# Exhibit A - Bid Package Scope of Work

Bulk Cargo Dock Rail Improvements

*Port of Brownsville, Texas*
September 28, 2022

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# 1. General Requirements

The proposed upgrades to the site are broken into two different bid packages, Rail Work and Material Handling.

Bidders must provide acceptable qualifications and experience with their bids.

Bidders shall have the opportunity to bid on one or both bid packages. Owner reserves the right to award each bid package separately.

# 2. General Description of Scope of Work by Rail Contractor

The scope of Work includes the procurement and construction of new rail and rail drainage layout in coordination with the rest of the site upgrades at the West Plains LLC Port of Brownsville site in Port of Brownsville, TX as described in these specifications, reference drawings, and appendices.

The Contractor is responsible for the construction of rail and rail drainage engineering plans prepared by HDR and approve by OmniTRAX. These plans once approved will be delivered with approved specifications as an Issued for Construction (IFC) package.

At the completion of the project the Contractor shall provide to the Owner one (1) complete electronic set of as-built drawings in both Portable Document Format (.pdf) and AutoCAD (.dwg) format. The Owner's drawing numbering system shall be utilized on all Contractor drawings.

The Contractor shall furnish the entire scope of work in accordance with these specifications and all materials, equipment, and services required to complete the rail and rail drainage installation, except as noted in Section 1.2.

The Contractor shall assist the Owner in a timely manner to obtain permits required for rail or rail drainage installation. The Owner is responsible for permit costs. The Contractor is responsible for all support documentation, drawings, and professional seals/approvals required to obtain the permit. The Contractor and subcontractor(s) are responsible for their own construction licensing fees and any permits related to operating a construction business.

The contractor shall follow OmniTRAX Technical Specifications for Industrial Tracks.

Where guidelines for construction are not found in OmniTRAX Technical Specifications then the contractor shall follow American Railway Engineering and Maintenance-of-Way Association (AREMA) Manual for Railway Engineering.

The Contractor shall locate and mark all existing utilities and underground structures.

The Contractor shall furnish all construction equipment.

The Contractor shall supply all materials, including fasteners, associated with installing the Owner supplied equipment.

The Contractor shall be responsible for the excavation, installation, subgrade preparation, and backfill for proposed rail alignments. Excess excavated material shall be disposed of in an area designated by the Owner, but no more than 1 mile away from the site of the excavation. If the material excavated is unsuitable for use as backfill, the Contractor shall provide suitable material for use. The Owner will determine if the excavated material is suitable for backfill.

For the purpose of bidding, the Contractor shall assume a minimum 8 inches of subballast and 8 inches of ballast under tracks, conservative bearing pressure of 2,000 psf and that no special foundation treatments will be required.

The Contractor's Proposal shall provide a schedule for completion of the construction of the rail and rail drainage.

The Contractor shall provide the Owner with foundation designs, including calculations, 30 days prior to installation for review. Delays in site development due to delays in the Contractor's submittal of the foundation designs shall be the Contractor's responsibility.

# 3. Rail Work Bid Items

The following bid items are to be included in the proposal (Reference Exhibit B):

Rail Work Bid Item 1, Mobilization

Rail Work Bid Item 2, Demobilization

Rail Work Bid Item 3, Existing Track Removal

As shown in the concept plan the Existing Track Removal shall include the equipment and labor required to remove the existing track. Removal includes: rail, ties, Other Track Material (OTM), and ballast.

Rail Work Bid Item 4, Existing Turnout Removal

As shown in the concept plan the Existing Turnout Removal shall include the equipment and labor required to remove the existing turnout. Removal includes: rail, ties, OTM, and ballast.

Rail Work Bid Item 5, Existing Track Shift

As shown in the concept plan the Shift Track will include the equipment and labor required to shift the existing track over to the new alignment.

Rail Work Bid Item 6, Furnish and Install 115# Rail

The installation of rail shall include material required to construct the rail which includes: rail, ties, OTM, and ballast.

Rail

Rail shall be a minimum 115# defect-free American Railway Engineering and Maintenance-of-Way Association (AREMA) No. 1 relay or new. Industrial Quality Rail is acceptable. No rail shall be less than 15 feet in length (39 feet lengths preferred).

Ties

Ties shall be timber cross ties new, seven-inch x nine-inch x eight-foot-six-inch Industrial Grade specifications.

1. All timber crossties and timber switch ties shall be mixed hardwood timbers with minimum of selective end plating. All timber crossties and switch ties shall be creosote treated with a minimum creosote retention of 10 pounds per cubic foot.
2. Tie spacing shall be as per the Operating Railroad Specification but shall not exceed 21 inches.
3. Ties in curves exceeding Operating Railroad Specification maximum allowable curvature, or 12.5 degrees and above, shall be Grade ties, spaced at 18-inch centers.
4. Crossties shall be placed uniformly. Ties must be laid with hearth side down, square to the rails on tangent track and radially on curves.
5. Transition zones adjacent to grade crossing panels shall include a minimum of five ties matching the crossing switch tie length.
6. Transition zones adjacent to embedded track sections shall include a minimum of five switch ties of 10-foot length.

Other Track Material

OTM, including but not limited to track bolts, nuts, and lock washers shall be new and of the correct size to fit rail and joint bar properly.

1. Track spikes shall be new 5/8-inch x 6-inch or 5/8-inch x 6 ¼-inch installed per Operating Railroad Specifications. Spike shall be installed with a minimum of four spikes per tie in tangent track, and six spikes per tie in curved track, with extra two spikes installed on gage side of rail. Spikes shall not be driven against the ends of joint bars.
2. Tie plates shall be at least twice the length of the base of rail. Tie plates may be single shoulder, defect-free second hand, or new. All track to be fully plated and compatible with the rail section used. Double shouldered tie plates must be utilized in curves of greater than 10 degrees and box anchored in Continuously Welded Rail (CWR) track. All switch ties will be completely box anchored.
3. Rail anchors must be new drive-on type and shall be installed as per the Operating Railroad Specification requirements. At a minimum, every fourth tie shall be box anchored in jointed track, and every second tie shall be box anchored in CWR track. All switch ties will be completely box anchored. Rail anchors shall not be installed immediately adjacent to rail joints. A minimum of 20 ties shall be fully box anchored beyond the ends of any grade crossing panels or embedded track section.
4. Track in curves exceeding Operating Railroad Specification maximum allowable curvature, or 12.5 degrees and above, shall utilize Pandrol or equivalent premium elastic fasteners and screw spikes.

Ballast

Ballast shall be of an approved material, with physical characteristics and gradation in accordance with the OmniTRAX Specifications. If no Operating Railroad Specifications are available, AREMA 4a ballast shall be used.

1. In the interest of bidding the contractor shall assume an 8-inch minimum ballast depth from bottom of tie to top of subballast.
2. Geotechnical report will be provided by owner following completion of design and the contractor shall meet the ballast thickness recommendation from the report.

Rail Work Bid Item 7, Furnish and Install No. 8 Turnouts

1. Turnout geometry shall comply with Operating Railroad Specification requirements.

2. No. 8 turnout at a minimum is acceptable.
3. Turnout components shall generally follow the AREMA Manual or Operating Railroad Specifications as applicable.
4. All rail through turnouts shall be new, minimum 115#. Industrial Quality rail is acceptable except for the stock rails.
5. All turnout components shall be new and match the rail dimensions.
6. Switch points shall be double reinforced Samson switch points with adjustable braces. Stock rails shall be chamfered to match the Samson switch points.
7. Switch stands shall have an ergonomic handle-type switch stand with bi-directional target and post. Switch stand shall be new, and adjusted, lubricated, and operate smoothly, without excessive force required for operation.
    a. See plans for required “shortened” switch stands which have a length of 11’ from centerline of rail instead of the standard 16’.
8. Turnout frogs shall be Solid Manganese Self-Guarded (SMSG) with a minimum length appropriate for the size turnout per the AREMA Manual.
9. The switch ties shall be new Grade, 7-inch x 9-inch and shall conform to AREMA Manual specifications. Switch tie lengths and quantity shall be as appropriate for the specific size turnout and shall meet AREMA Manual standards.
10. The switch point slide plates shall be lubricated with a graphite based dry lubricant (EZ-Slide Graphite Based Coating or equivalent). Container must be shaken thoroughly before application. Dry lubricant shall be applied with a paint brush to all surfaces of the plates and stock rails that come into contact with the switch points, as well as the No. 1 rod where it comes into contact with the stock rail. Apply no less than three coats, allowing the lubricant to dry completely before the next application. Wet lubricants shall not be used on switches or derails.
11. Head rods shall have four holes for new transit clips. Turnouts shall include new adjustable slide plates, new adjustable braces, and new machined turnout plating (no hook twin plates).

Rail work Bid Item 8, Relocate No. 8 Turnouts

The Contractor Shall relocate and reinstall existing No. 8 turnouts for use with the revised rail layout. Installation shall conform with all the provisions listed for Bid Item 7.

Rail Work Bid Item 9, Furnish and Install Sliding Derail (w/ Crowder)

The Contractor shall furnish and install a Western Cullen Hays, Inc. sliding derail with crowder model HB, or approved equal. This bid item will cover all material equipment and labor to install the sliding derail (w/ crowder).

Rail Work Bid Item 10, Construct Earthen Bumpers

1. Earthen bumpers shall be provided at the ends of each stub end track in accordance with the locations defined in the concept design drawings. Earthen bumpers shall be trapezoidal in shape, fifteen feet (15') wide at the top of rail, and extend upwards, five feet (5') above the top of rail. Earthen bumpers shall be twenty feet (20') long, as measured at the top of rail, with the first five (5') feet covering the end of the track, and the remaining fifteen feet (15'), extending beyond the end of the track. Slopes shall be nominally one-to-one (1:1).
2. Prior to placing the earth, the rail, ties, and ballast shall be covered with filter fabric. Fabric shall not be torn or damaged during installation. Ballast shall not be fouled by the installation. The earth used for the bumper may be of any clean material and shall be lightly compacted on the surface to prevent erosion.

Rail Work Bid Item 11 and 11A, Furnish and Install Crossing Panels

Please provide alterative pricing for concrete or composite crossing for this line item and specify whether proposing concrete or composite.

1. Contractor shall meet the requirements for timber crossing panels per OmniTRAX guidelines.
2. This bid item will cover all material equipment and labor to furnish and install timber crossing panels.

Rail Work Bid Item 12, Furnish and Install Gravel Crossing

1. Contractor shall meet the requirements for gravel crossing per OmniTRAX guidelines.
2. This bid item will cover all material equipment and labor to furnish and install gravel crossing.

Rail Work Bid Item 13, Furnish and Install Asphalt Crossing

1. Contractor shall meet the requirements for asphalt crossing per OmniTRAX guidelines.
2. This bid item will cover all material equipment and labor to furnish and install asphalt crossing.

Rail Work Bid Item 14, Furnish and Install 8” PVC Perforated Underdrain

The Contractor shall furnish and install an 8” underdrain including perforated PVC drain pipe, granular fill, excavation, and geotextile barrier cloth in accordance with the rail design and any OmniTRAX requirements. This includes all material, equipment and labor to furnish and install 8” PVC Perforated Underdrain.

Rail Work Bid Item 15, Furnish and Install 6” PVC Perforated Underdrain

The Contractor shall furnish and install a 6” underdrain including perforated PVC drain pipe, granular fill, excavation, and geotextile barrier cloth in accordance with the rail design and any OmniTRAX requirements. This includes all material, equipment and labor to furnish and install 6” PVC Perforated Underdrain.

Rail Work Bid Item 16, Furnish and Install 18” RCP Culvert Extension

1. Contractor shall install culvert extension as called out in the final IFC plans once designed. Pipes shall be installed with reinforced concrete pipe (RCP) class V concrete.
2. This bid item will cover all material equipment and labor to furnish and install culvert extension, including excavation and bedding requirements.

Rail Work Bid Item 17, Furnish and Install 12” RCP Culvert Extension

1. Contractor shall install culvert extension as called out in the final IFC plans once designed. Pipes shall be installed with reinforced concrete pipe (RCP) class V concrete.
2. This bid item will cover all material equipment and labor to furnish and install culvert extension, including excavation and bedding requirements.

Rail Work Bid Item 18, Earthwork

1. Contractor shall provide earthwork for the rail installation project in accordance to the rail design sections shown.

2. Contractor shall follow the subgrade preparation as outlined by the geotechnical report and OmniTRAX requirements.
3. For the purposes of bidding the contractor can assume the listed volume of cut material shown on the bid form.
4. This bid item will include subgrade preparation and required by the Geotechnical report. For bidding purposes contractor shall assume at least 3’ of limestone mixture into subgrade as part of this bid item.
    a. The overall square footage of rail grading is approximately 12,500 CY to be used for subgrade preparation considerations of cost.
5. This bid item will cover all material equipment and labor to construct required earthwork.

Topsoil and Seeding

All disturbed areas not considered part of a roadway or traffic area shall be covered with a minimum of 4 inches of topsoil and seeded with a ryegrass/Bermuda seed mix. Areas prone to erosion shall be protected by erosion control blankets, filter socks, netting, mulch, or other Owner approved method.

Rail Work Bid Item 19, Subballast

Subballast shall meet the guidelines of the Operating Railroad Specifications. Contractor shall coordinate with project geotechnical engineer for recommended subballast and ballast section thicknesses.

1. In the interest of bidding the contractor shall assume a 24-inch minimum subballast depth from bottom of tie to top of subballast.
2. Geotechnical report will be provided by Owner following completion of design and the Contractor shall meet the ballast thickness recommendation from the report.

Rail Work Bid Item 20, Furnish and Install Concrete Embedded Track (near pit)

1. Owner requests that in lieu of standard ballasted track section the Contractor shall construct concrete embedded track sections for approximately ten feet (10’) of track as it approaches the existing unloading pit, on both sides of the pit for a total of twenty feet (20’)
2. Design for this section of rail will be provided as part of the IFC drawings. For bidding purposes an example section of concrete embedded track has been shown.

3. This bid item will cover all material equipment and labor to construct the concrete embedded track section.
4. Rail Pits

   Contractor shall coordinate with Rail Contractor to ensure that drainage to the east and west leading away from the rail pits is not impeded. Previous efforts by the Owner to deepen a drainage channel along Track A east of the rail pit should be expanded to ensure water is drained away from the rail pit area.

Rail Work Bid Item 21, Furnish and Install Transition Rails

The Contractor shall furnish and install transition rails in accordance with the rail design and any OmniTRAX requirements.

Additive Bid Item 22, Install Rail Air Piping and Dedicated Rail Compressor

Bid Item 22 – Contractor to provide, as an option, a dedicated rail compressor and trackside air distribution system for the purposes of airing up empty railcars in preparation for assembly back into unit train lengths. Contractor shall bid this as a separate line item that can be removed from the scope, if not required by Owner.

Rail Air Compressor

1. Air compressor shall be a packaged unit with a minimum flow capacity of 22 cubic feet per minute (CFM) at 125 pounds per square inch (psi) pressure. Piston or scroll compressors are allowed. Packaged unit shall consist of the following:
2. Oil/Water Separator
3. Wet Air Storage Tank – 80 gallons or greater with automatic condensate drain
4. Heatless Desiccant Dryer capable of producing -40 deg F dew point air at the flow rate of compressor or greater
5. Filtration - Particulate and oil aerosol filtration as recommended by the manufacturer
6. Dry Air Storage Tank – 200 gallons or greater with inlet check valve
7. Air compressor, tanks, and equipment shall be skid-mounted or housed in a minimum 8-foot-long shipping container/conex or other Owner approved enclosure. Skid or enclosure shall be supported on concrete foundations and condensate drains shall be routed to a drainage feature and are not allowed to discharge adjacent to roadways without side drainage ditches.

Rail Piping

Rail air distribution piping shall be run below grade and available at the western switch end of each ladder Track I, H, G, and F. A pair of tracks may share a valve/riser. A threaded riser consisting of 2-inch or greater Schedule 40 A53 Grade B pipe shall extend above grade with a 90-degree street ell, ball valve, and 1-inch air hose with a universal twist lock coupler, or Owner approved alternative. Riser assembly total height shall at top of rail elevation or below and have an apron of concrete around the riser piping where it emerges from below grade. Riser shall be painted safety yellow or other bright color.

Installation of rail piping shall be coordinated with Rail Contractor.

# 4. Project Schedule

Unless stated otherwise, all submittals are due before 5:00 pm Central Time on the date indicated.

Rail Work

**Table 1 – Rail Work Schedule**

| Event | Date |
|---|---|
| Design-Bid-Build Bid Package – Issued for Bid (IFB) | September 22, 2022 |
| Mandatory Virtual Pre-bid Web Meeting (10:30AM CDT) | October 5, 2022 |
| Onsite visit for Rail Contractors (Optional) | October 7, 2022 |
| Contractor Bids Due | October 25, 2022 |
| BND/ West Plains Review of Bids | October 26 – November 27, 2022 |
| Contractor Notice to Proceed | December 2, 2022 |
| Site Available for Contractor Mobilization | February 1, 2023 |
| Existing Rail Removed and Ready for New Work | March 3, 2023 |
| Drainage and Rail Grading Complete | March 20, 2023 |
| Track Work Complete | May 3, 2023 |
| Commission Track and Demonstrate Capacity | May 16, 2023 |
| Punch List Completion and Contractor Demobilization | June 12, 2023 |

The Owner requests an efficient project schedule that provides the lowest cost while allowing reasonable time for engineering review, manufacture/delivery of the Facility equipment and components, high quality construction, and thorough facility check-out and start-up.

The Contractor shall submit a project schedule clearly indicating the Critical Path with the initial bid proposal. This project schedule shall show the major items of work, the time to complete each item, and the overall project completion date. Please note that the completion date is given considerable importance in awarding this Contract. The Contract will be awarded on the basis of low bid/best value and the Contractor's ability to meet the schedule. The Owner reserves the right to reject any and all bids.

All Rail Scope of Work is to be completed by May 11, 2023.

All Material Handling Scope of Work is to be completed by July 16, 2024.

LIQUIDATED DAMAGES: If the Contractor does not complete the Work by the listed completion date, the Contractor must pay Owner liquidated damages of $5,000 per calendar day per segment until all Work as outlined in this Bid Package is 100% complete.

# 5. Performance and Materials Testing

The following Performance Testing process shall be completed on or before the dates listed in section 4:

All work except minor, non-operational punch list items are complete.

The Owner will ensure that rail cars required for testing will be available. Contractor is to notify Owner 45 days in Advance of anticipated testing date so that any required rail cars can be on-hand for commissioning.

The Contractor will ensure that appropriate personnel are available on-site during testing to perform corrective action if required.

The Owner will engage a third-party testing laboratory to perform any soil density testing required, as well as slump, air and cylinder testing for ready-mix concrete. The Owner will supply the Contractor with copies of the test results.

The Contractor shall be responsible for all other construction material testing and certification. For example, the Contractor shall supply all mill certs & analysis for structural and reinforcing steel.

If material testing identifies material failing to meet minimum standards, the Contractor shall remove or correct the material to the satisfaction of the Owner.

# 6. Contractor's Performance Guarantee and Warranty

This Contract is of "make-good" intent, such that in the event the Plant or any of its components do not meet the requirements of the specification, the Contractor shall furnish any design, materials, equipment, and labor

required to modify the system or component at their expense as necessary to meet the specifications and guarantees.

One-year full parts and labor warranty (including in/out costs) for equipment and material furnished and installed by the Contractor shall be provided.

One-year field workmanship warranty (including in/out costs) for equipment and materials furnished by the Owner and installed by the Contractor shall be provided.

The warranty period begins upon the successful completion of the performance testing as outlined in Section 14 Testing and Start-Up.

# 7. Project Administration

Time is of the essence in the performance of this work. Much importance is placed on the timely completion of this work; therefore, the Owner reserves the right to award this Contract to someone other than the low bidder. If the dates stated in Section 8 are unattainable in your construction plan, your proposal should note your anticipated date of completion, along with the critical milestones identified in the plans, specifications, and bid forms.

The Owner's Project Manager or Site Representative will hold weekly progress meetings with the Contractor at the job site.

Prior to and during start-up and testing, the Contractor shall submit a daily schedule for each start-up, testing, or modification activity planned for the following day, by 3:00 pm.

All shipments shall be addressed to the Contractor at the site location. No materials shall be received, unloaded, or stored by the Owner unless agreed in advance. Contractor shall notify the Owner prior to shipping all equipment from supplier so that the Owner or Owner's Field Engineer can inspect the item.

The Contractor shall update project schedule on a timely basis. In particular, the Contractor shall submit an updated schedule within 1 week of submittal for a monthly progress payment. If the Contractor fails to comply with this request, the Owner may delay the monthly estimate payment until the updated schedule is received.

If it becomes necessary to amend the Contract or Scope of Work to satisfactorily complete this project, the Owner shall have right to add work to the Contractor's Scope or to hire a subcontractor to perform the work. Such amendment will not necessarily constitute extra work when the amendment serves to clarify or further delineate the work involved.

All amendments that materially change the Project Scope or amount of work to be done by the Contractor are to be performed only upon the execution of a written Change Order. Any additional work performed without a signed Change Order is done at the Contractor's risk. Unless the parties have agreed otherwise in writing, the Contractor agrees to do the work as directed by the Owner in the Change Orders at the unit rates for additional work included with the Contractor's original proposal.

The Owner retains the right to do any part of the Contract or any Change Order with its own forces or other contractors brought on to the site. If the Owner performs work included in the Project Scope, the Contract price shall be adjusted accordingly.

Without limiting Contractor's general environmental duties at the site, the Contractor shall control dust throughout the life of the project within the project area and other areas affected by the construction of the Plant.

All remedies set forth in this Exhibit A are in addition to any and all remedies available to Owner in the Contract, at law, or in equity.

A complete set of electronic As-built drawings are to be provided by the Contractor at project completion. The Owner will pay retainage only after receipt of the as-built drawings, and substantial completion of all required work per final drawing and specifications including performance testing.

## 8. Quality Assurance

Next to the Contractor's performance in providing safety of personnel and property, the ability of the Contractor to control the quality of the Work is a key factor in the award for this project as well as future invitations to bid.

The Contractor shall provide evidence that it has a Quality Control and Assurance Program and that it is in continuous operation. Evidence shall also be provided for significant subcontractors and vendors. Proposals will be evaluated taking into consideration evidence provided and the Owner's evaluation of the Contractor's focus on quality. Proposals without such evidence may be rejected.

The Owner reserves the right to make unannounced visits to the Contractor or subcontractor's facilities for the purpose of confirming that the program described in the proposal is being implemented. Access to all non-confidential records related to the Work shall be provided.

The program shall cover, as a minimum, engineering, design, procurement, storage, fabrication, assembly, and installation processes and shall be in written form.

It is expected that the Contractor shall employ a project manager with specific and sole responsibility for this Project. It is further expected that the Owner will deal directly with this representative for any and all issues relating to this Project.

# 9. Site-Specific Design Criteria

## General

### Items Subject to Buy American Act

Per 41 U.S. Code § 8302 - American materials required for public use, only unmanufactured articles, materials, and supplies that have been mined or produced in the United States, and only manufactured articles, materials, and supplies that have been manufactured in the United States substantially all from articles, materials, or supplies mined, produced, or manufactured in the United States, shall be acquired for use in this project unless the head of the US Department of Transportation Maritime Administration (MARAD) determines their acquisition to be inconsistent with the public interest, their cost to be unreasonable, or that the articles, materials, or supplies of the class or kind to be used, or the articles, materials, or supplies from which they are manufactured, are not mined, produced, or manufactured in the United States in sufficient and reasonably available commercial quantities and of a satisfactory quality.

### Prevailing Wages and Davis-Bacon Act

The Davis-Bacon and Related Acts apply to contractors and subcontractors performing on federally funded or assisted contracts, in excess of $2,000 for the construction, alteration, or repair (including painting and decorating) of public buildings or public works. Davis-Bacon Act and Related Act contractors and subcontractors must pay their laborers and mechanics employed under the contract no less than the locally prevailing wages and fringe benefits for corresponding work on similar projects in the area.

Rail Work

The Contractor shall reference and adhere to OmniTRAX Rail Specifications and AREMA “Exhibit A” specifications for materials, construction and quality requirements.

# 10. Construction Facilities and Procedures

The Contractor shall have a Construction Manager at the job site. This person shall be approved by and acceptable to the Owner.

The Electrical Contractor shall be licensed as such by the State of Texas.

The Contractor shall maintain at the site, a full set of drawings, specifications, and other technical data to which the Owner’s personnel has full and open access.

The Contractor will furnish temporary offices for its personnel.

Contractor’s employees are required to park in designated areas provided by the Owner.

Contractor will provide and maintain site perimeter fencing as necessary.

Construction personnel and their vehicles shall be subject to search by security personnel at their discretion.

All Contractor personnel shall have contractor identification clearly visible at all times. (Hardhat decals or ID badges).

Contractor shall provide own telephone and other site communications services and pay all costs associated therewith.

Temporary lights required by law or ordinance or necessary for protection of the public and workers or for execution and inspection of the Work shall be furnished, installed, and maintained by Contractor.

Contractor shall furnish water as required for the execution of this project. This shall include providing sanitary drinking water facilities for his employees including coolers, ice, disposable cups, and waste containers at each cooler.

Contractor shall furnish and maintain sanitary facilities for his personnel. Construction personnel will not be permitted to use the permanent plant toilet and washroom facilities.

Contractor will be required to have a random drug-testing program in place for all their employees and subcontract employees.

Contractor shall provide compressed air required for the Work.

Contractor shall provide for its first aid requirements.

Contractor shall promptly receive, unload, and place into storage all equipment, materials, and supplies for the Work, pay any and all demurrage, and maintain an inventory and record of location for all equipment and materials.

Contractor-furnished indoor storage shall consist of suitable construction trailers or equal. All materials stored on ground shall be supported on cribbing at least 6 inch off the ground surface.

Project is at an active grain terminal site with multiple contractors potentially performing work in overlapping areas and timeframes. To ensure safe movement of mobile equipment, all Contractors' mobile equipment shall be equipped with a placard to identify the Contractor responsible for the equipment. Contractor owned or leased vehicles will only be used on site. No private vehicles will be allowed past the designated parking area unless approved by Owner.

# 11. Construction Materials

Concrete

Concrete work shall comply with the recommendations of ACI 301 and ACI 318-11, unless otherwise specified.

Cement shall conform to ASTM C150 Type I or II cements.

Concrete aggregates shall conform to the requirements of ASTM C33.

Admixtures for concrete shall be in accordance with the manufacturer recommendations and shall conform to the requirements of ASTM C 494.

Mix water for concrete shall be clean, fresh, and potable.

Precast and cast-in-place concrete shall be afforded corrosion protection measures through the use of concrete admixtures, such as fly ash, calcium nitrite, or other approved methods as specified.

Cast-in-place concrete strength (*f'c*) shall be 5,000 psi minimum at 28 days.

Precast, non-pre-stressed concrete strength (*f'c*) shall be 5,000 psi minimum at 28 days.

Grout shall be non-metallic and non-shrink, with a minimum strength of 8,000 psi at 28 days, unless otherwise specified.

Minimum concrete cover over reinforcing bars shall be 3 inches, unless otherwise noted.

Chamfer all exposed external corners of concrete with 45-degree chamfers unless otherwise noted (chamfers shall be 3/4 inch, unless specified otherwise).

Construction joints between cast-in-place concrete shall be clean with a roughened surface of 0.25-inch amplitude and be bonded with epoxy bonding agent.

The following shall apply to all Reinforcing Steel:

Detailing, fabrication, and erection of reinforcing steel shall conform to the ACI Detailing Manual, ACI SP-66.

Reinforcing steel for cast-in-place and precast, non-prestressed concrete shall conform to ASTM A615 and ASTM A706 as applicable and will be uncoated unless noted on drawings.

Lifting inserts shall be provided in all precast members to facilitate lifting and supporting members during erection (additional reinforcing steel shall

be provided as necessary to prevent cracking during handling, delivery, and erection).

All reinforcing bar splices shall be Class “B” tension lap splices in accordance with ACI 318 Chapter 12, unless otherwise noted.

### Structural Steel

Steel work shall be performed in accordance with ANSI/AISC 360-05, “Specification for Structural Steel Buildings”, American Institute of Steel Construction, Steel construction Manual.

Welding shall conform to the requirements of ANSI/AWS D1.1.

Structural Steel shall be hot dipped galvanized and shall conform to the requirements of ASTM A123 / A123M “Zinc Coatings on Iron and Steel Products”.

Anchor bolts shall be galvanized and conform to the requirements of ASTM F1554, unless otherwise noted.

Structural bolts shall conform to ASTM A325.

## 12. Safety Procedures

### Contractor Requirements

All contractors and subcontractors must follow all OSHA regulations while on the Owner’s property.

1. Hardhats, safety glasses, safety toe boots, and high-visibility clothing must be worn at all times, with no exceptions.
2. All personnel onsite shall adhere to Owner’s Basic Safety Rules as presented in Attachment 1.
3. The Contractor shall adhere to all site-specific safety policies as presented in Attachment 3.
4. All personnel onsite shall participate in a “stand down” meeting to discuss and reinforce lock-out/tag-out procedures prior to any equipment being energized.
5. The following actions will result in immediate and permanent removal from the site:
6. Violation of Lock-out/Tag-out policies per Appendix G - West Plains Safety Requirements.

7. Violation of Fall Protection policies per Appendix G - West Plains Safety Requirements.

Emergency Contacts

In the event of a medical emergency, the Contractor shall immediately notify the Owner's onsite contact(s) listed below:

Blake Ducote – (225) 439-8173

The local West Plains safety contact is: Blake Ducote – (225) 439-8173

Port of Brownsville Harbor Master Office (Port Police) Dispatch – (956) 831-8256

The nearest hospital to the Jobsite is:

Valley Regional Medical Center

100 E. Alton Goor Blvd.

Brownsville, Texas 78526

(965)-350-7000

# 13. Design Codes and References

The equipment and related work supplied shall be in accordance with the applicable codes, standards and reference specifications listed in this specification. If two or more standards provide conflicting information, the most stringent shall apply or the Supplier shall obtain clarification for the Owner before proceeding with the work.

Design Codes

The Supplier's work shall comply with all applicable federal, state, and municipal codes and regulations.

- *ASTM American Society for Testing and Materials*
  - A1023 / A1023M Stranded Carbon Steel Wire Ropes for General Purpose
  - A123 / A123M Zinc Coatings on Iron and Steel Products
  - A307 Standard Specification for Structural Bolts and Studs
  - F3125 Standard Specification for Structural Bolts
  - A529 / A529M High-Strength Carbon-Manganese Steel of Structural Quality
  - A53 Standard Specification for Pipe, Steel, Black and Hot Dipped

- *ASME* *American Society of Mechanical Engineers*
  - B20.1 Safety Standard for Conveyors and Related Equipment
  - B31.3 Process Piping
- *AWS* *American Welding Society*
  - A5.C Arc Welding Electrodes and Fluxes
  - D1.1 Structural Welding – Steel
- *NFPA* *National Fire Protection Association*
  - 70 National Electric Code (NEC)
  - 70E Standard for Electrical Safety in the Workplace.
- *OSHA* *Occupational Safety and Health Administration*
- *SAE* *Society of Automotive Engineers*
- *SSPC* *Steel Structures Painting Council – Painting Manual Standards Vol. I & II*
- *UL* *Underwriters Laboratories*

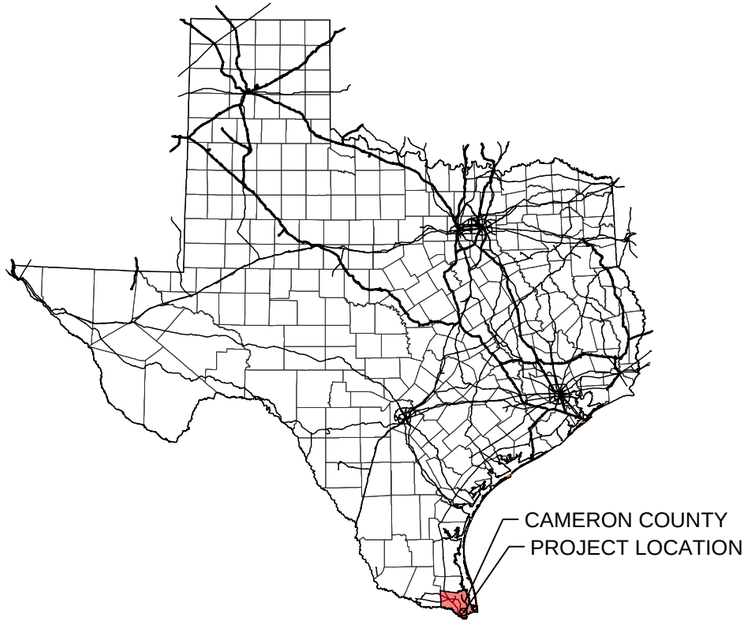
# Appendix A

# 60% Design Drawings - Rail

# BROWNSVILLE, CAMERON COUNTY, TX
# PORT OF BROWNSVILLE
# WEST PLAINS RAIL PLANS

## 60% REVIEW SET

## 22ND SEPTEMBER 2022




**STATE OF TEXAS**


**VICINITY MAP**

## SHEET INDEX



PE STAMP



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TEXAS P.E FIRM REGISTRATION NO. F-754

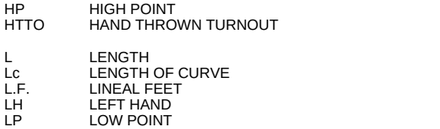
BROWNSVILLE, CAMERON COUNTY, TX
PORT OF BROWNSVILLE
WEST PLAINS RAIL PLANS

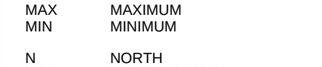
COVER SHEET

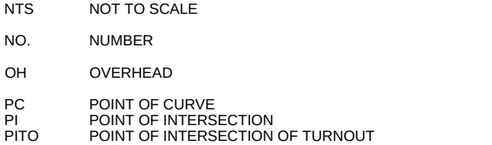
SCALE: NTS

# ABBREVIATIONS

| | |
|---|---|
| C-C | CENTER TO CENTER |
| CL | CENTER LINE |
| CL PT | CLEAR POINT |
| CONC | CONCRETE |
| CTRS | CENTERS |
| D, | DEGREE (S) |
| DIA. | DIAMETER |
| DSPD | DOUBLE SWITCH POINT DERAIL |
| EL | ELEVATION |
| EOT | END OF TRACK |
| EXIST. EX | EXISTING |
| ' | FOOT, FEET OR MINUTE (S) |
| " | INCH, INCHES OR SECOND (S) |
| HP | HIGH POINT |
| HTTO | HAND THROWN TURNOUT |
| L | LENGTH |
| Lc | LENGTH OF CURVE |
| L.F. | LINEAL FEET |
| LH | LEFT HAND |
| LP | LOW POINT |
| MAX | MAXIMUM |
| MIN | MINIMUM |
| N | NORTH |
| NTS | NOT TO SCALE |
| NO. | NUMBER |
| OH | OVERHEAD |
| PC | POINT OF CURVE |
| PI | POINT OF INTERSECTION |
| PITO | POINT OF INTERSECTION OF TURNOUT |
| P/L | PROPERTY LINE |
| PT | POINT OF TANGENT |
| PROP. | PROPOSED |
| PTSW | POINT OF SWITCH |
| R | RADIUS |
| RH | RIGHT HAND |
| RR | RAILROAD |
| R/W | RIGHT OF WAY |
| STA | STATION |
| T | TANGENT |
| TC | TRACK CENTERS |
| TF | TRACK FEET |
| TO | TURNOUT |
| T/R | TOP OF RAIL |
| TRK | TRACK |
| TYP | TYPICAL |
| VPC | POINT OF VERTICAL CURVE |
| VPI | POINT OF VERTICAL INTERSECTION |
| VPT | POINT OF VERTICAL TANGENT |
| X-ING | CROSSING |




# LEGEND

## UTILITIES

OVERHEAD POWER LINE

POLES AND GUY WIRES

CULVERT

WATER APPURTENANCES

PROPOSED CULVERT

PROPOSED DITCH/FLOW LINE

PROPOSED TRACK UNDERDRAIN

## TRACK

EXISTING TRACKS

REMOVE TRACK

RAISE AND SHIFT TRACK

PROPOSED TRACK

TURNOUT

EARTHEN BUMPER

SLIDING DERAIL WITH WHEEL CROWDER

EXISTING PIT

EMBEDDED TRACK

GRAVEL TRACK CROSSING

TIMBER TRACK CROSSING

ASPHALT TRACK CROSSING

## MISC

EXISTING SIGNS

EXISTING BUILDINGS AND SILOS

## PROPERTY

EXISTING PROPERT LINE

FLOOD LINES

## RAILWAY CONTACTS

BRG GENERAL MANAGER
XXX

BRG ROADMASTER
XXX

## SURVEY NOTES

ALL BEARING AND DISTANCES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH ZONE 4205, NORTH AMERICAN DATUM 1983, BASED ON GLOBAL POSITIONING SYSTEM (G.P.S.) METHODS;

# GENERAL NOTES

1. GENERAL NOTES APPLY TO ALL SHEETS EXCEPT WHERE MORE SPECIFIC REQUIREMENTS ARE PROVIDED ON INDIVIDUAL SHEETS.
2. PROJECT DRAWINGS, SPECIFICATIONS, GENERAL CONDITIONS, CONTRACT(S) AND OTHER DOCUMENTS ISSUED AS PART OF THIS PROJECT REPRESENT THE COMPLETE PROJECT REQUIREMENTS. CONTRACTOR SHALL COMPLY WITH THE REQUIREMENTS OF THE COMPLETE SET OF DOCUMENTS. THE REQUIREMENTS OF INDIVIDUAL PROJECT DOCUMENTS DO NOT REPRESENT THE COMPLETE PROJECT REQUIREMENTS AND SHALL NOT BE APPLIED INDEPENDENTLY.
3. CONTRACTOR SHALL MAINTAIN CONTROL OF EQUIPMENT, PERSONNEL, MATERIALS AND DEBRIS WITHIN THE CONSTRUCTION LIMITS OF THE PROJECT, PREVENT DISTURBANCE OF ANY AREA OUTSIDE OF THE CONSTRUCTION LIMITS, AND PREVENT THE TRACKING OF MUD, WEEDS AND DEBRIS TO OTHER AREAS AND ON PUBLIC ROADS, TO THE SATISFACTION OF THE WEST PLAINS (OWNER) AND RAILROAD, THROUGHOUT PERFORMANCE OF THE WORK.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFICATION OF ALL EXISTING ITEMS WITHIN OR ADJACENT TO THE WORK OR THAT THE ITEMS CURRENT CONDITION MAY BE DISTURBED BY THE WORK. IF NECESSARY, CONTRACTOR SHALL SEEK WRITTEN CLARIFICATION FROM OWNER AND RAILROAD.
5. CONTRACTORS SHALL NOTIFY THE TEXAS ONE CALL 48 HOURS PRIOR TO ANY EXCAVATION. THE ONE-CALL NOTES AND AUTHORIZATION SHALL BE KEPT AT THE JOB SITE.
6. NO WORK WHATSOEVER SHALL COMMENCE WITHOUT FIRST NOTIFYING OWNER AND RAILROAD A MINIMUM OF FIVE (5) WORKING DAYS IN ADVANCE.
7. RAIL CONTRACTOR SHALL COORDINATE ALL ON-SITE ACTIVITIES: CONSTRUCTION; STAGING; ACCESS; DELIVERIES; FIELD OFFICE; ETC., WITH SITE CONTRACTOR CONSTRUCTION DOCUMENTS (FACILITY) AND CONSTRUCTION CONTRACTOR.
8. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE FEDERAL, STATE, COUNTY AND CITY LAWS AND ORDINANCES AS WELL AS REGULATIONS OF THE DEPARTMENT OF INDUSTRIAL RELATIONS, OSHA, NPDES AND INDUSTRIAL ACCIDENT COMMISSION RELATED TO SAFETY AND CHARACTER OF THE WORK, EQUIPMENT AND LABOR PERSONNEL.
9. PROTECT IN PLACE (BY ANY MEANS NECESSARY) ALL EXISTING, CONSTRUCTED AND UNDER CONSTRUCTION SURFACING, STRUCTURES, UTILITIES, DRAINAGE, GRADING, ETC. RAIL CONTRACTOR SHALL BE RESPONSIBLE FOR THE COMPLETE REPAIR AT THEIR OWN EXPENSE FOR ANY DAMAGE CAUSED DIRECTLY OR INDIRECTLY BY THE RAIL CONTRACTOR TO EXISTING, CONSTRUCTED AND UNDER CONSTRUCTION SURFACING, STRUCTURES, UTILITIES, DRAINAGE, GRADING, ETC.
10. RAIL CONTRACTOR SHALL COORDINATE ANY WORK ACTIVITY WITHIN THE BRG RIGHT-OF-WAY WITH RAILROAD A MINIMUM OF TEN (10) WORKING DAYS PRIOR TO ENTERING THE RIGHT-OF-WAY.
11. RAIL CONTRACTOR SHALL COORDINATE WORK WHICH AFFECTS ADJACENT PROPERTY OWNERS AND WEST PLAINS SITE CONTRACTOR WORK THROUGH RAILROAD. ANY QUESTIONS OR AGREEMENTS BETWEEN RAIL CONTRACTOR AND ADJACENT PROPERTY OWNERS OR FACILITY CONTRACTOR SHALL BE MADE IN WRITING. A COPY OF SUCH AGREEMENT SHALL BE PROVIDED TO RAILROAD.
12. PROPERTY LINES AND RIGHT-OF-WAY LINES SHOWN ON THE PLANS ARE TAKEN FROM THE SITE SURVEY AND ARE PROVIDED FOR REFERENCE ONLY.
13. MATCH LINES FOR TRACK SHEETS ARE BASED ON THE PROPOSED STATIONING UNLESS OTHERWISE SPECIFIED.
14. ALL NEW TRACK AND TURNOUTS TO BE A MINIMUM 115# RAIL.
15. RAIL CONTRACTOR SHALL MAINTAIN AT LEAST ONE ACCESS TO ALL AFFECTED PROPERTIES, THE SITE PROPERTY, ALL WORK AREAS AND ANY RAIL OPERATION AREAS. IF NECESSARY, MULTIPHASE CONSTRUCTION SHALL BE UTILIZED AND COORDINATED WITH OWNER AND RAILROAD.
16. CONTRACTOR SHALL ENSURE THAT ONE COPY OF THE APPROVED PLANS AND SPECIFICATIONS ARE ONSITE AT ALL TIMES. FURTHER, THE CONTRACTOR IS RESPONSIBLE FOR SUPPLYING ALL SUBCONTRACTORS WITH THE APPROVED PLANS AND SPECIFICATIONS AND VERIFYING THAT ALL CONSTRUCTION IS IN ACCORDANCE WITH THE APPROVED CONSTRUCTION DOCUMENTS. THE CONTRACTOR SHALL CONTACT RAILROAD FOR CLARIFICATIONS OR DISCREPANCIES ON ANY INFORMATION SHOWN IN THE CONTRACT DOCUMENTS PRIOR TO CONSTRUCTION.
17. RAIL CONTRACTOR SHALL PROVIDE AS-BUILT DRAWINGS FOR ALL RAIL CONTRACTOR EXECUTED IMPROVEMENTS.
18. NO FIELD CHANGES WILL BE PERMITTED WITHOUT DIRECT WRITTEN AUTHORIZATION FROM THE OWNER AND RAILROAD.
19. ENVIRONMENTAL AND EROSION CONTROL PLANNING, EXECUTION AND PERMITTING ARE UNDER THE FACILITY CONTRACTOR CONTROL FOR THE WORK AREA. THIS INCLUDES THE STORM WATER MANAGEMENT PLAN (SWMP) AND LOCAL JURISDICTION REQUIREMENTS. RAIL CONTRACTOR SHALL NOT DISTURB OR REMOVE ANY ENVIRONMENTAL OR EROSION CONTROL MEASURES INSTALLED BY THE FACILITY CONTRACTOR UNLESS APPROVED IN WRITING AND MODIFICATION OF THE CONTROL MEASURES INSTALLED PRIOR TO DISTURBANCE OR REMOVAL.
20. RAIL CONTRACTOR SHALL COORDINATE WITH, AND ASSIST, THE FACILITY CONTRACTOR WITH INSPECTION AND MAINTENANCE OF EROSION CONTROL MEASURES WITHIN THE AREA OF RAIL CONSTRUCTION, STAGING, STORAGE, FIELD OFFICE AND OTHER AREAS UTILIZED BY THE RAIL CONTRACTOR.
21. RAIL CONTRACTOR SHALL COORDINATE WITH, AND ASSIST, THE FACILITY CONTRACTOR IN MAINTAINING AND CLEANING, TO THE SATISFACTION OF RAILROAD AND OWNER ALL PUBLIC AND PRIVATE ACCESS AND SERVICE ROADS USED DURING CONSTRUCTION.
22. RAIL CONTRACTOR SHALL PROVIDE WATER ONSITE AND UTILIZE AS REQUIRED TO MINIMIZE DUST GENERATION DURING, AND FOR THE ACTIVITIES OF THE RAIL CONTRACTOR CONSTRUCTION EFFORTS.
23. ANY CHEMICAL OR HAZARDOUS MATERIAL SPILLS SHALL BE IMMEDIATELY REPORTED TO THE OWNER, THE RAILROAD, THE FACILITY CONTRACTOR AND THE SWMP PERMITTING AGENCY. RELEASES OF PETROLEUM PRODUCTS AND CERTAIN HAZARDOUS SUBSTANCES LISTED UNDER THE FEDERAL CLEAN WATER ACT (40 CFR PART 116) MUST BE REPORTED TO THE NATIONAL RESPONSE CENTER, THE OWNER, THE FACILITY CONTRACTOR AND THE SWMP PERMITTING AGENCY. SPILLS THAT POSE AN IMMEDIATE RISK TO HUMAN LIFE SHALL BE REPORTED TO 911. FAILURE TO REPORT AND CLEAN UP ANY SPILL SHALL RESULT IN ISSUANCE OF A STOP WORK ORDER.
24. PREPARATION OF THE SUBGRADE FOR BENEATH RAIL CONSTRUCTION WILL BE PROVIDED BY OTHERS PRIOR TO RAIL CONSTRUCTION UNLESS OTHERWISE NOTED ON THE CONSTRUCTION DRAWINGS.
25. FOR AREAS OF RAIL CONTRACTOR EARTHWORK, RAIL CONTRACTOR IS SOLELY RESPONSIBLE FOR PROVIDING STABLE EXCAVATIONS AND TEMPORARY SLOPES AND FOR SATISFYING ALL APPLICABLE FEDERAL, STATE AND LOCAL REGULATIONS. TEMPORARY EXCAVATIONS SHALL PROVIDE, AT A MINIMUM, REQUIREMENTS OR DETAILS OF THE CONSTRUCTION PLANS AND SPECIFICATIONS AND BY STANDARD ENGINEERING PRACTICE. TEMPORARY CONSTRUCTION SLOPES SHALL BE SLOPED, SHORED, SHEETED, AND/OR BRACED IN ACCORDANCE WITH THE STABILITY REQUIREMENTS OR APPLICABLE REGULATIONS, AND SHALL BE NO STEEPER THAN THE SLOPES SHOWN OR SPECIFIED WITHIN THE PROJECT DOCUMENTS.
26. ALL SOIL STOCKPILES SHALL BE PROTECTED FROM SEDIMENT TRANSPORT BY APPROPRIATE EROSION CONTROL BMPS AND IN ACCORDANCE WITH THE FACILITY CONTRACTOR'S SWMP.
27. CONSTRUCTION OF DRAINAGE IMPROVEMENTS WILL BE PROVIDED BY OTHERS PRIOR TO RAIL CONSTRUCTION UNLESS OTHERWISE NOTED ON THE CONSTRUCTION DRAWINGS.
28. RAIL CONTRACTOR SHALL PROTECT IN PLACE THE CONSTRUCTED STORM DRAINAGE DITCHES, SWALES, STORM SEWER, AND APPURTENANCES. IF RAIL CONTRACTOR DISTURBED OR DAMAGES STORM DRAINAGE IMPROVEMENTS SHALL BE REPAIRED BY THE RAIL CONTRACTOR TO THE FACILITY CONTRACTOR'S SATISFACTION AT THE RAIL CONTRACTORS EXPENSE.
29. RAIL CONTRACTOR SHALL COORDINATE WITH FACILITY CONTRACTOR ON THE LOCATION OF ALL PROPOSED UTILITIES TO ASSURE COMPLIANCE WITH RAILROAD STANDARDS.
30. RAIL CONTRACTOR SHALL PROTECT IN PLACE THE CONSTRUCTED UTILITIES AND APPURTENANCES. RAIL CONTRACTOR DISTURBED OR DAMAGED UTILITY IMPROVEMENTS SHALL BE REPAIRED BY THE RAIL CONTRACTOR TO THE FACILITY CONTRACTOR'S SATISFACTION AT THE RAIL CONTRACTORS EXPENSE.
31. BALLAST OR SUBBALLAST SHALL NOT BE PLACED ON SUBGRADE OR SUBBALLAST THAT IS FROZEN OR EXHIBITS FROST PENETRATION.

PE STAMP

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TEXAS P.E FIRM REGISTRATION NO. F-754

**BROWNSVILLE, CAMERON COUNTY, TX**
**PORT OF BROWNSVILLE**
**WEST PLAINS RAIL PLANS**

ABBREVIATIONS, LEGEND AND GENERAL NOTES

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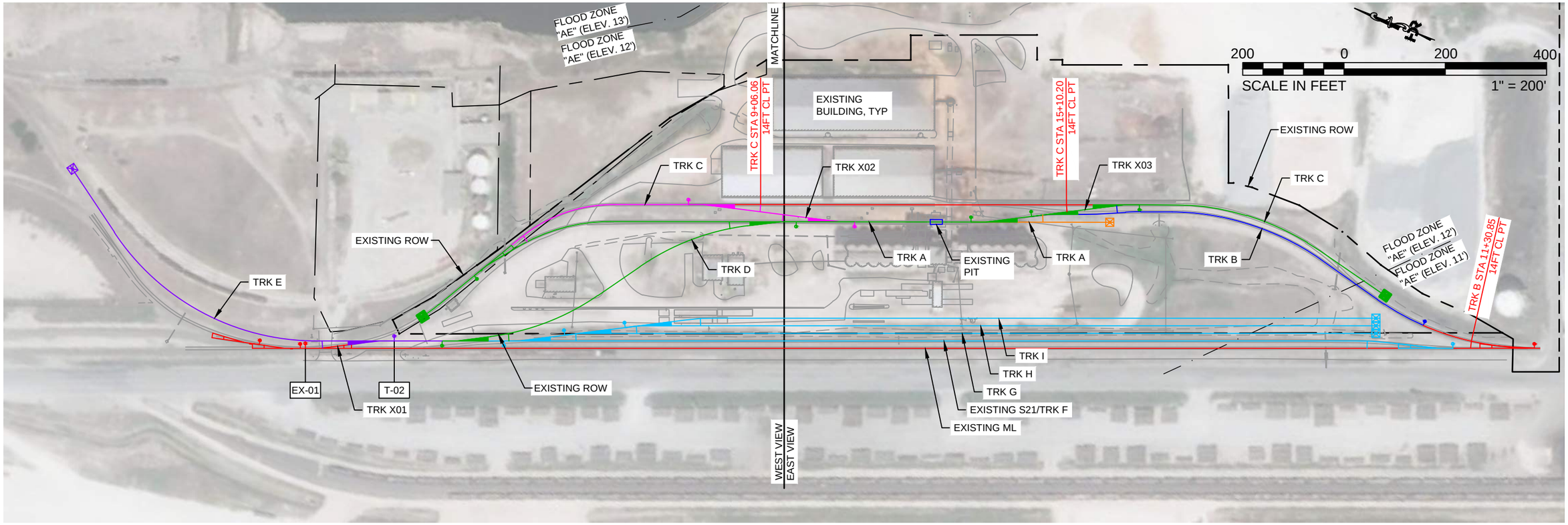


## BROWNSVILLE RIO GRANDE RAILROAD (BRG) OPERATING PLAN

TURNOUT EX-01 (MAINLINE) AND TURNOUT T-02 WILL BE UNLOCKED AND HAND TURNED TO ACCEPT CARS TO THE WEST PLAINS SITE. BRG WILL SHOVE ONTO THE WEST PLAINS SITE FROM THE WEST TURNOUT TO ENTER THE SITE THROUGH TRK X01 AND TRACK F (FORMALLY BRG S-21). BRG WILL SPOT THE FIRST SET OF CARS FROM CLEAR POINT TO END OF STORAGE TRACK. BRG WILL THEN SPOT THE REMAINING CARS ON TRACKS G, H & I RESPECTIVELY UNTIL ALL CARS ARE SPOTTED. BRG LOCOMOTIVES WILL EXIT THE SITE THROUGH TRK X-01 BACK TO THE BRG MAINLINE, ONCE AWAY FROM THE SITE TURNOUTS EX-01 AND T-02 WILL BE SWITCHED AND LOCKED OUT TO MAKE SURE NO TRAINS CAN ENTER THE WEST PLAINS SITE UNTIL BRG COMES BACK TO PICK UP UNLOADED CARS.

## WEST PLAINS (WP) OPERATING PLAN

ONCE BRG SPOTS THE LOADED CARS ONTO TRACKS F, G, H & I WP WILL BEGIN PULLING OUT THE CARS (1 TRACK AT A TIME) FOR UNLOADING 13 AT A TIME, AT MOST, UTILIZING TRACK E. FROM TRACK E WP WILL SHOVE ONTO TRACK D AND SPOT THE FIRST SET OF CARS ONTO TRACK B. WP WILL DETACH AND RUNAROUND BACK TO THE STORAGE TRACKS UTILIZING TRACK D AND TRACK E. WP WILL REPEAT THIS OPERATION FOR THE REMAINING SET OF CARS ON THE STORAGE TRACK AND SPOT THE CARS ON TRACK A. ONCE READY WP WILL PULL THE LOADED CARS ACROSS THE PIT FROM TRACK A FIRST UNLOADING THE CARS ONE AT A TIME AND UTILIZING EITHER TRACK A OR TRACK C IN ORDER TO NOT BLOCK TRUCK TRAFFIC THAT CROSSES TRACK D. ONCE ALL OF THE CARS ARE UNLOADED WP WILL SHOVE THE CARS BACK ONTO TRACK A UNTIL THE LOCOMOTIVE OR CAR MOVER CLEARS THE TURNOUT ONTO TRACK D AND PULL THE CARS BACK TO THE EMPTY STORAGE TRACK UTILIZING TRACK E. THIS OPERATION WILL BE REPEATED TO UNLOAD THE CARS STORED ON TRACK B UNTIL ALL OF THE CARS ARE UNLOADED AND PLACED BACK ONTO THE REMAINING SPOTS ON THE STORAGE TRACKS. THIS OPERATION WILL BE REPEATED FOR THE REMAINING LOADED CARS ON THE STORAGE TRACKS. EACH TRACK WILL REQUIRE TWO SETS OF CARS FOR UNLOADING WITH THE MAX NUMBER OF CARS PER SET AT 13 CARS AT 60' EACH. ONCE THE CARS ARE UNLOADED WP WILL AIR UP THE BRAKES FOR THE CARS USING THE ONSITE AIR TO PREPARE FOR BRG TO PICK UP THE EMPTY RAIL CARS OFF SITE.

| TRACK NAME | START CLEAR DISTANCE | END CLEAR DISTANCE | STORAGE LENGTH | NO. OF 60' CARS | NO. OF 69' CARS |
|---|---|---|---|---|---|
| TRK "F" CL PT to EB | 8+64.85 | 24+26.68 | 1561.83 | 26 CARS | 22 CARS |
| TRK "G" CL PT to EB | 8+42.33 | 22+93.87 | 1451.54 | 24 CARS | 21 CARS |
| TRK "H" CL PT to EB | 9+48.86 | 22+74.30 | 1325.44 | 22 CARS | 19 CARS |
| TRK "I" CL PT to EB | 12+90.13 | 26+15.96 | 1325.83 | 22 CARS | 19 CARS |
| | | TOTAL STORAGE | | 94 CARS | 81 CARS |

| TRACK NAME | START CLEAR DISTANCE | END CLEAR DISTANCE | STORAGE LENGTH | NO. OF 60' CARS | NO. OF 69' CARS |
|---|---|---|---|---|---|
| TRK "A" West CL PT to Mid Point of Pit | 2+24.42 | 10+37.93 | 814 | 13 CARS | 11 CARS |
| TRK "A" Mid Point of Pit to TRK "C" East EB | 10+37.93 | 21+77.11 | 925 | 15 CARS | 13 CARS |
| TRK "A" Optional Bad Order Track | 12+48.54 | 13+72.54 | 124 | 2 CARS | 1 CARS |
| TRK "B" East Side of Pit CL PT to DERAIL | 3+69.62 | 10+80.90 | 711 | 11 CARS | 10 CARS |
| TRK "C" West EB to PT.SW. | 1+77.79 | 7+63.81 | 586 | 9 CARS | 8 CARS |
| TRK "C" CL PT to TRK "A" Mid Point of Pit | 4+24.94 | 10+37.93 | 830 | 13 CARS | 12 CARS |
| TRK "C" West EB to TRK "A" CL PT | 1+77.79 | 6+28.88 | 651 | 10 CARS | 9 CARS |
| TRK "C" East Side of Pit PT. SW to EB | 16+34.51 | 21+77.11 | 543 | 9 CARS | 7 CARS |
| TRK "C" CL PT to CL PT | 9+06.06 | 15+10.20 | 604 | 10 CARS | 8 CARS |
| TRK "C" CL PT to East EB | 9+06.06 | 21+77.11 | 1271 | 21 CARS | 18 CARS |
| TRK "D" West CL PT TRK "A" Mid point of Pit | 5+31.83 | 10+37.93 | 896 | 14 CARS | 12 CARS |
| TRK "E" (+80' LOCO) | 5+00.00 | 13+60.87 | 781 | 13 CARS | 11 CARS |

## NOTE

SEE SHEETS 4 AND 5 FOR TRACK CAPACITY STATIONING

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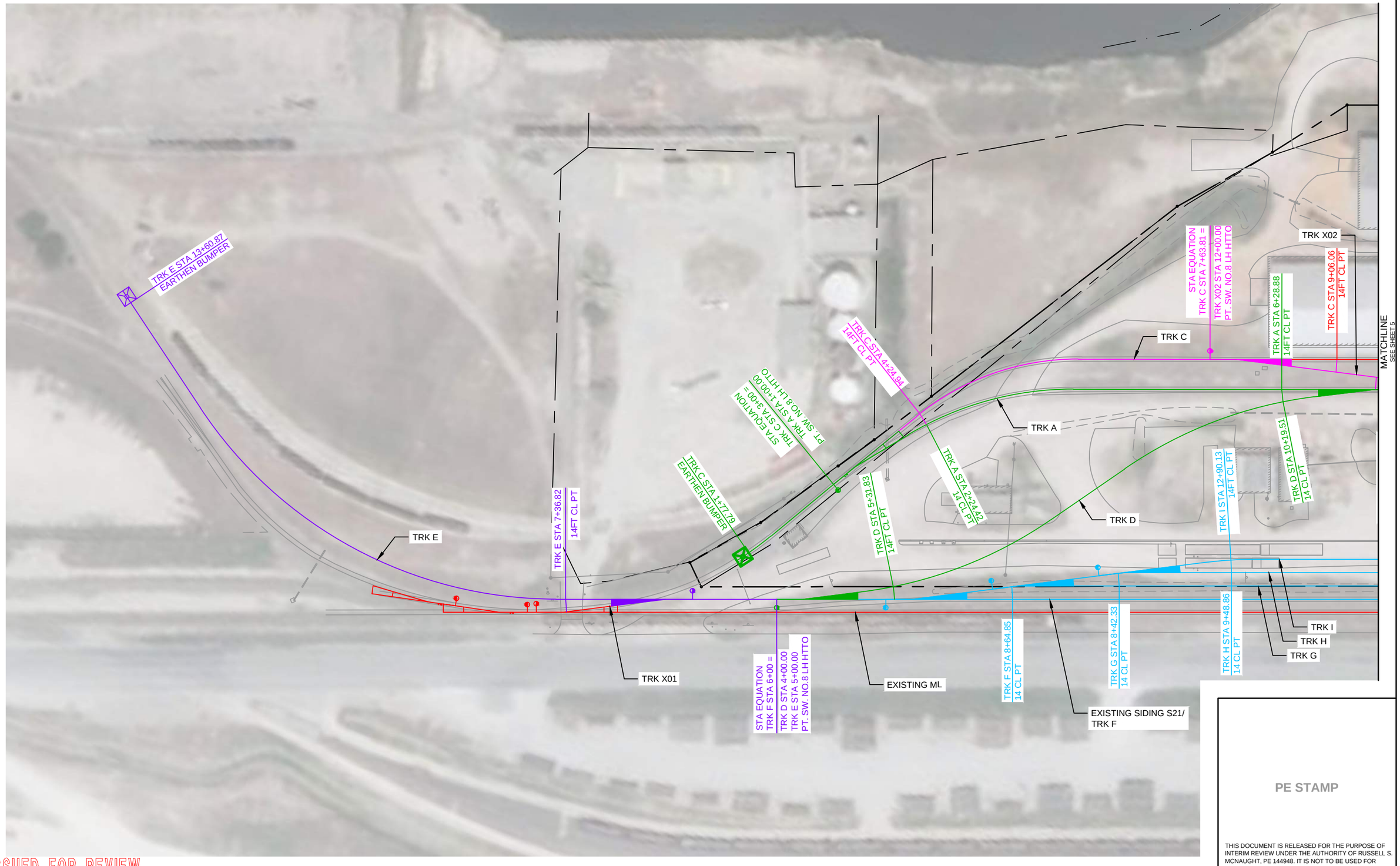
TEXAS P.E FIRM REGISTRATION NO. F-754

BROWNSVILLE, CAMERON COUNTY, TX
PORT OF BROWNSVILLE
WEST PLAINS RAIL PLANS

OVERALL PLAN

SCALE: 1:200 SHEET NO. 3 OF 40 SHEETS

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TEXAS P.E FIRM REGISTRATION NO. F-754

OmniTRAX

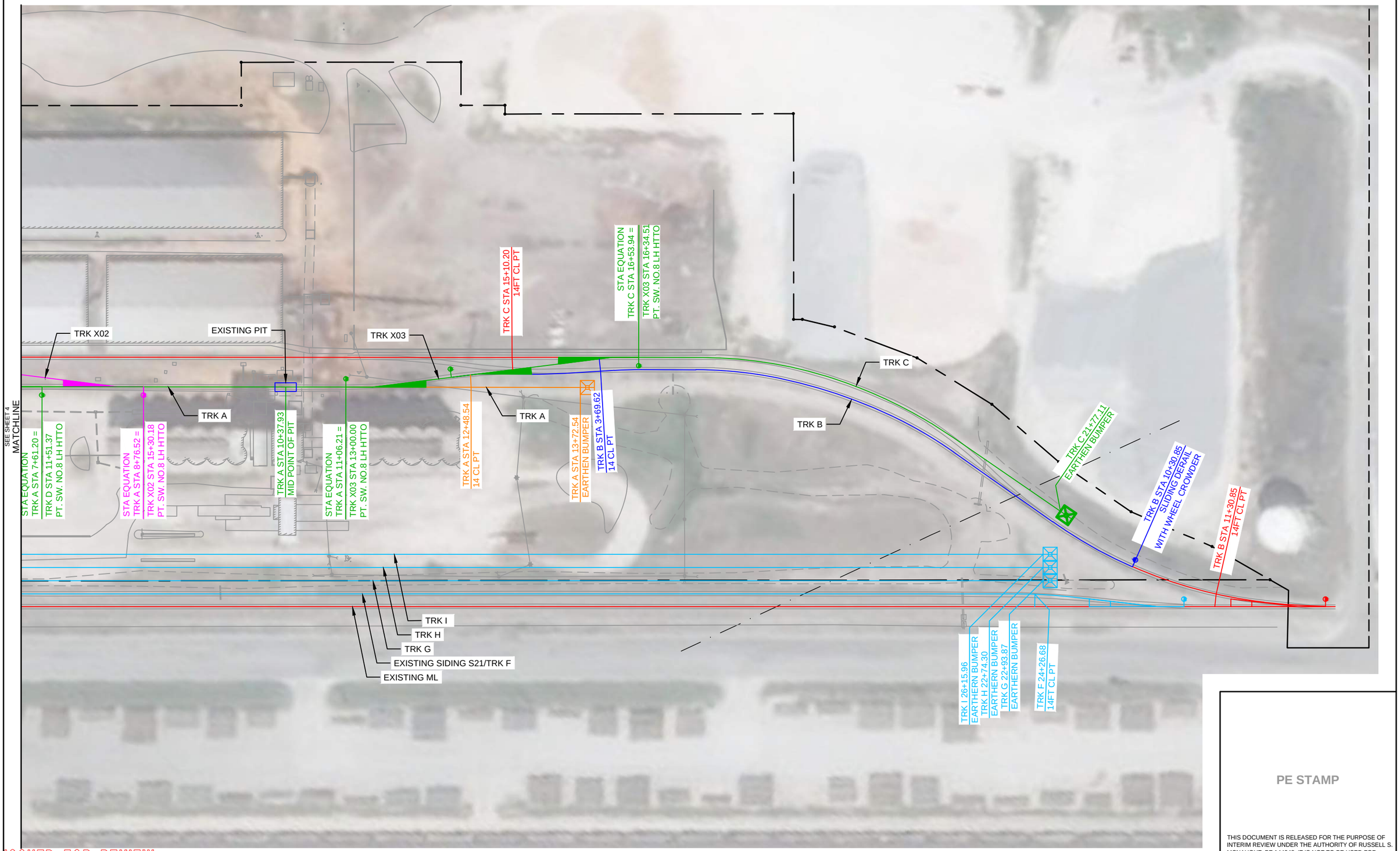
Westplains

**BROWNSVILLE, CAMERON COUNTY, TX**
**PORT OF BROWNSVILLE**
**WEST PLAINS RAIL PLANS**

TRACK CAPACITIES
WEST

SCALE: 1:100 | SHEET NO. 4 OF 40 SHEETS

PE STAMP

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TEXAS P.E FIRM REGISTRATION NO. F-754

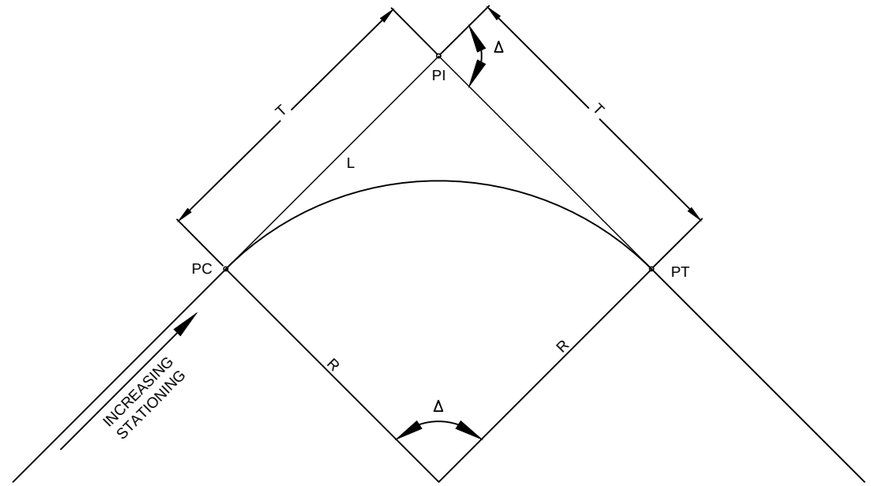
OmniTRAX

Westplains

**BROWNSVILLE, CAMERON COUNTY, TX**
**PORT OF BROWNSVILLE**
**WEST PLAINS RAIL PLANS**

TRACK CAPACITIES
EAST

SCALE: 1:100 | SHEET NO. 5 OF 40 SHEETS




SIMPLE CIRCULAR CURVE

R = RADIUS OF CIRCULAR CURVATURE

PC = POINT OF CURVATURE

PT = POINT OF TANGENT

PI = POINT OF INTERSECTION

= CENTRAL ANGLE OF CIRCULAR CURVE

$T = R \tan \frac{\Delta}{2}$

$L = \frac{\Delta}{D_C}$ (ARC DEFINITION)

$D_C = 2 \sin^{-1} \left(\frac{50}{R}\right)$ = DEGREE OF CURVATURE (CHORD DEFINITION)

## TRACK CIRCULAR CURVE DEFINITION

NTS

1

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| USER NAME = EBAYLEY | CHECKED - CRB | REVISED | REVISED | REVISED |
| PLOT DATE = 2022-09-22 | DATE - 2022-09-22 | REVISED | REVISED | REVISED |

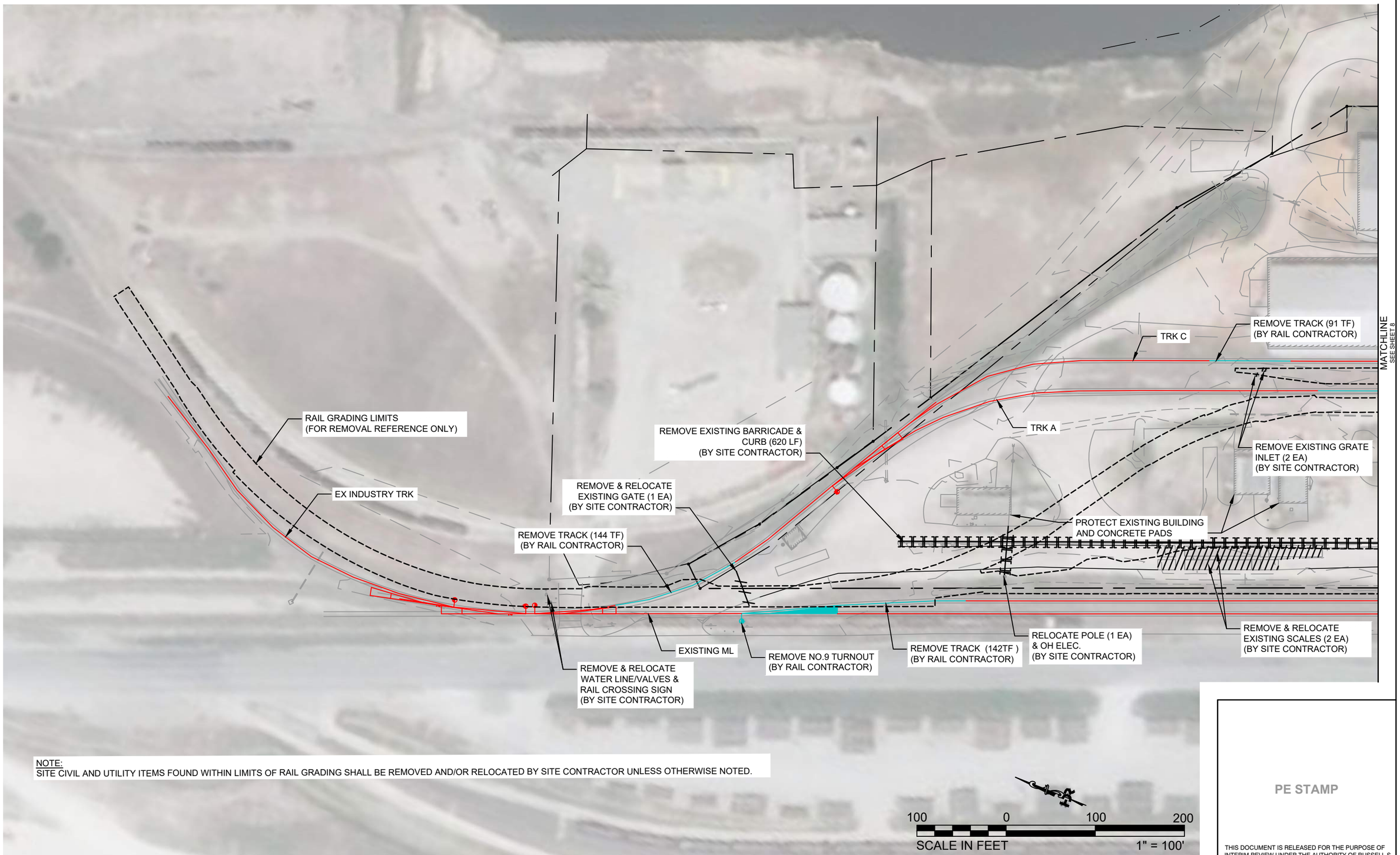
TEXAS P.E FIRM REGISTRATION NO. F-754

**BROWNSVILLE, CAMERON COUNTY, TX**
**PORT OF BROWNSVILLE**
**WEST PLAINS RAIL PLANS**

ALIGNMENT TABLES

SCALE: NTS

SHEET NO. 6 OF 40 SHEETS




NOTE:
SITE CIVIL AND UTILITY ITEMS FOUND WITHIN LIMITS OF RAIL GRADING SHALL BE REMOVED AND/OR RELOCATED BY SITE CONTRACTOR UNLESS OTHERWISE NOTED.

PE STAMP

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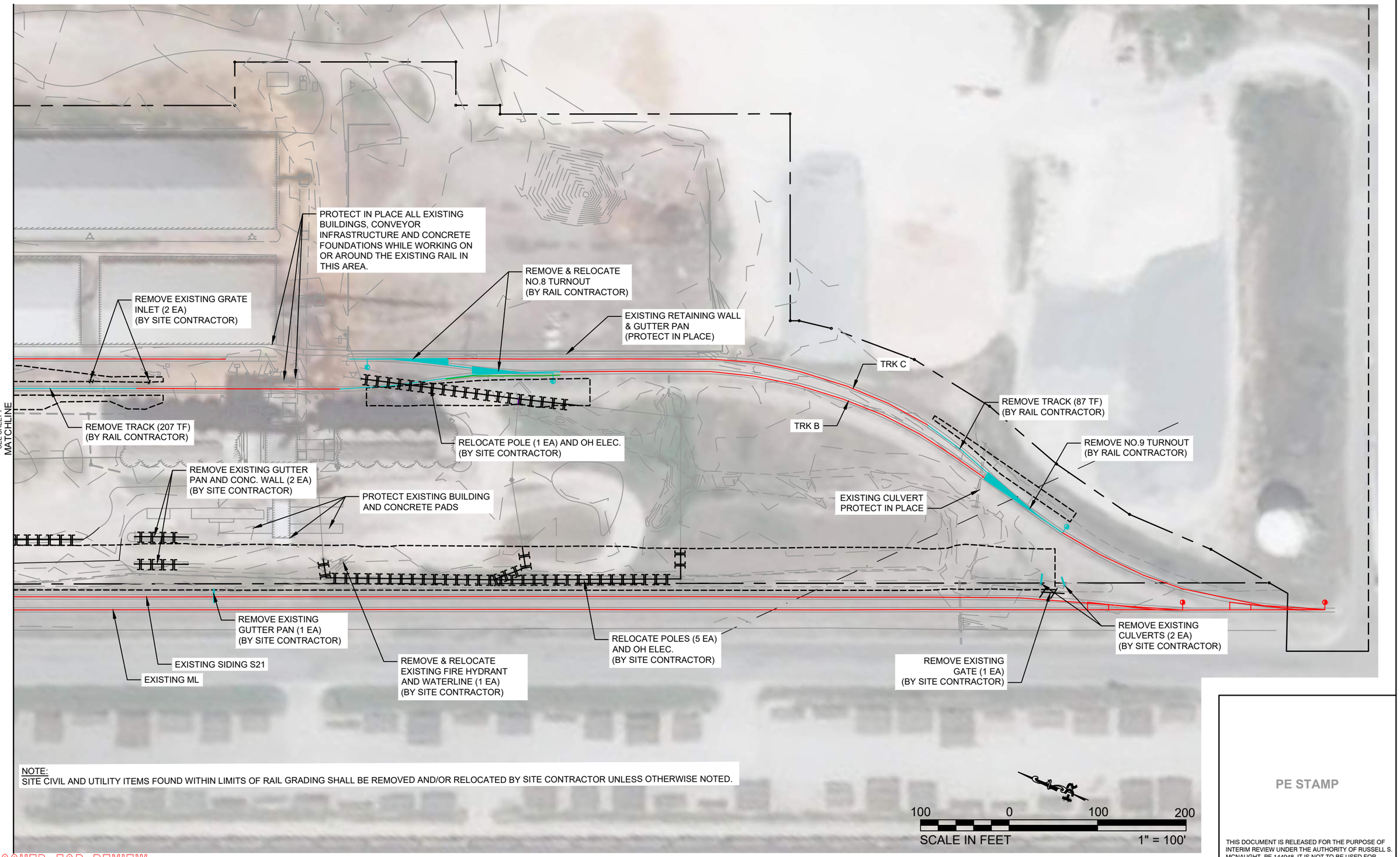
| USER NAME = EBAYLEY | CHECKED – CRB | REVISED | REVISED | REVISED |
| PLOT DATE = 2022-09-22 | DATE – 2022-09-22 | REVISED | REVISED | REVISED |

TEXAS P.E FIRM REGISTRATION NO. F-754

**BROWNSVILLE, CAMERON COUNTY, TX**
**PORT OF BROWNSVILLE**
**WEST PLAINS RAIL PLANS**

RAIL DEMOLITION PLAN
EAST

SCALE: 1:100 | SHEET NO. 7 OF 40 SHEETS

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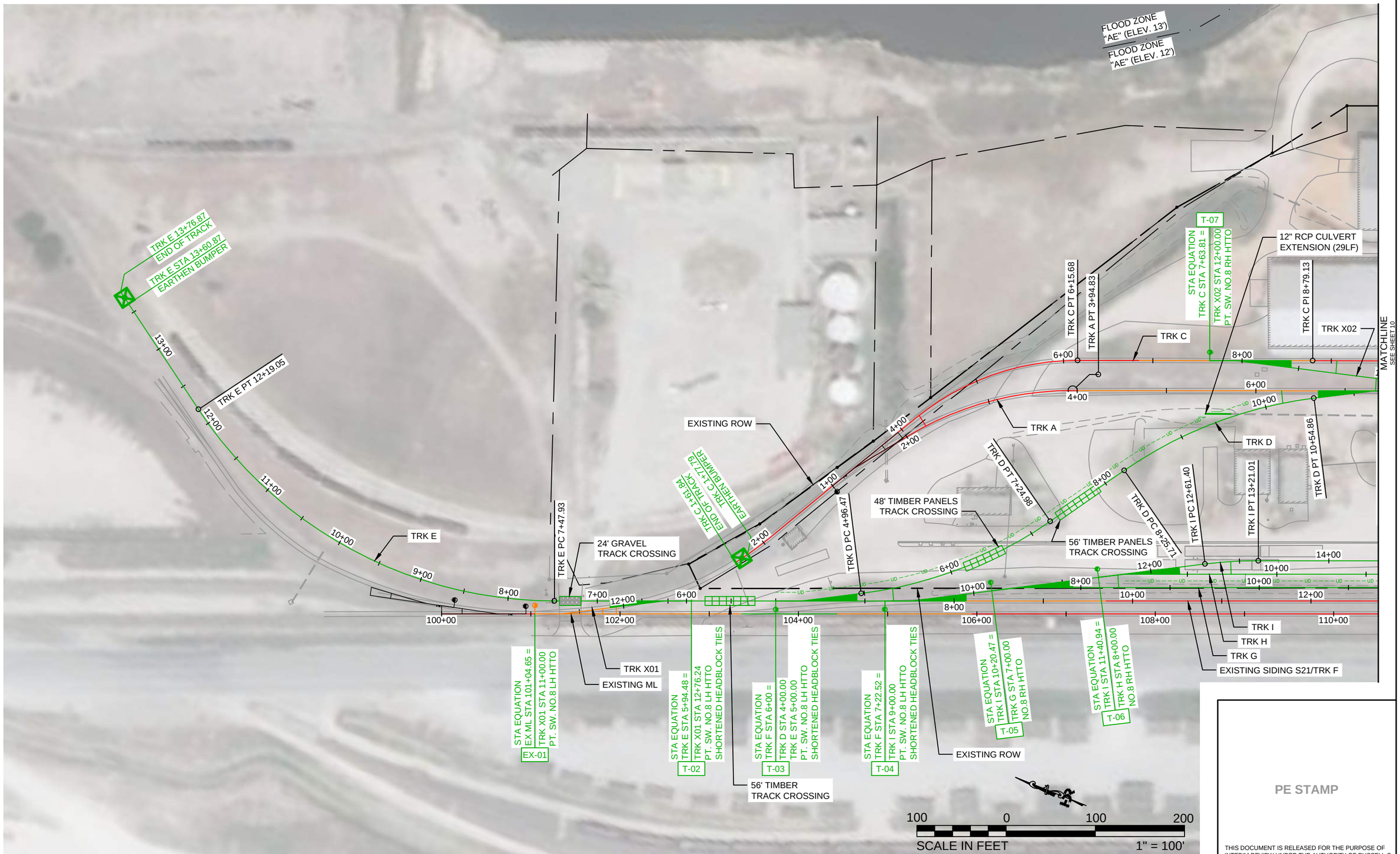
| PLOT DATE = 2022-09-22 | DATE – 2022-09-22 | REVISED | REVISED | REVISED |

TEXAS P.E FIRM REGISTRATION NO. F-754

BROWNSVILLE, CAMERON COUNTY, TX
PORT OF BROWNSVILLE
WEST PLAINS RAIL PLANS

RAIL DEMOLITION PLAN
WEST

SCALE: 1:100 | SHEET NO. 8 OF 40 SHEETS

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| PLOT DATE = 2022-09-22 | DATE – 2022-09-22 | REVISED | REVISED | REVISED |

TEXAS P.E FIRM REGISTRATION NO. F-754

OmniTRAX

Westplains

**BROWNSVILLE, CAMERON COUNTY, TX**
**PORT OF BROWNSVILLE**
**WEST PLAINS RAIL PLANS**

TRACK PLAN
WEST

SCALE: 1:50 | SHEET NO. 9 OF 40 SHEETS

EXISTING BUILDING, TYP

2 x 24' ASPHALT TRACK CROSSING

SEE SHEET 9 MATCHLINE

STA EQUATION TRK A STA 7+61.20 = TRK D STA 11+51.37 PT. SW. NO.8 LH HTTO

T-08

STA EQUATION TRK A STA 8+76.52 = TRK X02 STA 15+30.18 NO.8 RH HTTO

T-09

STA EQUATION TRK A STA 11+06.21 = TRK X03 STA 13+00.00 PT. SW. NO.8 LH HTTO

T-10

STA EQUATION TRK X03 STA 14+20.47 = TRK B STA 2+00.00 PT. SW. NO.8 RH HTTO

T-11

STA EQUATION TRK C STA 16+53.94 = TRK X03 STA 16+34.51 PT. SW. NO.8 LH HTTO

T-12

TRK X02

TRK A

TRK A 10+15.87 START EMBED TRACK

TRK A 10+25.87 END EMBED TRACK

TRK A 10+49.95 START EMBED TRK

TRK A 10+59.95 END EMBED TRACK

TRK A 13+88.54 END OF TRACK

TRK A STA 13+72.54 EARTHEN BUMPER

TRK B PC 2+99.51

TRK B PT 3+29.00

TRK B PC 3+85.59

TRK B PT 4+15.75

TRK B PC 4+78.03

TRK C PI 14+80.03

TRK C PI 15+48.50

TRK C PC 17+26.54

TRK C PCC 18+67.97

EXISTING ROW

TRK C

TRK C PT 20+30.07

18" RCP CULVERT EXTENSION (41LF)

TRK B

TRK B PCC 5+75.28

TRK B PCC 7+06.74

TRK B PT 7+89.24

TRK C 21+77.11 EARTHEN BUMPER

TRK B PC 9+26.91

TRK C 21+93.11 END OF TRACK

TRK B STA 10+30.85 SLIDING DERAIL WITH WHEEL CROWDER

T-13

TRK I

TRK H

TRK G

EXISTING SIDING S21/TRK F

EXISTING ML

EXISTING ROW

FLOOD ZONE "AE" (ELEV. 12')

FLOOD ZONE "AE" (ELEV. 11')

TRK I 26+15.96 EARTHERN BUMPER

TRK H 22+74.30 EARTHERN BUMPER

TRK G 22+93.87 EARTHERN BUMPER

TRK G 23+09.87 END OF TRACK

TRK H 22+90.30 END OF TRACK

TRK I 26+31.96 END OF TRACK

100 0 100 200

SCALE IN FEET 1" = 100'

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| PLOT DATE = 2022-09-22 | DATE – 2022-09-22 | REVISED | REVISED | REVISED |

TEXAS P.E FIRM REGISTRATION NO. F-754

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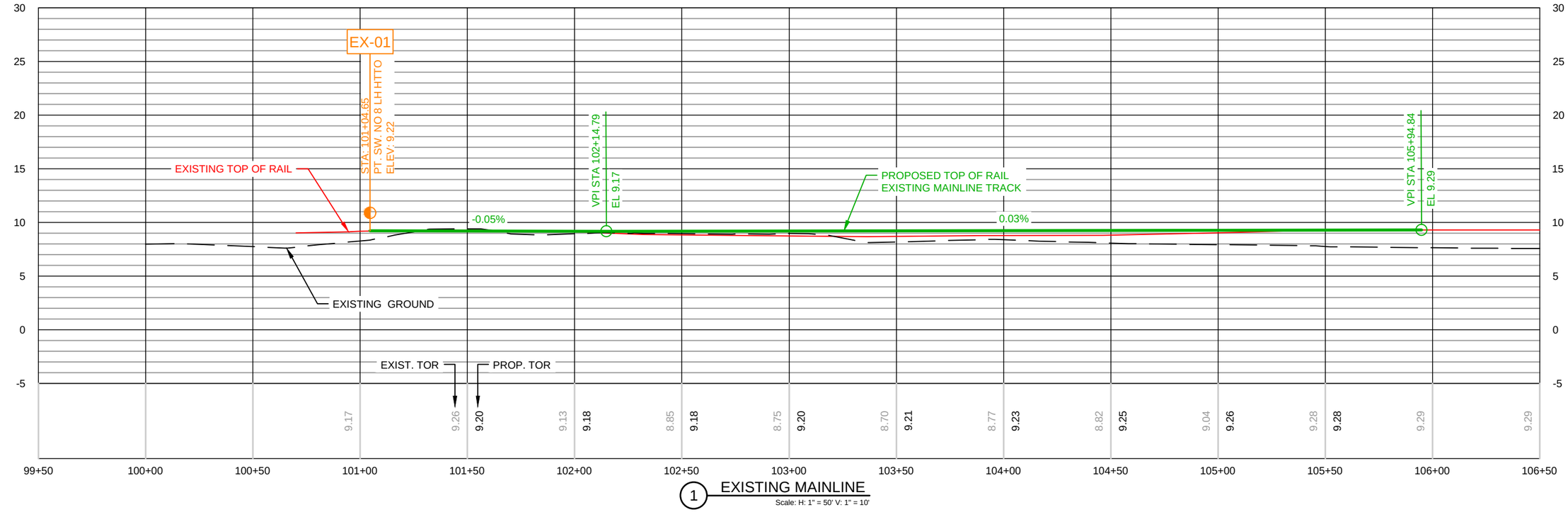
Westplains

BROWNSVILLE, CAMERON COUNTY, TX
PORT OF BROWNSVILLE
WEST PLAINS RAIL PLANS

TRACK PLAN EAST

SCALE: 1:50

SHEET NO. 10 OF 40 SHEETS




1 EXISTING MAINLINE

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

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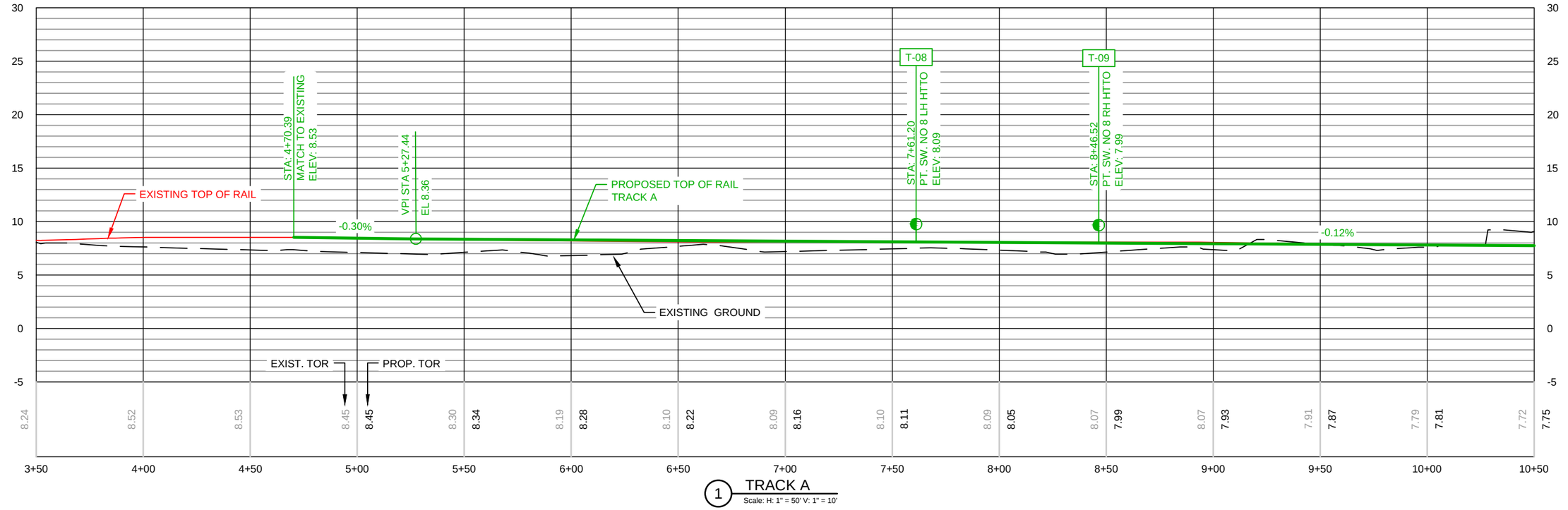
| PLOT DATE = 2022-09-22 | DATE - 2022-09-22 | REVISED | REVISED | REVISED |

TEXAS P.E FIRM REGISTRATION NO. F-754

**BROWNSVILLE, CAMERON COUNTY, TX**
**PORT OF BROWNSVILLE**
**WEST PLAINS RAIL PLANS**

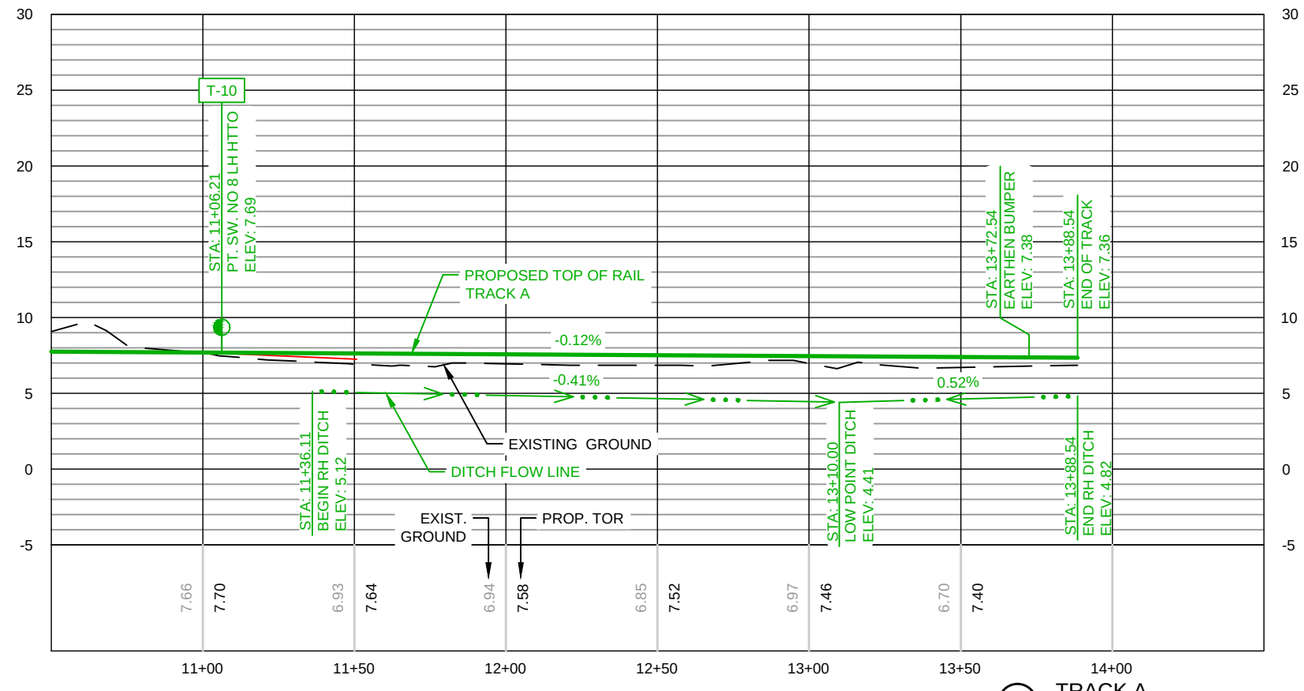
TRACK PROFILES
EXISTING MAINLINE

SCALE: 1:50 | SHEET NO. 11 OF 40 SHEETS




1 TRACK A

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




2 TRACK A

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

PE STAMP



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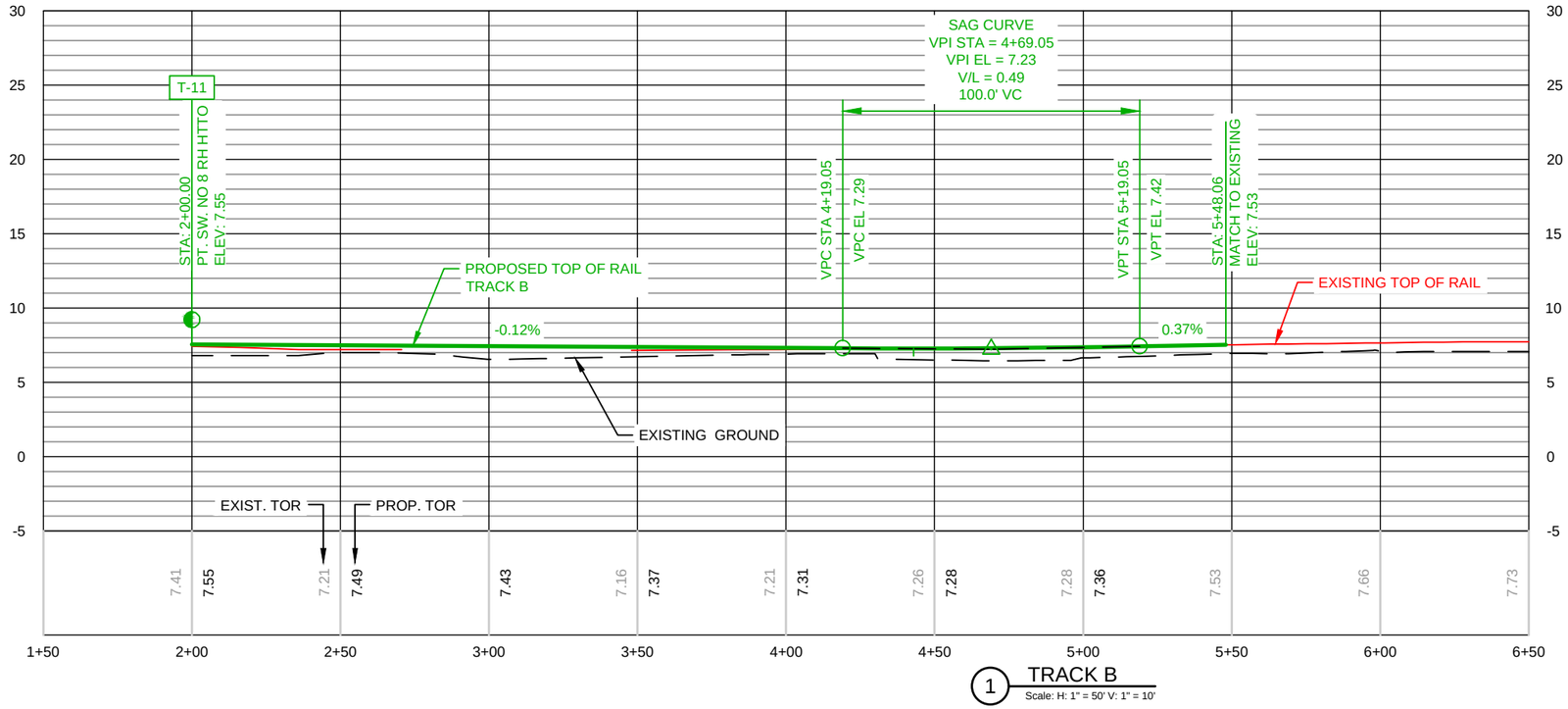
TEXAS P.E FIRM REGISTRATION NO. F-754

BROWNSVILLE, CAMERON COUNTY, TX
PORT OF BROWNSVILLE
WEST PLAINS RAIL PLANS

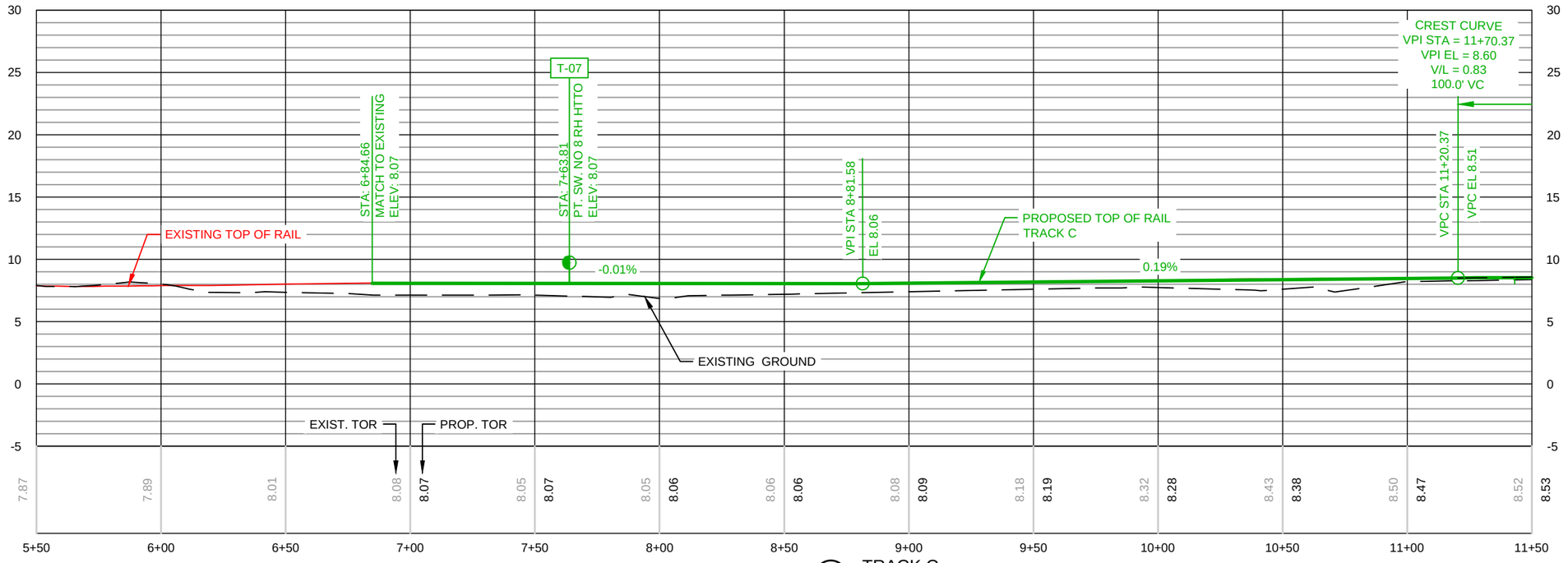
TRACK PROFILES
TRACK A

SCALE: 1:50




1 TRACK B

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




1 TRACK C

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

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| PLOT DATE = 2022-09-22 | DATE - 2022-09-22 | REVISED | REVISED | REVISED |

TEXAS P.E FIRM REGISTRATION NO. F-754

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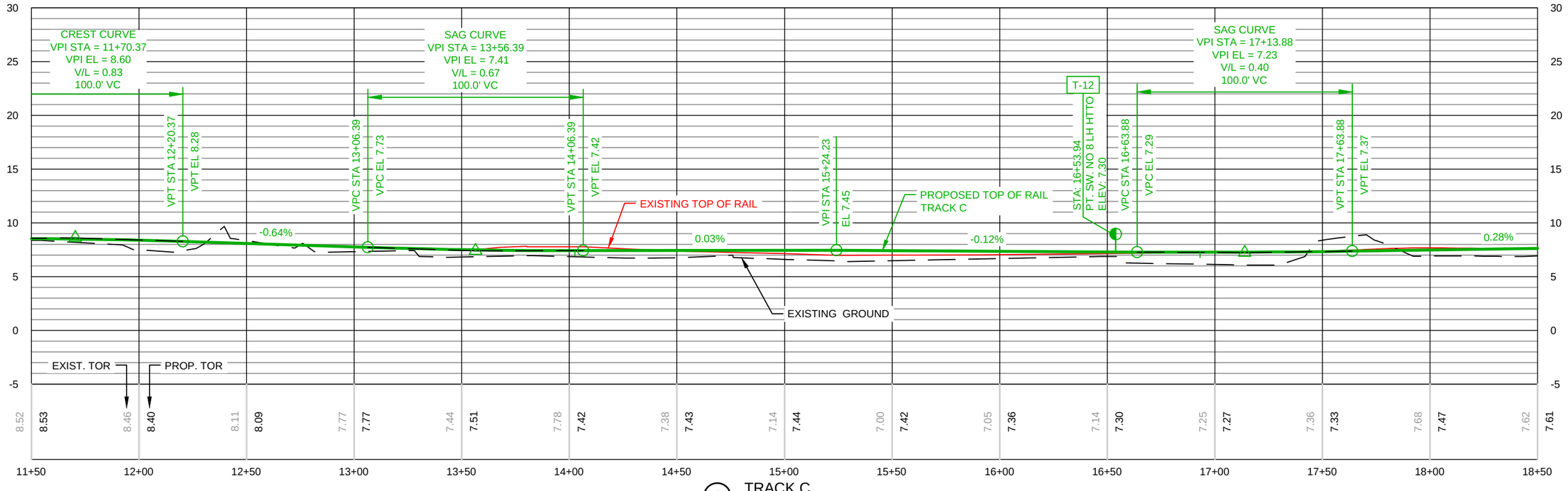
Westplains

**BROWNSVILLE, CAMERON COUNTY, TX**
**PORT OF BROWNSVILLE**
**WEST PLAINS RAIL PLANS**

TRACK PROFILES
TRACKS B AND C

SCALE: 1:50 | SHEET NO. 13 OF 40 SHEETS




2 TRACK C
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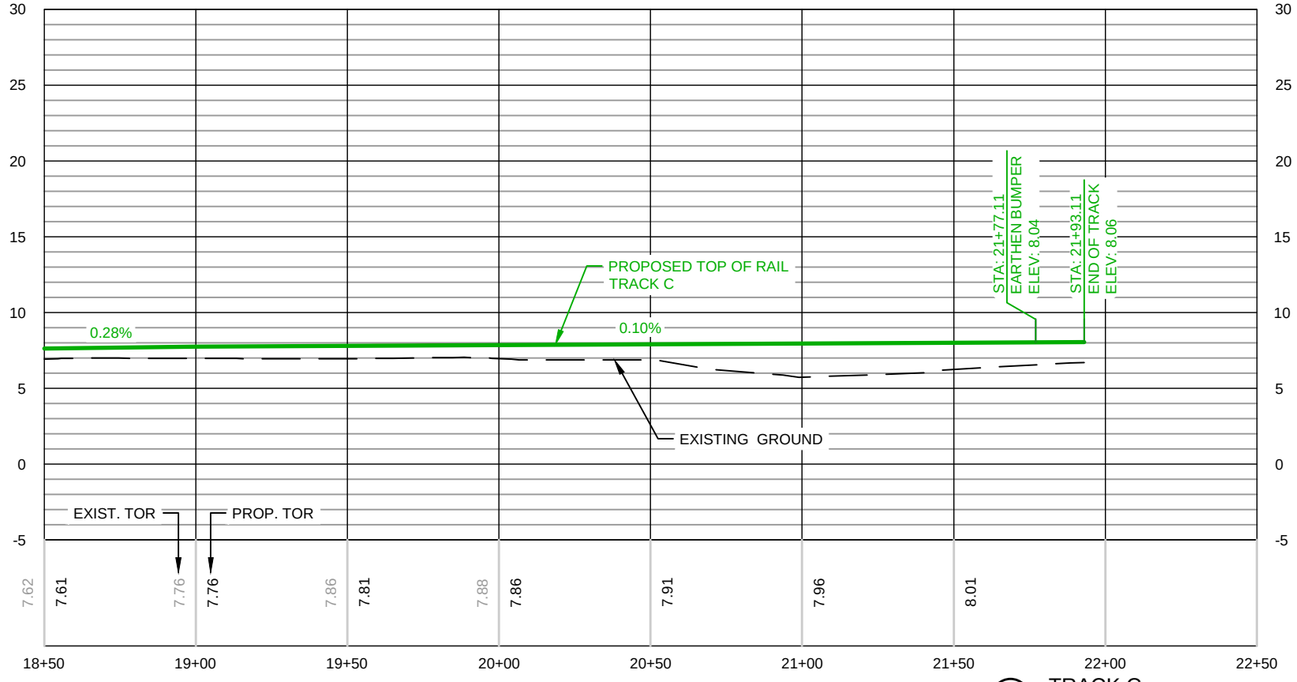


3 TRACK C
Scale: H: 1" = 50' V: 1" = 10'

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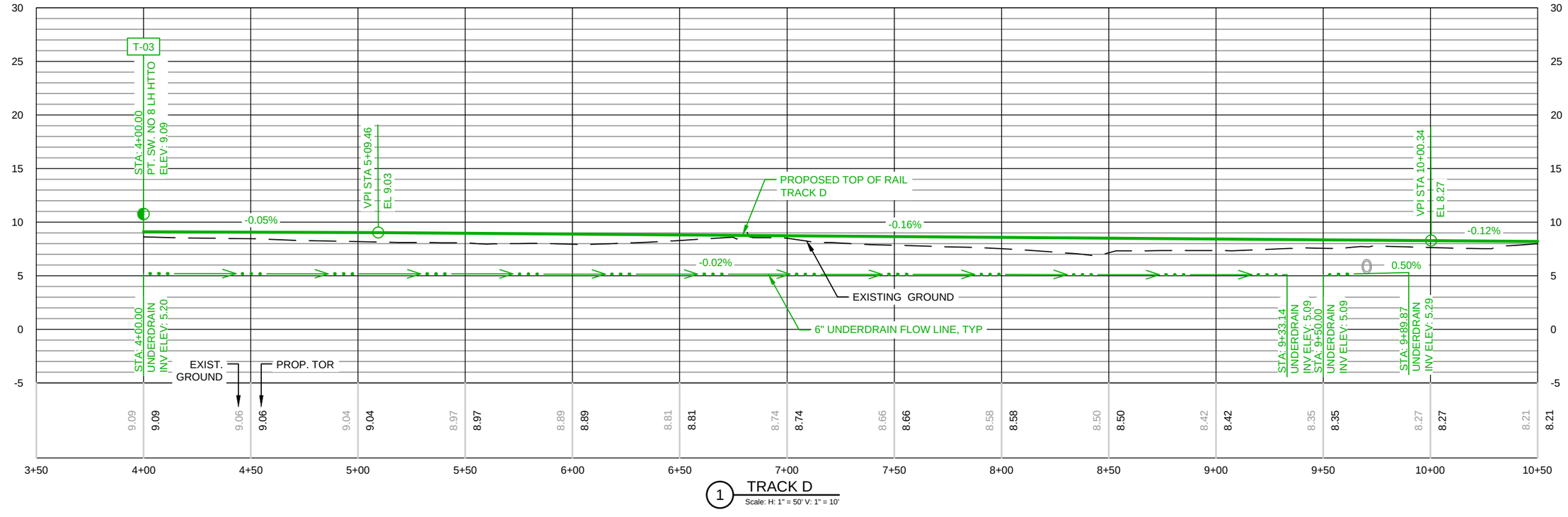
TEXAS P.E FIRM REGISTRATION NO. F-754

BROWNSVILLE, CAMERON COUNTY, TX
PORT OF BROWNSVILLE
WEST PLAINS RAIL PLANS

TRACK PROFILES
TRACK C

SCALE: 1:50 | SHEET NO. 14 OF 40 SHEETS

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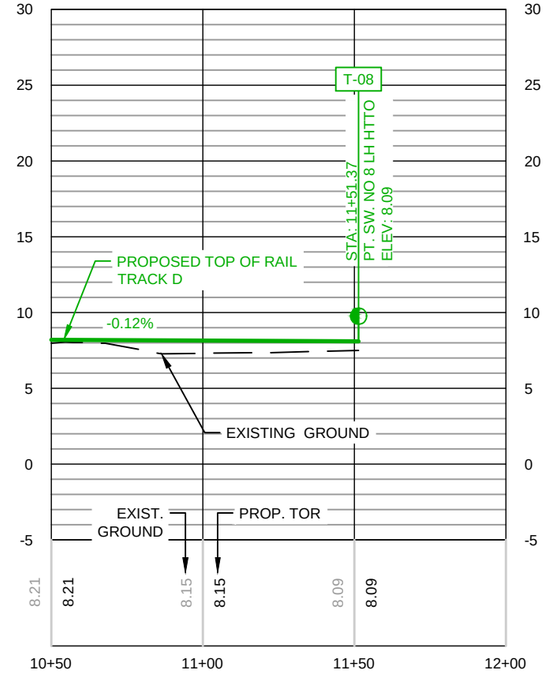


2 TRACK D

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

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TEXAS P.E FIRM REGISTRATION NO. F-754

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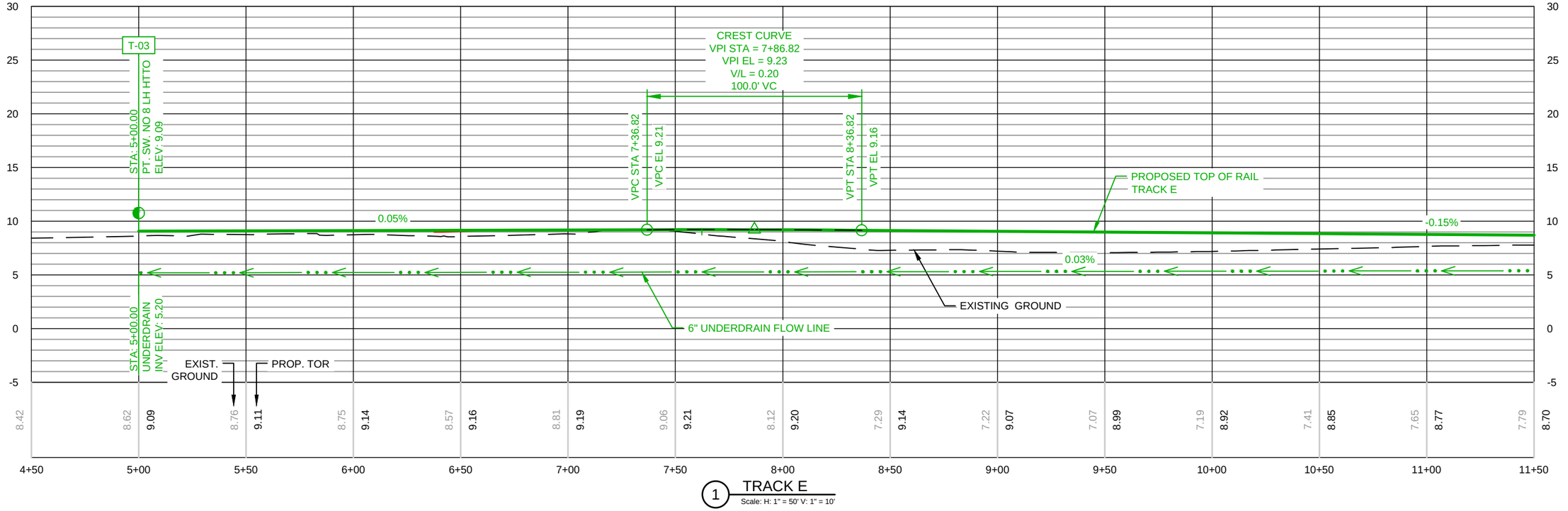
**BROWNSVILLE, CAMERON COUNTY, TX**
**PORT OF BROWNSVILLE**
**WEST PLAINS RAIL PLANS**

TRACK PROFILES
TRACK D

SCALE: 1:50

SHEET NO. 15 OF 40 SHEETS

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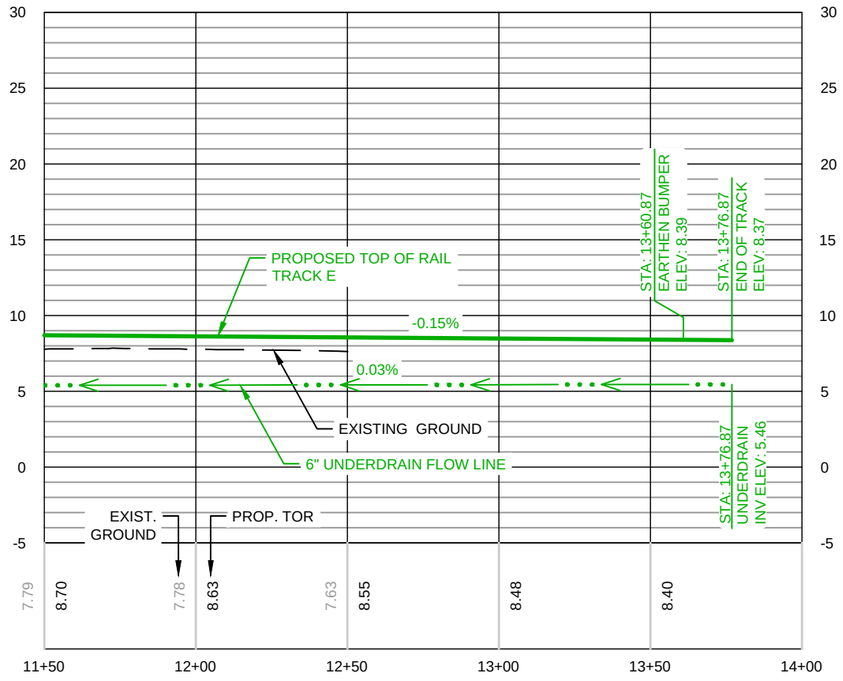


2 TRACK E
Scale: H: 1" = 50' V: 1" = 10'

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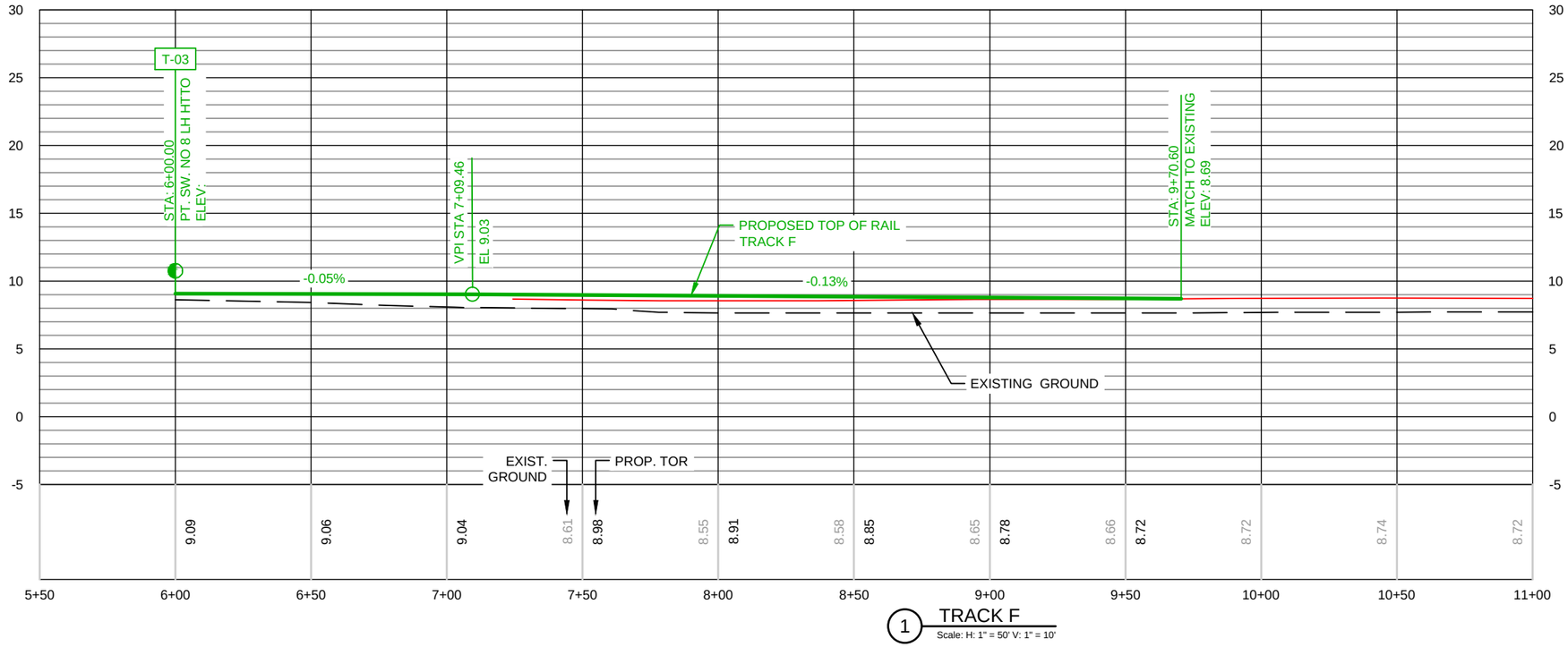
**BROWNSVILLE, CAMERON COUNTY, TX**
**PORT OF BROWNSVILLE**
**WEST PLAINS RAIL PLANS**

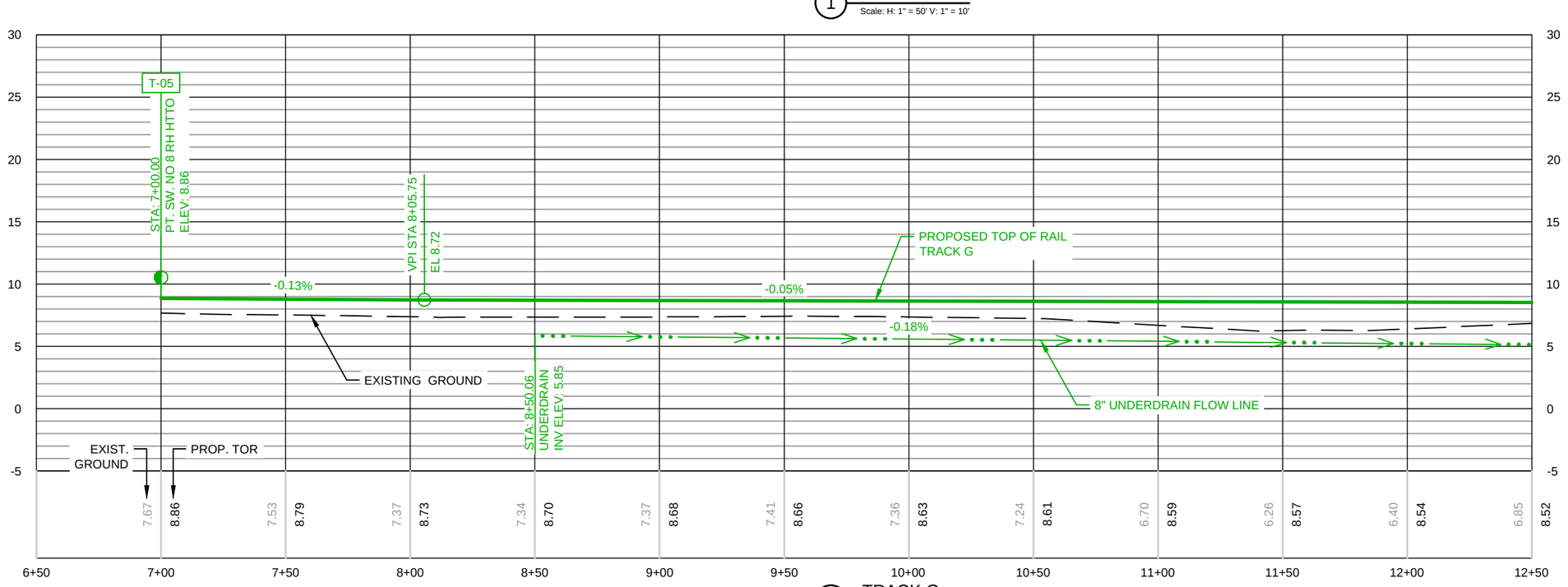
TRACK PROFILES
TRACK E

SCALE: 1:50 | SHEET NO. 16 OF 40 SHEETS




1 TRACK F

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




1 TRACK G

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

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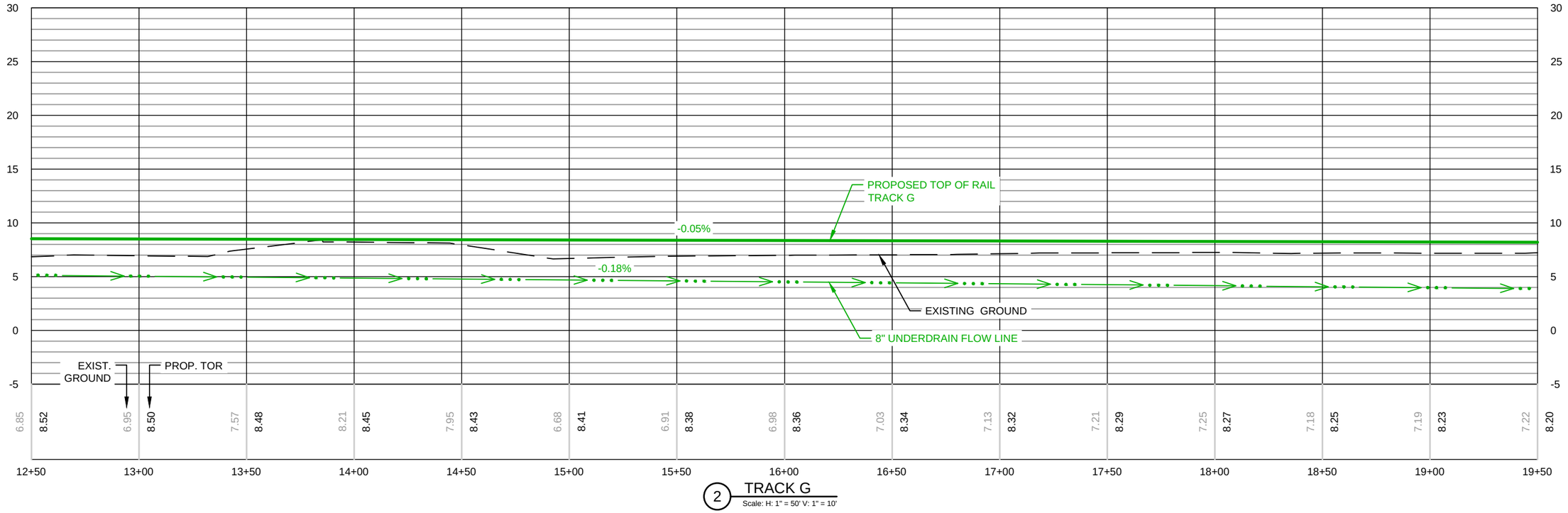
TEXAS P.E FIRM REGISTRATION NO. F-754

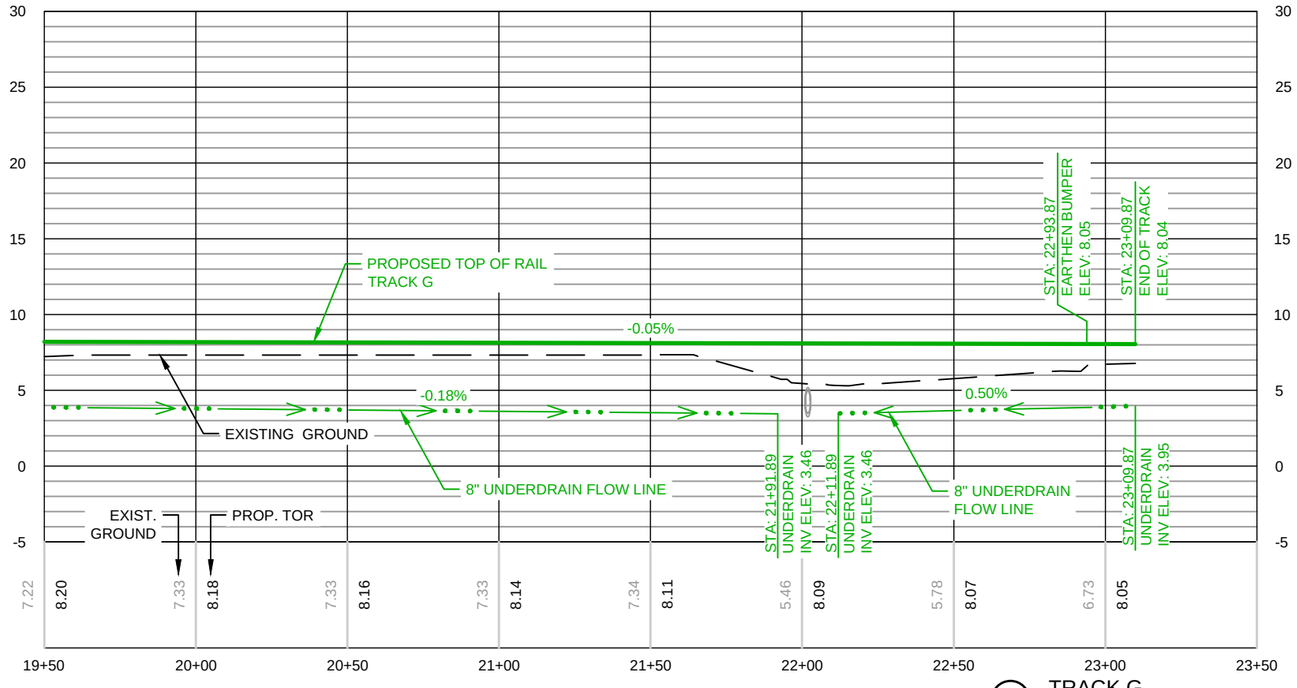
**BROWNSVILLE, CAMERON COUNTY, TX**
**PORT OF BROWNSVILLE**
**WEST PLAINS RAIL PLANS**

TRACK PROFILES
TRACKS FAND G

SCALE: 1:50 | SHEET NO. 17 OF 40 SHEETS




2 TRACK G
Scale: H: 1" = 50' V: 1" = 10'




3 TRACK G
Scale: H: 1" = 50' V: 1" = 10'

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TEXAS P.E FIRM REGISTRATION NO. F-754

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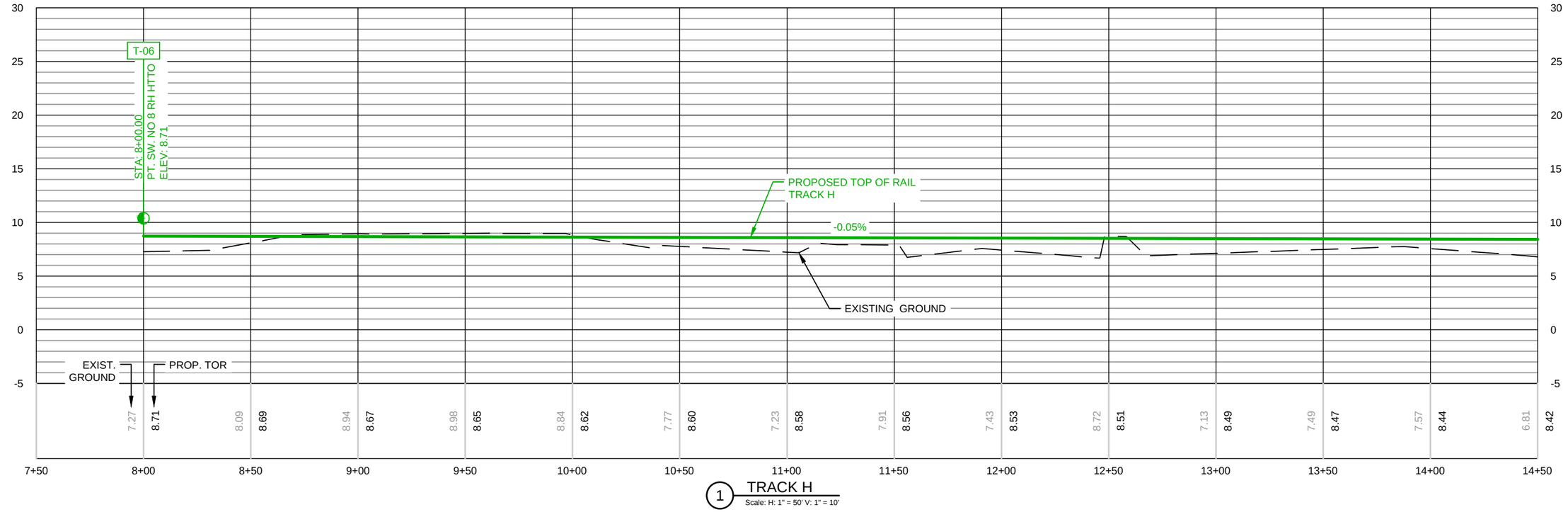
Westplains

**BROWNSVILLE, CAMERON COUNTY, TX**
**PORT OF BROWNSVILLE**
**WEST PLAINS RAIL PLANS**

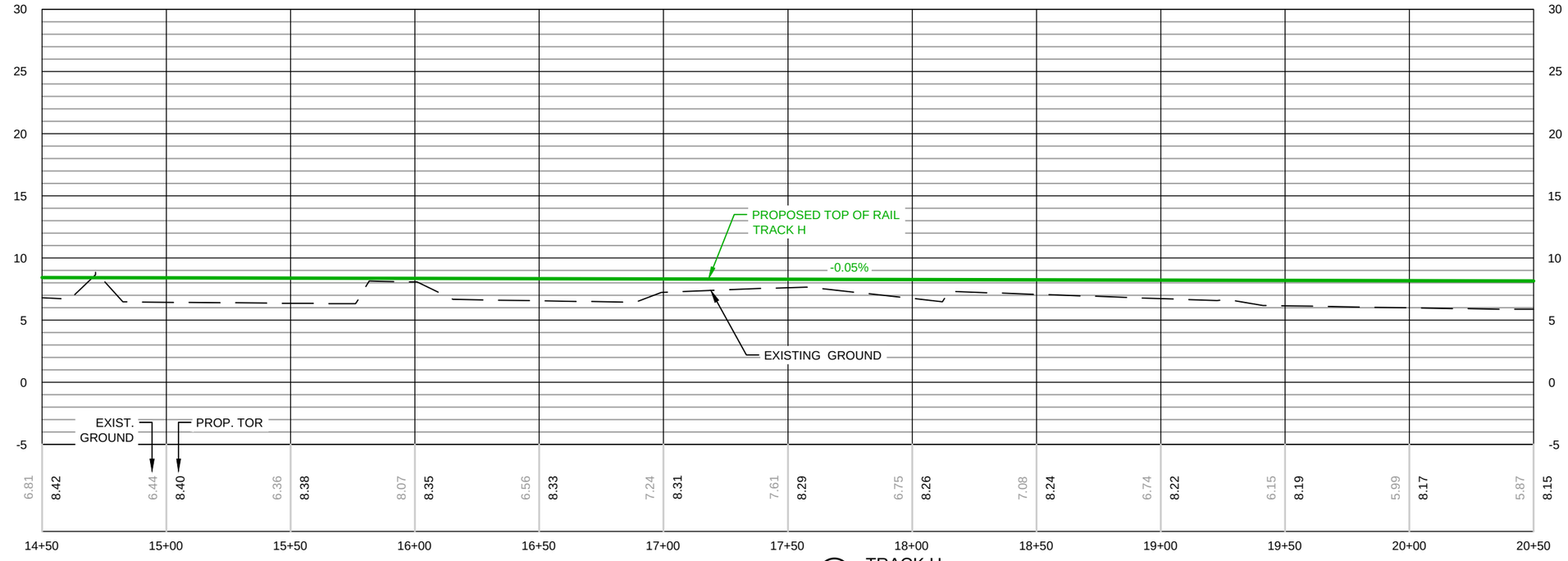
TRACK PROFILES
TRACK G

SCALE: 1:50 | SHEET NO. 18 OF 40 SHEETS




1 TRACK H

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




2 TRACK H

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

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TEXAS P.E FIRM REGISTRATION NO. F-754

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Westplains

**BROWNSVILLE, CAMERON COUNTY, TX**
**PORT OF BROWNSVILLE**
**WEST PLAINS RAIL PLANS**

TRACK PROFILES
TRACK H

SCALE: 1:50

SHEET NO. 19 OF 40 SHEETS

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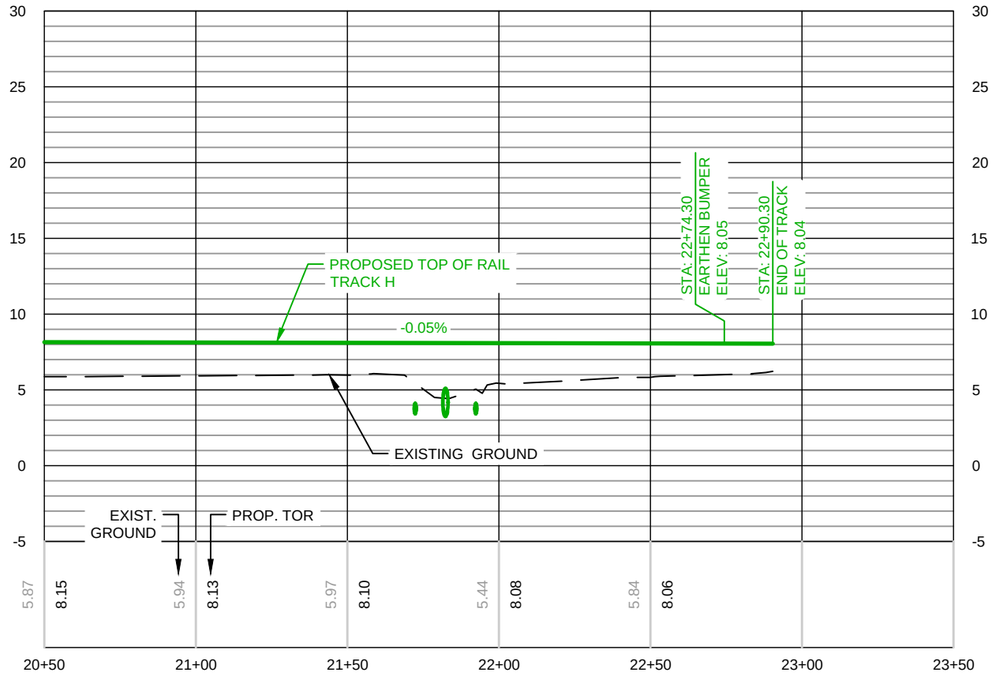


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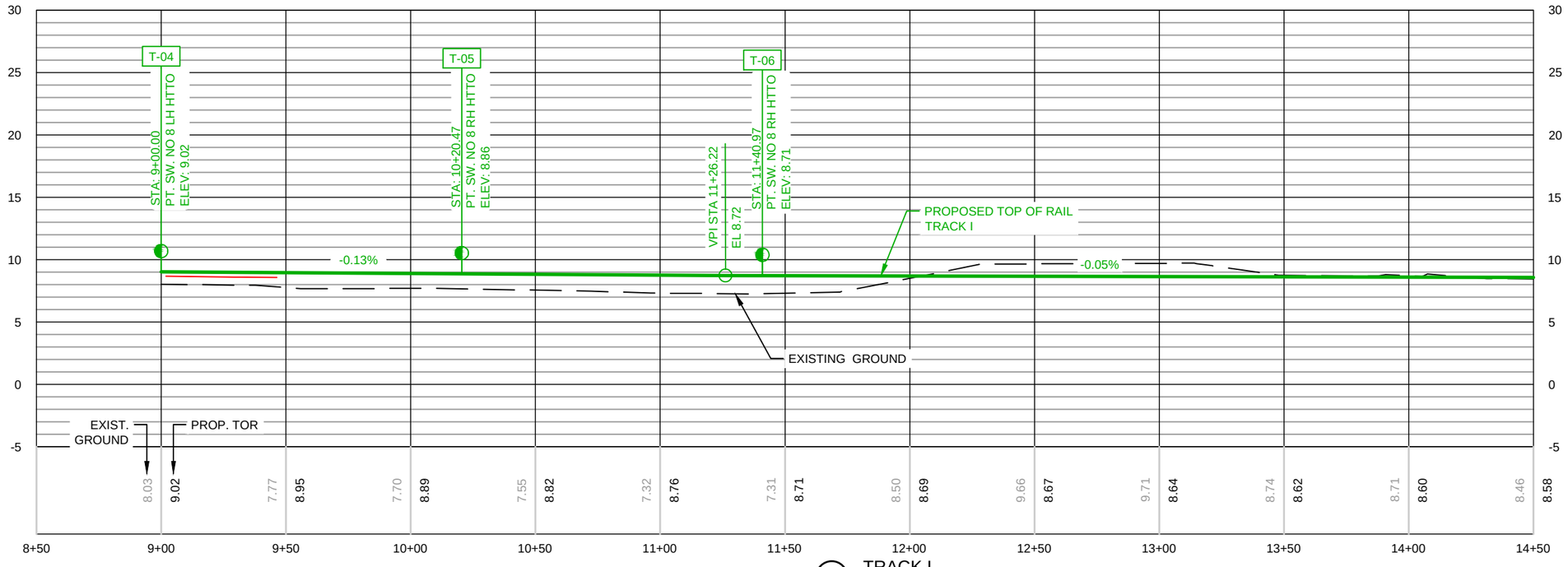


1 TRACK I
Scale: H: 1" = 50' V: 1" = 10'

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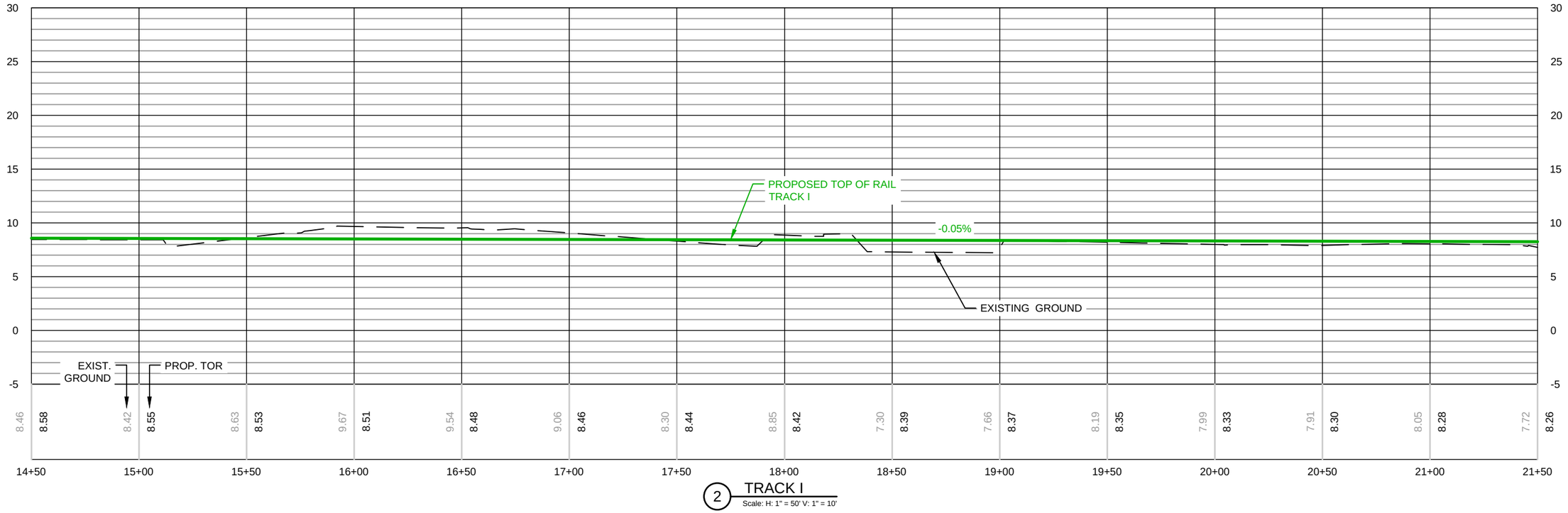
| PLOT DATE = 2022-09-22 | DATE - 2022-09-22 | REVISED | REVISED | REVISED |

TEXAS P.E FIRM REGISTRATION NO. F-754

**BROWNSVILLE, CAMERON COUNTY, TX**
**PORT OF BROWNSVILLE**
**WEST PLAINS RAIL PLANS**

TRACK PROFILES
TRACKS H AND I

SCALE: 1:50 | SHEET NO. 20 OF 40 SHEETS

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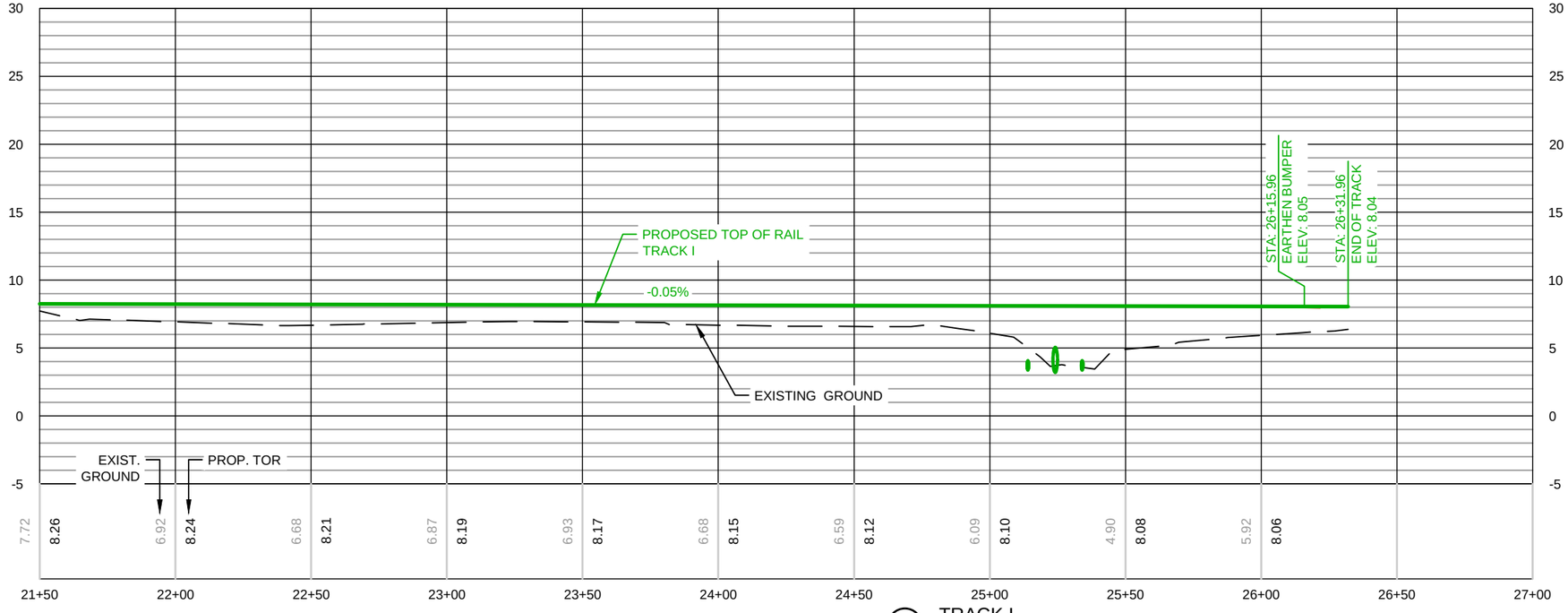


3 TRACK I
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TEXAS P.E FIRM REGISTRATION NO. F-754

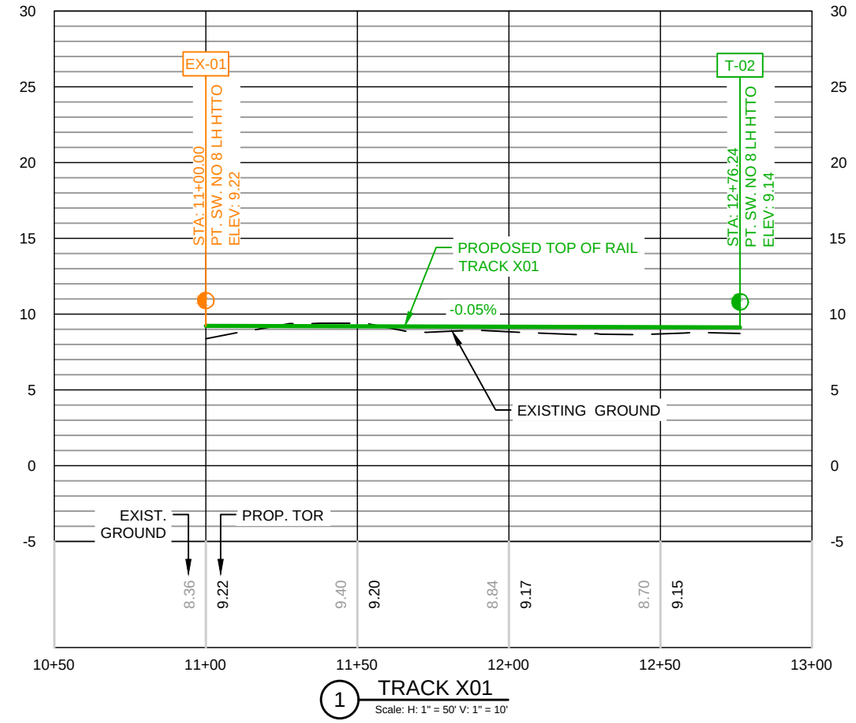
OmniTRAX

Westplains

**BROWNSVILLE, CAMERON COUNTY, TX**
**PORT OF BROWNSVILLE**
**WEST PLAINS RAIL PLANS**

TRACK PROFILES
TRACK I

SCALE: 1:50 | SHEET NO. 21 OF 40 SHEETS

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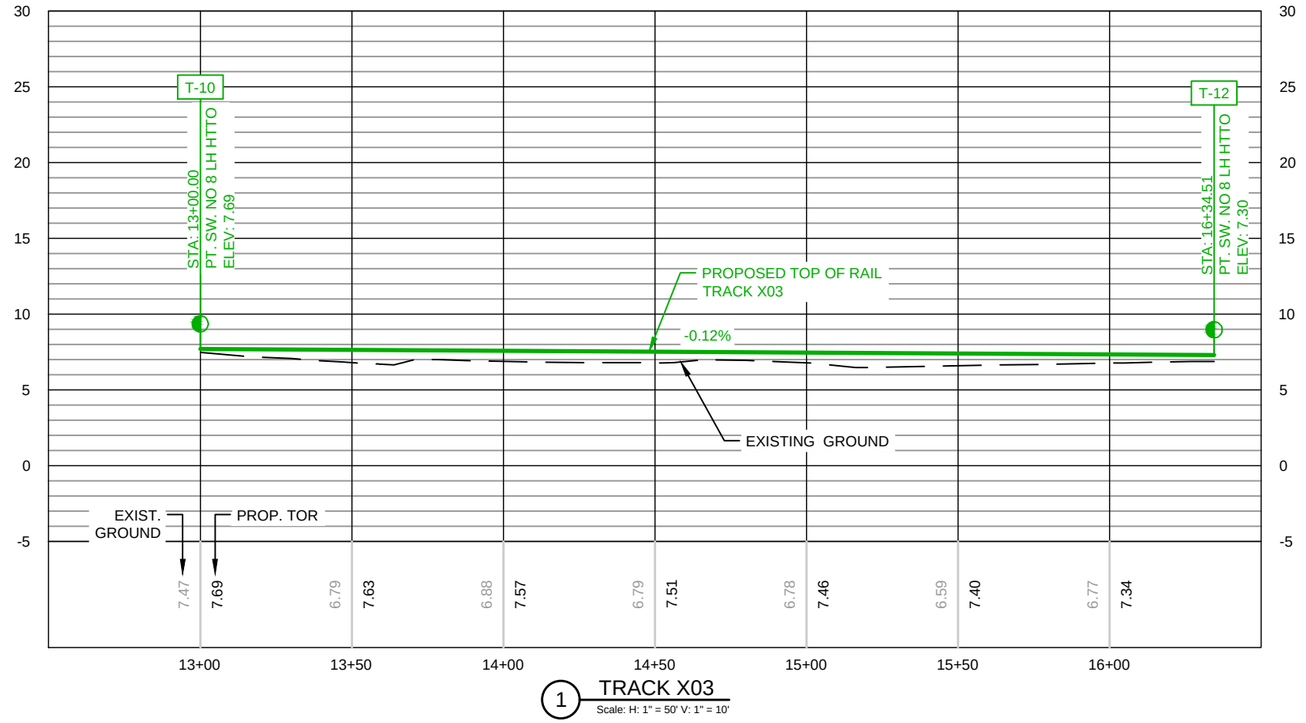


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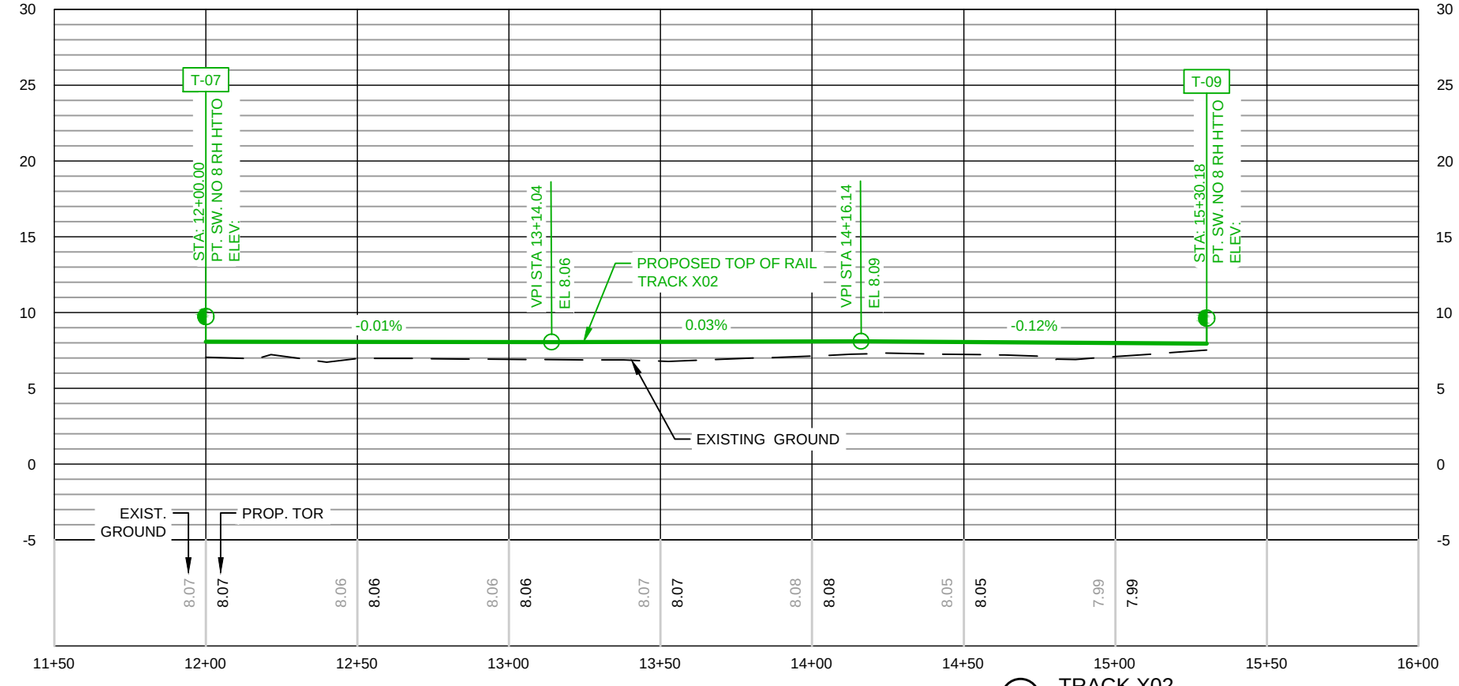


1 TRACK X02
Scale: H: 1" = 50' V: 1" = 10'

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TEXAS P.E FIRM REGISTRATION NO. F-754

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Westplains

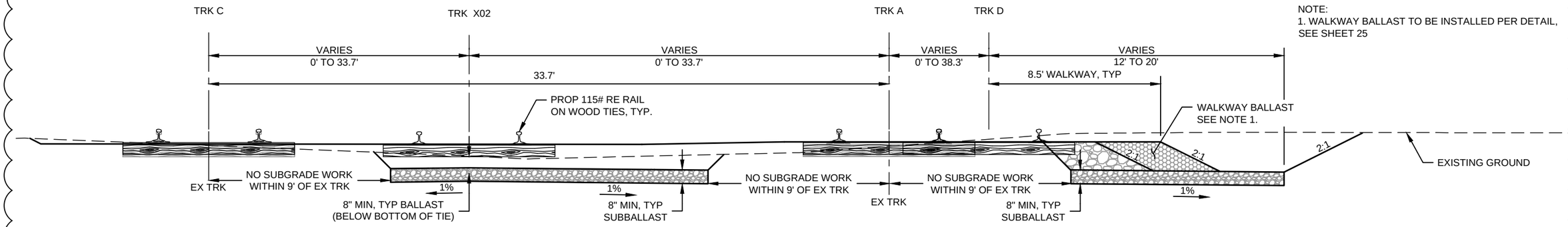
**BROWNSVILLE, CAMERON COUNTY, TX**
**PORT OF BROWNSVILLE**
**WEST PLAINS RAIL PLANS**

TRACK PROFILES
TRACKS X01, X02 AND X03

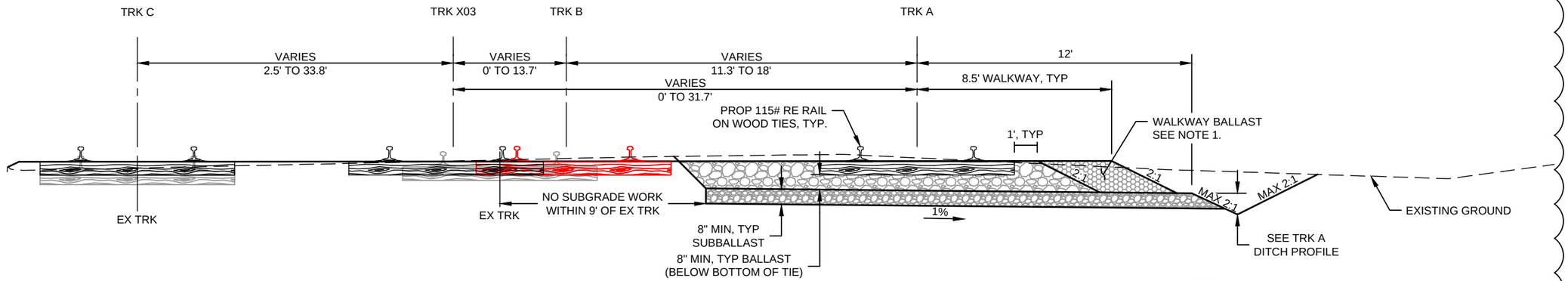
SCALE: 1:50 | SHEET NO. 22 OF 40 SHEETS

PE STAMP

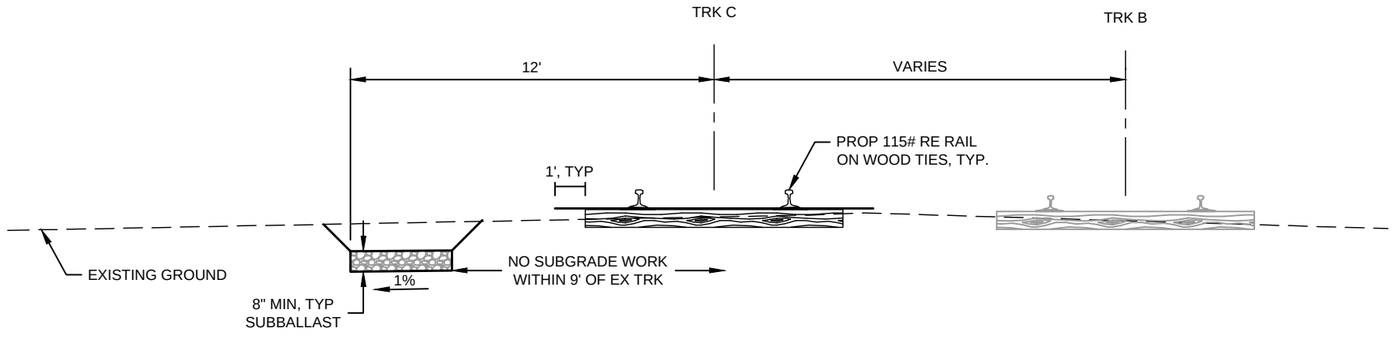
NOTE:
1. WALKWAY BALLAST TO BE INSTALLED PER DETAIL, SEE SHEET 25




TYPICAL TRACK SECTION - A
TRK C STA 7+64 TO 11+22




TYPICAL TRACK SECTION - C
TRK A STA 11+06 TO 13+89

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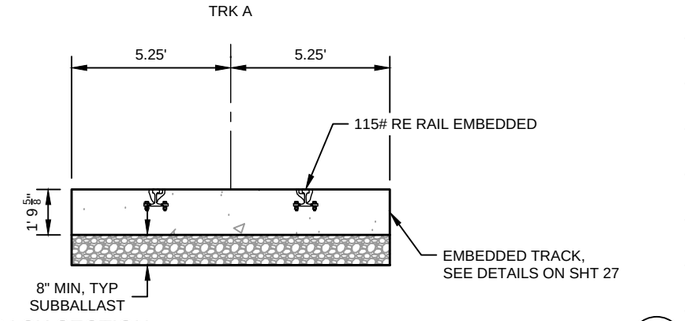


TYPICAL TRACK SECTION - B
TRK A STA 10+15.87 TO 10+25.87 AND TRK A STA 10+49.95 TO 10+59.95

RECENT PRELIMINARY GEOTECHNICAL REPORT WILL REQUIRE A DEEPER SUBBALLAST SECTION OF UP TO 24" AND SUBGRADE PREPARATION AND/OR GEOGRID.... TBD

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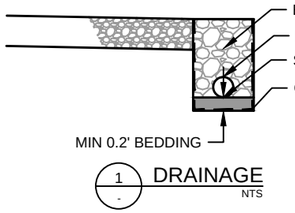
TEXAS P.E FIRM REGISTRATION NO. F-754

BROWNSVILLE, CAMERON COUNTY, TX
PORT OF BROWNSVILLE
WEST PLAINS RAIL PLANS

TRACK TYPICALS

SCALE: NTS

SHEET NO. 23 OF 40 SHEETS

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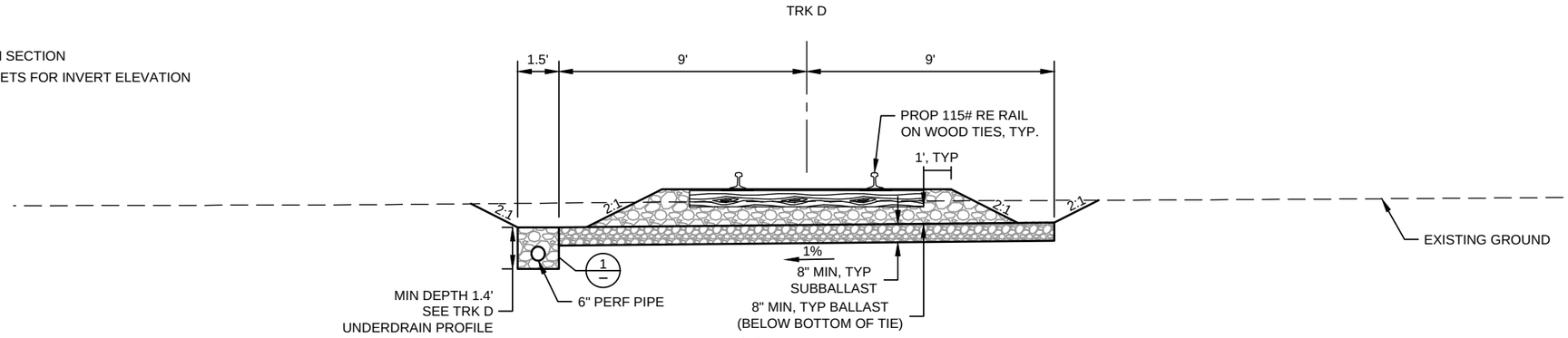
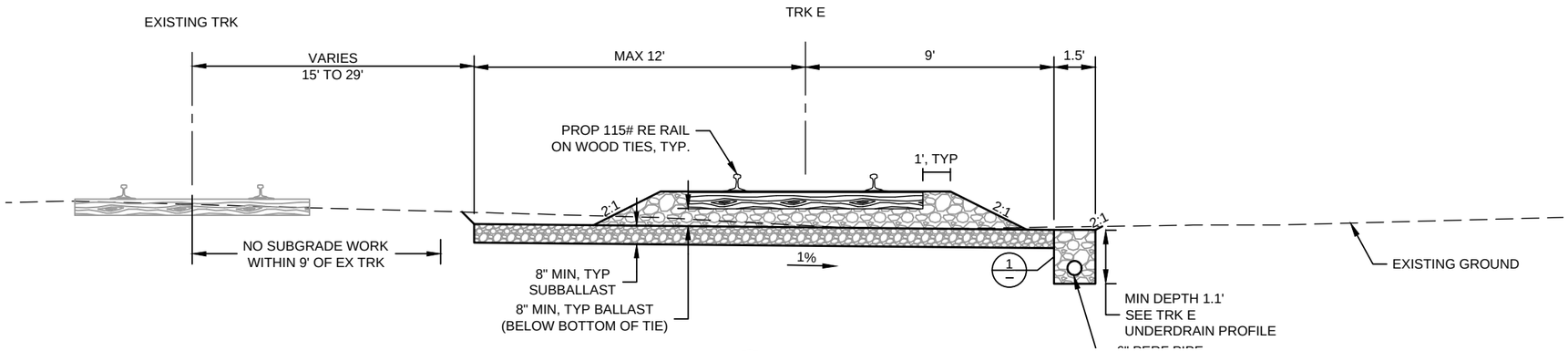



TYPICAL TRACK SECTION - TRK D STA 4+00 TO 9+92 — E

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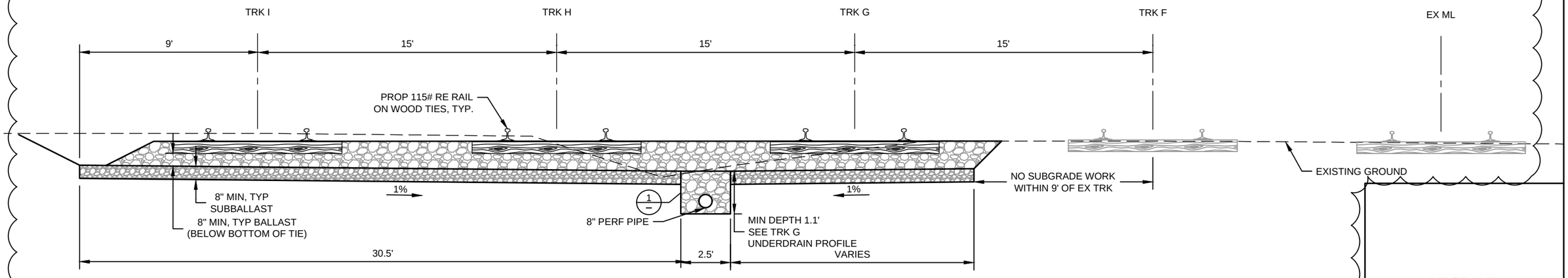


TYPICAL TRACK SECTION - TRK F STA 6+00 TO 24+93 — G

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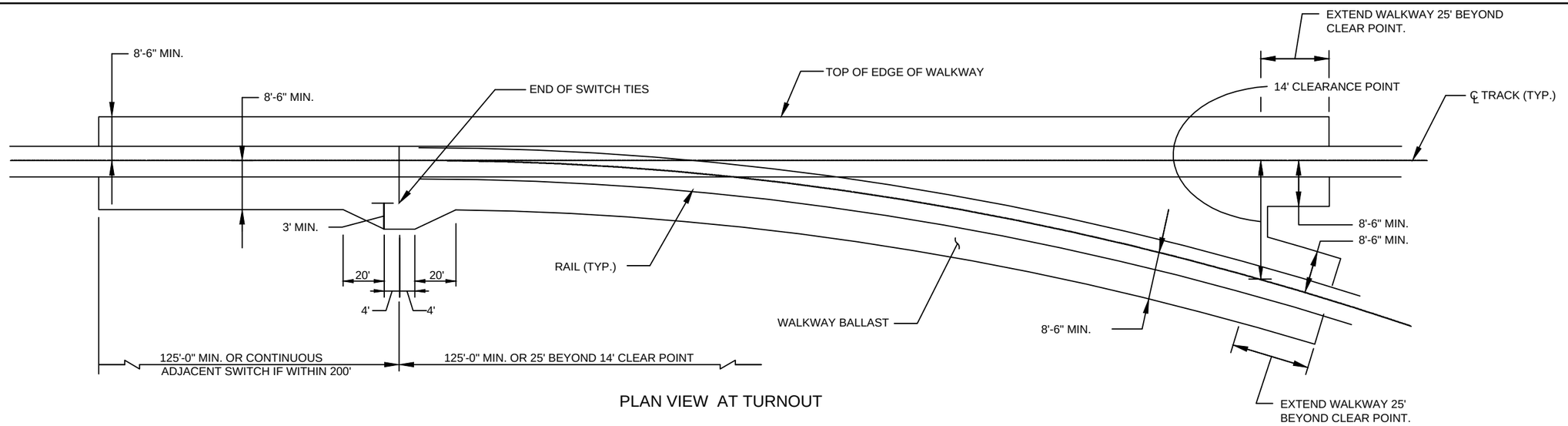
TEXAS P.E FIRM REGISTRATION NO. F-754

**BROWNSVILLE, CAMERON COUNTY, TX**
**PORT OF BROWNSVILLE**
**WEST PLAINS RAIL PLANS**

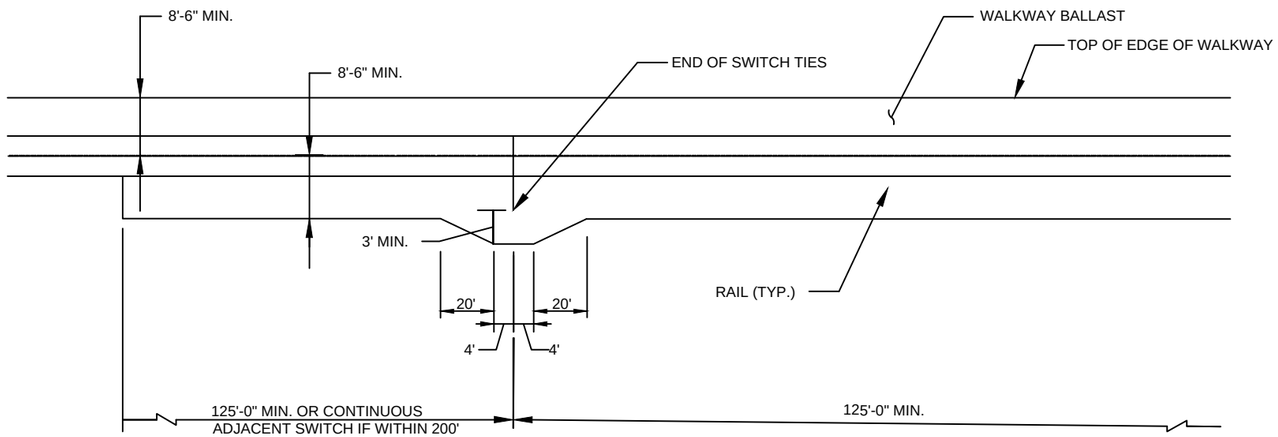
TRACK TYPICALS

SCALE: NTS

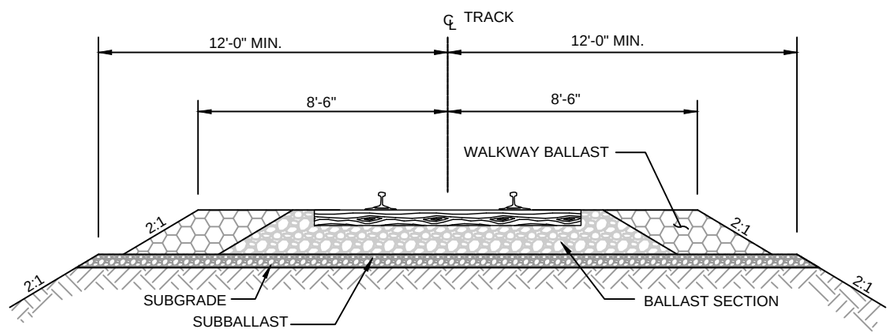
SHEET NO. 24 OF 40 SHEETS



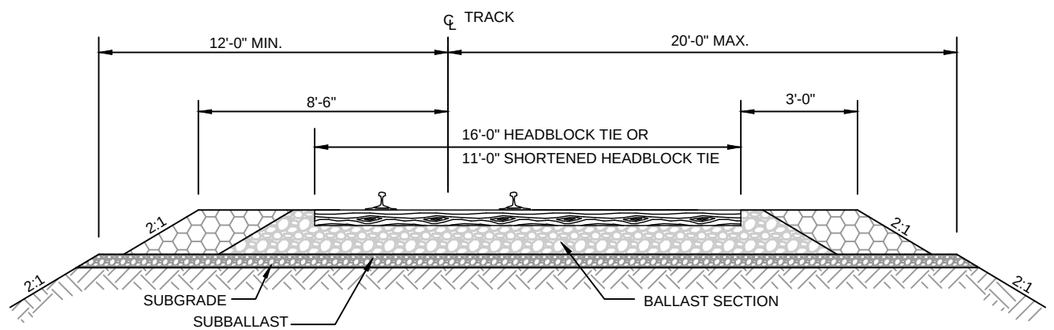

PLAN VIEW AT TURNOUT




PLAN VIEW AT DERAIL




STANDARD WALKWAY SECTION




WALKWAY SECTION AT SWITCH STAND

TYPICAL WALKWAY & PLAN AT TURNOUT AND DERAIL

1
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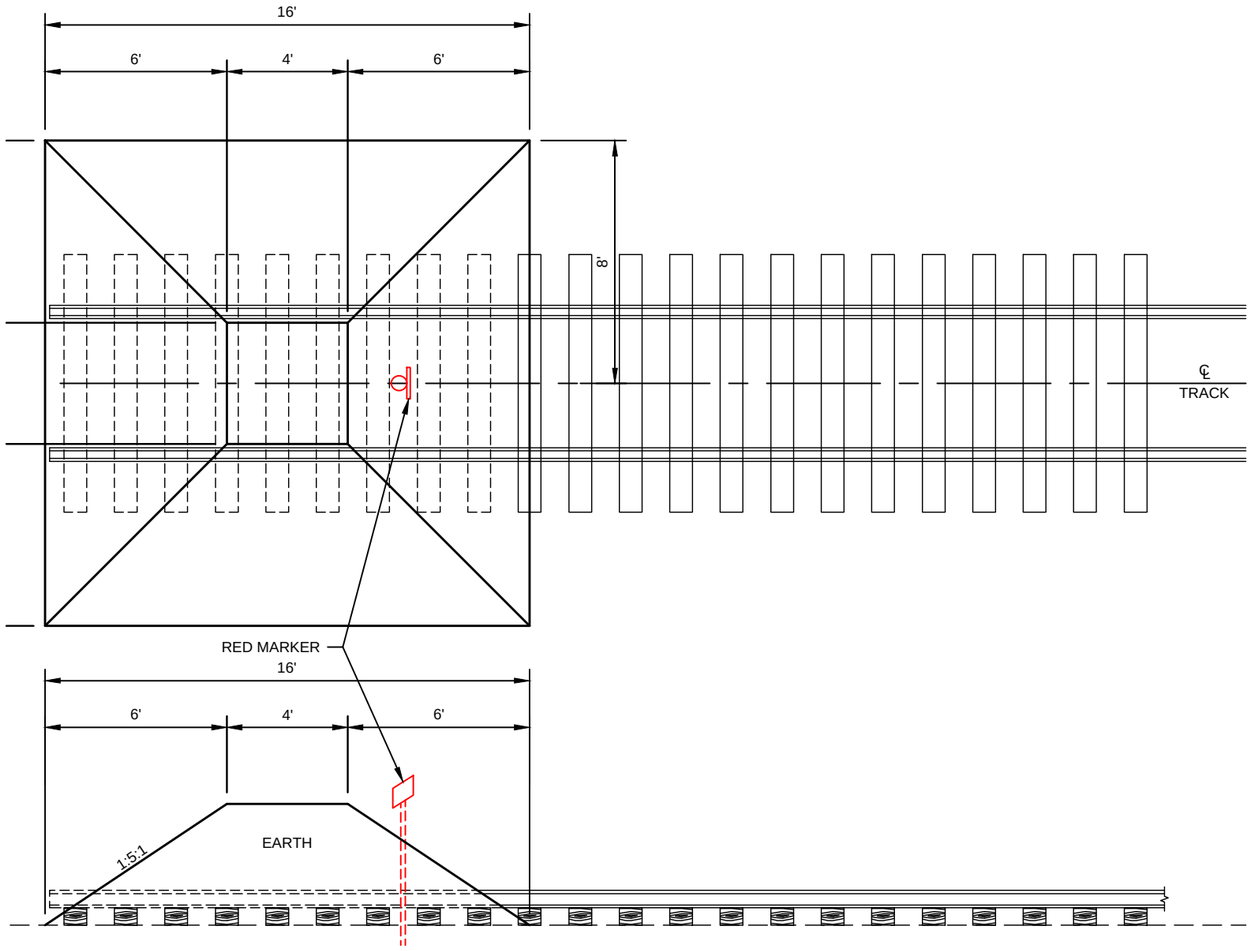
TEXAS P.E FIRM REGISTRATION NO. F-754

BROWNSVILLE, CAMERON COUNTY, TX
PORT OF BROWNSVILLE
WEST PLAINS RAIL PLANS

TRACK DETAILS

SCALE: NTS

SHEET NO. 25 OF 40 SHEETS




DETAIL – EARTHEN BUMPER

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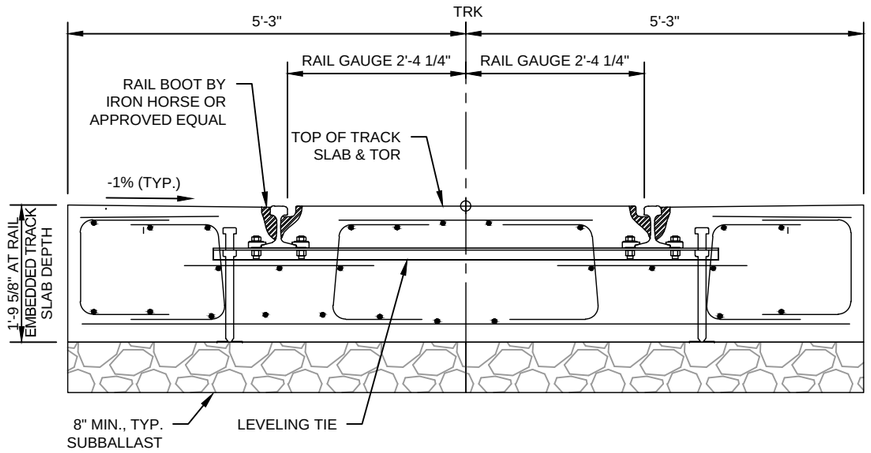
TEXAS P.E FIRM REGISTRATION NO. F-754

**BROWNSVILLE, CAMERON COUNTY, TX**
**PORT OF BROWNSVILLE**
**WEST PLAINS RAIL PLANS**

TRACK DETAILS

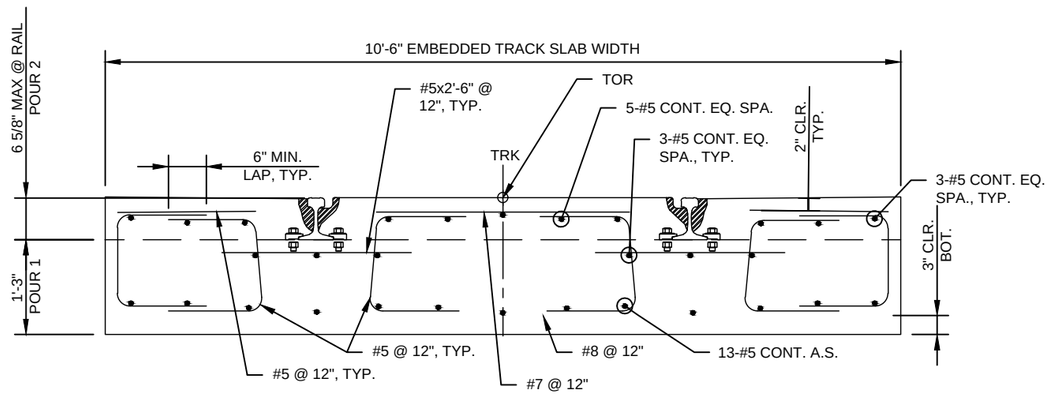
SCALE: NTS

SHEET NO. 26 OF 40 SHEETS



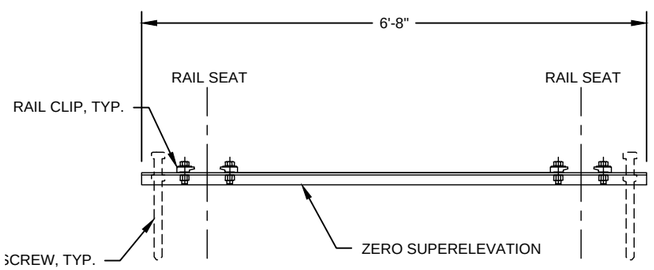

NON–REMOVABLE RAIL EMBEDDED TRACK DETAIL 1

NTS



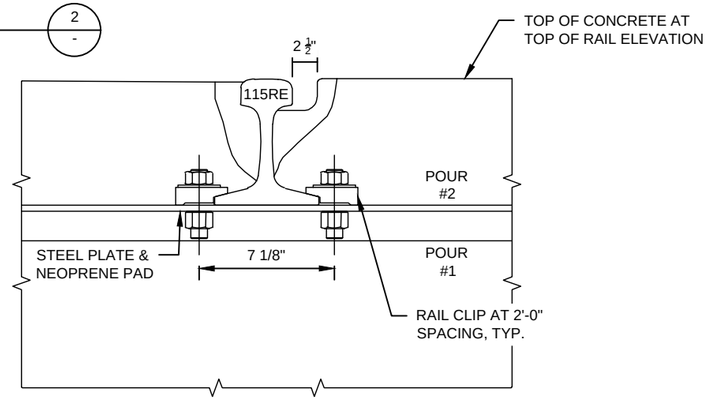

EMBEDDED TRACK SLAB REINFORCING 2

NTS




LEVELING TIE DETAIL 3

NTS




EMBEDDED TRACK RAIL ANCHOR DETAILS 4

NTS

STRUCTURAL GENERAL NOTES

SHOP DRAWINGS AND SUBMITTALS:

1. REVIEW OF SHOP DRAWINGS BY THE ENGINEER IS LIMITED TO COMPLIANCE OF THE COMPLETED STRUCTURE WITH THE DESIGN CONCEPT AND INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR DIMENSIONS, QUANTITIES, PERFORMANCE, SAFETY, COORDINATION WITH OTHER WORK, AND ALL OTHER REQUIREMENTS OF THE CONTRACT DOCUMENTS. REVIEW DOES NOT AUTHORIZE CHANGES TO CONTRACT.
2. CONTRACTOR SHALL PROVIDE SHOP DRAWINGS AND/OR MATERIAL CERTIFICATIONS FOR APPROVAL PRIOR TO CONSTRUCTION INCLUDING BUT NOT LIMITED TO THE FOLLOWING ITEMS:
   - CONCRETE MIX DESIGN
   - REINFORCING STEEL
   - LEVELING TIES AND ASSOCIATED HARDWARE
   - SILICONE SEALANT PRODUCT DATA
   - BOND BREAK PRODUCT DATA
   - EMBEDDED TRACK RAIL ANCHOR SHOP DRAWING AND LIST OF HARDWARE / FASTENER DATA
   - DETAILED WORK PLAN LISTING EACH INDIVIDUAL WORK TASK REQUIRED TO CONSTRUCT THE EMBEDDED TRACK

FOUNDATION:

1. TRACK SLAB HAS BEEN DESIGNED FOR A SOIL BEARING CAPACITY OF 4000 PSC, A MODULUS OF SUBGRADE REACTION OF 200 LB PER CUBIC IN, AND A MAXIMUM SETTLEMENT OF 1" UNDER SERVICE LOADING. CONTRACTOR SHALL VERIFY BEARING CAPABILITIES AND SOIL PARAMETERS
2. REINFORCING: CLEAR DISTANCE FROM FACE OF CONCRETE TO REINFORCING STEEL SHALL BE AS SHOWN ON THE TRACK SLAB SECTION. WHERE CLEAR DISTANCE IS NOT SHOWN, AREMA SHALL CONTROL.

CONCRETE NOTES:

1. CONCRETE SHALL BE ENTRAINED 6%+/- 1.5%, SHALL BE NORMAL WEIGHT CONCRETE, AND SHALL ACHIEVE A 28- DAY COMPRESSIVE STRENGTH OF 4000 PSI. CONCRETE SHALL USE TYPE II PORTLAND CEMENT.
2. ALL REINFORCING STEEL SHALL CONFORM TO THE REQUIREMENTS OF ASTM A 615, GRADE 60, UNLESS NOTED OTHERWISE ON DRAWING. ALL REINFORCING SHALL BE NON-EPOXY COATED.
3. REINFORCEMENT SHALL BE FREE OF LOOSE RUST, OIL OR OTHER MATERIAL AND SHALL BE SECURELY FASTENED TO PRESENT DISPLACEMENT DURING PLACING OF CONCRETE.
4. REINFORCING BARS SHALL NOT BE TACK OR SPOT WELDED FOR ANY PURPOSE.
5. ALL EXPOSED EDGES OF CONCRETE FOUNDATIONS AND STRUCTURES SHALL HAVE A " 45 DEG. CHAMFER AT HORIZONTAL AND VERTICAL CORNERS, UNLESS OTHERWISE NOTED.
6. DETAILING OF REINFORCING SHALL CONFORM TO THE REQUIREMENTS OF ACI 315, MANUAL OF STANDARD PRACTICE AND DETAILS SHOWN ON DRAWINGS FOR DETAILING REINFORCED CONCRETE STRUCTURES. HOOKS SHALL BE STANDARD ACI HOOKS UNLESS NOTED OTHERWISE.
7. CURE CONCRETE IN ACCORDANCE WITH ACI-308 USING A CURING COMPOUND.
8. LAPS, ANCHORAGES AND SPLICES SHALL COMPLY WITH THE REQUIREMENTS OF AREMA, BUT IN NO CASE SHALL LAPS AND SPLICES BE LESS THAN 40 BAR DIAMETERS UNLESS NOTED ON DRAWINGS. ALL LAP SPLICES SHALL BE TENSION LAP CLASS B SPLICES FOR 60 GRADE STEEL AND 4000 PSI CONCRETE.
9. PROVIDE A SMOOTH BROOM FINISH ON TOP OF THE TRACK SLAB. BROOMING SHALL BE PERPENDICULAR TO THE CENTER LINE OF THE TRACK
10. WHEN POURING CONCRETE IN COLD WEATHER (BELOW 40 F) ACI3O6R-16 "GUIDE TO COLD WEATHER CONCRETING" SHALL BE FOLLOWED. WHEN POURING CONCRETE IN HOT WEATHER (ABOVE 90 F) ACI3O5.1-14 "SPECIFICATION FOR HOT HEATHER CONCRETING" SHALL BE FOLLOWED.
11. ALL CONCRETE POURS SHALL BE MONOLITHIC FROM EXPANSION JOINT TO EXPANSION JOINT. INTERMEDIATE LATERAL COLD JOINTS BETWEEN EXPANSION JOINTS ARE NOT PERMITTED. EXPANSION JOINTS SHALL HAVE A MAXIMUM SPACING OF 200 FEET. CONSTRUCTION JOINTS SHALL BE EVENLY SPACED BETWEEN EXPANSION JOINTS WITH A MAXIMUM SPACING OF 60 FEET.

NOTES:

1. STEEL PLATE MINIMUM DIMENSIONS: $\frac{3}{4}$"x9"x10" WITH FOUR ANCHORS PER PLATE AND TWO RAIL CLIPS PER PLATE, NEOPRENE PAD DIMENSIONS SHALL BE AT A MINIMUM THE SIZE OF THE STEEL PLATE.
2. RAIL ANCHOR SHALL BE GALVANIZED $\frac{7}{8}$" THREADED ROD OR $\frac{7}{8}$" ANCHOR BOLT (8" MIN. EMBEDMENT DEPTH WITH 3" PROJECTION, ADJUSTMENT NUT, WASHER, AND LOCK NUT.
3. RAIL ANCHOR SHALL BE ASTM F1554 GRADE 36.
4. ALL EMBEDDED STEEL COMPONENTS PLATES, ANCHOR BOLTS, NUTS, WASHERS, RAIL CLIPS, AND LEVELING TIE SHALL BE GALVANIZED.
5. EMBEDDED TRACK RAIL ANCHORS SHALL BE SPACED AT A MAXIMUM OF 2'-0".

EMBEDDED TRACK STILL INVESTIGATING THE STRUCTURAL DESIGN

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| PLOT DATE = 2022-09-22 | DATE - 2022-09-22 | REVISED | REVISED | REVISED |

TEXAS P.E FIRM REGISTRATION NO. F-754

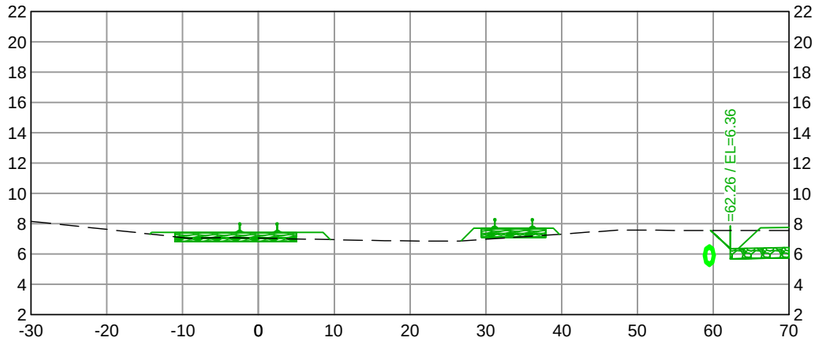
BROWNSVILLE, CAMERON COUNTY, TX
PORT OF BROWNSVILLE
WEST PLAINS RAIL PLANS

EMBEDDED TRACK DETAILS

SCALE: NTS

SHEET NO. 27 OF 40 SHEETS

TRK C - STA 7+63.81

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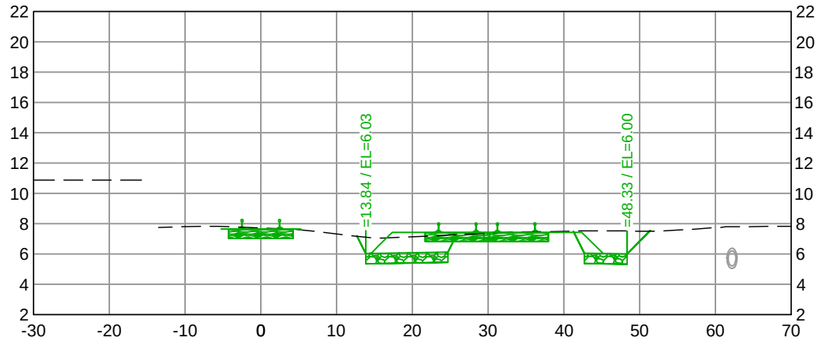
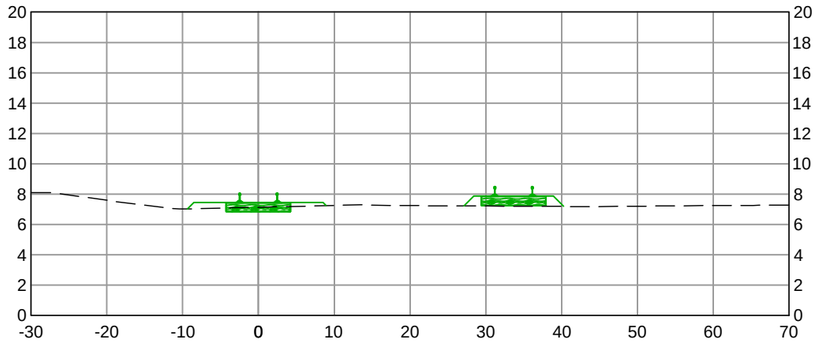
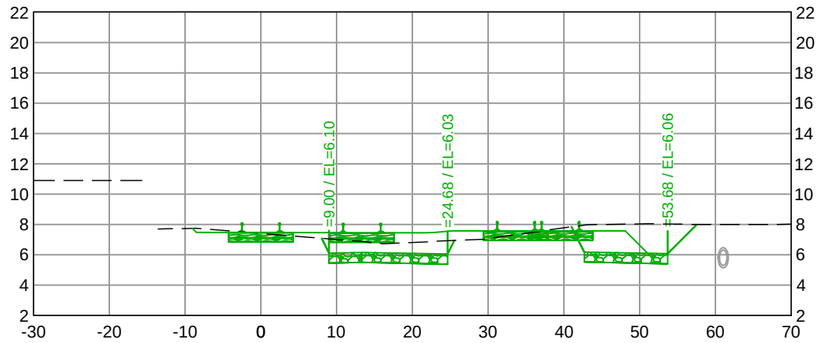


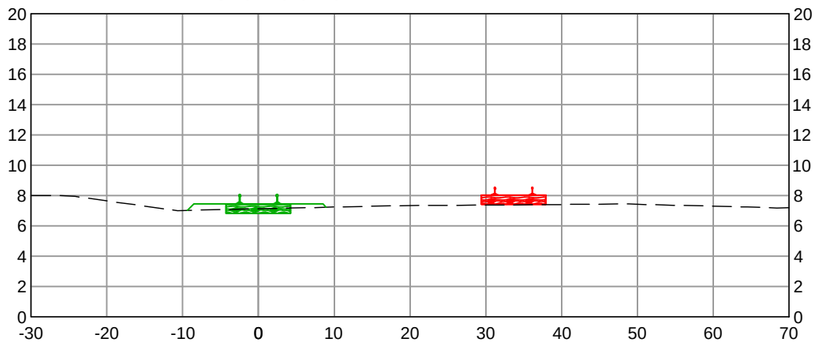

TRK C - STA 7+00.00



TRK C - STA 9+00.00




TRK C - STA 6+84.73



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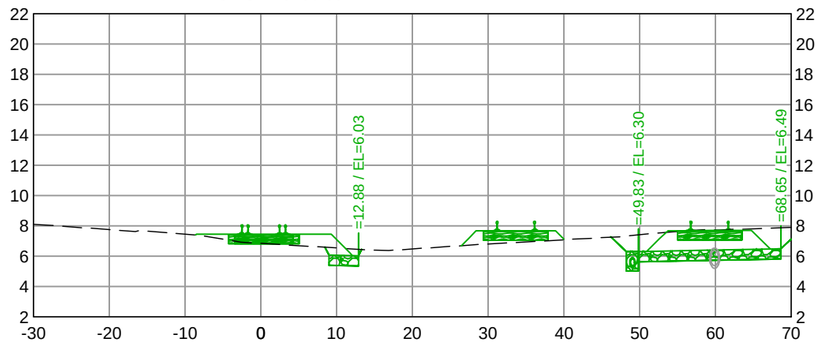


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| USER NAME = EBAYLEY | CHECKED - CRB | REVISED | REVISED | REVISED |
| PLOT DATE = 2022-09-22 | DATE - 2022-09-22 | REVISED | REVISED | REVISED |

TEXAS P.E FIRM REGISTRATION NO. F-754

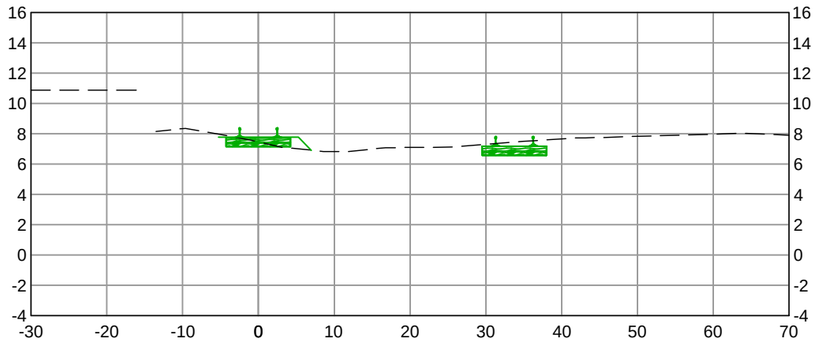
BROWNSVILLE, CAMERON COUNTY, TX
PORT OF BROWNSVILLE
WEST PLAINS RAIL PLANS

TRACK CROSS SECTIONS
TRACK C

SCALE: 1:20

SHEET NO. 28 OF 40 SHEETS

TRK C - STA 12+00.00



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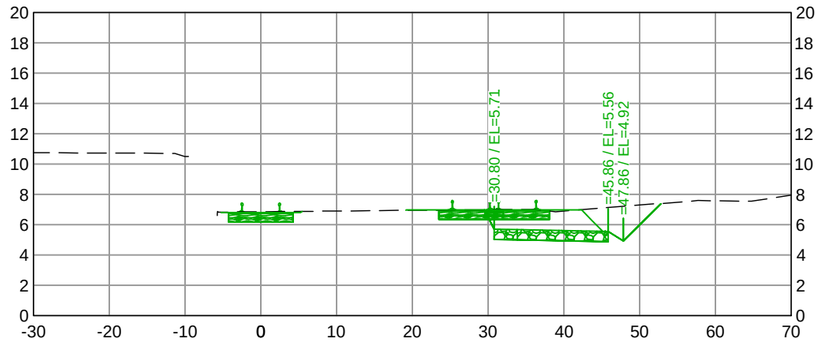
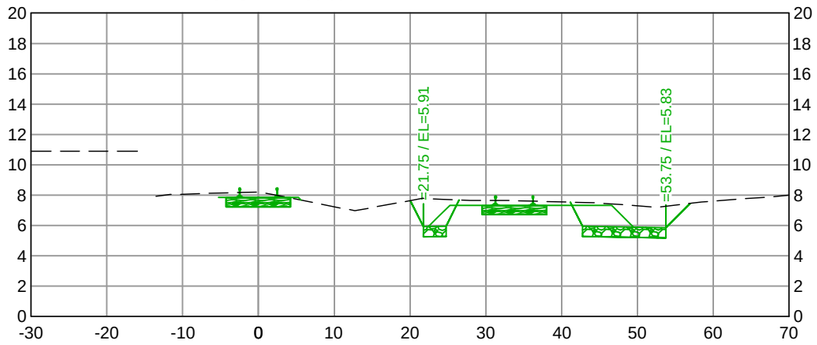
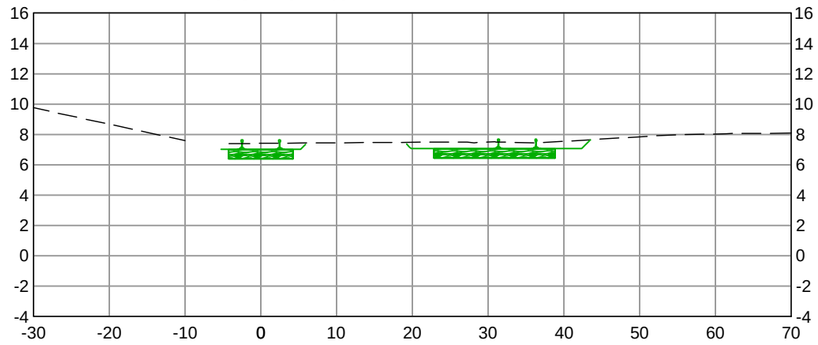


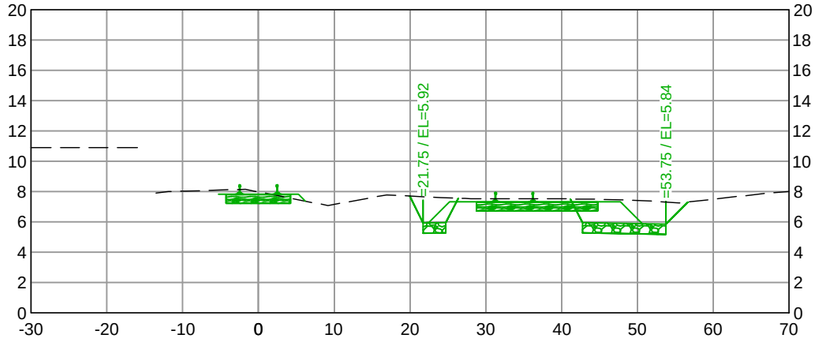

TRK C - STA 11+00.00



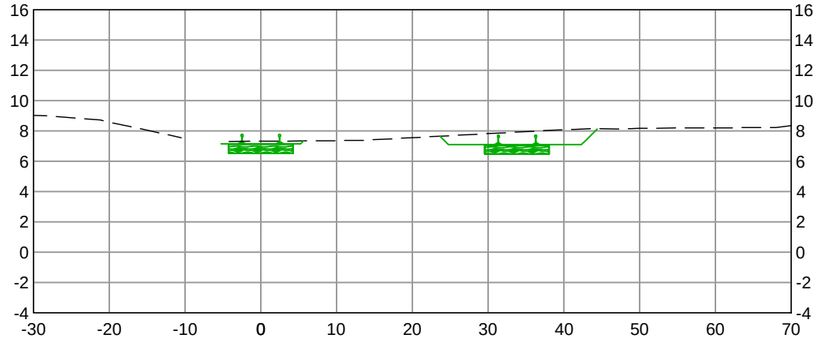

TRK C - STA 13+21.55



TRK C - STA 10+91.87




TRK C - STA 13+00.00



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TEXAS P.E FIRM REGISTRATION NO. F-754

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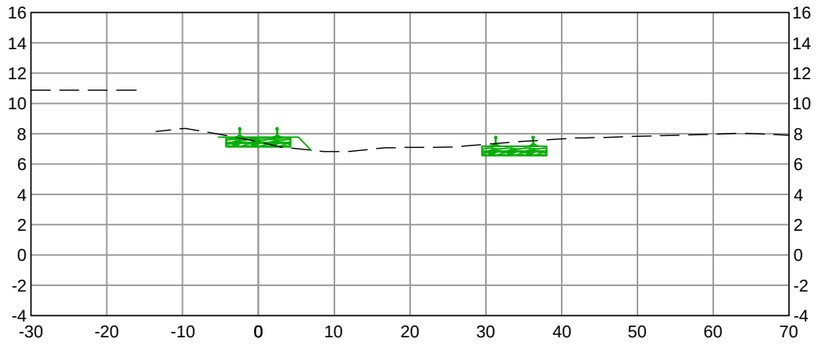
**BROWNSVILLE, CAMERON COUNTY, TX**
**PORT OF BROWNSVILLE**
**WEST PLAINS RAIL PLANS**

TRACK CROSS SECTIONS
TRACK C

SCALE: 1:20 | SHEET NO. 29 OF 40 SHEETS

TRK C - STA 12+00.00



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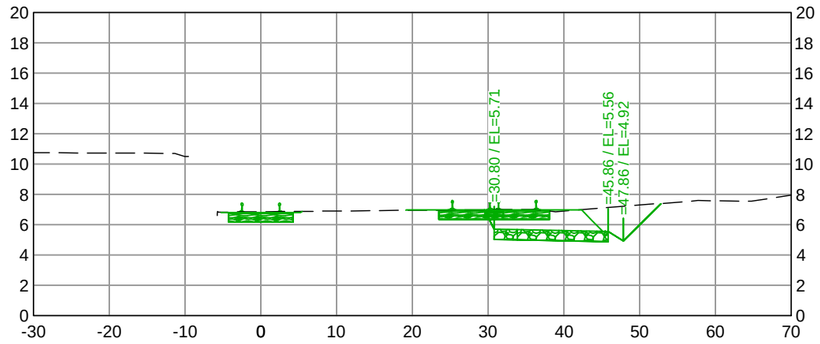


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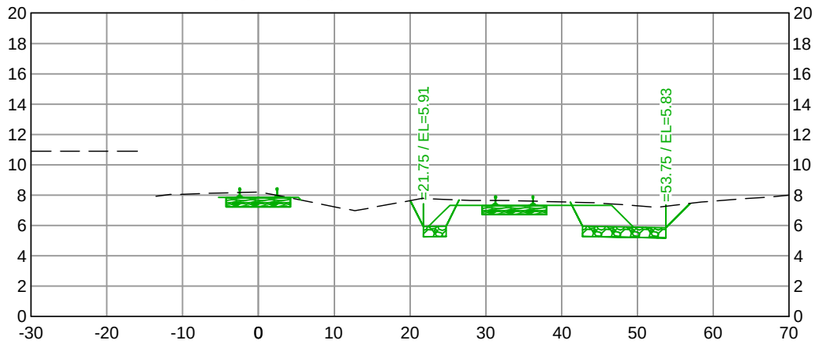


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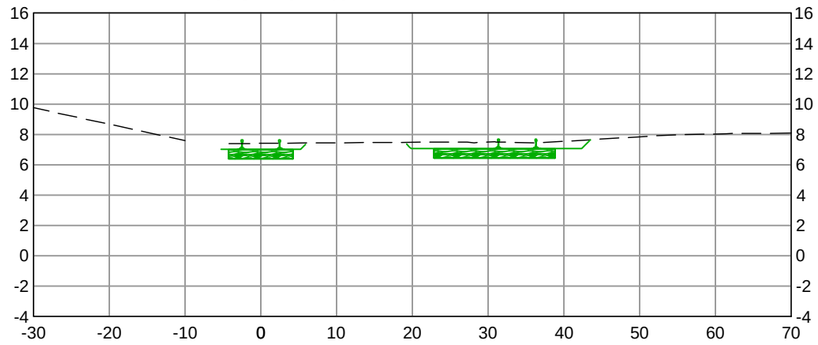

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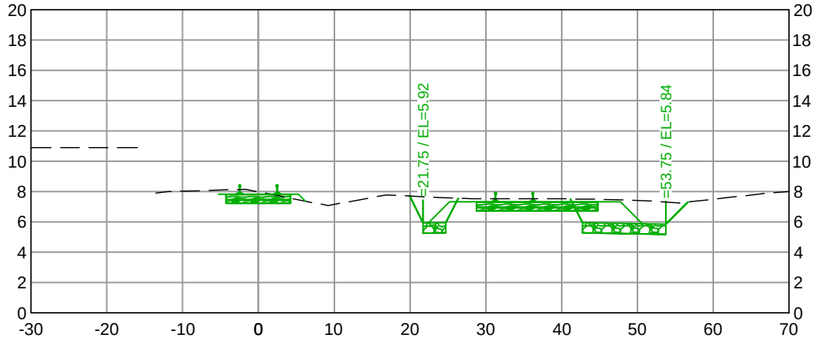


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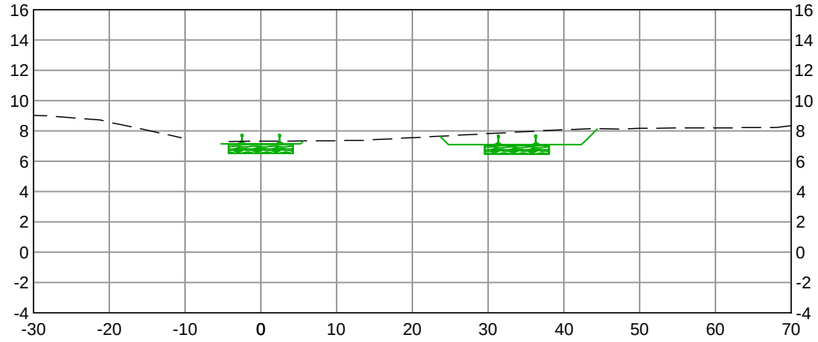

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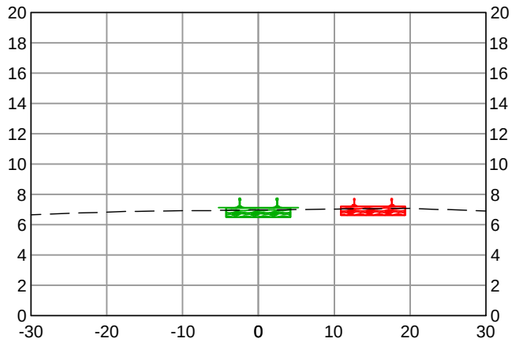
**BROWNSVILLE, CAMERON COUNTY, TX**
**PORT OF BROWNSVILLE**
**WEST PLAINS RAIL PLANS**

TRACK CROSS SECTIONS
TRACK C

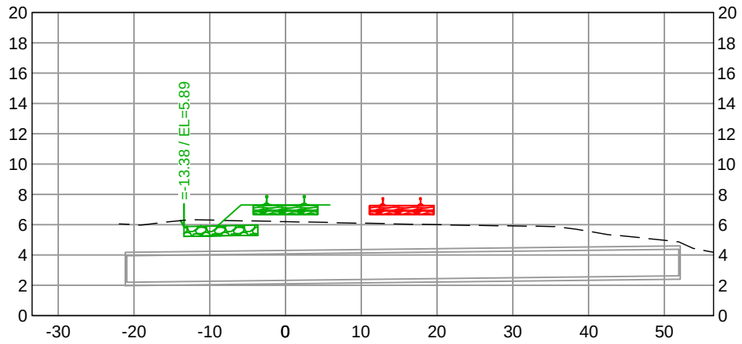
SCALE: 1:20 | SHEET NO. 30 OF 40 SHEETS

TRK C - STA 19+00.00

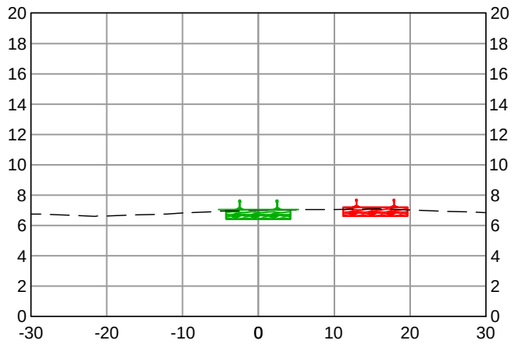



TRK C - STA 20+73.51

SECTION SKEWED ALONG CULVERT




TRK C - STA 18+67.97

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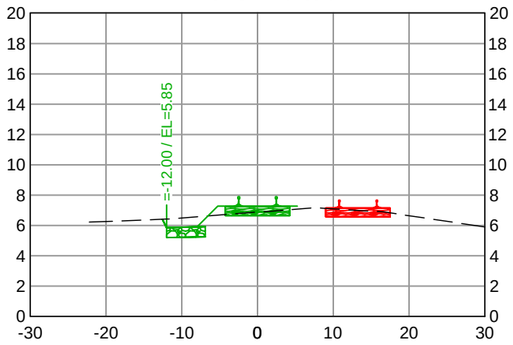
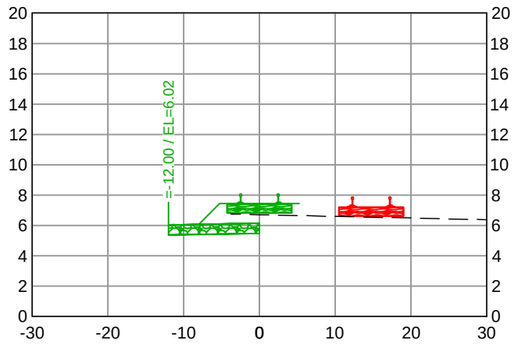



TRK C - STA 21+93.11

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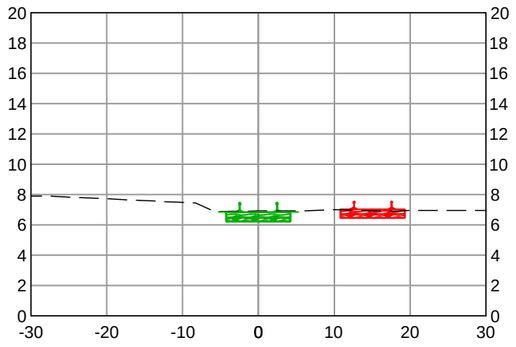


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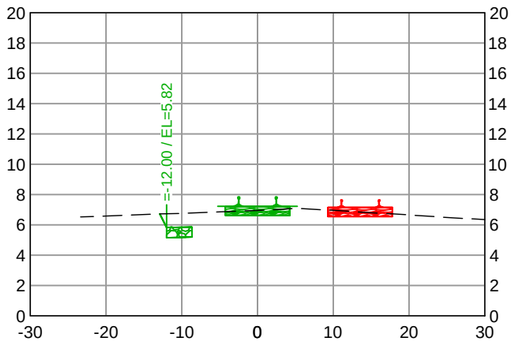


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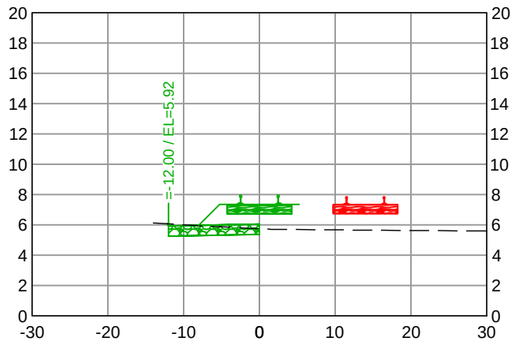


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| PLOT DATE = 2022-09-22 | DATE - 2022-09-22 | REVISED | REVISED | REVISED |

TEXAS P.E FIRM REGISTRATION NO. F-754

OmniTRAX

Westplains

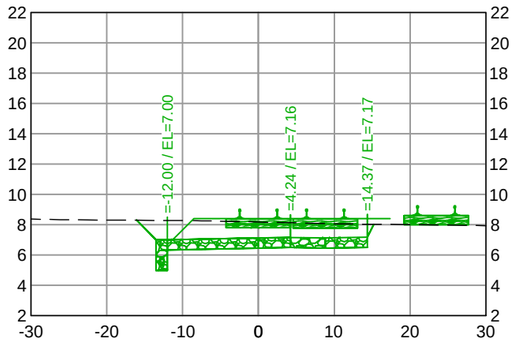
**BROWNSVILLE, CAMERON COUNTY, TX**
**PORT OF BROWNSVILLE**
**WEST PLAINS RAIL PLANS**

TRACK CROSS SECTIONS
TRACK C

SCALE: 1:20

SHEET NO. 31 OF 40 SHEETS

TRK D - STA 5+00.00

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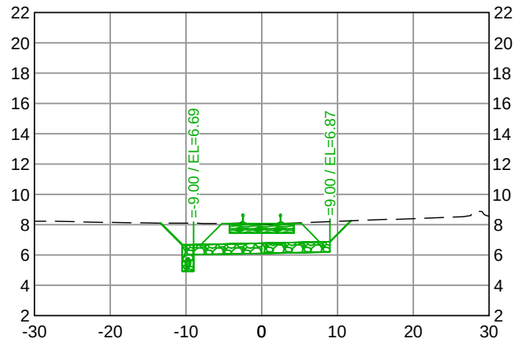
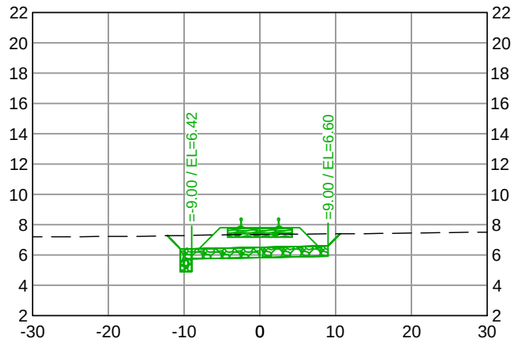
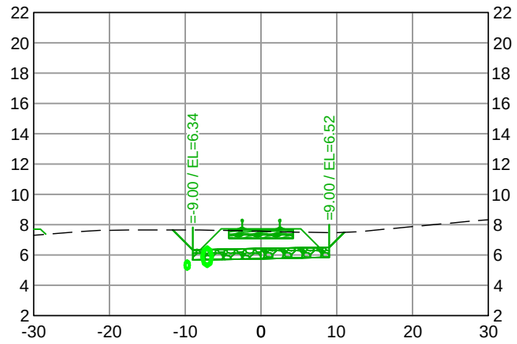


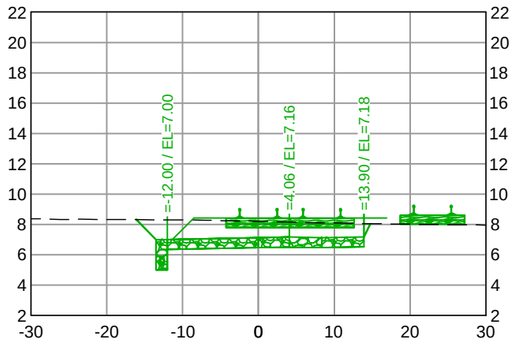

TRK D - STA 9+00.00



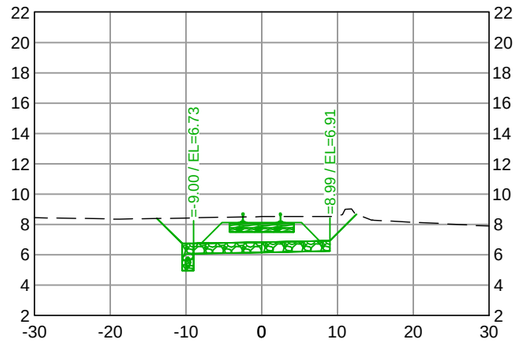

TRK D - STA 9+50.00




TRK D - STA 4+96.47




TRK D - STA 7+00.00

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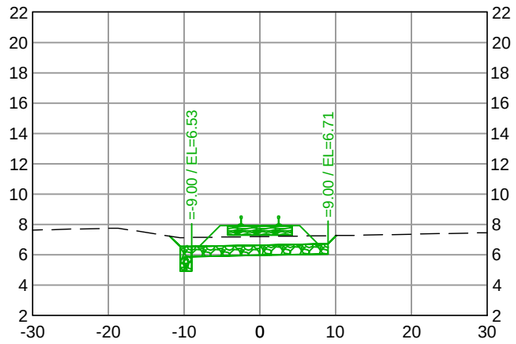
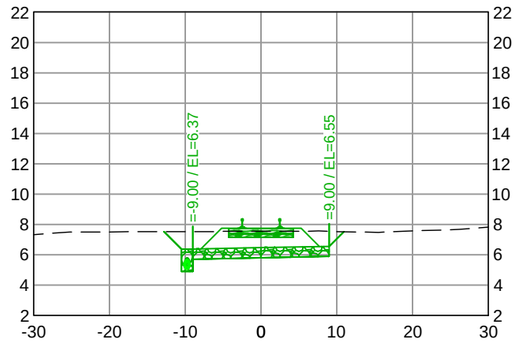
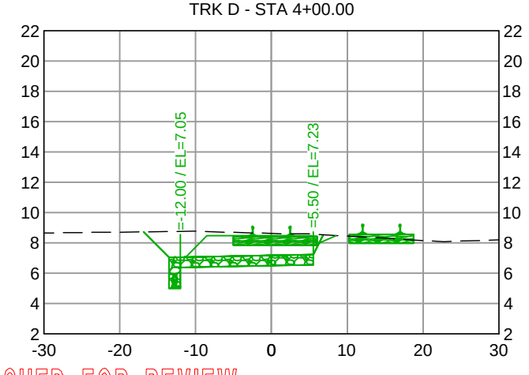


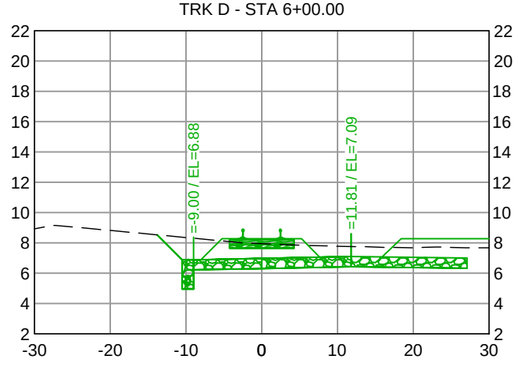

TRK D - STA 9+33.03



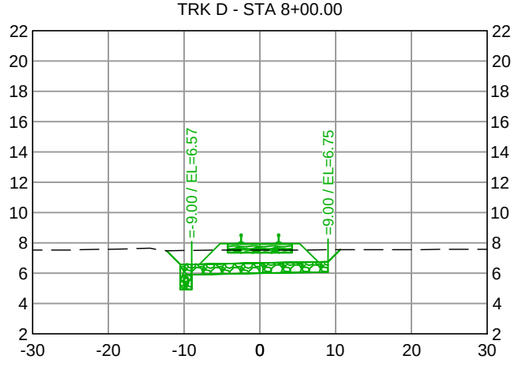

TRK D - STA 4+00.00




TRK D - STA 6+00.00




TRK D - STA 8+00.00

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| PLOT DATE = 2022-09-22 | DATE - 2022-09-22 | REVISED | REVISED | REVISED |

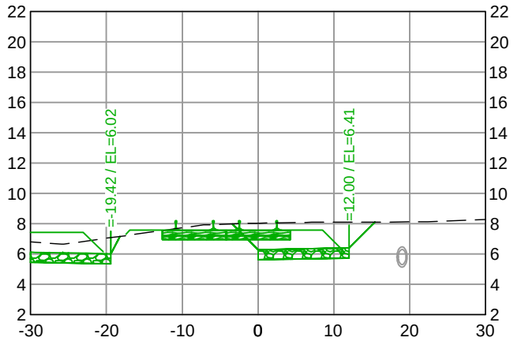
TEXAS P.E FIRM REGISTRATION NO. F-754

BROWNSVILLE, CAMERON COUNTY, TX
PORT OF BROWNSVILLE
WEST PLAINS RAIL PLANS

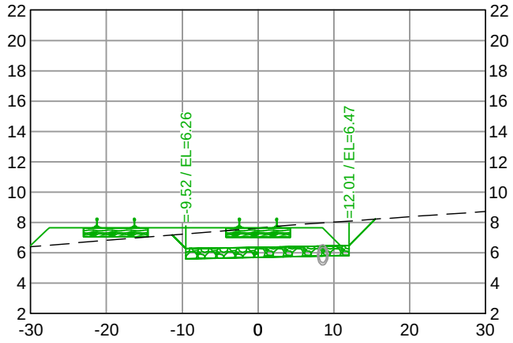
TRACK CROSS SECTIONS
TRACK D

SCALE: 1:20 | SHEET NO. 32 OF 40 SHEETS

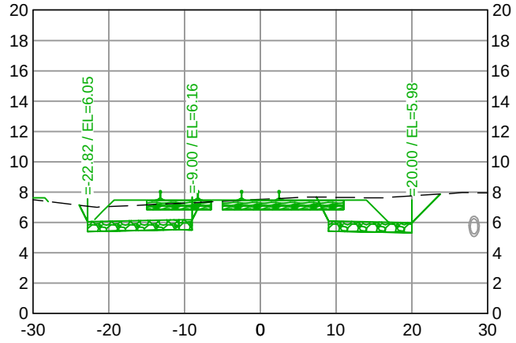
TRK D - STA 10+54.86




TRK D - STA 10+00.00

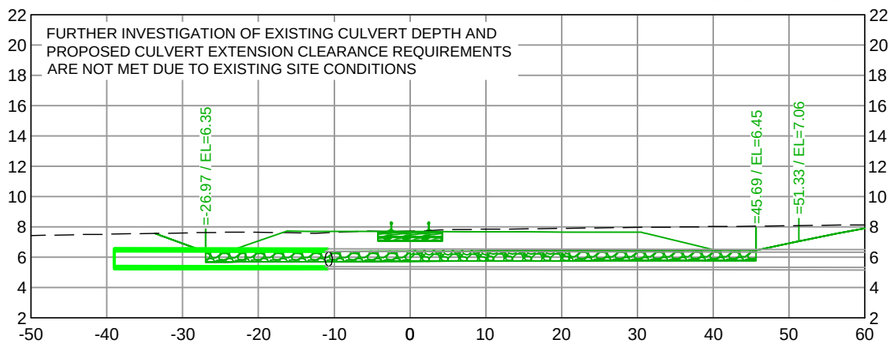



TRK D - STA 11+51.37

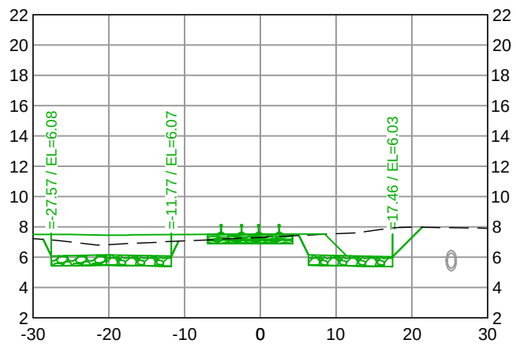



TRK D - STA 9+70.32

SECTION SKEWED ALONG CULVERT




TRK D - STA 11+00.00

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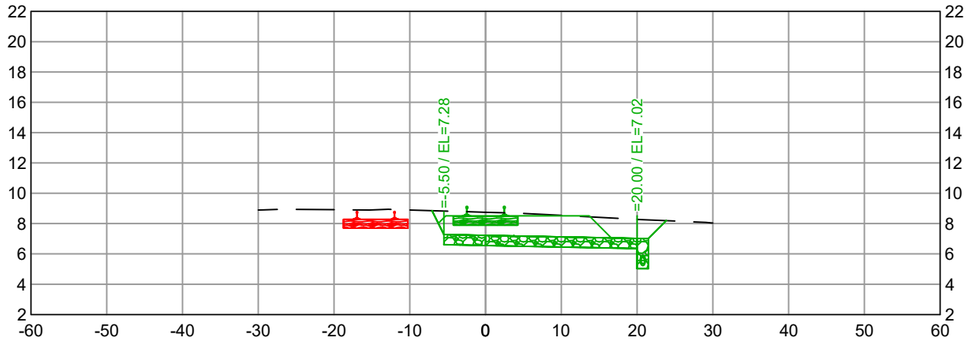
TEXAS P.E FIRM REGISTRATION NO. F-754

BROWNSVILLE, CAMERON COUNTY, TX
PORT OF BROWNSVILLE
WEST PLAINS RAIL PLANS

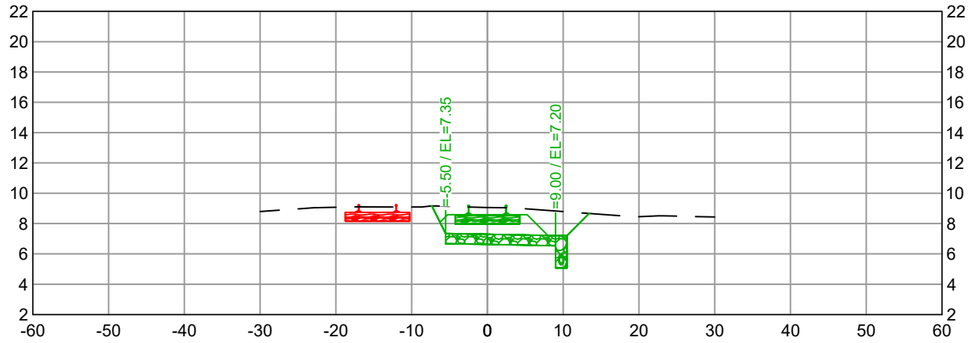
TRACK CROSS SECTIONS
TRACK D

SCALE: 1:20 | SHEET NO. 33 OF 40 SHEETS

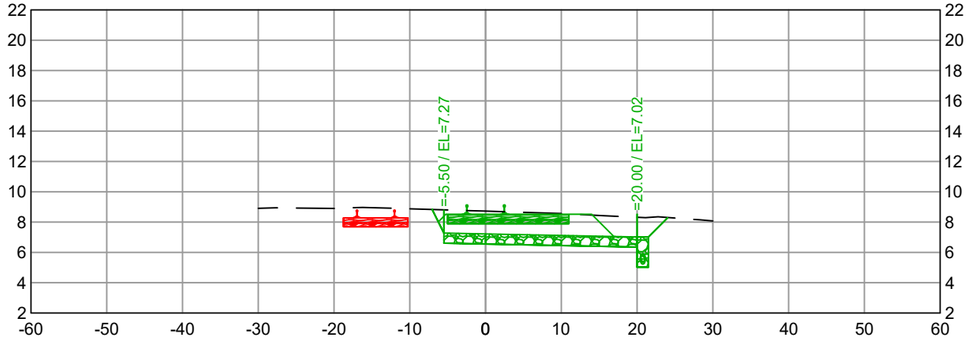
TRK E - STA 6+00.00




TRK E - STA 7+50.00




TRK E - STA 5+94.48

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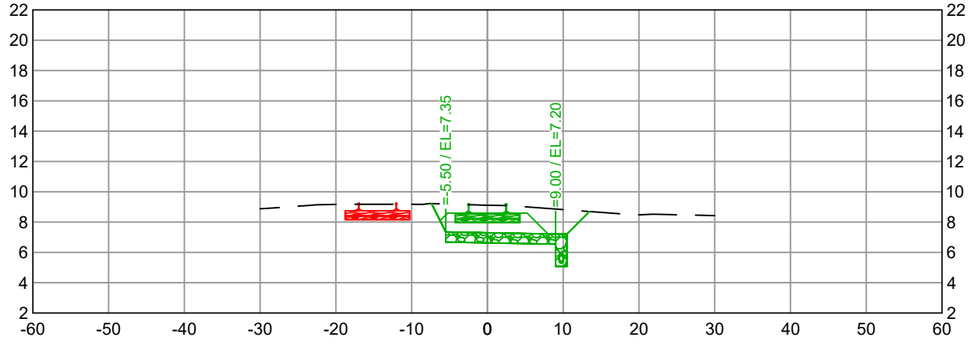


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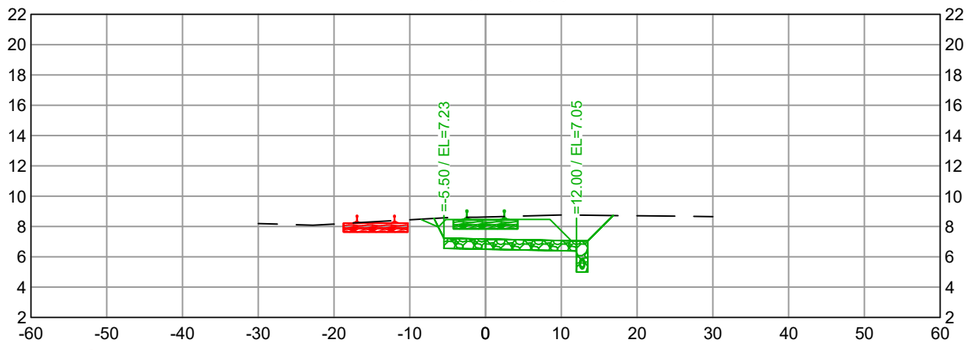


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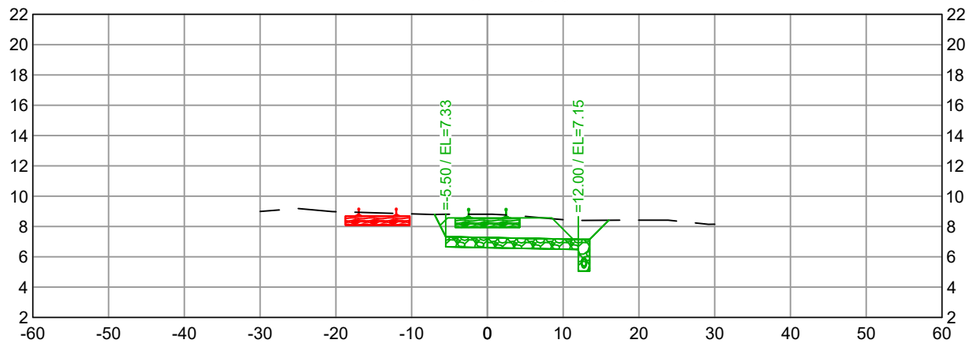


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BROWNSVILLE, CAMERON COUNTY, TX
PORT OF BROWNSVILLE
WEST PLAINS RAIL PLANS

TRACK CROSS SECTIONS
TRACK E

SCALE: 1:20 | SHEET NO. 34 OF 40 SHEETS

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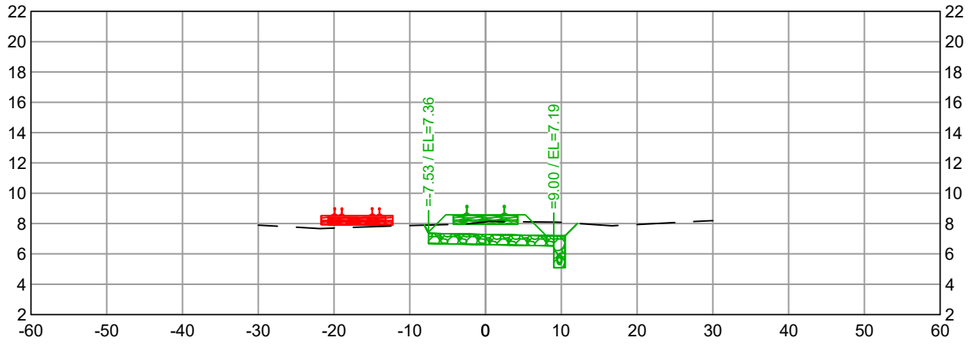


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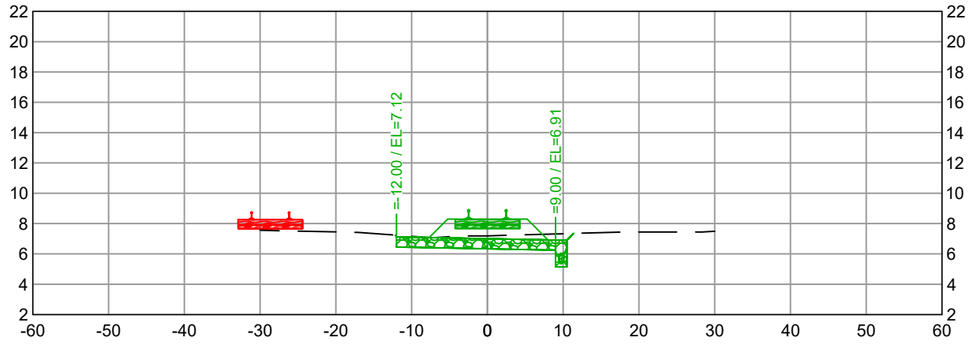


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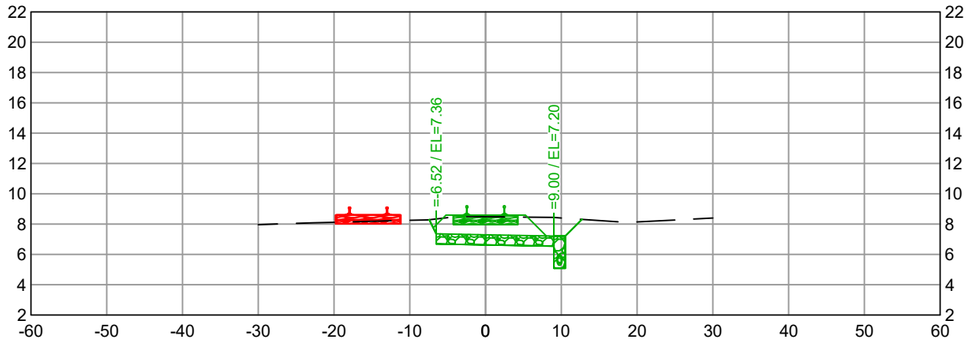


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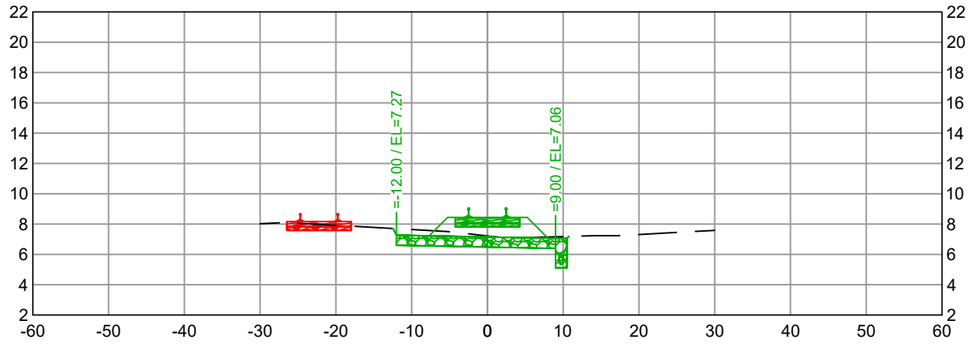


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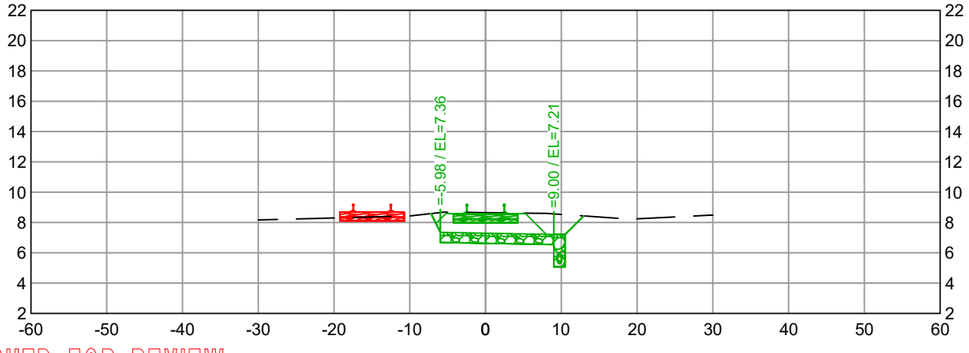


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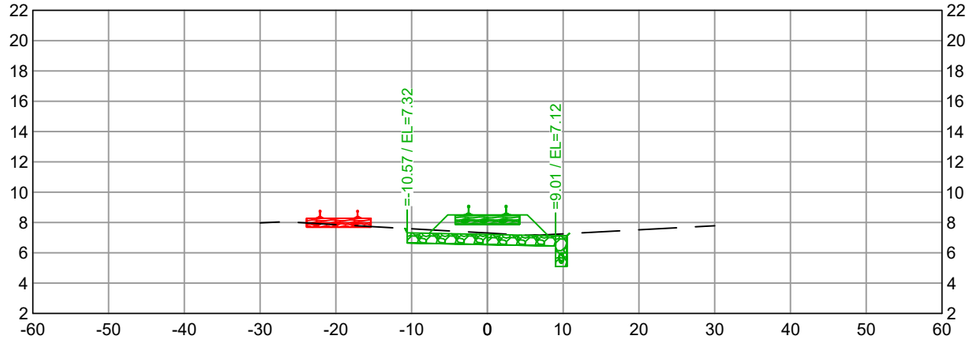


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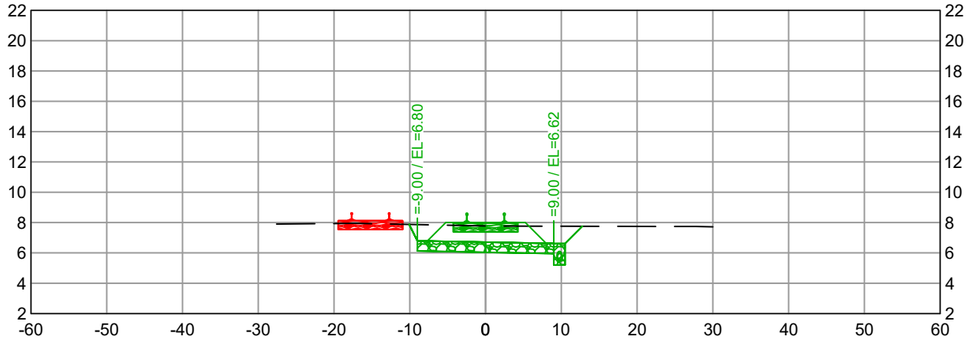


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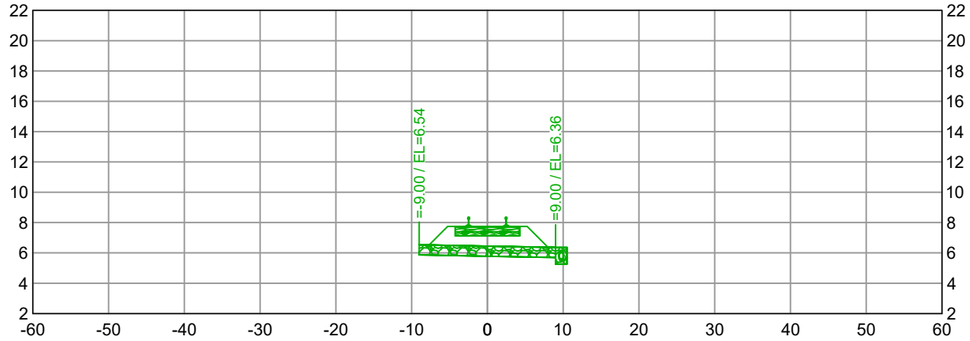


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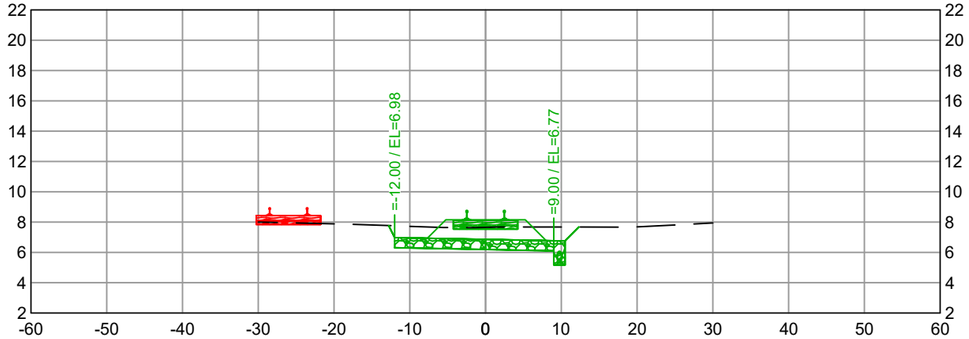


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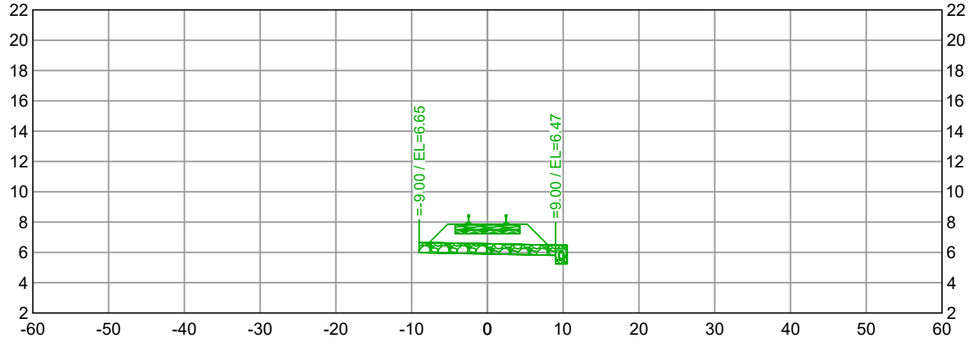


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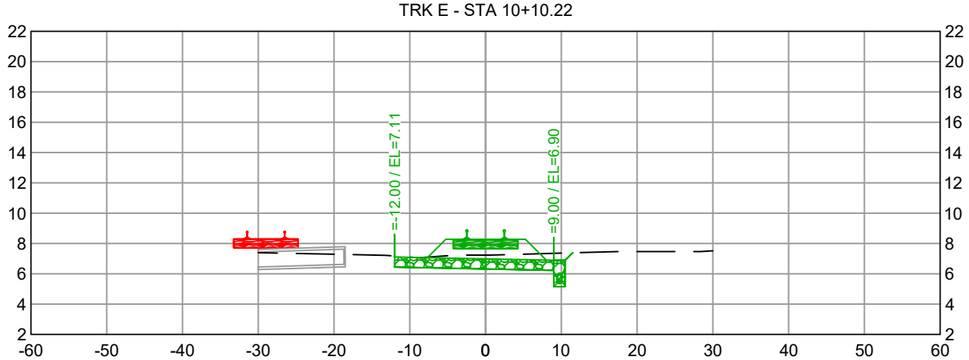


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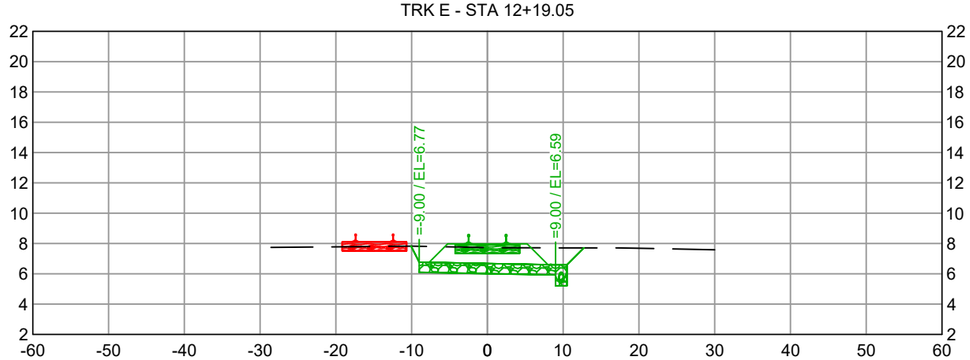


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BROWNSVILLE, CAMERON COUNTY, TX
PORT OF BROWNSVILLE
WEST PLAINS RAIL PLANS

TRACK CROSS SECTIONS
TRACK E

SCALE: 1:20 | SHEET NO. 36 OF 40 SHEETS

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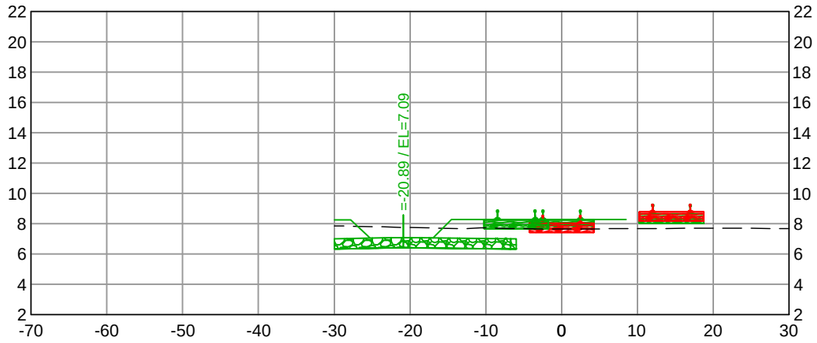


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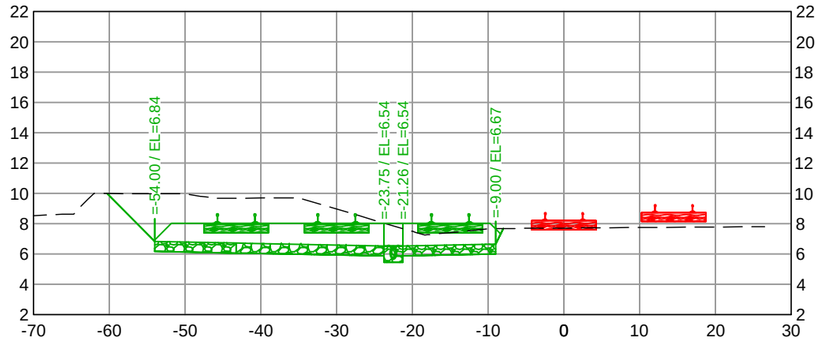


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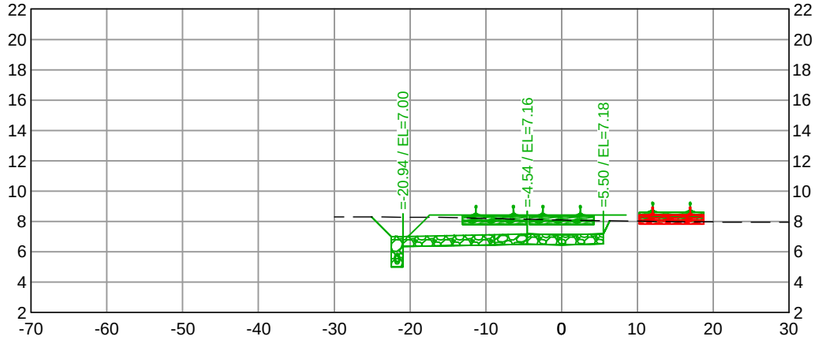


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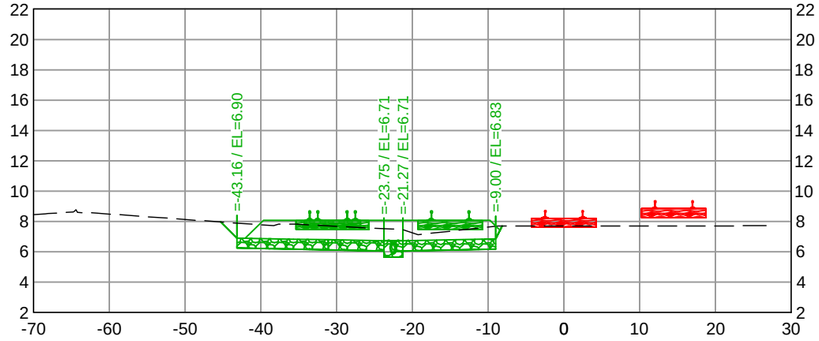


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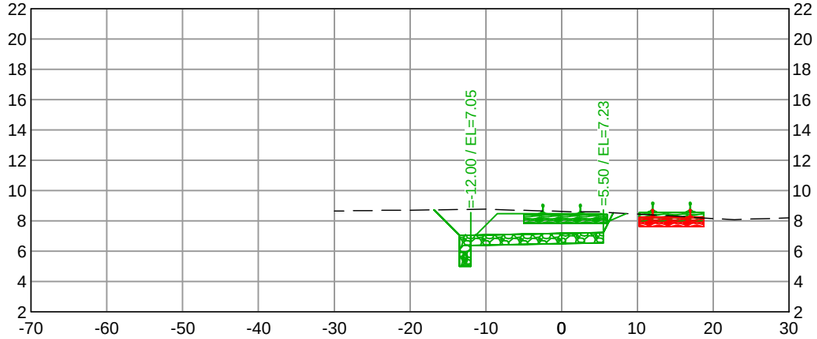


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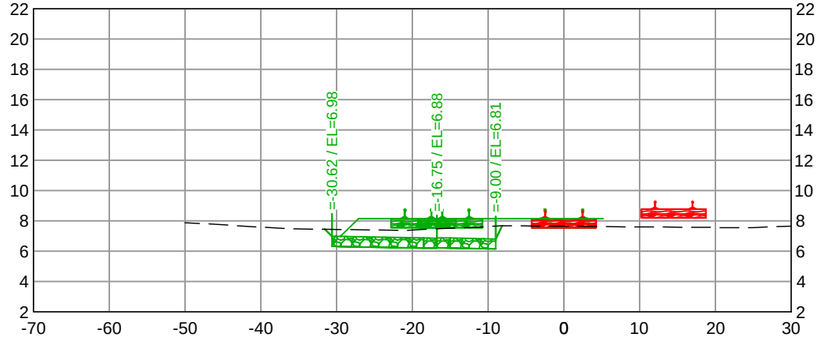


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**BROWNSVILLE, CAMERON COUNTY, TX**
**PORT OF BROWNSVILLE**
**WEST PLAINS RAIL PLANS**

TRACK CROSS SECTIONS
TRACK F

SCALE: 1:20 | SHEET NO. 37 OF 40 SHEETS

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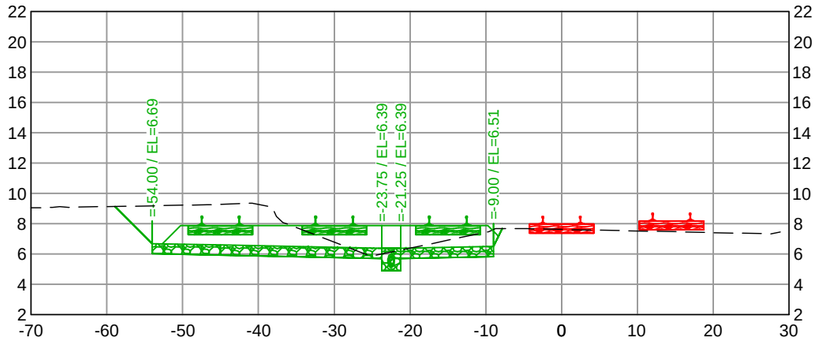


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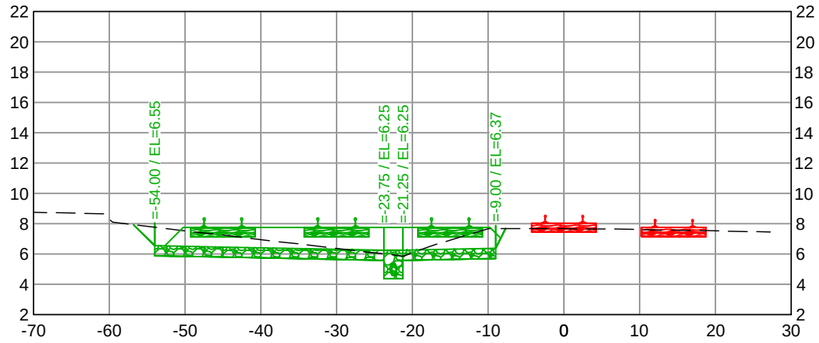


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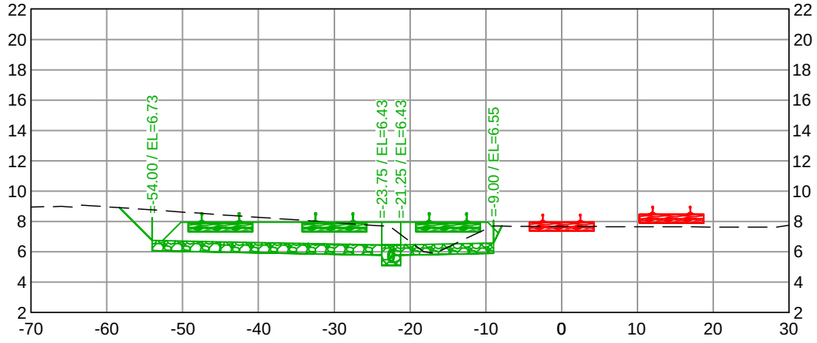


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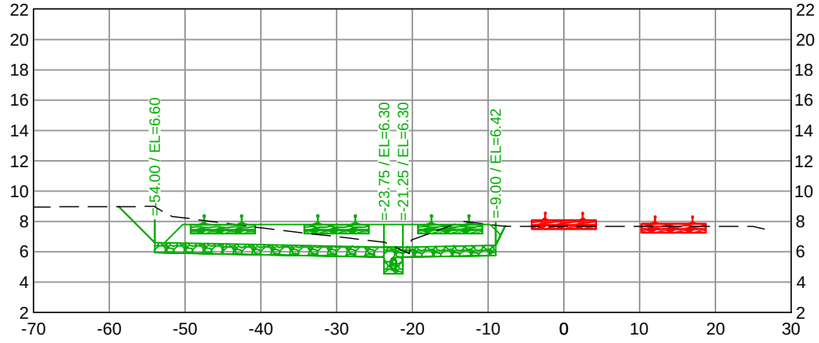


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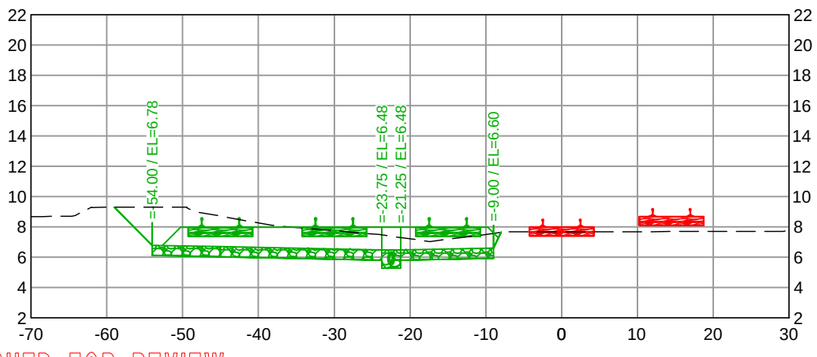


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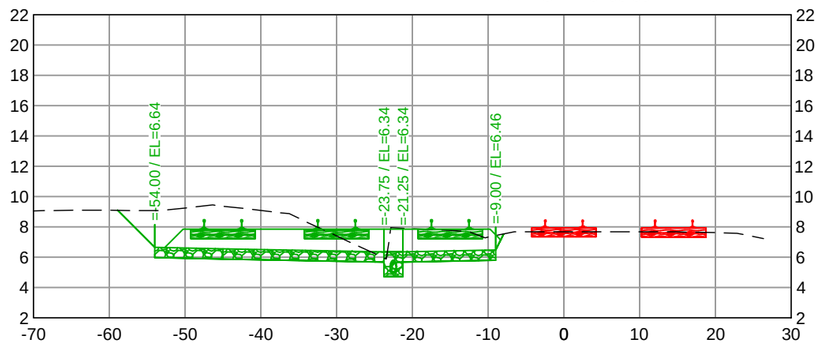


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TRACK CROSS SECTIONS
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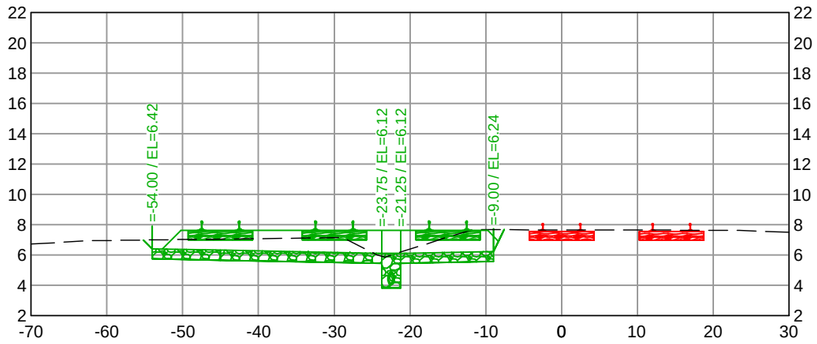


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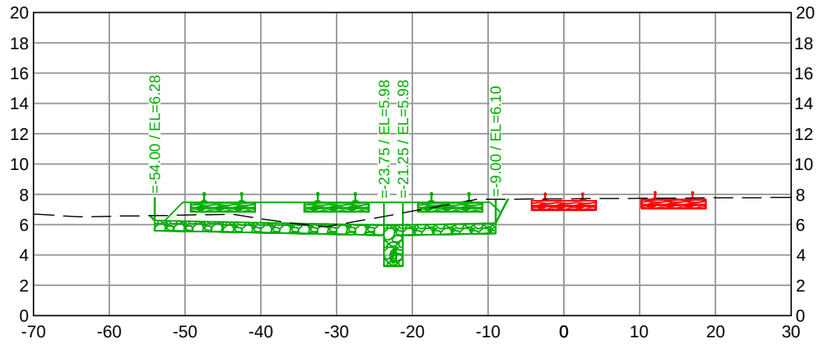


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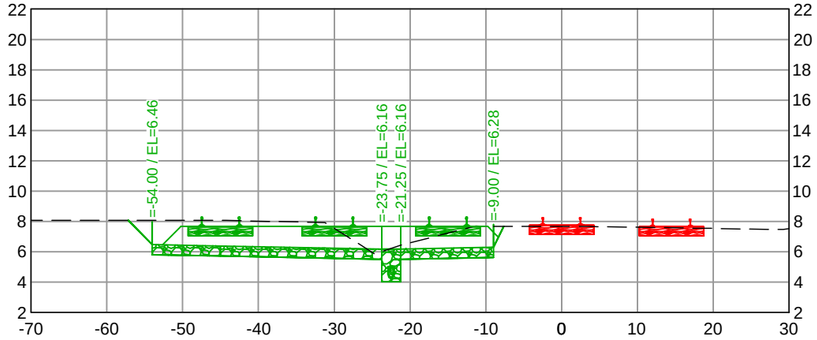


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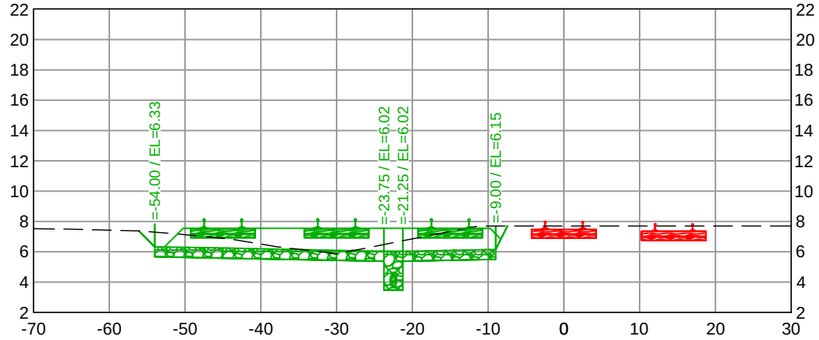


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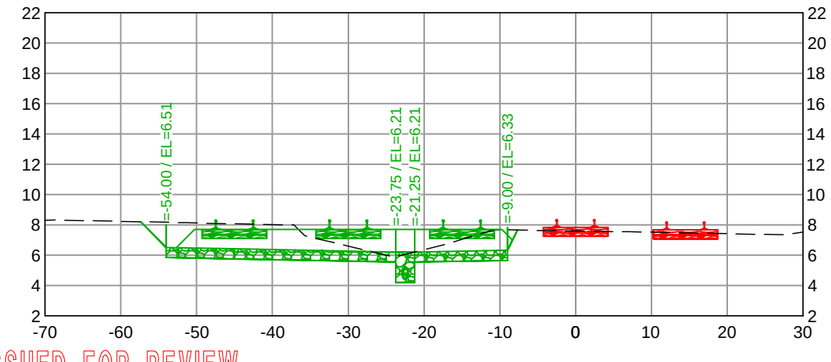


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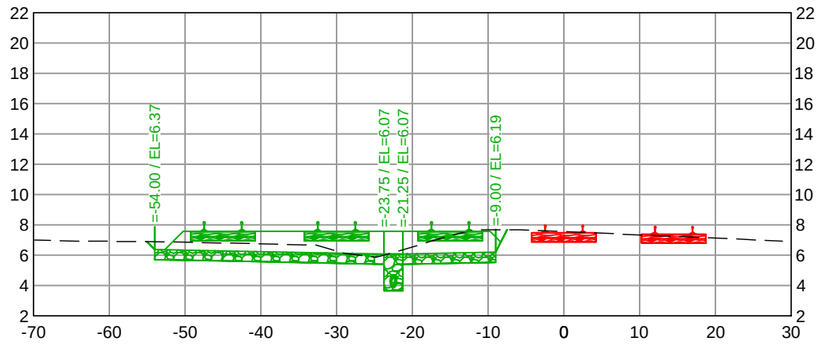


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**BROWNSVILLE, CAMERON COUNTY, TX**
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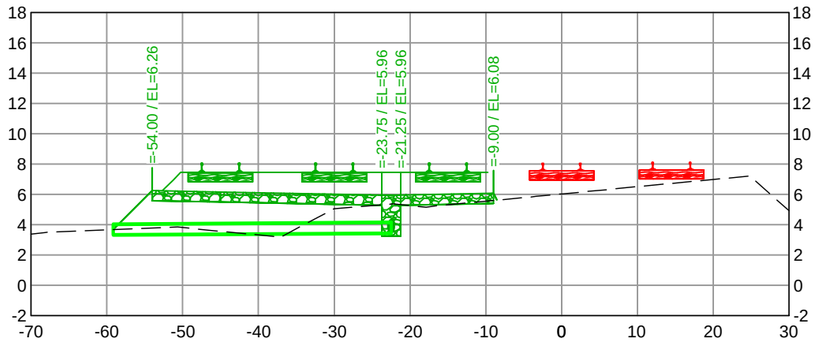


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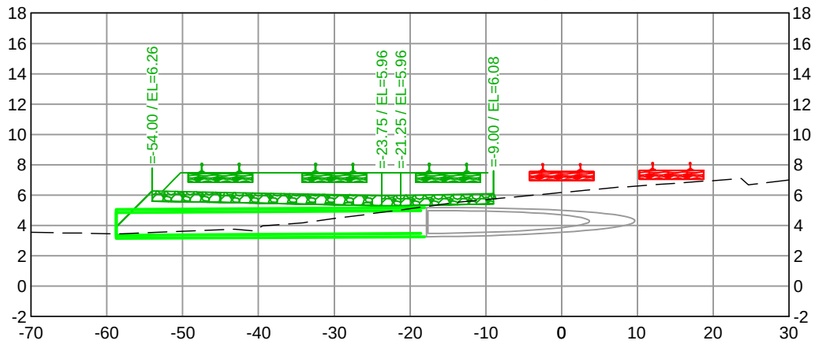


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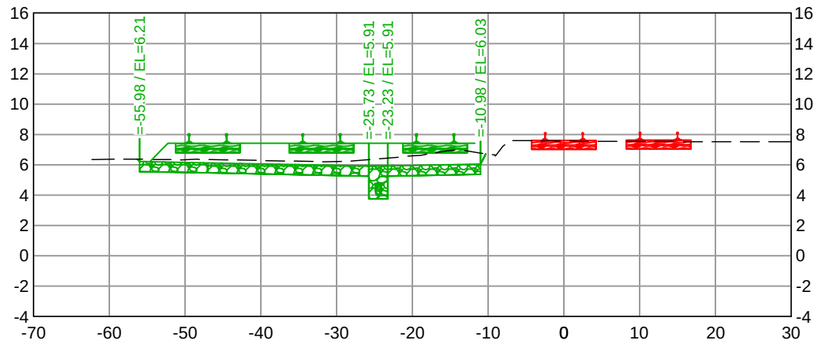


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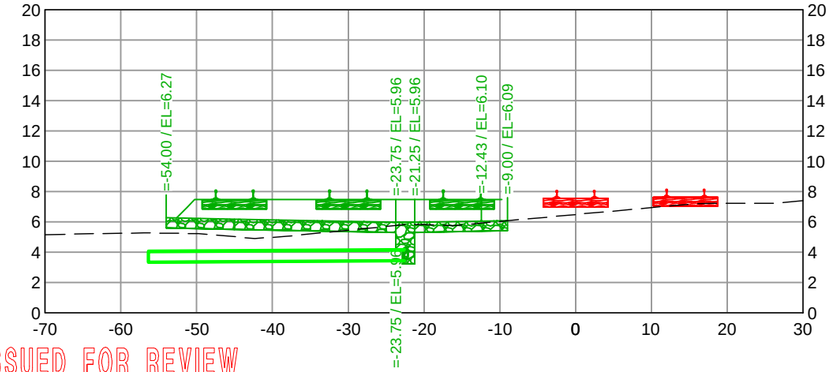


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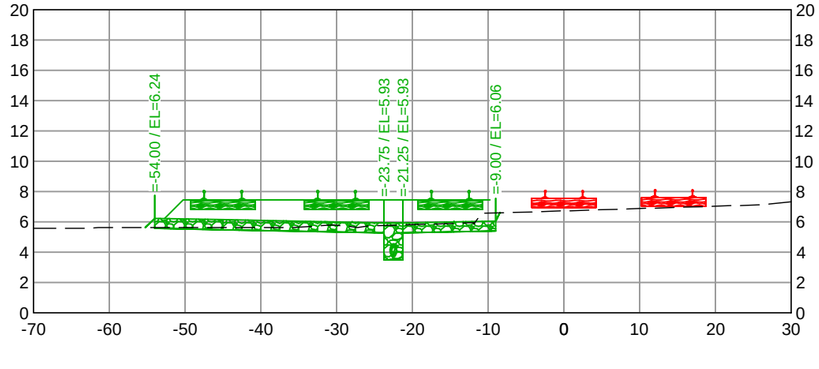


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OmniTRAX

Westplains

**BROWNSVILLE, CAMERON COUNTY, TX**
**PORT OF BROWNSVILLE**
**WEST PLAINS RAIL PLANS**

TRACK CROSS SECTIONS
TRACK F

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# Appendix B

# Preliminary Geotechnical Analyses and Recommendations Report

# Preliminary Geotechnical Analyses and Recommendations Report

**Port of Brownsville Grain Facility Improvements**

West Plains, LLC

Brownsville, Cameron County, Texas

September 20, 2022

September 20, 2022 HDR Project No. 10287181

Brian Carleton
Chief Operating Officer
West Plains, LLC
14210 Hillsdale Circle
Omaha, NE 68137

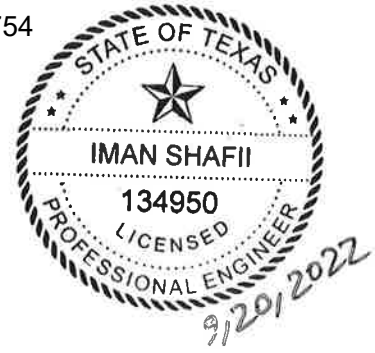
**Preliminary Geotechnical Analyses and Recommendations Report**
**Port of Brownsville Grain Facility Improvements**

Dear Mr. Carleton,

HDR Engineering, Inc. appreciates the opportunity to provide professional geotechnical engineering services to West Plains, LLC for increasing its Port of Brownsville Grain Facility's throughput and capacity of grain and agricultural feed shipping in Cameron County, Texas. In this submittal, please find the preliminary geotechnical analyses and recommendations report for the aforementioned project.

Thank you for your consideration of our services and partnership on this project. If you have any questions or require further information, please contact us at 713-576-3565.

Sincerely,
HDR Engineering, Inc.
TBPE Firm Registration No. F-754




Iman Shafii, Ph.D., P.E.
*Geotechnical Engineer*

Thomas C. Wesling, P.E.
*Senior Geotechnical Engineer*

hdrinc.com
4828 Loop Central Drive, Suite 800, Houston, TX 77081-2220
(713) 622-9264

## Contents

## Tables



## Figures



## Attachment

# 1 Introduction

## 1.1 Project Description

HDR Engineering, Inc. (HDR) was retained by West Plains, LLC (West Plains) to provide preliminary geotechnical engineering services for the proposed Grain Facility Improvements project at the Port of Brownsville located in Cameron County, Texas. West Plains is planning to increase the throughput and capacity of its facility's grain and agricultural feed shipping. The site is located at the Grain Elevator facility near RL Ostos Road in Brownsville, Cameron County, Texas. A *Vicinity Map* of the project location is presented on Figure 1.

HDR understands that the West Plains facility improvement project includes the following primary components:

- New ship loading conveyance system from grain storage to existing dock and associated dock improvements
- New 25,000-ton dry feed ingredient storage building with a footprint of 170 feet by 400 feet
- Rail siding improvements to allow 110-car unit trains on site

The *Conceptual Site Plan for Ship Loading and Ingredient Barn* is presented on Figure 2a. The *Rail Exhibit* is presented on Figures 2b and 2c. This report provides preliminary geotechnical recommendations to support the design of the improvements to the West Plains Grain Facility.

## 1.2 Purpose and Scope

The purposes of this preliminary geotechnical study were to: 1) obtain subsurface information to define geotechnical conditions at the site through performing new soil borings as well as reviewing an existing geotechnical report by MEG Engineers dated December 30, 2015, 2) determine pertinent soil properties for preliminary engineering design, and 3) provide preliminary geotechnical engineering recommendations. This report provides the following:

- Description of the existing soil and groundwater conditions
- Discussion of potential vertical movements
- Preliminary recommendations and design parameters for grid-beam stiffened slab-on-grade for the ingredient barn
- Preliminary recommendations and design parameters for deep foundations for various conveyor supports
- Preliminary recommendations for rail-road track section (ballast and subballast thickness) and subgrade preparation
- Discussion of soil corrosion potential

- Recommendations for supplemental geotechnical investigation to develop final design parameters and recommendations
- Construction considerations

These purposes were accomplished by:

- Coordinating the field investigation performed by Rock Engineering & Testing Laboratory, Inc. (RETL), which included drilling of geotechnical soil borings to explore subsurface conditions and obtain samples for geotechnical laboratory testing.
- Assigning and coordinating laboratory testing on selected soil samples to assess pertinent engineering properties.
- Preparing this report summarizing our findings and geotechnical recommendations.

The results of our analyses and recommendations are included in this geotechnical report. The geotechnical data study including field and laboratory test results, dated August 8, 2022, and prepared by RETL, is included in Attachment A. Pertinent information (Boring Location Plan and boring logs B-1 through B-4) from the MEG Geotechnical Engineering Report for the Proposed Grain Elevator at RL Ostos Road, Port of Brownville, dated December 30, 2015, is included in Attachment B. A geologic fault study and environmental assessments were beyond the scope of this study.

## 1.3 Applicability of Report

This report was prepared exclusively for West Plains to guide the Project Team and support civil and structural design for its Port of Brownsville Grain Facility improvements as presented herein. This study was conducted using the standard level of care and diligence normally practiced by recognized engineering firms now performing similar services under similar circumstances. This report, including all illustrations, should be used in its entirety. This report should be made available to the project team for information only and not as a warranty of subsurface conditions. It should not be used, whether in whole or part, as a stand-alone construction specifications document. The information contained herein should be used in conjunction with appropriate local, state, and federal guidelines for construction of similar facilities.

# 2 Geotechnical Data Study

The geotechnical data study performed by RETL is summarized herein.

## 2.1 Geotechnical Field Investigation

The field program consisted of drilling eight geotechnical borings (i.e., B-5 through B-12) to depths ranging from 25 to 120 feet below the existing grade at project site. The approximate locations of the soil borings are shown on the *Plan of Borings* presented on Figure 3. Table 2-1 presents the boring coordinates, ground surface elevations, and exploration depths.

**Table 2-1: Boring Coordinates, Surface Elevations, and Exploration Depths**

| Boring ID | Latitude | Longitude | Approximate Surface Elevation (ft) | Exploration Depth (ft) |
|---|---|---|---|---|
| B-5 | N 25.95535º | W 97.38443º | 11 | 100 |
| B-6 | N 25.95533º | W 97.38524º | 11 | 100 |
| B-7 | N 25.95546º | W 97.38616º | 11 | 120 |
| B-8 | N 25.95393º | W 97.38693º | 7 | 25 |
| B-9 | N 25.95316º | W 97.38762º | 8 | 25 |
| B-10 | N 25.95367º | W 97.38618º | 8 | 35 |
| B-11 | N 25.95418º | W 97.38474º | 8 | 25 |
| B-12 | N 25.95468º | W 97.38330º | 6 | 25 |

Note:
1- Coordinates and surface elevations are approximate and obtained from Google Earth.

The borings were drilled using a drilling rig equipped with a rotary head turning solid stem augers in combination with mud rotary drilling techniques used to advance the boreholes. Soil samples were generally taken at about 2-foot intervals to a depth of 15 feet below existing grade, at 5-foot intervals to a depth of 100 feet below existing grade, and at 10-ft intervals to the completion depth of the borings.

Specifics regarding the field investigation are included in Attachment A, including a plan of borings, boring logs, and results of field and laboratory tests.

## 2.2 Geotechnical Laboratory Testing

Laboratory tests were performed on selected soil samples from the soil borings to assess pertinent geotechnical engineering soil properties. The laboratory testing program included the following tests that were performed in accordance with ASTM standards:

- Visual classification
- Moisture content
- Percent passing the No. 200 sieve (-200)
- Sieve Analysis
- Atterberg limits: Liquid Limit (LL), Plastic Limit (PL), and Plasticity Index (PI)
- Dry unit weight (DUW)
- Unconfined compression (UC)
- Unconsolidated-undrained (UU) triaxial compression
- Incremental Consolidation
- Corrosion potential (pH, sulfates, chlorides, and resistivity)

The laboratory test results are presented in the geotechnical data report in Attachment A.

### 2.2.1 Geotechnical Index Tests

The classification tests included tests for natural water content, liquid and plastic limits (collectively termed Atterberg limits), dry unit weight, and material finer than a No. 200 sieve. These tests aided in classifying the soils and were used to correlate the results of other tests performed on samples taken from different borings and/or different depths.

### 2.2.2 Shear Strength Tests

The undrained shear strength was evaluated for selected undisturbed samples of cohesive soils by performing unconfined compression (UC) tests and unconsolidated-undrained (UU) triaxial compression tests. The natural water content and dry unit weights were calculated as routine parts of the UC and UU tests. The results of the laboratory shear strength tests and the field estimates of shear strength are presented on the boring logs and in the summary of lab test results in Attachment A. Stress-strain curves of the UC and UU tests are presented in Attachment A.

### 2.2.3 Soil Corrosion Potential Tests

Steel and concrete elements in contact with soil, whether part of a foundation or part of the supported structure, are subject to degradation due to corrosion or chemical attack. Therefore, buried steel and concrete elements should be designed to resist corrosion and degradation based on accepted practices.

Series of corrosion tests including pH, sulfate ion concentration, chloride ion concentration, and electrical resistivity were performed on four selected soil samples to evaluate the corrosion potential of the soils at the site. The corrosion potential test results are summarized in Table 2-2.

**Table 2-2: Summary of Soil Corrosion Potential Tests**

| Boring ID | Depth (feet) | pH | Sulfate (mg $SO_4$/kg) | Chloride (mg/kg) | Electrical Resistivity (Ohm-cm) |
|---|---|---|---|---|---|
| B-5 | 12 – 14 | 8.37 | 445 | 40 | 859 |
| B-6 | 2 – 4 | 7.83 | 321 | 140 | 956 |
| B-7 | 23.5 – 25 | 8.74 | 221 | 100 | 1,030 |
| B-7 | 48.5 – 50 | 8.05 | 66.7 | 1,000 | 317 |

# 3 Site and Subsurface Conditions

## 3.1 Site Location and Description

The project site is located at the Port of Brownsville, at West Plains' Grain Elevator facility near RL Ostos Road in Brownsville, Cameron County, Texas. A *Vicinity Map* of the project location is presented on Figure 1. Based on Google Earth, existing ground surface of

project site varies from approximately El. +6 feet on the southeastern portion of the site to El. +11 feet on the northern portion of the site.

## 3.2 Subsurface Stratigraphy, Engineering Properties, and Groundwater

Characterization of the subsurface conditions at the site was supported through the information from Borings B-5 thru B-12 as part of the RETL field exploration and laboratory testing presented herein, as well as historical Borings B-1 thru B-4 from MEG Engineers geotechnical report dated December 30, 2015. A summary of subsurface stratigraphy and groundwater information is provided in the following subsections as noted on the boring logs in Attachments A and B.

### 3.2.1 Subsurface Soil Conditions

The subsurface conditions, as revealed from historical and recent borings, consist of predominantly cohesive soils with intermittent cohesionless soils to the termination depths of borings. The cohesive soils consist of soft to hard brown and light to dark gray fat clay, fat clay with sand, sandy fat clay, lean clay, lean clay with sand, and sandy lean clay. The granular soils consist of loose to very dense gray and brown silty sand, poorly graded sand with silt, silty clayey sand, and clayey sand.

The fat clays are of high to very high plasticity with liquid limits ranging from 50 to 67 and plasticity indices ranging from 28 to 48. The lean clay with sand and sandy lean clay are of medium to high plasticity with liquid limits ranging from 28 to 49 and plasticity indices ranging from 8 to 30. Field estimates and laboratory tests indicated that the undrained shear strengths of the cohesive soils were generally soft (250 psf) to hard (greater than 4,500 psf). The fines content (percent passing No. 200 sieve) of lean/fat clay ranges from 89 to 100 percent. The fines content of lean/fat clay with sand ranges from 73 to 83 percent and the fines content of sandy lean/fat clay ranges from 52 to 68 percent. Calcareous nodules were encountered occasionally at different depths within the drilled borings. Gravel fragments and aggregates were occasionally encountered within the top 5 feet in different borings.

Layers of granular soils, consisting of very loose to very dense clayey/silty sand and sand with silt soils, were encountered intermittently throughout the soil profile. The fines content of granular soils ranges approximately from 10 to 49 percent.

Further details of the subsurface soil conditions within the borings explored by RETL and MEG are presented on the boring logs in Attachments A and B, respectively. It should be noted that there are some inconsistencies between the RETL and MEG borings. The RETL boring logs indicate some very soft clay and/or very loose sand in the 8- to 14-ft depth range which generally corresponds to where groundwater was encountered. The MEG borings do not show this layer on their logs.

### 3.2.2 Depth-to-Water Conditions

The eight land-based borings (i.e., Boring B-5 through B-12) drilled as part of this study were initially drilled using dry-auger drilling techniques in an effort to observe the short-term depth-to-water conditions at the project site. Free water was first recorded when

initially encountered in all borings, but B-8, at depths ranging from approximately 4.5 feet to 13.5 feet below existing grade. After allowing the water levels to stabilize in the boreholes after 15 minutes, depth-to-water readings were recorded and ranged from approximately 5 feet to 13 feet below existing grade.

Depth-to-water readings were also recorded in four Historical Borings (B-1 through B-4) at 10-ft below existing grade at the time of drilling.

## 3.3 Geology

The area surrounding the site is physiographically located in the Western Gulf Coast Plains of south Texas, in an area of low topographic relief, with elevations ranging from approximately 5 to 10 feet above mean sea level. Based on previous reports and available published documentation[1], the area is underlain by a mixture of Quaternary (Pleistocene-Holocene) alluvial/deltaic deposits, with the oldest being the Beaumont Formation. Anticipated maximum thickness of the Beaumont formation is approximately 300 feet[2]. The Beaumont clay formation is heterogeneous containing thick interbedded layers of clay, fine sand, and silt.

The clay fraction is primarily composed of montmorillonite, illite, kaolinite, and finely ground quartz. The clay present in the formation has been pre-consolidated by a process of desiccation. Numerous wetting and drying cycles have produced a network of small randomly oriented, closely spaced joints within some depth zones. These small joints frequently have a shiny appearance, and the clays are called slickensided in these cases. The joint pattern may have an influence on the construction and engineering behavior of the soil.

The coastal plain in this region has a complex tectonic geology, several major features of which are: Gulf Coastal geosyncline, salt domes, and major sea level fluctuations during the glacial stages, subsidence, and geologic faulting activities. Most of these geologic faulting activities have ceased for millions of years, but some are still active. A detailed geologic fault investigation and study of the site geology were beyond the scope of this report.

## 3.4 Seismic Site Classification

Based on a cursory review of historical USGS Earthquake data[3], the project area is generally considered an inactive seismic zone; however seismic activity cannot be completely ruled out. Site Class is based on the average soil properties represented in the upper 100 feet of the subsurface profile. Our review of historic and current subsurface data and based upon seismic site class definitions in *Section 1613: Earthquake Loads* of the *2018 International Building Code* and *Chapter 20: Site Classification Procedure for*

[1] USGS 2005; "Geologic Map of Southernmost Texas, United States, and Parts of Tamaulipas and Nuevo Leon, Mexico: Environmental Health Investigations in the United States-Mexico Border Region"; USGS Open-File Report OF-2005-1409; Page, W.R., VanSistine, D.P., and Turner, K.J., text & plate, scale 1:250,000.

[2] USGS, 2018; "Online Spatial Geology Data by State – Cameron County"; accessed November 23, 2021, https://mrdata.usgs.gov/geology/state/geog-units.html

[3] USGS, 2018; Earthquake Hazards Program, "Search Earthquake Catalog", https://earthquake.usgs.gov/earthquakes/search/

*Seismic Design* of *ASCE 7-16: Minimum Design Loads for Buildings and Other Structures*, the project area is designated as a Seismic Site Class D: Stiff Soil.

The susceptibility of soil to liquefaction is a function of the gradation, density, aging/cementation, and fines content of the soil. Due to low seismicity of the area and soil conditions, we anticipate that the liquefaction potential of the soils will be low under seismic events.

## 3.5 Variations in Subsurface Conditions

Interpretations of soil conditions, as described in this report, are based solely on the data collected by others as discussed herein, and HDR's geotechnical experience in this geographic region. Although we have allowed for minor variations in the subsurface conditions, our recommendations may not be appropriate for subsurface conditions other than those reported herein. It is recommended that careful observations occur during construction to verify our interpretations. Should variations from our interpretations be found, it is recommended that HDR be notified and authorized to evaluate what, if any, revisions should be made to our recommendations.

# 4 Soil Shear Strength Parameters

Our interpreted preliminary *Subsurface Design Parameters* developed from the information presented in the RETL data report and MEG engineering report are presented on Figures 4a and 4b, for material handling area (i.e., new ingredient barn, weigh batchers, conveyors, overhead bin, and diverters) and railroad alignment, respectively. The preliminary soil shear strength parameters recommended for design based on the geotechnical data herein are presented in Table 4-1 and Table 4-2 for material handling area and railroad alignment, respectively.

Short-term soil strength parameters (undrained cohesion and undrained friction angle) and long-term soil strength parameters (drained cohesion and drained friction angle) were selected for each soil stratum based on the laboratory and field test data collected during our field exploration and laboratory testing and our experience with similar projects and subsurface conditions. The geotechnical boring logs used to develop these parameters are presented in Attachments A and B of this report.

**Table 4-1: Soil Shear Strength Parameters for Material Handling Area**

| Stratum/ Material | Stratum Elevation (feet) | Unit Weight (pcf) | | Undrained (short-term) | | Drained (long-term) | |
|---|---|---|---|---|---|---|---|
| | | Total | Effective | Cohesion, c (psf) | Friction Angle, ϕ (˚) | Effective Cohesion, c' (psf) | Effective Friction Angle, ϕ' (˚) |
| Clayey Sand | +11 to +6 | 125 | 62 | -- | 30 | -- | 30 |
| Sandy Clay | +6 to -3 | 125 | 62 | 600 | -- | 50 | 22 |
| Clayey Sand | -3 to -10 | 125 | 62 | -- | 26 | -- | 26 |
| Clayey Sand | -10 to -20 | 125 | 62 | -- | 28 | -- | 28 |
| Sandy Clay | -20 to -26 | 125 | 62 | 1,000 | -- | 100 | 22 |
| Silty Sand | -26 to -37 | 125 | 62 | -- | 32 | -- | 32 |
| Clay | -37 to -60 | 130 | 67 | 2,000 | -- | 200 | 25 |
| Silty Sand | -60 to -70 | 125 | 62 | -- | 32 | -- | 32 |
| Clay | -70 to -87 | 125 | 62 | 2,500 | -- | 250 | 25 |
| Silty Sand | -87 to -97 | 125 | 62 | -- | 36 | -- | 36 |
| Clay | -97 to -110 | 125 | 62 | 2,500 | -- | 250 | 25 |

**Table 4-2: Soil Shear Strength Parameters for Railroad Alignment**

| Stratum/ Material | Stratum Elevation (feet) | Unit Weight (pcf) | | Undrained (short-term) | | Drained (long-term) | |
|---|---|---|---|---|---|---|---|
| | | Total | Effective | Cohesion, c (psf) | Friction Angle, ϕ (˚) | Effective Cohesion, c' (psf) | Effective Friction Angle, ϕ' (˚) |
| Clayey Sand | +8 to +6 | 125 | 62 | -- | 32 | -- | 32 |
| Sandy Clay | +6 to 0 | 125 | 62 | 500 | -- | 75 | 22 |
| Sandy Clay | 0 to -5 | 125 | 62 | 250 | -- | 50 | 22 |
| Clayey Sand | -5 to -18 | 130 | 67 | -- | 30 | -- | 30 |

# 5 Potential Vertical Movement and Shrink-Swell Considerations

Estimates of vertical soil movements at the site were evaluated using the Texas Department of Transportation (TxDOT) Potential Vertical Rise (PVR) test method, TEX-124-E. Vertical soil movements from shrinking and/or swelling clays may occur at this site as a result of moisture changes within the clay soil with varying weather patterns. The estimated potential vertical movements in the vicinity of proposed new structures were evaluated using current moisture conditions and a zone of seasonal moisture change of

8 feet. The PVR was calculated to be on the order of 0 to 2 inches, and therefore, will not be an issue for the type of structures and foundations considered across the project site.

# 6 Preliminary Foundation Recommendations for the Proposed Ingredient Barn

The proposed ingredient barn will have a footprint of 170 feet by 400 feet. The proposed finished floor elevation is unknown at this time, therefore the amount of cut and fill under the structure footprint is unknown at this time. Based on an ingredient capacity of 25,000 tons and a 170-ft by 400-ft structure the approximate floor load is on the order of 750 psf. It is our understanding that a previous pile supported structure with a footprint larger than the planned structure was located within the proposed footprint of proposed ingredient barn.

Based on discussions with the project structural engineers, a grid-beam stiffened slab-on-grade is the preferred foundation system for the proposed ingredient barn. A grid-beam stiffened slab-on-grade can potentially be used; however, an evaluation will have to be performed regarding how the existing in-place substructure and the very loose soil layer will affect the new structure. Preliminary design of the grid-beam stiffened slab-on-grade should be in accordance with the preliminary recommendations herein.

## 6.1 Grid-Beam Stiffened Slab-on-Grade

The grid-beam stiffened slab-on-ground including beam depth, spacing and reinforcement, and the slab thickness and reinforcement, should be designed based on the soil parameters presented herein. Beams should be founded on a 2- to 4-ft thick load transfer platform. Specifics regarding the load transfer platform will have to be determined after an evaluation of the existing in-place substructure is performed. The load transfer platform could potentially consist of compacted select clay fill or flexible base material with possibly one to two \layers of geogrid. Allowable bearing pressures would be on the order of 1,500 to 1,800 psf for beams with a width of at least 1 foot. The intersection of beams could be widened to 2 feet by 2 feet or greater and sized using allowable bearing pressure on the order of 1,800 to 2,200 psf.

Preliminary Wire Reinforcement Institute (WRI) and Building Research Advisory Board (BRAB) parameters are provided in Table 6-1. WRI parameters were presented in a manual developed for the WRI entitled “Design of Slab-On-Ground Foundations” (August 1981) and are discussed in Chapter 18, Division III of the UBC. BRAB parameters were obtained from the Board’s Report No. 33 to the Federal Housing Administration entitled “Criteria for Selection and Design of Residential Slabs-on-Ground” (1968).

**Table 6-1: WRI/BRAB Parameters for Grid-Beam Slab-on-Grade Design**

| Parameter | WRI | BRAB |
|---|---|---|
| Effective Plasticity Index | 15 to 20 * | 15 to 20 * |
| Climate Rating, Cw | 15 | 15 |
| Soil-Climate Support Index, 1-C | 0.06 | n/a |
| Soil-Climate Support Index, C | n/a | 0.94 |
| * The effective plasticity index will depend on the finished floor elevation and final cut and fill requirements. | | |

### 6.1.1 Coefficient of Vertical Subgrade Reaction

Often, the design of slab involves the concentration of various magnitudes of point loads across the slab. Typical analyses require a coefficient (or modulus) of subgrade reaction, which is defined as the ratio between the pressure at any given point on the surface of contact and the deformation produced by the load application at that point. Input dimensions of the value of the coefficient of subgrade reaction for specific computer programs should be reviewed. Some programs require a subgrade value for a 1-ft by 1-ft plate while others require the subgrade value for the actual foundation size. We estimated a vertical subgrade reaction value for a 1-ft by 1-ft plate based on correlations proposed by Terzaghi. Based on site specific soil data and published correlations for similar materials, the coefficient of vertical subgrade reaction for a 1-ft by 1-ft plate can be taken as 50 tons/ft$^3$ for underlying soils. Terzaghi also provides equations for adjusting the coefficient of subgrade reaction for a 1-ft by 1-ft plate to actual foundation dimensions. If the contact area has the shape of a rectangle with a length/width ratio of "a", the coefficient of subgrade modulus can be obtained from the following equation:

$$k_{s1} = \overline{k_{s1}} \times \frac{a + 0.5}{1.5\,a}$$

where, $\overline{k_{s1}}$ is the coefficient of vertical subgrade reaction for square plates (i.e., 50 tons/ft$^3$ as recommended for this project) and "a" refers to the length to width ratio of the rectangular contact area.

## 6.2 Estimated Ingredient Barn Foundation Settlement

We understand the entire footprint of the proposed ingredient barn is underlain by wooden piles that supported an old structure that was removed. Some concrete elements of the old foundation may also still be left in place. Therefore, predicting the potential settlement of this structure is not possible at this time. Differential settlements may be problematic due to existence of in-place wooden piles and concrete foundations. Any evaluation of settlement will require information about the existing in-place foundation layout.

# 7 Preliminary Deep Foundation Recommendations for Tower Structure and Support for the Conveyor System

We understand that the proposed main tower structure has an approximate weight of 50 kips, it will have a height of 60 feet above ground, and current plans are to support the tower on deep foundations. Specifics regarding the other conveyor supports are not available at this time. This section provides preliminary recommendations for unit diameter Auger Cast-In-Place (ACIP) piles and 24-inch diameter open-ended steel pipe piles (SPP) including static axial capacity curves, axial group effects, lateral capacity design parameters, lateral group effects, and settlement of pile groups.

## 7.1 Static Axial Capacity

The soil design parameters used for axial capacity computations are presented in Table 4-1. It should be noted that we neglected the strength of the top 5 feet of material while determining the axial capacity of piles to account for variability in the near surface soils, construction disturbance, and potential soil shrinkage.

The ultimate axial capacity for unit diameter ACIP pile in both compression and tension was computed in accordance with the static method of analysis using the computer program SHAFT Version 2017. The computational procedures used in SHAFT are based principally in the FHWA-NHI 18-024 FHWA GEC 010. The ultimate axial capacity for 24-inch diameter open-ended SPP, in both compression and tension was computed using the USACE axial capacity method[4] in the computer program APILE, Version v2019.9.3.

The ultimate compressive capacity of a pile can be developed from skin friction, end bearing, or a combination of both. For our analyses, end-bearing capacity was neglected for ACIP pile when computing ultimate compressive capacities. The weight of the pile was also neglected in the computations. For open-ended steel pipe piles, however, end-bearing was computed. A remolded shear strength equal to 50% of undrained shear strength was used for cohesive soils for calculating the internal plugging condition in open-ended steel pipe piles.

Preliminary ultimate axial capacity curves for unit diameter ACIP pile and 24-inch diameter open-ended SPP are presented on Figures 5 and 6. The USACE recommended factors of safety for compression and tension are provided on the ultimate pile capacity curves are presented on Figures 5 and 6.

The weight of the pile was neglected in the computation of ultimate tension capacity, but it may be included once the penetration is determined. The buoyant weight of the pile should be used; 90 pcf is typically used as the buoyant weight of concrete piles. A factor of safety of 1.2 should be applied to the pile weight.

[4] *U.S. Army Corps of Engineers, 1991, EM 1110-2-2906: Design of Pile Foundations*

## 7.2 Axial Group Effect

The overall allowable axial load carrying capacity of a large group of piles can, in many cases, be less than the sum of the individual allowable capacities. A reduction in the individual pile capacity, to allow for group effects, is usually not necessary for piles having a sufficient center-to-center spacing. The reduction in individual capacity depends on many factors including the configuration of the group, number of piles in the group, pile size, the depth of installation, and the pile spacing. We recommend that piles be spaced at least 3 pile diameters (center-to-center) to reduce substantial axial group effects.

## 7.3 Lateral Capacity Design Parameters

The pile foundations associated with this project will be subjected to axial and lateral loads. We understand that laterally loaded piles are to be designed using the commercially available computer program LPILE. Table 7-1 includes the soil unit weights, undrained shear strengths, strain values for cohesive soils, internal angles of friction, and LPILE soil modulus values. We recommend assuming groundwater table at the ground surface for pile capacity calculation purpose. We also recommend neglecting soil strength in the upper 2 feet below final grade for lateral capacity design due to potential construction disturbance.

**Table 7-1: Soil Design Parameters for LPILE Analysis**

| p-y Curve Type Material | Elev. (ft) Top of Layer | Elev. (ft) Bottom of Layer | Total Unit Weight (pcf) | Cohesion, c (psf) | Friction Angle, ϕ (˚) | Subgrade Modulus (pci) | $\varepsilon_{50}$ (in/in) |
|---|---|---|---|---|---|---|---|
| Sand (Reese) | +11 | +9 | Neglect for Construction Disturbance | | | | |
| Sand (Reese) | +9 | +6 | 125 | -- | 30 | 60 | -- |
| Soft Clay (Matlock) | +6 | -3 | 125 | 600 | -- | -- | 0.01 |
| Sand (Reese) | -3 | -10 | 125 | -- | 26 | 20 | -- |
| Sand (Reese) | -10 | -20 | 125 | -- | 28 | 25 | -- |
| Mod. Stiff Clay w/o Free Water | -20 | -26 | 125 | 1,000 | -- | -- | 0.007 |
| Sand (Reese) | -26 | -37 | 125 | -- | 32 | 60 | -- |
| Stiff Clay w/o Free Water | -37 | -60 | 130 | 2,000 | -- | -- | 0.006 |
| Sand (Reese) | -60 | -70 | 125 | -- | 32 | 60 | -- |
| Stiff Clay w/o Free Water | -70 | -87 | 125 | 2,500 | -- | -- | 0.005 |
| Sand (Reese) | -87 | -97 | 125 | -- | 36 | 125 | -- |
| Stiff Clay w/o Free Water | -97 | -110 | 125 | 2,500 | -- | -- | 0.005 |

Notes:
1- Subgrade modulus values are same for both static and cyclic loading conditions in sands.
2- Strains at 50% of maximum stress for lateral capacity analyses based on the recommendation of LPile 2019.11.02. The strains at 50% of maximum stress are same for both static and cyclic loading conditions in clays.

## 7.4 Lateral Group Effects

In general, the lateral load carrying capacity of a pile within a group will be less than of an individual pile. Leading row piles generally experience less reduction in lateral capacity as compared to trailing row piles for the same head deflection criteria. The pile group arrangement and more importantly, the center-to-center spacing between adjacent piles has a significant impact on lateral group effects. Piles spaced greater than about 5 to 6-pile's diameter, center-to-center, generally have limited lateral group effects. If the proposed center-to-center spacing between piles is smaller than 5-pile's diameter, it is recommended that group lateral capacity be analyzed on a case-by-case basis.

## 7.5 Settlement of Pile Groups

Settlement of an individual pile depends upon the loads applied, pile size, and subsurface conditions. Based on our experience, we expect settlements of individual piles due to soil consolidation for properly designed and installed piles to be less than about 1 inch with different settlement about ½-inch.

Groups of piles will likely settle more than individual piles subjected for the same load per pile. The increase in settlement between individual piles and groups is generally negligible for small to moderately sized groups of piles (5 x 5 or less). The settlement of groups is dependent on several variables including: dimension of the pile group, pile lengths, sustained structural load, and compressibility characteristics of the foundation soils.

# 8 Preliminary Railroad Embankment Recommendations

## 8.1 Railroad Section Recommendations

A new rail track is proposed for construction around the perimeter of the site as shown on Figures 2b and 2c. Based on Google Earth surface elevation data, current ground surface elevations in the vicinity of rail track vary from about El. +3.5 feet to El. +8 feet. Our discussion and preliminary recommendations for embankment fill for the roadbed, ballast and subballast, lime-fly ash stabilization of subgrade, bearing capacity of subgrade, and railroad sections are presented in the following sections.

### 8.1.1 Embankment Fill for Trackbed

Discussions of fill selection and placement for the track roadbed embankment are presented in Section 10. Embankment slopes should be constructed at 2H:1V or flatter, and the crest of slope should be no closer than 12 inches feet from edge of track.

### 8.1.2 Ballast

Ballast is selected crushed and graded aggregate material primarily functioning to distribute the load from the ties to the subgrade at an acceptable pressure. Ballast also provides a firm bearing surface for the ties, lateral and longitudinal stability to the track structure, and drainage for the track structure.

Ballast material should be a clean, washed and graded crushed stone aggregate that has properties meeting the requirements of recommended limiting values of testing for ballast material[5] of the AREMA Manual for Railway Engineering. The required properties include limiting values from the following ASTM tests:

- Percent Material Passing No. 200 Sieve
- Bulk Specific Gravity
- Absorption Percent
- Clay Lumps and Friable Particles
- Degradation (LAA)
- Soundness
- Flat and/or Elongated Particles

Additionally, the ballast should be an American Railway Engineering and Maintenance-of-Way Association (AREMA) size No. 4 material. The recommended gradation is provided in Table 8-1[6].

**Table 8-1: AREMA Size No. 4 Material Gradation**

| Sieve Size | Percent Passing |
|---|---|
| 2” | 100 |
| 1 1/2” | 90-100 |
| 1” | 20-55 |
| 3/4” | 0-15 |
| 1/4” | 0-5 |

### 8.1.3 Subballast

Crushed stone subballast is typically used as a transition layer between the ballast and the subgrade. The primary function of the subballast is to prevent pumping and intermixing of the ballast and the subgrade. The subballast material is typically a finer material than the overlying ballast. Operation of trains over new track laid without adequate subgrade stabilization and subballast tends to drive the ballast into the subgrade, forming depressions which later develop into ballast pockets requiring extra maintenance.

The subballast should be sufficiently impervious to divert most of the surface water runoff into side drainage ditches to prevent saturation of the subgrade. However, the subballast should also be sufficiently pervious to permit the release of perched or seeping water to reduce the potential accumulation of water underneath the subballast. The subballast

[5] American Railway Engineering and Maintenance-of-Way Association (2019), *Manual for Railway Engineering*, Volume 1, Chapter 1, Part 2, Section 2.4.1, Table 1-2-1 Recommended Limiting Values of Testing for Ballast Material

[6] American Railway Engineering and Maintenance-of-Way Association (2019), *Manual for Railway Engineering*, Volume 1, Chapter 1, Part 2, Section 2.4.5, Table 1-2-2. Recommended Ballast Gradations.

should have sufficient strength and gradation characteristics to support the load applied by the ballast section and uniformly distribute the load to the underlying subgrade.

Subballast should consist of material in conformance with TxDOT Standard Specifications Item 247, Flexible Base, Type A, Grade1-2. The subballast should be placed in loose lifts no greater than 8-inches thick and compacted to at least 100 percent of the maximum dry density and within 2 percentage points of the optimum water content as determined by TxDOT Test Method Tex-113-E.

### 8.1.4 Lime-Fly Ash Stabilization of Subgrade

We recommend that lime-fly ash stabilization of the subgrade be performed to assist in strengthening the subgrade and eliminating instability to achieve a proper working surface. The lime-fly ash stabilized zone should extend laterally a minimum of 3 feet from the proposed toe of railroad embankment. Note that the depth of lime-fly ash stabilization and the application rate may vary along the alignment depending on the nature of the exposed subgrade on a case-by-case basis. Discussions regarding the lime-fly ash stabilization are presented in Section 10.6.

### 8.1.5 Bearing Capacity

The preliminary allowable bearing capacity of the atop the stabilized subgrade soils was estimated to be between 1,800 and 2,200 pounds per square foot (psf) beneath the proposed embankment. The estimated allowable bearing capacity is based on a factor of safety (FS) of 2.0.

### 8.1.6 Railroad Sections

Satisfactory performance of conventional at-grade railroad track sections requires consideration of the following interrelated factors: 1) load interaction and transfer between the rail, ties, ballast, subballast and subgrade; 2) drainage of the track foundation system; 3) reduction of differential movements through proper subgrade preparations; and 4) the ability of the prepared subgrade and any fill to support applied loads.

In development of the preliminary rail section, we assumed the following rail parameters:

- Gross Rail Load (Train Car Weight): 360 kips
- Train Travel Velocity: 30 mph
- Car Wheel Diameter: 38-inch
- Center-to-center Tie Spacing: 19.5-inch
- Timber Tie Dimensions: 7-inch x 8.5-inch x 102-inch

Based on our understanding of the proposed rail construction and expected loading, along with the soil conditions encountered in the borings performed for the project, a preliminary railroad section is presented in Table 8-2.

**Table 8-2: Proposed Railway Section**

| Material | Minimum Thickness (inches) | Minimum Thickness (inches) |
|---|---|---|
| Ballast | 8 to 12 | 8 to 12 |
| Subballast | 18 to 24 | 12 to 18 |
| Tensar Triaxial Geogrid TX-5 | Not Included | Included |
| Lime-Fly Ash Stabilized Subgrade | 36 to 42 | 36 to 42 |

## 8.2 Railroad Embankment Slope Stability

Current plans show that the top of track elevation varies approximately between El. +7½ to El. +8 ft. We understand that the railroad embankments are planned to be constructed mostly without any raise to the existing grade. However, the eastern portion of Track F in the vicinity of STA 23+43 is going to constructed with an up to approximately 4-ft tall embankment on top of the existing grade at El. +3.5 ft. Therefore, we performed slope stability analyses on a 4-ft tall embankment in the vicinity of Track F, STA 23+43.

The analyzed embankment consists of an 8-in thick ballast and 20-in thick subballast, constructed on a minimum 44-in-in thick lime-fly ash stabilized subgrade. An embankment slope of 2H:1V including the ballast and subballast was investigated as part of the slope stability analyses for the railroad embankment.

### 8.2.1 Factors of Safety for Slope Stability Analyses

For satisfactory performance, the proposed slope configurations should have an acceptable factor of safety during their entire time of service. Factors of safety for various potential loading conditions and modes of failure should be considered. The required factors of safety for various loading conditions analyzed in this study are discussed below. The End of Construction (short-term) loading condition models the slope immediately following construction. Undrained soil strength parameters are used in evaluating this loading condition. The Steady State (long-term) loading condition models the slope when the excess pore water pressures have dissipated to a steady-state condition. Drained soil strength parameters are used in evaluating this loading condition.

AREMA has recommended minimum factor of safety to be in accordance with *Manual for Railway Engineering*[7]. AREMA indicates that a factor of safety of 1.5 is considered adequate but does not differentiate between short- and long-term conditions.

### 8.2.2 Slope Stability Analysis Methodology

We performed slope stability analyses using *Slope/W* by *Geostudio*. We used Spencer's method that uses two-dimensional limit equilibrium analysis to determine the factor of safety for the slope. The computed factor of safety is the ratio of the forces resisting movement to the forces driving movement.

[7] *American Railway Engineering and Maintenance-of-Way Association, 2019, Manual for Railway Engineering, Volume 1, Chapter 1, Part 1, Section 1, Article 2.3*

Assumptions used in our analyses are summarized below:

1. A surcharge of 1,882 psf was considered for the railroad loading.
2. Water level is assumed at El. +0 ft.
3. Slopes maintain their geometries as our analyses did not consider the effects of scour or erosion.
4. Slope stability analyses were limited to static forces. We did not evaluate the effects of dynamic forces, e.g., wind, waves, and seismic on the existing and/or excavated slope. The dynamic effects of "extreme" events such as tropical storm or hurricane events were not considered.
5. Rapid drawdown was not considered.

### 8.2.3 Soil Information Used for Stability Analysis

Undrained soil parameters (undrained cohesion and undrained friction angle) and drained soil parameters (drained cohesion and drained friction angle) were selected for each soil stratum based on the laboratory and field test data collected during our field exploration and laboratory testing, previous geotechnical studies performed at this site, and our experience with similar projects and subsurface conditions. During the geotechnical field investigation, five borings (Borings B-8 through B-12) were performed along the proposed railroad alignment. The locations of Borings B-8 through B-12 are shown on Figure 3. The stratigraphy used in our analyses, along with short-term and long-term parameters selected for each stratum are presented on Table 8-3.

**Table 8-3: Soil Parameters for Slope Stability of the Railroad Embankment**

| Stratum/ Material | Stratum Elevation (feet) | Unit Weight (pcf) | | Undrained (short-term) | | Drained (long-term) | |
|---|---|---|---|---|---|---|---|
| | | Total | Effective | Cohesion, c (psf) | Friction Angle, ϕ (˚) | Effective Cohesion, c' (psf) | Effective Friction Angle, ϕ' (˚) |
| Ballast | +7.5 to +6.83 | 140 | 77 | -- | 38 | -- | 38 |
| Subballast | +6.83 to +5.17 | 130 | 67 | -- | 36 | -- | 36 |
| Lime-Fly Ash Stabilized Subgrade | +5.17 to +1.5 | 120 | 24 | 2,500 | -- | 500 | 30 |
| Sandy Clay | +1.5 to 0 | 125 | 62 | 500 | -- | 75 | 22 |
| Soft Clay | 0 to -5 | 125 | 62 | 250 | -- | 50 | 22 |
| Clayey Sand 2 | -5 to -18 | 130 | 67 | -- | 30 | -- | 30 |

### 8.2.4 Results of Stability Analyses

The stability of the proposed railroad embankment was assessed using our interpretation of the soils encountered during the field investigations. The *Slope/W* output for the cross-sections analyzed for short-term (undrained) and long-term (drained) are presented Figures 7a and 7b. The calculated factors of safety for short-term, and long-term conditions are summarized in Table 8-4.

**Table 8-4: Calculated Factors of Safety from Stability Analyses of the Railroad Embankment**

| Railroad Embankment Side Slope | Condition | Minimum Required Factor of Safety | Minimum Factor of Safety Calculated in *Slope/W* | Figure |
|---|---|---|---|---|
| 2H:1V | Short-Term | 1.5 | 1.6 | 7a |
| | Long-Term | 1.5 | 1.5 | 7b |

Based on our slope stability analyses using the anticipated geometry and assumptions, the proposed railroad embankment meets the minimum factors of safety for global stability.

## 8.3 Railroad Embankment Settlement

The recommendations for the railroad trackbed and railroad sections are presented in Section 8.1. We performed a settlement analysis for a 4-ft tall railroad embankment to be constructed above existing grade.

Settlement estimates presented herein were determined based on consolidation test results as part of the study as well as our experience with similar soils under similar loads. We expect that total settlements caused by the railroad embankment to be on the order of 2 to 3 inches. Additionally, settlement of less than ½ inch should be expected within the embankment material. Differential settlements are expected to be on the order of ½ the total settlement. It should be noted that these estimates are based on uniformly loaded subgrade with sustained contact pressures that are no greater than the raised railroad embankment provided to us and the estimate train load.

# 9 Soil Corrosion Potential

General discussions regarding the corrosion of steel and the degradation of concrete with respect to the results of the analytical tests performed on soil samples as part of this study are provided in this section.

## 9.1 Corrosion of Steel

The corrosion potential of steel is influenced by electrical resistivity, chloride ion concentration, and pH. Corrosion of steel is more likely in soil environments with low resistivity, high chloride ion concentrations, or low pH. Table 9-1 presents some general guidelines concerning the corrosion potential of soil on steel as a function of soluble chloride, electrical resistivity, and pH.

**Table 9-1: Guidelines for Corrosion Potential of Buried Steel**

| Soluble Chloride Concentrations (ppm) | Electrical Resistivity (ohm-cm) | pH | Corrosion Potential |
|---|---|---|---|
| > 500 | 0 - 1,000 | 0 - 4.5 | Very Severe |
| 100 - 500 | 1,000 - 2,000 | 4.5 - 5.5 | Severe |
| 25 - 100 | 2,000 - 5,000 | 5.5 - 6.5 | Moderate |
| 10 - 25 | 5,000 - 10,000 | > 6.5 | Mild |
| ----- | 10,000 + | ----- | Very Mild |

Each variable should be used independently of the others when evaluating soil corrosion potential. For example, it is not necessary to have both an electrical resistivity less than 1,000 ohm-cm and a pH less than 4.5 to indicate a very severe corrosion potential.

- Measured soluble chloride contents ranged from 40 to 1,000 ppm, which indicate the soils have a moderate to very severe corrosion potential.
- Measured electrical resistivity values varied from 317 to 1,030 ohm-cm, which indicate the soils have a severe to very severe corrosion potential.
- Measured pH values ranged from 7.83 to 8.74, which indicate the soils have a mild corrosion potential.

Based on the results of our analyses, the soils at the site appear to exhibit a very severe tendency to corrode buried steel. A Corrosion Engineer should review the test results discussed herein, when designing appropriate methods of protecting buried steel.

## 9.2 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 American Concrete Institute (ACI) guidelines. Table 9-2 presents general guideline concerning the potential for degradation of concrete as a function of sulfate ion concentration.

**Table 9-2: ACI Guidelines for Severity of Potential Exposure to Sulfate**

| Aggressiveness | Sulfate Ion Concentration (ppm) |
|---|---|
| Very severe | > 20,000 |
| Severe | 2,000 – 20,000 |
| Moderate | 1,000 – 2,000 |
| Mild | < 1,000 |

The results of sulfate tests (66 to 445 ppm) on the selected soil samples from this study indicate the potential for deterioration of concrete, based on sulfate ion concentrations, is mild across the site. We recommend that a Corrosion Engineer be consulted to determine if protective measures are warranted.

# 10 Preliminary Construction Considerations

Construction considerations regarding site preparation and drainage, building pad preparation, shallow open-cut excavations, select clay fill material and placement, lime-fly ash stabilized subgrade, driven pile installation recommendations, augered cast-in-place pile installation, and construction monitoring are provided in the following sub-sections. Details regarding excavation, dewatering, selection of equipment/machinery, project site safety, and other similar construction techniques requiring "means and methods" to accomplish the work is the sole responsibility of the project contractor.

## 10.1 Site Preparation and Drainage

Subgrade preparation should include clearing and stripping all organic material, debris, limestone, and other deleterious materials. Areas of the subgrade that are observed to be soft, wet, weak, or contain deleterious materials should be over-excavated to expose competent soils. Over-excavated areas should be backfilled with properly placed and compacted select clay fill. Our recommendations for select clay fill are presented in Section 10.4.

After removing deleterious materials and stripping, the exposed subgrade should be proof-rolled with a fully loaded dump truck or other heavy (20-ton), rubber-tired vehicle (where practical) and observed by the Geotechnical Engineer-of-Record or their qualified representative to evaluate the conditions of the subgrade. Final grade should be achieved using select clay fill or on-site cohesive soils that meet the requirements as described in Section 10.4.

Site preparation may be significantly impacted by rainfall if drainage is not improved before and during construction. Drainage of surface water during site preparation as well as during any proposed site grade raise will be crucial issues to maintain subgrade stability. The contractor should be aware of potential site access/mobility problems and should take appropriate steps to ensure safety of personnel and equipment. Good positive drainage away from the construction area should be provided to preclude ponding of water due to rain and surface runoff.

## 10.2 Building/Structure Pad Preparation

Within the building footprint and for a distance 3-ft outside the footprint, remove and dispose of any existing fill material, deleterious materials, and organics, and enough of the remaining soil to provide minimum required select fill pad beneath the slab-on-grade. The soil subgrade should be scarified to a depth of at least 8 inches and recompacted to a minimum of 95 percent of the maximum dry density as determined using TxDOT Test Method Tex-114-E. Water contents should be maintained within 0 to +3 percent of the optimum water content. In-place moisture density tests should be performed at a frequency of 1 test per 2,500 $ft^2$, but not less than 3 tests per lift per structure.

For closed in structures, considerations should be given to placing a capillary moisture barrier/drainage layer (minimum thickness of 4 inches) should be placed atop the compacted select fill. The material should consist of free-draining, clean, crushed stone with sizes ranging mostly between ¼ and ½ inch. A material conforming to ASTM C 33,

Grade 67 is recommended. The purpose of this layer is to break the transmission of capillary moisture to the underside of the slab.

Additionally, a vapor retarder should be placed beneath the slab. The vapor retarder material should be in compliance with ASTM E 1745 and have a thickness of at least 10 mils, as recommended by ACI 302.1R-04 “Guide for Concrete Floor and Slab Construction”. The vapor barrier material should be of sufficient strength and durability to resist puncture during reinforcing steel and concrete placement. Placement of the vapor barrier should be in accordance with manufacturer’s recommendations.

## 10.3 Shallow Open-Cut Excavations

Construction and/or temporary slopes, bracing, and/or shoring are the sole responsibility of the contractor. We understand potential shallow open-cut excavations will encounter cohesive soils during construction. Based on Occupational Safety and Health Administration (OSHA) Standards, 29 CFR Part 1926, Subpart P, Excavations and our interpretation of the subsurface conditions indicated in our borings, we classify the natural cohesive soils encountered in our borings generally as Type B soils, assuming the soils remain dry during excavation; otherwise, if the soils do not remain dry based on the potential seepage due to shallow groundwater, the cohesive soils should be classified as Type C soils.

Sides of temporary vertical excavations less than about 4 feet deep may stay open for short periods of time. OSHA requires trenches deeper than 4 feet be sloped back or braced. However, if side slopes begin to slough, the sides should be either braced or sloped back. Excavations deeper than about 4 feet (and less than 20 feet) should be either braced or sloped back no steeper than 1H:1V in Type B soils, and no steeper than 1.5H:1V in Type C soils. Flatter slopes or bracing should be used in either case if sloughing or raveling is observed. Per OSHA, sloping or benching for excavations greater than 20 feet deep shall be designed by a registered Professional Engineer.

Temporary construction sheeting, if used, will be subject to lateral earth pressures from the surrounding soil, groundwater, and surcharge loads. Prior to construction, the Contractor should have a qualified engineer calculate the lateral earth pressures and design the shoring to withstand these pressures. The magnitude of the lateral earth pressures will be dependent on soil and groundwater conditions at the excavation location.

We recommend that stockpiled materials be kept back from the excavation at least a distance equal to the excavation depth to avoid surcharging the excavation walls. If this is impractical due to space constraints, any trench retention system should be designed for the anticipated surcharge loading.

## 10.4 Select Clay Fill Material and Placement

We recommend using low plasticity cohesive soils for select clay fill. Select clay fill should have a liquid limit of less than 40, a plasticity index between 8 and 20, and at least 50 percent of the material finer than the No. 200 sieve. Select clay fill should be free of deleterious matter and should have an effective clod diameter less than 3 inches. On-site soils can be used for fill purposes if they meet the aforementioned criteria.

Select clay fill should be compacted to at least 95% of the maximum dry density as determined by Tex-114-E at a moisture content between 0 to +3. Maintain compacted lift thicknesses to 6 inches or less. Select clay fill should be compacted by a sheepsfoot or padfoot type roller, or by alternative methods that provide a "kneading" compaction equivalent to the sheepsfoot or padfoot roller. Adjacent to foundations, piping, utilities, or other structural features and confined areas, select clay fill should be placed in 4-inch-thick loose lifts and compacted using hand-operated compaction equipment.

If wet weather or extended dry periods deteriorate the exposed surface whereby a good bond cannot be formed between successive lifts, the Contractor should prepare the surface as necessary. This preparation may include removing or scarifying the top couple of inches of the underlying material before placing the next lift.

## 10.5 Geogrid

Table 8-2 includes an alternative track section with geogrid. For preliminary consideration we have recommended using Tensar Triaxial Geogrid TX-5 or equivalent. The geogrid should be placed between the subballast and lime-fly ash stabilized subgrade in accordance with the manufacturer's recommendations.

## 10.6 Lime-Fly Ash Stabilized Subgrade

Lime-fly ash stabilization may be used to modify onsite soils. Laboratory tests should be conducted at the time of construction to determine the optimum lime-fly ash content. For estimation purposes, we recommend that at recommended locations, the subgrade be stabilized with 2 to 4% lime and 6 to 10% fly ash. Organics, chemical fertilizers, and some clay minerals can modify the amount of lime necessary for lime fixation. Specific mix design should be based on TxDOT Test Method Tex-127-E and a minimum unconfine compressive strength of 100 psi.

Lime-fly ash stabilization should be done in accordance with the TxDOT Item 265 – Fly Ash or Lime-Fly Ash Treatment. Lime-fly ash stabilized soils should be uniformly compacted to 95 percent of the maximum dry density as determined by TxDOT Test Method Tex-113-E.

The moisture-density relationship should be established based on a material sample obtained on site after stabilization with lime-fly ash. A combination of sheepsfoot or padfoot rollers and pneumatic rollers is recommended to compact the lime-fly ash stabilized clay fill.

## 10.7 Driven Pile Installation Recommendations

### 10.7.1 Pile Drivability and Equipment

We recommend that a wave equation analysis be performed to select the proper hammer and cushioning. We are available to provide such geotechnical consultation once the final design has been developed. We also recommend that consideration be given to using fixed leads during pile driving operations. Production piles should be driven using a hammer of adequate size in as nearly a continuous operation as feasible, without interruption, if possible. Pile driving hammers may be diesel, steam, or air operated. The

use of a drop hammer, with a light ram and a large stroke, is discouraged since this type of hammer can produce exceedingly high and damaging stresses.

The results of the wave equation analysis should be used to demonstrate that the proposed hammer has sufficient energy to install the piles to the required capacity and/or penetration, and that the hammer is properly cushioned to avoid structurally damaging the piles. To avoid damaging the pile and/or pile driving equipment, refusal criteria should be determined and agreed upon by all parties involved prior to the start of actual pile driving.

### 10.7.2 Pile Driving Specification

The design engineer, in conjunction with the Geotechnical Engineer of Record (GEOR), or their qualified representative, should prepare detailed pile driving specifications. The specifications should cover the project requirements for furnishing and installing the piles including the scope of services, necessary submittals, piling details, equipment requirements, installation requirements and tolerances, capacity evaluation, and construction records. The specification should require the contractor to submit a complete package detailing the proposed piling equipment and installation procedures for approval prior to mobilization to the site.

We recommend that the specification establish a pile-driving criterion to clearly define the required pile capacities, pile penetrations, and/or final driving resistance for acceptance. The results of the wave equation analysis should be used to establish the pile driving criterion. Requirements for PDA tests and capacity evaluation should be stated. The specification should require the contractor to notify the GEOR, or their qualified representative, of any changes to the pile driving equipment and methods so that the pile-driving criterion can be adjusted, if necessary. Remedial measures should be presented to address piles not achieving the specified criterion, out of tolerance piles, or piles with questionable driving records.

### 10.7.3 Production Piles

Production piles should be installed to a penetration criterion. The penetration criteria should be in conjunction with the pile driving criteria, to avoid pile damage. The selection of a particular length and particular criteria depends on the pile size, available length, and capacity requirements, in addition to the soil properties. We recommend retapping selected production piles periodically to determine if the driving resistance and pile capacity increase or decrease with time.

We recommend surveying the production piles to detect possible vertical and/or horizontal movement (commonly referred to as heave) which can result from soil displacement when driving adjacent piles. Piles which heave after driving adjacent piles should be redriven to at least their original penetration and final driving resistance. If unacceptable pile and ground movements are experienced due to heaving, supplemental installation techniques, such as pilot holes, may be considered. If pre-drilling is required, the pilot holes should not be larger than 2/3 the diameter of the pile and should not extend more than 2/3 of the planned pile penetration.

### 10.7.4 Pile Driving Records

An independent inspector should keep an accurate and detailed driving log during production driving operations. The log should provide a complete record of hammer blows per foot of penetration from the initial to the final blow for each pile installed. The record for each pile should also include the driving date, pile information, hammer information, cushion information, hammer and compressor operation information, ground and pile tip elevations, records of predrilling and/or retapping, and notes on installation delays, problems, or unusual occurrences.

### 10.7.5 PDA Tests

We recommend that design pile capacities be verified during installation by dynamic methods utilizing PDA. PDA testing can verify hammer performance, driving stresses, hammer-to-pile alignment, pile damage, and pile capacity during driving. It should be performed at the end of driving and after soil set-up is allowed to occur. The GEOR or their qualified representative should be consulted to develop a PDA testing program.

## 10.8 Augered Cast-In-Place (ACIP) Pile Installation

The proper installation of augered cast-in-place piles depends upon the Contractor's experience, construction procedures, and equipment. The performance of this type of foundation is affected more by the quality of construction techniques than other types of deep foundation systems. We recommend installing augered cast-in-place piles in general accordance with the *Augered Cast-in-Place Pile Manual*[8] prepared by the Deep Foundations Institute. The Contractor should have relevant project experience with augering and pumping equipment, installation of augered cast-in-place piles in similar subsurface conditions, placement of reinforcing steel for compression and tension loads, as well as experience handling special grout mixes and admixtures.

A comprehensive monitoring program is essential to observe the installation of augered cast-in-place piles, and to help reduce the risk associated with improper construction techniques. Construction monitoring should be performed in accordance with the *Inspector's Guide to Augered Cast-in-Place Piles*[9] prepared by the Deep Foundations Institute. We recommend that construction monitoring be performed by qualified personnel independent of the Contractor.

The installation process makes it inherently difficult to verify the integrity of the installed augered cast-in-place piles, yet the integrity is essential to the load carrying capacity of the piles. There are several aspects of the installation procedure that can be monitored to aid in assessing whether the augered cast-in-place pile is being installed properly, as outline below.

- Grout take
- Consistency of grout pressure
- Comparison of actual versus theoretical grout volume

[8] Augered Cast-in-Place Piles Manual, 3nd Edition, Deep Foundations Institute, Englewood Cliffs, New Jersey, 2016.

[9] Augered Cast-in-Place Piles Inspector's Guide, 2nd Edition, Deep Foundations Institute, Englewood Cliffs, New Jersey, 2010.

- Withdrawal rate of auger

Records kept during construction monitoring should include these aspects of installation. Many qualified contractors have Pile Installation Recorders equipped in their installation rigs to monitor installations.

The volume of grout placed is an important installation control used during the installation of augered cast-in-place piles. Common practice is to pump more than the calculated volume for a given diameter hole and to monitor the actual amount. The ratio of the amount of grout pumped to the theoretical volume of the pile is referred to as the “grout take”. The appropriate design grout take is a function of the local soil conditions and can vary considerably from project site to project site. To verify the design grout take for a particular site, pile load tests and/or sonic integrity logging should be performed. Installing piles with an inappropriate grout take can result in poor quality piles. An insufficient and/or a non-uniform grout take could result in necking. The driller and the inspector should continually monitor the grout volume being placed. The grout take should be monitored and recorded for every 5 feet of pile penetration as part of the installation inspection. A non-uniform grout take along an individual pile indicates that the pile is not uniform.

The pile contractor should be able to demonstrate that a grout mix can be furnished to meet this project's requirements. The grout mix should be tested by making at least six, 2-inch square cubes for each day during which piles are placed. Test cubes should be cured and tested in accordance with ASTM C109 and may be restrained from expansion as described in ASTM C942.

The Contractor’s installation plan should be reviewed prior to construction operations. In general, previously cast piles should achieve their initial set (at least 6 hours) prior to the placement of adjacent piles. Augered cast-in-place piles spaced closer than about 6 feet (clear spacing) should be placed at least 6 hours apart and preferably on alternate days. The installation plan should address pile spacing and wait times for construction of adjacent piles. These recommendations and others should be incorporated into a well-written augered cast-in-place pile installation specification prior to the start of construction.

## 10.9 Construction Monitoring

We recommend that the GEOR, or their qualified representative, be present on-site during construction to observe and monitor construction activities. Construction monitoring performed by qualified personnel independent of the Contractor is recommended because the performance of foundations constructed during this project will be directly related to the Contractor’s adherence to the recommendations presented in this report and to the specifications prepared by the Designer. Additionally, due to the possibility of variations in subsurface conditions, we recommend that qualified geotechnical personnel observe construction on-site who can monitor construction activities and may aid in recognizing unanticipated subsurface conditions and reconciling these conditions with design recommendations. Construction monitoring should be performed during the installation of piles to observe pile installation. During the pile installation and construction phases, we can provide material testing and surveillance to 1) observe compliance with the design concepts, specifications, and recommendations, and 2) perform quality control tests including performing PDA services.

# 11 Supplemental Geotechnical Studies

The following supplemental studies and/or information will be required for final design.

- Supplemental borings to further evaluate the discrepancy between the RETL and MEG borings.
- Obtain topographic information across the project site.
- Finished floor elevation of the ingredient barn.

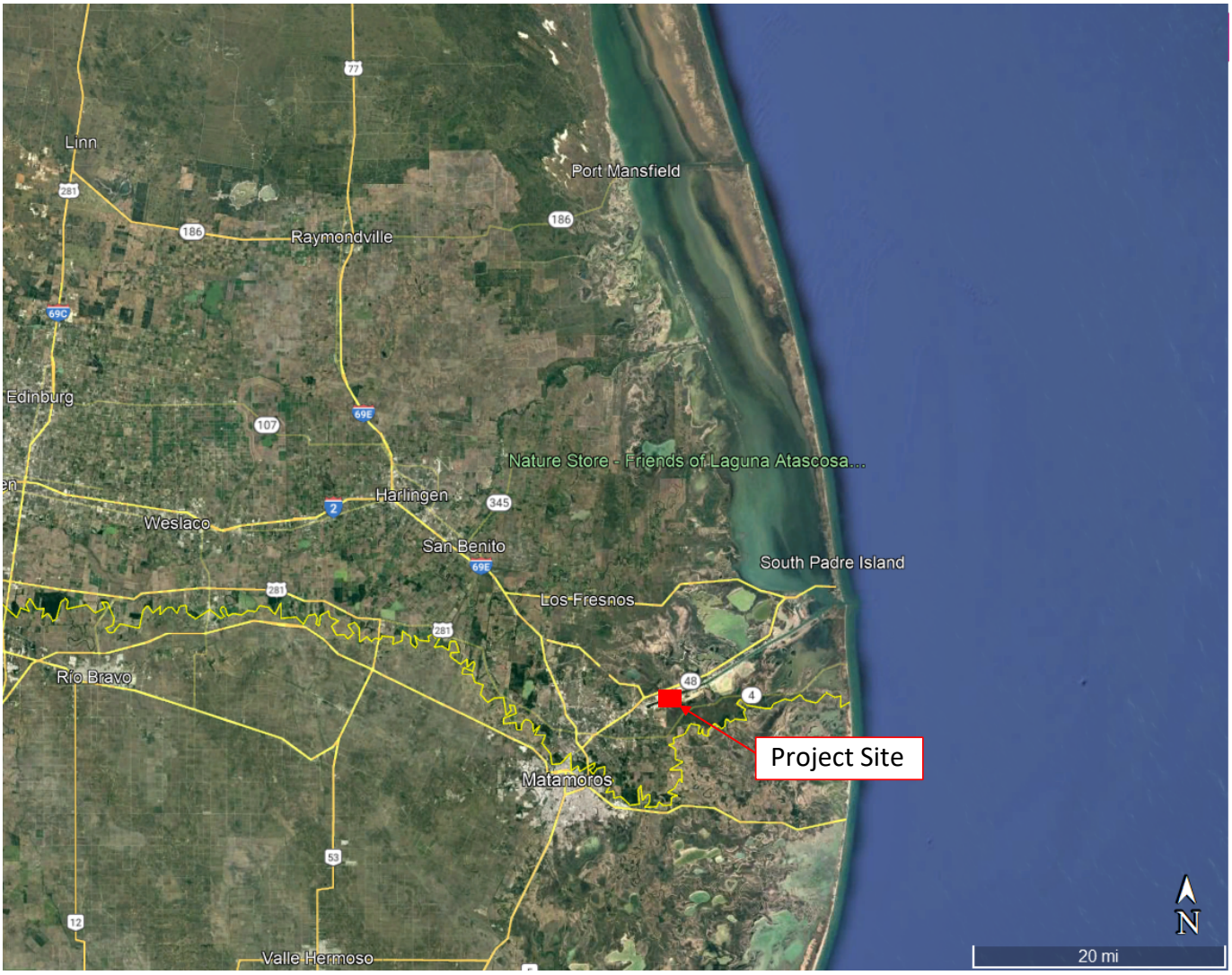
# 12 Limitations

The geotechnical engineering recommendations presented herein are based on the geotechnical engineer's experience and professional opinion. These services were performed with the degree of skill and care normally utilized by other members of the geotechnical engineering profession practicing in this location and at this time. There is no warranty, either express or implied. The results, conclusions, and recommendations contained herein are directed at, and intended to be utilized within our contracted scope of work. This report is not intended to be used for any other purposes.

The analyses, conclusions, and recommendations in this report are based on the subsurface conditions present in the borings at the time of drilling and the engineering characteristics of the soil as determined through field and laboratory testing at this point in time. The report does not reflect variations in subsurface conditions that may exist between or beyond these borings. Subsurface conditions can change over time due to both natural and manmade forces, including changes in condition and/or use of adjacent properties.

This report was prepared for the sole and exclusive use by the client, as an instrument of service. No third party may use or rely upon the information provided in this report without our express written consent. We assume no responsibility for the unauthorized use of this report by other parties and for purposes beyond the stated project objectives and scope limitations.

# Figures



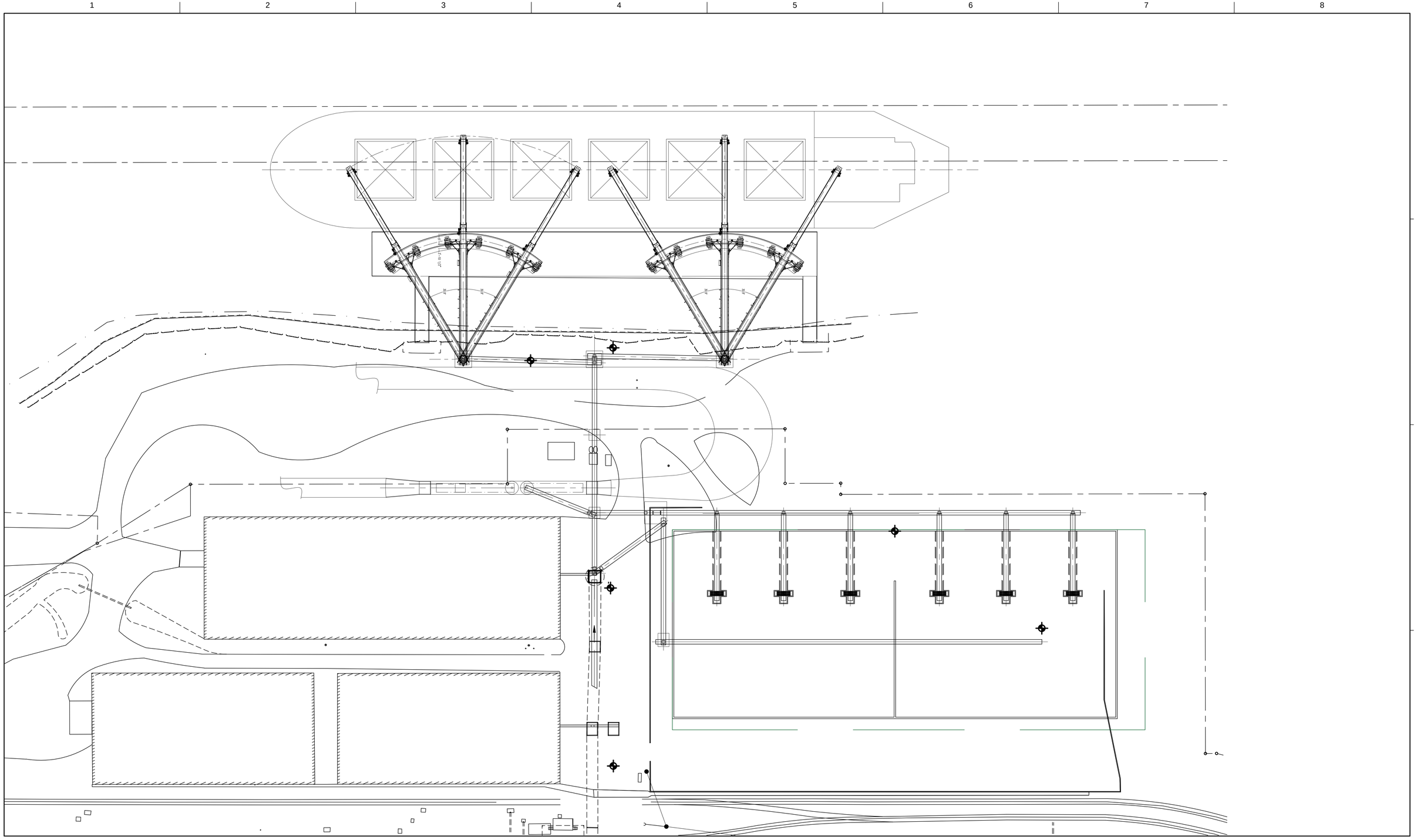

**DATA SOURCE**
Google Earth

0 MILES 20

## SITE VICINITY MAP

**PORT OF BROWNSVILLE GRAIN FACILITY IMPROVEMENTS**

**WEST PLAINS, LLC**



| | | |
|---|---|---|
| PROJECT MANAGER | ART CONTI | |
| MECHANICAL | KYLE WUNDT | |
| ISSUE | DATE | DESCRIPTION |
| - | - | - |
| PROJECT NUMBER | 10287181 | |

**WEST PLAINS LLC**
**PORT OF BROWNSVILLE TEXAS**
**BROWNSVILLE, TEXAS**

# FACILITY UPGRADES
# CONCEPTUAL PLAN
# SHIP LOADING AND INGREDIENT BARN

0 1" 2"

FILENAME 00D-02.DWG

SCALE -

SHEET **00D-02**

FIGURE 2a

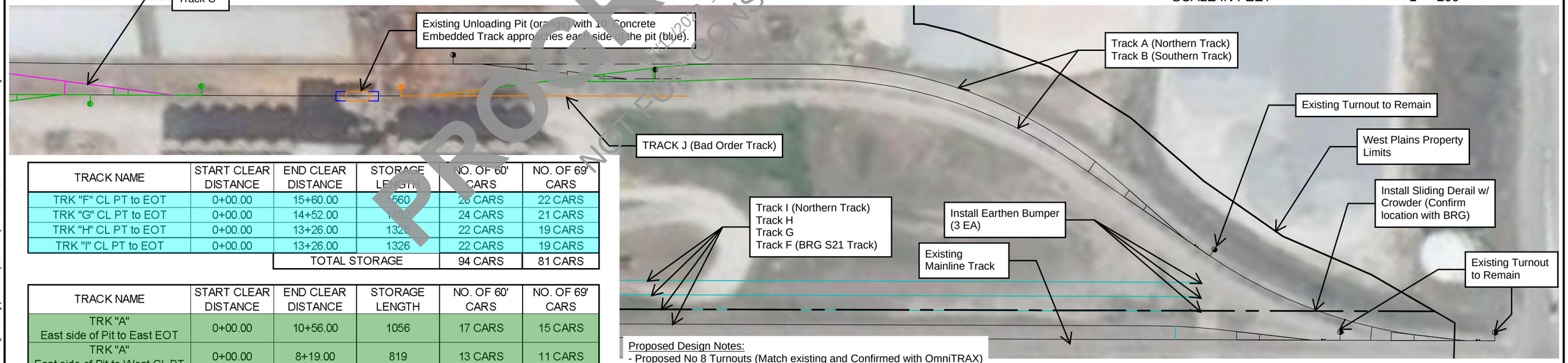
Disclaimer

This design concept is for preliminary bidding and review purposes only. It does not constitute approval nor a guarantee to provide any level of service to this location. This concept is based on available aerial imagery and does not consider matters which could impact feasibility, including without limitation utilities, environmental conditions, permitting, and property issues. Ultimate formal project design must meet operating railroads technical specifications for construction of industrial tracks.

Right-of-Way lines are approximate and are depicted from aerial imagery.


## OVERALL RAIL SITE VIEW

200 0 200 400
SCALE IN FEET 1" = 200'




| TRACK NAME | START CLEAR DISTANCE | END CLEAR DISTANCE | STORAGE LENGTH | NO. OF 60' CARS | NO. OF 69' CARS |
|---|---|---|---|---|---|
| TRK "F" CL PT to EOT | 0+00.00 | 15+60.00 | 1560 | 26 CARS | 22 CARS |
| TRK "G" CL PT to EOT | 0+00.00 | 14+52.00 | 1452 | 24 CARS | 21 CARS |
| TRK "H" CL PT to EOT | 0+00.00 | 13+26.00 | 1326 | 22 CARS | 19 CARS |
| TRK "I" CL PT to EOT | 0+00.00 | 13+26.00 | 1326 | 22 CARS | 19 CARS |
| | | TOTAL STORAGE | | 94 CARS | 81 CARS |

| TRACK NAME | START CLEAR DISTANCE | END CLEAR DISTANCE | STORAGE LENGTH | NO. OF 60' CARS | NO. OF 69' CARS |
|---|---|---|---|---|---|
| TRK "A" East side of Pit to East EOT | 0+00.00 | 10+56.00 | 1056 | 17 CARS | 15 CARS |
| TRK "A" East side of Pit to West CL PT | 0+00.00 | 8+19.00 | 819 | 13 CARS | 11 CARS |
| TRK "J" Optional Bad Order Track | 0+00.00 | 1+40.00 | 140 | 2 CARS | 2 CARS |
| TRK "B" CL PT to EOT | 0+00.00 | 8+08.00 | 808 | 13 CARS | 11 CARS |
| TRK "C" CL PT to CL PT | 0+00.00 | 5+36.00 | 536 | 8 CARS | 7 CARS |
| TRK "D" East side of Pit to West CL PT | 0+00.00 | 8+67.00 | 867 | 14 CARS | 12 CARS |
| TRK "E" (+LOCO) | 0+00.00 | 8+60.00 | 800.00 | 13 CARS | 11 CARS |

Proposed Design Notes:
- Proposed No 8 Turnouts (Match existing and Confirmed with OmniTRAX)
- Proposed minimum 12 deg curves (Confirmed with OmniTRAX)
- 14' Clear Points
- Cyan Track used as BRG car pick up/drop off car storage
- Green/Blue Tracks used for Unloading Operations
- Pink Track to be used as Bad Order Track and Locomotive Storage

100 0 100 200
SCALE IN FEET 1" = 100'

## WESTSIDE RAIL SITE VIEW

BROWNSVILLE - WEST PLAINS
RAIL EXHIBIT

SHEET 1 OF 2

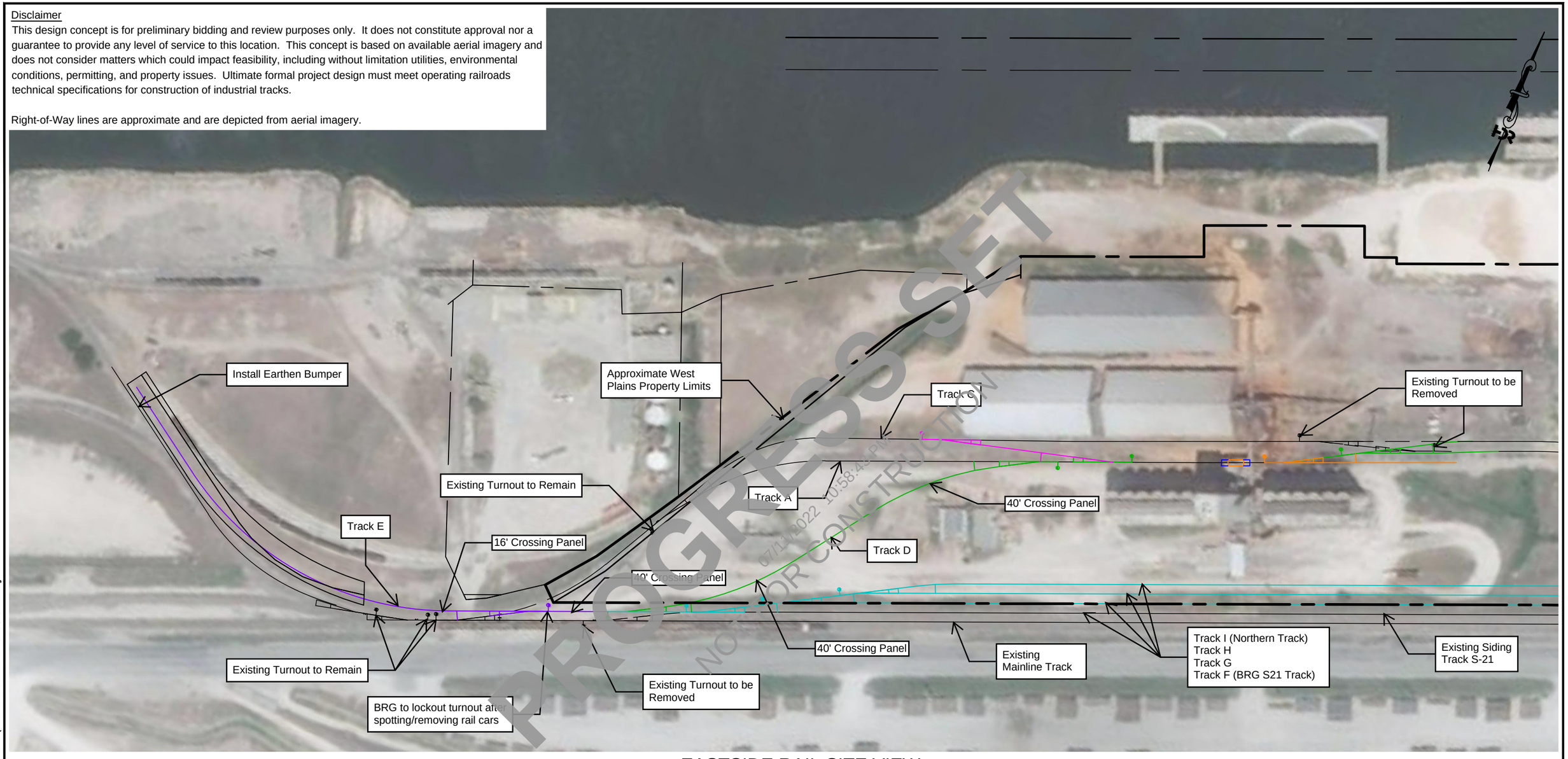
July 6, 2022

FIGURE 2b

Disclaimer

This design concept is for preliminary bidding and review purposes only. It does not constitute approval nor a guarantee to provide any level of service to this location. This concept is based on available aerial imagery and does not consider matters which could impact feasibility, including without limitation utilities, environmental conditions, permitting, and property issues. Ultimate formal project design must meet operating railroads technical specifications for construction of industrial tracks.

Right-of-Way lines are approximate and are depicted from aerial imagery.






## EASTSIDE RAIL SITE VIEW

Proposed Design Notes:
- Proposed No 8 Turnouts (Match existing, Confirmed with OmniTRAX)
- Proposed minimum 12 deg curves (Confirmed with OmniTRAX)
- 14' Clear Points
- Cyan Track used as BRG car pick up/drop off car storage
- Green/Blue Track used for Unloading Operations
- Pink Track to be used as Bad Order Track and Locomotive Storage
- Purple Track to be used as an Operations Tail Track

150 0 150 300
SCALE IN FEET 1" = 150'

BROWNSVILLE - WEST PLAINS
RAIL EXHIBIT

SHEET 2 OF 2

July 6, 2022



FIGURE 2c


0 400
Feet

N

Legend

Geotechnical Soil Borings (RETL, 2022)

Historical Geotechnical Soil Borings (MEG, 2015)

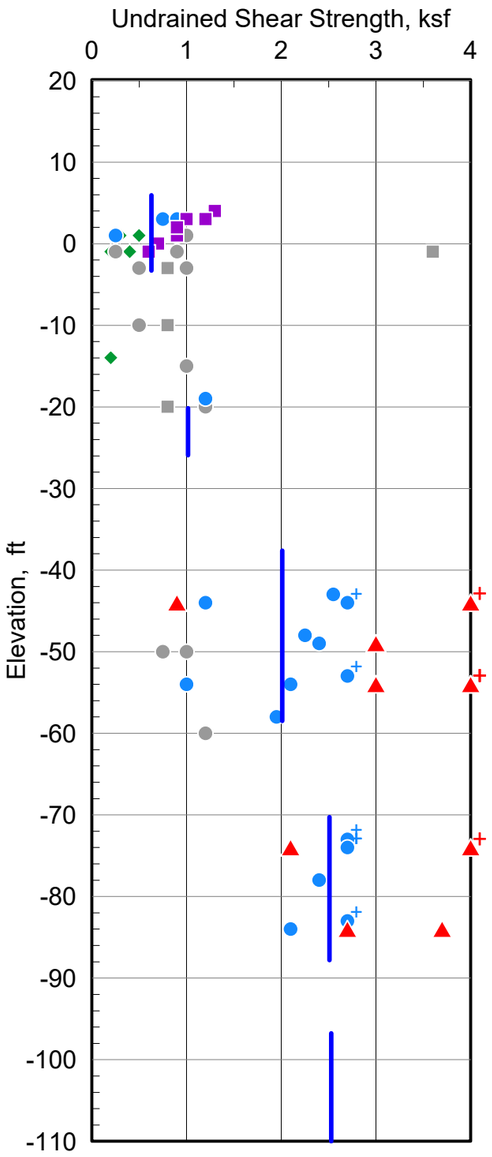
**PLAN OF BORINGS**

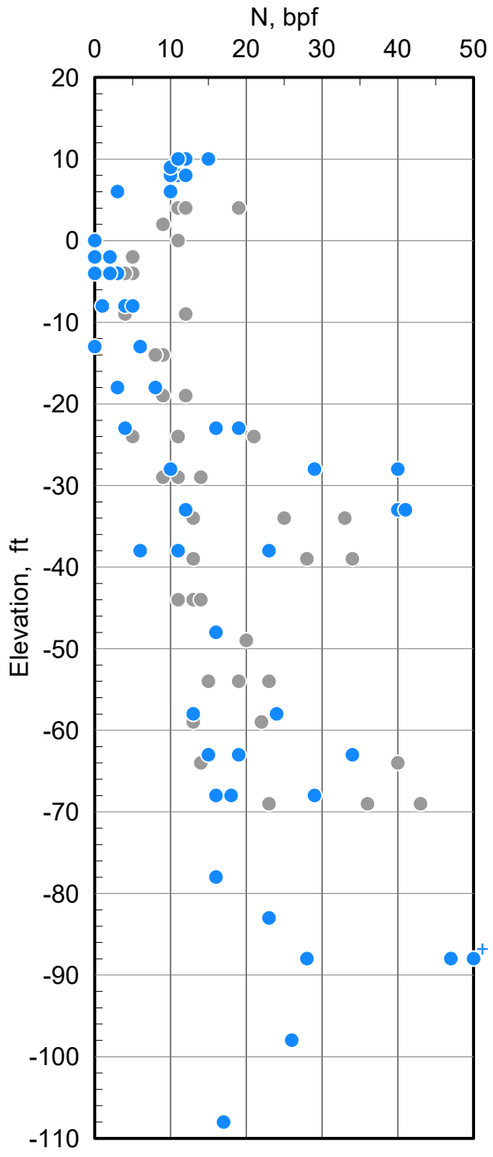
PORT OF BROWNSVILLE GRAIN FACILITY IMPROVEMENTS

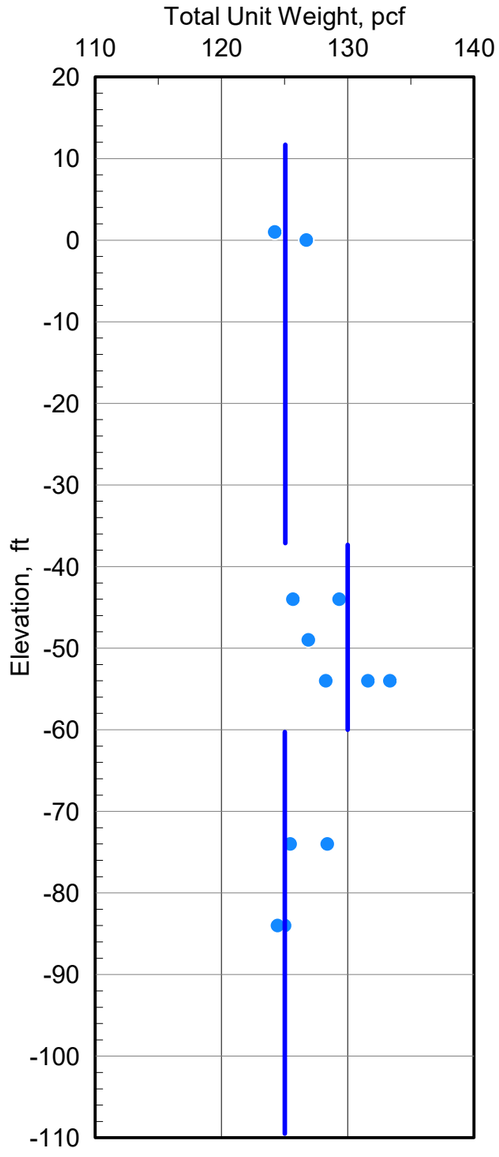
WEST PLAINS, LLC

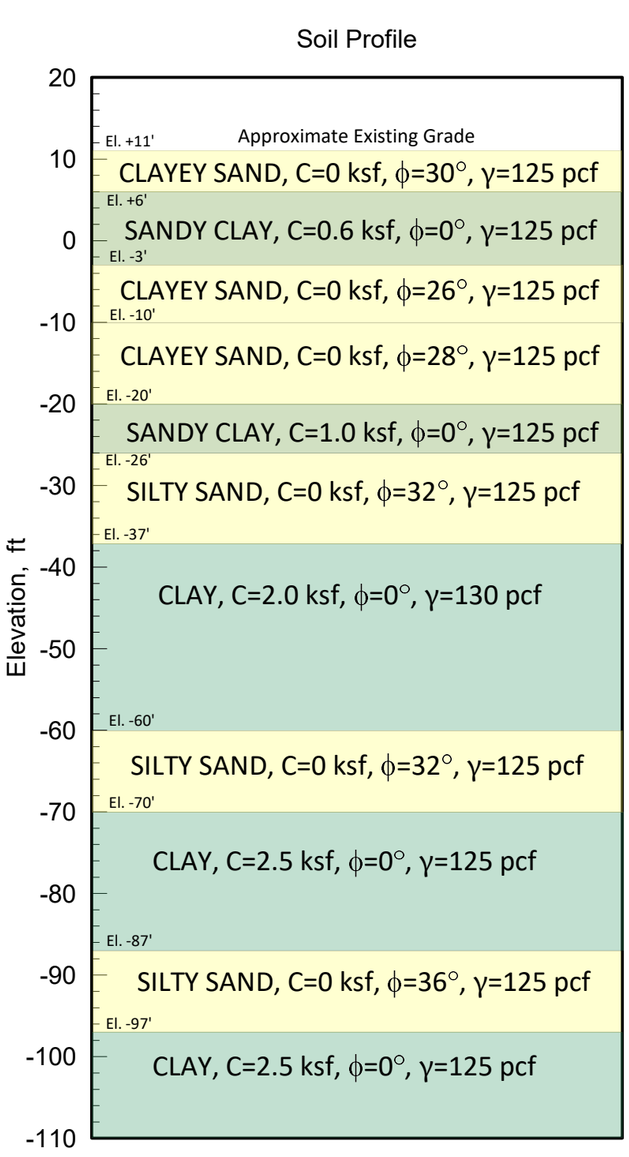
Geotechnical Analyses and Recommendations Report

FIGURE 3




Design Value

PP
UU
UC
TV

Design Value

**Borings Used:**

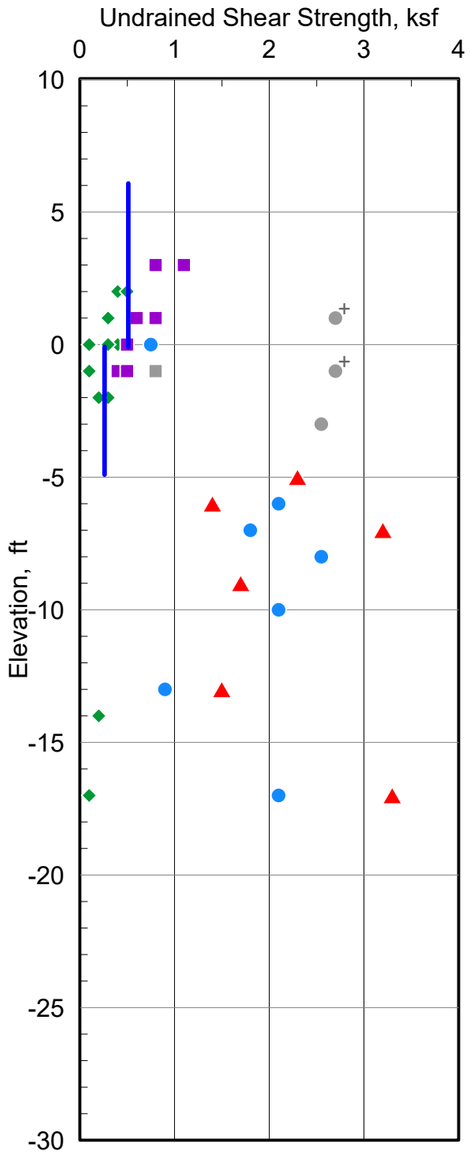
1. MEG Borings B-1, B-2, B-3 (historical borings)
2. RETL Borings B-5 through B-7 (new borings)

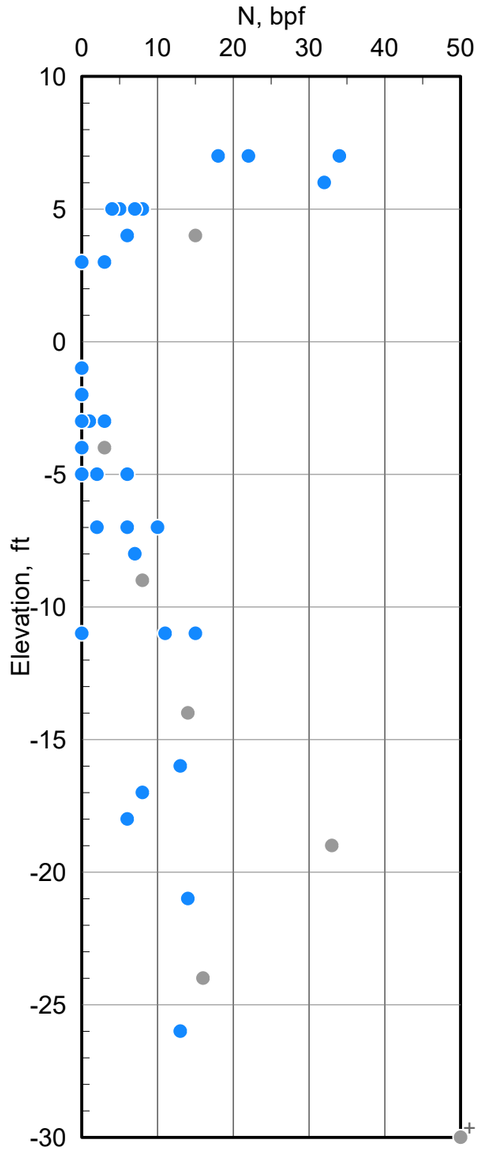
**General Notes:**

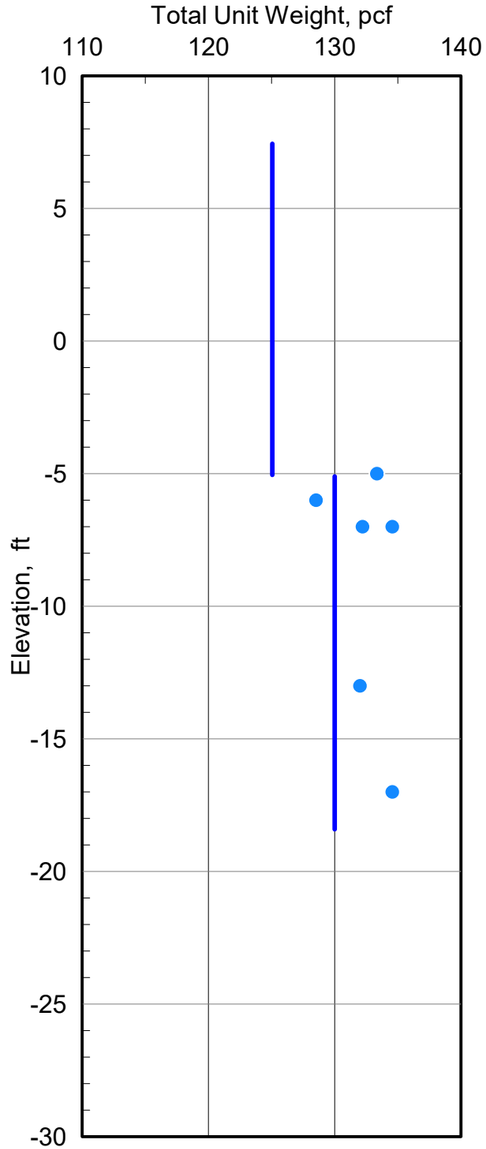
1. Pocket penetrometer values have been reduced.
2. Historical data (MEG Borings B-1, B-2, & B-3) are shown in gray symbols.

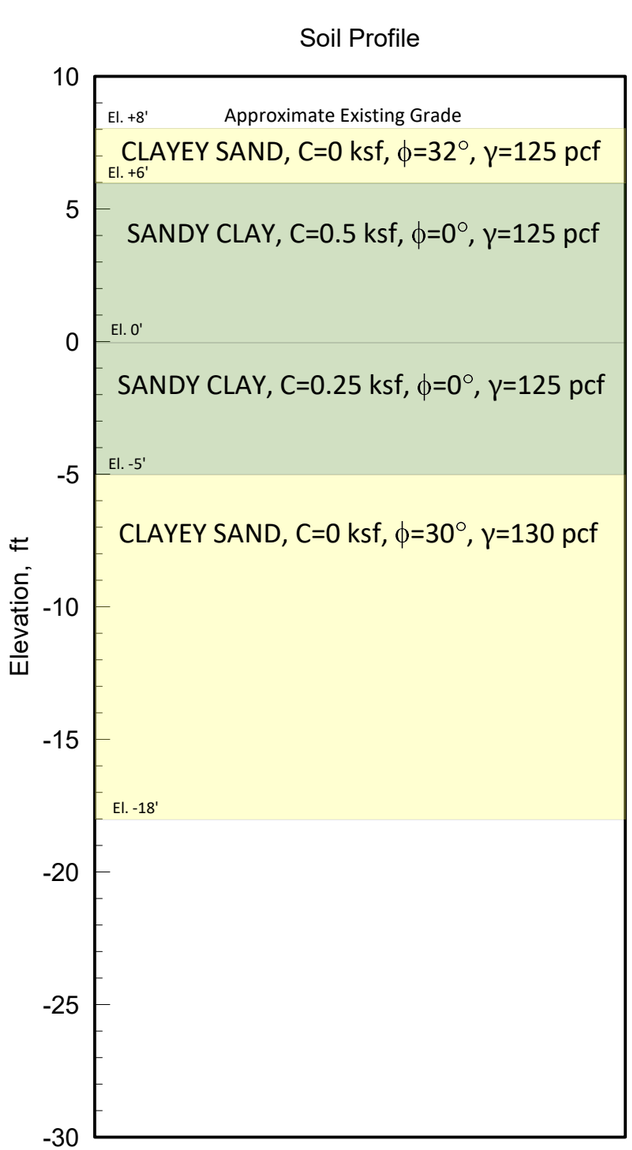
**SUBSURFACE DESIGN PARAMETERS**
**MATERIAL HANDLING AREA**
PORT OF BROWNSVILLE GRAIN FACILITY IMPROVEMENTS
WEST PLAINS, LLC
BROWNSVILLE, TEXAS

FIGURE 4a




Design Value

PP
UU
UC
TV

Design Value

**Borings Used:**

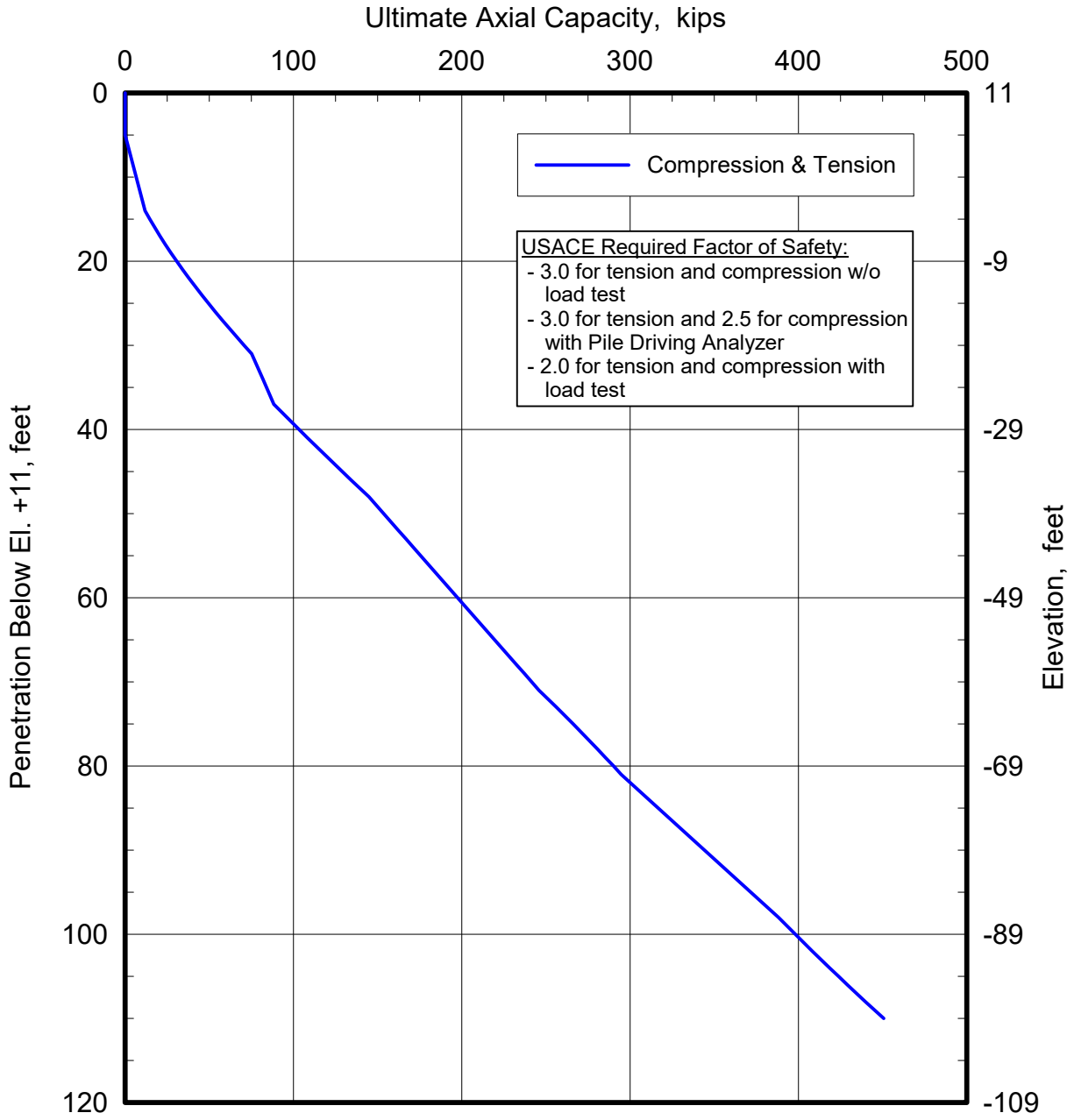
1. MEG Boring B-4 (historical boring)
2. RETL Borings B-8 through B-12 (new borings)

**General Notes:**

3. Pocket penetrometer values have been reduced.
4. Historical data (MEG boring B-4) are shown in gray symbols.

**SUBSURFACE DESIGN PARAMETERS**
**RAILROAD ALIGNMENT**
PORT OF BROWNSVILLE GRAIN FACILITY IMPROVEMENTS
WEST PLAINS, LLC
BROWNSVILLE, TEXAS

FIGURE 4b

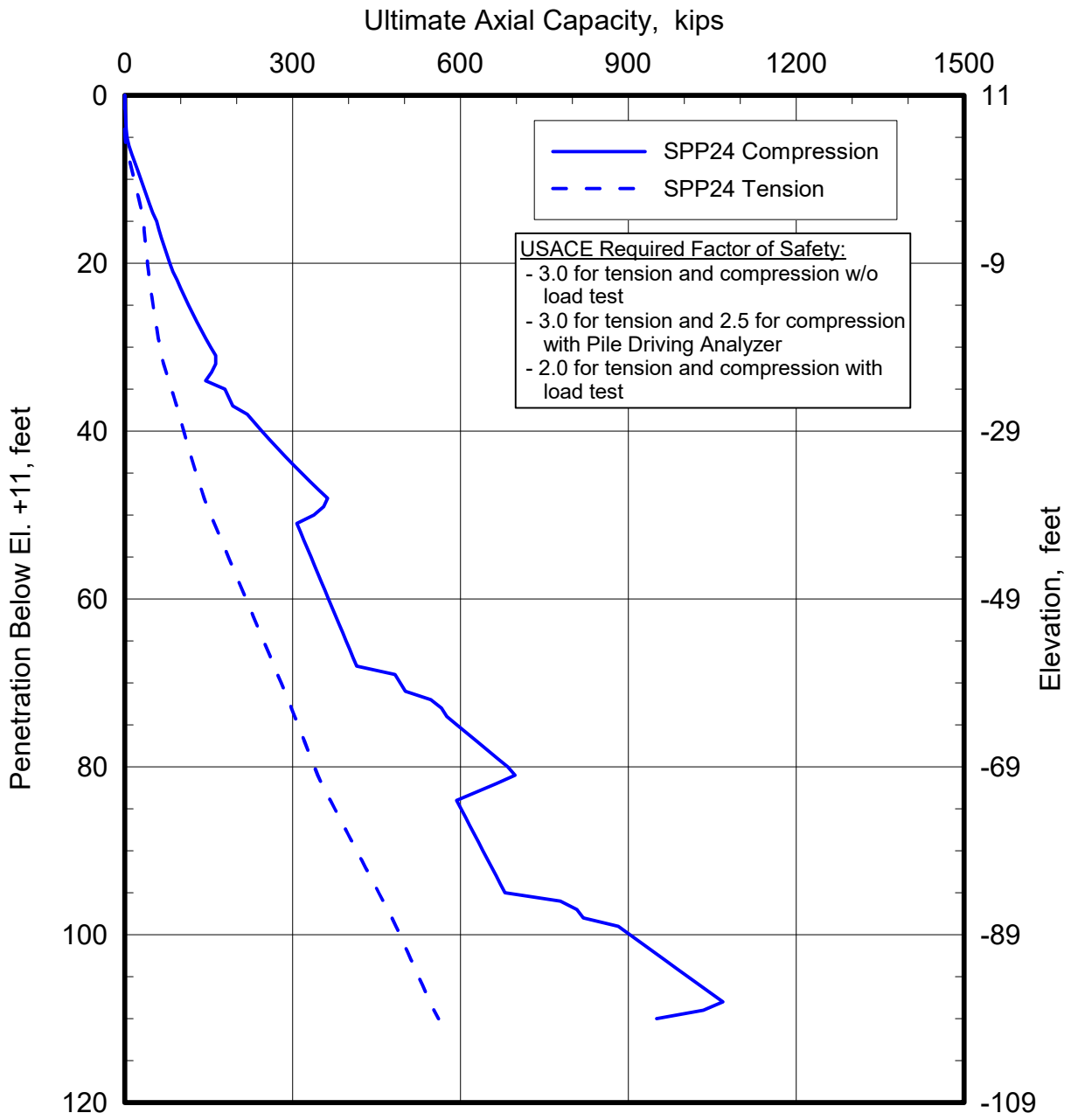



**NOTES:**

1. To obtain capacity for a given size pile, multiply values from the curve by the pile diameter, in feet.
2. End bearing was neglected in computing the compression capacity of ACIP pile.
3. These curves represent **ultimate** values for compression and tension. The appropriate factor of safety should be applied to arrive at the allowable capacity in accordance with EM 1110-2-2906.
4. Each curve is for a single isolated vertical pile and does not consider group effects.
5. Pile capacity curves do not include weight of pile. Structural engineer should add weight as required.

**PRELIMINARY ULTIMATE AXIAL CAPACITY CURVES**
**UNIT DIAMETER AUGURED CAST-IN-PLACE (ACIP) PILES**
PORT OF BROWNSVILLE GRAIN FACILITY IMPROVEMENTS
WEST PLAINS, LLC
BROWNSVILLE, TEXAS

FIGURE 5




**NOTES:**

1. These curves represent **ultimate** values for compression and tension. The appropriate factor of safety should be applied to arrive at the allowable capacity in accordance with EM 1110-2-2906.
2. Each curve is for a single isolated vertical pile and does not consider group effects.
3. Pile capacity curves do not include weight of pile. Structural engineer should add weight as required.
4. Curves assume piles are driven by an impact hammer.

**PRELIMINARY ULTIMATE AXIAL CAPACITY CURVES**
**24-INCH DIAMETER OPEN-ENDED STEEL PIPE PILES (1/2-INCH THICKNESS)**
PORT OF BROWNSVILLE GRAIN FACILITY IMPROVEMENTS
WEST PLAINS, LLC
BROWNSVILLE, TEXAS

Analysis: Short-Term
Station: TRK F - STA 23+53.93
Embankment Side Slope: 2H:1V
Method of Analysis: Spencer
Calculated FS: 1.6

| Color | Name | Unit Weight (pcf) | Cohesion (psf) | Effective Cohesion (psf) | Effective Friction Angle (°) |
|---|---|---|---|---|---|
| | Ballast | 140 | | 0 | 38 |
| | Clayey Sand 2 | 130 | | 0 | 30 |
| | Lime-Fly Ash Stabilized Subgrade - ST | 120 | 2,500 | | |
| | Sandy Clay - ST | 125 | 500 | | |
| | Soft Clay - ST | 125 | 250 | | |
| | Subballast | 130 | | 0 | 36 |

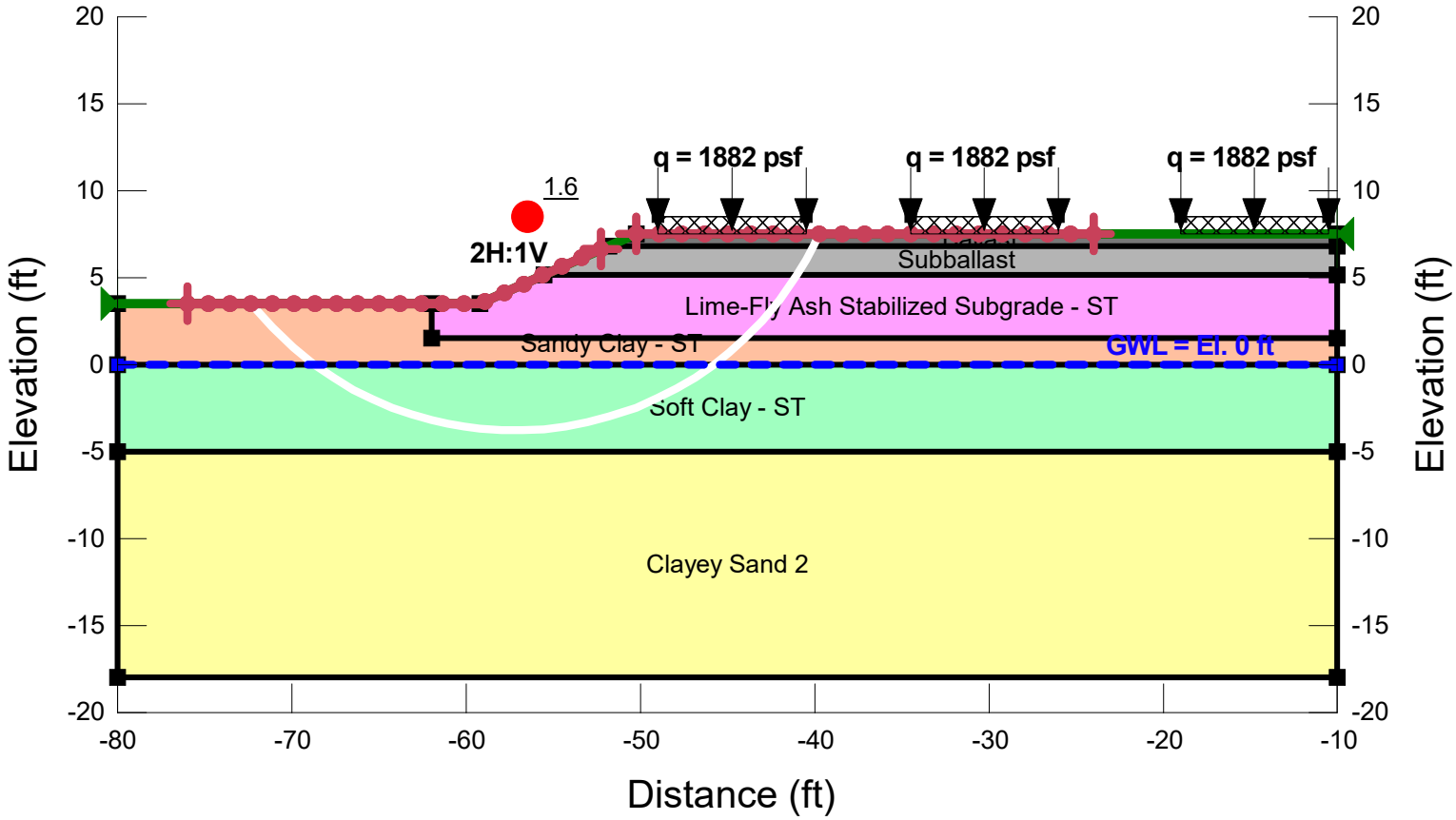



FIGURE 7a

Analysis: Long-Term
Station: TRK F - STA 23+53.93
Embankment Side Slope: 2H:1V
Method of Analysis: Spencer
Calculated FS: 1.5

| Color | Name | Unit Weight (pcf) | Effective Cohesion (psf) | Effective Friction Angle (°) |
|---|---|---|---|---|
| | Ballast | 140 | 0 | 38 |
| | Clayey Sand 2 | 130 | 0 | 30 |
| | Lime-Fly Ash Stabilized Subgrade - LT | 120 | 500 | 30 |
| | Sandy Clay - LT | 125 | 75 | 22 |
| | Soft Clay - LT | 125 | 50 | 22 |
| | Subballast | 130 | 0 | 36 |

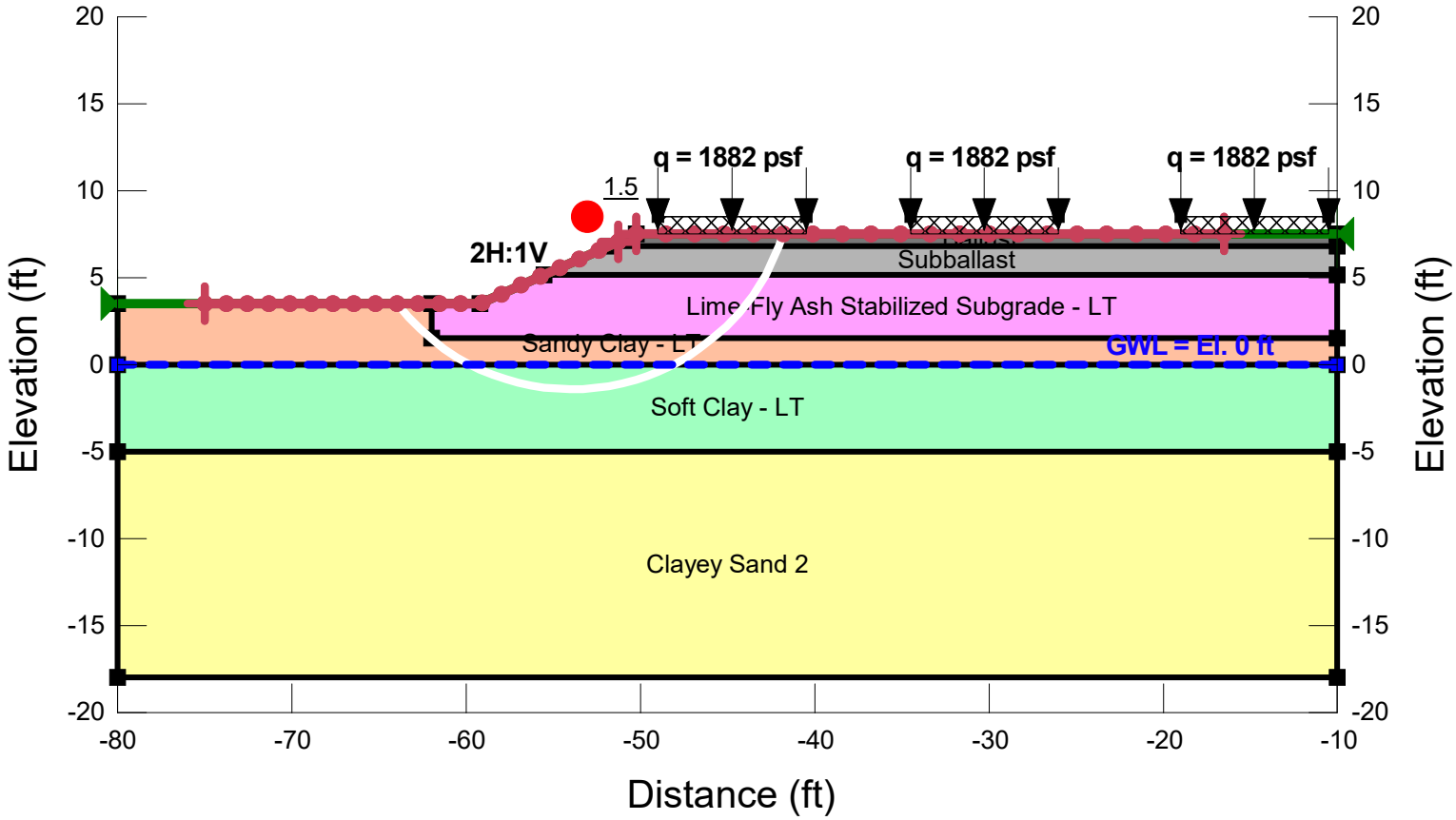



FIGURE 7b

# Attachment A

## Geotechnical Data Report – Rock Engineering & Testing Laboratory, Inc.

- GEOTECHNICAL ENGINEERING
- CONSTRUCTION MATERIALS ENGINEERING & TESTING
- SOILS • ASPHALT • CONCRETE

August 15, 2022

HDR
555 N Carancahua Street, Suite 1600
Corpus Christi, Texas 78401

Attention: Mr. Kyle Wundt

SUBJECT: **LIMITED GEOTECHNICAL SERVICES**
**PORT OF BROWNSVILLE GRAIN FACILITY IMPROVEMENTS**
**Brownsville, Texas**
**RETL Job No. G122360 (Rev. 1)**

Dear Mr. Wundt,

As requested, Rock Engineering and Testing Laboratory, Inc. (RETL) has performed a limited subsurface investigation for the above referenced project, and is providing this revised report (Rev. 1) that supersedes our original report dated August 8, 2022. This revised report contains additional laboratory testing results plots.

## Authorization

The scope of work for this project was performed in accordance with Rock Engineering and Testing Laboratory, Inc. (RETL) proposal number CGP051622B (Revision 2) dated June 16, 2022. The scope of work was approved and incorporated into the Geotech Subconsultant Agreement dated June 23, 2022, which was signed and returned to RETL via email transmission.

## Purpose and Scope

The purpose of this exploration was to obtain soil samples from the project site and perform laboratory testing on selected soil samples. The scope of the exploration included the subsurface investigation, description of the soils encountered, preparation of the corresponding boring logs, and provision of this letter report, one copy of which is transmitted electronically herewith.

The scope of services did not include performing engineering analysis, provision of recommendations, or implementing environmental assessment. Any statements in this report or on the boring logs regarding odors, colors, unusual or suspicious items or conditions are strictly for the information of the client.

The Geotechnical Engineer states that the findings contained herein have been presented after being prepared in a manner consistent with that level of care and skill ordinarily exercised by reputable members of the Geotechnical Engineer's profession practicing contemporaneously under similar conditions in the locality of the project. RETL operates in general accordance with "*Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction*", (ASTM D 3740). No other representations are expressed or implied, and no warranty or guarantee is included or intended.

This report has been prepared for the exclusive use of HDR for the specific application to the proposed Port Of Brownsville Grain Facility Improvements project located at the Port of Brownsville, in Brownsville, Texas.

## Scope of Field Exploration

The field exploration included reconnaissance of the project site, drilling eight (8) test borings and recovering soils samples to perform laboratory testing on selected soil samples. The depths and approximate coordinates of the borings are summarized below:

| Boring | Location | Depth (feet) | Approximate Coordinates |
|---|---|---|---|
| B-5 | Material Handling Area | 100 | N 25.95535 °, W 97.38443° |
| B-6 | Material Handling Area | 100 | N 25.95533 °, W 97.38524° |
| B-7 | Material Handling Area | 120 | N 25.95546 °, W 97.38616° |
| B-8 | Rail Alignment | 25 | N 25.95393 °, W 97.38693° |
| B-9 | Rail Alignment | 25 | N 25.95316 °, W 97.38762° |
| B-10 | Rail Alignment | 35 | N 25.95367 °, W 97.38618° |
| B-11 | Rail Alignment | 25 | N 25.95418 °, W 97.38474° |
| B-12 | Rail Alignment | 25 | N 25.95468 °, W 97.38330° |

HDR determined the number, depth and location of the borings and RETL performed the drilling and logging operations.

The borings were performed using a drilling rig equipped with a rotary head turning solid stem augers in combination with mud rotary drilling techniques used to advance the boreholes. Disturbed soil samples were obtained employing split-barrel sampling procedures in general accordance with the procedures for "*Penetration Test and Split-Barrel Sampling of Soils",* (ASTM D1586). Relatively undisturbed soil samples were obtained using thin-wall tube sampling procedures in general accordance with "*Thin Walled Tube Sampling of Soils*", (ASTM D1587). The samples obtained by this procedure were extruded by a hydraulic ram in the field.

All soil samples were placed in plastic bags, marked according to boring number, depth and any other pertinent field data, stored in special containers and delivered to the laboratory for testing.

Upon completion of the drilling operations the drill holes were grouted and the site cleaned as required.

## Field Tests and Observations

**Standard Penetration Test (SPTs)** – During the sampling procedures, SPTs were performed to obtain the standard penetration value of the soil at selected intervals. The standard penetration value (N) is defined as the number of blows of a 140-pound hammer, falling 30 inches, required to advance the split-barrel sampler 1 foot into the soil. The sampler is lowered to the bottom of the previously cleaned drill hole and advanced by blows from the hammer. The number of blows is recorded for each of three successive 6-inch penetrations. The "N" value is obtained by adding the second and third 6-inch increment number of blows. An automatic hammer was utilized when performing SPTs. An automatic hammer is usually taken as having an efficiency close to one. The results of standard penetration tests indicate the relative density of cohesionless soils and comparative consistency of cohesive soils, thereby providing a basis for estimating the relative strength and compressibility of the soil profile components.

**Water Level Observations** – Water level observations were obtained during the test boring operations. Water level observations are noted on the boring logs provided in the Appendix. In relatively pervious soils, such as sandy soils, the indicated depths are usually reliable groundwater levels. In relatively impervious soils, such as clayey soils, a suitable estimate of the groundwater depth may not be possible, even after several days of observation. Seasonal variations, temperature, land-use, proximity to water bodies and recent rainfall conditions may influence the depth to the groundwater. The amount of water in open boreholes largely depends on the permeability of the soils encountered at the boring locations.

**Ground Surface Elevations** – The ground surface elevations at the boring locations were not provided, therefore, depths referred to in this letter report are from the ground surface at the boring locations during the time of our field investigation.

## Laboratory Testing Program

In addition to the field investigation, a laboratory testing program was conducted to determine additional pertinent engineering characteristics of the subsurface materials.

The laboratory testing program included supplementary visual classification (ASTM D2487) and water content tests (ASTM D2216) on the samples. In addition, selected samples were subjected to Atterberg limits tests (ASTM D4318), percent material finer than the #200 sieve tests (ASTM D1140), unconfined compressive strength tests (ASTM D2166), UU triaxial compression tests (ASTM D2850), consolidation tests (ASTM D2435), and corrosion tests (including sulfate and chloride content, electric resistivity and pH tests). The estimated soil shear strengths of clayey soils were obtained using a hand penetrometer and/or a torvane.

The samples to be tested and the type of testing were selected by HDR. The laboratory testing program was conducted in general accordance with applicable ASTM or TxDOT Specifications. The results of these tests are to be found on the accompanying Boring Logs, summary table and test results provided in the Appendix.

## Groundwater Observations

Groundwater (GW) observations are summarized in the following table.

| Groundwater (GW) Observations | | |
|---|---|---|
| **Boring** | **During Drilling** | **Delayed Reading (time)** |
| B-5 | 4.5 feet | GW at 8.5 feet (15 hrs.) |
| B-6 | 13.5 feet | GW at 12.5 feet (15 min.) |
| B-7 | 13.5 feet | GW at 12.0 feet (15 min.) |
| B-8 | Dry | GW at 13.0 feet (15 min.) |
| B-9 | 9.5 feet | GW at 7.0 feet (15 min.) |
| B-10 | 7.0 feet | GW at 9.0 feet (15 min.) |
| B-11 | 9.0 feet | GW at 8.5 feet (15 min.) |
| B-12 | 8.0 feet | GW at 5.0 feet (15 min.) |

## Closing

Pursuant to instructions by the client, no engineering analyses have been performed for this project. Unless notified to the contrary all soil samples will be disposed of 3 months after issuance of this report.

Often, because of design and construction details that occur on a project, questions arise concerning soil conditions and Rock Engineering and Testing Laboratory, Inc. (RETL) (TBPE Firm No. 2101) would be pleased to continue its role as the Geotechnical Engineer during project implementation.

We appreciate the opportunity to be of service to you on this project. Please call us if you have any questions concerning the information presented within this letter

Sincerely,

James P. Bauer, P.E.
Branch Manager

Francisco J. Arias, P.E.
Senior Project Manager

Attachment: Boring Location Plan
Boring Logs
Laboratory Test Results

- GEOTECHNICAL ENGINEERING
- CONSTRUCTION MATERIALS ENGINEERING & TESTING
- SOILS • ASPHALT • CONCRETE

# BORING LOCATION PLAN


August 15, 2022
Attn: Mr. Kyle Wundt
HDR

**PORT OF BROWNSVILLE GRAIN FACILITY IMPROVEMENTS**
Port of Brownsville
Brownsville, Texas

**ROCK ENGINEERING & TESTING LABORATORY, LLC.**

**Corpus Christi**
Office: 361.883.4555
Fax: 361.883.4711
6817 Leopard St.
Corpus Christi, TX 78409

**San Antonio**
Office: 210.495.8000
Fax: 210.495.8015
10856 Vandale
San Antonio, TX 78216

**Round Rock**
Office: 512.284.8022
Fax: 512.284.7764
7 Roundville Ln.
Round Rock, TX 78664

www.rocktesting.com

# LOG OF BORING B-5



Rock Engineering & Testing Lab. Inc
6817 Leopard Street
Corpus Christi, Texas 78409
Telephone: 361-883-4555
Fax: 361-883-4711

CLIENT: HDR Engineering, Inc.
PROJECT: Port of Brownsville Grain Facility Improv.
LOCATION: Brownsville, Texas
NUMBER: G122360
DATE(S) DRILLED: 7/7/2022

DRILLING METHOD(S):
Solid Stem Auger/Mud Rotary

GROUNDWATER INFORMATION:
Groundwater (GW) was encountered at a depth of 4.5 feet during drilling.
15-Hour Delayed Readings: GW at 8.5 feet.

SURFACE ELEVATION: N/A

| SOIL SYMBOL | DEPTH (FT) | SAMPLE NUMBER | SAMPLES | N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT Qc: TONS/SQ FT | MOISTURE CONTENT (%) | ATTERBERG LIMITS: LIQUID LIMIT LL | ATTERBERG LIMITS: PLASTIC LIMIT PL | ATTERBERG LIMITS: PLASTICITY INDEX PI | DRY DENSITY POUNDS/CU.FT | COMPRESSIVE STRENGTH (TONS/SQ FT) | MINUS NO. 200 SIEVE (%) | DESCRIPTION OF STRATUM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | SS S-1 | | N= 12 | 6<br>13 | | | | | | | **SILTY CLAYEY SAND**, with gravel, light brown, dry, stiff.<br>Same as above, no gravel, moist. |
| | | SS S-2 | | N= 11 | 17 | | | | | | 49 | Same as above. |
| | | SS S-3 | | ~~N= 3~~ | ▽ 21<br>25 | 52 | 20 | 32 | | | | Same as above, soft.<br>**FAT CLAY**, dark gray, moist, soft. |
| | 5 | SH S-4 | | P= 1.25 | | | | | | 1.0 | | Same as above, firm. |
| | | SH S-5 | | P= 0.25 | 23 | 35 | 16 | 19 | 101 | 0.9 | 77 | **LEAN CLAY WITH SAND**, dark gray, moist, firm. (CL) |
| | 10 | SS S-6 | | N= WOH | 27 | | | | | | 67 | **SANDY LEAN CLAY**, dark gray, moist, very soft. |
| | | SS S-7 | | N= WOH | | | | | | | | Same as above. |
| | 15 | SS S-8 | | N= 3 | 20 | 38 | 16 | 22 | | | 39 | **CLAYEY SAND**, dark gray, moist, soft. (SC) |
| | | SS S-9 | | N= 4 | | | | | | | | **SANDY SILTY CLAY**, with calcareous deposits, light gray, moist, firm. |
| | 20 | | | | | | | | | | | |
| | | SH S-10 | | Tv= 0.1 | 23 | 25 | 18 | 7 | | | 68 | Same as above, gray. (CL-ML) |
| | 25 | | | | | | | | | | | |
| | | SS S-11 | | N= 8 | 24 | | | | | | | Same as above, brown, stiff. |
| | 30 | | | | | | | | | | | |
| | | SS S-12 | | N= 4 | 26 | | | | | | 59 | **SANDY LEAN CLAY**, brown, moist, firm. |
| | 35 | | | | | | | | | | | |
| | | SS S-13 | | N= 10 | 24<br>26 | 49 | 19 | 30 | | | | **LEAN CLAY WITH SAND**, brown, moist, stiff.<br>**CLAYEY SAND**, brown, moist, stiff. |
| | 40 | | | | | | | | | | | |

N - STANDARD PENETRATION TEST RESISTANCE
Qc - STATIC CONE PENETROMETER TEST INDEX
P - POCKET PENETROMETER RESISTANCE

REMARKS:
Drilling operations were performed by RETL at GPS Coordinates N 25.95535° W 97.38443°
Approx. Elev. = 11.00 feet

LOG_OF_BORING G122360.GPJ ROCK_ETL.GDT 8/4/22

# LOG OF BORING B-5



Rock Engineering & Testing Lab. Inc
6817 Leopard Street
Corpus Christi, Texas 78409
Telephone: 361-883-4555
Fax: 361-883-4711

CLIENT: HDR Engineering, Inc.
PROJECT: Port of Brownsville Grain Facility Improv.
LOCATION: Brownsville, Texas
NUMBER: G122360
DATE(S) DRILLED: 7/7/2022

DRILLING METHOD(S):
Solid Stem Auger/Mud Rotary

GROUNDWATER INFORMATION:
Groundwater (GW) was encountered at a depth of 4.5 feet during drilling.
15-Hour Delayed Readings: GW at 8.5 feet.

| SOIL SYMBOL | DEPTH (FT) | SAMPLE NUMBER | SAMPLES | N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT Qc: TONS/SQ FT | MOISTURE CONTENT (%) | ATTERBERG LIMITS LIQUID LIMIT LL | ATTERBERG LIMITS PLASTIC LIMIT PL | ATTERBERG LIMITS PLASTICITY INDEX PI | DRY DENSITY POUNDS/CU.FT | COMPRESSIVE STRENGTH (TONS/SQ FT) | MINUS NO. 200 SIEVE (%) | DESCRIPTION OF STRATUM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 45 | SS S-14 | | N= 12 | | | | | | | | **SILTY SAND**, brown, moist, medium. |
| | 50 | SS S-15 | | N= 11 | 23 | 34 | 16 | 18 | | | 68 | **SANDY LEAN CLAY**, brown, moist, stiff. (CL) |
| | 55 | SH S-16 | | P= 4.5+ | 24 | | | | | | | **FAT CLAY**, brown, moist, very stiff. |
| | 60 | SH S-17 | | P= 4.0 | 22 | 62 | 23 | 39 | 104 | 3.0 | 99 | Same as above. (CH) |
| | 65 | SH S-18 | | P= 3.5 | 27 | | | | 105 | 4.1 | 99 | Same as above. |
| | 70 | SS S-19 | | N= 13 | | | | | | | | **LEAN CLAY WITH SAND**, brown, moist, stiff. |
| | 75 | SS S-20 | | N= 19 | 28 | 30 | 20 | 10 | | | | **CLAYEY SAND**, brown, moist, very stiff. |
| | 80 | SS S-21 | | N= 16 | | | | | | | | Same as above. |
| | 85 | SH S-22 | | P= 4.5+ | 31 | | | | 98 | 2.1 | | **FAT CLAY**, brown, moist, very stiff. |

N - STANDARD PENETRATION TEST RESISTANCE
Qc - STATIC CONE PENETROMETER TEST INDEX
P - POCKET PENETROMETER RESISTANCE

REMARKS:
Drilling operations were performed by RETL at GPS Coordinates N 25.95535° W 97.38443°
Approx. Elev. = 11.00 feet

LOG_OF_BORING G122360.GPJ ROCK_ETL.GDT 8/4/22

# LOG OF BORING B-5



Rock Engineering & Testing Lab. Inc
6817 Leopard Street
Corpus Christi, Texas 78409
Telephone: 361-883-4555
Fax: 361-883-4711

CLIENT: HDR Engineering, Inc.
PROJECT: Port of Brownsville Grain Facility Improv.
LOCATION: Brownsville, Texas
NUMBER: G122360
DATE(S) DRILLED: 7/7/2022

DRILLING METHOD(S):
Solid Stem Auger/Mud Rotary

GROUNDWATER INFORMATION:
Groundwater (GW) was encountered at a depth of 4.5 feet during drilling.
15-Hour Delayed Readings: GW at 8.5 feet.

| SOIL SYMBOL | DEPTH (FT) | SAMPLE NUMBER | SAMPLES | N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT Qc: TONS/SQ FT | MOISTURE CONTENT (%) | ATTERBERG LIMITS LIQUID LIMIT LL | ATTERBERG LIMITS PLASTIC LIMIT PL | ATTERBERG LIMITS PLASTICITY INDEX PI | DRY DENSITY POUNDS/CU.FT | COMPRESSIVE STRENGTH (TONS/SQ FT) | MINUS NO. 200 SIEVE (%) | DESCRIPTION OF STRATUM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 90 | SH S-23 | | P= 3.5 | | | | | | | | **FAT CLAY**, brown, moist, very stiff. |
| | 95 | SS S-24 | | N= 23 | 27 | 58 | 21 | 37 | | | 100 | Same as above. (CH) |
| | 100 | SS S-25 | | N= 47 | | | | | | | | **SILTY CLAYEY SAND**, brown, moist, dense. |
| | | | | | | | | | | | | Boring was terminated at a depth of 100 feet. |

N - STANDARD PENETRATION TEST RESISTANCE
Qc - STATIC CONE PENETROMETER TEST INDEX
P - POCKET PENETROMETER RESISTANCE

REMARKS:
Drilling operations were performed by RETL at GPS Coordinates N 25.95535° W 97.38443°
Approx. Elev. = 11.00 feet

# LOG OF BORING B-6



Rock Engineering & Testing Lab. Inc
6817 Leopard Street
Corpus Christi, Texas 78409
Telephone: 361-883-4555
Fax: 361-883-4711

CLIENT: HDR Engineering, Inc.
PROJECT: Port of Brownsville Grain Facility Improv.
LOCATION: Brownsville, Texas
NUMBER: G122360
DATE(S) DRILLED: 7/7/2022

DRILLING METHOD(S):
Solid Stem Auger/Mud Rotary

GROUNDWATER INFORMATION:
Groundwater (GW) was encountered at a depth of 13.5 feet during drilling.
.25-Hour Delayed Readings: GW at 12.5 feet.

SURFACE ELEVATION: N/A

| SOIL SYMBOL | DEPTH (FT) | SAMPLE NUMBER | SAMPLES | N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT Qc: TONS/SQ FT | MOISTURE CONTENT (%) | ATTERBERG LIMITS LIQUID LIMIT LL | ATTERBERG LIMITS PLASTIC LIMIT PL | ATTERBERG LIMITS PLASTICITY INDEX PI | DRY DENSITY POUNDS/CU.FT | COMPRESSIVE STRENGTH (TONS/SQ FT) | MINUS NO. 200 SIEVE (%) | DESCRIPTION OF STRATUM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | SS S-1 | | N= 25 | 12 | 28 | 15 | 13 | | | | **CLAYEY SAND**, with gravel, light brown, moist, very stiff. |
| | | SS S-2 | | N= 10 | | | | | | | | **SILTY CLAYEY SAND**, brown, moist, medium. |
| | | SS S-3 | | ~~N= 10~~ | 20 | | | | | | 60 | **SANDY LEAN CLAY**, brown, moist, stiff. |
| | 5 | | | | 24 | | | | | | 77 | **FAT CLAY WITH SAND**, brown, moist, stiff. |
| | | SH S-4 | | P= 1.5 | | | | | | 1.3 | | **LEAN CLAY WITH SAND**, dark gray, moist, stiff. |
| | | SH S-5 | | Tv= 0.25 | 28 | 36 | 17 | 19 | | 0.9 | 71 | Same as above, firm. (CL) |
| | 10 | SH S-6 | | Tv= 0.2 | 28 | | | | 99 | 0.7 | | Same as above, brown. |
| | | SS S-7 | | N= WOH | 32 | 34 | 17 | 17 | | | 62 | **SANDY LEAN CLAY**, dark gray, moist, very soft. (CL) |
| | 15 | SS S-8 | | N= WOH | | | | | | | | **CLAYEY SAND**, dark gray, moist, very soft. |
| | 20 | SS S-9 | | N= 5 | 21 | 29 | 13 | 16 | | | 44 | Same as above, light gray, firm. (SC) |
| | 25 | SS S-10 | | N= WOH | | | | | | | | Same as above, brown, very soft. |
| | 30 | SS S-11 | | N= 3 | 26 | | | | | | 68 | **SANDY SILTY CLAY**, brown, moist, soft. |
| | 35 | SS S-12 | | N= 16 | | | | | | | | **SILTY SAND**, brown, moist, medium. |
| | 40 | SS S-13 | | N= 23 | 22 | | | | | | 17 | Same as above. |

N - STANDARD PENETRATION TEST RESISTANCE
Qc - STATIC CONE PENETROMETER TEST INDEX
P - POCKET PENETROMETER RESISTANCE

REMARKS:
Drilling operations were performed by RETL at GPS Coordinates N 25.95533° W 97.38524°
Approx. Elev. = 11.00 feet

# LOG OF BORING B-6



Rock Engineering & Testing Lab. Inc
6817 Leopard Street
Corpus Christi, Texas 78409
Telephone: 361-883-4555
Fax: 361-883-4711

CLIENT: HDR Engineering, Inc.
PROJECT: Port of Brownsville Grain Facility Improv.
LOCATION: Brownsville, Texas
NUMBER: G122360
DATE(S) DRILLED: 7/7/2022

DRILLING METHOD(S):
Solid Stem Auger/Mud Rotary

GROUNDWATER INFORMATION:
Groundwater (GW) was encountered at a depth of 13.5 feet during drilling.
.25-Hour Delayed Readings: GW at 12.5 feet.

| SOIL SYMBOL | DEPTH (FT) | SAMPLE NUMBER | SAMPLES | N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT Qc: TONS/SQ FT | MOISTURE CONTENT (%) | ATTERBERG LIMITS LIQUID LIMIT LL | ATTERBERG LIMITS PLASTIC LIMIT PL | ATTERBERG LIMITS PLASTICITY INDEX PI | DRY DENSITY POUNDS/CU.FT | COMPRESSIVE STRENGTH (TONS/SQ FT) | MINUS NO. 200 SIEVE (%) | DESCRIPTION OF STRATUM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 45 | SS S-14 | | N= 40 | | | | | | | | **SILTY SAND**, brown, moist, dense. |
| | | SS S-15 | | N= 6 | 22 | 46 | 17 | 29 | | | 56 | **SANDY LEAN CLAY**, brown, moist, firm. (CL) |
| | 50 | | | | 21 | | | | | | 92 | **FAT CLAY**, brown, moist, firm. |
| | | SH S-16 | | P= 4.25 | 22 | | | | 106 | 4.1 | | Same as above, hard. |
| | 55 | | | | | | | | | | | |
| | | SH S-17 | | P= 3.75 | 23 | 65 | 24 | 41 | | | 100 | Same as above, very stiff. (CH) |
| | 60 | | | | | | | | | | | |
| | | SH S-18 | | P= 4.5+ | 21 | | | | 106 | 4.9 | | Same as above, hard. |
| | 65 | | | | | | | | | | | |
| | | SH S-19 | | P= 3.25 | | | | | | | | Same as above, very stiff. |
| | 70 | | | | | | | | | | | |
| | | SS S-20 | | N= 34 | 23 | | | | | | 25 | **SILTY CLAYEY SAND**, brown, moist, dense. |
| | 75 | | | | | | | | | | | |
| | | SS S-21 | | N= 29 | | | | | | | | Same as above, medium. |
| | 80 | | | | | | | | | | | **FAT CLAY**, brown, moist, very stiff. |
| | | SH S-22 | | P= 4.5+ | 28 | 67 | 28 | 39 | | | | Same as above. |
| | 85 | | | | | | | | | | | |

N - STANDARD PENETRATION TEST RESISTANCE
Qc - STATIC CONE PENETROMETER TEST INDEX
P - POCKET PENETROMETER RESISTANCE

REMARKS:
Drilling operations were performed by RETL at GPS Coordinates N 25.95533° W 97.38524°
Approx. Elev. = 11.00 feet

# LOG OF BORING B-6



Rock Engineering & Testing Lab. Inc
6817 Leopard Street
Corpus Christi, Texas 78409
Telephone: 361-883-4555
Fax: 361-883-4711

CLIENT: HDR Engineering, Inc.
PROJECT: Port of Brownsville Grain Facility Improv.
LOCATION: Brownsville, Texas
NUMBER: G122360
DATE(S) DRILLED: 7/7/2022

DRILLING METHOD(S):
Solid Stem Auger/Mud Rotary

GROUNDWATER INFORMATION:
Groundwater (GW) was encountered at a depth of 13.5 feet during drilling.
.25-Hour Delayed Readings: GW at 12.5 feet.

| SOIL SYMBOL | DEPTH (FT) | SAMPLE NUMBER | SAMPLES | N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT Qc: TONS/SQ FT | MOISTURE CONTENT (%) | ATTERBERG LIMITS LIQUID LIMIT LL | ATTERBERG LIMITS PLASTIC LIMIT PL | ATTERBERG LIMITS PLASTICITY INDEX PI | DRY DENSITY POUNDS/CU.FT | COMPRESSIVE STRENGTH (TONS/SQ FT) | MINUS NO. 200 SIEVE (%) | DESCRIPTION OF STRATUM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 90 | SH S-23 | | P= 4.0 | | | | | | | | **FAT CLAY**, brown, moist, very stiff. |
| | 95 | SH S-24 | | P= 4.5+ | 25 | | | | 100 | 2.7 | | Same as above. |
| | 100 | SS S-25 | | N= 62 | | | | | | | | **SILTY SAND**, brown, moist, very dense. |
| | | | | | | | | | | | | Boring was terminated at a depth of 100 feet. |

N - STANDARD PENETRATION TEST RESISTANCE
Qc - STATIC CONE PENETROMETER TEST INDEX
P - POCKET PENETROMETER RESISTANCE

REMARKS:
Drilling operations were performed by RETL at GPS Coordinates N 25.95533° W 97.38524°
Approx. Elev. = 11.00 feet

# LOG OF BORING B-7



Rock Engineering & Testing Lab. Inc
6817 Leopard Street
Corpus Christi, Texas 78409
Telephone: 361-883-4555
Fax: 361-883-4711

CLIENT: HDR Engineering, Inc.
PROJECT: Port of Brownsville Grain Facility Improv.
LOCATION: Brownsville, Texas
NUMBER: G122360
DATE(S) DRILLED: 7/6/2022

DRILLING METHOD(S):
Solid Stem Auger/Mud Rotary

GROUNDWATER INFORMATION:
Groundwater (GW) was encountered at a depth of 13.5 feet during drilling.
.25-Hour Delayed Readings: GW at 12 feet.

SURFACE ELEVATION: N/A

| SOIL SYMBOL | DEPTH (FT) | SAMPLE NUMBER | SAMPLES | N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT Qc: TONS/SQ FT | MOISTURE CONTENT (%) | ATTERBERG LIMITS LIQUID LIMIT LL | ATTERBERG LIMITS PLASTIC LIMIT PL | ATTERBERG LIMITS PLASTICITY INDEX PI | DRY DENSITY POUNDS/CU.FT | COMPRESSIVE STRENGTH (TONS/SQ FT) | MINUS NO. 200 SIEVE (%) | DESCRIPTION OF STRATUM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | SS S-1 | | N= 11 | 13 | | | | | | | **LEAN CLAY**, brown, moist, stiff. |
| | | SS S-2 | | N= 12 | 11 | 44 | 16 | 28 | | | 88 | Same as above. (CL) |
| | 5 | SS S-3 | | N= 10 | | | | | | | | **FAT CLAY**, dark gray, moist, stiff. |
| | | SH S-4 | | P= 2.0 | | 56 | 22 | 34 | | 1.2 | | Same as above. |
| | | SH S-5 | | P= 1.0 | | | | | | | | Same as above, firm. |
| | 10 | SH S-6 | | Tv= 0.1<br>P= 0.5 | | | | | | 0.6 | | Same as above, gray and brown, soft. |
| | | SS S-7 | | N= 2 | | | | | | | | Same as above. |
| | 15 | SS S-8 | | N= 2 | 24 | 34 | 12 | 22 | | | 44 | **CLAYEY SAND**, gray, moist, soft. (SC) |
| | 20 | SS S-9 | | N= 1 | | | | | | | | Same as above, with calcareous deposits, very soft. |
| | 25 | SS S-10 | | N= 6 | | | | | | | | Same as above, firm. |
| | 30 | SH S-11 | | P= 2.0 | 25 | | | | | | | **SILTY LEAN CLAY**, brown, moist, stiff. |
| | 35 | SS S-12 | | N= 19 | | | | | | | | **POORLY GRADED SAND WITH SILT**, brown, moist, medium. |
| | 40 | SS S-13 | | N= 40 | 21 | NP | NP | NP | | | 10 | Same as above, dense. (SP-SM) |

N - STANDARD PENETRATION TEST RESISTANCE
Qc - STATIC CONE PENETROMETER TEST INDEX
P - POCKET PENETROMETER RESISTANCE

REMARKS:
Drilling operations were performed by RETL at GPS Coordinates N 25.95546° W 97.38616°
Approx. Elev. = 10.00 feet

LOG_OF_BORING G122360.GPJ ROCK_ETL.GDT 8/4/22

# LOG OF BORING B-7



Rock Engineering & Testing Lab. Inc
6817 Leopard Street
Corpus Christi, Texas 78409
Telephone: 361-883-4555
Fax: 361-883-4711

CLIENT: HDR Engineering, Inc.
PROJECT: Port of Brownsville Grain Facility Improv.
LOCATION: Brownsville, Texas
NUMBER: G122360
DATE(S) DRILLED: 7/6/2022

DRILLING METHOD(S):
Solid Stem Auger/Mud Rotary

GROUNDWATER INFORMATION:
Groundwater (GW) was encountered at a depth of 13.5 feet during drilling.
.25-Hour Delayed Readings: GW at 12 feet.

| SOIL SYMBOL | DEPTH (FT) | SAMPLE NUMBER | SAMPLES | N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT Qc: TONS/SQ FT | MOISTURE CONTENT (%) | ATTERBERG LIMITS LIQUID LIMIT LL | ATTERBERG LIMITS PLASTIC LIMIT PL | ATTERBERG LIMITS PLASTICITY INDEX PI | DRY DENSITY POUNDS/CU.FT | COMPRESSIVE STRENGTH (TONS/SQ FT) | MINUS NO. 200 SIEVE (%) | DESCRIPTION OF STRATUM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 45 | SS S-14 | | N= 40 | | | | | | | | **POORLY GRADED SAND WITH SILT**, brown, moist, dense. |
| | 50 | SS S-15 | | N= 23 | | | | | | | | **SANDY LEAN CLAY**, brown, moist, very stiff. |
| | 55 | SH S-16 | | P= 2.0 | 22 | | | | 103 | 0.9 | 77 | **LEAN CLAY WITH SAND**, brown, moist, firm. |
| | 60 | SS S-17 | | N= 26 | | | | | | | | Same as above, very stiff. |
| | 65 | SH S-18 | | P= 1.0 | 23 | 38 | 17 | 21 | 107 | 3.0 | 99 | **LEAN CLAY**, brown, moist, very stiff. (CL) |
| | 70 | SS S-19 | | N= 14 | | | | | | | | **SILTY CLAYEY SAND**, brown, moist, medium. **CLAYEY SAND**, brown, moist, stiff. |
| | 75 | SS S-20 | | N= 15 | 33 | 43 | 18 | 25 | | | 99 | **LEAN CLAY**, brown, moist, very stiff. (CL) |
| | 80 | SS S-21 | | N= 18 | | | | | | | | **SILTY SAND**, brown, moist, medium. |
| | 85 | SH S-22 | | P= 4.5+ | 28 | | | | 98 | 4.1 | | **FAT CLAY**, brown, moist, hard. |

N - STANDARD PENETRATION TEST RESISTANCE
Qc - STATIC CONE PENETROMETER TEST INDEX
P - POCKET PENETROMETER RESISTANCE

REMARKS:
Drilling operations were performed by RETL at GPS Coordinates N 25.95546° W 97.38616°
Approx. Elev. = 10.00 feet

# LOG OF BORING B-7



Rock Engineering & Testing Lab. Inc
6817 Leopard Street
Corpus Christi, Texas 78409
Telephone: 361-883-4555
Fax: 361-883-4711

CLIENT: HDR Engineering, Inc.
PROJECT: Port of Brownsville Grain Facility Improv.
LOCATION: Brownsville, Texas
NUMBER: G122360
DATE(S) DRILLED: 7/6/2022

DRILLING METHOD(S):
Solid Stem Auger/Mud Rotary

GROUNDWATER INFORMATION:
Groundwater (GW) was encountered at a depth of 13.5 feet during drilling.
.25-Hour Delayed Readings: GW at 12 feet.

| SOIL SYMBOL | DEPTH (FT) | SAMPLE NUMBER | SAMPLES | N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT Qc: TONS/SQ FT | MOISTURE CONTENT (%) | ATTERBERG LIMITS LIQUID LIMIT LL | ATTERBERG LIMITS PLASTIC LIMIT PL | ATTERBERG LIMITS PLASTICITY INDEX PI | DRY DENSITY POUNDS/CU.FT | COMPRESSIVE STRENGTH (TONS/SQ FT) | MINUS NO. 200 SIEVE (%) | DESCRIPTION OF STRATUM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 90 | SS S-23 | | N= 16 | 26 | 53 | 25 | 28 | | | 98 | **FAT CLAY**, brown, moist, very stiff. (CH) |
| | 95 | SH S-24 | | P= 3.5 | 22 | | | | 102 | 3.7 | | Same as above. |
| | 100 | SS S-25 | | N= 28 | 25 | | | | | | 21 | **SILTY SAND**, brown, moist, medium. |
| | 110 | SS S-26 | | N= 26 | 30 | 45 | 21 | 24 | | | | **LEAN CLAY WITH SAND**, dark gray, moist, very stiff. |
| | 120 | SS S-27 | | N= 17 | | | | | | | | Same as above, gray. |
| | | | | | | | | | | | | Boring was terminated at a depth of 120 feet. |

N - STANDARD PENETRATION TEST RESISTANCE
Qc - STATIC CONE PENETROMETER TEST INDEX
P - POCKET PENETROMETER RESISTANCE

REMARKS:
Drilling operations were performed by RETL at GPS Coordinates N 25.95546° W 97.38616°
Approx. Elev. = 10.00 feet

# LOG OF BORING B-8



Rock Engineering & Testing Lab. Inc
6817 Leopard Street
Corpus Christi, Texas 78409
Telephone: 361-883-4555
Fax: 361-883-4711

CLIENT: HDR Engineering, Inc.
PROJECT: Port of Brownsville Grain Facility Improv.
LOCATION: Brownsville, Texas
NUMBER: G122360
DATE(S) DRILLED: 7/6/2022

DRILLING METHOD(S):
Solid Stem Auger/Mud Rotary

GROUNDWATER INFORMATION:
Groundwater (GW) was not encountered during drilling.
.25-Hour Delayed Readings: GW at 13 feet.

SURFACE ELEVATION: N/A

| SOIL SYMBOL | DEPTH (FT) | SAMPLE NUMBER | SAMPLES | N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT Qc: TONS/SQ FT | MOISTURE CONTENT (%) | ATTERBERG LIMITS LIQUID LIMIT LL | ATTERBERG LIMITS PLASTIC LIMIT PL | ATTERBERG LIMITS PLASTICITY INDEX PI | DRY DENSITY POUNDS/CU.FT | COMPRESSIVE STRENGTH (TONS/SQ FT) | MINUS NO. 200 SIEVE (%) | DESCRIPTION OF STRATUM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | SS S-1 | | N= 27 | 5 | 23 | 16 | 7 | | | 21 | **SILTY CLAYEY SAND**, with gravel, brown, dry, medium. (SC-SM) |
| | | SS S-2 | | N= 6 | | | | | | | | **FAT CLAY**, dark gray, moist, firm. |
| | 5 | SH S-3 | | P= 1.0 | 38 | 66 | 18 | 48 | | 0.6 | 89 | Same as above, gray and brown. (CH) |
| | | SH S-4 | | P= 0.5 | | | | | | 0.6 | | Same as above, brown. |
| | | SS S-5 | | N= WOH | 36 | 41 | 15 | 26 | | | 75 | **LEAN CLAY WITH SAND**, dark gray, moist, very soft. (CL) |
| | 10 | SS S-6 | | N= WOH | | | | | | | | Same as above. |
| | | SH S-7 | | P= 3.0 | 19 | 35 | 14 | 21 | 108 | 1.4 | 43 | **CLAYEY SAND**, light gray, moist, stiff. (SC) |
| | 15 | SS S-8 | | N= 7 | | | | | | | | Same as above, firm. |
| | | SH S-9 | | P= 1.5 | 20 | | | | 110 | 1.5 | | Same as above, brown, stiff. |
| | 20 | | | | | | | | | | | |
| | | SS S-10 | | N= 8 | | | | | | | | **LEAN CLAY WITH SAND**, brown, moist, stiff. |
| | 25 | | | | | | | | | | | Boring was terminated at a depth of 25 feet. |

N - STANDARD PENETRATION TEST RESISTANCE
Qc - STATIC CONE PENETROMETER TEST INDEX
P - POCKET PENETROMETER RESISTANCE

REMARKS:
Drilling operations were performed by RETL at GPS Coordinates N 25.95393° W 97.38693°
Approx. Elev. = 7.00 feet

# LOG OF BORING B-9



Rock Engineering & Testing Lab. Inc
6817 Leopard Street
Corpus Christi, Texas 78409
Telephone: 361-883-4555
Fax: 361-883-4711

CLIENT: HDR Engineering, Inc.
PROJECT: Port of Brownsville Grain Facility Improv.
LOCATION: Brownsville, Texas
NUMBER: G122360
DATE(S) DRILLED: 7/8/2022

DRILLING METHOD(S):
Solid Stem Auger/Mud Rotary

GROUNDWATER INFORMATION:
Groundwater (GW) was encountered at a depth of 9.5 feet during drilling.
.25-Hour Delayed Readings: GW at 7 feet.

SURFACE ELEVATION: N/A

| SOIL SYMBOL | DEPTH (FT) | SAMPLE NUMBER | SAMPLES | N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT Qc: TONS/SQ FT | MOISTURE CONTENT (%) | ATTERBERG LIMITS LIQUID LIMIT LL | ATTERBERG LIMITS PLASTIC LIMIT PL | ATTERBERG LIMITS PLASTICITY INDEX PI | DRY DENSITY POUNDS/CU.FT | COMPRESSIVE STRENGTH (TONS/SQ FT) | MINUS NO. 200 SIEVE (%) | DESCRIPTION OF STRATUM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | SS S-1 | | N= 18 | 7 | 28 | 16 | 12 | | | 52 | **SANDY LEAN CLAY**, with aggregate, dark brown, dry, very stiff. (CL) |
| | | SS S-2 | | N= 8 | | | | | | | | **SILTY SAND**, brown, moist, loose. |
| | 5 | SS S-3 | | N= WOH | | | | | | | | **FAT CLAY**, dark gray and brown, moist, very soft. |
| | | SH S-4 | | Tv= 0.2 P= 0.5 | 29 | 59 | 19 | 40 | | 0.5 | 97 | Same as above, firm. (CH) |
| | | SS S-5 | | N= WOH | | | | | | | | Same as above, dark gray, very soft. |
| | 10 | SS S-6 | | N= 1 | 35 | | | | | | 73 | **FAT CLAY WITH SAND**, dark gray, moist, very soft. |
| | | SS S-7 | | N= 2 | | | | | | | | **LEAN CLAY WITH SAND**, dark gray, moist, soft. |
| | 15 | SS S-8 | | N= 6 | 21 | 36 | 15 | 21 | | | | Same as above, firm. |
| | | SS S-9 | | N= 11 | | | | | | | | Same as above, stiff. |
| | 20 | | | | | | | | | | | |
| | | SH S-10 | | P= 3.5 | 16 | | | | 116 | 3.3 | | Same as above, brown, very stiff. |
| | 25 | | | | | | | | | | | Boring was terminated at a depth of 25 feet. |

N - STANDARD PENETRATION TEST RESISTANCE
Qc - STATIC CONE PENETROMETER TEST INDEX
P - POCKET PENETROMETER RESISTANCE

REMARKS:
Drilling operations were performed by RETL at GPS Coordinates N 25.95316° W 97.38762°
Approx. Elev. = 8.00 feet

# LOG OF BORING B-10



Rock Engineering & Testing Lab. Inc
6817 Leopard Street
Corpus Christi, Texas 78409
Telephone: 361-883-4555
Fax: 361-883-4711

CLIENT: HDR Engineering, Inc.
PROJECT: Port of Brownsville Grain Facility Improv.
LOCATION: Brownsville, Texas
NUMBER: G122360
DATE(S) DRILLED: 7/5/2022

DRILLING METHOD(S):
Solid Stem Auger/Mud Rotary

GROUNDWATER INFORMATION:
Groundwater (GW) was encountered at a depth of 7 feet during drilling.
.25-Hour Delayed Readings: GW at 9 feet.

SURFACE ELEVATION: N/A

| SOIL SYMBOL | DEPTH (FT) | SAMPLE NUMBER | SAMPLES | N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT Qc: TONS/SQ FT | MOISTURE CONTENT (%) | ATTERBERG LIMITS LIQUID LIMIT LL | ATTERBERG LIMITS PLASTIC LIMIT PL | ATTERBERG LIMITS PLASTICITY INDEX PI | DRY DENSITY POUNDS/CU.FT | COMPRESSIVE STRENGTH (TONS/SQ FT) | MINUS NO. 200 SIEVE (%) | DESCRIPTION OF STRATUM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | SS S-1 | | N= 20 | | | | | | | | **SANDY LEAN CLAY**, with aggregate, dark gray, moist, very stiff. |
| | | SS S-2 | | N= 5 | | | | | | | | **FAT CLAY WITH SAND**, dark gray, moist, firm. |
| | 5 | SH S-3 | | Tv= 0.2 | 31 | 61 | 19 | 42 | | 1.1 | 82 | Same as above, gray and brown, stiff. (CH) |
| | | SH S-4 | | P= 1.25 | | | | | | | | Same as above, firm. |
| | | SH S-5 | | Tv= 0.15 P= 0.25 | | | | | | 0.4 | | **LEAN CLAY WITH SAND**, gray and brown, moist, soft. |
| | 10 | SS S-6 | | N= 3 | 21 | | | | | | 36 | **SILTY CLAYEY SAND**, gray, moist, soft. |
| | | SS S-7 | | N= 6 | | | | | | | | **SANDY LEAN CLAY**, brown, moist, firm. |
| | 15 | SH S-8 | | P= 4.25 | 16 | 23 | 16 | 7 | 116 | 3.2 | 29 | **SILTY CLAYEY SAND**, brown, moist, very stiff. (SC-SM) |
| | 20 | SS S-9 | | N= 15 | | | | | | | | Same as above, with calcareous deposits. |
| | 25 | SS S-10 | | N= 13 | 25 | NP | NP | NP | | | 41 | **SILTY SAND**, brown, moist, medium. (SM) |
| | 30 | SS S-11 | | N= 14 | | | | | | | | Same as above. |
| | 35 | SS S-12 | | N= 13 | | | | | | | | Same as above. |
| | | | | | | | | | | | | Boring was terminated at a depth of 35 feet. |

N - STANDARD PENETRATION TEST RESISTANCE
Qc - STATIC CONE PENETROMETER TEST INDEX
P - POCKET PENETROMETER RESISTANCE

REMARKS:
Drilling operations were performed by RETL at GPS Coordinates N 25.95367° W 97.38618°
Approx. Elev. = 8.00 feet

# LOG OF BORING B-11



Rock Engineering & Testing Lab. Inc
6817 Leopard Street
Corpus Christi, Texas 78409
Telephone: 361-883-4555
Fax: 361-883-4711

CLIENT: HDR Engineering, Inc.
PROJECT: Port of Brownsville Grain Facility Improv.
LOCATION: Brownsville, Texas
NUMBER: G122360
DATE(S) DRILLED: 7/5/2022

DRILLING METHOD(S):
Solid Stem Auger/Mud Rotary

GROUNDWATER INFORMATION:
Groundwater (GW) was encountered at a depth of 9 feet during drilling.
.25-Hour Delayed Readings: GW at 8.5 feet.

SURFACE ELEVATION: N/A

| SOIL SYMBOL | DEPTH (FT) | SAMPLE NUMBER | SAMPLES | N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT Qc: TONS/SQ FT | MOISTURE CONTENT (%) | ATTERBERG LIMITS LIQUID LIMIT LL | ATTERBERG LIMITS PLASTIC LIMIT PL | ATTERBERG LIMITS PLASTICITY INDEX PI | DRY DENSITY POUNDS/CU.FT | COMPRESSIVE STRENGTH (TONS/SQ FT) | MINUS NO. 200 SIEVE (%) | DESCRIPTION OF STRATUM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | SS S-1 | | N= 34 | 8 | 28 | 24 | 4 | | | 33 | **SILTY SAND**, with aggregate, dark brown, dry, dense. (SM) |
| | | SS S-2 | | N= 4 | | | | | | | | **FAT CLAY WITH SAND**, dark gray, moist, firm. |
| | 5 | SH S-3 | | Tv= 0.25 P= 1.0 | 31 | | | | | 0.8 | 82 | Same as above. |
| | | SH S-4 | | P= 0.75 | | | | | | 0.8 | | **LEAN CLAY WITH SAND**, gray, moist, firm. |
| | | SS S-5 | | N= WOH | | | | | | | | Same as above, very soft. |
| | 10 | SS S-6 | | N= 1 | 27 | 45 | 16 | 29 | | | | Same as above. |
| | | SH S-7 | | P= 3.5 | 18 | 33 | 15 | 18 | 113 | 2.3 | 31 | **CLAYEY SAND**, dark gray, moist, very stiff. (SC) |
| | 15 | SS S-8 | | N= 10 | | | | | | | | Same as above, stiff. |
| | 20 | SS S-9 | | N= WOH | 27 | | | | | | 56 | **SANDY LEAN CLAY**, brown, moist, very soft. |
| | | SS S-10 | | N= 13 | | | | | | | | **SILTY SAND**, brown, moist, medium. |
| | 25 | | | | | | | | | | | Boring was terminated at a depth of 25 feet. |

N - STANDARD PENETRATION TEST RESISTANCE
Qc - STATIC CONE PENETROMETER TEST INDEX
P - POCKET PENETROMETER RESISTANCE

REMARKS:
Drilling operations were performed by RETL at GPS Coordinates N 25.95418° W 97.38474°
Approx. Elev. = 8.00 feet

# LOG OF BORING B-12



Rock Engineering & Testing Lab. Inc
6817 Leopard Street
Corpus Christi, Texas 78409
Telephone: 361-883-4555
Fax: 361-883-4711

CLIENT: HDR Engineering, Inc.
PROJECT: Port of Brownsville Grain Facility Improv.
LOCATION: Brownsville, Texas
NUMBER: G122360
DATE(S) DRILLED: 7/5/2022

DRILLING METHOD(S):
Solid Stem Auger/Mud Rotary

GROUNDWATER INFORMATION:
Groundwater (GW) was encountered at a depth of 8 feet during drilling.
.25-Hour Delayed Readings: GW at 5 feet.

SURFACE ELEVATION: N/A

| SOIL SYMBOL | DEPTH (FT) | SAMPLE NUMBER | SAMPLES | N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT Qc: TONS/SQ FT | MOISTURE CONTENT (%) | ATTERBERG LIMITS LL | ATTERBERG LIMITS PL | ATTERBERG LIMITS PI | DRY DENSITY POUNDS/CU.FT | COMPRESSIVE STRENGTH (TONS/SQ FT) | MINUS NO. 200 SIEVE (%) | DESCRIPTION OF STRATUM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | SS S-1 | | N= 7 | | | | | | | | **FAT CLAY**, dark gray, dry, firm. |
| | | SS S-2 | | N= 3 | | 52 | 18 | 34 | | | | Same as above, soft. |
| | 5 | SH S-3 | | Tv= 0.15 P= 0.5 | 30 | | | | | 0.6 | 90 | Same as above, firm. |
| | | SH S-4 | | Tv= 0.1 P= 0.5 | | 33 | 16 | 17 | | 0.5 | | **LEAN CLAY WITH SAND**, gray, moist, firm. |
| | | SS S-5 | | N= WOH | | | | | | | | Same as above, very soft. |
| | 10 | SS S-6 | | N= WOH | 36 | 52 | 17 | 35 | | | 76 | **FAT CLAY WITH SAND**, gray and brown, moist, very soft. (CH) |
| | | SS S-7 | | N= 2 | | | | | | | | Same as above, brown, soft. |
| | 15 | SH S-8 | | P= 3.5 | 17 | 32 | 13 | 19 | 113 | 1.7 | 44 | **CLAYEY SAND**, gray, moist, stiff. (SC) |
| | | SH S-9 | | Tv= 0.1 | 23 | 22 | 15 | 7 | | | 44 | **SILTY CLAYEY SAND**, gray, moist, loose. (SC-SM) |
| | 20 | | | | | | | | | | | |
| | | SS S-10 | | N= 6 | 22 | | | | | | 29 | Same as above, brown. |
| | 25 | | | | | | | | | | | Boring was terminated at a depth of 25 feet. |

N - STANDARD PENETRATION TEST RESISTANCE
Qc - STATIC CONE PENETROMETER TEST INDEX
P - POCKET PENETROMETER RESISTANCE

REMARKS:
Drilling operations were performed by RETL at GPS Coordinates N 25.95468° W 97.38330°
Approx. Elev. = 6.00 feet

Engineering & Testing
Laboratory, Inc.

Rock Engineering & Testing Laboratory
6817 Leopard Street
Corpus Christi, TX 78409-1703
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## KEY TO SOIL CLASSIFICATION AND SYMBOLS

### UNIFIED SOIL CLASSIFICATION SYSTEM

| MAJOR DIVISIONS | | SYMBOL | NAME |
|---|---|---|---|
| COARSE GRAINED SOILS | GRAVEL AND GRAVELLY SOILS | GW | Well Graded Gravels or Gravel-Sand mixtures, little or no fines |
| | | GP | Poorly Graded Gravels or Gravel-Sand mixtures, little or no fines |
| | | GM | Silty Gravels, Gravel-Sand-Silt mixtures |
| | | GC | Clayey Gravels, Gravel-Sand-Clay Mixtures |
| | SAND AND SANDY SOILS | SW | Well Graded Sands or Gravelly Sands, little or no fines |
| | | SP | Poorly Graded Sands or Gravelly Sands, little or no fines |
| | | SM | Silty Sands, Sand-Silt Mixtures |
| | | SC | Clayey Sands, Sand-Clay mixtures |
| FINE GRAINED SOILS | SILTS AND CLAYS LL < 50 | ML | Inorganic Silts and very fine Sands, Rock Flour, Silty or Clayey fine Sands or Clayey Silts |
| | | CL | Inorganic Clays of low to medium plasticity, Gravelly Clays, Sandy Clays, Silty Clays, Lean Clays |
| | | OL | Organic Silts and Organic Silt-Clays of low plasticity |
| | SILTS AND CLAYS LL > 50 | MH | Inorganic Silts, Micaceous or Diatomaceous fine Sandy or Silty soils, Elastic Silts |
| | | CH | Inorganic Clays of high plasticity, Fat Clays |
| | | OH | Organic Clays of medium to high plasticity, Organic Silts |
| HIGHLY ORGANIC SOILS | | PT | Peat and other Highly Organic soils |

### TERMS CHARACTERIZING SOIL STRUCTURE

SLICKENSIDED - having inclined planes of weakness that are slick and glossy in appearance

FISSURED - containing shrinkage cracks, frequently filled with fine sand or silt; usually more or less vertical

LAMINATED (VARVED) - composed of thin layers of varying color and texture, usually grading from sand or silt at the bottom to clay at the top

CRUMBLY - cohesive soils which break into small blocks or crumbs on drying

CALCAREOUS - containing appreciable quantities of calcium carbonate, generally nodular

WELL GRADED - having wide range in grain sizes and substantial amounts of all intermediate particle sizes

POORLY GRADED - predominantly of one grain size uniformly graded) or having a range of sizes with some intermediate size missing (gap or skip graded)

### SYMBOLS FOR TEST DATA

- Groundwater Level (Initial Reading)
- Groundwater Level (Final Reading)
- Shelby Tube Sample
- SPT Samples
- Auger Sample
- Rock Core

### TERMS DESCRIBING CONSISTENCY OF SOIL

| COARSE GRAINED SOILS | | FINE GRAINED SOILS | | |
|---|---|---|---|---|
| DESCRIPTIVE TERM | NO. BLOWS/FT. STANDARD PEN. TEST | DESCRIPTIVE TERM | NO. BLOWS/FT. STANDARD PEN. TEST | UNCONFINED COMPRESSION TONS PER SQ. FT. |
| Very Loose | 0 - 4 | Very Soft | < 2 | < 0.25 |
| Loose | 4 - 10 | Soft | 2 - 4 | 0.25 - 0.50 |
| Medium | 10 - 30 | Firm | 4 - 8 | 0.50 - 1.00 |
| Dense | 30 - 50 | Stiff | 8 - 15 | 1.00 - 2.00 |
| Very Dense | over 50 | Very Stiff | 15 - 30 | 2.00 - 4.00 |
| | | Hard | over 30 | over 4.00 |

Field Classification for "Consistency" is determined with a 0.25" diameter penetrometer

Rock Engineering & Testing Lab. Inc
6817 Leopard Street
Corpus Christi, Texas 78409
Telephone: 361-883-4555
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# SUMMARY OF LABORATORY RESULTS



**CLIENT** HDR Engineering, Inc. **PROJECT NAME** Port of Brownsville Grain Facility Improv.

**PROJECT NUMBER** G122360 **PROJECT LOCATION** Brownsville, Texas

| Borehole | Depth | Liquid Limit | Plastic Limit | Plasticity Index | Maximum Size (mm) | %<#200 Sieve | Water Content (%) | |
|---|---|---|---|---|---|---|---|---|
| B-5 | 0.0 | | | | | | 6.0 | |
| B-5 | 1.0 | | | | | | 13.0 | |
| B-5 | 2.0 | | | | 0.074 | 49 | 17.0 | |
| B-5 | 4.0 | | | | | | 21.0 | |
| B-5 | 5.0 | 52 | 20 | 32 | | | 25.0 | |
| B-5 | 10.0 | | | | 0.074 | 67 | 27.0 | |
| B-5 | 14.0 | 38 | 16 | 22 | 0.074 | 39 | 20.0 | |
| B-5 | 28.5 | | | | | | 24.0 | |
| B-5 | 33.5 | | | | 0.074 | 59 | 26.0 | |
| B-5 | 38.5 | 49 | 19 | 30 | | | 24.0 | |
| B-5 | 39.5 | | | | | | 26.0 | |
| B-5 | 48.5 | 34 | 16 | 18 | 0.074 | 68 | 23.0 | |
| B-5 | 53.5 | | | | | | 24.0 | |
| B-5 | 73.5 | 30 | 20 | 10 | | | 28.0 | |
| B-5 | 93.5 | 58 | 21 | 37 | 0.074 | 100 | 27.0 | |
| B-6 | 0.0 | 28 | 15 | 13 | | | 12.0 | |
| B-6 | 4.0 | | | | 0.074 | 60 | 20.0 | |
| B-6 | 5.0 | | | | 0.074 | 77 | 24.0 | |
| B-6 | 8.0 | 36 | 17 | 19 | 0.074 | 83 | 28.0 | |
| B-6 | 12.0 | 34 | 17 | 17 | 0.074 | 62 | 32.0 | |
| B-6 | 18.5 | 29 | 13 | 16 | 0.074 | 44 | 21.0 | |
| B-6 | 28.5 | | | | 0.074 | 68 | 26.0 | |
| B-6 | 38.5 | | | | 0.074 | 17 | 22.0 | |
| B-6 | 48.5 | 46 | 17 | 29 | 0.074 | 56 | 22.0 | |
| B-6 | 49.5 | | | | 0.074 | 92 | 21.0 | |
| B-6 | 73.5 | | | | 0.074 | 25 | 23.0 | |
| B-6 | 83.5 | 67 | 28 | 39 | | | 28.0 | |
| B-7 | 0.0 | | | | | | 13.0 | |
| B-7 | 2.0 | 44 | 16 | 28 | 0.074 | 88 | 11.0 | |
| B-7 | 14.0 | 34 | 12 | 22 | 0.074 | 44 | 24.0 | |
| B-7 | 38.5 | | | | 0.074 | 10 | 21.0 | |
| B-7 | 73.5 | 43 | 18 | 25 | 0.074 | 99 | 33.0 | |
| B-7 | 88.5 | 53 | 25 | 28 | 0.074 | 98 | 26.0 | |
| B-7 | 98.5 | | | | 0.074 | 21 | 25.0 | |
| B-7 | 108.5 | 45 | 21 | 24 | | | 30.0 | |
| B-8 | 0.0 | 23 | 16 | 7 | 0.074 | 21 | 5.0 | |
| B-8 | 4.0 | 66 | 18 | 48 | 0.074 | 89 | 38.0 | |
| B-8 | 8.0 | 41 | 15 | 26 | 0.074 | 75 | 36.0 | |
| B-9 | 0.0 | 28 | 16 | 12 | 0.074 | 52 | 7.0 | |
| B-9 | 6.0 | 59 | 19 | 40 | 0.074 | 97 | 29.0 | |
| B-9 | 10.0 | | | | 0.074 | 73 | 35.0 | |
| B-9 | 14.0 | 36 | 15 | 21 | | | 21.0 | |
| B-10 | 4.0 | 61 | 19 | 42 | 0.074 | 82 | 31.0 | |

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# SUMMARY OF LABORATORY RESULTS



**CLIENT** HDR Engineering, Inc. **PROJECT NAME** Port of Brownsville Grain Facility Improv.

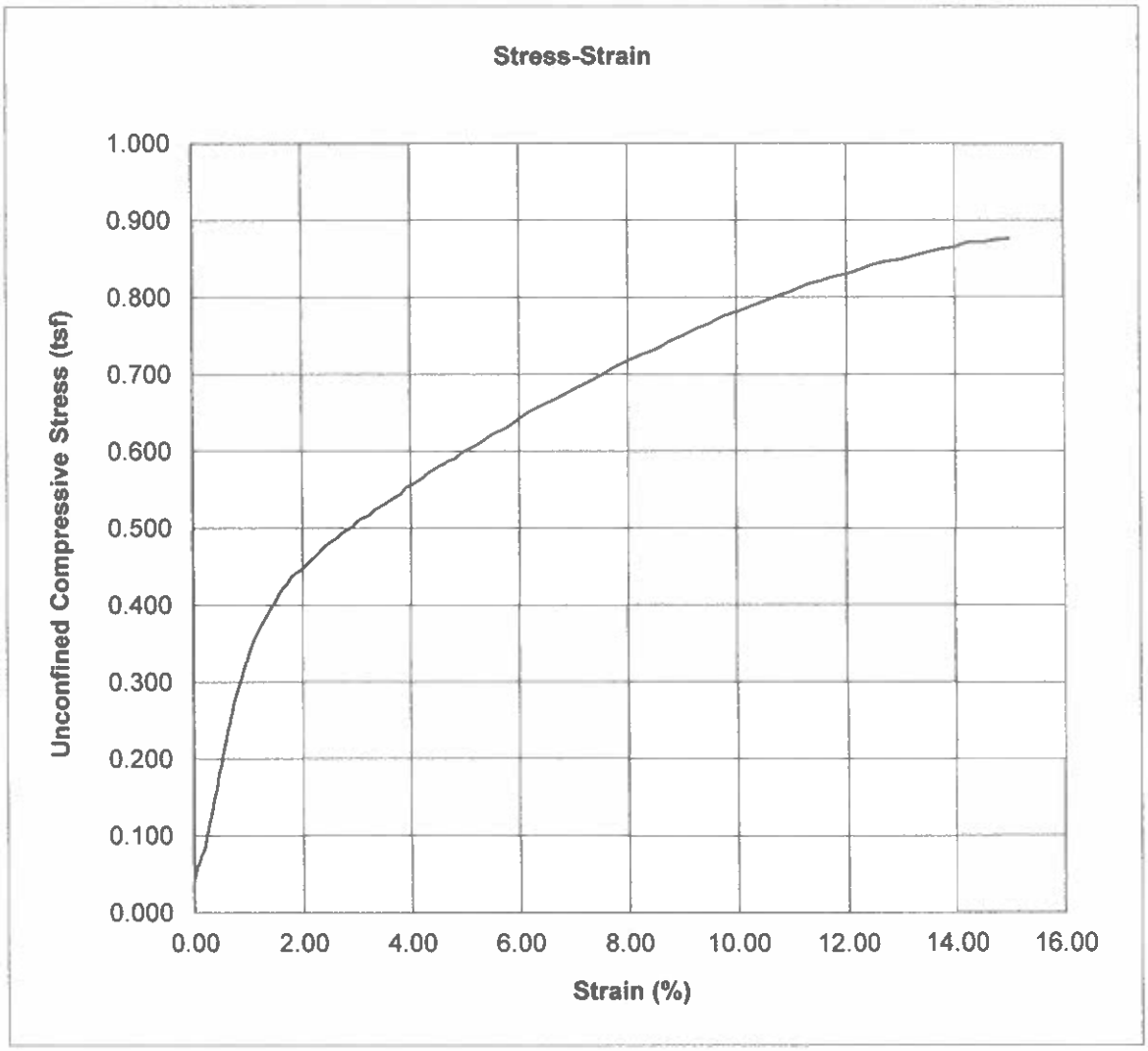
**PROJECT NUMBER** G122360 **PROJECT LOCATION** Brownsville, Texas

| Borehole | Depth | Liquid Limit | Plastic Limit | Plasticity Index | Maximum Size (mm) | %<#200 Sieve | Water Content (%) | |
|---|---|---|---|---|---|---|---|---|
| B-10 | 10.0 | | | | 0.074 | 36 | 21.0 | |
| B-10 | 23.5 | | | | 0.074 | 41 | 25.0 | |
| B-11 | 0.0 | 28 | 24 | 4 | 0.074 | 33 | 8.0 | |
| B-11 | 4.0 | | | | 0.074 | 82 | 31.0 | |
| B-11 | 10.0 | 45 | 16 | 29 | | | 27.0 | |
| B-11 | 18.5 | | | | 0.074 | 56 | 27.0 | |
| B-12 | 2.0 | 52 | 18 | 34 | | | | |
| B-12 | 4.0 | | | | 0.074 | 90 | 30.0 | |
| B-12 | 6.0 | 33 | 16 | 17 | | | | |
| B-12 | 10.0 | 52 | 17 | 35 | 0.074 | 76 | 36.0 | |
| B-12 | 23.5 | | | | 0.074 | 29 | 22.0 | |

# UNCONFINED COMPRESSION TEST

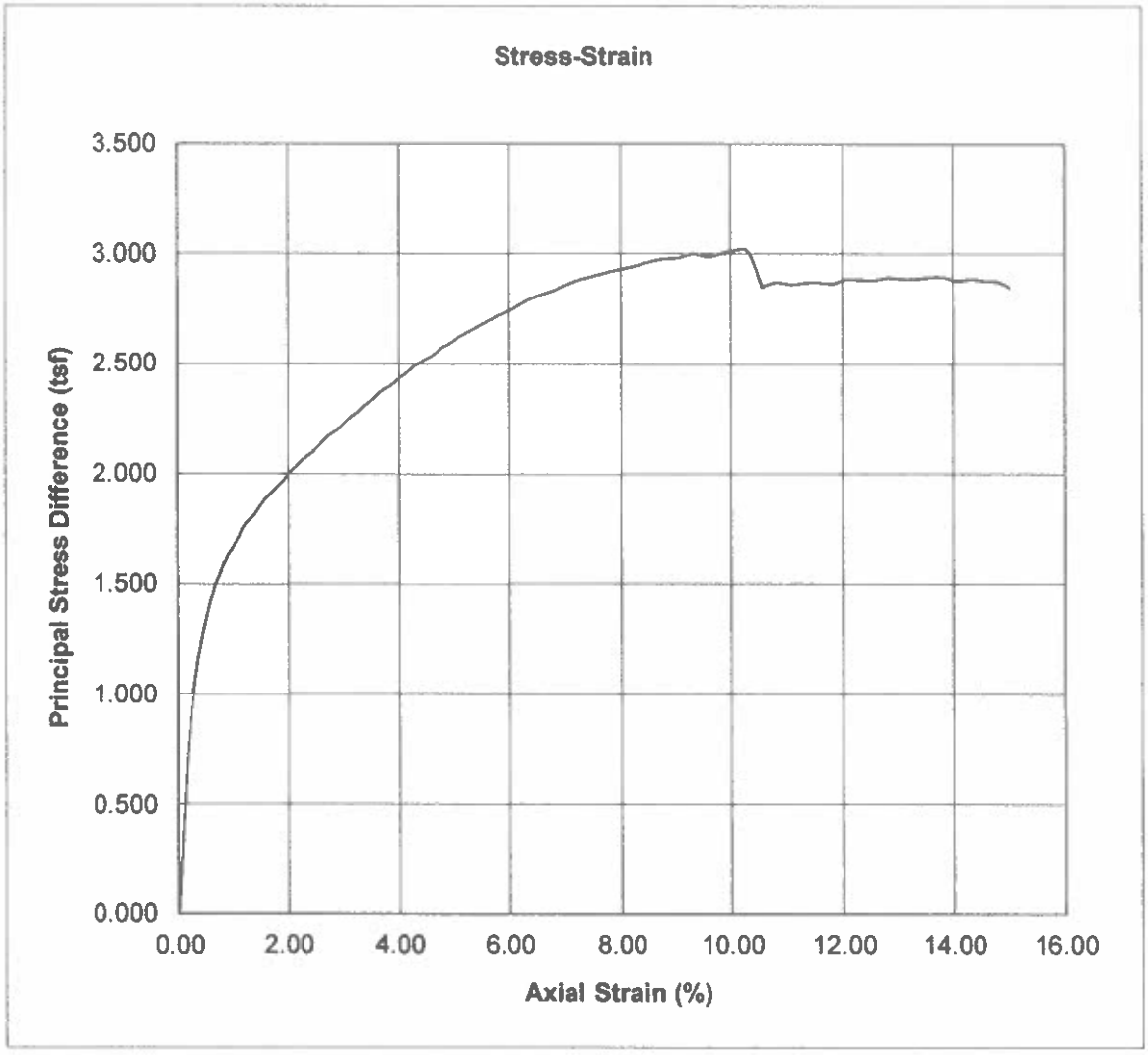
UNCONFINED COMPRESSION TEST

**Port Of Brownsville - G-122360**
**B-5 - 8-10 ft**

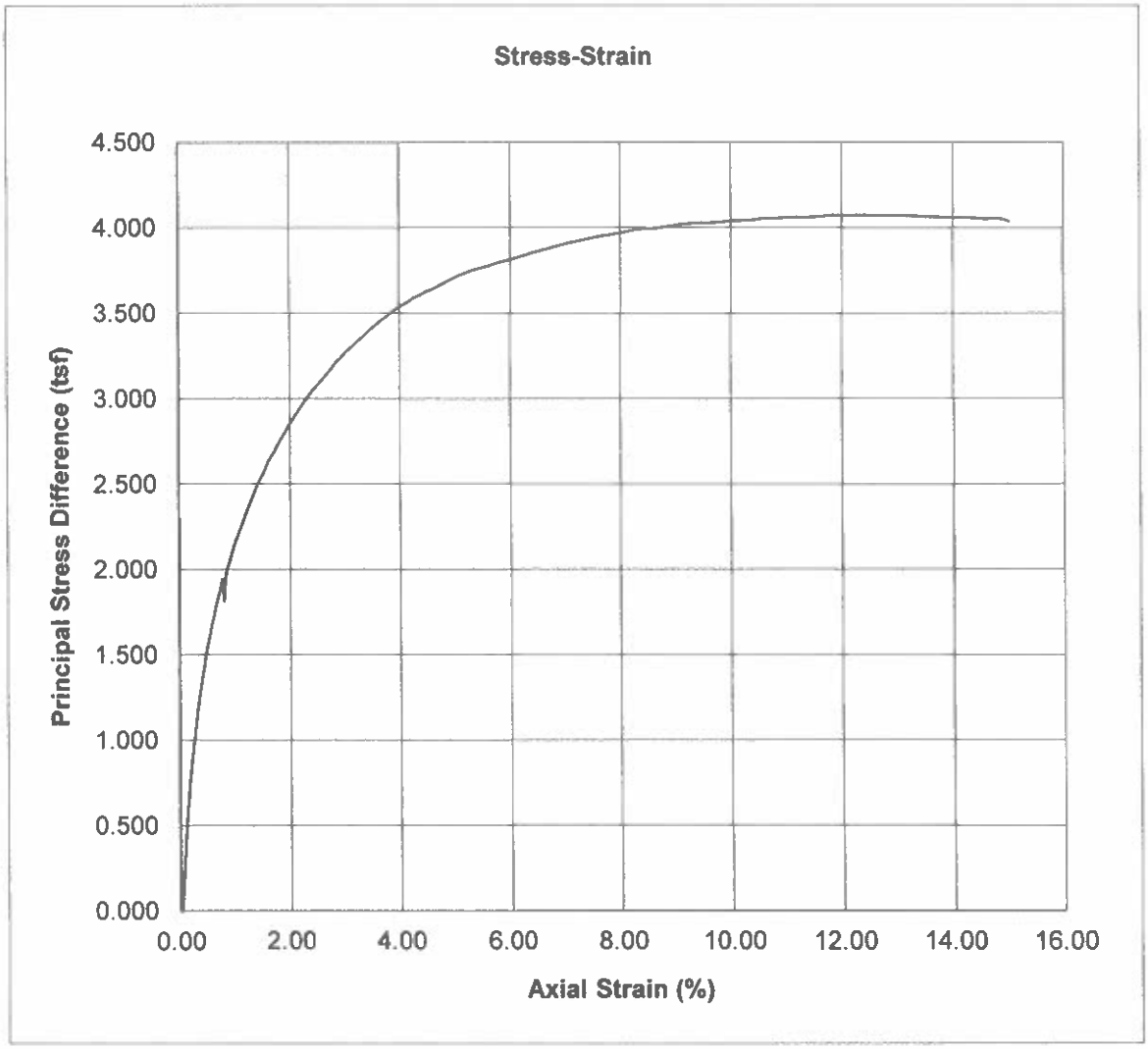


# UU TRIAXIAL COMPRESSION TESTS

UU TRIAXIAL COMPRESSION TES
CONFINING PRESSURE = 25 PSI
**Port Of Brownsville - G-122360**
**B-5 - 58-60 ft**



UU TRIAXIAL COMPRESSION TES
CONFINING PRESSURE = 27 PSI
**Port Of Brownsville - G-122360**
**B-5 - 63-65 ft**

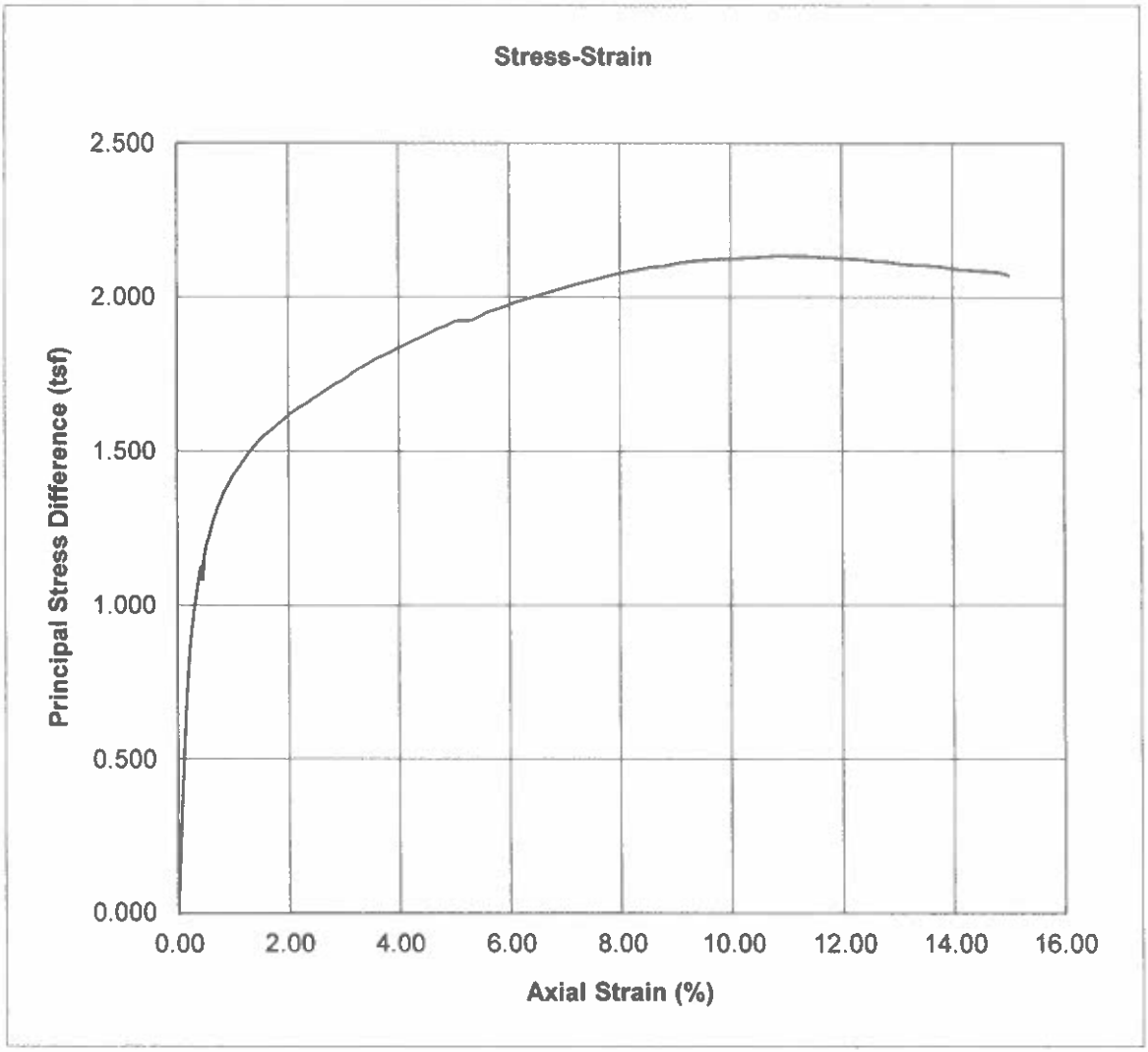


UU TRIAXIAL COMPRESSION TES

CONFINING PRESSURE = 35.4 PSI

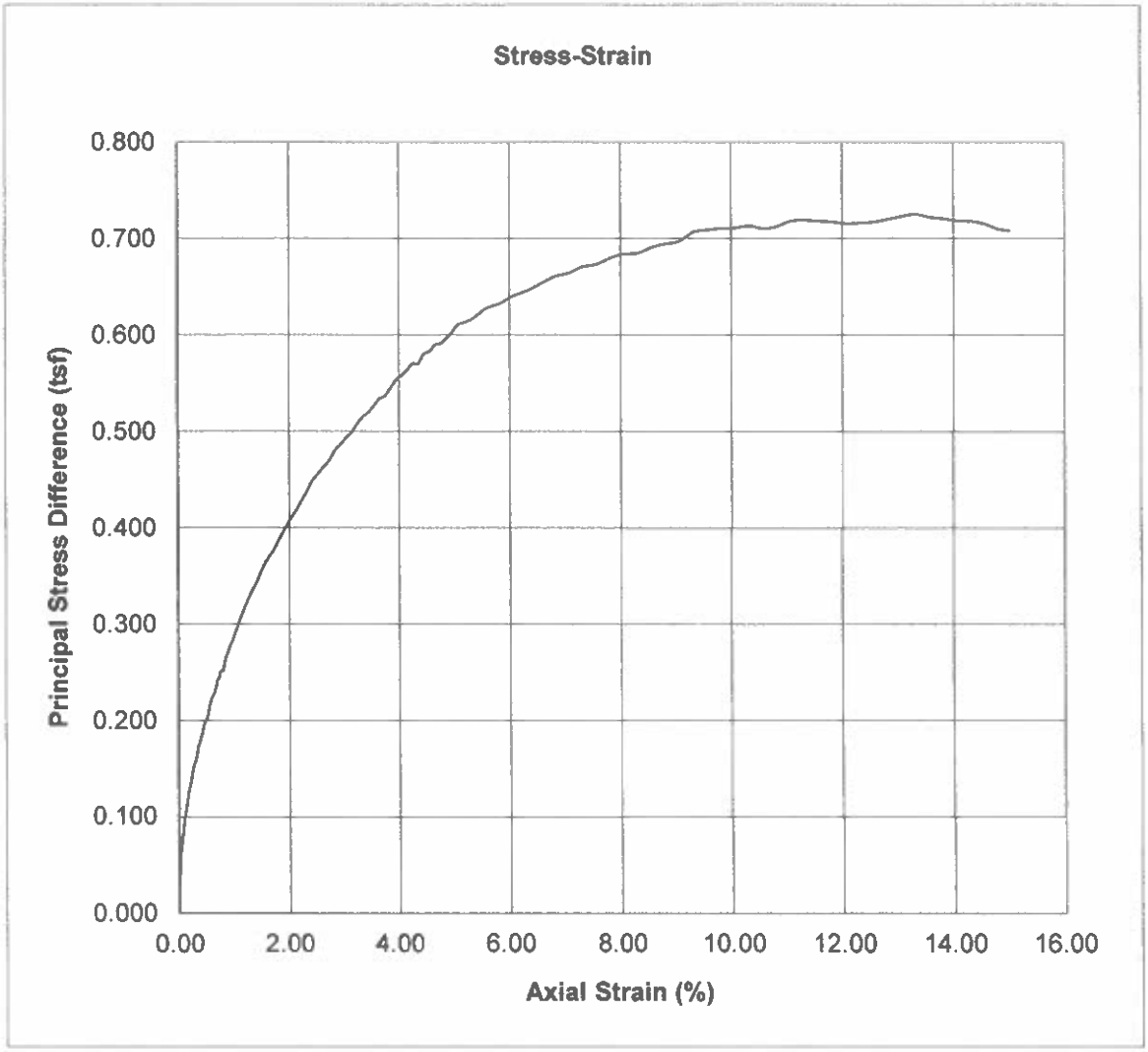
**Port Of Brownsville - G-122360**

**B-5 - 83-85 ft**



UU TRIAXIAL COMPRESSION TES
CONFINING PRESSURE = 5 PSI

**Port Of Brownsville - G-122360**
**B-6 - 10-12 ft**

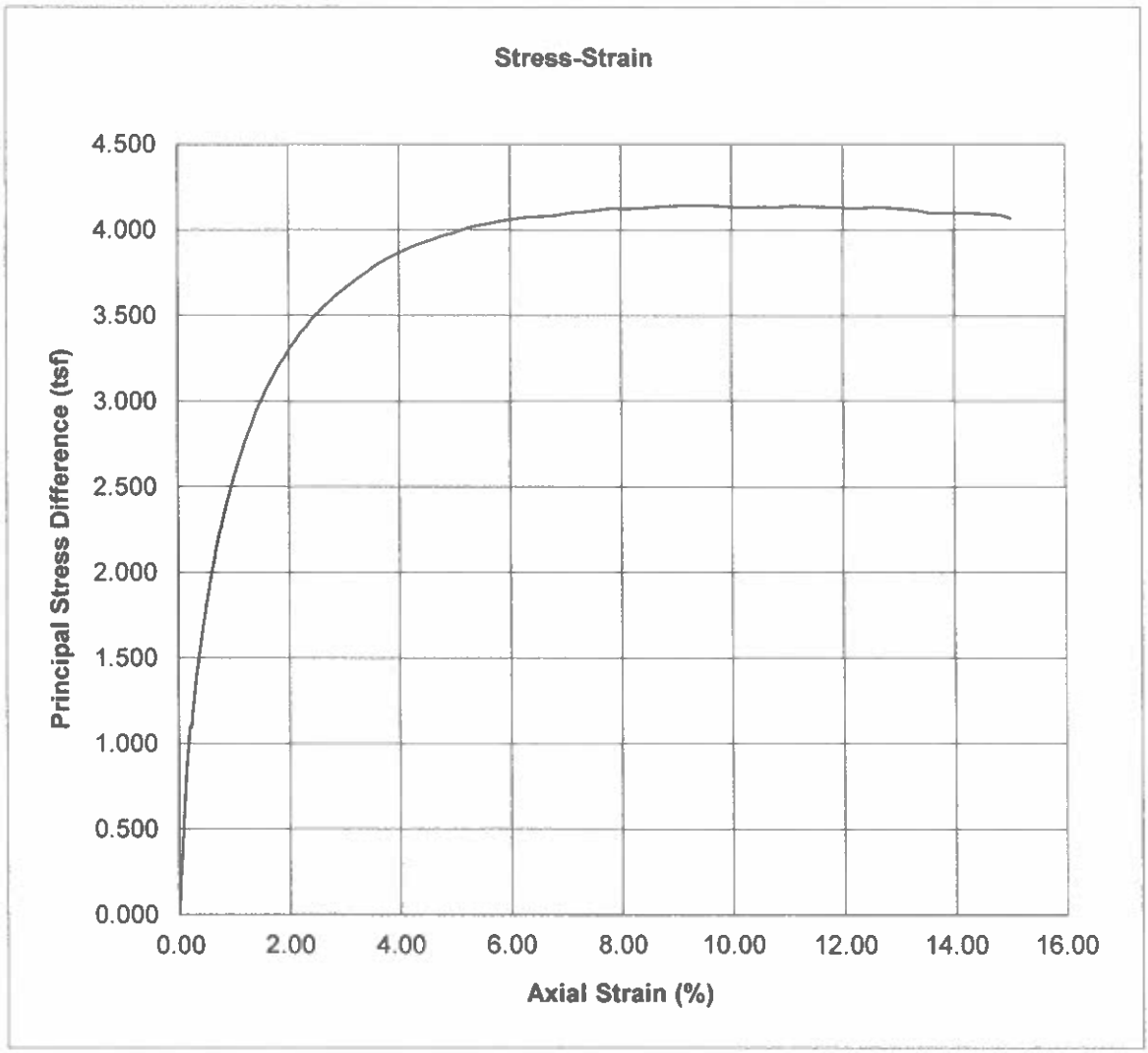


UU TRIAXIAL COMPRESSION TES

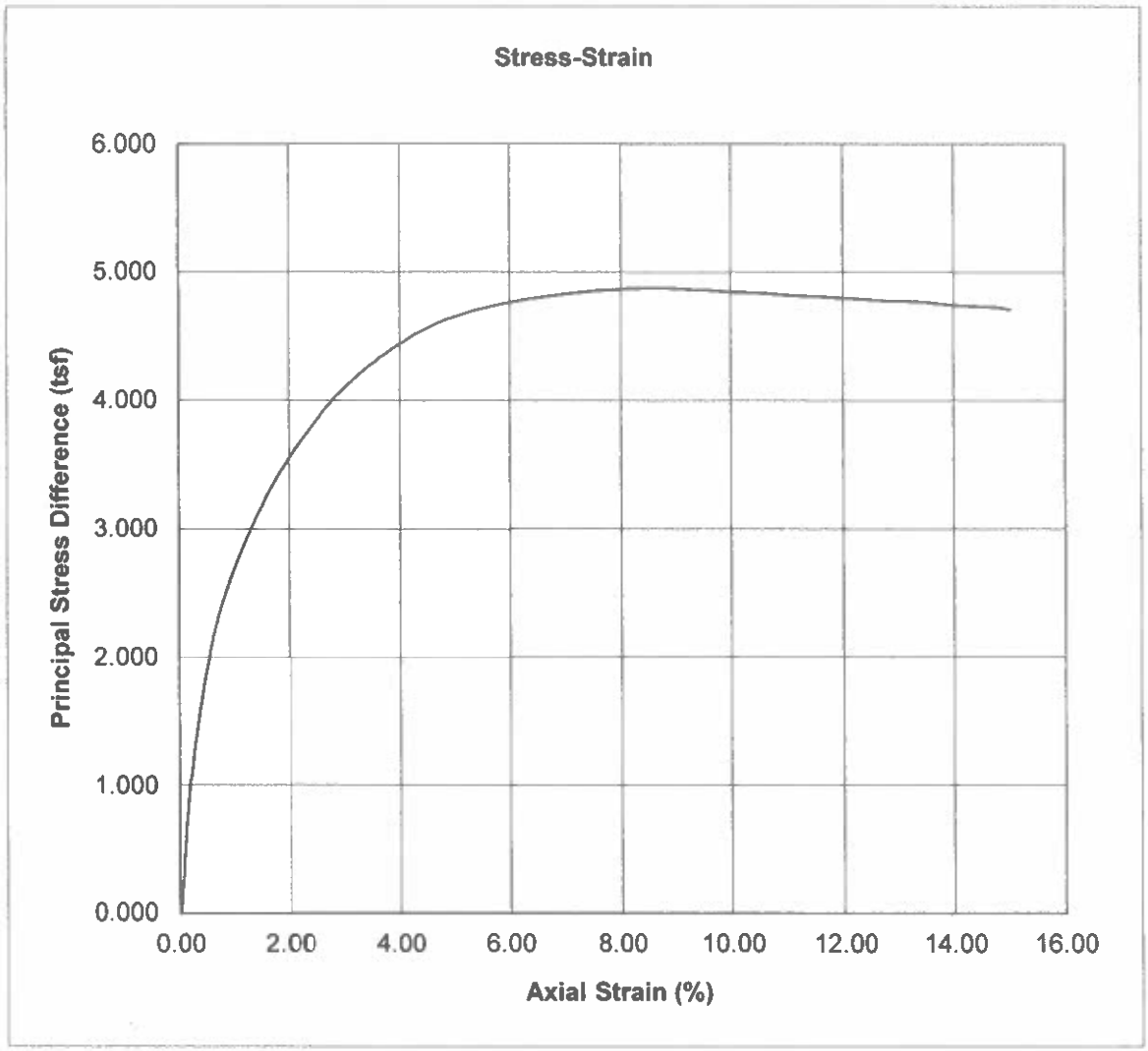
CONFINING PRESSURE = 22.9 PSI

**Port Of Brownsville - G-122360**

**B-6 - 53-55 ft**



UU TRIAXIAL COMPRESSION TES
CONFINING PRESSURE = 27 PSI
**Port Of Brownsville - G-122360**
**B-6 - 63-65 ft**

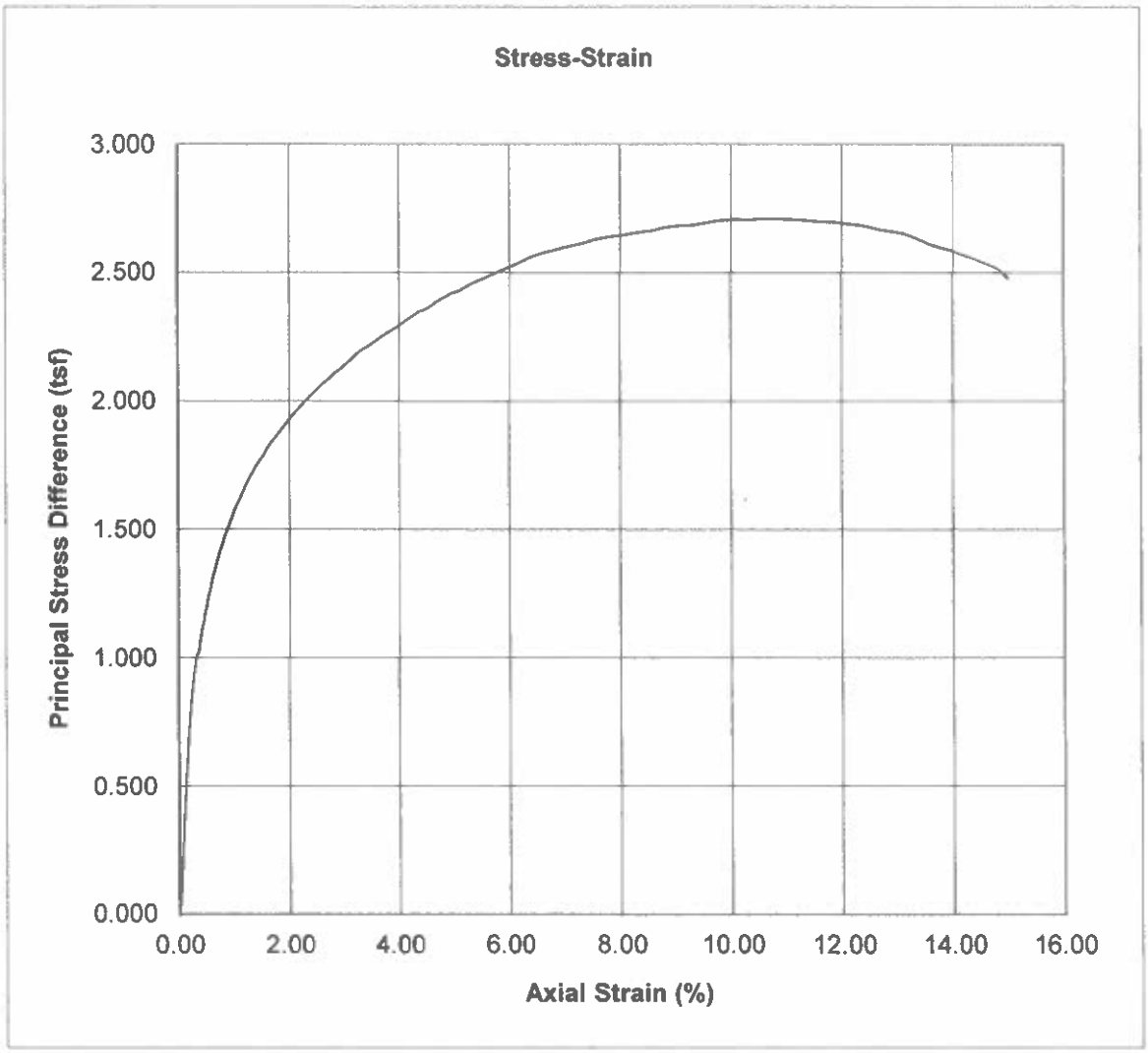


UU TRIAXIAL COMPRESSION TES

CONFINING PRESSURE = 39.5 PSI

**Port Of Brownsville - G-122360**

**B-6 - 93-95 ft**

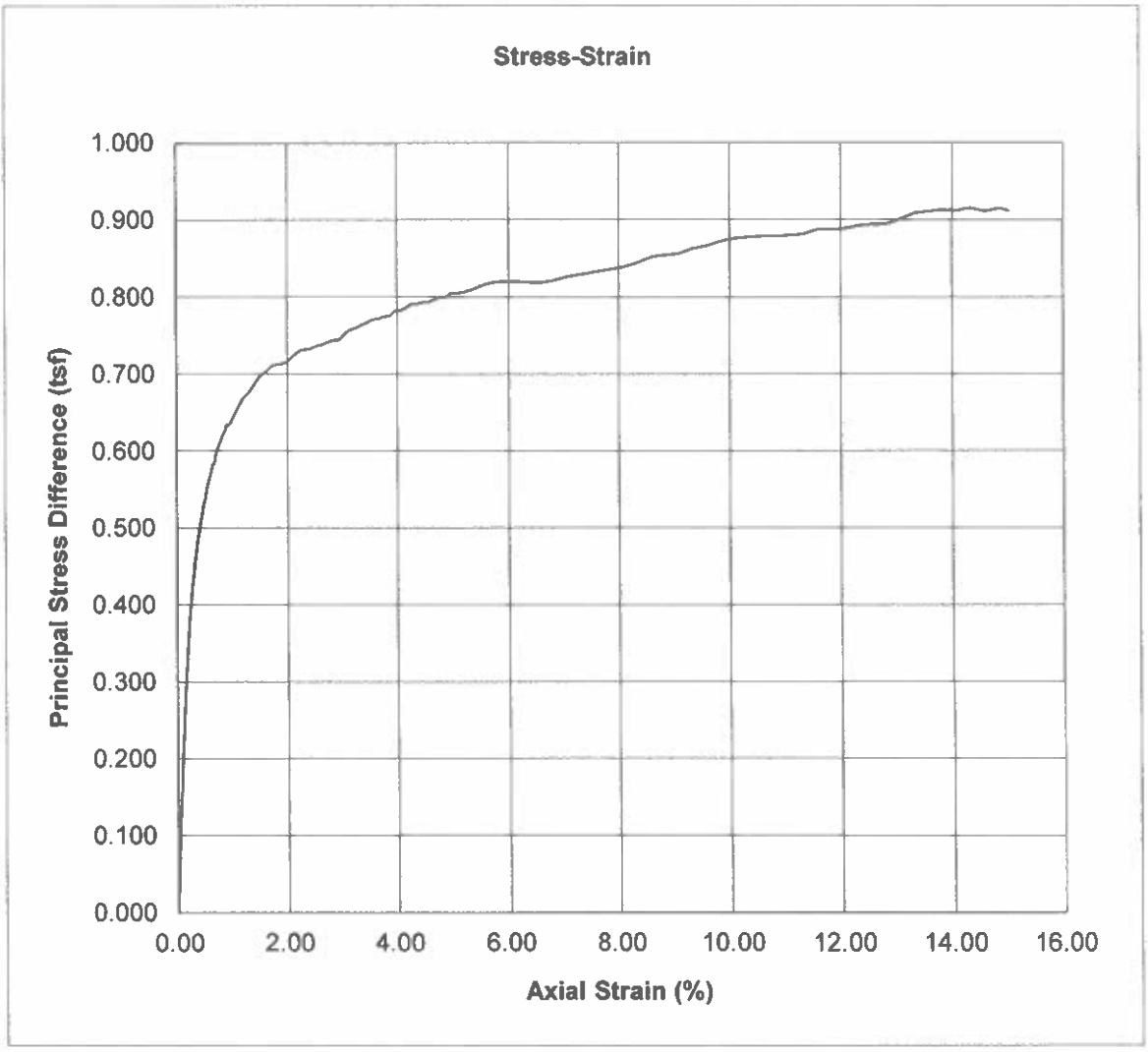


UU TRIAXIAL COMPRESSION TES

CONFINING PRESSURE = 22.9 PSI

**Port Of Brownsville - G-122360**

**B-7 - 53-55 ft**

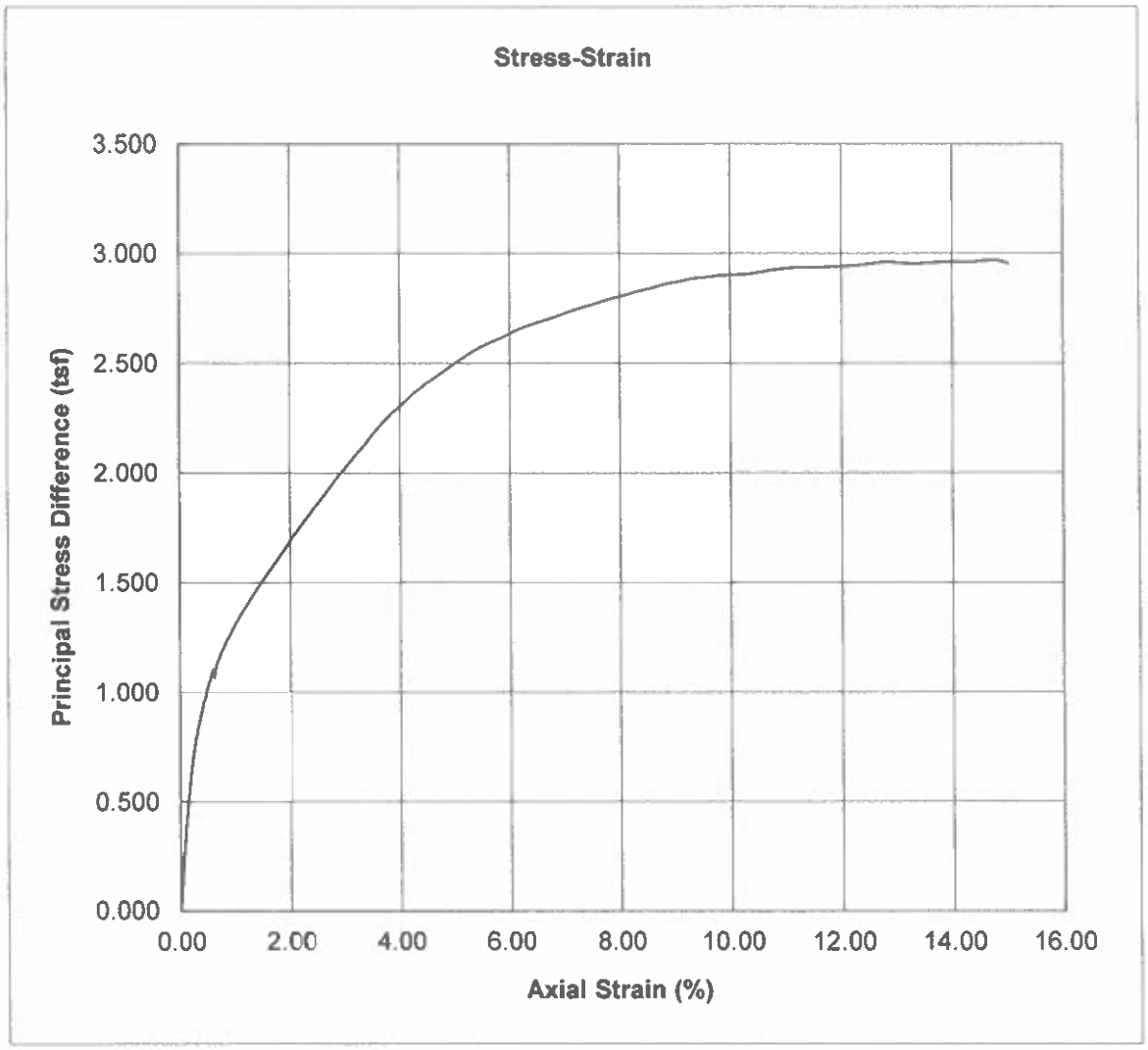


UU TRIAXIAL COMPRESSION TES

CONFINING PRESSURE = 27.1 PSI

**Port Of Brownsville - G-122360**

**B-7 - 63-65 ft**

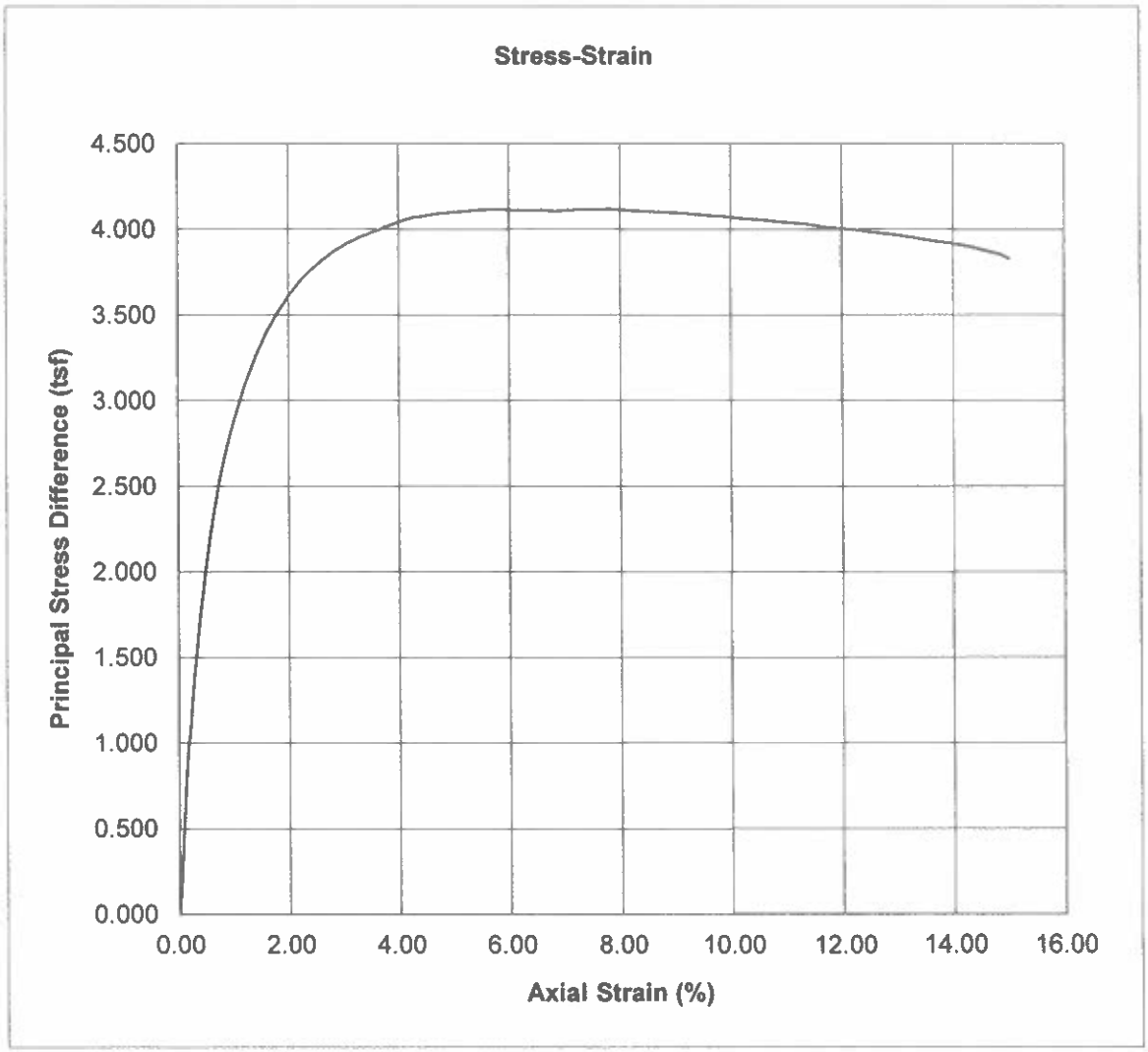


UU TRIAXIAL COMPRESSION TES

CONFINING PRESSURE = 35.4 PSI

**Port Of Brownsville - G-122360**

**B-7 - 83-85 ft**

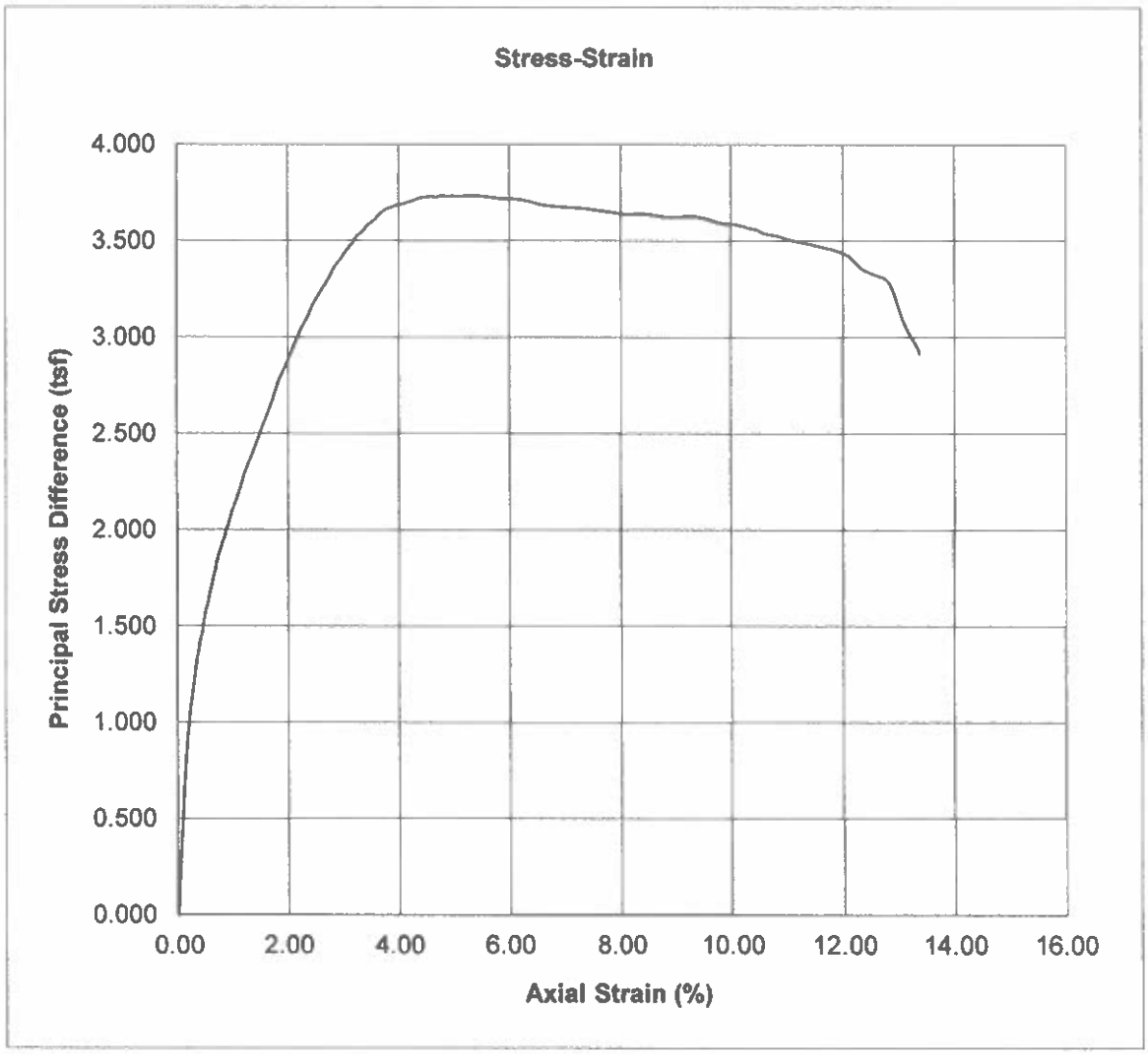


UU TRIAXIAL COMPRESSION TES

CONFINING PRESSURE = 39.6 PSI

**Port Of Brownsville - G-122360**

**B-7 - 93-95 ft**

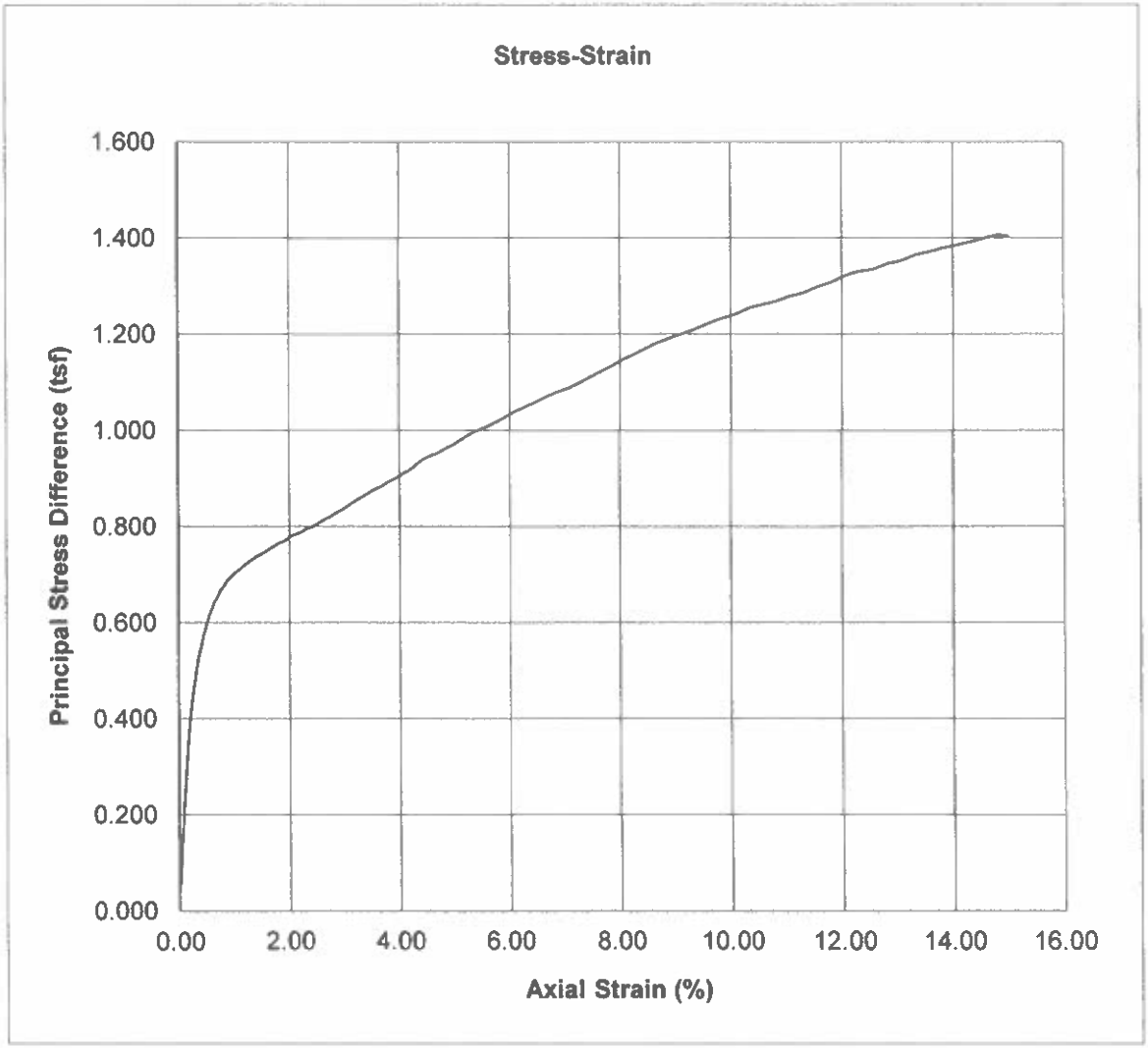


UU TRIAXIAL COMPRESSION TES

CONFINING PRESSURE = 5.8 PSI

**Port Of Brownsville - G-122360**

**B-8 - 12-14 ft**

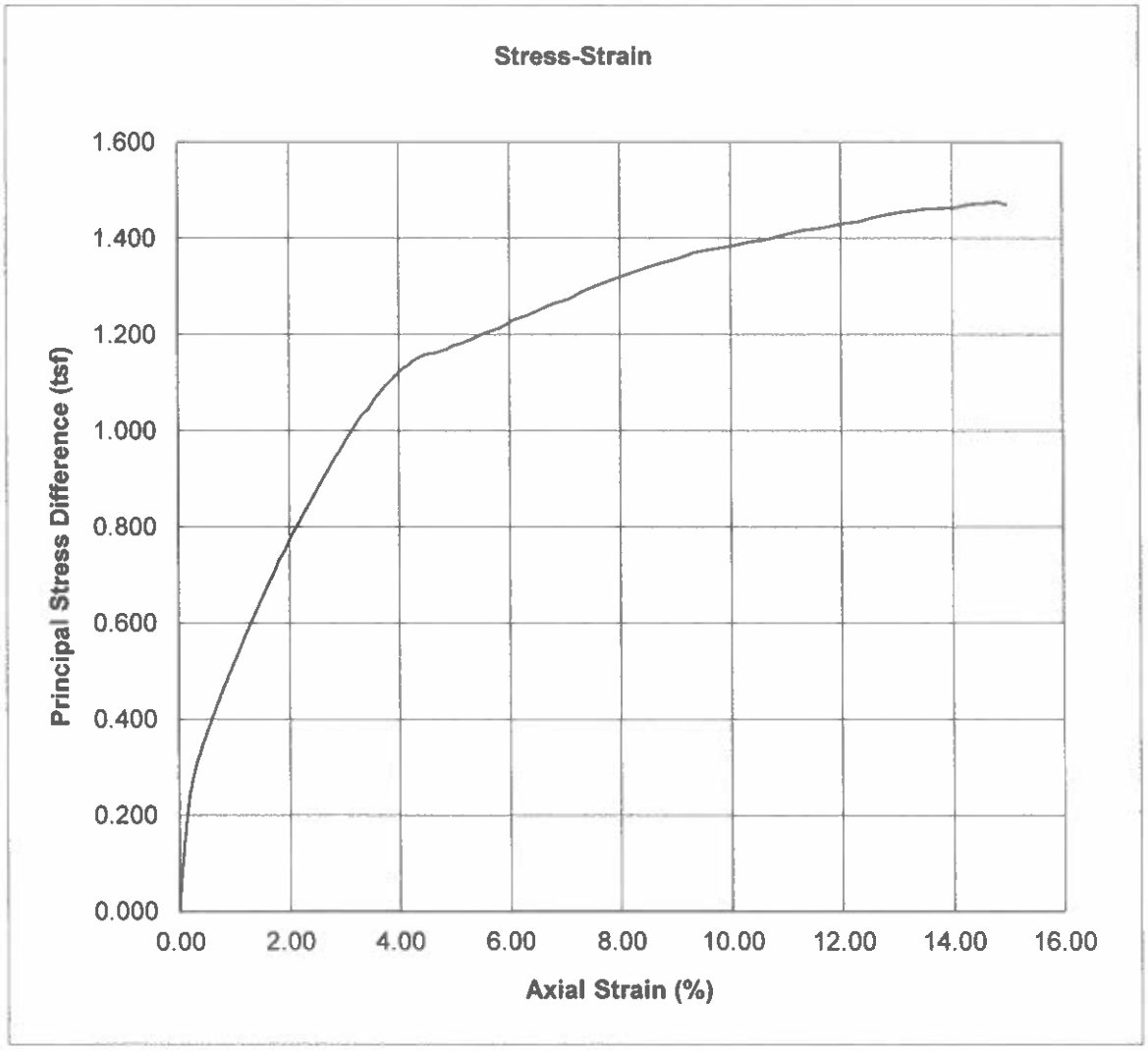


UU TRIAXIAL COMPRESSION TES

CONFINING PRESSURE = 8.3 PSI

**Port Of Brownsville - G-122360**

**B-8 - 18-20 ft**

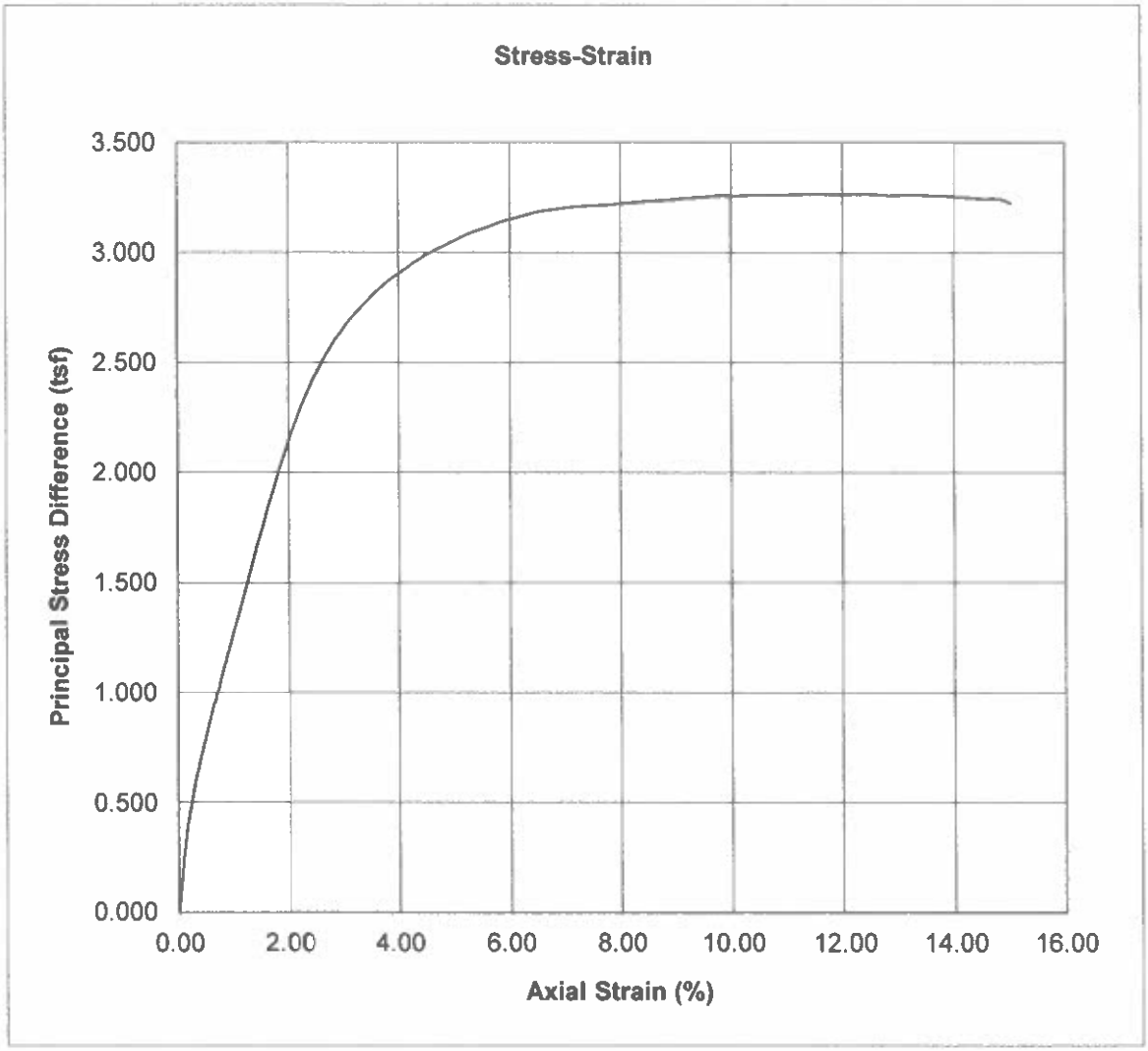


UU TRIAXIAL COMPRESSION TES

CONFINING PRESSURE = 10.4 PSI

**Port Of Brownsville - G-122360**

**B-9 - 23-25 ft**

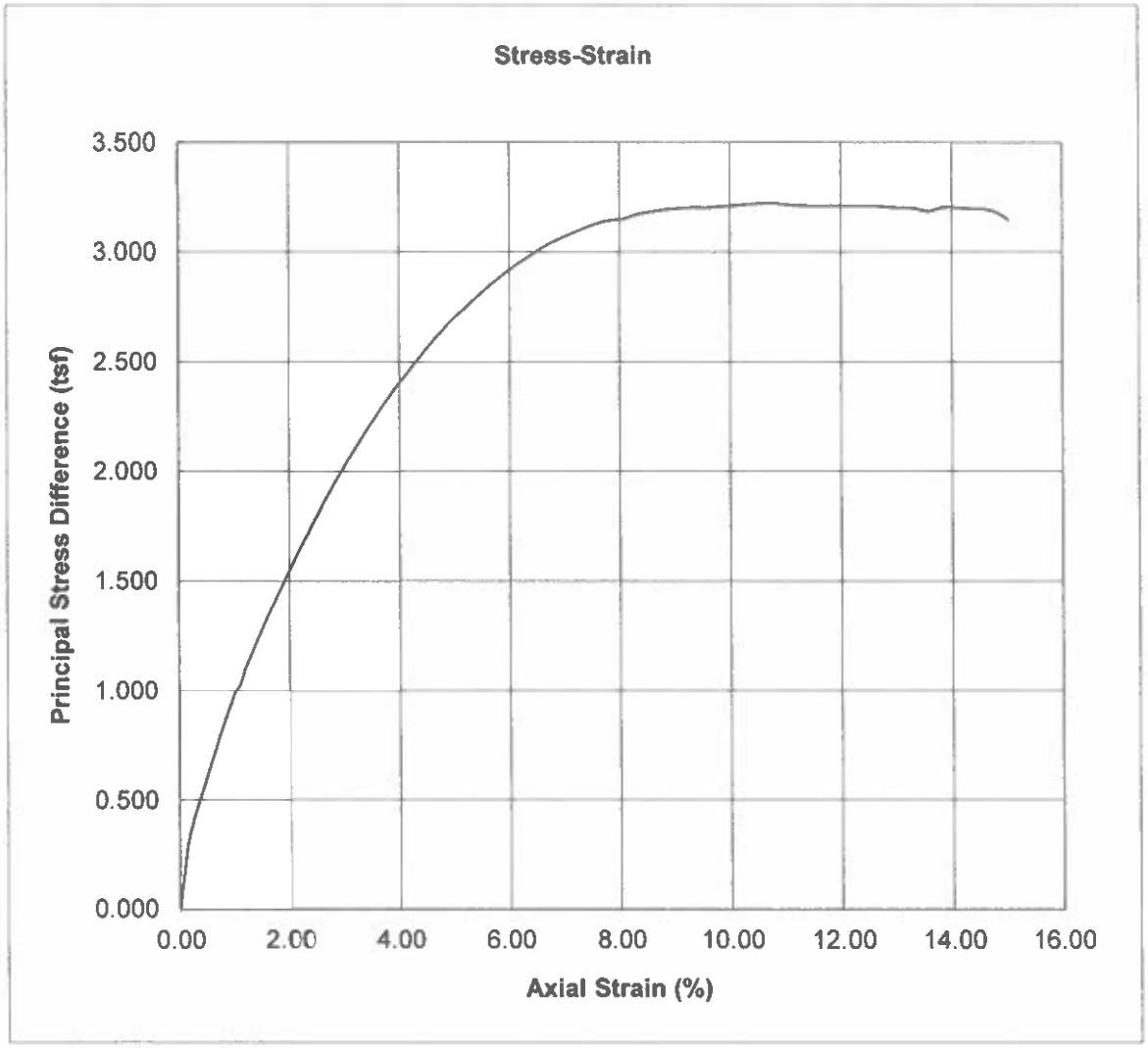


UU TRIAXIAL COMPRESSION TES

CONFINING PRESSURE = 6.7 PSI

**Port Of Brownsville - G-122360**

**B-10 - 14-16 ft**

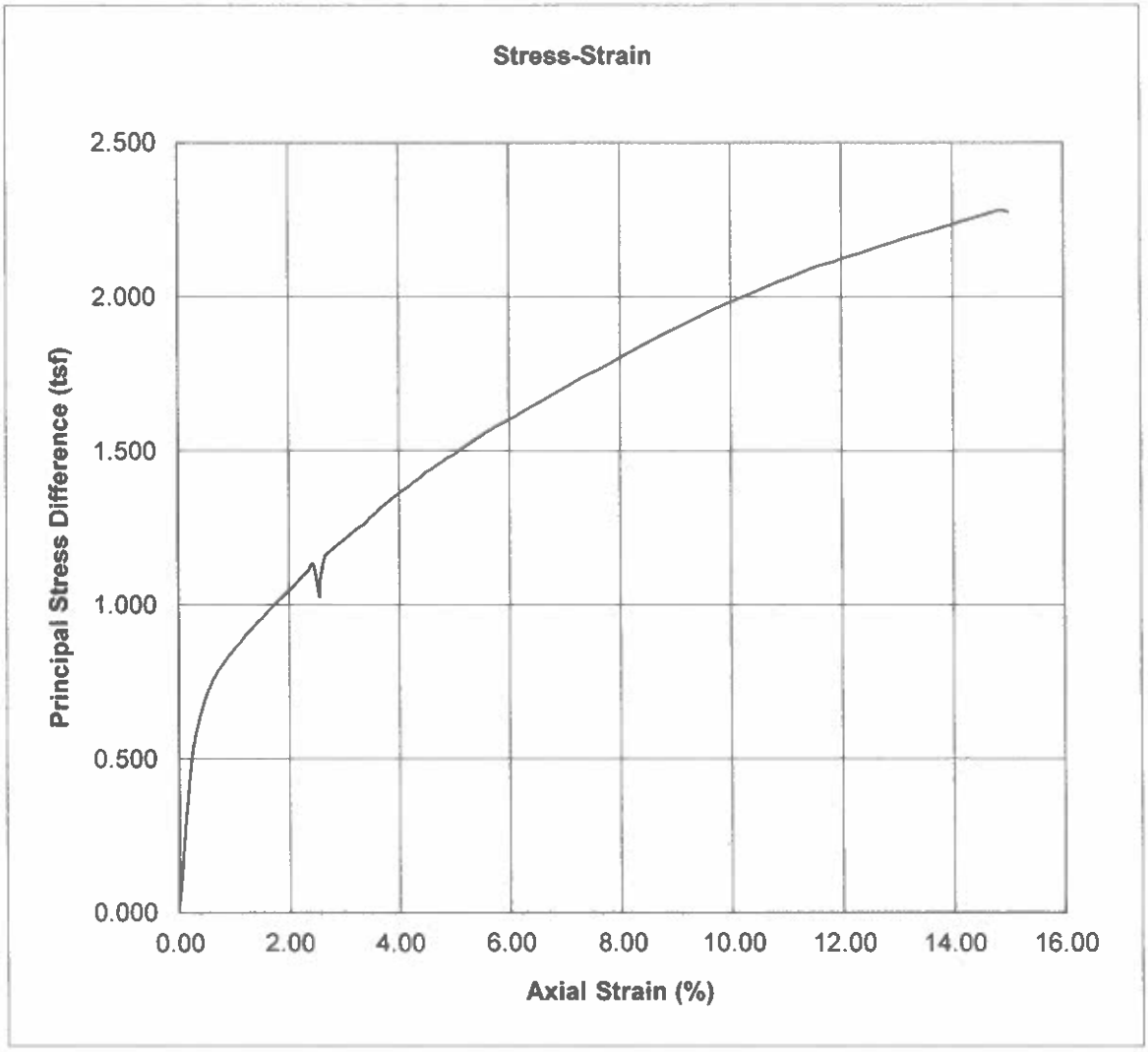


UU TRIAXIAL COMPRESSION TES

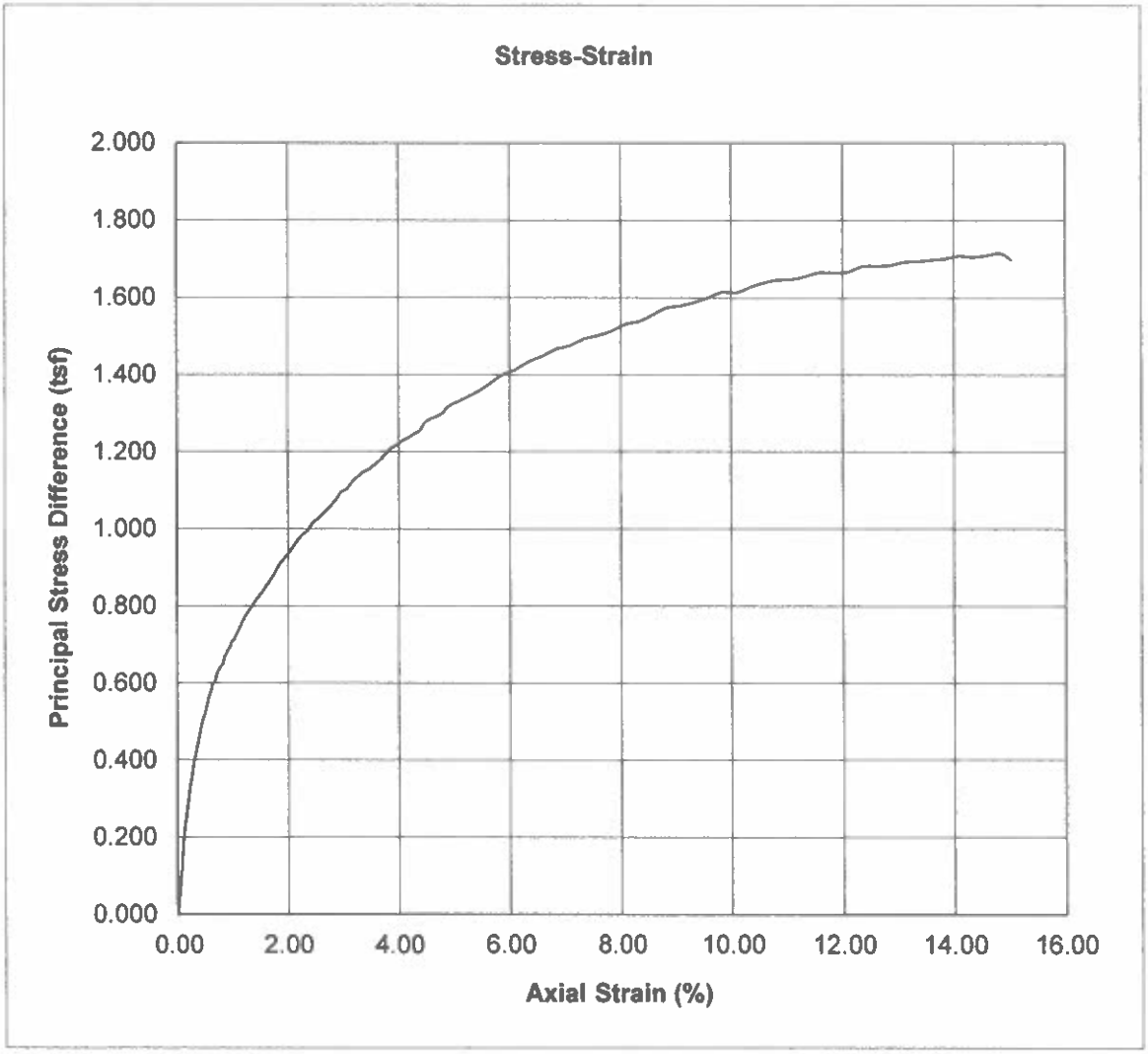
CONFINING PRESSURE = 5.8 PSI

**Port Of Brownsville - G-122360**

**B-11 - 12-14 ft**

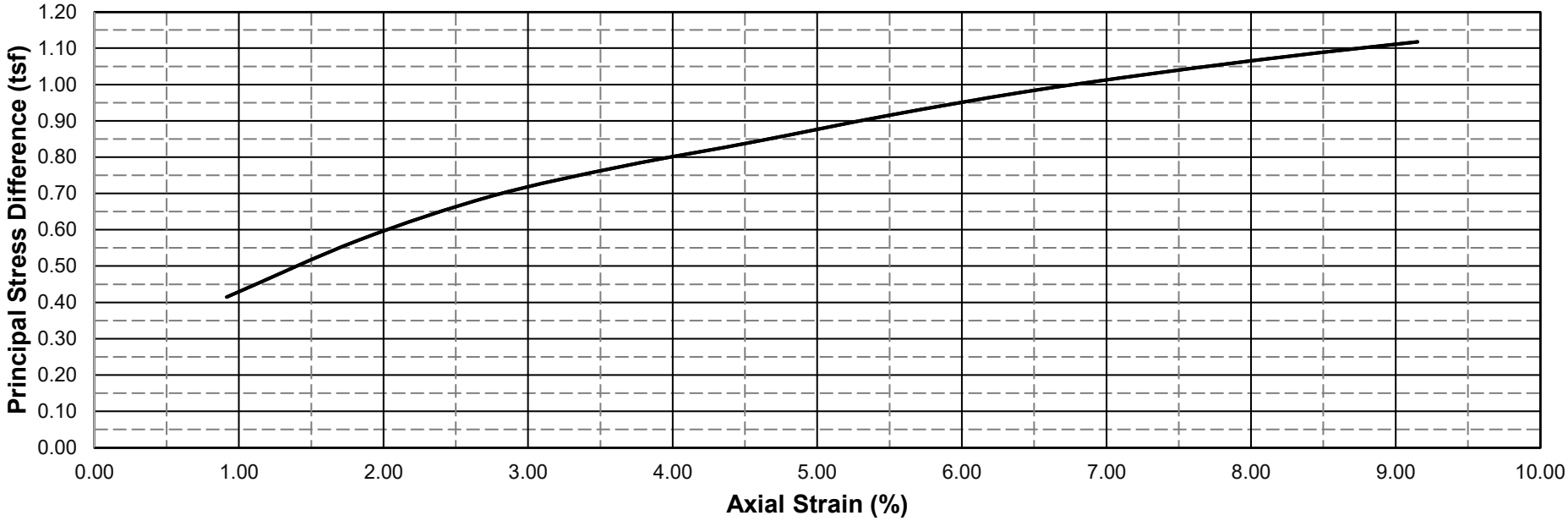


UU TRIAXIAL COMPRESSION TES
CONFINING PRESSURE = 6.7 PSI
**Port Of Brownsville - G-122360**
**B-12 - 14-16 ft**



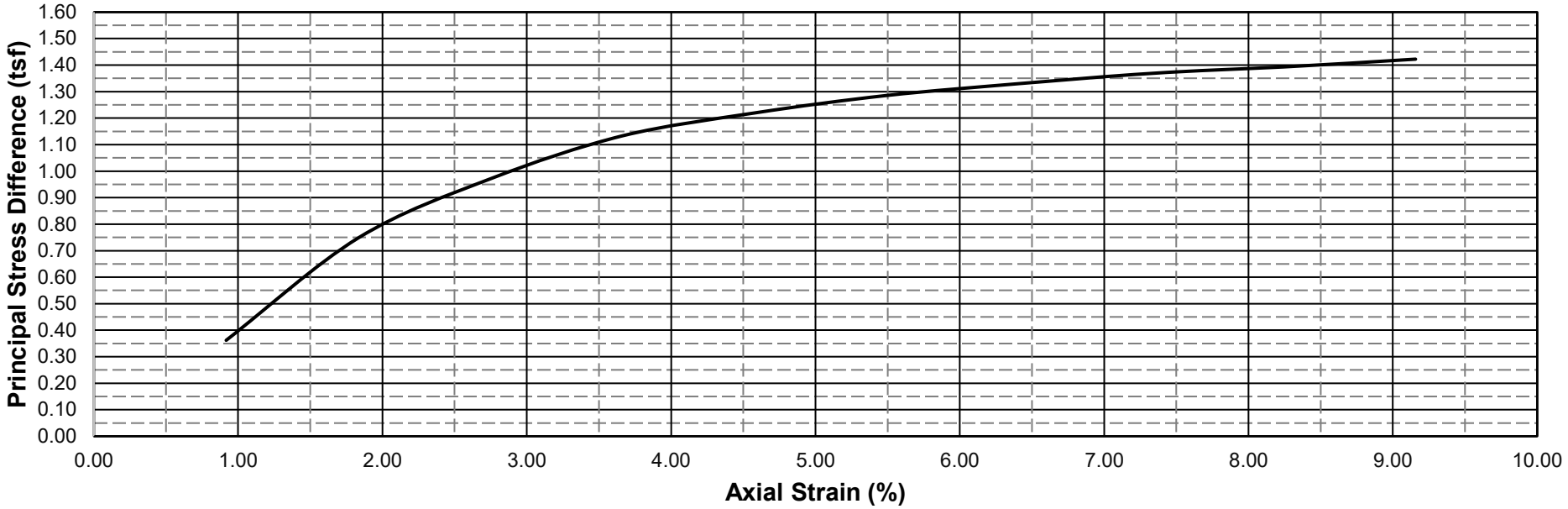
# Port Of Brownsville G122360
## B-5, S-4, (6-8 ft)

## Stress-Strain



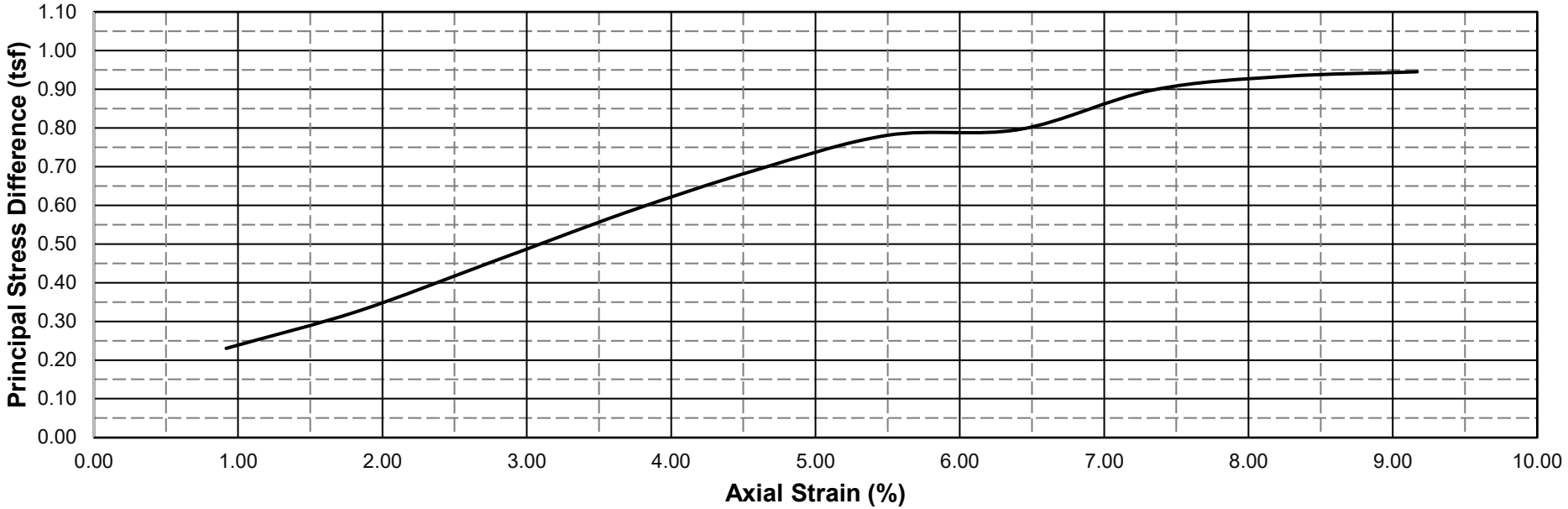
# Port Of Brownsville G122360
## B-6, S-4, (6-8 ft)

## Stress-Strain



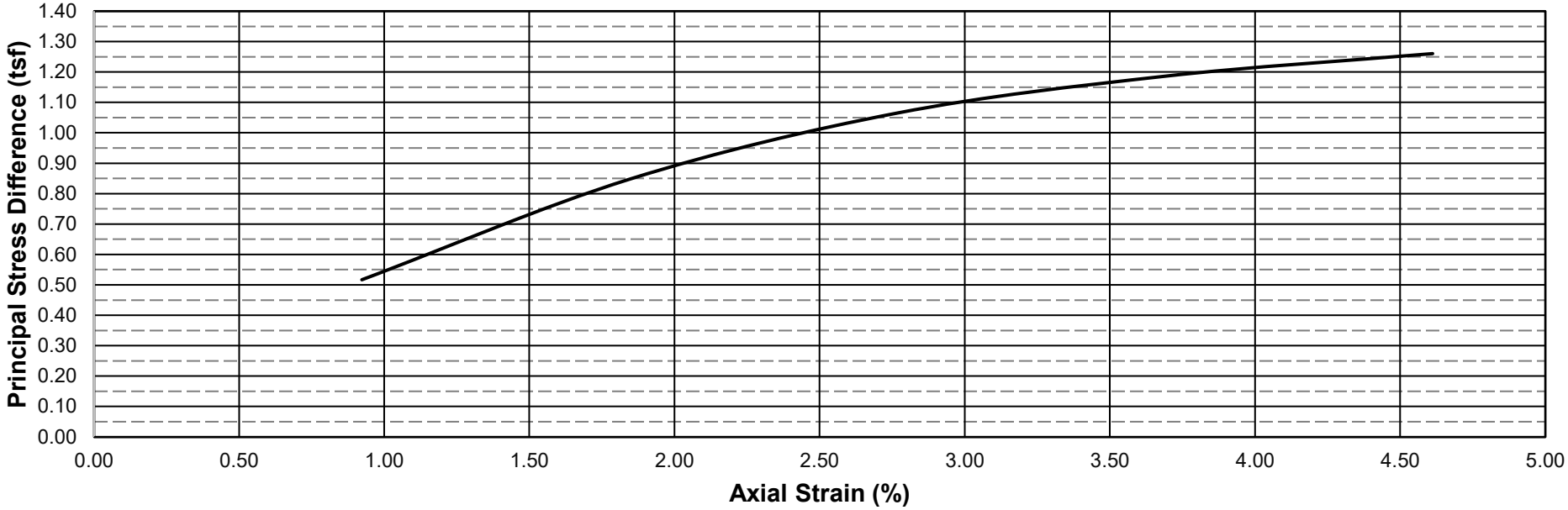
# Port Of Brownsville G122360
## B-6, S-5, (8-10 ft)

## Stress-Strain



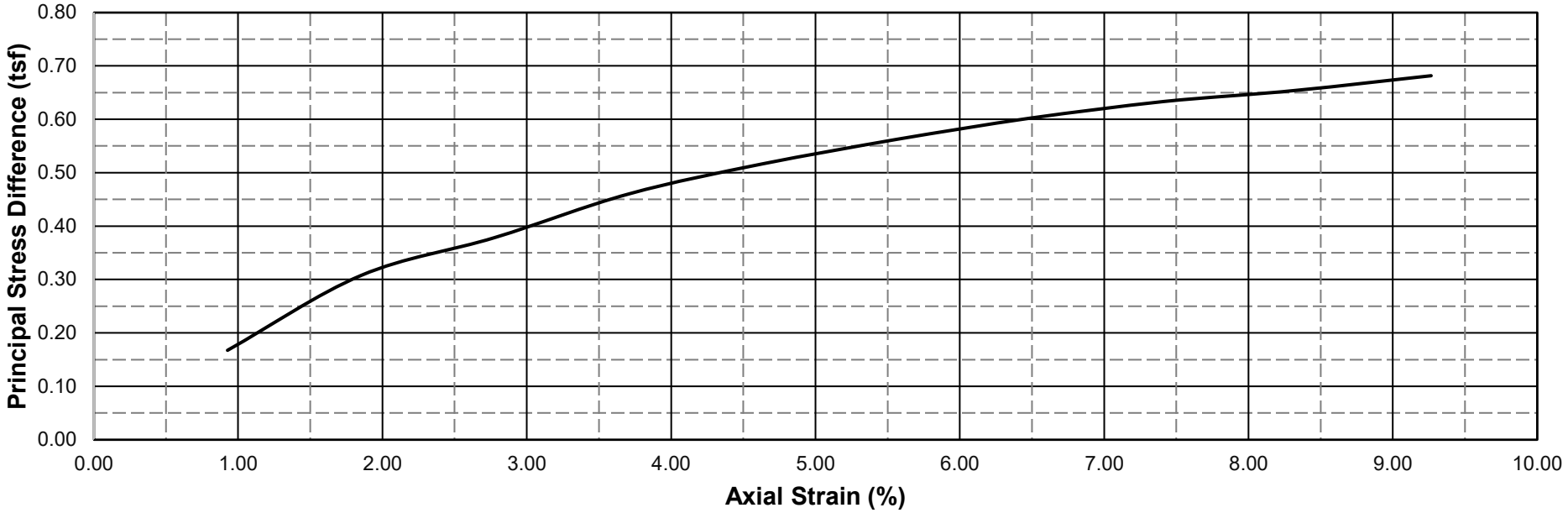
# Port Of Brownsville G122360
# B-7, S-4, (6-8 ft)

## Stress-Strain



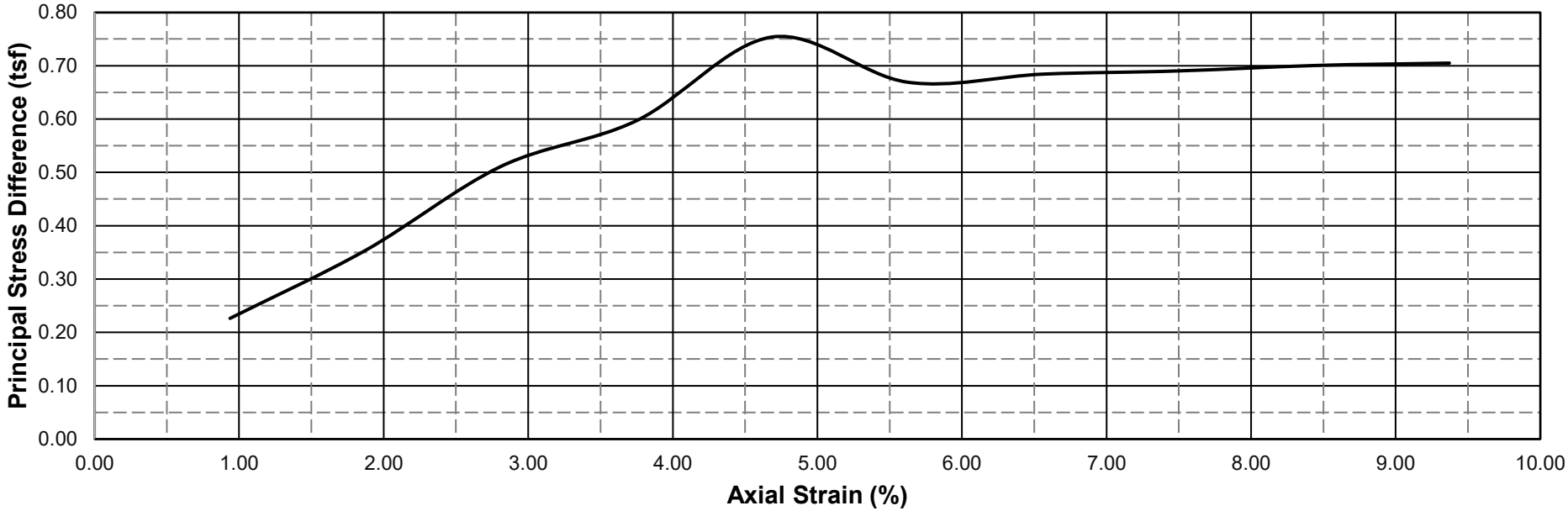
# Port Of Brownsville G122360
# B-7, S-6, (10-12 ft)

## Stress-Strain



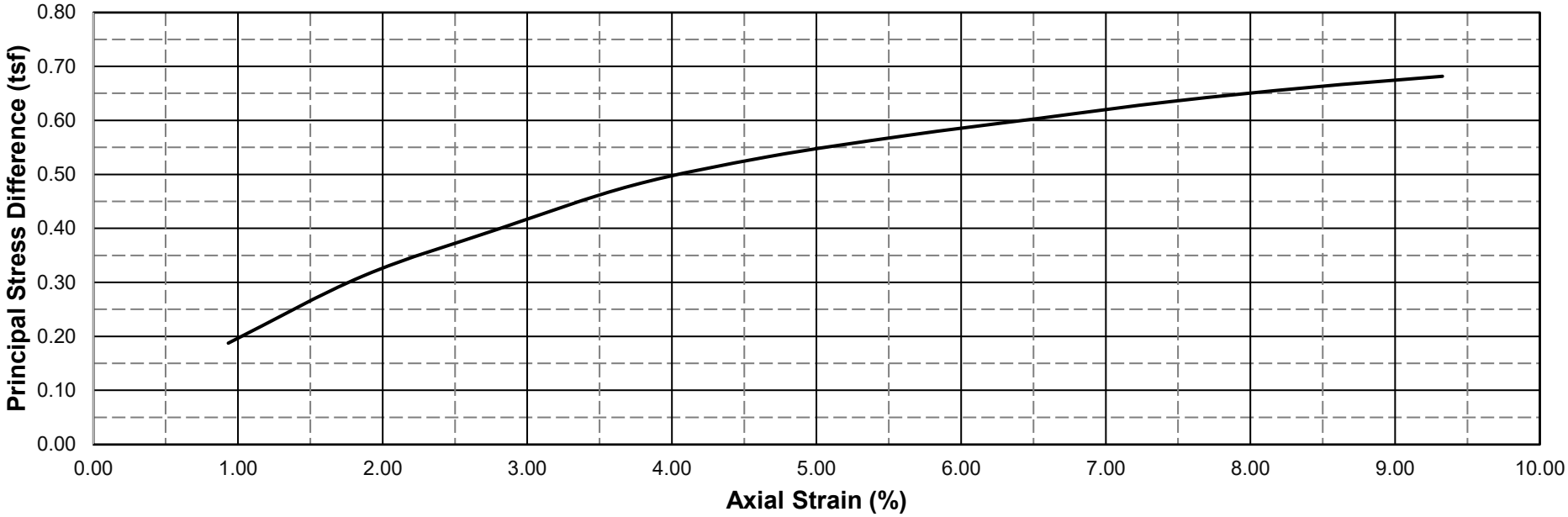
# Port Of Brownsville G122360
## B-8, S-3, (4-6 ft)

### Stress-Strain



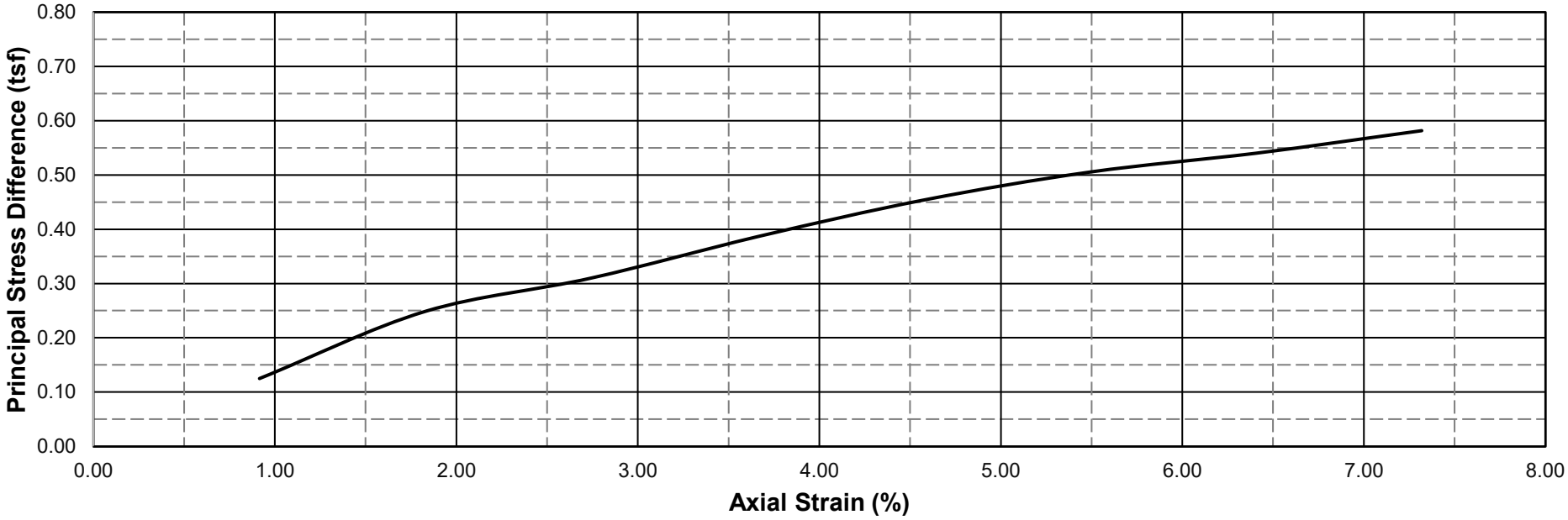
# Port Of Brownsville G122360
## B-8, S-4, (6-8 ft)

## Stress-Strain



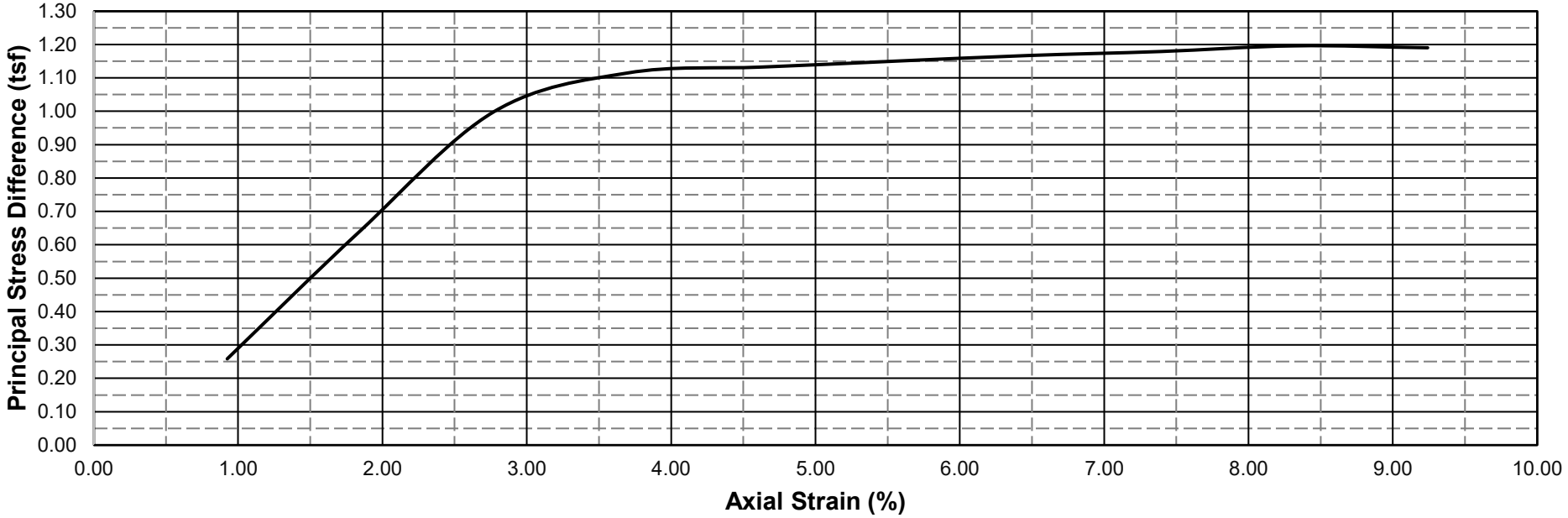
# Port Of Brownsville G122360
# B-9, S-4, (6-8 ft)

## Stress-Strain



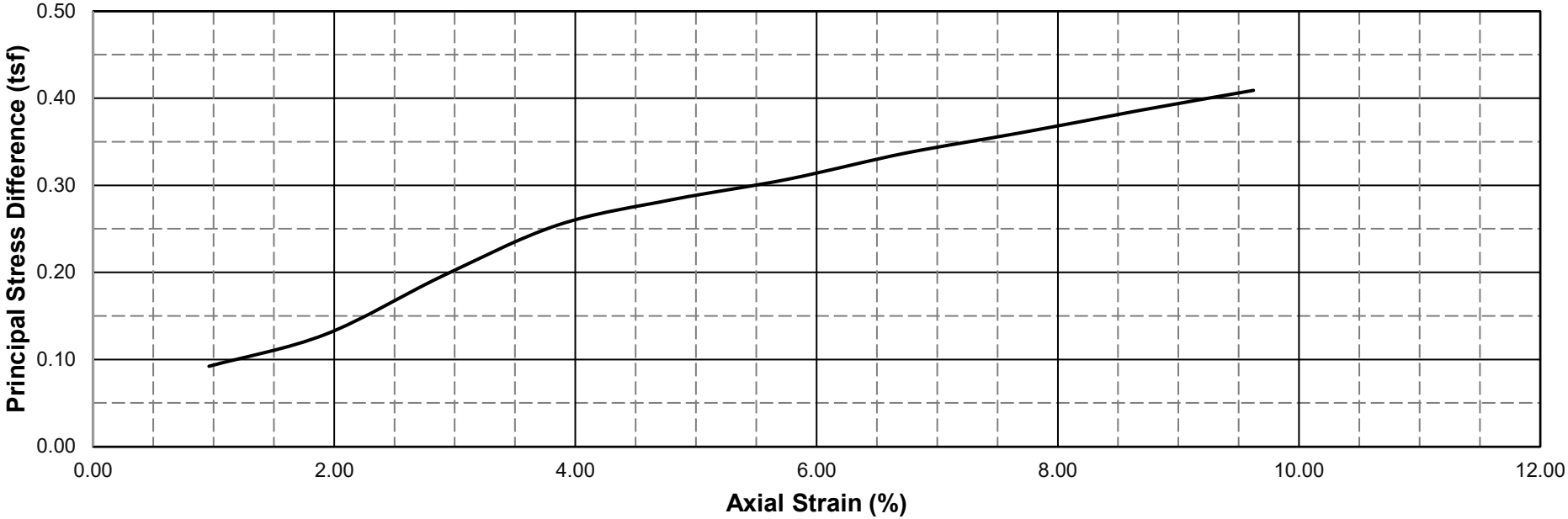
# Port Of Brownsville G122360
# B-10, S-3, (4-6 ft)

## Stress-Strain



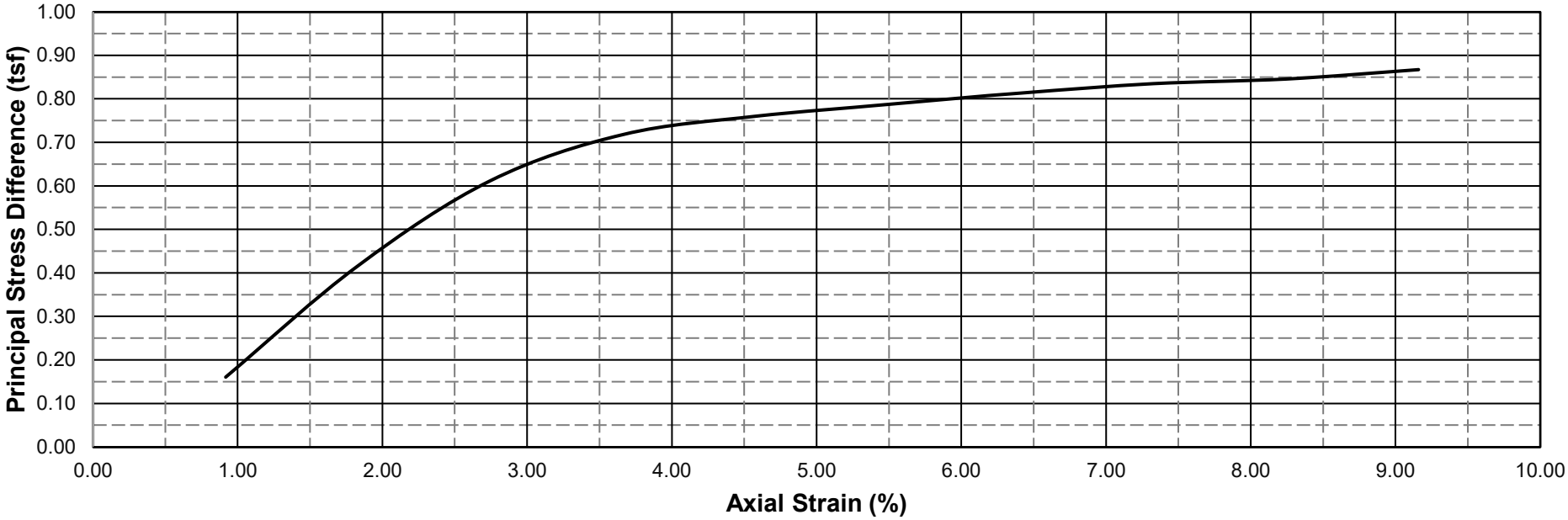
# Port Of Brownsville G122360
# B-10, S-5, (8-10 ft)

## Stress-Strain



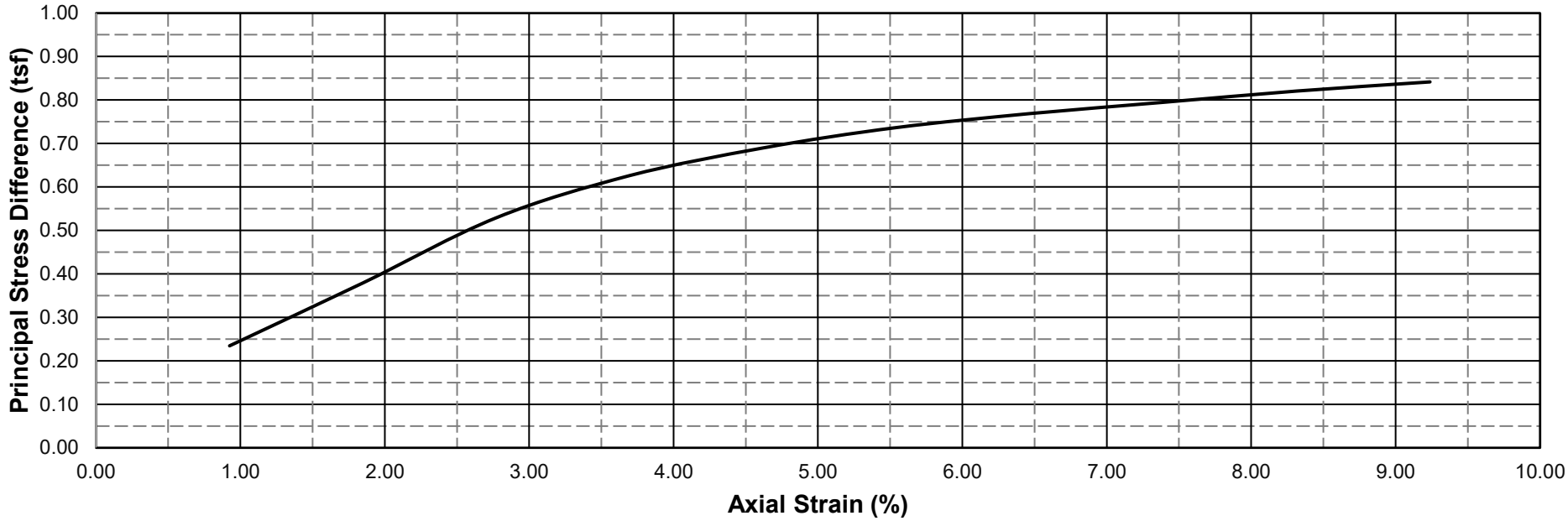
# Port Of Brownsville G122360
# B-11, S-3, (4-6 ft)

## Stress-Strain



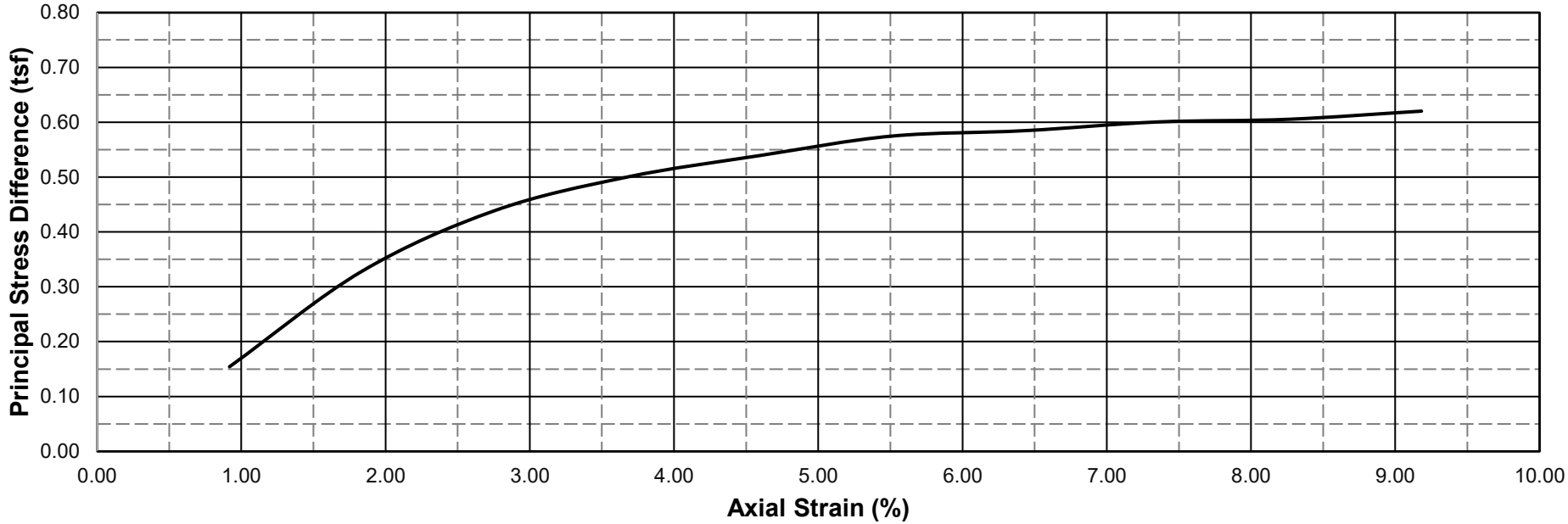
# Port Of Brownsville G122360
## B-11, S-4, (6-8 ft)

## Stress-Strain



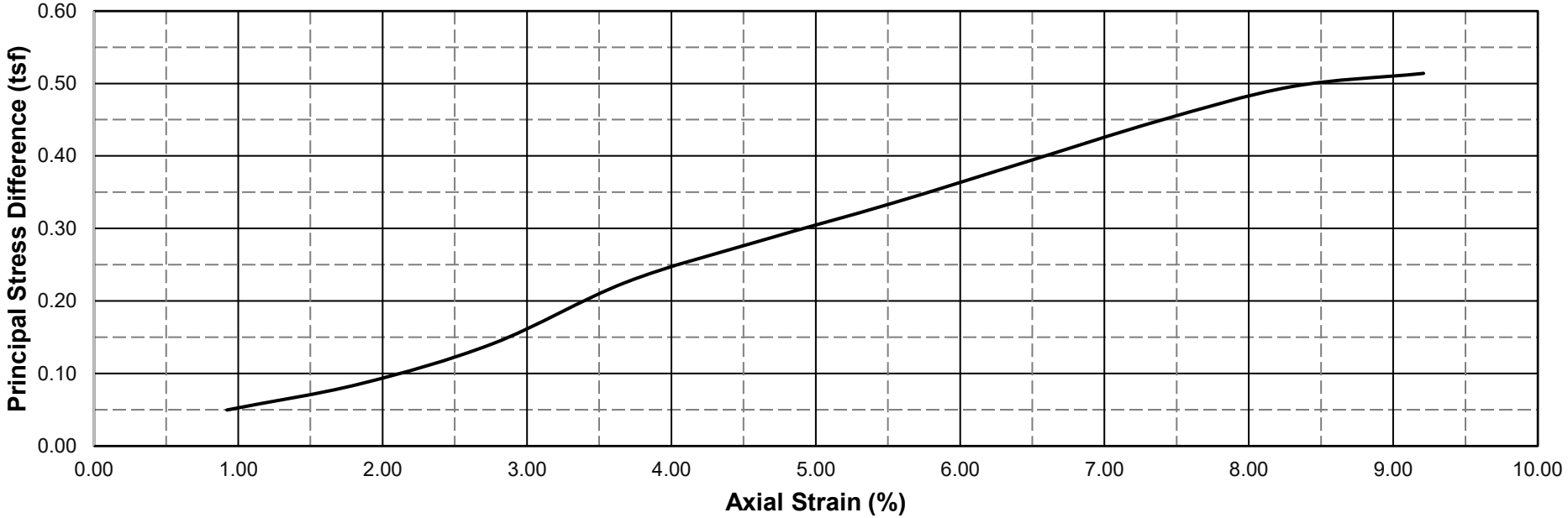
# Port Of Brownsville G122360
# B-12, S-3, (4-6 ft)

## Stress-Strain



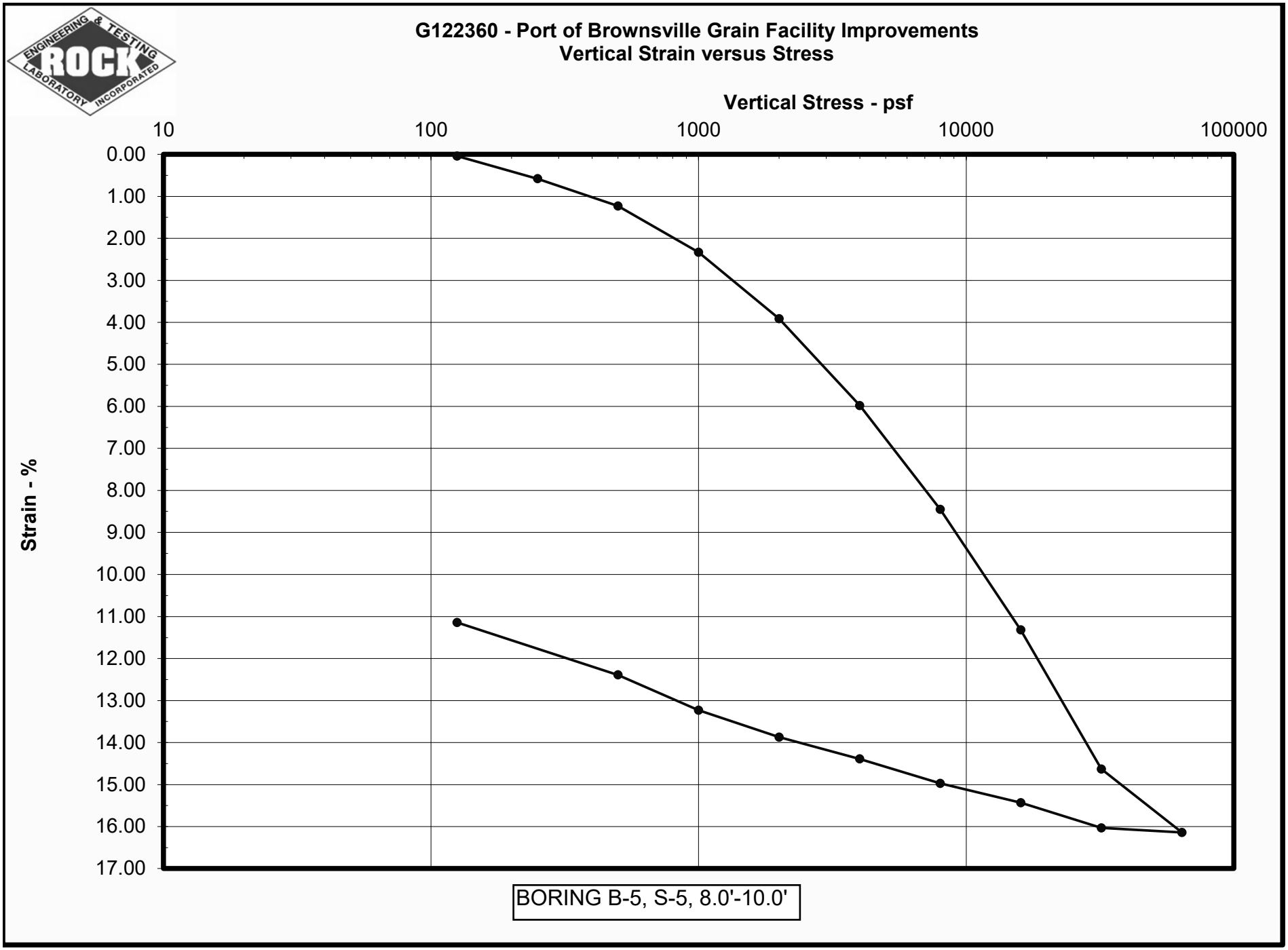
# Port Of Brownsville G122360
# B-12, S-4, (6-8 ft)

## Stress-Strain



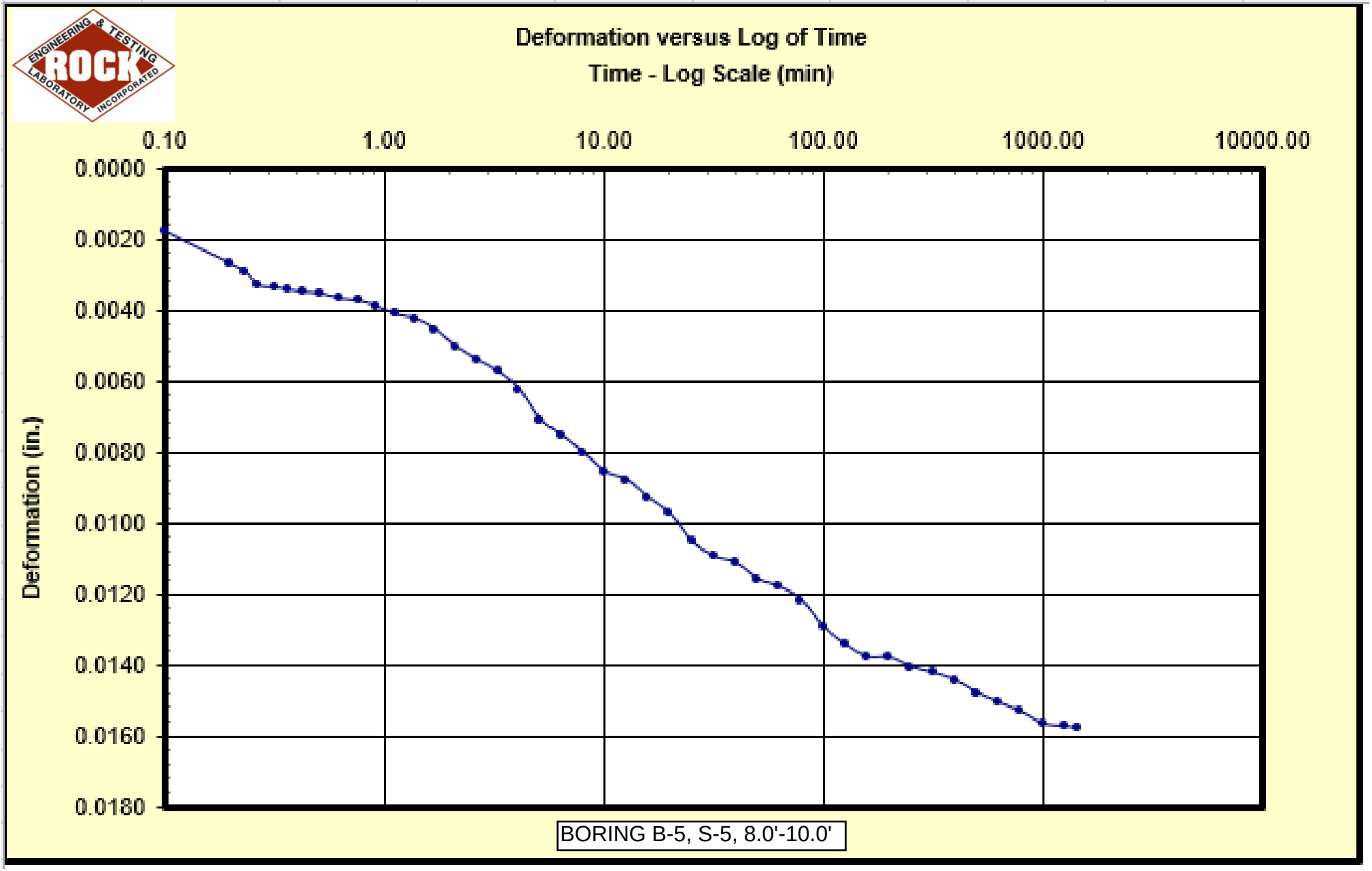
# CONSOLIDATION TEST RESULTS
# BORING B-5, S-5, 8.0'-10.0'

**G122360 - Port of Brownsville Grain Facility Improvements**
**Vertical Strain versus Stress**



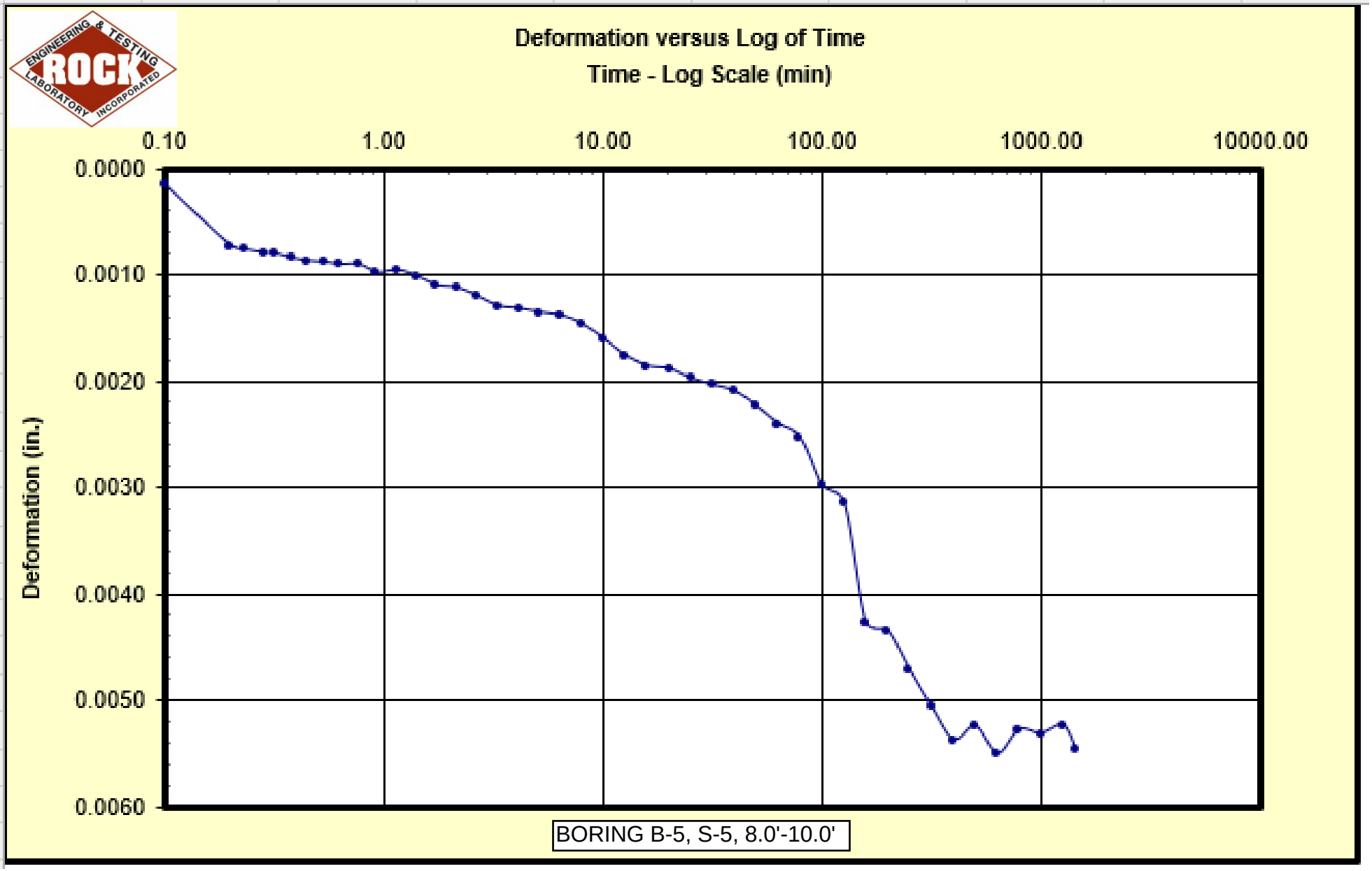
**G122360 - Port of Brownsville Grain Facility Improvements**

**Vertical Stress = 125 psf**



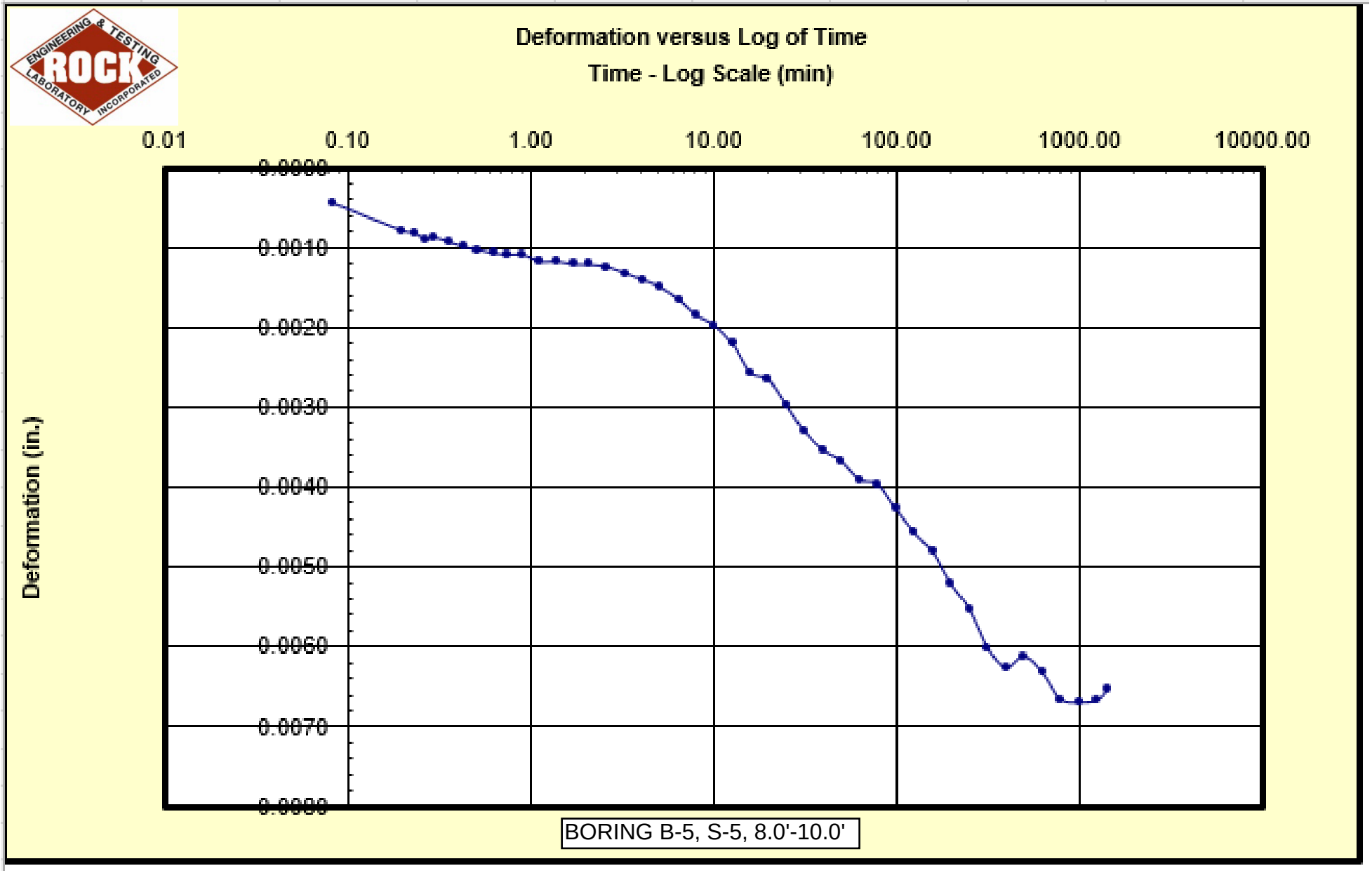
**G122360 - Port of Brownsville Grain Facility Improvements**

**Vertical Stress = 500 psf**



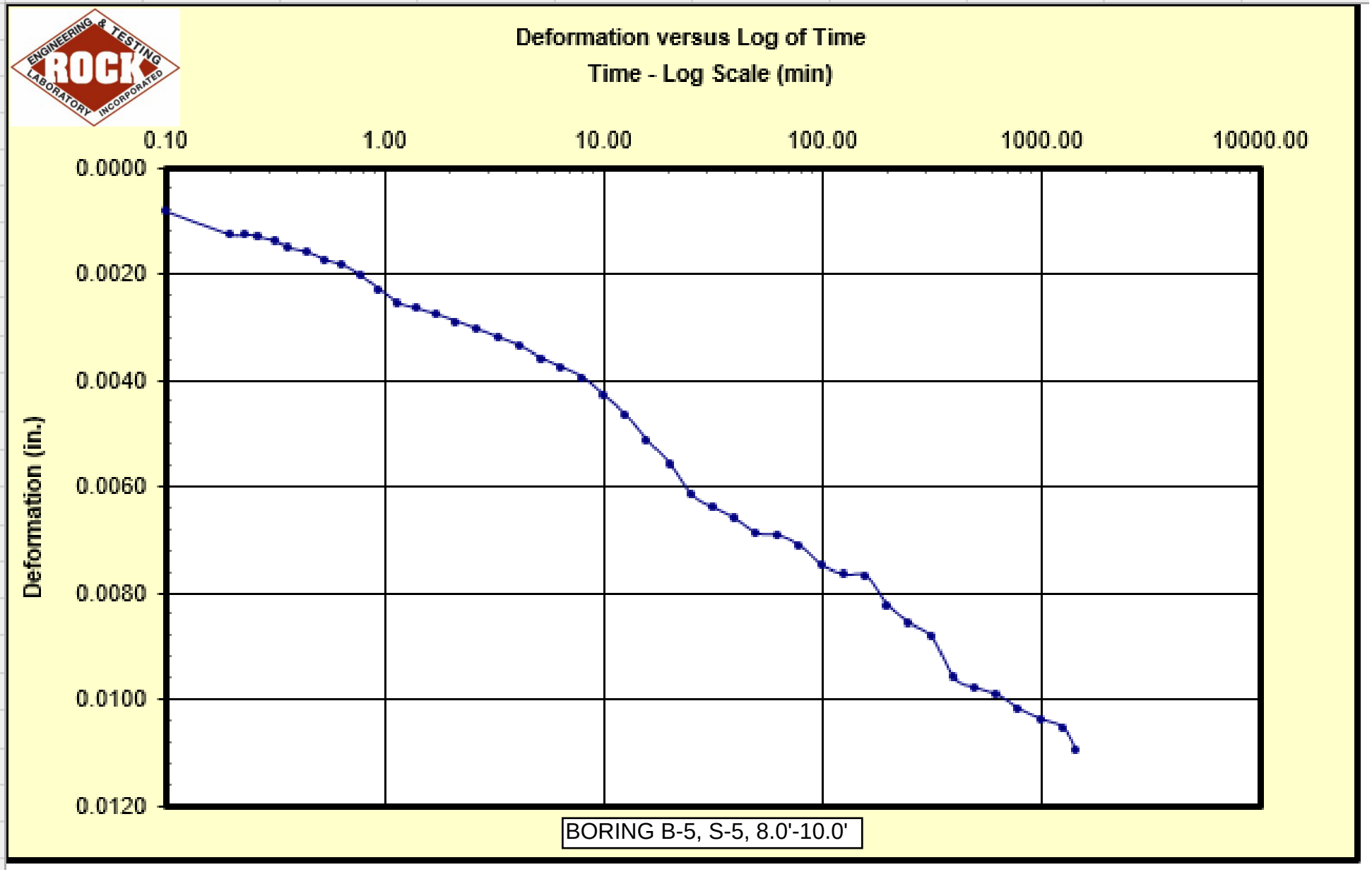
**G122360 - Port of Brownsville Grain Facility Improvements**

**Vertical Stress = 1,000 psf**



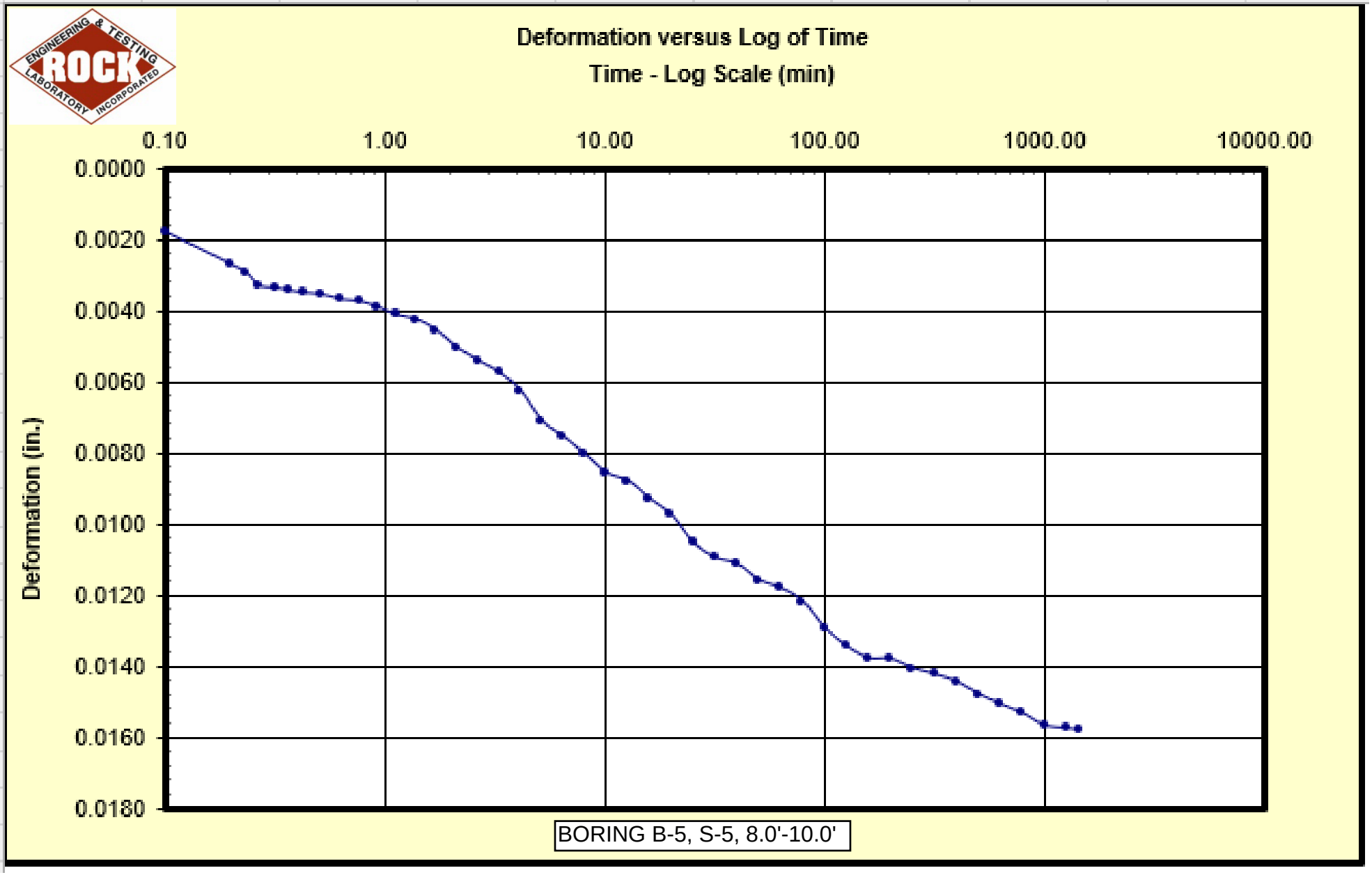
**G122360 - Port of Brownsville Grain Facility Improvements**

**Vertical Stress = 2,000 psf**



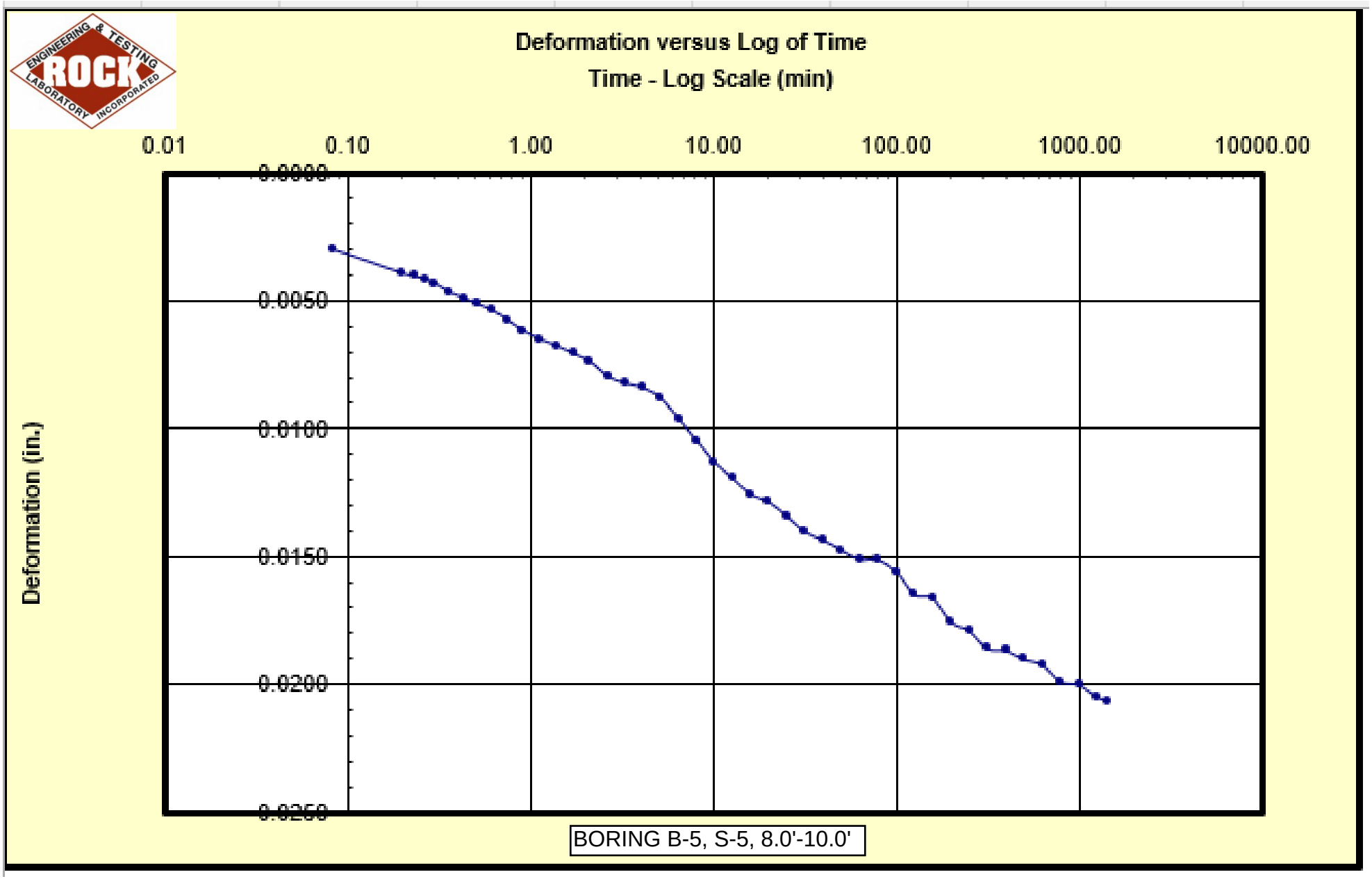
**G122360 - Port of Brownsville Grain Facility Improvements**

**Vertical Stress = 4,000 psf**



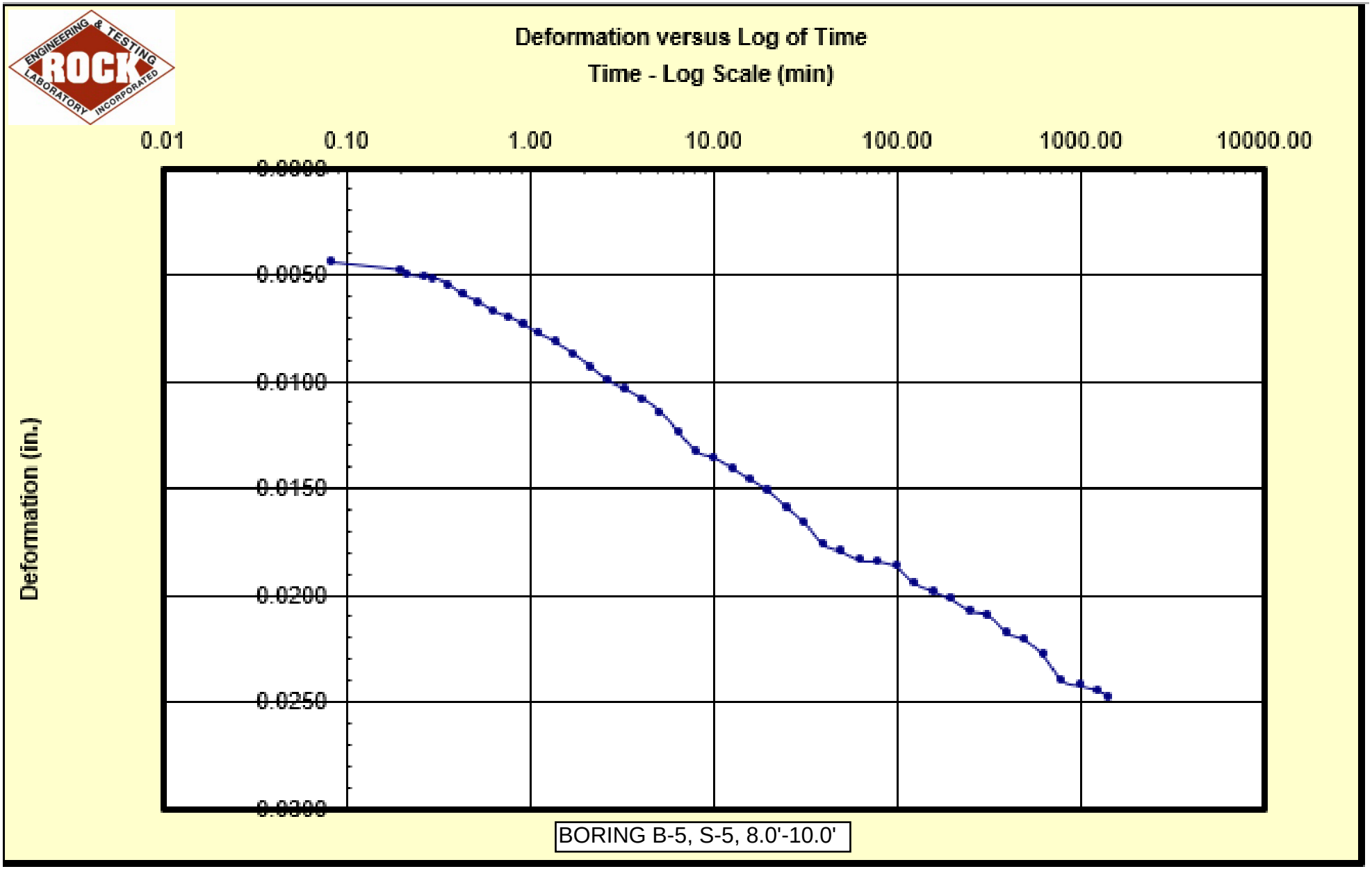
**G122360 - Port of Brownsville Grain Facility Improvements**

**Vertical Stress = 8,000 psf**



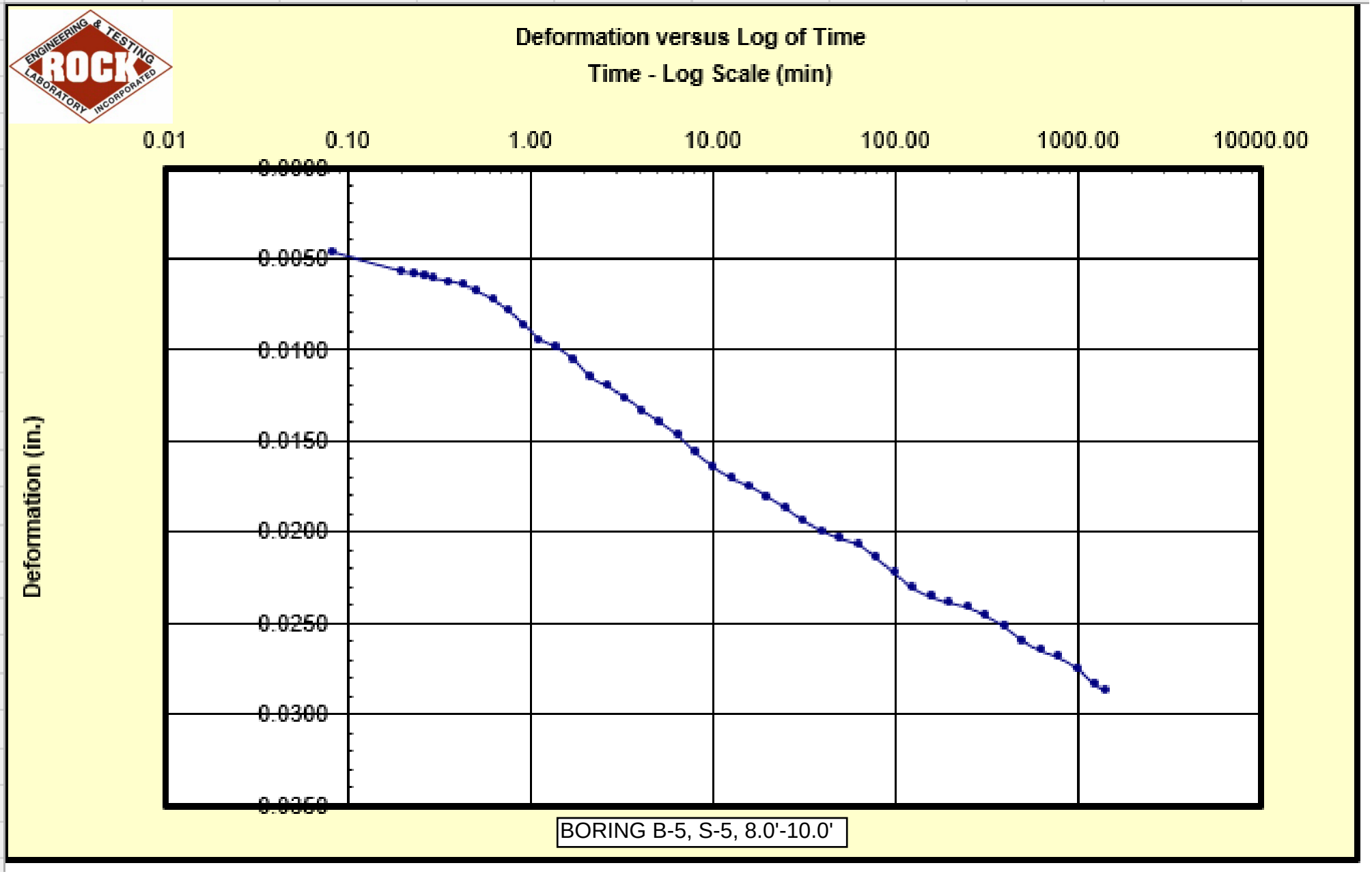
**G122360 - Port of Brownsville Grain Facility Improvements**

**Vertical Stress = 16,000 psf**



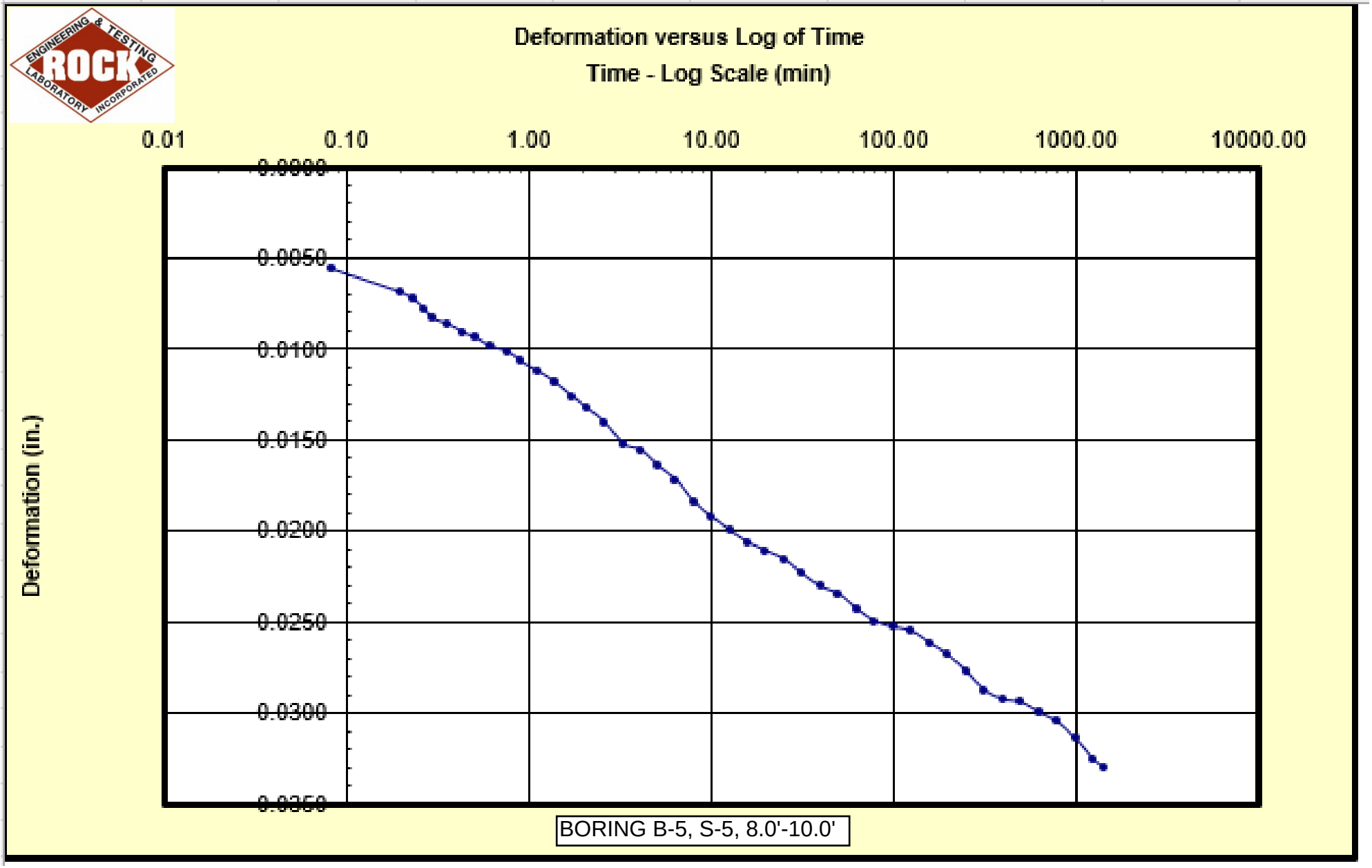
**G122360 - Port of Brownsville Grain Facility Improvements**

**Vertical Stress = 32,000 psf**



**G122360 - Port of Brownsville Grain Facility Improvements**

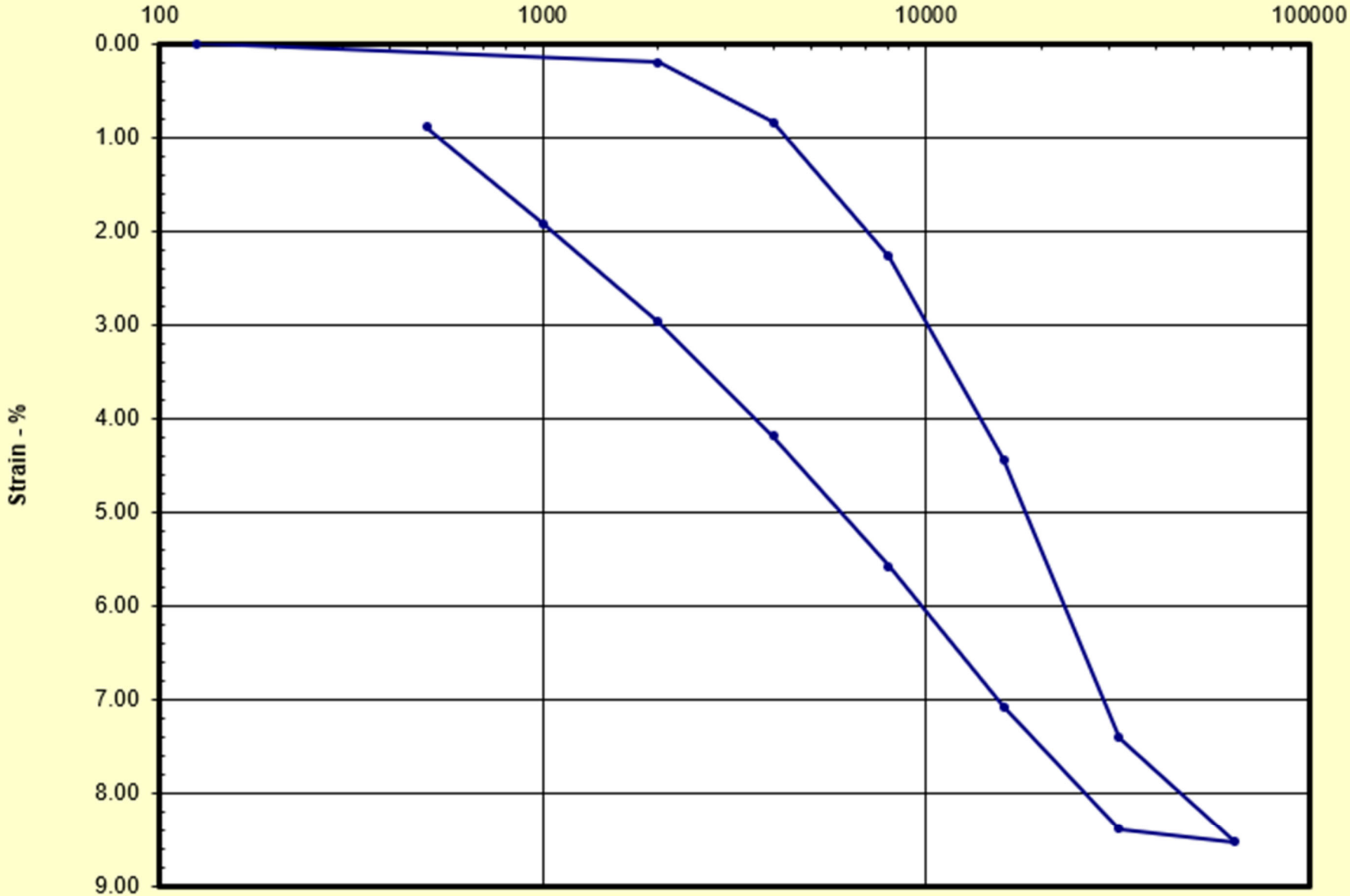
**Vertical Stress = 64,000 psf**



# CONSOLIDATION TEST RESULTS
# BORING B-6, S-17, 58.0’-60.0’

ROCK ENGINEERING & TESTING LABORATORY INCORPORATED

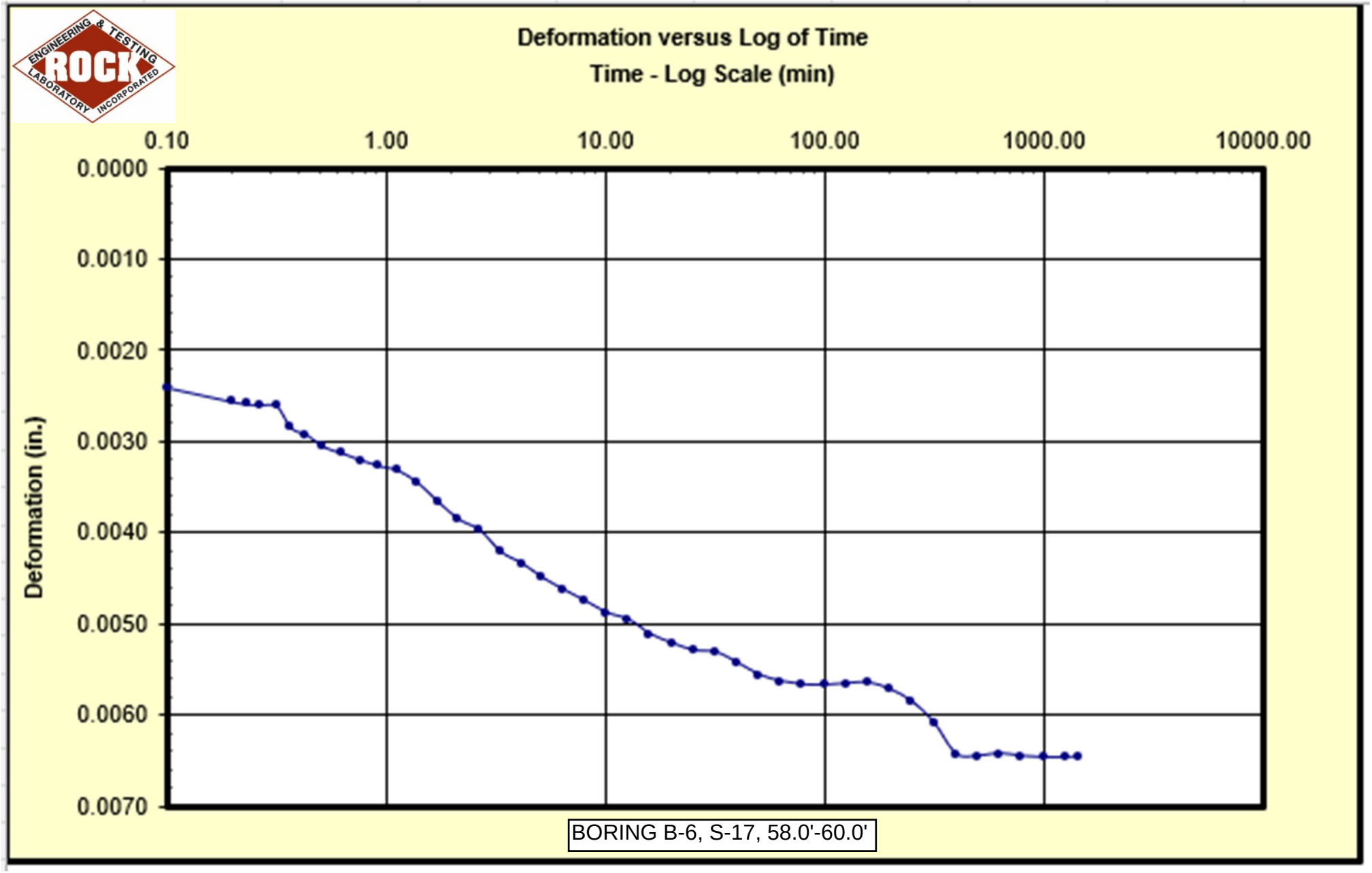
G122360 -Port of Brownsville Grain Facility Improvements
Vertical Strain versus Stress




BORING B-6, S-17, 58.0'-60.0'

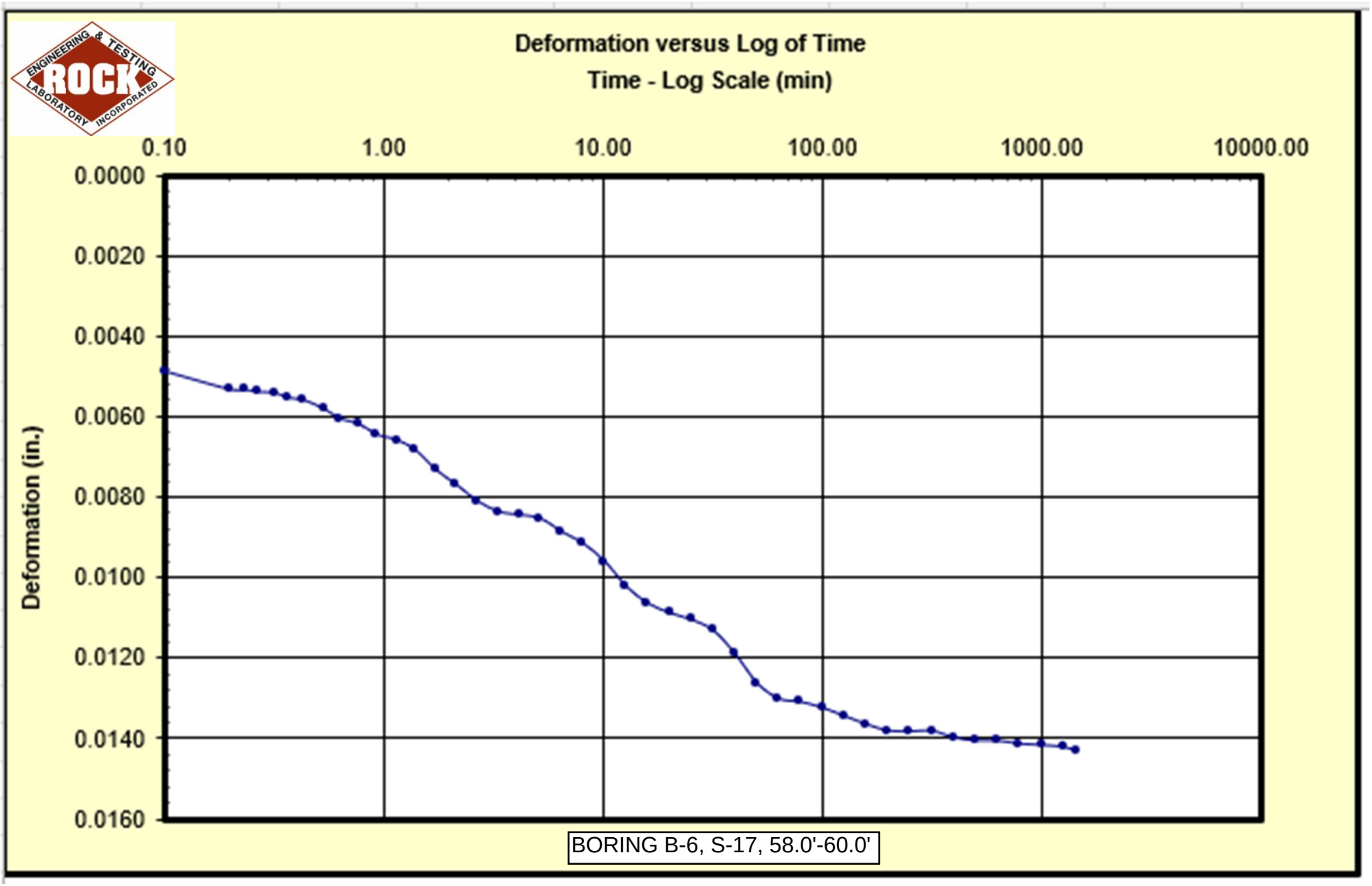
**G122360 - Port of Brownsville Grain Facility Improvements**

**Vertical Stress = 8,000 psf**



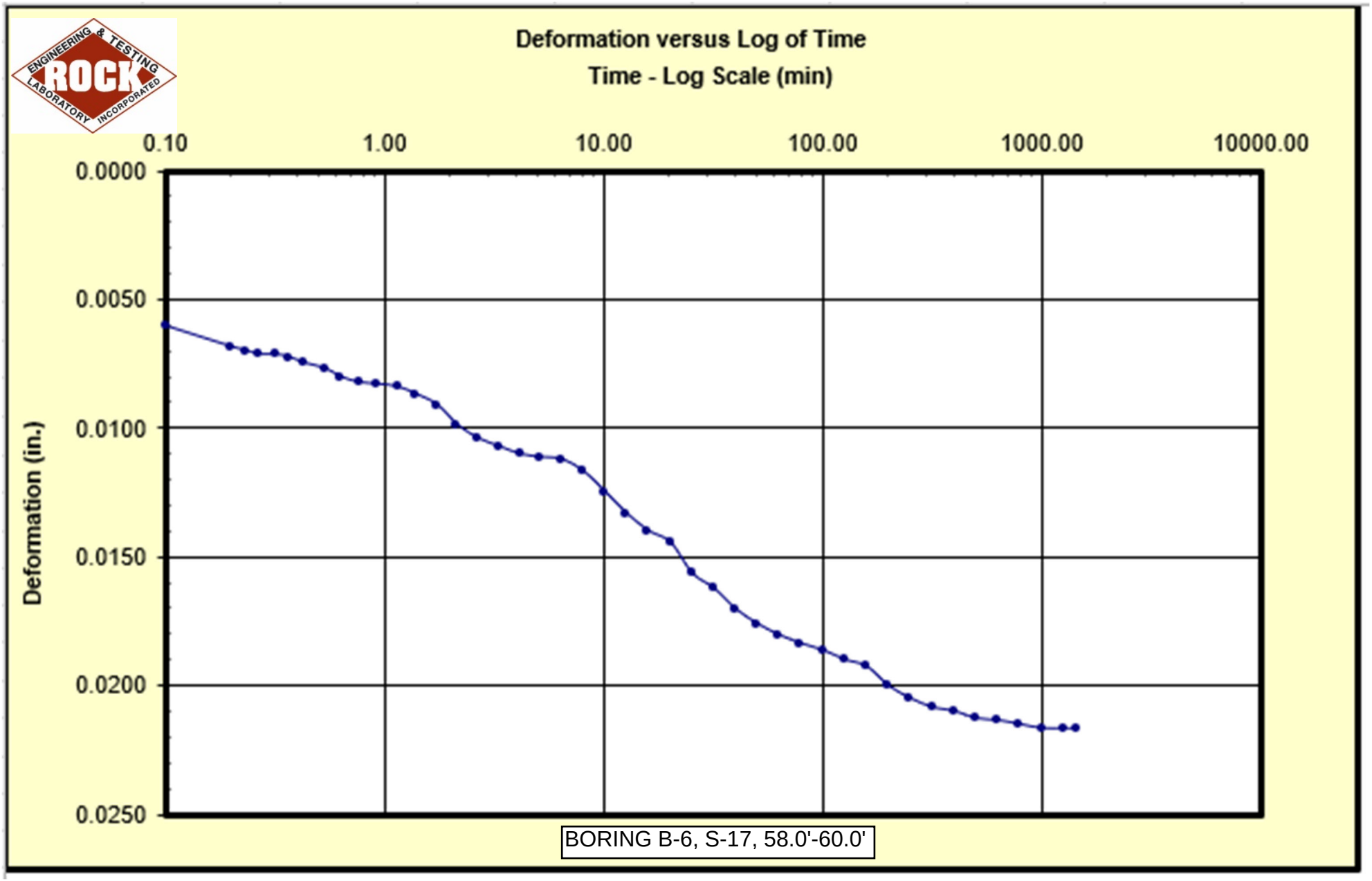
**G122360 - Port of Brownsville Grain Facility Improvements**

**Vertical Stress = 16,000 psf**



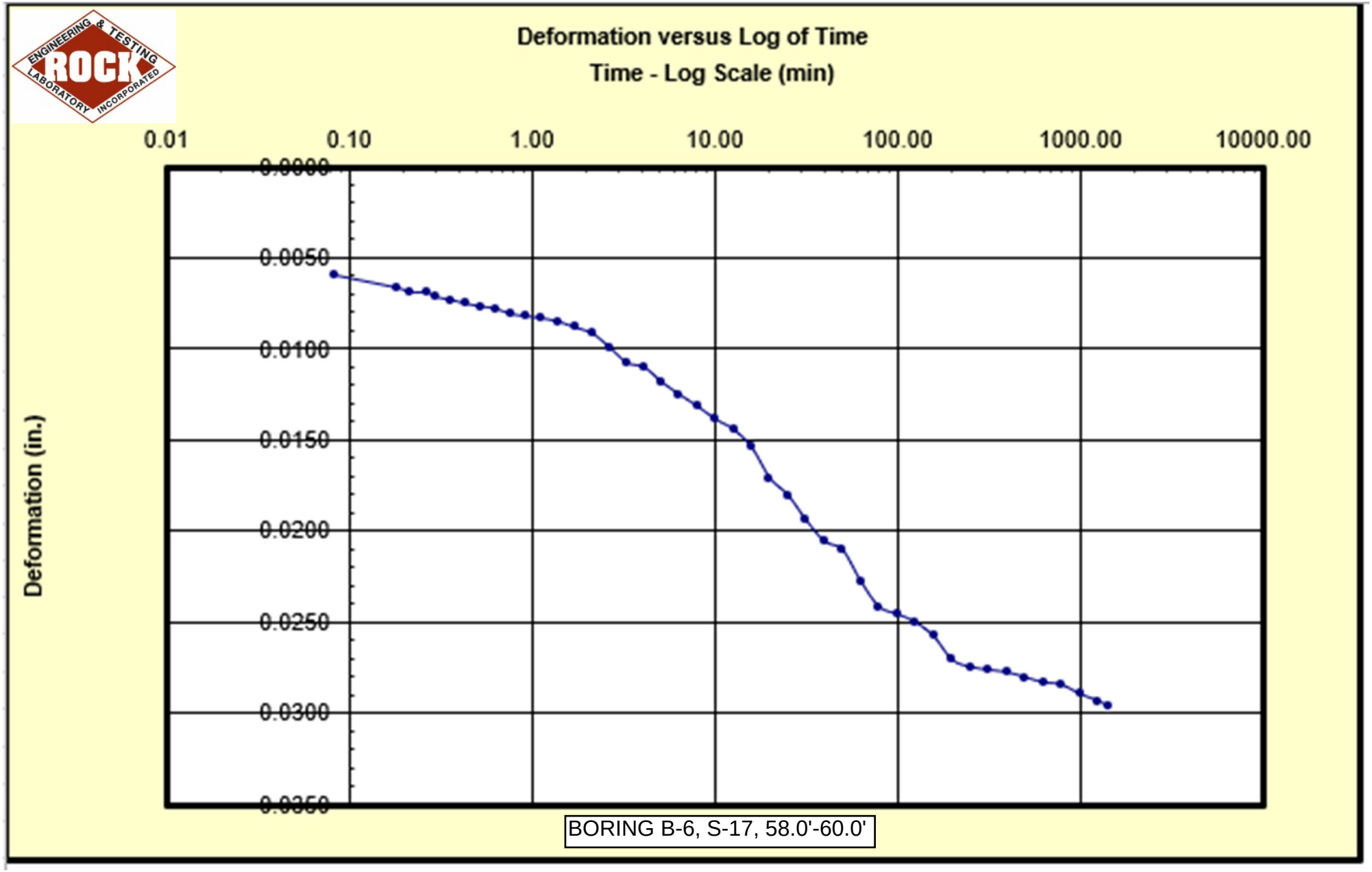
**G122360 - Port of Brownsville Grain Facility Improvements**

**Vertical Stress = 32,000 psf**



**G122360 - Port of Brownsville Grain Facility Improvements**

**Vertical Stress = 64,000 psf**



# CORROSION TESTING

**ALAMO ANALYTICAL LABORATORIES, LTD.**
**Main: 10526 Gulfdale • San Antonio, Texas 78216-3601 • (210) 340-8121 . Fax. (210) 340-8123**

REPORT NARRATIVE 7/21/2022

Francisco Arias
Rock Engineering & Testing Laboratory, Inc.
10856 Vandale Street
San Antonio , Texas - 78216
TEL: (832) 606-0543 Email: francisco@rocktesting.com
FAX:

RE: G - 122360 Port of Brownsville

Dear Francisco Arias: Order No.: 2207046

Enclosed please find the analytical report for the sample/s received on 7/14/2022.

SAMPLE RECEIPT: Samples were received intact and with chain of custody documentation.
HOLDING TIMES: All samples were analyzed within prescribed holding times and/or in accordance with the Sample Acceptance Policy unless otherwise noted in the report.

COMMENTS: No significant observations were made.

If you have any questions regarding these test results call (210) 340-8121.

Thank you,

Reddy Gosala, Ph.D
Laboratory Director

**CLIENT:** Rock Engineering & Testing Laboratory, I **Project:** G - 122360 Port of Brownsville
**Lab Order:** 2207046

| Alamo Lab ID | Client ID | Collection Date | Analyses | Matrix | Result | MDL | PQL | Units | DF | Qua |
|---|---|---|---|---|---|---|---|---|---|---|
| **TestName:** TEX-620-J | | **TestNo:** TX620J | **Date Analyzed** 7/15/2022 9:00:00 AM | | | | Initials: YK | | | |
| 2207046-01A | 1 B - 5, S-7, 12'-14' | 7/12/2022 9:00:00 AM | Sulfate | Solid | 445 | 0 | 25 | mg/Kg | 1 | |
| 2207046-02A | 2 B - 6, S-2, 2'-4' | 7/12/2022 9:00:00 AM | Sulfate | Solid | 321 | 0 | 25 | mg/Kg | 1 | |
| 2207046-03A | 3 B - 7, S-10, 23.5'-25' | 7/12/2022 9:00:00 AM | Sulfate | Solid | 221 | 0 | 25 | mg/Kg | 1 | |
| 2207046-04A | 4 B - 7, S-15, 48.5'-50' | 7/12/2022 9:00:00 AM | Sulfate | Solid | 66.7 | 0 | 25 | mg/Kg | 1 | |
| **TestName:** TEX-620-J | | **TestNo:** TX620J | **Date Analyzed** 7/15/2022 11:00:00 AM | | | | Initials: YK | | | |
| 2207046-01A | 1 B - 5, S-7, 12'-14' | 7/12/2022 9:00:00 AM | Chloride | Solid | 40 | 0 | 5 | mg/Kg | 1 | |
| 2207046-02A | 2 B - 6, S-2, 2'-4' | 7/12/2022 9:00:00 AM | Chloride | Solid | 140 | 0 | 5 | mg/Kg | 1 | |
| 2207046-03A | 3 B - 7, S-10, 23.5'-25' | 7/12/2022 9:00:00 AM | Chloride | Solid | 100 | 0 | 5 | mg/Kg | 1 | |
| 2207046-04A | 4 B - 7, S-15, 48.5'-50' | 7/12/2022 9:00:00 AM | Chloride | Solid | 1000 | 0 | 5 | mg/Kg | 1 | |
| **TestName:** RESISTIVITY | | **TestNo:** SM2510B | **Date Analyzed** 7/15/2022 4:00:00 PM | | | | Initials: YK | | | |
| 2207046-01A | 1 B - 5, S-7, 12'-14' | 7/12/2022 9:00:00 AM | Resistivity | Solid | 859 | 0 | 0.0001 | ohms-cm | 1 | |
| 2207046-02A | 2 B - 6, S-2, 2'-4' | 7/12/2022 9:00:00 AM | Resistivity | Solid | 956 | 0 | 0.0001 | ohms-cm | 1 | |
| 2207046-03A | 3 B - 7, S-10, 23.5'-25' | 7/12/2022 9:00:00 AM | Resistivity | Solid | 1030 | 0 | 0.0001 | ohms-cm | 1 | |
| 2207046-04A | 4 B - 7, S-15, 48.5'-50' | 7/12/2022 9:00:00 AM | Resistivity | Solid | 317 | 0 | 0.0001 | ohms-cm | 1 | |
| **TestName:** CORROSIVITY by pH | | **TestNo:** SW9045D | **Date Analyzed** 7/18/2022 10:30:00 AM | | | | Initials: YK | | | |
| 2207046-01A | 1 B - 5, S-7, 12'-14' | 7/12/2022 9:00:00 AM | pH at 25 o C | Solid | 8.37 | 0.07 | 0.1 | pH Units | 1 | |
| 2207046-02A | 2 B - 6, S-2, 2'-4' | 7/12/2022 9:00:00 AM | pH at 25 o C | Solid | 7.83 | 0.07 | 0.1 | pH Units | 1 | |
| 2207046-03A | 3 B - 7, S-10, 23.5'-25' | 7/12/2022 9:00:00 AM | pH at 25 o C | Solid | 8.74 | 0.07 | 0.1 | pH Units | 1 | |
| 2207046-04A | 4 B - 7, S-15, 48.5'-50' | 7/12/2022 9:00:00 AM | pH at 25 o C | Solid | 8.05 | 0.07 | 0.1 | pH Units | 1 | |

H Holding times for preparation or analysis exceeded; J - Analyte detected below quanititation limits

* Non-NELAP Standards ** Sub Contracted

Approved by: Reddy Gosala, Laboratory Direc

**Report of Laboratory Analysis**

**CLIENT:** Rock Engineering & Testing Laboratory, I

**Work Order:** 2207046 **Project:** G - 122360 Port of Brownsville

# QC SUMMARY REPORT

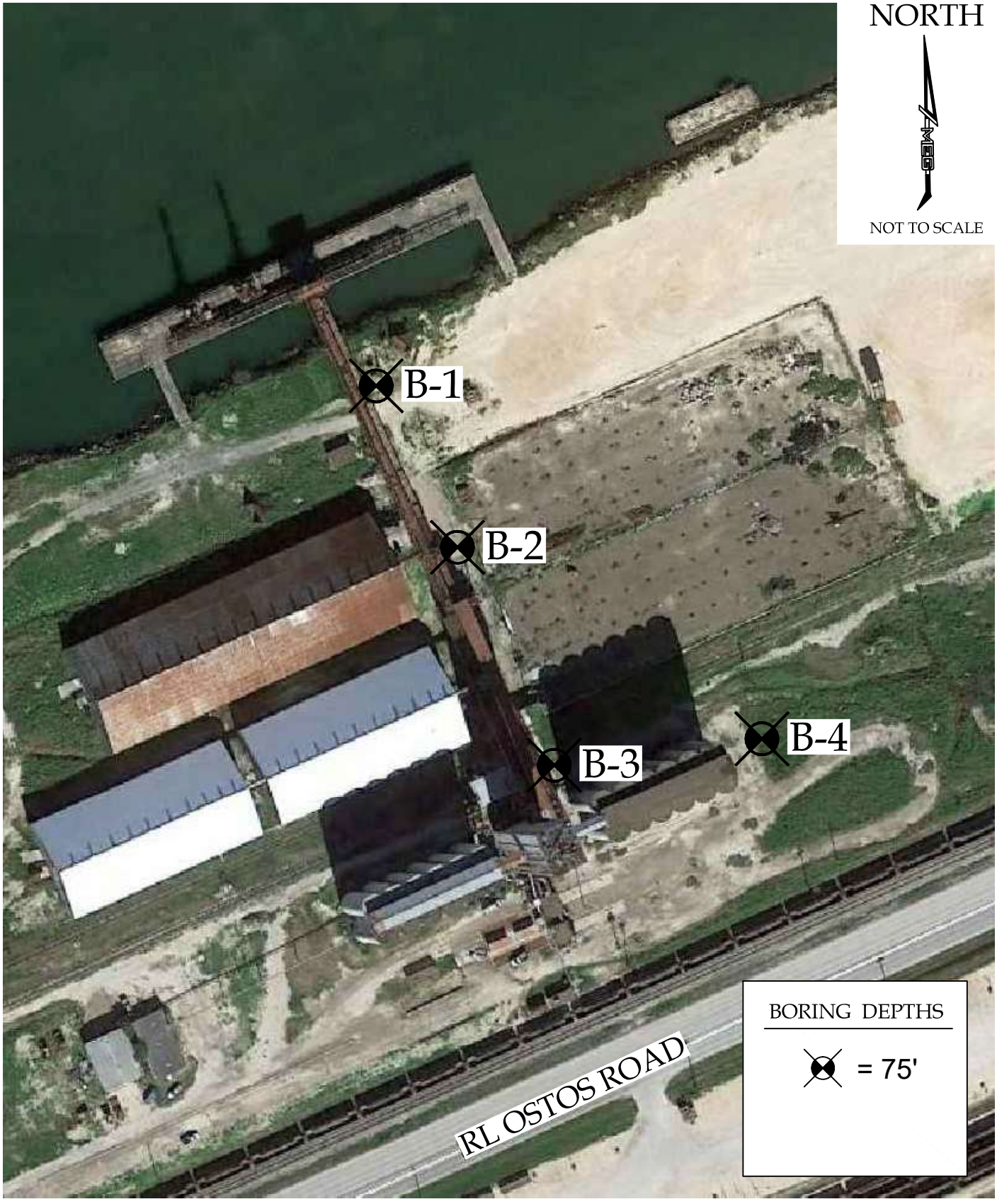
| Analyte | BLK | SPK value | %REC LCS | %REC LCSD | RPD % | RPD Limit | %REC MS | %REC MSD | RPD % | RPD Limit | Low - High Limit | Parent | DUP | RPD % | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Batch ID:** PH_S-7/18/2022 | **TestName:** CORROSIVITY by pH | | | | | | | | | | | | | | |
| **Run ID:** PH_S_220718A | **Test Code:** SW9045D | | | | **Units:** pH Units | | | | **Analysis Date:** 7/18/2022 10:30:00 AM | | **Prep Date:** 7/18/2022 8:30:00 | | | | |
| pH at 25 o C | | 7 | 100.4% | | | | | | | | 6.9 - 7.1 | 8.0 | 8.0 | 0.000 | 0.0 |
| **Batch ID:** RESIST-7/15/2022 | **TestName:** RESISTIVITY | | | | | | | | | | | | | | |
| **Run ID:** COND_220715A | **Test Code:** SM2510B | | | | **Units:** ohms-cm | | | | **Analysis Date:** 7/15/2022 4:00:00 PM | | **Prep Date:** 7/15/2022 4:00:00 | | | | |
| Resistivity | | 707.7 | 99.4% | | | | | | | | 90 - 110 | 317.0 | 329.0 | 4.000 | 10.0 |
| **Batch ID:** TX620J-CL-7/15/2022 | **TestName:** TEX-620-J | | | | | | | | | | | | | | |
| **Run ID:** CL_220715A | **Test Code:** TX620J | | | | **Units:** mg/Kg | | | | **Analysis Date:** 7/15/2022 11:00:00 AM | | **Prep Date:** 7/14/2022 4:30:00 | | | | |
| Chloride | <5 | 1000 | 94.0% | | | | 86.0% | 82.0% | 5.000 | 30.0 | 80 - 120 | | | | |
| **Batch ID:** TX620J-SO4-7/15/2022 | **TestName:** TEX-620-J | | | | | | | | | | | | | | |
| **Run ID:** UV1_220715A | **Test Code:** TX620J | | | | **Units:** mg/Kg | | | | **Analysis Date:** 7/15/2022 9:00:00 AM | | **Prep Date:** 7/14/2022 4:30:00 | | | | |
| Sulfate | <25 | 250 | 92.1% | | | | 97.8% | 95.7% | 1.000 | 30.0 | 80 - 120 | | | | |

**Approved by:**

**Laboratory QC Report**

# Attachment B

## Boring Location Plan and Logs from MEG Geotechnical Engineering Report




**BORING LOCATION PLAN**

PROPOSED GRAIN ELEVATOR
AT RL. OSTOS ROAD

BROWNSVILLE, CAMERON COUNTY, TEXAS

MILLENNIUM ENGINEERS GROUP, INC.
5804 N. GUMWOOD AVENUE
PHARR, TEXAS 78577
WWW.MEGENGINEERS.COM
TEL: 956-702-8500
FAX: 956-702-8140

**Project: Proposed Grain Elevator at RL Ostos Road**
**Project Location: Brownsville, Cameron County, Texas**
**Project Number: 01-15-29209**

# Log of Boring B-1

Sheet 1 of 1

| | | |
|---|---|---|
| Date(s) Drilled: **November 11, 2015** | Logged By: **J.P. Palma** | Checked By: **R. Palma** |
| Drilling Method: **straight flight / rotary wash** | Drill Bit Size/Type: **4 in. soil bit** | Total Depth of Borehole: **75 feet bgs** |
| Drill Rig Type: **CME 45** | Drilling Contractor: **Jedi Drilling** | Approximate Surface Elevation: **5 feet Natural Ground (assumed)** |
| Groundwater Level and Date Measured: **10 feet ATD** | Sampling Method(s): **2 in. Split Spoon, Tube** | Hammer Data: **140 lb., 30 in. drop, Automatic** |
| Borehole Backfill: **Subgrade Cuttings** | Location: **See Boring Location Map** | |

| Elevation, feet | Depth, feet | Sample Type | Sample Number | Sampling Resistance, blows/foot | Relative Consistency | USCS Symbol | Graphic Log | MATERIAL DESCRIPTION | Moisture Content, % | Dry Unit Weight, pcf | Percent Fines | LL, % | PI, % | Shear Strength (tsf) | REMARKS AND OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 0 | | 1 | 11 | | CL-CH | | lean CLAY w/ sand to fat CLAY, dk. brown to brown, moist to wet, med. stiff to stiff | 8 | | | | | | |
| | | | 2 | | | | | | 17 | | | 28 | 13 | PP=1.0 | |
| 0 | 5 | | 3 | | | | | | 25 | | | | | PP=0.25 | |
| | | | 4 | | | | | | 33 | | | 31 | 9 | PP=0.5 | |
| -5 | 10 | | 5 | 5 | | | | (ATD) ▽ | 23 | | | | | | |
| -10 | 15 | | 6 | 12 | | | | | 19 | | | 34 | 16 | | |
| -15 | 20 | | 7 | 9 | | | | | 19 | | | | | | |
| -20 | 25 | | 8 | 9 | | | | | 24 | | | 54 | 29 | | |
| | | | | | | SC-CL | | clayey SAND to sandy lean CLAY, brown, wet, stiff | | | | | | | |
| -25 | 30 | | 9 | 21 | | | | | 26 | | | | | | |
| -30 | 35 | | 10 | 14 | | | | | 26 | | 15 | | | | |
| -35 | 40 | | 11 | 25 | | | | | 23 | | | | | | |
| -40 | 45 | | 12 | 13 | | | | | 23 | | 56 | | | | |
| | | | | | | CL-CH | | lean CLAY w/ sand to fat CLAY, brown, moist to wet, med. stiff to stiff | | | | | | | |
| -45 | 50 | | 13 | 19 | | | | | 21 | | 98 | | | | |
| -50 | 55 | | 14 | 20 | | | | | 21 | | | | | | |
| -55 | 60 | | 15 | 23 | | | | | 24 | | | | | | |
| -60 | 65 | | 16 | 14 | | | | | 27 | | | 31 | 13 | | |
| | | | | | | CL | | sandy lean CLAY, brown, moist to wet, stiff to hard | | | | | | | |
| -65 | 70 | | 17 | 40 | | | | | 56 | | 32 | | | | |
| -70 | 75 | | 18 | 43 | | | | | 23 | | | | | | |
| -75 | 80 | | | | | | | Bottom of Boring at 75 feet bgs | | | | | | | |

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Figure

**Project: Proposed Grain Elevator at RL Ostos Road**
**Project Location: Brownsville, Cameron County, Texas**
**Project Number: 01-15-29209**

# Log of Boring B-2

Sheet 1 of 1

| | | |
|---|---|---|
| Date(s) Drilled **November 11, 2015** | Logged By **J.P. Palma** | Checked By **R. Palma** |
| Drilling Method **straight flight / rotary wash** | Drill Bit Size/Type **4 in. soil bit** | Total Depth of Borehole **75 feet bgs** |
| Drill Rig Type **CME 45** | Drilling Contractor **Jedi Drilling** | Approximate Surface Elevation **5 feet Natural Ground (assumed)** |
| Groundwater Level and Date Measured **10 feet ATD** | Sampling Method(s) **2 in. Split Spoon, Tube** | Hammer Data **140 lb., 30 in. drop, Automatic** |
| Borehole Backfill **Subgrade Cuttings** | Location **See Boring Location Map** | |

| Elevation, feet | Depth, feet | Sample Type | Sample Number | Sampling Resistance, blows/foot | Relative Consistency | USCS Symbol | Graphic Log | MATERIAL DESCRIPTION | Moisture Content, % | Dry Unit Weight, pcf | Percent Fines | LL, % | PI, % | Shear Strength (tsf) | REMARKS AND OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 0 | | 1 | 19 | | CL-CH | | lean CLAY w/ sand to fat CLAY, dk. brown to brown, moist to wet, med. stiff to stiff | 21 | | | 48 | 29 | | |
| | | | 2 | 9 | | | | | 23 | | 86 | | | | |
| 0 | 5 | | 3 | 11 | | | | | 25 | | | 63 | 41 | | |
| | | | 4 | 5 | | | | | 27 | | | | | | |
| -5 | 10 | | 5 | 3 | | | | (ATD) ▽ | 32 | | | 44 | 24 | | |
| | | | 6 | | | | | | 21 | | | | | PP=0.5 | |
| -10 | 15 | | | | | | | | | | | | | | |
| -15 | 20 | | 7 | 8 | | | | | 16 | | | 33 | 8 | | |
| -20 | 25 | | 8 | 12 | | | | | 19 | | | | | | |
| | | | | | | SC-CL | | clayey SAND to sandy lean CLAY, brown, wet, stiff | | | | | | | |
| -25 | 30 | | 9 | 11 | | | | | 26 | | | | | | |
| -30 | 35 | | 10 | 11 | | | | | 29 | | 53 | | | | |
| -35 | 40 | | 11 | 13 | | | | | 30 | | | | | | |
| -40 | 45 | | 12 | 34 | | | | | 23 | | 16 | | | | |
| -45 | 50 | | 13 | 14 | | CL-CH | | lean CLAY w/ sand to fat CLAY, brown, moist to wet, med. stiff to stiff | 22 | | | 36 | 19 | | |
| -50 | 55 | | 14 | | | | | | 26 | | | | | PP=1.0 | |
| -55 | 60 | | 15 | 19 | | | | | 23 | | | | | | |
| -60 | 65 | | 16 | | | | | | 29 | | | | | PP+2.0 | |
| | | | | | | CL | | sandy lean CLAY, brown, moist to wet, stiff to hard | | | | | | | |
| -65 | 70 | | 17 | 14 | | | | | 30 | | | | | | |
| -70 | 75 | | 18 | 23 | | | | | 26 | | 98 | | | | |
| -75 | 80 | | | | | | | Bottom of Boring at 75 feet bgs | | | | | | | |

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Figure

**Project: Proposed Grain Elevator at RL Ostos Road**
**Project Location: Brownsville, Cameron County, Texas**
**Project Number: 01-15-29209**

# Log of Boring B-3

Sheet 1 of 1

| | | |
|---|---|---|
| Date(s) Drilled **November 11, 2015** | Logged By **J.P. Palma** | Checked By **R. Palma** |
| Drilling Method **straight flight / rotary wash** | Drill Bit Size/Type **4 in. soil bit** | Total Depth of Borehole **75 feet bgs** |
| Drill Rig Type **CME 45** | Drilling Contractor **Jedi Drilling** | Approximate Surface Elevation **5 feet Natural Ground (assumed)** |
| Groundwater Level and Date Measured **10 feet ATD** | Sampling Method(s) **2 in. Split Spoon, Tube** | Hammer Data **140 lb., 30 in. drop, Automatic** |
| Borehole Backfill **Subgrade Cuttings** | Location **See Boring Location Map** | |

| Elevation, feet | Depth, feet | Sample Type | Sample Number | Sampling Resistance, blows/foot | Relative Consistency | USCS Symbol | Graphic Log | MATERIAL DESCRIPTION | Moisture Content, % | Dry Unit Weight, pcf | Percent Fines | LL, % | PI, % | Shear Strength (tsf) | REMARKS AND OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 0 | | 1 | 12 | | CL-CH | | lean CLAY w/ sand to fat CLAY, dk. brown to brown, moist to wet, med. stiff to stiff | 16 | | | | | | |
| | | | 2 | | | | | | 19 | | | 23 | 3 | | |
| 0 | 5 | | 3 | | | | | | 29 | | | | | PP=1.5 | |
| | | | 4 | | | | | | 33 | | | 62 | 39 | PP=1.0 | |
| -5 | 10 | | 5 | 4 | | | | (ATD) ▽ | 30 | | | | | | |
| -10 | 15 | | 6 | 4 | | | | | 23 | | 84 | | | | |
| -15 | 20 | | 7 | | | | | | 23 | | | | | PP=1.0 | |
| -20 | 25 | | 8 | | | | | | 22 | | | 36 | 15 | PP=2.0 | |
| | | | | | | SC-CL | | clayey SAND to sandy lean CLAY, brown, wet, stiff | | | | | | | |
| -25 | 30 | | 9 | 5 | | | | | 39 | | 63 | | | | |
| -30 | 35 | | 10 | 9 | | | | | 27 | | | | | | |
| -35 | 40 | | 11 | 33 | | | | | 26 | | | | | | |
| -40 | 45 | | 12 | 28 | | | | | 26 | | 18 | | | | |
| -45 | 50 | | 13 | 11 | | CL-CH | | lean CLAY w/ sand to fat CLAY, brown, moist to wet, med. stiff to stiff | 21 | | | | | | |
| -50 | 55 | | 14 | | | | | | 25 | | | 56 | 31 | PP=0.75 | |
| -55 | 60 | | 15 | 15 | | | | | 28 | | | | | | |
| -60 | 65 | | 16 | 22 | | | | | 23 | | | 43 | 20 | | |
| | | | | | | CL | | sandy lean CLAY, brown, moist to wet, stiff to hard | | | | | | | |
| -65 | 70 | | 17 | 40 | | | | | 24 | | 54 | | | | |
| -70 | 75 | | 18 | 36 | | | | | 26 | | | | | | |
| -75 | 80 | | | | | | | Bottom of Boring at 75 feet bgs | | | | | | | |

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Figure

**Project: Proposed Grain Elevator at RL Ostos Road**
**Project Location: Brownsville, Cameron County, Texas**
**Project Number: 01-15-29209**

# Log of Boring B-4

Sheet 1 of 1

| | | |
|---|---|---|
| Date(s) Drilled **November 11, 2015** | Logged By **J.P. Palma** | Checked By **R. Palma** |
| Drilling Method **straight flight / rotary wash** | Drill Bit Size/Type **4 in. soil bit** | Total Depth of Borehole **75 feet bgs** |
| Drill Rig Type **CME 45** | Drilling Contractor **Jedi Drilling** | Approximate Surface Elevation **5 feet Natural Ground (assumed)** |
| Groundwater Level and Date Measured **10 feet ATD** | Sampling Method(s) **2 in. Split Spoon, Tube** | Hammer Data **140 lb., 30 in. drop, Automatic** |
| Borehole Backfill **Subgrade Cuttings** | Location **See Boring Location Map** | |

| Elevation, feet | Depth, feet | Sample Type | Sample Number | Sampling Resistance, blows/foot | Relative Consistency | USCS Symbol | Graphic Log | MATERIAL DESCRIPTION | Moisture Content, % | Dry Unit Weight, pcf | Percent Fines | LL, % | PI, % | Shear Strength (tsf) | REMARKS AND OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 0 | | 1 | 15 | | CL-CH | | lean CLAY w/ sand to fat CLAY, dk. brown to brown, moist to wet, med. stiff to stiff | 14 | | | 35 | 21 | | |
| | | | 2 | | | | | | 35 | | | | | PP=0.25 | |
| 0 | 5 | | 3 | | | | | | 32 | | | 56 | 35 | PP=0.5 | |
| | | | 4 | | | | | | 38 | | 89 | | | PP=0.25 | |
| -5 | 10 | | 5 | 3 | | | | (ATD) ▽ | 26 | | | 28 | 12 | | |
| -10 | 15 | | 6 | 8 | | | | | 17 | | | | | | |
| -15 | 20 | | 7 | 14 | | | | | 23 | | | | | | |
| -20 | 25 | | 8 | 33 | | | | | 18 | | 64 | | | | |
| | | | | | | SC-CL | | clayey SAND to sandy lean CLAY, brown, wet, stiff | | | | | | | |
| -25 | 30 | | 9 | 16 | | | | | 26 | | | | | | |
| -30 | 35 | | 10 | 58 | | | | | 25 | | 18 | | | | |
| -35 | 40 | | 11 | 27 | | | | | 24 | | | | | | |
| -40 | 45 | | 12 | 15 | | | | | 22 | | 73 | | | | |
| -45 | 50 | | 13 | 23 | | CL-CH | | lean CLAY w/ sand to fat CLAY, brown, moist to wet, med. stiff to stiff | 21 | | | 58 | 36 | | |
| -50 | 55 | | 14 | 13 | | | | | 24 | | | | | | |
| -55 | 60 | | 15 | | | | | | 30 | | | 61 | 44 | PP=3.0 | |
| -60 | 65 | | 16 | 13 | | | | | 25 | | | | | | |
| | | | | | | CL | | sandy lean CLAY, brown, moist to wet, stiff to hard | | | | | | | |
| -65 | 70 | | 17 | 64 | | | | | 20 | | | | | | |
| -70 | 75 | | 18 | 45 | | | | | 22 | | | | | | |
| -75 | 80 | | | | | | | Bottom of Boring at 75 feet bgs | | | | | | | |

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Figure

**Project: Proposed Grain Elevator at RL Ostos Road**
**Project Location: Brownsville, Cameron County, Texas**
**Project Number: 01-15-29209**

# Key to Log of Boring

Sheet 1 of 1

| Elevation, feet | Depth, feet | Sample Type | Sample Number | Sampling Resistance, blows/foot | Relative Consistency | USCS Symbol | Graphic Log | MATERIAL DESCRIPTION | Moisture Content, % | Dry Unit Weight, pcf | Percent Fines | LL, % | PI, % | Shear Strength (tsf) | REMARKS AND OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |

## COLUMN DESCRIPTIONS

1 **Elevation, feet:** Elevation (MSL, feet)

2 **Depth, feet:** Depth in feet below the ground surface.

3 **Sample Type:** Type of soil sample collected at the depth interval shown.

4 **Sample Number:** Sample identification number.

5 **Sampling Resistance, blows/foot:** Number of blows to advance driven sampler foot (or distance shown) beyond seating interval using the hammer identified on the boring log.

6 **Relative Consistency:** Relative consistency of the subsurface material.

7 **USCS Symbol:** USCS symbol of the subsurface material.

8 **Graphic Log:** Graphic depiction of the subsurface material encountered.

9 **MATERIAL DESCRIPTION:** Description of material encountered. May include consistency, moisture, color, and other descriptive text.

10 **Moisture Content, %:** Water content of the soil sample, expressed as percentage of dry weight of sample.

11 **Dry Unit Weight, pcf:** Dry weight per unit volume of soil sample measured in laboratory, in pounds per cubic foot.

12 **Percent Fines:** The percent fines (soil passing the No. 200 Sieve) in the sample. WA indicates a Wash Sieve, SA indicates a Sieve Analysis.

13 **LL, %:** Liquid Limit, expressed as a water content

14 **PI, %:** Plasticity Index, expressed as a water content

15 **Shear Strength (tsf):** Unconfined Compressive Strength

16 **REMARKS AND OTHER TESTS:** Comments and observations regarding drilling or sampling made by driller or field personnel.

## FIELD AND LABORATORY TEST ABBREVIATIONS

**CHEM:** Chemical tests to assess corrosivity
**COMP:** Compaction test
**CONS:** One-dimensional consolidation test
**LL:** Liquid Limit, percent
**PI:** Plasticity Index, percent
**SA:** Sieve analysis (percent passing No. 200 Sieve)
**UC:** Unconfined compressive strength test, Qu, in ksf
**WA:** Wash sieve (percent passing No. 200 Sieve)

## TYPICAL MATERIAL GRAPHIC SYMBOLS

- Well graded GRAVEL (GW)
- Well graded GRAVEL with Silt (GW-GM)
- Poorly graded GRAVEL with Silt (GP-GM)
- Silty GRAVEL (GM)
- Clayey GRAVEL (GC)
- Well graded SAND (SW)
- Poorly graded SAND (SP)
- Well graded SAND with Silt (SW-SM)
- Well graded SAND with Clay (SW-SC)
- Poorly graded SAND with Silt (SP-SM)
- Poorly graded SAND with Clay (SP-SC)
- Silty SAND (SM)
- Clayey SAND (SC)
- SILT, SILT w/SAND, SANDY SILT (ML)
- SILT, SILT w/SAND, SANDY SILT (MH)
- Fat CLAY, CLAY w/SAND, SANDY CLAY (CH)
- SILT, SILT with SAND, SANDY SILT (ML-MH)
- CLAY to Fat CLAY w// SAND (CL-CH)
- SILTY CLAY (CL-ML)
- Lean CLAY/PEAT (CL-OL)
- Fat CLAY/SILT (CH-MH)
- Silty SAND to Sandy SILT (SM-ML)
- Silty SAND to Sandy SILT (SM-MH)
- Clayey SAND to Sandy CLAY (SC-CL)
- Clayey SAND to Sandy CLAY (SC-CH)
- Silty to Clayey SAND (SM-SC)

## TYPICAL SAMPLER GRAPHIC SYMBOLS

- 2 in. Split Spoon
- 2.5-inch-OD Modified California w/ brass liners
- 3-inch-OD California w/ brass rings
- Shelby Tube (Thin-walled, fixed head)
- Grab Sample
- Bulk Sample
- Pitcher Sample
- Other sampler now modified

## OTHER GRAPHIC SYMBOLS

- Water level (at time of drilling, ATD)
- Water level (after waiting a given time)
- Minor change in material properties within a stratum
- Inferred or gradational contact between strata
- Queried contact between strata

## GENERAL NOTES

1. Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive, and actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
2. Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

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(713) 622-9264

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Appendix C

# WestPlains Safety Requirements

# Contractor Safety Guidelines

1. All Contractor personnel will follow the Company safety regulations, procedures, and guidelines. These will be reviewed with you prior to starting any work in or around the complex, including specific PPE requirements.
2. The Contractor and his employees will be shown the Emergency Action Plan, which includes all emergency evacuation routes and procedures. The Contractor will notify the Company Manager of any employee changes and the new employees will be shown the Emergency Action Plan prior to starting work.
3. Contractor will designate a Foreman or Supervisor that is responsible for maintaining a high degree of safety for contractor employees throughout their presence on company property.
4. Absolutely **NO SMOKING** is permitted in or around the property except in posted, designated areas.
5. The Contractor's work schedule will be fully coordinated with the Company's work schedule each day. Contractor personnel are **NOT** permitted in any part of the property beyond their designated work area(s) without the proper authorization from the Company Manager.
6. Contractor employees that are performing tasks at elevated levels higher than ground level or work floor must be protected from falls by guarded work platforms, walking/working surfaces with handrails or fall arrest systems. Only **Full Body Harnesses** are allowed as part of a fall arrest system.
7. Welding, cutting, or other hot work is NOT permitted in the facility except under special circumstances. In those cases, the Contractor **MUST** obtain a Hot Work Permit signed by the Company Manager.
8. All electrical equipment (and tools) used must be appropriate for the job, and be U.L., F.M. or OSHA listed for the location in which they are used.
9. The Contractor **MUST** have approval to use and/or store Hazardous Materials, including solvents and other flammable materials. The Contractor must also provide the Company Manager with appropriate Safety Data Sheets (SDS), for any such Hazardous Materials brought onto the premises.
10. **ALL DEBRIS CONNECTED WITH THE WORK BEING PERFORMED MUST BE CLEANED UP AND REMOVED DAILY, OR ON ANOTHER SCHEDULE AS AGREED TO BY COMPANY MANAGEMENT.**
11. Company Lockout/Tagout procedures must be followed by the Contractor at all times. All guards and covers removed from any machinery being worked on must be replaced **IMMEDIATELY** upon completion of work.
12. **ALL** tools, equipment, ladders, and vehicles belonging to the Contractor must be stored in a safe manner (Or location) at the end of each work day. The Contractor **WILL** inspect the work area(s) to be sure it remains in a safe condition. **NO EXCEPTIONS**.
13. The Contractor must sign the Visitor/Contractor Log and provide Company with a complete list of contractor's workers daily.

---

**I have been informed of the above safety information and understand what I have read and signed.**

**Contractor Name** _____

**Contractor Representative:** _____ **Signature:** _____

**Company Representative:** _____ **Signature:** _____

**Location:** _____ **Insurance Certificate ( Y / N )** **Date:** _____

# Location: West Plains LLC - Brownsville, TX

West Plains LLC

9155 RL Ostos Rd.

Brownsville, TX 78520

## Contractor Safety Program

### Purpose

The Contractor Safety Program is designed to protect West Plains LLC and contractor employees, equipment and facilities from injury, accident or loss. Contractors are persons not directly employed by West Plains LLC who provide specific labor or services.

Examples of Contractor Employers are:

- Construction & Millwright Companies
- Utility Service or Repair Companies
- Pest Control Services
- Grain Inspection Personnel
- Transportation & Shipping Services

As a condition of doing business with West Plains LLC, all contractors must comply with applicable local, state, federal regulatory requirements and West Plains LLC safety policies and procedures. Specific compliance is required in the following:

### Responsibilities

#### Management

- Ensure contracts for bids contain appropriate information concerning the Contractor Safety Program including all requirements.
- Provide contractors with specific Contractor Safety Guidelines prior to commencement of work.
- Provide access to SDS material upon request of contractors.
- Ensure the area in which the contractor employees are working are maintained safe and free of hazards.
- Monitor all contractor activity at their location. Unless approved in advance by either the Regional Manager, the Corporate Safety Director, or the Vice-President of Operations, a company representative is required to be on-site each day that contractor work is being conducted.

#### Contractors

- Review and sign Contractor Safety Guidelines provided by local management.
- Sign the Visitor/Contractor Log and provide West Plains LLC with complete list of contractor workers daily.
- Conduct daily safety inspections of all assigned areas.
- Identify and correct hazards.

- Provide contractor employees with required Personal Protective Equipment.
- Ensure contractor employees have the proper training for assigned tasks.
- Coordinate with [[179:1125]] for any safety related issues.
- Maintain required insurance coverage.
- Establish and maintain an effective Safety and Health Program.
- Establish and maintain an effective Housekeeping Program.

**Minimum Insurance Requirements**

Contractors and Vendors are required to meet minimum Insurance Requirements according to the following schedule:

*Coverage Minimum per Occurrence Limits*

- Automobile Liability $ 1,000,000
- General Liability $ 1,000,000
- Products Liability $ 1,000,000
- Completed Operations Liability $ 1,000,000
- Workmen's Compensation $ 1,000,000

*Certificates of Insurance*

Contractors must provide West Plains LLC a Certificate of Insurance. The Certificate must list West Plains LLC, its Divisions and Subsidiaries as a Certificate Holder with notification of cancellation or non-renewal. Without the Certificate, West Plains LLC may have to assume the liabilities and responsibilities for the Contractor.

**Training**

Information and training is to be made available to contractors in the form of copies of written safety programs. Written programs from the Required Training List, based on hazard exposure are to be presented to contractors.

*Required Training for Contractor Employees:*

- General Safety Rules, including reporting of unsafe conditions.
- Hazard Communications & Chemical Safety
- Lockout/Tagout
- Electrical Safety
- Evacuation Routes, Alarms and Procedures
- Hot Work Program
- Confined Space Program
- Person Protective Equipment
- Fall Prevention
- Bin Entry

**Safety Reviews**

A comprehensive pre-work safety review conference will be conducted for all contractor work that involves:

- construction & renovation
- equipment installation & repair
- utility modifications
- electrical & plumbing work
- work at elevated locations
- confined space entry
- use of toxic substances
- hot work or welding
- bin entry

Safety review participants will consist of company and contractor safety representatives. All task specific safety concerns shall be addressed and resolved prior to commencement of work by the contractor.

**Hazardous Chemical/Substance Notification**

Contractor must follow the OSHA Hazard Communication Standard requirements including use of safe handling and storage of chemicals. Contractors are required to inform West Plains LLC of all hazardous substances which may be brought on to West Plains LLC property, including providing the most current Safety Data Sheet for each substance. All spills and leaks of hazardous chemicals must be immediately reported to [[179:1125]].

**Confined Space Entry**

Contractor employees are not authorized to enter any confined spaces on all West Plains LLC property unless specifically required by the service or construction contract.

**Work at Elevated Locations**

Required fall protection equipment shall be used by all contractor employees when working at elevated locations.

**Other Policies and Procedures**

All contractor employees shall adhere to all other West Plains LLC Policies, including but not limited to: access to company facilities or company equipment; use of controlled substances; firearm & explosive restrictions; harassment of other persons; traffic and parking regulations.

Attached Files

Contractor Safety Guidelines BU-WP-HM.docx
Uploaded: 10/21/2019