, rectangular wood post, or steel post) will be as shown in the plans. The exact position of transitions shall be as shown in the plans or as directed by the Engineer.
 - Roll element shall meet the requirements of Item 540, Metal Beam Guard Fence except as modified in the plans.
 - Button head "post" bolts (ASTM A307) shall be of sufficient length to extend through the full thickness of the nut and Type A 1 1/2" O.D. washer and not more than 1" beyond it. Button head "splice" bolts (ASTM A307) are 3/4" x 1 1/2" with 3/8" double recessed nuts (ASTM A563).
 - Fittings (bolts, nuts, and washers) shall be galvanized in accordance with Item 445, "Galvanizing." Fittings shall be subsidiary to the big item requiring construction of the transition.
 - Crown will be welded to accommodate transitions.
 - If solid rock is encountered, see the GF (31) standard sheet for the proper installation guidance.
 - Posts shall not be set in concrete, of any depth.
 - 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 can furnish composite material posts and/or blocks.
 - Refer to GF (31) standard sheet for additional details.

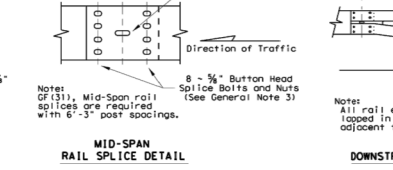
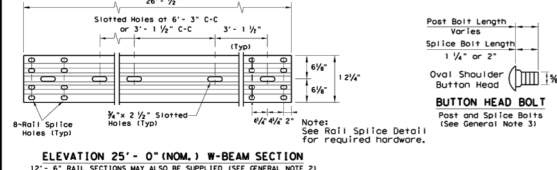
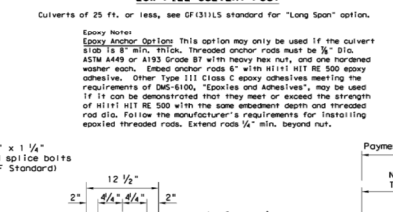
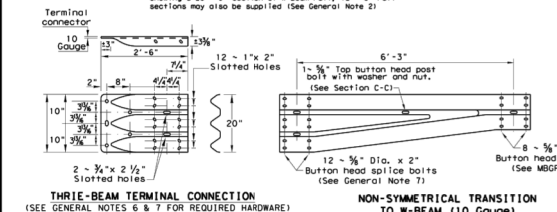
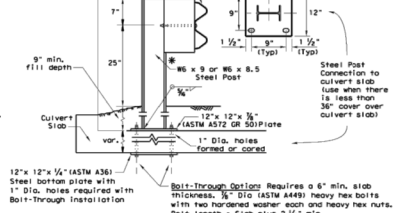
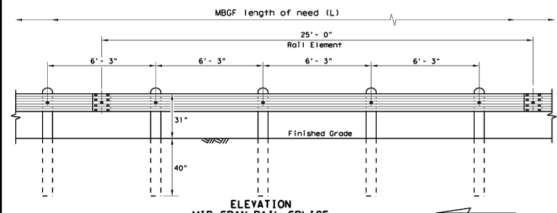
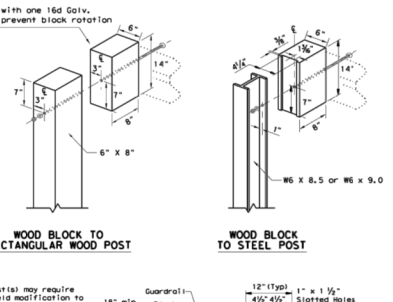
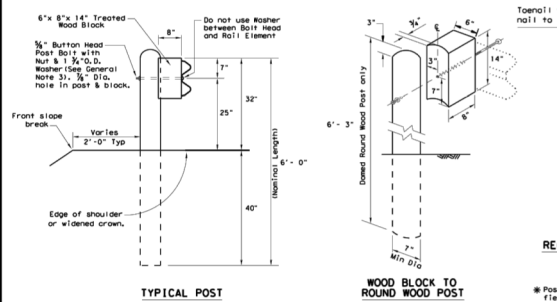
TERMINAL CONNECTION NOTE
To ensure a stable connection, (12) Rectangular Washers (RW03) are required under the recessed nuts of the Terminal Connection splice.



Texas Department of Transportation Design Division Standard

METAL BEAM GUARD FENCE TRANSITION (TL-2) (Low Speed Transition)
GF (31) TL-2-11

FILE#	gf31tl2-11.dgn	DATE	08/19/2022	BY	MM/VP	CHK	MM/VP
DESIGNED	December 2011	DATE	12/01/11	BY	MM/VP	CHK	MM/VP
REVISION		DATE		BY		CHK	
		DATE		BY		CHK	
		DATE		BY		CHK	

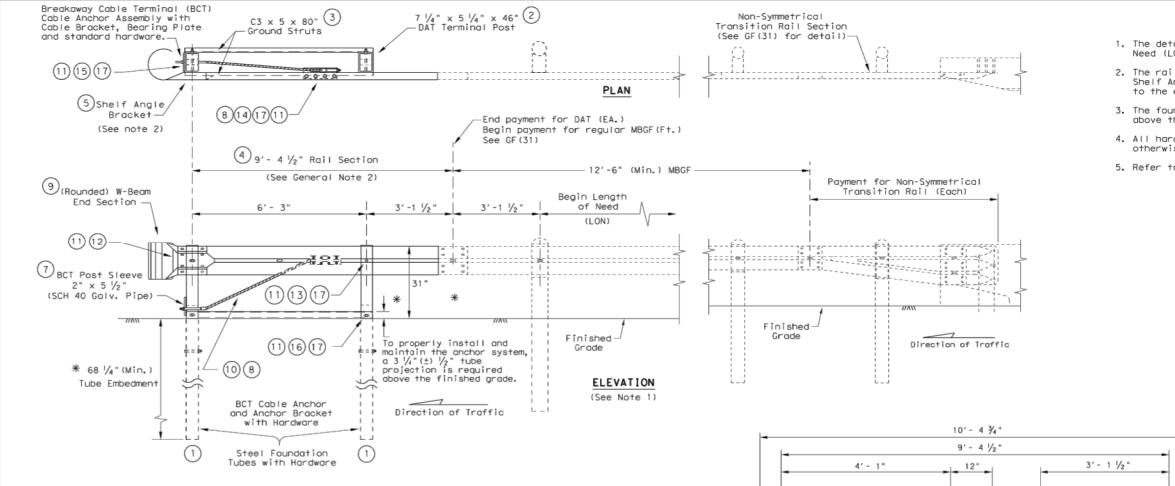


- GENERAL NOTES**
- The type of post (round wood post, rectangular wood post, or steel post) will be as shown in the plans. The exact position of MBSF shall be shown in the plans or as directed by the Engineer. Steel posts to be galvanized in accordance with Item 445, "Galvanizing."
 - Roll element shall meet the requirements of Item 540, Metal Beam Guard Fence except as modified in the plans. The Contractor may furnish roll elements of 25'-0", or 12'-6" (nom.) lengths. Roll elements may have slotted holes at 3'-0" C-C or 6'-3" C-C. A special length of roll may be manufactured to accommodate the downstream anchor terminal (DAT) and the transition sections of guardrail.
 - Button head "post" bolts (ASTM A307) shall be of sufficient length to extend through the full thickness of the nut (ASTM A563) and Type A (1 1/2" O.D.) washer and not more than 1" beyond it. Button head "splice" bolts (ASTM A307) are 3/4" x 1 1/2" (or 2" long at triple roll splices) with 3/8" double recessed nuts (ASTM A563). Three beam "connection" 3/4" dia. (ASTM A325) hex bolts shall be of sufficient length to extend through the full thickness of the rail, washers, and nuts.
 - Fittings (bolts, nuts, and washers) shall be galvanized in accordance with Item 445, "Galvanizing." Fittings shall be subsidiary to the big item.
 - Crown shall be welded to accommodate the Metal Beam Guard Fence.
 - The lateral approach to the guard fence, shall have a maximum slope of 1V:10H.
 - 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.
 - Unless otherwise shown in the plans, guard fence placed in the vicinity of curves shall be positioned so that the face of curb is located directly below or behind the face of the rail. Rail placed over curves shall be installed so that the post bolt is located approximately 25 inches above the gutter pan or edge of shoulder.
 - 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 may be less. Any excess post length, after meeting these depths, may be field cut to ensure proper guardrail mounting height. Backfill with a cohesionless material.
 - Posts shall not be set in concrete, of any depth.
 - Special fabrication will be required of installations having a curvature of less than 150 ft. radius.
 - 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 can furnish composite material posts and/or blocks.
 - 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 Bridge Standard SGP-MB.

Texas Department of Transportation Design Division Standard

METAL BEAM GUARD FENCE
GF (31)-14

FILE#	gf31tl2.dgn	DATE	08/19/2022	BY	MM/VP	CHK	MM/VP
DESIGNED	December 2011	DATE	12/01/11	BY	MM/VP	CHK	MM/VP
REVISION		DATE		BY		CHK	
		DATE		BY		CHK	
		DATE		BY		CHK	

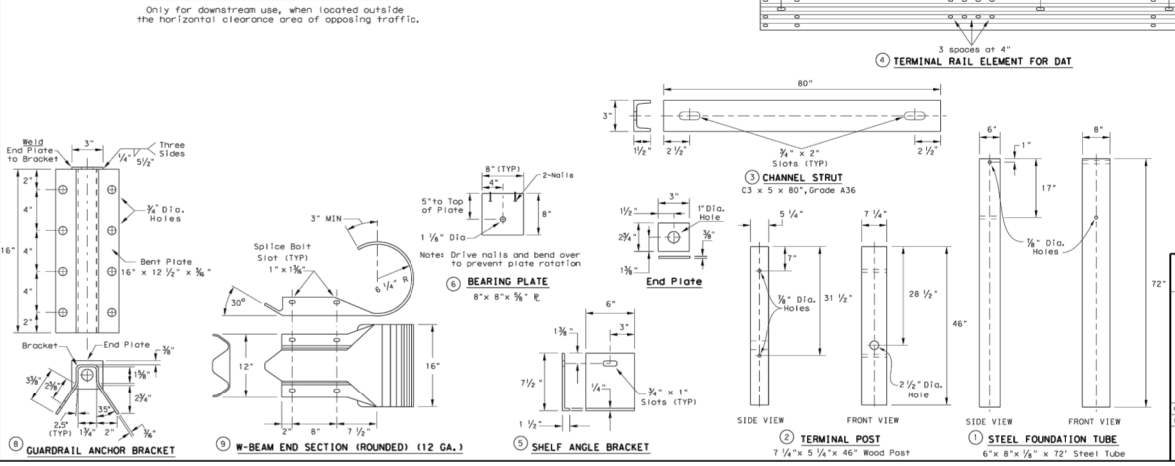


- GENERAL NOTES**
- The detail shows the minimum length of Need (LON) for a DAT connected to a concrete rail.
 - The rail section at the end post is supported by the Shelf Angle Bracket. The rail element is not attached to the end post.
 - The foundation tubes shall not project more than 3 3/4" above the finished grade.
 - All hardware for DAT shall be ASTM A307 unless otherwise shown.
 - Refer to GF (31) sheet for terminal connection details.

MOW STRIP INSTALLATION
If a mow strip is required with the DAT installation the leave-out area around the steel foundation tubes and the two channel struts may be omitted. This will require a full pour at the foundation tubes.

(DAT) PARTS LIST

#	DESCRIPTION	QTY
1	Steel Foundation Tube	2
2	DAT Terminal Post	2
3	Channel Strut	2
4	Terminal Rail Element	1
5	Shelf Angle Bracket	1
6	BCT Bearing Plate	1
7	BCT Post Sleeve	1
8	Guardrail Anchor Bracket	1
9	(Rounded) W-Beam End Section	1
10	BCT Cable Anchor	1
11	Recessed Nut, Guardrail	20
12	1 1/4" Button Head Bolt	4
13	10" Button Head Bolt	2
14	3/4" x 2" Hex Head Bolt	8
15	3/4" x 8" Hex Head Bolt	4
16	3/4" x 10" Hex Head Bolt	2
17	3/4" Flat Washer	18



Texas Department of Transportation Design Division Standard

METAL BEAM GUARD FENCE (Downstream Anchor Terminal)
GF (31) DAT-14

FILE#	gf31dat14.dgn	DATE	08/19/2022	BY	MM/VP	CHK	MM/VP
DESIGNED	December 2011	DATE	12/01/11	BY	MM/VP	CHK	MM/VP
REVISION		DATE		BY		CHK	
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		DATE		BY		CHK	

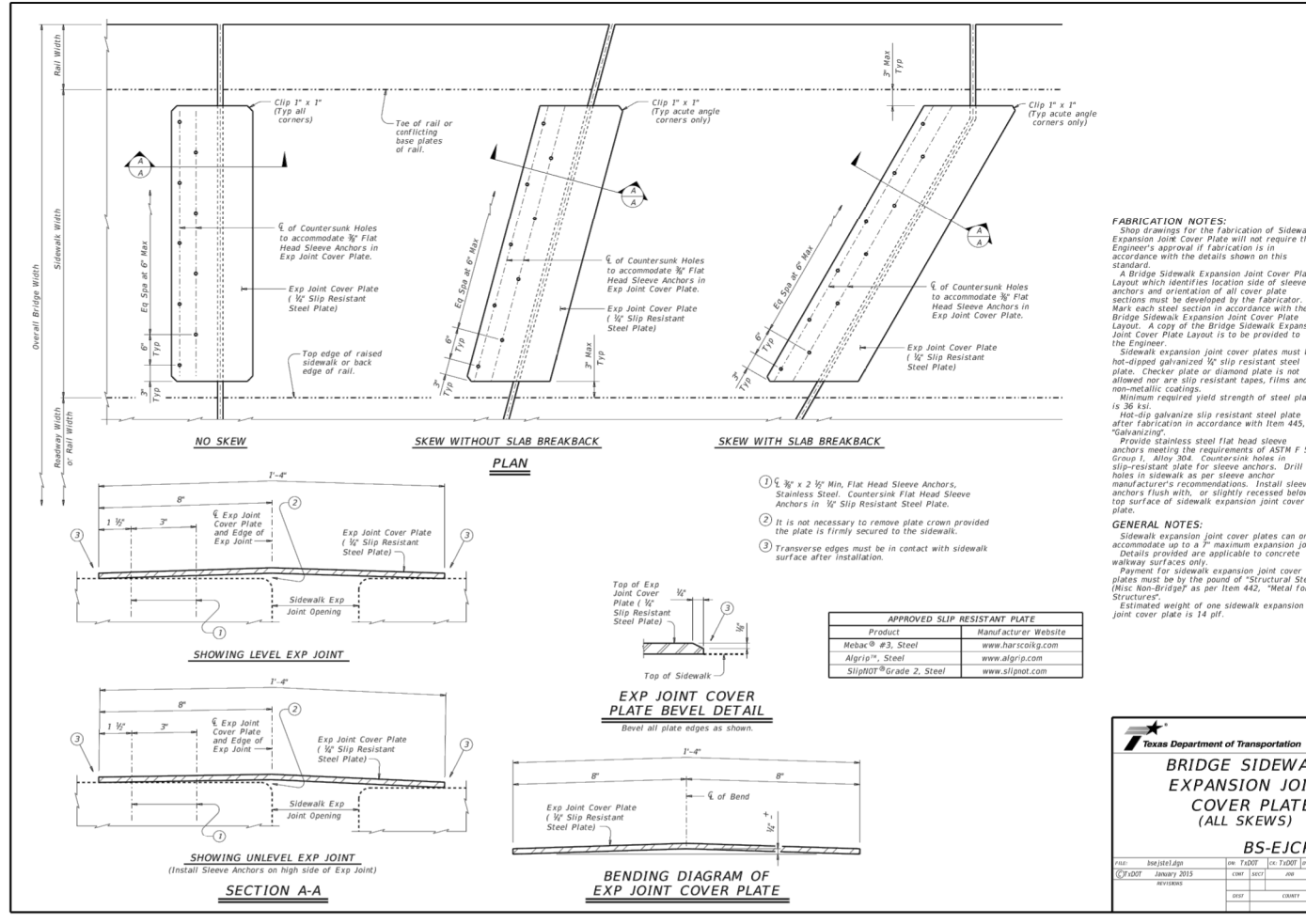
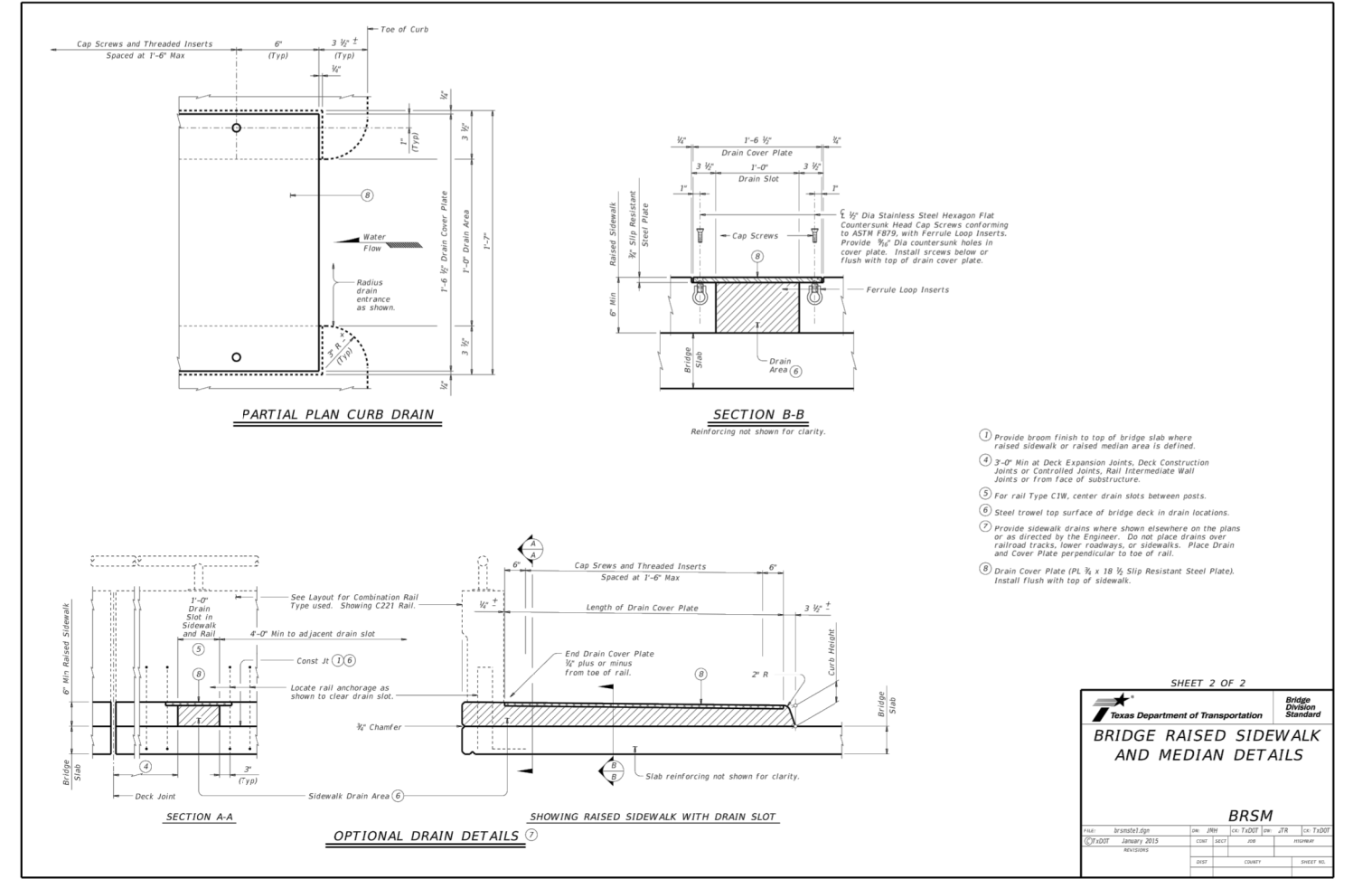
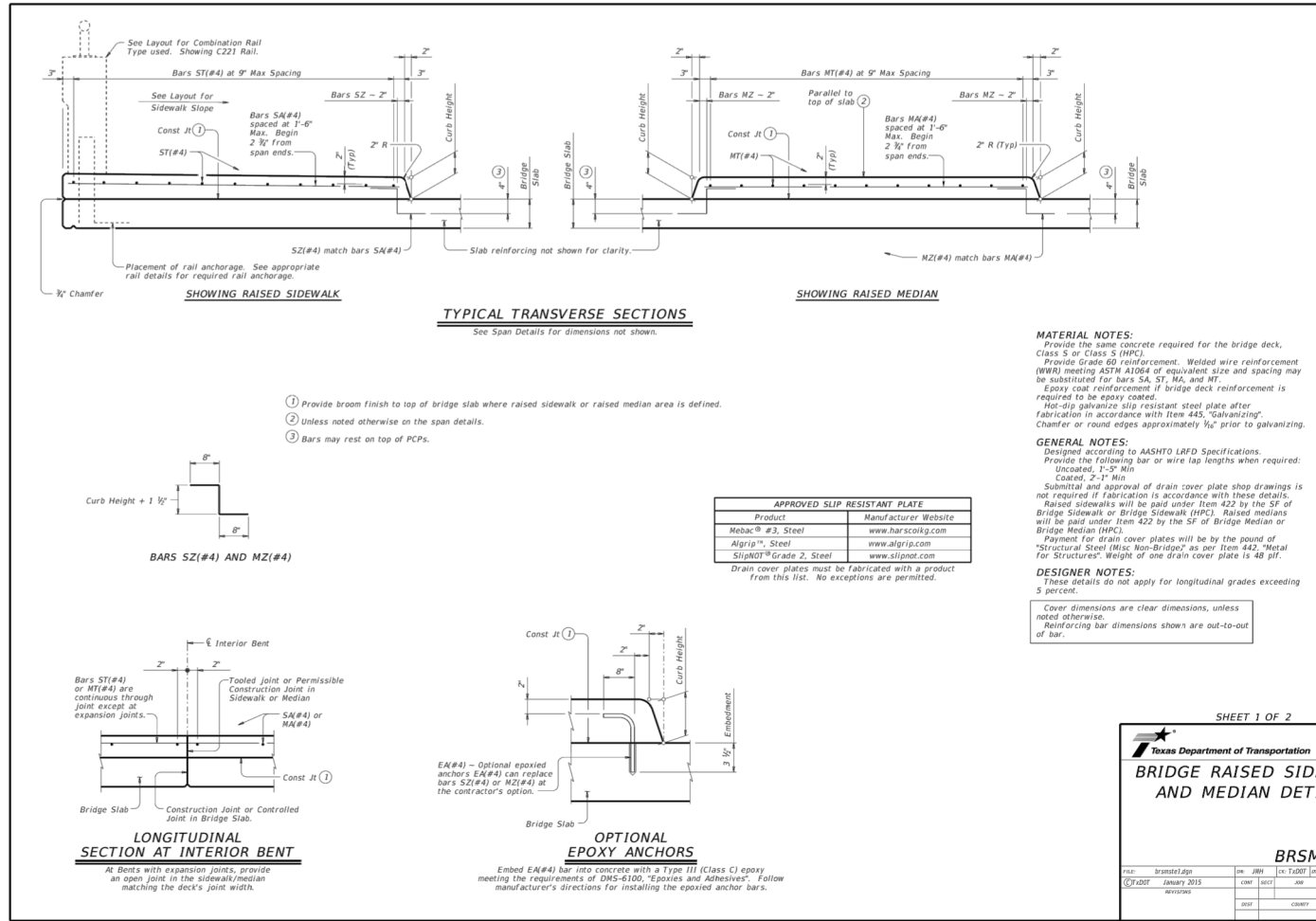


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TEXAS REG. ENGINEERING FIRM F-1297

FORT BEND COUNTY, TEXAS
BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

DETAILS 7

CNTY PROJ #	RPS PROJ #	DATE	SCALE	SHEET NO.
17-2-11	008169	08.19.2022	N.T.S.	
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	177
RM	RM	MDT	MDT	



TEXAS DEPARTMENT OF TRANSPORTATION Bridge Division Standard

BRIDGE SIDEWALK EXPANSION JOINT COVER PLATE (ALL SKEWS)

BS-EJCP

FABRICATION NOTES:
Shop drawings for the fabrication of Sidewalk Expansion Joint Cover Plate will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.
A Bridge Sidewalk Expansion Joint Cover Plate Layout which identifies location side of sleeve anchors and orientation of all cover plate sections must be developed by the fabricator. Bars each steel section in accordance with the Bridge Sidewalk Expansion Joint Cover Plate layout. A copy of the Bridge Sidewalk Expansion Joint Cover Plate Layout is to be provided to the Engineer.
Sidewalk expansion joint cover plates must be hot-dipped galvanized 1/2" slip resistant steel plate. Checker plate or diamond plate is not allowed nor are slip resistant tapes, films and non-metallic coatings.
Minimum required yield strength of steel plate is 36 ksi.
Hot-dip galvanize slip resistant steel plate after fabrication in accordance with Item 445, "Galvanizing".
Provide stainless steel flat head sleeve anchors meeting the requirements of ASTM F 593, Group 1, Alloy 304. Countersunk holes in slip-resistant plate for sleeve anchors. Drill holes in sidewalk as per sleeve anchor manufacturer's recommendations. Install sleeve anchors flush with, or slightly recessed below, top surface of sidewalk expansion joint cover plate.

GENERAL NOTES:
Sidewalk expansion joint cover plates can only accommodate up to a 7" maximum expansion joint. Details provided are applicable to concrete roadway surfaces only.
Payment for sidewalk expansion joint cover plates must be by the pound of "Structural Steel (Misc. Non-Bridg)" as per Item 442, "Metal for Structures". Estimated weight of one sidewalk expansion joint cover plate is 14 pfl.

APPROVED SLIP RESISTANT PLATE	
Product	Manufacturer Website
Mebacor #3, Steel	www.harscoalg.com
Algrip™, Steel	www.algrip.com
SlipNOT® Grade 2, Steel	www.slipnot.com

TEXAS DEPARTMENT OF TRANSPORTATION Bridge Division Standard

BRIDGE RAISED SIDEWALK AND MEDIAN DETAILS

BRSM

08/19/2022

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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

DETAILS 8

SHEET 8 OF 12

CNTY PROJ #	RPS PROJ #	DATE	SCALE	SHEET NO
17-2-11	008169	08.19.2022	N.T.S.	178

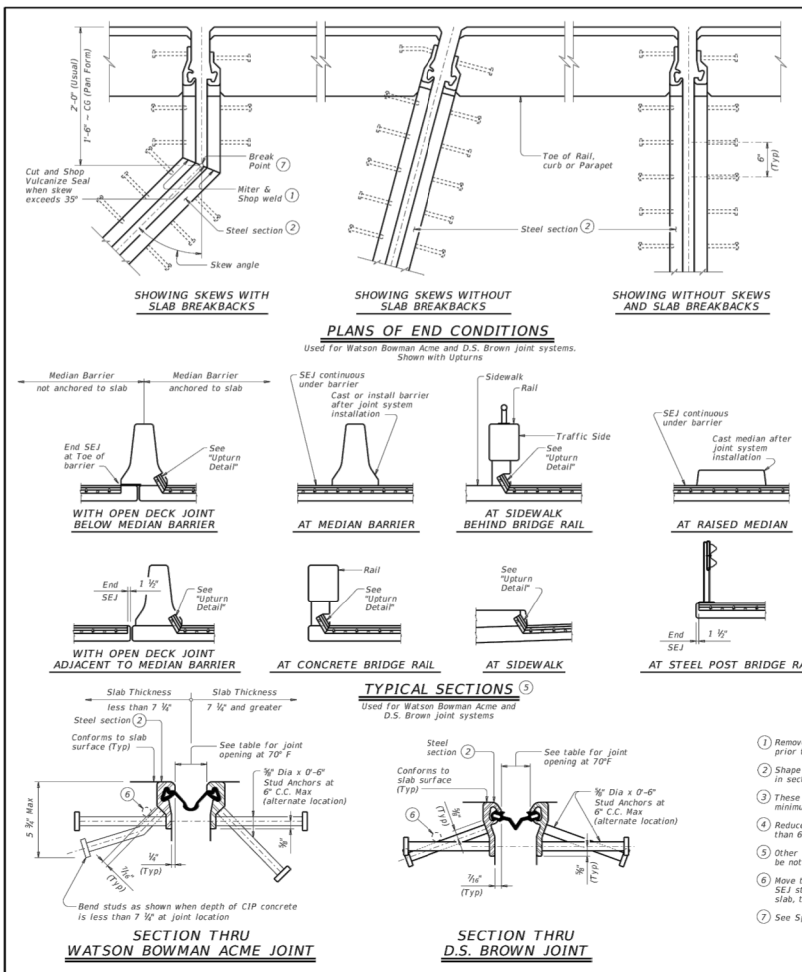


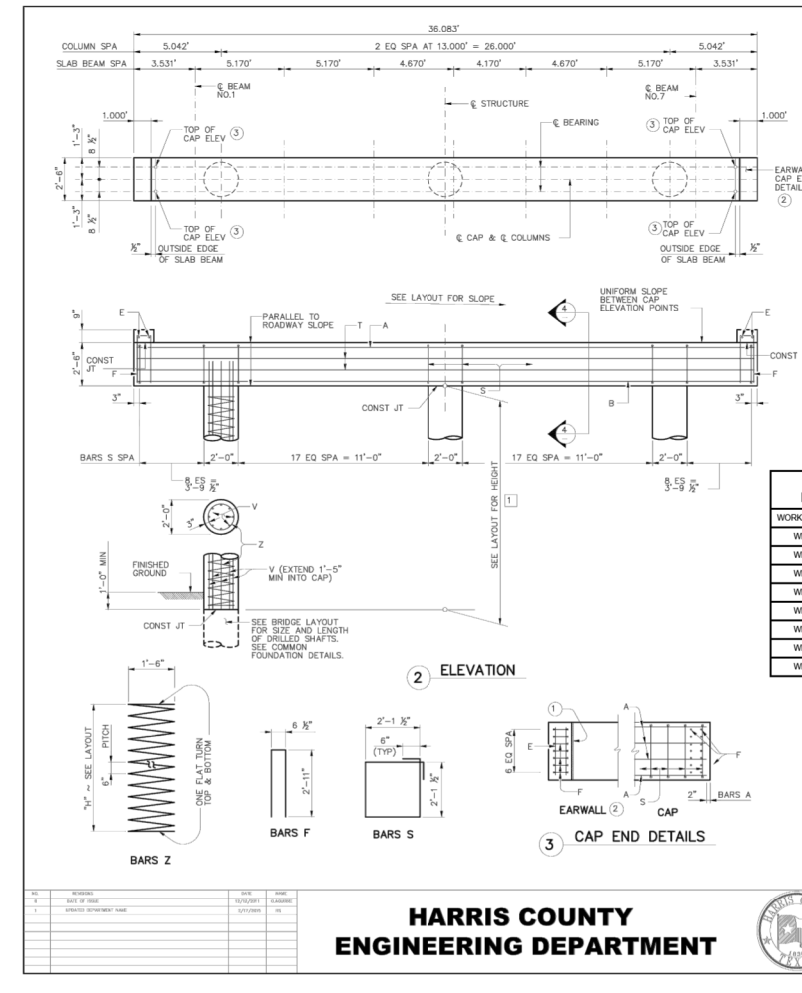
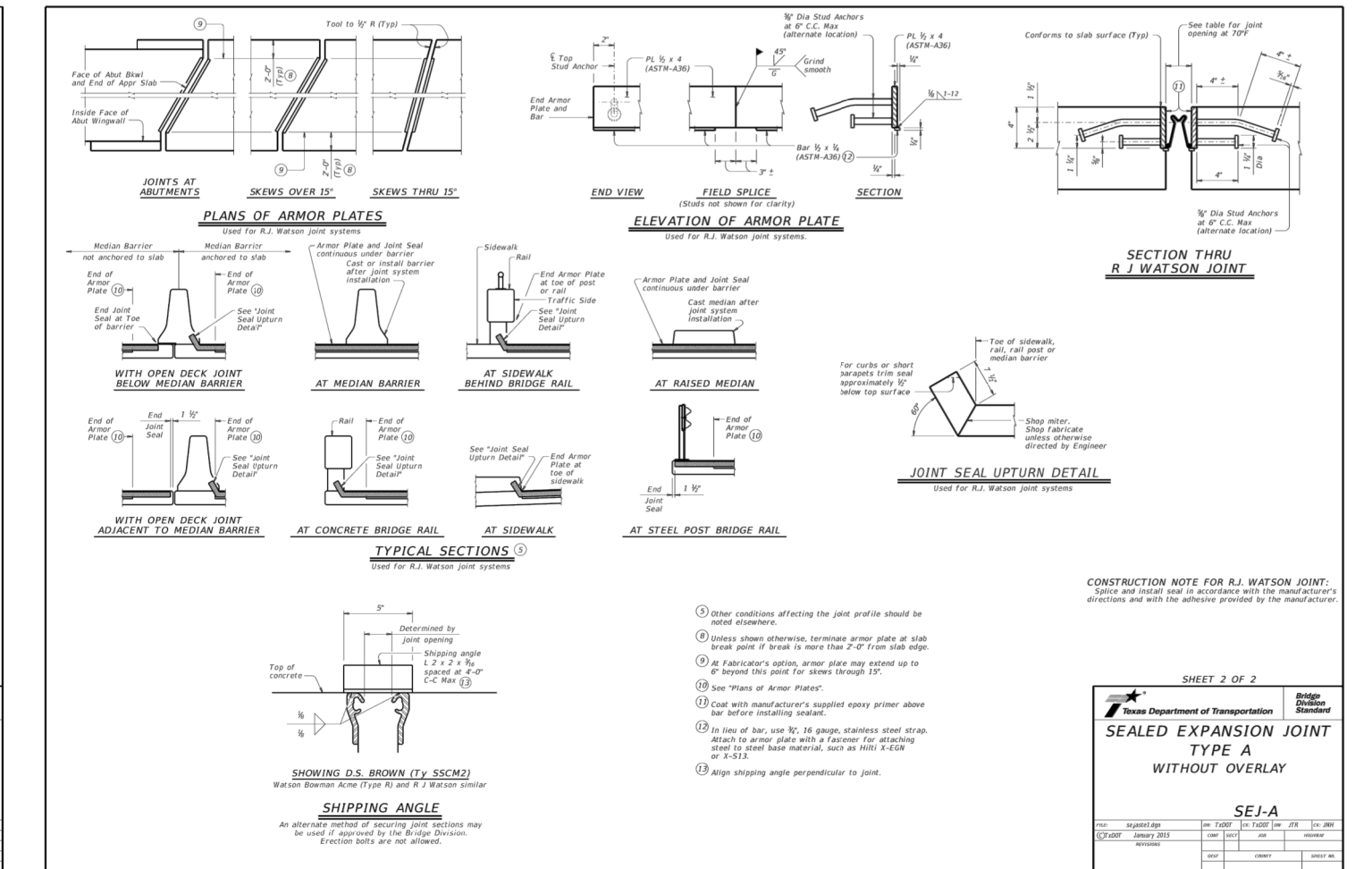
TABLE OF SEALED EXPANSION JOINT INFORMATION

MANUFACTURER	STEEL SECTION	STRIP SEAL	
		4" JOINT	5" JOINT
D.S. Brown	Type SSCM2	ADR-400	ADR-XTRA
Watson Bowman Acme	Type R	SE-400	SE-500
R.J. Watson	As Shown	SF-400	N/A

REDUCED LONGITUDINAL MOVEMENT RANGE

SKREW (deg)	JOINT SIZE	JOINT SIZE
0	4.0"	5.0"
15	4.0"	5.0"
30	3.5"	4.2"
45	2.8"	3.5"

DESIGN NOTES:
 Joints installed on a skew have reduced ability to accommodate longitudinal movement. Use table values to determine the correct joint size for skewed installations.
 For other skews over 25 degrees, calculate reduced movement range by multiplying joint size by cosine (skew).
FABRICATION NOTES:
 Temporarily shop assemble corresponding sections of Sealed Expansion Joints, check for fit, and mark for shipment. Secure corresponding sections together for shipment with shipping angle. Do not use erection bolts. The seal must be continuous and included in the price bid for Sealed Expansion Joint.
 Strip steel sections in convenient lengths for stage construction or widening. One shop splice is permitted in each shipping length provided no piece is less than 2'-0" long and sufficient studs are added to limit the stud to shop splice distance to 2' Min and 4' Max. Weld studs in accordance with AWS D1.1. Shop weld all shop and field splices and grind smooth areas in contact with seal. Make all necessary field splice joint preparations in the shop.
 Paint portions of steel sections not in contact with concrete with the primer specified for System II paint.
 Shop drawings for the fabrication of Sealed Expansion Joints will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.
CONSTRUCTION NOTES:
 Secure the Sealed Expansion Joint in position and place to the proper grade and alignment by welding braces to adjacent reinforcing steel, to prestressed beam stirrups, or to anchors cast in concrete diaphragms. Include cost of temporary bracing in the price bid for Sealed Expansion Joint.
 Remove shipping angle immediately after each joint half is secured in place. Grind smooth, and touch up with organic zinc-rich paint.
 Clean and prepare seal cavity for seal installation as per the manufacturer's installation procedures.
GENERAL NOTES:
 Provide Sealed Expansion Joints in the size and at locations shown on the plans.
 Minimum slab and overhang thickness required for the use of SEJ-A is 6 1/2".



BILL OF REINFORCING STEEL

BAR	NO.	SIZE	LENGTH	WEIGHT
A	4	#11	35'-9"	760
B	4	#11	35'-9"	760
E	4	#4	2'-2"	6
F	14	#4	6'-5"	60
S	54	#5	9'-6"	535
T	4	#5	35'-9"	149
V	24	#7	21'-5"	1,061
Z	3	#3	199'-0"	224

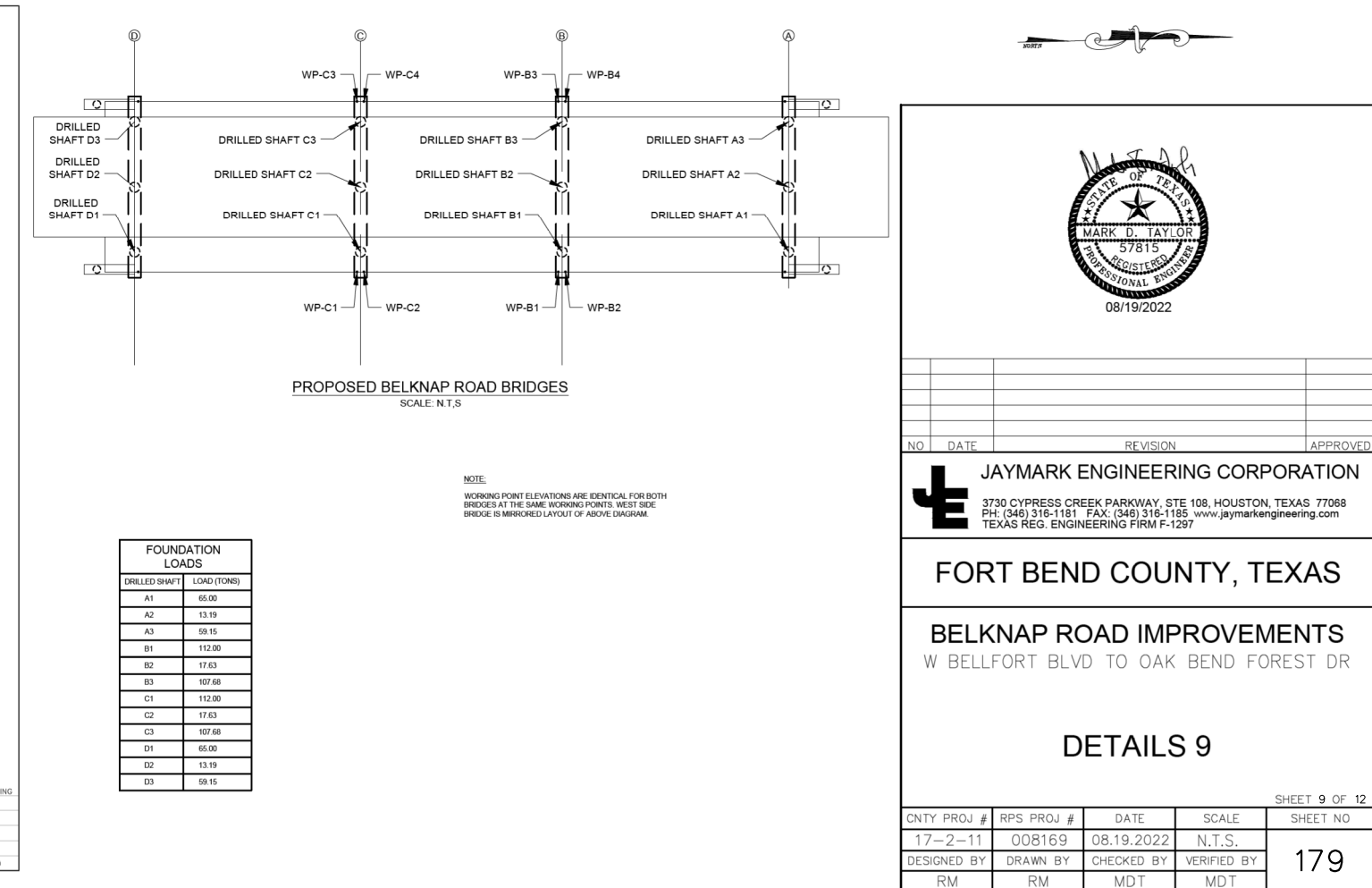
ESTIMATED QUANTITIES

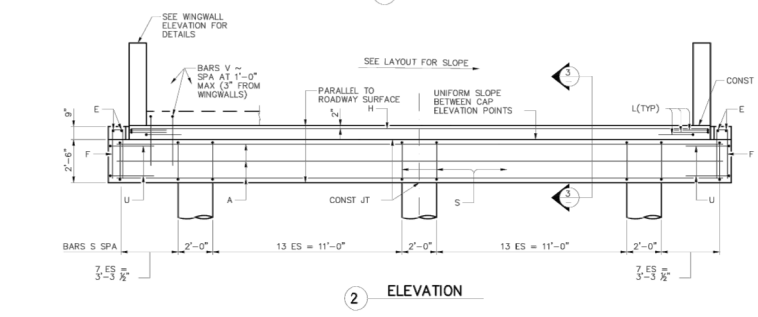
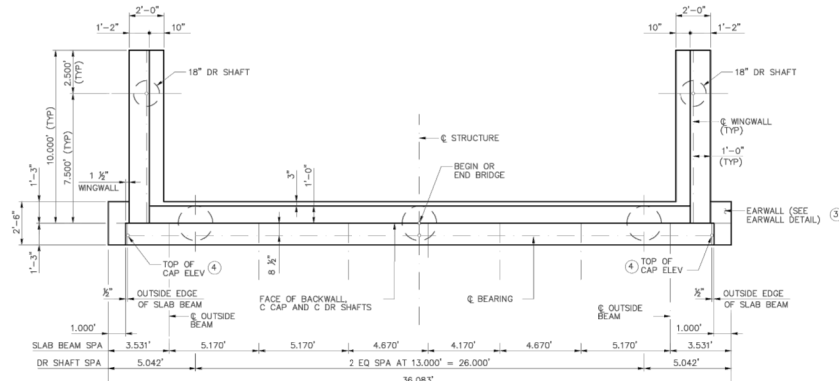
REINFORCING STEEL	LB	3,545
REINFORCING STEEL	CY	8.5
CLASS "B1" CONCRETE (CAP)	CY	8.5
CLASS "B1" CONCRETE (COL)	CY	7.0

NOTES TO DESIGN ENGINEER:
 A. THESE DRAWINGS ARE CONSIDERED TO BE DESIGN GUIDELINES FOR THE CONSTRUCTION OF BRIDGE COMPONENTS. THE INTENDED USE IS TO BE A FRAMEWORK FOR THE DESIGN ENGINEER TO DEVELOP SPECIFIC DETAILS.
 B. THE DESIGN ENGINEER SHALL INCORPORATE ONLY THE NECESSARY STANDARD GUIDELINE DRAWINGS AND DETAILS INTO HIS PROJECT PLANS, AND SHALL ADJUST PLACE NUMBERS ACCORDINGLY.
 C. THE DESIGN ENGINEER SHALL CONSULT THE HARRIS COUNTY DESIGN MANUAL AND SPECIFICATIONS FOR GUIDELINE DRAWINGS.
 D. THE DESIGN ENGINEER SHALL REMOVE THESE NOTES, ALL REFERENCES TO THESE NOTES, AND ANY OTHER EXTRANEOUS INFORMATION FROM THE DESIGN SUBMITTAL DRAWINGS. DESIGN ENGINEER SHALL PROVIDE ANY NOTES OR OTHER APPROPRIATE INFORMATION NECESSARY TO COMPLETE THE BRIDGE PLANS.

INTERIOR BENT NOTES
 1. DESIGNED ACCORDING TO AASHTO LRFD SPECIFICATIONS.
 2. ALL CONCRETE SHALL BE CLASS B1, 3000 P.S.I. @ 28 DAYS IN ACCORDANCE WITH HARRIS COUNTY SPECIFICATION ITEM 421 FOR STRUCTURAL CONCRETE.
 3. ALL EXPOSED CORNERS SHALL BE CHAMFERED 3/4", UNLESS OTHERWISE NOTED.
 4. ALL REINFORCING STEEL SHALL BE A.S.T.M. A615 GRADE 60 STEEL.
 5. DIMENSIONS RELATING TO REINFORCING STEEL ARE TO CENTER OF BARS, UNLESS OTHERWISE NOTED.
 6. SEE COMMON FOUNDATION DETAILS FOR ADDITIONAL INFORMATION.
 7. MAXIMUM CALCULATED FOUNDATION LOADS: X TONS PER SHAFT.

NOTES TO ENGINEER
 1. QUANTITIES SHOWN ARE BASED ON AN "H" DIMENSION OF 20'.





WORKING POINT	ELEVATION
WP-A1	85.64
WP-A2	85.36
WP-D1	85.31
WP-D2	86.01

NOTE: WORKING POINT ELEVATIONS ARE IDENTICAL FOR BOTH BRIDGES AT THE SAME WORKING POINTS.

- NOTES TO DESIGN ENGINEER:
- THESE DRAWINGS ARE CONSIDERED TO BE DESIGN GUIDELINES FOR THE CONSTRUCTION OF HARRIS COUNTY BRIDGES. THEIR INTENDED USE IS TO BE A FRAMEWORK FOR THE DESIGN ENGINEER TO DEVELOP SPECIFIC DESIGN.
 - IT IS THE RESPONSIBILITY OF THE DESIGN ENGINEER TO VERIFY THE COMPLETENESS AND ACCURACY OF THE INFORMATION HEREIN CONTAINED AND TO ADJUST ACCORDING TO SPECIFIC PROJECT REQUIREMENTS.
 - THE DESIGN ENGINEER SHALL INCORPORATE ONLY THE NECESSARY STANDARD GUIDELINE DRAWINGS AND DETAILS INTO HIS PROJECT PLANS AND SHALL ADJUST PAGE NUMBERS ACCORDINGLY.
 - THE DESIGN ENGINEER SHALL CONSULT THE HARRIS COUNTY DESIGN MANUAL AND SPECIFICATIONS FOR INFORMATION PERTINENT TO THESE DESIGN GUIDELINE DRAWINGS.
 - THE DESIGN ENGINEER SHALL REMOVE THESE NOTES, ALL REFERENCES TO THESE NOTES, AND ANY OTHER EXTRANEOUS INFORMATION FROM THE DESIGN GUIDELINE DRAWINGS. DESIGN ENGINEER SHALL PROVIDE ANY NOTES OF OTHER APPROVED INFORMATION NECESSARY TO COMPLETE THE BRIDGE PLANS.
- INCREASE AS REQUIRED TO MAINTAIN 3/4" FROM FINISHED GRADE.
 - 3/4" PREFORMED BITUMINOUS FIBER MATERIAL BETWEEN BEAM AND EARWALL. BOND TO BEAM WITH AN APPROVED ADHESIVE. INSIDE FACE OF EARWALL TO BE CAST WITH VERTICAL SIDE OF BEAM.
 - DO NOT CAST EARWALLS UNTIL BEAMS ARE ERECTED IN THEIR FINAL POSITION.
 - TOP OF CAP ELEVATIONS ARE BASED ON SECTIONS DEPTH AT CENTERLINE BEARING.
 - WORKING POINTS ARE LABELED FROM LEFT TO RIGHT LOOKING UPSTATION.

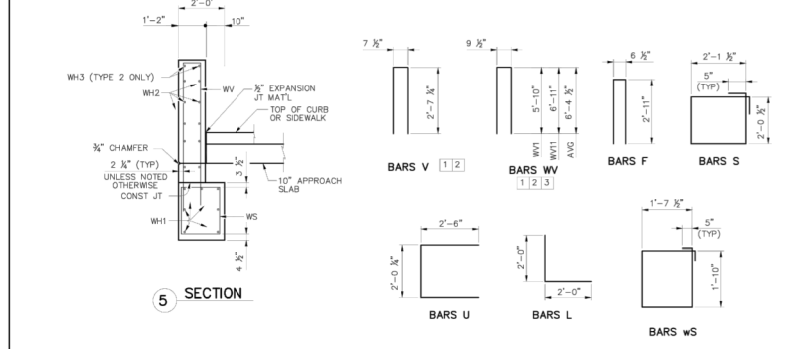
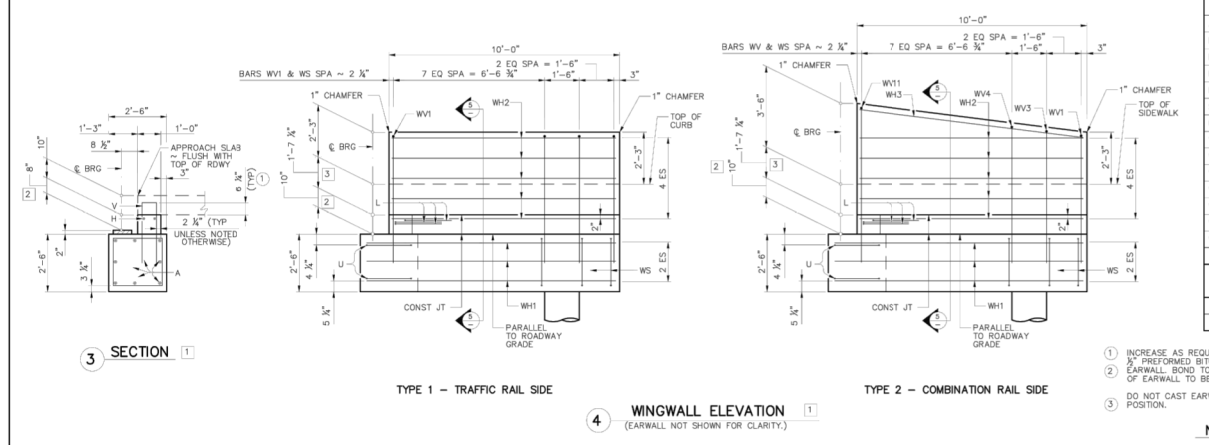
- NOTES TO ENGINEER
- QUELTING DRAWINGS ARE FOR B12 BEAMS. ADJUST DIMENSIONS AND QUANTITIES ACCORDING TO SPECIFIC BEAMS.
- ABUTMENT NOTES
- DESIGNED ACCORDING TO AASHTO LRFD SPECIFICATIONS.
 - ALL CONCRETE SHALL BE CLASS B1, 3500 P.S.I. @ 28 DAYS IN ACCORDANCE WITH HARRIS COUNTY SPECIFICATION ITEM 421 FOR STRUCTURAL CONCRETE.
 - ALL EXPOSED CORNERS SHALL BE CHAMFERED 3/4", UNLESS OTHERWISE NOTED.
 - ALL REINFORCING STEEL SHALL BE A.S.T.M. A615 GRADE #60 STEEL.
 - DIMENSIONS RELATING TO REINFORCING STEEL ARE TO CENTER OF BARS, UNLESS OTHERWISE NOTED.
 - SEE COMMON FOUNDATION DETAILS FOR ADDITIONAL INFORMATION.
 - MAXIMUM CALCULATED FOUNDATION LOADS: X TONS PER SHAFT.

HARRIS COUNTY ENGINEERING DEPARTMENT

FIRM INFO

SEAL NOTE

DESIGN GUIDELINES-ABUTMENT
SLAB BEAM-DR SHAFT
HALF BOULEVARD, 0' SKEW
(1 OF 2)



BILL OF REINFORCING STEEL 1					
BAR	NO.	SIZE	LENGTH	WEIGHT	
A	8	#11	35'-1"	1,491	
E	4	#4	2'-2"	6	
F	10	#4	6'-5"	43	
H	2	#6	33'-8"	101	
L	6	#6	4'-0"	36	
S	44	#4	9'-2"	269	
U	4	#6	7'-0"	42	
V	33	#5	5'-10"	201	
WH1	14	#6	11'-0"	231	
WH2	20	#6	9'-8"	290	
WH3	2	#6	9'-9"	29	
WS	22	#4	7'-9"	114	
WV1	11	#5	12'-6"	143	
WV [AVG]	11	#5	13'-7"	156	
REINFORCING STEEL				LB	3,152
REINFORCING STEEL				LB	3,152
CLASS BY CONCRETE				CY	17.5

- INCREASE AS REQUIRED TO MAINTAIN 3/4" FROM FINISHED GRADE.
- 3/4" PREFORMED BITUMINOUS FIBER MATERIAL BETWEEN BEAM AND EARWALL. BOND TO BEAM WITH AN APPROVED ADHESIVE. INSIDE FACE OF EARWALL TO BE CAST WITH VERTICAL SIDE OF BEAM.
- DO NOT CAST EARWALLS UNTIL BEAMS ARE ERECTED IN THEIR FINAL POSITION.

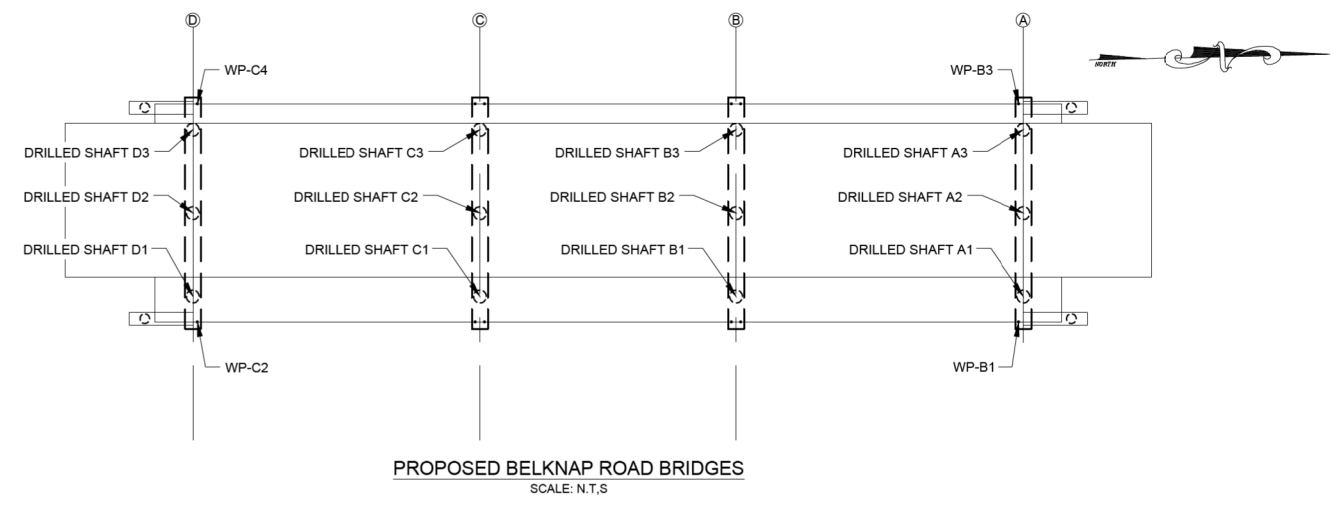
- NOTES TO ENGINEER
- GUIDELINE DRAWINGS ARE FOR B12 BEAMS. ADJUST DIMENSIONS AND QUANTITIES ACCORDING TO SPECIFIC BEAMS.
 - THE ENGINEER SHALL DETERMINE SECTION DEPTHS BASED ON THEORETICAL BEAM CAMBER, DEAD LOAD DEFLECTIONS OF 8" CAST-IN-PLACE SLAB AND THE EFFECT OF VERTICAL CURVE.
 - THE ENGINEER SHALL DETERMINE WINGWALL HEIGHT BASED ON ROADWAY AND SIDEWALK CROSS SLOPES.

HARRIS COUNTY ENGINEERING DEPARTMENT

FIRM INFO

SEAL NOTE

DESIGN GUIDELINES-ABUTMENT
SLAB BEAM-DR SHAFT
HALF BOULEVARD, 0' SKEW
(2 OF 2)



NOTE:
WORKING POINT ELEVATIONS ARE IDENTICAL FOR BOTH BRIDGES AT THE SAME WORKING POINTS. WEST SIDE BRIDGE IS MIRRORRED LAYOUT OF ABOVE DIAGRAM.

FOUNDATION LOADS	
DRILLED SHAFT	LOAD (TONS)
A1	65.00
A2	13.19
A3	59.15
B1	112.00
B2	17.63
B3	107.68
C1	112.00
C2	17.63
C3	107.68
D1	65.00
D2	13.19
D3	59.15



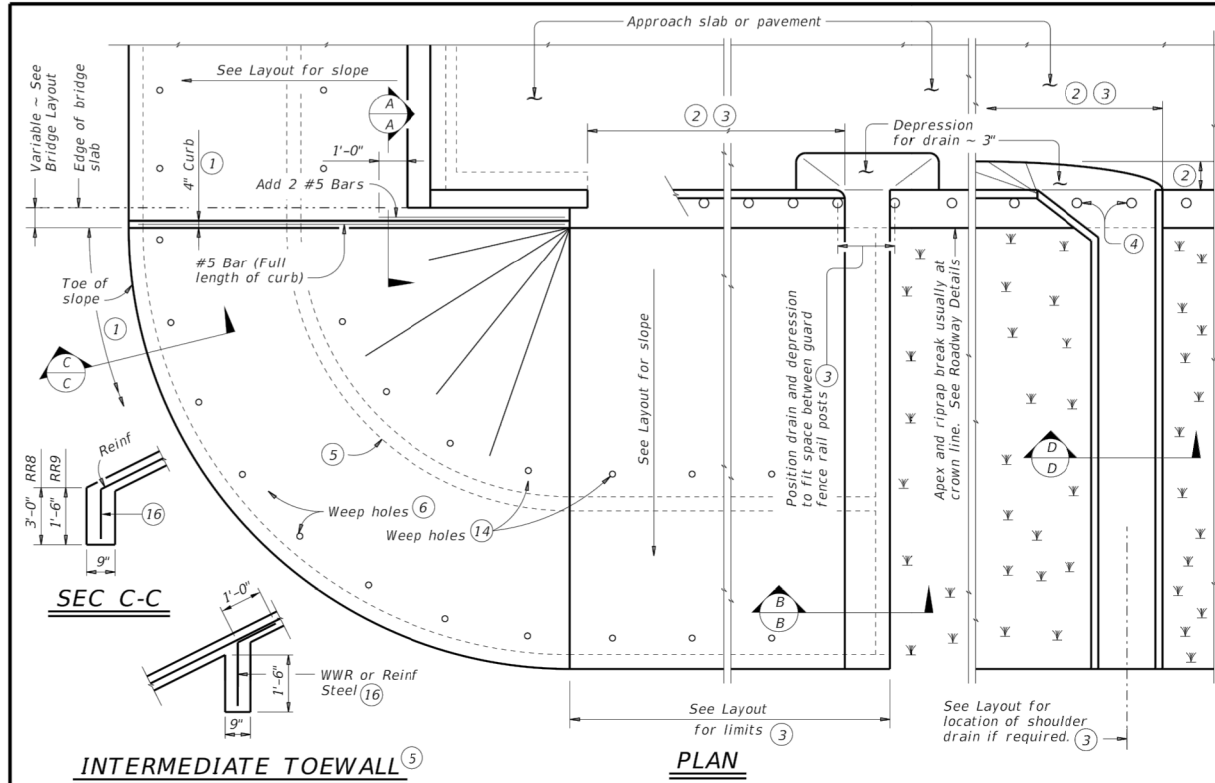
NO.	DATE	REVISION	APPROVED

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FORT BEND COUNTY, TEXAS
BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

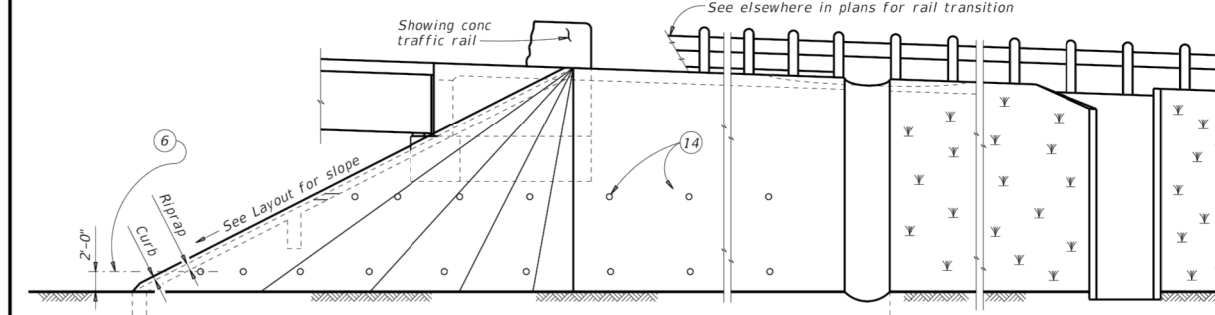
DETAILS 10

CNTY PROJ #	RPS PROJ #	DATE	SCALE	SHEET NO
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DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RM	RM	MDT	MDT	

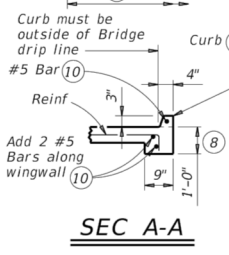


INTERMEDIATE TOEWALL 5

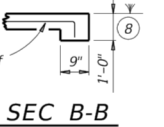
PLAN



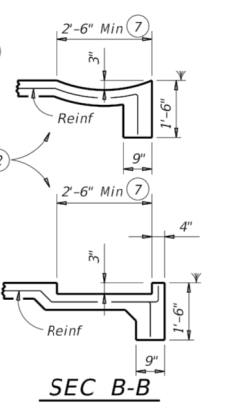
ELEVATION



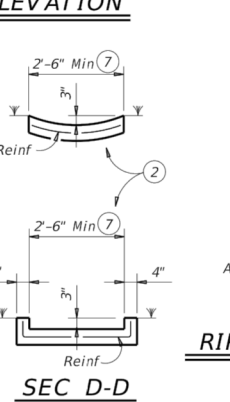
SEC A-A



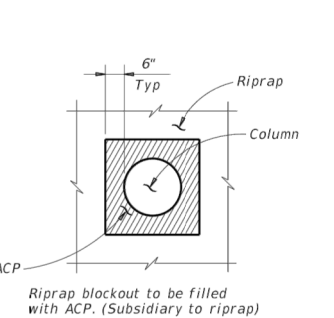
SEC B-B
(No drain)



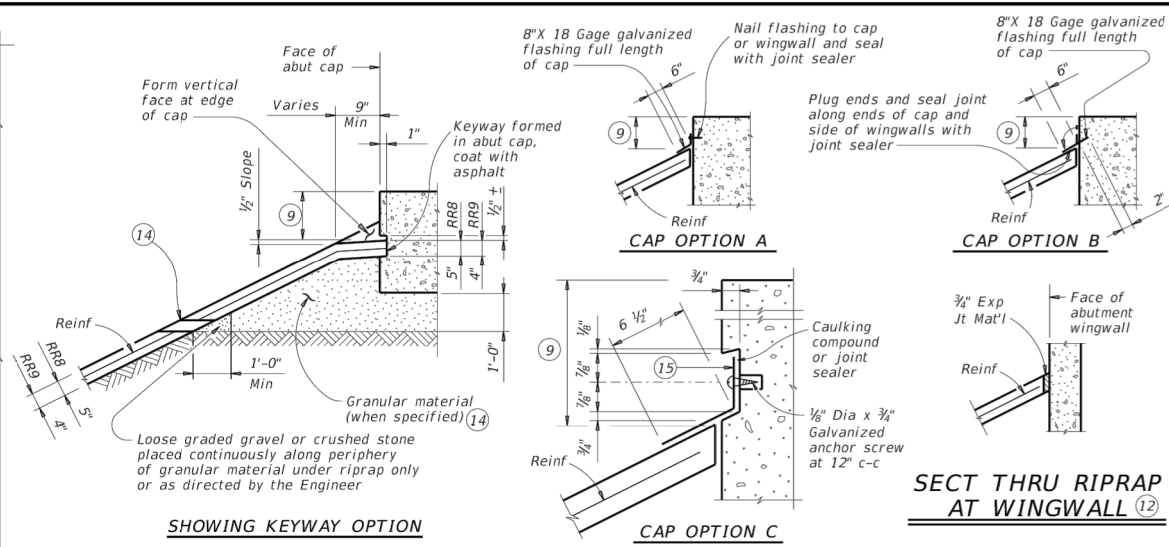
SEC B-B
(Shoulder drain integral with riprap)



SEC C-C
(Shoulder drain)



RIPRAP DETAIL AT COLUMNS
(As directed by the Engineer)

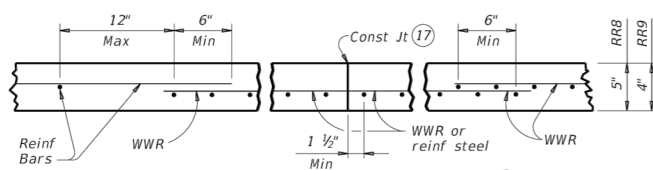


SHOWING KEYWAY OPTION

SECTIONS THRU RIPRAP AT CAP 11

SECT THRU RIPRAP AT WINGWALL 12

- When riprap is shown extended around header on layout, extend slab and toewall as shown and eliminate 4" curb.
- Limits and configuration of drains and depressions are as shown elsewhere in plans or as directed by the Engineer.
- Location of shoulder drain must consider limitations imposed by rail transition. Do not locate shoulder drains at expansion joints between approach slab and concrete pavement.
- See details elsewhere in plans for installation of guard fence posts through concrete riprap.
- Provide intermediate toewall only when designated elsewhere in the plans or included in the specifications.
- Provide lower level of 2" Dia weep holes at 10' c-c backed by 1 CF packet of gravel and galvanized hardware cloth at all locations unless directed by the Engineer to eliminate.
- Use wider or other drain configurations if shown elsewhere in plans or if directed by the Engineer.
- Wall extension may be reduced or modified if approved by the Engineer. Increase wall extension to 1'-6" whenever the optional intermediate toewall is called for in the plans.
- Top of cap to top of riprap dimension varies as directed by the Engineer. Should be 9" Min for beam/slab type bridges and 1'-6" for slab span, box beam, or slab beam bridges.
- #5 bars shown are required even when synthetic fiber reinforcing option is selected.
- Provide sealing option for joint between the face of cap and riprap as designated by the Engineer or as shown elsewhere on plans.
- Flashing (shown in Cap Option A) may be used at wingwall in addition to Exp Jt Mat'l if shown on plans or directed by the Engineer.
- Provide #3 reinforcing bars at 18" Spa c-c. Provide Welded Wire Reinforcement (WWR) as 6x6-D2.9xD2.9 or D3xD3. Combinations of WWR and reinforcing bars may be used if both are permitted. Use lap splices of a minimum 6 inches, measured from the transverse wire of WWR, and the ends of reinforcing bars.
- If granular material is specified, provide upper level of 2" Dia weep holes at 10' c-c backed by galvanized hardware cloth.
- 8" x 18 Gage Galv Sheet Metal
- Provide WWR or #3 bars, with 1'-0" extension into slope.
- WWR or reinforcing steel is continuous through riprap construction joints. Provide WWR or reinforcing steel that extends 1'-1" minimum into adjacent riprap on each side of construction joint even if synthetic reinforcing fiber is utilized.



REINFORCEMENT DETAILS 13

See General Notes for optional synthetic fiber reinforcement.

- GENERAL NOTES:**
- Provide Class "B" concrete ($f'c = 2,000$ psi) unless noted elsewhere in plans.
 - Provide Grade 60 reinforcing steel.
 - Provide deformed welded wire reinforcement (WWR) meeting ASTM A1064, unless otherwise shown.
 - Provide reinforcing bars, deformed WWR, or any suitable combination of both types for riprap reinforcing, unless specified elsewhere in the plans.
 - Optionally synthetic fibers may be used if approved by the Engineer. Provide synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) in lieu of steel reinforcing in riprap concrete.
 - Install construction joints or grooved joints extending the full slant slope height at intervals of approximately 20 feet unless otherwise directed by the Engineer.
 - Hardware cloth, loose grade stone behind weep holes, flashing, or other sealing material are subsidiary to the bid item "Riprap". See Layout for limits of riprap.
 - RR8 is to be used on stream crossings.
 - RR9 is to be used on other embankments.

FOR CONTRACTOR'S INFORMATION ONLY:
 5" of RR8 = 0.015 CY/SF
 4" of RR9 = 0.012 CY/SF
 #3 Reinf at 18" c-c = 0.501 Lbs/SF
 6x6-D3xD3 = 0.408 Lbs/SF

Texas Department of Transportation
 Bridge Division Standard
CONCRETE RIPRAP AND SHOULDER DRAINS EMBANKMENTS AT BRIDGE ENDS (TYPES RR8 & RR9)
CRR

FILE: crrstd1-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CC: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS				
DIST	COUNTY	SHEET NO.		

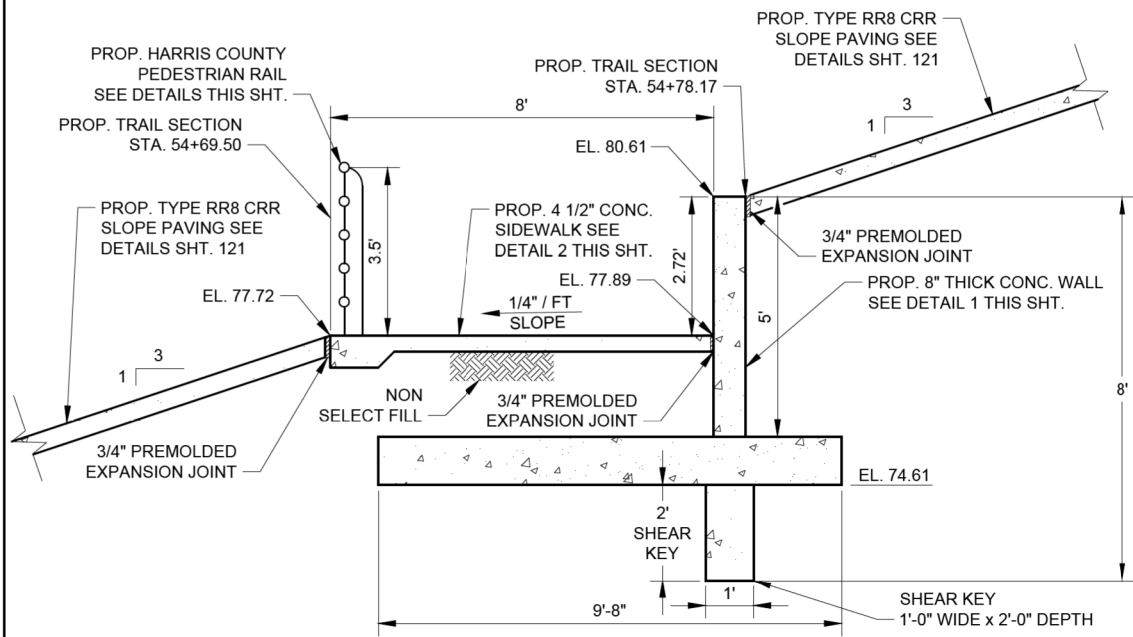
Professional Engineer
 MARK D. TAYLOR
 57815
 08/19/2022

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FORT BEND COUNTY, TEXAS
BELKNAP ROAD IMPROVEMENTS
 W BELLFORT BLVD TO OAK BEND FOREST DR

DETAILS 11

CNTY PROJ #	RPS PROJ #	DATE	SCALE	SHEET NO.
17-2-11	008169	08.19.2022	N.T.S.	181
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RM	RM	MDT	MDT	

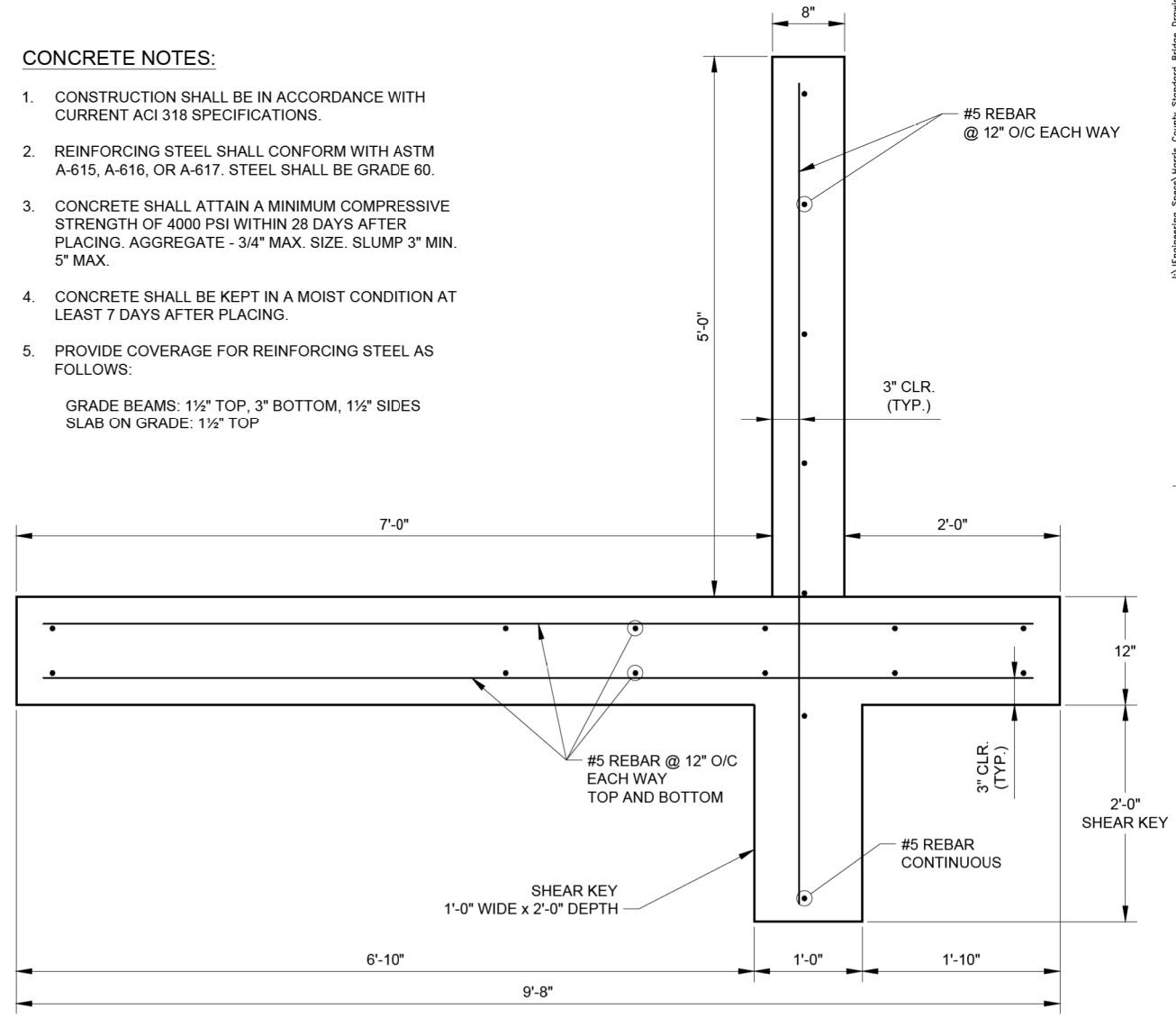


**SECTION THROUGH PEDESTRIAN TRAIL 3
AND RR8 CRR SLOPE PAVING**

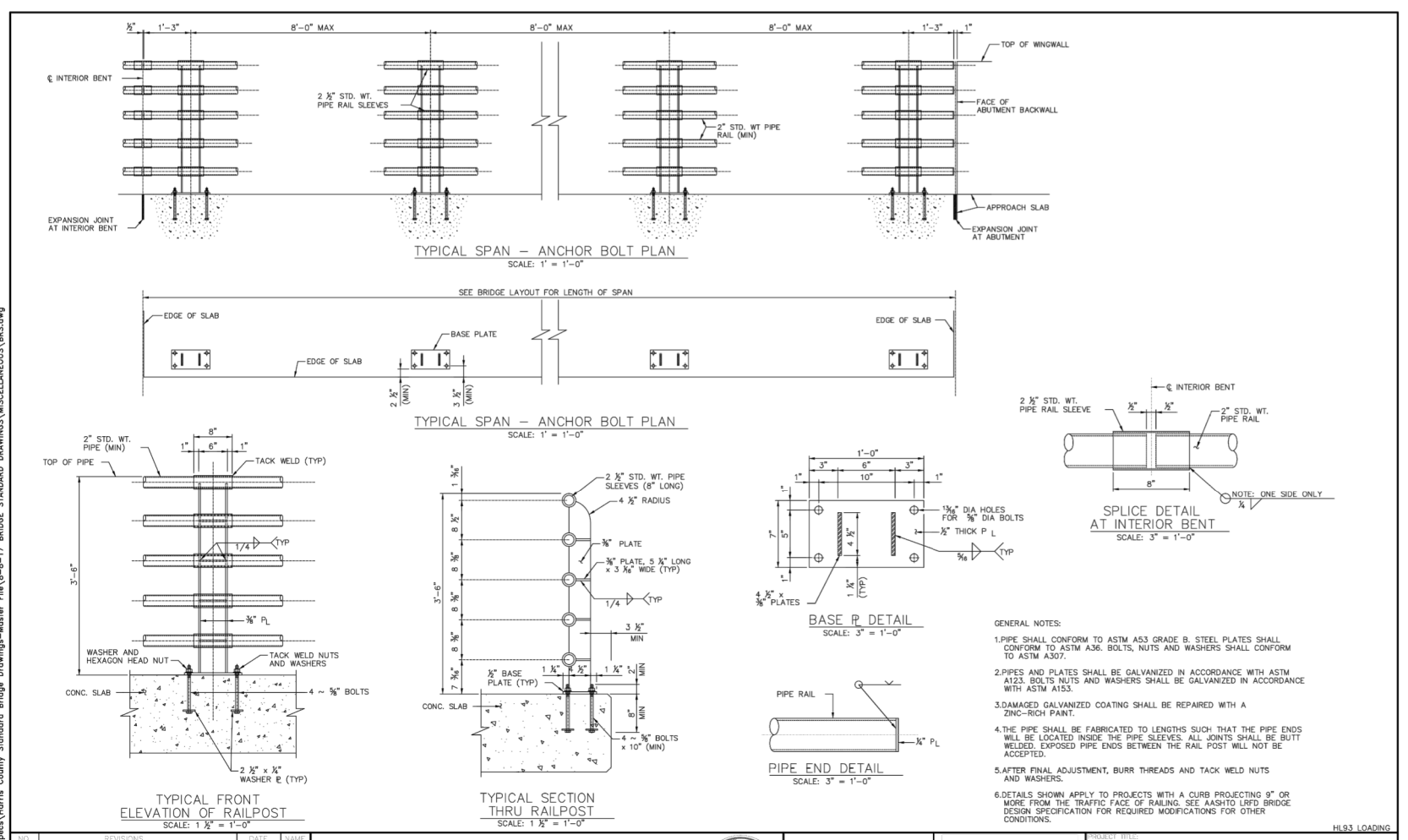
STA. 1+64.33 TO STA. 2+92.74 SEE SHT. SHEET 76
SCALE: 1"=4'

CONCRETE NOTES:

- CONSTRUCTION SHALL BE IN ACCORDANCE WITH CURRENT ACI 318 SPECIFICATIONS.
- REINFORCING STEEL SHALL CONFORM WITH ASTM A-615, A-616, OR A-617. STEEL SHALL BE GRADE 60.
- CONCRETE SHALL ATTAIN A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI WITHIN 28 DAYS AFTER PLACING. AGGREGATE - 3/4" MAX. SIZE. SLUMP 3" MIN. 5" MAX.
- CONCRETE SHALL BE KEPT IN A MOIST CONDITION AT LEAST 7 DAYS AFTER PLACING.
- PROVIDE COVERAGE FOR REINFORCING STEEL AS FOLLOWS:
GRADE BEAMS: 1 1/2" TOP, 3" BOTTOM, 1 1/2" SIDES
SLAB ON GRADE: 1 1/2" TOP



RETAINING WALL - DETAIL 1
SCALE: 1"=10'



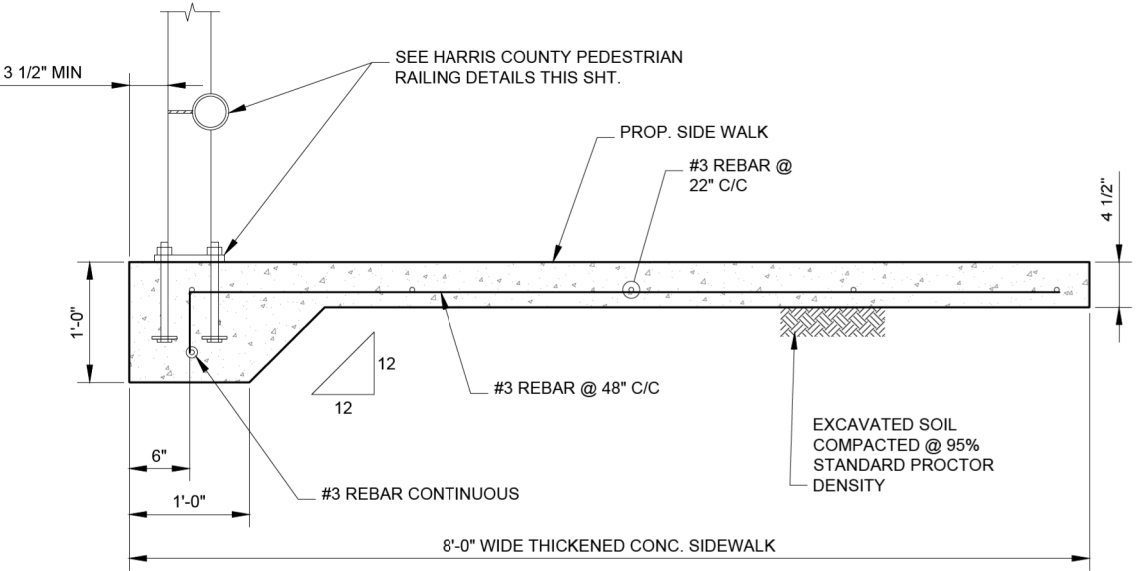
**HARRIS COUNTY
ENGINEERING DEPARTMENT**



PROJECT TITLE	HL93 LOADING
BRIDGE RAILING STANDARDS	BRS-PR
PEDESTRIAN RAILING DETAILS	8/9/17

NO.	REVISIONS	DATE	NAME

Engineering Space\Harris County Standard Bridge Drawings\Master File\8-8-17 BRIDGE STANDARD DRAWINGS\VEGETATION\BRS.dwg



CONCRETE SIDEWALK - DETAIL 2
SCALE: 1"=5'

NO.	DATE	REVISION	APPROVED

JAYMARK ENGINEERING CORPORATION

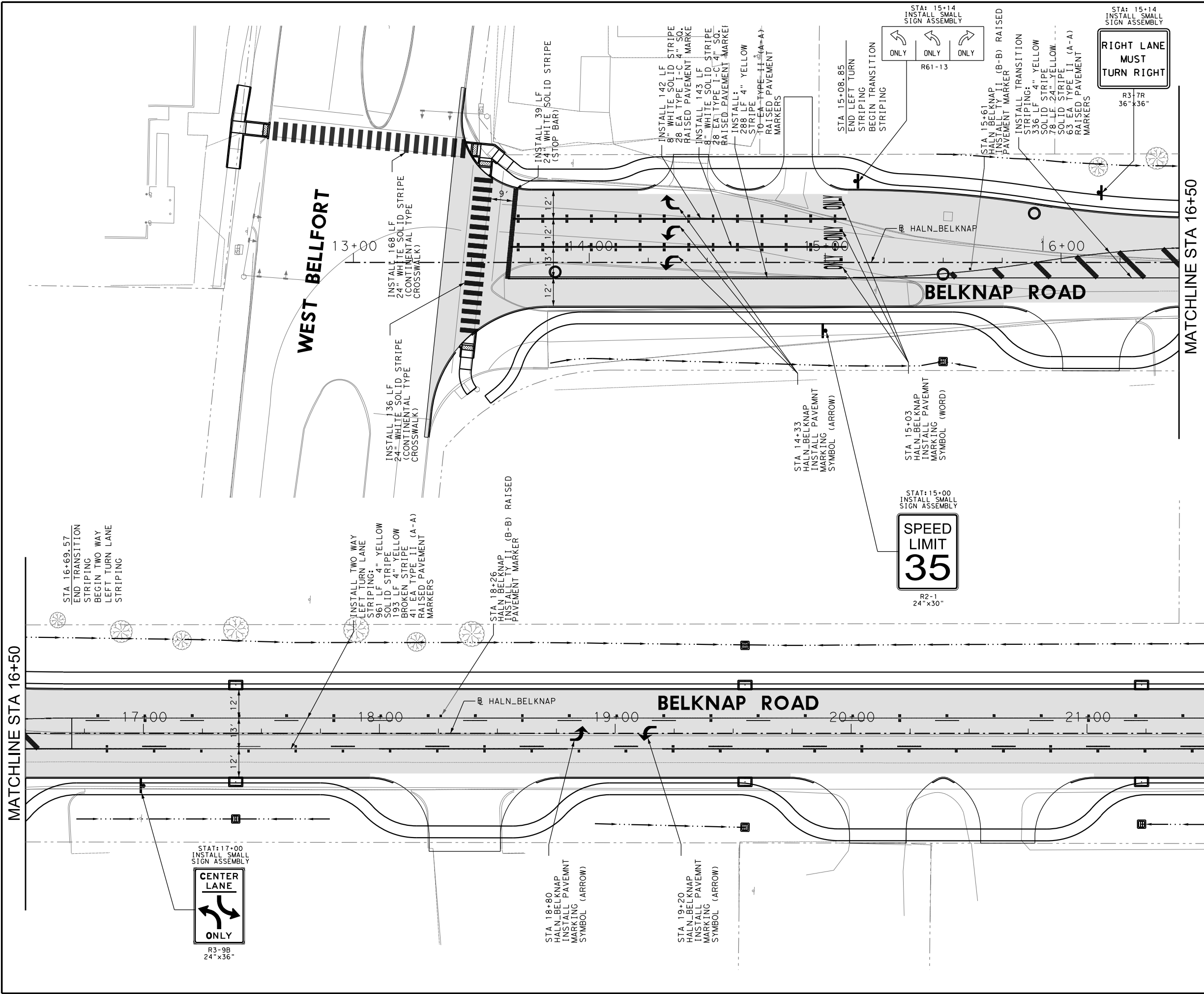
3730 CYPRESS CREEK PARKWAY, STE 108, HOUSTON, TEXAS 77068
PH: (346) 316-1181 FAX: (346) 316-1185 www.jaymarkengineering.com
TEXAS REG. ENGINEERING FIRM F-1297

FORT BEND COUNTY, TEXAS

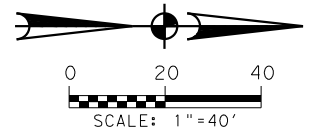
BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

DETAILS 12

CNTY PROJ #	RPS PROJ #	DATE	SCALE	SHEET NO
17-2-11	008169	08.19.2022	AS NOTED	182
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RM	RM	MDT	MDT	



- NOTES:
- SEE GENERAL NOTES SHEETS AND PROJECT NOTES SHEETS FOR ADDITIONAL INFORMATION.
 - THE PROPOSED PAVEMENT MARKINGS SHALL BE REFLECTORIZED THERMOPLASTIC UNLESS OTHERWISE NOTED IN THE PLANS.
 - ALL STRIPING DIMENSIONS ARE FROM THE FACE OF CURB AND THE CENTER OF THE STRIPING PATTERN UNLESS OTHERWISE NOTED IN THE PLANS.



CAUTION!!!!
OVERHEAD ELECTRIC LOCATIONS ARE APPROXIMATE

CALL BEFORE YOU DIG!
TEXAS ONE CALL PARTICIPANTS REQUEST 48 HOURS NOTICE BEFORE YOU DIG, DRILL, OR BLAST - STOP CALL
Texas One Call System
1-800-DIG-TESS



14-Nov-2023

NO.	DATE	REVISION	APPROVED

rps Texas PE Firm Reg. #F-929
575 N. Dairy Ashford, Suite 700, Houston, Texas 77079
T+1 281 589 7257 E usinfrastructure@rpsgroup.com

FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

SIGNING AND PAVEMENT MARKING PLAN

CNTY	PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	2023	2023	1/8"=1'-0"	183
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY		
RPS	RPS	RPS	RPS		

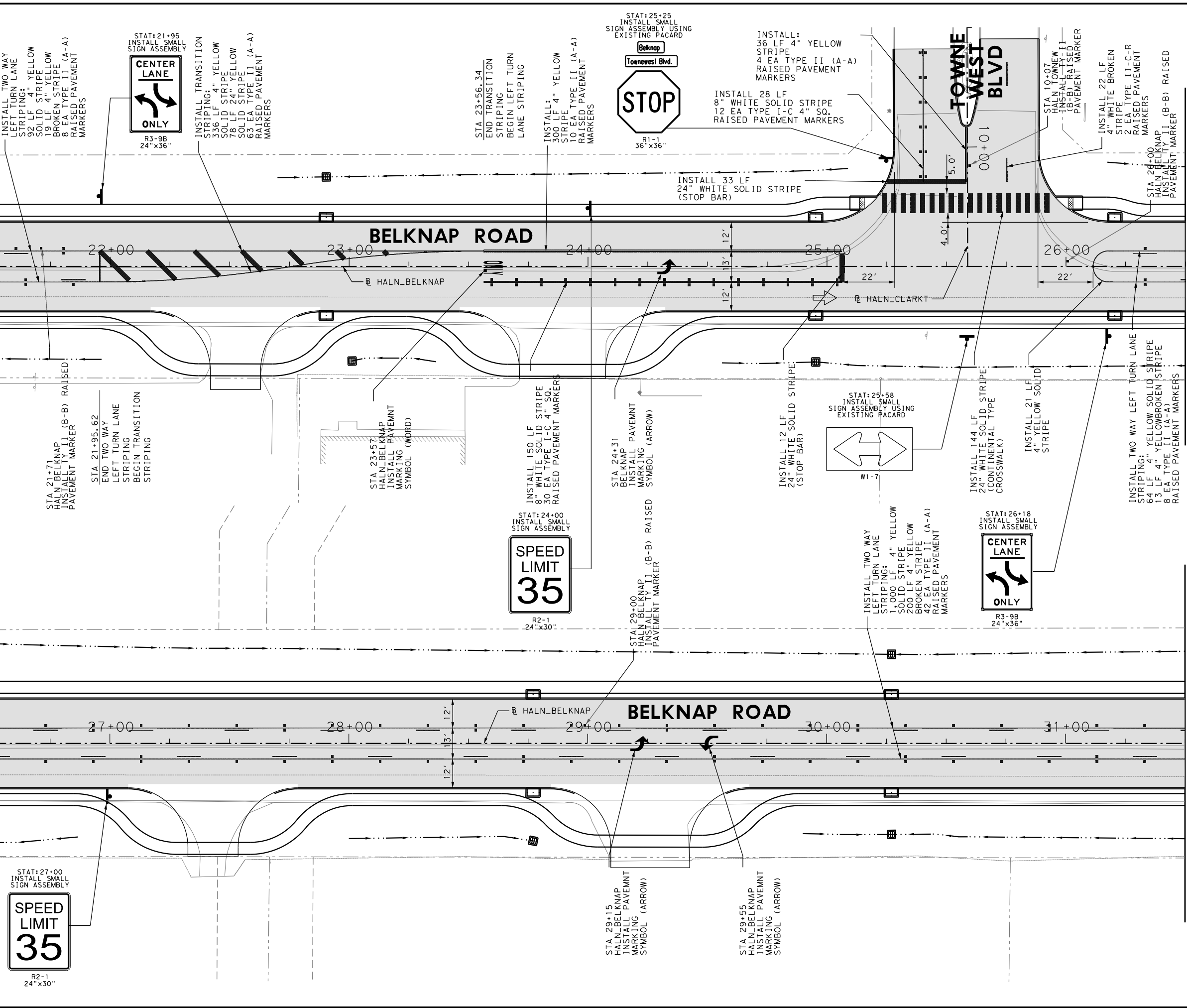
SHEET 1 OF 6

rpsdw11ics01\$

11/7/2023 2:05:11 PM \\rpsdw11\ics01\ics_pdf_work_dir\4357\22956_1\8169_SHEET_SIGNING AND PAVEMENT MARKING_02.dgn

MATCHLINE STA 21+50

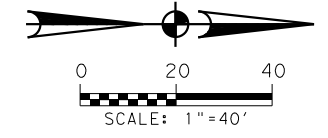
MATCHLINE STA 26+50



MATCHLINE STA 26+50

MATCHLINE STA 31+50

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575 N. Dairy Ashford, Suite 700, Houston, Texas 77079
T +1 281 589 7257 E us@infrastructure@rpsgroup.com

FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

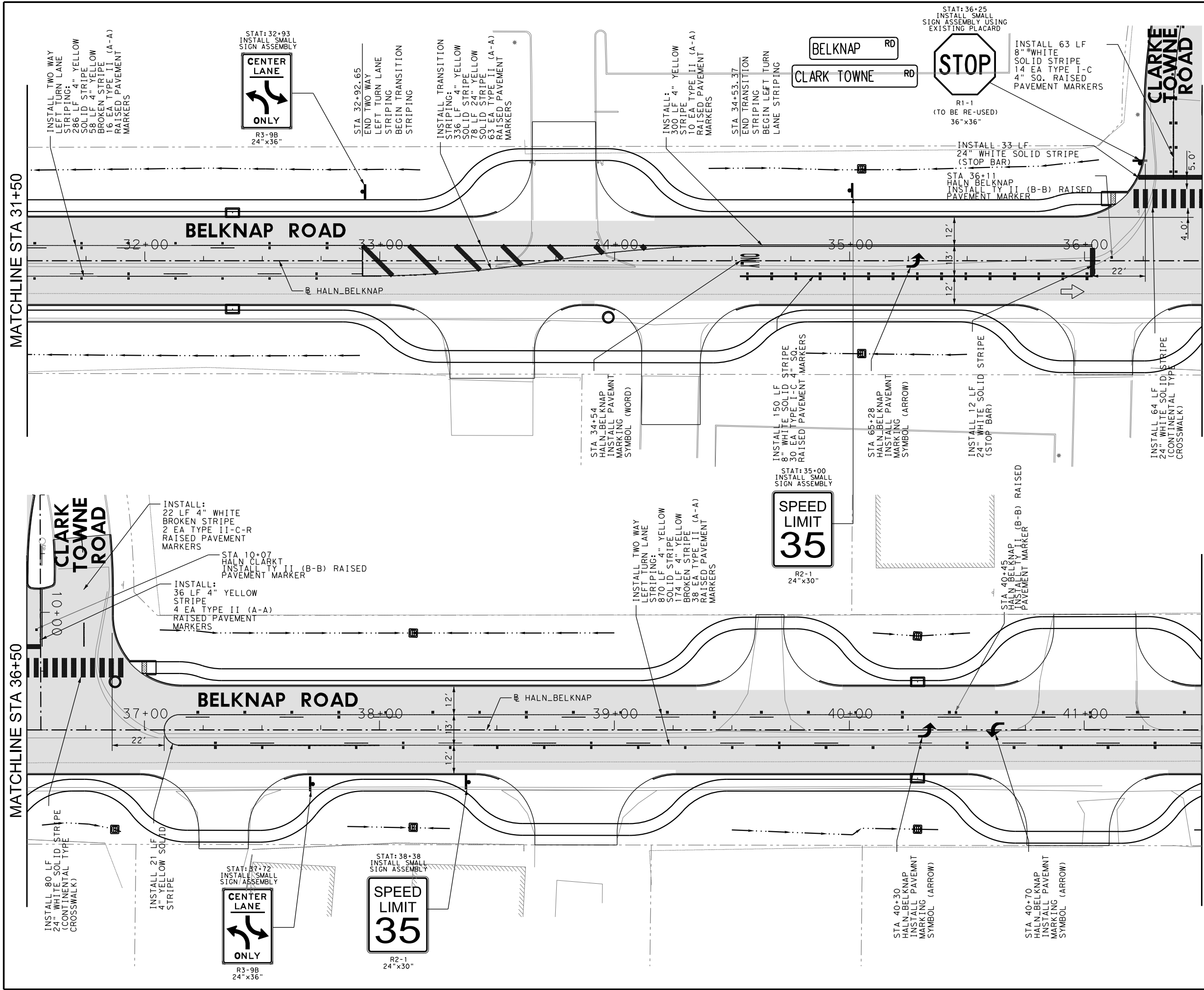
SIGNING AND PAVEMENT
MARKING PLAN

CNTY	PROJ	RPS PROJ	DATE	SCALE	SHEET NO
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY		
RPS	RPS	RPS	RPS		184

SHEET 2 OF 6

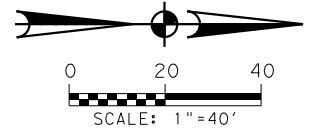
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11/7/2023 2:05:22 PM \\rpsdw11\ics01\ics01\work_dir\4357\22956_3\8169_SHEET_SIGNING AND PAVEMENT MARKING_03.dgn



NOTES:

1. SEE GENERAL NOTES SHEETS AND PROJECT NOTES SHEETS FOR ADDITIONAL INFORMATION.
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Texas One Call System
1-800-DIG-TESS



14-Nov-2023

NO.	DATE	REVISION	APPROVED

rps Texas PE Firm Reg. #F-929
575 N. Dairy Ashford, Suite 700, Houston, Texas 77079
T +1 281 589 7257 E usinfrastructure@rpsgroup.com

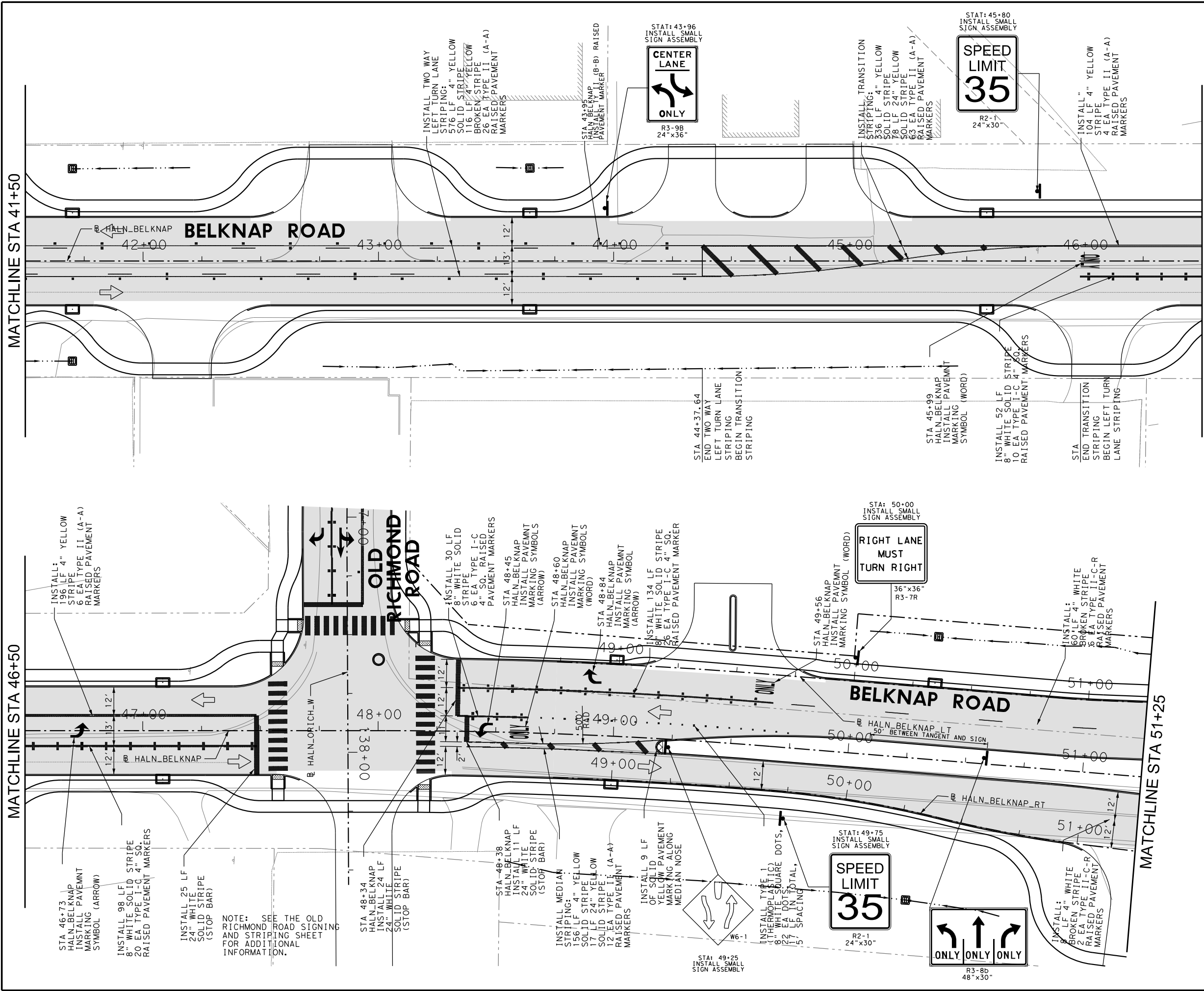
FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

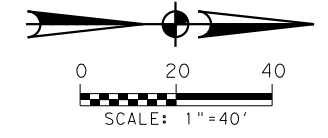
SIGNING AND PAVEMENT
MARKING PLAN

SHEET 3 OF 6

CNTY	PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169		2023		185
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY		
RPS	RPS	RPS	RPS		



- NOTES:
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OR BLAST - STOP CALL
Texas One Call System
1-800-DIG-TESS

Professional Engineer Seal for Xiaoming Chen, State of Texas, No. 119339, dated 11/9/2023. The seal includes the text 'REGISTERED PROFESSIONAL ENGINEER' and a signature.

NO.	DATE	REVISION	APPROVED

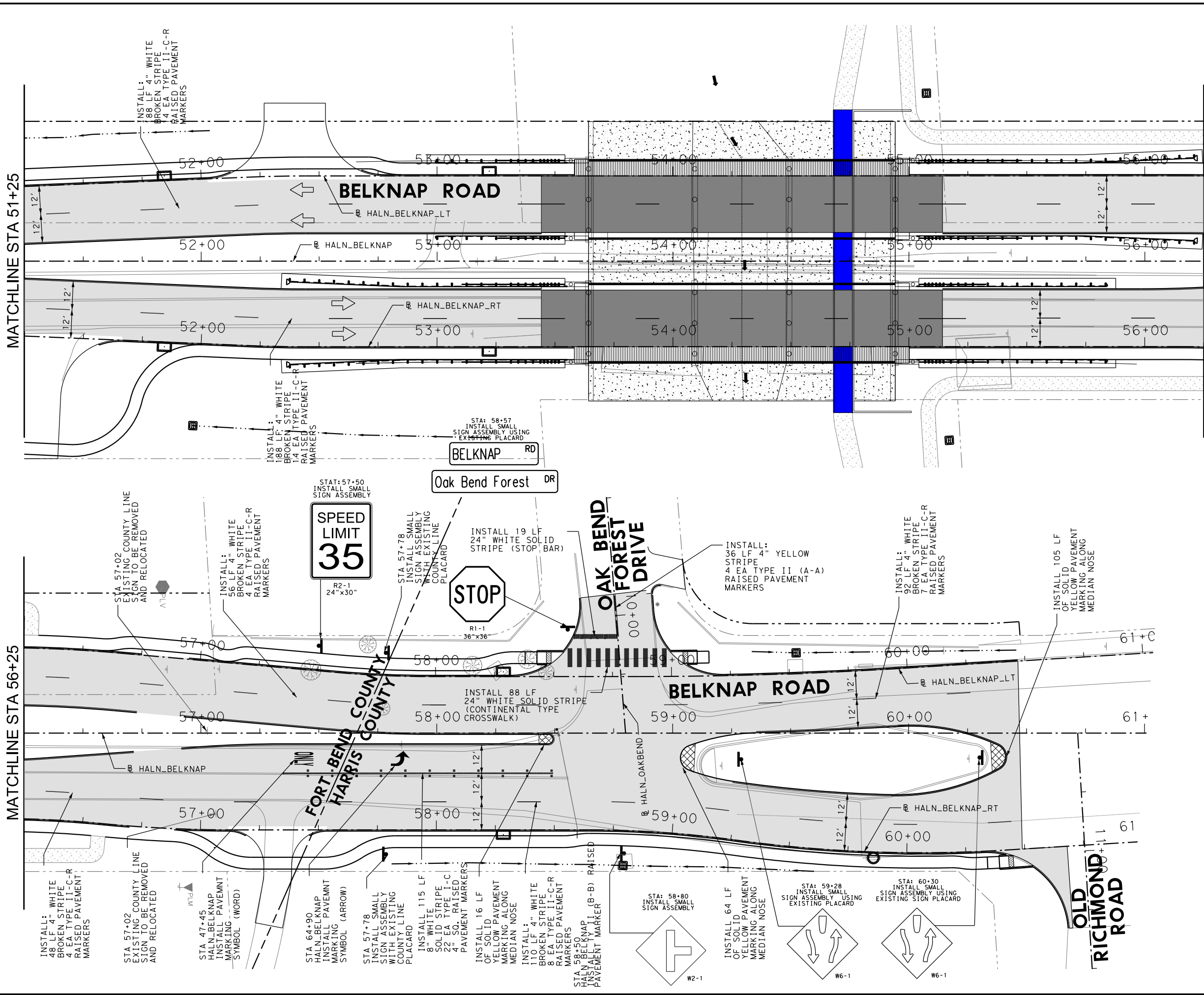
rps Texas PE Firm Reg. #F-929
575 N. Dairy Ashford, Suite 700, Houston, Texas 77079
T+1 281 589 7257 E us@infrastructure@rpsgroup.com

FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

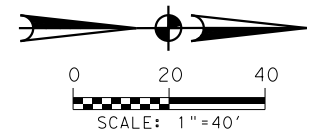
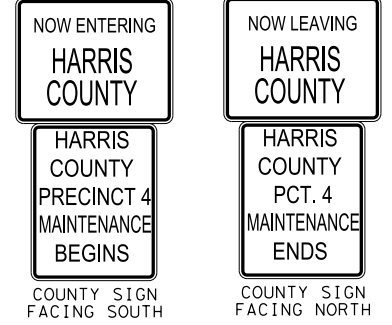
SIGNING AND PAVEMENT MARKING PLAN

CNTY	PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	2023			186
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY		
RPS	RPS	RPS	RPS		



NOTES:

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LOCATIONS ARE APPROXIMATE

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OR BLAST - STOP CALL
Texas One Call System
1-800-DIG-TESS



02/06/2024

NO	DATE	REVISION	APPROVED

rps Texas PE Firm Reg. #F-929
575 N. Dairy Ashford, Suite 700, Houston, Texas 77079
T+1 281 589 7257 E us@infrastructure@rpsgroup.com

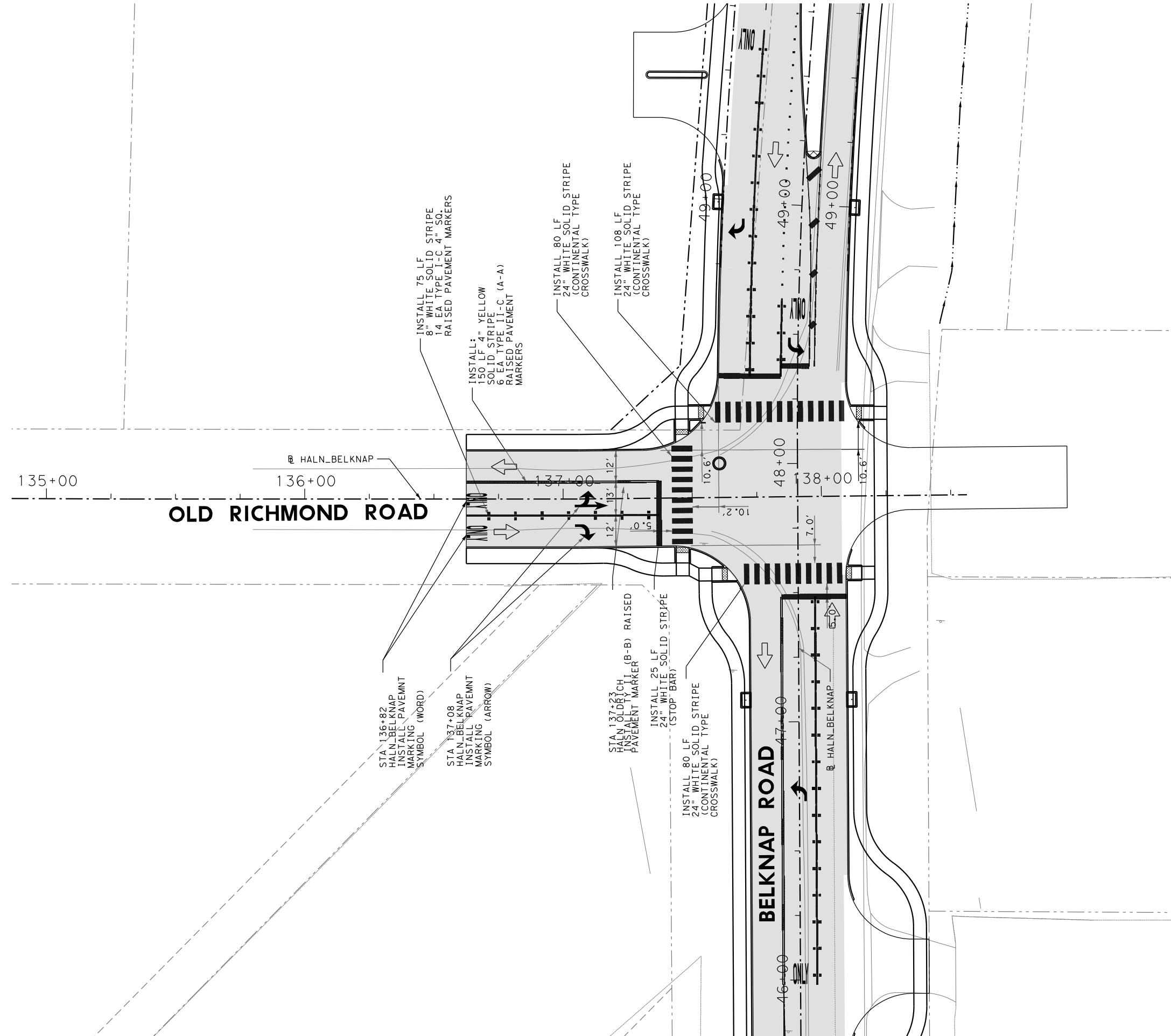
FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

SIGNING AND PAVEMENT
MARKING PLAN

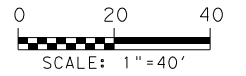
CNTY PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	2023		187
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RPS	RPS	RPS	RPS	

SHEET 5 OF 6



NOTES:

1. SEE GENERAL NOTES SHEETS AND PROJECT NOTES SHEETS FOR ADDITIONAL INFORMATION.
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Texas One Call System
1-800-DIG-TESS

Xiao Ming Chen
11/9/2023

NO.	DATE	REVISION	APPROVED

rps Texas PE Firm Reg. #F-929
575 N. Dairy Ashford, Suite 700, Houston, Texas 77079
T +1 281 589 7257 E usinfrastructure@rpsgroup.com

FORT BEND COUNTY, TEXAS

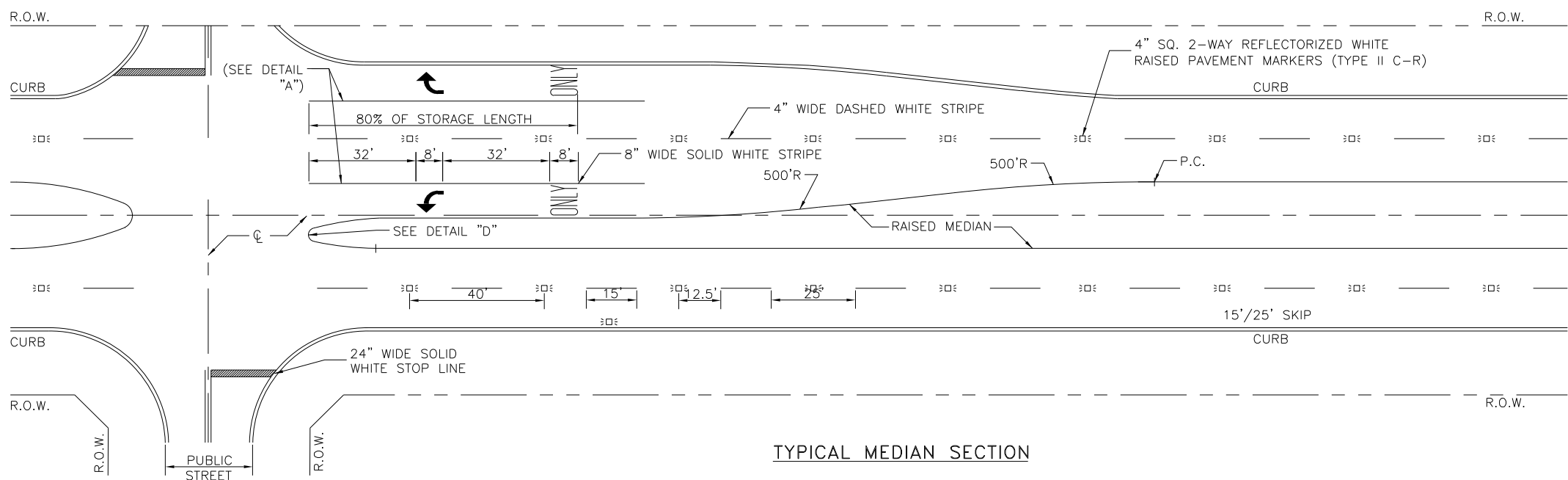
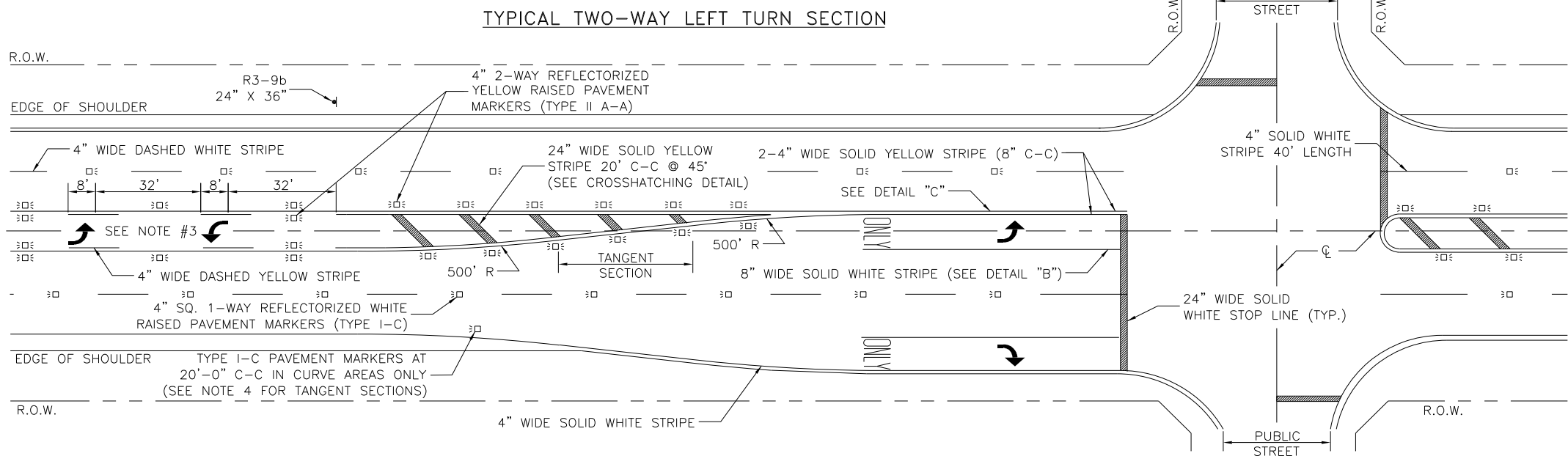
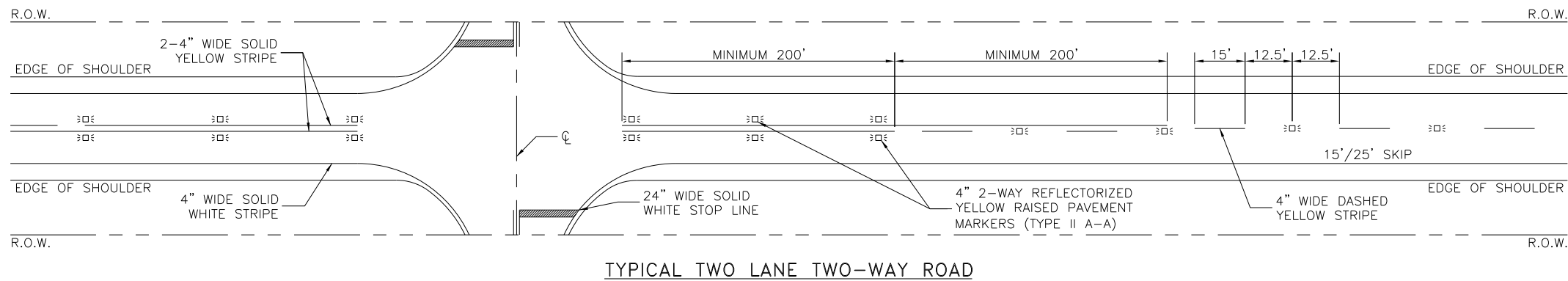
BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

SIGNING AND PAVEMENT
MARKING PLAN

SHEET 6 OF 6

CNTY	PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	2023			188
DESIGNED BY	RPS	DRAWN BY	RPS	CHECKED BY	RPS
				VERIFIED BY	RPS

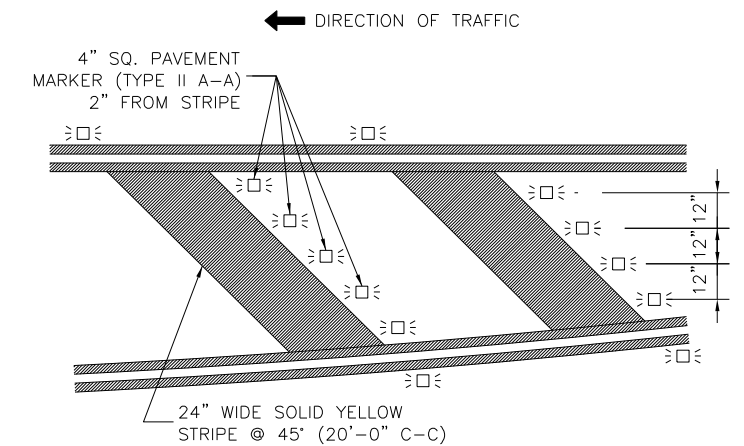
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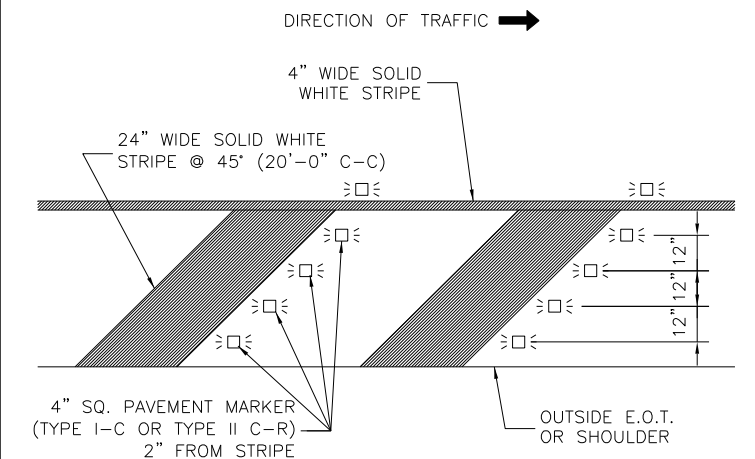
NOTES:

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

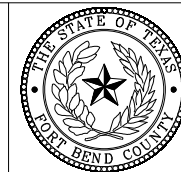


OUTSIDE EDGE CROSSHATCHING DETAIL



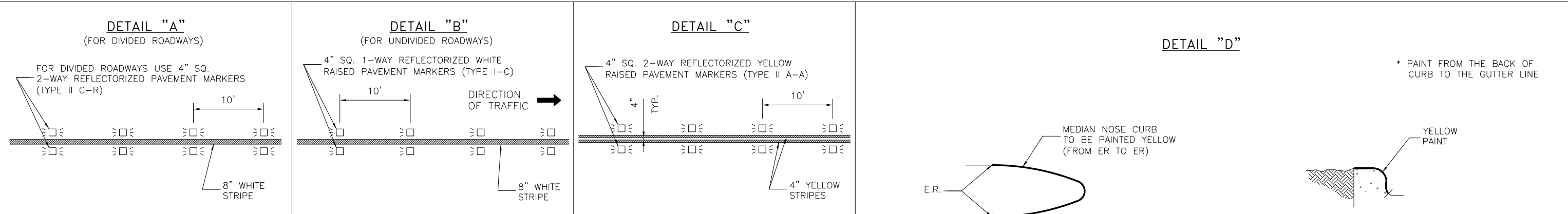
NO.	REVISIONS	DATE	NAME
1	ORIGINAL STANDARD ISSUED	3-1-22	RJS

FORT BEND COUNTY
ENGINEERING DEPARTMENT



PROJECT TITLE:		BELKNAP ROAD
DRAWN BY:	INIT	FBCD STANDARD
CK'D BY:	INIT	46
SCALE:	NONE	SHEET DESCRIPTION: PAVEMENT MARKING DETAILS
DATE:	3-1-22	APPROVED BY:
		SHEET 1 OF 2
		SHEET NO: 189/

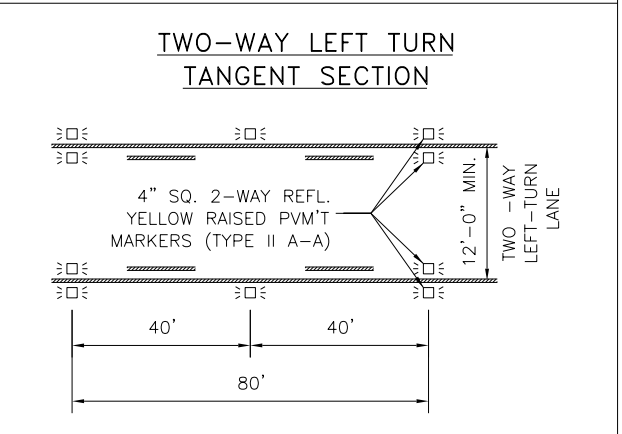
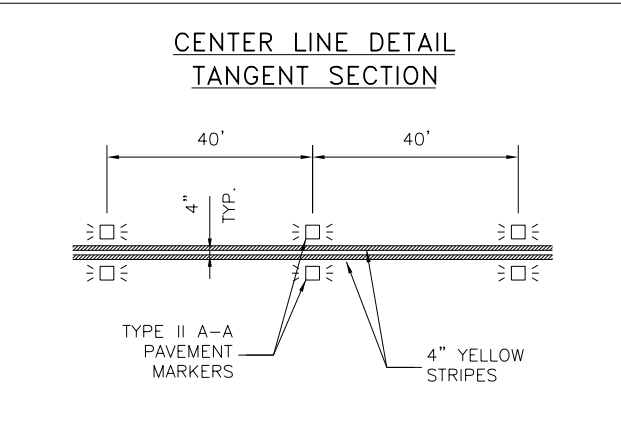
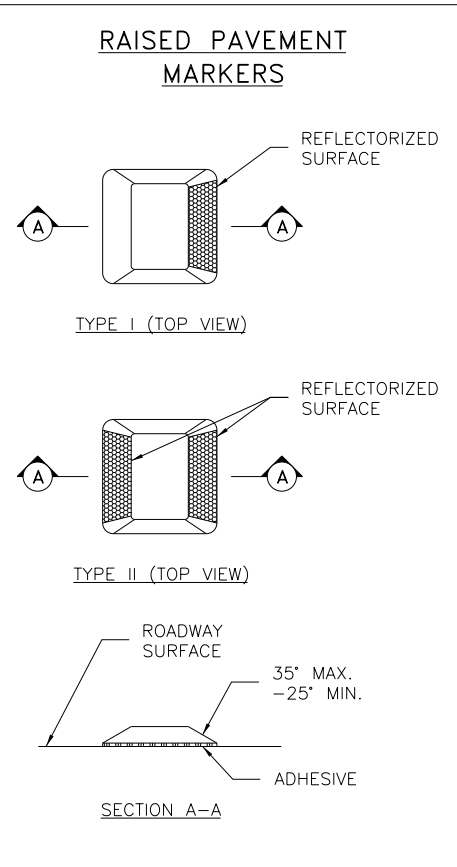
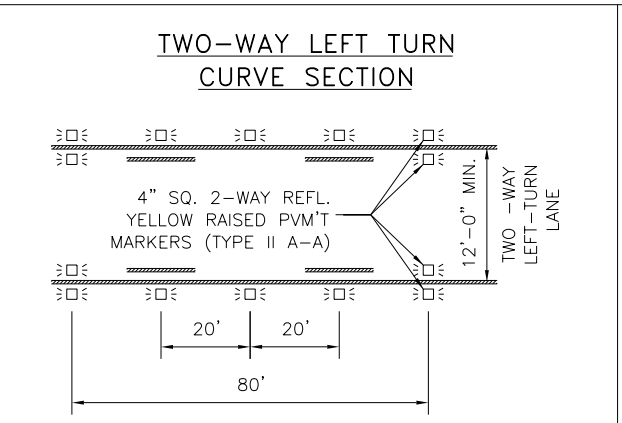
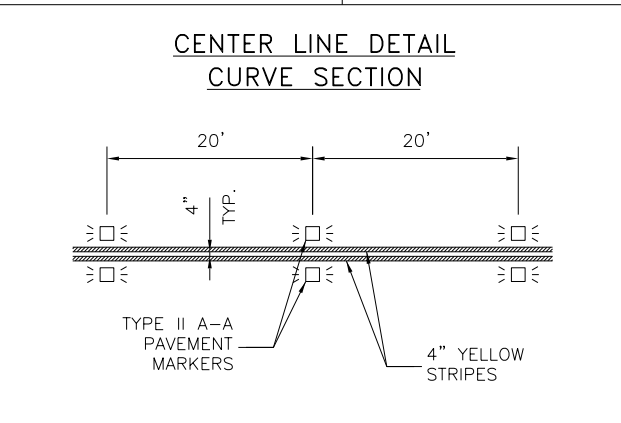
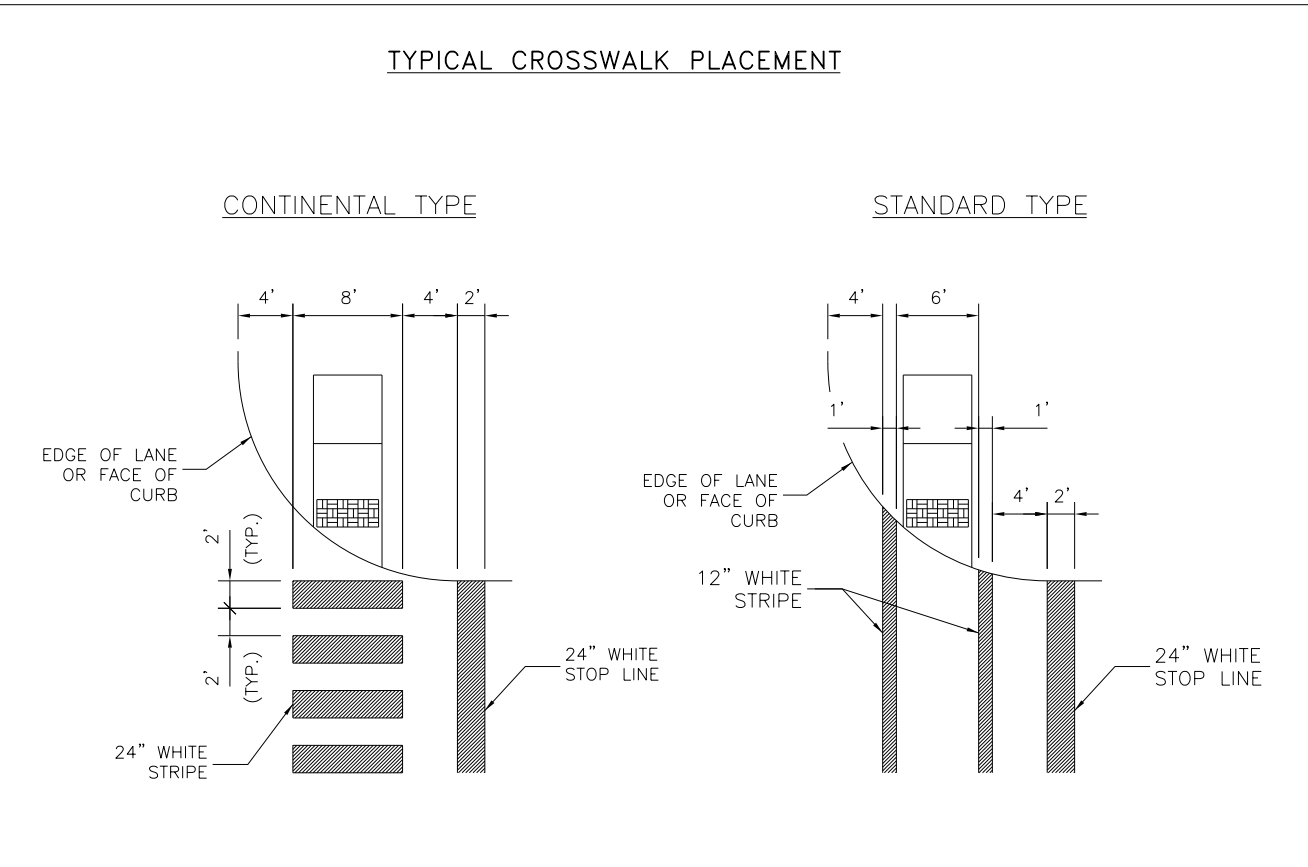
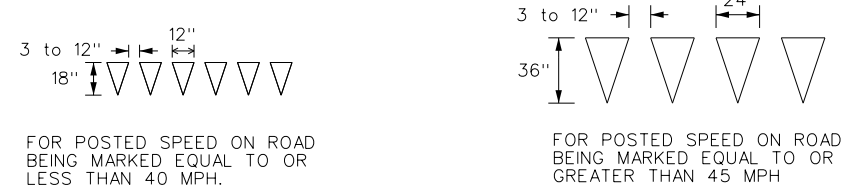
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PAVEMENT MARKER LEGEND

SYMBOL	DESCRIPTION
▷◁	4" x 4" REFLECTORIZED RAISED PAVEMENT MARKER
▷◁	INDICATED DIRECTION OF TRAFFIC FLOW

YIELD LINE DETAILS

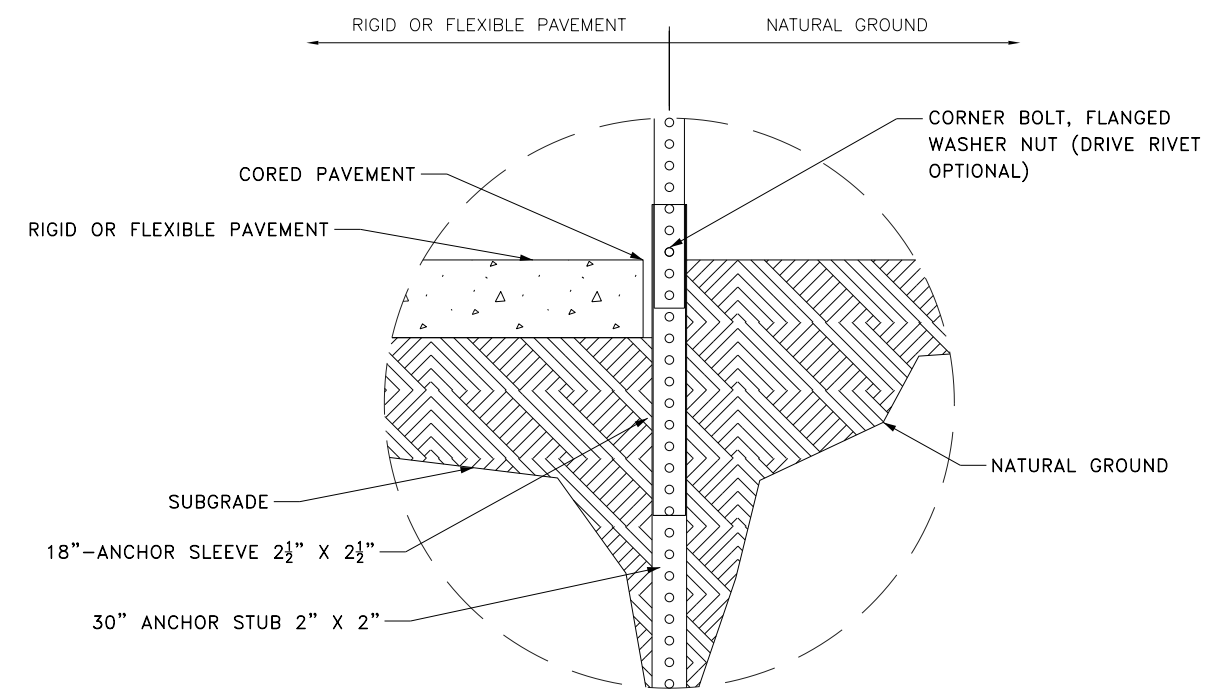
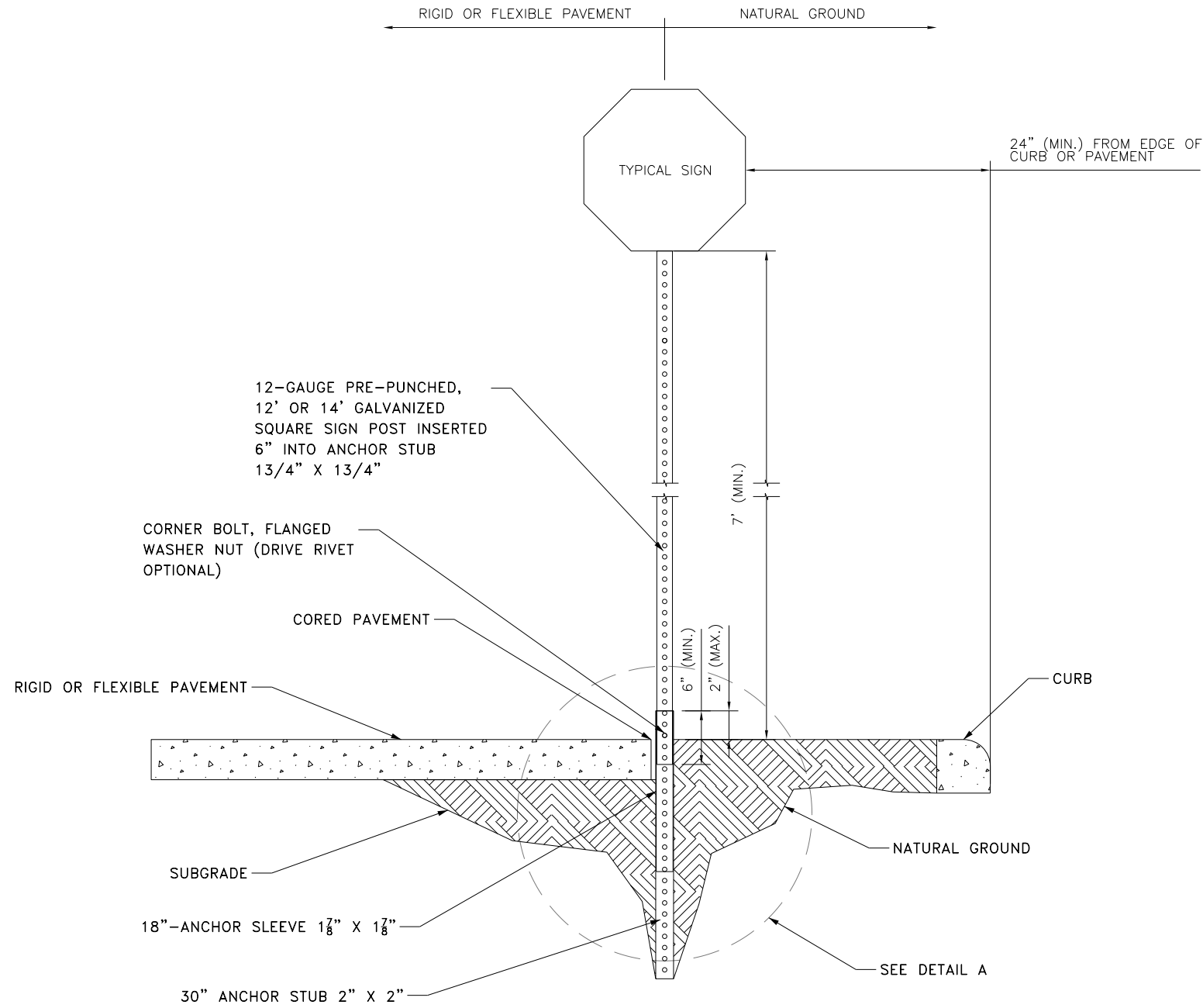


NO.	REVISIONS	DATE	NAME
1	ORIGINAL STANDARD ISSUED	3-1-22	RJS

FORT BEND COUNTY ENGINEERING DEPARTMENT



PROJECT TITLE: BELKNAP ROAD		FCED STANDARD: 47
DRAWN BY: INIT	SHEET DESCRIPTION: PAVEMENT MARKING DETAILS	
CK'D BY: INIT	SHEET 2 OF 2	SHEET NO: 190/
DATE: 3-1-22	APPROVED BY:	



TYPICAL GROUND SIGN INSTALLATION
DETAIL A

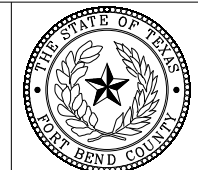
NOTES:

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.

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NO.	REVISIONS	DATE	NAME
▲	ORIGINAL STANDARD ISSUED	3-1-22	RJS
▲			
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▲			

FORT BEND COUNTY
ENGINEERING DEPARTMENT



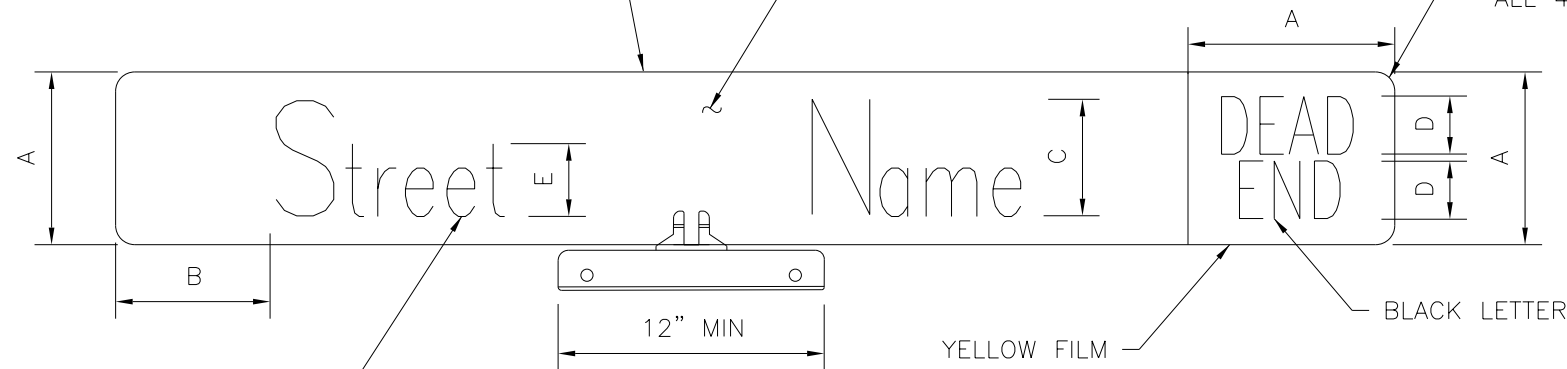
PROJECT TITLE: BELKNAP ROAD		FBCE STANDARD 52
DRAWN BY: INIT	SHEET DESCRIPTION: TYPICAL GROUND SIGN INSTALLATION	
CK'D BY: INIT	SCALE: AS NOTED	SHEET NO: 191
DATE: 3-1-22	APPROVED BY:	

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SIGN PLATE SHALL BE 0.08" FLAT, DOUBLE SIDED ALUMINUM

GREEN FILM

CORNERS SHALL BE 0.5" ROUNDED (TYPICAL ALL 4 CORNERS)



LETTERS SHALL BE WHITE REFLECTIVE VIP DIAMOND GRADE SHEETING (TYPICAL). LETTERING FONT SHALL BE HIGHWAY D

STREET SIGN NAME DETAIL

DIMENSION SCHEDULE

9" SIGN	
'A'	9"
'B'	2"
'C'	6"
'D'	3.5"
'E'	4.5"

NOTES:

ALL STREET BLADES SHALL BE 9" IN HEIGHT

TWO-SIDED D3 SIGN LOWER CLASSIFICATION STREET

SEE 45°/90° RAW EXTRUDED ALUMINUM CROSS PIECE SIGN BRACKET DETAILS

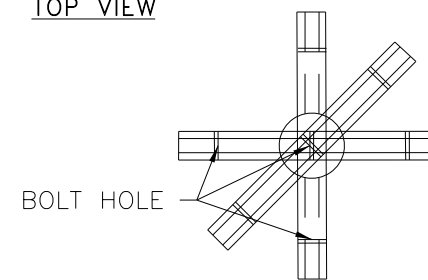
TWO-SIDED D3 SIGN HIGHER CLASSIFICATION STREET

SEE RAW ALUMINUM SQUARE POST CAP BRACKET DETAILS. INSTALL ON SQUARE POST.

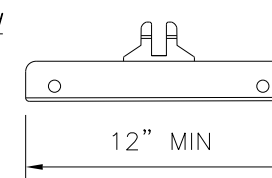
DUAL SIDED STREET SIGN DETAIL

45°/90° RAW EXTRUDED ALUMINUM CROSS PIECE SIGN BRACKET DETAILS

TOP VIEW



SIDE VIEW

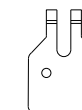


RAW ALUMINUM SQUARE POST CAP BRACKET DETAILS

FRONT VIEW



SIDE VIEW



NO.	REVISIONS	DATE	NAME
1	ORIGINAL STANDARD ISSUED	3-1-22	RJS
2			
3			
4			

FORT BEND COUNTY ENGINEERING DEPARTMENT



PROJECT TITLE: BELKNAP ROAD		FBCD STANDARD
DRAWN BY: INIT	SHEET DESCRIPTION: STREET SIGN NAME DETAILS	53
CK'D BY: INIT		SHEET NO:
SCALE: AS NOTED	APPROVED BY:	192/
DATE: 3-1-22		

J:\Engineering Specs\Harris County Standard Traffic Drawings-Master file\3-16-2018 STANDARD TRAFFIC DRAWINGS\2-PAVEMENT MARKINGS AND SIGN\SSD.dwg

	* MINIMUM SIZE OF 36X36 SHALL BE USED FOR STOP SIGNS THAT FACE MULTI-LANE APPROACHES										
TMUTCD/SHSD ID	R1-1	R1-2	R1-3P	R2-1	R3-4	R3-5R (L)	R3-7L (R)	R3-8	R4-7	R6-1R, R6-1L	R6-2R (L)
LOCAL	30x30*	30x30	18x6	24x30	24x24	30x36	30x30	Varies x 30	24x30	36x12	24x30
COLLECTOR	36x36	36x36	18x6	24x30	30x30	30x36	36x36	Varies x 30	24x30	36x12	30x36
THOROUGHFARE	36x36	36x36	18x6	24x30	30x30	30x36	36x36	Varies x 36	24x30	36x12	30x36
	* SIGNALIZED LOCATIONS ONLY WHERE APPROVED BY HCD										
TMUTCD/SHSD ID	NO PARKING (ALL TYPES)	R8-8	R10-6R (L)	R10-17T	W1-1R (L)	W1-2R (L)	W1-3R (L)	W1-4R (L)	W1-6R (L), W1-7	W1-7T	W1-8R (L)
LOCAL	18x24	24x30	24x36	30x30	30x30	30x30	30x30	30x30	48x24	48x24	18x24
COLLECTOR	18x24	24x30	24x36	30x30	36x36	36x36	36x36	36x36	48x24	48x24	18x24
THOROUGHFARE	18x24	24x30	24x36	30x30	36x36	36x36	36x36	36x36	48x24	48x24	30x36
TMUTCD/SHSD ID	W2-1	W2-2R (L)	W3-1	W3-3	W4-2R (L)	W6-2	W6-3	W8-13aT	W9-1R (L)	W9-2R (L)	W10-1
LOCAL	30x30	30x30	30x30	30x30	36x36	36x36	36x36	36x36	36x36	36x36	30 dia.
COLLECTOR	30x30	30x30	30x30	30x30	36x36	36x36	36x36	36x36	36x36	36x36	30 dia.
THOROUGHFARE	36x36	36x36	36x36	36x36	36x36	36x36	36x36	36x36	36x36	36x36	30 dia.
TMUTCD/SHSD ID	W11-1 through W11-12	W13-1P	W14-1	W14-2	W16-2aP	W16-7PL (PR)	W16-9	S1-1	S4-3P	ENDSCHOOLZONE	I-3
LOCAL	30x30	18x18	30x30	24x24	24x12	30x18	24x12	36x36	24x8	24x36	VARIES X 18
COLLECTOR	36x36	18x18	36x36	24x24	24x12	30x18	24x12	36x36	24x8	24x36	VARIES X 18
THOROUGHFARE	36x36	18x18	36x36	N/A	24x12	30x18	24x12	36x36	24x8	24x36	VARIES X 30
		2" TYP. 6" CLEARVIEW 2-W FONT 3" CLEARVIEW 2-W FONT 4" TYP.		Reflective Material Post							
TMUTCD/SHSD ID	OM-3R, OM-3L	GROUND MOUNTED STREET NAME SIGN		TYPES D-DY, D-DW							
LOCAL	12X36	VARIES X 8		36" TALL							
COLLECTOR	12X36	VARIES X 8		36" TALL							
THOROUGHFARE	12X36	VARIES X 8		36" TALL							

NO.	REVISIONS	DATE	NAME
△			
△			
△			
△			

HARRIS COUNTY
ENGINEERING DEPARTMENT



PROJECT TITLE:		TRAFFIC STANDARD
SHEET DESCRIPTION:		SSD
DRAWN BY: JDZ	DATE: 3/16/18	
CK'D BY: BSH	SCALE: NONE	SHEET NO: 193 /

TRAFFIC SIGNAL NOTES

GENERAL:

UNLESS OTHERWISE SHOWN ON THE PLANS OR OTHERWISE DIRECTED, COMMENCE WORK AFTER SUNRISE AND ENSURE CONSTRUCTION EQUIPMENT IS OFF THE ROAD BY SUNSET.

KEEP ALL LANE CLOSURE BETWEEN THE HOURS OF 9 AM & 3 PM UNLESS PERMISSION RECEIVED BY FORT BEND COUNTY ENGINEERING.

GENERAL: ROADWAY ILLUMINATION AND ELECTRICAL

FOR ROADWAY ILLUMINATION AND ELECTRICAL ITEMS, USE MATERIALS FROM PRE-QUALIFIED PRODUCERS AS SHOWN ON THE CONSTRUCTION DIVISION (CST) OF THE TxDOT'S MATERIAL PRODUCERS LIST. CHECK THE LATEST LINK ON THE TxDOT'S WEBSITE FOR THIS LIST. THE CATEGORY/ITEM IS "ROADWAY ILLUMINATION AND ELECTRICAL SUPPLIES." NO SUBSTITUTIONS WILL BE ALLOWED FOR MATERIALS FOUND ON THIS LIST.

PERFORM ELECTRICAL WORK IN CONFORMANCE WITH THE NATIONAL ELECTRICAL CODE (NEC) AND THE TxDOT STANDARD SHEETS.

THE CONTRACTOR MAY MAKE THE ELECTRICAL GROUNDING CONNECTIONS AND PERMISSIBLE SPLICES USING THE THERMAL FUSION PROCESS, CADWELD, THERMOWELD, OR APPROVED EQUAL, INSTEAD OF BOLTED CONNECTIONS AND SPLICES.

GENERAL: TRAFFIC SIGNALS

FOR TRAFFIC SIGNAL ITEMS, USE ITEMS FROM THE FORT BEND COUNTY APPROVED EQUIPMENT LIST AND THE MATERIALS PRE-QUALIFIED FOR ILLUMINATION AND ELECTRICAL ITEMS (LOCATED AT HTTP://FTP.STATE.TX.US/PUB/TXDOT-INFO/CMD/MPL/RIAES.PDF) AS SHOWN ON THE TxDOT'S MATERIAL PRODUCERS LIST AND THE ROADWAY ILLUMINATION AND ELECTRICAL SUPPLIES LIST. CHECK THE LATEST LINKS ON THE TxDOT WEBSITE FOR THESE LISTS. NO SUBSTITUTIONS WILL BE ALLOWED FOR MATERIALS FOUND ON THESE LISTS.

GENERAL: SITE MANAGEMENT

PERSONAL VEHICLES OF EMPLOYEES ARE NOT PERMITTED TO PARK WITHIN THE RIGHT OF WAY, INCLUDING SECTIONS CLOSED TO PUBLIC TRAFFIC. EMPLOYEES MAY PARK ON THE RIGHT OF WAY AT THE CONTRACTOR'S OFFICE, EQUIPMENT, AND MATERIALS STORAGE YARD SITES.

ASSUME OWNERSHIP OF DEBRIS AND DISPOSE OF AT AN APPROVED LOCATION.

CONTROL THE DUST CAUSED BY CONSTRUCTION OPERATIONS.

GENERAL: TRAFFIC CONTROL AND CONSTRUCTION

WHEN DESIGN DETAILS ARE NOT SHOWN ON THE PLANS, PROVIDE SIGNS AND ARROWS CONFORMING TO THE LATEST "STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS" MANUAL.

GENERAL: UTILITIES

CONSIDER THE LOCATIONS OF UNDERGROUND UTILITIES DEPICTED IN THE PLANS AS APPROXIMATE AND EMPLOY RESPONSIBLE CARE TO AVOID DAMAGING UTILITY FACILITIES. ADVANCED FIELD CONFIRMATION BY THE UTILITY OWNER OR OPERATOR IS REQUIRED. WHERE POSSIBLE, PROTECT AND PRESERVE PERMANENT SIGNS, MARKERS, AND DESIGNATIONS OF UNDERGROUND FACILITIES.

IF THE CONTRACTOR DAMAGES OR CAUSES DAMAGE (BREAKS, LEAKS, NICKS, DENTS, GOUGES, ETC.) TO THE UTILITY, CONTACT THE UTILITY FACILITY OWNER OR OPERATOR IMMEDIATELY.

INSTALL 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 TxDOT STANDARD SHEETS.

BEFORE BEGINNING ANY UNDERGROUND WORK, NOTIFY THE COUNTY AT CONSTRUCTION@FORTBENDCOUNTYTX.GOV & TRAFFIC@FORTBENDCOUNTYTX.GOV TO ESTABLISH THE LOCATIONS OF ANY EXISTING ELECTRICAL SYSTEMS FOR LIGHTING FACILITIES WITHIN THE LIMITS OF THIS PROJECT.

ITEM 5: CONTROL OF WORK

SUBMIT SHOP DRAWINGS ELECTRONICALLY FOR THE FABRICATION OF ITEMS AS DOCUMENTED IN TABLE 1 BELOW. SUBMIT TO TRAFFIC@FORTBENDCOUNTYTX.GOV

**Table 1
2014 Construction Specification Required Shop/Working Drawing Submittals**

Spec Item No.'s	Product	Submittal Required	Approval Required (Y/N)	Contractor/Fabricator P.E. Seal Required	Reviewing Party
680	Installation of Highway Traffic Signals	Y	Y	N	T
682	Vehicle and Pedestrian Signal Heads	Y	Y	N	T
684	Traffic Signal Cables	Y	Y	N	T
687	Pedestal Pole Assemblies	Y	Y	N	T
688	Detectors	Y	Y	N	A
SS	Screw-In Type Anchor Foundations	Y	Y	N	T

ITEM 416: DRILLED SHAFT FOUNDATIONS

INCLUDE THE COST FOR FURNISHING AND INSTALLING ANCHOR BOLTS MOUNTED IN THE DRILLED SHAFTS IN THE UNIT BID PRICE FOR THE VARIOUS DIAMETER DRILLED SHAFTS.

THE COUNTY MAY TEST USING ULTRASONIC METHODS THE ANCHOR BOLTS FOR LIGHT STANDARDS, AND TRAFFIC SIGNAL POLES AFTER THEY ARE INSTALLED. REPLACE FAULTY ANCHOR BOLTS AS DIRECTED. DO NOT WELD THE ANCHOR BOLTS.

ITEM 502: BARRICADES, SIGNS, AND TRAFFIC HANDLING

USE A TRAFFIC CONTROL PLAN FOR HANDLING TRAFFIC THROUGH THE VARIOUS PHASES OF CONSTRUCTION. FOLLOW THE PHASING SEQUENCE UNLESS OTHERWISE AGREED UPON BY THE COUNTY. ENSURE THIS PLAN CONFORMS TO THE LATEST "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" AND THE LATEST BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS. THE LATEST VERSIONS OF WORK ZONE STANDARD SHEETS WZ (BTS-1) AND WZ (BTS-2) ARE THE TRAFFIC CONTROL PLAN FOR THE SIGNAL INSTALLATIONS.

SUBMIT CHANGES TO THE TRAFFIC CONTROL PLAN TO THE COUNTY. PROVIDE A LAYOUT SHOWING THE CONSTRUCTION PHASING, SIGNS, STRIPING, AND SIGNALIZATIONS FOR CHANGES TO THE ORIGINAL TRAFFIC CONTROL PLAN.

FURNISH AND MAINTAIN THE BARRICADES AND WARNING SIGNS, INCLUDING THE NECESSARY TEMPORARY AND PORTABLE TRAFFIC CONTROL DEVICES, DURING THE VARIOUS PHASES OF CONSTRUCTION. PLACE AND CONSTRUCT THESE BARRICADES AND WARNING SIGNS IN ACCORDANCE WITH THE LATEST "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" FOR TYPICAL CONSTRUCTION LAYOUTS.

COVER WORK ZONE SIGNS WHEN WORK RELATED TO THE SIGNS IS NOT IN PROGRESS, OR WHEN ANY HAZARD RELATED TO THE SIGNS NO LONGER EXISTS.

KEEP THE DELINEATION DEVICES, SIGNS, AND PAVEMENT MARKINGS CLEAN. THIS WORK IS SUBSIDIARY TO THE ITEM, "BARRICADES, SIGNS, AND TRAFFIC HANDLING."

COVER OR REMOVE THE PERMANENT SIGNS AND CONSTRUCTION SIGNS THAT ARE INCORRECT OR THAT DO NOT APPLY TO THE CURRENT SITUATION FOR A PARTICULAR PHASE.

DO NOT MOUNT SIGNS ON DRUMS OR BARRICADES, EXCEPT THOSE LISTED IN THE LATEST BARRICADES AND CONSTRUCTION STANDARD SHEETS.

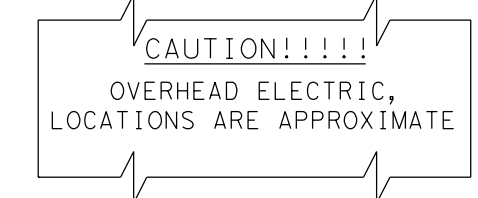
USE TRAFFIC CONES FOR DAYTIME WORK ONLY. REPLACE THE CONES WITH PLASTIC DRUMS DURING NIGHTTIME HOURS.

PLACE POSITIVE BARRIERS TO PROTECT DROP-OFF CONDITIONS GREATER THAN 2 FT. WITHIN THE CLEAR ZONE THAT REMAIN OVERNIGHT.

ITEM 506: TEMPORARY EROSION, SEDIMENTATION AND ENVIRONMENTAL CONTROLS

THE USE OF HAY BALES IS NOT PERMITTED AS STORM WATER POLLUTION PREVENTION PLAN (SWP3) MEASURES.

THE STORM WATER POLLUTION PREVENTION PLAN (SWP3) CONSISTS OF TEMPORARY EROSION CONTROL MEASURES NEEDED AND PROVIDED FOR UNDER THIS ITEM. THE DISTURBED AREA IS LESS THAN ONE ACRE AND USE OF EROSION CONTROL MEASURES IS NOT ANTICIPATED. IF PHYSICAL CONDITIONS ENCOUNTERED AT THE JOB SITE REQUIRE NECESSARY CONTROLS, BMP INSTALLATION, MAINTENANCE, AND REMOVAL WILL BE PAID AS EXTRA WORK ON A FORCE ACCOUNT BASIS PER ARTICLES 4.4 AND 9.7. SINCE THE DISTURBED AREA IS LESS THAN 5 ACRES, A "NOTICE OF INTENT" (NOI) IS NOT REQUIRED.



CALL BEFORE YOU DIG!
TEXAS ONE CALL PARTICIPANTS REQUEST 48 HOURS NOTICE BEFORE YOU DIG, DRILL, OR BLAST - STOP CALL

Texas One Call System
1-800-DIG-TESS



Handwritten Signature

11/07/2023

IDCUS 15915 Katy Freeway, Suite 300 Houston, Texas 77094
(713) 541-5591 Fax: (713) 541-3501
Planners|Engineers|Construction Managers T.B.P.E. FIRM REGISTRATION NO. F-6825

rps Texas PE Firm Reg. #F-929
5810 Tennyson Parkway, Suite 280, Plano, Texas 75024
T+1 972 202 4242 E.usinfrastructure@rpsgroup.com

FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

TRAFFIC SIGNAL NOTES

SHEET 1 OF 3

CNTY PROJ #	RPS PROJ #	DATE	SCALE	SHEET NO
17-2-11	008169	XXX 2022		
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
IDCUS	IDCUS	IDCUS	IDCUS	194

11/7/2023 4:30:46 PM T:\FORT_BEND_COUNTY\BELKNAP\CADD\TRAFFIC\SIGNALS\BEL-GEN-NOTES-01.dgn

TRAFFIC SIGNAL NOTES

ITEM 618: CONDUIT

WHEN BACKFILLING BORE PITS, ENSURE THAT THE CONDUIT IS NOT DAMAGED DURING INSTALLATION OR DUE TO SETTLING OF THE BACKFILL MATERIAL. COMPACT SELECT BACKFILL IN 3 EQUAL LIFTS TO THE BOTTOM OF THE CONDUIT; OR IF USING SAND, PLACE IT 2 IN. ABOVE THE CONDUIT. ENSURE BACKFILL DENSITY IS EQUAL TO THAT OF THE EXISTING SOIL. PREVENT ANY MATERIAL FROM ENTERING THE CONDUIT.

CONSTRUCT BORE PITS A MINIMUM OF 5 FT. FROM EDGE OF BASE OR PAVEMENT.

UNLESS SHOWN ON THE PLANS, INSTALL UNDERGROUND CONDUIT A MINIMUM OF 24 IN. DEEP. INSTALL THE CONDUIT IN ACCORDANCE WITH THE LATEST NATIONAL ELECTRICAL CODE (NEC). AND APPLICABLE TxDOT STANDARD SHEETS. PLACE CONDUIT UNDER DRIVEWAYS OR ROADWAYS A MINIMUM OF 24 IN. BELOW THE PAVEMENT SURFACE.

IF USING CASING TO PLACE BORED CONDUIT, THE CASING IS SUBSIDIARY TO THE CONDUIT.

IF PLACING THE CONDUIT UNDER EXISTING PAVEMENT TO REACH THE SERVICE POLES, BORE THE CONDUIT IN PLACE AND EXTEND IT A MINIMUM DISTANCE OF 5 FT. BEYOND THE EDGE OF SHOULDER OR THE BACK OF CURB.

USE MATERIALS FROM PRE-QUALIFIED PRODUCERS AS SHOWN ON THE TxDOT'S CONSTRUCTION DIVISION (CST) MATERIAL PRODUCER'S LIST. CHECK THE LATEST LINKS ON THE TxDOT WEBSITE FOR THE LIST. THE CATEGORY IS "ROADWAY ILLUMINATION AND ELECTRICAL SUPPLIERS". THE POLYMER CONCRETE BARRIER BOX IS SUBSIDIARY TO ITEM 618, "CONDUIT".

ITEM 620: ELECTRICAL CONDUCTOR

TEST EACH WIRE OF EACH CABLE OR CONDUCTOR AFTER INSTALLATION. INCOMPLETE CIRCUITS OR DAMAGE TO THE WIRE OR THE CABLE ARE CAUSE FOR IMMEDIATE REJECTION OF THE ENTIRE CABLE BEING TESTED. REMOVE AND REPLACE THE ENTIRE CABLE AT NO EXPENSE TO THE COUNTY. ALSO TEST THE REPLACEMENT CABLE AFTER INSTALLATION.

WHEN PULLING CABLES OR CONDUCTORS THROUGH CONDUIT, DO NOT EXCEED THE MANUFACTURER'S RECOMMENDED PULLING TENSIONS. LUBRICATE THE CABLES OR CONDUCTORS WITH A LUBRICANT RECOMMENDED BY THE CABLE MANUFACTURER.

ENSURE THAT CIRCUITS TEST CLEAR OF FAULTS, GROUNDS AND OPEN CIRCUITS.

SPLIT BOLT CONNECTORS ARE ALLOWED ONLY FOR SPICES ON GROUNDING CONDUCTORS.

FOR PEDESTAL POLE ASSEMBLIES (ITEM 687) WITHIN THE PROJECT, PROVIDE SINGLE POLE BREAKAWAY DISCONNECTS AS SHOWN ON THE CONSTRUCTION DIVISION (CST) MATERIAL PRODUCER'S LIST. CHECK THE LATEST LINK ON THE TxDOT WEBSITE FOR THIS LIST. THE CATEGORY IS "ROADWAY ILLUMINATION AND ELECTRICAL SUPPLIERS". THE FUSE HOLDER IS SHOWN ON THE LIST UNDER ITEM 685. FOR UNDERGROUND (HOT) CONDUCTORS. INSTALL A BREAKAWAY CONNECTOR WITH A DUMMY FUSE (SLUG). PROVIDE DUMMY FUSE (SLUG). FOR GROUNDED (NEUTRAL) CONDUCTORS, INSTALL BREAKAWAY CONNECTOR WITH A WHITE COLORED MARKING AND A PERMANENTLY INSTALLED DUMMY FUSE (SLUG).

FOR ELECTRICAL LICENSING AND ELECTRICAL CERTIFICATION REQUIREMENTS FOR THIS PROJECT, SEE ITEM 7 OF THE STANDARD SPECIFICATIONS AND ANY APPLICABLE SPECIAL PROVISIONS TO ITEM 7.

ITEM 624: GROUND BOX

THE GROUND BOX LOCATIONS ARE APPROXIMATE. ALTERNATE GROUND BOX LOCATIONS MAY BE USED AS DIRECTED, TO AVOID PLACING IN SIDEWALKS OR DRIVEWAYS.

GROUND METAL GROUND BOX COVERS. BOND THE GROUND BOX COVER AND GROUND CONDUCTORS TO A GROUND ROD LOCATED IN THE GROUND BOX AND TO THE SYSTEM GROUND.

DURING CONSTRUCTION AND UNTIL PROJECT COMPLETION, PROVIDE PERSONNEL AND EQUIPMENT NECESSARY TO REMOVE GROUND BOX LIDS FOR INSPECTION. PROVIDE THIS ASSISTANCE WITHIN 24 HOURS OF NOTIFICATION.

CONSTRUCT CONCRETE APRONS IN ACCORDANCE WITH THE LATEST STANDARD SHEET ED (4)-14. MAKE THE DEPTH OF THE CONCRETE APRON THE SAME AS THE DEPTH OF THE GROUND BOX, EXCEPT FOR TYPE 1 AND TYPE 2 GROUND BOXES. FOR TYPE 1 OR TYPE 2 GROUND BOXES, CONSTRUCT THE CONCRETE APRON IN ACCORDANCE WITH DETAILS SHOWN ON THE "GROUND BOX DETAILS INSTALLATION" STANDARD.

THE REQUIREMENTS INCLUDED IN DMS-11070 AND DMS-11071 SUPERSEDE THE REQUIREMENTS OF STANDARD SHEETS ED(4)-14 AND ED(13)-03 RESPECTIVELY.

ITEM 628: ELECTRICAL SERVICES

VERIFY AND COORDINATE THE ELECTRICAL SERVICE LOCATION WITH THE ENGINEERING SECTION OF THE APPROPRIATE UTILITY DISTRICT OR COMPANY.

IDENTIFY THE ELECTRICAL SERVICE POLE WITH AN ADDRESS NUMBER ASSIGNED BY THE UTILITY SERVICE PROVIDER. PROVIDE 2-IN. NUMERIC VISIBLE FROM THE HIGHWAY. PROVIDE PAINTED FIGURES ON STEEL POLE OR SERVICE CABINETS.

ITEM 680: HIGHWAY TRAFFIC SIGNALS

CLEARLY MARK OR HIGHLIGHT ON THE SHOP DRAWINGS THE ITEMS BEING FURNISHED FOR THIS PROJECT.

FURNISH LABOR, TOOLS, EQUIPMENT AND MATERIALS AS SHOWN ON THE PLANS AND SPECIFICATION FOR A COMPLETE AND OPERATING SIGNAL INSTALLATION.

COMPLETE TRAFFIC SIGNAL CONSTRUCTION WORK, INCLUDING CORRECTING DISCREPANCIES SHOWN ON THE FORT BEND COUNTY ROAD & BRIDGE PUNCH LIST BEFORE THE BEGINNING OF THE TEST PERIOD.

PROVIDE A FULL-TIME QUALIFIED TRAFFIC SIGNAL TECHNICIAN RESPONSIBLE FOR INSTALLING, MAINTAINING, OR REPLACING TRAFFIC SIGNAL DEVICES.

STAKING IN THE FIELD IS SUBJECT TO APPROVAL. VERIFY STAKE LOCATIONS OF ALL SIGNAL POLES WITH FORT BEND COUNTY ENGINEERING BEFORE START OF SHAFT DRILLING.

MAKE ADJUSTMENTS IN PROJECT CONSTRUCTION, IF NEEDED, DUE TO CONFLICTS WITH UNDERGROUND UTILITIES. VERIFY ALL ADJUSTMENTS WITH FORT BEND COUNTY ENGINEERING.

DO NOT AIM THE LUMINAIRE ARMS MOUNTED ON TRAFFIC SIGNAL POLES INTO THE INTERSECTION. AIM EACH ARM PERPENDICULAR TO THE CENTERLINE OF THE ROADWAY IT IS INTENDED TO COVER, TO DEVELOP THE PROPER ILLUMINATION PATTERN FOR THE INTERSECTION.

ALLOW THE ELECTRICAL WORK TO BE INSPECTED BY THE COUNTY. COMPLYING WITH THE PROVISIONS AND REQUIREMENTS OF THE COUNTY ELECTRICAL ORDINANCE IS NOT REQUIRED. SUCH INSPECTION DOES NOT MAKE THE COUNTY A PARTY TO THIS CONTRACT.

PROVIDE CONTINUOUS CONDUCTORS WITHOUT SPLICES FROM SIGNAL CONTROLLER TO SIGNAL HEADS. ROUTE THE CONDUCTORS FOR LUMINAIRES TO THE SERVICE ENCLOSURE. SPLICES OR ATTACHMENTS TO THE TERMINAL BLOCK IN THE ACCESS COMPARTMENT OF THE MAST ARM POLE ARE NOT PERMITTED EXCEPT FOR THE LUMINAIRE CABLE.

ABRASIONS TO THE CONDUCTOR INSULATION CAUSED WHILE PULLING CABLE FOR THE TRAFFIC SIGNAL SYSTEM ARE CAUSE FOR IMMEDIATE REJECTION. REMOVE AND REPLACE THE ENTIRE DAMAGED CABLE AT NO EXPENSE TO THE COUNTY.

WHEN PULLING CABLES OR CONDUCTORS THROUGH CONDUIT, DO NOT EXCEED THE MANUFACTURER'S RECOMMENDED PULLING TENSIONS. LUBRICATE THE CABLES OR CONDUCTORS WITH A LUBRICANT AS RECOMMENDED BY THE CABLE MANUFACTURER.

BOND THE CONTROLLER HOUSING, SIGNAL POLES, AND CONDUIT TO A MINIMUM NO. 6 AWG STRANDED COPPER CONDUCTOR. AN EQUIPMENT GROUNDING CONDUCTOR IS REQUIRED IN EVERY CONDUIT TO FORM A CONTINUOUS GROUNDING SYSTEM TO GROUNDING SYSTEM. EFFECTIVELY CONNECT THE GROUNDING SYSTEM TO GROUND RODS OR CONCRETE GROUNDING ELECTRODES AS INDICATED IN THE PLANS.

WRAP SIGNAL HEADS WITH DARK PLASTIC OR SUITABLE MATERIAL TO CONCEAL THE SIGNAL FACES FROM THE TIME OF INSTALLATION UNTIL PLACING INTO OPERATION. DO NOT USE BURLAP.

FURNISH SIGNAL HEADS FROM THE SAME MANUFACTURER.

USE TYPE C HIGH SPECIFIC INTENSITY GRADE SHEETING FOR SIGNS MOUNTED UNDER OR ADJACENT TO THE SIGNAL HEADS.

FOR A STEEL MAST ARM POLE ASSEMBLY. HOLD THE ANCHOR BOLTS AND CONDUITS RIGIDLY IN PLACE WITH A WELDED STEEL TEMPLATE.

LEAVE A MINIMUM OF ONE FULL DIAMETER THREAD EXPOSED ON EACH ANCHOR BOLT SECURING A SIGNAL POLE.

FURNISH AND ATTACH COMPRESSION TYPE CONNECTORS. INSTALL THE CONNECTORS WITH A COMPRESSION MECHANICAL RELEASE HAND-CRIMPING TOOL TO EACH INDIVIDUAL CONDUCTOR BEFORE MAKING CONNECTIONS TO THE TERMINAL STRIPS.

THE CONTRACTOR MAY USE READY MIX CONCRETE.

APPLY MEMBRANE CURING ON CONCRETE WORK IN ACCORDANCE WITH SECTION 420.4.10.3, "MEMBRANE CURING".

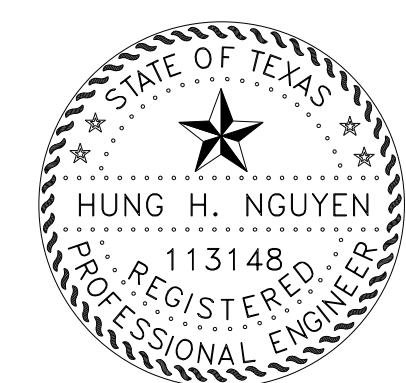
THE STANDARD 4.5 IN. GALVANIZED PIPE TYPE POLES, EXCEPT THE BREAKAWAY TYPE, ARE SUBJECT ONLY TO THE ENGINEER'S INSPECTION FOR THEIR ACCEPTANCE. MILL TEST REPORTS OR DOCUMENTAL WILL NOT BE REQUIRED.

NOTES

- SEE GENERAL NOTES SHEETS AND PROJECT NOTES SHEETS FOR ADDITIONAL INFORMATION.
- THE UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE AND ARE NOT FIELD VERIFIED. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF THE EXISTING UTILITIES PRIOR TO COMMENCING WORK ON THE PROJECT. THIS WORK WILL NOT BE PAID FOR DIRECTLY BUT WILL BE SUBSIDIARY TO THE VARIOUS BID ITEMS.
- THE SEAL FOR RONALD J. THOMAS, PE OF RPS APPEARS ON THIS SHEET FOR THE PROPOSED PAVEMENT DESIGN. THE SEAL FOR XXXXXX OF CIVILTECH APPEARS ON THIS SHEET FOR THE PROPOSED STORM SEWER (INCLUDING THE PROPOSED DITCHES) DESIGN.



CALL BEFORE YOU DIG!
TEXAS ONE CALL PARTICIPANTS REQUEST 48 HOURS NOTICE BEFORE YOU DIG, DRILL, OR BLAST - STOP CALL
Texas One Call System
1-800-DIG-TESS



Hung H. Nguyen

11/07/2023

IDCUS INC. 15915 Katy Freeway, Suite 300 Houston, Texas 77094
(713) 541-5591 Fax: (713) 541-3501
Planners|Engineers|Construction Managers T.B.P.E. FIRM REGISTRATION NO. F-6825

NO.	DATE	REVISION	APPROVED

rps Texas PE Firm Reg. #F-929
5810 Tennyson Parkway, Suite 280, Plano, Texas 75024
T+1 972.202.4242 E.usinfrastructure@rpsgroup.com

FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS

W BELLFORT BLVD TO OAK BEND FOREST DR

TRAFFIC SIGNAL NOTES

SHEET 2 OF 3

CNTY PROJ #	RPS PROJ #	DATE	SCALE	SHEET NO
17-2-11	008169	XXX 2022		
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
IDCUS	IDCUS	IDCUS	IDCUS	195

\$USERS\$

\$TIMES\$

\$DATES\$
\$FILES\$

\$FILES\$
\$TIMES\$

TRAFFIC SIGNAL NOTES

ITEM 682: VEHICLE AND PEDESTRIAN SIGNAL HEADS

INSTALL TWO SET SCREWS ON VEHICLE SIGNAL HEAD MOUNTING HARDWARE FITTINGS.

ITEM 686: TRAFFIC SIGNAL POLE ASSEMBLIES (STEEL)

FOR A STEEL MAST ARM POLE ASSEMBLY, HOLD THE ANCHOR BOLTS AND CONDUITS RIGIDLY IN PLACE WITH A WELDED STEEL TEMPLATE.

LEAVE A MINIMUM OF ONE FULL DIAMETER THREAD EXPOSED ON EACH ANCHOR BOLT SECURING A SIGNAL POLE.

USE A TEXAS CONE PENETROMETER READING OF 10. THE DRILLED SHAFT LENGTH IS FROM THE SURFACE ELEVATION TO THE BOTTOM OF THE DRILLED SHAFT. PROVIDE AN ADDITIONAL LENGTH OF THE POLE FOUNDATION FROM THE SURFACE LEVEL TO THE ROADWAY LEVEL, IF REQUIRED FOR UNUSUAL LOCATIONS. PROVIDE THE DRILLED SHAFT DEPTH REGARDLESS OF THE LENGTH OF THE POLE FOUNDATION. THE POLE FOUNDATION DEPTH FROM THE SURFACE LEVEL TO THE ROADWAY LEVEL IS A MAXIMUM OF 4 FT., OR AS APPROVED.

LOCATE MAST ARM POLE ASSEMBLIES A MINIMUM OF 4 FT. FROM THE ROADWAY CURB OR PAVEMENT EDGE.

AFTER THE TRAFFIC SIGNAL POLE ASSEMBLY IS PLUMB AND THE NUTS ARE TIGHT, TACK-WELD EACH ANCHOR BOLT NUT IN TWO PLACES TO ITS WASHER. TACK-WELD EACH WASHER TO THE BASE PLATE IN TWO PLACES. DO NOT WELD COMPONENTS TO THE BOLT. PERFORM TACK-WELDING IN ACCORDANCE WITH THE ITEM, "STEEL STRUCTURES." AFTER TACK-WELDING, REPAIR GALVANIZING DAMAGE ON BOLTS, NUTS, AND WASHERS IN ACCORDANCE WITH SECTION 445.3.5, "REPAIRS."

THE COUNTY MAY TEST THE ANCHOR BOLTS USING ULTRASONIC METHODS FOR TRAFFIC SIGNAL POLES AFTER THEY ARE INSTALLED. REPLACE FAULTY ANCHOR BOLTS AS DIRECTED. DO NOT WELD THE ANCHOR BOLTS.

ITEM 687: PEDESTAL POLE ASSEMBLIES:


FURNISH AND INSTALL SCREW-IN ANCHOR FOUNDATIONS IN ACCORDANCE WITH SPECIAL SPECIFICATION ITEM, "SCREW-IN ANCHOR TYPE FOUNDATIONS." THE WORK PERFORMED AND MATERIALS FURNISHED IN ACCORDANCE WITH THIS ITEM ARE SUBSIDIARY TO THE ITEM, "PEDESTAL POLE ASSEMBLIES"

ITEM 688: PEDESTRIAN DETECTORS

PROVIDE PEDESTRIAN PUSH BUTTONS A MINIMUM OF 2 IN. DIAMETER IN THE SMALLEST DIMENSION.


INSTALL A RUBBER GROMMET OR BUSHING BETWEEN THE PUSH BUTTON ASSEMBLY AND THE SIGNAL POLE TO PROTECT THE CONDUCTORS

CAUTION!!!!
OVERHEAD ELECTRIC,
LOCATIONS ARE APPROXIMATE

CALL BEFORE YOU DIG!
TEXAS ONE CALL PARTICIPANTS REQUEST
48 HOURS NOTICE BEFORE YOU DIG, DRILL,
OR BLAST - STOP CALL
 **Texas One Call System**
1-800-DIG-TESS



Hung H. Nguyen
11/07/2023

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NO.	DATE	REVISION	APPROVED

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T+1 972 202 4242 E usinfrastructure@rpsgroup.com

FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

TRAFFIC SIGNAL NOTES

SHEET 3 OF 3

CNTY	PROJ #	RPS PROJ #	DATE	SCALE	SHEET NO
17	2-11	008169	XXX 2022		
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY		
IDCUS	IDCUS	IDCUS	IDCUS		196

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11/7/2023 4:30:51 PM T:\FORT_BEND_COUNTY\BELKNAP\CADD\TRAFFIC SIGNALS\BEL-GEN-NOTES-03.dgn

11/7/2023 4:30:51 PM T:\FORT_BEND_COUNTY\BELKNAP\CADD\TRAFFIC SIGNALS\BEL-GEN-NOTES-03.dgn

TRAFFIC SIGNAL ITEMS - BELKNAP ROAD

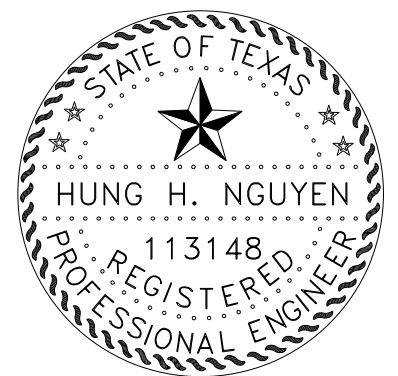
TRAFFIC SIGNAL ITEMS	UNITS	QTY
TXDOT 416/6032 DRILL SHAFT (TRF SIG POLE) (36 IN)	LF	58
TXDOT 618/6046 CONDT (PVC) (SCH 80) (2")	LF	235
TXDOT 618/6047 CONDT (PVC) (SCH 80) (2") (BORE)	LF	65
TXDOT 618/6053 CONDT (PVC) (SCH 80) (3")	LF	225
TXDOT 618/6054 CONDT (PVC) (SCH 80) (3") (BORE)	LF	815
TXDOT 618/6058 CONDT (PVC) (SCH 80) (4")	LF	165
TXDOT 618/6070 CONDT (RM) (2")	LF	70
TXDOT 620/6009 ELEC CONDR (NO.6) BARE	LF	1730
TXDOT 620/6012 ELEC CONDR (NO.4) INSULATED	LF	480
TXDOT 621/6005 TRAY CABLE (4 CONDR) (12 AWG)	LF	1000
TXDOT 624/6010 GROUND BOX TY D (162922)W/APRON	EA	4
TXDOT 624/6021 GROUND BOX TY 2 (243636)W/APRON	EA	1
TXDOT 628/6187 ELC SRV TY D 120/240 070(NS)SS(E)PS(U)	EA	1
TXDOT 680/6002 INSTALL HWY TRF SIG (ISOLATED)	EA	1
* CONTROLLER, FULL ACTUATED W/CABINET	EA	1
* STREET NAME SIGN, "Belknap Rd" (72"x18")	EA	1
* STREET NAME SIGN, "Old Richmond Rd" (114"x18")	EA	1
* STREET NAME SIGN, "Old Richmond Rd" (114"x18")	EA	1
* SIGN, "LEFT TURN YIELD ON FLASHING YELLOW ARROW" (R10-17T) (36"x42")	EA	2
* SIGN, OPTIONAL MOVEMENT LANE CONTROL R3-6L (30"x36")	EA	1
* POWER SUPPLY	EA	1
* ARM, 8' LUMINAIRE	EA	4
* TRAFFIC SIGNAL CONTROLLER FOUNDATION	EA	1
* ROD, 5/8"x10' COPPER GROUND (CONTROLLER ONLY)	EA	1
* CONTROL, PHOTOELECTRIC	EA	1
* GLANCE EMERGENCY PRE-EMPTION AND FIELD MONITORING NIT	EA	1
* UNINTERRUPTIBLE POWER SUPPLY	EA	1
* VEHICLE DETECTION VANTAGE RADIUS DETECTOR	EA	4
* VEHICLE DETECTION PROCESSOR UNIT	EA	1
* CABLE, CAT 5E	LF	1055
TXDOT 682/6001 VEH SIG SEC (12")LED(GRN)	EA	9
TXDOT 682/6002 VEH SIG SEC (12")LED(GRN ARW)	EA	3
TXDOT 682/6003 VEH SIG SEC (12")LED(YEL)	EA	9
TXDOT 682/6004 VEH SIG SEC (12")LED(YEL ARW)	EA	4
TXDOT 682/6005 VEH SIG SEC (12")LED(RED)	EA	9
TXDOT 682/6006 VEH SIG SEC (12")LED(RED ARW)	EA	2
TXDOT 682/6018 PED SIG SEC (LED) (COUNTDOWN)	EA	8
TXDOT 682/6023 BACK PLATE (12") (3 SEC)	EA	8
TXDOT 682/6024 BACK PLATE (12") (4 SEC)	EA	3
TXDOT 684/6007 TRF SIG CBL (TY A) (12 AWG) (2 CONDR)	LF	1700
TXDOT 684/6009 TRF SIG CBL (TY A) (12 AWG) (4 CONDR)	LF	1700
TXDOT 684/6012 TRF SIG CBL (TY A) (12 AWG) (7 CONDR)	LF	1800
TXDOT 686/6027 INS TRF SIG PL AM(S)1 ARM(24')LUM	EA	1
TXDOT 686/6035 INS TRF SIG PL AM(S)1 ARM(32')LUM	EA	1
TXDOT 686/6039 INS TRF SIG PL AM(S)1 ARM(36')LUM	EA	1
TXDOT 686/6041 INS TRF SIG PL AM(S)1 ARM(40')LUM	EA	1
TXDOT 687/6001 PED POLE ASSEMBLY	EA	6
* SCREW-IN TYPE ANCHOR FOUNDATION	EA	6
TXDOT 688/6001 PED DETECT PUSH BUTTON (APS)	EA	8
* SIGN, PED, WALK SMB. W/DIR ARROW (R10-3eL) (9"x15")	EA	2
* SIGN, PED, WALK SMB. W/DIR ARROW (R10-3eR) (9"x15")	EA	6
TXDOT 688/6003 PED DETECTOR CONTROLLER UNIT	EA	1
TXDOT 6058/6001 BBU SYSTEM (EXTERNAL BATT CABINET)	EA	1
* ALPHA TECHNOLOGIES FXM-2000, MODEL AOES-6 CABINET 030-127-22 (WITH FOUR 220GXL ALPHA BATTERIES)	EA	1
* ALPHA TECHNOLOGIES REMOTE BATTERY MONITORING SYSTEM	EA	1
TXDOT 8777/2001 LED RDWY LUMINAIRE (.25KW EQ) (DW-HOU)	EA	4

* SUBSIDIARY TO OTHER ITEMS (FOR CONTRACTOR'S INFORMATION ONLY)

FORT BEND COUNTY ENGINEERING - APPROVED SIGNAL EQUIPMENT LIST		
EQUIPMENT	MANUFACTURER	MODEL
TRAFFIC SIGNAL CABINET	HENKE	P168CS-TS2-1 P44 TRAFFIC SIGNAL CABINET
TRAFFIC SIGNAL CONTROLLER	ECONOLITE	COB21110110000 COBALT 2100 TRAFFIC SIGNAL CONTROLLER
CONFLICT MONITOR	EBERLE DESIGN	006-MMU16LEIP CONFLICT SMART MONITOR
UNINTERRUPTIBLE POWER SUPPLY	ALPHA TECHNOLOGIES	FXM-2000, MODEL AOES-6 CABINET 030-127-22 (WITH FOUR 220GXL ALPHA BATTERIES)
REMOTE BATTERY MONITORING SYSTEM	ALPHA TECHNOLOGIES	2-STRING
FIELD MONITORING UNIT	APPLIED INFORMATION	AI-500-085-02 HSM
EMERGENCY PRE-EMPTION	APPLIED INFORMATION	GLANCE - INC LUDED WITH AI-500-85-02 FMU
LED SIGNAL	DURALIGHT	JXJ300-07_03 TXDOT ARROW LED - CLEAR LENS
	DURALIGHT	JXC300-HFT_03 TXDOT BALL LED - HI-FLUX
AUDIBLE PEDESTRIAN PUSH BBUTTONS	POLARA	9X15 NAVIGATOR (2 WIRE) BLACK/BLACK (87-EN23TNO-B) ICCU - SHELF MODEL INCLUDING HARDWARE KIT (87-ICCU-S)
SIGNAL AND PEDESTRIAN POLES	PELCO	PB-5100 SERIES PED POLE ALUMINUM
SIGNAL AND PEDESTRIAN HOUSING	MCCAIN	M31825 PED SIGNAL HOUSING; COLOR SHALL BE BLACK
PEDESTRIAN COUNTDOWN MODULES	DURALIGHT	JXM-400 VIEIL 16" X 18" PED LED
LUMINAIRE FIXTURE	PHILLIPS	LUMEC RFM 108W48LED4K G2 R2M UNV DMG FAWS RCD7 PH9 SP2
GROUND BOX	TXDOT APPROVED LIST	
TRAFFIC SIGNAL CABLE	TXDOT APPROVED LIST	
CONDUIT	TXDOT APPROVED LIST	
RADAR DETECTION SYSTEM	ITERIS	VANTAGE RADIUS

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11/07/2023

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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

**SUMMARY OF TRAFFIC
SIGNAL ITEMS**

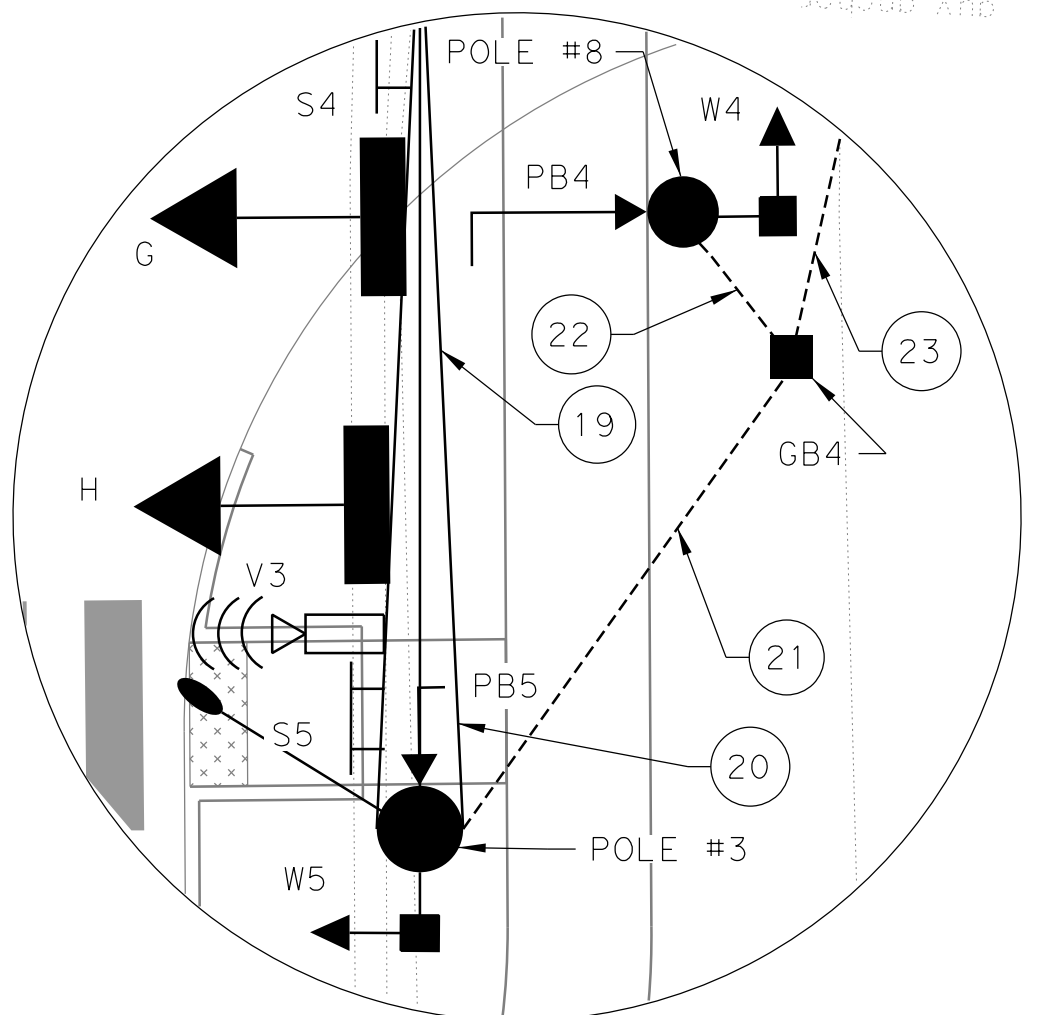
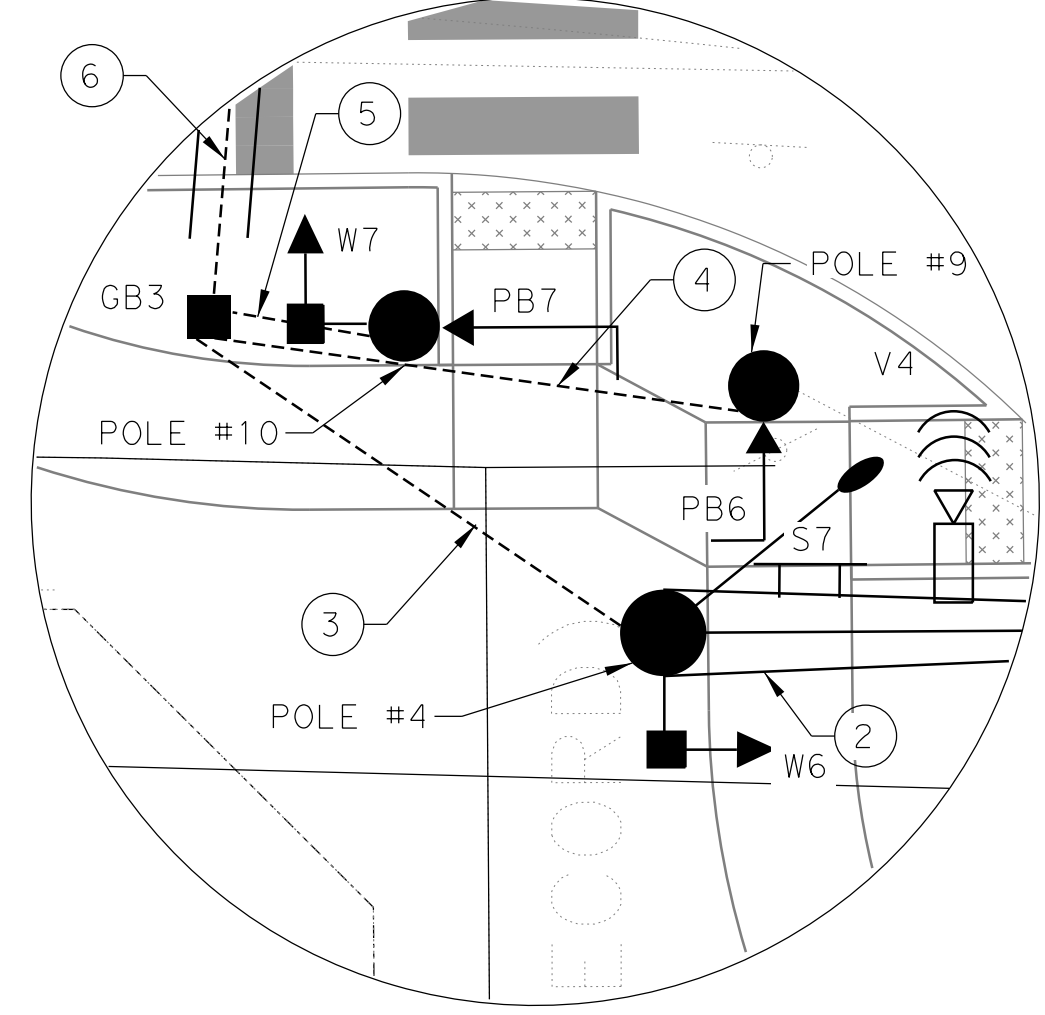
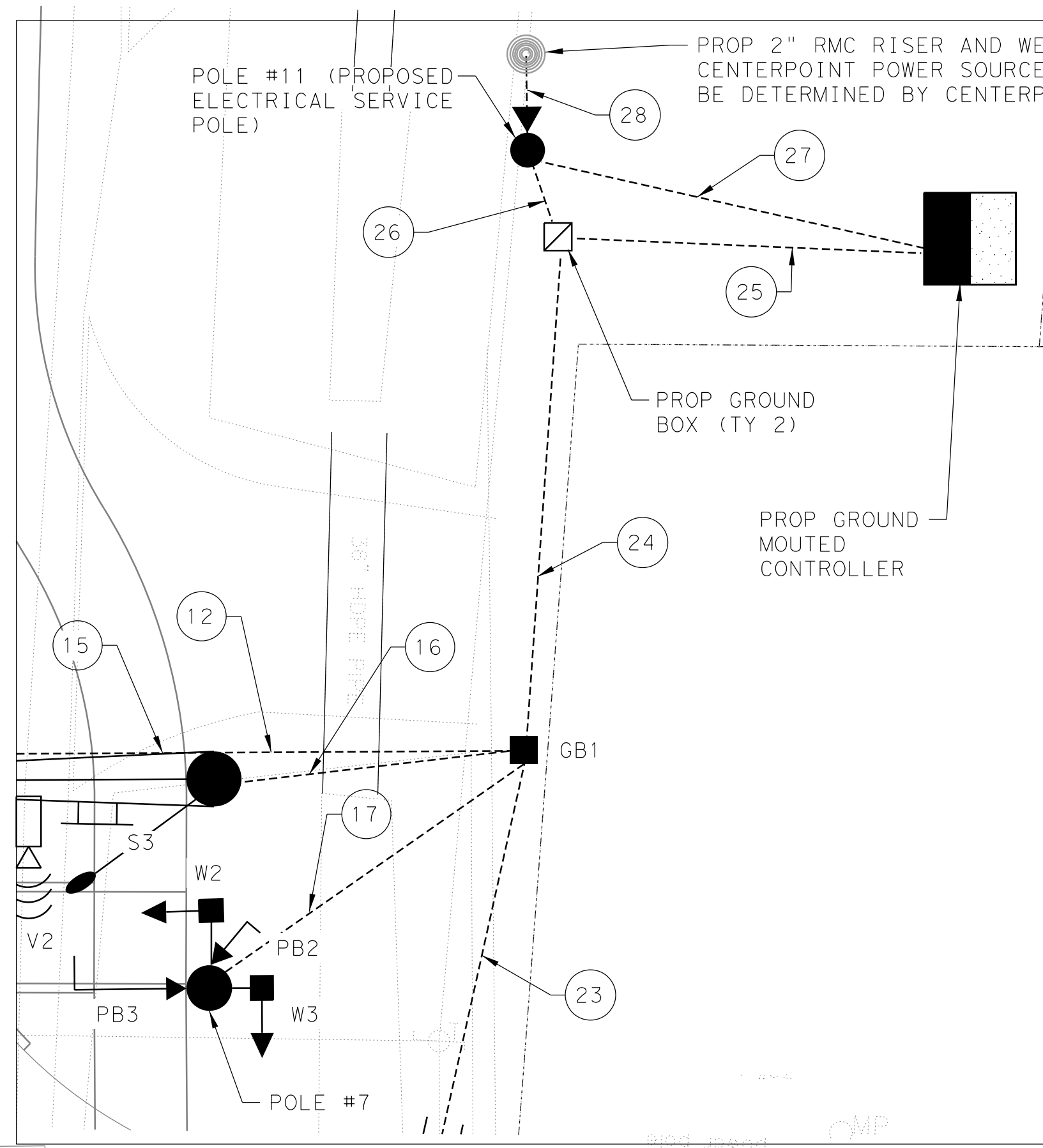
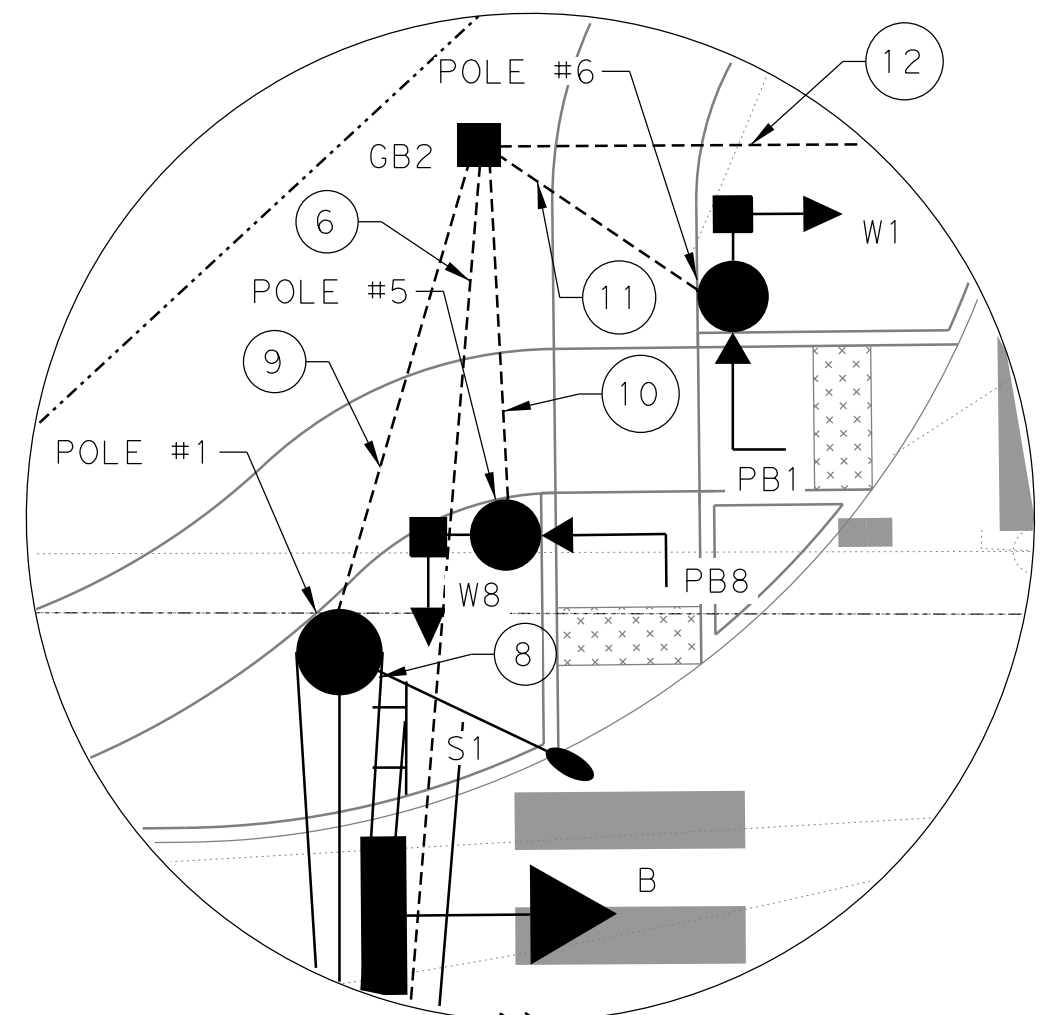
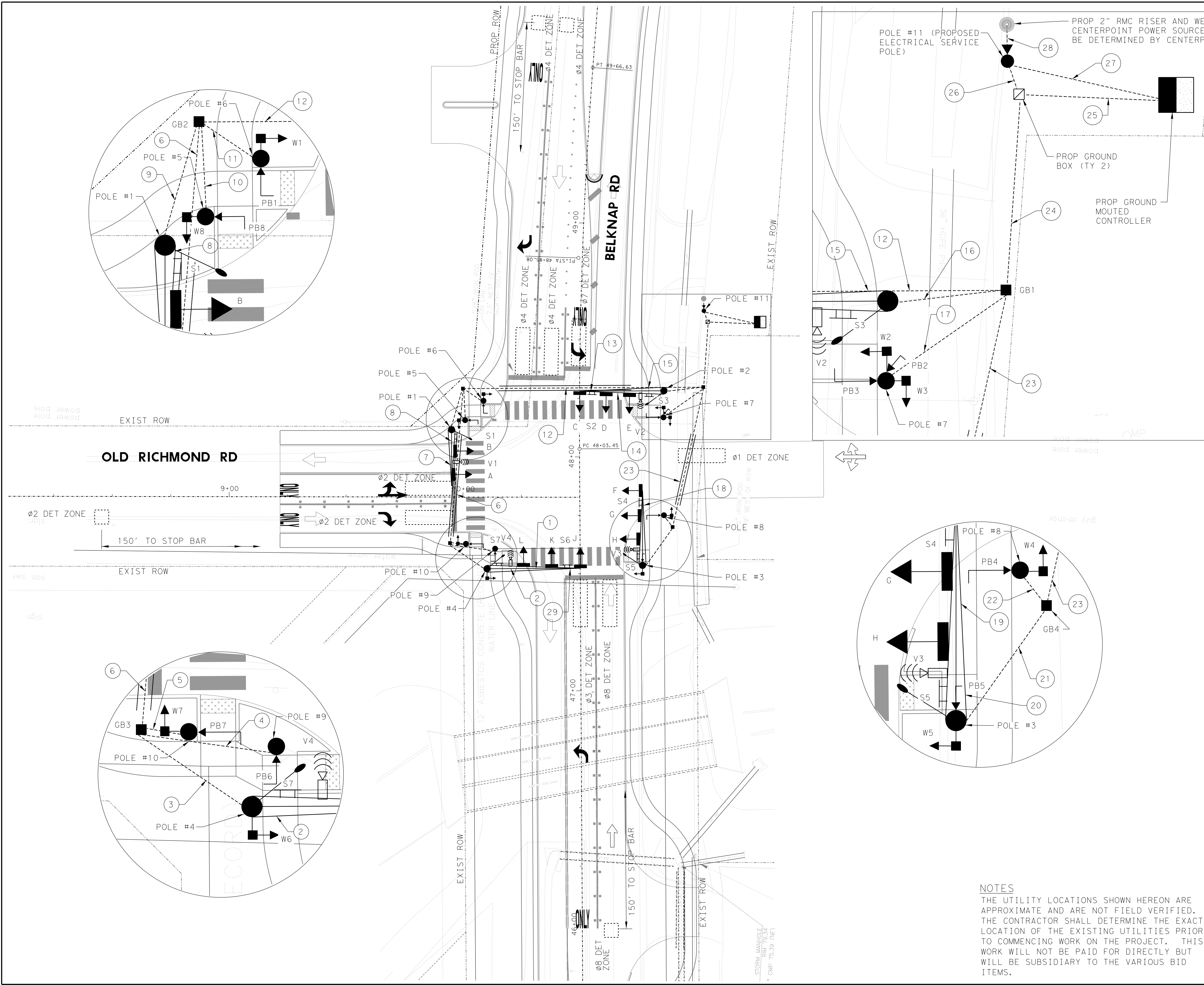
SHEET 1 OF 1

CNTY PROJ #	RPS PROJ #	DATE	SCALE	SHEET NO
17-2-11	008169	XXX 2022		
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IDCUS	IDCUS	IDCUS	IDCUS	197

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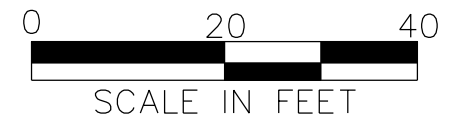


LEGEND

- MAST ARM POLE
- PEDESTAL POLE
- GROUND MOUNTED CONTROLLER
- 8' LUMINAIRE ARM
- ⬆ SIGNAL HEAD
- ⬆ PEDESTRIAN SIGNAL HEAD
- ⬆ PEDESTRIAN PUSH BUTTON/SIGN
- ⬆ OVERHEAD SIGN
- ELECTRIC SERVICE
- GB# ■ GROUND BOX (TY D)
- GROUND BOX (TY 2)
- CONDUIT
- ==== CONDUIT (BORE)
- ← DIRECTION OF TRAFFIC FLOW
- DETECTION ZONE
- ⊗ CONDUIT RUN
- ⊞ VEHICLE VANTAGE DETECTOR

PROPOSED SPEED LIMIT

BELKNAP=45 MPH
OLD RICHMOND= 45 MPH



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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

SIGNAL LAYOUT
OLD RICHMOND ROAD AT BELKNAP ROAD

NOTES
THE UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE AND ARE NOT FIELD VERIFIED. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF THE EXISTING UTILITIES PRIOR TO COMMENCING WORK ON THE PROJECT. THIS WORK WILL NOT BE PAID FOR DIRECTLY BUT WILL BE SUBSIDIARY TO THE VARIOUS BID ITEMS.

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17-2-11	008169	XXX 2022		
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
IDCUS	IDCUS	IDCUS	IDCUS	198

ELECTRICAL CONDUIT AND CONDUCTOR SCHEDULE		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
POWER	#4 XHHW																												3	
	#6 XHHW																											2		
LUMINAIRE	4/C #12 TRAY CABLE			1			1				1		2					1				1		1	4		4			
SIGNAL CABLE	2/C-#12					1	2				1	1	4					2				1	1	2	8	8				
	4/C-#12			1	1	2					1	1	4					2				1	1	2	8	8				
	7/C-#12	2	2	2			2	1	1	1		3	1	2	2	2			1	2	2	2		2	7	6				
GROUND	#6 BARE COPPER			2	1	1	2				2	1	1	3				2	1			2	1	2	3	3	1	1	1	
VEHICLE DETECTION	CAT 5e		1	1				1		1	1		2					1	1			1	1		4	4				
CONDUIT	2" PVC				1	1						1	1										1				1	1	1	
	3" PVC			2			2					2		3				2				2		2	1	1				
	4" PVC																								2	2				
	2" RMC																												*1	

* ALL EXPOSED CONDUIT TO BE RMC, ATTACHED TO CENTERPOINT POWER POLE

TRAFFIC SIGNAL POLE INFORMATION				
POLE NO.	SIGNAL POLE DESIGNATION	FOUNDATION TYPE/DEPTH	BELKNAP RD STATION	OFFSET
1	SMA-24L	36-A/13'	48+11.73	54.72' LT
2	SMA-36L	36-A/13'	48+28.52	36.12' RT
3	SMA-32L	36-A/13'	47+53.46	26.67' RT
4	SMA-40L	36-B/15'	47+52.42	39.90' LT
5	PEDESTAL POLE	SCREW-IN ANCHOR	48+15.70	48.95' LT
6	PEDESTAL POLE	SCREW-IN ANCHOR	48+23.82	41.06' LT
7	PEDESTAL POLE	SCREW-IN ANCHOR	48+16.94	35.91' RT
8	PEDESTAL POLE	SCREW-IN ANCHOR	47+74.84	35.94' RT
9	PEDESTAL POLE	SCREW-IN ANCHOR	47+60.98	36.36' LT
10	PEDESTAL POLE	SCREW-IN ANCHOR	47+63.13	48.84' LT
11	ELECTRICAL SERVICE TY D	N/A	48+63.75	52.65' RT
	GROUND MOUNTED CONTROLLER	N/A	48+59.35	76.81' RT

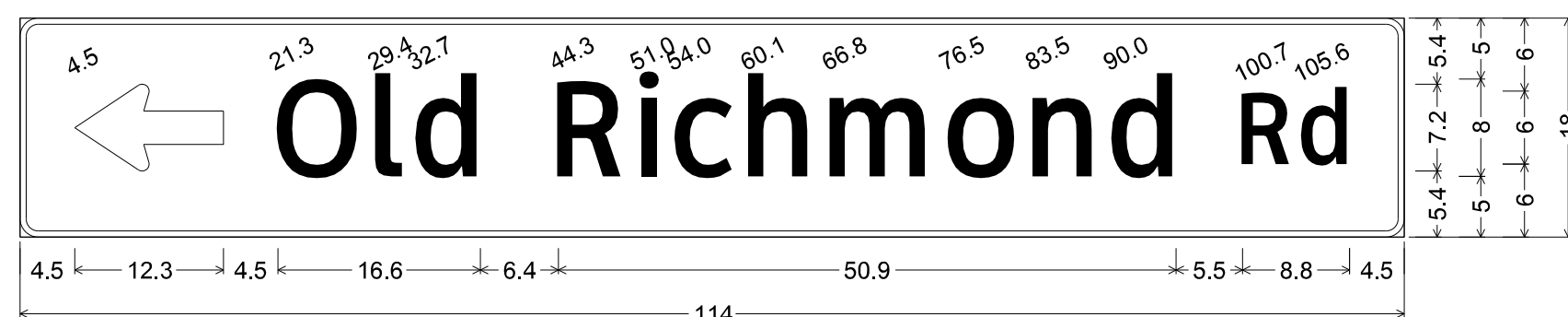
NOTES:

- LOCATION OF UTILITIES SHOWN ARE APPROXIMATE. IT IS THE CONTRACTOR'S RESPONSIBILITY TO LOCATE ALL UTILITIES (PUBLIC AND PRIVATE) PRIOR TO COMMENCING WORK. THE CONTRACTOR IS FULLY RESPONSIBLE FOR ANY DAMAGES CAUSED BY HIS FAILURE TO LOCATE AND PRESERVE THESE UTILITIES, WHETHER UNDERGROUND, ABOVE GROUND OR OVERHEAD.
- CALL THE FOLLOWING NUMBERS FOR LOCATION OF UNDERGROUND FACILITIES 72 HOURS PRIOR TO ANY EXCAVATION IN AREA: UTILITIES - 713-223-4567 (HOUSTON) 1-800-669-8344 (OUTSIDE HOUSTON) PIPELINES - 1-800-245-4545 AND 1-800-344-8377.
- LOCATIONS OF CENTERPOINT FACILITIES ARE APPROXIMATE AND HAVE NOT BEEN VERIFIED IN THE FIELD. CONTRACTOR TO INSTALL 2" RMC AND WEATHER HEAD ON EXISTING CPE POWER POLE FOR SERVICE CONNECTION.
- ALL CONSTRUCTION SIGNS AND BARRICADES SHALL CONFORM TO THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
- CONTRACTOR SHALL RESTORE THE CONSTRUCTION AREA TO ORIGINAL CONDITION PRIOR TO FINAL INSPECTION.
- IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE WITH FORT BEND COUNTY TO VERIFY EXACT LOCATIONS PRIOR TO CONSTRUCTION.
- ALL ELECTRICAL AND CONDUIT WORK SHALL CONFORM TO NEC CODES.

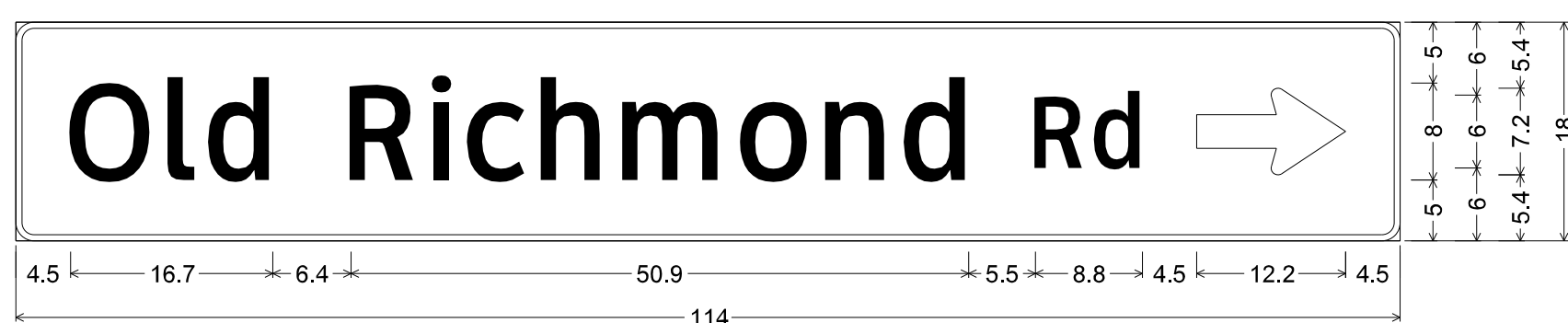
ELECTRICAL SERVICE DATA

Electrical Service Description (see ED(5) (6) (9))	Service Conduit Size (PVC)	Service Conductors No./Size	Safety Switch Amps	Main Disconnect Ckt. Bkr. Pole/Amps	Two-Pole Contractor Amps	Panel/bd/ Loadcenter Amp Rating (MIN)	Circuit No.	Branch Ckt. Bkr. Pole/Amps	KVA Load
TY D 120/240 070(NS)SS(E)PS(U)	2"	3/#4	N/A	2P/070	30	100	T.S. Lighting	1P/50 2P/15	<7.1

SIGN SCHEDULE



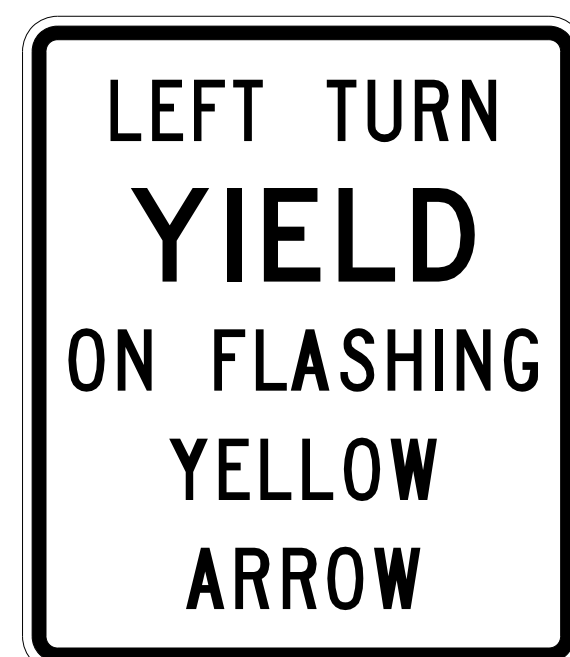
Identifier : D3-1G 8in LT
1.5" Radius, 0.5" Border, White on Green;
Standard Arrow Custom 12.3" X 7.1" 180°; [Old Richmond] ClearviewHwy-3-W 70% spacing;
[Rd] ClearviewHwy-3-W 70% spacing;
S3



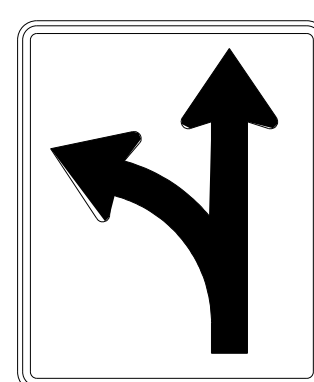
Identifier : D3-1G 8in RT
1.5" Radius, 0.5" Border, White on Green;
[Old Richmond] ClearviewHwy-3-W 70% spacing; [Rd] ClearviewHwy-3-W 70% spacing;
Standard Arrow Custom 12.3" X 7.1" 0°;
S7



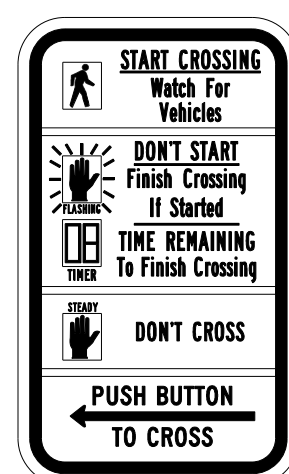
Identifier : D3-1G 8in
1.5" Radius, 0.5" Border, White on Green;
[Belknap] ClearviewHwy-3-W; [Rd] ClearviewHwy-3-W;
S1, S5



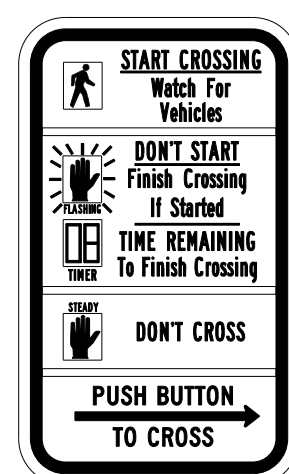
S2, S6
R10-17T
(36"X42")



S4
R3-6L
(30"X36")

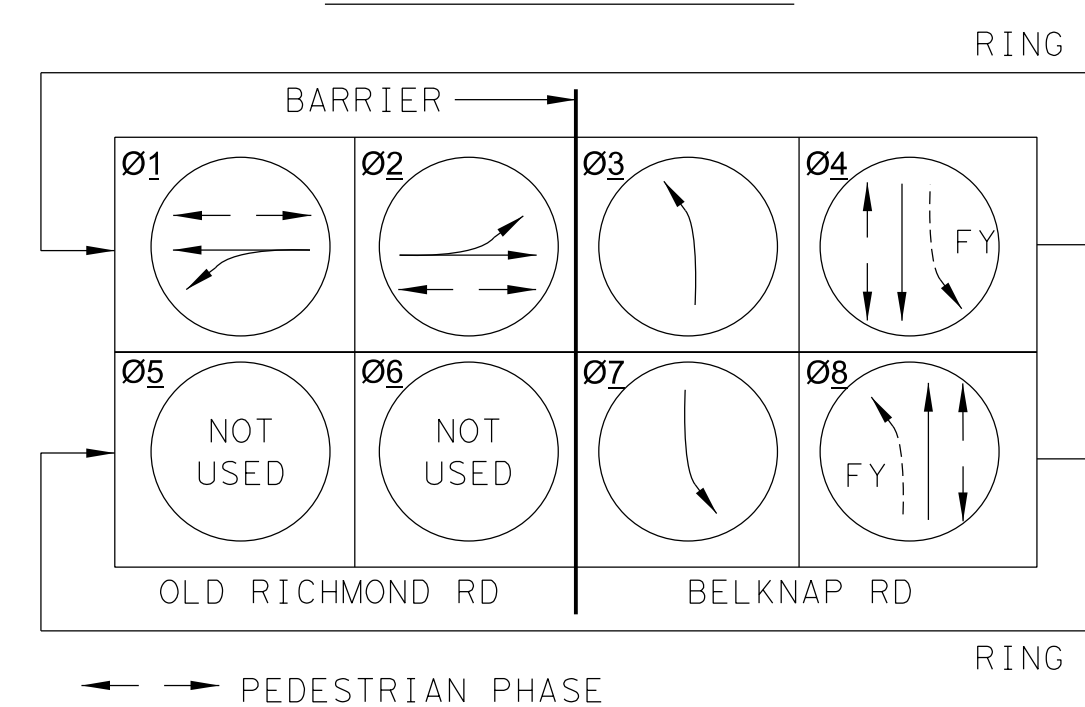


R10-3eL
(9"X15")
(ACCESSIBLE PEDESTRIAN PUSH BUTTON)
PB4, PB8

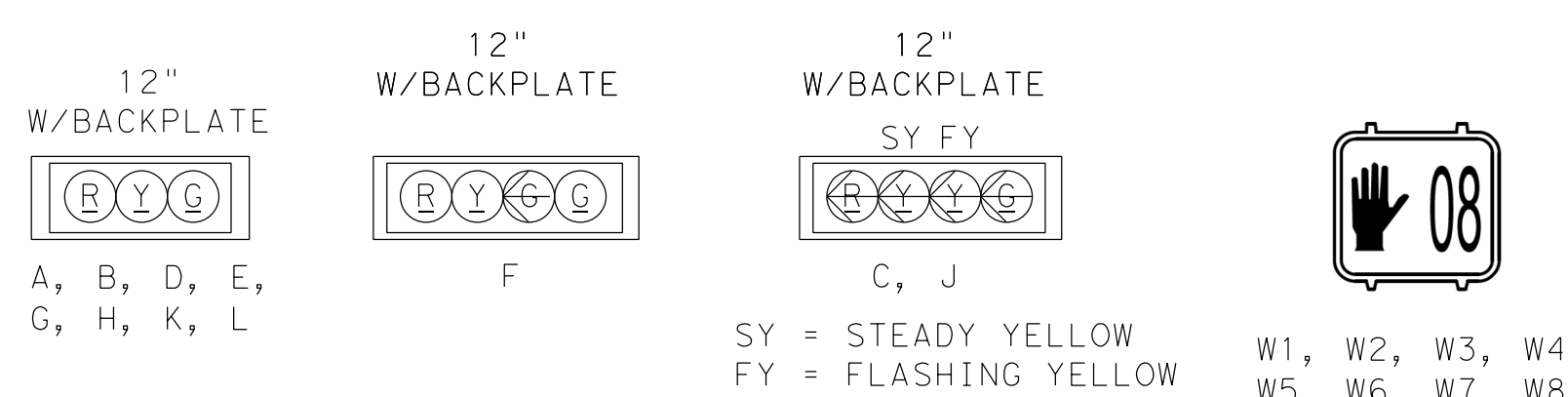


R10-3eR
(9"X15")
(ACCESSIBLE PEDESTRIAN PUSH BUTTON)
PB1, PB2, PB3, PB5, PB6, PB7

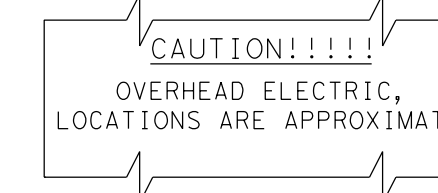
PHASING DIAGRAM



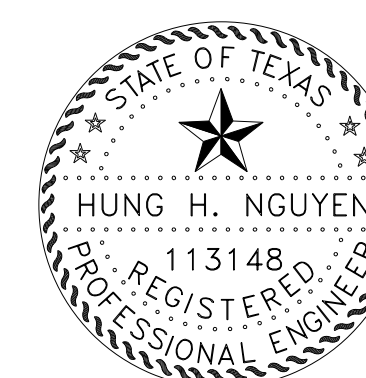
*** SIGNAL HEAD SCHEDULE**



* GE LED LAMP UNITS



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OLD RICHMOND ROAD AT BELKNAP ROAD

CNTY PROJ #	RPS PROJ #	DATE	SCALE	SHEET NO
17-2-11	008169	XXX 2022	N.T.S.	
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QUANTITY ESTIMATE


TRAFFIC SIGNAL POLE ITEMS		UNITS	QTY
TXDOT 618/6046	CONDT (PVC) (SCH 80) (2")	LF	135
TXDOT 618/6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	220
TXDOT 618/6053	CONDT (PVC) (SCH 80) (3")	LF	10
TXDOT 620/6009	ELEC CONDR (NO. 6) BARE	LF	365
TXDOT 624/6010	GROUND BOX TY D (162922) W/APRON	EA	2
TXDOT 682/6018	PED SIG SEC (LED)(COUNTDOWN)	EA	4
TXDOT 684/6007	TRF SIG CBL (TY A) (12 AWG) (2 CONDR)	LF	375
TXDOT 684/6009	TRF SIG CBL (TY A) (12 AWG) (4 CONDR)	LF	375
TXDOT 687/6001	PED POLE ASSEMBLY	EA	3
*	SCREW-IN ANCHOR FOUNDATION	EA	3
TXDOT 688/6001	PED DETECT PUSH BUTTON (APS)	EA	4
*	SIGN, PED, WALK SMB. W/DIR ARROW (R10-3eL) (9"X15")	EA	3
*	SIGN, PED, WALK SMB. W/DIR ARROW (R10-3eR) (9"X15")	EA	1

* SUBSIDIARY TO OTHER ITEMS (FOR CONTRACTOR'S INFORMATION ONLY)



Xiaoming Chen
11/9/2023

NO	DATE	REVISION	APPROVED



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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
INTERSECTION OF W BELLFORT & BELKNAP RD

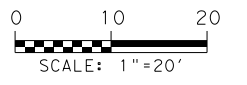
SUMMARY OF QUANTITIES FOR SIGNAL MODIFICATION

SHEET 1 OF 1

CNTY PROJ	RPS PROJ	DATE	SCALE	SHEET NO
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- LEGEND:**
- PEDESTAL POLE
 - APS PEDESTRIAN PUSH BUTTON
 - LED COUNTDOWN PEDESTRIAN SIGNAL HEAD
 - GB GROUND BOX
 - CONDUIT
 - === CONDUIT (BORE)
 - ↑ DIRECTION OF TRAFFIC FLOW
 - ⊗ CONDUIT RUN



CAUTION!!!!
OVERHEAD ELECTRIC,
LOCATIONS ARE APPROXIMATE

CALL BEFORE YOU DIG!
TEXAS ONE CALL PARTICIPANTS REQUEST
48 HOURS NOTICE BEFORE YOU DIG, DRILL,
OR BLAST - STOP CALL
Texas One Call System
1-800-DIG-TESS



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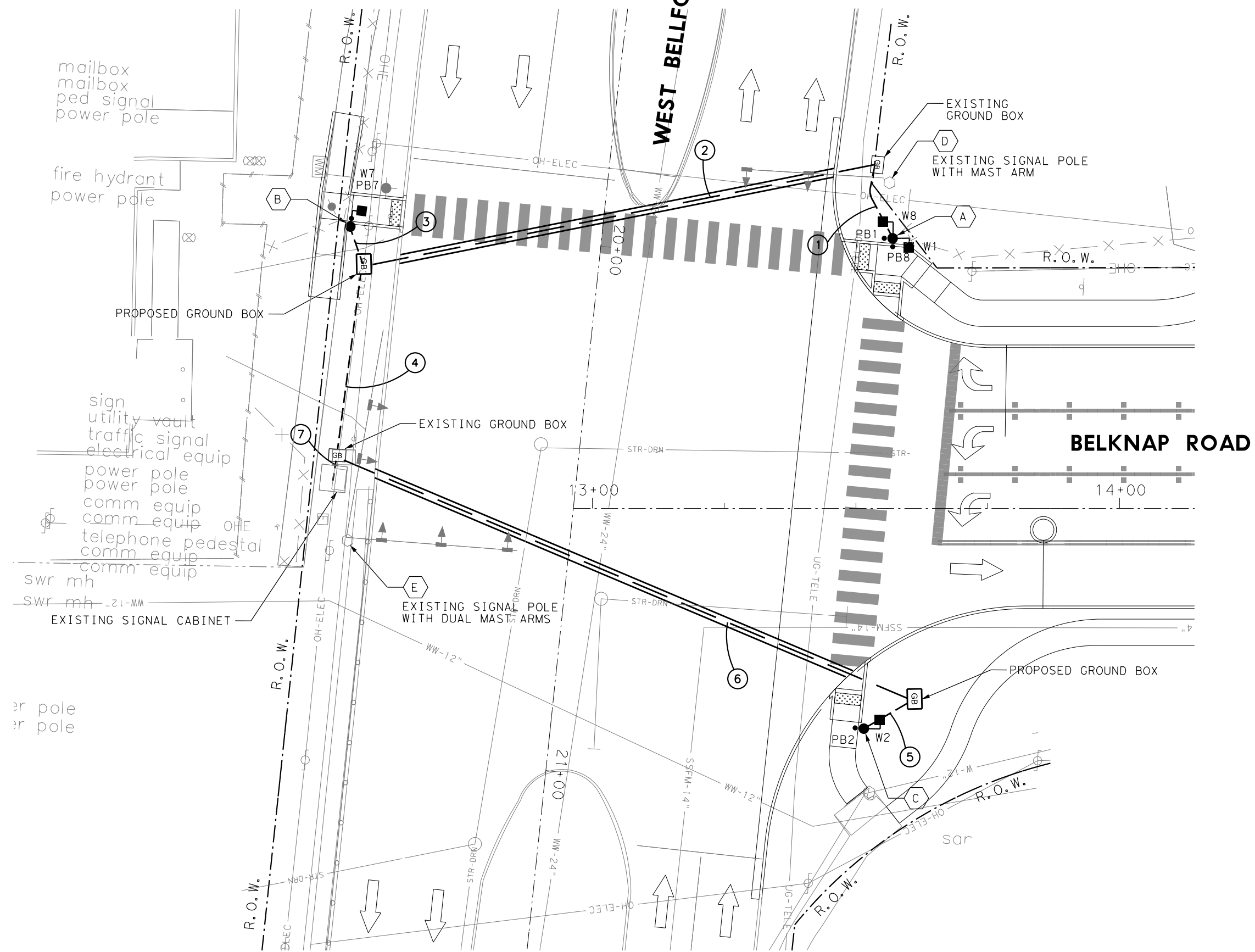
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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
INTERSECTION OF W BELLFORT & BELKNAP RD

**TRAFFIC SIGNAL
MODIFICATION LAYOUT
AT W BELLFORT**

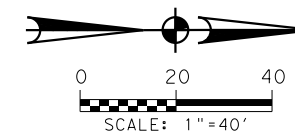
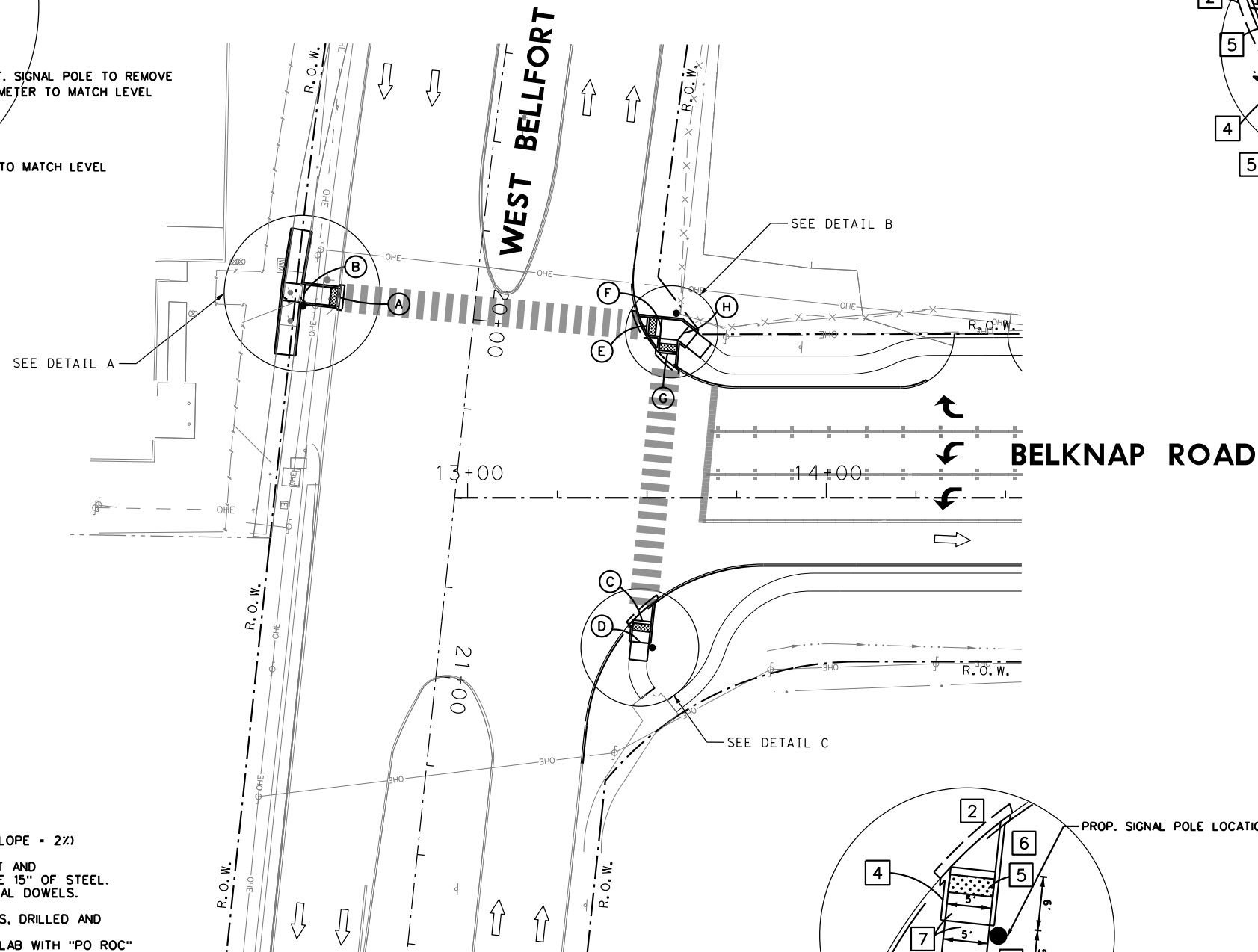
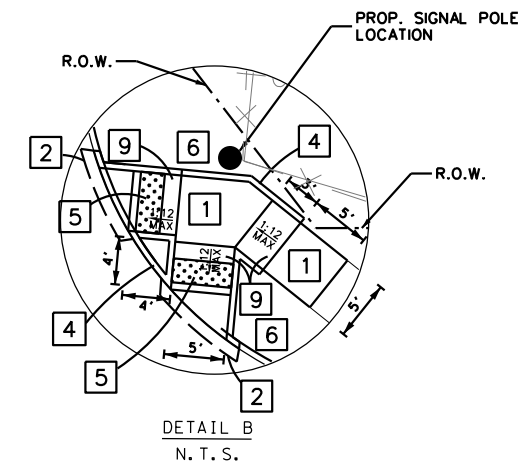
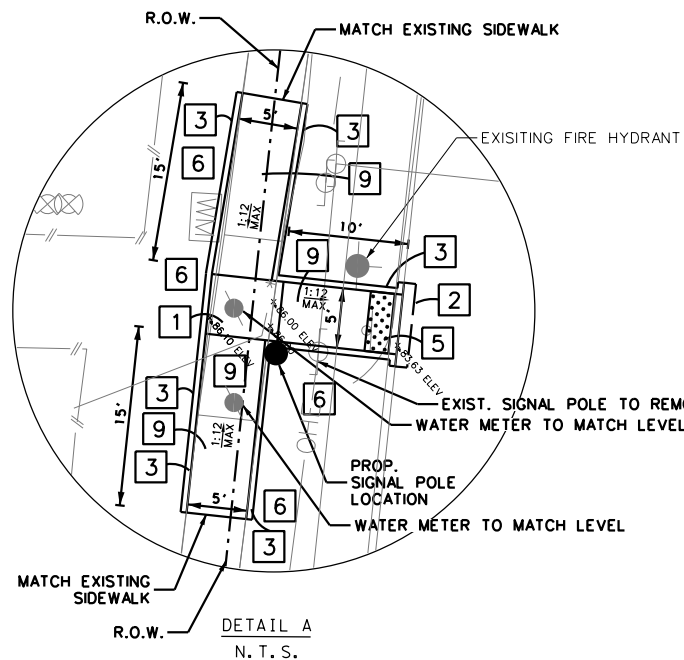
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PAVING QUANTITIES

Harris County Spec 104	REMOVING OLD CONCRETE	SY	38
Harris County Spec 162	BLOCK SODDING	SY	28
Harris County Spec 473	ADJUST LEVEL OF WATER METER	EA	2
Harris County Spec 530	FURNISH AND INSTALL 4-1/2" REINFORCED CONCRETE RAMP	SY	55
Harris County Spec 530	FURNISH AND INSTALL TYPE SEVEN (7) REINFORCED CONCRETE RAMP	EA	1
Harris County Spec 530	FURNISH AND INSTALL 4 1/2" REINFORCED CONCRETE SIDEWALK	SY	20
Harris County Spec 530	FURNISH AND INSTALL 6" REINFORCED CONCRETE CURB	LF	40
Harris County Spec 530	FURNISH AND INSTALL 10" REINFORCED CONCRETE CURB	LF	90
Harris County SS9011	DETECTABLE WARNING 2' WIDE (RED BRICK TRUNCATED DOME)	LF	15



CAUTION!!!!
OVERHEAD ELECTRIC,
LOCATIONS ARE APPROXIMATE

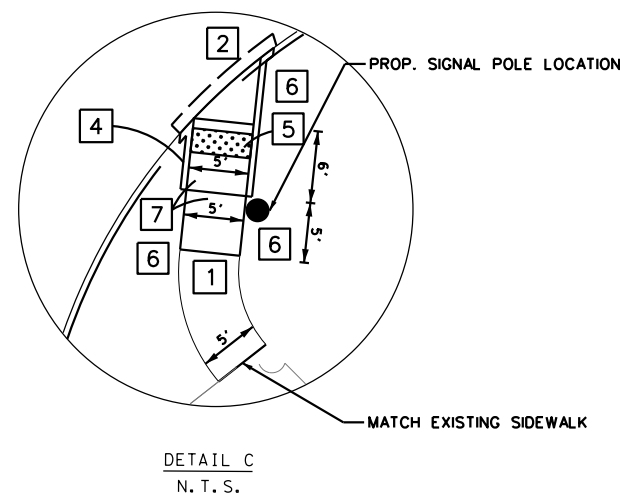
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48 HOURS NOTICE BEFORE YOU DIG, DRILL,
OR BLAST - STOP CALL
Texas One Call System
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PROPOSED PAVING CONSTRUCTION NOTES

- 1 4 1/2" REINFORCED CONCRETE SIDEWALK (MAX. SLOPE = 2%)
- 2 SAWCUT 1" FROM THE FACE OF CURB, BREAK-OUT AND REMOVE CONCRETE CURB AND PAVEMENT, EXPOSE 15" OF STEEL. IF NO REINFORCING STEEL EXISTS, USE HORIZONTAL DOWELS. HORIZONTAL DOWELS SHALL BE #6 REBARS, 24" LONG AT 18" CENTERS, DRILLED AND EMBEDDED 12" INTO THE CENTER OF THE EXISTING CONCRETE SLAB WITH "PO ROC" OR EQUAL.
- 3 PROPOSED 10" CONCRETE CURB.
- 4 PROPOSED 6" CONCRETE CURB.
- 5 DETECTABLE WARNING 2' WIDE RED BRICK TRUNCATED DOMES.
- 6 RE-GRADE AREA, COMPACT AND SOD.
- 7 TYP. 7 REINFORCED CONCRETE RAMP (MAX. RUNNING SLOPE = 1:12)
- 8 BRICK PAVER WITH MATCHING COLOR
- 9 4 1/2" REINFORCED CONCRETE RAMP (MAX. SLOPE = 8.3%)
- 10 REINFORCED 6" CONCRETE PAVEMENT FOR MEDIANS

STATION AND OFFSET SHOWN TO FACE OF CURB

REFERENCE POINT	BASELINE	STATION	OFFSET
A	W BELLFORT	19+97.8	37.7' RT
B	W BELLFORT	19+97.7	47.7' RT
C	BELKNAP	13+48.7	34.4' RT
D	BELKNAP	13+48.0	40.3' RT
E	BELKNAP	13+49.9	47.9' LT
F	BELKNAP	13+53.9	47.8' LT
G	BELKNAP	13+55.7	40.3' LT
H	BELKNAP	13+60.2	46.0 LT



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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
INTERSECTION OF W BELLFORT & BELKNAP RD

CURB RAMP
PAVING PLAN
AT W BELLFORT

CNTY PROJ	RPS PROJ	DATE	SCALE	SHEET NO
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ELECTRICAL CONDUIT AND CONDUCTOR SCHEDULE								
ITEM	DESCRIPTION	1	2	3	4	5	6	7
SIGNAL CABLE	2/C #12	2	2	1	3	1	1	4
	4/C #12	2	2	1	3	1	1	4
GROUND	#6 BARE COPPER	1	1	1	1	1	1	1
CONDUIT	2 INCH PVC	1	-	1	1	-	1	-
	2 INCH PVC (BORE)	-	1	-	-	1	-	-
	3 INCH PVC	-	-	-	-	-	-	1

NOTES:


1. LOCATION OF UTILITIES SHOWN ARE APPROXIMATE. IT IS THE CONTRACTOR'S RESPONSIBILITY TO LOCATE ALL UTILITIES (PUBLIC AND PRIVATE) PRIOR TO COMMENCING WORK. THE CONTRACTOR IS FULLY RESPONSIBLE FOR ANY DAMAGES CAUSED BY HIS FAILURE TO LOCATE AND PRESERVE THESE UTILITIES, WHETHER UNDERGROUND, ABOVE GROUND OR OVERHEAD.
2. CALL THE FOLLOWING NUMBERS FOR LOCATION OF UNDERGROUND FACILITIES 72 HOURS PRIOR TO ANY EXCAVATION IN AREA: UTILITIES - 713-223-4567 (HOUSTON) 1-800-669-8344 (OUTSIDE HOUSTON) PIPELINES - 1-800-245-4545 AND 1-800-344-8377.
3. LOCATIONS OF CENTERPOINT FACILITIES ARE APPROXIMATE AND HAVE BEEN VERIFIED IN THE FIELD. CONTRACTOR TO INSTALL 2" RMC AND WEATHER HEAD ON EXISTING CPE POWER POLE FOR SERVICE.
4. ALL CONSTRUCTION SIGNS AND BARRICADES SHALL CONFORM TO THE TEXAS MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES.
5. CONTRACTOR SHALL RESTORE THE CONSTRUCTION AREA TO ORIGINAL CONDITION PRIOR TO FINAL INSPECTION.
6. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE WITH FORT BEND COUNTY TO VERIFY EXACT LOACTIONS PRIOR TO CONSTRUCTION.
7. ALL ELECTRICAL AND CONDUIT WORK SHALL CONFORM TO NEC CODES.
8. KEEP THE EXISTING TRAFFIC SIGNAL TIMING AND PHASING.

TRAFFIC SIGNAL POLE AAND CABINET INFORMATION				
POLE NO.	SIGNAL POLE DESCRIPTION	FOUNDATION TYPE/DEPTH	W BELFORT STATION	OFFSET
A	4"x10' PEDESTRIAN POLE WITH PEDESTRIAN SIGNAL HEADS W1, W8 AND PUSH BUTTON PB1, PB8	SCREW-IN ANCHOR	19+92.4	56.2' LT
B	4"x10' PEDESTRIAN POLE WITH PEDESTRIAN SIGNAL HEADS W7 AND PUSH BUTTON PB7	SCREW-IN ANCHOR	20+01.2	47.7' RT
C	4"x10' PEDESTRIAN POLE WITH PEDESTRIAN SIGNAL HEADS W2 AND PUSH BUTTON PB2	SCREW-IN ANCHOR	20+85.8	59.2' LT
D	EXISTING SIGNAL POLE WITH MAST ARM	EXISTING	EXISTING	EXISTING
E	EXISTING SIGNAL POLE WITH DUAL MAST ARMS	EXISTING	EXISTING	EXISTING
F	EXISTING CABINET	EXISTING	EXISTING	EXISTING



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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
INTERSECTION OF W BELLFORT & BELKNAP RD

SIGNAL MODIFICATION
MISCELLANEOUS DETAILS

SHEET 1 OF 1

CNTY PROJ •	RPS PROJ •	DATE	SCALE	SHEET NO
17-2-11	008169	2023		
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	203
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PROPOSED (APS) ACCESSIBLE PEDESTRIAN SIGNAL UNITS

LED COUNTDOWN PEDESTRIAN SIGNAL HEADS



W1, W2, W7 AND W8

R10-3eR



Pb1

R10-3eL



Pb2, Pb7 AND Pb8

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DATE: FILE:

GENERAL NOTES FOR ALL ELECTRICAL WORK

1. The location of all conduits, junction boxes, ground boxes, and electrical services is diagrammatic and may be shifted to accommodate field conditions.
2. Provide new and unused materials. Ensure that all materials and installations comply with the applicable articles of the National Electrical Code (NEC), TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA), and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association (CSA), Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Where reference is made to NEMA listed devices, International Electrotechnical Commission (IEC) listed devices will not be considered an acceptable equal to a NEMA listed device. Acceptable devices may have both a NEMA and IEC listing. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection. Replace or reinstall rejected material or equipment at no additional cost to the Department.
3. Miscellaneous nuts, bolts and hardware, except for high strength bolts, may be stainless steel when plans specify galvanized, provided the bolt size is 1/2 in. or less in diameter.
4. Provide the following test equipment as required by the Engineer to confirm compliance with the contract and the NEC: voltmeter, ammeter, megohm meter (1000 volt DC), ground resistance tester, torque wrenches, and torque screwdrivers. Ensure all equipment has been properly calibrated within the last year. Provide calibration certification to the Engineer upon request. Operate test equipment during inspection as requested by the Engineer.
5. Install grounding as shown on the plans and in accordance with the NEC. Ensure all metallic conduits; metal poles; luminaires; and metal enclosures are bonded to the equipment grounding conductor. Provide stranded bare copper or green insulated grounding conductors. Ground rods, connectors, and bonding jumpers are subsidiary to the various bid items.
6. When required by the Engineer, notify the Department in writing of materials from the Material Producers List (MPL) intended for use on each project. Prequalified materials are listed on the MPL on TxDOT's website under "Roadway Illumination and Electrical Supplies." No substitutions will be allowed for materials on this list.

CONDUIT

A. MATERIALS

1. Provide conduit, junction boxes, fittings, and hardware as per TxDOT Departmental Material Specification (DMS) 11030 "Conduit" and Item 618 "Conduit" of TxDOT's "Standard Specifications For Construction And Maintenance Of Highways, Streets, And Bridges," latest edition. Provide conduits listed under Item 618 on the MPL under "Roadway Illumination and Electrical Supplies." Provide conduit types according to the descriptive code or as shown on the plans. Do not substitute other types of conduits for those shown. Provide liquidtight flexible metal conduit (LFMC) when flexible conduit is called for on galvanized steel rigid metallic conduit (RMC) systems. Provide liquidtight flexible nonmetallic conduit (LFNC) when flexible conduit is called for on polyvinyl chloride (PVC) systems.
2. Provide galvanized steel RMC for all exposed conduits, unless otherwise shown on the plans. Properly bond all metal conduits.
3. Unless otherwise shown on the plans, provide junction boxes with a minimum size as shown in the following table, which applies to the greatest number of conductors entering the box through one conduit with no more than four conduits per box. When a mixture of conductor sizes is present, count the conductors as if all are of the larger size. For situations not applicable to the table, size junction boxes in accordance with NEC.

AWG	3 CONDUCTORS	5 CONDUCTORS	7 CONDUCTORS
#1	10" x 10" x 4"	12" x 12" x 4"	16" x 16" x 4"
#2	8" x 8" x 4"	10" x 10" x 4"	12" x 12" x 4"
#4	8" x 8" x 4"	10" x 10" x 4"	10" x 10" x 4"
#6	8" x 8" x 4"	8" x 8" x 4"	10" x 10" x 4"
#8	8" x 8" x 4"	8" x 8" x 4"	8" x 8" x 4"

4. Junction boxes with an internal volume of less than 100 cu. in. and supported by entering raceways must have threaded entries or hubs identified for the intended purpose and supported by connection of two or more rigid metal conduits. Secure conduit within 3 ft. of the enclosure or within 18 in. of the enclosure if all conduit entries are on the same side. Mechanically secure all junction boxes with an internal volume greater than 100 cu. inches.
5. Provide hot dipped galvanized cast iron or sand cast aluminum outlet boxes for junction boxes containing only 10 AWG or 12 AWG conductors. Do not use die cast aluminum boxes. Size outlet boxes according to the NEC.
6. Do not use intermediate metal conduit (IMC) or electrical metallic tubing (EMT) unless specifically required by the plan sheets. When EMT is called for, provide junction boxes made from galvanized steel sheeting, listed and approved for outdoor use, unless otherwise noted on the plans. Size all galvanized steel junction boxes in accordance with the NEC. Provide junction boxes for IMC conduit systems that meet the same requirements for junction boxes used with RMC systems.
7. Provide PVC junction boxes intended for outdoor use on PVC conduit systems, unless otherwise noted on the plans.

8. Provide PVC elbows in PVC conduit systems, unless otherwise shown on the plans. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the PVC conduit system. When galvanized steel RMC elbows are specifically called for in the plans and any portion of the RMC elbow is buried less than 18 in., ground the RMC elbow by means of a grounding bushing on a rigid metal extension. Grounding of the rigid metal elbow is not required if the entire RMC elbow is encased in a minimum of 2 in. of concrete. PVC extensions are allowed on these concrete encased rigid metal elbows. RMC or PVC elbows are subsidiary to various bid items.
9. When required, provide High-Density Polyethylene (HDPE) conduit with factory installed internal conductors according to Item 622 "Duct Cable." At the Contractor's request and with approval by the Engineer, substitute HDPE conduit with no conductors for bored schedule 40 or schedule 80 PVC conduit bid under Item 618. Ensure bored HDPE substituted for PVC is schedule 40 and of the same size PVC called for in the plans. Ensure the substituted HDPE meets the requirements of Item 622, except that the conduit is supplied without factory-installed conductors. Make the transition of the HDPE conduit to PVC (or RMC elbow when required) at the bore pit. Provide conduit of the size and schedule as shown on the plans. Do not extend substituted conduit into ground boxes or foundations. Provide PVC or galvanized steel RMC elbows as called for at all ground boxes and foundations.
10. Use two-hole straps when supporting 2 in. and larger conduits. On electrical service poles, properly sized stainless steel or hot dipped galvanized one-hole standoff straps are allowed on the service riser conduit.

B. CONSTRUCTION METHODS

1. Provide and install expansion joint conduit fittings on all structure-mounted conduits at the structure's expansion joints to allow for movement of the conduit. In addition, provide and install expansion joint fittings on all continuous runs of galvanized steel RMC conduit externally exposed on structures such as bridges at maximum intervals of 150 ft. When requested by the project Engineer, supply manufacturer's specification sheet for expansion joint conduit fittings. Repair or replace expansion joint fittings that do not allow for movement at no additional cost to the Department. Provide the method of determining the amount of expansion to the Engineer upon request. Do not use LFMC or LFNC as a substitute for the required expansion conduit fittings.
2. Space all conduit supports at maximum intervals of 5 ft. Install conduit spacers when attaching metal conduit to surface of concrete structures. See "Conduit Mounting Options" on ED(2). Install conduit support within 3 ft. of all enclosures and conduit terminations.
3. Do not attach conduit supports directly to pre-stressed concrete beams except as shown specifically in the plans or as approved by the Engineer.
4. Unless otherwise shown on the plans, jack or bore conduit placed beneath existing roadways, driveways, sidewalks, or after the base or surfacing operation has begun. Backfill and compact the bore pits below the conduit per Item 476 "Jacking, Boring, or Tunneling Pipe or Box" prior to installing conduit or duct cable to prevent bending of the connections.
5. When placing conduit in the sub-grade of new roadways, backfill all trenches with excavated material unless otherwise noted on the plans. When placing conduit in the sub-base of new roadways, backfill all trenches with cement-stabilized base as per requirements of Items 110 "Excavation", 400 "Excavation and Backfill for Structures", 401 "Flowable Backfill", 402 "Trench Excavation Protection", and 403 "Temporary Special Shoring."
6. Provide and place warning tape approximately 10 in. above all trenched conduit as per Item 618.
7. During construction, temporarily cap or plug open ends of all conduit and raceways immediately after installation to prevent entry of dirt, debris and animals. Temporary caps constructed of durable duct tape are allowed. Tightly fix the tape to the conduit opening. Clean out the conduit and prove it clear in accordance with Item 618 prior to installing any conductors.
8. Ensure conduit entry into the top of any enclosure is waterproof by installing conduit sealing hubs or using boxes with threaded bosses. This includes surface mounted safety switches, meter cans, service enclosures, auxiliary enclosures and junction boxes. Grounding bushings on water tight sealing hubs are not required.
9. Fit the ends of all PVC conduit terminations with bushings or bell end fittings. Provide and install a grounding type bushing on all metal conduit terminations.
10. Install a bonding jumper from each grounding bushing to the nearest ground rod, grounding lug, or equipment grounding conductor. Ensure all bonding jumpers are the same size as the equipment grounding conductor. Bonding of conduit used as a casing under roadways for duct cable is not required, if the duct extends the full length through the casing.
11. At all electrical services, install a 6 AWG solid copper grounding electrode conductor.
12. Place conduits entering ground boxes so that the conduit openings are between 3 in. and 6 in. from the bottom of the box. See the ground box detail on sheet ED(4).
13. Seal ends of all conduits with duct seal, expandable foam, or by other methods approved by the Engineer. Seal conduit immediately after completion of conductor installation and pull tests. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a conduit sealant.
14. File smooth the cut ends of all mounting strut and conduit. Before installing, paint the field cut ends of all mounting strut and RMC (threaded or non-threaded) with zinc rich paint (94% or more zinc content) to alleviate overspray. Use zinc rich paint to touch up galvanized material as allowed under Item 445 "Galvanizing." Do not paint non-galvanized material with a zinc rich paint as an alternative for materials required to be galvanized.



**ELECTRICAL DETAILS
CONDUITS & NOTES**

ED(1) - 14

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REVISIONS		DIST	COUNTY		SHEET NO.
					204

ELECTRICAL CONDUCTORS

A. MATERIAL INFORMATION

1. Provide Type XHHW insulated conductors in accordance with Departmental Material Specification (DMS)11040 "Conductors" and Item 620 "Electrical Conductors." Provide conductors as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies" Item 620. Color code insulated conductors in conformance with the NEC. Identify grounded (neutral) conductors with white insulation. Identify grounding conductors (ground wires) with green insulation or bare conductors. Identify ungrounded (hot) conductors with any color insulation except green, white, or gray. Keep color scheme consistent throughout the wiring system. Identify conductors 6 American Wire Gauge (AWG) and smaller by continuous color jacket. Identify electrical conductors 4 AWG and larger by continuous color jacket or by colored tape. When identifying conductors with colored tape, mark at least 6 in. of the conductor's insulation with half laps of tape.
2. Provide a solid copper 6 AWG grounding electrode conductor to bond the electrical service equipment to the concrete encased grounding electrode or the ground rod at the service location. Connect the grounding electrode conductor to the ground rod with a UL listed connector in accordance with DMS 11040. Connect the grounding electrode conductor to the concrete encased grounding electrode as shown in the plans.
3. Where two or more circuits are present in one conduit or enclosure, permanently identify the conductors of each branch circuit by attaching a non-metallic tag around both circuit conductors at each accessible location. Provide tags with two straps, large enough to indicate circuit number, letter, or other identification as shown in the plans. Print circuit identification on the tag with a permanent marker.
4. Use listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors for splicing as specified in DMS 11040. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Provide UL listed gel-filled insulating splice covers. Splicing materials, insulating materials, breakaway disconnects, splice covers, and fuse holders are subsidiary to various bid items.

B. CONSTRUCTION METHODS

1. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the conduit system. After installing conductors in conduit, perform conductor pull test. If a conductor cannot be freely pulled, make any needed alterations or repairs at no additional cost to the department. Perform insulation resistance tests in accordance with Item 620. Coordinate with the Engineer to witness the tests.
2. Leave 2 ft. minimum, 3 ft. maximum length for each conductor up to the splice in ground boxes. Leave 3 ft. minimum, 4 ft. maximum length of conductor in ground boxes when pulled through with no splice. Leave 1 ft. minimum, 1.5 ft. maximum length of conductor at enclosures, weatherheads and pole bases.
3. Make splices only in junction boxes, ground boxes, pole bases, or electrical enclosures and use only listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors. Insulate splices with heavy wall heat shrink tubing or gel-filled insulating splice covers to provide a watertight splice. Overlap conductor insulation with heat shrink tubing a minimum of 2 in. past both sides of the splice. Where heat shrink tubing may not shrink sufficiently to provide a watertight seal around the individual conductors, prior to heating the tubing, increase the diameter of the conductor insulation using hot melt adhesive tape to provide a watertight seal between the individual conductors and the heat shrink tubing. Ensure the tape extends past the heat shrink tubing. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Heat shrink tubing that appears to have been burned, or overheated, is considered defective and must be replaced.
4. Size and install gel-filled insulating splice covers according to manufacturer's specifications when used in place of heat shrink tubing.
5. Wire nuts with factory applied waterproof sealant may be used for 8 AWG or smaller conductors in above ground junction boxes, but not in pole bases or ground boxes. Install wire nuts in an upright position to prevent the accumulation of water.
6. Support conductors in illumination poles with a J-hook at the top of the pole.
7. When terminating conductors, remove the insulation and jacketing material without nicking the individual strands of the conductor. Conductors with nicked individual conductor strands or removed strands will be considered damaged.
8. Replace conductors and cables that are damaged beyond repair or that fail an insulation resistance test at no additional cost to the department.
9. Do not repair damaged conductors with duct tape, electrical tape, or wire nuts. Use only approved splicing methods.
10. Do not terminate more than one conductor under a single connector, unless the connector is rated for multiple conductors. Do not exceed the pressure connector's listing for maximum number and size of conductors allowed.
11. Install breakaway connectors on conductors bid under Item 620 whenever those conductors pass through a breakaway support device. Follow manufacturer's instructions when terminating conductors to breakaway connectors. Properly torque threaded connections. Proper terminations are critical to the safe operation of breakaway devices. Trim waterproofing boots on breakaway connectors to fit snugly around the conductor to ensure waterproof connection. Only one conductor may enter a single opening in a boot. Provide waterproof boots with the correct number of openings. Leave unused openings factory sealed. Use prequalified breakaway connectors as shown on the MPL.

12. Provide and install a separate stranded equipment grounding conductor (EGC) in all conduits that contain circuit wiring of 50 volts or more. Unless shown elsewhere, size the EGC to be the same size as the largest current carrying conductor contained in the conduit. Ensure all EGCs are bonded together at every accessible location. For traffic signal installations, provide a minimum size 8 AWG EGC. The EGC is paid for under Item 620.

C. TEMPORARY WIRING

1. Install temporary conductors and electrical equipment in accordance with the NEC article "Temporary Installations" and Department standard sheets.
2. Provide a ground fault circuit interrupter (GFCI) for power outlets for portable electrical equipment, power tools, ice machines, ice storage bins and refrigerators located outdoors at grade. GFCI may be any one of the following: molded cord and plug set, receptacle, or circuit breaker type.
3. Use listed wire nuts with factory applied sealant for temporary wiring where approved.
4. Enclose conductor splices within a listed enclosure or ground box, or ensure the splices are more than 10 ft. above grade vertically and more than 5 ft. horizontally from any metal structure. Where installing temporary conductors in areas subject to vehicle traffic or mobile construction equipment, ensure the vertical clearance to ground is at least 18 ft. when measured at the lowest point. Ground messenger wires that support power conductors in conformance with the NEC.
5. Protect and when necessary repair any existing electrical conduits uncovered during the construction process in a timely manner and in conformance with the NEC.

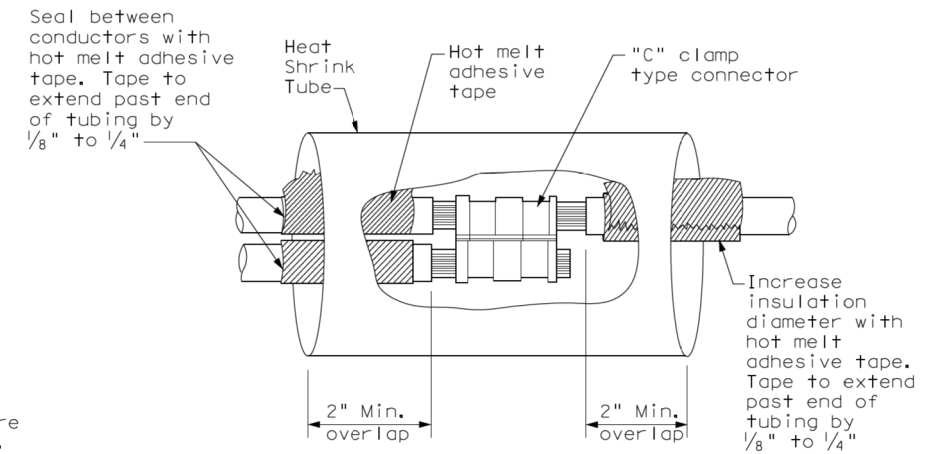
GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

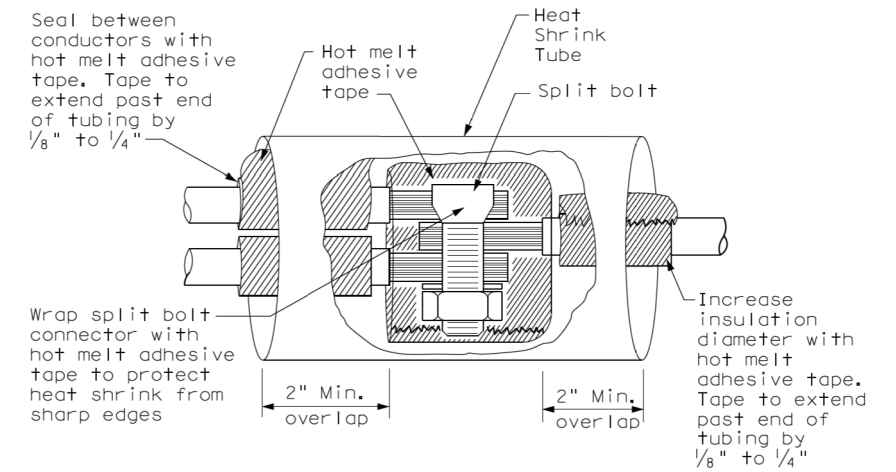
1. Provide and install a grounding electrode at electrical services. Provide ground rods according to DMS 11040 and the plans. Larger diameter or longer length rods may be called for in some specific locations, see the individual plans sheets. Concrete encased grounding electrodes may be called for in specific locations including electrical service, see individual plan sheets.

B. CONSTRUCTION METHODS

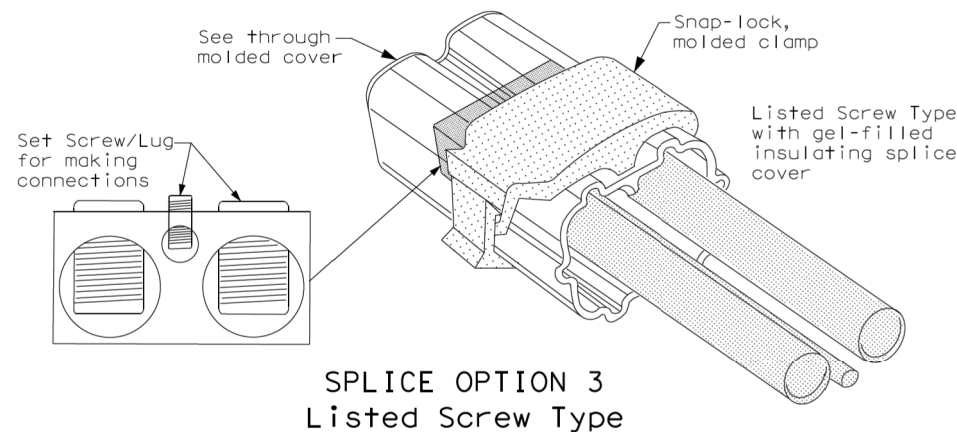
1. Furnish auxiliary ground rods for lightning protection and install in soil, concrete, or both, as called for in the plans. For ground rods installed in concrete, ensure the connection of the conductor to the ground rod is readily accessible for inspection or repairs. For ground rods installed in soil, ensure that the upper end is between 2 to 4 in. below finished grade.
2. Do not place ground rods in the same drilled hole as a timber pole.
3. Install ground rods so the imprinted part number is at the upper end of the rod.
4. Remove all non-conductive coatings such as concrete splatter from the rod at the clamp location.
5. Route all conductors as short and straight as possible for connection to lightning protection ground rods. When a bend is required, ensure a minimum radius bend of four inches for these conductors.
6. Unless otherwise called for in the plans, protect grounding electrode conductors with non-metallic conduit. When protecting grounding electrode conductors with metal conduit, provide and install a grounding type bushing and properly sized bonding jumper on each end of the metal conduit.
7. Written authorization is required before installing a ground rod in a horizontal trench for rocky soil or a solid rock bottom.



**SPLICE OPTION 1
Compression Type**



**SPLICE OPTION 2
Split Bolt Type**



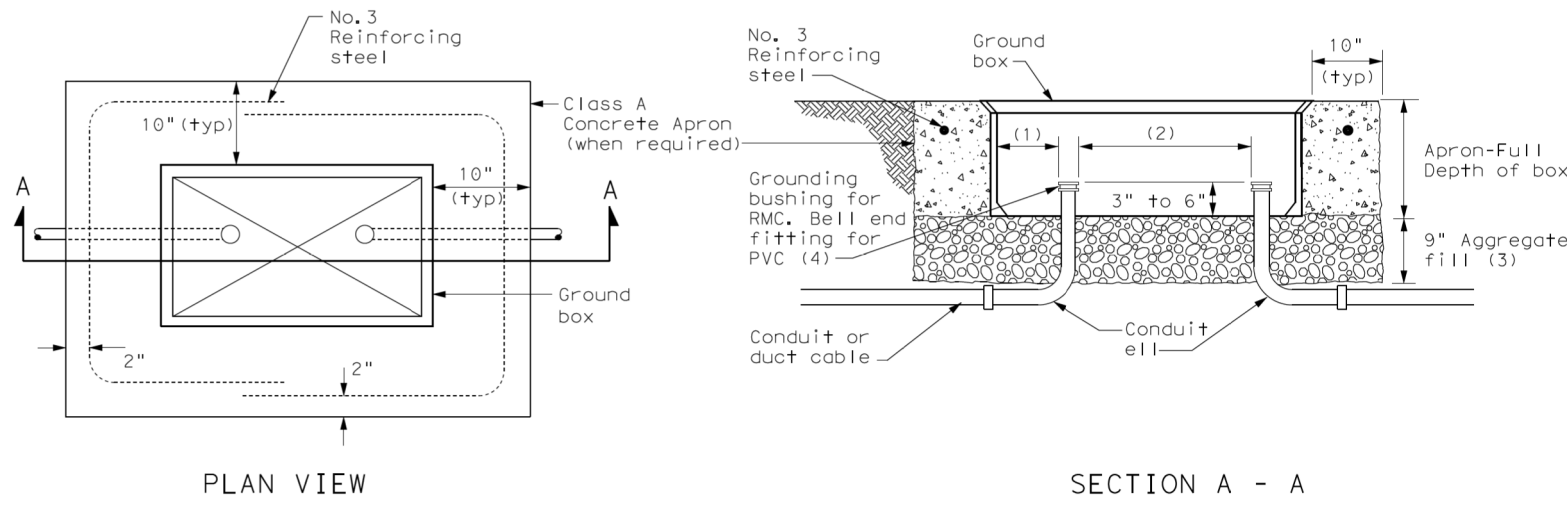
**SPLICE OPTION 3
Listed Screw Type**

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 Texas Department of Transportation		Traffic Operations Division Standard	
<h2>ELECTRICAL DETAILS CONDUCTORS</h2>			
<h3>ED(3)-14</h3>			
FILE: ed3-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
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		205	

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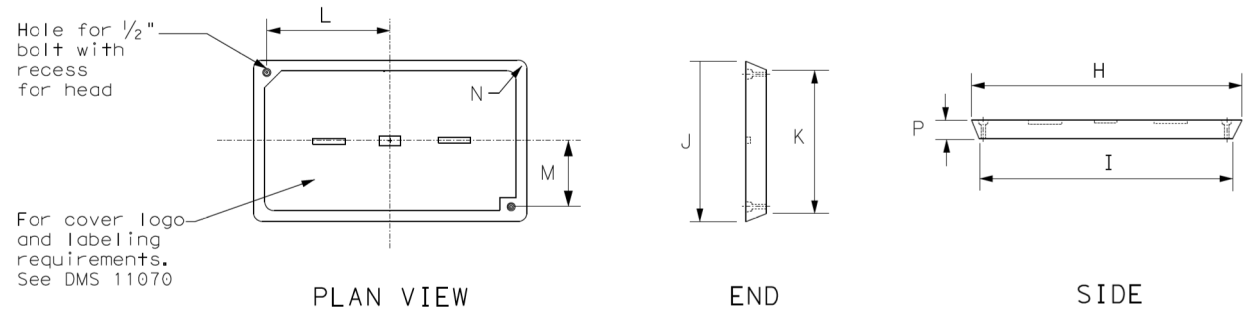


APRON FOR GROUND BOX

- (1) Uniformly space ends of conduits within the ground box. Position ends of conduits so that ground box walls do not interfere with the installation of grounding bushings or bell end fittings.
- (2) Maintain sufficient space between conduits to allow for proper installation of bushing.
- (3) Place aggregate under the box, not in the box. Aggregate should not encroach on the interior volume of the box.
- (4) Install a grounding bushing on the upper end of all RMC terminating in a ground box. Ground RMC elbows when any part of the elbow is less than 18 in. below the bottom of the ground box. Install a PVC bushing or bell end fitting on the upper end of all PVC conduits terminating in a ground box.

GROUND BOX DIMENSIONS	
TYPE	OUTSIDE DIMENSIONS (INCHES) (Width x Length X Depth)
A	12 X 23 X 11
B	12 X 23 X 22
C	16 X 29 X 11
D	16 X 29 X 22
E	12 X 23 X 17

GROUND BOX COVER DIMENSIONS								
TYPE	DIMENSIONS (INCHES)							
	H	I	J	K	L	M	N	P
A, B & E	23 1/4	23	13 3/4	13 1/2	9 7/8	5 1/8	1 3/8	2
C & D	30 1/2	30 1/4	17 1/2	17 1/4	13 1/4	6 3/4	1 3/8	2



GROUND BOX COVER

GROUND BOXES

A. MATERIALS

1. Provide polymer concrete ground boxes measuring 16x30x24 in. (WxLxD) or smaller in accordance with Departmental Material Specification (DMS) 11070 "Ground Boxes" and Item 624 "Ground Boxes."
2. Provide Type A, B, C, D, and E ground boxes as shown in the plans, and as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 624.
3. Ensure ground box cover is correctly labeled in accordance with DMS 11070.
4. Provide larger ground boxes in accordance with Item 624 and as shown in the plans.

B. CONSTRUCTION METHODS

1. Remove all gravel and dirt from conduit. Cap all conduits prior to placing aggregate and setting ground box. Provide Grade 3 or 4 coarse aggregate as shown on Table 2 of Item 302 "Aggregates for Surface Treatments." Ensure aggregate bed is in place and at least 9 inches deep, prior to setting the ground box. Install ground box on top of aggregate.
2. Cast ground box aprons in place. Reinforcing steel may be field bent. Ensure the depth of concrete for the apron extends from finished grade to the top of the aggregate bed under the box. Ground box aprons, including concrete and reinforcing steel, are subsidiary to ground boxes when called for by descriptive code.
3. Keep bolt holes in the box clear of dirt. Bolt covers down when not working in ground boxes.
4. Install all conduits and ells in a neat and workmanlike manner. Uniformly space conduits so grounding bushings and bell end fittings can easily be installed.
5. Temporarily seal all conduits in the ground box until conductors are installed.
6. Permanently seal conduits immediately after the completion of conductor installation and pull tests. Permanently seal the ends of all conduits with duct seal, expandable foam, or other method as approved. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a sealant.
7. When a ground rod is present in a ground box, bond all equipment grounding conductors together and to the ground rod with listed connectors.
8. When a type B or D ground box is stacked to meet volume requirements, it is allowable to cut an appropriately sized hole for conduit entry in the side wall at least 18 inches below grade.
9. If an existing ground box in the contract has a metal cover, bond the cover to the equipment grounding conductor with a 3 ft. long stranded bonding jumper the same size as the grounding conductor. The bonding jumper is subsidiary to various bid items. Verify existing ground boxes with metal covers are shown on the plans, with notes fully describing the work required.
10. If other ground boxes with metal covers are within the project limits but are not part of the contract, the Engineer may direct the Contractor to bond the metal covers, identifying the specific boxes in writing. This work will be paid for separately.
11. Bond metal ground box covers to the grounding conductor with a tank ground type lug.

				Traffic Operations Division Standard	
<h2>ELECTRICAL DETAILS</h2> <h3>GROUND BOXES</h3> <h4>ED(4) - 14</h4>					
FILE:	ed4-14.dgn	DN:	TxDOT	CK:	TxDOT
© TxDOT	October 2014	CONT:	SECT:	JOB:	HIGHWAY:
REVISIONS		DIST:	COUNTY:	SHEET NO.	
				206	

DATE:
FILE:

ELECTRICAL SERVICES NOTES

- Provide new materials. Ensure installation and materials comply with the applicable provisions of the National Electrical Code (NEC) and National Electrical Manufacturers Association (NEMA) standards. Ensure material is Underwriters Laboratories (UL) listed. Provide and install electrical service conduits, conductors, disconnects, contactors, circuit breaker panels, and branch circuit breakers as shown on the Electrical Service Data chart in the plans. Faulty fabrication or poor workmanship in material, equipment, or installation is justification for rejection. Where manufacturers provide warranties and guarantees as a customary trade practice, furnish these to the State.
- Provide electrical services in accordance with Electrical Details standard sheets, Departmental Material Specification (DMS) 11080 "Electrical Services," DMS 11081 "Electrical Services-Type A," DMS 11082 "Electrical Services-Type C," DMS 11083 "Electrical Services-Type D," DMS 11084 "Electrical Services-Type T," DMS 11085 "Electrical Services-Pedestal (PS)", and Item 628 "Electrical Services" of the Standard Specifications. Provide electrical service types A, C, and D, as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 628. Provide other service types as detailed on the plans.
- Provide all work, materials, services, and any incidentals needed to install a complete electrical service as specified in the plans.
- Coordinate with the Engineer and the utility provider for metering and compliance with utility requirements. Primary line extensions, connection charges, meter charges, and other charges by the utility company to provide power to the location are paid for in accordance with Item 628. Get approval for the costs associated with these charges prior to engaging the utility company to do the work. Consult with the utility provider to determine costs and requirements, and coordinate the work as approved.
- The enclosure manufacturer will provide Master Lock Type 2 with brass tumblers keyed #2195 for all custom electrical enclosures. Installing Contractor is to provide Master Lock #2195 Type 2 with brass tumblers for "off the shelf" enclosures. Master Lock #2195 keys and locks become property of the State. Unless otherwise approved, do not energize electrical service equipment until locks are installed.
- Enclosures with external disconnects that de-energize all equipment inside the enclosure do not need a dead front trim. Protect incoming line terminations from incidental contact as required by the NEC.
- When galvanized is specified for nuts, screws, bolts or miscellaneous hardware, stainless steel may be used.
- Provide wiring and electrical components rated for 75°C. Provide red, black, and white colored XHHW service entrance conductors of minimum size 6 American Wire Gauge (AWG). Identify size 6 AWG conductors by continuous color jacket. Identify electrical conductors sized 4 AWG and larger by continuous color jacket or by colored tape. Mark at least 6 inches of the conductor's insulation with half laps of colored tape, when identifying conductors. Ensure each service entrance conductor exits through a separately bushed non-metallic opening in the weatherhead. The lengths of the conductors outside the weatherhead are to be 12 inches minimum, 18 inches maximum, or as required by utility.
- All electrical service conduit and conductors attached to the electrical service including the riser or the elbow below ground are subsidiary to the electrical service. For an underground utility feed, all service conduit and conductors after the elbow, including service conduit and conductors for the utility pole riser when furnished by the Contractor, will be paid for separately.
- Provide rigid metal conduit (RMC) for all conduits on service, except for the 1/2 in. PVC conduit containing the electrical service grounding electrode conductor. Size the service entrance conduit as shown in the plans. Ensure conduit for branch circuit entry to enclosure is the same size as that shown on the layout sheets for branch circuit conduit. Extend all rigid metal conduits a minimum of 6 inches underground and then couple to the type and schedule of the conduit shown on the layout for that particular branch circuit. Install a grounding bushing on the RMC where it terminates in the service enclosure.
- Use of liquidtight flexible metal conduit (LFMC) is allowed between the meter and service enclosure when they are mounted 90 to 180 degrees to each other. Size the LFMC the same size as service entrance conduit. LFMC must not exceed 3 feet in length. Strap LFMC within 1 foot of each end. LFMC less than 12 inches in length need not be strapped. Each end of LFMC must have a grounding bushing or be terminated with a grounding fitting. The LFMC must contain a grounded (neutral) conductor. Ensure any bend in LFMC never exceeds 180 degrees. A pull test is required on all installed conductors, with at least six inches of free conductor movement demonstrated to the satisfaction of the Engineer.
- Ensure all mounting hardware and installation details of services conform to utility company specifications.
- For all electrical service enclosures listed under Item 628 on the MPL, the UL 508 enclosure manufacturers will prepare and submit a schematic drawing unique to each service. Before shipment to the job site, place the applicable laminated schematic drawings and the laminated plan sheet showing the electrical service data chart used to build the enclosure in the enclosure's data pocket. The installing contractor will copy and laminate the actual project plan sheets detailing all equipment and branch circuits supplied by that service. The laminated plan sheets are to be placed in the service enclosure's document pocket. Reduce 11 in. x 17 in. plan sheets to 8 1/2 in. x 11 in. before laminating. If the installation differs from the plan sheets, the installing contractor is to redline plan sheets before laminating.
- When providing an "Off The Shelf" Type D or Type T service, provide laminated plan sheets detailing equipment and branch circuits supplied by that service. Reduce 11 in. x 17 in. plan sheets to 8 1/2 in. x 11 in. before laminating. Deliver these drawings before completion of the work to the Engineer, instead of placing in enclosure that has no door pocket.
- Do not install conduit in the back wall of a service enclosure where it would penetrate the equipment mounting panel inside the enclosure. Provide grounding bushings on all metal conduits, and terminate bonding jumpers to grounding bus. Grounding bushings are not required when the end of the metal conduit is fitted with a conduit sealing hub or threaded boss, such as a meter base hub.

SERVICE ASSEMBLY ENCLOSURE

- Provide threaded hub for all conduit entries into the top of enclosure.
- Type galvanized steel (GS) enclosures may be used for Type C panelboards and for Type D and T services that do not use an enclosure mounted photoceII or lighting contactor. Provide GS enclosures in accordance with DMS 11080, 11082, 11083, and 11084.
- Provide aluminum (AL) and stainless steel (SS) enclosures for Types A, C, and D in accordance with DMS 11080, 11081, 11082, 11083, and 11084. Do not paint stainless steel.
- Provide pedestal service (PS) enclosures in accordance with ED(9) and DMS 11080 and 11085. Do not provide GS pedestal services. If GS is shown in the PS descriptive code, provide an AL enclosure.

MAIN DISCONNECT & BRANCH CIRCUIT BREAKERS

- Field drill flange-mounted remote operator handle if needed, to ensure handle is lockable in both the "On" and "Off" positions.
- When the utility company provides a transformer larger than 50 KVA, verify that the available fault current is less than the circuit breaker's ampere interrupting capacity (AIC) rating and provide documentation from the electric utility provider to the Engineer.

PHOTOELECTRIC CONTROL

- Provide photocell as listed on the MPL. Move, adjust, or shield the photocell from stray or ambient night time light to ensure proper operation. Mount photocell facing north when practical. Mount top of pole photocells as shown on Top Mounted PhotoceII Detail.

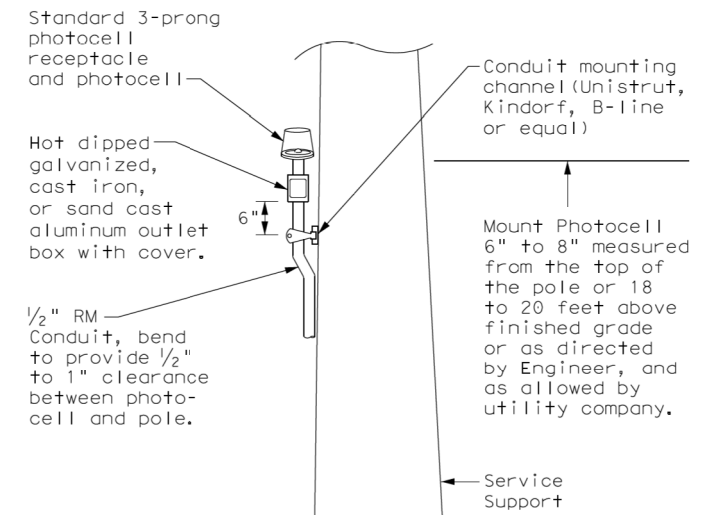
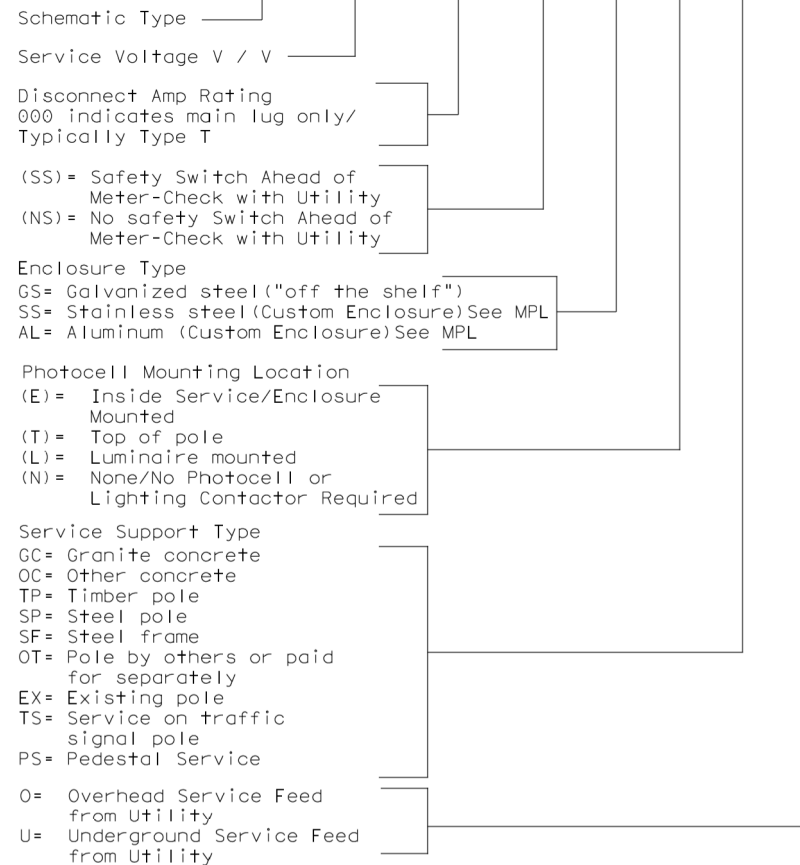
* ELECTRICAL SERVICE DATA												
Elec. Service ID	Plan Sheet Number	Electrical Service Description	Service Conduit **Size	Service Conductors No./Size	Safety Switch Amps	Main Ckt. Bkr. Pole/Amps	Two-Pole Contractor Amps	Panelbd/ Loadcenter Amp Rating	Branch Circuit ID	Branch Ckt. Bkr. Pole/Amps	Branch Circuit Amps	KVA Load
SB 183	289	ELC SRV TY A 240/480 100(SS)AL(E)SF(U)	2"	3/#2	100	2P/100	100	N/A	Lighting NB	2P/40	26	28.1
									Lighting SB	2P/40	25	
									Underpass	1P/20	15	
NB Access	30	ELC SRV TY D 120/240 060(NS)SS(E)TS(O)	1 1/4"	3/#6	N/A	2P/60		100	Sig. Controller	1P/30	23	5.3
							30		Luminaires	2P/20	9	
									CCTV	1P/20	3	
2nd & Main	58	ELC SRV TY T 120/240 000(NS)GS(N)SP(O)	1 1/4"	3/#6	N/A	N/A	N/A	70	Flashing Beacon 1	1P/20	4	1.0
									Flashing Beacon 2	1P/20	4	

* Example only, not for construction. All new electrical services must have electrical service data chart specific to that service as shown in the plans.

** Verify service conduit size with utility. Size may change due to utility meter requirements. Ensure conduit size meets the National Electrical Code.

EXPLANATION OF ELECTRICAL SERVICE DESCRIPTIVE CODE

ELEC SERV TY X XXX/XXX XXX (XX) XX (X) XX (X)



TOP MOUNTED PHOTOCELL

Install conduit strap maximum 3 feet from box. 5 foot maximum spacing between straps supporting conduit.



ELECTRICAL DETAILS SERVICE NOTES & DATA

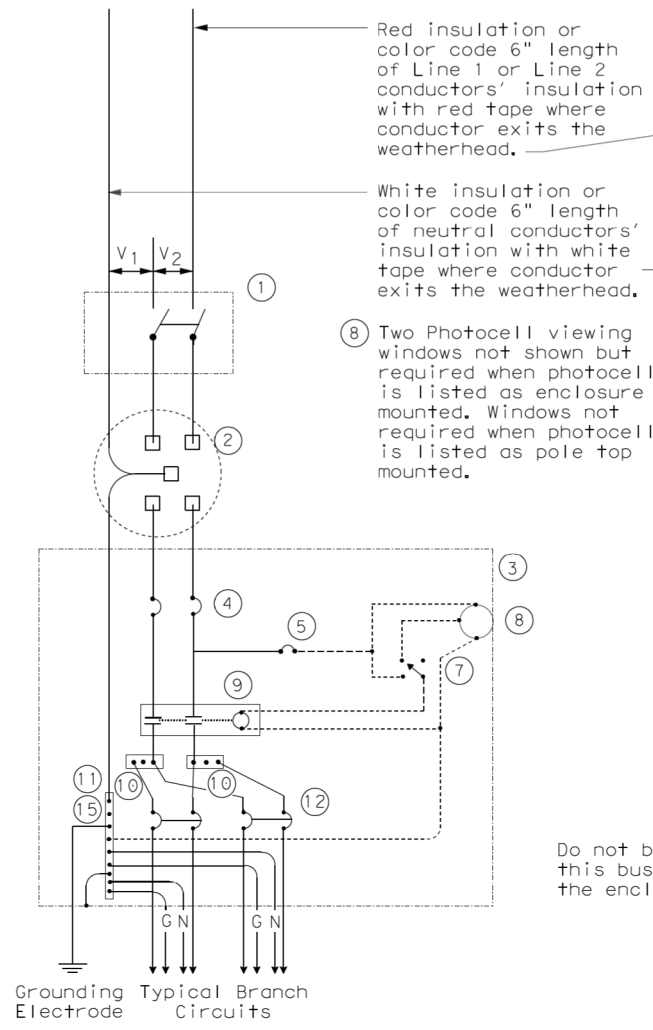
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				207

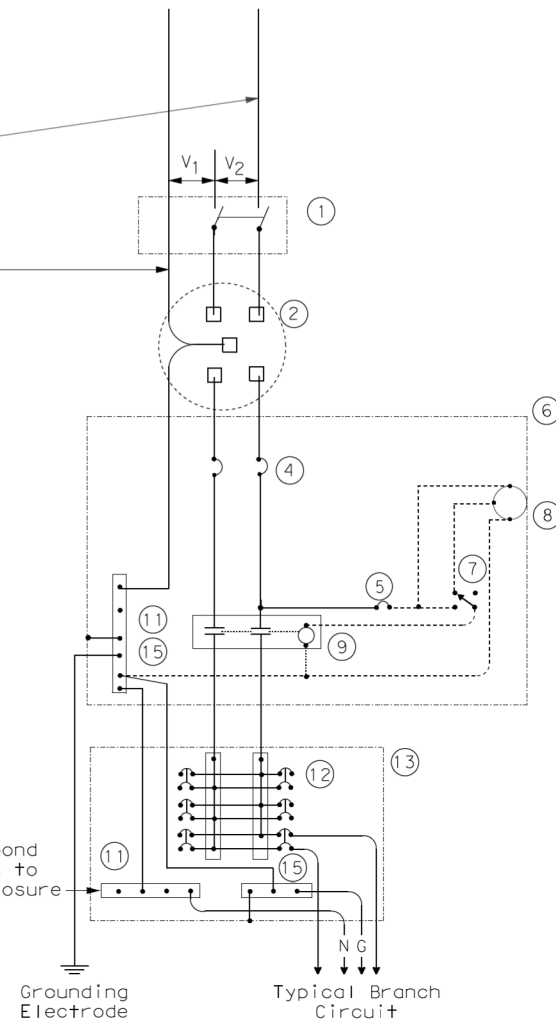
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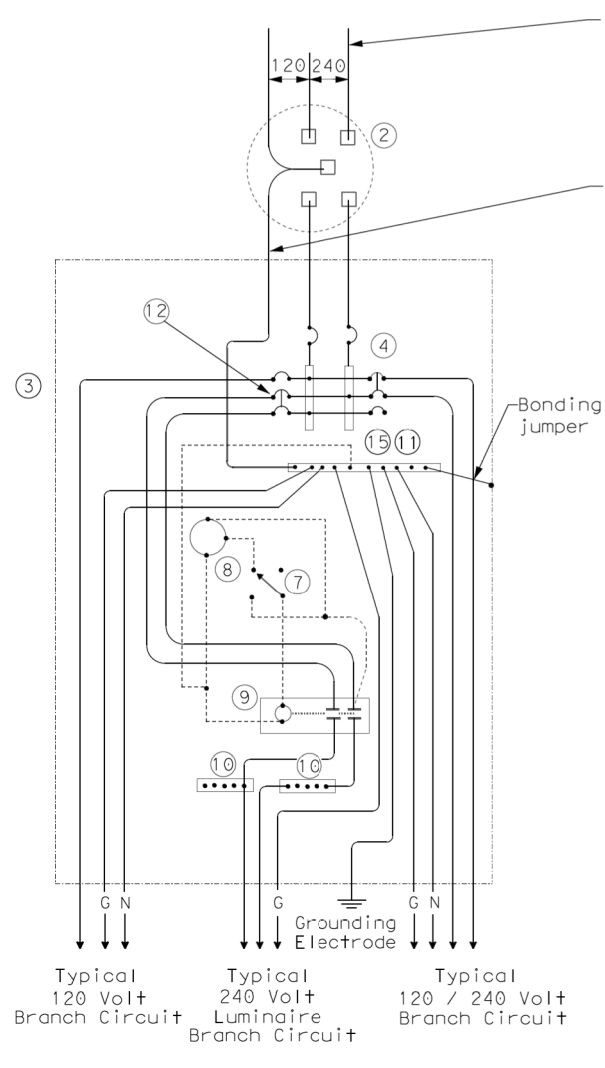
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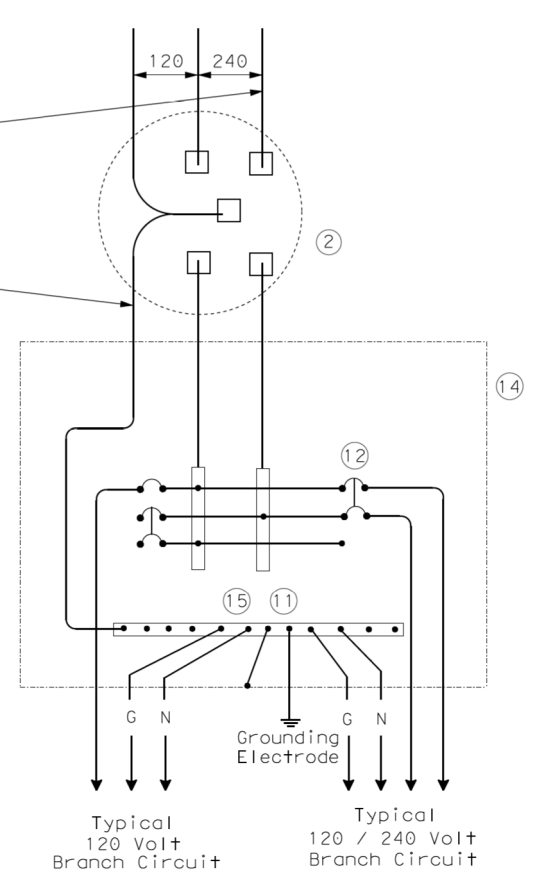
**SCHEMATIC TYPE A
THREE WIRE**



**SCHEMATIC TYPE C
THREE WIRE**



**SCHEMATIC TYPE D - CUSTOM
120/240 VOLTS - THREE WIRE**



**SCHEMATIC TYPE T
120/240 VOLTS - THREE WIRE**
Galvanized steel - "Buy Off The Shelf" only. When required install photocell top of the pole or on luminaire only, no lighting contractor will be installed.

WIRING LEGEND	
————	Power Wiring
.....	Control Wiring
—N—	Neutral Conductor
—G—	Equipment grounding conductor-always required

SCHEMATIC LEGEND	
1	Safety Switch (when required)
2	Meter (when required-verify with electric utility provider)
3	Service Assembly Enclosure
4	Main Disconnect Breaker (See Electrical Service Data)
5	Circuit Breaker, 15 Amp (Control Circuit)
6	Auxiliary Enclosure
7	Control Station ("H-O-A" Switch)
8	Photo Electric Control (enclosure-mounted shown)
9	Lighting Contactor
10	Power Distribution Terminal Blocks
11	Neutral Bus
12	Branch Circuit Breaker (See Electrical Service Data)
13	Separate Circuit Breaker Panelboard
14	Load Center
15	Ground Bus

		Traffic Operations Division Standard	
ELECTRICAL DETAILS SERVICE ENCLOSURE AND NOTES			
ED(6) - 14			
FILE: ed6-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
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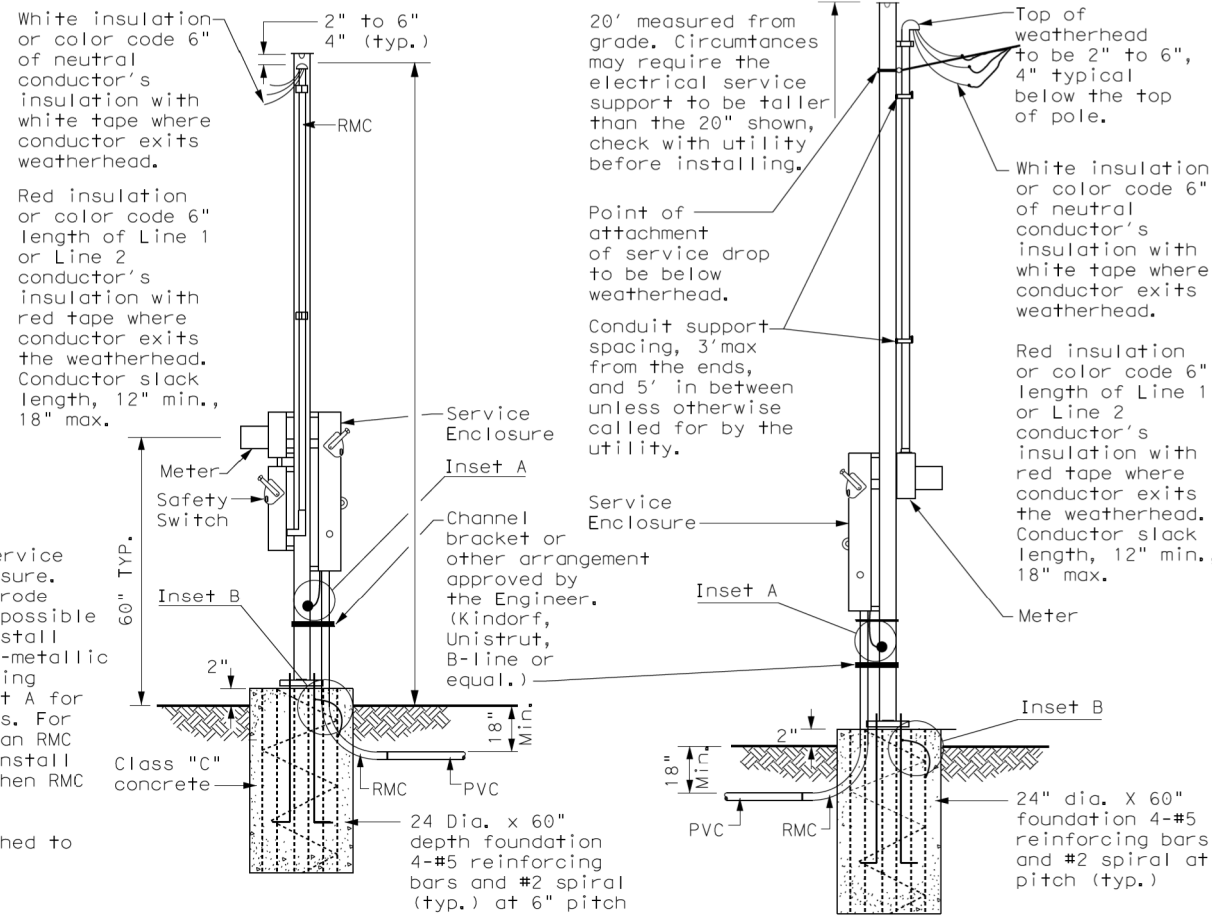
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SUPPORT TYPE STEEL POLE (SP) AND STEEL FRAME (SF)

- Provide steel pole and steel frame supports as per TxDOT Departmental Material Specification (DMS)11080 "Electrical Services." Mount all equipment and conduit on 12 gauge galvanized steel or stainless steel channel strut, 1 1/2 in. or 1 3/8 in. wide by 1 in. up to 3 3/4 in. deep Unistrut, Kindorf, B-line or equal. Bolt or weld all channel and hardware to vertical members as approved. Do not stack channel. File smooth and paint field cut ends of all channel with zinc-rich paint before installing.
- Provide poles for overhead service with an eyebolt or similar fitting for attachment of the service drop to the pole in conformance with the electric utility provider's specifications.
- Provide and install galvanized 3/4 in. x 18 in. x 4 in. (dia. x length x hook length) anchor bolts for underground service supports. Provide and install galvanized 3/4 in. x 56 in. x 4 in. anchor bolts for overhead service supports. Ensure anchor bolts have 3 in of thread, with 3 1/4 in. to 3 1/2 in. of the exposed anchor bolt projecting above finished foundation. Provide and install leveling nuts for all anchor bolts.
- Bond one of the anchor bolts to the rebar cage with 6 AWG bare stranded copper conductor. Use listed mechanical connectors rated for embedment in concrete. See Inset B.
- Furnish and install rigid metallic ellis in all steel pole and steel frame foundations for all conduits entering the service from underground.
- Use class C concrete for foundations. Ensure reinforcing steel is Grade 60 with 3" of unobstructed concrete cover.
- Drill and tap steel poles and frames for 1/2 in. X 13 UNC tank ground fitting. For steel pole service supports, provide and install tank ground fitting 4 in. to 6 in. below electrical service enclosure. Provide properly sized hole through the bottom of the enclosure for the service grounding electrode conductor. Ensure electrical service grounding electrode conductor is as short and straight as possible from the enclosure to the tank ground fitting. For steel frame service supports, provide and install tank ground fitting on steel frame post. Install service grounding electrode conductor in a non-metallic conduit or tubing from the enclosure to the steel frame post. Connect electrical service grounding electrode conductor to the tank ground fitting. See steel frame and steel pole details and Inset A for more information. Size service entrance conduit and branch circuit conduit as shown in the plans. For underground conduit runs from the electrical service, extend RMC from the service enclosure to an RMC elbow, and then connect the schedule type and size of conduit shown in the plans. Provide and install grounding bushings where RMC terminates in the enclosure. Grounding bushings are not required when RMC is fitted into a sealing hub or threaded boss.
- If Steel pole or frame is painted, bond each separate painted piece with a bonding jumper attached to a tapped hole.
- Provide 1/4" - 20 machine screws for bonding. Do not use sheet metal screws. Remove all non-conductive material at contact points. Terminate bonding jumpers with listed devices. Install minimum size 6 AWG stranded copper bonding jumpers. Make up all threaded bonding connections wrench tight.
- Avoid contact of the service drop and service entrance conductors with the metal pole to prevent abrasion of the insulated conductors.
- Shop drawings are not required for service support structure unless specifically stated elsewhere or directed by the Engineer.

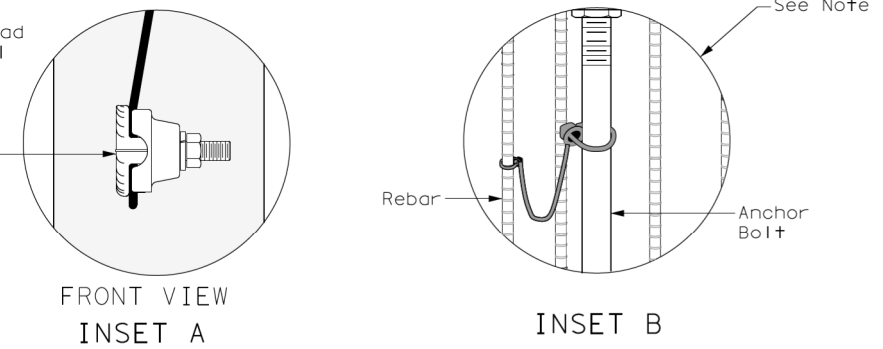
White insulation or color code 6" of neutral conductor's insulation with white tape where conductor exits weatherhead.

Red insulation or color code 6" length of Line 1 or Line 2 conductor's insulation with red tape where conductor exits the weatherhead. Conductor slack length, 12" min., 18" max.

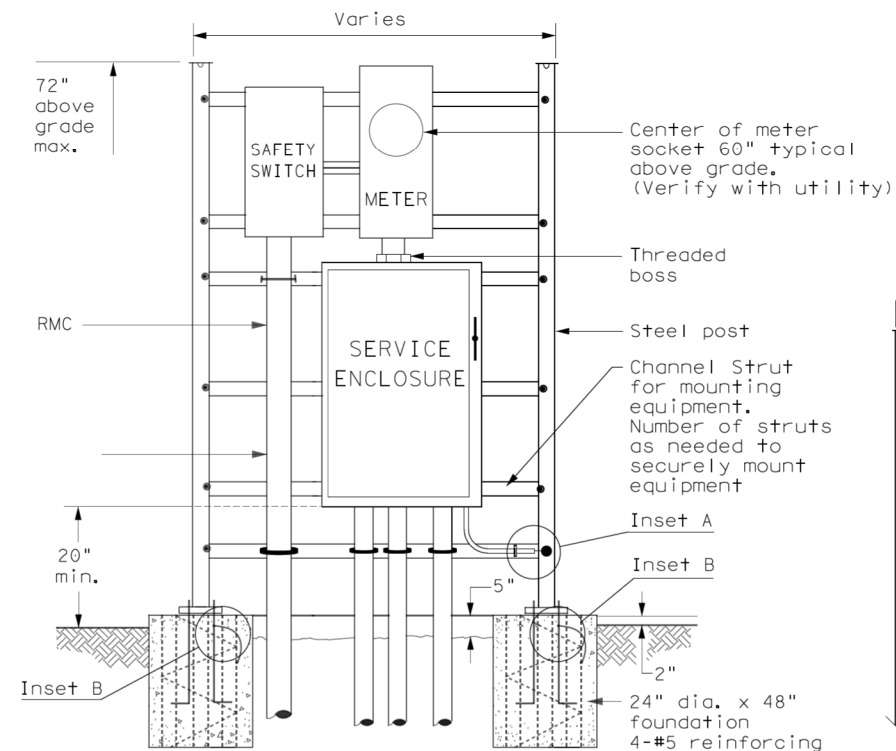


WITH SAFETY SWITCH WITHOUT SAFETY SWITCH
 SERVICE SUPPORT TYPE SP (O) - OVERHEAD SERVICE

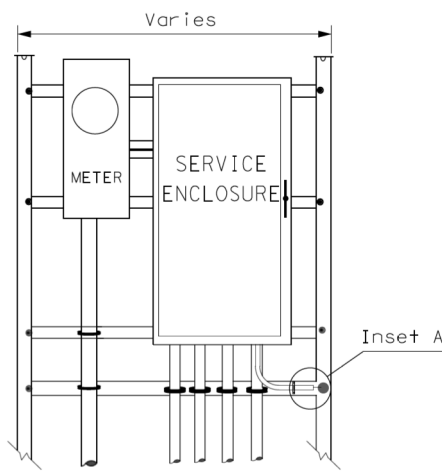
Drill, tap, and thread 1/2" X 13 UNC. Install tank ground fitting, connect electrical service grounding electrode conductor. See Note 7.



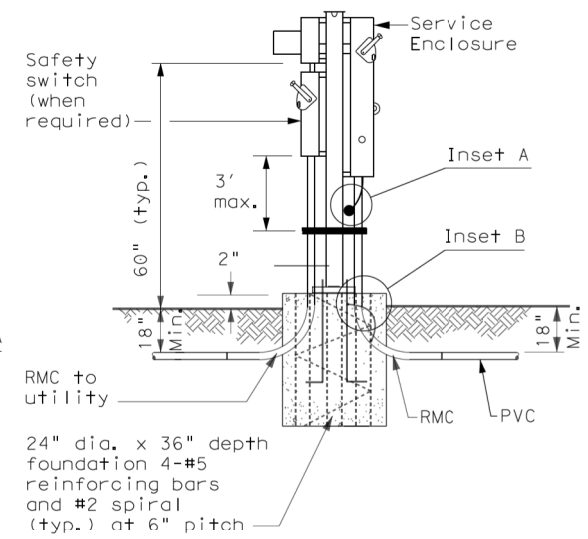
FRONT VIEW INSET A INSET B



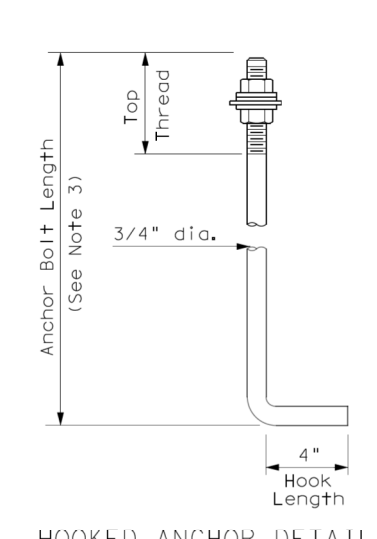
WITH SAFETY SWITCH FRONT VIEW
 SERVICE SUPPORT TYPE SF (U) - UNDERGROUND SERVICE



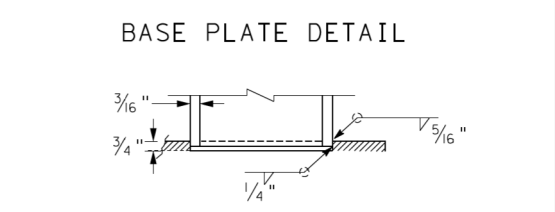
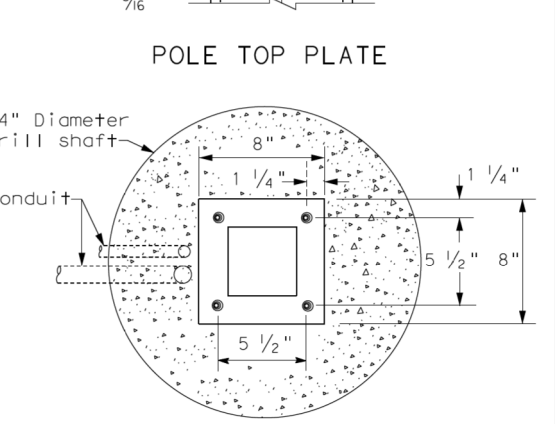
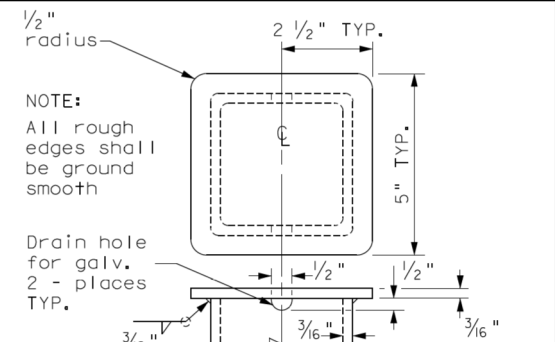
WITHOUT SAFETY SWITCH FRONT VIEW
 SERVICE SUPPORT TYPE SF (U) - UNDERGROUND SERVICE



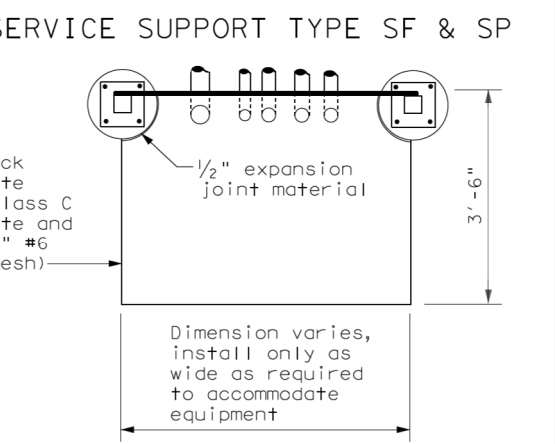
WITH SAFETY SWITCH FRONT VIEW
 SERVICE SUPPORT TYPE SP (U) - UNDERGROUND SERVICE



HOOKED ANCHOR DETAIL



BOTTOM OF POLE



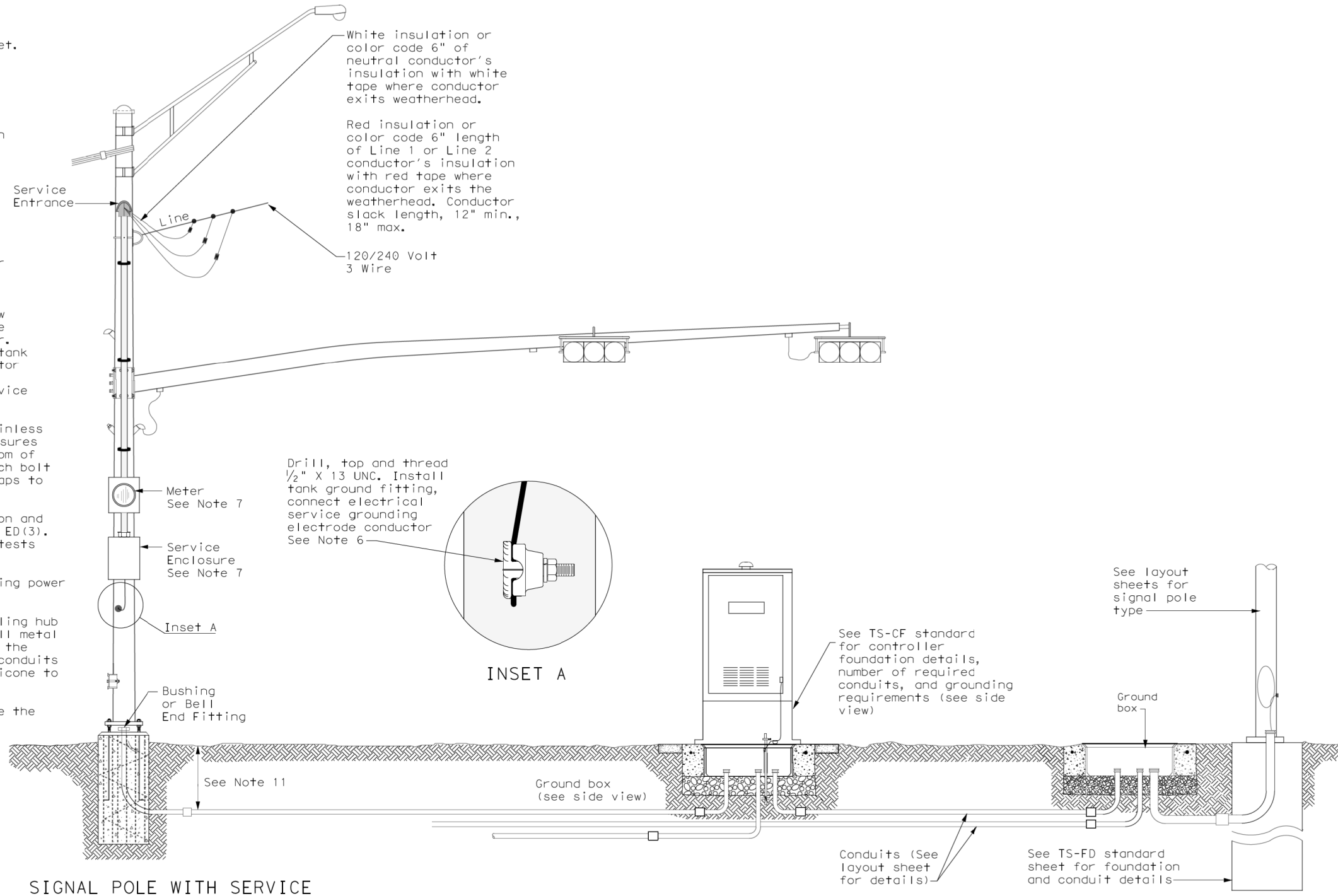
TOP VIEW
 SERVICE SUPPORT TYPE SF (O) & SF (U)

		Traffic Operations Division Standard	
ELECTRICAL DETAILS SERVICE SUPPORT TYPES SF & SP ED(7)-14			
FILE: ed7-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
©TxDOT October 2014	CONT	SECT	JOB
REVISIONS			HIGHWAY
	DIST	COUNTY	SHEET NO.
			209

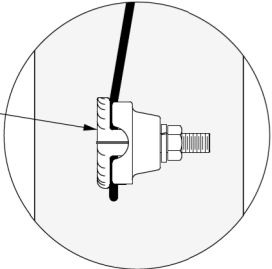
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TRAFFIC SIGNAL NOTES

1. Do not pass luminaire conductors through the signal controller cabinet.
2. Include an equipment grounding conductor in all conduits throughout the electrical system. Bond all exposed metal parts to the grounding conductor.
3. Provide roadway luminaires, when required, in accordance with the material and construction sections of Item 610, "Roadway Illumination Assemblies," except for performance testing of luminaires. Test installed roadway luminaires for proper operation as a part of the associated traffic signal system test.
4. If internally illuminated street name signs are approved for use, ground the fixture to the pole with a 12 AWG green XHHW conductor.
5. Bond anchor bolts to rebar cage in two locations using #3 bars or 6 AWG stranded copper conductors. Use listed mechanical connectors rated for embedment in concrete. See TxDOT standard TS-FD for further details.
6. Drill and tap signal poles for 1/2 in. X 13 UNC tank ground fitting. Provide and install tank ground fitting 4 in. to 6 in. directly below electrical service enclosure. Provide properly sized hole through the bottom of the enclosure for the service grounding electrode conductor. Connect the electrical service grounding electrode conductor to the tank ground fitting. Ensure electrical service grounding electrode conductor is as short and straight as possible from the enclosure to the tank ground fitting. See Inset A detail for further information. Size service entrance conduit and branch circuit conduit as shown in the plans.
7. Mount electrical service enclosure and meter to signal pole with stainless steel bands. Ensure bands are a minimum width of 3/4 in. Secure enclosures to bands using two-bolt brackets. Install brackets near top and bottom of each enclosure. Install properly sized stainless steel washers on each bolt in the enclosure. Band or drill and tap properly sized stand-off straps to signal pole for attaching conduit.
8. Conduct pull tests and insulation resistance tests on all illumination and power conductors as required in Item 620 "Electrical Conductors" and ED(3). To prevent electronics damage, do not conduct insulation resistance tests on traffic signal cables after termination.
9. Lock all enclosures and bolt down all ground box covers before applying power to the signal installation.
10. Terminate conduits entering the top of enclosures with a conduit-sealing hub or threaded boss such as meter hub. Install a grounding bushing on all metal conduits not connected to conduit-sealing hub or threaded boss. Bond the grounding bushing to the ground bus with a bonding jumper. Seal all conduits entering enclosures with duct seal or expanding foam. Do not use silicone to seal conduit ends.
11. For all conduits, ensure the burial depth is a minimum of 18". Ensure the minimum burial depth for conduit placed under a roadway is 24".



Drill, tap and thread 1/2" X 13 UNC. Install tank ground fitting, connect electrical service grounding electrode conductor See Note 6



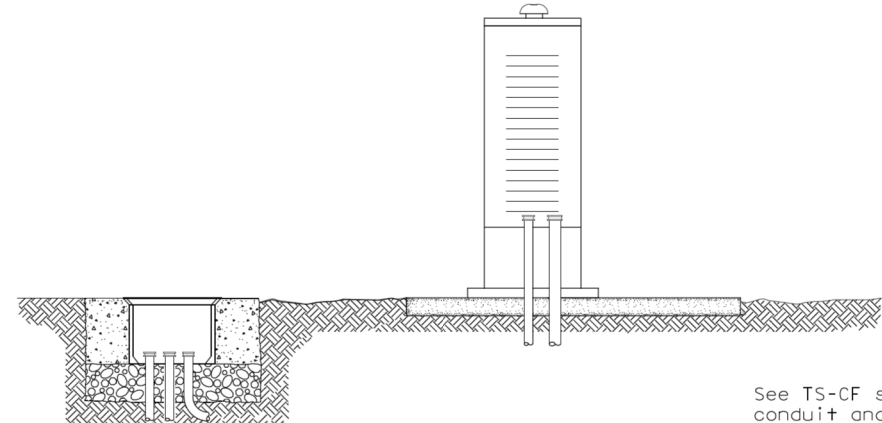
INSET A

SIGNAL POLE WITH SERVICE

Type T electrical service mounted on signal pole shown as an example. See electrical details, layout sheets, and electrical service data chart for additional details.

SIGNAL CONTROLLER FRONT VIEW

SIGNAL POLE



SIGNAL CONTROLLER SIDE VIEW

See TS-CF standard for conduit and grounding requirements. See layout sheets for ground box locations and any additional conduits that are required.



**ELECTRICAL DETAILS
TYPICAL TRAFFIC SIGNAL
SYSTEM DETAILS**

ED(8) - 14

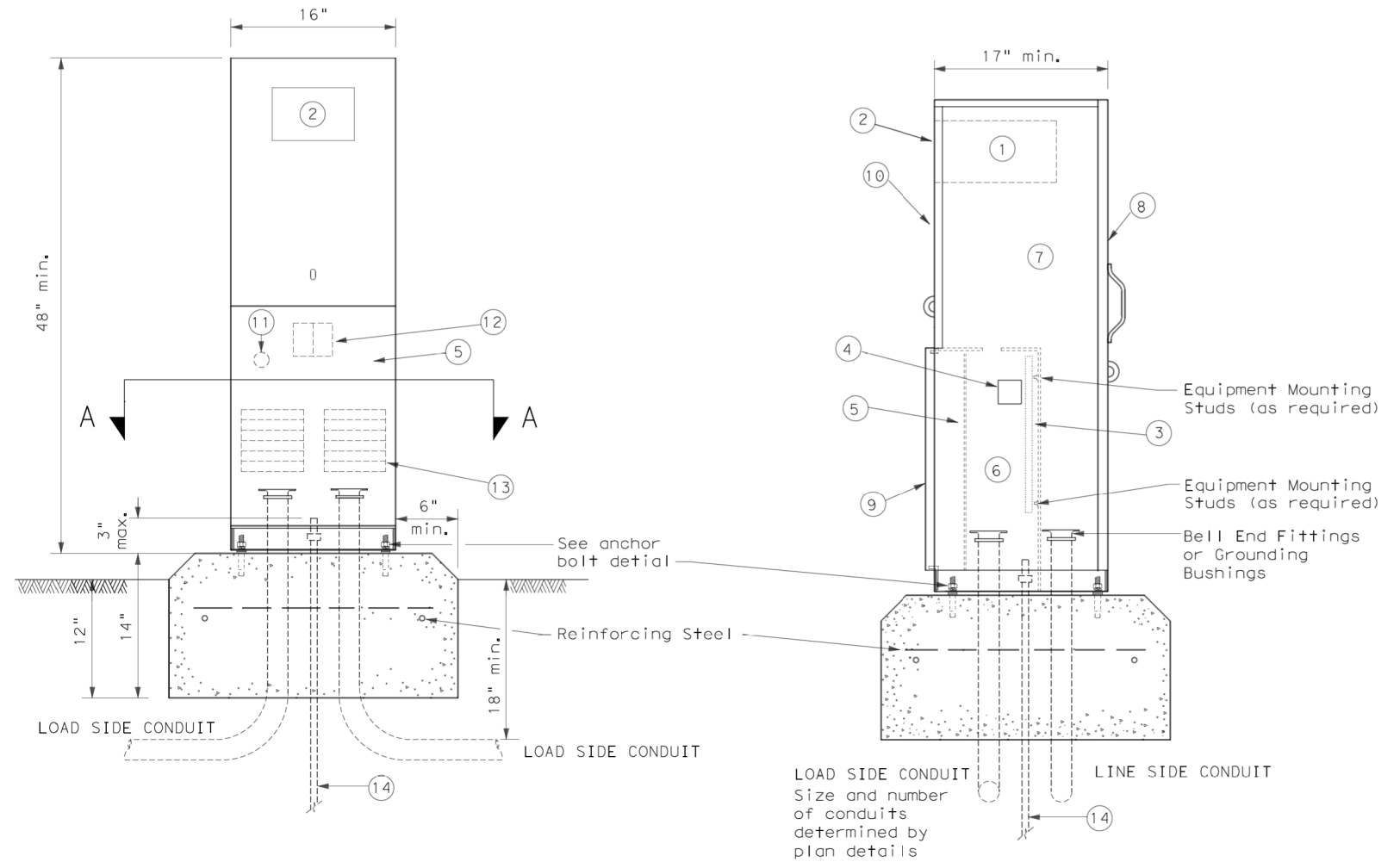
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© TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS				
	DIST	COUNTY	SHEET NO.	
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PEDESTAL SERVICE NOTES

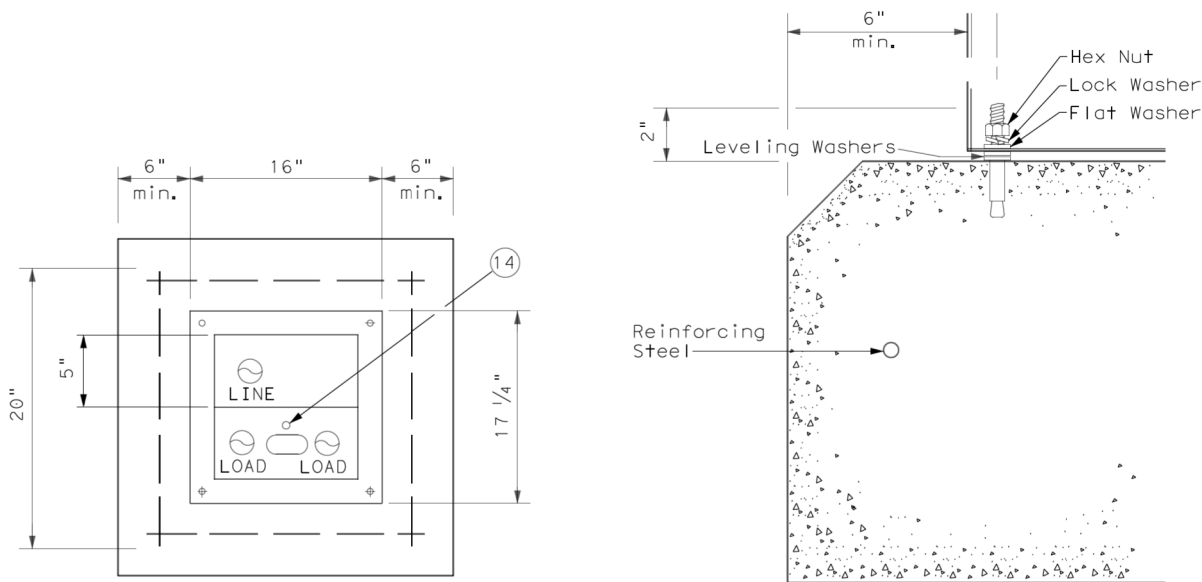
1. Manufacture pedestal electrical services in accordance with Departmental Material Specifications (DMS) 11080 "Electrical Services", 11085 "Electrical Services-Pedestal (PS)" and Item 628 "Electrical Services." Provide pedestal electrical services as listed on the Material Producers list (MPL) on the Department's web site under "Roadway Illumination and Electrical Supplies," Item 628. Ensure all mounting hardware and installation details of services meet utility company specifications. Contact the local utility company for approval of pedestal details prior to installing the electrical pedestal service. Submit any changes required by the utility company prior to manufacturing the pedestal enclosure.
2. When a meter socket is required, provide a socket with a minimum 100 amp rating that complies with local utility requirements.
3. Provide Class A or C concrete for pedestal service foundations in accordance with Item 420, "Concrete Substructures," except that concrete will not be paid for directly but is considered subsidiary to Item 628.
4. Provide #4 reinforcing steel for foundations in accordance with Item 440, "Reinforcement for Concrete."
5. Install 1/2 in. X 2 1/16 in. minimum length concrete single expansion type anchors for mounting pedestal enclosure to foundation. Anchor location to match mounting holes in each corner of enclosure. Secure each of the four corners of the pedestal enclosure to the anchors in the foundation with a 1/2 in. galvanized or stainless steel machine thread bolt, a properly sized locknut and a flat washer.
6. Finish top of concrete foundation in a neat and workmanlike manner. If leveling washers are used, ensure no more than 1/8 in. gap at any corner. Do not exceed a maximum dip or rise in the foundation of 1/8 in. per foot. When properly installed, ensure the top of the service enclosure is level front to back and side to side within 1/4 in. Repair rocking or movement of the service enclosure at no additional cost to the department.
7. Do not use liquidtight flexible metal conduit (LFMC) on pedestal type services.
8. Ensure all elbows in the foundation are sized as per utility provider's conduit requirements for underground conduit and feeders. PVC extensions may be installed provided the ends of the rigid metal conduits are more than 2 in. below the top of the concrete foundation. Where extension conduits are metal, grounding bushings must be installed with a bonding jumper properly terminated.



FRONT VIEW

SIDE VIEW

TYPE C shown, TYPE A similar except that TYPE A shall have individual circuit breakers (CB) mounted on an equipment mounting panel. CB Handles shall protrude through hinged deadfront trim.



SECTION A-A

ANCHOR BOLT DETAIL

LEGEND

1	Meter Socket, (when required)
2	Meter Socket Window, (when required)
3	Equipment Mounting Panel
4	Photo Electric Control Window, (When required)
5	Hinged Deadfront Trim
6	Load Side Conduit Trim
7	Line Side Conduit Area
8	Utility Access Door, with handle
9	Pedestal Door
10	Hinged Meter Access
11	Control Station (H-O-A Switch)
12	Main Disconnect
13	Branch Circuit Breakers
14	Copper Clad Ground Rod - 5/8" X 10'

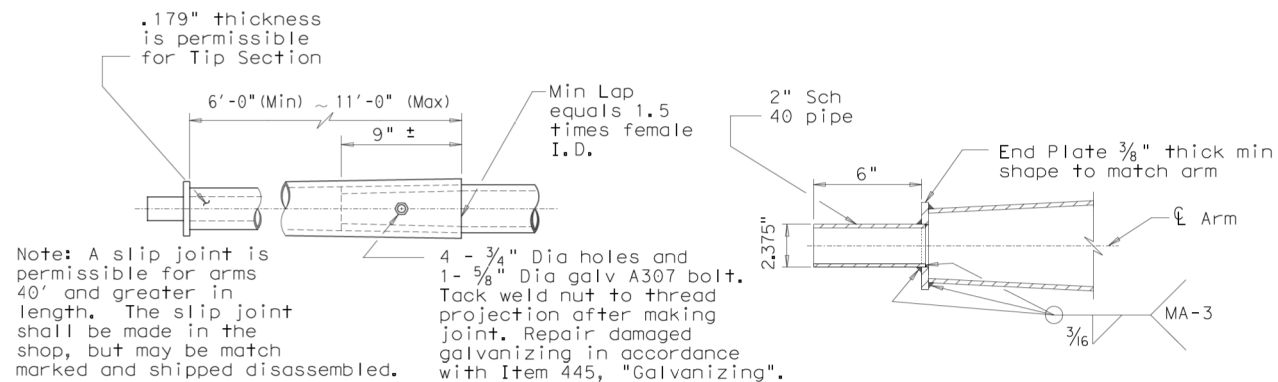


**ELECTRICAL DETAILS
ELECTRICAL SERVICE SUPPORT
PEDESTAL SERVICE TYPE PS**

ED(9) - 14

FILE: ed9-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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SLIP JOINT DETAIL

TENON DETAIL

Note: A slip joint is permissible for arms 40' and greater in length. The slip joint shall be made in the shop, but may be match marked and shipped disassembled.

4 - 3/4" Dia holes and 1 - 5/8" Dia galv A307 bolt. Tack weld nut to thread projection after making joint. Repair damaged galvanizing in accordance with Item 445, "Galvanizing".

Stainless steel bands (or Cables) and cast bracket as in "Astro-Brac", "Sky Bracket" or "Easy Bracket" with 1 1/2" Dia Threaded Coupling.

BRACKET ASSEMBLY

VIBRATION WARNING

Mast Arms of SMA and DMA structures and clamp-on Arms of LMA structures of approximately 40 ft or longer are subject to harmonic vertical vibrations in light wind conditions due to the aeroelastic characteristics of a few of the myriads of possible combinations of the following: signal numbers, weights and positions; existence/solidity of backplates; presence of additional attachments to the arm, such as signs and cameras; arm-wind orientation; and arm-pole stiffness.

Such vibrations may cause fatigue damage to the structure and may lead to galloping in moderate wind conditions which may further damage the structure and alarm the public. Tests have indicated that when wind is blowing toward the back side of signal heads having un-vented backplates attached the probability of unacceptable harmonic vibration and/or galloping is rather high.

If backplates are not required for improved visibility they should not be applied to the signal heads or, if they must be applied, they should be vented as a first and inexpensive measure to mitigate vibrations.

The traffic signal mast arms shall be visually inspected in 5 to 20 mph wind conditions after installation of signal heads and any attachments, including any required backplates. If vertical movements with a total excursion (maximum upward excursion to maximum downward excursion) of more than approximately 8" are observed at the arm tip, a damping plate shall be fitted to the arm. See "Damping Plate Mounting Details" on standard sheet, MA-DPD-10.

This visual inspection shall be repeated after each modification of the structure that could affect its aeroelastic response. Excessive vibrations shall not be allowed to continue for more than two days.

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto. Design Wind Speed equals 100 mph plus a 1.3 gust factor.

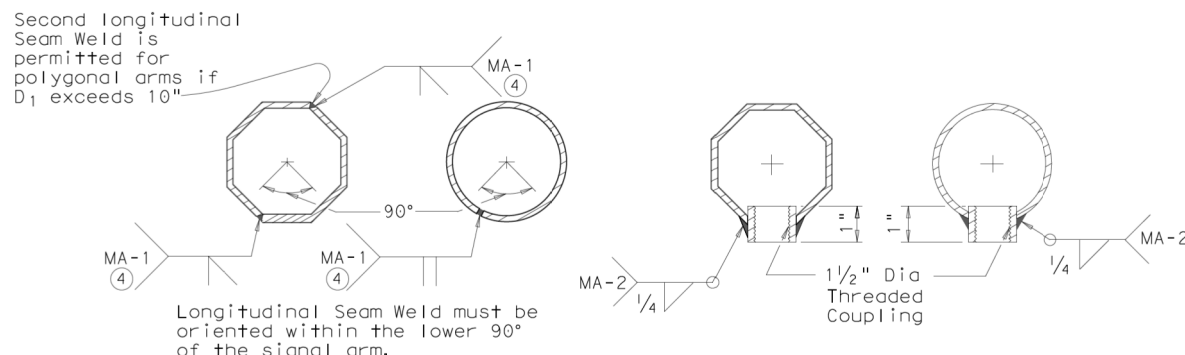
Poles are designed to support one 8'-0" luminaire arm, one 9'-0" internally lighted street name sign and one traffic signal arm with a length as tabulated. The specified luminaire load applied at the end of the luminaire arm equals 60 lbs vertical dead load plus the horizontal wind load on an effective projected area of 1.6 sq ft. The specified internally lighted street name sign load applied 4.5 ft from the centerline of the pole equals 85 lbs vertical dead load plus horizontal wind load on an effective projected area of 11.5 sq ft. The specified signal load applied at the end of the traffic signal arm equals 180 lbs vertical dead load plus the horizontal wind load on an effective projected area of 32.4 sq ft (actual area times drag coefficient).

See Standard Sheet "MA-D" for pole details, "MA-C" for traffic signal arm connection details, "MA-C (ILSN)" for internally lighted street name sign arm connection details, "LUM-A" for luminaire arm and connection details, "SNS" for internally lighted street name sign details, and "TS-FD" for anchor bolt and foundation details. See "MA-C" for material specifications.

Fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the fabricator must obtain prior to fabrication. Materials, fabrication tolerances, and shipping practices shall meet the requirements of this sheet and Item 686, "Traffic Signal Pole Assemblies (Steel)".

Unless otherwise noted, all parts shall be galvanized in accordance with Item 445, "Galvanizing", after fabrication.

Deviation from the details and dimensions shown herein require submission of shop drawings in accordance with Item 441, "Steel Structures". Alternate designs are not acceptable.



ARM WELD DETAIL

ARM COUPLING DETAILS

④ 60% Min. penetration
100% penetration within
6" of circumferential
base welds.

SHEET 2 OF 2

Texas Department of Transportation
 Traffic Operations Division
TRAFFIC SIGNAL SUPPORT STRUCTURES
SINGLE MAST ARM ASSEMBLY
 (100 MPH WIND ZONE)
SMA-100(2)-12

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REVISIONS		CONT	SECT	JOB	HIGHWAY
5-96					CS
1-12		DIST	COUNTY		SHEET NO.
			FORT BEND		213

123B

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FOUNDATION DESIGN TABLE

FDN TYPE	DRILLED SHAFT DIA	REINFORCING STEEL		EMBEDDED DRILLED SHAFT LENGTH-ft (4), (5), (6)			ANCHOR BOLT DESIGN (1)			FOUNDATION DESIGN LOAD (2)		TYPICAL APPLICATION	
		VERT BARS	SPIRAL & PITCH	TEXAS CONE PENETROMETER N blows/ft	ANCHOR BOLT DIA	Fy (ksi)	BOLT CIR DIA	ANCHOR TYPE	MOMENT K-ft	SHEAR Kips			
24-A	24"	4- #5	#2 at 12"	5.7	5.3	4.5	3/4"	36	12 3/4"	1	10	1	Pedestal pole, pedestal mounted controller.
30-A	30"	8- #9	#3 at 6"	11.3	10.3	8.0	1 1/2"	55	17"	2	87	3	Mast arm assembly. (see Selection Table)
36-A	36"	10- #9	#3 at 6"	13.2	12.0	9.4	1 3/4"	55	19"	2	131	5	Mast arm assembly. (see Selection Table) 30' strain pole with or without luminaire.
36-B	36"	12- #9	#3 at 6"	15.2	13.6	10.4	2"	55	21"	2	190	7	Mast arm assembly. (see Selection Table) Strain pole taller than 30' & strain pole with mast arm
42-A	42"	14- #9	#3 at 6"	17.4	15.6	11.9	2 1/4"	55	23"	2	271	9	Mast arm assembly. (see Selection Table)

NOTES:

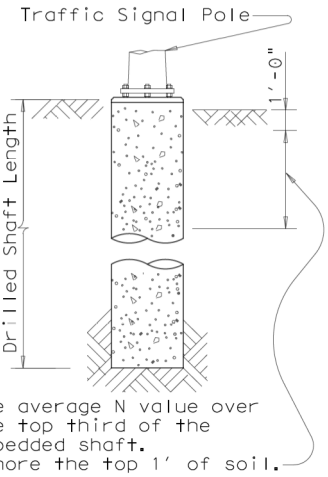
- Anchor bolt design develops the foundation capacity given under Foundation Design Loads.
- Foundation Design Loads are the allowable moments and shears at the base of the structure.
- Foundations may be listed separately or grouped according to similarity of location and type. Quantities are for the Contractor's information only.
- Field Penetrometer readings at a depth of approximately 3 to 5 feet may be used to adjust shaft lengths.
- If rock is encountered, the Drilled Shaft shall extend a minimum of two diameters into solid rock.
- Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

FOUNDATION SUMMARY TABLE (3)

LOCATION IDENTIFICATION	AVG. N BLOW /ft.	FDN TYPE	NO. EA	DRILLED SHAFT LENGTH (FEET) (6)				
				24-A	30-A	36-A	36-B	42-A
POLE 1	10	36-A				13		
POLE 2	10	36-A				13		
POLE 3	10	36-A				13		
POLE 4	10	36-A				13		
TOTAL DRILLED SHAFT LENGTHS						52		

FOUNDATION SELECTION TABLE FOR STANDARD MAST ARM PLUS ILSN SUPPORT ASSEMBLIES (ft)

WIND SPEED	MAX SINGLE ARM LENGTH	FDN 30-A	FDN 36-A	FDN 36-B	FDN 42-A
		80 MPH DESIGN	32'	48'	
80 MPH DESIGN	MAXIMUM DOUBLE ARM LENGTH COMBINATIONS	24' X 24'			
		28' X 28'			
		32' X 28'	32' X 32'		
			36' X 36'		
			40' X 36'		
100 MPH DESIGN	MAXIMUM DOUBLE ARM LENGTH COMBINATIONS	44' X 28'	44' X 36'		
				44' X 36'	
				32' X 32'	
				36' X 36'	
				40' X 24'	40' X 36'
				44' X 36'	

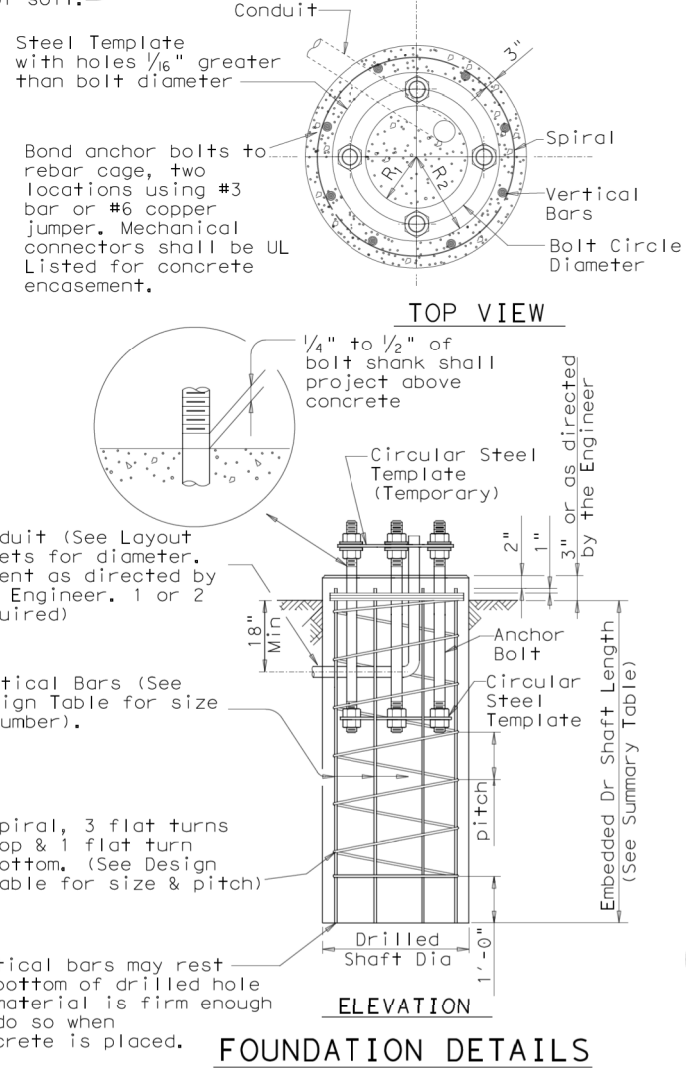
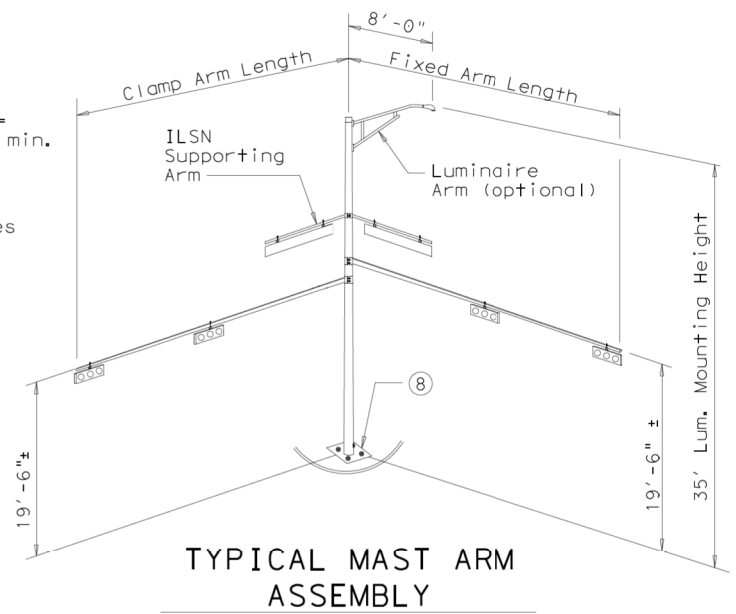
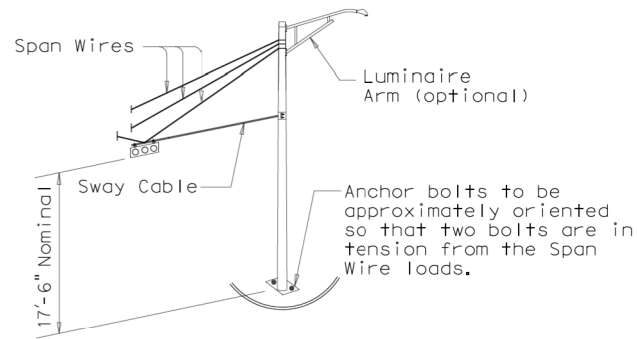
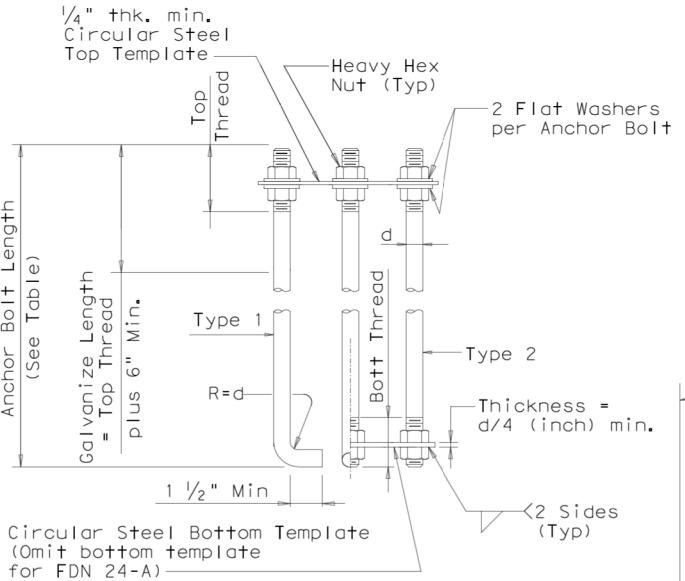


ANCHOR BOLT & TEMPLATE SIZES

BOLT DIA IN.	BOLT LENGTH	TOP THREAD	BOTTOM THREAD	BOLT CIRCLE	R2	R1
3/4"	1'-6"	3"	—	12 3/4"	7 1/8"	5 5/8"
1 1/2"	3'-4"	6"	4"	17"	10"	7"
1 3/4"	3'-10"	7"	4 1/2"	19"	11 1/4"	7 3/4"
2"	4'-3"	8"	5"	21"	12 1/2"	8 1/2"
2 1/4"	4'-9"	9"	5 1/2"	23"	13 3/4"	9 1/4"

(7) Min dimensions given, longer bolts are acceptable.

- EXAMPLE:**
- For 80mph design wind speed, foundation 30-A can support up to a 32' arm with another arm up to 28'
 - For 100mph design wind speed, foundation 36-A can support a single 36' mast arm.



GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals and interim revisions thereto.

Reinforcing steel shall conform to Item 440, "Reinforcing Steel".

Concrete shall be Class "C".

Threads for anchor bolts and nuts shall be rolled or cut threads of 8UN series up to 2" in diameter or UNC series for all sizes. Bolts and nuts shall have Class 2A and 2B fit tolerances. Galvanized nuts shall be tapped after galvanizing.

Anchor bolts that are larger than 1" in diameter shall conform to "alloy steel" or "medium-strength mild steel" per Item 449, "Anchor Bolts". Anchor bolts that are 1" in diameter or less shall conform to ASTM A36. Galvanize a minimum of the top end thread length plus 6" for all anchor bolts unless otherwise noted. Exposed washers and exposed nuts shall be galvanized. All galvanizing shall be in accordance with Item 445, "Galvanizing".

Templates and embedded nuts need not be galvanized. Lubricate and tighten anchor bolts when erecting the structure in accordance with Item 449, "Anchor Bolts".



TRAFFIC SIGNAL POLE FOUNDATION

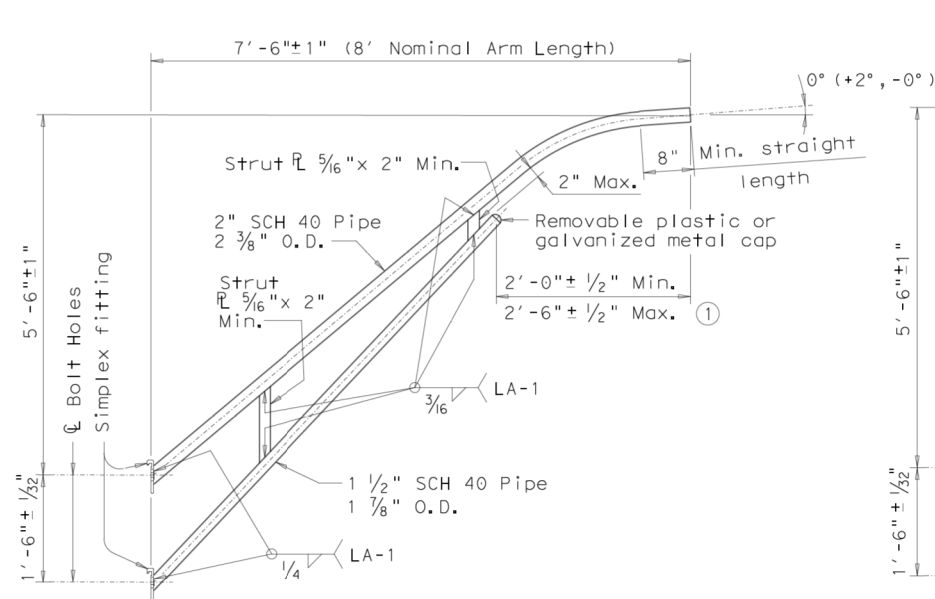
TS-FD-12

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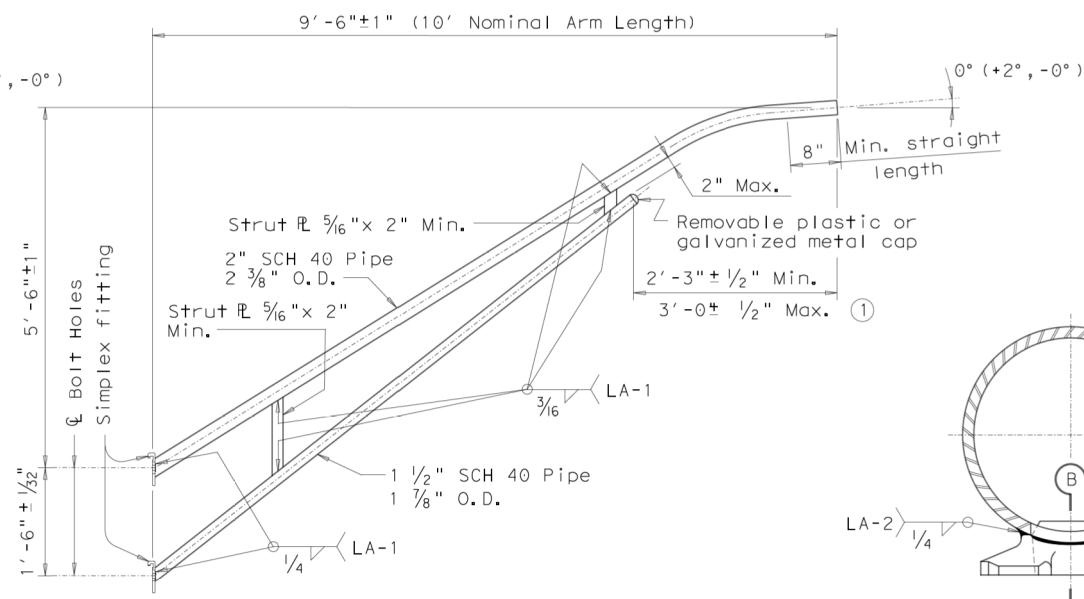
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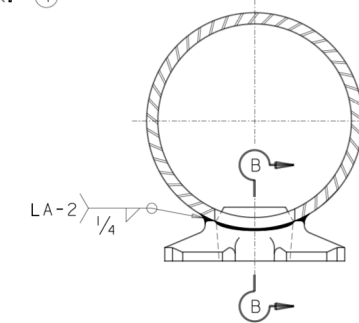
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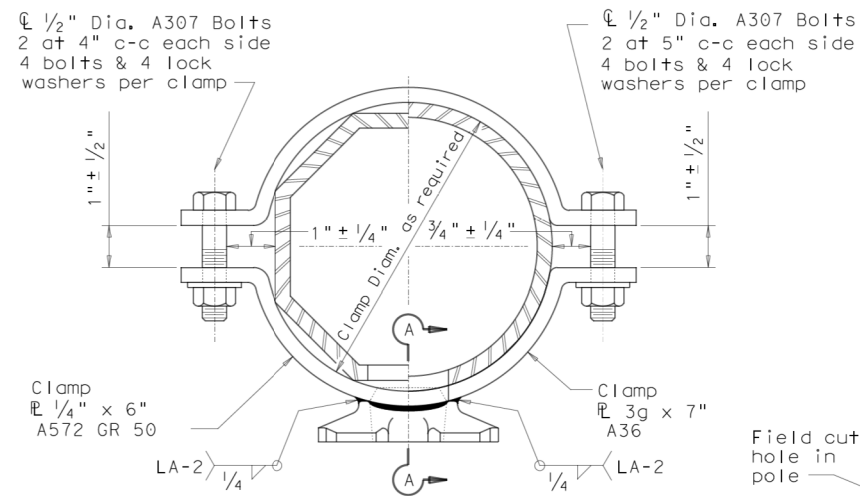
8-FOOT LUMINAIRE ARM



10-FOOT LUMINAIRE ARM

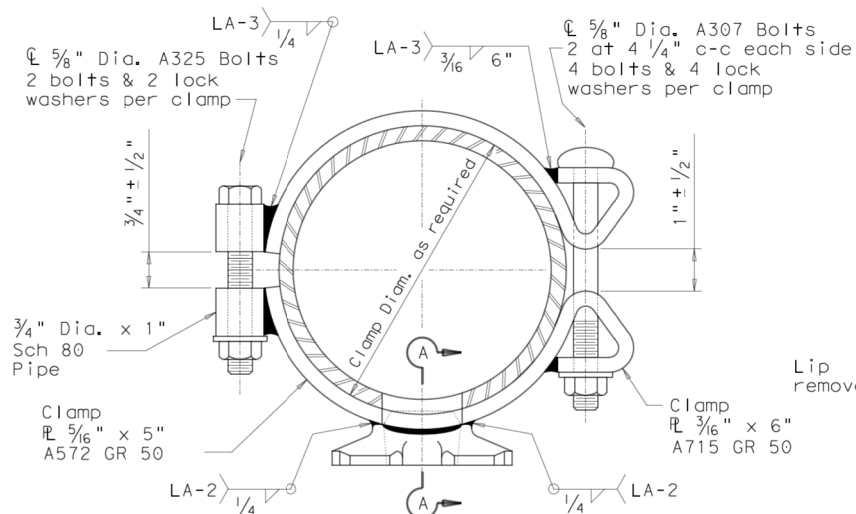


DIRECT ATTACHMENT DETAIL



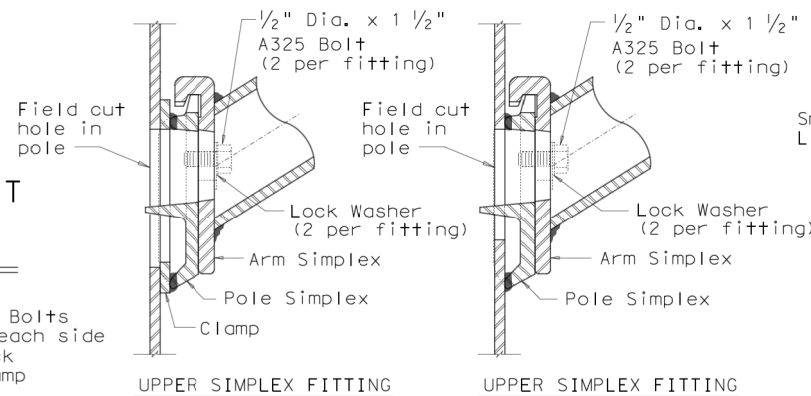
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CLAMP ATTACHMENT DETAIL NO. 2 (HALF SECTION)



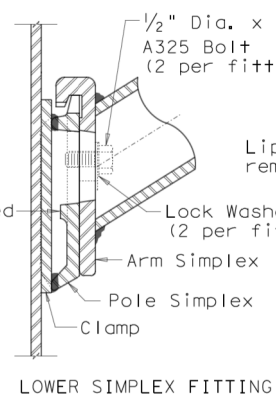
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CLAMP ATTACHMENT DETAIL NO. 4 (HALF SECTION)

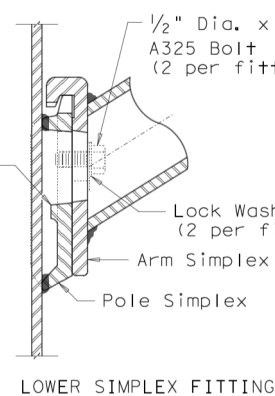


UPPER SIMPLEX FITTING

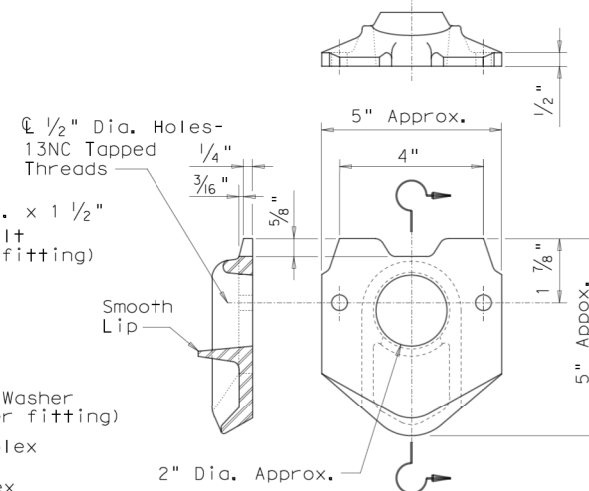
UPPER SIMPLEX FITTING



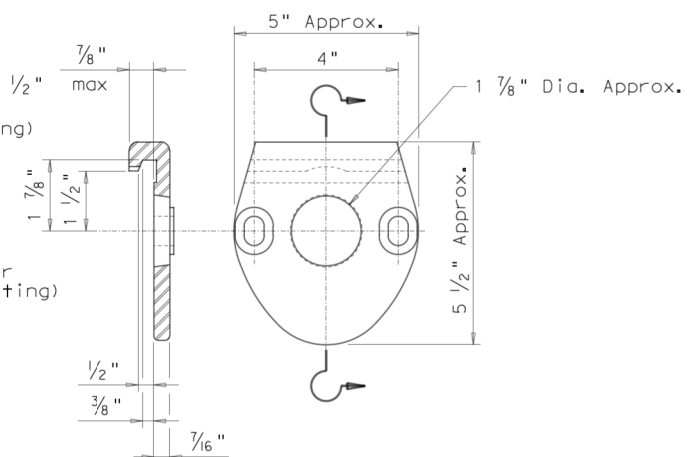
SECTION A-A



SECTION B-B



POLE SIMPLEX DETAIL



ARM SIMPLEX DETAIL

MATERIALS	
Pole or Arm Simplex	ASTM A27 Gr.65-35 or A148 Gr.80-50, A576 Gr.1021 (3), or A36 (Arm only)
Arm Pipes	ASTM A53 Gr.B, A501, A1008 HSLAS-F Gr.50 (4), or A1011 HSLAS-F Gr.50 (4)
Arm Strut Plates (2)	ASTM A36, A572 Gr.50 (4), or A588
Misc.	ASTM designations as noted

- Dimensional limits are given to show acceptable variation in design. All of a Fabricator's production of a particular arm length shall have the same dimensions within specified tolerances.
- Any of the materials listed for plates may be used where the drawings do not specify a particular ASTM designation.
- A576 must be suitable for forging and also meet minimum tensile strength of 65 ksi, minimum yield of 35 ksi, and elongation in 2 inches of 22 percent.
- ASTM A572, A1008 HSLAS-F, and A1011 HSLAS-F may have higher yield strengths but shall not have less elongation than the grade indicated.

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Revisions thereto. Design Wind Speed equals 90 mph plus a 1.3 gust factor. Arms are designed to support a 60 lb. luminaire having an effective projected area (actual area times drag coefficient) of 1.6 sq. ft.

Materials and fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. In the absence of specified Fabrication tolerances, dimensions shall be within the tolerances generally obtainable in normal fabrication practice.

Unless otherwise noted, all parts shall be galvanized after fabrication in accordance with Item 445, "Galvanizing".

Deviation from the details and dimensions shown herein require submission of shop drawings in accordance with Item 441, "Steel Structures". Alternate designs are not acceptable.

Each pole simplex fitting shall be supplied with 2 ASTM A325 bolts and 2 lock washers of the size specified. The bolts and lock washers shall be secured to the pole with the other hardware items called for in the plans. When clamp attachment is specified, the Fabricator shall ship the clamp assembly securely attached to the pole at the location shown on the plans.

If clamp assemblies are ordered without poles, the Fabricator shall ship one upper and one lower clamp assembly together in a single package, including all nuts and washers required for the clamps and simplex fittings.

Texas Department of Transportation

 Traffic Operations Division

STANDARD ASSEMBLY DRAWINGS FOR LUMINAIRE SUPPORT STRUCTURES

 ARM DETAILS

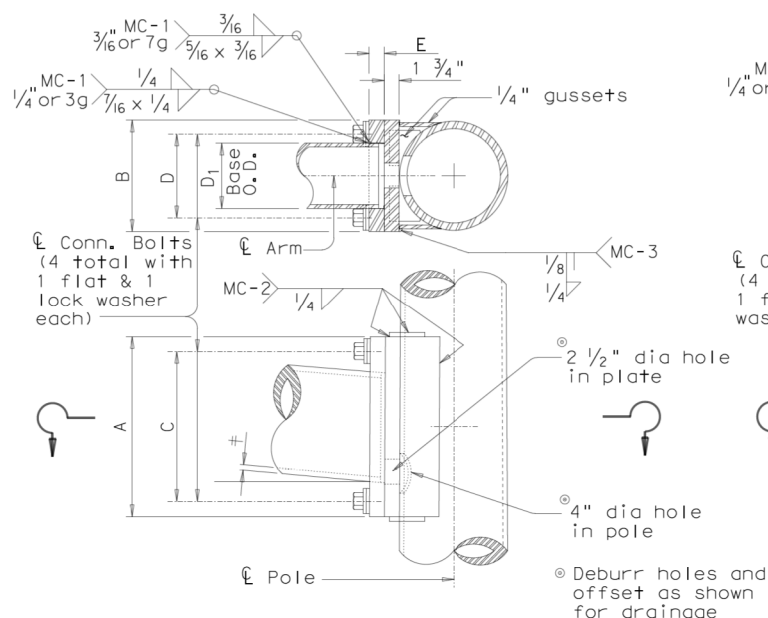
LUM-A-12

© TxDOT August 1995		DN: LEH	CK: JSY	DW: LTT	CK: TEB
5-96	1-99	1-12	REVISIONS	CONT	SECT
		JOB		HIGHWAY	
		COUNTY		SHEET NO.	
				215	

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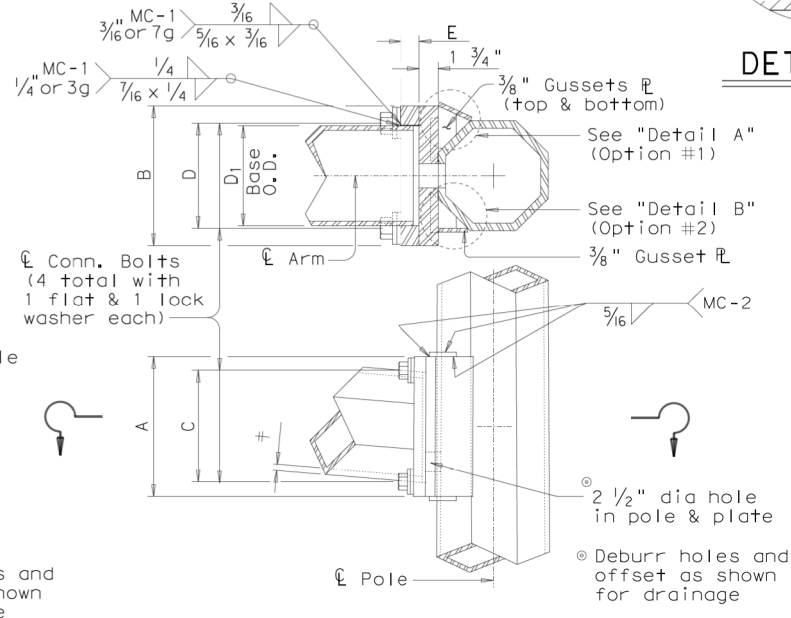
DATE: FILE:

ARM SIZE		A	B	C	D	E	CONN BOLT DIA
D ₁	≠	in.	in.	in.	in.	in.	in.
6.5	.179	12	9	9	6	1 3/4	1
7.5	.179	13	9	10	6	1 3/4	1
8.0	.179	14	10	11	7	2	1 1/4
9.0	.179	16	11	13	8	2	1 1/4
9.5	.179	17	12	14	9	2	1 1/4
9.5	.239	18	12	15	9	2	1 1/4
10.0	.239	18	12	15	9	2	1 1/4
10.5	.239	18	13	15	10	3	1 1/2
11.0	.239	18	13	15	10	3	1 1/2

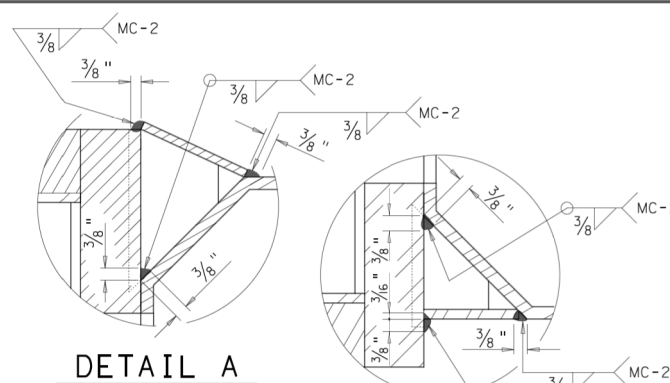


FIXED MOUNT DETAIL 1

ARM SIZE		A	B	C	D	E	CONN BOLT DIA
D ₁	≠	in.	in.	in.	in.	in.	in.
7.0	.179	11	11	8	8	1 3/4	1 1/4
7.5	.179	11	11	8	8	1 3/4	1 1/4
8.0	.179	11	11	8	8	2	1 1/4
9.0	.179	13	13	10	10	2	1 1/4
10.0	.179	13	13	10	10	2	1 1/4
9.5	.239	13	13	10	10	2	1 1/4
10.0	.239	14	14	11	11	2	1 1/2
11.0	.239	14	14	11	11	3	1 1/2
11.5	.239	14	14	11	11	3	1 1/2

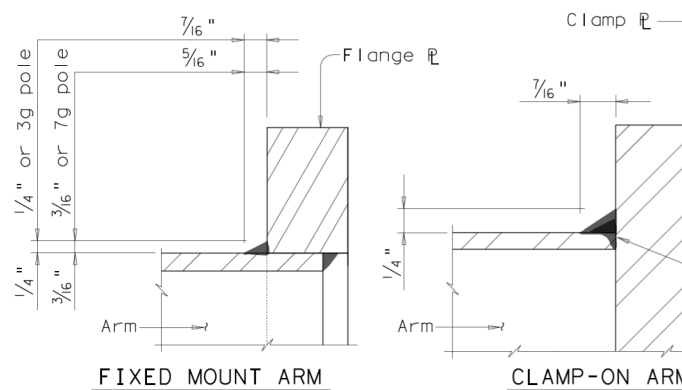


FIXED MOUNT DETAIL 2



DETAIL A

DETAIL B



FIXED MOUNT ARM

CLAMP-ON ARM

ARM BASE WELD DETAILS

MATERIALS	
Round Shafts or Polygonal Shafts ¹	ASTM A595 Gr. A, A588, A1008 HSLAS Gr.50 Class 2, A1011 HSLAS Gr.50 Class 2, A572 Gr.50 or A1011 SS Gr.50 ²
Plates ¹	ASTM A36, A588, or A572 Gr.50
Connection Bolts	ASTM A325 or A449, except where noted
Pin Bolts	ASTM A325
Pipe ¹	ASTM A53 Gr. B, A501, A1008 HSLAS-F Gr.50, A1011 HSLAS-F Gr.50
Misc. Hardware	Galvanized steel or stainless steel or as noted

- ¹ ASTM A572, A1008 HSLAS, A1011 HSLAS, A1008 HSLAS-F, A1011 HSLAS-F or A1011 SS may have higher yield strengths but shall not have less elongation than the grade indicated.
- ² ASTM A1011 SS Gr.50 material shall also have a minimum elongation of 18 percent in 8 inches or 23 percent in 2 inches. Material thickness in excess of those stipulated under A1011 SS will be acceptable providing the material meets all other A1011 SS requirements and the requirements of this item.

GENERAL NOTES:

Clamp-on details are used for the second arm on dual mast arm assemblies. A Maximum 1 1/2" wide vertical slotted hole shall be cut in the front clamp plate to facilitate drainage during galvanizing. The slot shall be centered behind the arm and shall be no longer than the arm diameter minus 1"

Fixed mount details are used for single mast arm assemblies and for the first arm on dual mast arm assemblies.

Where duplicate parts occur on a detail, welds shown for one part shall apply to all similar parts on the detail.

Pin bolts are required to prevent rotation of clamp-on arms under design wind forces.

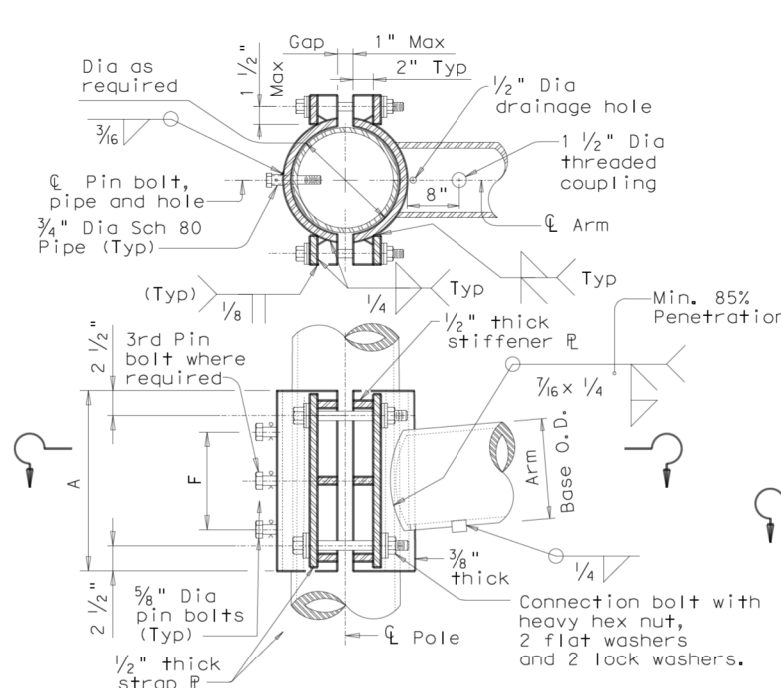
NOTE:

Pin bolts shall be A325 with threads excluded from the shear plane. Pin bolt and 3/4" dia pipe shall have 3/16" dia holes for a 1/8" dia galvanized cotter pin. Back clamp plate shall be furnished with a 3/4" dia hole for each pin bolt. An 1/16" dia hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.

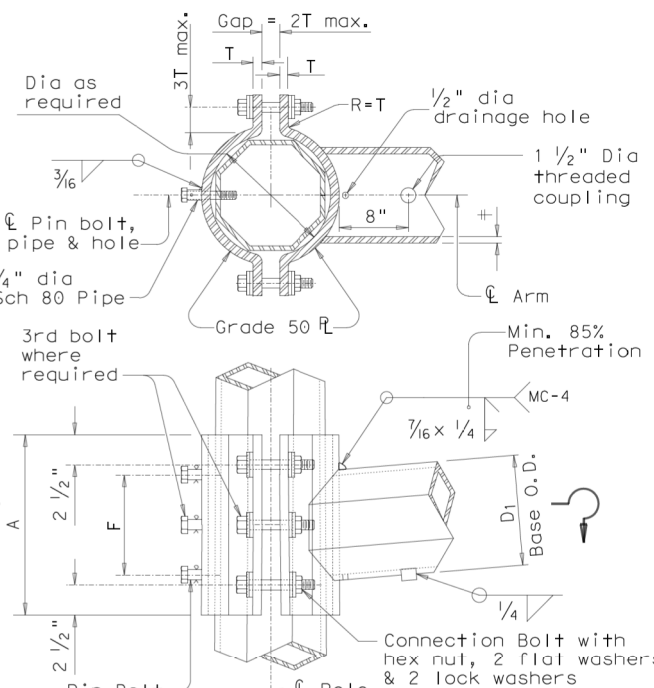
ARM SIZE		A	F	CONN. BOLTS	PIN BOLTS
D ₁	≠	in.	in.	No. Dia	No. Dia
6.5	.179	12	6	4 1	2 5/8
7.5	.179	14	8	4 1	2 5/8
8.0	.179	14	8	4 1	2 5/8
9.0	.179	16	10	4 1	2 5/8
9.5	.179	18	12	4 1 1/4	3 5/8
9.5	.239	18	12	4 1 1/4	3 5/8
10.0	.239	18	12	4 1 1/4	3 5/8

ARM SIZE		A	F	T	CONN. BOLTS	PIN BOLTS
D ₁	≠	in.	in.	in.	No. Dia	No. Dia
7.0	.179	12	6	3/4	4 3/4	2 5/8
7.5	.179	14	8	3/4	4 3/4	2 5/8
8.0	.179	14	8	3/4	4 3/4	2 5/8
9.0	.179	16	10	7/8	4 1	2 5/8
10.0	.179	18	10	7/8	4 1	2 5/8
9.5	.239	18	10	1	6 1	3 5/8
10.0	.239	18	10	1	6 1	3 5/8

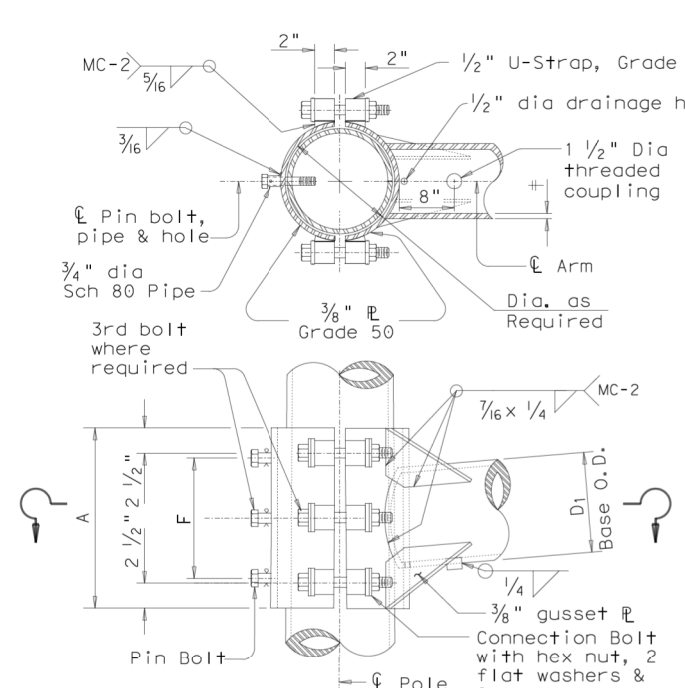
ARM SIZE		A	F	CONN. BOLTS	PIN BOLTS
D ₁	≠	in.	in.	No. Dia	No. Dia
6.5	.179	12	6	4 1	2 5/8
7.5	.179	14	8	4 1	2 5/8
8.0	.179	14	8	4 1	2 5/8
9.0	.179	16	10	4 1	2 5/8
9.5	.179	18	12	6 1	3 5/8
9.5	.239	18	12	6 1	3 5/8
10.0	.239	18	12	6 1	3 5/8



CLAMP-ON DETAIL 1



CLAMP-ON DETAIL 2



CLAMP-ON DETAIL 3

Texas Department of Transportation
Traffic Operations Division

STANDARD ASSEMBLY FOR TRAFFIC SIGNAL SUPPORT STRUCTURES

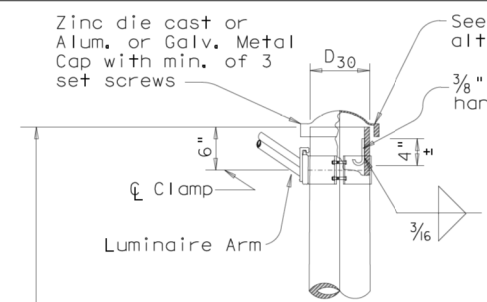
MAST ARM CONNECTIONS

MA-C-12

© TxDOT August 1995	DN: MS	CK: JSY	DW: MMF	CK: JSY
5-96	CONT	SECT	JOB	HIGHWAY
5-09	DIST	COUNTY	SHEET NO.	
1-12			216	

126A

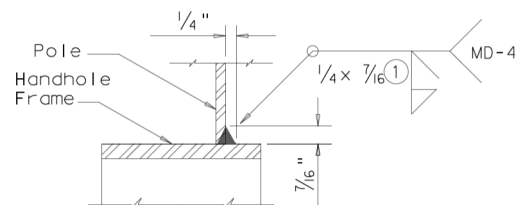
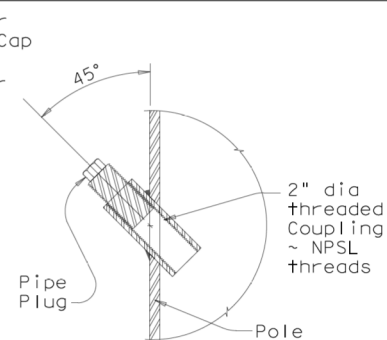
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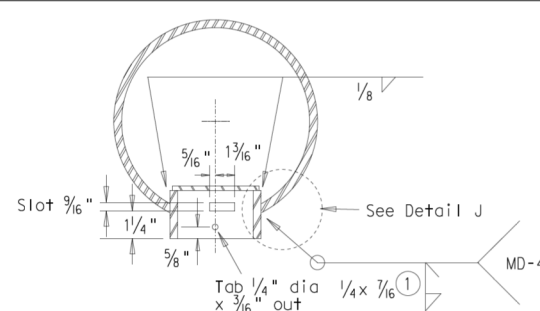
DETAIL A

(for pole with luminaire)

POLE COUPLING DETAIL

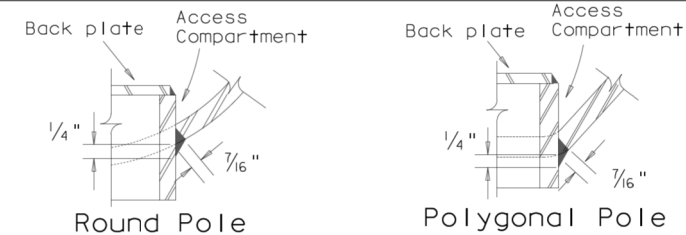


DETAIL G

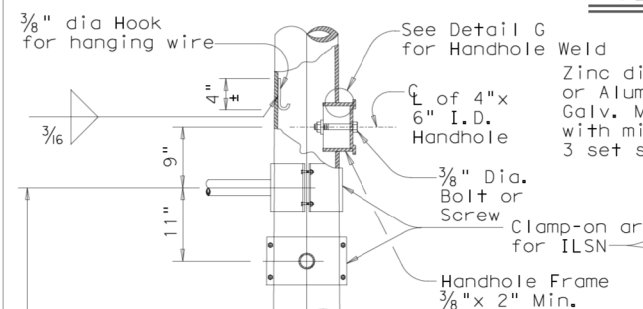


SECTION X-X

Opening for access compartment shall be no more than 1/16 inch wider than the access compartment itself.

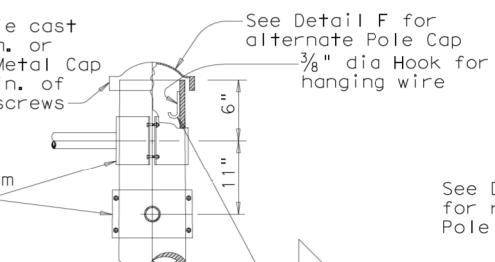


DETAIL J

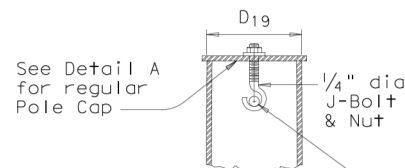


DETAIL B

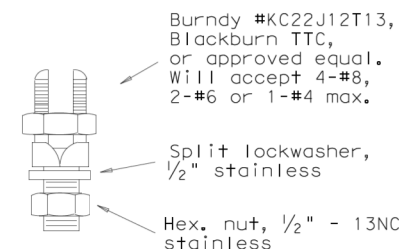
(If ILSN applied)



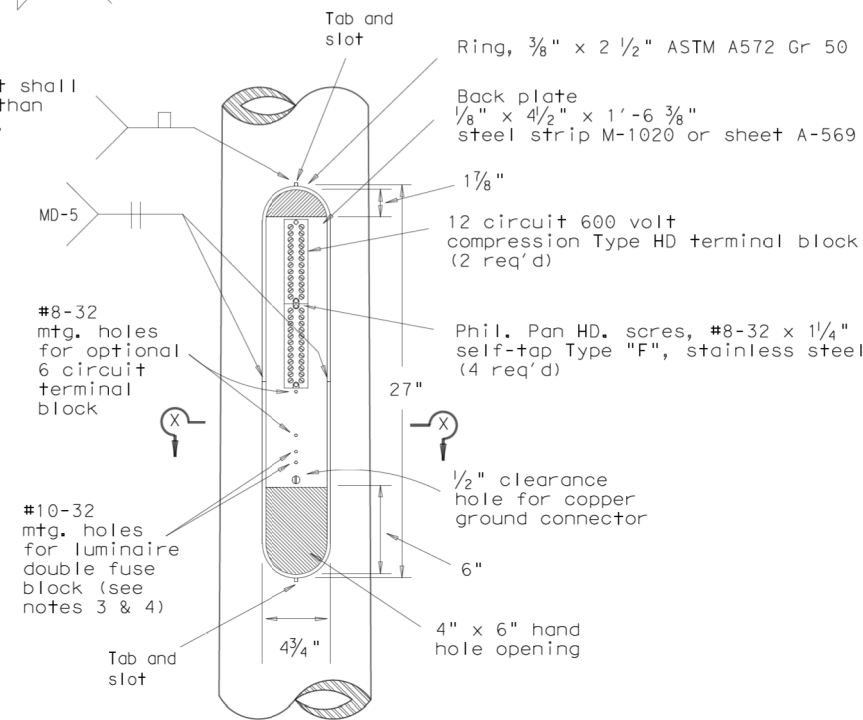
DETAIL C



SECTION Y-Y



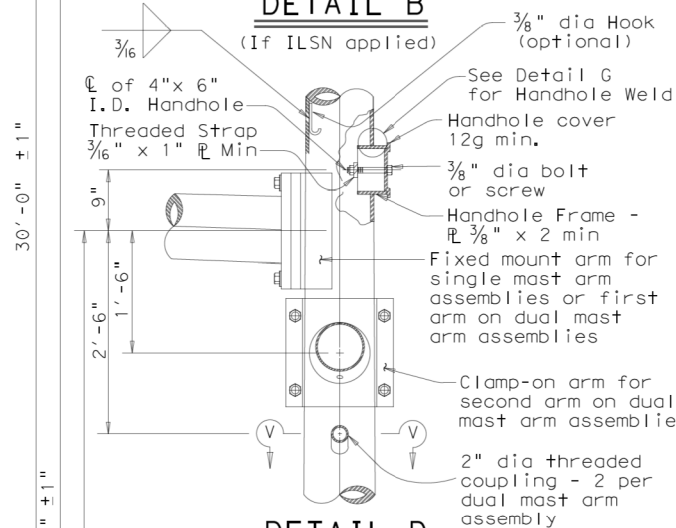
COPPER GROUND CONNECTOR



ACCESS COMPARTMENT

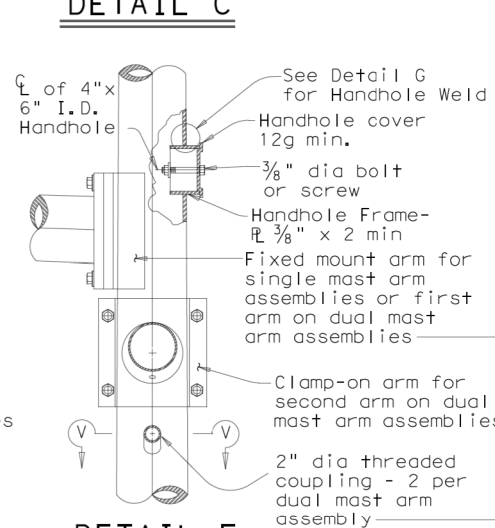
NOTES:

- The cover shall be one piece formed from ABS plastic, shall be a pearl gray color, and shall be suitable for exposure to harsh sunlight and extreme weather. Cover shall latch with two screw latches and shall fit tightly to the enclosure ring to create a rainproof seal. Latch screws shall be 1/4-20 stainless flat socket head screws with tamper proof feature.
- The pole manufacturer shall provide with each pole a separate kit consisting of: one cover with two latching assemblies, two terminal strips (Marathon #985GP12CU or approved equal), four #8-32 x 1 1/4 self tapping type "F" stainless steel pan head screws, and one ground connector (Blackburn TTC, Burndy KC22J12T13, or Ilco SSS-5). The traffic signal contractor shall install the kit items in the field.
- The screw hole spacing on the enclosure back plate shall be for two Marathon #985GP12 terminal strips, one Marathon #985GP06CU terminal strip, and one Bussmann #BM6032B fuse block.
- Install one Bussmann #BM6032B, Littelfuse #L60030M-2C, or Ferraz-Shawmut #30352 fuse block for poles where luminaires are to be installed.



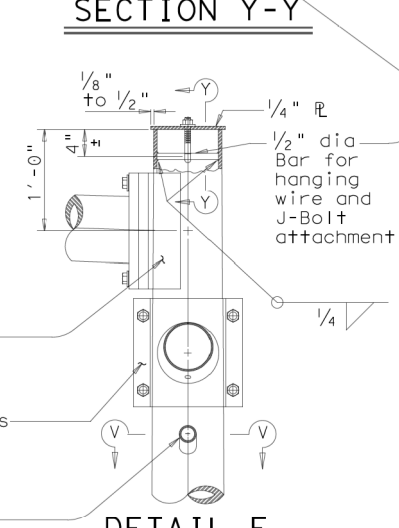
DETAIL D

(for 30' pole with luminaire and ILSN sign)



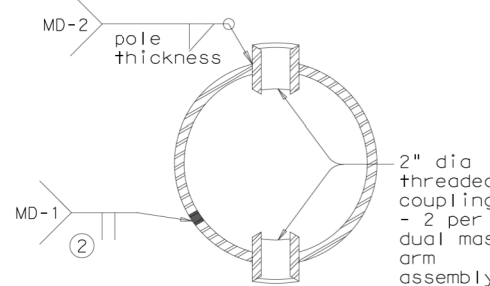
DETAIL E

(for 24' pole with ILSN sign and no luminaire)



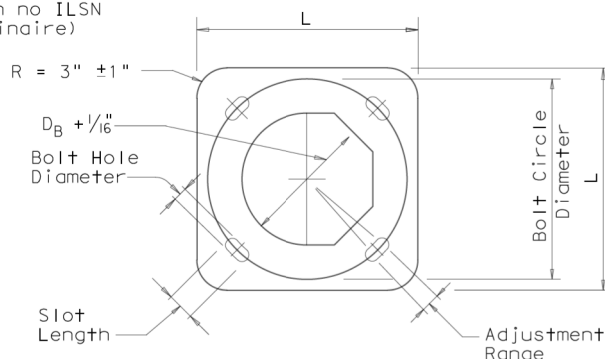
DETAIL F

(for 19' pole with no ILSN sign and no luminaire)



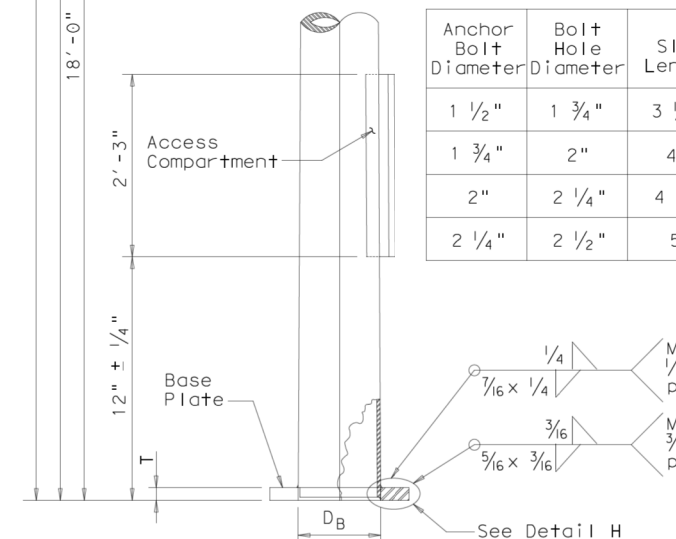
SECTION V-V

Anchor Bolt Diameter	Bolt Hole Diameter	Slot Length	Bolt Circle Diameter	Base R Dim. L x T	Adjust. Range
1 1/2"	1 3/4"	3 1/2"	17"	18" x 1 1/2"	13.4°
1 3/4"	2"	4"	19"	20" x 1 3/4"	13.5°
2"	2 1/4"	4 1/2"	21"	22" x 2"	13.6°
2 1/4"	2 1/2"	5"	23"	24" x 2 1/4"	13.7°

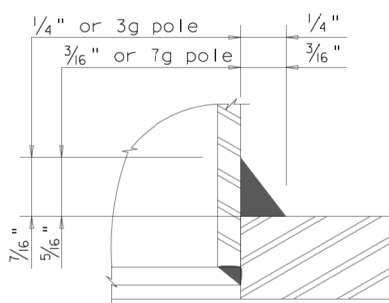


BASE PLATE PLAN

- 85% Min. penetration
- 60% Min. penetration 100% penetration within 6" of circumferential base welds.



POLE ELEVATION



DETAIL H

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES MAST ARM POLE DETAILS

MA-D-12

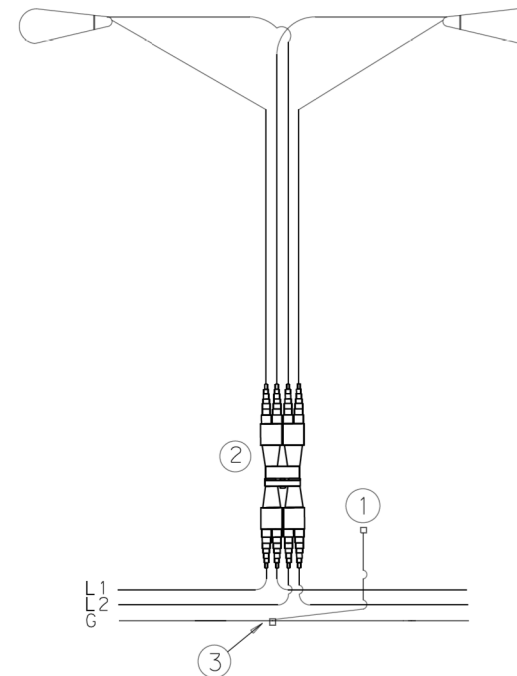
© TxDOT August 1995	DN: MS	CK: JSY	DW: FDN	CK: CAL
8-99 1-12	REVISIONS	CONT	SECT	JOB
				HIGHWAY
			COUNTY	SHEET NO.
				217

ROADWAY ILLUMINATION ASSEMBLY NOTES

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1. Details apply to roadway lighting installations bid or referenced under Item 610, "Roadway Illumination Assemblies." Provide, furnish, and install all other materials not shown on the plans which may be necessary for complete and proper construction. Where manufacturers provide warranties or guarantees as a customary trade practice, furnish to the State such warranties or guarantees.
2. The locations of poles and fixtures may be shifted by the Engineer to accommodate local conditions. Install or remove poles and luminaires located near overhead electrical lines using established industry and utility safety practices and in accordance with laws governing such work. Consult with the appropriate utility company prior to beginning such work.
3. Provide new and unused materials. Ensure that all materials and installations comply with the applicable articles of the National Electrical Code (NEC), TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA), and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association, Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection.
4. Provide Roadway Illumination Light Fixtures as per TxDOT Departmental Material Specification (DMS) 11010, Item 610, and as shown on the Material Producers List (MPL) for Roadway Illumination and Electrical Supplies.
5. Fabricate steel roadway illumination poles in accordance with Roadway Illumination Poles (RIP) standards and Item 610. Poles fabricated according to RIP standards do not require shop drawing submittals.
 - a. Alternate designs to RIP standards or the use of aluminum to fabricate poles will require the submission of shop drawings electronically. For instructions on submitting shop drawings electronically see "Guide to Electronic Shop Drawing Submittal" on the TxDOT web site.
 - b. Limitations on use of the RIP standard: The RIP standard details were developed for installations in locations where the 3-second gust basic maximum wind speed is 110 mph, and where the elevation of the base of the pole is less than (i.e. not more than) 25' above the elevation of the surrounding terrain, in accordance with the "AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals," 4th Edition (2001) (AASHTO Design Specifications). For poles to be installed in regions where the maximum basic wind speed exceeds 110 mph or to be mounted more than 25' above the surrounding terrain, provide poles meeting the following requirements:
 - i. Submittals. Following the electronic shop drawing submittal process (see Guide to Electronic Shop Drawing Submittal on the TxDOT web site), submit to the Engineer for approval fabrication drawings and calculations for the poles, sealed by a Texas licensed professional engineer (P.E.).
 - ii. Luminaire Structural Support Requirements. Provide light poles, arms, and anchor bolt assemblies with a 25 year design life to safely resist dead loads, ice loads and the required basic wind speeds at the location of installation in accordance with the 6th edition (2013) of the AASHTO Design Specifications. For transformer base poles, include transformer base and connecting hardware in calculations and shop drawing submittals. Structurally test all transformer bases to resist the theoretical plastic moment capacity of the pole. Submit certification of the plastic moment load test and FHWA breakaway requirement test of the model of base being furnished with the shop drawings. Show breakaway base model number, manufacturer's name, and logo on shop drawings. Include on manufacturer's shop drawings the ASTM designations for all materials to be used.
6. For both transformer and shoe-base type illumination poles, provide and install double-pole breakaway fuse holders as specified by DMS-11040. Breakaway fuse holders are listed on the MPL for Roadway Illumination and Electrical Supplies under Items 610 & 620. Provide 10 amp time delay fuses for breakaway connectors in light poles, or inside the light fixture for underpass luminaires. In each pole, connect luminaires to the breakaway connector with continuous stranded 12 AWG copper conductors as listed on the MPL. Bond all equipment grounding conductors together and to the ground lug in the transformer base or hand hole.
7. Tighten anchor bolts for shoe base, concrete traffic barrier base, and bridge mount roadway illumination poles, in accordance with Item 449.
8. Install T-Base with following procedure:
 - a. Anchor Bolt Tightening.
 - i. Coat the threads of the anchor bolts with electrically conductive lubricant.
 - ii. Place the T-base over the anchor bolts. Foundation must be level and flat. The maximum permissible gap under any one corner of the t-base is 1/8" before nuts are tightened.
 - iii. Coat the bearing surfaces of the nuts and washers with electrically conductive lubricant. Install (1) 1/2" hold down washer, (1) lock washer, and (1) nut on each anchor bolt. Turn the nuts onto the bolts so that each is hand-tight against the washer.
 - iv. Using a torque wrench, tighten each nut to 150 ft-lb. Uniform contact is required between the foundation and the T-base in the corner regions of the T-base, and all corner gaps must be closed after applying torque. If a gap still exists after torquing to 150 ft-lbs, continue torquing each bolt incrementally until gap is closed or maximum allowable torque of 250 ft. pound is reached, whichever comes first. If 250 ft-lbs is not enough to close the gap the foundation must be leveled. Gaps along the straight sides of the T-bases and the foundation are permissible. Ensure that no high point of contact occurs between the straight sides of the T-base and the foundation.
 - v. Check top of T-base for level. If not level then foundation must be leveled.
 - b. Top Bolt Procedure
 - i. Erect pole over T-base with crane. Coat bolts, nuts, washers, and lock washers with electrically conductive lubricant.

- ii. Install bolts and 1/2" connecting washers from the inside of the T-base, thread up through the pole base. Install flat washers, lock washers and nuts snug tight according to Item 447, "Structural Bolting."
- iii. Tighten each nut to 150 ft-lb. using a torque wrench.
- c. Level and Plumb
 - i. Ensure pole is plumb and mast arm is perpendicular to the roadway according to plans to within 5 degrees.
9. Construct luminaire pole foundations in accordance with Item 416, "Drilled Shaft Foundations," and TxDOT standard sheet RID(2).
10. Provide and install underpass luminaires in accordance with Item 610, DMS-11010, and TxDOT standard sheet RID(3). Typical luminaire size for underpass luminaires is 150W HPS or 150W EQ LED.
11. Mount luminaires on arms level as shown by the luminaire level indicator.
12. Orient luminaires perpendicular to the roadway intended to be lit unless otherwise shown on the plans.



L1, L2 = Hot Conductors
G = Grounding Conductor

TYPICAL WIRING DIAGRAM

LUMINAIRES SERVED AT 480V ON 240/480 VOLT SERVICE OR LUMINAIRES SERVED AT 240V FOR 120/240 VOLT SERVICE.

NOTES:

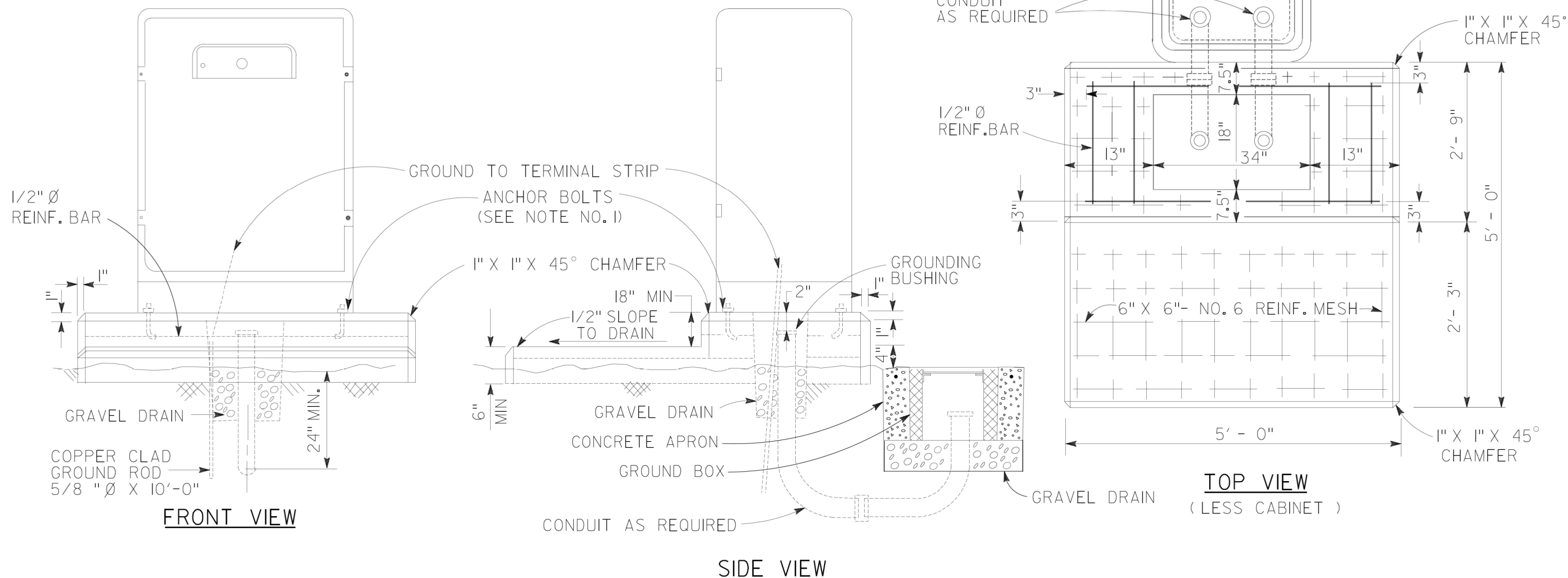
- ① Use 1/2 in.-13 UNC threaded, copper or tin-plated copper, pole bonding connector, sized appropriately for conductors, bonded to T-base, or use ground lug in handhole as available.
- ② Use pre-qualified two-pole breakaway connectors for all luminaire pole installations. For luminaires fed by a circuit with a neutral conductor, use double pole breakaway connectors with the neutral side unfused and marked white.
- ③ Split Bolt or other connector.

				Traffic Operations Division Standard	
<h2>ROADWAY ILLUMINATION DETAILS</h2> <h3>RID(1)-17</h3>					
FILE:	rid1-17.dgn	DN:	CK:	DW:	CK:
© TxDOT	January 2007	CONT	SECT	JOB	HIGHWAY
REVISIONS					
7-17		DIST	COUNTY	SHEET NO.	
				218	

DATE:
FILE:

CABINET AS PER CONTROLLER MANUFACTURER

NOTE: SEE PLAN LAYOUT FOR CONDUIT ENTRANCES AND SIZES



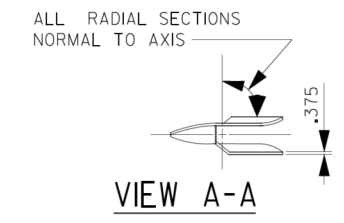
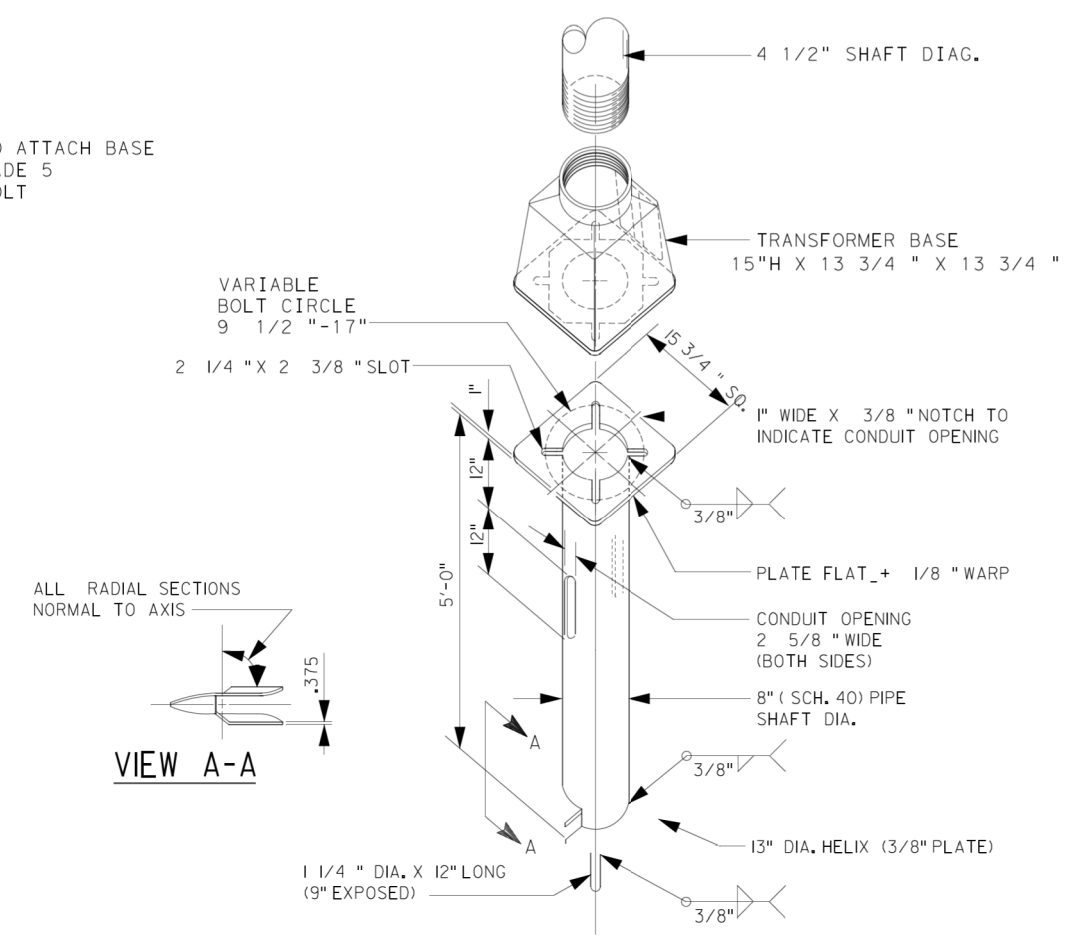
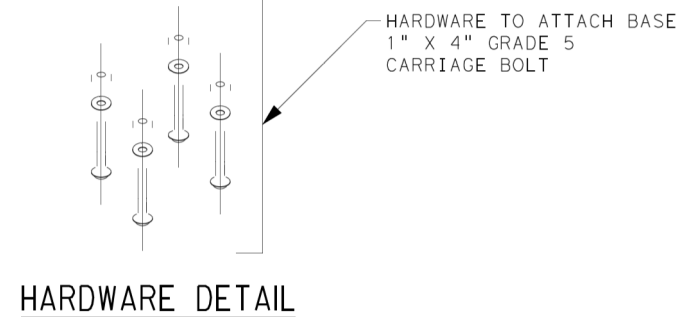
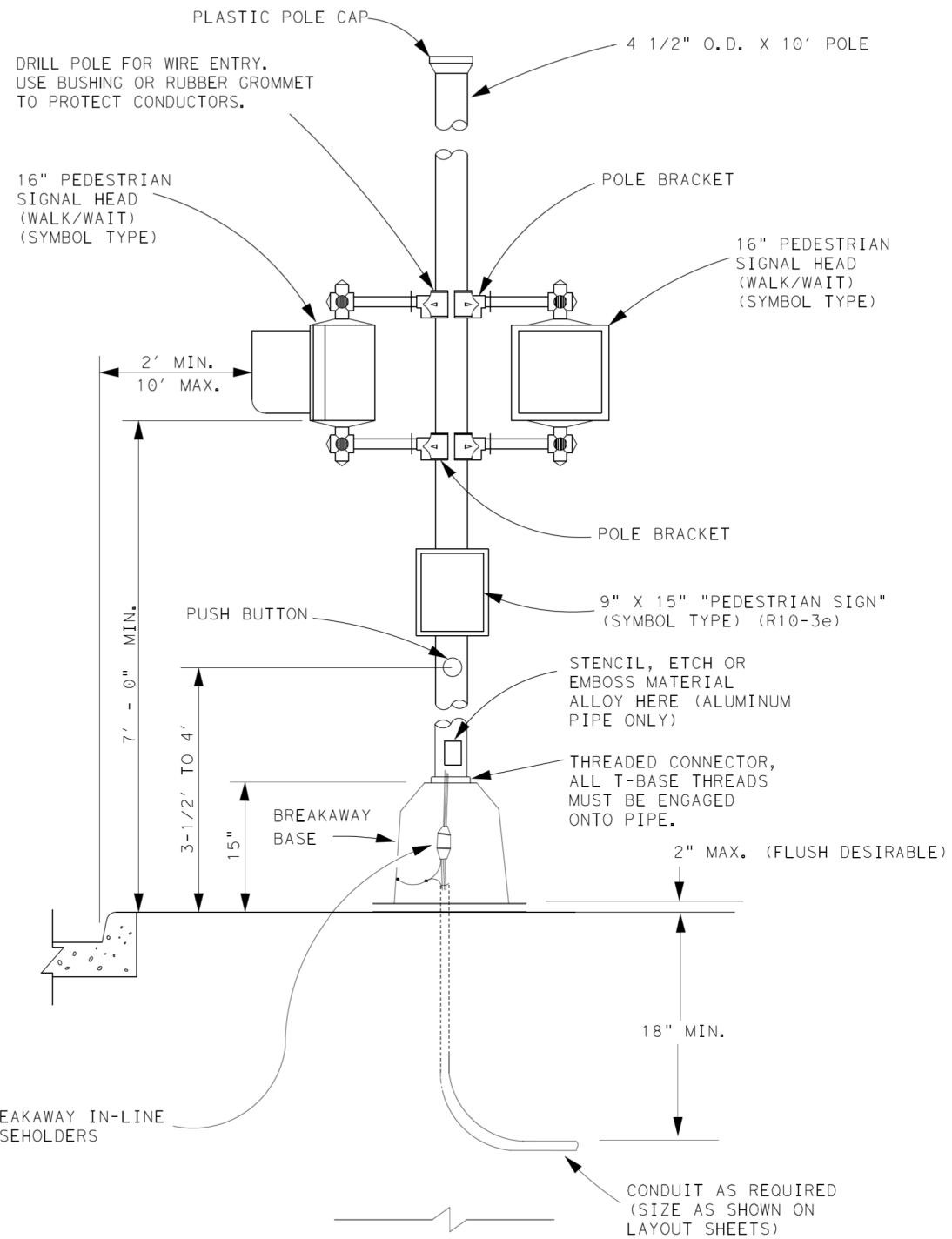
NOTES:

1. CABINET MANUFACTURER TO PROVIDE DETAILS OF ANCHOR BOLT LOCATION.
2. MODIFY DIMENSIONS FOR CONCRETE BASE TO FIT EQUIPMENT FURNISHED, IF NECESSARY.
3. PROVIDE GRAVEL DRAIN FOR CONTROLLER AND ALL GROUND BOXES.
4. FURNISH CLASS "B" OR CLASS "C" CONCRETE.
5. SET CONTROLLER FOUNDATION LEVEL WITH THE PAVEMENT SURFACE OR AS APPROVED BY THE ENGINEER.
6. FURNISH AT NO COST TO THE DEPARTMENT ANY ADDITIONAL CONCRETE WHICH MAY BE NECESSARY TO STABILIZE THE FOUNDATION AT UNUSUAL LOCATIONS.
7. PLACE REINFORCING BARS AS DIRECTED.
8. UPON INSTALLING THE CONTROLLER CABINET, APPLY A SILICON-BASED CAULKING COMPOUND AROUND THE BASE OF THE CONTROLLER CABINET.

 Texas Department of Transportation
Houston District

SIGNAL DETAILS/STANDARDS
CONTROLLER FOUNDATION
DETAIL
SD/SCFD

FILE#	DN#	CK#	DW#	CK#
© TxDOT 2007	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS	HOU	6		
08-04	COUNTY	CONTROL	SECT	JOB
03-07				HIGHWAY



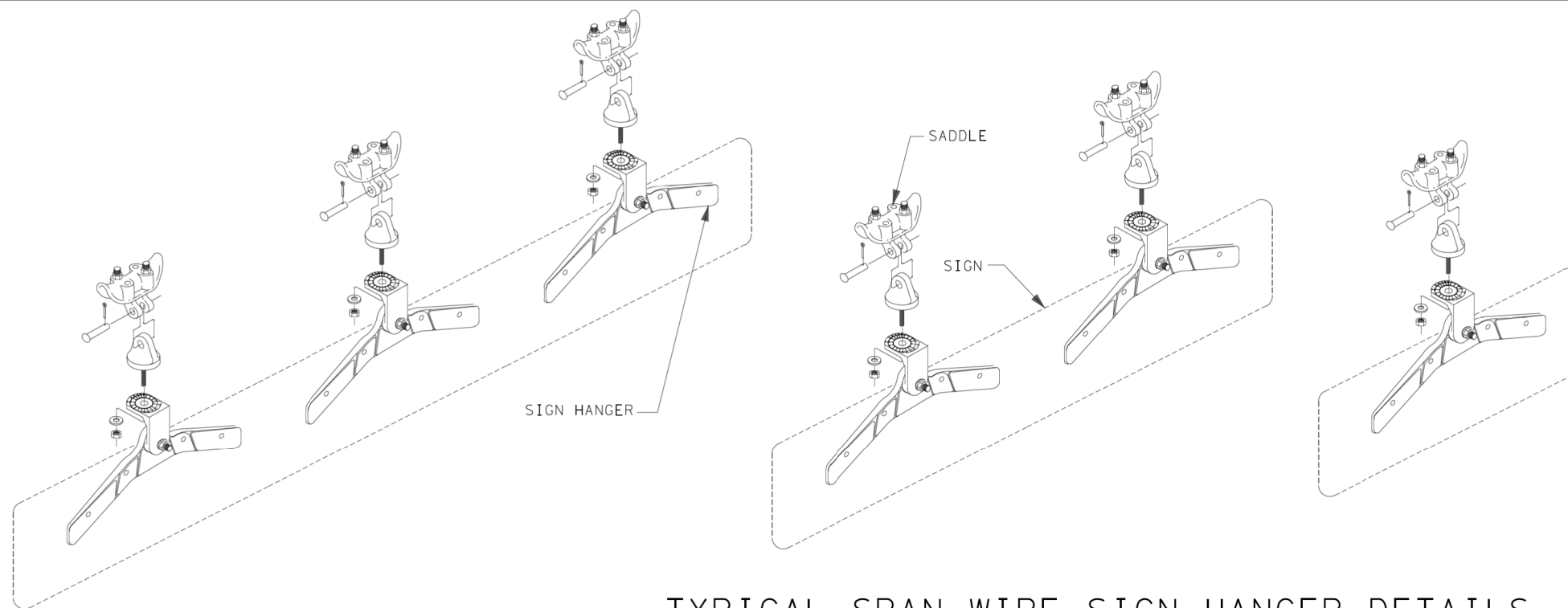
NOTE:

SEE STANDARD (RFBA - 13) FOR NOTES AND NON - FUSED BREAKAWAY ELECTRICAL CONNECTOR DETAILS

Texas Department of Transportation
Houston District

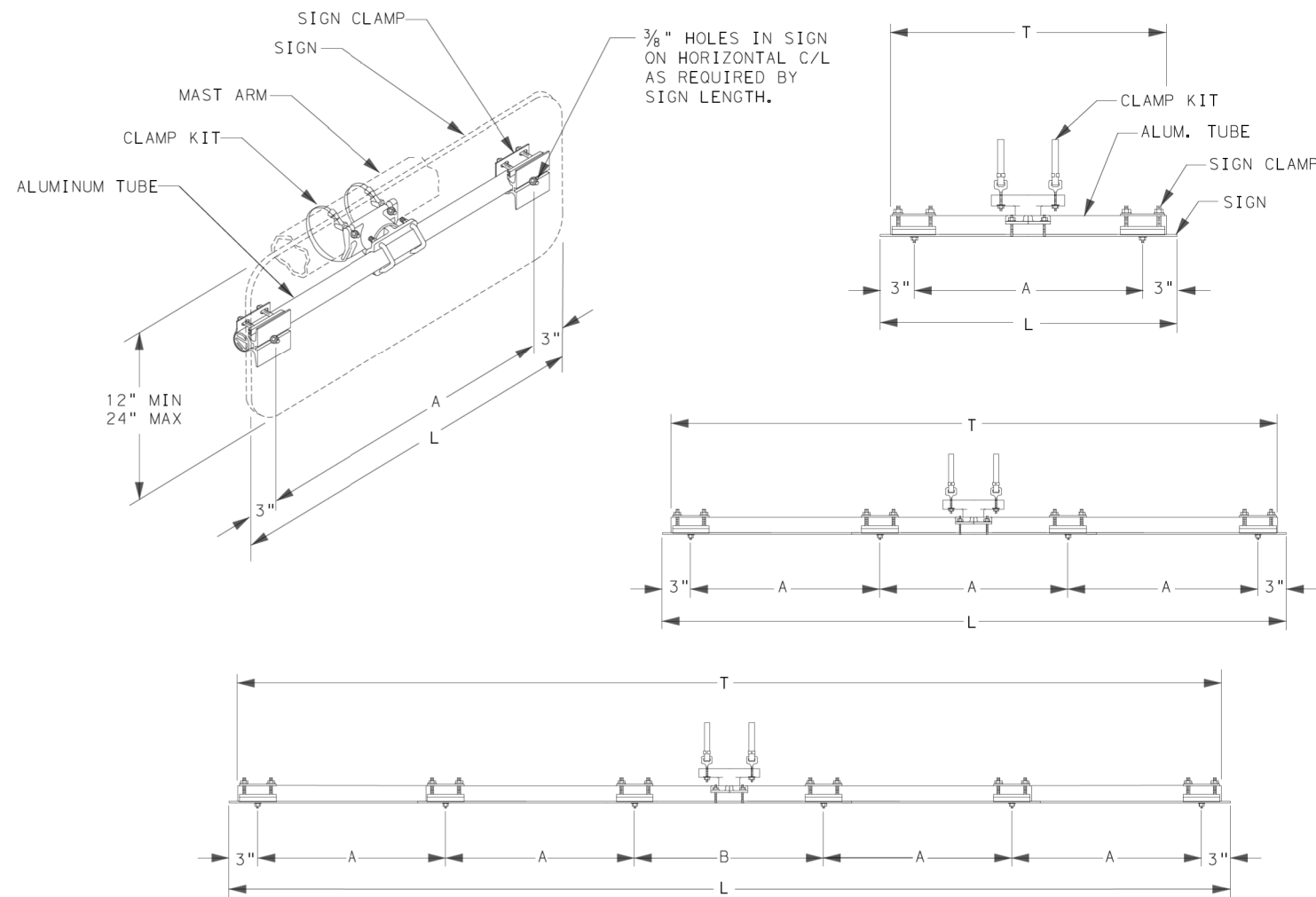
SIGNAL DETAILS/STANDARDS
CONSTRUCTION DETAILS
FOR POLE MOUNTED
PEDESTRIAN SIGNALS
CD/PMPS

FILE:	DN:	CK:	DW:	CK:
© TxDOT 2007	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS	HOU	6		
04-05 11-08 02-15	COUNTY	CONTROL	SECT	JOB
05-05 01-14				HIGHWAY
03-07 07-14				220



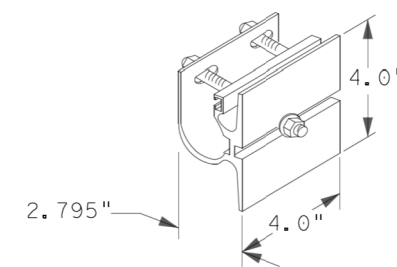
1. USE PELCO PARTS OR APPROVED EQUAL.
2. FURNISH HARDWARE FOR A COMPLETE INSTALLATION.
3. ATTACH THE 90 LB SPAN WIRE CLAMPS (SADDLES) TO TETHERS (SWAY CABLES).
4. FURNISH 1 ADJUSTABLE FREE SWINGING SIGN HANGER PER STREET NAME SIGN SMALLER THAN 3 FT. - 0 IN. SIGNS 3 FT - 0 IN. TO 6 FT. - 0 IN. REQUIRE 2 HANGERS. SIGNS LARGER THAN 6 FT. - 0 IN. REQUIRE 3 HANGERS.

TYPICAL SPAN WIRE SIGN HANGER DETAILS



SIGNS (1'-6" to 3'-0" Long)

SIGN LENGTH (L)	TUBE LENGTH (T)	A
1'-6"	16"	12"
2'-0"	22"	18"
2'-6"	28"	24"
3'-0"	34"	30"



GUSSETED TUBE CROSS SECTION

SIGN CLAMP DETAIL

SIGNS (3'-6" to 8'-0" Long)

SIGN LENGTH (L)	TUBE LENGTH (T)	A
3'-6"	40"	12"
4'-0"	46"	14"
4'-6"	52"	16"
5'-0"	58"	18"
5'-6"	64"	20"
6'-0"	70"	22"
6'-6"	76"	24"
7'-0"	82"	26"
7'-6"	88"	28"
8'-0"	94"	30"

SIGNS (8'-6" to 10'-0" Long)

SIGN LENGTH (L)	TUBE LENGTH (T)	A	B
8'-6"	100"	19"	20"
9'-0"	106"	20"	22"
9'-6"	112"	21"	24"
10'-0"	118"	22"	26"

TYPICAL MAST ARM SIGN MOUNT DETAILS

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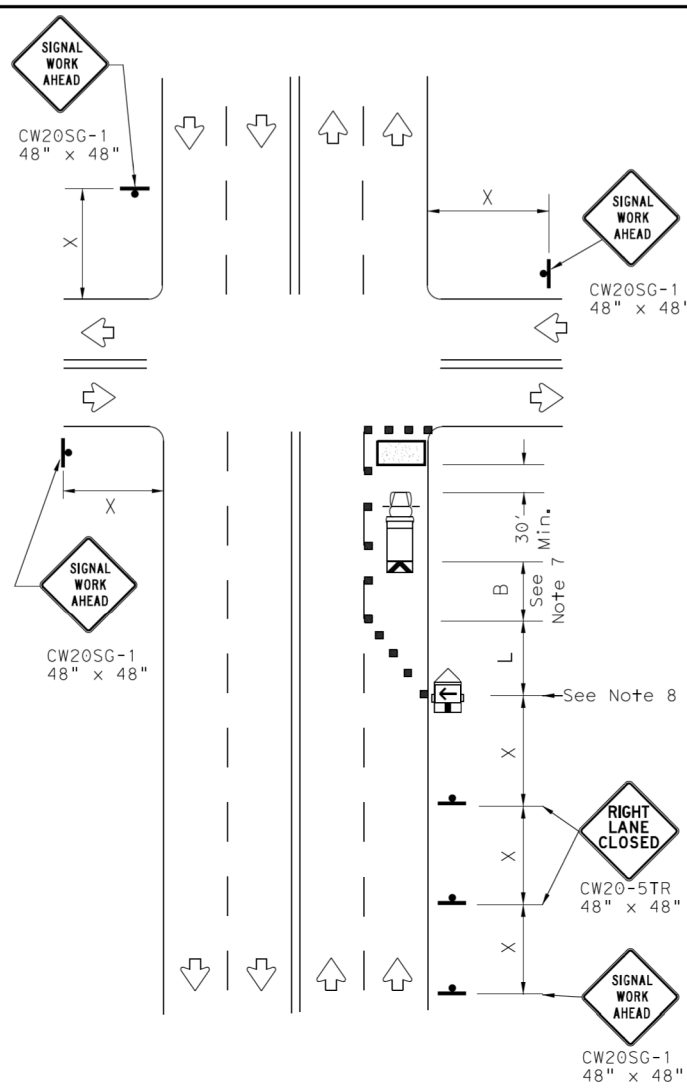
Texas Department of Transportation
 Houston District

SIGNAL DETAILS/STANDARDS
OVERHEAD STREET NAME SIGN
MOUNTING DETAILS
 OSNS/MD

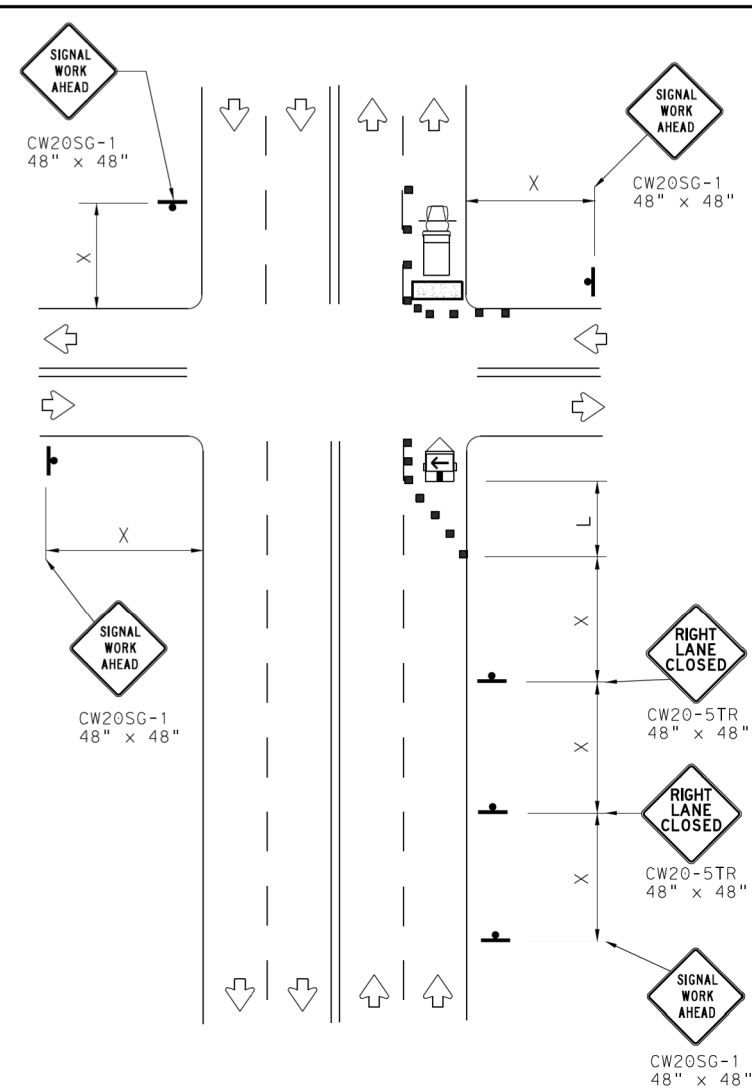
© TxDOT 2004	DN:	CK:	DW:	CK:	PROJECT NO.	SHEET
	HOU	6				
	COUNTY	CONTROL	SECT	JOB	HIGHWAY	
						221

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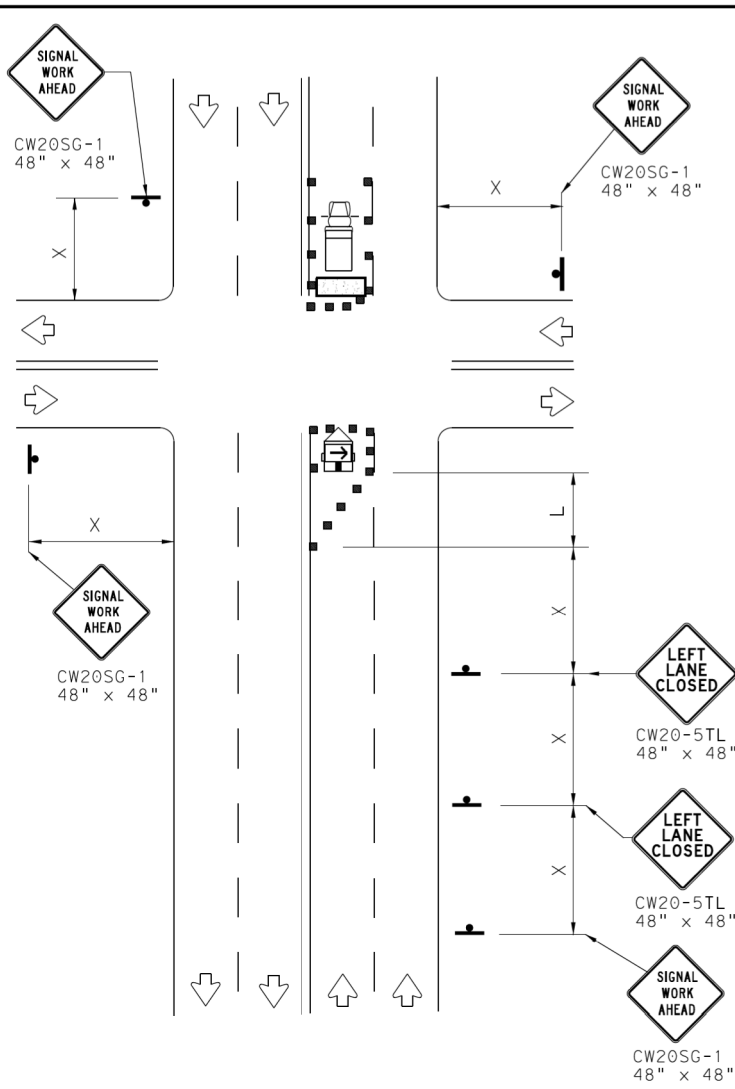
DATE:
FILE:



NEAR SIDE LANE CLOSURE
SHORT DURATION OR SHORT TERM STATIONARY



FAR SIDE RIGHT LANE CLOSURE
SHORT DURATION OR SHORT TERM STATIONARY



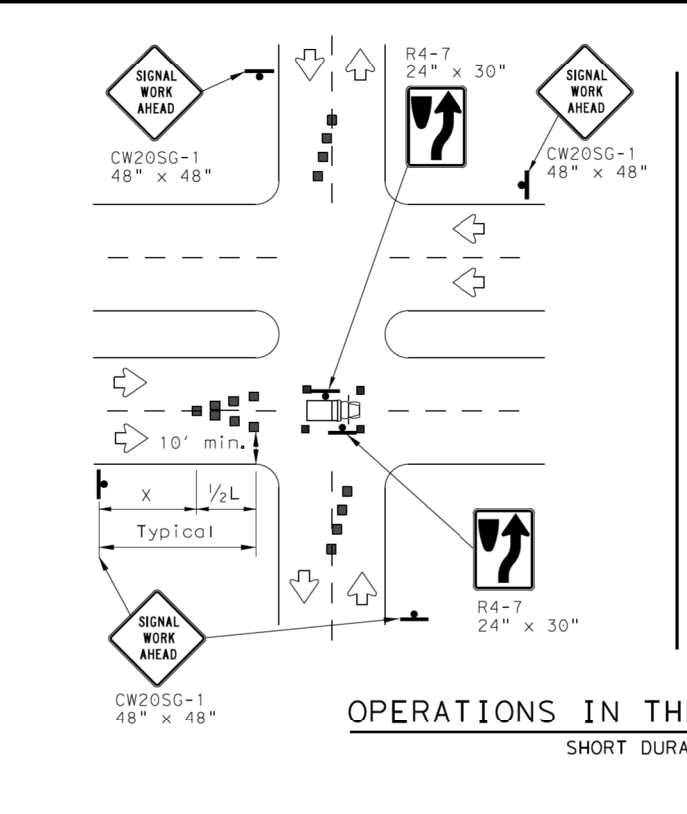
FAR SIDE LEFT LANE CLOSURE
SHORT DURATION OR SHORT TERM STATIONARY

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

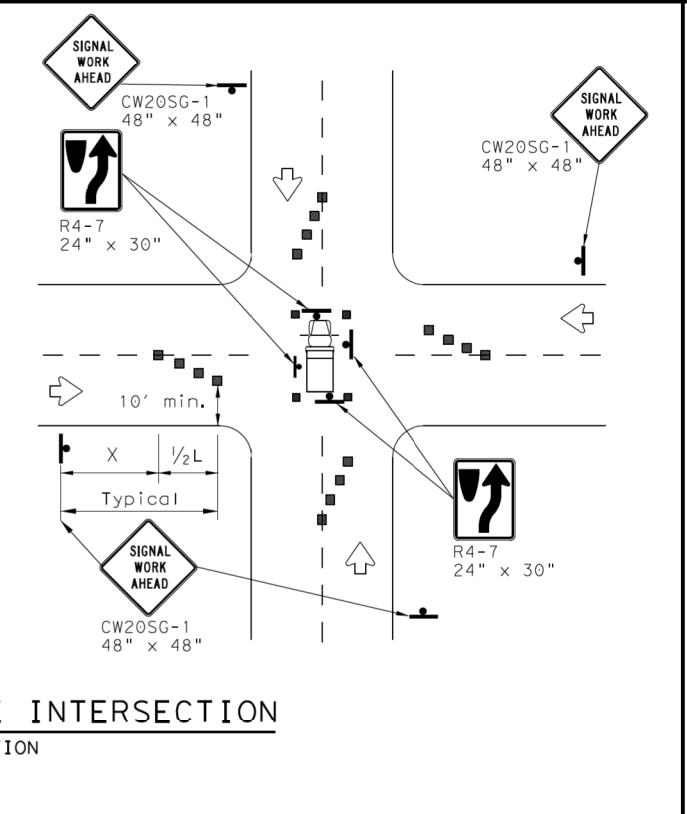
Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
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)

WORKERS IN BUCKET TRUCKS SHALL NOT WORK ABOVE OPEN LANES OF TRAFFIC.



OPERATIONS IN THE INTERSECTION
SHORT DURATION



GENERAL NOTES

- The minimum size channelizing device is the 28" cone. 42" Two-piece cones, drums, vertical panels or barricades will be required when the device must be left unattended at night.
- Obstructions or hazards at the work area shall be clearly marked and delineated at all times.
- Flaggers and Flagger Symbol (CW20-7) signs may be required according to field conditions.
- Vehicles parked in roadway shall be equipped with at least two high intensity rotating, flashing, oscillating or strobe type lights.
- High level warning devices (flag trees) may be used at corners of the vehicle.
- When work operations are performed on existing signals, the signals may be placed in flashing red mode when approved by the engineer. If existing signals do not have power, All-Way Stop (R1-1 and R1-3P) signs may be implemented when approved by the engineer.
- For Short-Term Stationary work the buffer space "B" from the above table should be used if field conditions permit. For Short Duration (less than 1 hour) any buffer space provided will enhance the safety of the setup.
- The arrow board at this location may be omitted for Short Duration work if the work vehicle has an arrow board in operation. As an option, the arrow board may be placed at the end of the taper in the closed lane if space is not available at the beginning of the taper.
- Signs and devices for the NEAR SIDE LANE CLOSURE may be altered for a left lane closure by using a LEFT LANE CLOSED (CW20-5TL) and adding channelizing devices on the centerline to protect the work space from opposing traffic.



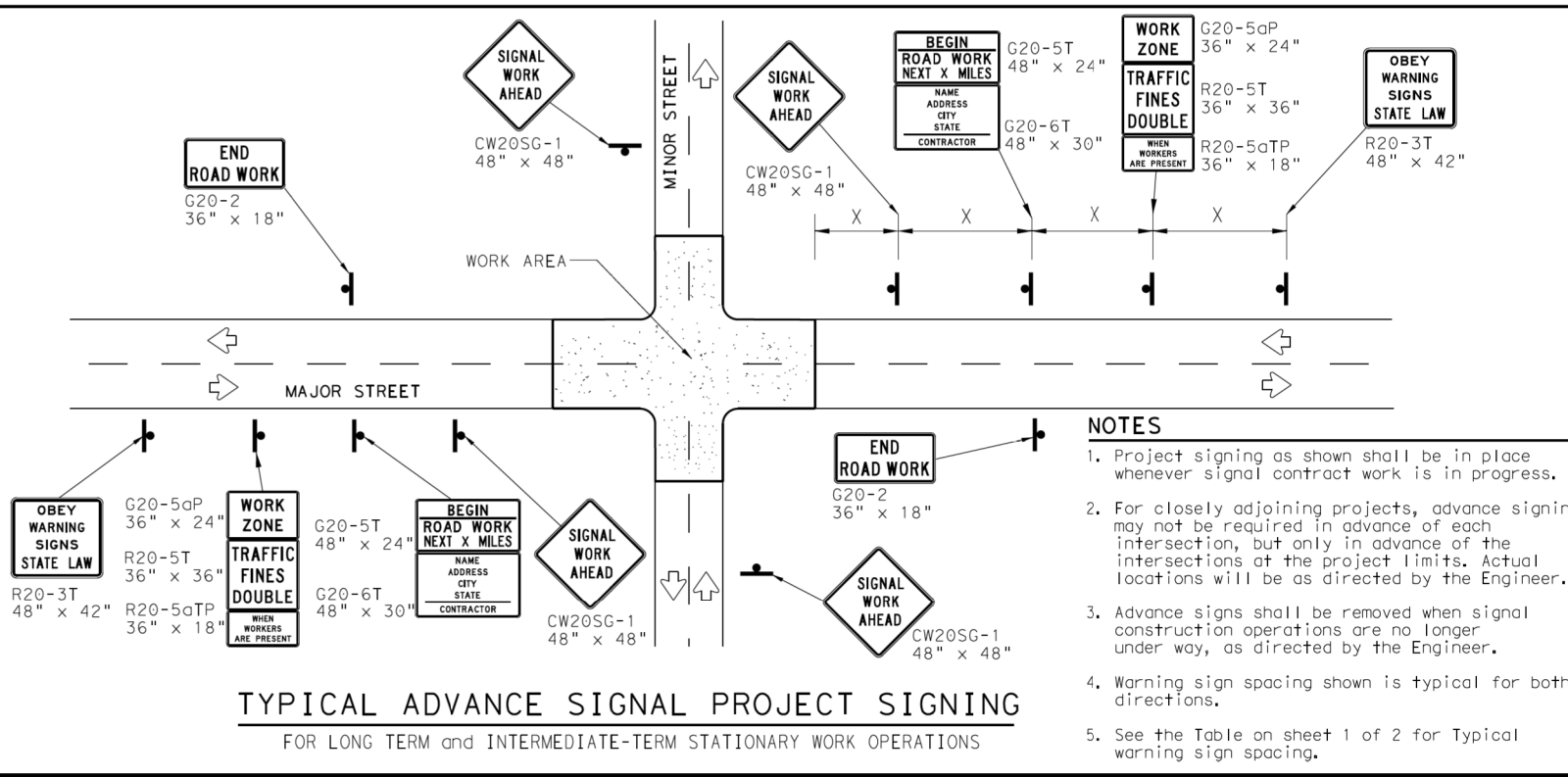
TRAFFIC SIGNAL WORK TYPICAL DETAILS

WZ(BTS-1)-13

FILE: wzbts-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS				
2-98 10-99 7-13	DIST	COUNTY	SHEET NO.	
4-98 3-03			222	

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DATE: FILE:



TYPICAL ADVANCE SIGNAL PROJECT SIGNING
FOR LONG TERM and INTERMEDIATE-TERM STATIONARY WORK OPERATIONS

- NOTES**
1. Project signing as shown shall be in place whenever signal contract work is in progress.
 2. For closely adjoining projects, advance signing may not be required in advance of each intersection, but only in advance of the intersections at the project limits. Actual locations will be as directed by the Engineer.
 3. Advance signs shall be removed when signal construction operations are no longer under way, as directed by the Engineer.
 4. Warning sign spacing shown is typical for both directions.
 5. See the Table on sheet 1 of 2 for Typical warning sign spacing.

GENERAL NOTES FOR WORK ZONE SIGNS

1. Signs shall be installed and maintained in a straight and plumb condition.
2. Wooden sign posts shall be painted white.
3. Barricades shall NOT be used as sign supports.
4. Nails shall NOT be used to attach signs to any support.
5. All signs shall be installed in accordance with the plans or as directed by the Engineer.
6. The Contractor shall furnish the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD).
7. The Contractor shall furnish sign supports and substrates listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD), installed as per the manufacturer's recommendations.
8. Temporary signs that have damaged or cracked substrates and/or damaged or marred reflective sheeting shall be replaced as directed by the Engineer.
9. 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".
10. Damaged wood posts shall be replaced. Splicing wood posts will not be allowed.

DURATION OF WORK

1. Work zone durations are defined in Part 6, Section 6G.02 of the Texas Manual on Uniform Traffic Control Devices (TMUTCD).

SIGN MOUNTING HEIGHT

1. Sign height of Long-term/Intermediate-term warning signs shall be as shown on Figure 6F-1 of the TMUTCD.
2. Sign height of Short-term/Short Duration warning signs shall be as shown on Figure 6F-2 of the TMUTCD.
3. Regulatory signs shall be mounted at least 7 feet, but not more than 9 feet, above the paved surface regardless of work duration.

REMOVING OR COVERING

1. When sign messages may be confusing or do not apply, the signs shall be removed or completely covered, unless otherwise approved by the Engineer.
2. 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. Burlap, or heavy materials such as plywood or aluminum shall not be used to cover signs.
3. Duct tape or other adhesive material shall NOT be affixed to a sign face.
4. Signs and anchor stubs shall be removed and holes back filled upon completion of the work.

REFLECTIVE SHEETING

1. All signs shall be retroreflective and constructed of sheeting meeting the requirements of the DMS and color usage table shown on this sheet.

SIGN SUPPORT WEIGHTS

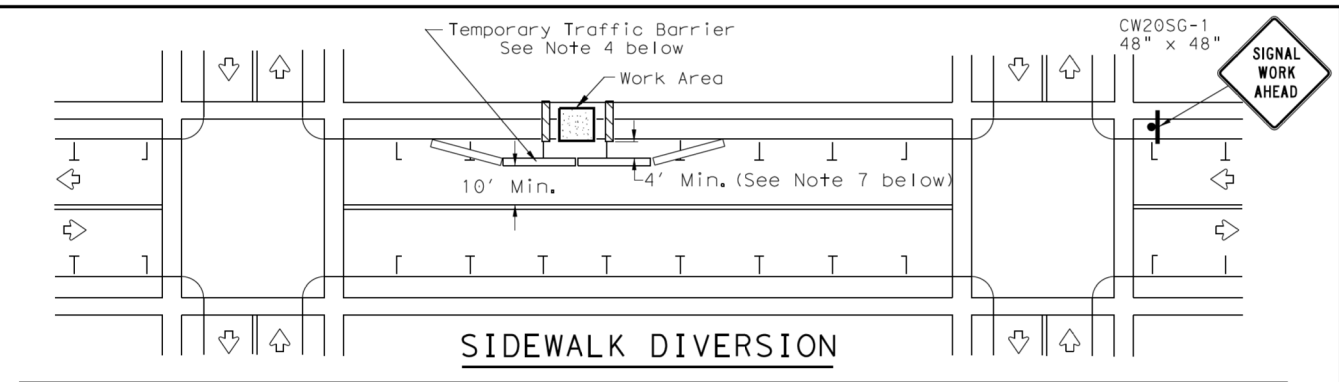
1. Weights used to keep signs from turning over should be sandbags filled with dry, cohesionless material.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects will not be permitted for use as sign support 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.

LEGEND	
	Sign
	Channelizing Devices
	Type 3 Barricade

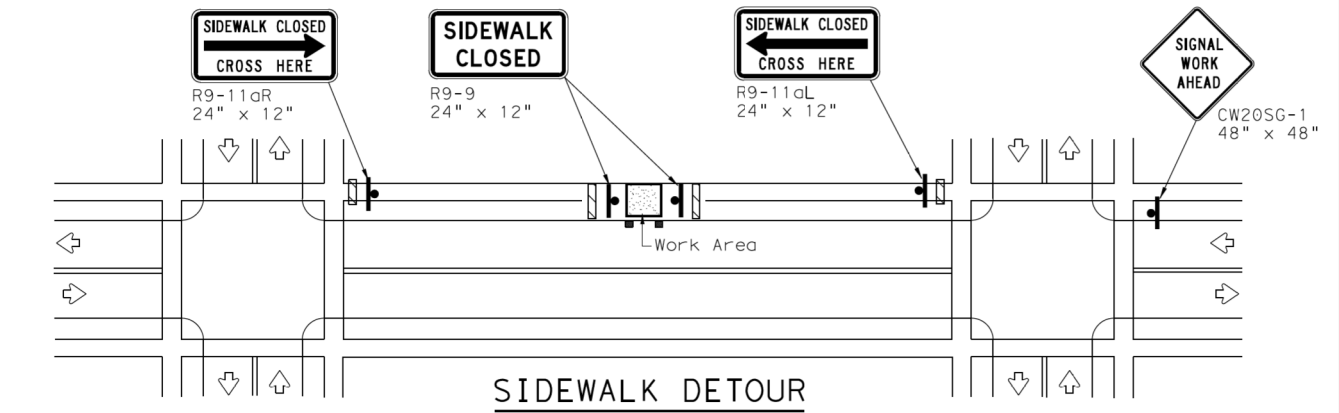
DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN FACE MATERIALS	DMS-8300
FLEXIBLE ROLL-UP REFLECTIVE SIGNS	DMS-8310

COLOR	USAGE	SHEETING MATERIAL
ORANGE	BACKGROUND	TYPE B _{FL} OR TYPE C _{FL} SHEETING
WHITE	BACKGROUND	TYPE A SHEETING
BLACK	LEGEND & BORDERS	ACRYLIC NON-REFLECTIVE SHEETING

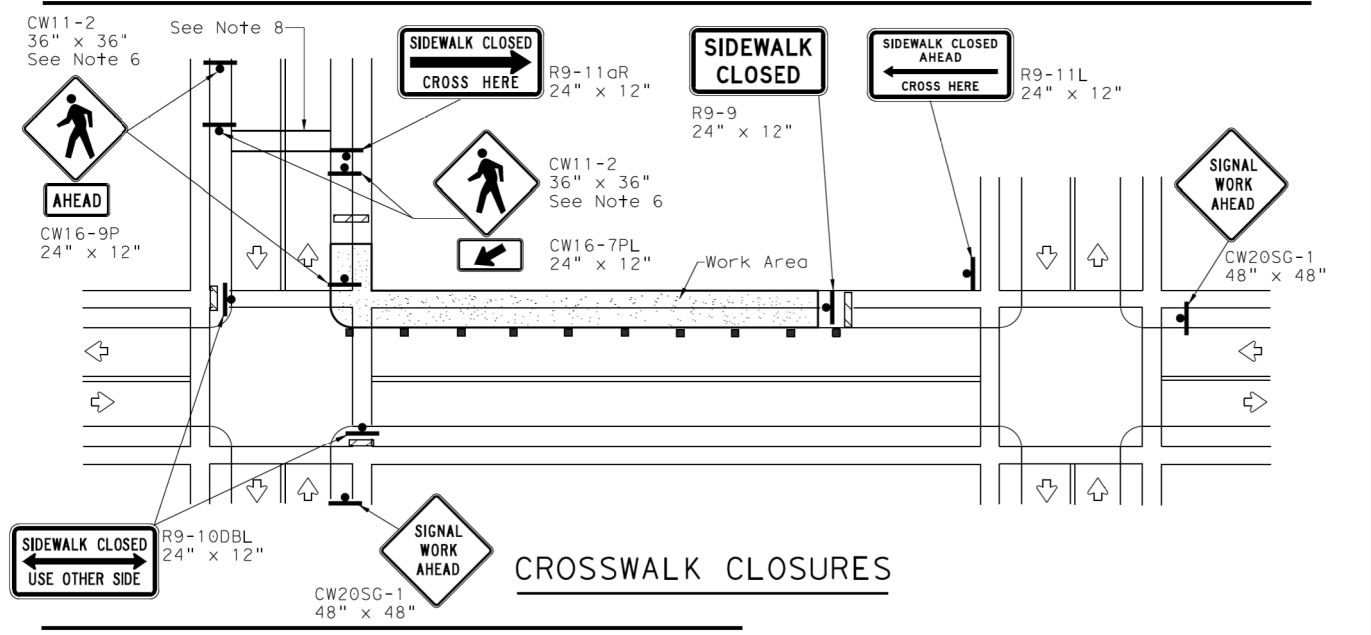
Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found at the following web address:
http://www.txdot.gov/txdot_library/publications/construction.htm



SIDEWALK DIVERSION



SIDEWALK DETOUR



CROSSWALK CLOSURES

PEDESTRIAN CONTROL

1. Holes, trenches or other hazards shall be adequately protected by covering, delineating or surrounding the hazard with orange plastic pedestrian fencing or longitudinal channelizing devices, or as directed by the Engineer.
2. "CROSSWALK CLOSURES" as detailed above will require the Engineer's approval prior to installation.
3. R9 series signs shown may be placed on supports detailed on the BC standards or CWZTCD list, or when fabricated from approved lightweight plastic substrates, they may be mounted on top of a plastic drum at or near the location shown.
4. For speeds less than 45 mph longitudinal channelizing devices may be used instead of traffic barriers when approved by the Engineer. Attenuation of blunt ends and installation of water filled devices shall be as per BC(9) and manufacturer's recommendations.
5. Location of devices are for general guidance. Actual device spacing and location must be field adjusted to meet actual conditions.
6. Where pedestrians with visual disabilities normally use the closed sidewalk Detectable Pedestrian Barricades should be used instead of the Type 3 Barricades shown.
7. The width of existing sidewalk should be maintained if practical.
8. Pavement markings for mid-block crosswalks shall be paid for under the appropriate bid items.
9. When crosswalks or other pedestrian facilities are closed or relocated, temporary facilities shall be detectable and shall include accessibility features consistent with the features present in the existing pedestrian facility.

SHEET 2 OF 2



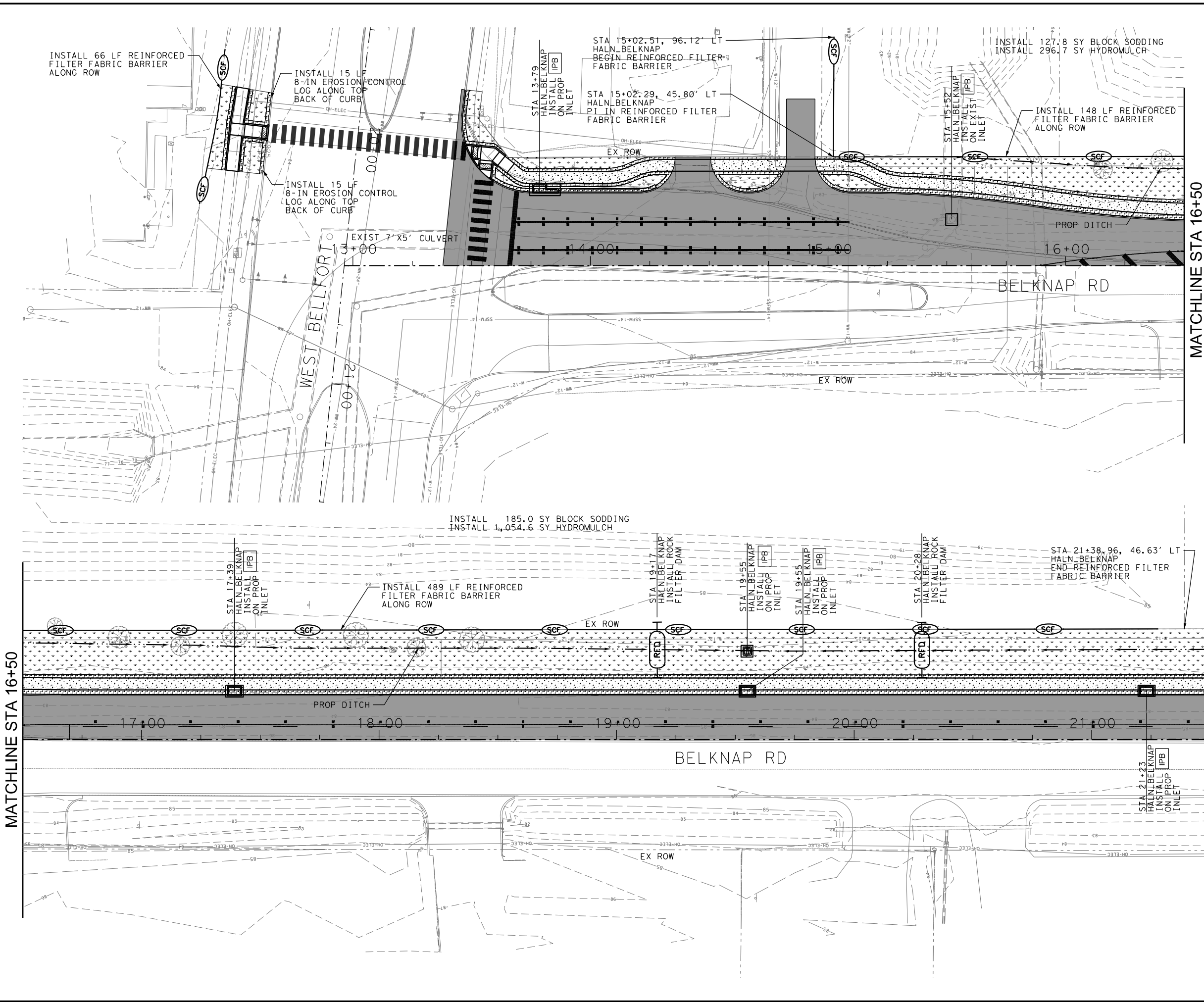
TRAFFIC SIGNAL WORK BARRICADES AND SIGNS

WZ(BTS-2)-13

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©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS				
2-98 10-99 7-13	DIST	COUNTY		SHEET NO.
4-98 3-03				223

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LEGEND

- REINFORCED FILTER FABRIC BARRIER
- ROCK FILTER DAM (TYPE 2)
- INLET PROTECTION BARRIER
- PROP DITCH FLOW
- BLOCK SODDING
- HYDROMULCH SEEDING
- CURRENT CONSTRUCTION PHASE
- PREVIOUS CONSTRUCTION PHASE



CAUTION!!!!
OVERHEAD ELECTRIC,
LOCATIONS ARE APPROXIMATE

CALL BEFORE YOU DIG!
TEXAS ONE CALL PARTICIPANTS REQUEST
48 HOURS NOTICE BEFORE YOU DIG, DRILL,
OR BLAST - STOP CALL

Texas One Call System
1-800-DIG-TESS



14-Nov-2023

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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

EROSION CONTROL
PHASE 1 & 2

CNTY PROJ	RPS PROJ	DATE	SCALE	SHEET NO
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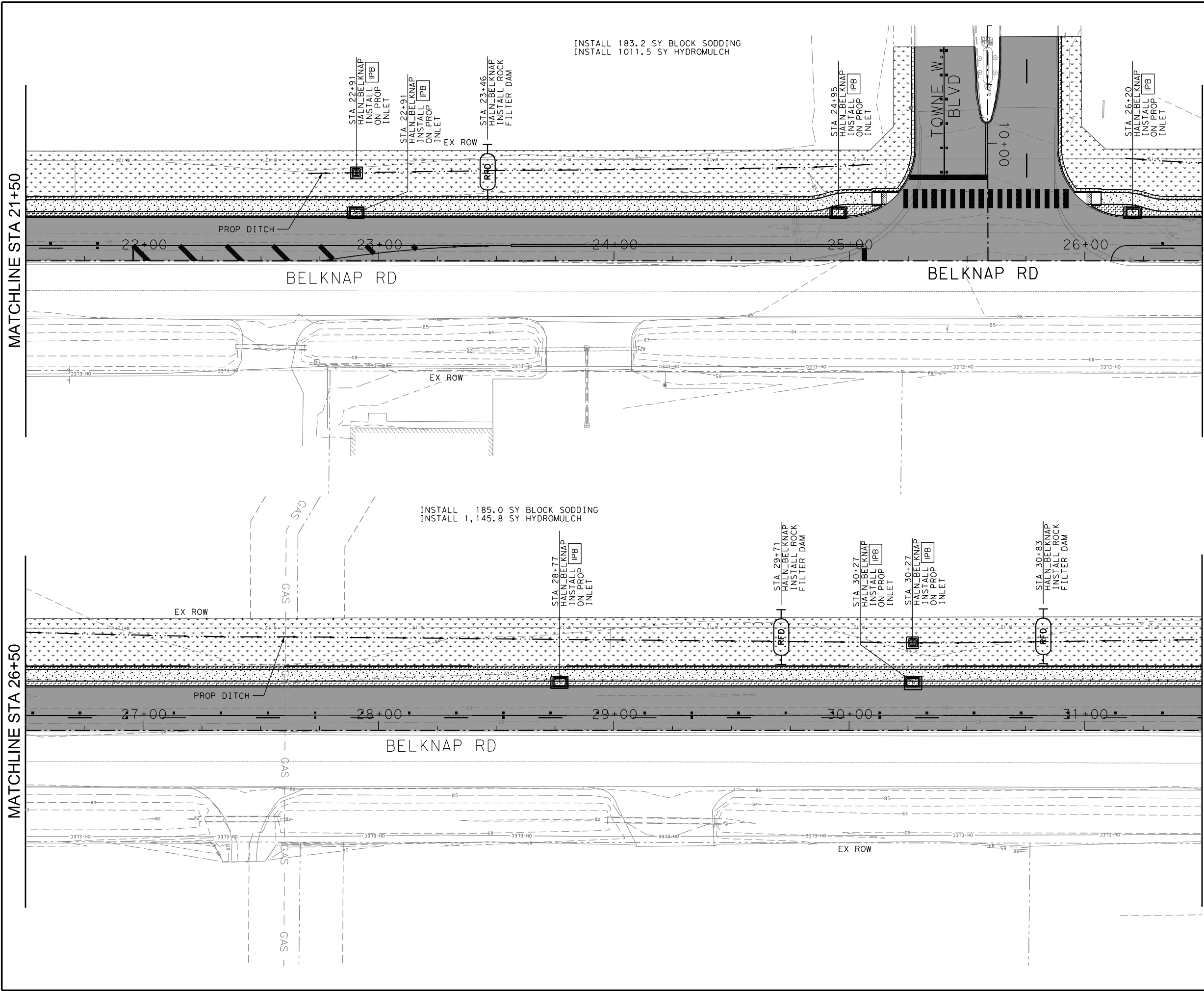
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224

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- LEGEND**
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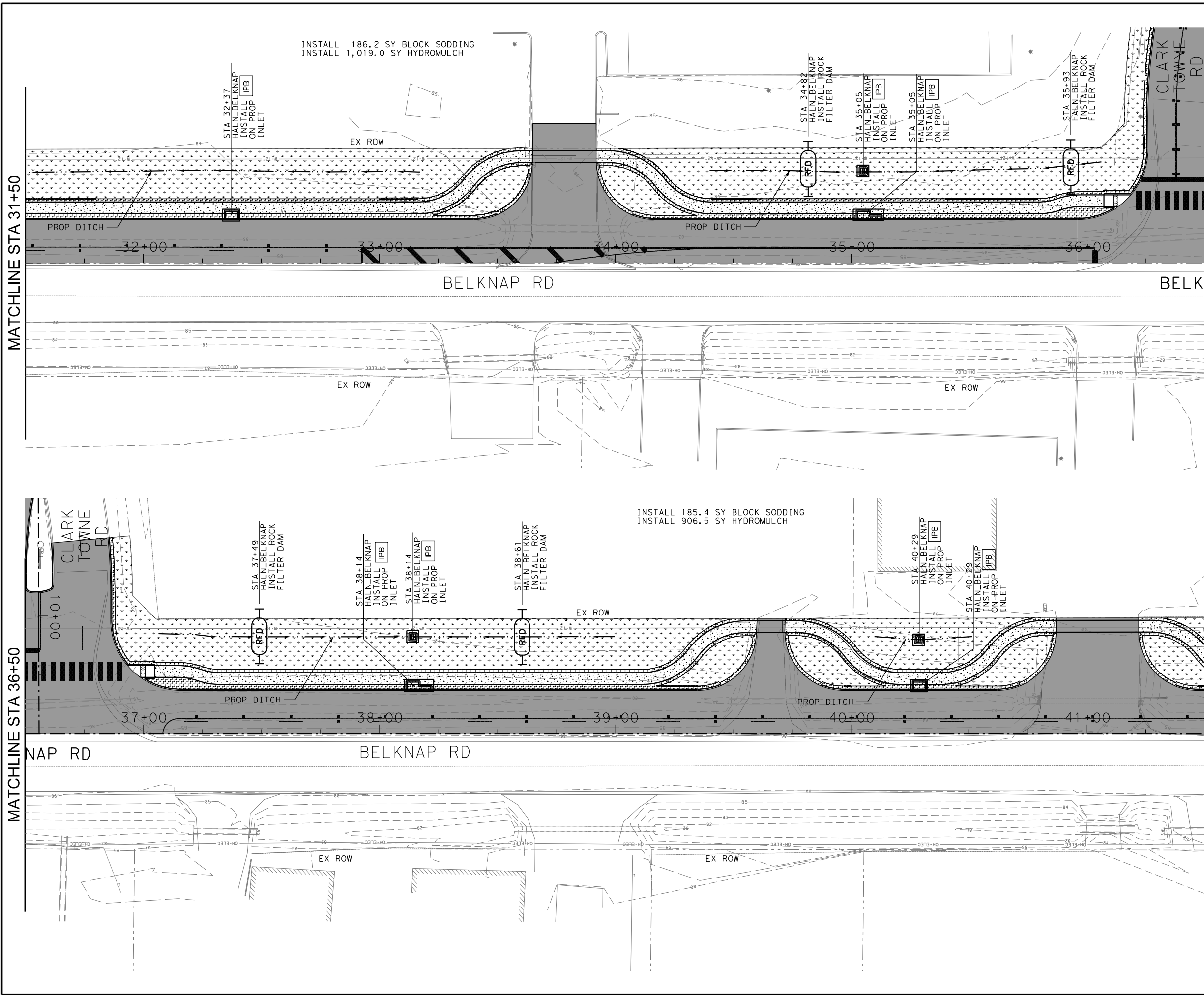
SHEET 2 OF 8

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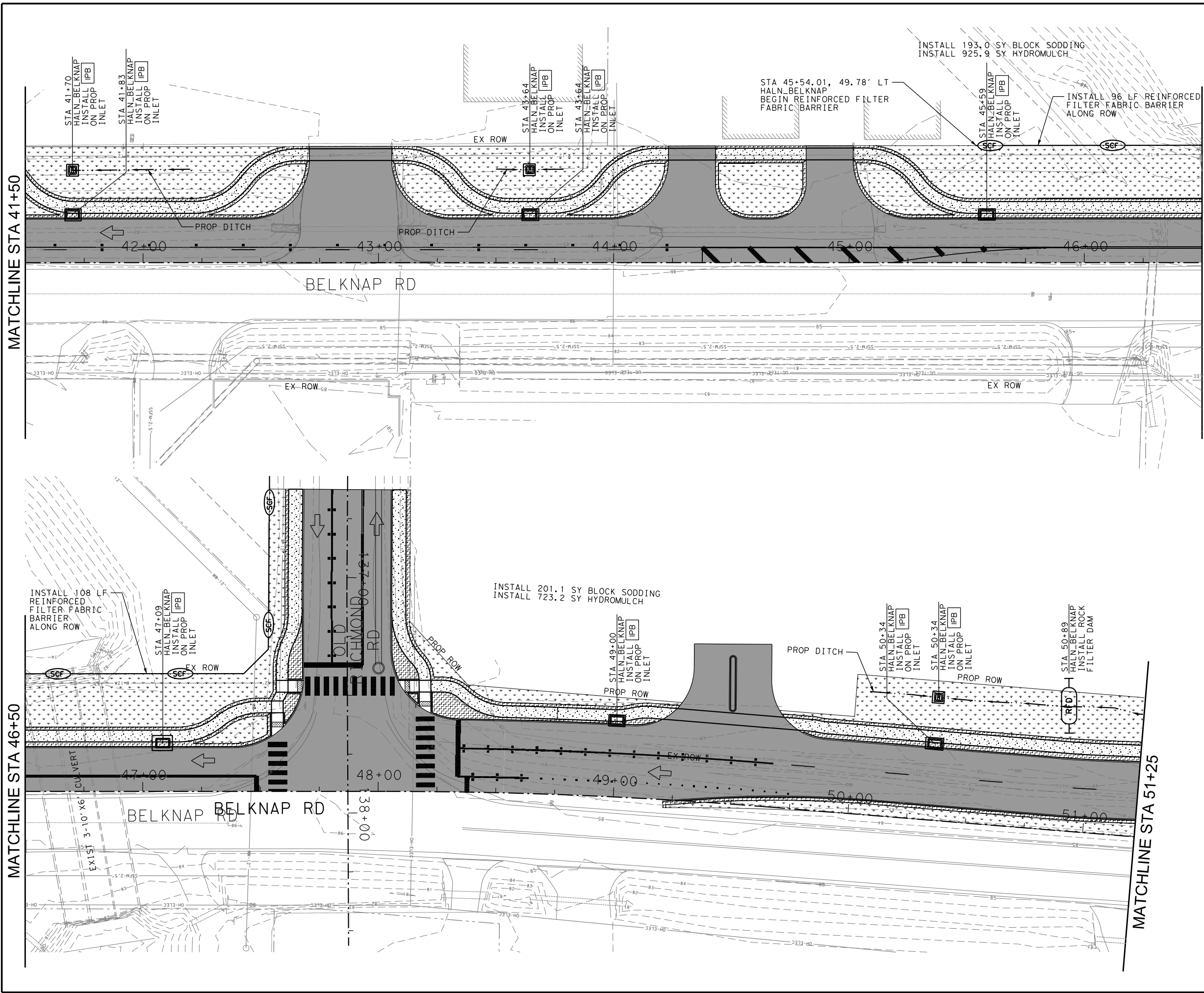
EROSION CONTROL
PHASE 1 & 2

SHEET 3 OF 8

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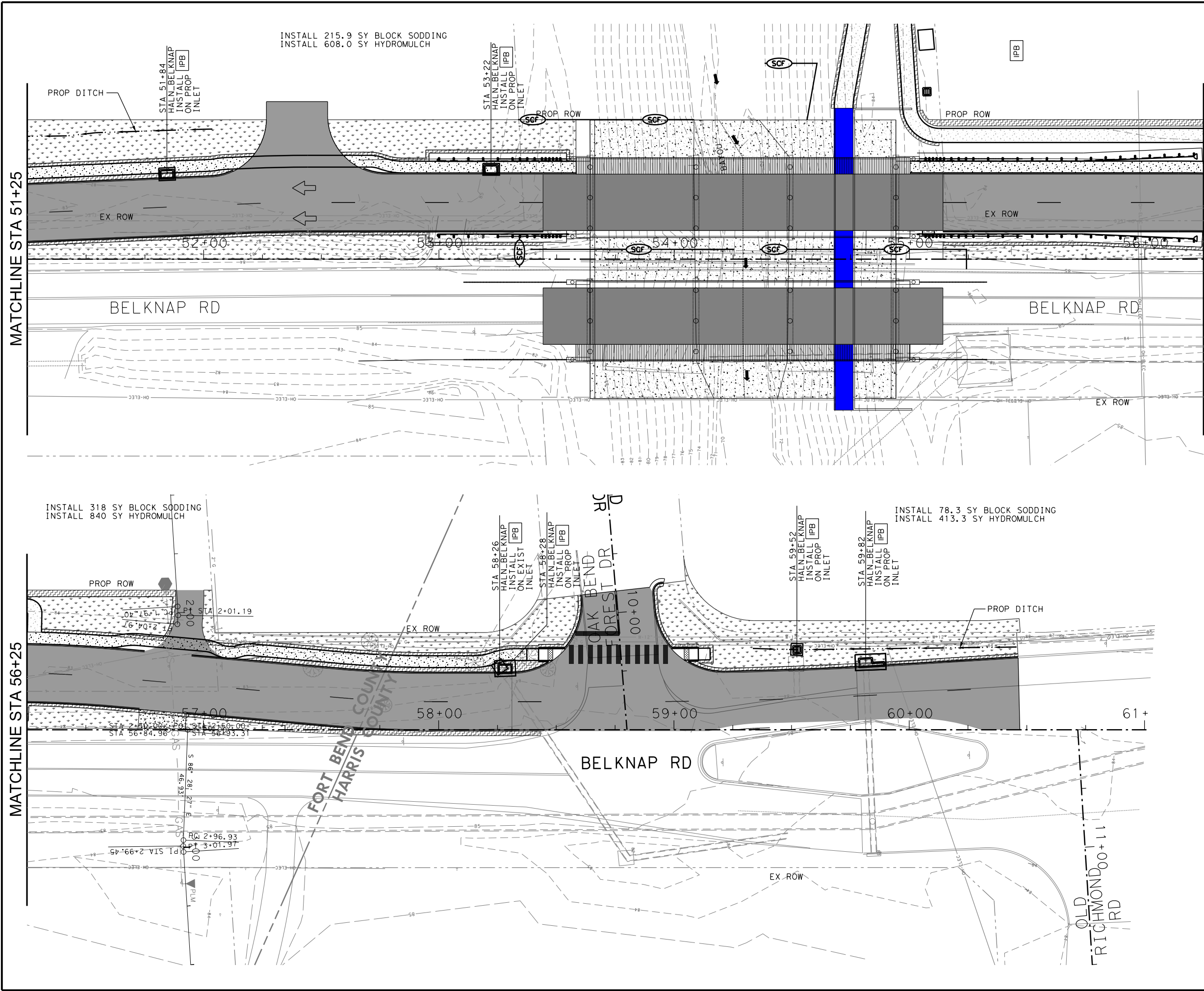
BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

EROSION CONTROL
PHASE 1 & 2

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SHEET 4 OF 8

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- LEGEND**
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STATE OF TEXAS

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 135069
 LICENSED PROFESSIONAL ENGINEER
 02/06/2024

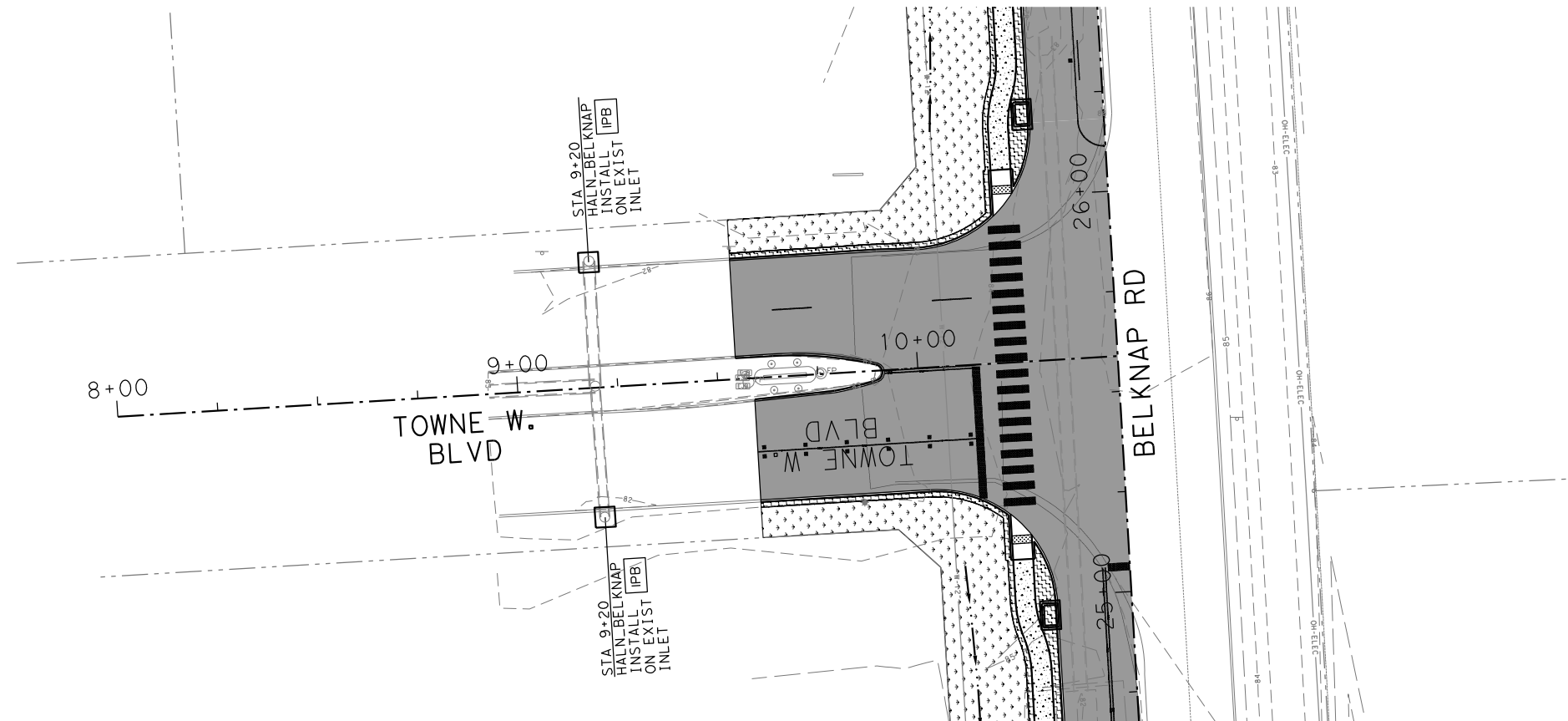
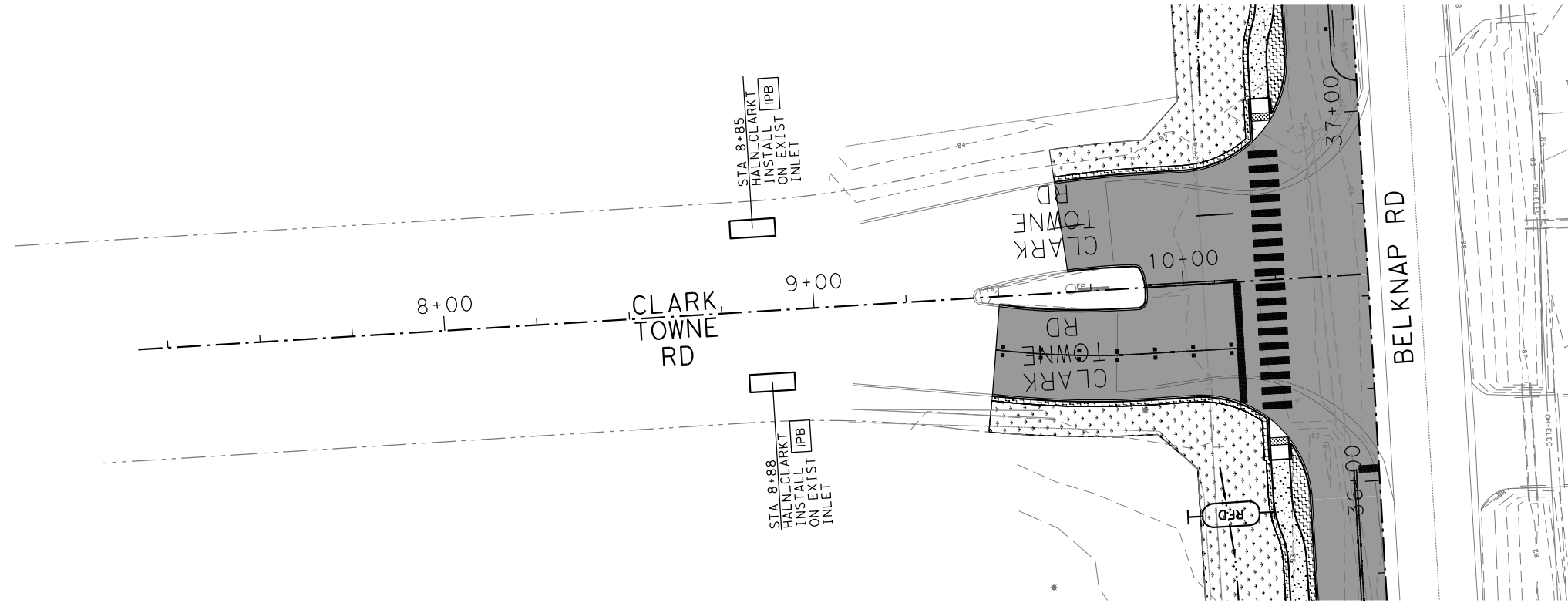
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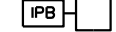
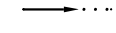

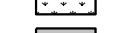

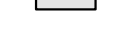
SHEET 5 OF 8

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DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY	
RPS	RPS	RPS	RPS	

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LEGEND

-  REINFORCED FILTER FABRIC BARRIER
-  ROCK FILTER DAM (TYPE 2)
-  INLET PROTECTION BARRIER
-  PROP DITCH FLOW
-  BLOCK SODDING
-  HYDROMULCH SEEDING
-  CURRENT CONSTRUCTION PHASE
-  PREVIOUS CONSTRUCTION PHASE



CAUTION!!!!
OVERHEAD ELECTRIC,
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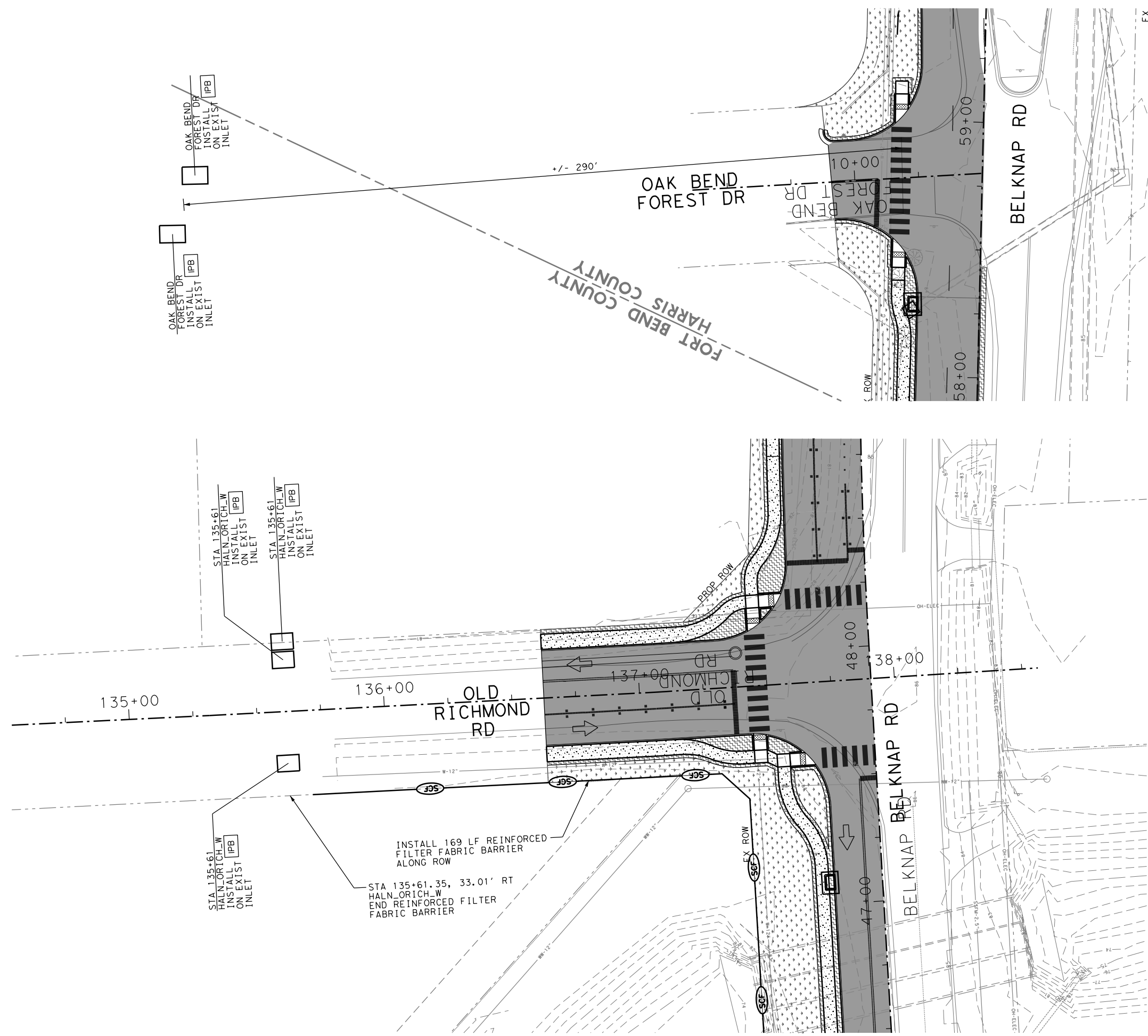
FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

EROSION CONTROL
PHASE 1 & 2

SHEET 6 OF 8

CNTY	PROJ	RPS PROJ	DATE	SCALE	SHEET NO
17-2-11	008169	2023			229
DESIGNED BY	DRAWN BY	CHECKED BY	VERIFIED BY		
RPS	RPS	RPS	RPS		



LEGEND

- REINFORCED FILTER FABRIC BARRIER
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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

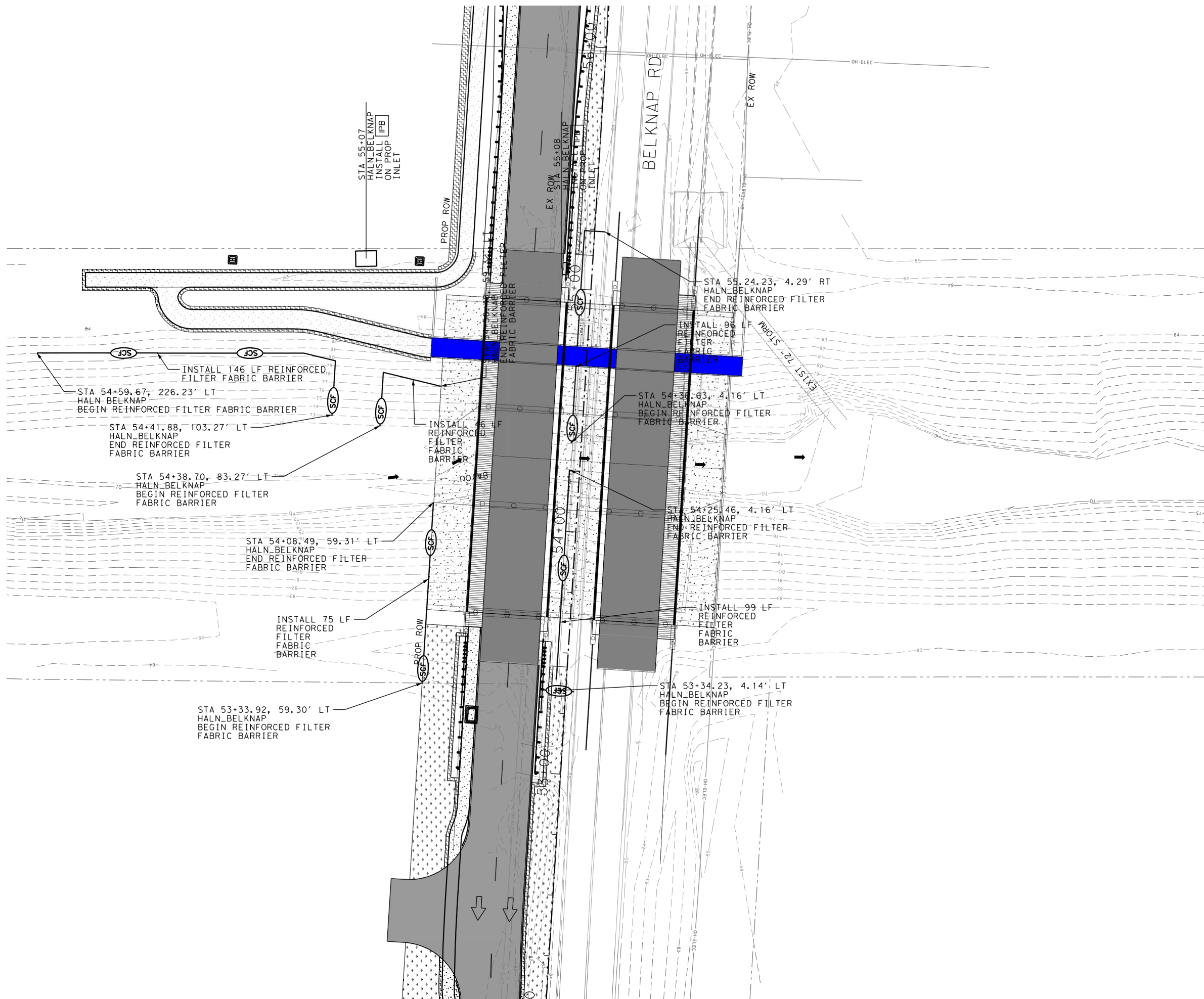
EROSION CONTROL
PHASE 1 & 2

SHEET 7 OF 8









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LEGEND

-  REINFORCED FILTER FABRIC BARRIER
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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

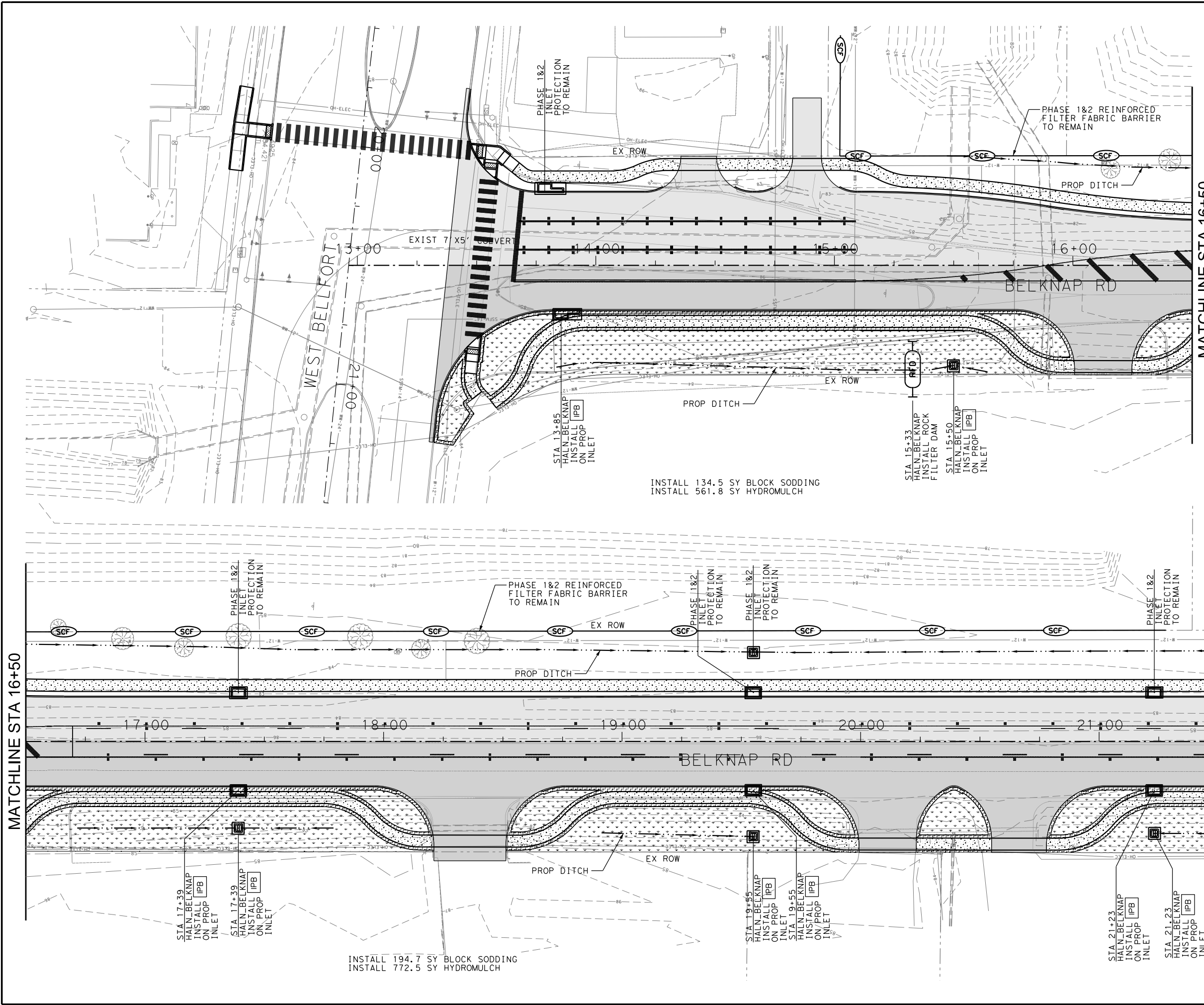
EROSION CONTROL
PHASE 1 & 2

SHEET 8 OF 8

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LEGEND

- REINFORCED FILTER FABRIC BARRIER
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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

EROSION CONTROL
PHASE 3 & 4

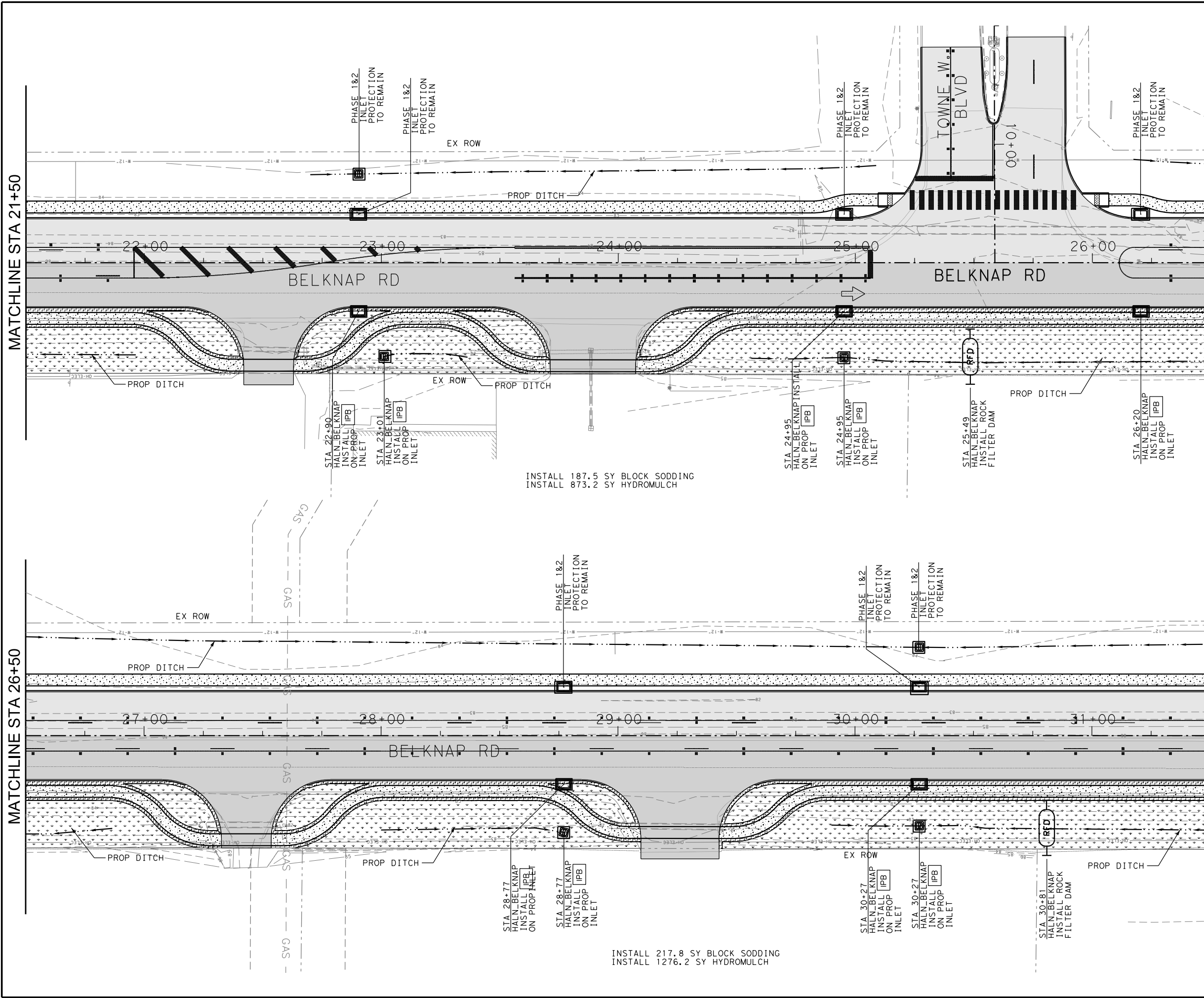
SHEET 1 OF 8

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





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LEGEND

-  REINFORCED FILTER FABRIC BARRIER
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FORT BEND COUNTY, TEXAS
BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

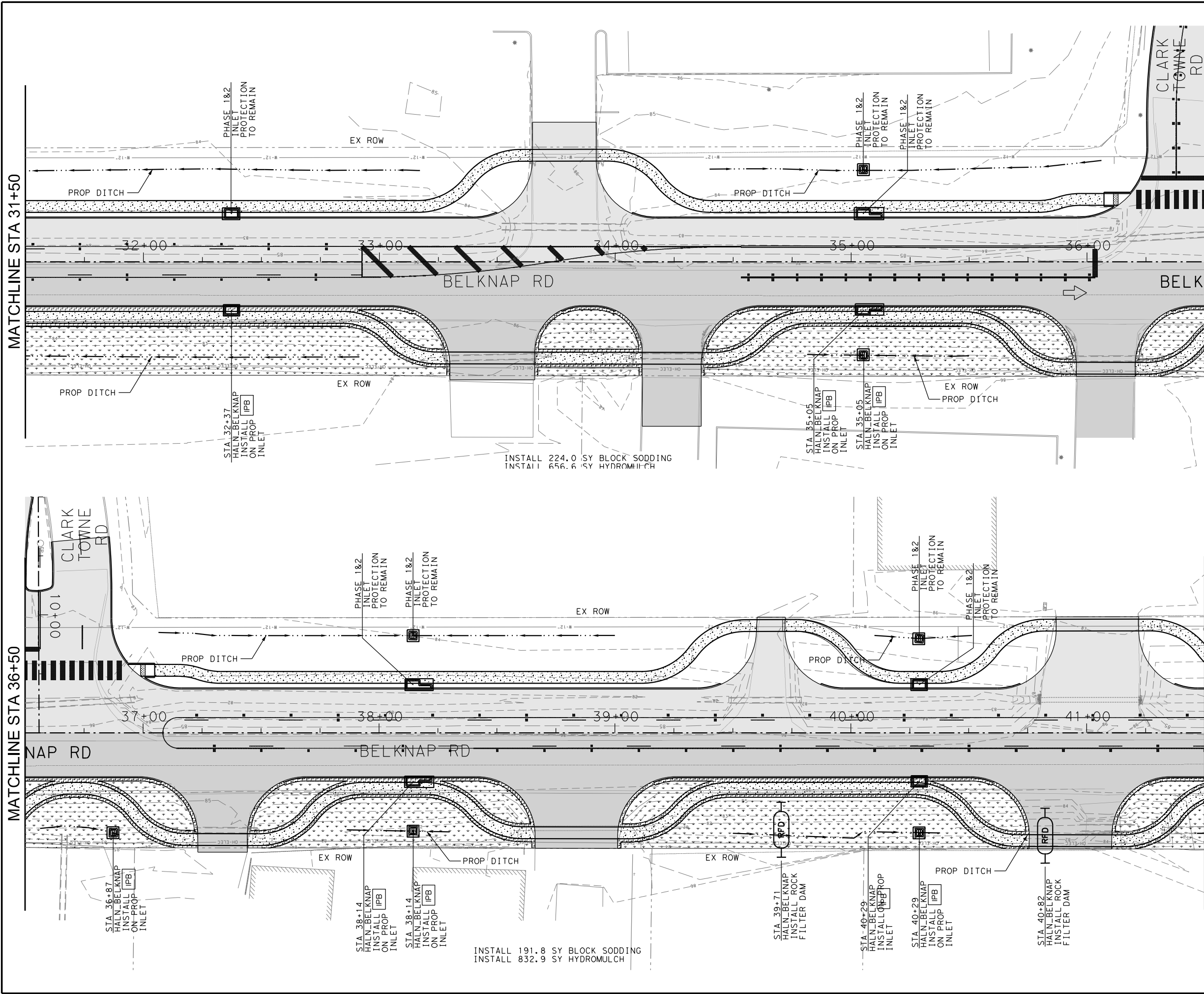
EROSION CONTROL
PHASE 3 & 4

SHEET 2 OF 8

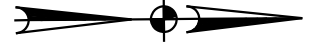
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- LEGEND**
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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
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EROSION CONTROL
PHASE 3 & 4

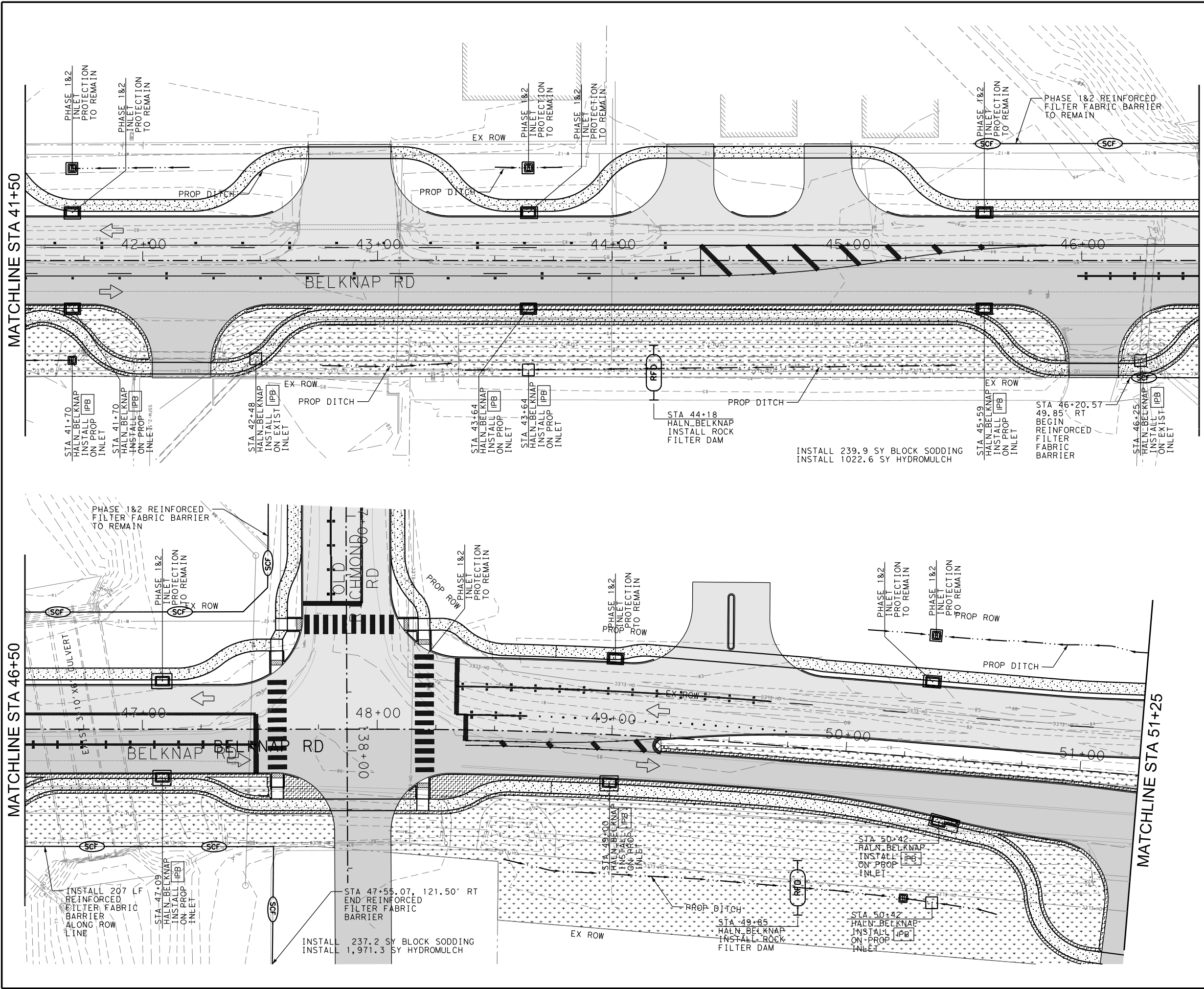
SHEET 3 OF 8

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- LEGEND**
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FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
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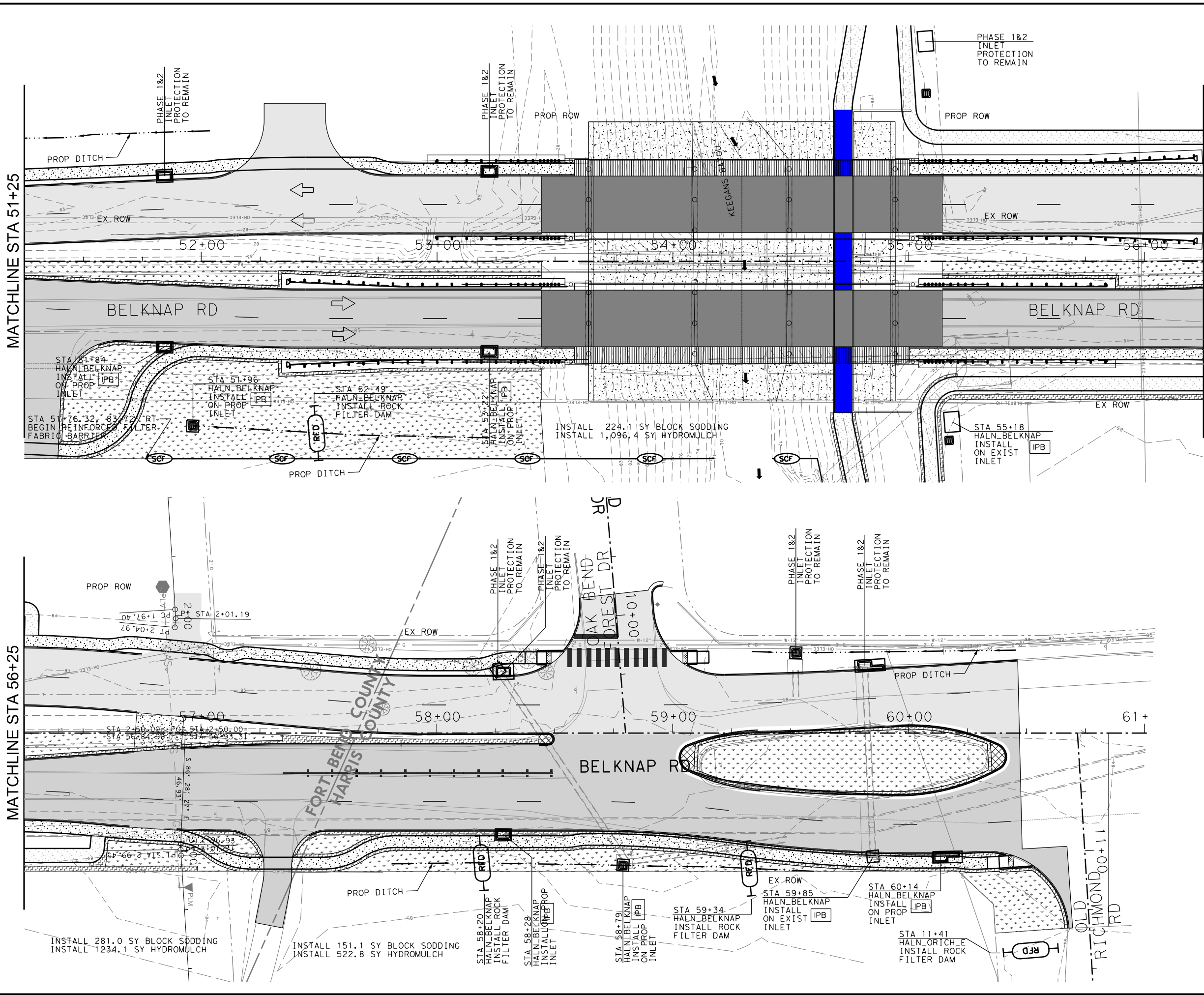
EROSION CONTROL
PHASE 3 & 4

SHEET 4 OF 8

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- LEGEND**
- REINFORCED FILTER FABRIC BARRIER
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STATE OF TEXAS
 GABRIEL ODREMAN NORIEGA
 135069
 LICENSED PROFESSIONAL ENGINEER
 02/06/2024

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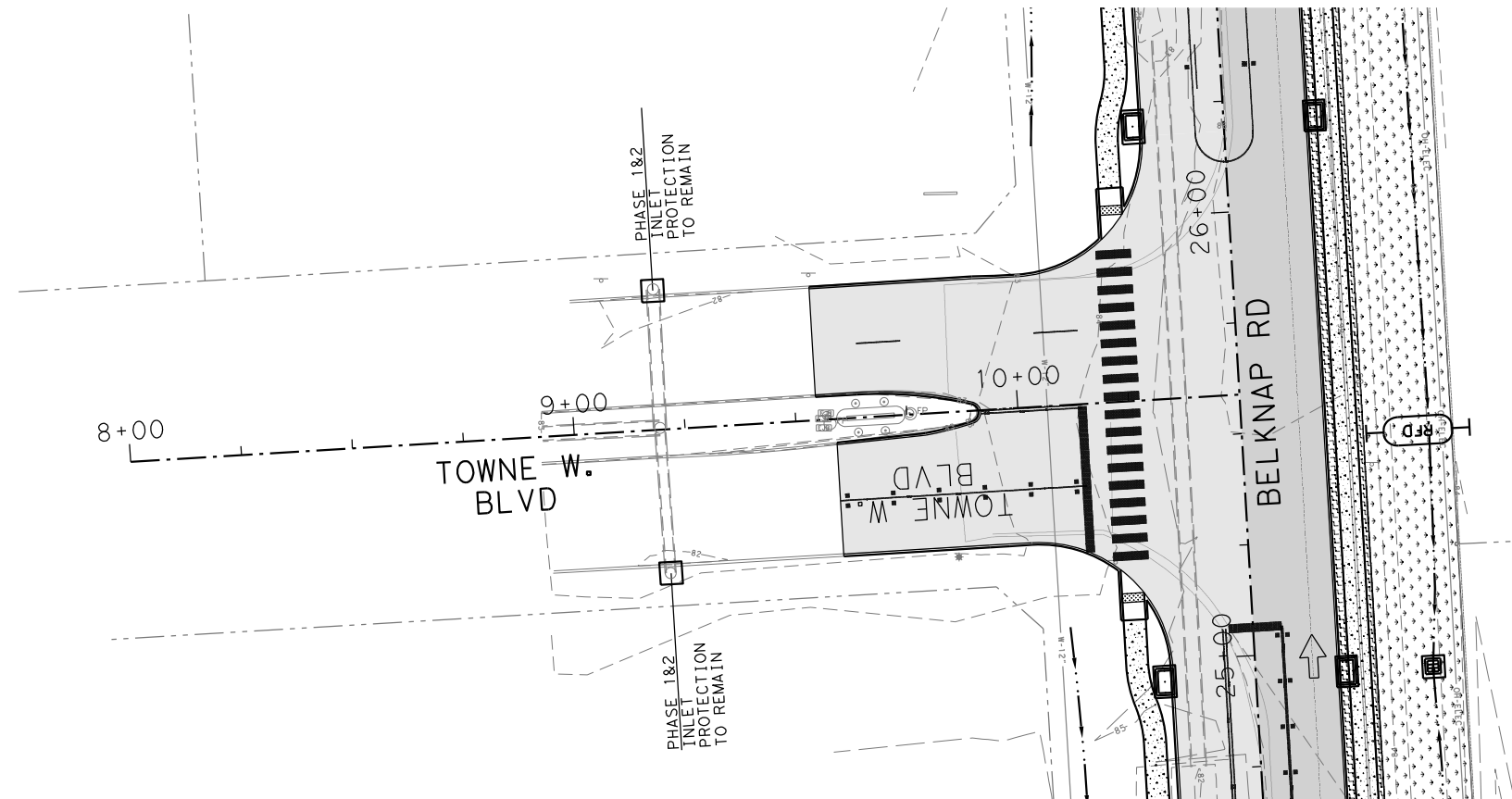
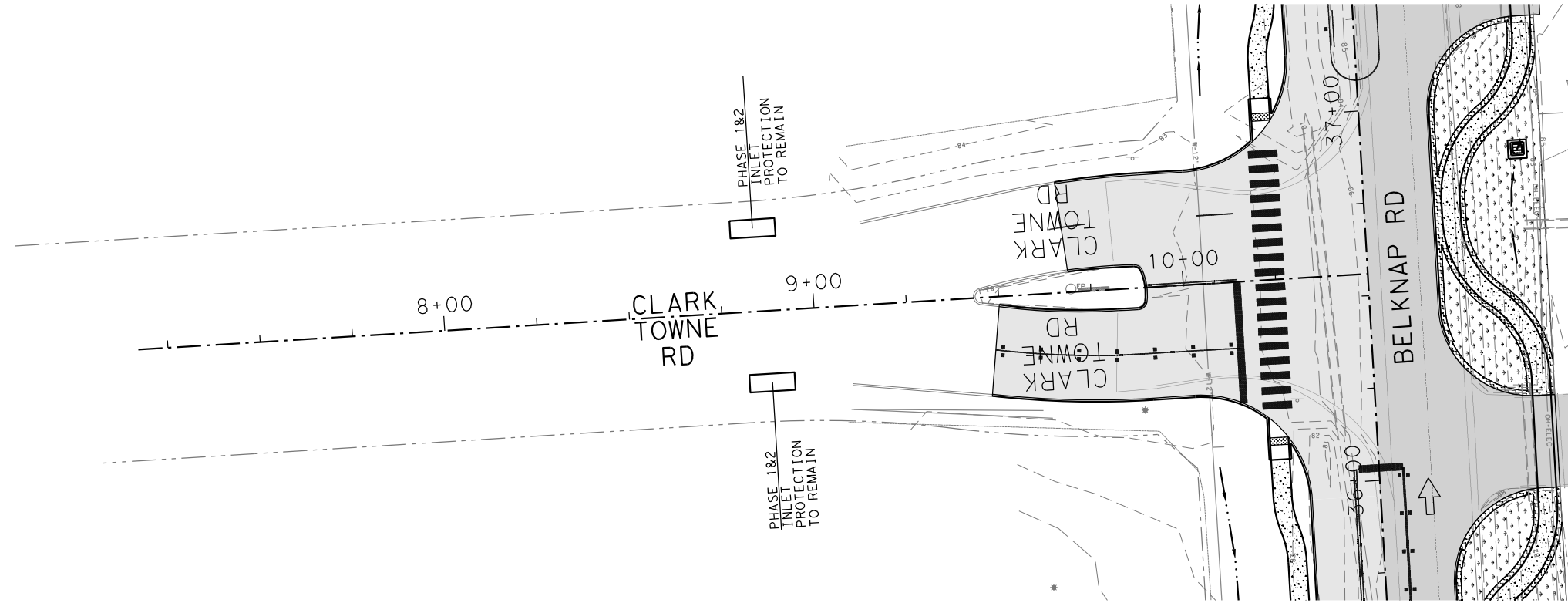
FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
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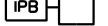
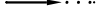
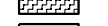


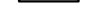
EROSION CONTROL
PHASE 3 & 4

SHEET 5 OF 8

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17-2-11	008169		2023		236
DESIGNED BY	RPS	DRAWN BY	RPS	CHECKED BY	RPS
		VERIFIED BY	RPS		



LEGEND

-  REINFORCED FILTER FABRIC BARRIER
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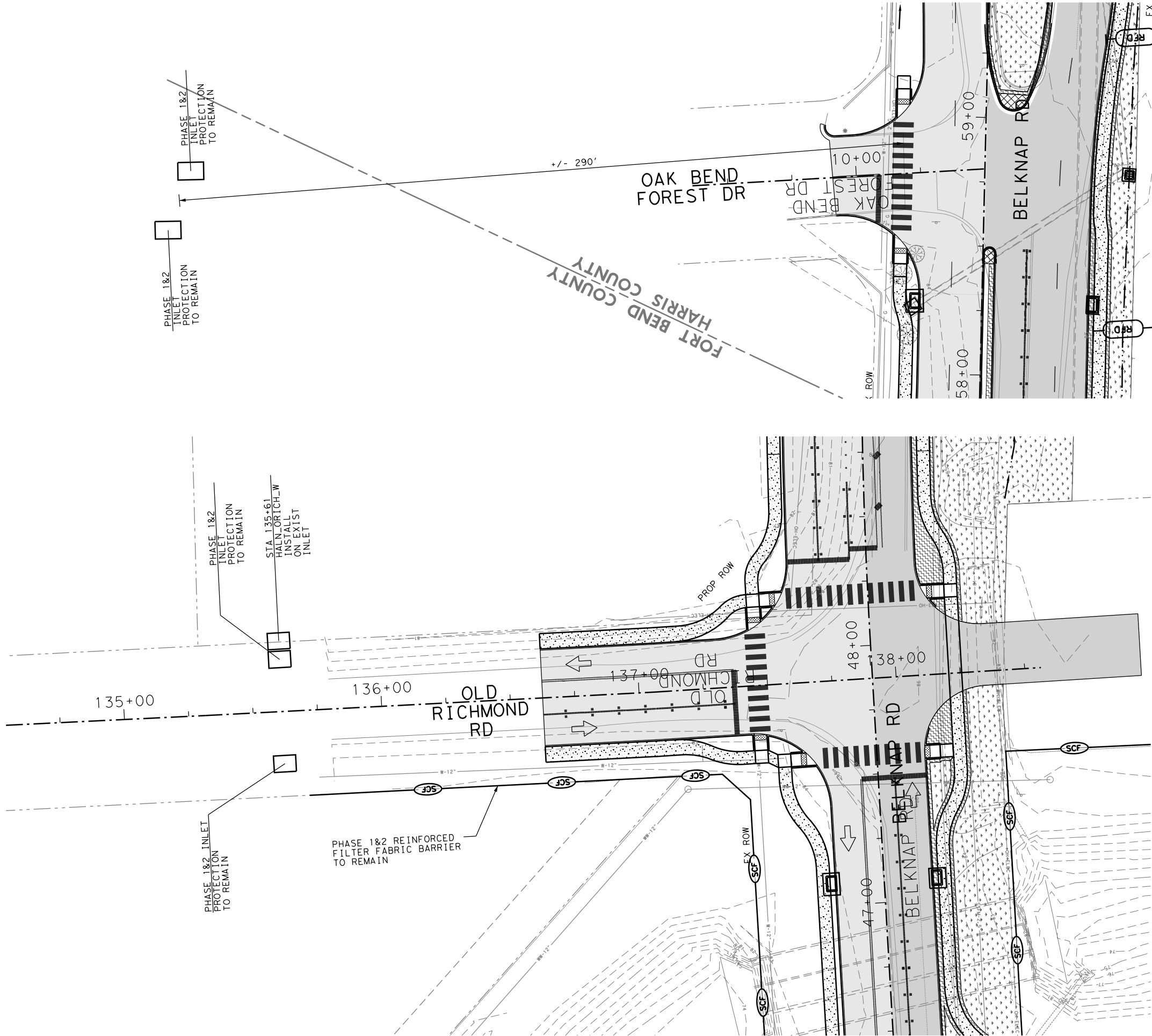
FORT BEND COUNTY, TEXAS

BELKNAP ROAD IMPROVEMENTS
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EROSION CONTROL
PHASE 3 & 4

SHEET 6 OF 8

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17-2-11	008169		2023		237
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RPS	RPS	RPS	RPS		



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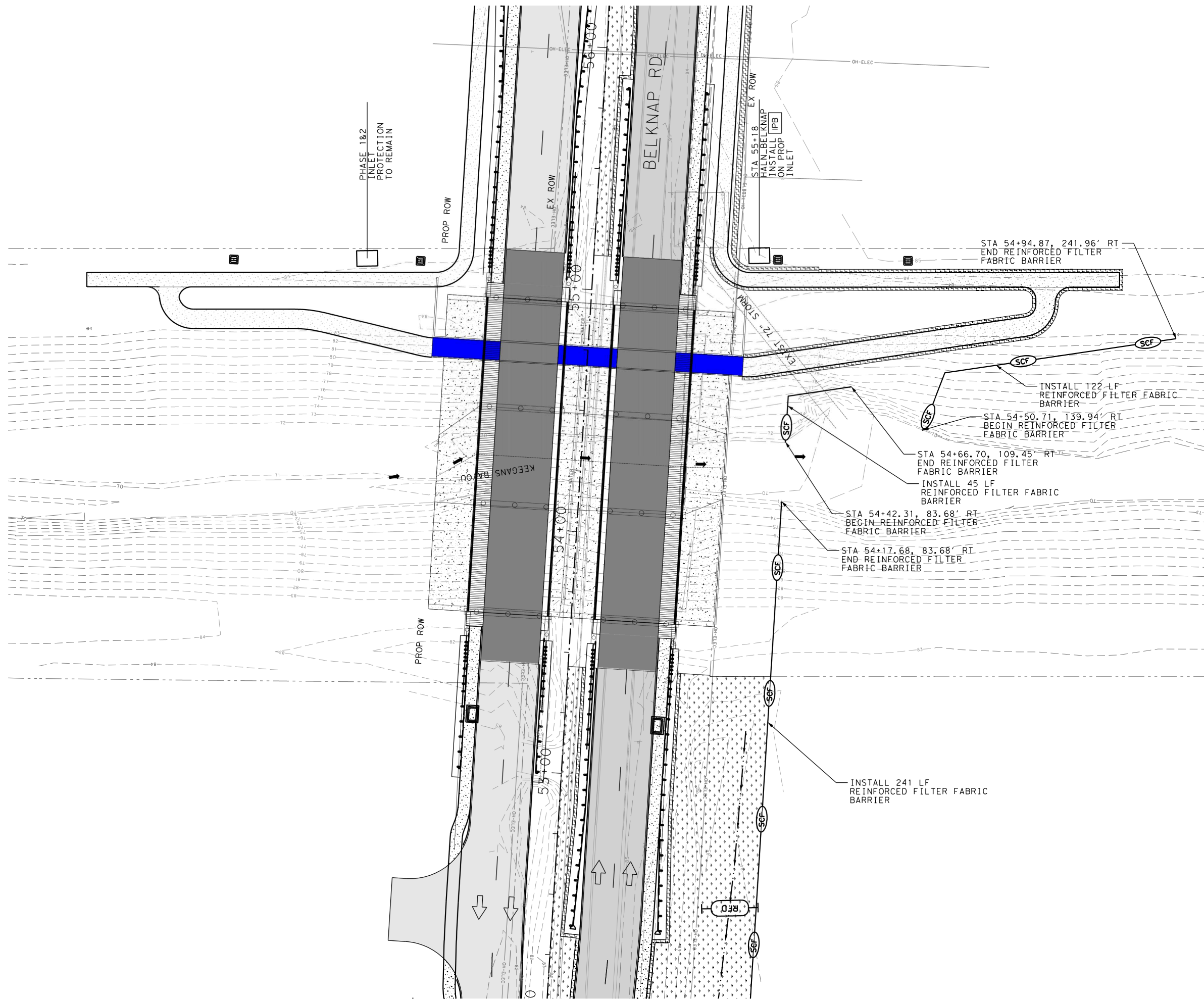
FORT BEND COUNTY, TEXAS
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PHASE 3 & 4









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LEGEND

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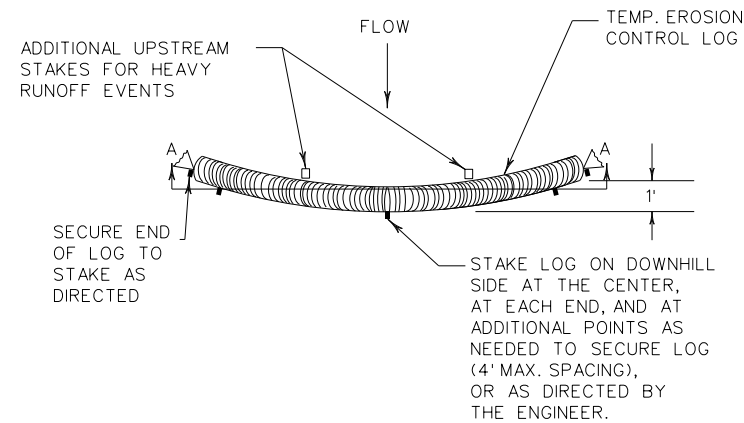
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EROSION CONTROL
PHASE 3 & 4

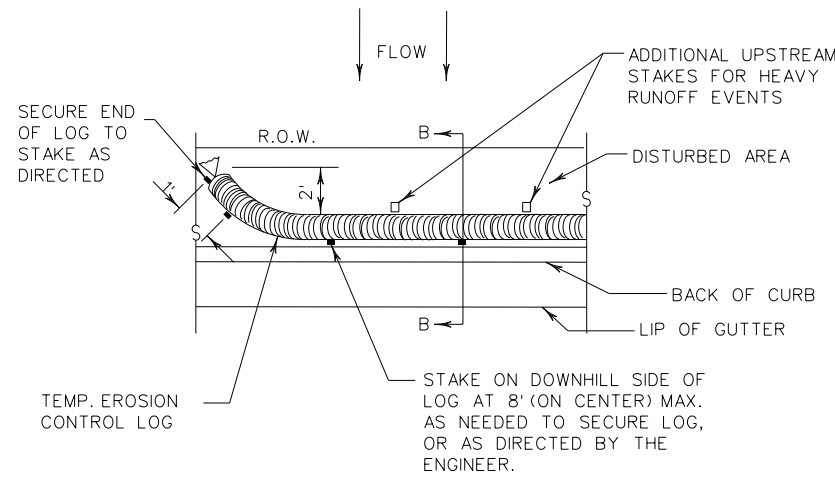
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SHEET 8 OF 8

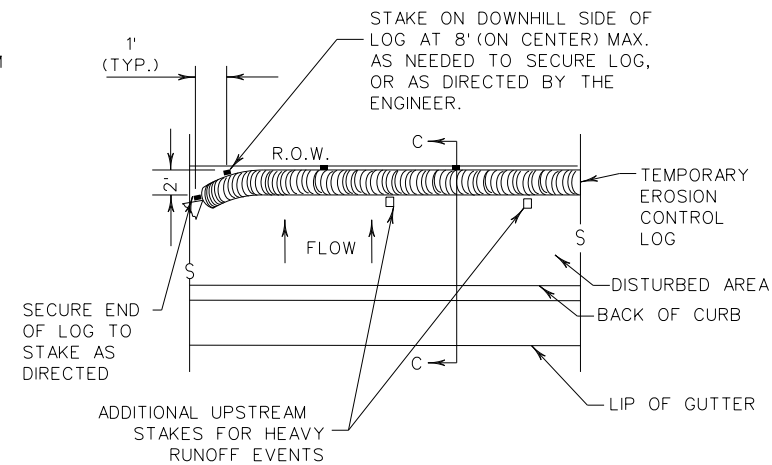
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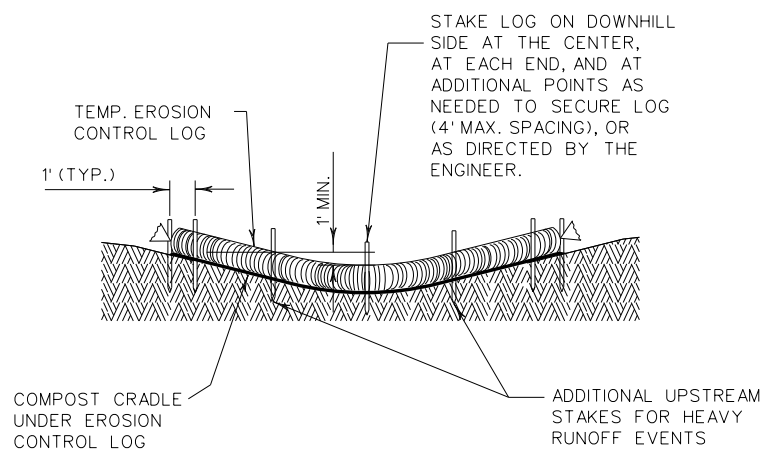
PLAN VIEW



PLAN VIEW



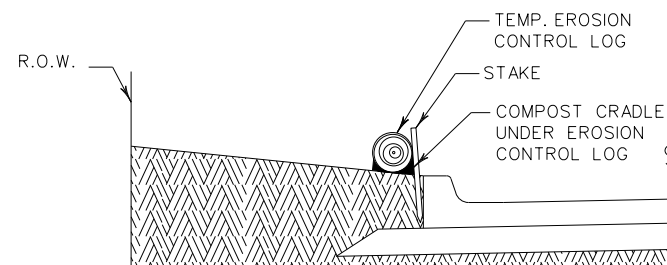
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

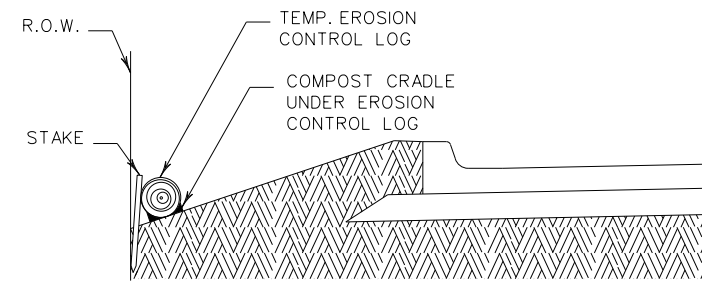
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

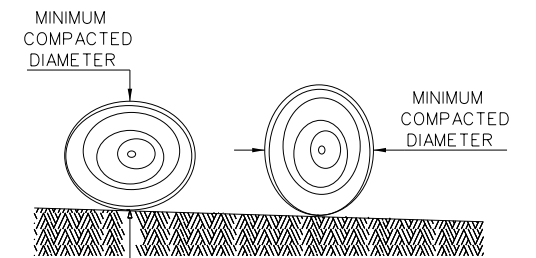
CL-BOC



SECTION C-C

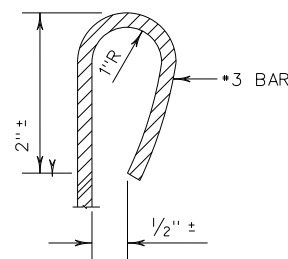
EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

- LEGEND
- CL-D EROSION CONTROL LOG DAM
 - CL-BOC EROSION CONTROL LOG AT BACK OF CURB
 - CL-ROW EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
 - CL-SST EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
 - CL-SSL EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
 - CL-DI EROSION CONTROL LOG AT DROP INLET
 - CL-CI EROSION CONTROL LOG AT CURB INLET
 - CL-GI EROSION CONTROL LOG AT CURB & GRATE INLET



REBAR STAKE DETAIL

SEDIMENT BASIN & TRAP USAGE GUIDELINES

An erosion controllog sediment trap may be used to filter sediment out of runoff draining from an unstabilized area.

Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Controllogs should be placed in the following locations:

1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows away from the project.

The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.

Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.

GENERAL NOTES:

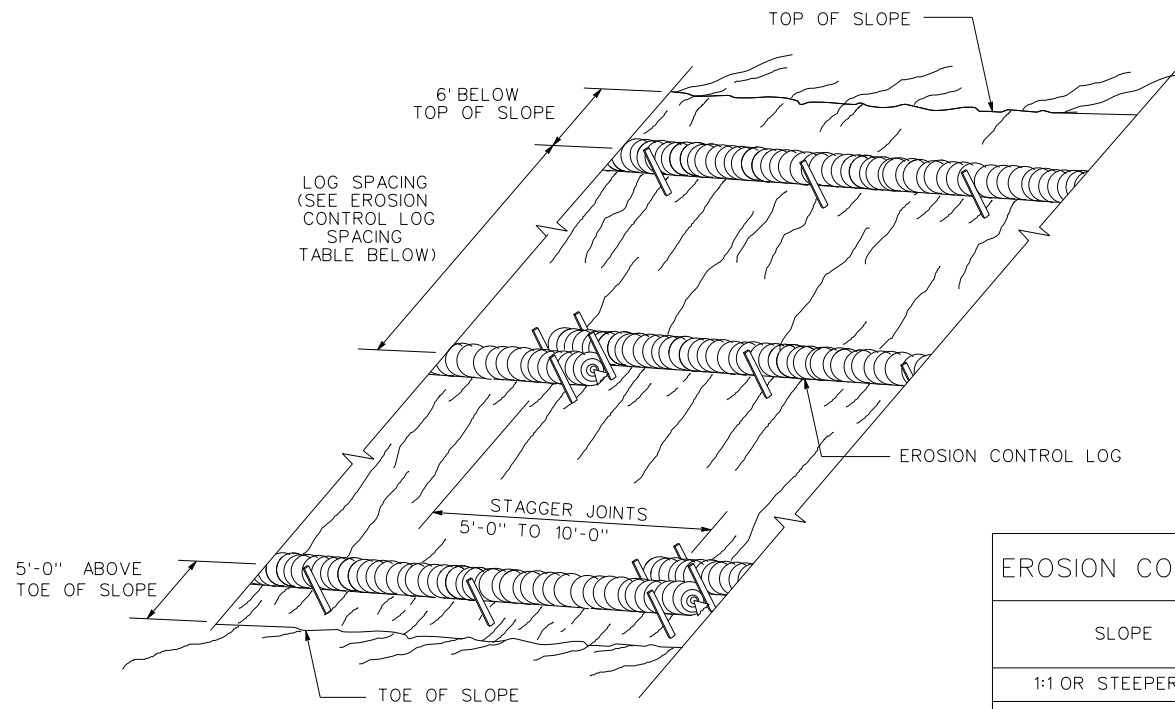
1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.

SHEET 1 OF 3

		Design Division Standard	
<p>TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES</p> <p>EROSION CONTROL LOG</p> <p>EC(9)-16</p>			
FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT
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			241

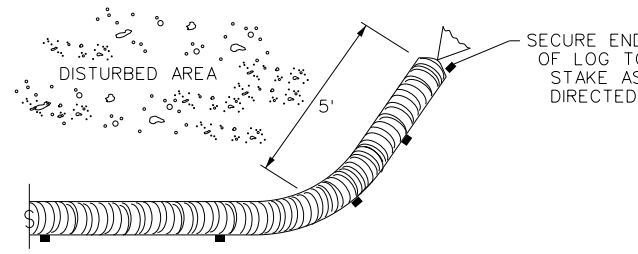
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EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

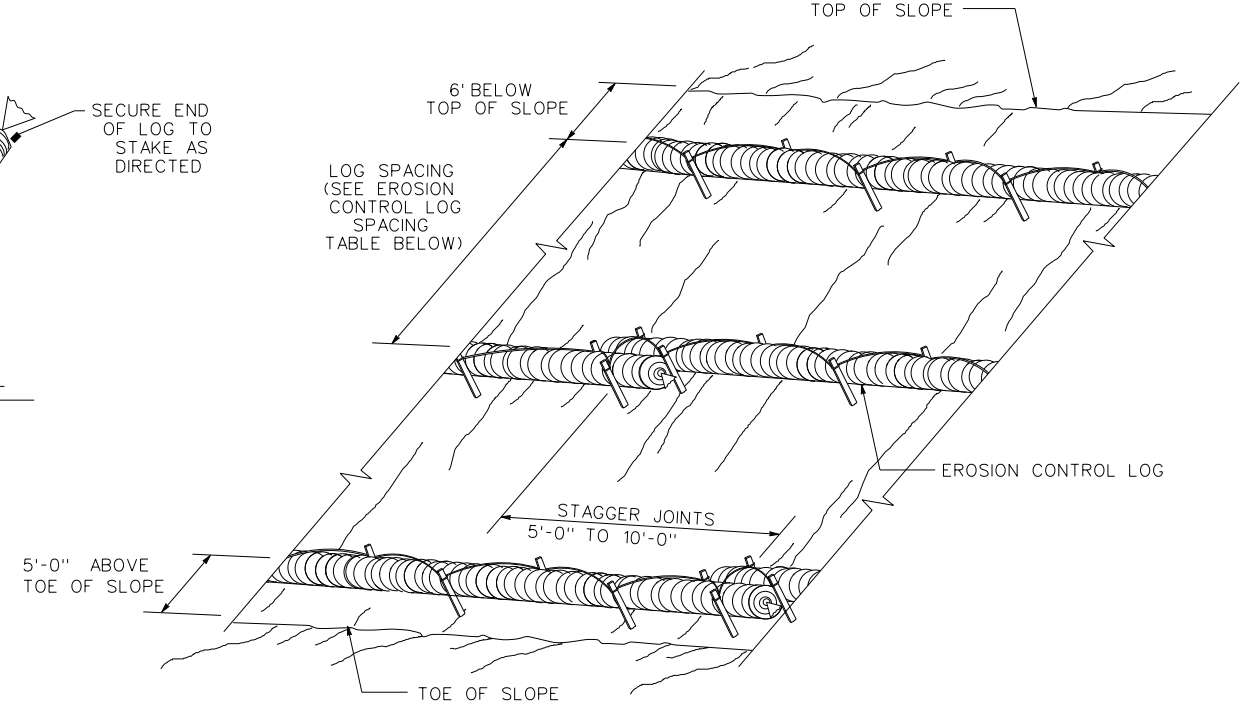
CL-SST



END SECTION RAP DETAIL

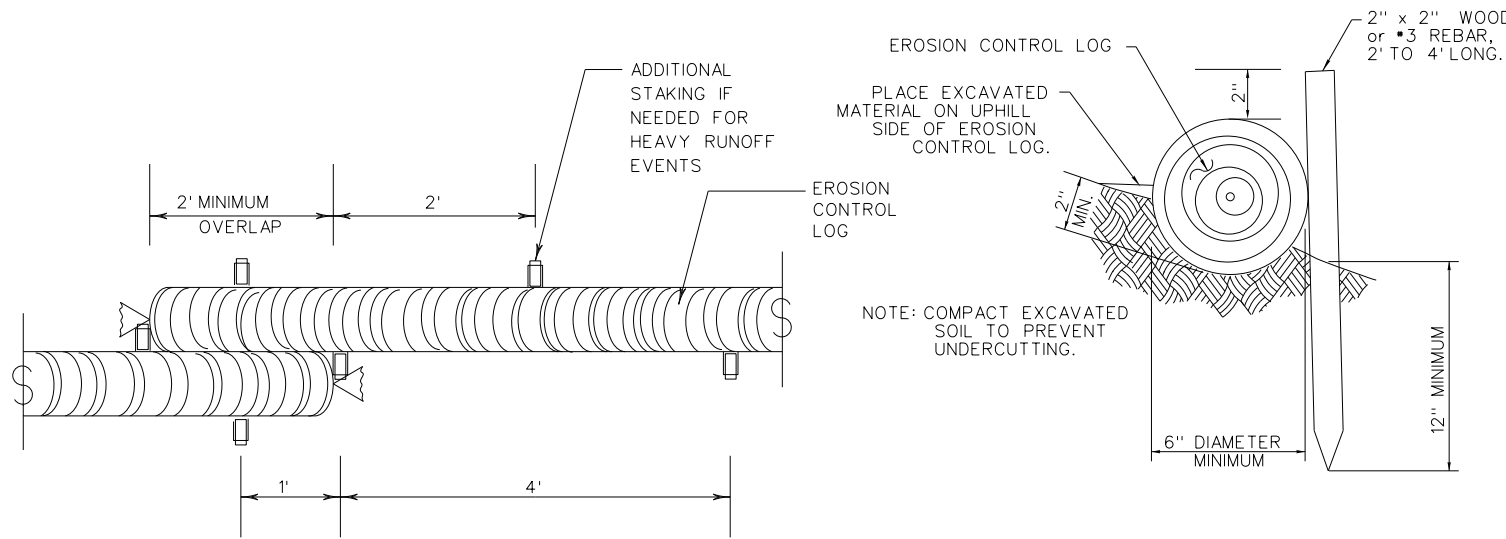
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

• ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



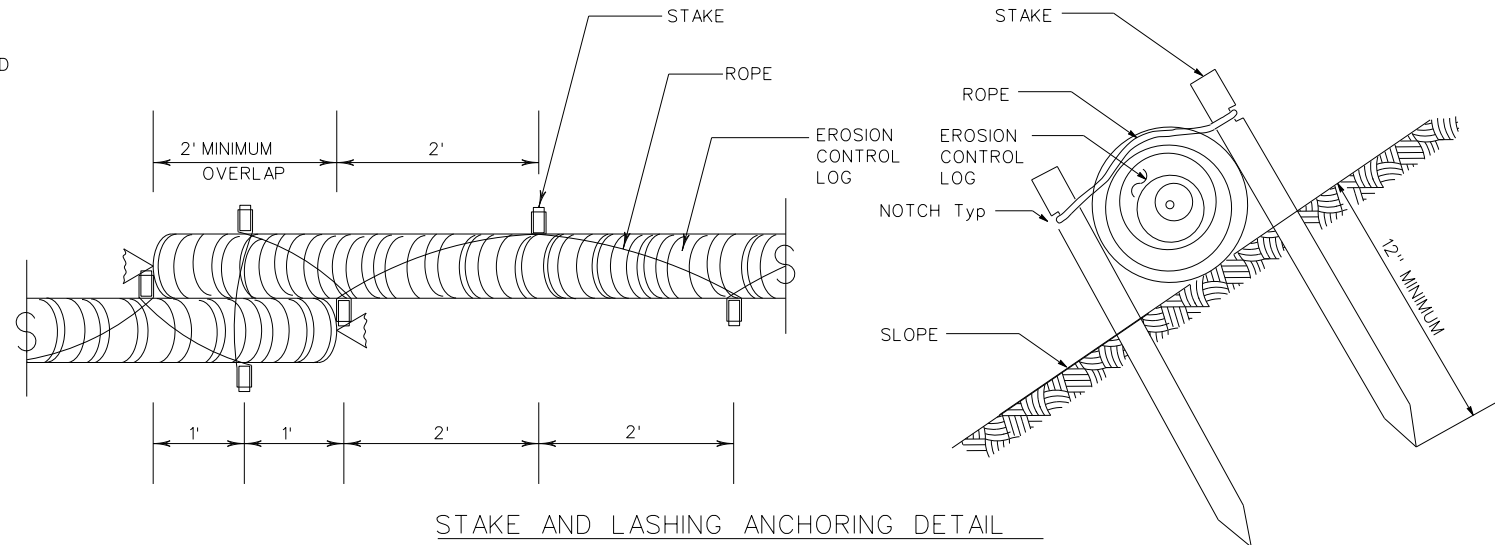
EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL



STAKE AND TRENCHING ANCHORING DETAIL

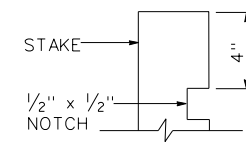
CL-SST



STAKE AND LASHING ANCHORING DETAIL

CL-SSL

LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"



STAKE NOTCH DETAIL

SHEET 2 OF 3

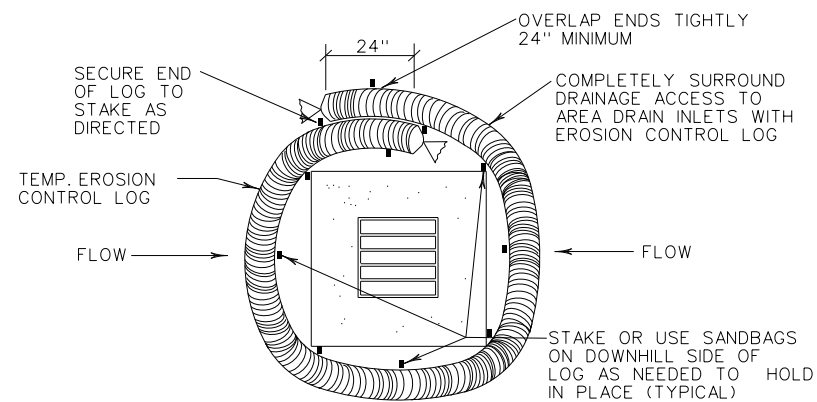


TEMPORARY EROSION,
SEDIMENT AND WATER
POLLUTION CONTROL MEASURES
EROSION CONTROL LOG

EC(9)-16

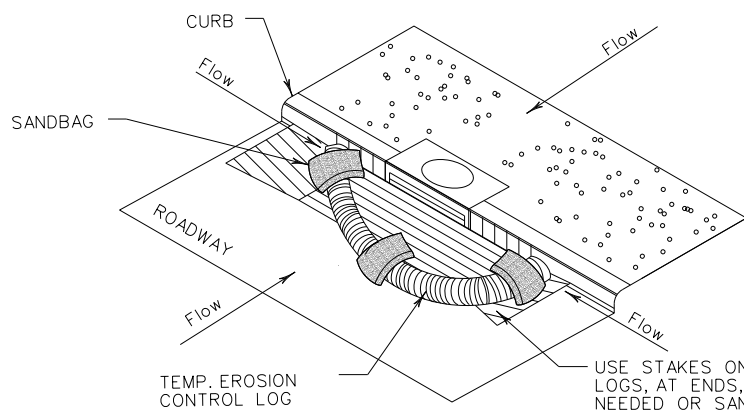
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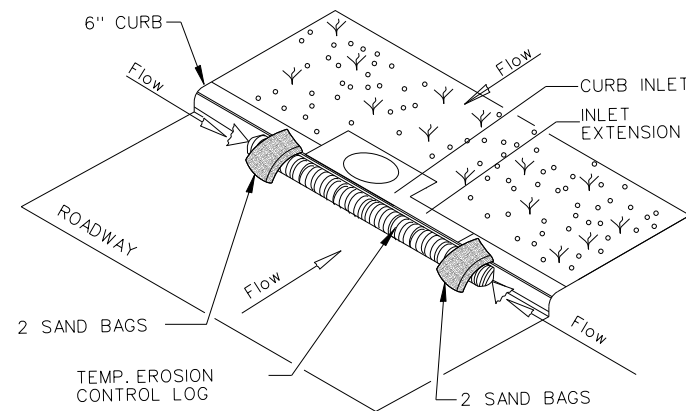
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

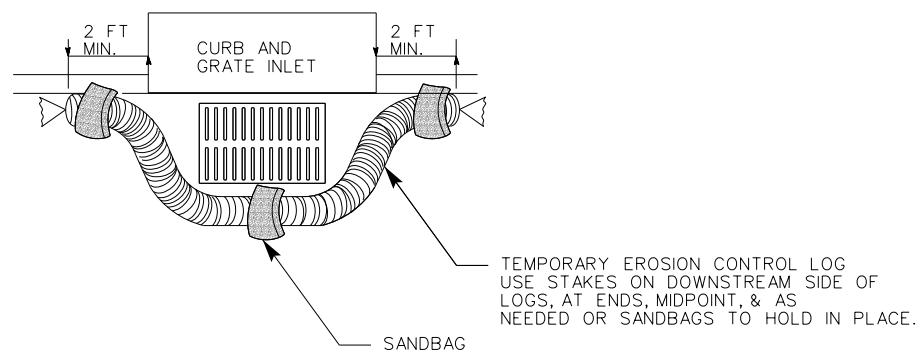
CL-CI



EROSION CONTROL LOG AT CURB INLET

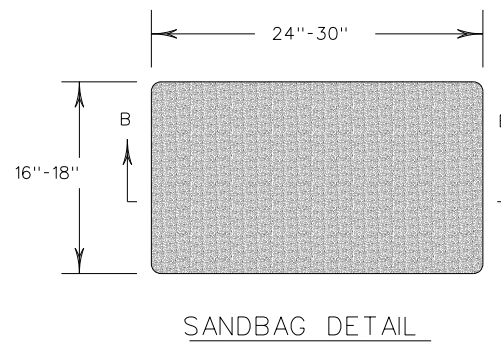
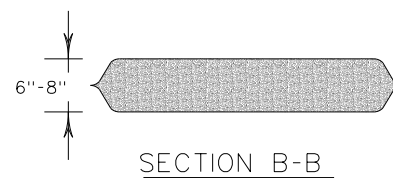
CL-CI

NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI



SANDBAG DETAIL

SHEET 3 OF 3



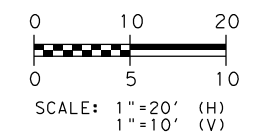
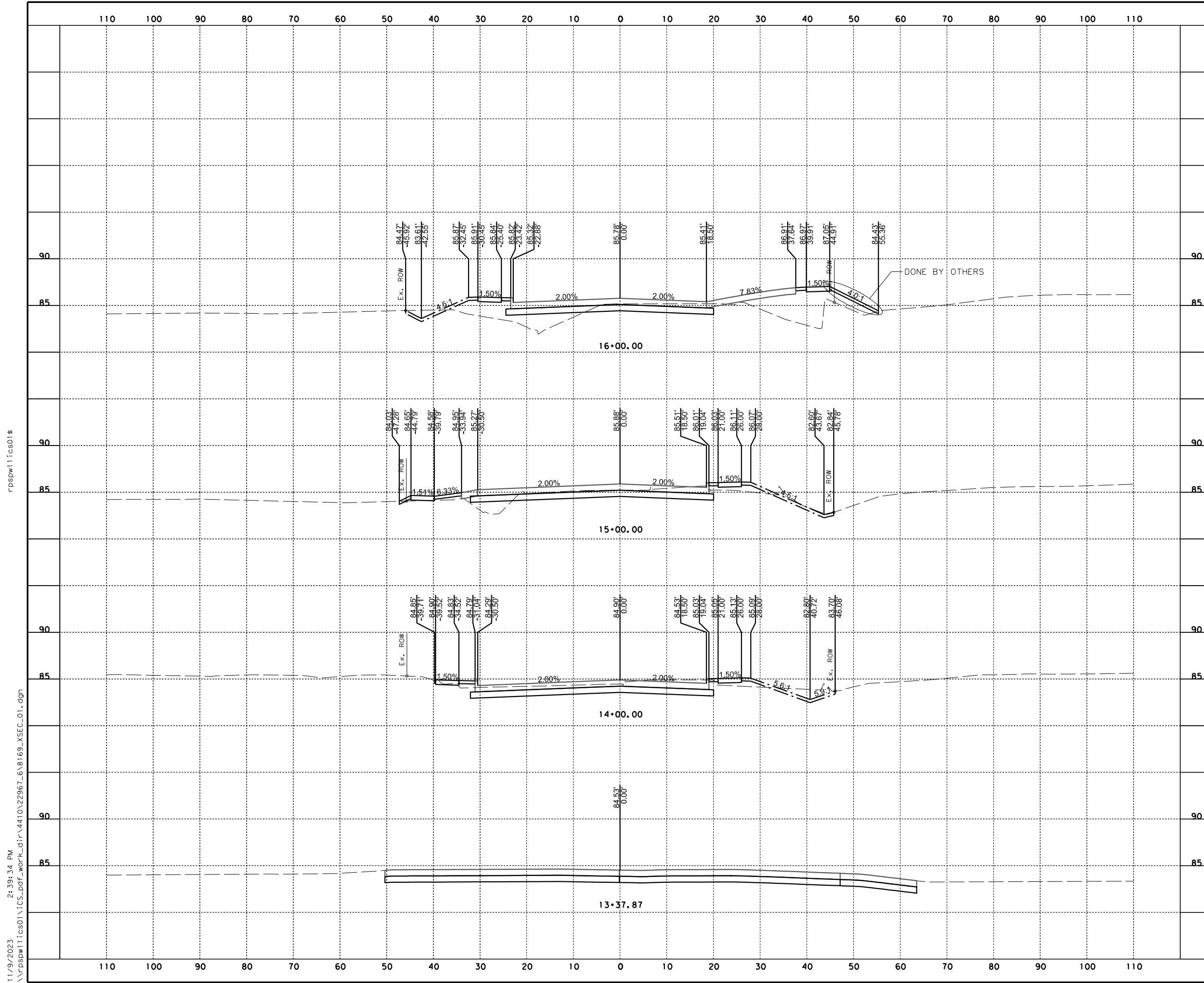
TEMPORARY EROSION,
SEDIMENT AND WATER
POLLUTION CONTROL MEASURES
EROSION CONTROL LOG

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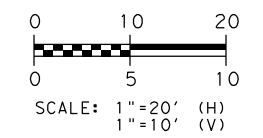
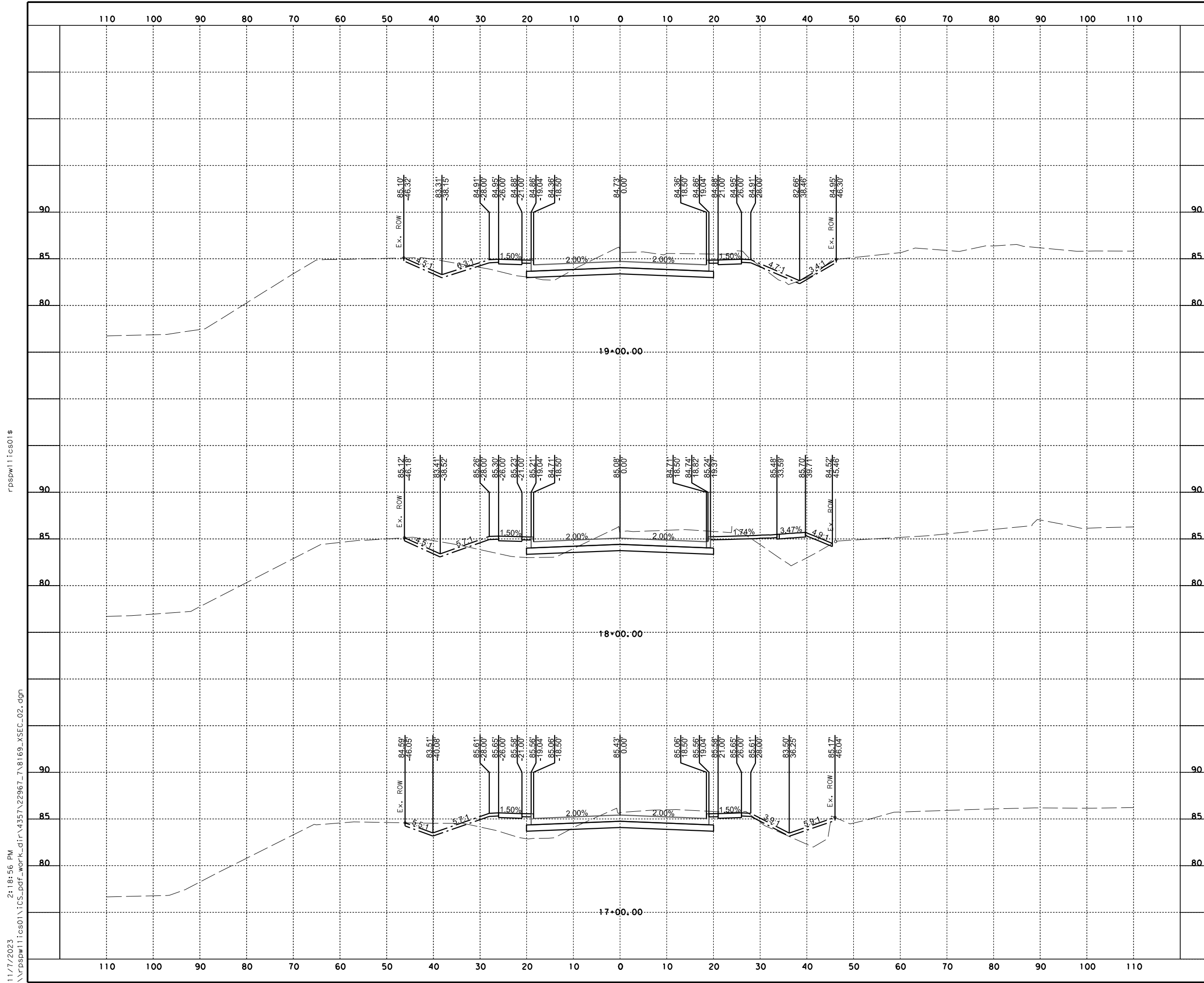
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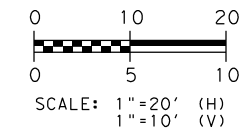
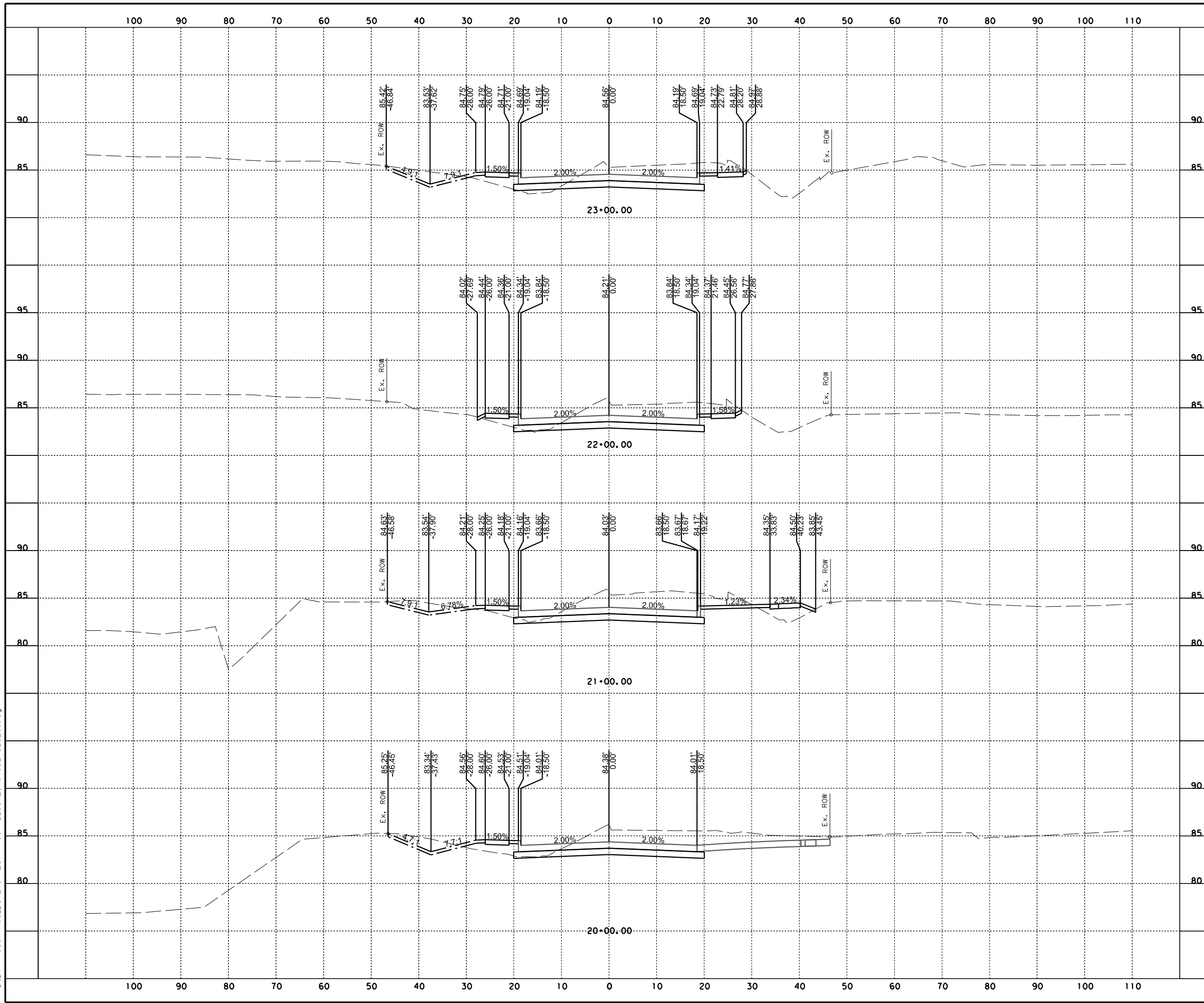
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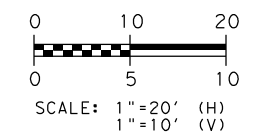
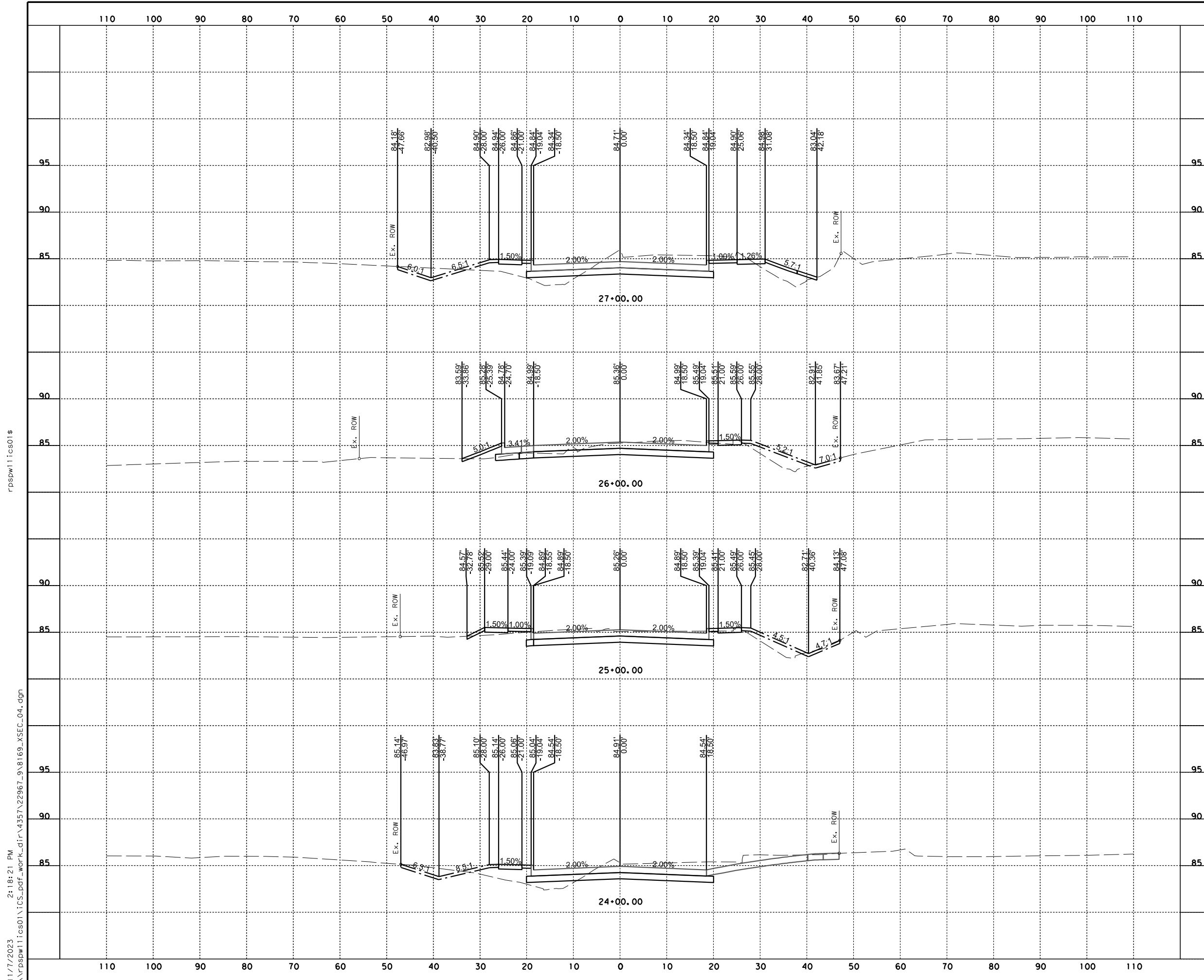
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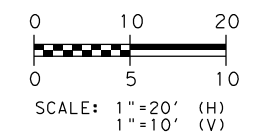
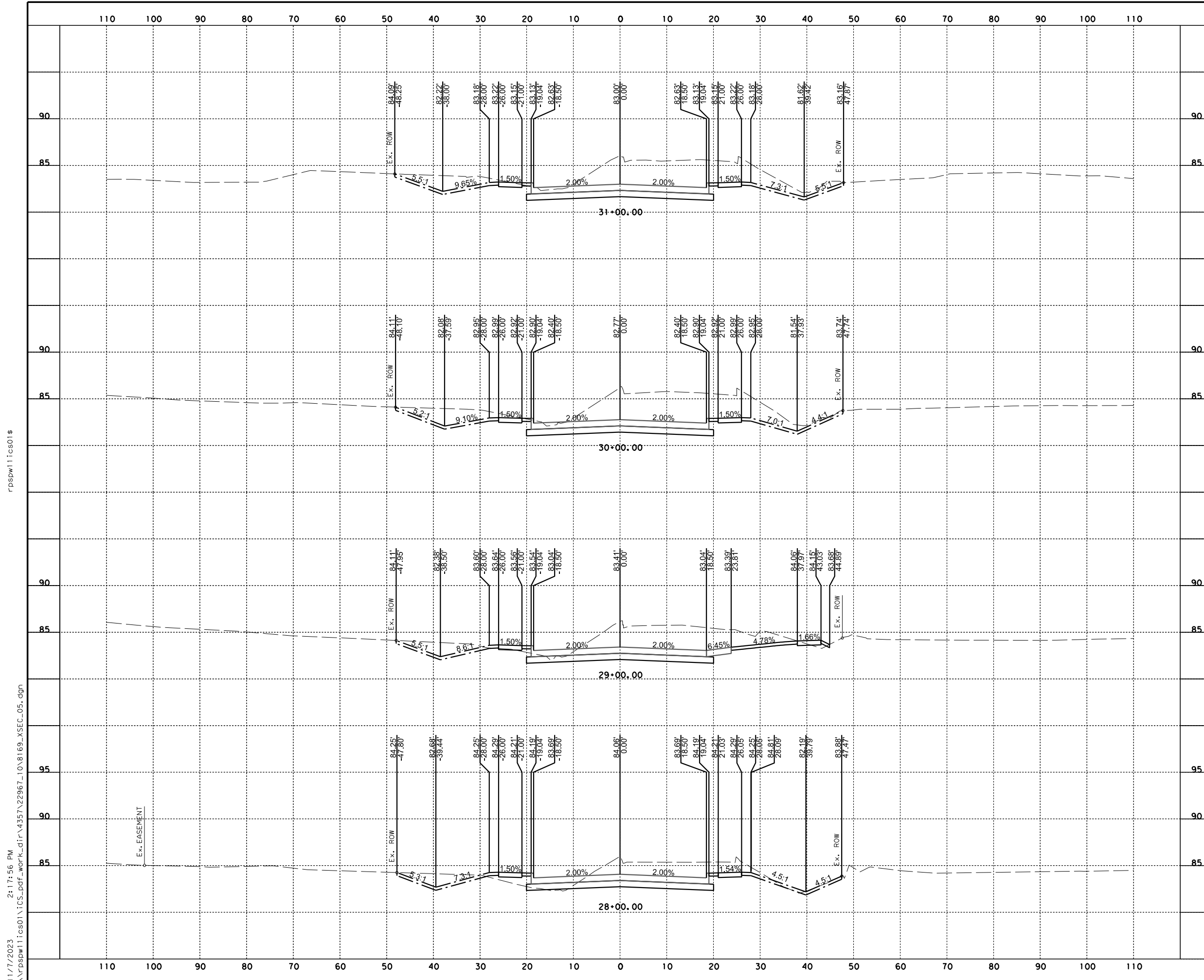
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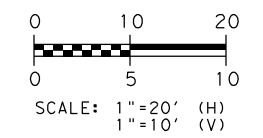
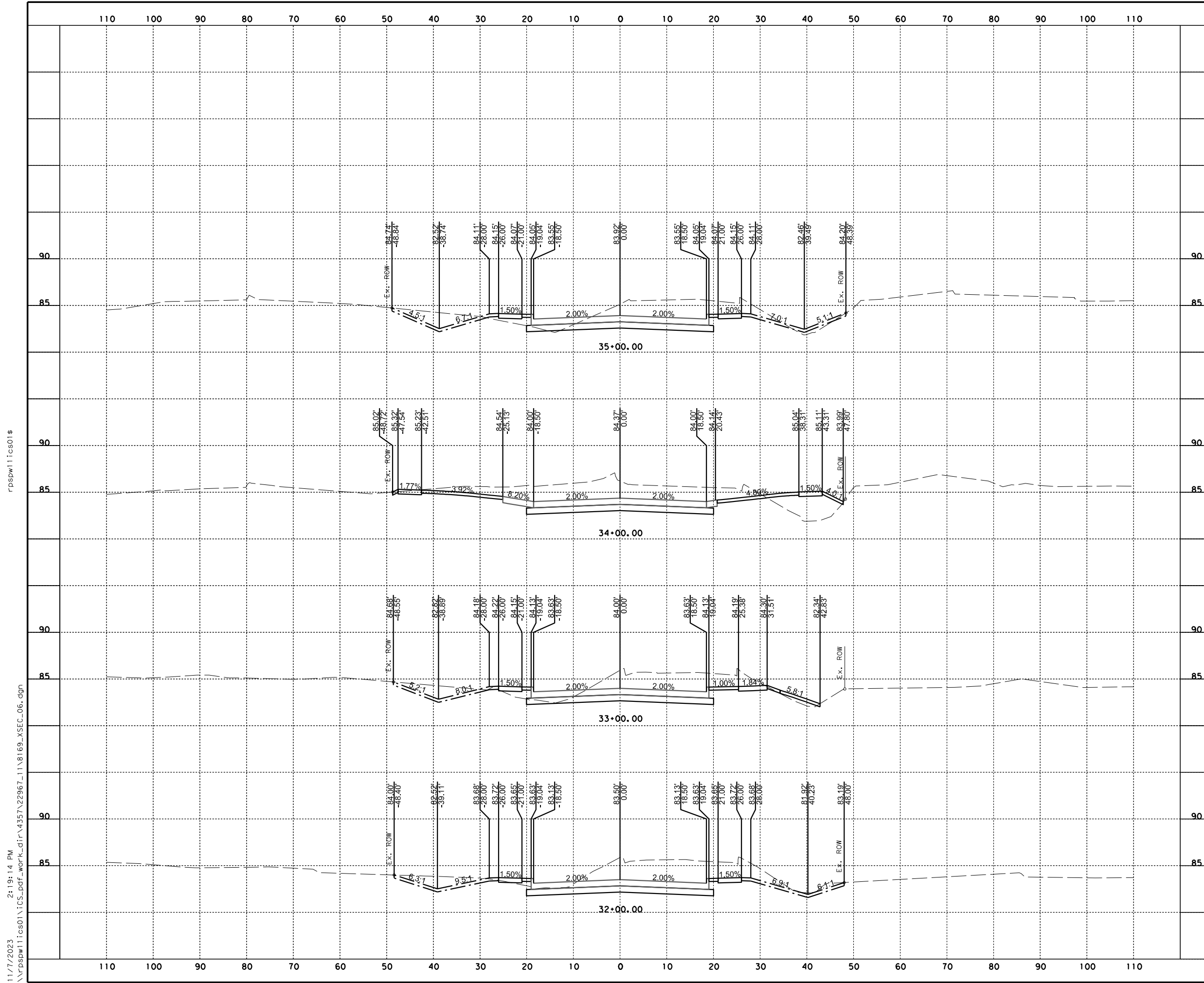
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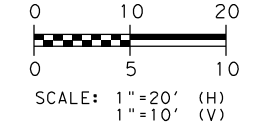
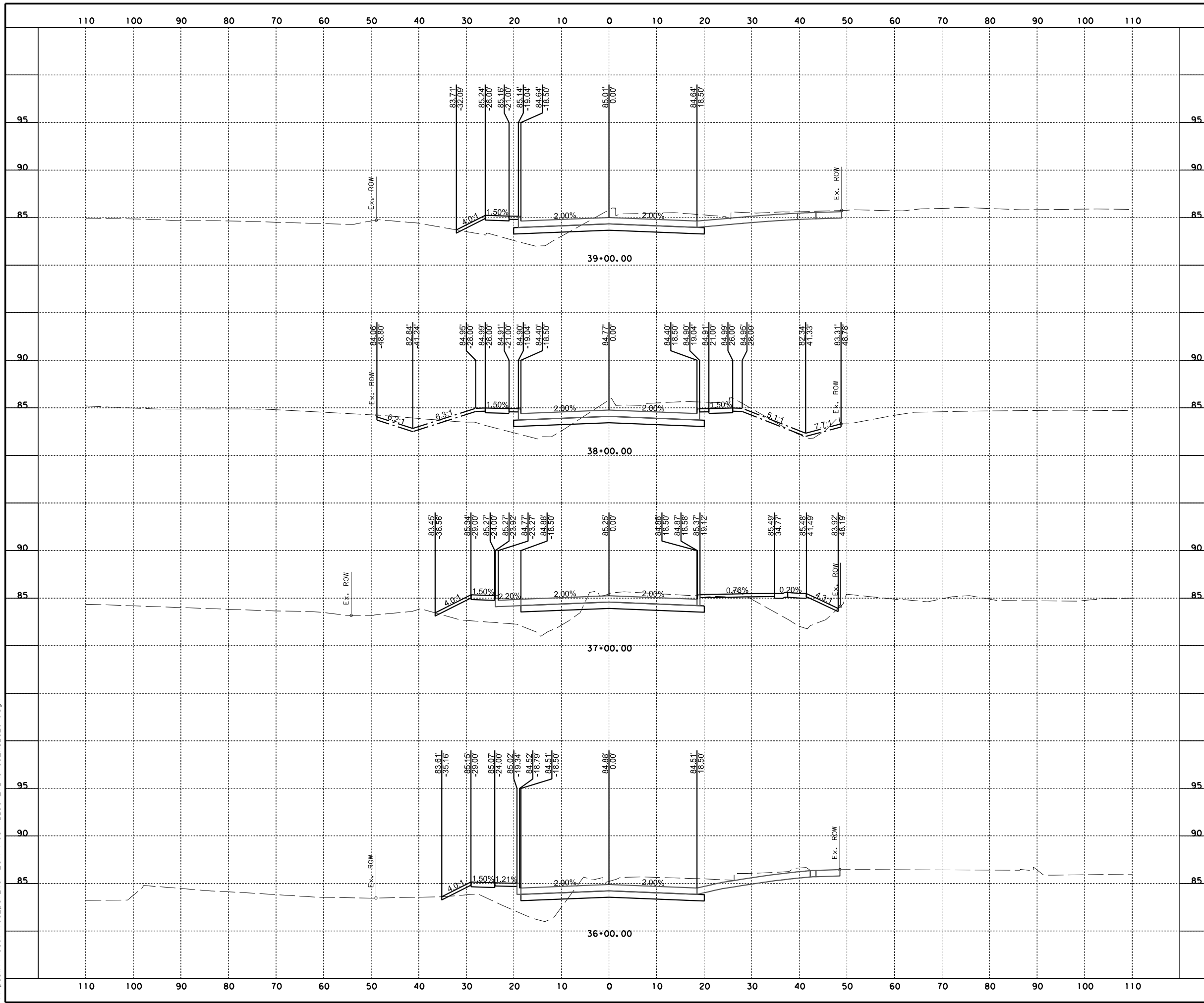
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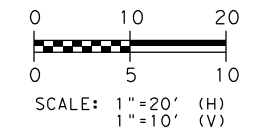
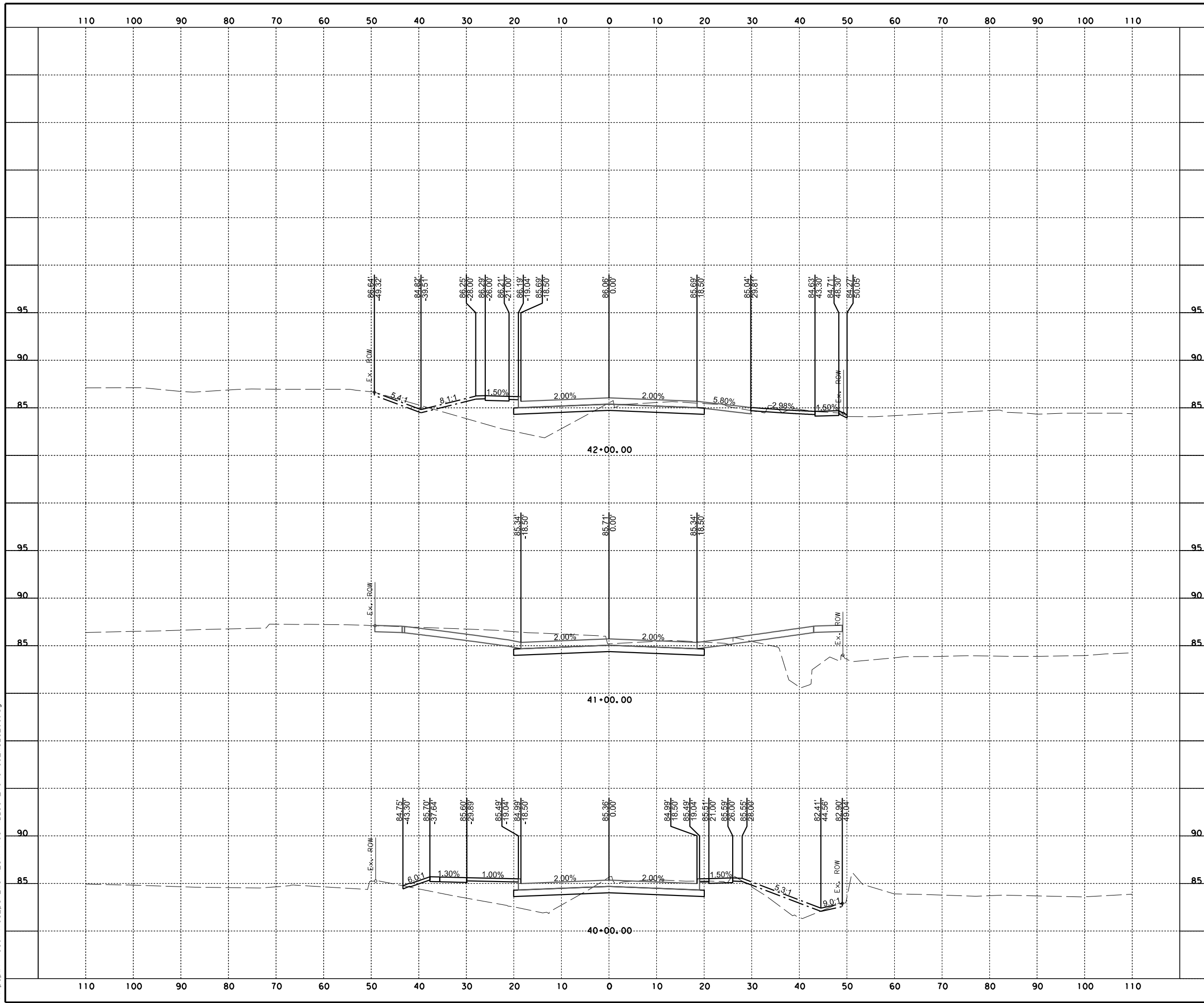
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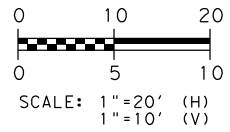
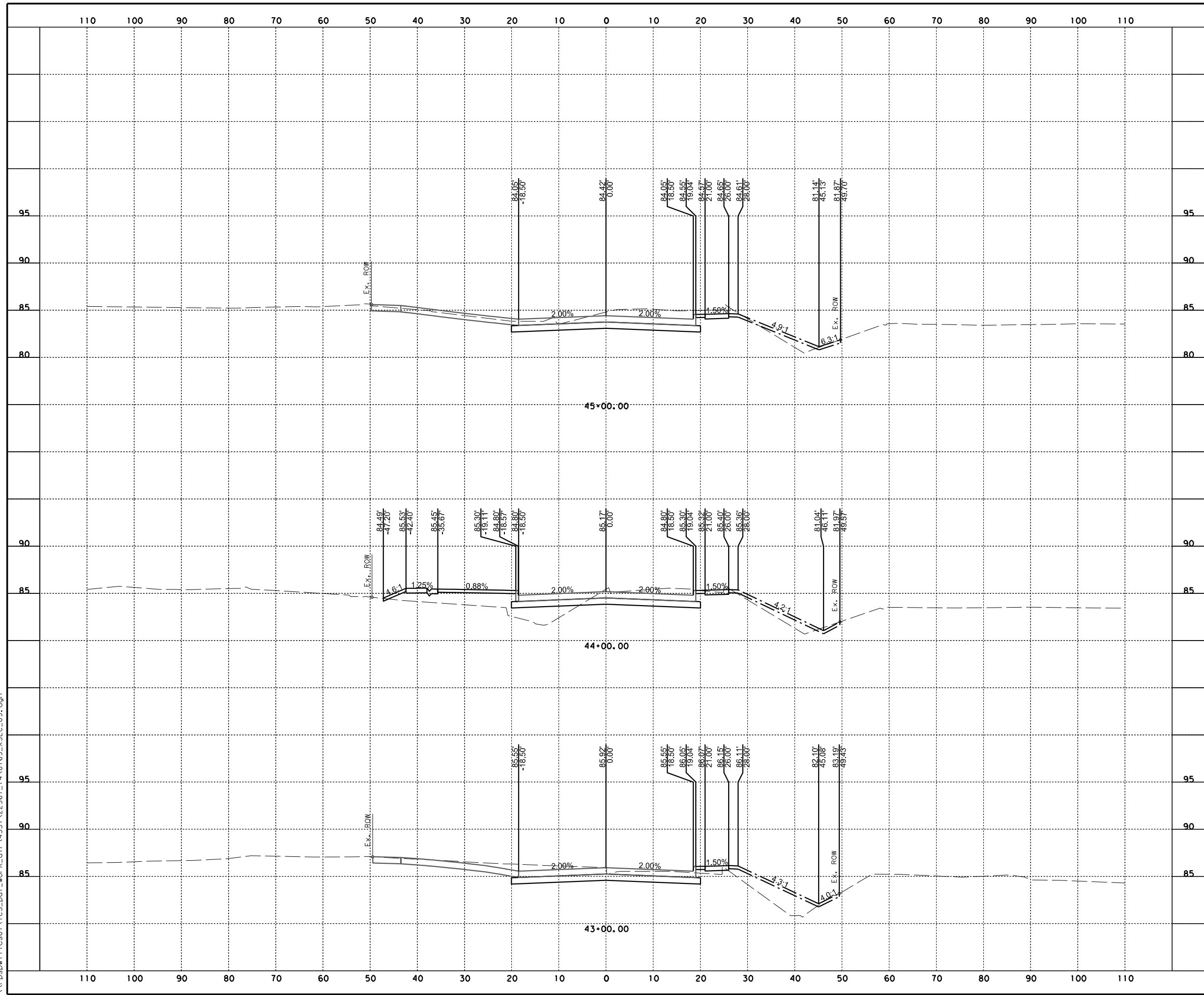
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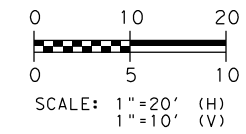
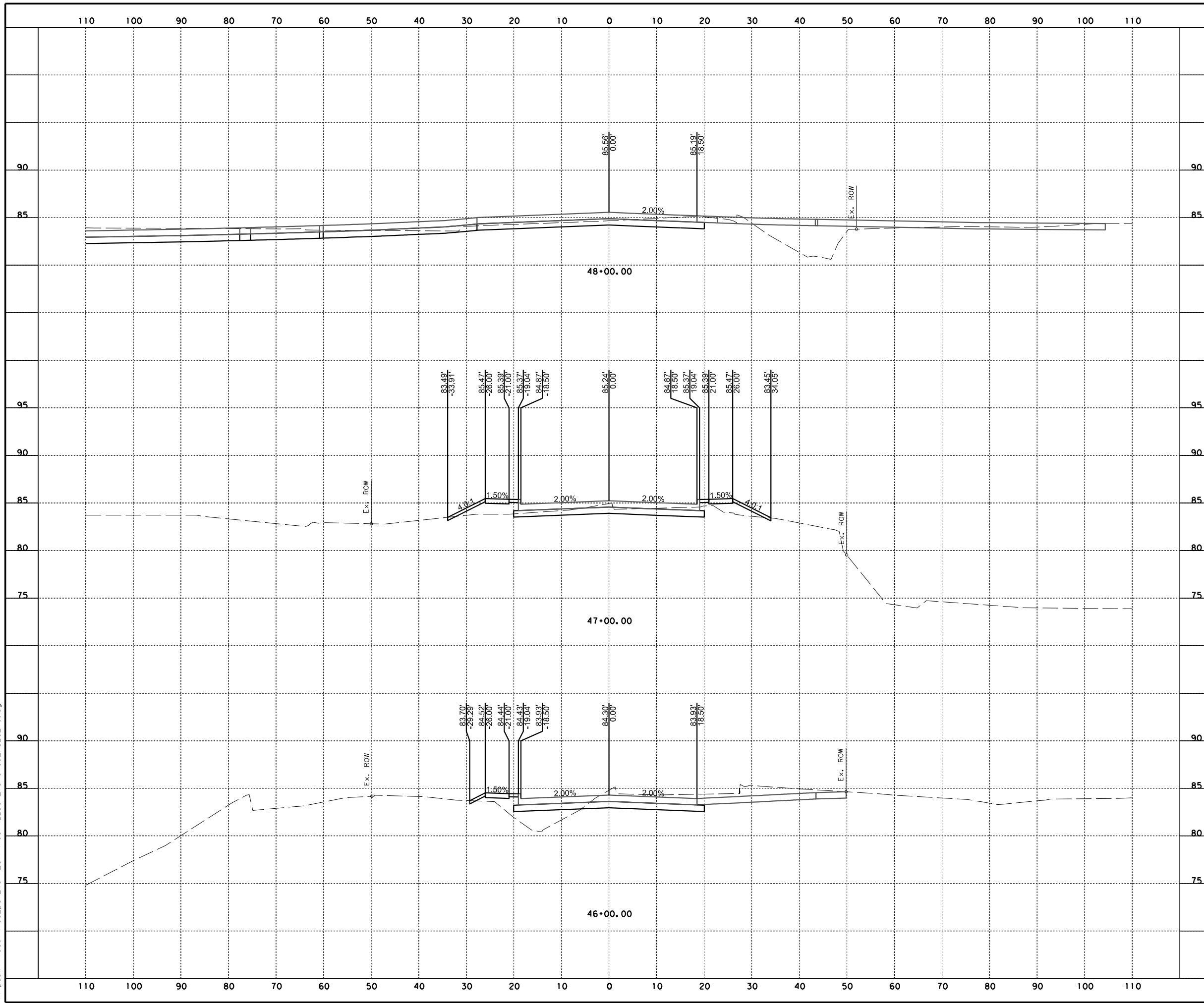
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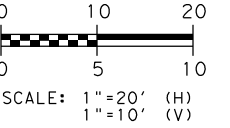
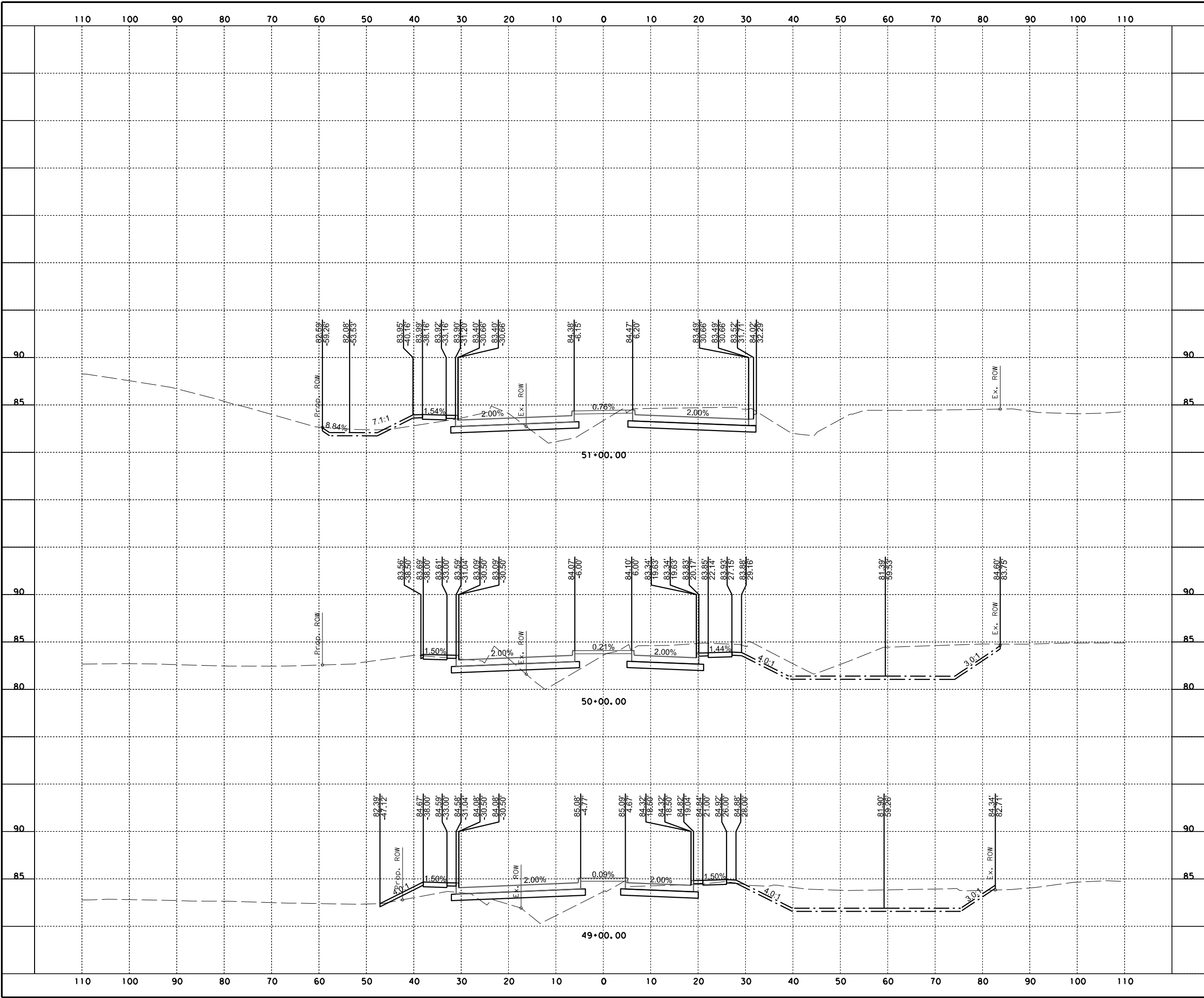
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W BELLFORT BLVD TO OAK BEND FOREST DR

CROSS SECTIONS

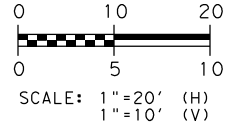
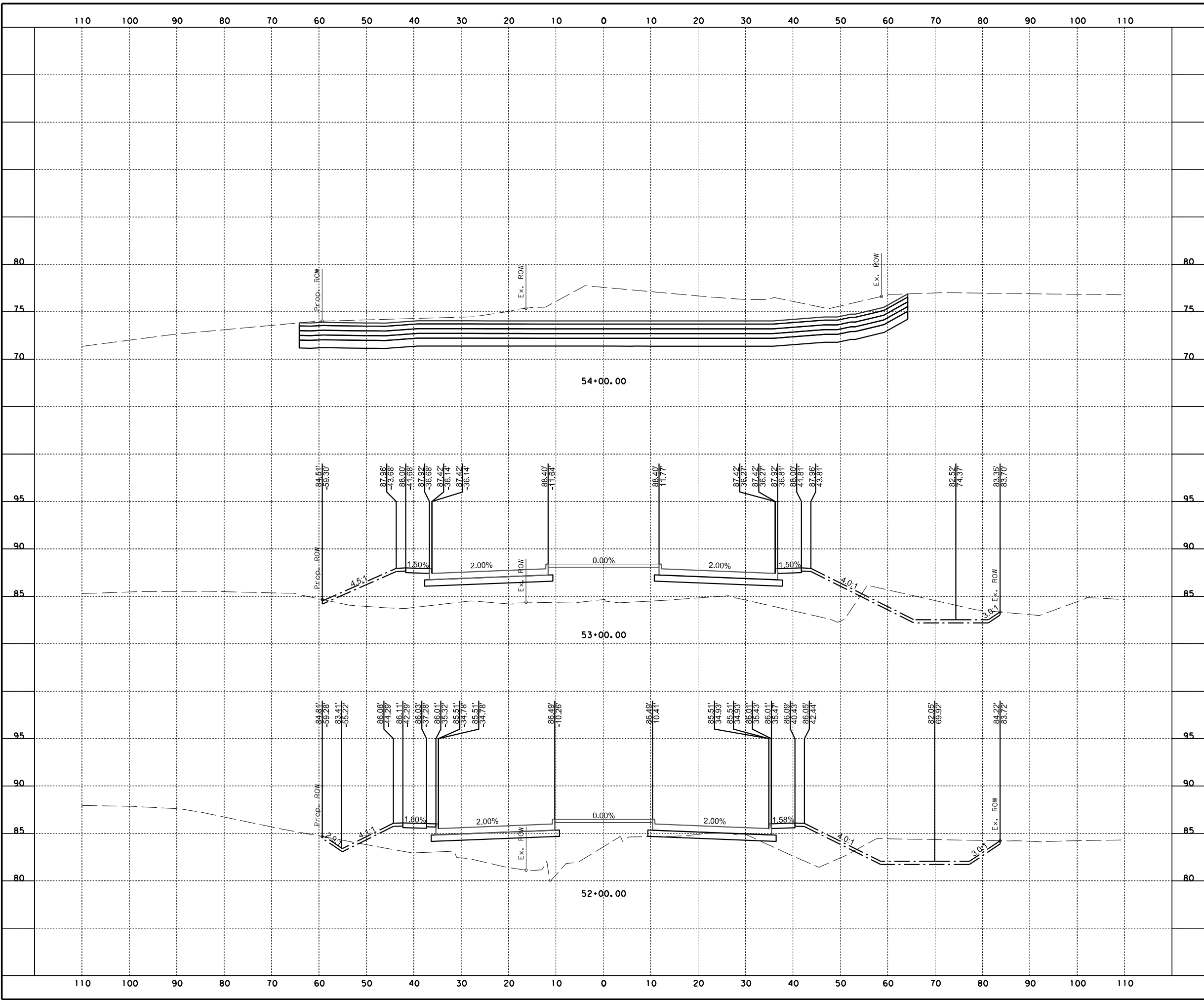
SHEET 11 OF 12

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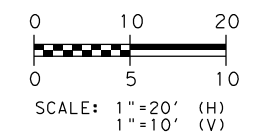
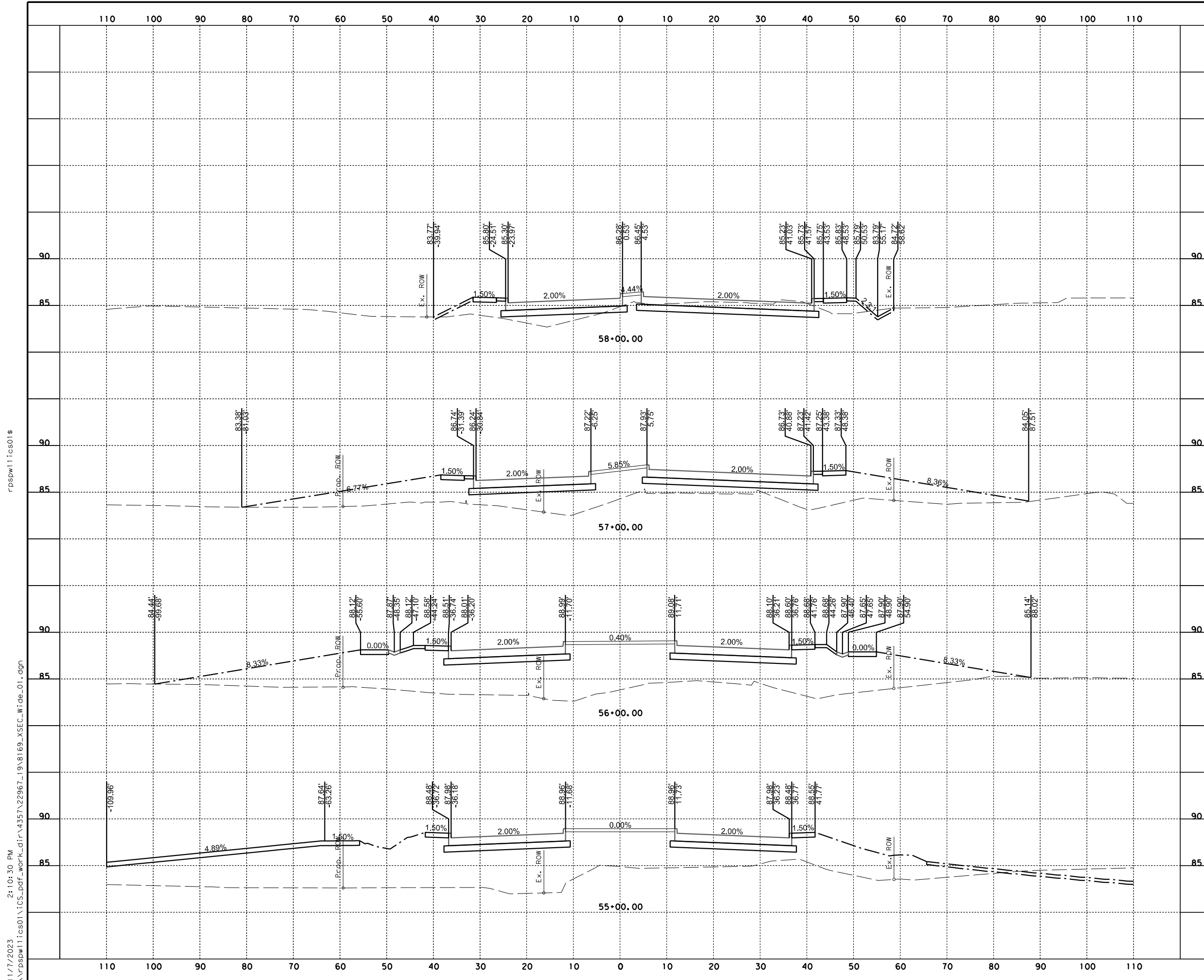
BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

CROSS SECTIONS

SHEET 12 OF 12

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Ronald J. Thomas
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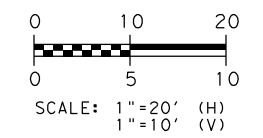
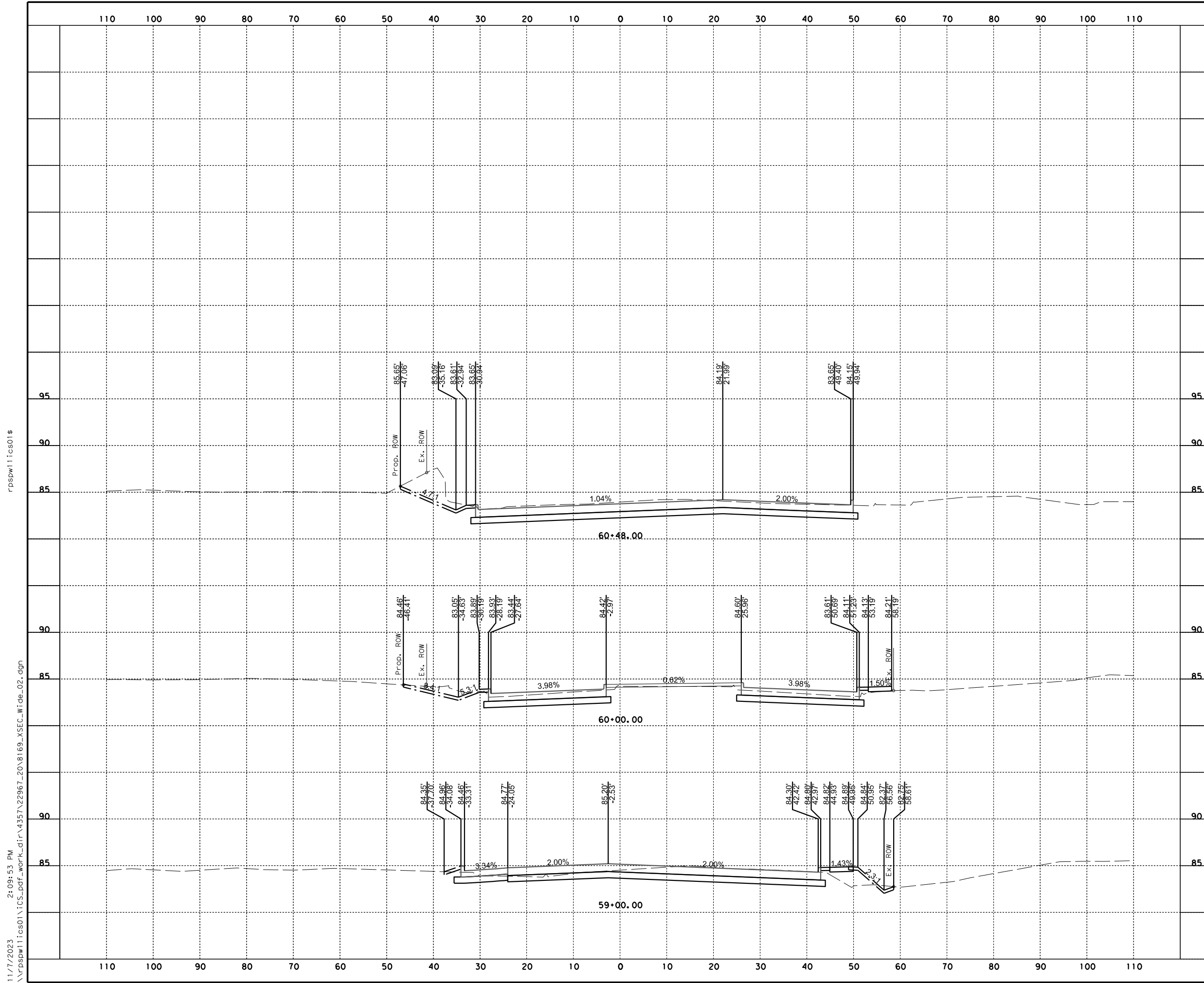
BELKNAP ROAD IMPROVEMENTS
W BELLFORT BLVD TO OAK BEND FOREST DR

CROSS SECTIONS
WIDE BUILD

CNTY PROJ *	RPS PROJ *	DATE	SCALE	SHEET NO
17-2-11	008169	2023		256
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W BELLFORT BLVD TO OAK BEND FOREST DR

CROSS SECTIONS
WIDE BUILD

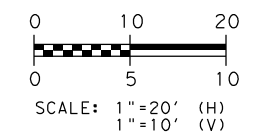
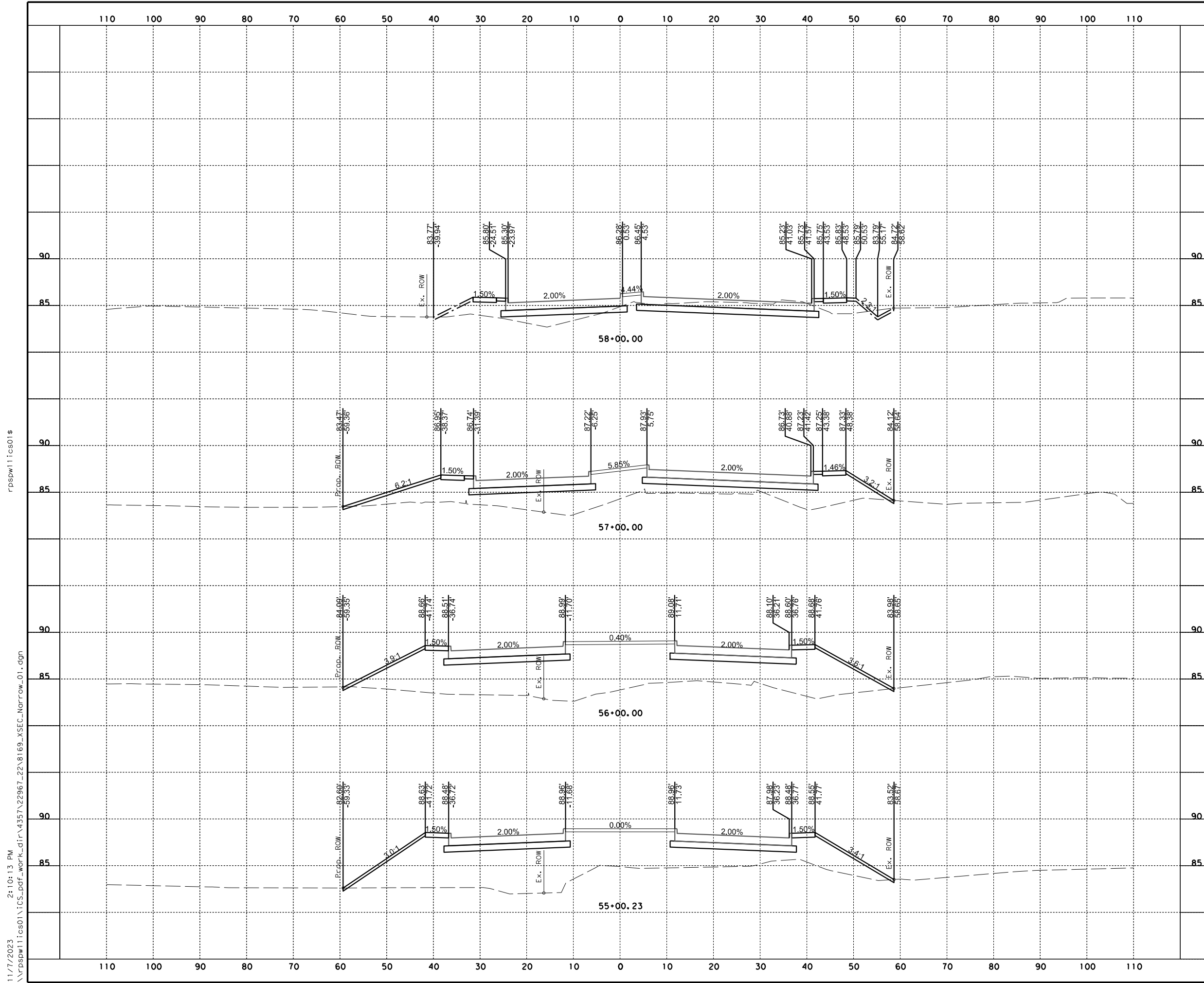
SHEET 2 OF 2

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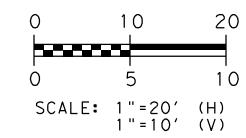
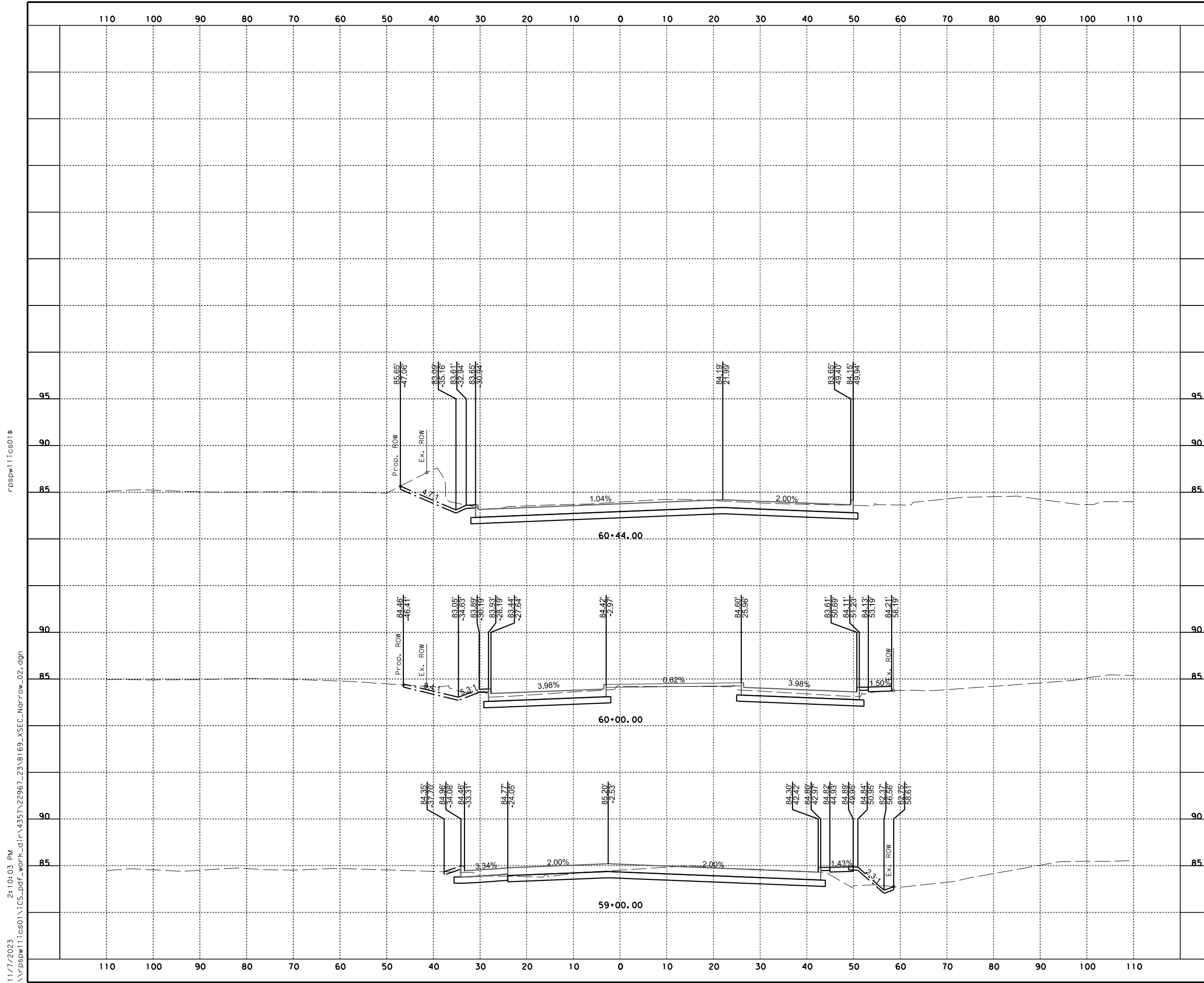
BELKNAP ROAD IMPROVEMENTS
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CROSS SECTIONS
NARROW BUILD

SHEET 1 OF 2

CNTY PROJ	RPS PROJ	DATE	SCALE	SHEET NO
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SHEET 2 OF 2

CNTY	PROJ	RPS PROJ	DATE	SCALE	SHEET NO
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