

February 21, 2024

To: Contractors Holding Lincoln Street Bridge Replacement Packages.

Subject: **ADDENDUM No. 1**

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Please note the following questions/answer and confirm receipt of this ADDENDUM No. 1.

**1. - Q1 – AC Adjustment was shown in the contract**

- **Yes there will be asphalt work leading up to the bridge on both sides and on the bridge therefore it is beneficial to leave this in for when asphalt placement is to occur.**

**2. – Q2 – Clarification of the 3 dates shown in the contract at 225 days, 270 days, and 365 days.**

- **Please note that these are correct. The 225 days from Notice to proceed is for substantial completion, the 270 from notice to proceed is for opening for vehicular traffic, and the 360 days is for final completion of the construction.**

**3 – Q3 – Allowance bid line item for testings**

- **Our construction inspector will provide field testing.**

**4 – Q4 Request for engineers estimate**

- **Engineers estimate posted with Addendum**

**5 – Q5 Sidewalk Material and Permanent Steel Casing for drilled shafts line item**

- **Additional line items has been added for Class AA concrete, Permanent Steel Casing for 3'-0" diameter drilled pier, and Epoxy coated reinforcing steel**

**6 – Q6 Is there a specific bid bond form required or will a standard bid bond form work?**

- **No this will come from your surety.**

**7 - Q7 There is not a signature sheet for an LLC, should we use the corporation signature sheet?**

- **This is acceptable.**

8 – Q8 Request for Engineers estimate

- **Please see attached**

9 – Q9 Request for Bid opening date be moved from February 28<sup>th</sup>, 2024.

- **It has now been moved to February 29th, 2024 at 2 pm.**

10- Q10 Are the attendees from the first pre-bid meeting eligible to bid if they didn't attend the pre-bid held on Wednesday, 2/21/24?

- **Only those at the pre-bid walkthrough on February 21<sup>st</sup>, 2024 are allowed to bid.**

11 - Q11 Are the permanent signs shown on plan sheets SPM-1 through SPM-4 required to fabricated and installed under this contract?

- **No our City Sign Shop will do all the fabrication and installation of the signs.**

12 - Q12 Are the soils borings available

- **These have been included in the addendum.**

Sincerely,

CITY OF CONCORD

Jamie Williams, P.E.  
Transportation Project Engineer

JMW/dah

cc: Contract File – Lincoln Street Bridge Replacement



**Attendee Sign-in Sheet**  
**Lincoln Street Bridge Replacement**  
**Pre-Quote Conference**

February 21<sup>st</sup>, 2024      11:30 A.M.

Name & Organization	Email	Phone #
Nelson Puyes Lee Construction Co.	nroups@lee-carolinas.com	704 588 5272
Jake Linn Lee Construction	Estimating@LeeCarolinas.com	704-207-5355
Christopher McCray Dellinger Inc	chrismccray@dellingerinc.com	704-506-6627
Stephen Tate Dellinger Inc.	State@dellinger-inc.com	704-242-0677
Luke Lackey E.S. Wagner	llackey@eswagner.com	844-680-7218
Lee Bradley Blythe Construction	lee.bradley@BlytheConstruction.com	704-805-6323
Frank Fulp Smith-Rive, LLC	frank@smithrive.com	336-705-0542
KEVIN BURNS R E BURNS & SONS	kevinereburns.com	704-921-8646



**Attendee Sign-in Sheet**  
**Lincoln Street Bridge Replacement**  
**Pre-Quote Conference**

February 21<sup>st</sup>, 2024    11:30 A.M.

Name & Organization

Email

Phone #

COLE LONDON Thomas Concrete	Cole.LONDON@ThomasConcrete.com	214-914-3362
Tyler Sigman Kemp Sigman Construction	Tyler@KempSigmanConstruction.com	828-302-7018
Alex Sullivan NJR Group, Inc	ASULLIVAN@NJRGROUPINC.COM	704-726-0936
Ben Speights NJR Group Inc	bspeights@njrgroupinc.com	704-985-5285





## **INVITATION TO BID**

**City of Concord Transportation Department**

**Date: February 14<sup>th</sup>, 2024**

Attendance at a qualifying pre-Bid conference of the project on **February 21<sup>st</sup>, 2024 at 11:30 AM** on site, at the Lincoln St. Bridge on the Lincoln Street side, will be required for a Bid submittal.

Sealed bids will be received by the City of Concord at the Alfred M. Brown Operations Center, Conference Room C, 635 Alfred Brown Jr. Court, SW, Concord, North Carolina 28026-0308 until 2:00 p.m., local time, Wednesday February 29<sup>th</sup>, 2024 for the Lincoln Street Bridge Replacement Contract.

At said place and time, and promptly thereafter, all bids that have been duly received will be publicly opened and read aloud.

The Project Information is generally described as follows: The work under this contract includes, but is not limited to, the selected Contractor performing all necessary work to complete the 0.11 mile of bridge and bridge approach replacement by removing the existing bridge structure, asphalt pavement, curb and gutter, and sidewalk, and constructing the new bridge structure, asphalt pavement, curb and gutter and sidewalk per the Bridge Replacement of Lincoln Street Crossing Irish Buffalo Creek plan set, and as discussed in the pre-bid conference, including mobilizations, demobilizations, all labor including special subcontracting, permits, licenses, certifications, handwork, fabrications, tools, equipment, all materials, miscellaneous hardware, any supporting hardware and software, consumables, preparations, adhesives, other items and incidentals, excavations and grading, hauling, traffic control safety operations, site security, security of the work, infrastructure removals and resettings, incidental infrastructure relocations, removal of any debris, cleanup, and disposal(s), seeding and mulching, testings, cleanup, and disposal(s), touch-up repairs, special subcontracting, permits, licenses, and all else required as necessary in accordance with the Contract documents to the satisfaction of the Director and the City of Concord.

All bids must be in accordance with the Contract documents on file with the office of the City of Concord Transportation Department.

Copies of the Contract documents have also been provided to plan rooms of Associated General Contractors and F.W. Dodge Corporation in Charlotte, North Carolina.

Copies of the Contract documents may be obtained from the City of Concord at the address stipulated herein.

Bidders must be licensed Contractors in the State of North Carolina. All Subcontractors must also be licensed Contractors in the State of North Carolina.

Bids will be received on a unit price basis.

A 5% Bid security must accompany each bid.

The successful Bidder will be required to furnish a 100 percent (%) Performance Bond (on form provided by

the City of Concord) and a 100 percent (%) Payment Bond as security for the faithful performance and the payment of all bills and obligations arising from the performance of the work.

The local government of the City of Concord does not discriminate in administering any of its programs and activities. The Contractor awarded the contract for the work will be required to assure that no person shall be denied employment or fair treatment, or in any way discriminated against on the basis of race, sex, religion, age, national origin, or disability.

In accordance with 1 NC Administrative Code 30 I.0101, it is the policy of the City of Concord that Bidders undertake good faith efforts to recruit minority – disadvantaged business participation in the work. With regards to this, please reference the City of Concord DBE Program’s Policy Statement. Bidders will need to provide an affidavit of good faith efforts to comply with this policy as part of submitting a bid. However, no specific goals for DBE participation have been established for this contract. Firms proposed by Bidders as a participating minority and disadvantaged business with current certification by the NCDOT will be considered acceptable for listing in the Bidder’s submittal of MBE-DBE participation.

The Contractor and all Subcontractors will be required to conform to the labor standards set forth in the Contract Documents.

The North Carolina Department of Transportation Standard Specifications for Roads and Structures (Standard Specifications) Latest Edition and the North Carolina Department of Transportation Raleigh, “Highway Design Branch Roadway Standard Drawings” (Standard Drawings) Latest Edition shall be used on this project in conjunction with the work. The Contractor shall obtain and hold a copy of said Standard Specifications and Standard Drawings, latest Editions. Definition of terms shall be as stated in Section 101 except where those that specifically delineate and apply to the North Carolina Department of Transportation and its Divisions will be synonymous with and applied to the City of Concord and its comparative Departments and those also as stated in Exhibit “A” of the contract documents. The Contractor shall also obtain and hold a copy of the City of Concord Technical Standards Manual for use in applications as directed by the Director or his designated representative.

It is an absolute requirement of the City of Concord that the project work site and work force be drug free and that associated individuals, including subcontractors, working on the project be free of prior or pending felony convictions, the qualifications statement should include a commitment to this requirement and an indication of the plan of the firm to ensure compliance with this requirement.

The City of Concord reserves the right to reject any or all bids, including without limitation the rights to reject any or all nonconforming, nonresponsive, unbalanced, or conditional bids, and will award to lowest responsible Bidder taking into consideration quality, performance, and time specified in Bid Form for performance of the work. The City of Concord also reserves the right to waive informalities.

If the Contract is to be awarded, the City of Concord will give the successful Bidder a Notice of Award within the number of days set forth in the Bid Form.

BY: (signed) Lloyd Wm. Payne Jr.  
Lloyd Wm. Payne, Jr., ICMA-CM  
City Manager

February 14<sup>th</sup>, 2024

To: Interested Contractors

SUBJECT: Solicitation of Bids  
**Lincoln Street Bridge Replacement**

The City of Concord Transportation Department is requesting bids for the replacement of the Lincoln Street Bridge. Please note that this project is partially funded by Community Development Block Grant (CDBG) funding and has certain requirements of the selected Contractor under the Davis Bacon and Related Acts (DBRA).

There will be a Pre-bid Conference for the purpose of giving potential bidders an opportunity to ask questions and providing additional information about the project. To qualify to submit a bid, attendance at this conference is required. The Conference will be held on-site at the Lincoln Street Bridge on the Lincoln Street side at 11:30 AM on February 21<sup>st</sup>, 2024, weather permitting. (Call 704-920-5341 if further information is needed).

If interested, please attend the on-site Conference. Signed bids, un-separated from the Bidding Documents, will be received in a sealed package by 2:00 pm on Wednesday February 29<sup>th</sup>, 2024, in Conference Room C of the Brown Operations Building, 635 Alfred Brown Jr. Ct SW., Concord, N.C. 28025. Thank you for your consideration and if you have any questions with this solicitation, please call us at 704-920-5341.

Sincerely,  
CITY OF CONCORD

Jamie Williams, P.E.,  
Transportation Director

JMW/DAH

cc: Project File: **Lincoln Street Bridge Replacement**  
**Mary Carr, Planning and Neighborhood Development**



TRANSPORTATION DEPARTMENT

EXHIBIT "G"  
GENERAL CONDITIONS AND BID FORM

Solicitations of Bids for the  
**Lincoln Street Bridge Replacement**

The City of Concord is requesting Bids for all necessary work to remove the existing concrete pavement, curb and gutter, rehabilitate the subgrade, and rebuild the road base with asphalt while constructing new curb and gutter as further described below. If you wish to submit a Bid on this work, please fill out the Bid Form sheet that is enclosed herein and return at the address listed below.

1) Definitions:

City – City of Concord, North Carolina

Change Order - A document recommended by the Director which is signed by Contractor and City and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.

Contract – the executed agreement between the City of Concord and the successful bidder, covering the performance of the work and the compensation therefore. The term contract is all inclusive with reference to all written agreements affecting a contractual relationship and all documents referred to therein, and shall specifically include, but not be limited to, the Bid Form, the printed Contract Form and all Attachments thereto, the Contract Bonds, Insurance Forms, Exhibits, the Plans, the Standard Specifications and all supplemental specifications thereto, the general conditions, and all executed supplemental agreements, all of which constitute one instrument.

Contract Price - The moneys payable by City to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement and subject to the applicable provisions of these General Conditions in the case of Unit Price Work and authorized Change Orders).

Contractor – the Contractor named in the contract documents.

Director – City of Concord Transportation Director or the Director’s representative.

Field Order - A written order issued by the Director which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.

Engineer - City of Concord Transportation Director

Owner – City of Concord, North Carolina.

Proposal requirements – the legal and procedural documents, any general and special provisions, together with modifications thereof, and Standard Specifications requirements, with all addenda thereto.

Quoter - An individual, partnership, firm, corporation, or joint venture submitting a quote for the work contemplated

Special Conditions - That part of the Contract Documents which amends or supplements

these **General Conditions**.

**Standard Drawings** - North Carolina Department of Transportation Raleigh, "Highway Design Branch Roadway Standard Drawings" **Latest Ed.**

**Standard Specifications** – North Carolina Department of Transportation Raleigh, "Standard Specifications for Roads and Structures", **Latest Ed.** and the "Highway Design Branch Roadway Standard Drawings" **Latest Ed.**

**Subcontractor** – any person, firm, partnership, corporation, with a direct contract with the Contractor who acts for or in behalf of the Contractor in executing any part of the contract, but does not include one who merely furnishes materials.

**Transportation Department** – City of Concord Transportation Department.

**Underground Facility, Utility, Services** - All underground pipeline, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic of other control systems.

**Work** – the entire completed service or the various, separately identifiable parts, labor, material or requirement thereof needed to perform such under the contract documents to the satisfaction of the City.

- 2) **Project Information:** The work under the Lincoln St Bridge Replacement consists of removal of existing structures, and other materials, and perform necessary grading, tie-in, and installation of new bridge structure, asphalt, curbing, storm structure adjustments and all other necessary tasks to meet the Bridge Replacement of Lincoln Street Crossing Irish Buffalo Creek plan set. All work and materials shall meet and be in accordance with the provisions of the Occupational Safety and Health Administration, the North Carolina Department of Labor, North Carolina Department of Transportation Standard Specifications for Roads and Structures, latest Edition, the North Carolina Department of Transportation Roadways Standards Drawings, latest Edition the Manual on Uniform Traffic Control Devices, latest Edition, the City of Concord Technical Standards Manual, latest Edition, The Water and Sewer Authority of Cabarrus County's Standard Specifications, The City of Concord's Ordinances, Policies, and Standard Specifications, NCDOT Standard Specifications, and The North Carolina Administrative Code for Wastewater Collection and Water Distribution Systems. In the event of conflict between the Water and Sewer Authority of Cabarrus County's Standard Specifications, the City of Concord's Ordinances, policies, and Standard Specifications, and NCDOT Standard Specifications, or the North Carolina Administrative Code, the more restrictive requirements shall apply. All work should be completed in accordance with the Contract documents to the satisfaction of the Director and the City of Concord.

The Contractor is also hereby referred to certain items of the Special Conditions for further information with regards to this work.

Any defective work whether the result of poor workmanship, use of defective materials, damage through carelessness or any other cause shall be removed and the work re-executed at no cost to the City.

- 3) **Specified Times of the Contract, Working Hours, Schedules, Reports, and Supervision:** The Contractor shall pursue the work diligently with workmen in sufficient numbers, abilities, and supervision; and with equipment, materials and methods of construction as may be required to satisfactorily complete the work described in this contract as provided by the Director by the Completion Date of **TWO HUNDRED AND SEVENTY (270)** calendar days from the Commencement Date shall be the "Completion Date for Vehicular Access,"

**THREE HUNDRED AND SIXTY (360)** calendar days from the Commencement Date shall be the “Completion Date”. from the Notice to Proceed Date to maintain working hours from 9:00 AM to 4:00 PM with a ½ hour unpaid lunch allowance unless otherwise modified by the Director. All work shall be accomplished in a continuous manner once the contractor begins. Normal, daily mobilizations in the course of the work shall be considered incidental to the contract unit prices of all quote items.

Additionally, the Contractor will at no cost to the City notify the Director within **forty-eight (48)** hours in advance of beginning work and thereafter coordinate with the Director or the Director’s representative regarding the proposed work schedule, pay request submittals and obtain approval and request for cooperative efforts by the City.

**The Contractor and Transportation Director, or appointed designee, is to coordinate specific times when work is to be limited with the adjacent property representatives.**

The contractor is to inform the Director or the Designated Representative of the estimated arrival time on site and description of work to be performed for each workday. In the event that no work is to be performed, the contractor shall provide an explanation describing the reasons for the given day.

The Contractor will be required to begin work in accordance with the Notification to Proceed from the City on all work included in this contract or as directed by the Director or the Director’s representative.

The Contractor shall at all times be responsible for the supervision, conduct, and discipline of his employees and/or Subcontractors and persons employed by said Subcontractors. All foremen and workmen must have sufficient knowledge, skill, and experience to perform properly the work assigned to them. Any foreman or workman, who in the opinion of the Director, that does not perform his work in a skillful and diligent manner, or who acts in a disorderly or intemperate manner, shall be removed from any portion of the work covered by this contract by the Contractor.

When one or multi-crews are employed, there shall be a designated crew foremen or job superintendent that will represent the Contractor as a single point of contact for the crew(s).

- 4) Specifications and Regulations: The following sections under this Part 4) are for **earthwork, stormwater conveyance structure installation or adjustments, structural subgrades, concrete sidewalk installation, ADA accommodations, concrete curb and gutter, roadway asphalt and concrete pavements, sedimentation and erosion control, pavement marking, site security and work zone traffic safety, and other operations as also delineated and described in Part 2) Project Information, other Parts of Exhibit A, the construction plans, and Special Conditions.**

All material, methods and other aspects of the work shall be provided, constructed, installed, inspected, and accepted in accordance with and as further defined under the applicable Divisions and Sections of the Standard Specifications, associated Standard Drawings, provisions of these General Conditions, Special Conditions, Contract Documents, construction plans or associated documents and cross-references therein and as generally described as follows:

Note: Where mentioned and applied in the Standard Specifications, Engineer shall under this contract be deemed as and have the same authority as the Transportation Director. Other

items with regards to specifications and regulations for this work are noted in the Special Conditions.

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### **Construction Control of Work**

The Contractor shall be responsible for all project control, construction layout, and staking so as to properly construct the work in accordance with Division 1 - Section 105 and other applicable Sections and Divisions of the Standard Specifications. All work shall be to the satisfaction of the Director or the Director's representative. No direct payment will be made for the control of work as this operation will be incidental to the work and full compensation for such will need to be included as part of the unit prices for the various Pay Items in the contract.

### **Work Zone Traffic Control**

All material, installation of control measures, and maintenance of this section of the work shall be in accordance with Division 11 and other applicable Sections and Divisions of the Standard Specifications. All work shall be to the satisfaction of the Director or the Director's representative.

All pedestrian control, vehicular traffic control, safety, and security associated with the entire work shall be in accordance with Part 6 of the Manual on Uniform Traffic Control Devices (MUTCD) latest Edition, OSHA, and any other applicable federal, state and local laws and regulations and shall be the responsibility of the Contractor. All hazards associated with the work that may pose as a danger and hazard shall be protected both during and outside of working hours. The Contractor shall not close a lane of traffic, detain and/or alter the traffic flow on or during holidays, holiday weekends, special events, or any other time when traffic is unusually heavy.

The Contractor is responsible for operating and maintaining traffic control correctly. At least one member of each crew on the project site shall be certified in Work Zone Traffic Control and the operation(s) being used. If the Contractor fails to provide proper traffic control, the Director or the Director's representative has the authority to cease all operations and the contractor will not be allowed to continue for that day on this contract. This will result in the loss of production for this day and is not a legitimate claim for contract time extension.

The Contractor shall operate his equipment and conduct his operation to maintain the flow and safety of traffic. Maintenance of traffic (both vehicular and pedestrian) shall be done in accordance with Section 150 of the Standard Specifications. Work shall only be performed when weather and visibility conditions allow safe operations. Traffic cones (36-inch minimum height) may be used when approved by the Director or the Director's representative. When cones are used, they shall be either double stacked or have special heavy bottoms such that they will not be blown over by traffic. The Contractor shall temporarily remove his equipment from the travelway for emergency vehicles and school buses as directed by the Director or the Director's representative.

Work shall not be performed before sunrise or after sunset unless approved by the Director and such work is in compliance with Section 107 of the Standard Specifications and the Contractor provides artificial lighting as may be necessary to provide for safe and proper construction and to provide for adequate inspection of the work as described in Section 1413 of the Standard Specifications. No direct payment will be made for any items as covered in Section 1413 as such will be considered incidental to other pay items of the work.



**Earthwork**

All material, construction, inspection and acceptance of this section of the work shall be in accordance with Division 2, Division 8 and other applicable Sections and Divisions of the Standard Specifications. All work shall be to the satisfaction of the Director or the Director's representative.

**Pipes and Culverts**

All material, construction, inspection and acceptance of this section of the work shall be in accordance with Division 3 and other applicable Sections and Divisions of the Standard Specifications. All work shall be to the satisfaction of the Director or the Director's representative.

**Subgrades, Bases, and Shoulders**

All material, construction, inspection and acceptance of this section of the work shall be in accordance with Division 5 and other applicable Sections and Divisions of the Standard Specifications. All work shall be to the satisfaction of the Director or the Director's representative.

**Asphalt Pavements**

All material, construction, inspection and acceptance of this section of the work shall be in accordance with Division 6 and other applicable Sections and Divisions of the Standard Specifications. All work shall be to the satisfaction of the Director or the Director's representative.

**Concrete Pavements**

All material, construction, inspection and acceptance of this section of the work shall be in accordance with Division 7 and other applicable Sections and Divisions of the Standard Specifications **unless otherwise delineated or specified**. All work shall be to the satisfaction of the Director or the Director's representative.

**Concrete Sidewalks, Wheelchair Ramps and Associated Incidentals**

All material, construction, inspection and acceptance of this section of the work shall be in accordance with Division 8 - Section 848 and other applicable Sections and Divisions of the Standard Specifications. All work shall be to the satisfaction of the Director or the Director's representative. All concrete materials, unless otherwise delineated or specified, used for the work shall be 3600 psi and be non-tinted.

**Concrete Curb and Gutter**

All material, construction, inspection and acceptance of this section of the work shall be in accordance with Division 8 - Section 846 and other applicable Sections and Divisions of the Standard Specifications. All work shall be to the satisfaction of the Director or the Director's representative.

**Materials**

All materials used for the work shall be in accordance with Division 10 and other applicable Sections and Divisions of the Standard Specifications. The Contractor shall furnish the applicable certifications and documentation for all materials as required by the Standard Specifications. Material that is not properly certified will not be accepted.

**Pavement Markings**



All material, construction, inspection and acceptance of this section of the work shall be in accordance with Division 12 and other applicable Sections and Divisions of the Standard Specifications. All work shall be to the satisfaction of the Director or the Director's representative.

**Sedimentation and Erosion Control**

All material, construction, inspection and acceptance of this section of the work shall be in accordance with Division 16 and other applicable Sections and Divisions of the Standard Specifications. All work shall be to the satisfaction of the Director or the Director's representative.

**Acceptance of Materials and Work**

Acceptance of all materials and work shall be to the satisfaction of the Director or the Director's representative.

**Water Meter Vault**

Provide water meter vault as shown in the plans, in accordance with the City of Concord Standard Detail and as directed by the Engineer. All items shown in the detail shall be included in this unit, including gate valve, vault, appurtenances to complete, and connection to existing backflow preventer. City to furnish and install meter.

Measurement and Payment

Water Meter Vault will be measured and paid as the actual number of vaults satisfactorily installed, connected and accepted. Such price and payment will be full compensation for all labor, material and equipment necessary to construct the water meter vault in accordance with the plans.

Payment will be made under:

Pay Item	Pay Unit
4-in Water Meter Vault	Each

**Abandon Water Vault**

Abandon water vault by breaking off and removing the top section in conflict with the proposed sidewalk, breaking the bottom slab for drainage and filling the vault with suitable material.

Plug connecting utility pipes before filling or removing the vault.

Removed frames and covers become the property of the Contractor for proper disposal.

Measurement and Payment

Payment will be made under:

Pay Item	Pay Unit
Abandon Water Vault	Each

**Storm Drain Inlet Protection**

DESCRIPTION

The Work covered in this section consists of installing storm drain inlet protection as necessary help reduce the effects of soil erosion and to retain sediment.

INSPECTION AND MAINTENANCE OF SEDIMENT TUBES

Inspect filter sacks after installation to ensure that no gaps exist under the filter sack and the rim of structure.

Inspect filter sacks every seven (7) days. Repair any damage to filter sack or replace per engineer request.

Remove sediment deposits that impair the filtration capability of a filter sack when the sediment reaches sediment capacity line on filter. Remove and/or replace installed filter sacks as required to adapt to changing construction site conditions.

MEASUREMENT AND PAYMENT

The quantity of "Filter Sack Inlet Protection" is to be paid for per each filter sack installed and accepted. All work consisting of, but not limited to, purchases, storing, and installing the filter sack and all material, time, and labor costs associated will be considered incidental to the work.

Payment will be made under:

Pay Item	Pay Unit
Storm Drain Inlet Protection	Each

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Inspection, quality control management and required testing for stormwater piping, concrete, and asphalt construction shall be in accordance with Division 3 – Pipe Culverts, Division 5 - Subgrades, Bases, and Shoulders, Division 6 – Asphalt Pavement, Division 7 – Concrete Pavements and Shoulders and Division 8 – Incidentals of the Standard Specifications and in accordance with the requirements shown in the Contract Documents. Other required inspections (i.e. erosion control devices, earthwork, etc.) shall be in accordance with the Standard Specifications and the Contract Documents.

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Responsibilities of the Contractor shall be in accordance with Division 1 of the Standard Specifications and in accordance with the requirements shown in the Contract Documents.

The Contractor shall keep himself fully informed of, comply with, give all notices, and secure all permits and approvals associated with Federal, State and local laws, regulations, codes and ordinances in any manner affecting the work, and all such orders and decrees as exist, or may be enacted by bodies having any jurisdiction or authority over the work, and shall indemnify and hold harmless the City against any claim or liability, including the cost of defense and

attorney's fee arising from, or based on, the violation of any such laws, regulations, codes, ordinances, order or decree, whether by himself or his employee.

If any device, design, material or process covered by letters, patent or copyright is used by the Contractor, he shall provide for such use by legal agreement with the owner of the patent or a duly authorized licensee of such owner, and shall hold harmless the City from any and all loss or expense on account thereof in accordance with the first paragraph of this subsection, including its use by the City.

- 5) Posted Weight Limits: The Contractor's attention is directed to the fact that certain bridges in the City of Concord have posted weight limits. The Contractor will not be allowed to exceed the posted weight limits in transporting materials or equipment to the project. The Contractor should make a thorough examination of all maps and haul routes (both City and NCDOT facilities) on this project.
- 6) Utility Locations, Conflict and Coordination: Protection of all public and private property on and adjacent to the work and responsibility to the public shall be in accordance with Section 107 of the Standard Specifications.

The Contractor shall be solely responsible for contacting the appropriate utility or agency in the work areas and for the exact locations of all overhead or underground facilities, utilities or services before starting work. It shall be the sole responsibility of the Contractor to verify the location of all utilities and services along and in the work area and to protect such from uninterrupted service. The Contractor shall adhere to all applicable regulations and follow accepted safety procedures when working in the vicinity of utilities in order to insure the safety of construction personnel and the public.

Permanent relocation(s) of any utility or utility service as indicated on the construction plans and as specified on the Quoting Form shall be performed by the Contractor. Acceptance of all materials and work shall be to the satisfaction of the Director or the Director's representative in coordination with representatives of the appropriate utility or agency.

Any utility or service that, in the opinion of the Contractor, will have to be made safe or temporarily relocated in order to perform the work shall be coordinated between the Contractor and the applicable utility or service provider. No direct payment will be made for this work, as it will be incidental to the project work and payment at the contract unit price for the various Pay Items in the contract will be full compensation for such action.

- 7) Site Security, Sanitary Provisions, Clean-Up, Pollution Control, and Storage: The Contractor shall at all times conduct the work as to insure the least possible obstruction to pedestrians, vehicular traffic and inconvenience to the general public and businesses in the vicinity of the work, and to insure the protection of persons and property in a manner satisfactory to the City. No road shall be closed to the public except with the permission of the Director. Fire hydrants on or adjacent to the work shall be kept accessible to fire-fighting equipment at all times.

The Contractor is wholly responsible for off-site location of his trucks, equipment and associated material.

At the end of each workday, the Contractor shall clean the site of any non-structural component debris and waste materials, which result from the work and secure the work from any hazardous condition. The Contractor or his Subcontractor will haul and properly dispose

away any such debris or waste material to an approved, public receiving facility permitted by the Solid Waste Management Division of the North Carolina Department of Environment and Natural Resources to receive the type material being disposed. All debris materials permanently removed are the property of the Contractor.

The Contractor shall provide for the control of erosion, siltation, and pollution in accordance with Section 107-13 of the Standard Specifications.

The Contractor shall provide in accordance with Section 107-7 of the Standard Specifications such sanitary accommodations for the use of his employees as may be necessary to comply with the requirements and regulations of the local and State health authorities

The Contractor shall not enter upon private property for any purpose without obtaining permission, and shall be responsible for the preservation of all public property and other items, along and adjacent to the street right-of-way. The Contractor shall use every suitable precaution to prevent damage to such items and especially including vehicles, structures, poles, wires, conduits, underground infrastructure, signs, pavement, monuments, and property marks in the vicinity of the work.

- 8) Insurance: The Contractor shall procure and maintain insurance for the contract time by the Contractor, at his own expense, in an amounts and coverage as stated in **Sec. 7 and Sec. 8** of the **CONSTRUCTION CONTRACT FOR Lincoln Street Bridge Replacement**. Certificate(s) of Insurance and proof thereof shall be furnished to the Transportation Director and approved by the City of Concord Safety, Health and Risk Manager and City Attorney(s) prior to commencement of the work.
- 9) Indemnity: Refer to **Sec. 13** of the **CONSTRUCTION CONTRACT FOR Lincoln Street Bridge Replacement**
- 10) Contract Administration: The general responsibility for the administration of this contract will be done by the Director or the Director's representative. All work, reports, and requests for payment shall be subject to inspection and evaluation by the Director or the Director's representative at any time.

The Director acting directly, or through duly authorized representatives, will decide all questions which may arise as to the quality and acceptability of the work performed and as to the rate of progress of the work; all questions which may arise as to the interpretation of the contract; and all questions as to the acceptable fulfillment of the contract on the part of the Contractor. The Director's decision shall be final and shall have executive authority to enforce and make effective such decisions and orders if the Contractor fails to carry out promptly.

- 11) Method of Measurement: Measurement of the work will be made based on the actual and verified quantities which has been satisfactorily completed and accepted by the City as under the specific pay items as provided on the Quote Form. The method of measurement and computations used in determination of quantities of material furnished and of work performed under the contract will be those methods generally recognized as conforming to accepted engineering practices and according to United States standard measures. Quantities indicated on the Quote Form are estimated and not guaranteed; they are solely for comparing Bid.

- 12) Basis of Payment and Requests for Payment: The quantities of the work, measured as provided above, will be paid for at the bid unit price on the Quote Form.
- 13) Payment(s) and full compensation for the work will be based on the actual accepted quantities installed and payment(s) shall include any and all related items as specified in the Project Information and as indicated on the construction plans and discussed in the pre-bid conference, the Standard Specifications or any Special Provisions attached hereto including, but is not limited to, all mobilizations, demobilizations, control, layout, materials, tools, labor, rentals, consumables, miscellaneous hardware, supporting hardware and software, clearing, grubbing, excavations, hauling operations, filling, rough grading and fine grading, compaction, installation and / or adjustments of stormwater drainage conveyance structures, incidental relocations, structural stabilization, forming, backfilling, sawing exiting concrete and asphalt, furnishing, placing, and finishing concrete, construction joints, ADA accommodations, milling, tacking, furnishing, placing and compaction of asphalt, sedimentation and erosion control, touch-up repairs, security of the work, traffic control and safety operations with associated materials, removal of any debris, cleanup, and disposal(s), special subcontracting, permits and licenses, seeding, mulching, miscellaneous landscaping and relocations, and all else required as necessary, in accordance with the Contract documents, City Technical Standards Manual, Standard Specifications, and Standard Drawings to the satisfaction of the Director and the City of Concord.

**Note:** There will be no payment made for any item of the work not specifically listed as a Quote Pay Item as they are considered incidental to the other Pay Items in the Quote.

**Note:** Any theft of materials or vandalism to the work that occurs during construction, as noted by the Director or his representative, shall be repaired or replaced at the expense of the Contractor at no cost to the City. Contractor will insure the work until such is completed and accepted by the City.

Forms for billing the City for services performed are to be made on forms provided by the City of Concord. No other forms will be accepted by the City and processed for payment. The Contractor shall submit month invoices (if the work goes beyond one month) by the 25<sup>th</sup> day of each month or interim invoices if so necessitated by certain contracts and as directed by the City, which shall be processed for payment thirty (30) days after receipt. Invoices and time sheets shall be in duplicate – one original set to be attached to invoices for City of Concord Finance Department and one copy to be filed with the Transportation Department.

- 14) Oral Agreements and Claims for Additional Compensation: No oral order, objection, claim or notice by any party to the others shall effect or modify any of the terms of obligations contained in any of the contract documents other than by a definitely agreed upon waiver or modification by both the Contractor and the City in writing.

Any claims for additional compensation shall be submitted in writing to the Director with detailed justification within thirty (30) days after receipt of the final invoice payment. The failure of the Contractor to submit the claim(s) within thirty days shall be a waiver of any such claims and a bar to recovery.

- 15) Contract Time and City's Right to Terminate Contract: This contract shall commence on the effective date given in the Contract Agreement (Notice to Proceed Date) and shall be effective for a period of The date that is **TWO HUNDRED AND SEVENTY (270)** calendar days from the Commencement Date shall be the "Completion Date for Vehicular Access,"

**THREE HUNDRED AND SIXTY (360)** calendar days from the Commencement Date shall be the "Completion Date". days. Any requests for extensions to the contract time shall be made in writing by the Contractor and approved by the Director. The City shall have the right to suspend work or to terminate the contract after giving at least **ten (10)** days written notice of suspension or termination to the Contractor.

- 16) Subletting of Contract: The Contractor shall not sublet, sell, transfer, assign or otherwise dispose of this contract or any portion thereof, or his right, title or interest therein, without written consent of the City. Subletting of this contract or any portion of the contract shall conform to the provisions of these General Conditions and the Standard Specifications Division 1 - Section 108-6.
- 17) Notices to Proceed: The Contractor shall be ready to perform work operations and stand on emergency call as soon as possible after the issuance of a City Purchase Order Number / Notice to Proceed, but in no event delay the onset of work operations later than **thirty (30)** days of delivery of said City Purchase Order Number / Notice to Proceed.
- 18) Litigation Venue: Any controversy or litigation arising out of this contract shall be resolved in the courts of Cabarrus County, North Carolina and as further stated in **Sec. 15.** of the **CONSTRUCTION CONTRACT FOR Lincoln Street Bridge Replacement**. This contract shall be subject to the laws of the State of North Carolina and with respect to this Part 18), time is of the essence.
- 19) Submission and Rejection of Quotes: No Quoter may submit more than one quote. Multiple quotes under different names will not be accepted from one firm or association. A conditional quote will not be accepted. Oral, telephone, facsimile, or telegraph quotes will not be accepted. The Quote Form must be filled out and submitted in the bound documents. All quotes will remain subject to acceptance for the number of days set forth in the Quote Form. The City of Concord reserves the right to reject any or all quotes.
- 20) Liquidated Damages: The City and Contractor recognize that time is of the essence of this contract and that the City will suffer financial loss if the work is not completed within the contract specified time, plus any extensions thereof allowed in accordance with Part 17) of these General Conditions. They also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by the City if the work is not completed on time. Accordingly, instead of requiring any such proof, the City and Contractor agree that as liquidated damages for delay in vehicular access (but not as a penalty) the Contractor shall pay the City **\$ 1000.00 for each calendar day**, and delay in final completion of the project (but not as a penalty) the Contractor shall pay the City **\$ 500.00** for each calendar day that expires after the respective contract specified time until the remaining / outstanding work (punchlist) is performed by the Contractor and until such time as punchlist completion and readiness for final payment is made. Should these delays continue concurrently; the liquidated damage amounts are subject to combination.

In case of joint responsibility for delay in the completion of the work, where two or more separate contracts are in force at the same time and cover work at the same site, liquidated damages assessed against any one Contractor will be based upon the individual responsibility of that Contractor for the delay as determined by, and in the judgment of, the Director.

The City shall have the right to deduct the liquidated damages from any money in its hands, otherwise due, or to become due, to the Contractor, or to initiate applicable dispute resolution

procedures and recover liquidated damages for nonperformance of this contract within the specified time of the contract.

**Bid Submittal**

Sealed bids will be received by the City of Concord at the Alfred M. Brown Operations Center, Conference Room C, 635 Alfred Brown Jr. Court, SW, Concord, North Carolina 28026-0308 until 2:00 p.m., local time, Wednesday February 29<sup>th</sup>, 2024 for the Lincoln Street Bridge Replacement.

At said place and time, and promptly thereafter, all bids that have been duly received will be publicly opened and read aloud.

**Attendance at the Pre-Bid Conference (On-site at 11:30 AM, February 21<sup>st</sup>, 2024) is required to submit a Bid**

**Jamie Williams, P.E., Transportation Project Engineer  
City of Concord  
635 Alfred Brown Jr. Court SW / P.O. Box 308  
Concord, NC 28026-0308**

Please note on outside of the envelope  
Bid Included – **Lincoln Street Bridge Replacement**

- Continued Next Page -





**BID FORM**  
**Lincoln Street Bridge Replacement**

<b>BASE BID ITEMS (1 THRU 18)</b>					
<b>Line Item and Sec No.</b>	<b>Description – Base Bid</b>	<b>Unit</b>	<b>Quantity</b>	<b>Unit Price \$</b>	<b>Item Total \$</b>
	Mobilization	LS	1		
0000400000-N 801	Construction Surveying	LS	1		
0043000000-N 226	Grading	LS	1		
0050000000-E 226	Supplemental Clearing and Grubbing	ACRE	1		
0057000000-E 226	Undercut Excavation	CY	450		
0127000000-N 235	Embankment Settlement Gauges	EA	1		
0134000000-E 240	Drainage Ditch Excavation	CY	810		
0194000000-E 265	Select Granular Material	CY	400		
0196000000-E 270	Geotextile for Soil Stabilization	SY	400		
01004500000-E 505	Geotextile for Subgrade Stabilization	SY	300		
0248000000-N SP	Type III Reinforced Approach Fill	LS	1		
0314000000-E SP	Select Material	TON	10		
0318000000-E 300	Foundation Conditioning Material, Minor Structures	TON	50		
0321000000-E 300	Foundation Conditioning Geotextile	SY	150		
0335200000-E 305	15" Drainage Pipe	LF	88		
0335850000-E 305	15" Drainage Pipe Elbow	EA	2		
0448200000-E 310	15" RC Pipe Culv, Class IV	LF	264		
0448500000-E 310	30" RC Pipe Culv, Class IV	LF	76		
0995000000-E 340	Pipe Removal	LF	307		
1077000000-E SP	No. 57 Stone for Rock Cross Vane and Step Pool	TON	25		
1099500000-E 505	Shallow Undercut	CY	100		
1099700000-E 505	Class IV Subgrade Stabilization	TON	200		
1121000000-E 520	Aggregate Base Course	TON	180		
1220000000-E 545	Incidental Stone Base	TON	50		
1330000000-E 607	Incidental Milling	SY	260		



1491000000-E 610	Base Course, Type B25.0C	TON	200		
1503000000-E 610	Binder Course, Type I19.0C	TON	60		
1519000000-E 610	Surface Course, Type S9.5B	TON	320		
1575000000-E 620	AsphBinder for Plant Mix PG64-22	TON	35		
2022000000-E 815	Subdrain Excavation	CY	44.8		
2026000000-E 815	Geotextile for Subsurface Drain	SY	200		
2036000000-E 815	Subdrain Coarse Aggregate	CY	33.6		
2044000000-E 815	6" Perforated Subdrain Pipe	LF	200		
2070000000-N 815	Subdrain Pipe Outlet	EA	1		
2077000000-E 815	6" Outlet Pipe	LF	6		
2286000000-N 840	Masonry Drainage Structures	EA	7		
2308000000-E 840	Masonry Drainage Structures	LF	3.1		
2374000000-N 840	Frame w/Grate and Hood 840.03 Type F	EA	2		
2374000000-N 840	Frame w/Grate and Hood 840.03 Type G	EA	5		
2549000000-E 846	2'-6" Concrete Curb and Gutter	LF	950		
2591000000-E 848	4" Concrete Sidewalk both sides	SY	770		
3030000000-E 862	Steel Beam Guardrail	LF	50		
3150000000-N 862	Additional Guardrail Posts	EA	5		
3215000000-N 862	Guardrail Anchor Units, Type III	EA	4		
3288000000-N 862	Guardrail End Units, Type TL-2	EA	4		
3569000000-E 867	Barbed Wire Fence Reset	LF	180		
3628000000-E 876	Plain Rip Rap, Class I	TON	30		
3642000000-E 876	Plain Rip Rap, Class A	TON	5		
3649000000-E 876	Plain Rip Rap, Class B	TON	40		
3651000000-E SP	Boulders	TON	75		
3656000000-E 876	Geotextile for Drainage	SY	985		
4685000000-E 1205	Thermoplastic (4", 90 MILS)	LF	2000		
4900000000-N 1251	Permanent Raised Pavement Markers	EA	10		
6000000000-E 1605	Temporary Silt Fence	LF	1625		
6006000000-E 1610	Erosion Control Stone Class A	TON	90		
6009000000-E 1610	Erosion Control Stone Class B	TON	135		
6012000000-E 1610	Sediment Control Stone	TON	290		
6015000000-E 1615	Temporary Mulching	ACRE	1		
6018000000-E 1620	Seed for Temporary Seeding	LB	100		

6021000000-E 1620	Fertilizer for Temporary Seeding	TON	0.5		
6029000000-E SP	Safety Fence	LF	320		
6030000000-E 1630	Silt Excavation	CY	220		
6036000000-E 1631	Matting For Erosion Control	SY	7570		
6037000000-E 1629	Coir Fiber Mat	SY	100		
6042000000-E 1632	¼" Hardware Cloth	LF	315		
6070000000-N 1639	Special Stilling Basins	EA	10		
6071002000-E 1642	Flocculant	LB	25		
6084000000-E 1660	Seeding and Mulching	ACRE	3		
6087000000-E 1660	Mowing	ACRE	0.5		
6093000000-E 1661	Seed For Repair Seeding	LB	50		
6096000000-E 1662	Seed For Supplemental Seeding	LB	50		
6108000000-E 1665	Fertilizer Topdressing	TON	0.5		
6111000000-E SP	Impervious Dike	LF	195		
6114500000-N 1667	Specialized Hand Mowing	MHR	10		
6117000000-N 1675	Response for Erosion Control	EA	13		
6117500000-N SP	Concrete Washout Structure	EA	2		
6123000000-E 1670	Reforestation	ACRE	1.0		
<b>STRUCTURES</b>					
8021000000-N SP	Removal of Existing Structure at 13+82.50	LS	1		
8105520000-E 411	3'-0" Drilled Piers in Soil	LF	112		
8105620000-E 411	3'-0" Drilled Piers Not in Soil	LF	52		
8111200000-E 411	Permanent Steel Casing for 3'-0" Dia Drilled Pier	LF	144		
8115000000-N 411	CSL Testing	EA	2		
8121000000-N 412	Unclassified Structure Excavation	LS	1		
8175000000-E 420	Class AA Concrete	CY	58.6		
8182000000-E 420	Class A Concrete	CY	119		
8210000000-N 422	Bridge Approach Slabs	LS	1		
8217000000-E 425	Reinforcing Steel	LBS	38,833		
8224000000-E 425	Epoxy Coated Reinforcing Steel	LBS	2,908		
8238000000-E 425	Spiral Column Reinforcing	LBS	4,422		
8328200000-E 450	Pile Driving Setup for HP 12x53 Steel Piles	EA	20		
8364000000-E 450	HP 12X53 Steel Piles	LF	400		
8391000000-N 450	Steel Pile Points	EA	10		
8475000000-E 460	Two Bar Metal Rail	LF	256		
8517000000-E 460	1'-2"x3'-4¼" Concrete Parapet	LF	270		
8608000000-E 876	Rip Rap Class II (2'-0" Thick)	TON	622		

8622000000-E 876	Geotextile for Drainage	SY	692		
8657000000-N 430	Elastomeric Bearings	LS	1		
8762000000-E 430	3'-0"x1'-9" Prestressed Concrete Cored Slabs	LF	2430		
<b>UTILITY CONSTRUCTION</b>					
	Plug Existing 24" Sewer Pipe for Abandonment	EA	4		
	Remove Existing 24" Sewer Pipe	LF	65		
	Remove Existing Sewer Manhole	EA	1		
	Concrete Encasement For Existing 42" Sewer Pipe	LF	50		
	Adjust Existing Sewer Manhole Rim ~1FT	EA	1		
	Adjust Existing Sewer Manhole Rim ~4FT	EA	1		
.....					
<b>TOTAL BID</b> .....					
<b>15% CONTINGENCY</b> .....					
.....					

- This bid shall not add any unauthorized additions, deletions, or conditional bid.
- Bidder agrees that any and all excavations are unclassified.
- This bid will remain subject to acceptance for **thirty (30)** days after the date of submittal given above and that once accepted and the Contract executed between the City and the Contractor that the unit prices shall remain as submitted herewith for a period of **three hundred sixty-five (365)** days.
- Bidder agrees that the Work will be **substantially complete within 225 days after the Notice to Proceed is executed and complete, and ready for final payment on or within TWO HUNDRED AND SEVENTY (270) days** after the effective date of the contract (Notice to Proceed date). Time is of the essence.

**Do Not Separate the Bid Form and Signature of Bidder sheets from the Contract Document Book.**

**\*\*\*\*\* SIGNATURE OF BIDDER \*\*\*\*\***

***If an Individual***

Contractor's License Number: \_\_\_\_\_

License Expiration Date: \_\_\_\_\_

By: \_\_\_\_\_  
(signature of individual)

doing business as: \_\_\_\_\_

Business address: \_\_\_\_\_  
City: \_\_\_\_\_ State: \_\_\_\_\_ ZIP: \_\_\_\_\_

Phone No.: \_\_\_\_\_

Date: \_\_\_\_\_, 20\_\_

ATTEST: \_\_\_\_\_

***If a Partnership***

Contractor's License Number: \_\_\_\_\_

License Expiration Date: \_\_\_\_\_

By: \_\_\_\_\_  
(firm name)

\_\_\_\_\_  
(signature of general partner)

doing business as: \_\_\_\_\_

Business address: \_\_\_\_\_  
City: \_\_\_\_\_ State: \_\_\_\_\_ ZIP: \_\_\_\_\_

Phone No.: \_\_\_\_\_

Date: \_\_\_\_\_, 20\_\_

ATTEST: \_\_\_\_\_ Title: \_\_\_\_\_

***If a Corporation***

Contractor's License Number: \_\_\_\_\_

License Expiration Date: \_\_\_\_\_

By: \_\_\_\_\_  
(corporation name)

\_\_\_\_\_ Title: \_\_\_\_\_  
(signature of authorized official)

Business address: \_\_\_\_\_  
City: \_\_\_\_\_ State: \_\_\_\_\_ ZIP: \_\_\_\_\_

Phone No.: \_\_\_\_\_

Date: \_\_\_\_\_, 20\_\_

ATTEST: \_\_\_\_\_ Title: \_\_\_\_\_

(Seal)

**If a Joint Venture (OTHER PARTY MUST SIGN BELOW)**

***If an Individual***

Contractor's License Number: \_\_\_\_\_

License Expiration Date: \_\_\_\_\_

By: \_\_\_\_\_  
(signature of individual)

doing business as: \_\_\_\_\_

Business address: \_\_\_\_\_  
City: \_\_\_\_\_ State: \_\_\_\_\_ ZIP: \_\_\_\_\_

Phone No.: \_\_\_\_\_

Date: \_\_\_\_\_, 20\_\_

ATTEST: \_\_\_\_\_

***If a Partnership***

Contractor's License Number: \_\_\_\_\_

License Expiration Date: \_\_\_\_\_

By: \_\_\_\_\_  
(firm name)

\_\_\_\_\_  
(signature of general partner)

doing business as: \_\_\_\_\_

Business address: \_\_\_\_\_  
City: \_\_\_\_\_ State: \_\_\_\_\_ ZIP: \_\_\_\_\_

Phone No.: \_\_\_\_\_

Date: \_\_\_\_\_, 20\_\_

ATTEST: \_\_\_\_\_ Title: \_\_\_\_\_

***If a Corporation***

Contractor's License Number: \_\_\_\_\_

License Expiration Date: \_\_\_\_\_

By: \_\_\_\_\_  
(corporation name)

\_\_\_\_\_  
(signature of authorized official) Title: \_\_\_\_\_

Business address: \_\_\_\_\_  
City: \_\_\_\_\_ State: \_\_\_\_\_ ZIP: \_\_\_\_\_

Phone No.: \_\_\_\_\_

Date: \_\_\_\_\_, 20\_\_

ATTEST: \_\_\_\_\_ Title: \_\_\_\_\_

(Seal)

- Continued Next Page -

**DEBARRED FIRMS CERTIFICATION FORM**

FROM: City of Concord City Council  
P.O. Box 308, 35 Cabarrus Ave., W.  
Concord, North Carolina 28026-0308

TO: Bidders of **Lincoln Street Bridge Replacement**

The undersigned hereby certifies that the firm of \_\_\_\_\_  
has not been suspended by the State of North Carolina or any Agency or Department thereof for  
conviction or indictment or any of the offences enumerated in N.C.G.S. 133-27 nor will award  
any subcontracts of any tier to firms that have been suspended for conviction or indictment of any  
of the offenses enumerated in N.C.G.S. 133-27.

\_\_\_\_\_  
Name of firm

\_\_\_\_\_  
Signature of authorized official

Title: \_\_\_\_\_

ATTEST: \_\_\_\_\_

Title: \_\_\_\_\_

(Seal)

\_\_\_\_\_ County  
North Carolina

Sworn and Subscribed before me this the \_\_\_ day of \_\_\_\_\_, 20\_\_

\_\_\_\_\_  
Signature of Notary Public

\_\_\_\_\_  
(Print or type name of Notary Public)

13+00 13+50 14+00 14+50 15+00

**GRADE DATA**  
 (-)8.2129% (-)1.9270%  
 PI = 12+00.00  
 EL = 588.20'  
 VC = 165'

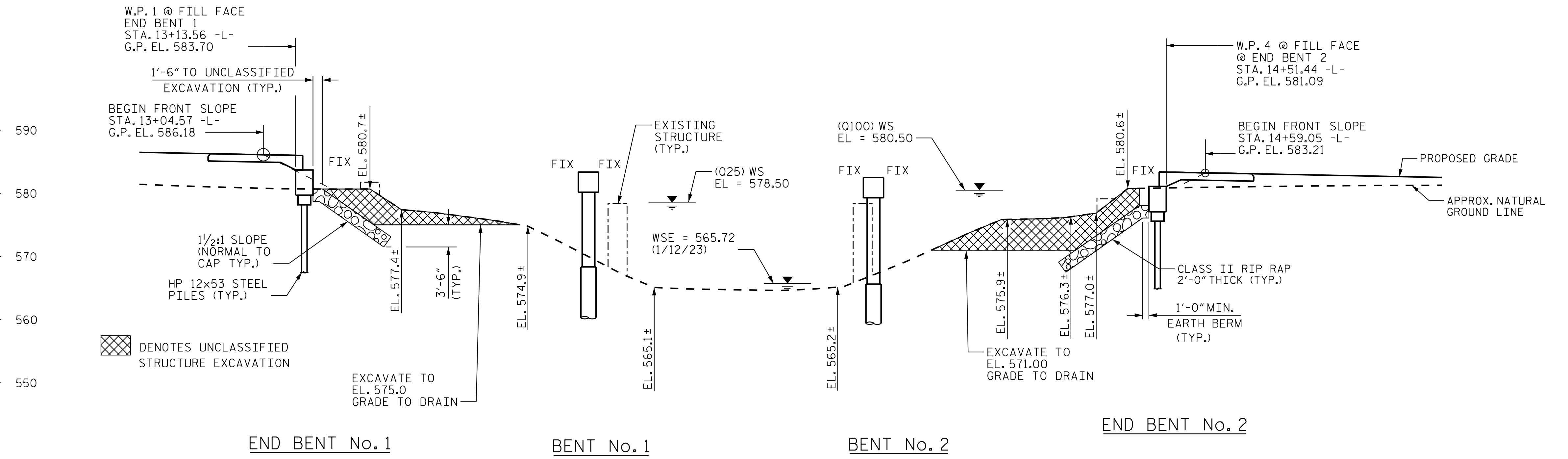
**SPAN A**

**SPAN B**

**SPAN C**

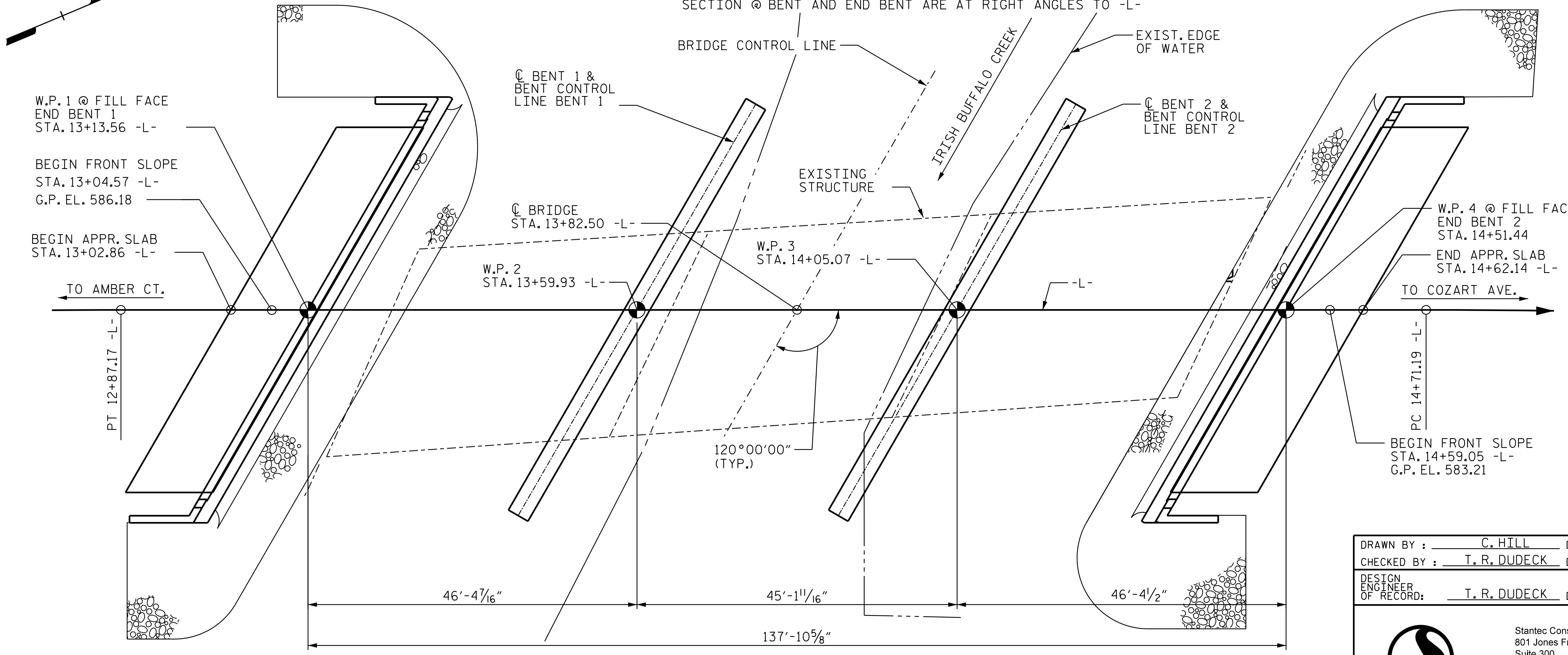
**HYDRAULIC DESIGN DATA**

DESIGN DISCHARGE	5400 CFS.
FREQUENCY	25 YR.
DESIGN HIGH WATER EL.	578.5
DRAINAGE AREA	36.4 SQ. MI.
BASE DISCHARGE(Q100)	7100 CFS.
BASE HIGH WATER EL.	580.5
OVERTOPPING FLOOD DATA	
OVERTOPPING DISCHARGE	6500+ CFS.
FREQUENCY	100+ YR.
OVERTOPPING EL.	578.5
RIVER STATION	29791



**SECTION ALONG C -L-**

SECTION @ BENT AND END BENT ARE AT RIGHT ANGLES TO -L-



**PLAN**

PILES AND COLUMNS NOT SHOWN IN PLAN VIEW

PROJECT NO. N/A  
 CABARRUS COUNTY  
 STATION: 13+82.50

SHEET 1 OF 5 REPLACES BRIDGE #120320

CITY OF CONCORD, NC  
**GENERAL DRAWING**  
 FOR BRIDGE OVER IRISH BUFFALO CREEK  
 ON LINCOLN STREET (-L-)  
 BETWEEN COZART AVE. AND  
 AMBER CT.

DRAWN BY : C. HILL DATE : 3/27/23  
 CHECKED BY : T. R. DUDECK DATE : 3/27/23  
 DESIGN ENGINEER OF RECORD : T. R. DUDECK DATE : 02/23/24

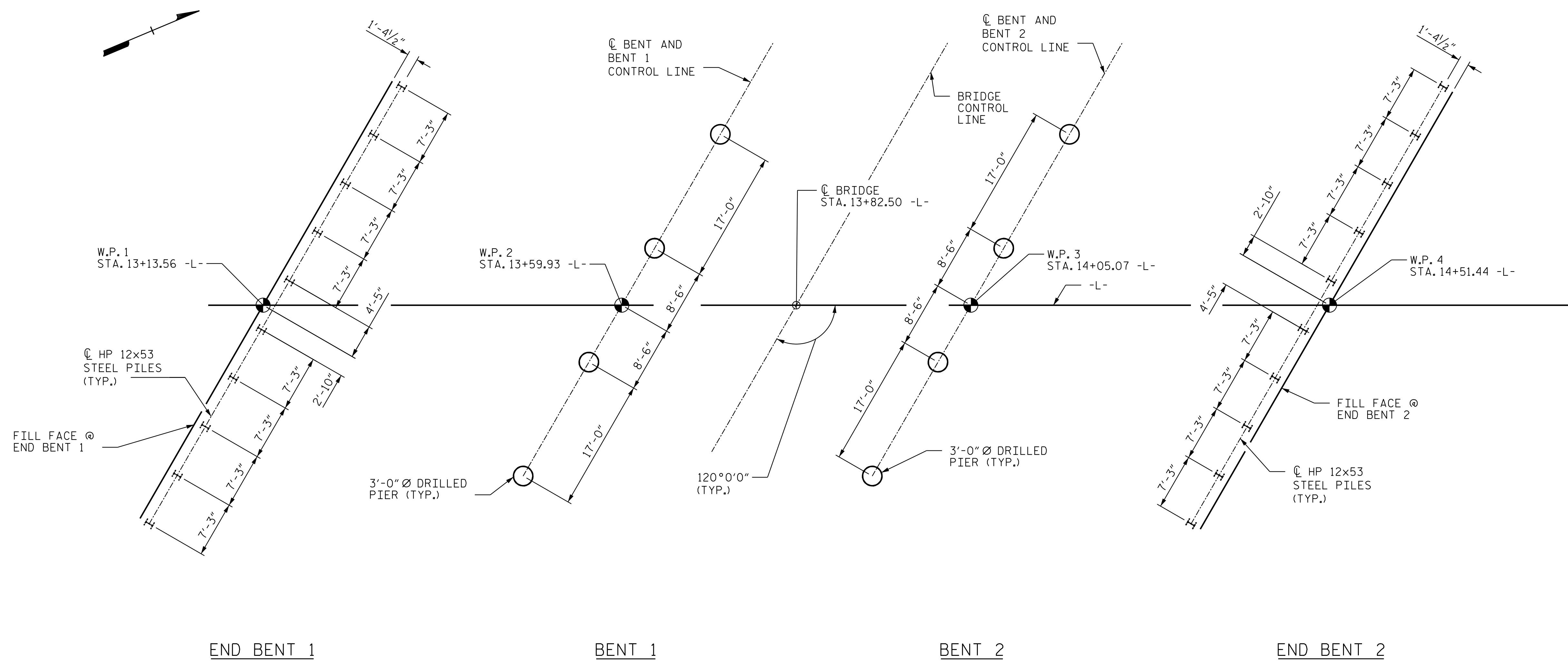
Stantec Consulting Services Inc.  
 801 Jones Franklin Road  
 Suite 300  
 Raleigh, NC 27606  
 Tel. (919) 851-6866  
 Fax. (919) 851-7024  
 www.stantec.com  
 License No. F-0672

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			S-1
2			4			TOTAL SHEETS 25

2/23/2024 5:55:27 PM  
 U:\Structures\Bridges - Replacement\Dr of Iring\Final\2544\_SMU\_GD\_01.dgn  
 19316





### FOUNDATION LAYOUT

DIMENSIONS LOCATING PILES AND DRILLED PIERS ARE SHOWN TO CENTERLINE OF PILES AND DRILLED PILES

#### NOTES:

- FOR PILES, SEE SPECIAL PROVISION AND SECTION 450 OF THE STANDARD SPECIFICATIONS.
- IT HAS BEEN ESTIMATED THAT A HAMMER WITH AN EQUIVALENT RATED ENERGY IN THE RANGE OF 30-40 FT-LBS PER BLOW WILL BE REQUIRED TO DRIVE PILES AT END BENT NO. 1 AND END BENT NO. 2.
- FOR DRILLED PIERS, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.
- PERMANENT STEEL CASINGS MAY BE REQUIRED FOR DRILLED PIERS AT BENT NO. 1 AND BENT NO. 2. IF REQUIRED, DO NOT EXTEND PERMANENT CASINGS BEYOND THE TOP OF BEDROCK WITHOUT PRIOR APPROVAL FROM THE ENGINEER. THE ENGINEER WILL DETERMINE THE NEED FOR PERMANENT CASINGS.
- MONITOR THE APPROACH FILL AT END BENT NO. 2 RIGHT LANE FOR SETTLEMENT AFTER CONSTRUCTING THE APPROACH FILL TO GRADE. CONSTRUCT THE APPROACH SLAB AFTER THE SETTLEMENT RATE IS LESS THAN 0.10 INCH OVER A PERIOD OF FOUR WEEKS.

PROJECT NO.        N/A         
       CABARRUS        COUNTY  
 STATION:        13+82.50       

SHEET 2 OF 5

CITY OF CONCORD, NC  
**GENERAL DRAWING**  
 FOR BRIDGE OVER IRISH BUFFALO CREEK  
 ON LINCOLN STREET (-L-)  
 BETWEEN COZART AVE. AND  
 AMBER CT.

DRAWN BY :        J. B. GEILE        DATE : 04/11/23  
 CHECKED BY :        T. R. DUDECK        DATE : 07/13/23  
 DESIGN ENGINEER OF RECORD:        T. R. DUDECK        DATE : 02/23/24

Stantec Consulting Services Inc.  
 801 Jones Franklin Road  
 Suite 300  
 Raleigh, NC 27606  
 Tel. (919) 851-6866  
 Fax. (919) 851-7024  
 www.stantec.com  
 License No. F-0672



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	TOTAL SHEETS
1			3			S-2
2			4			25

2/23/2024 5:55:28 PM  
 J:\Projects\2024\240224\240224.dgn  
 J:\Structures\Bridges\_Replacement\Dr-of-fing\Final\2544\_SMU\_FL.dgn

## SUMMARY OF PILE INFORMATION/ INSTALLATION

(BLANK ENTRIES INDICATE ITEM IS NOT APPLICABLE TO STRUCTURE)

END BENT/ BENT NO. PILE (S) + - # (e.g., BENT 1, PILES 1-5)	FACTORED RESISTANCE PER PILE TONS	PILE CUT-OFF (TOP OF PILE) ELEVATION FT	ESTIMATED PILE LENGTH PER PILE FT	SCOUR CRITICAL ELEVATION FT	MIN. PILE TIP (TIP NO HIGHER THAN) ELEV FT	REQUIRED DRIVING RESISTANCE (RDR)** PER PILE TONS	TOTAL PILE REDRIVES QUANTITY EACH	PREDRILLING LENGTH PER PILE LIN FT	PREDRILLING ELEVATION (ELEV NOT TO PREDRILL BELOW) FT	MAXIMUM PREDRILLING DIA INCHES	PILE EXCAVATION (BOTTOM OF HOLE) ELEV FT	PILE EXC NOT IN SOIL PER PILE LIN FT	PILE EXC IN SOIL PER PILE LIN FT
END BENT 1	91	581.8	20			155							
END BENT 2	91	579.3	30			185							

\* PREDRILLING FOR PILES IS REQUIRED FOR END BENTS/ BENT WITH A PREDRILLING LENGTH AND AT THE CONTRACTOR'S OPTION FOR END BENTS/ BENTS WITH PREDRILLING INFORMATION BUT NO PREDRILLING LENGTH.

\*\* RDR=  $\frac{\text{FACTORED RESISTANCE} + \text{FACTORED DOWNDRAY LOAD} + \text{FACTORED DEAD LOAD}}{\text{DYNAMIC RESISTANCE FACTOR}} + \text{NORMAL DOWNDRAG RESISTANCE} + \frac{\text{NORMAL SCOUR RESISTANCE}}{\text{SCOUR RESISTANCE FACTOR}}$

## PILE DESIGN INFORMATION

(BLANK ENTRIES INDICATE ITEM IS NOT APPLICABLE TO STRUCTURE)

END BENT/ BENT NO. PILE (S) + - # (e.g., BENT 1, PILES 1-5)	FACTORED AXIAL LOAD PER PILE TONS	FACTORED DOWNDRAG LOAD PER PILE FT	FACTORED DEAD LOAD* PER PILE TONS	DYNAMIC RESISTANCE FACTOR	NOMINAL DOWNDRAG RESISTANCE PER PILE TONS	NOMINAL SCOUR RESISTANCE PER PILE TONS	SCOUR RESISTANCE FACTOR (DEFAULT=1.00)
END BENT 1	91			0.60			1.00
END BENT 2	91	12		0.60	9		1.00

\* FACTORED DEAD LOAD IS FACTORED WEIGHT OF PILE ABOVE THE GROUND LINE.

## SUMMARY OF DRILLED PIER INFORMATION/ INSTALLATION

(BLANK ENTRIES INDICATE ITEM IS NOT APPLICABLE TO STRUCTURE)

END BENT/ BENT NO. PILE (S) + - # (e.g., BENT 1, PILES 1-3)	FACTORED RESISTANCE PER PIER TONS	MINIMUM PIER TIP (TIP NO HIGHER THAN) ELEV. FT	REQUIRED TIP RESISTANCE PER PIER TSF	SCOUR CRITICAL ELEVATION FT	MIN. DRILLED PIER PENETRATION INTO ROCK PER PIER LIN FT	DRILLED PIER LENGTH* PER PIER LIN FT	DRILLED PIER LENGTH NOT IN SOIL* PER PIER LIN FT	DRILLED PIER LENGTH IN SOIL* PER PIER LIN FT	PERMANENT STEEL CASING REQUIRED? YES OR MAYBE	PERMANENT STEEL CASING TIP ELEVATION (ELEV NOT TO EXTEND CASING BELOW) FT	PERMANENT STEEL CASING LENGTH** PER PIER LIN FT
BENT 1	258	552.0		545	7.0		7.0	14.0	MAYBE	TOP OF BEDROCK	18.0
BENT 2	258	552.0		545	7.0		7.0	14.0	MAYBE	TOP OF BEDROCK	18.0
TOTAL QTY:						168.0					144

\* DRILLED PIER LENGTH, DRILLED PIER LENGTH NOT IN SOIL AND DRILLED PIER LENGTH IN SOIL REPRESENT ESTIMATED DRILLED PIER QUANTITIES AND ARE MEASURED AND PAID FOR AS EITHER "36 INCH DIA. DRILLED PIERS" OR "36 INCH DIA. DRILLED PIERS NOT IN SOIL" AND "36 INCH DIA. DRILLED PIERS IN SOIL" IN ACCORDANCE WITH ARTICLE 411-7 OF THE NCDOT STANDARD SPECIFICATIONS.  
\*\* PERMANENT STEEL CASING LENGTH EQUALS THE DIFFERENCE BETWEEN THE GROUND LINE OR TOP OF DRILLED PIER ELEVATION, WHICHEVER IS HIGHER, AND THE PERMANENT CASING TIP ELEVATION AND IS MEASURED AND PAID FOR AS "PERMANENT STEEL CASING FOR 36" DIA. DRILLED PIER" IN ACCORDANCE WITH ARTICLE 411-7 OF THE NCDOT STANDARD SPECIFICATIONS.

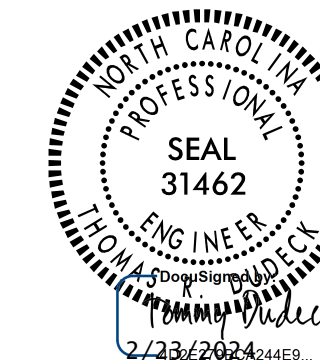
**NOTES:**

- THE PILE FOUNDATION TABLES ARE BASED ON THE BRIDGE SUBSTRUCTURE DESIGN AND FOUNDATION RECOMMENDATIONS SEALED BY A NORTH CAROLINA PROFESSIONAL ENGINEER (THOMAS J. DAILY, 045672) ON 06-13-2023.
- TOTAL PILE DRIVING EQUIPMENT SETUP QUANTITY (NOT SHOWN IN PILE FOUNDATION TABLES) EQUALS THE NUMBER OF DRIVEN PILES, I.E., THE NUMBER OF PILES WITH A REQUIRED DRIVING RESISTANCE.
- THE ENGINEER WILL DETERMINE THE NEED FOR PDA TESTING, PIPE PILE PLATES, PERMANENT STEEL CASING, SPTS, CSL TESTING, SID INSPECTIONS AND PITS WHEN THESE ITEMS MAY BE REQUIRED.

DRAWN BY : K. A. WOYAHN DATE : 07/06/23  
 CHECKED BY : T. R. DUDECK DATE : 08/23/23  
 DESIGN ENGINEER OF RECORD: T. R. DUDECK DATE : 02/23/24



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PROJECT NO. N/A  
CABARRUS COUNTY  
 STATION: 13+82.50

SHEET 3 OF 5

CITY OF CONCORD, NC

FOUNDATION LAYOUT TABLES

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	TOTAL SHEETS
1			3			25
2			4			

+

+

## SUMMARY OF PILE ACCESSORIES

(BLANK ENTRIES INDICATE ITEM IS NOT APPLICABLE TO STRUCTURE)

END BENT/ BENT NO. PILE (s) #-# (e.g., BENT 1, PILES 1-5')	PIPE PILE PLATES REQUIRED YES OR MAYBE	STEEL PILE POINTS			STEEL PILE TIPS REQUIRED? YES
		PIPE PILE CUTTING SHOES REQUIRED? YES	PIPE PILE CONICAL POINTS REQUIRED? YES	H-PILE POINTS REAUired? YES	
END BENT 1	YES			YES	
TOTAL QTY.				10	

## SUMMARY OF DRILLED PIER TESTING

(BLANK ENTRIES INDICATE ITEM IS NOT APPLICABLE TO STRUCTURE)

END BENT/ BENT NO. PILE (s) #-# (e.g., BENT 1, PIERS 1-3')	STANDARD PENETRATION TEST (SPT) REQUIRED? YES OR MAYBE	CROSSHOLE SONIC LOGGING (CSL) REQUIRED? YES OR MAYBE	TOTAL CSL TUBE LENGTH (FOR ALL TUBES) PER PIER LIN FT	SHAFT INSPECTION DEVICE (SID) REQUIRED? YES OR MAYBE	PILE INTEGRITY TEST (PIT) REQUIRED? MAYBE
BENT 1		YES	90.0		
BENT 2		YES	90.0		
TOTAL QTY.			720.0		

\* CSL TUBES ARE REQUIRED IF CSL TESTING IS OR MAY BE REQUIRED. THE NUMBER OF CSL TUBES PER DRILLED PIER IS EQUAL TO ONE TUBE PER FOOT OF DESIGN PIER DIAMETER WITH AT LEAST 4 TUBES PER PIER. THE LENGTH OF EACH CSL TUBE IS EQUAL TO THE DRILLED PIER LENGTH PLUS 1.5 FT.

PROJECT NO.     N/A      
    CABARRUS     COUNTY  
 STATION:     13+82.50    

SHEET 4 OF 5

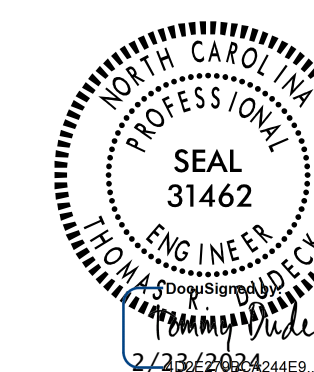
CITY OF CONCORD, NC

### FOUNDATION LAYOUT TABLES

DRAWN BY :     K. A. WOYAHN     DATE : 07/06/23  
 CHECKED BY :     T. R. DUDECK     DATE : 08/23/23  
 DESIGN ENGINEER OF RECORD:     T. R. DUDECK     DATE : 02/23/24



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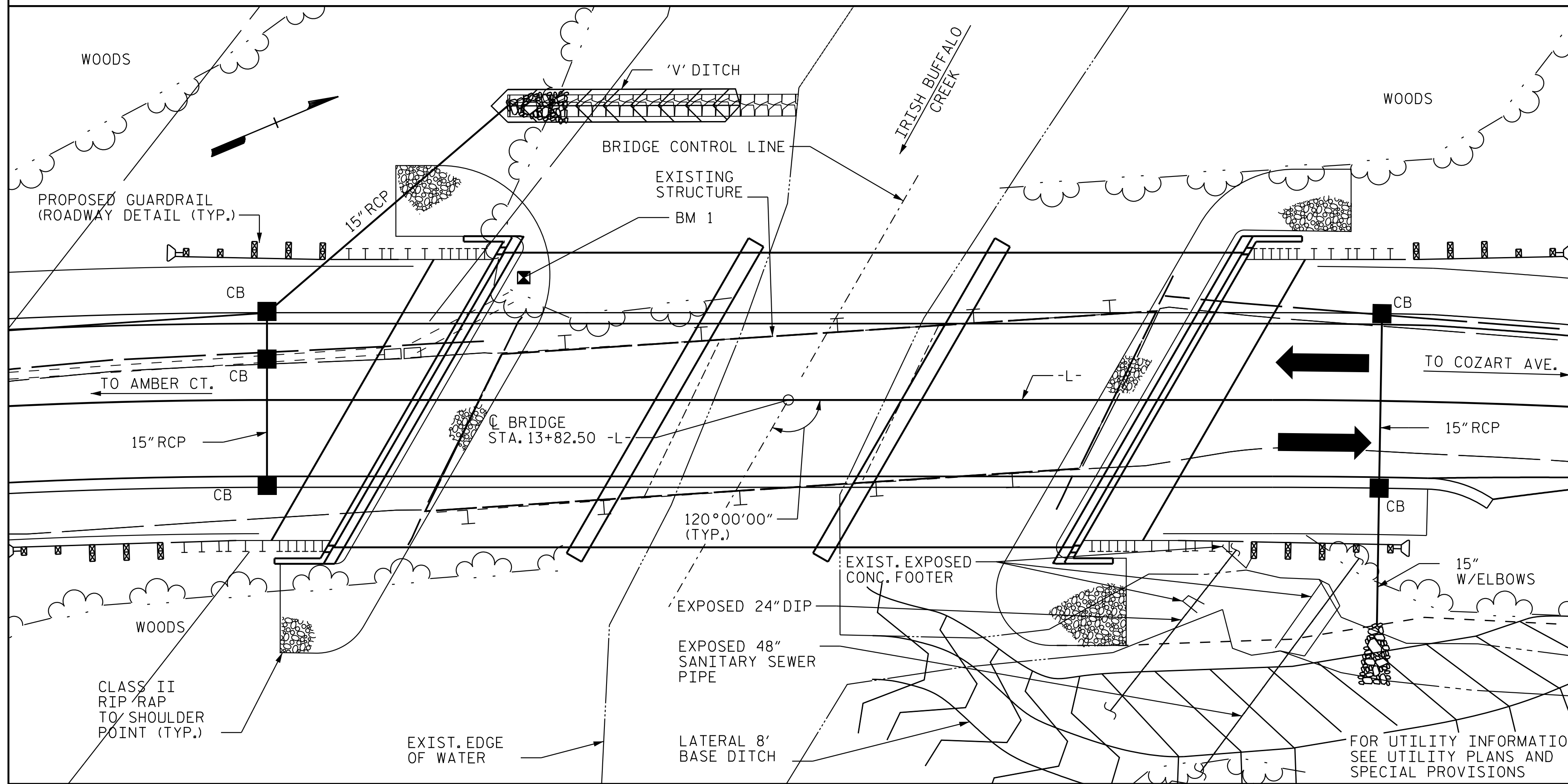
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 SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-4
1			3			TOTAL SHEETS
2			4			25

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BM #1: PK IN ROOT OF 20 INCH SYCAMORE N600562.602 E1528754.836, STA. 13+08.51 -L-, 5.61' LT. EL. 577.74



LOCATION SKETCH

TOTAL BILL OF MATERIAL

	REMOVAL OF EXISTING STRUCTURE AT STA. 13+82.50 -L-	3'-0" DIA. DRILLED PIERS IN SOIL	3'-0" DIA. DRILLED PIERS NOT IN SOIL	PERMANENT STEEL CASING FOR 3'-0" DIA. DRILLED PIER	CSL TESTING	UNCLASSIFIED STRUCTURE EXCAVATION	CLASS AA CONCRETE	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	EPOXY COATED REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL
	LUMP SUM	LIN. FT.	LIN. FT.	LIN. FT.	EA.	LUMP SUM	CU. YDS.	CU. YDS.	LUMP SUM	LBS.	LBS.	LBS.
SUPERSTRUCTURE							58.6		LUMP SUM		2908	
END BENT NO. 1						LUMP SUM		26.9		4335		
BENT NO. 1		56.0	28.0	72.0	1			32.4		15533		2256
BENT NO. 2		56.0	28.0	72.0	1			32.1		14630		2166
END BENT NO. 2						LUMP SUM		26.9		4335		
TOTAL	LUMP SUM	112.0	56.0	144.0	2	LUMP SUM	58.6	118.3	LUMP SUM	38833	2908	4422

TOTAL BILL OF MATERIAL

	PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES	HP 12 X 53 STEEL PILES	STEEL PILE POINTS	TWO BAR METAL RAIL	1'-2" X 3'-4 1/4" CONCRETE PARAPET	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS	3'-0" X 1'-9" PRESTRESSED CONCRETE CORED SLABS	
EA.	NO.	LIN. FT.	EA.	LIN. FT.	LIN. FT.	TONS	SO. YDS.	LUMP SUM	NO.	LIN. FT.
				255.5	270.0			LUMP SUM	54	2430.0
10	10	200	10			295	328			
10	10	200				327	364			
20	20	400		255.5	270.0	622	692	LUMP SUM	54	2430.0

NOTES

- ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING
- THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.
- THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.
- FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.
- REMOVAL OF THE EXISTING BRIDGE SHALL BE PERFORMED IN A MANNER THAT PREVENTS DEBRIS FROM FALLING INTO THE WATER. THE CONTRACTOR SHALL SUBMIT DEMOLITION PLANS FOR REVIEW AND REMOVE THE BRIDGE IN ACCORDANCE WITH ARTICLE 402-2 OF THE STANDARD SPECIFICATIONS.
- THE MATERIAL SHOWN IN THE CROSS-HATCHED AREA SHALL BE EXCAVATED FOR A DISTANCE OF 40 FT EACH SIDE OF CENTERLINE ROADWAY AS DIRECTED BY THE ENGINEER. THIS WORK WILL BE PAID FOR AT THE CONTRACT LUMP SUM PRICE FOR UNCLASSIFIED STRUCTURE EXCAVATION. SEE SECTION 412 OF THE STANDARD SPECIFICATIONS.
- THE SUBSTRUCTURE OF THE EXISTING BRIDGE INDICATED ON THE PLANS IS FROM THE BEST INFORMATION AVAILABLE. SINCE THIS INFORMATION IS SHOWN FOR THE CONVENIENCE OF THE CONTRACTOR, THE CONTRACTOR SHALL HAVE NO CLAIM WHATSOEVER AGAINST THE DEPARTMENT OF TRANSPORTATION FOR ANY DELAYS OR ADDITIONAL COST INCURRED BASED ON DIFFERENCES BETWEEN THE EXISTING BRIDGE SUBSTRUCTURE SHOWN ON THE PLANS AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.
- THIS STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH "HEC 18- EVALUATING SCOUR AT BRIDGES."
- FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.
- FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.
- FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.
- ASPHALT WEARING SURFACE IS INCLUDED IN ROADWAY QUANTITY ON ROADWAY PLANS.
- FOR ASBESTOS ASSESSMENT FOR BRIDGE DEMOLITION AND RENOVATION ACTIVITIES, SEE SPECIAL PROVISIONS.
- INASMUCH AS THE PAINT SYSTEM ON THE EXISTING STRUCTURAL STEEL CONTAINS LEAD, THE CONTRACTOR'S ATTENTION IS DIRECTED TO ARTICLE 107-1 OF THE STANDARD SPECIFICATIONS. ANY COSTS RESULTING FROM COMPLIANCE WITH APPLICABLE STATE OR FEDERAL REGULATIONS PERTAINING TO HANDLING OF MATERIALS CONTAINING LEAD BASED PAINT SHALL BE INCLUDED IN THE BID PRICE FOR "REMOVAL OF EXISTING STRUCTURE AT STATION 13+82.50."

FOR OTHER DESIGN DATA AND GENERAL NOTES, SEE SHEET SN.  
FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

PROJECT NO. N/A  
CABARRUS COUNTY  
STATION: 13+82.50

SHEET 5 OF 5

CITY OF CONCORD, NC

GENERAL DRAWING

FOR BRIDGE IRISH BUFFALO CREEK ON LINCOLN STREET (-L-) BETWEEN COZART AVE. AND AMBER CT.

DRAWN BY: C. HILL DATE: 3/27/23  
CHECKED BY: T. R. DUDECK DATE: 3/27/23  
DESIGN ENGINEER OF RECORD: T. R. DUDECK DATE: 02/23/24

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-5
1	TRD	2/23/24	3			TOTAL SHEETS 25
2			4			

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## LOAD AND RESISTANCE FACTOR RATING (LRFD) SUMMARY FOR PRESTRESSED CONCRETE GIRDERS

LEVEL	VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING	MINIMUM RATING FACTORS (RF)	TONS = W X RF	STRENGTH I LIMIT STATE										SERVICE III LIMIT STATE					COMMENT NUMBER			
						MOMENT					SHEAR					MOMENT								
						LIVELOAD FACTORS	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	LIVELOAD FACTORS	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN		GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING	HL-93(Inv)	N/A	1	1.02	--	1.75	0.730	1.86	45'	EL	21.90	0.726	1.02	45'	EL	1.50	0.80	0.730	2.14	45'	EL	21.90		
	HL-93(0pr)	N/A	--	1.35	--	1.35	0.730	2.41	45'	EL	21.90	0.726	1.35	45'	EL	1.50	N/A	--	--	--	--	--		
	HS-20(Inv)	36.000	2	1.22	43.9	1.75	0.730	2.28	45'	EL	21.90	0.726	1.22	45'	EL	1.50	0.80	0.730	2.63	45'	EL	21.90		
	HS-20(0pr)	36.000	--	1.61	58.0	1.35	0.730	2.95	45'	EL	21.90	0.726	1.61	45'	EL	1.50	N/A	--	--	--	--	--		
LEGAL LOAD RATING	SV	SNSH	13.500	--	3.56	48.1	1.4	0.730	5.56	45'	EL	21.90	0.726	3.56	45'	EL	1.50	0.80	0.730	5.13	45'	EL	21.90	
		SNGARBS2	20.000	--	1.48	29.6	1.4	0.730	2.45	45'	EL	21.90	0.726	1.48	45'	EL	1.50	0.80	0.730	2.26	45'	EL	21.90	
		SNAGRIS2	22.000	--	1.42	31.2	1.4	0.730	2.25	45'	EL	21.90	0.726	1.42	45'	EL	1.50	0.80	0.730	2.08	45'	EL	21.90	
		SNCOTTS3	27.250	--	1.53	41.7	1.4	0.730	2.39	45'	EL	21.90	0.726	1.53	45'	EL	1.50	0.80	0.730	2.20	45'	EL	21.90	
		SNAGGRS4	34.925	--	1.43	49.9	1.4	0.730	2.14	45'	EL	21.90	0.726	1.43	45'	EL	1.50	0.80	0.730	1.98	45'	EL	21.90	
		SNS5A	35.550	--	1.73	61.5	1.4	0.730	2.77	45'	EL	21.90	0.726	1.73	45'	EL	1.50	0.80	0.730	2.56	45'	EL	21.90	
		SNS6A	39.950	--	2.42	96.7	1.4	0.730	4.36	45'	EL	17.40	0.726	2.42	45'	EL	1.50	0.80	0.730	4.06	45'	EL	17.40	
	SNS7B	42.000	--	2.58	108.4	1.4	0.730	4.49	45'	EL	21.90	0.726	2.58	45'	EL	1.50	0.80	0.730	4.15	45'	EL	21.90		
	TTST	TNAGRIT3	33.000	--	1.67	55.1	1.4	0.730	2.76	45'	EL	21.90	0.726	1.67	45'	EL	1.50	0.80	0.730	2.55	45'	EL	21.90	
		TNT4A	33.075	--	1.61	53.3	1.4	0.730	2.79	45'	EL	21.90	0.726	1.61	45'	EL	1.50	0.80	0.730	2.58	45'	EL	21.90	
		TNT6A	41.600	--	1.56	64.9	1.4	0.730	2.34	45'	EL	21.90	0.726	1.56	45'	EL	1.50	0.80	0.730	2.16	45'	EL	21.90	
		TNT7A	42.000	--	1.43	60.1	1.4	0.730	2.39	45'	EL	21.90	0.726	1.43	45'	EL	1.50	0.80	0.730	2.21	45'	EL	21.90	
		TNT7B	42.000	--	1.36	57.1	1.4	0.730	2.48	45'	EL	21.90	0.726	1.36	45'	EL	1.50	0.80	0.730	2.30	45'	EL	21.90	
		TNAGRIT4	43.000	--	1.31	56.3	1.4	0.730	2.37	45'	EL	21.90	0.726	1.31	45'	EL	1.50	0.80	0.730	2.19	45'	EL	21.90	
TNAGT5A		45.000	--	1.34	60.3	1.4	0.730	2.20	45'	EL	21.90	0.726	1.34	45'	EL	1.50	0.80	0.730	2.03	45'	EL	21.90		
TNAGT5B	45.000	3	1.23	55.4	1.4	0.730	2.15	45'	EL	21.90	0.726	1.23	45'	EL	1.50	0.80	0.730	1.99	45'	EL	21.90			

**LOAD FACTORS:**

DESIGN LOAD RATING FACTORS	LIMIT STATE	$\gamma_{DC}$	$\gamma_{DW}$
	STRENGTH I	1.25	1.50
	SERVICE III	1.00	1.00

**NOTES:**

MINIMUM RATING FACTORS ARE BASED ON THE STRENGTH I AND SERVICE III LIMIT STATES.  
ALLOWABLE STRESSES FOR SERVICE III LIMIT STATE ARE AS REQUIRED FOR DESIGN.

# CONTROLLING LOAD RATING

1 DESIGN LOAD RATING (HL-93)

2 DESIGN LOAD RATING (HS-20)

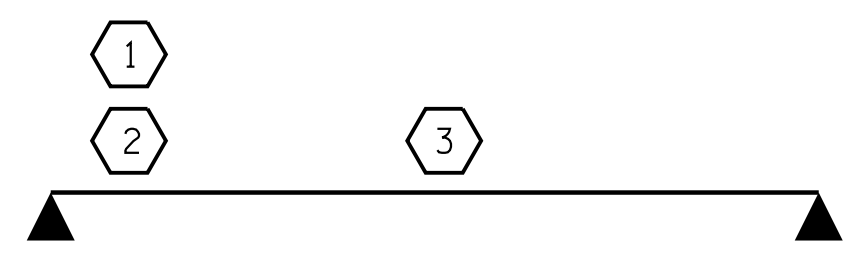
3 LEGAL LOAD RATING \*\*

\*\* SEE CHART FOR VEHICLE TYPE

---

GIRDER LOCATION

I - INTERIOR GIRDER  
EL - EXTERIOR LEFT GIRDER  
ER - EXTERIOR RIGHT GIRDER



**LRFR SUMMARY**  
FOR SPAN A

PROJECT NO. N/A  
CABARRUS COUNTY  
STATION: 13+82.50

DRAWN BY : K. A. WOYAHN DATE : 05/15/23  
CHECKED BY : T. R. DUDECK DATE : 08/23/23  
DESIGN ENGINEER OF RECORD: T. R. DUDECK DATE : 02/23/24

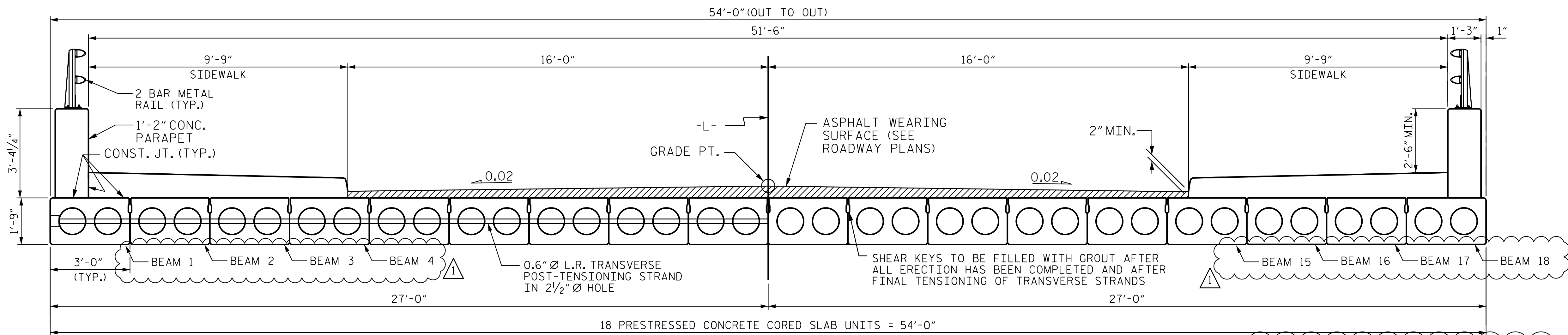
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CITY OF CONCORD, NC

STANDARD  
LRFR SUMMARY FOR  
45' CORED SLAB UNIT  
60° SKEW & 120° SKEW  
(NON-INTERSTATE TRAFFIC)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-6
1			3			TOTAL SHEETS
2			4			25



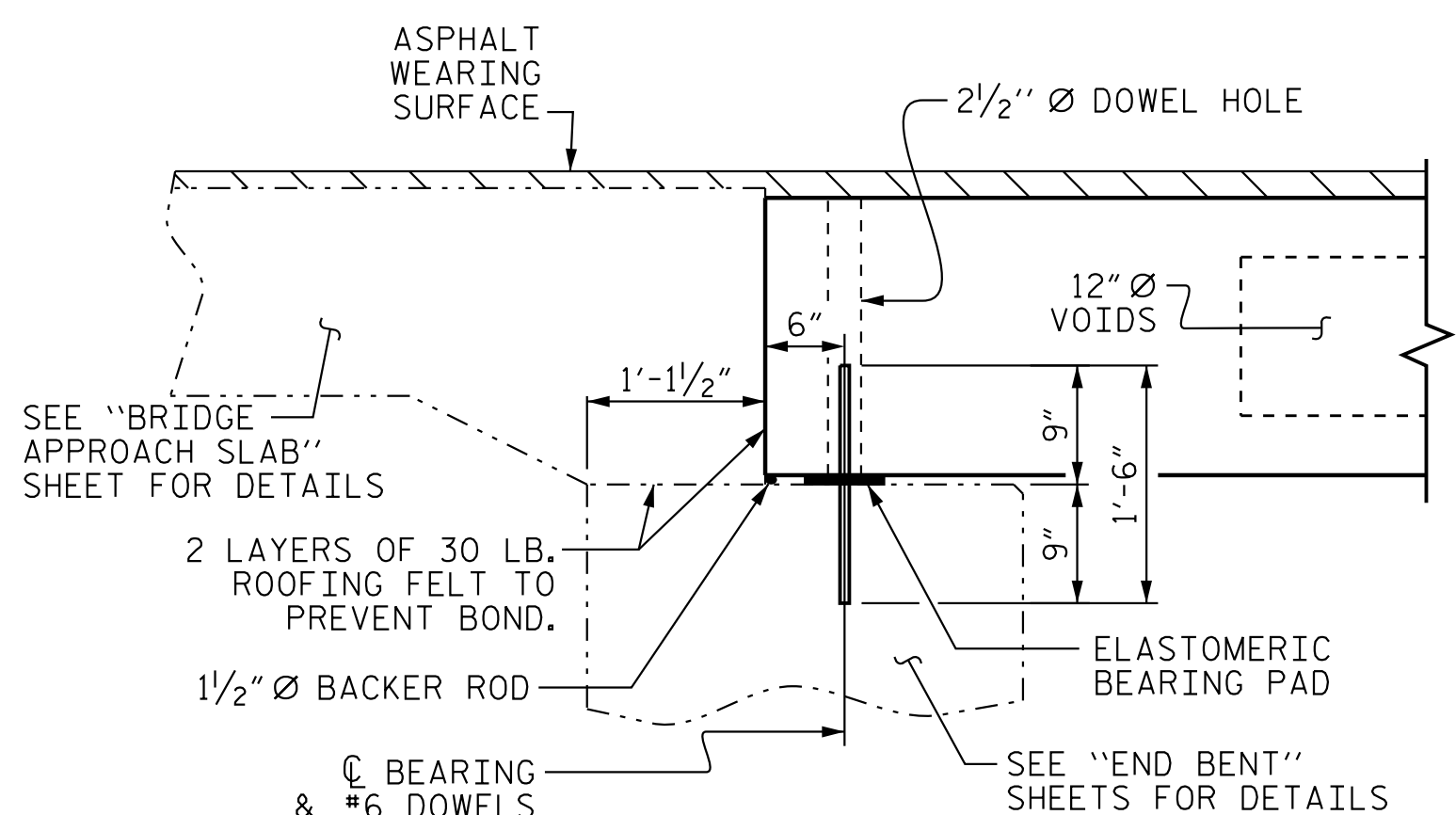
HALF SECTION AT INTERMEDIATE DIAPHRAGMS

HALF SECTION THROUGH VOIDS

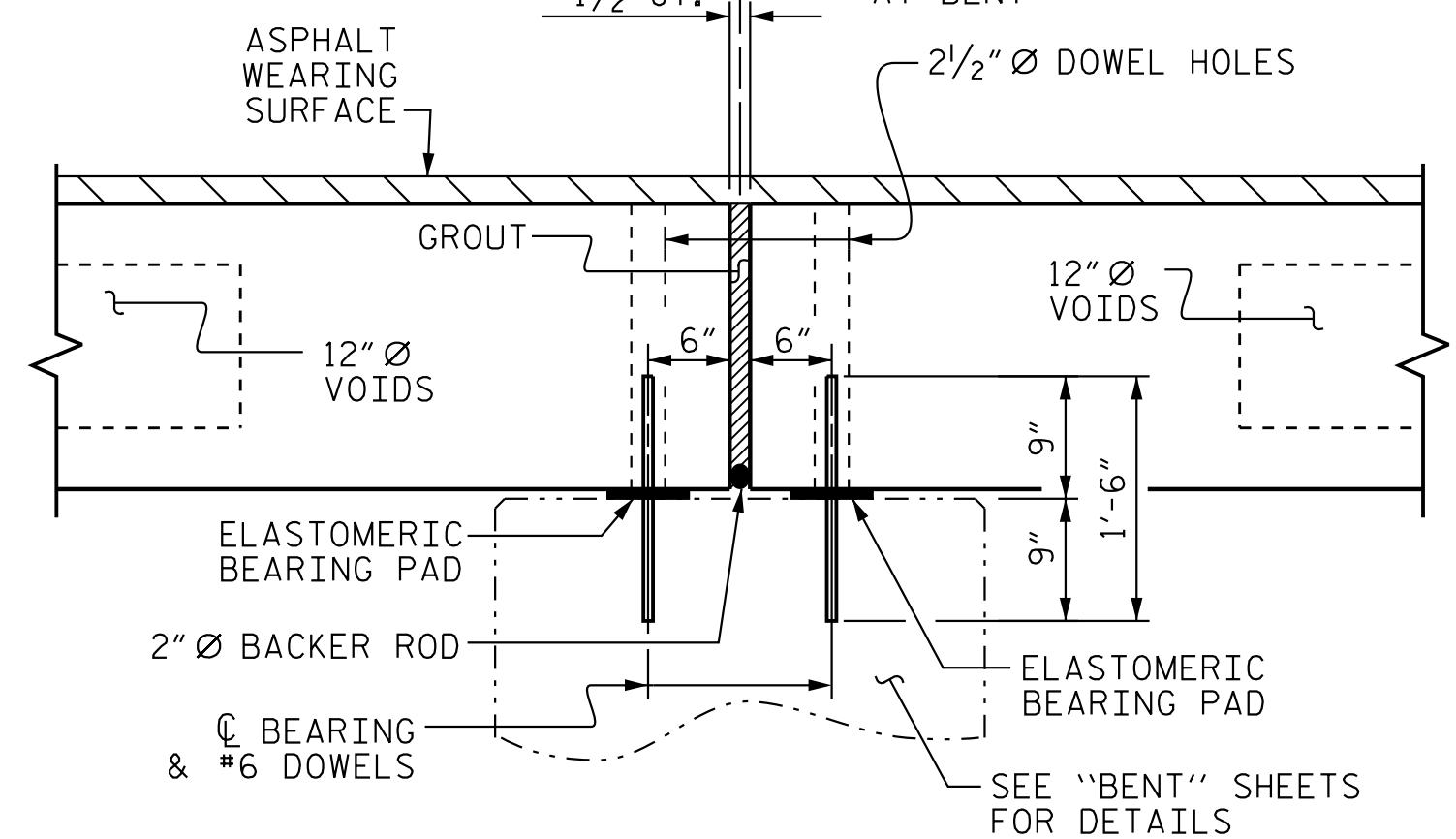
TYPICAL SECTION  
3 NON-COMPOSITE SIMPLE SPANS ON 21" CORED SLAB UNITS WITH ASPHALT WEARING SURFACE

FIXED END

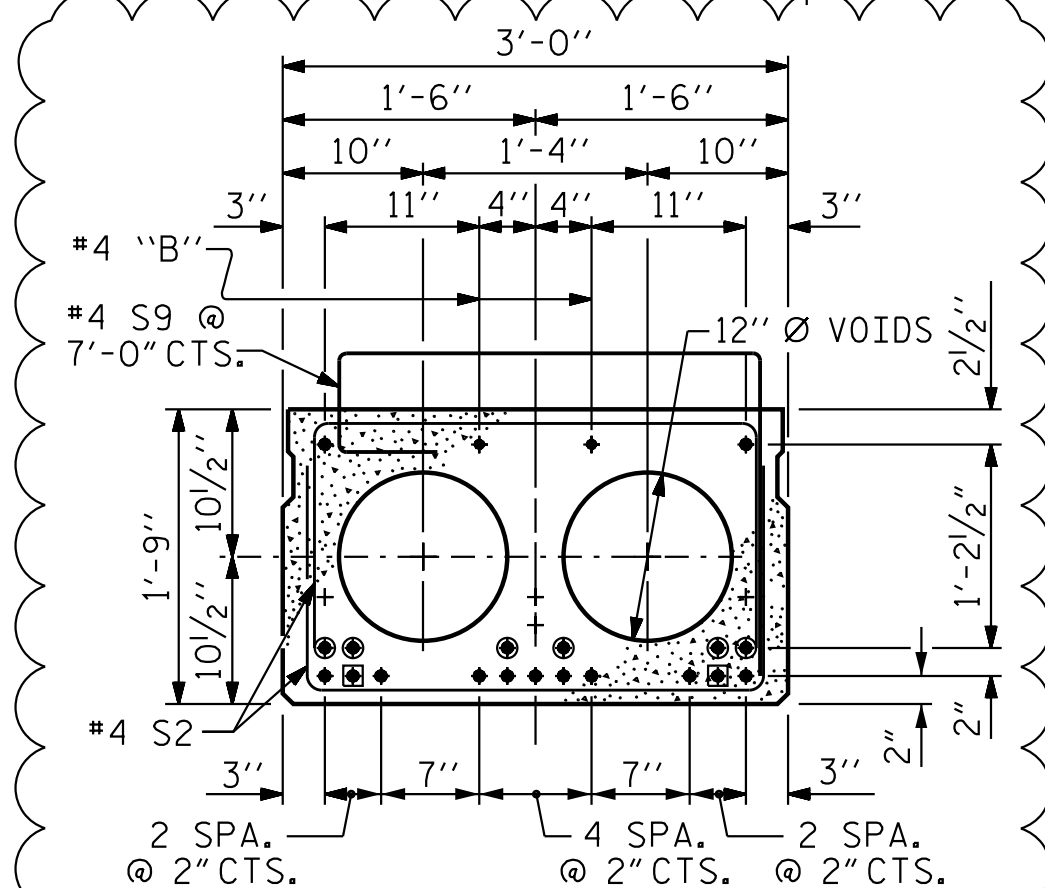
FIXED END FIXED END



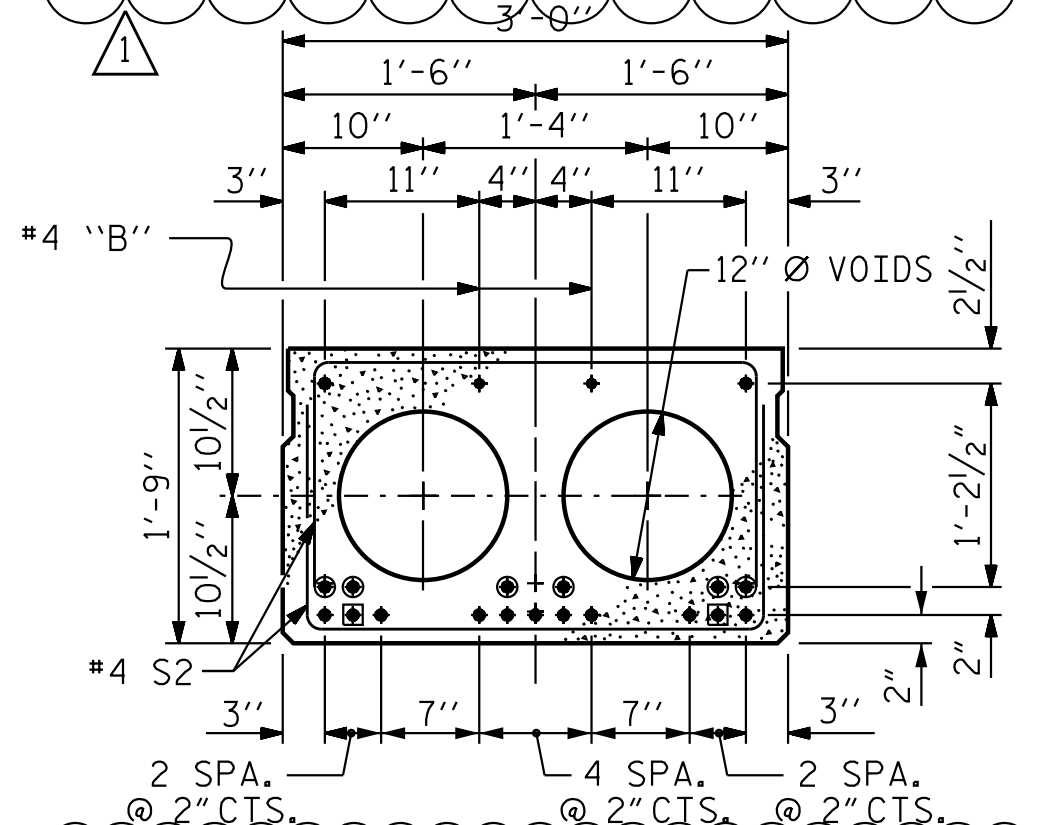
SECTION AT END BENT



SECTION AT BENT

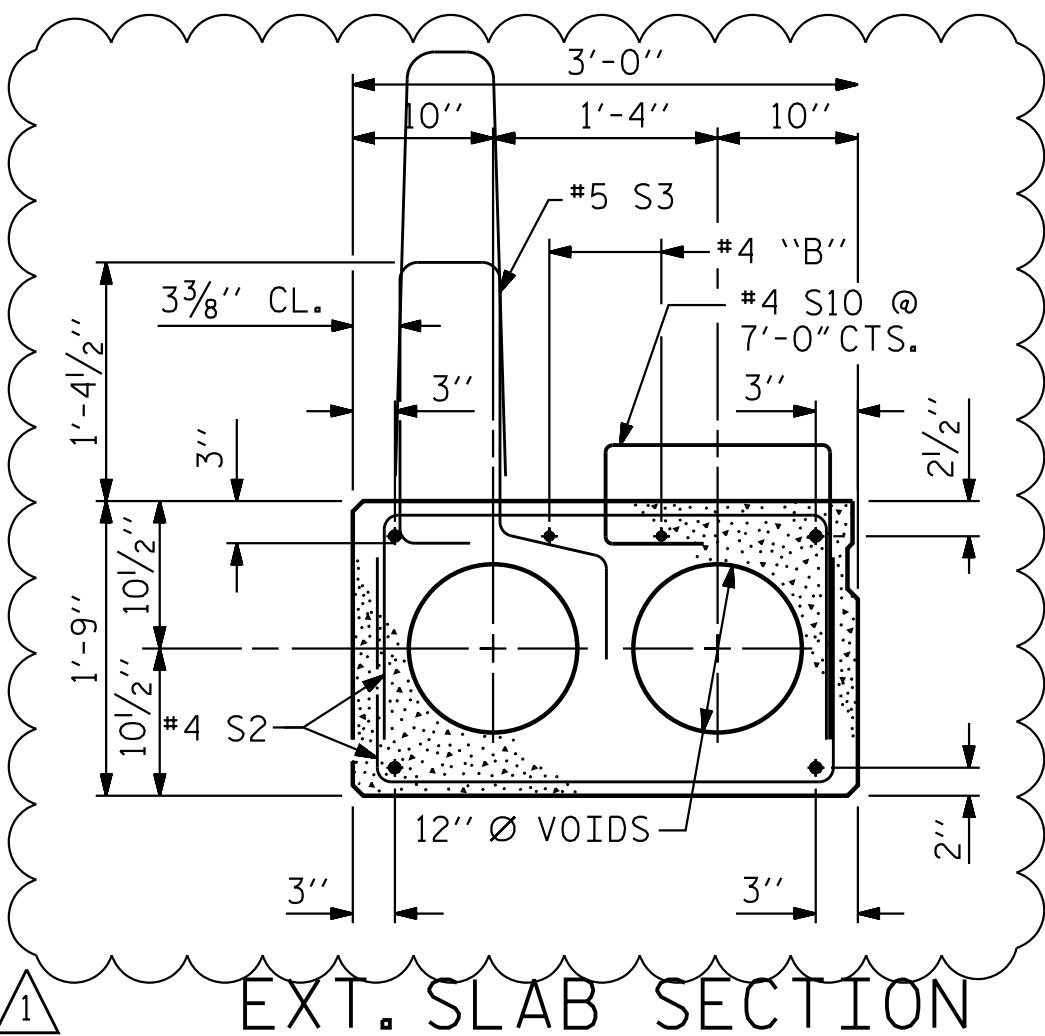


INTERIOR SLAB SECTION (45' UNIT, BEAMS 2,3,16,17) (13 STRANDS REQUIRED)



INTERIOR SLAB SECTION (45' UNIT, BEAMS 4-15) (13 STRANDS REQUIRED)

0.6" Ø LOW RELAXATION STRAND LAYOUT



EXT. SLAB SECTION (FOR PRESTRESSED STRAND LAYOUT, SEE INTERIOR SLAB SECTION.)

- ▲ BOND SHALL BE BROKEN ON THESE STRANDS FOR A DISTANCE OF 6'-0" FROM END OF CORED SLAB UNIT. SEE STANDARD SPECIFICATIONS, ARTICLE 1078-7.
- BOND SHALL BE BROKEN ON THESE STRANDS FOR A DISTANCE OF 2'-0" FROM END OF CORED SLAB UNIT. SEE STANDARD SPECIFICATIONS, ARTICLE 1078-7.
- OPTIONAL FULL LENGTH DEBONDED STRANDS. THESE STRANDS ARE NOT REQUIRED. IF THE FABRICATOR CHOOSES TO INCLUDE THESE STRANDS IN THE CORED SLAB UNIT, THE STRANDS SHALL BE DEBONDED FOR THE FULL LENGTH OF THE UNIT AT NO ADDITIONAL COST. SEE STANDARD SPECIFICATIONS, ARTICLE 1078-7.

DEBONDING LEGEND

PROJECT NO. N/A  
CABARRUS COUNTY  
STATION: 13+82.50

SHEET 1 OF 3

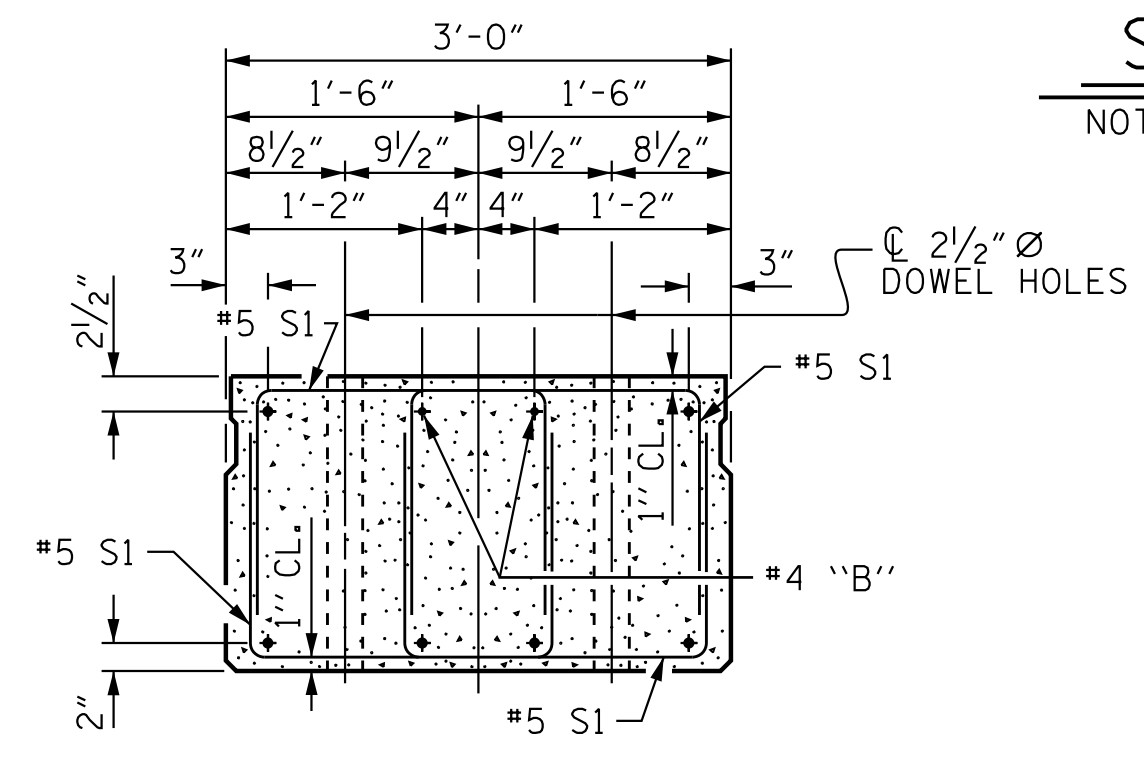
CITY OF CONCORD, NC  
SUPERSTRUCTURE  
3'-0" X 1'-9"  
PRESTRESSED CONCRETE  
CORED SLAB UNIT  
120° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-7
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2			4			25

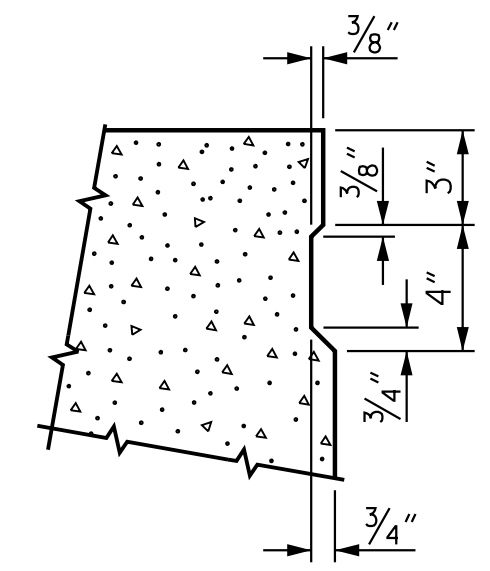
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CHECKED BY: T. R. DUDECK DATE: 08/23/23  
DESIGN ENGINEER OF RECORD: T. R. DUDECK DATE: 02/23/24



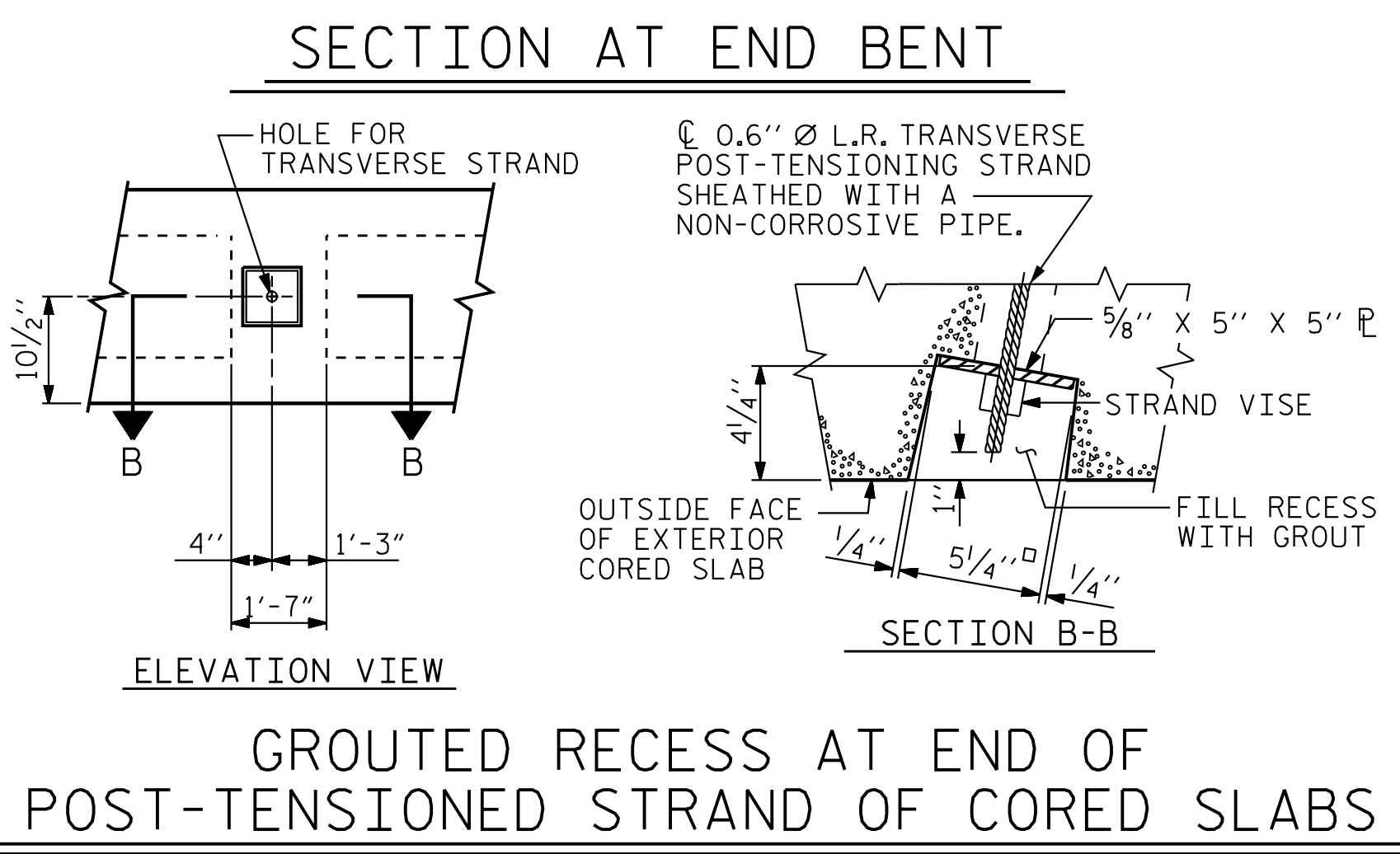
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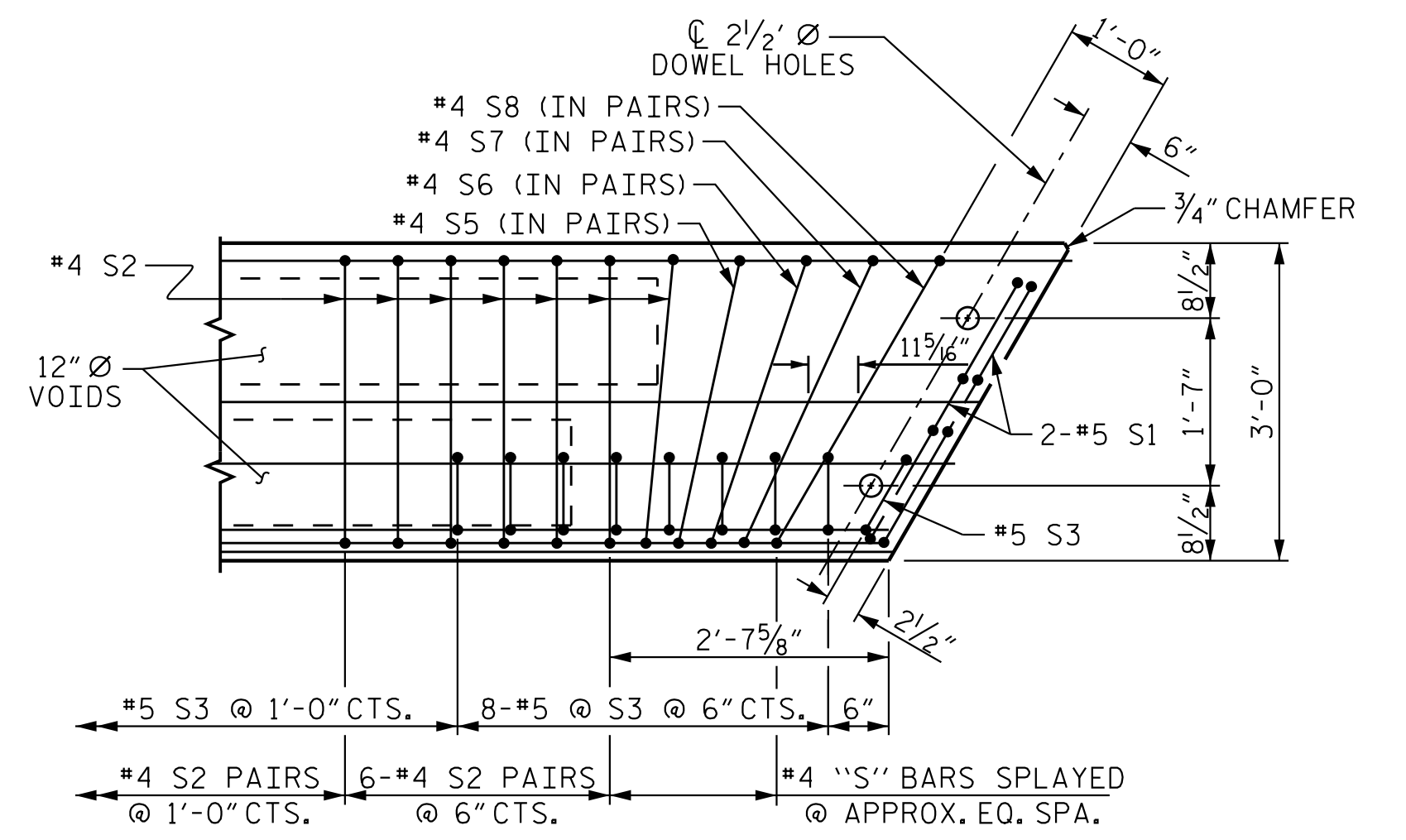
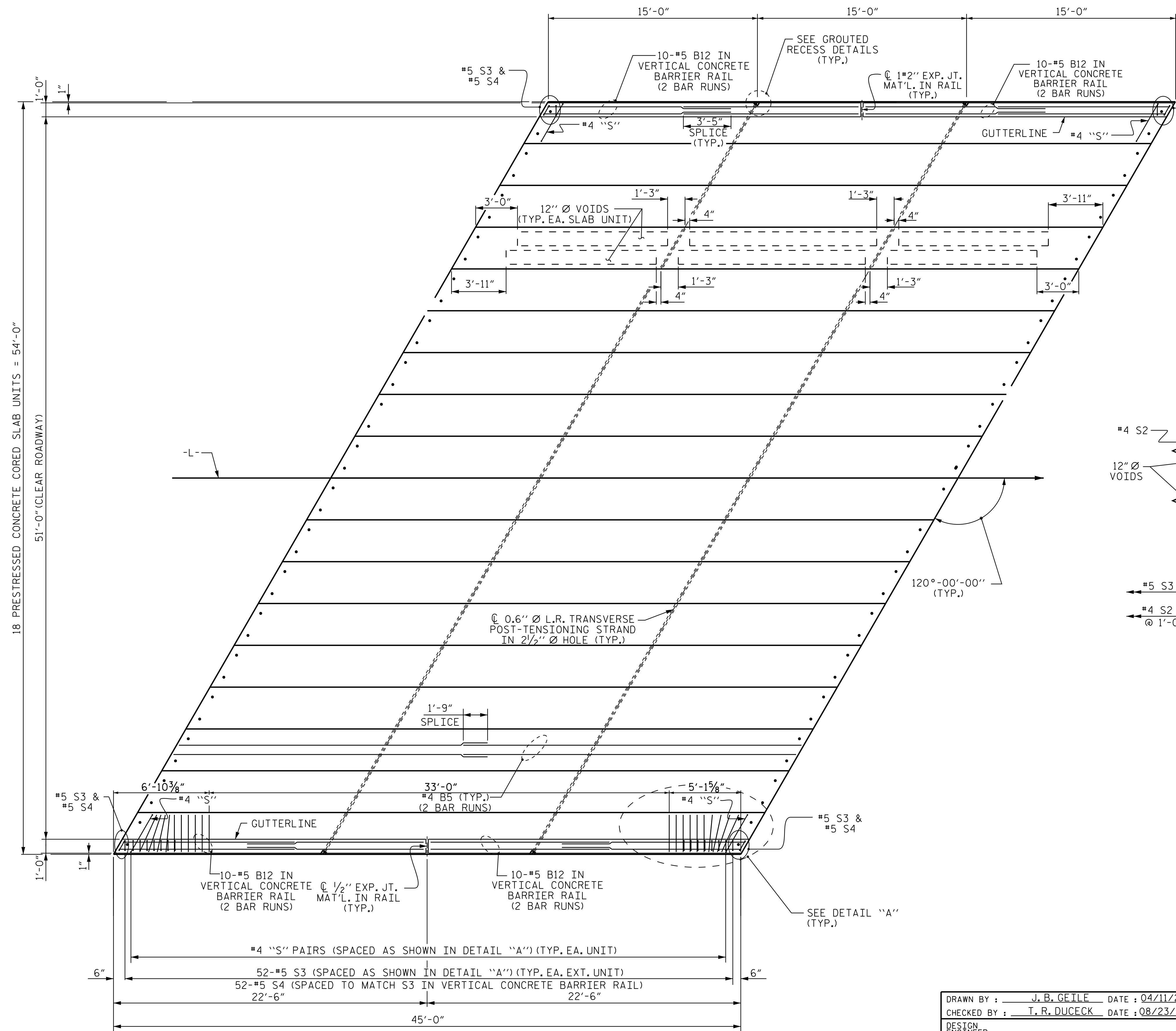
END ELEVATION  
SHOWING PLACEMENT OF DOUBLE STIRRUPS AND LOCATION OF DOWEL HOLES. (STRAND LAYOUT NOT SHOWN.)  
INTERIOR SLAB UNIT SHOWN-EXTERIOR SLAB UNIT SIMILAR EXCEPT SHEAR KEY LOCATION.



SHEAR KEY DETAIL  
NOTE: OMIT SHEAR KEY ON OUTSIDE FACE OF EXTERIOR CORED SLABS.







**DETAIL "A"**  
 (SIMILAR EACH END OF UNIT)  
 NOTE: EXTERIOR UNIT SHOWN - INTERIOR UNIT SIMILAR EXCEPT OMIT #5 S3 BARS.

**PLAN OF UNIT**  
 NOTE: S9 & S10 BARS NOT SHOWN FOR CLARITY.


PROJECT NO.            N/A  
           CABARRUS            COUNTY  
 STATION:            13+82.50

SHEET 2 OF 3

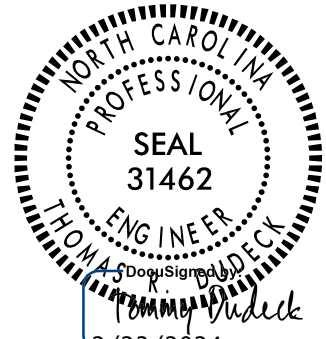
CITY OF CONCORD, NC

PLAN OF 45' UNIT  
 32'-0" CLEAR ROADWAY  
 120° SKEW

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 CHECKED BY :            T. R. DUDECK            DATE : 08/23/23  
 DESIGN ENGINEER OF RECORD:            T. R. DUDECK            DATE : 02/23/24



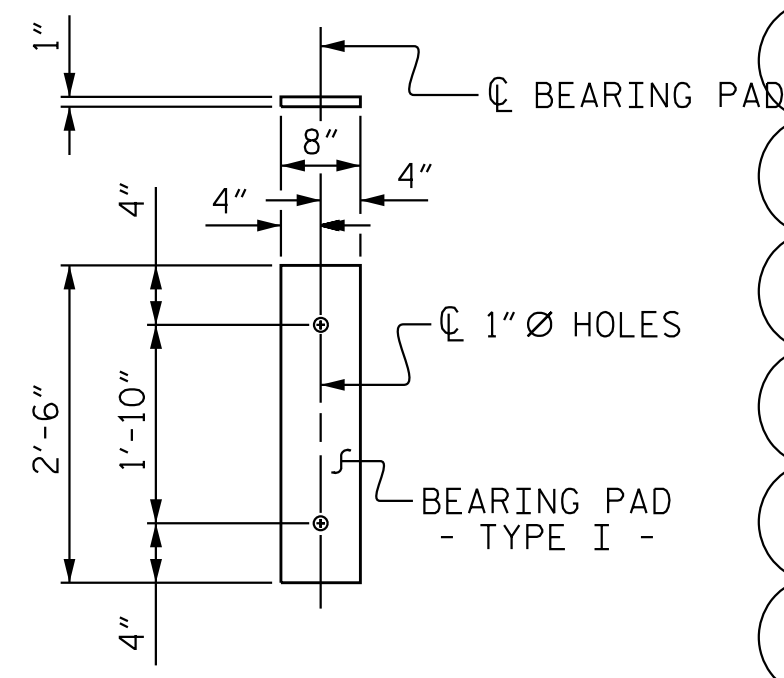
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2			4			25

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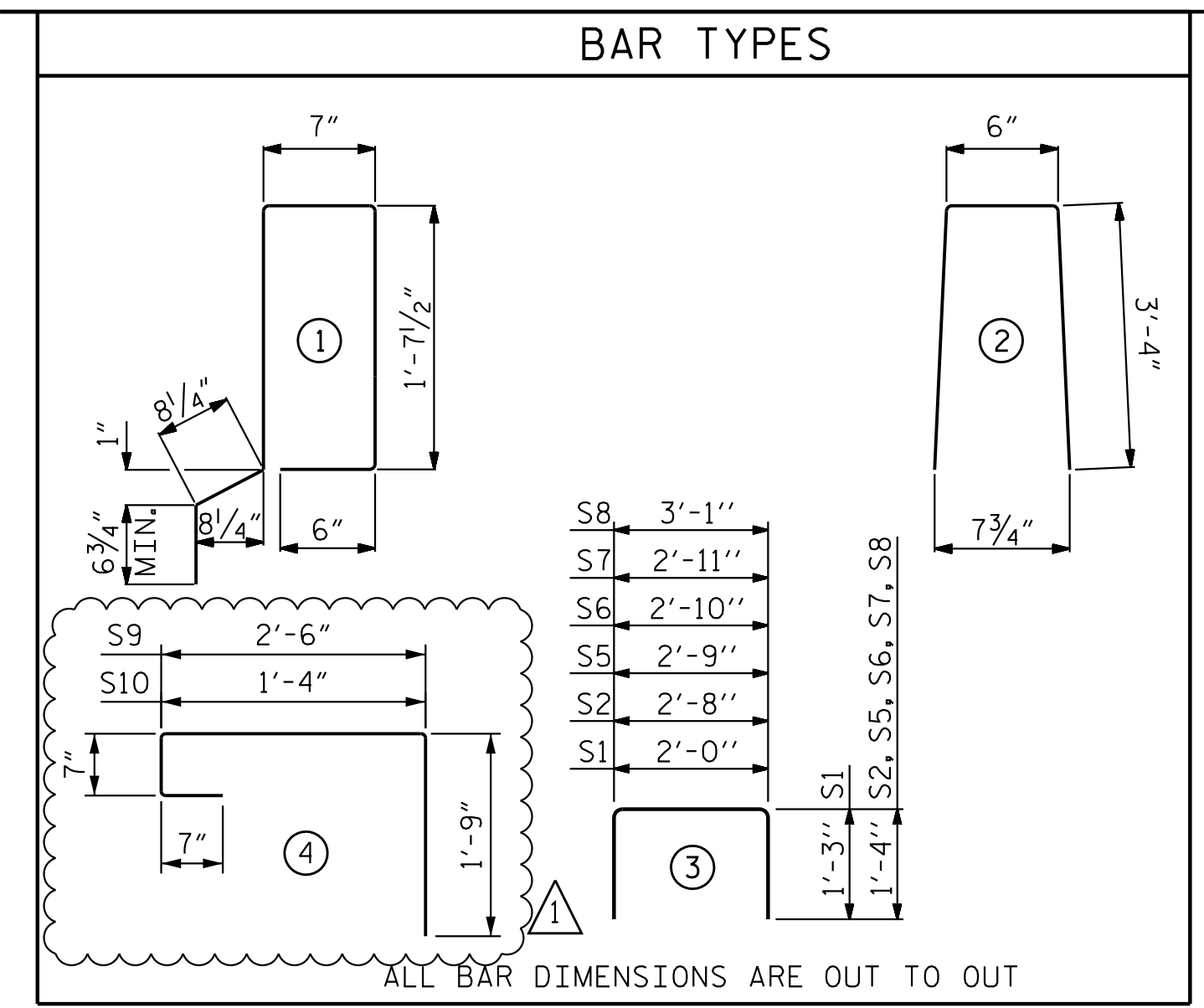


**FIXED END**  
(TYPE I - 108 REQ'D)  
**ELASTOMERIC BEARING DETAILS**

ELASTOMER IN ALL BEARINGS SHALL BE 50 DUROMETER HARDNESS.

**BILL OF MATERIAL FOR ONE 45' CORED SLAB UNIT**

				EXTERIOR UNIT (BEAMS 1 & 16)		INTERIOR UNIT (BEAMS 2, 3, 16, 17)		INTERIOR UNIT (BEAMS 4 - 16)	
BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT	LENGTH	WEIGHT	LENGTH	WEIGHT
B5	4	#4	STR	23'-3"	62	23'-3"	62	23'-3"	62
S1	8	#5	3	4'-6"	38	4'-6"	38	4'-6"	38
S2	92	#4	3	5'-4"	328	5'-4"	328	5'-4"	328
*S3	54	#5	1	5'-7"	314				
S5	4	#4	3	5'-5"	14	5'-5"	14	5'-5"	14
S6	4	#4	3	5'-6"	15	5'-6"	15	5'-6"	15
S7	4	#4	3	5'-7"	15	5'-7"	15	5'-7"	15
S8	4	#4	3	5'-9"	15	5'-9"	15	5'-9"	15
*S9	7	#4	4	4'-3"	20				
*S10	7	#4	4	4'-3"	20				
REINFORCING STEEL				LBS.	487		487		487
* EPOXY COATED REINFORCING STEEL				LBS.	334		25		
5000 P.S.I. CONCRETE				CU. YDS.	6.6		6.6		6.6
0.6" Ø L.R. STRANDS				No.	13		13		13



**NOTES**

ALL PRESTRESSING STRANDS SHALL BE 7-WIRE LOW RELAXATION GRADE 270 STRANDS AND SHALL CONFORM TO AASHTO M203 EXCEPT FOR SAMPLING REQUIREMENTS WHICH SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

ALL REINFORCING STEEL CAST WITH THE CORED SLAB SECTIONS SHALL BE GRADE 60 AND SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED CONCRETE CORED SLABS.

RECESSES FOR TRANSVERSE STRANDS SHALL BE GROUTED AFTER THE TENSIONING OF THE STRANDS.

THE 2 1/2" Ø DOWEL HOLES AT FIXED ENDS OF SLAB SECTIONS SHALL BE FILLED WITH NON-SHRINK GROUT.

THE BACKER RODS SHALL CONFORM TO THE REQUIREMENTS OF TYPE M BOND BREAKER. SEE SECTION 1028 OF THE STANDARD SPECIFICATIONS.

WHEN CORED SLABS ARE CAST, AN INTERNAL HOLD-DOWN SYSTEM SHALL BE EMPLOYED TO PREVENT VOIDS FROM RISING OR MOVING SIDEWAYS. AT LEAST SIX WEEKS PRIOR TO CASTING CORED SLABS, THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER FOR REVIEW AND COMMENT, DETAILED DRAWINGS OF THE PROPOSED HOLD-DOWN SYSTEM. IN ADDITION TO STRUCTURAL DETAILS, LOCATION AND SPACING OF THE HOLD-DOWNS SHALL BE INDICATED.

ALL REINFORCING STEEL IN THE VERTICAL CONCRETE BARRIER RAIL SHALL BE EPOXY COATED.

PRESTRESSING STRANDS SHALL BE CUT FLUSH WITH THE CORED SLAB UNIT ENDS.

APPLY EPOXY PROTECTIVE COATING TO CORED SLAB UNIT ENDS.

GROOVED CONTRACTION JOINTS, 1/2" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE BARRIER RAIL AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. A CONTRACTION JOINT SHALL BE LOCATED AT EACH THIRD POINT BETWEEN BARRIER RAIL EXPANSION JOINTS. ONLY ONE CONTRACTION JOINT IS REQUIRED AT MIDPOINT OF BARRIER RAIL SEGMENTS LESS THAN 20 FEET IN LENGTH AND NO CONTRACTION JOINTS ARE REQUIRED FOR THOSE SEGMENTS LESS THAN 10 FEET IN LENGTH.

FLAME CUTTING OF THE TRANSVERSE POST-TENSIONING STRAND IS NOT ALLOWED.

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE CORED SLAB UNIT SHALL BE DONE WHEN THE CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN THE REQUIRED STRENGTH SHOWN IN THE "CONCRETE RELEASE STRENGTH" TABLE.

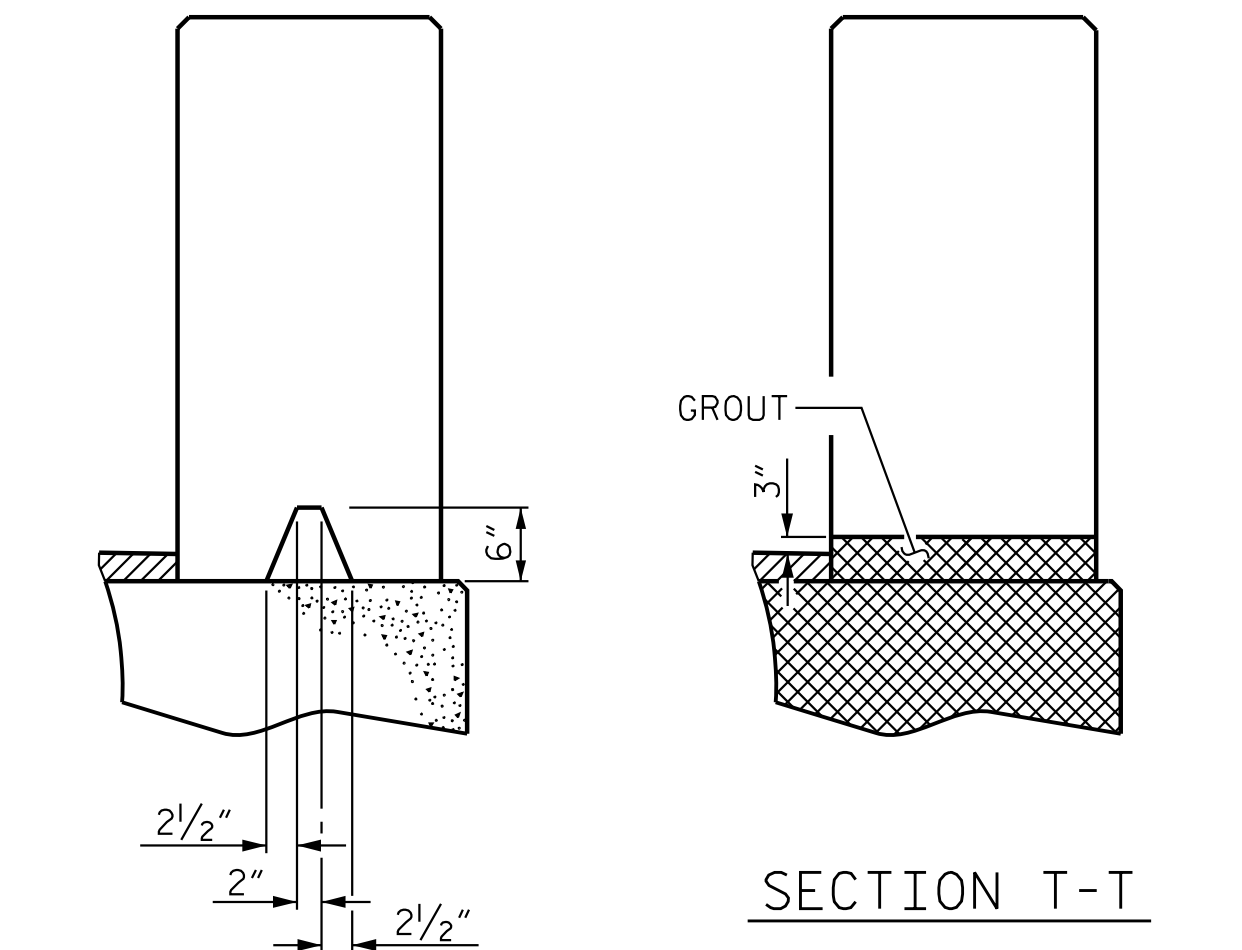
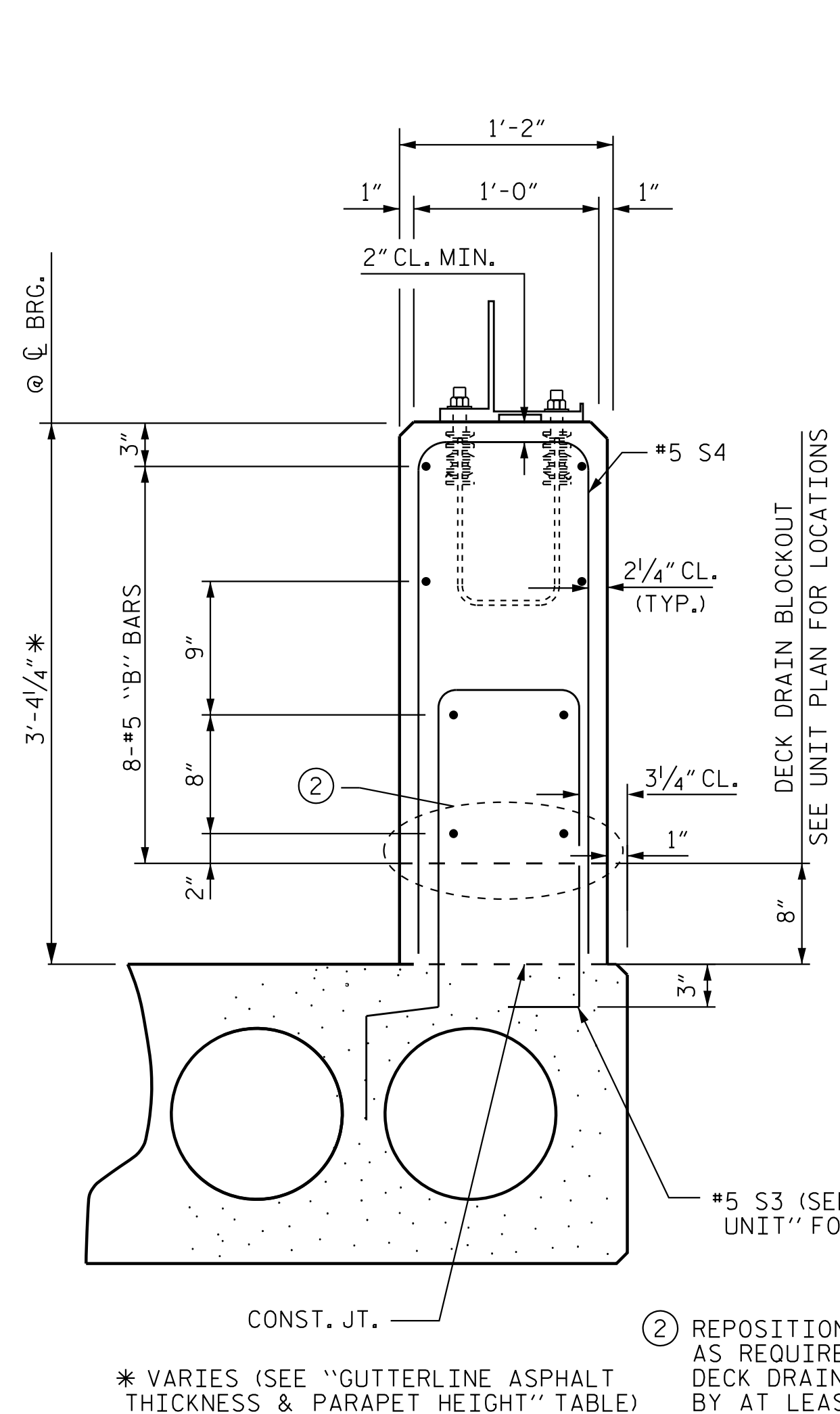
FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

THE PERMITTED THREADED INSERTS ARE DETAILED AS AN OPTION FOR THE CONTRACTOR TO ATTACH FALSEWORK AND FORMWORK DURING CONSTRUCTION.

THE PERMITTED THREADED INSERTS IN THE EXTERIOR UNITS SHALL BE SIZED BY THE CONTRACTOR, SPACED AT 4'-0" CENTERS AND GALVANIZED IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATIONS. STAINLESS STEEL THREADED INSERTS MAY BE USED AS AN ALTERNATE.

THE PERMITTED THREADED INSERTS SHALL BE GROUTED BY THE CONTRACTOR IMMEDIATELY FOLLOWING REMOVAL OF THE FALSEWORK.

THE COST OF THE PERMITTED THREADED INSERTS SHALL BE INCLUDED IN THE PRICE BID FOR THE PRECAST UNITS.

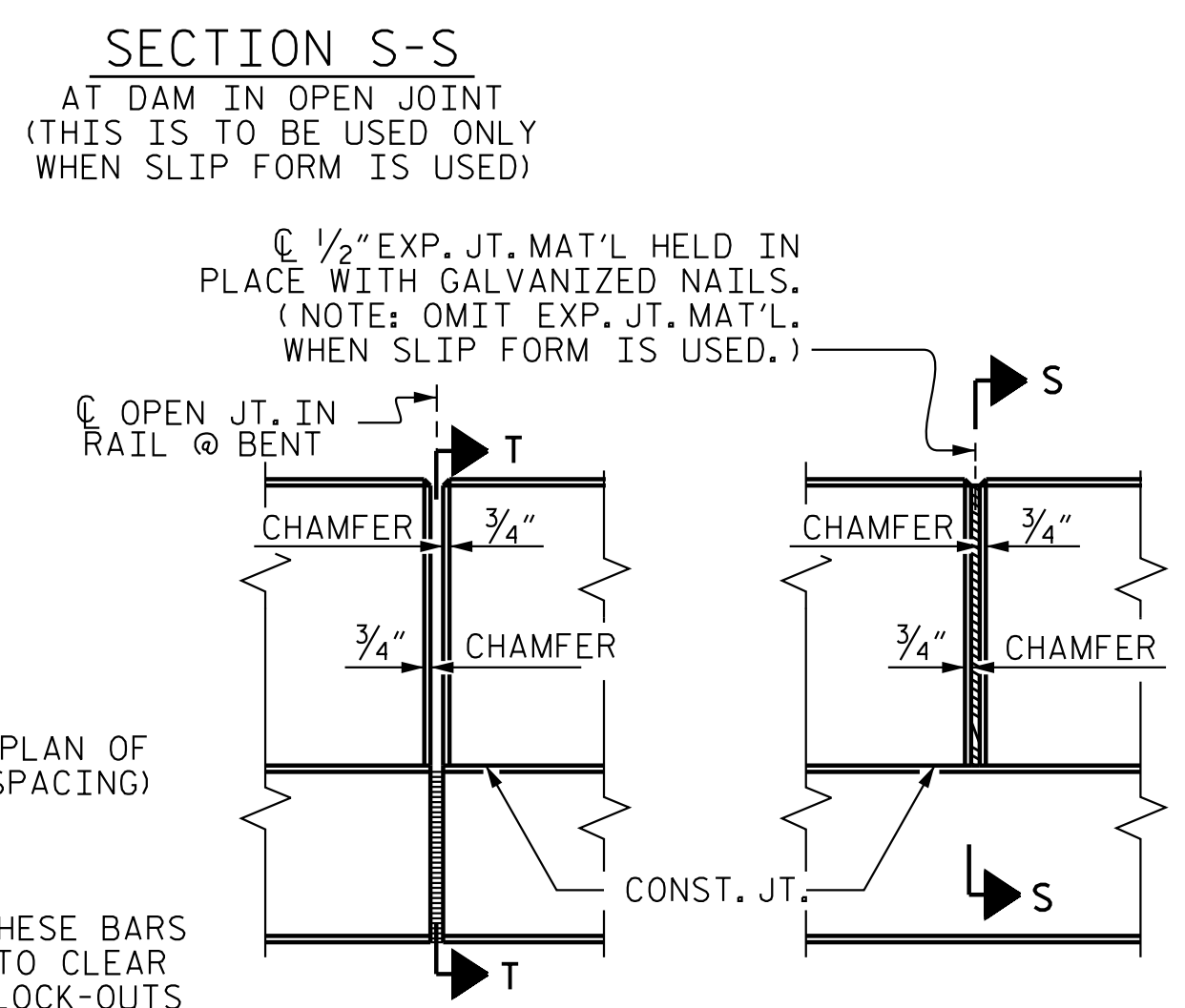


**BILL OF MATERIAL FOR CONCRETE PARAPET FOR ONE SPAN**

BAR	BARS PER PAIR OF EXTERIOR UNITS	TOTAL NO.	SIZE	TYPE	LENGTH	WEIGHT	
45' UNIT							
*B12	80	80	#5	STR	14'-2"	1182	
*S4	104	104	#5	2	5'-8"	615	
* EPOXY COATED REINFORCING STEEL						LBS.	1797
CLASS AA CONCRETE						CU. YDS.	10.6
TOTAL CONCRETE PARAPET						LN. FT.	90.00

**GUTTERLINE ASPHALT THICKNESS & PARAPET HEIGHT**

51'-0" CLEAR ROADWAY	ASPHALT OVERLAY THICKNESS	PARAPET HEIGHT
	@ MID-SPAN	@ MID-SPAN
	SUPERED SECTION	
45' UNIT	2"	3'-8"



**SECTION THRU CONC. PARAPET**      **ELEVATION AT EXPANSION JOINTS**

**VERTICAL CONCRETE PARAPET SECTION**

**CORED SLABS REQUIRED**

	NUMBER	LENGTH	TOTAL LENGTH
45' UNIT			
EXTERIOR C.S.	6	45'-0"	270'-0"
INTERIOR C.S.	48	45'-0"	2,160'-0"
TOTAL	54	45'-0"	2,430'-0"

(SPANS A, B, AND C)

**DEAD LOAD DEFLECTION AND CAMBER**

45' CORED SLAB UNIT	3'-0" x 1'-9"
CAMBER (SLAB ALONE IN PLACE)	7/8" ↑
DEFLECTION DUE TO SUPERIMPOSED DEAD LOAD**	1/8" ↓
FINAL CAMBER	3/4" ↑

\*\* INCLUDES FUTURE WEARING SURFACE

DRAWN BY: J. B. GEILE DATE: 04/11/23  
 CHECKED BY: T. R. DUDECK DATE: 08/25/23  
 DESIGN ENGINEER OF RECORD: T. R. DUDECK DATE: 02/23/24

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PROJECT NO.        N/A  
       CABARRUS        COUNTY  
 STATION:        13+82.50

CITY OF CONCORD, NC

3'-0" X 1'-9"  
 PRESTRESSED CONCRETE  
 CORED SLAB UNIT

120° SKEW

REVISIONS						SHEET NO.
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### NOTES

AT THE CONTRACTOR'S OPTION, METAL RAIL MAY BE EITHER ALUMINUM OR GALVANIZED STEEL IN ACCORDANCE WITH THE REQUIREMENTS OF THE GENERAL NOTES AND THE FOLLOWING SPECIFICATIONS FOR THE ALTERNATE MATERIALS; HOWEVER, THE CONTRACTOR WILL BE REQUIRED TO USE THE SAME RAIL MATERIAL ON ALL STRUCTURES ON THE PROJECT FOR WHICH METAL RAIL IS DESIGNATED.

UNLESS OTHERWISE REQUIRED IN THE CONTRACT DOCUMENTS, THE CONTRACTOR HAS THE OPTION TO USE AN ALTERNATE TO THE 2 BAR METAL RAIL. THE ALTERNATE RAIL SHALL MEET THE REQUIREMENTS OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND MUST BE LISTED ON THE DEPARTMENT'S APPROVED PRODUCTS LIST (APL) UNDER "2 BAR METAL RAIL ALTERNATE". ADJUSTMENTS TO THE CONCRETE PARAPET WILL NOT BE ALLOWED.

#### ALUMINUM RAILS

MATERIAL FOR POSTS, BASES AND RAILS, EXPANSION BARS AND CLAMP BARS SHALL BE ASTM B-221 ALLOY 6061-T6. MATERIAL FOR RIVETS SHALL BE ASTM B316 ALLOY 6061-T6. RIVETS SHALL BE STANDARD BUTTON HEAD AND CONE POINT COLD DRIVEN AS PER DRAWING.

THE BASE OF RAIL POSTS, OR ANY OTHER ALUMINUM SURFACE IN CONTACT WITH CONCRETE SHALL BE THOROUGHLY COATED WITH AN ALUMINUM IMPREGNATED CAULKING COMPOUND OF APPROVED QUALITY.

MATERIAL FOR SHIMS TO BE ASTM B209 ALLOY 6061-T6.

#### GALVANIZED STEEL RAILS

MATERIAL AND GALVANIZING ARE TO CONFORM TO THE FOLLOWING SPECIFICATIONS:

POST, POST BASES, RAILS, EXPANSION BARS AND CLAMP BARS: AASHTO M270 GRADE 36 STRUCTURAL STEEL - GALVANIZED TO AASHTO M111.

RIVETS: RIVETS SHALL MEET THE REQUIREMENTS OF ASTM A502 FOR GRADE 1 RIVETS.

THE CUT ENDS OF GALVANIZED STEEL RAILING, AFTER GRINDING SMOOTH SHALL BE GIVEN TWO COATS OF ZINC RICH PAINT MEETING THE REQUIREMENTS OF FEDERAL SPECIFICATION MIL-P-26915 USAF TYPE 1, OR OF FEDERAL SPECIFICATIONS TT-P-641.

SHIMS: SHIMS SHALL MEET THE REQUIREMENTS OF ASTM A570 FOR GRADE 33 OR A611 FOR GRADE C AND SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M111.

RAIL CAPS: RAIL CAPS SHALL MEET THE REQUIREMENTS OF ASTM A570 FOR GRADE 33 OR A611 FOR GRADE C AND SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M111.

#### GENERAL NOTES

RAILING SHALL BE CONTINUOUS FROM END POST TO END POST OF BRIDGE. EACH JOINT IN RAIL LENGTH SHALL BE SPLICED AS DETAILED. PANEL LENGTHS OF RAIL SHALL BE ATTACHED TO A MINIMUM OF THREE POSTS.

FOR END OF RAIL TO CLEAR FACE OF CONCRETE END POST DIMENSION, SEE STANDARD NO. BMR2.

CAP SCREWS SHALL BE ASTM F593 ALLOY 305 STAINLESS STEEL. WASHERS SHALL MEET THE REQUIREMENTS OF ASTM F844 EXCEPT THEY SHALL BE MADE FROM ALLOY 304 STAINLESS STEEL.

CERTIFIED MILL REPORTS ARE REQUIRED FOR RAILS AND POSTS. SHOP INSPECTION IS NOT REQUIRED.

METAL RAIL POSTS SHALL BE SET NORMAL TO CURB GRADE.

METHOD OF MEASUREMENT FOR METAL RAILS: FOR LENGTH OF METAL RAILS TO BE PAID FOR, SEE THE STANDARD SPECIFICATIONS.

CURVED RAIL USAGE: WHERE RAILS ARE TO BE USED ON BRIDGES ON HORIZONTAL AND/OR VERTICAL CURVATURE THE CONTRACTOR MAY, AT HIS OPTION, HAVE THE REQUIRED CURVATURE IN THE RAIL FORMED IN THE SHOP OR IN THE FIELD. IN EITHER EVENT, THE RAIL SHALL CONFORM WITHOUT BUCKLING OR KINKING TO THE REQUIRED CURVATURE IN A UNIFORM MANNER ACCEPTABLE TO THE ENGINEER.

TO INSURE FUTURE IDENTIFICATION OF THE FABRICATOR, A PERMANENT IDENTIFYING MARK SHALL BE PLACED ON EACH POST. THE METHOD OF MARKING AND LOCATION SHALL BE SUCH THAT IT DOES NOT DETRACT FROM THE APPEARANCE OF THE POST, BUT REMAINS VISIBLE AFTER RAIL PLACEMENT.

SHIMS SHALL BE USED AS NECESSARY FOR POST ALIGNMENT.

ALLOY 6351-T5 MAY BE SUBSTITUTED FOR ALLOY 6061-T6 WHERE APPLICABLE.

MINOR VARIATIONS IN DETAILS OF METAL RAIL WILL BE CONSIDERED. DETAILS OF SUCH VARIATIONS, IF DESIRED, SHALL BE SUBMITTED FOR APPROVAL.

GROOVED CONTRACTION JOINTS, 1/2" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE PARAPET AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. A CONTRACTION JOINT SHALL BE LOCATED AT EACH THIRD POINT BETWEEN PARAPET EXPANSION JOINTS. ONLY ONE CONTRACTION JOINT IS REQUIRED AT MIDPOINT OF PARAPET SEGMENTS LESS THAN 20 FEET IN LENGTH AND NO CONTRACTION JOINTS ARE REQUIRED FOR THOSE SEGMENTS LESS THAN 10 FEET IN LENGTH.

PAY LENGTH = 255.5 LIN. FT.

PROJECT NO. N/A

CABARRUS COUNTY

STATION: 13+82.50

SHEET 1 OF 3

CITY OF CONCORD, NC

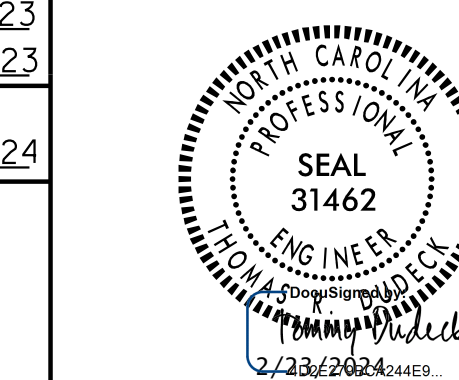
STANDARD

2 BAR METAL RAIL

#### REVISIONS

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1			3		
2			4		

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S-10  
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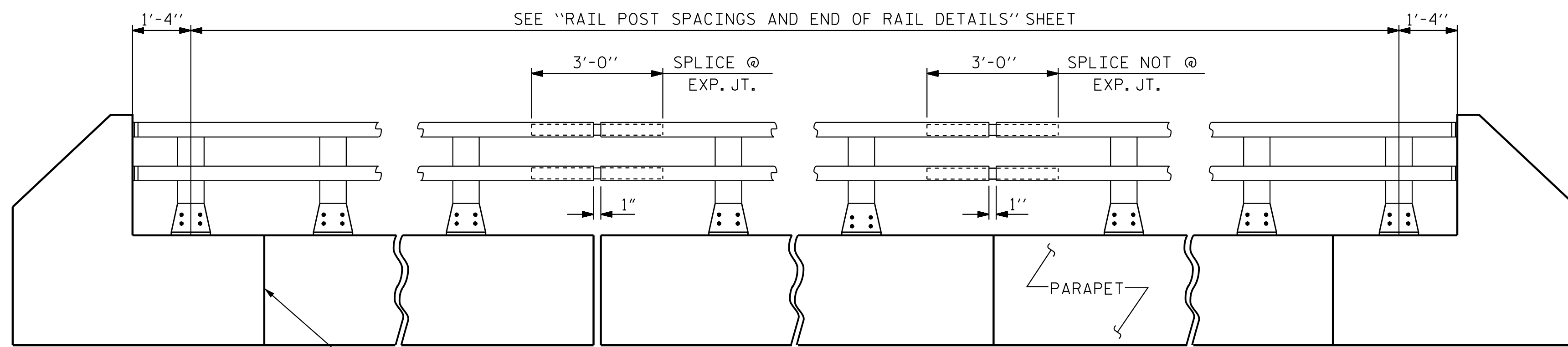


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 CHECKED BY: T. R. DUDECK DATE: 08/24/23  
 DESIGN ENGINEER OF RECORD: T. R. DUDECK DATE: 02/23/24



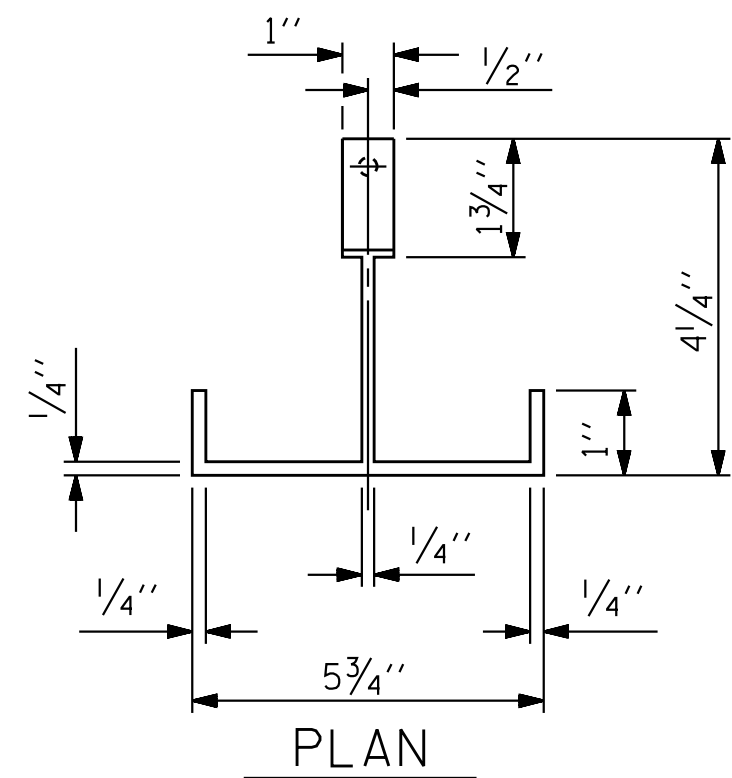
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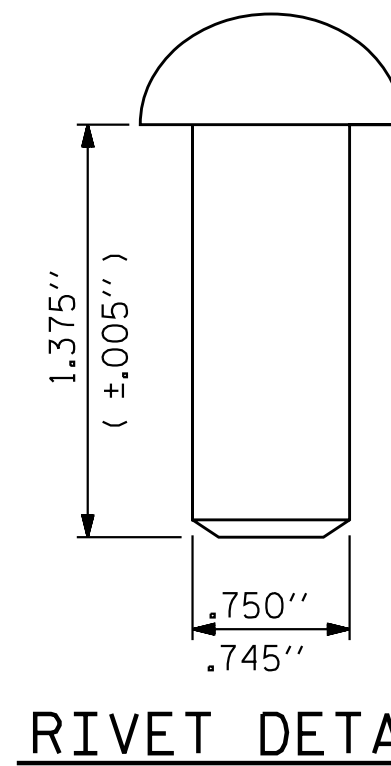
### ELEVATION

NOTE: FOR ATTACHMENT OF METAL RAIL TO END POST, SEE STANDARD NO. BMR2.

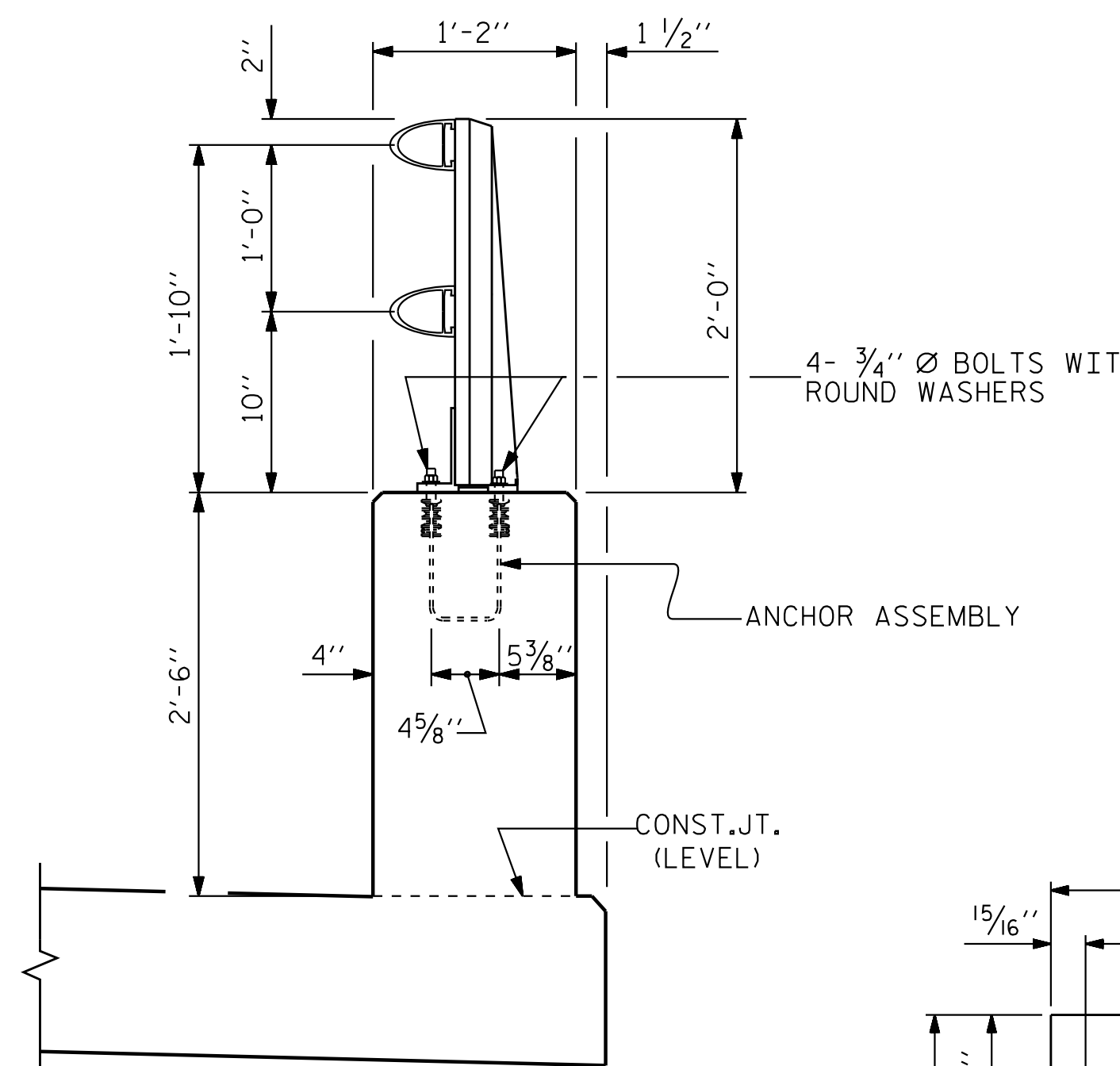
TOOLED CONTRACTION JT. (SEE NOTES)



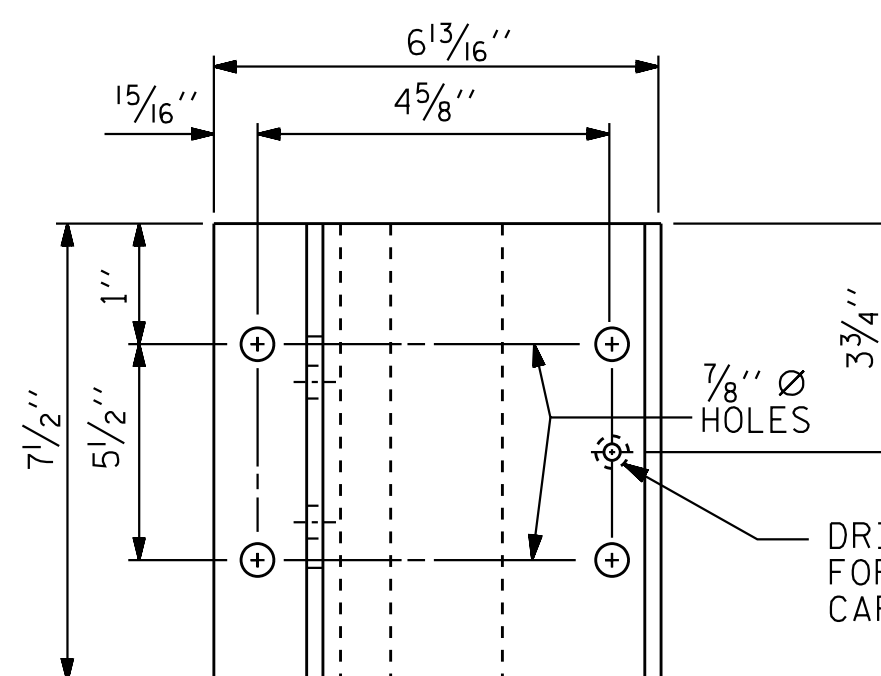
### PLAN



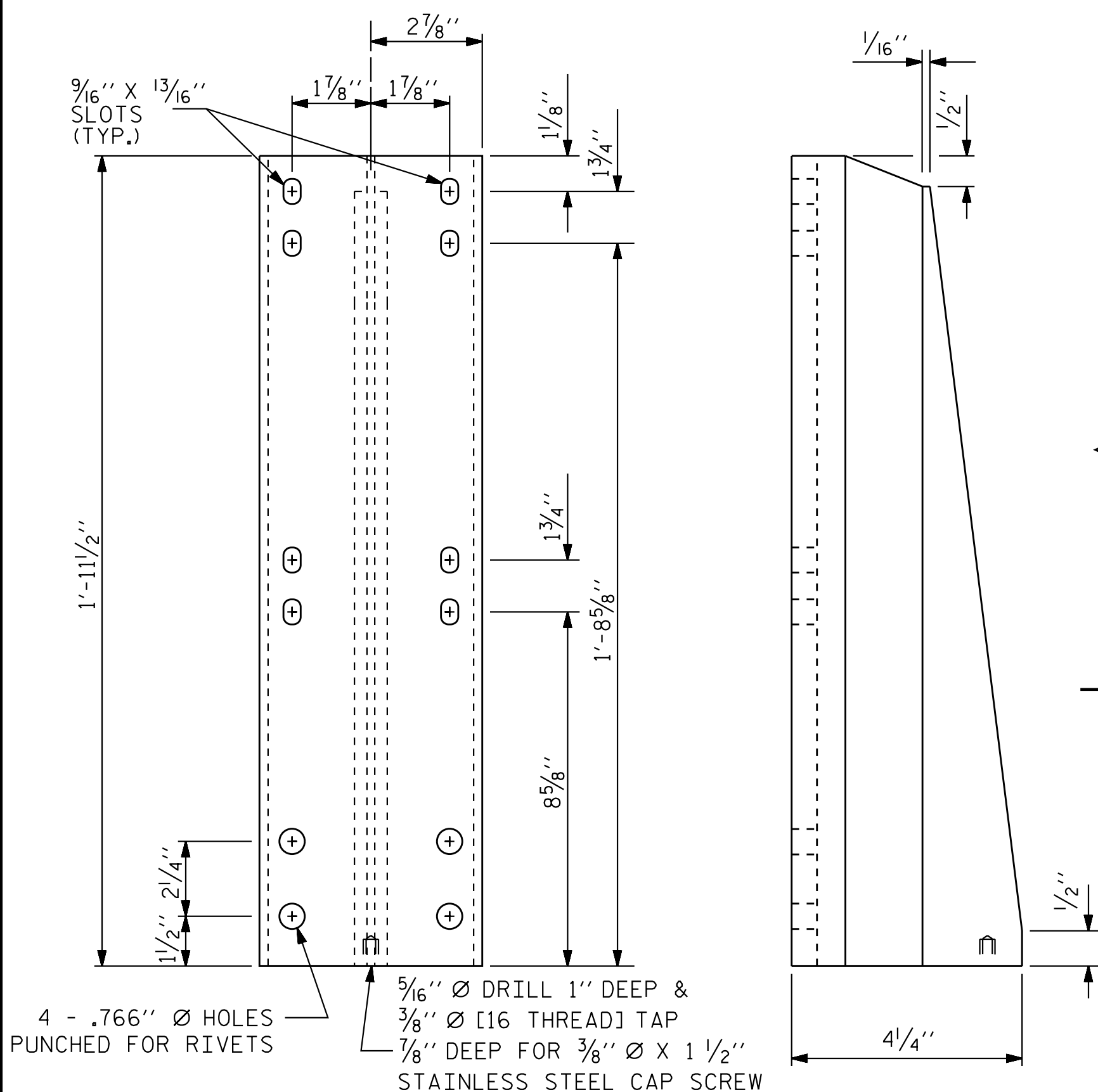
### RIVET DETAIL



### SECTION THRU PARAPET AND RAIL



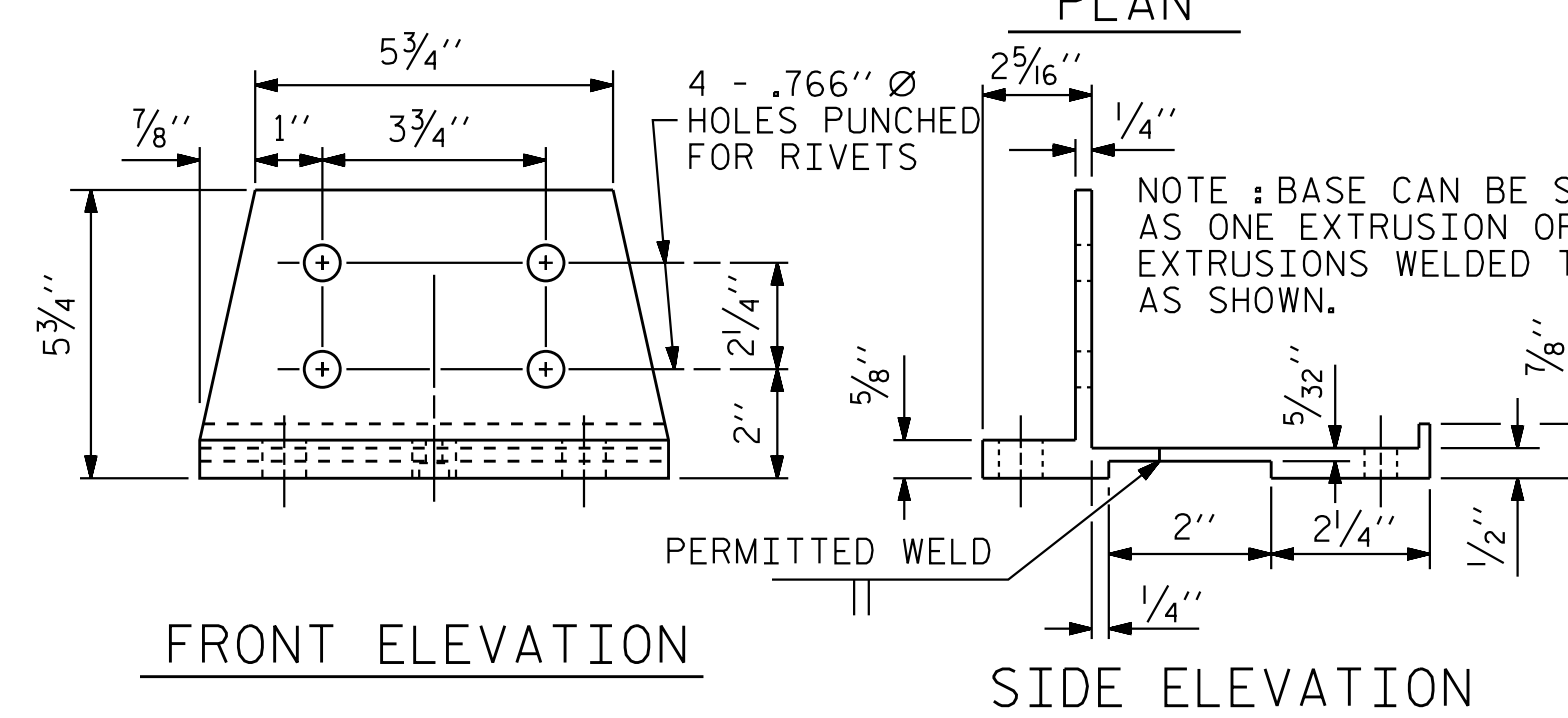
### PLAN



### FRONT ELEVATION

### SIDE ELEVATION

### DETAILS OF POST

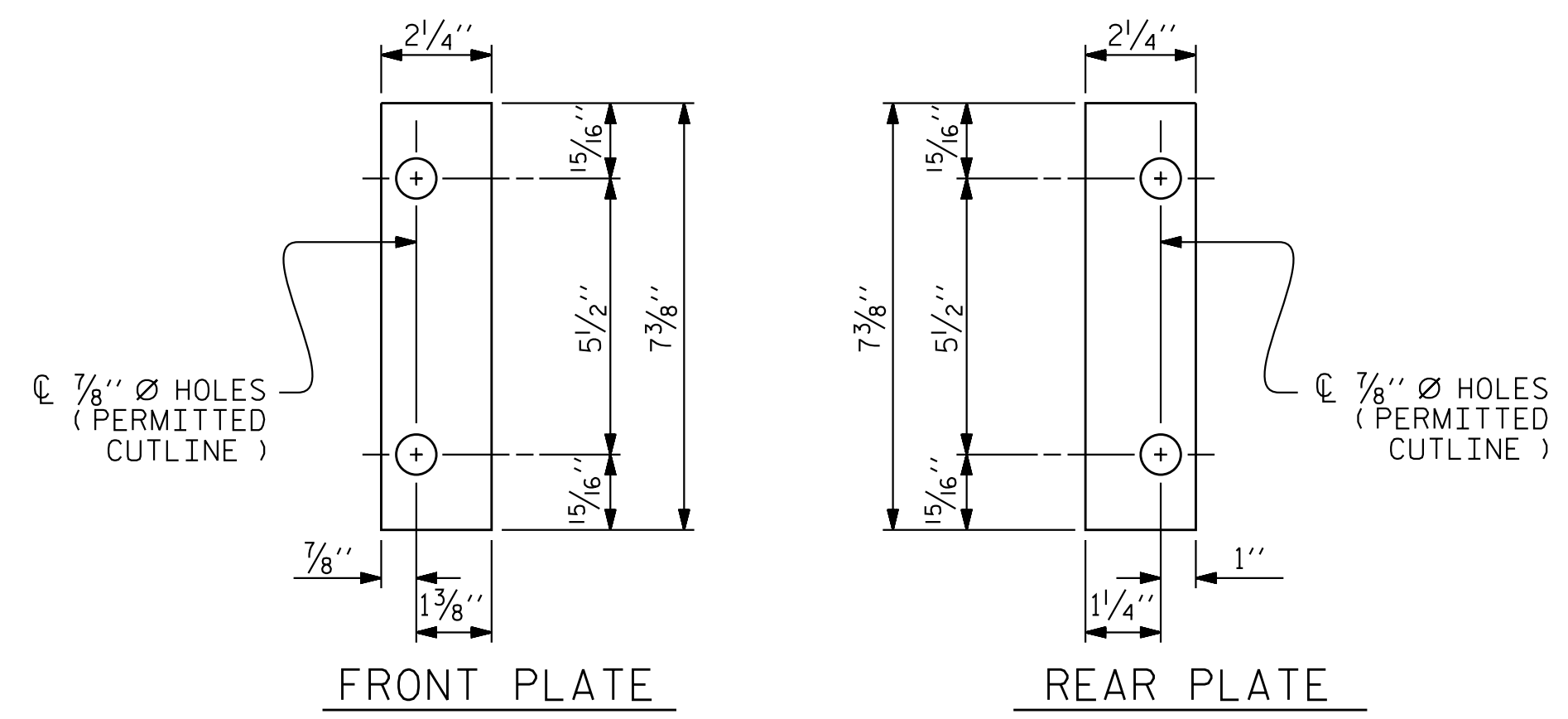


### FRONT ELEVATION

### SIDE ELEVATION

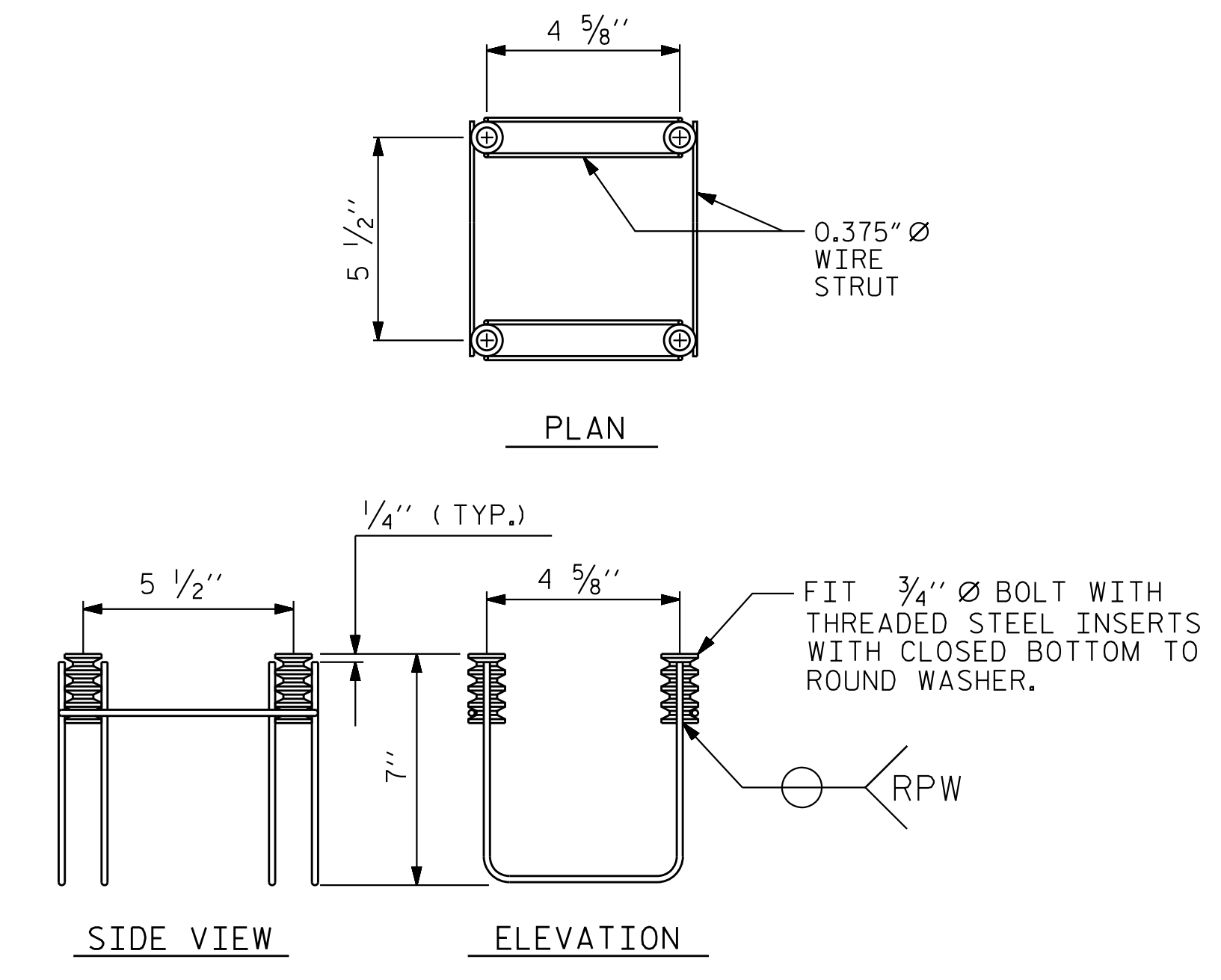
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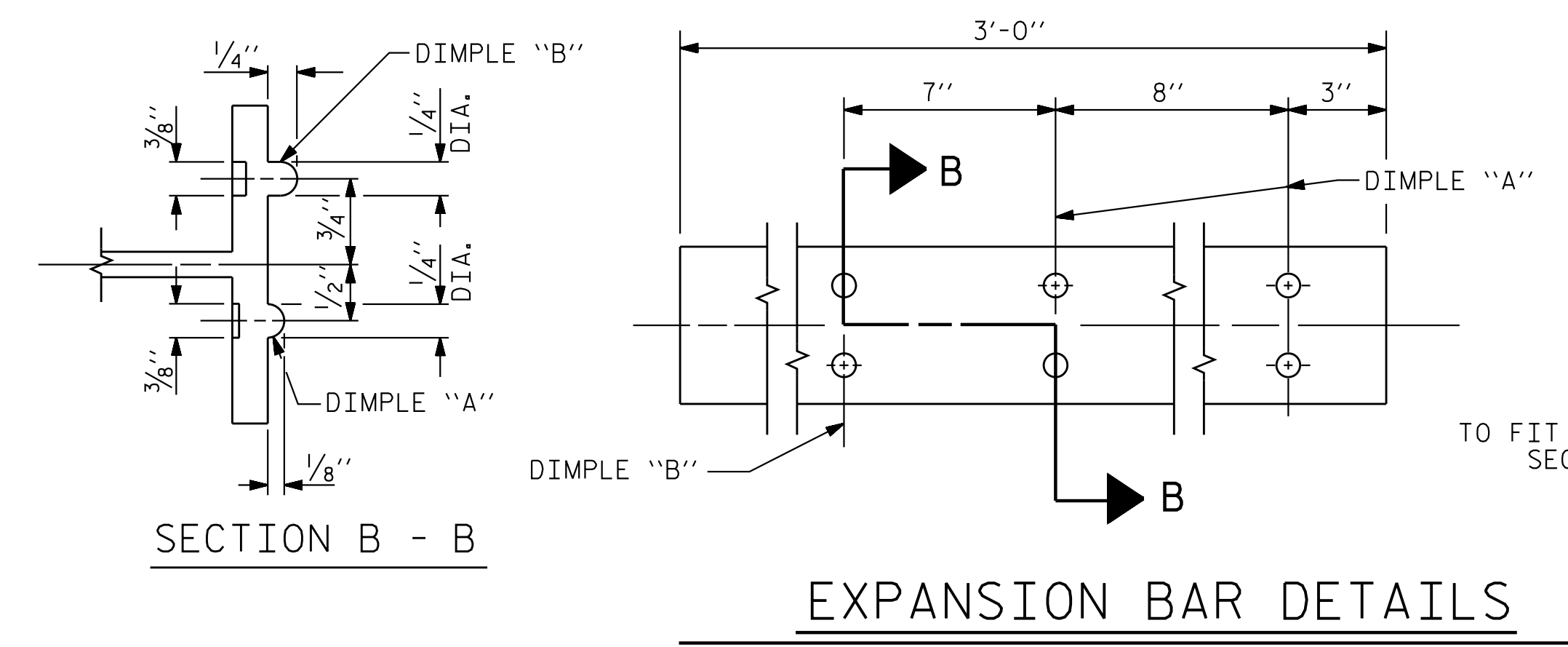
**SHIM DETAILS**

NOTE:  
SHIMS MAY BE CUT ALONG PERMITTED CUTLINE OR SLOTTED TO EDGE OF PLATE TO FACILITATE PLACEMENT.

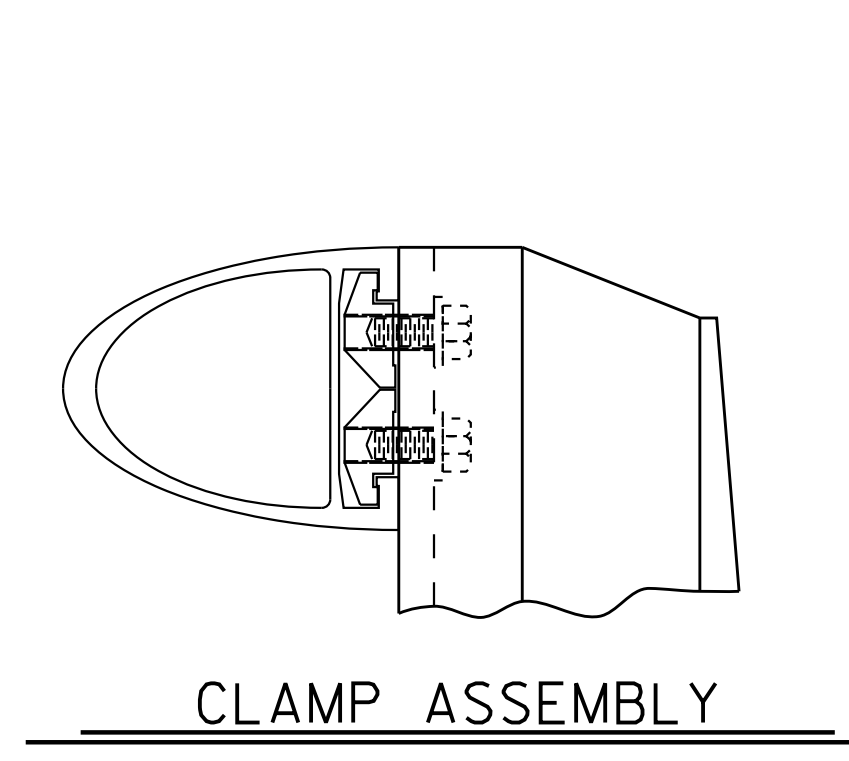


**4-BOLT METAL RAIL ANCHOR ASSEMBLY**

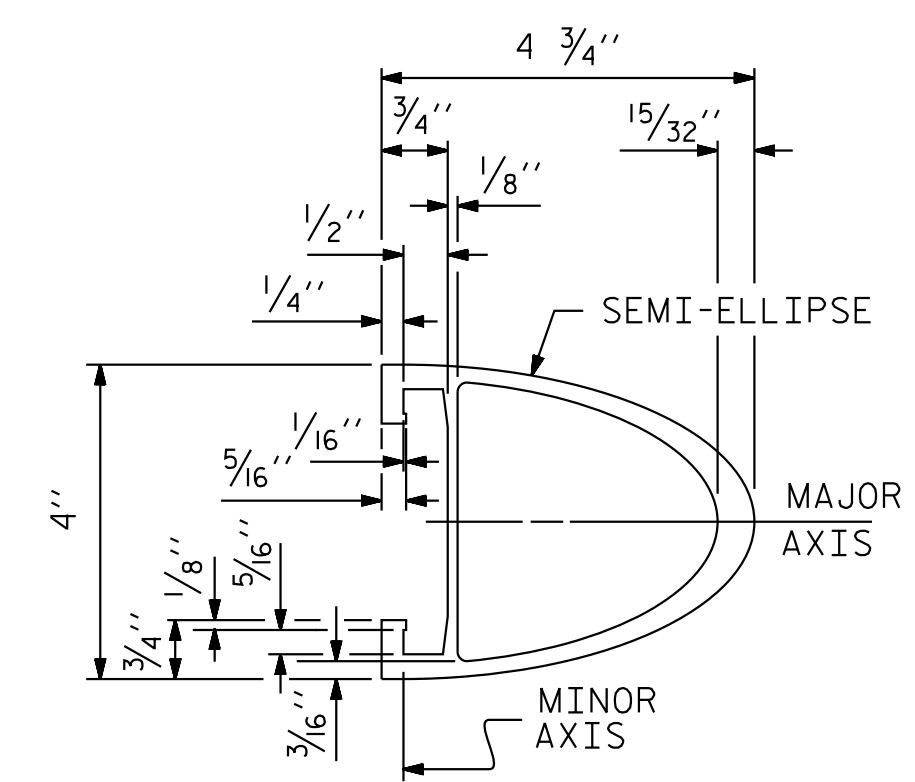
( 5 ASSEMBLIES REQUIRED )



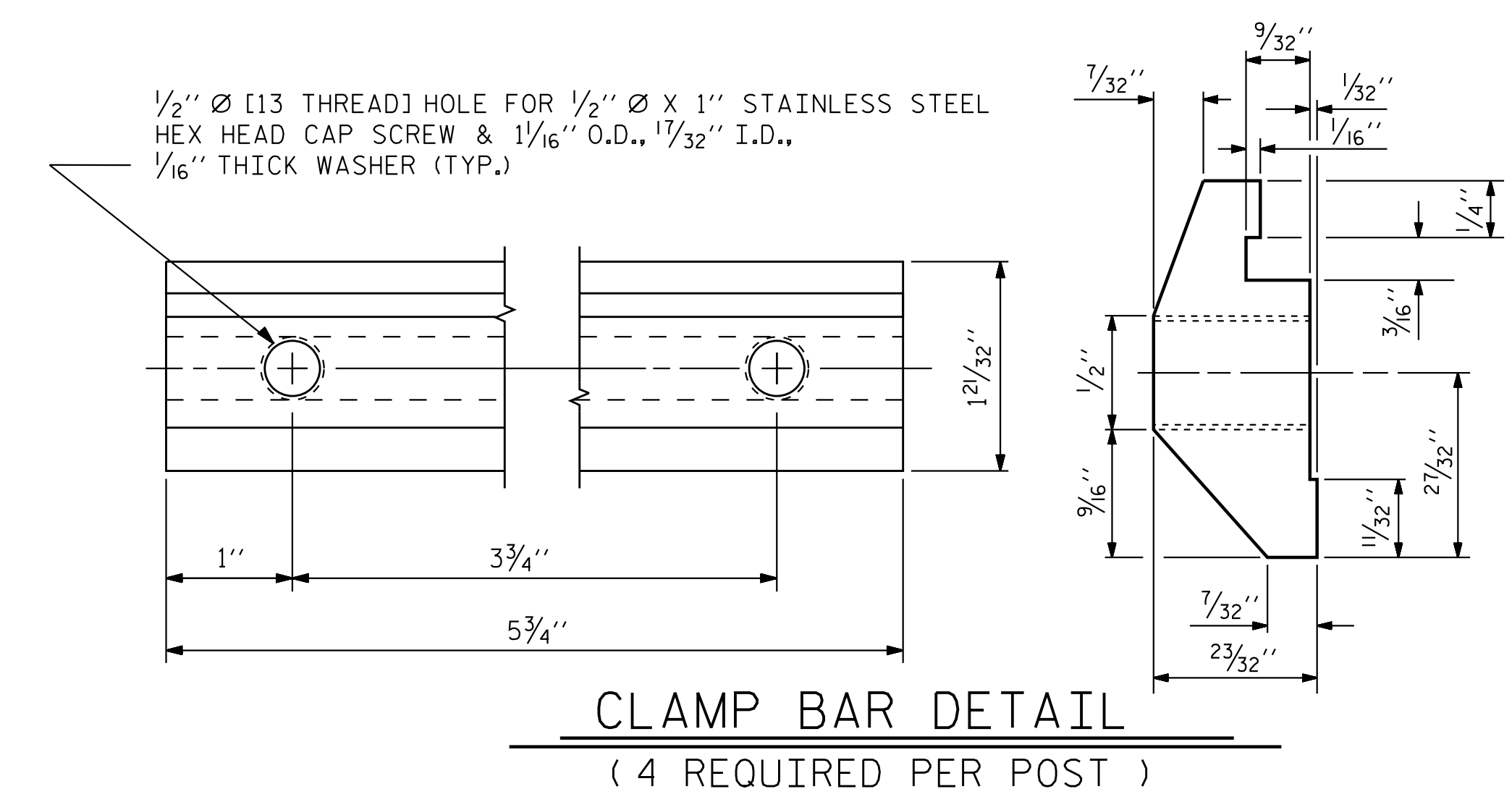
**EXPANSION BAR DETAILS**



**CLAMP ASSEMBLY**

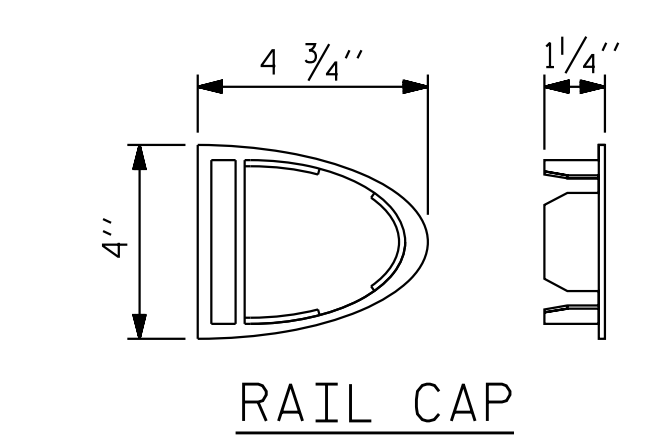


**RAIL SECTION**



**CLAMP BAR DETAIL**

( 4 REQUIRED PER POST )



**RAIL CAP**

PROJECT NO.        N/A  
       CABARRUS        COUNTY  
STATION:        13+82.50

SHEET 2 OF 3

CITY OF CONCORD, NC  
STANDARD  
**2 BAR METAL RAIL**

DRAWN BY :        K. A. WOYAHN        DATE : 05/15/23  
CHECKED BY :        T. R. DUDECK        DATE : 08/24/23  
DESIGN ENGINEER OF RECORD:        T. R. DUDECK        DATE : 02/23/24

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ENGINEER  
T. R. DUDECK  
2/23/2024

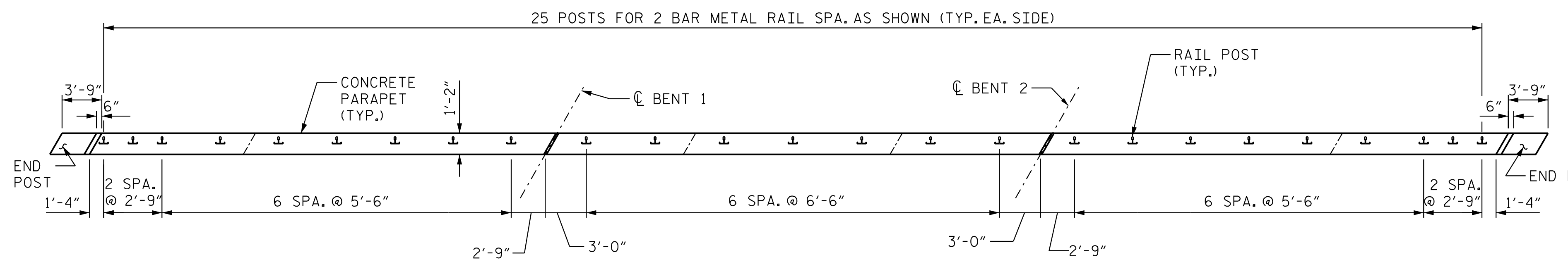
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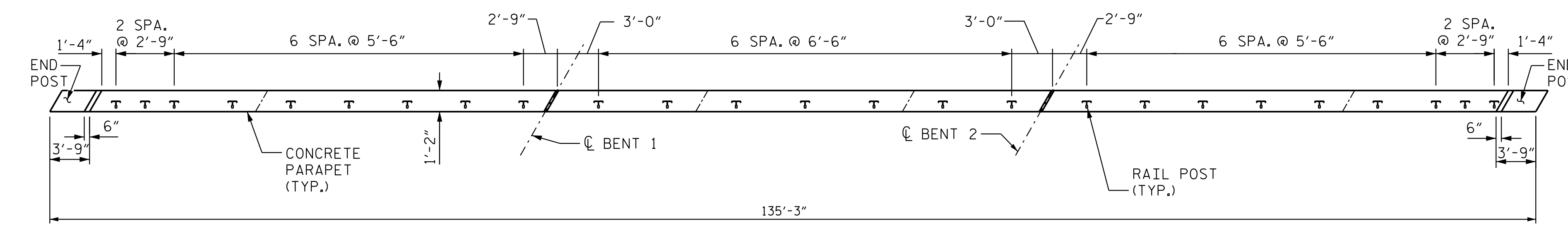
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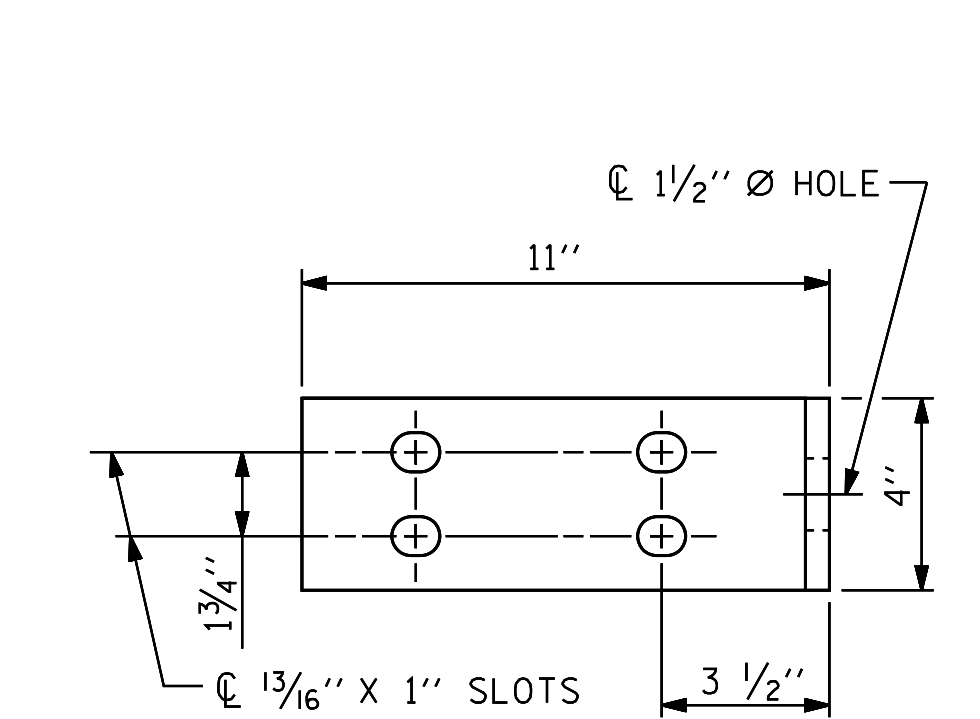


LEFT SIDE PARAPET

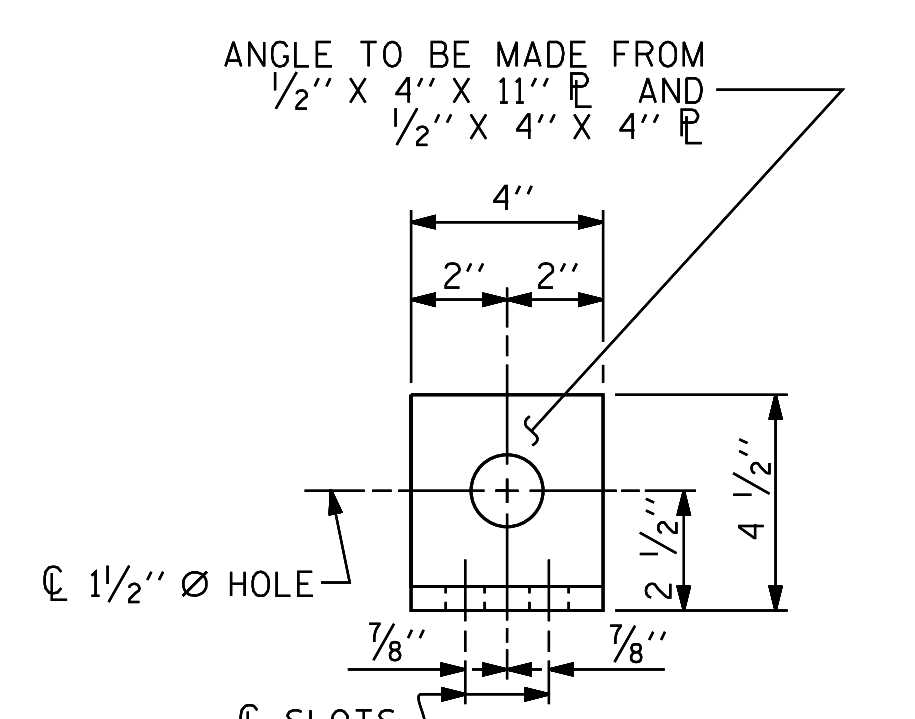


RIGHT SIDE PARAPET

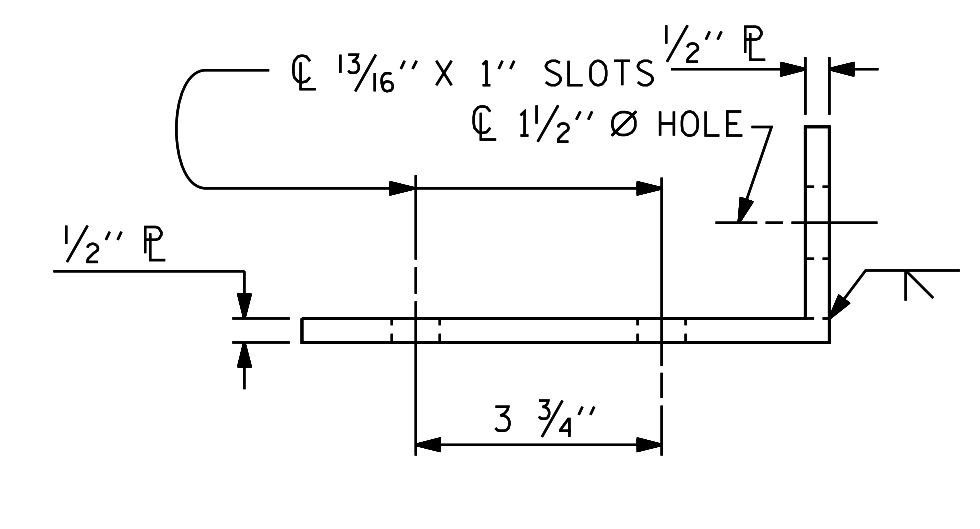
PLAN OF RAIL POST SPACINGS



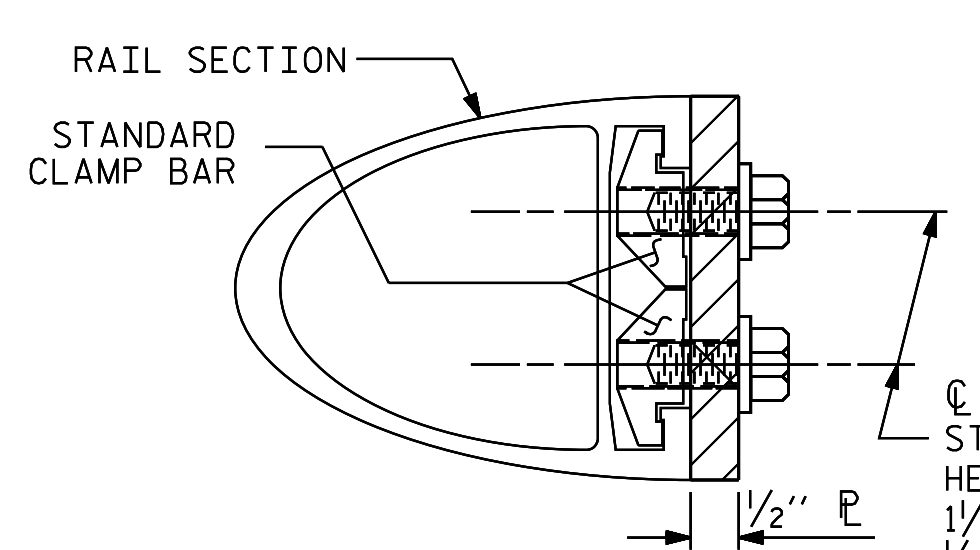
ELEVATION



END VIEW (FIX AND EXP.)



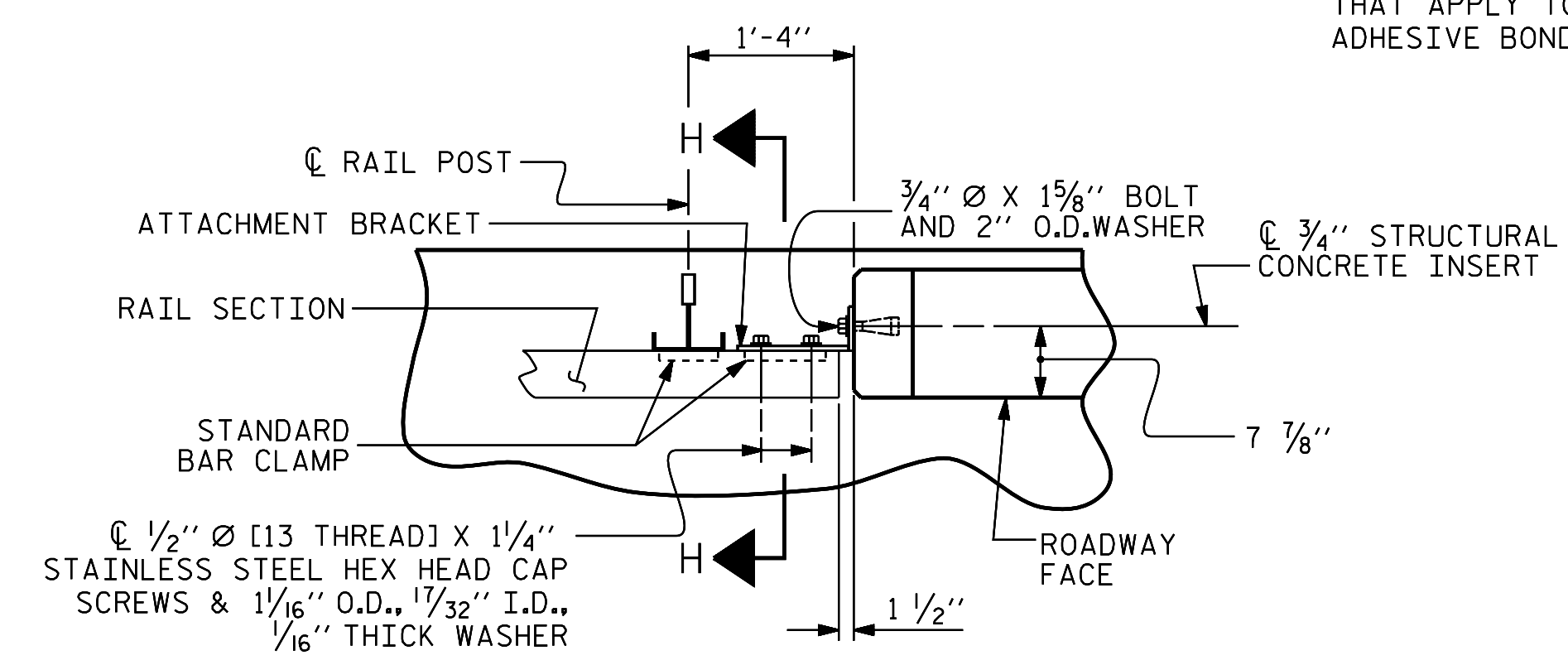
TOP VIEW



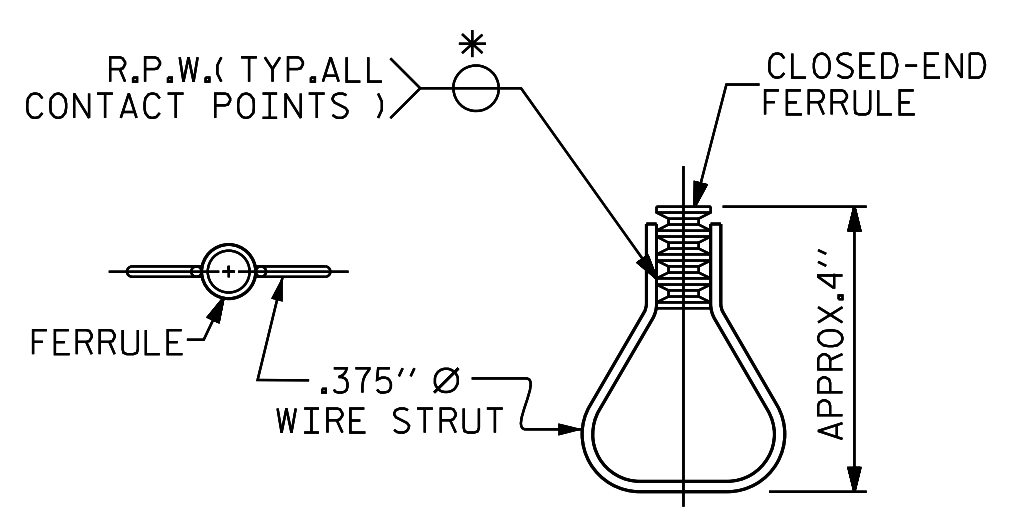
SECTION H-H (FIX)

FIXED

DETAILS FOR ATTACHING METAL RAIL TO END POST



PLAN - RAIL AND END POST



STRUCTURAL CONCRETE INSERT

\* EACH WELDED ATTACHMENT OF WIRE TO FERRULE SHALL DEVELOP THE TENSILE STRENGTH OF THE WIRE.

NOTES

- STRUCTURAL CONCRETE INSERT
- THE STRUCTURAL CONCRETE INSERT ASSEMBLY SHALL CONSIST OF THE FOLLOWING COMPONENTS:
- A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF THREADS OF 1/2".
  - B. 1 - 3/4" Ø X 1 5/8" BOLT WITH WASHER. BOLT SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLT AND WASHER SHALL BE GALVANIZED. (AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLT AND WASHER MAY BE USED AS AN ALTERNATE FOR THE 3/4" Ø X 1 5/8" GALVANIZED BOLT AND WASHER. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.)
  - C. WIRE STRUT SHOWN IN THE CONCRETE INSERT ASSEMBLY DETAIL IS THE MINIMUM ALLOWABLE SIZE AND SHALL HAVE A MINIMUM TENSILE STRENGTH OF 100,000 PSI. AS AN OPTION, A 7/16" Ø WIRE STRUT WITH A MINIMUM TENSILE STRENGTH OF 90,000 PSI IS ACCEPTABLE.

NOTES

- METAL RAIL TO END POST CONNECTION
- THE METAL RAIL TO END POST CONNECTION SHALL CONSIST OF THE FOLLOWING COMPONENTS:
- A. 1/2" PLATES SHALL CONFORM TO AASHTO M270 GRADE 36 AND SHALL BE GALVANIZED AFTER FABRICATION.
  - B. 3/4" STRUCTURAL CONCRETE INSERT SHALL HAVE A WORKING LOAD SHEAR CAPACITY OF 4800 LBS. THE FERRULES SHALL ENGAGE A 3/4" Ø X 1 5/8" BOLT WITH 2" O.D. WASHER IN PLACE. THE 3/4" Ø X 1 5/8" BOLT SHALL HAVE N. C. THREADS.
  - C. CAP SCREWS FOR RAIL ATTACHMENT TO ANGLE SHALL CONFORM TO THE REQUIREMENTS OF ASTM F593 ALLOY 305 STAINLESS STEEL. CAP SCREWS TO BE CENTERED IN SLOTS AT 60°F.
  - D. STANDARD CLAMP BARS (SEE METAL RAIL SHEET).
  - E. 1/2" Ø PIPE SLEEVES (IF REQUIRED) TO BE GALVANIZED.

THE COST OF THE STANDARD CLAMP BARS AND CAP SCREWS USED IN THE METAL RAIL TO END POST CONNECTION SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR LINEAR FEET OF 1 OR 2 BAR METAL RAILS.

THE 3/4" STRUCTURAL CONCRETE INSERT WITH BOLT SHALL BE ASSEMBLED IN THE SHOP.

THE COST OF THE 3/4" STRUCTURAL CONCRETE INSERT ASSEMBLY, AND THE 1/2" PLATES COMPLETE IN PLACE SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.

THE CONTRACTOR, AT HIS OPTION, MAY USE AN ADHESIVE BONDING SYSTEM IN LIEU OF THE STRUCTURAL CONCRETE INSERT EMBEDDED IN THE END POST. IF THE ADHESIVE BONDING SYSTEM IS USED, THE 3/4" Ø X 1 5/8" BOLT WITH WASHER SHALL BE REPLACED WITH A 3/4" Ø X 6 1/2" BOLT AND 2" O.D. WASHER. ALL SPECIFICATIONS THAT APPLY TO THE 3/4" Ø X 1 5/8" BOLT SHALL APPLY TO THE 3/4" Ø X 6 1/2" BOLT. FIELD TESTING OF THE ADHESIVE BONDING SYSTEM IS NOT REQUIRED.

PROJECT NO. N/A  
 CABARRUS COUNTY  
 STATION: 13+82.50

SHEET 3 OF 3

CITY OF CONCORD, NC  
 STANDARD  
 RAIL POST SPACINGS  
 AND  
 END OF RAIL DETAILS  
 FOR ONE OR TWO BAR METAL RAILS

REVISIONS						SHEET NO. S-12
NO.	BY:	DATE:	NO.	BY:	DATE:	
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2			4			

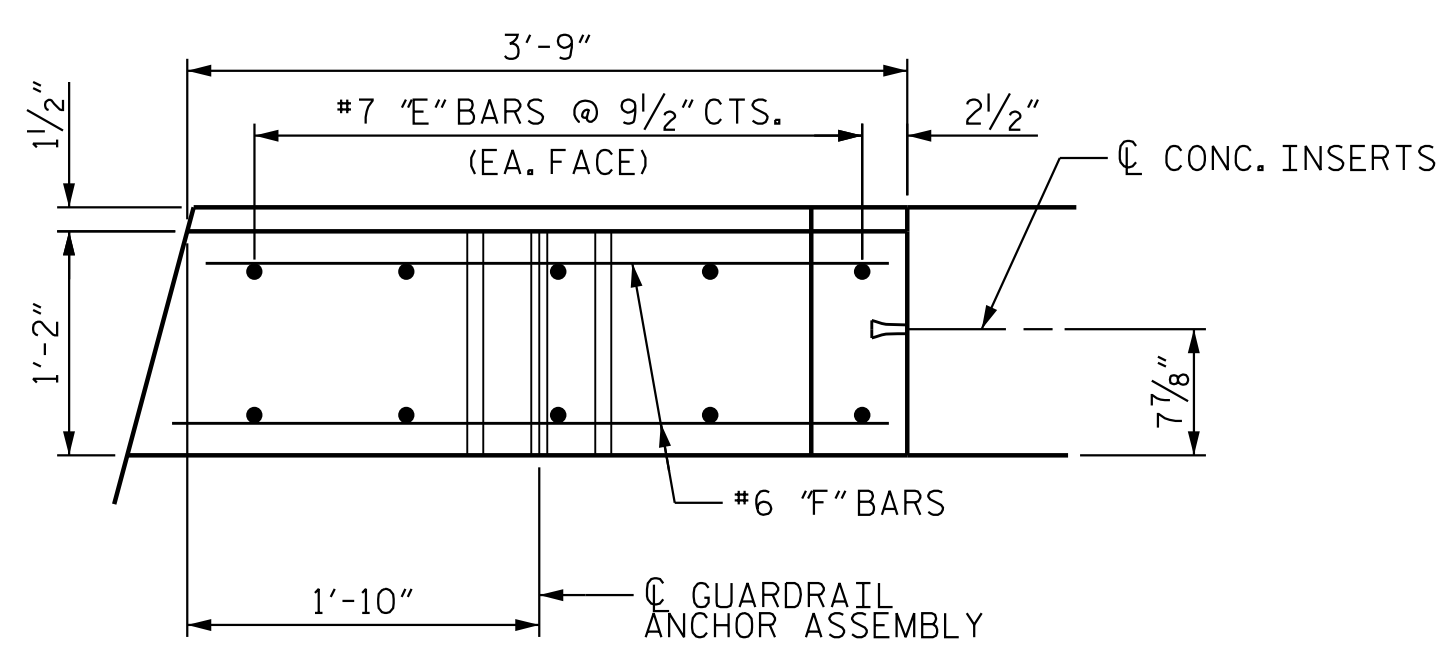
DRAWN BY: K. A. WOYAHN DATE: 05/17/23  
 CHECKED BY: T. R. DUDECK DATE: 08/23/23  
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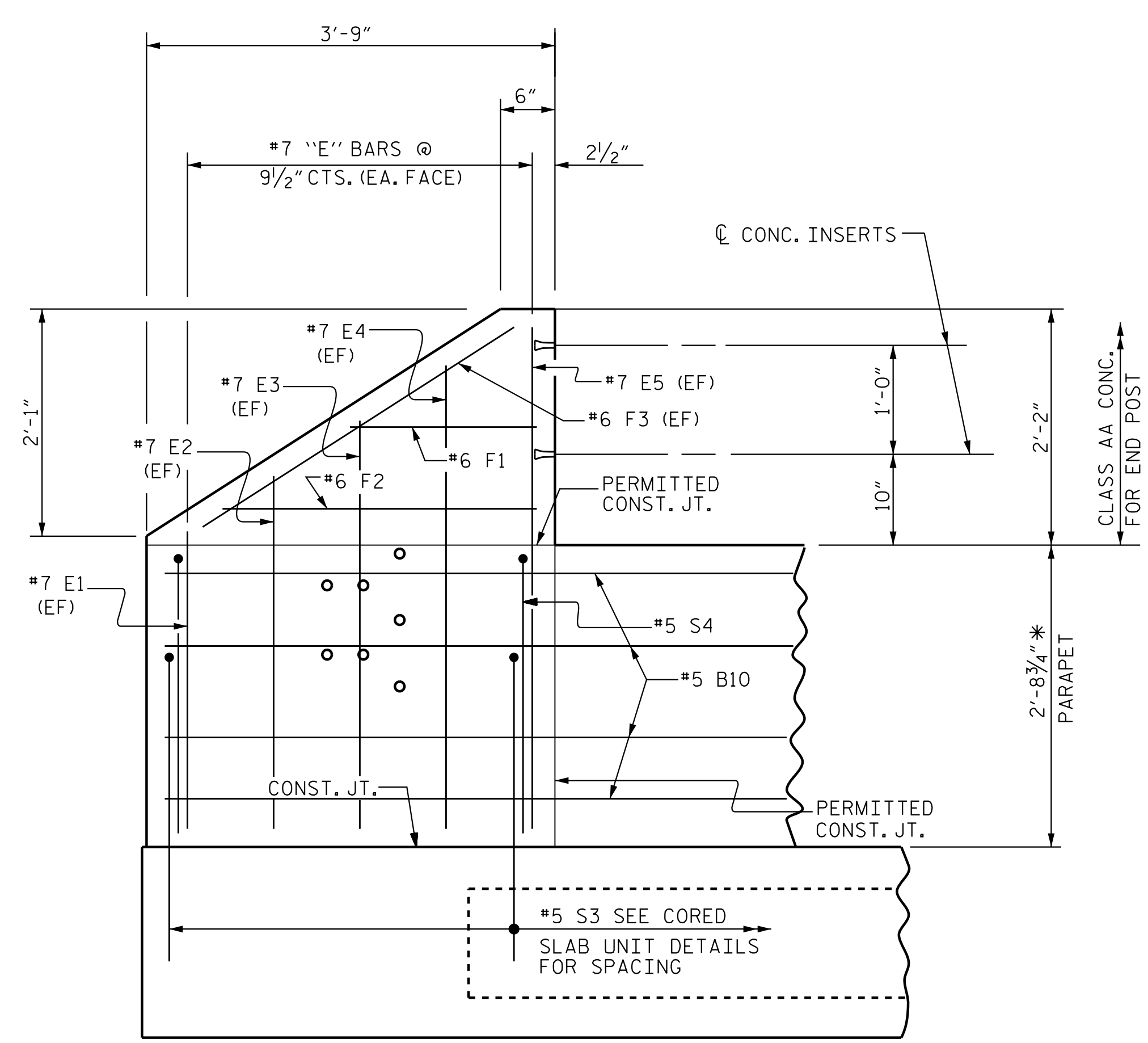
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### NOTES

ALL REINFORCING STEEL IN PARAPETS AND END POSTS SHALL BE EPOXY COATED.

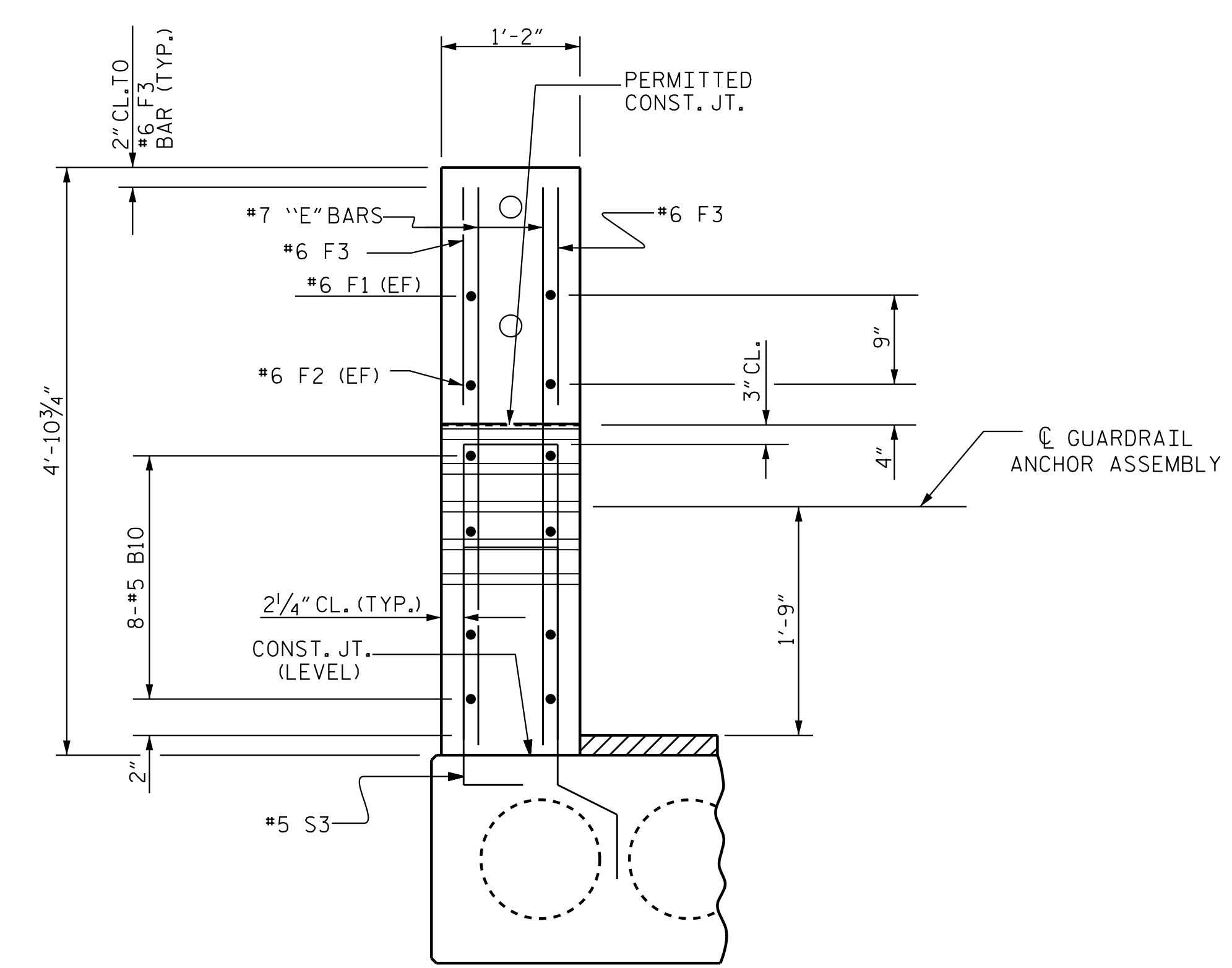
BILL OF MATERIAL					
FOUR END POSTS					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
*E1	8	#7	STR	2'-8"	44
*E2	8	#7	STR	3'-2"	52
*E3	8	#7	STR	3'-8"	60
*E4	8	#7	STR	4'-3"	69
*E5	8	#7	STR	4'-7"	75
*F1	8	#6	STR	1'-8"	20
*F2	8	#6	STR	2'-10"	34
*F3	8	#6	STR	3'-4"	40
* EPOXY COATED REINFORCING STEEL				LBS.	394
CLASS AA CONCRETE				C. Y.	0.8
* DENOTES EPOXY COATED REINFORCING					



### ELEVATION

(EF) DENOTES BAR IN EA. FACE

\* VARIES (SEE "GUTTERLINE ASPHALT THICKNESS & PARAPET HEIGHT" TABLE) (SEE SHEET S-9)



### END VIEW

PROJECT NO. N/A  
 CABARRUS COUNTY  
 STATION: 13+82.50

CITY OF CONCORD, NC					
SUPERSTRUCTURE					
CONCRETE					
PARAPET AND END POST					
DETAILS					
REVISIONS					SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
TOTAL SHEETS					25

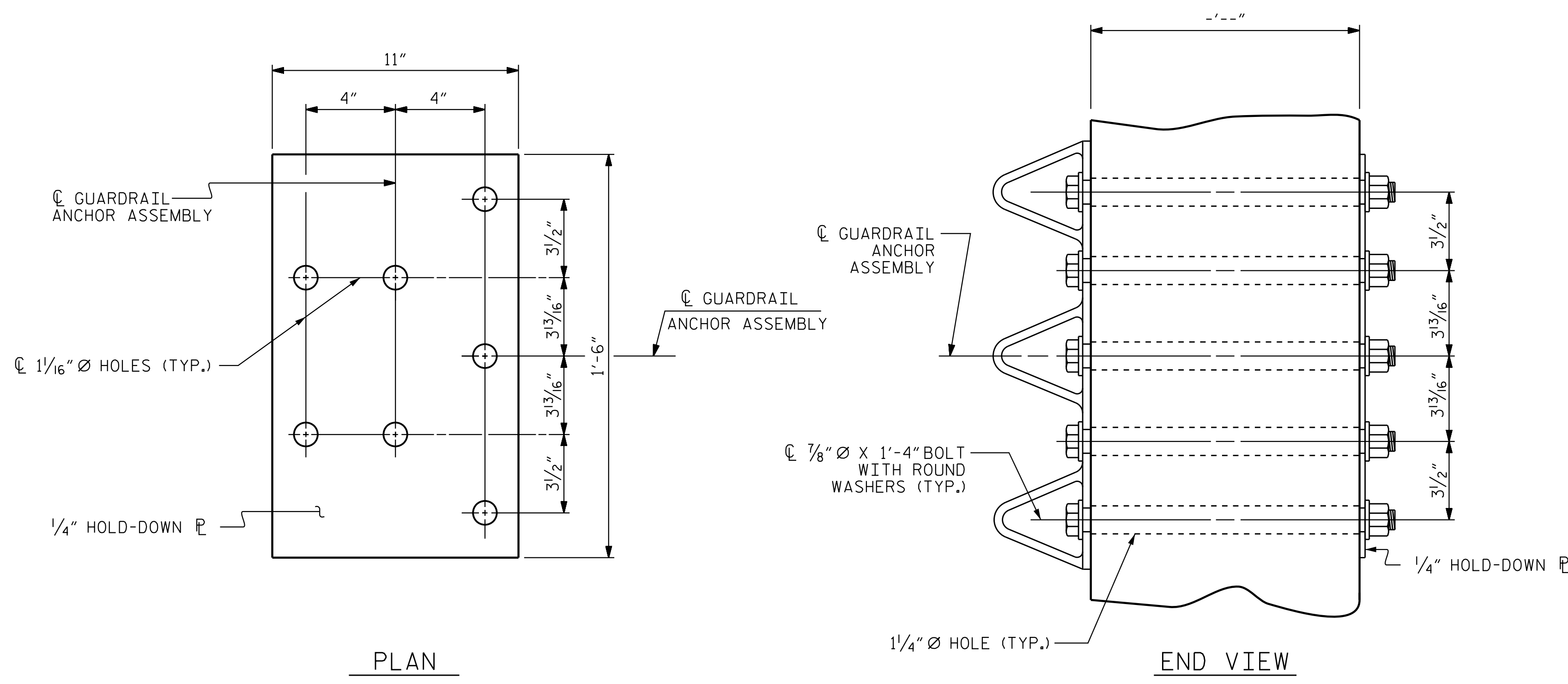
DRAWN BY : K. A. WOYAHN DATE : 5/23/23  
 CHECKED BY : T. R. DUDECK DATE : 08/23/23  
 DESIGN ENGINEER OF RECORD : T. R. DUDECK DATE : 02/23/24

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**GUARDRAIL ANCHOR ASSEMBLY DETAILS**

**NOTES**

THE GUARDRAIL ANCHOR ASSEMBLY SHALL CONSIST OF A 1/4" HOLD DOWN PLATE AND 7 - 7/8" Ø BOLTS WITH NUTS AND WASHERS.

THE HOLD-DOWN PLATE SHALL CONFORM TO AASHTO M270 GRADE 36. AFTER FABRICATION, THE HOLD-DOWN PLATE SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH AASHTO M111.

BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307 AND NUTS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M291. BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED. AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS, NUTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE 7/8" Ø GALVANIZED BOLTS, NUTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.

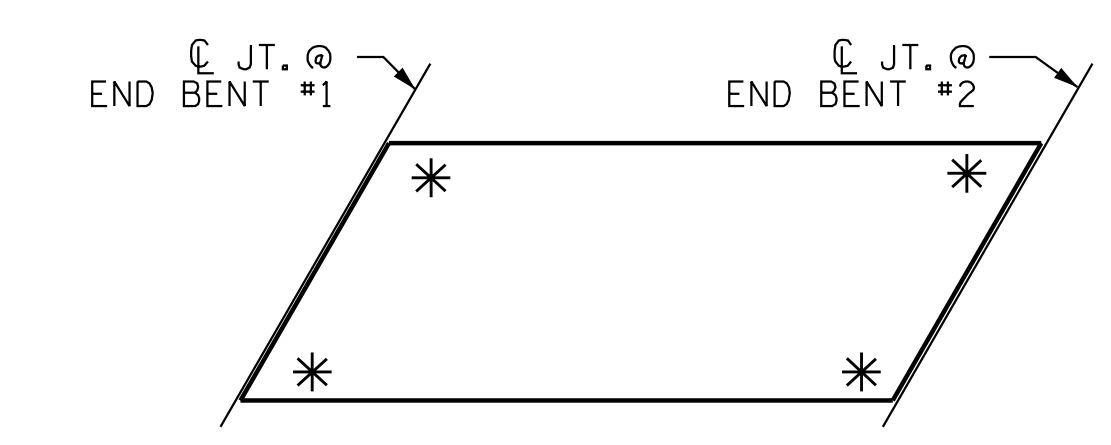
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF THE PARAPET. FOR POINTS OF ATTACHMENT, SEE SKETCH.

AFTER INSTALLATION, THE EXPOSED THREAD OF THE BOLT SHALL BE BURRED WITH A SHARP POINTED TOOL.

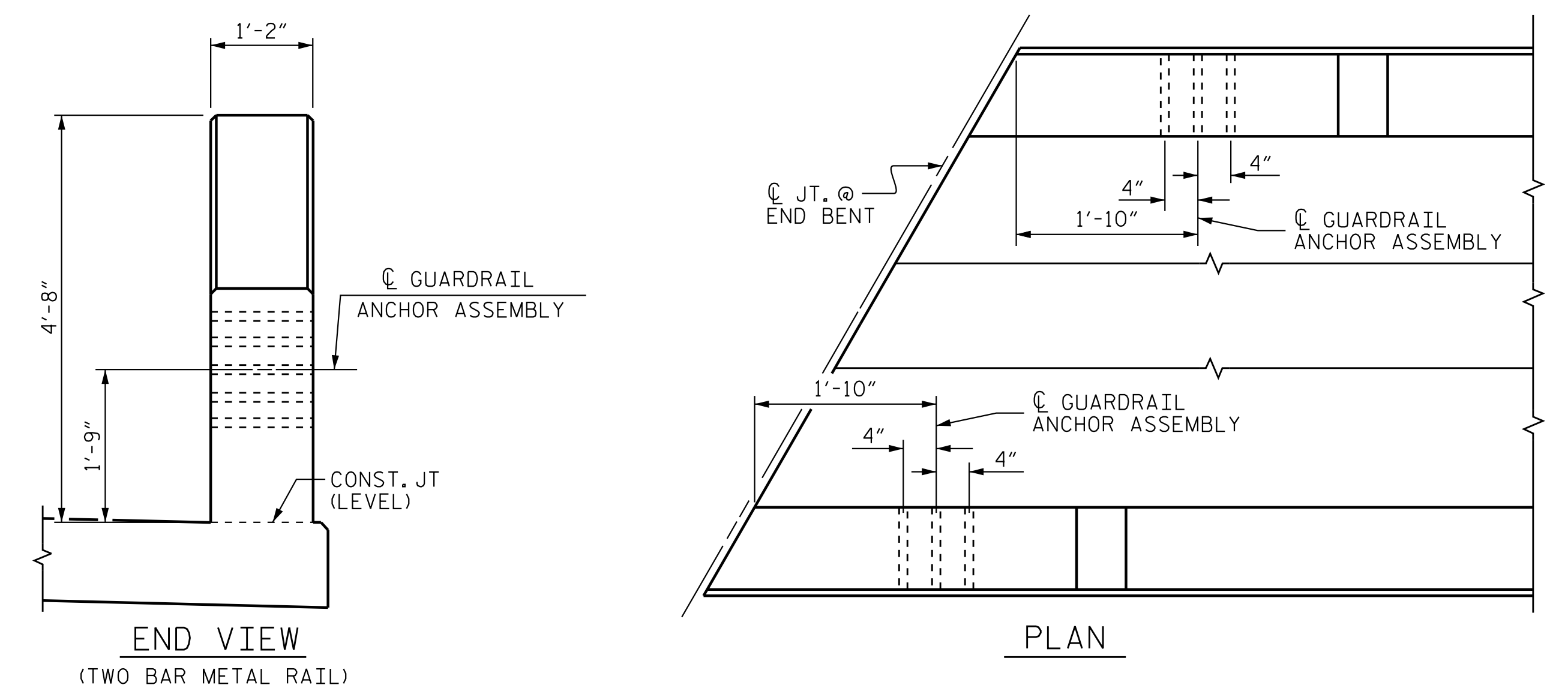
THE COST OF THE GUARDRAIL ANCHOR ASSEMBLIES WITH BOLTS, NUTS AND WASHERS COMPLETE IN PLACE, SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.

THE VERTICAL REINFORCING BARS MAY BE SHIFTED SLIGHTLY IN THE END POST TO CLEAR ASSEMBLY BOLTS.

THE 1 1/4" Ø HOLES SHALL BE FORMED OR DRILLED WITH A CORE BIT. IMPACT TOOLS WILL NOT BE PERMITTED. ANY CONCRETE DAMAGED BY THIS WORK SHALL BE REPAIRED TO THE SATISFACTION OF THE ENGINEER.



**SKETCH SHOWING POINTS OF ATTACHMENT**  
\* LOCATION OF GUARDRAIL ATTACHMENT



**LOCATION OF GUARDRAIL ANCHOR AT END POST**

PROJECT NO. N/A  
CABARRUS COUNTY  
STATION: 13+82.50

CITY OF CONCORD, NC  
STANDARD  
GUARDRAIL ANCHORAGE  
DETAILS  
FOR METAL RAILS

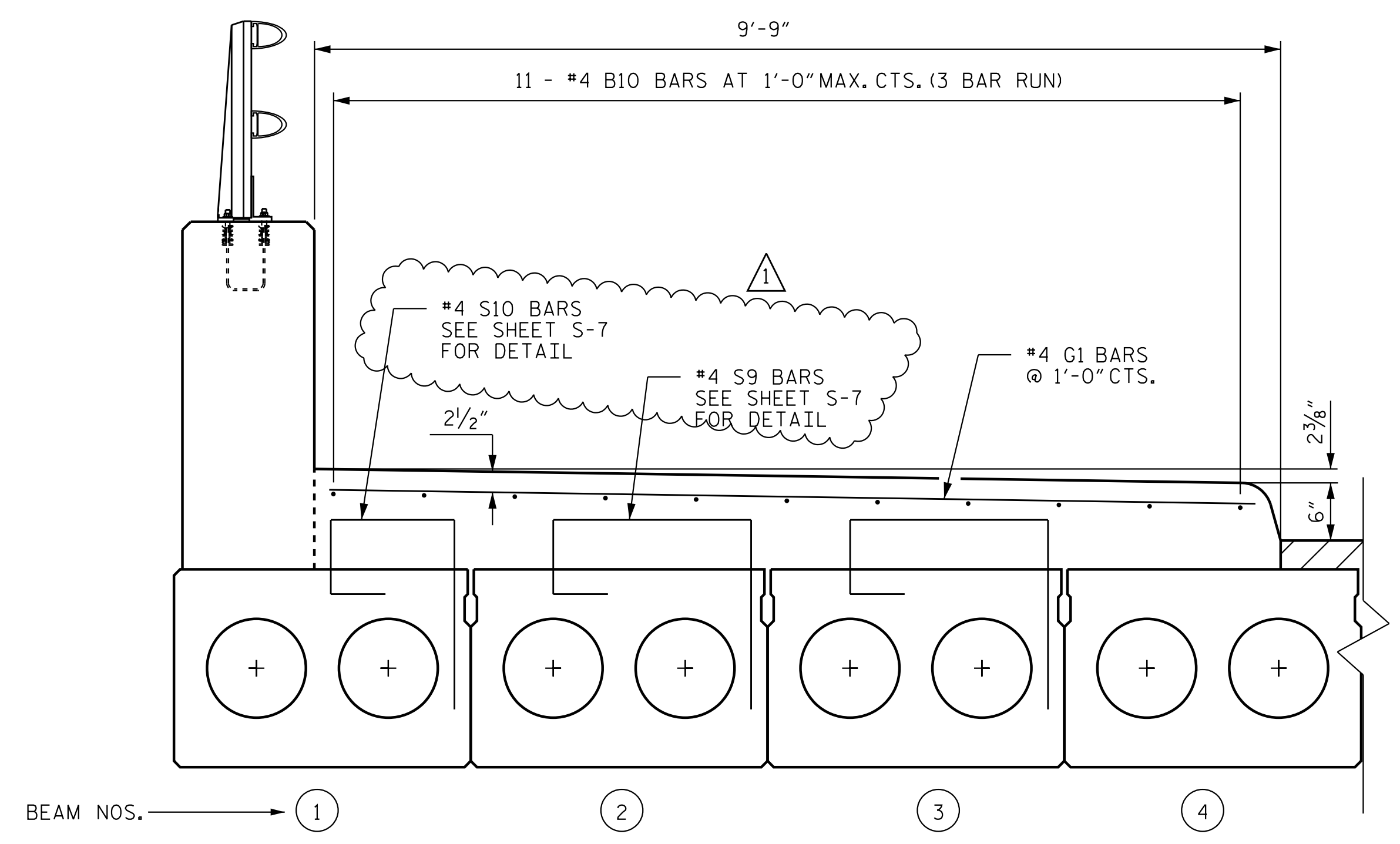
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CHECKED BY: T. R. DUDECK DATE: 08/23/23  
DESIGN ENGINEER OF RECORD: T. R. DUDECK DATE: 02/23/24

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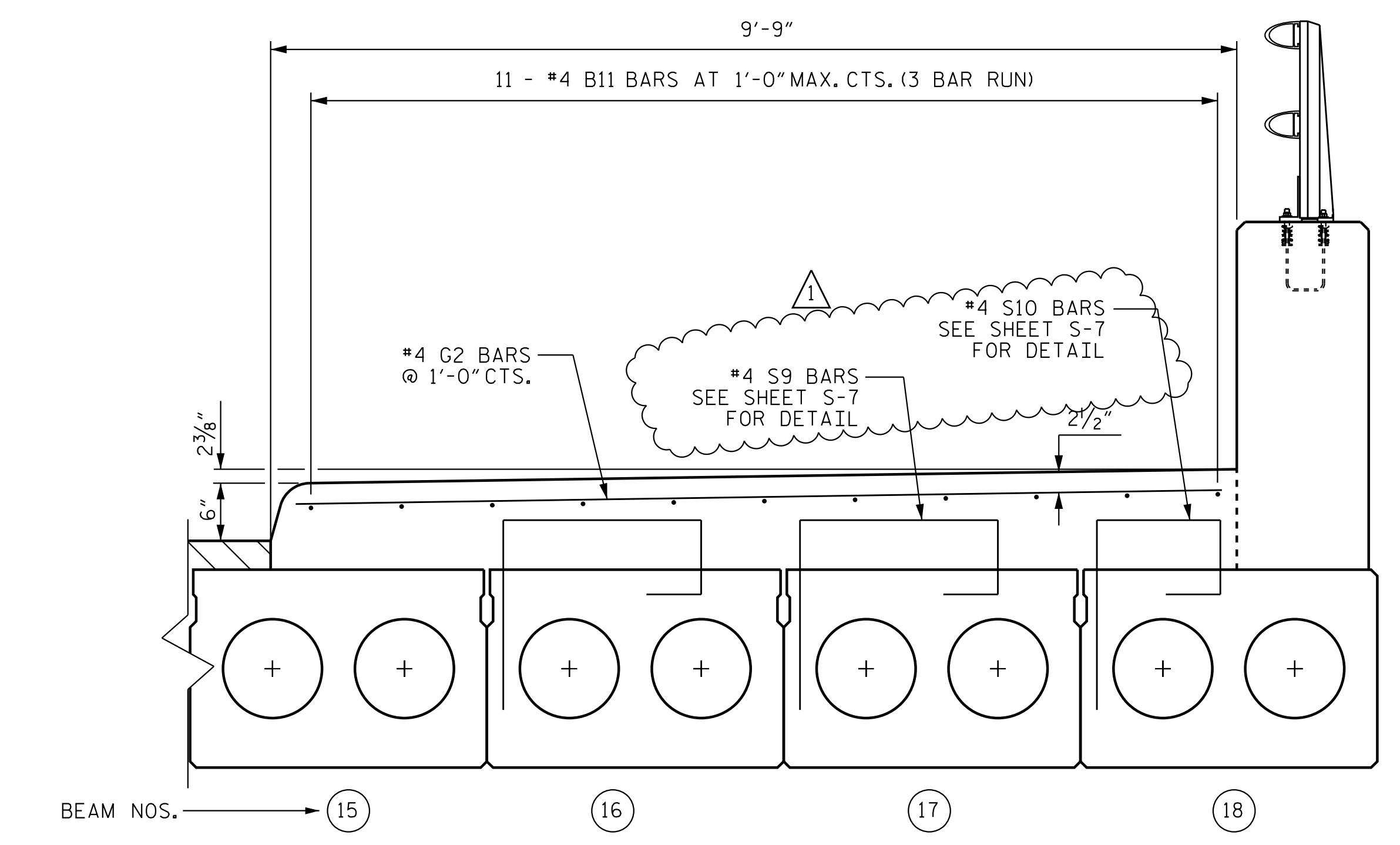
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2			4			25

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LEFT SIDEWALK



RIGHT SIDEWALK

BILL OF MATERIAL					
LEFT SIDEWALK					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* G1	70	#4	STR	9'-3"	433
* B10	33	#4	STR	46'-4"	1021
* EPOXY COATED REINFORCING STEEL				LBS.	1454
CLASS AA CONCRETE				C.Y.	29.3
RIGHT SIDEWALK					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* G2	70	#4	STR	9'-3"	433
* B11	33	#4	STR	46'-4"	1021
* EPOXY COATED REINFORCING STEEL				LBS.	1454
CLASS AA CONCRETE				C.Y.	29.3

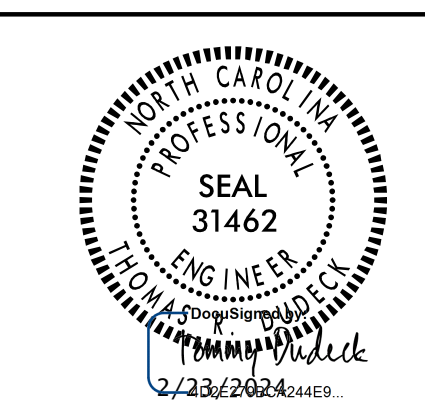
SPLICE LENGTHS	
BAR SIZE	EPOXY COATED
#4	2'-0"

PROJECT NO. N/A  
 CABARRUS COUNTY  
 STATION: 13+82.50

CITY OF CONCORD, NC					
SIDEWALK DETAIL					
REVISIONS					
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2			4		
					SHEET NO. S-15
					TOTAL SHEETS 25

DRAWN BY : K. A. WOYAHN DATE : 05/24/23  
 CHECKED BY : T. R. DUDECK DATE : 08/23/23  
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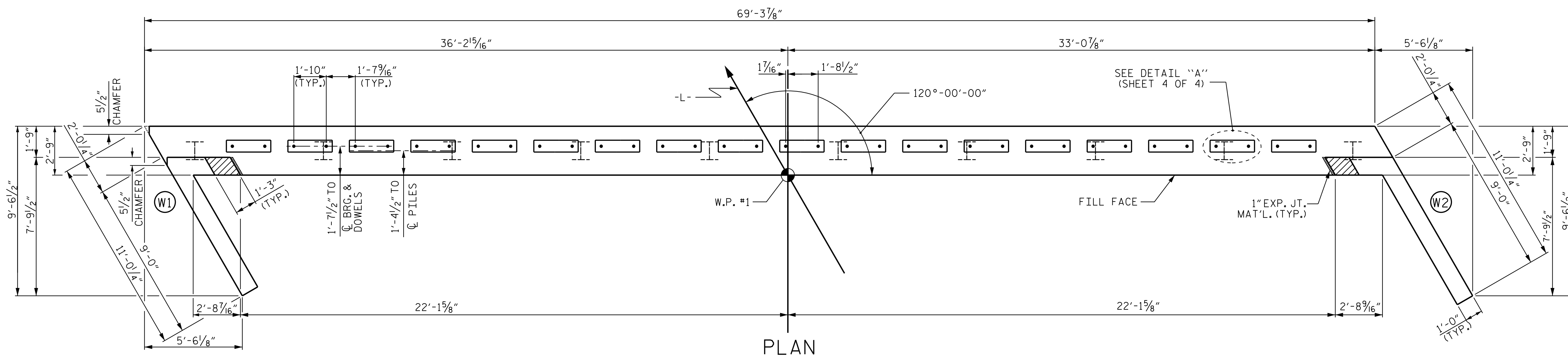
**NOTES**

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR DOWELS.

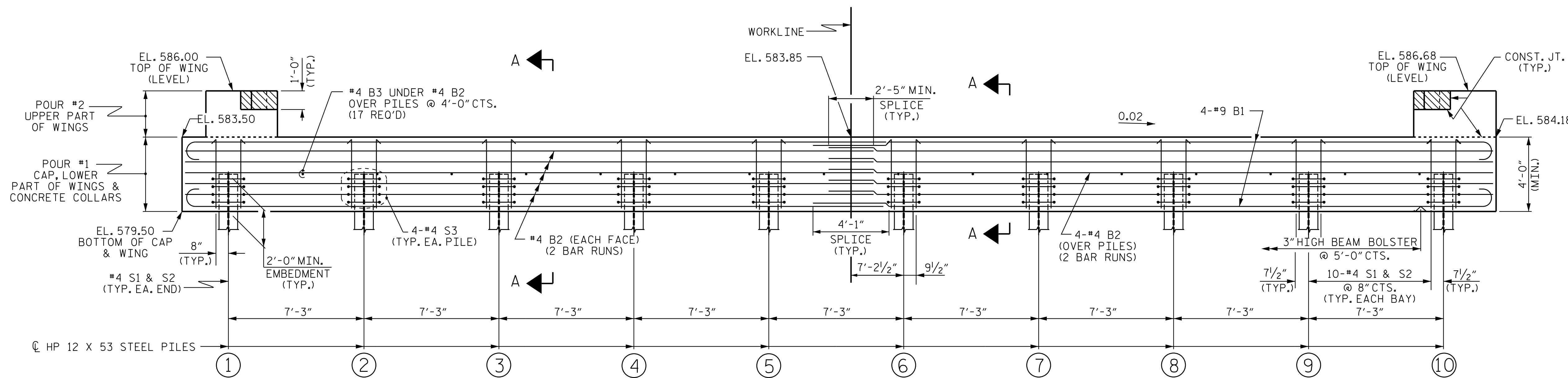
THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE VERTICAL CONCRETE BARRIER RAIL IS CAST IF SLIP FORMING IS USED.

FOR PILE SPLICE DETAILS, SEE SHEET 4 OF 4.

FOR WING DETAILS, SEE SHEET 3 OF 4.



**PLAN**



**ELEVATION**

WINGS NOT SHOWN FOR CLARITY.  
FOR SECTION A-A, SEE SHEET 4 OF 4.  
CONCRETE COLLARS FOR STEEL PILES NOT SHOWN IN PLAN AND ELEVATION VIEWS FOR CLARITY.

TOP OF PILE ELEVATIONS	
①	581.61
②	581.68
③	581.75
④	581.82
⑤	581.89
⑥	581.96
⑦	582.03
⑧	582.10
⑨	582.17
⑩	582.24

PROJECT NO.        N/A  
       CABARRUS        COUNTY  
 STATION:        13+82.50

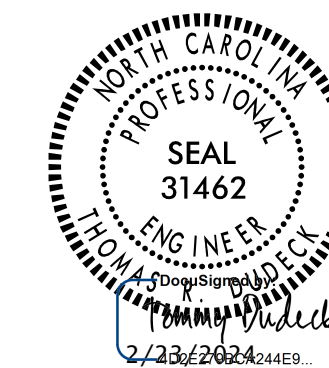
SHEET 1 OF 4

CITY OF CONCORD, NC  
 SUBSTRUCTURE  
 END BENT No. 1

DRAWN BY :        J. B. GEILE        DATE : 04/13/23  
 CHECKED BY :        T. R. DUDECK        DATE : 08/23/23  
 DESIGN ENGINEER OF RECORD:        T. R. DUDECK        DATE : 02/23/24



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2			4			



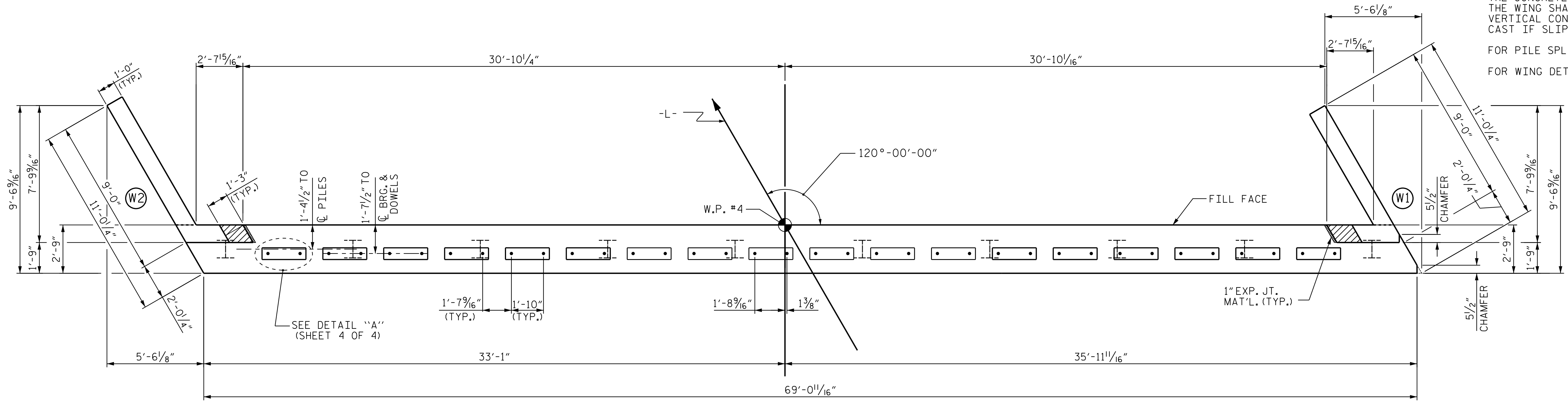
**NOTES**

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR DOWELS.

THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE VERTICAL CONCRETE BARRIER RAIL IS CAST IF SLIP FORMING IS USED.

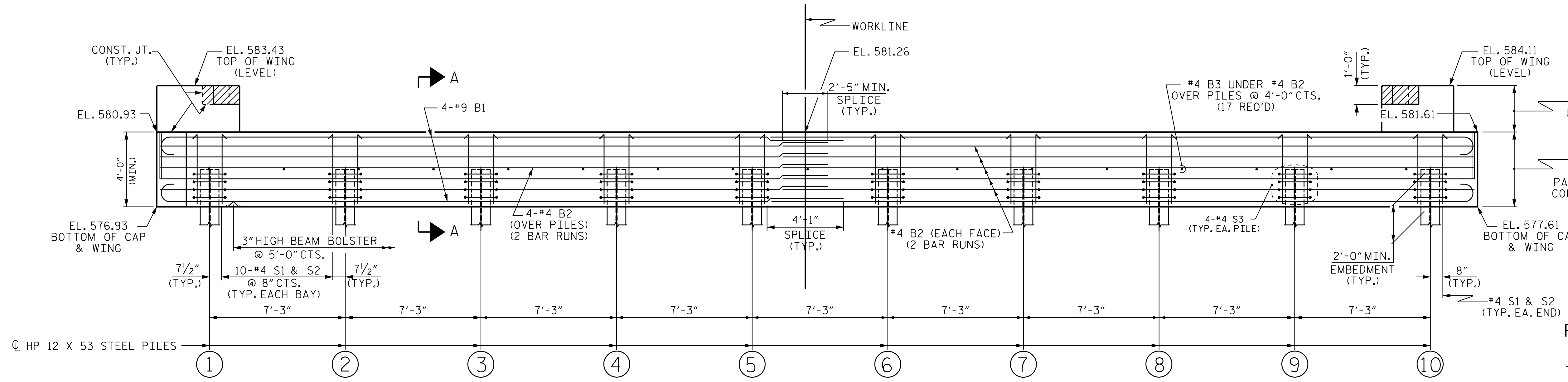
FOR PILE SPLICE DETAILS, SEE SHEET 4 OF 4.

FOR WING DETAILS, SEE SHEET 3 OF 4.



**PLAN**

TOP OF PILE ELEVATIONS	
①	579.03
②	579.09
③	579.16
④	579.23
⑤	579.30
⑥	579.37
⑦	579.44
⑧	579.51
⑨	579.58
⑩	579.65



**ELEVATION**

WINGS NOT SHOWN FOR CLARITY.  
 FOR SECTION A-A, SEE SHEET 4 OF 4.  
 CONCRETE COLLARS FOR STEEL PILES NOT SHOWN IN PLAN AND ELEVATION VIEWS FOR CLARITY.  
 SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL", SHEET 4 OF 4.

PROJECT NO. N/A  
CABARRUS COUNTY  
 STATION: 13+82.50

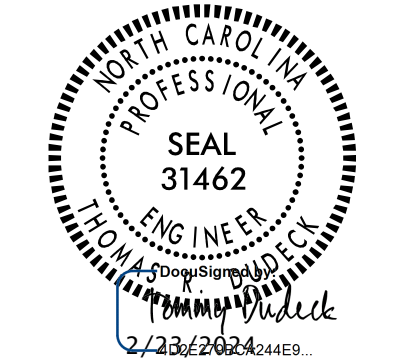
SHEET 2 OF 4

CITY OF CONCORD, NC  
 SUBSTRUCTURE  
 END BENT No. 2

DRAWN BY: J. B. GEILE DATE: 04/12/23  
 CHECKED BY: T. R. DUDECK DATE: 08/23/23  
 DESIGN ENGINEER OF RECORD: T. R. DUDECK DATE: 02/23/24



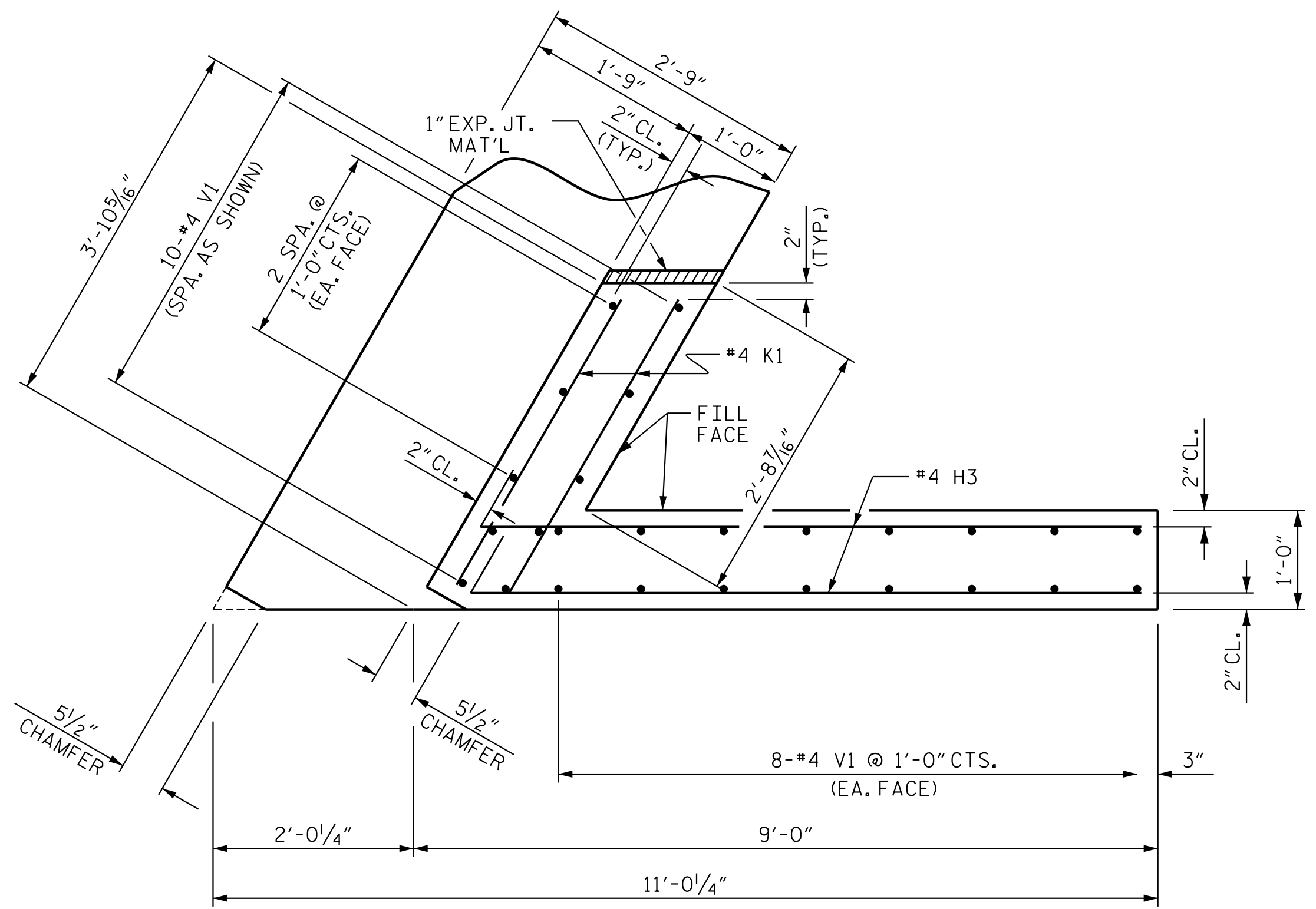
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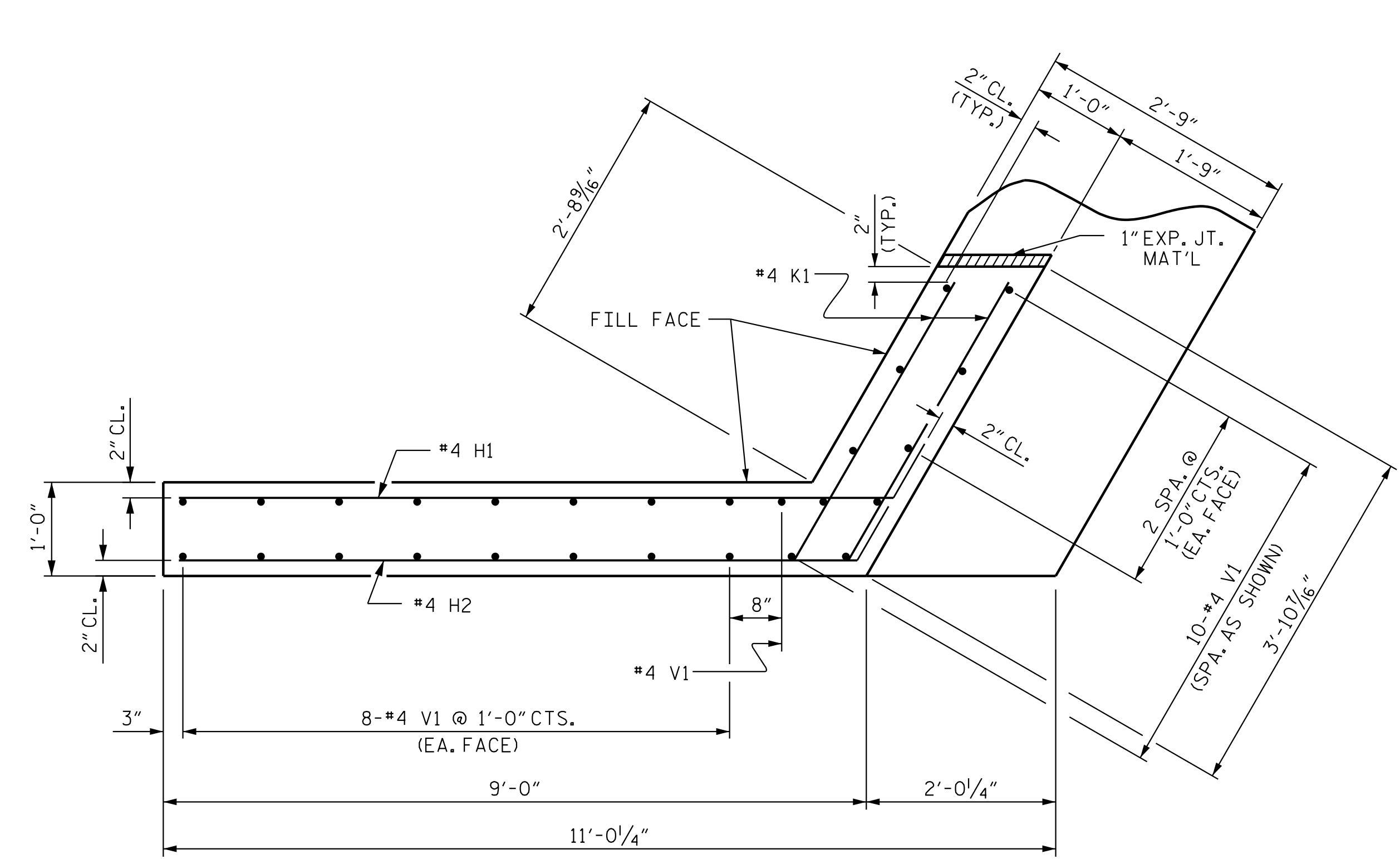
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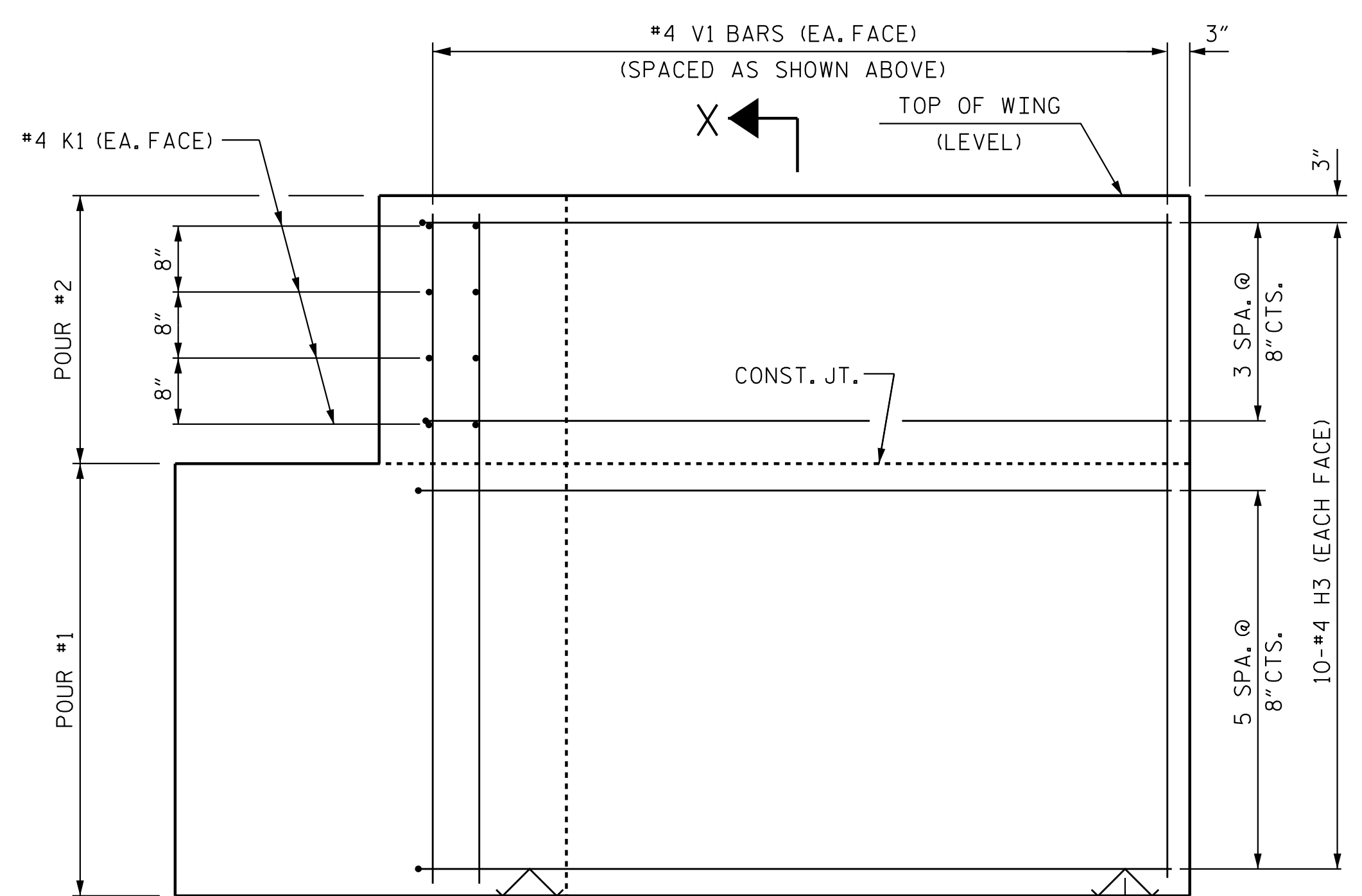




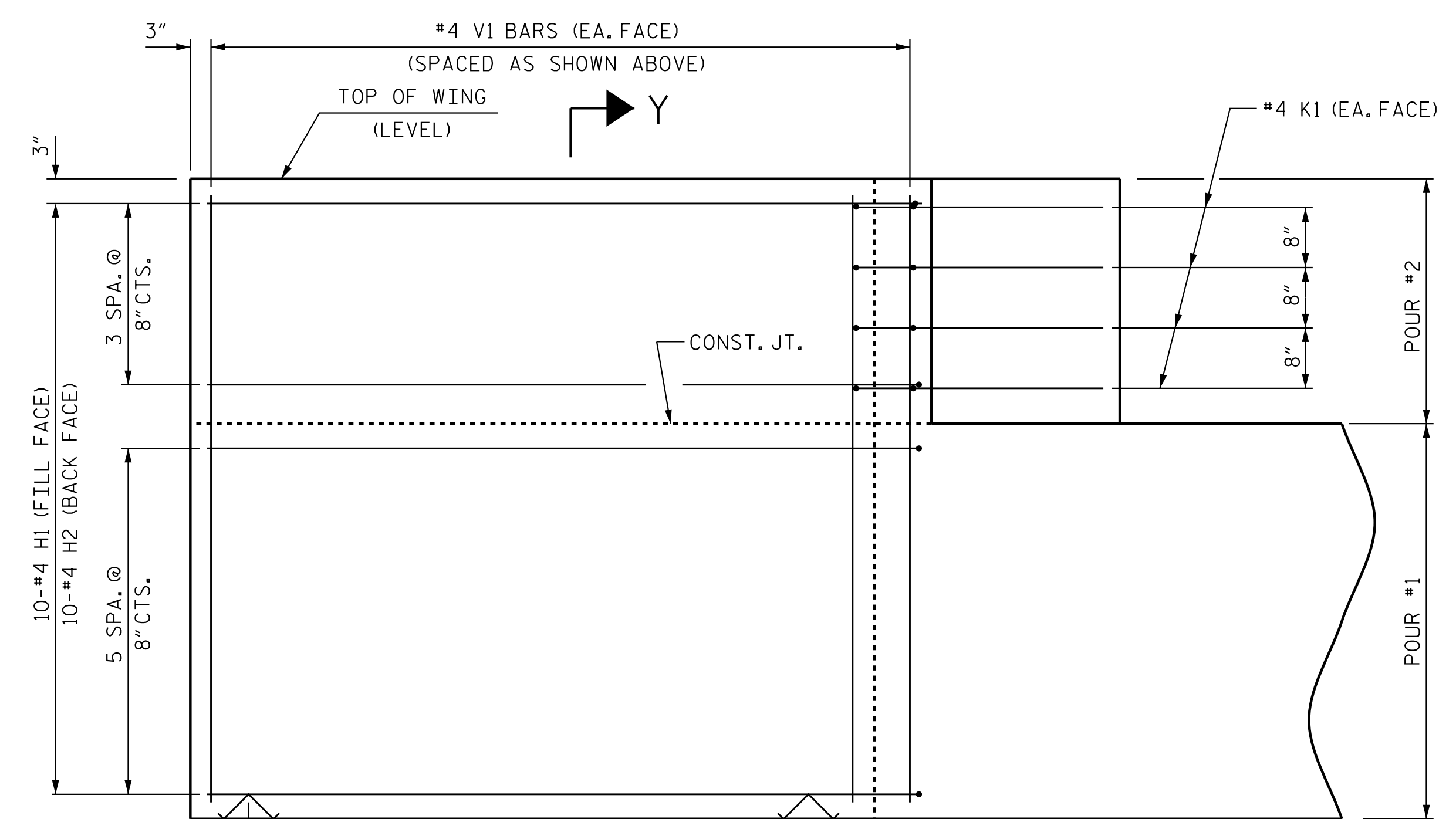
PLAN OF WING (W1)



PLAN OF WING (W2)

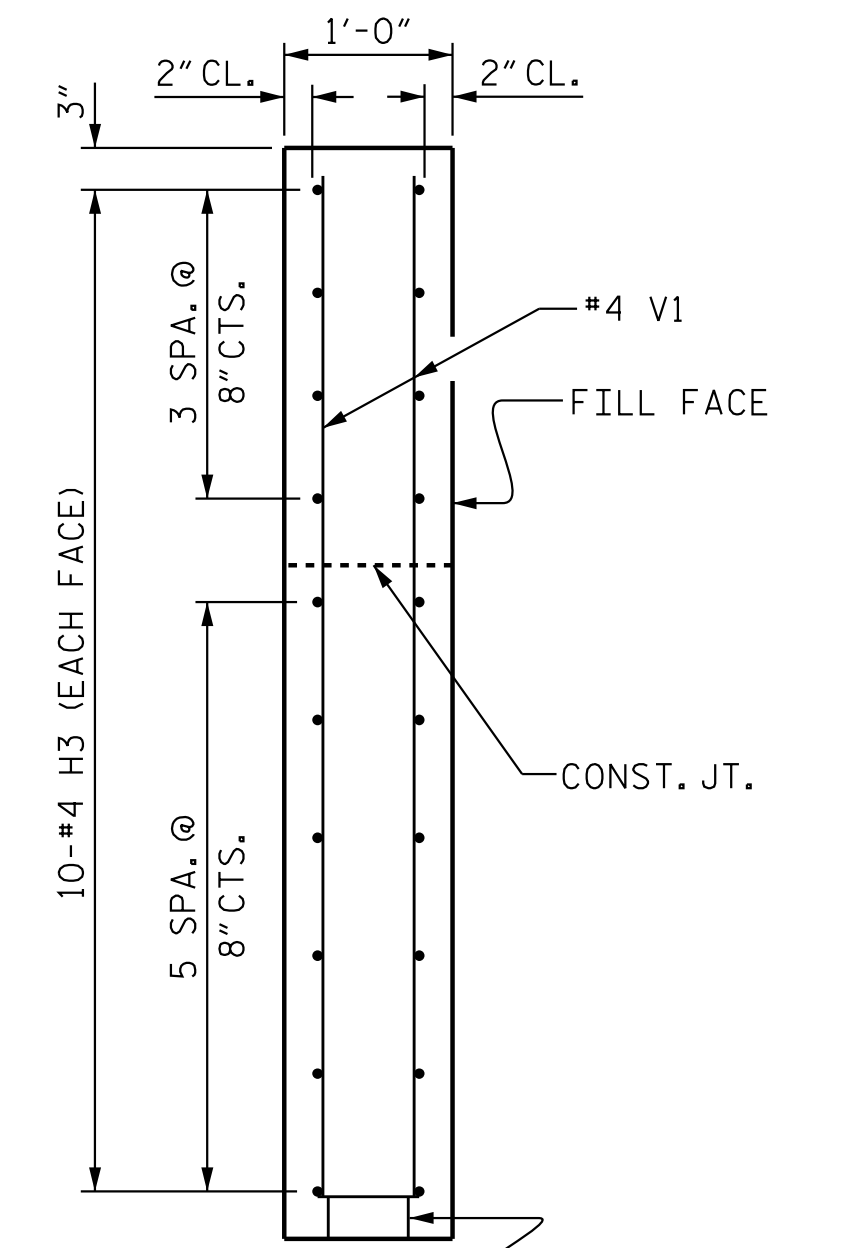


ELEVATION OF WING (W1)

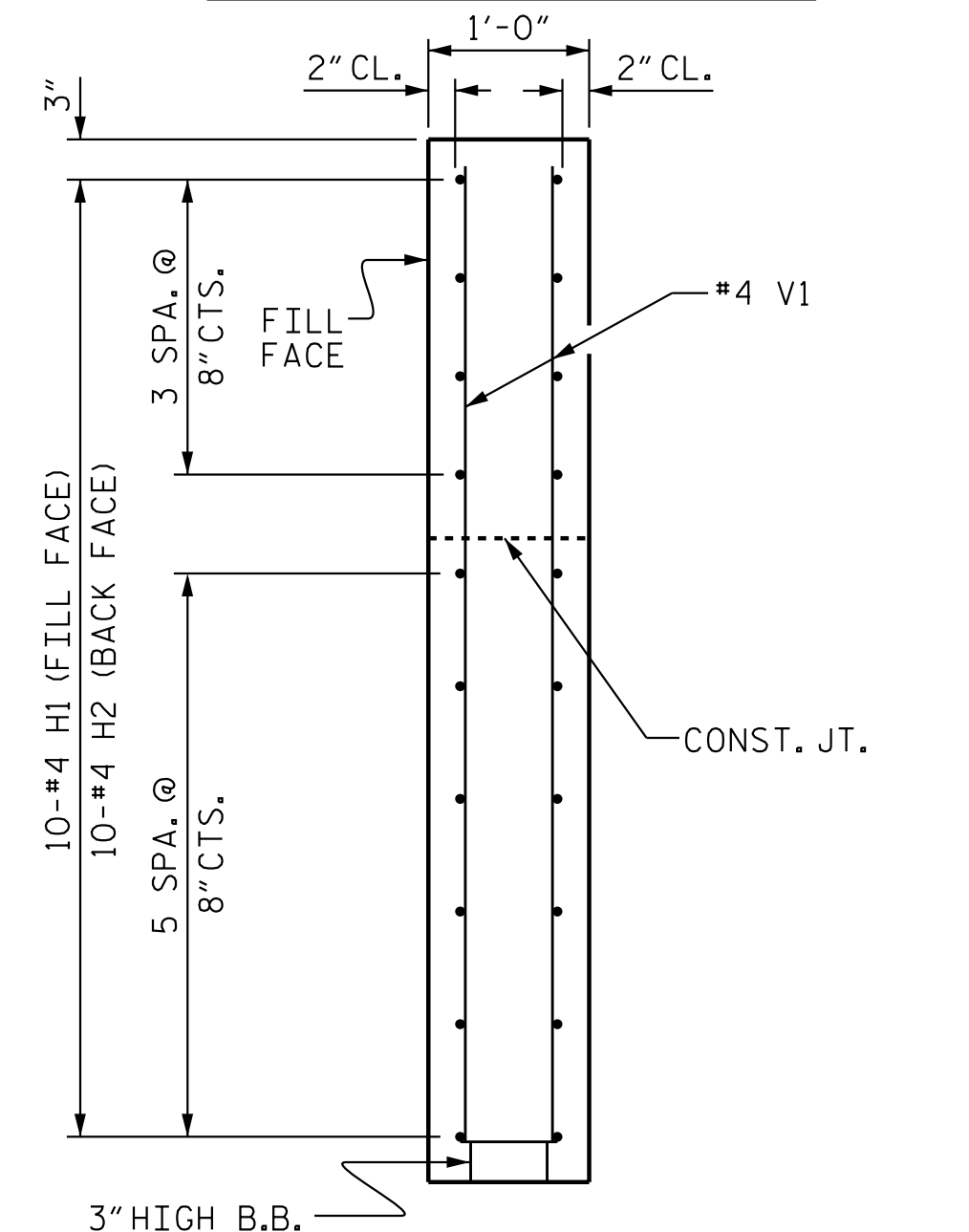


ELEVATION OF WING (W2)

WING DETAILS



SECTION X-X



SECTION Y-Y

PROJECT NO. N/A  
 CABARRUS COUNTY  
 STATION: 13+82.50

SHEET 3 OF 4

CITY OF CONCORD, NC					
SUBSTRUCTURE					
END BENT					
WING DETAILS					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
SHEET NO.					S-18
TOTAL SHEETS					25

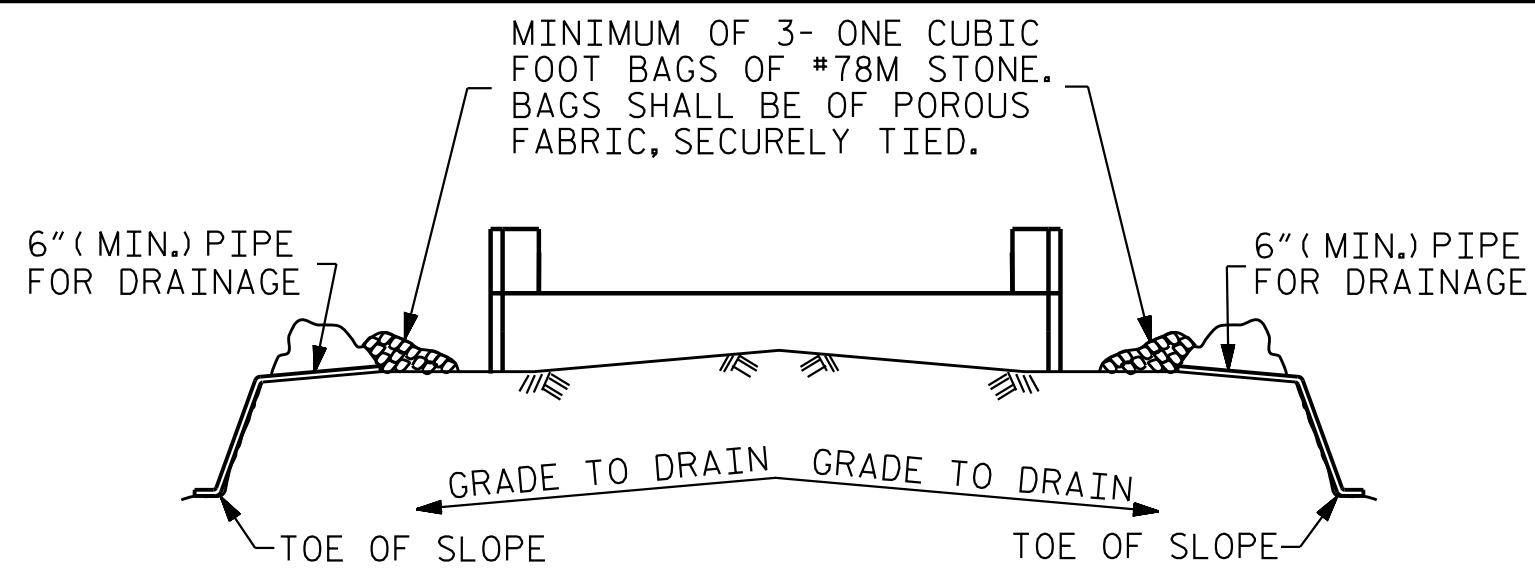
DRAWN BY: J. B. GEILE DATE: 04/13/23  
 CHECKED BY: T. R. DUDECK DATE: 08/23/23  
 DESIGN ENGINEER OF RECORD: T. R. DUDECK DATE: 02/23/24

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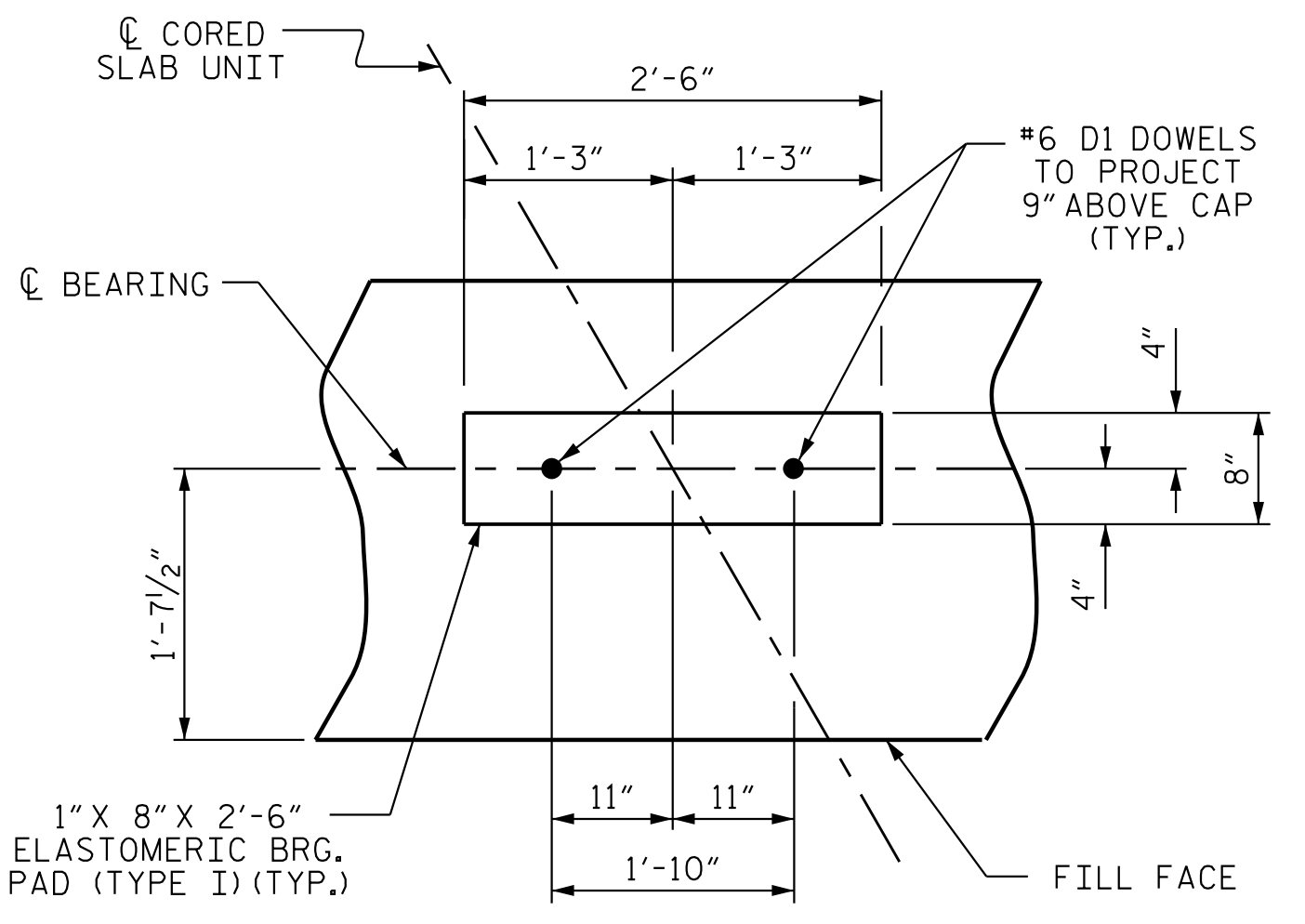


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

BAGGED STONE SHALL REMAIN IN PLACE UNTIL THE ENGINEER DIRECTS THAT IT BE REMOVED. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF SILT ACCUMULATIONS AT BAGGED STONE WHEN SO DIRECTED BY THE ENGINEER. BAGS SHALL BE REMOVED AND REPLACED WHENEVER THE ENGINEER DETERMINES THAT THEY HAVE DETERIORATED AND LOST THEIR EFFECTIVENESS.

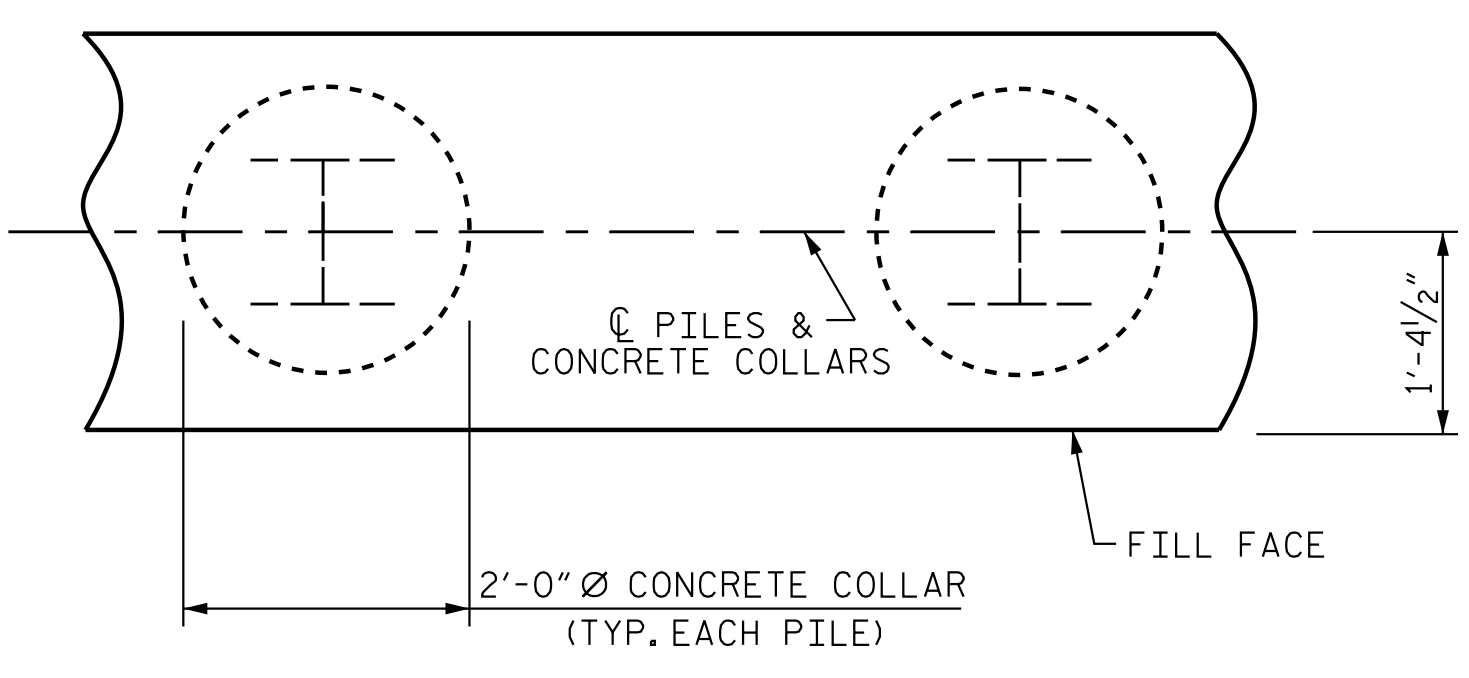
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

**TEMPORARY DRAINAGE AT END BENT**



**DETAIL "A"**

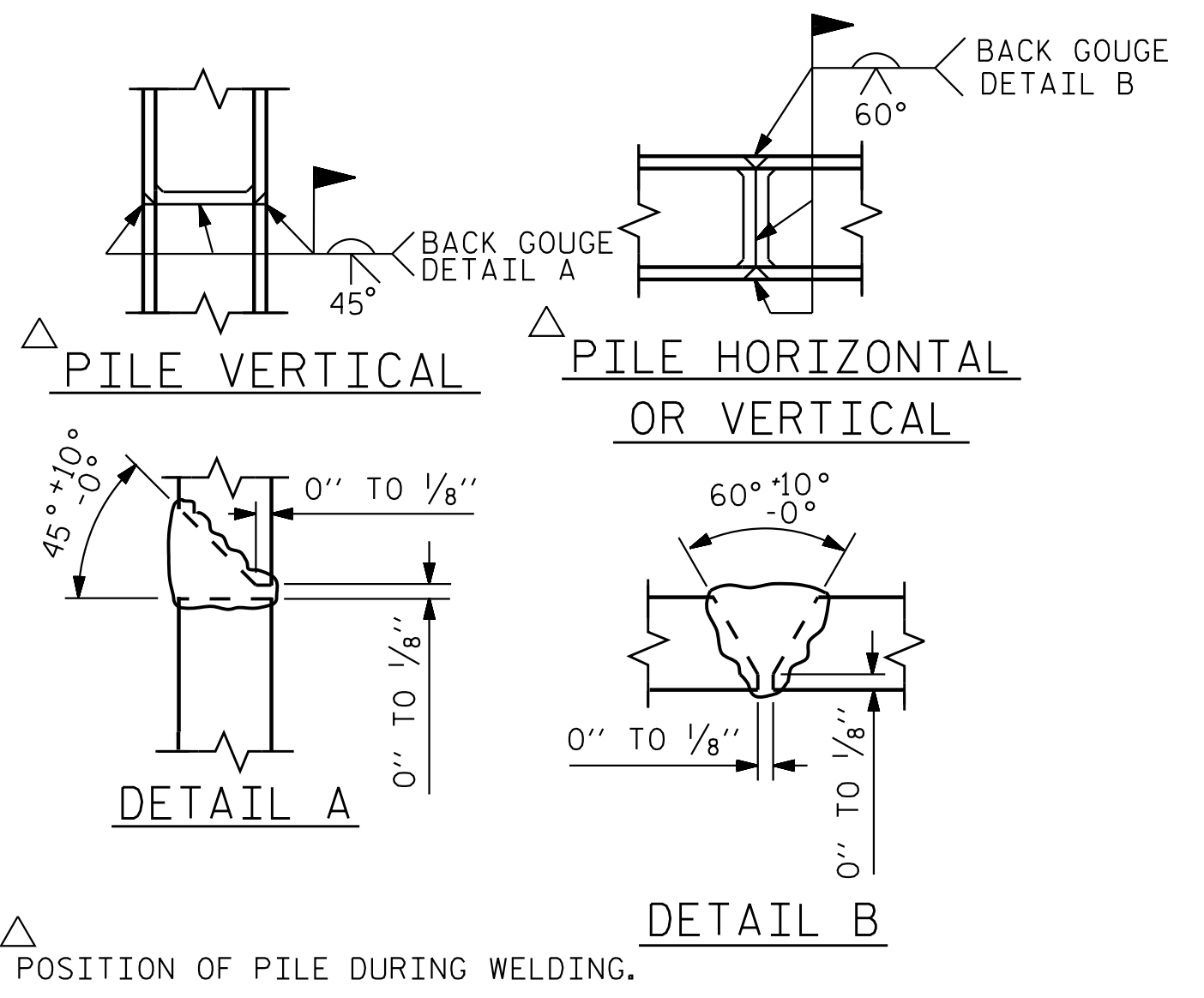
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**PLAN**

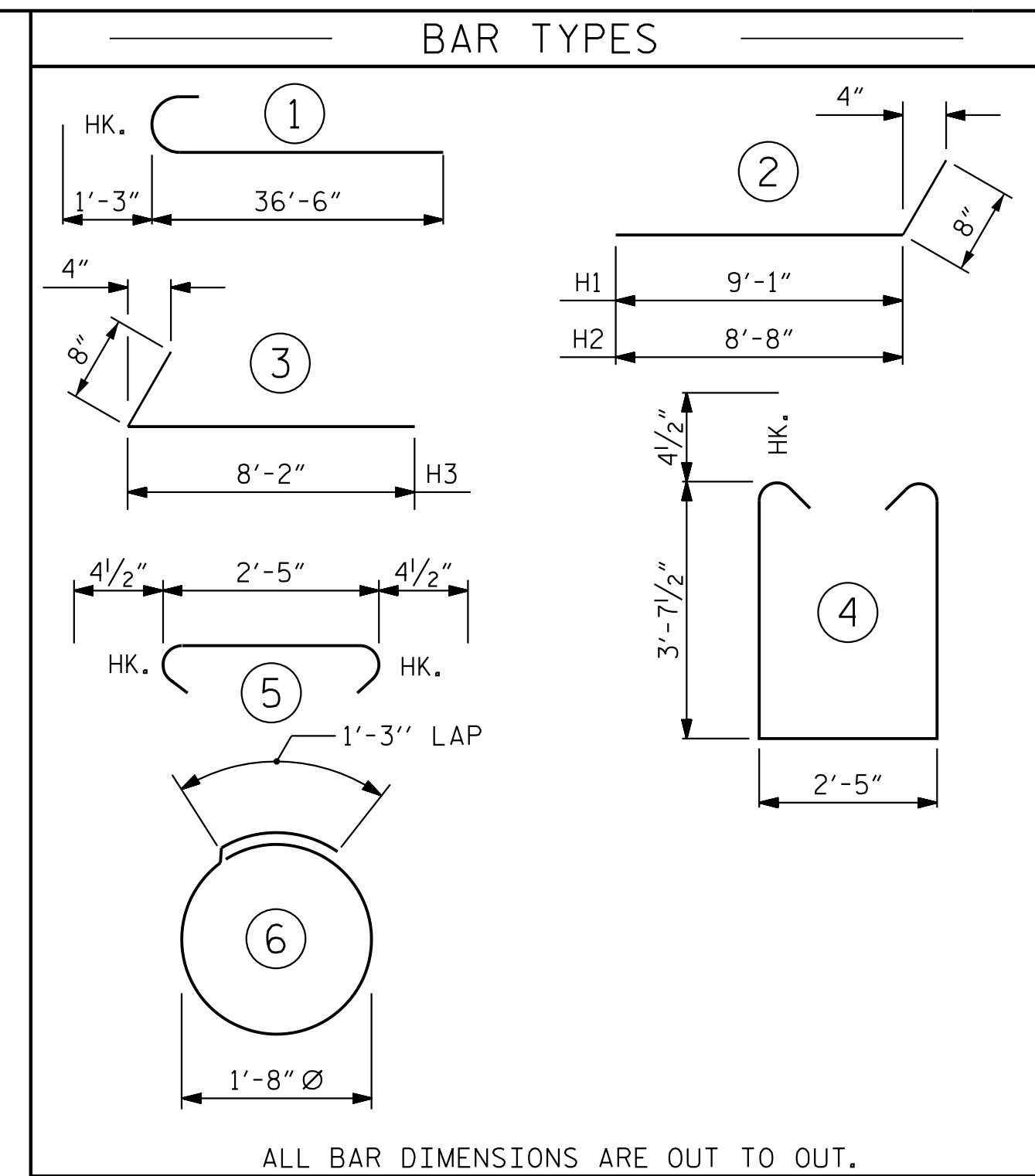
**CORROSION PROTECTION FOR STEEL PILES DETAIL**

(END BENT No. 1 SHOWN, END BENT No. 2 SIMILAR BY ROTATION)



**PILE SPLICE DETAILS**

POSITION OF PILE DURING WELDING.



ALL BAR DIMENSIONS ARE OUT TO OUT.

END BENT No. 1		END BENT No. 2	
HP 12 X 53 STEEL PILES	NO: 10	HP 12 X 53 STEEL PILES	NO: 10
LIN. FT.= 200		LIN. FT.= 300	
PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES	NO: 10	PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES	NO: 10
STEEL PILE POINTS	NO: 10		

BILL OF MATERIAL FOR ONE END BENT					
BAR NO.	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	16	#9	1	37'-9"	2054
B2	28	#4	STR	35'-8"	667
B3	17	#4	STR	2'-5"	27
D1	36	#6	STR	1'-6"	81
H1	10	#4	2	9'-9"	65
H2	10	#4	2	9'-4"	62
H3	20	#4	3	8'-10"	118
K1	16	#4	STR	3'-3"	35
S1	92	#4	4	10'-5"	640
S2	92	#4	5	3'-2"	194
S3	40	#4	6	6'-6"	174
V1	53	#4	STR	6'-2"	218

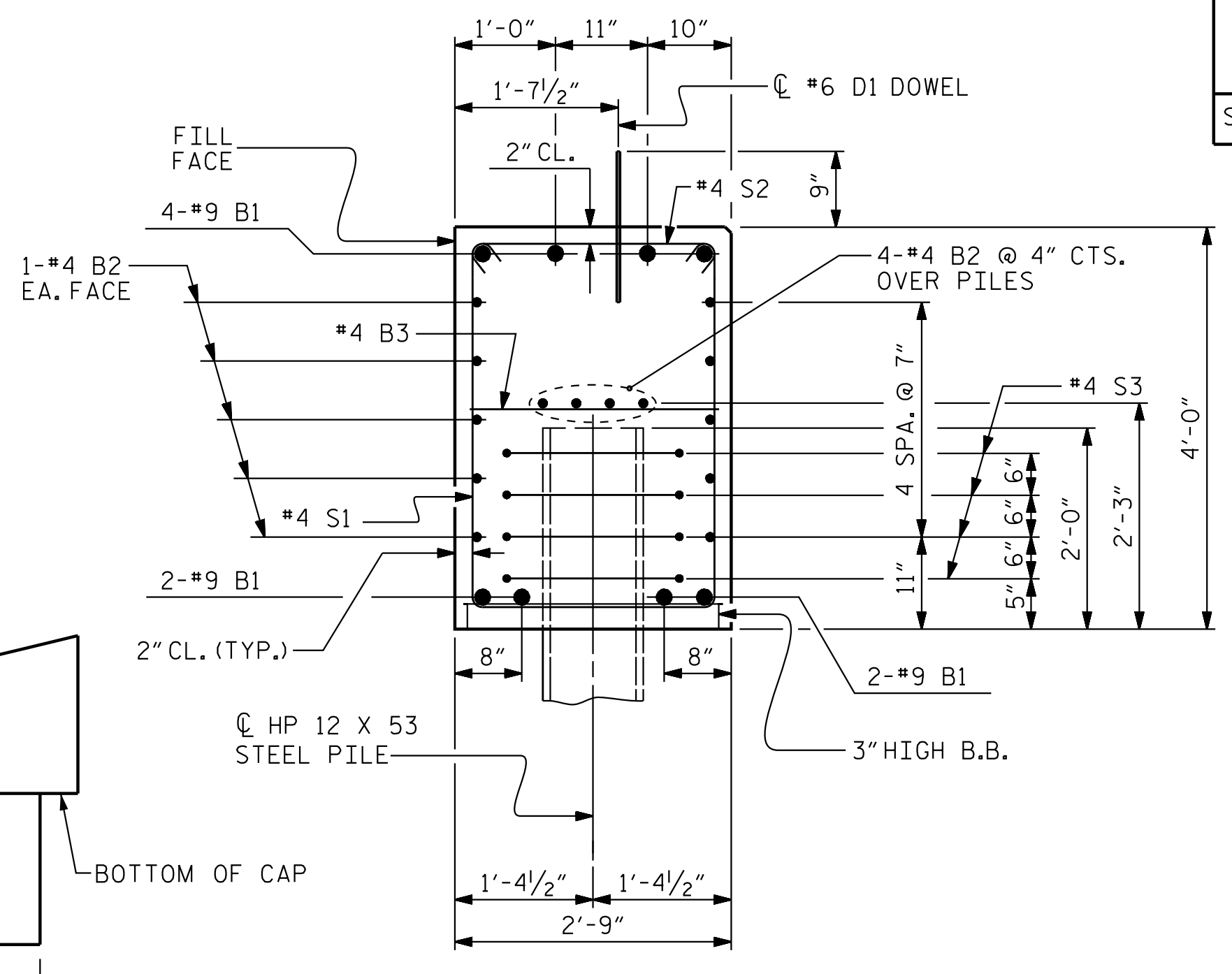
REINFORCING STEEL (FOR ONE END BENT) 4335 LBS.

CLASS A CONCRETE BREAKDOWN (FOR ONE END BENT)

POUR #1 CAP, LOWER PART OF WINGS & COLLARS 24.7 C.Y.

POUR #2 UPPER PART OF WINGS 2.2 C.Y.

TOTAL CLASS A CONCRETE 26.9 C.Y.



**SECTION A-A**

(CONCRETE COLLAR NOT SHOWN FOR CLARITY. SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL.")

DRAWN BY : J. B. GEILE DATE : 04/13/23  
 CHECKED BY : T. R. DUDECK DATE : 08/24/23  
 DESIGN ENGINEER OF RECORD : T. R. DUDECK DATE : 02/23/24

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PROJECT NO. N/A  
 CABARRUS COUNTY  
 STATION: 13+82.50

SHEET 4 OF 4

CITY OF CONCORD, NC  
 SUBSTRUCTURE  
 END BENT Nos. 1 & 2  
 DETAILS

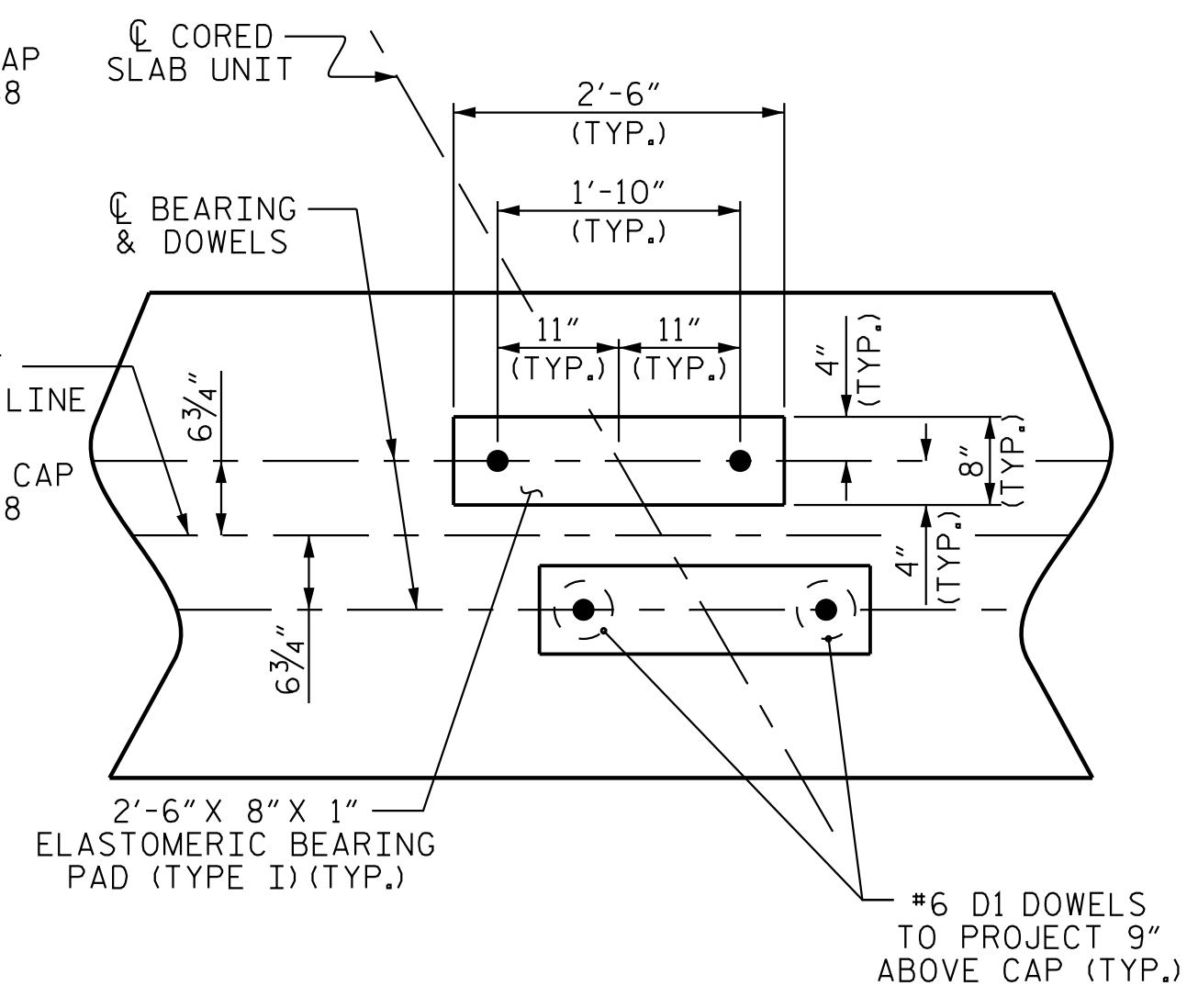
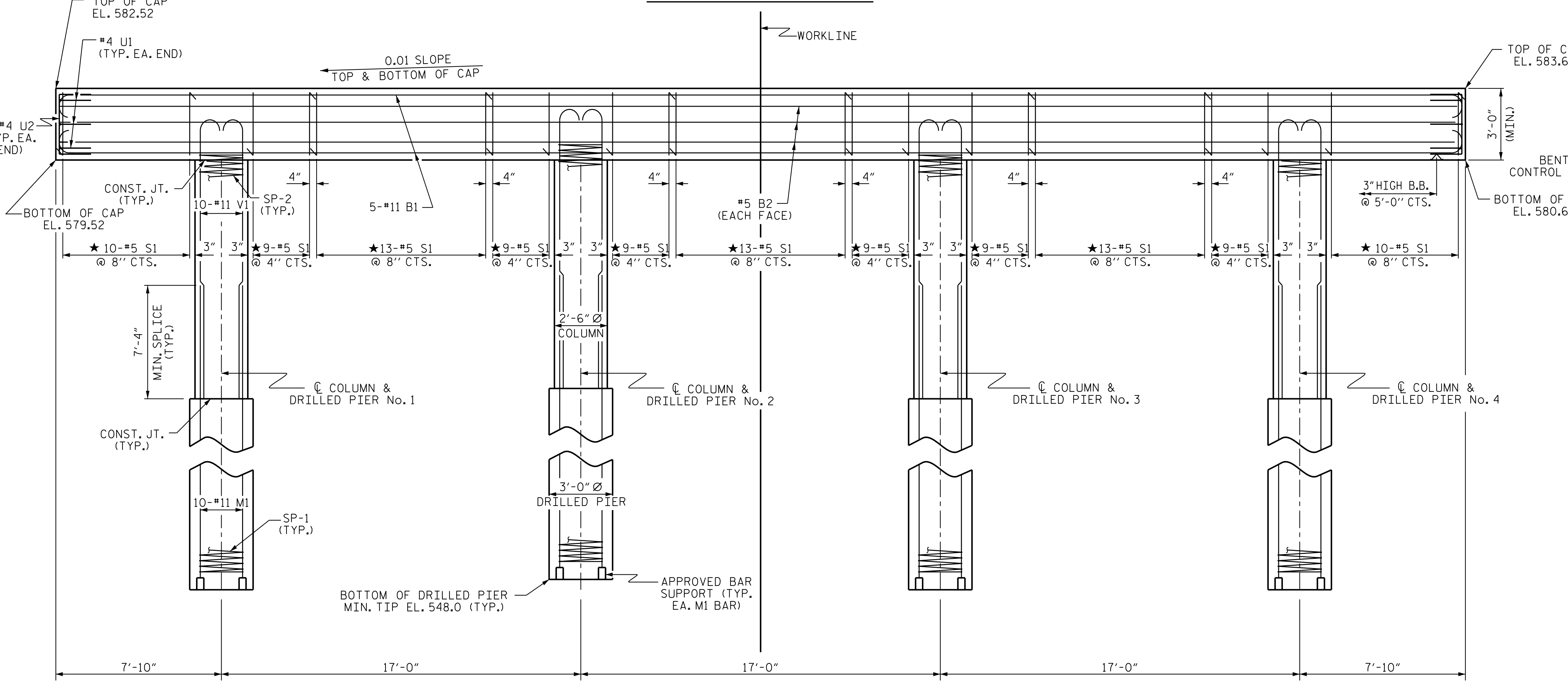
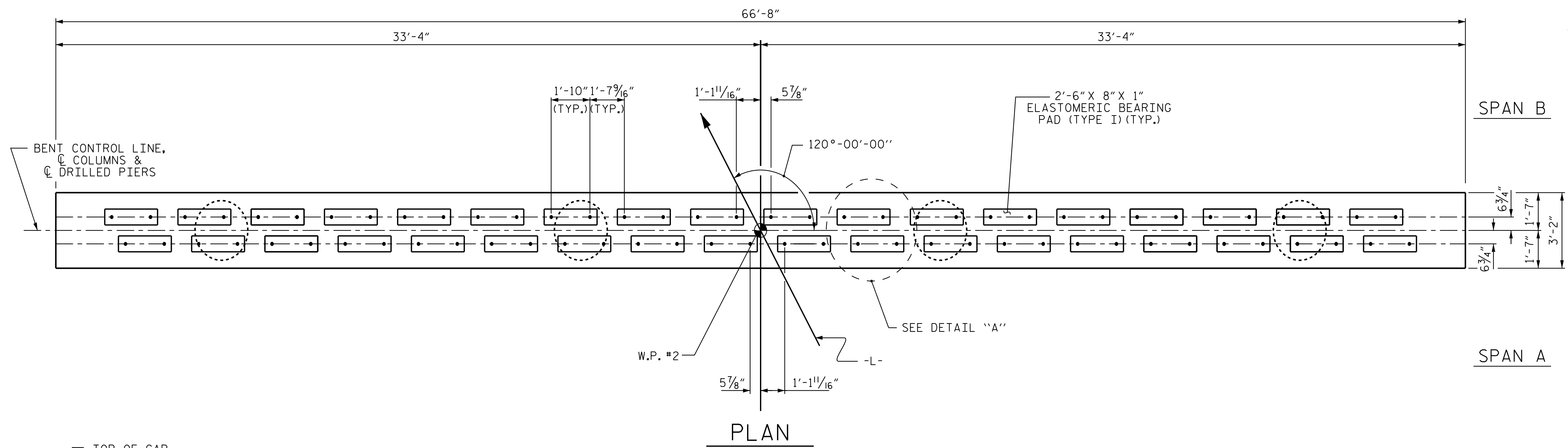
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2			4			

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### NOTES

- STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR DOWELS.
- HOOKS ON "V" BARS MAY BE TURNED AS NECESSARY FOR PLACING REINFORCING STEEL.
- FOR DRILLED PIERS, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.
- ALL STEEL IN THE DRILLED PIERS IS INCLUDED IN THE PAY ITEMS FOR "REINFORCING STEEL" AND "SPIRAL COLUMN REINFORCING STEEL."
- ★ INVERT ALTERNATE STIRRUPS.
- THE LOCATION OF THE CONSTRUCTION JOINT IN THE DRILLED PIERS IS BASED ON AN APPROXIMATE GROUND LINE ELEVATION. IF THE CONSTRUCTION JOINT IS ABOVE THE ACTUAL GROUND LINE ELEVATION, THE CONTRACTOR SHALL PLACE THE CONSTRUCTION JOINT ONE FOOT BELOW THE GROUND LINE.
- DRILLED PIERS SHALL BE TERMINATED ONE FOOT ± ABOVE NORMAL WATER SURFACE ELEVATION FOR SHAFTS LOCATED IN WATER.
- THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT THE LONGITUDINAL REINFORCEMENT FOR DRILLED PIERS IS DETAILED WITH 3 FEET OF EXTRA LENGTH.



PROJECT NO. N/A  
 CABARRUS COUNTY  
 STATION: 13+82.50

SHEET 1 OF 2

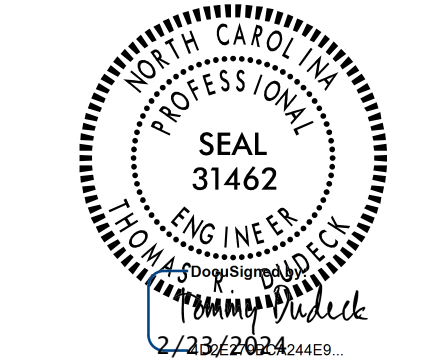
CITY OF CONCORD, NC

SUBSTRUCTURE  
 BENT 1

DRAWN BY: K. A. WOYAHN DATE: 04/13/23  
 CHECKED BY: T. R. DUDECK DATE: 08/23/23  
 DESIGN ENGINEER OF RECORD: T. R. DUDECK DATE: 02/23/24

**Stantec**

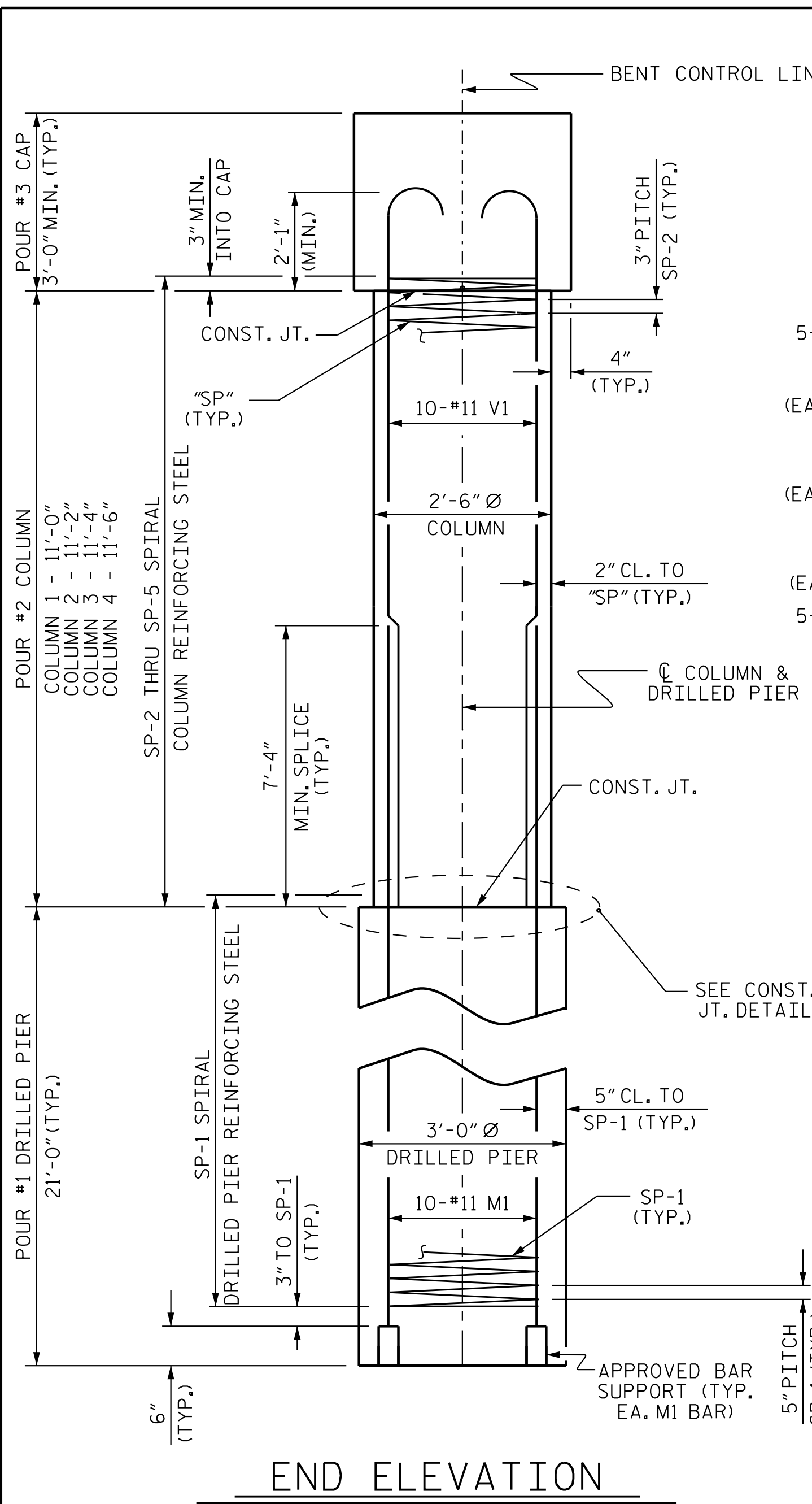
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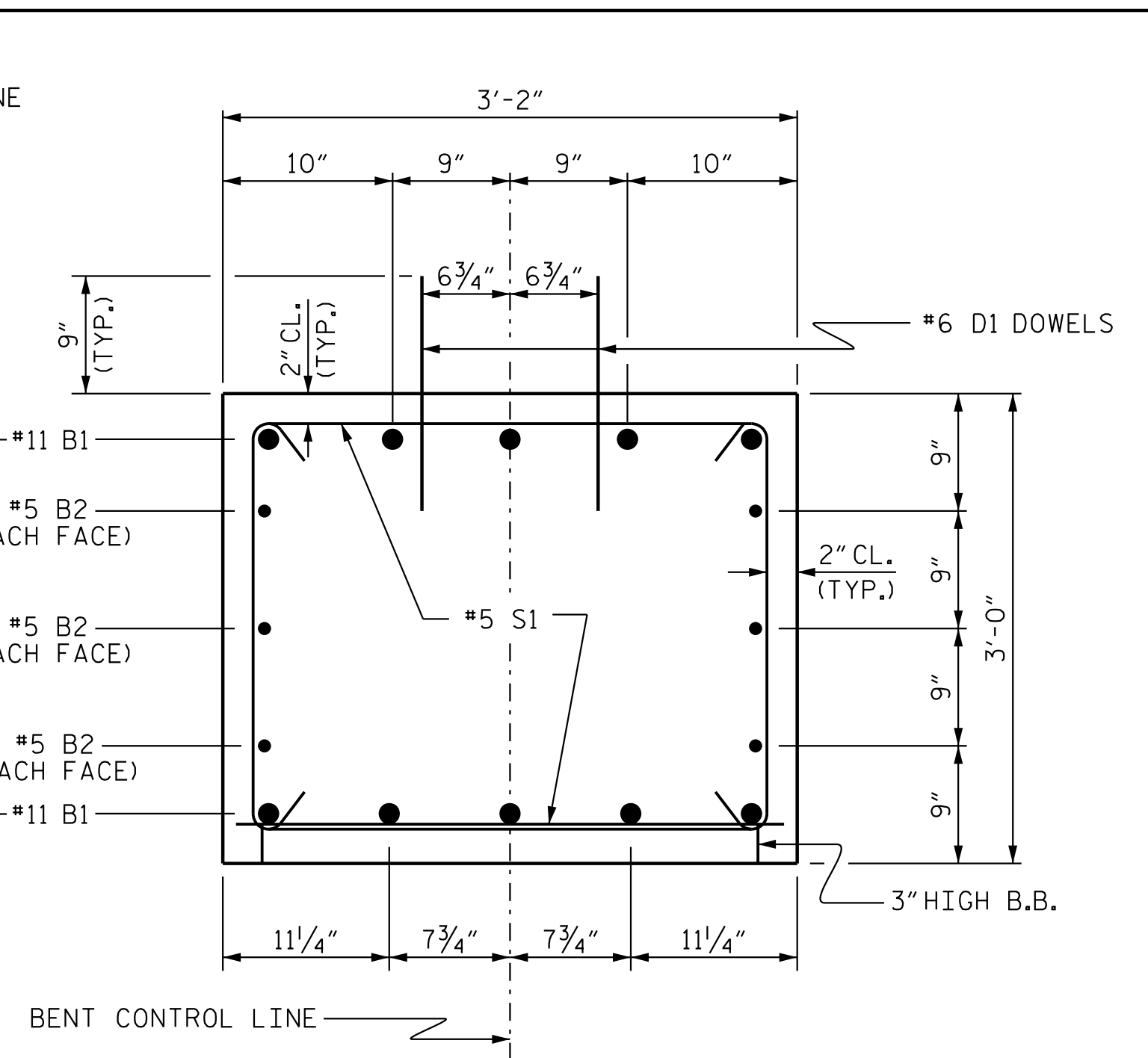
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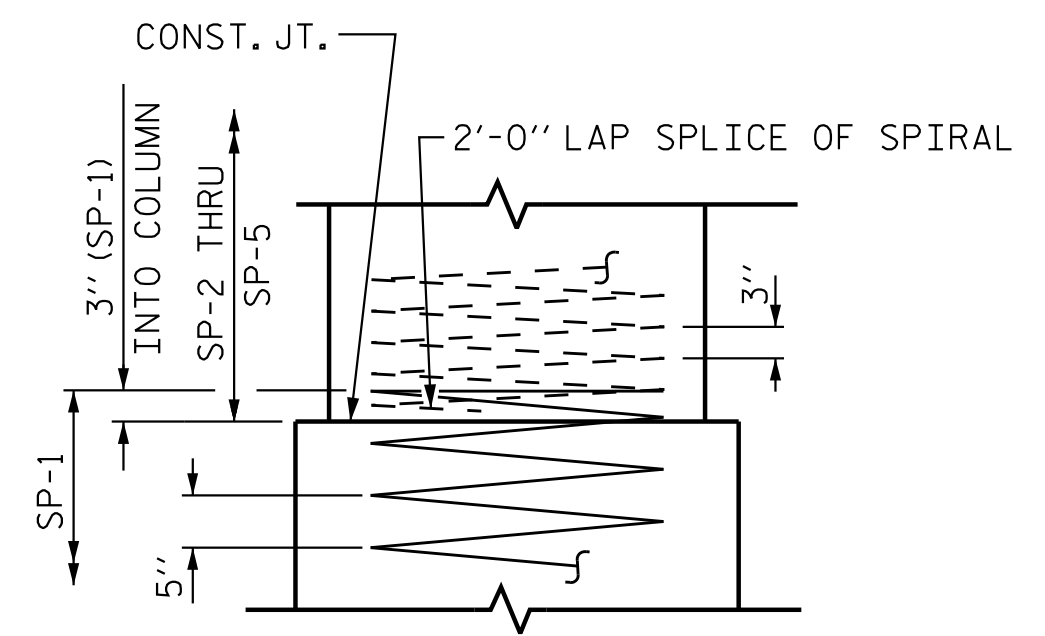
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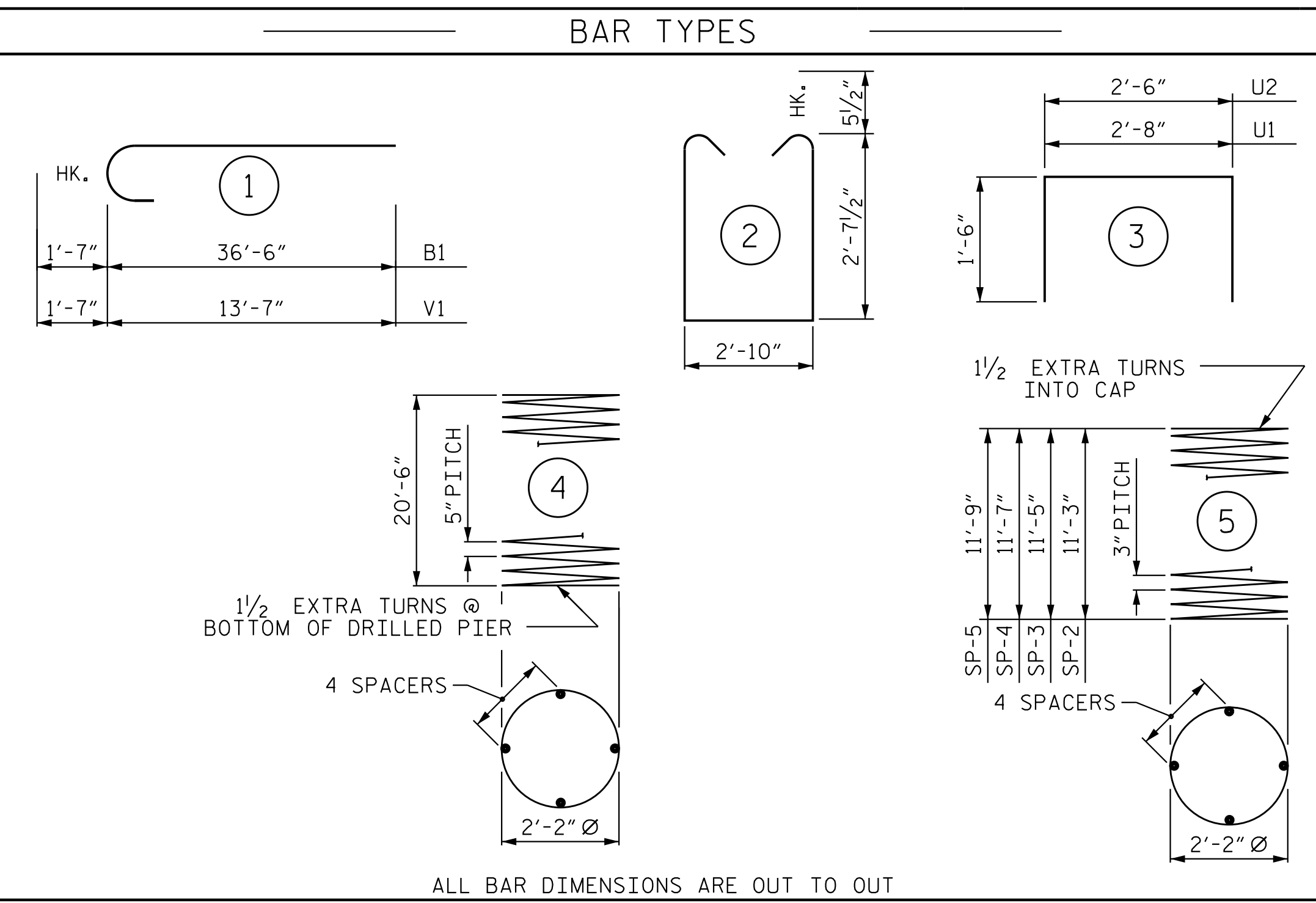
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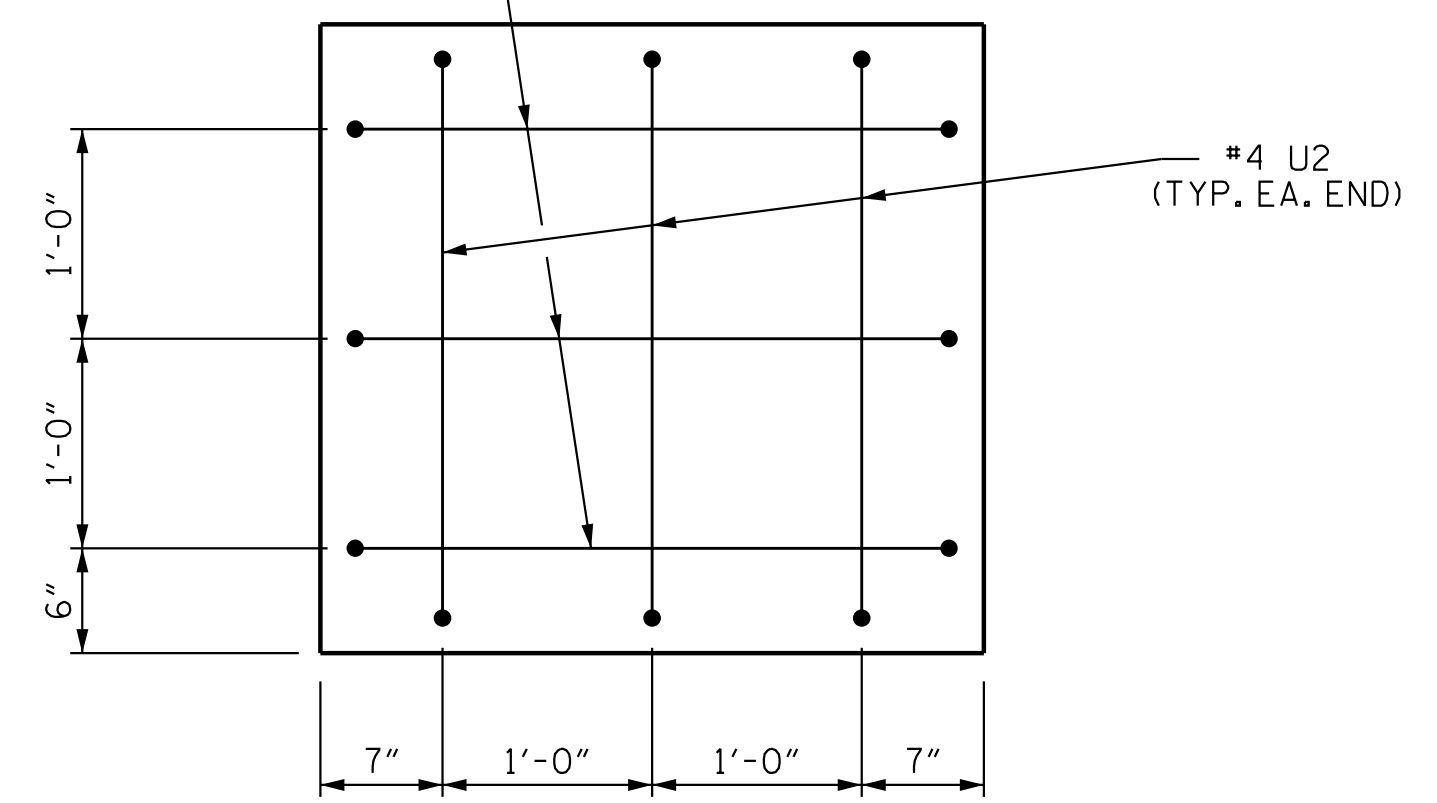
SECTION THRU CAP



CONSTRUCTION JOINT DETAIL

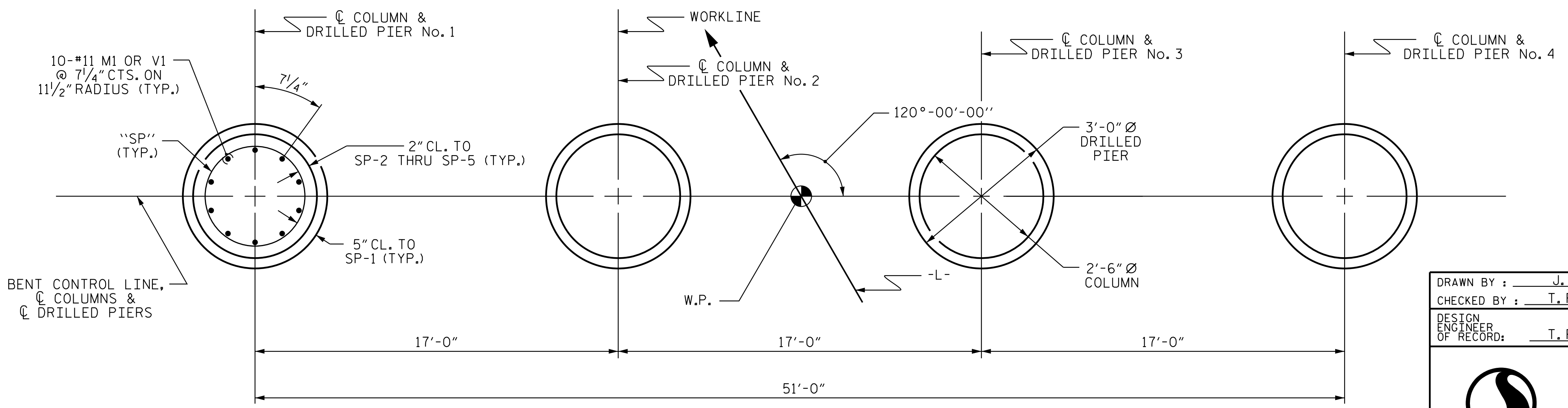


ALL BAR DIMENSIONS ARE OUT TO OUT



END OF CAP VIEW

(TYPICAL BOTH ENDS)



PLAN OF DRILLED PIERS & COLUMNS

DRAWN BY: J. B. GEILE DATE: 04/13/23  
 CHECKED BY: T. R. DUDECK DATE: 08/23/23  
 DESIGN ENGINEER OF RECORD: T. R. DUDECK DATE: 02/23/24

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BILL OF MATERIAL FOR ONE BENT					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	20	#11		38'-1"	4047
B2	12	#5	STR	35'-4"	442
D1	72	#6	STR	1'-6"	162
M1	40	#11	STR	30'-10"	6553
S1	113	#5	2	9'-0"	1061
U1	6	#4	3	5'-8"	23
U2	6	#4	3	5'-6"	22
V1	40	#11	1	15'-2"	3223
REINFORCING STEEL (FOR ONE BENT)					15533 LBS.
SP-1	4	#5	4	337'-6"	1408
SP-2	1	#4	5	310'-8"	208
SP-3	1	#4	5	315'-2"	211
SP-4	1	#4	5	319'-7"	213
SP-5	1	#4	5	324'-1"	216
SPIRAL COLUMN REINFORCING STEEL (FOR ONE BENT)					2256 LBS.
* THE SP-1 SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR * THE SP-2 SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR					
CLASS A CONCRETE BREAKDOWN (FOR ONE BENT)					
POUR #2 (COLUMNS)					8.2 C.Y.
POUR #3 (CAP)					24.2 C.Y.
TOTAL CLASS A CONCRETE					32.4 C.Y.
DRILLED PIERS: (FOR ONE BENT) DRILLED PIER CONCRETE POUR #1 (DRILLED PIERS) 22.0 C.Y. 3'-0" DRILLED PIER NOT IN SOIL 28.0 LIN. FT. 3'-0" DRILLED PIER IN SOIL 56.0 LIN. FT. PERMANENT STEEL CASING FOR 3'-0" DRILLED PIER 72.0 LIN. FT. CSL TUBES 360.0 LIN. FT.					

PROJECT NO. N/A  
 CABARRUS COUNTY  
 STATION: 13+82.50

SHEET 2 OF 2

CITY OF CONCORD, NC  
 SUBSTRUCTURE  
 BENT No. 1

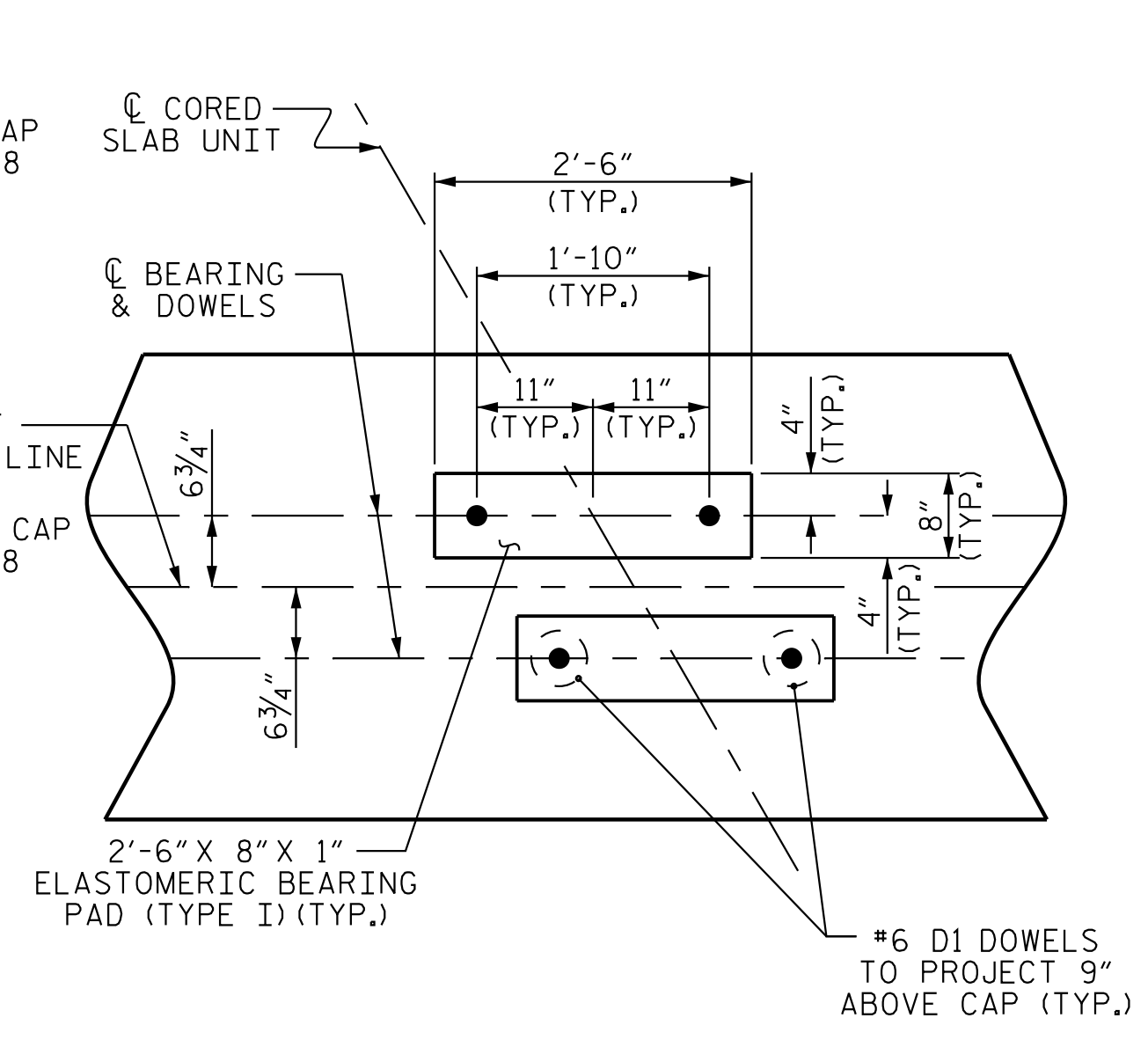
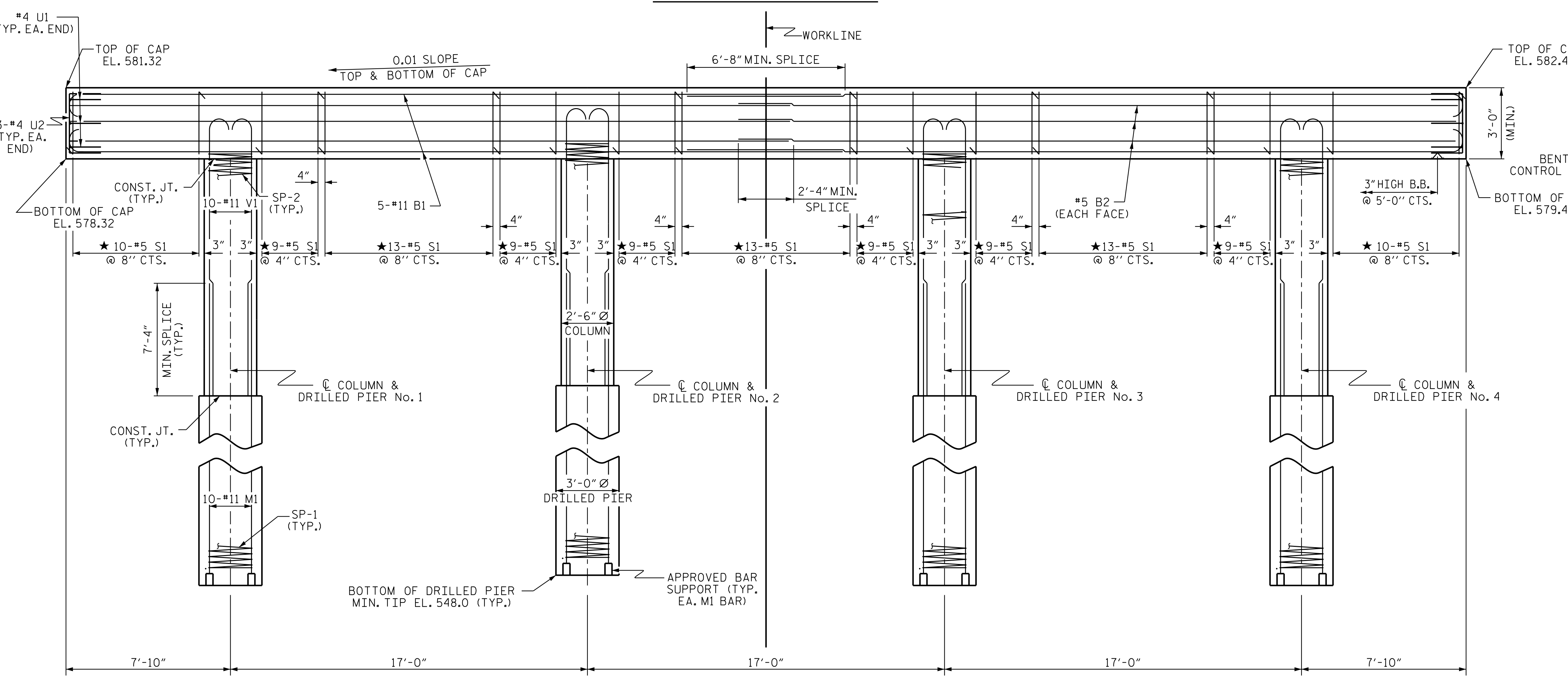
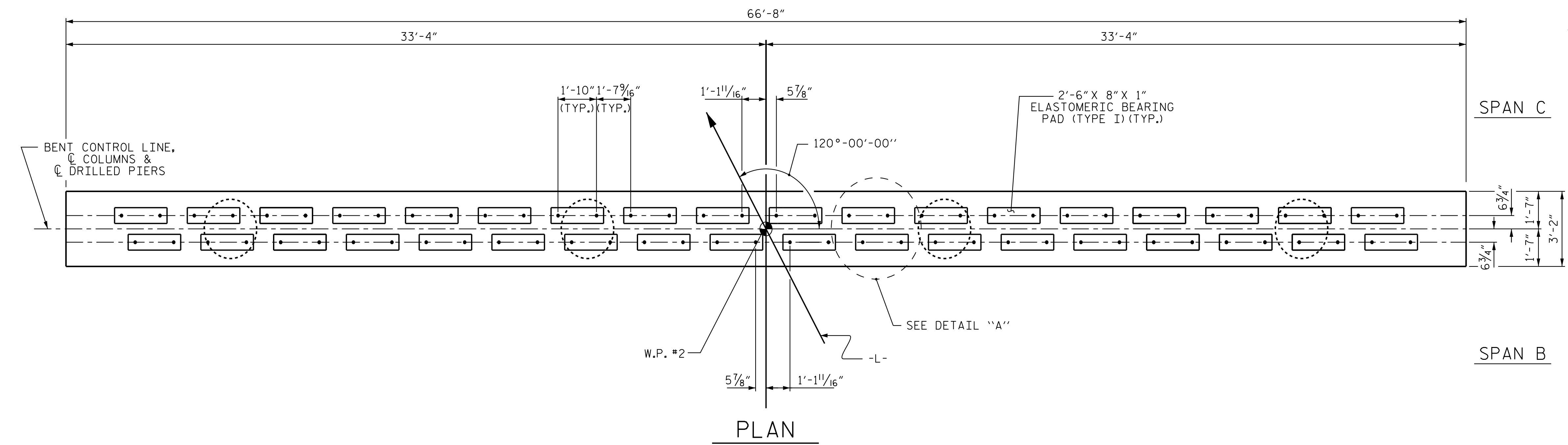
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2			4			25

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**NOTES**

- STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR DOWELS.
- HOOKS ON "V" BARS MAY BE TURNED AS NECESSARY FOR PLACING REINFORCING STEEL.
- FOR DRILLED PIERS, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.
- ALL STEEL IN THE DRILLED PIERS IS INCLUDED IN THE PAY ITEMS FOR "REINFORCING STEEL" AND "SPIRAL COLUMN REINFORCING STEEL."
- ★ INVERT ALTERNATE STIRRUPS.
- THE LOCATION OF THE CONSTRUCTION JOINT IN THE DRILLED PIERS IS BASED ON AN APPROXIMATE GROUND LINE ELEVATION. IF THE CONSTRUCTION JOINT IS ABOVE THE ACTUAL GROUND LINE ELEVATION, THE CONTRACTOR SHALL PLACE THE CONSTRUCTION JOINT ONE FOOT BELOW THE GROUND LINE.
- DRILLED PIERS SHALL BE TERMINATED ONE FOOT ± ABOVE NORMAL WATER SURFACE ELEVATION FOR SHAFTS LOCATED IN WATER.
- THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT THE LONGITUDINAL REINFORCEMENT FOR DRILLED PIERS IS DETAILED WITH 3 FEET OF EXTRA LENGTH.



PROJECT NO. N/A  
 CABARRUS COUNTY  
 STATION: 13+82.50

SHEET 1 OF 2  
 CITY OF CONCORD, NC

SUBSTRUCTURE  
 BENT No. 2

DRAWN BY: K. A. WOYAHN DATE: 04/13/23  
 CHECKED BY: T. R. DUDECK DATE: 08/23/23  
 DESIGN ENGINEER OF RECORD: T. R. DUDECK DATE: 02/23/24

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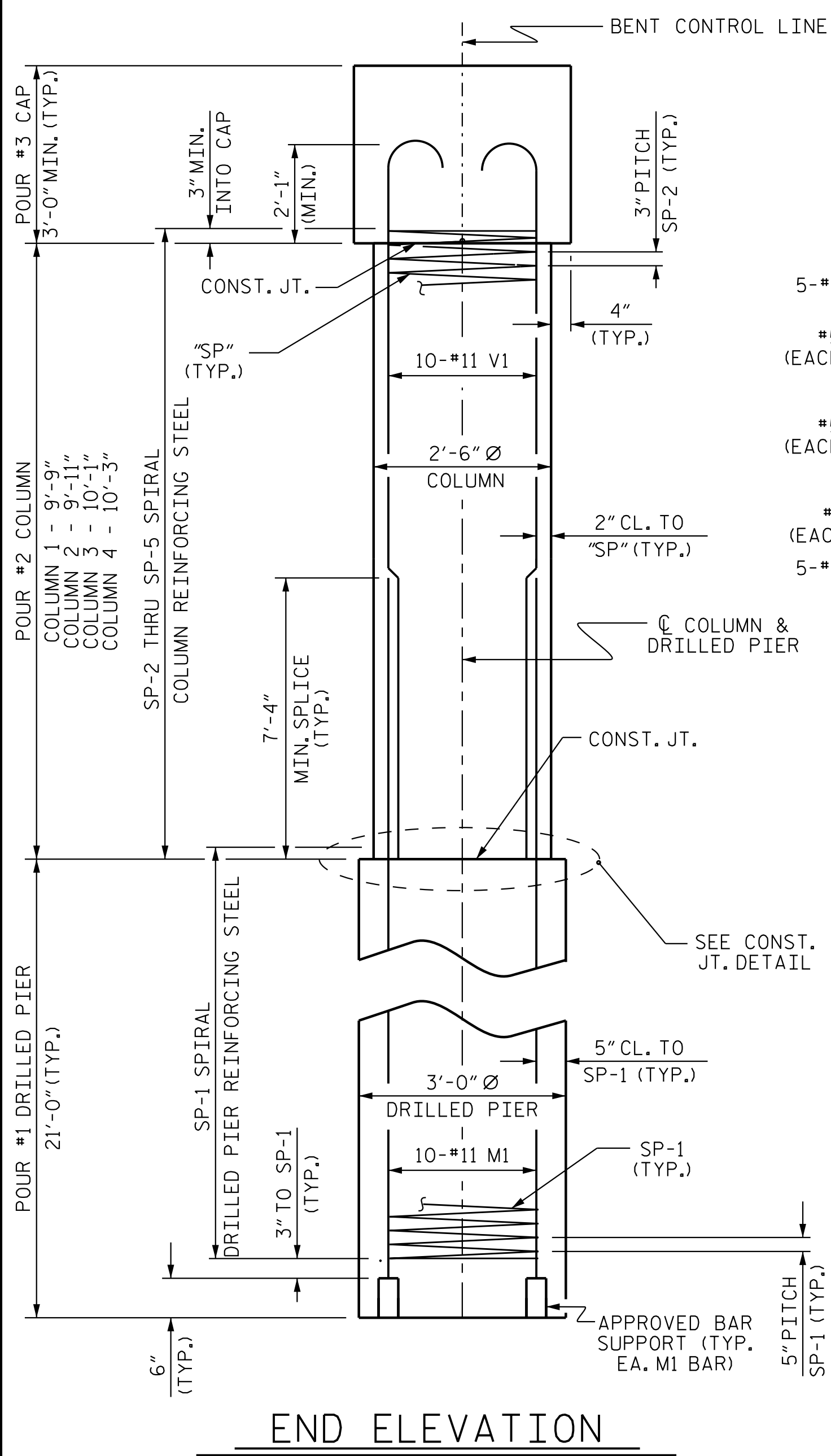
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PROFESSIONAL SEAL  
 T. R. DUDECK  
 ENGINEER  
 2/23/2024

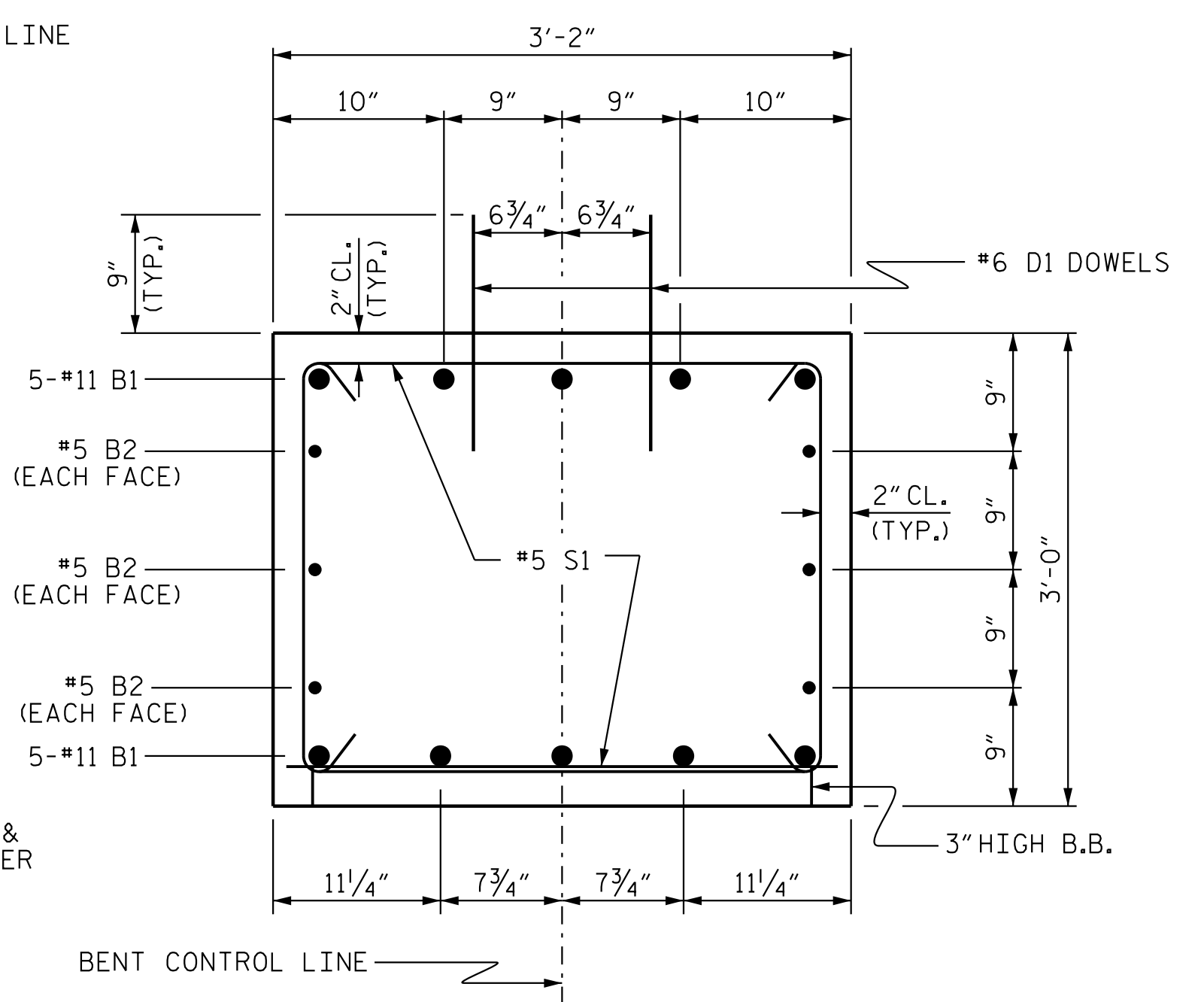
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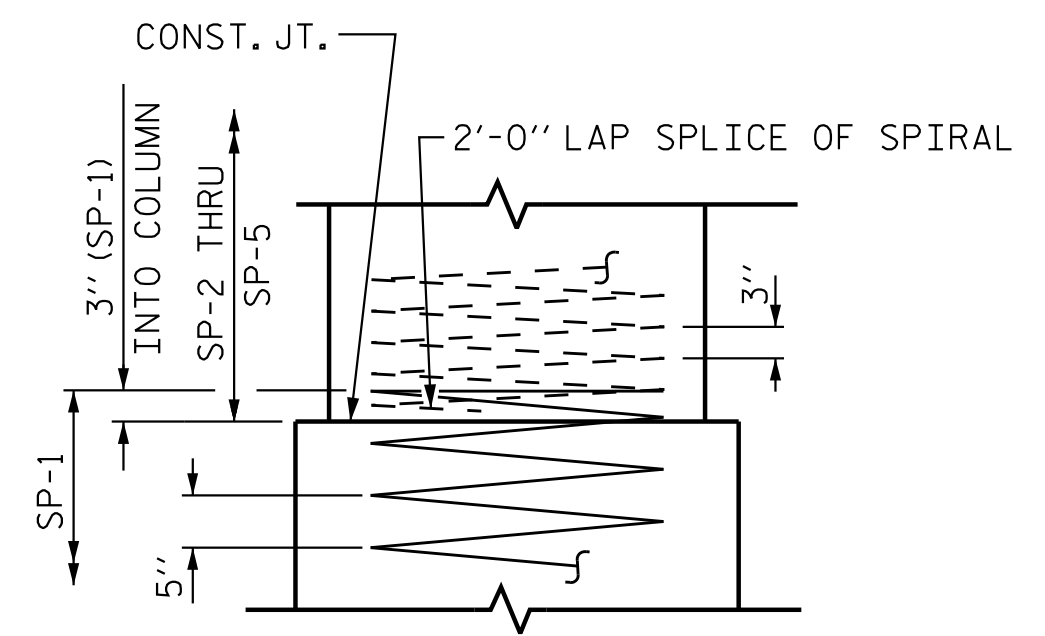
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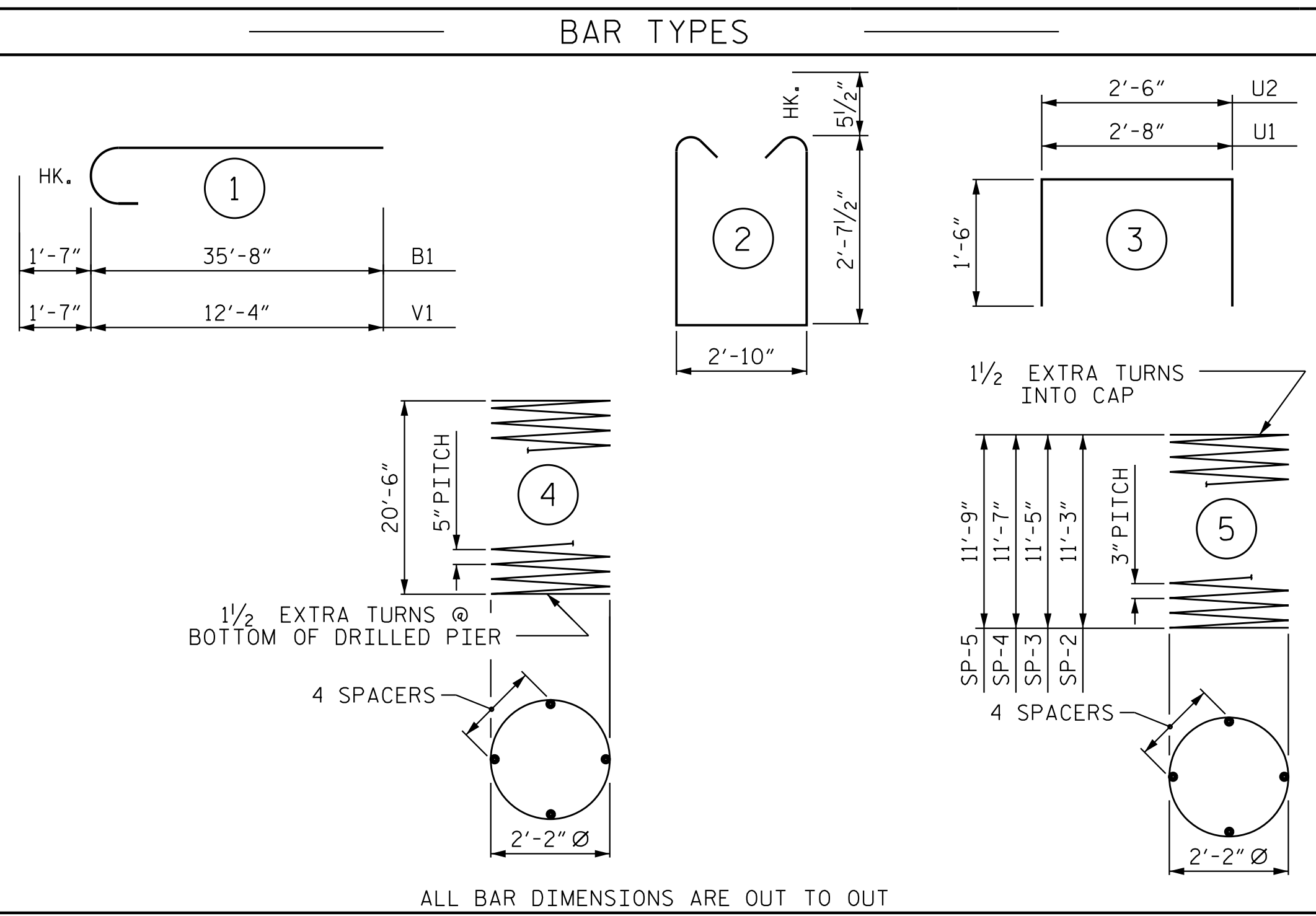
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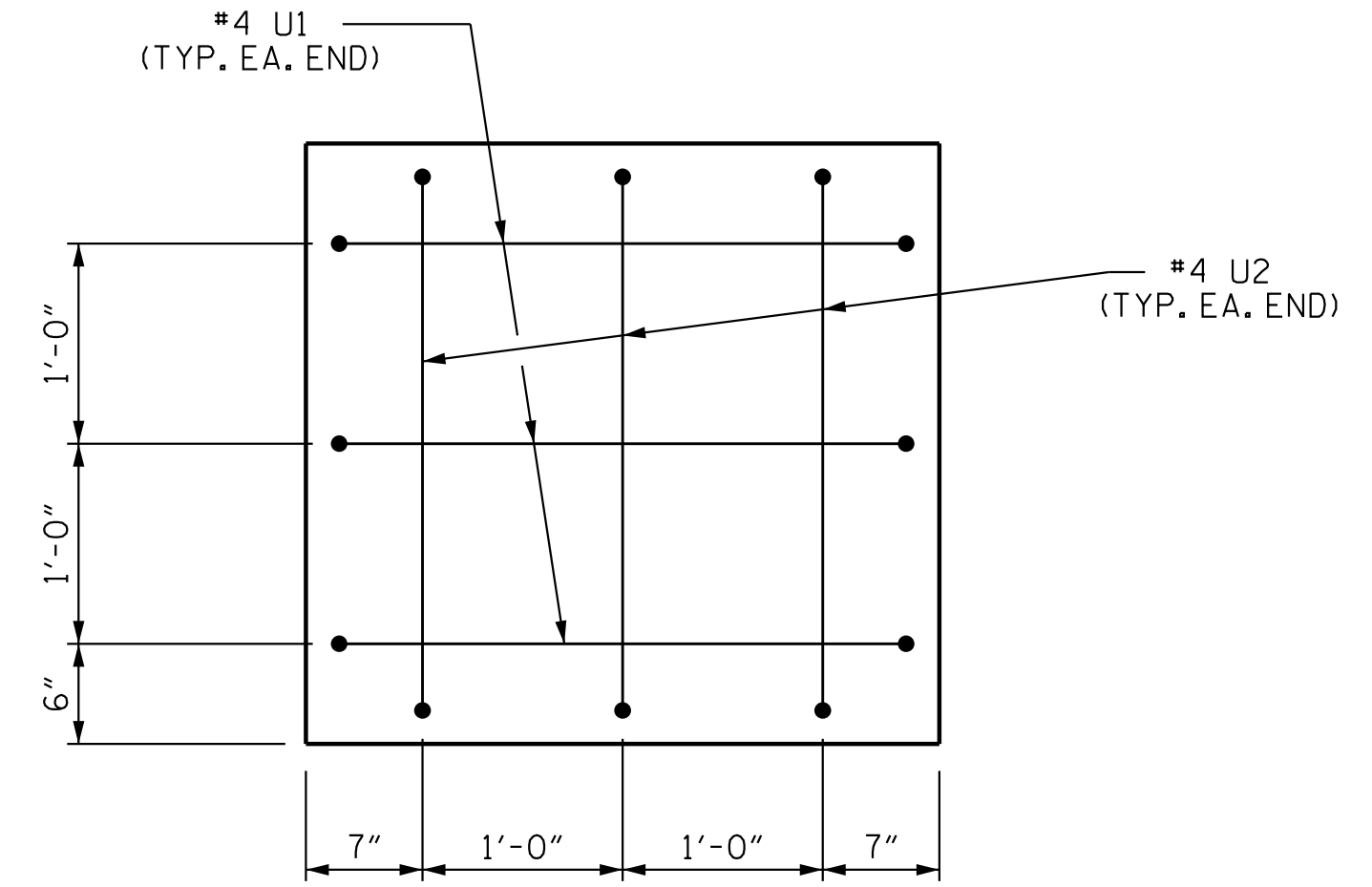
SECTION THRU CAP



CONSTRUCTION JOINT DETAIL



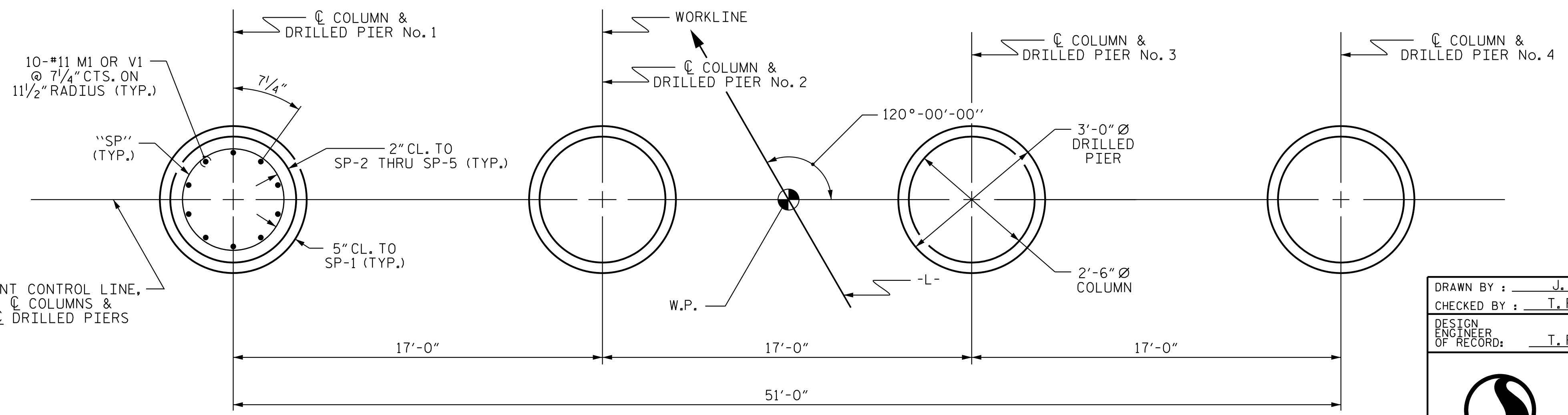
ALL BAR DIMENSIONS ARE OUT TO OUT



END OF CAP VIEW

(TYPICAL BOTH ENDS)

BILL OF MATERIAL FOR ONE BENT					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	20	#11	1	38'-1"	4047
B2	12	#5	STR	35'-4"	442
D1	72	#6	STR	1'-6"	162
M1	40	#11	STR	27'-10"	5915
S1	113	#5	2	9'-0"	1061
U1	6	#4	3	5'-8"	23
U2	6	#4	3	5'-6"	22
V1	40	#11	1	13'-11"	2958
REINFORCING STEEL (FOR ONE BENT)					14630 LBS.
SPIRAL COLUMN REINFORCING STEEL (FOR ONE BENT)					2166 LBS.
* THE SP-1 SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR					
* THE SP-2 SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR					
CLASS A CONCRETE BREAKDOWN (FOR ONE BENT)					
POUR #2 (COLUMNS)				7.3 C.Y.	
POUR #3 (CAP)				24.2 C.Y.	
TOTAL CLASS A CONCRETE				32.1 C.Y.	
DRILLED PIERS: (FOR ONE BENT)					
DRILLED PIER CONCRETE POUR #1 (DRILLED PIERS)				22.0 C.Y.	
3'-0" Ø DRILLED PIER NOT IN SOIL				28.0 LIN. FT.	
3'-0" Ø DRILLED PIER IN SOIL				56.0 LIN. FT.	
PERMANENT STEEL CASING FOR 3'-0" Ø DRILLED PIER				72.0 LIN. FT.	
CSL TUBES				360.0 LIN. FT.	



PLAN OF DRILLED PIERS & COLUMNS

DRAWN BY: J. B. GEILE DATE: 04/13/23  
 CHECKED BY: T. R. DUDECK DATE: 08/23/23  
 DESIGN ENGINEER OF RECORD: T. R. DUDECK DATE: 02/23/24

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PROJECT NO. N/A  
 CABARRUS COUNTY  
 STATION: 13+82.50

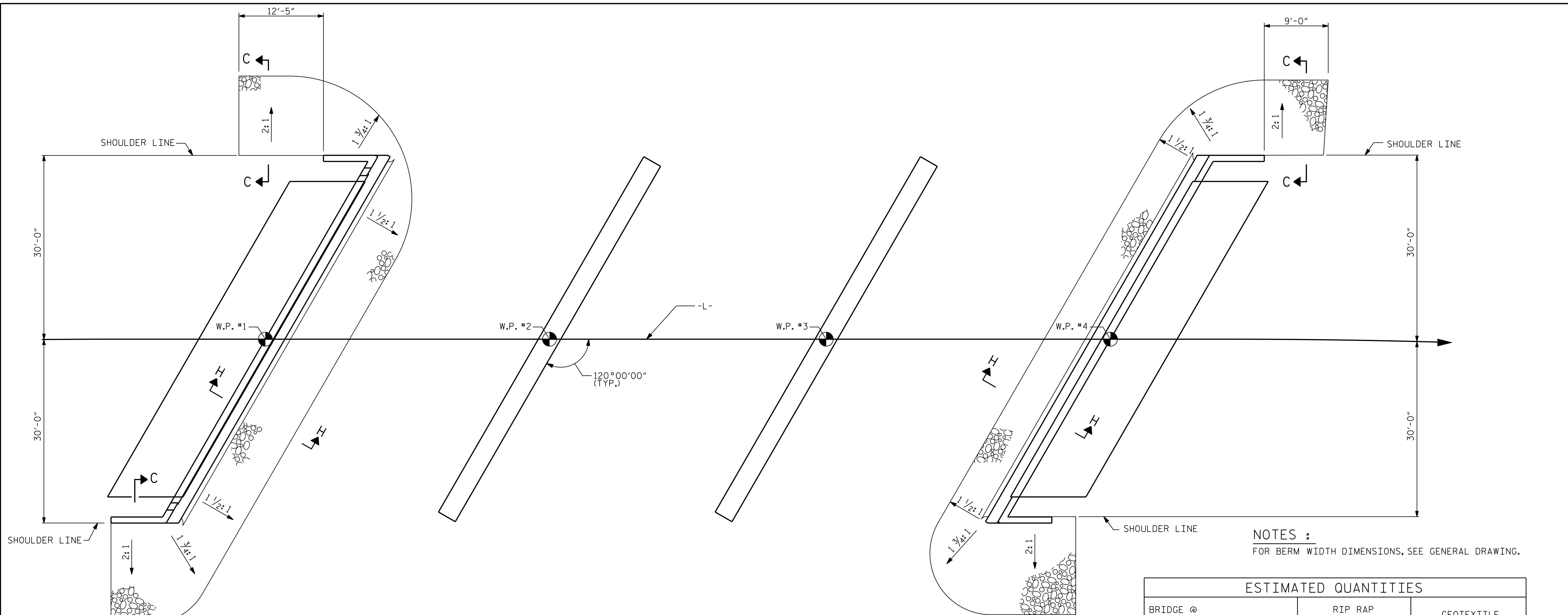
SHEET 2 OF 2

CITY OF CONCORD, NC  
 SUBSTRUCTURE  
 BENT No. 2 DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-23
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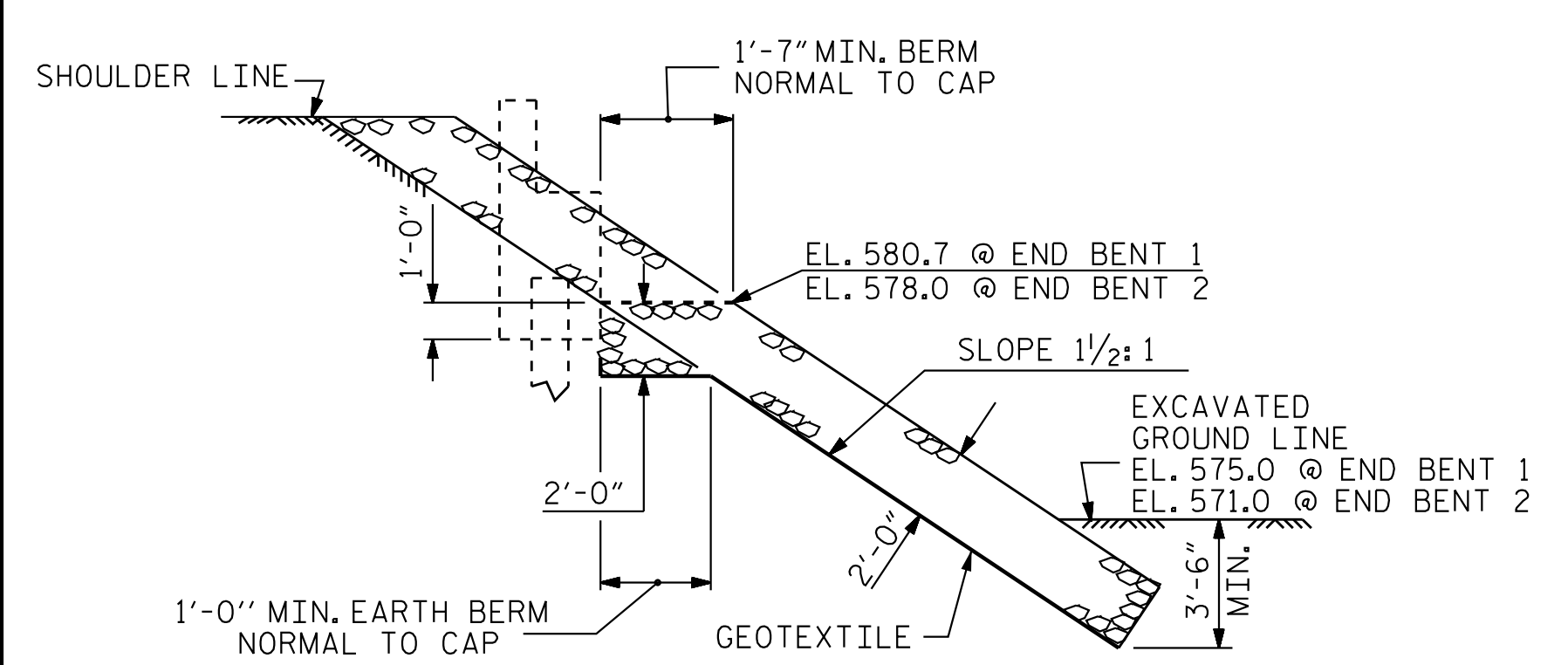




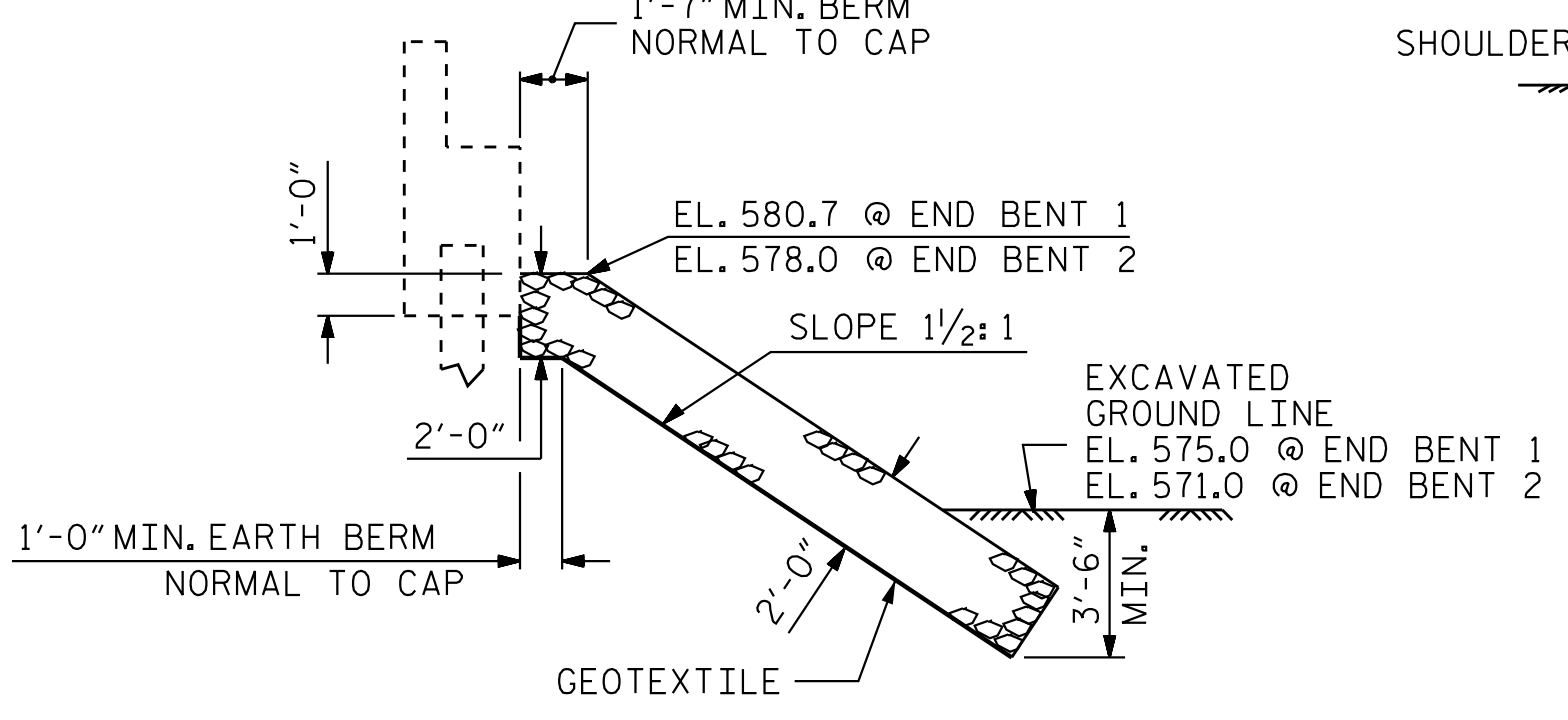
PLAN OF RIP RAP

NOTES :  
FOR BERM WIDTH DIMENSIONS, SEE GENERAL DRAWING.

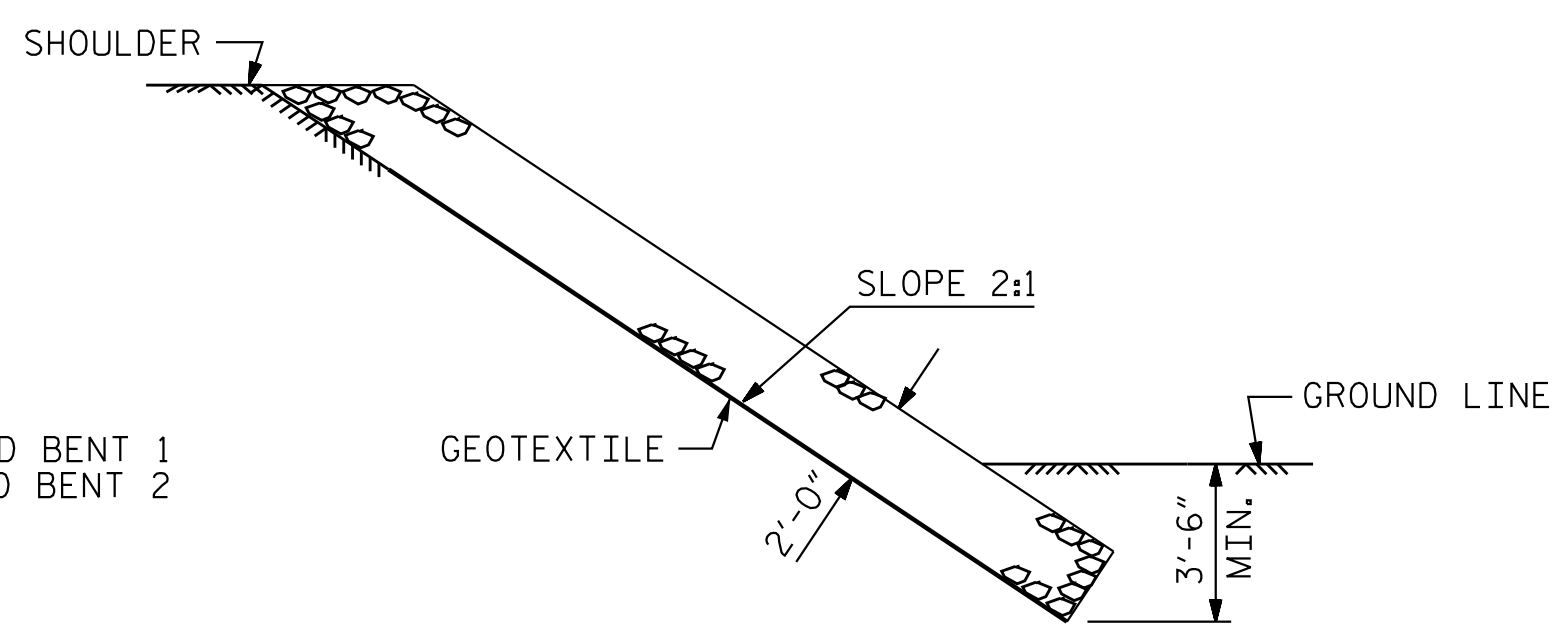
ESTIMATED QUANTITIES		
BRIDGE @ STA. 13+82.50 -L-	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT 1	295	328
END BENT 2	327	364



SECTION H-H



SECTION C-C  
BERM RIP RAPPED



SECTION C-C

PROJECT NO. N/A  
CABARRUS COUNTY  
STATION: 13+82.50

CITY OF CONCORD, NC  
STANDARD  
RIP RAP DETAILS

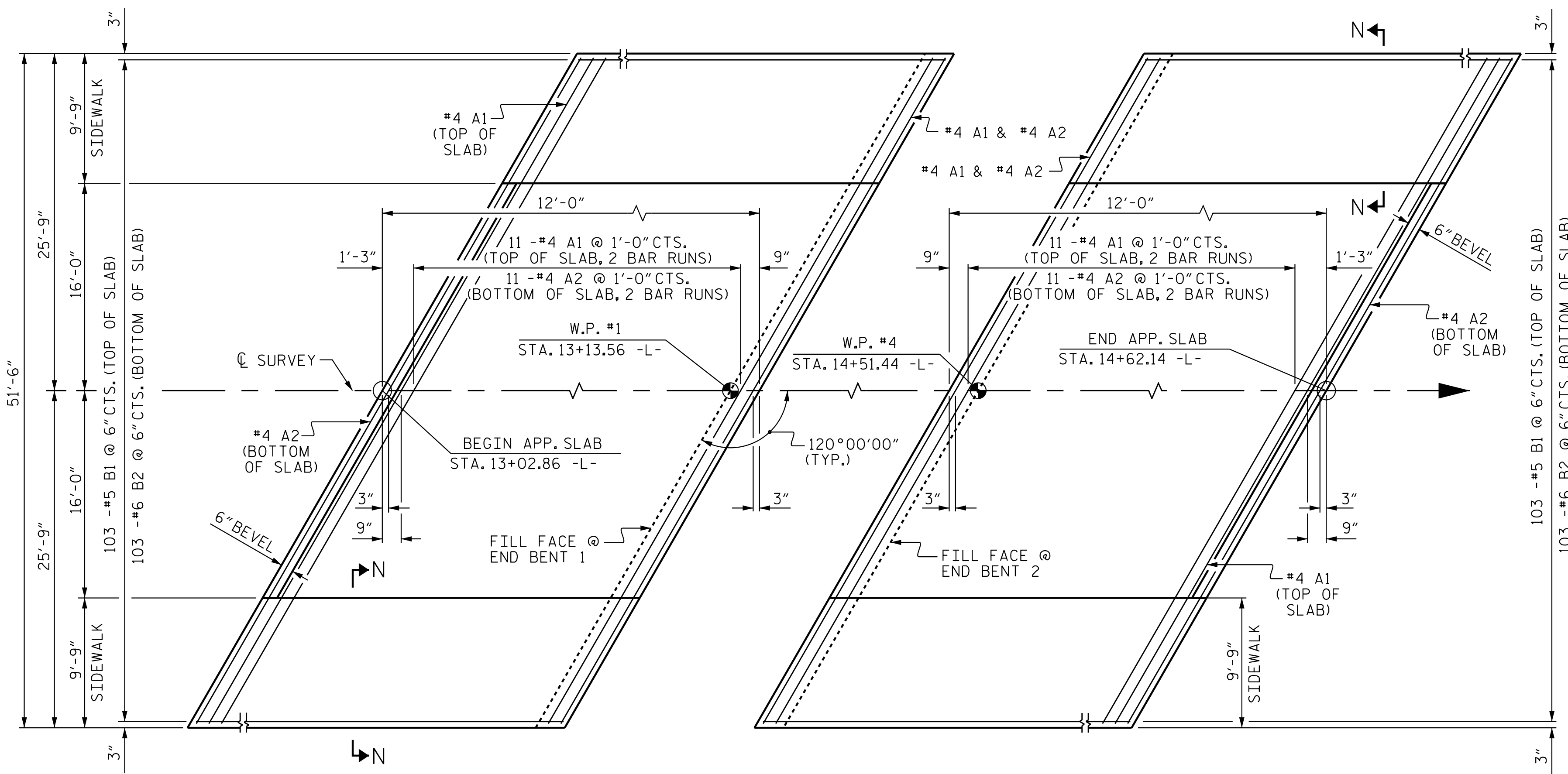
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1			3			TOTAL SHEETS
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DRAWN BY : K. A. WOYAHN DATE : 05/16/23  
CHECKED BY : T. R. DUDECK DATE : 08/23/23  
DESIGN ENGINEER OF RECORD : T. R. DUDECK DATE : 02/23/24

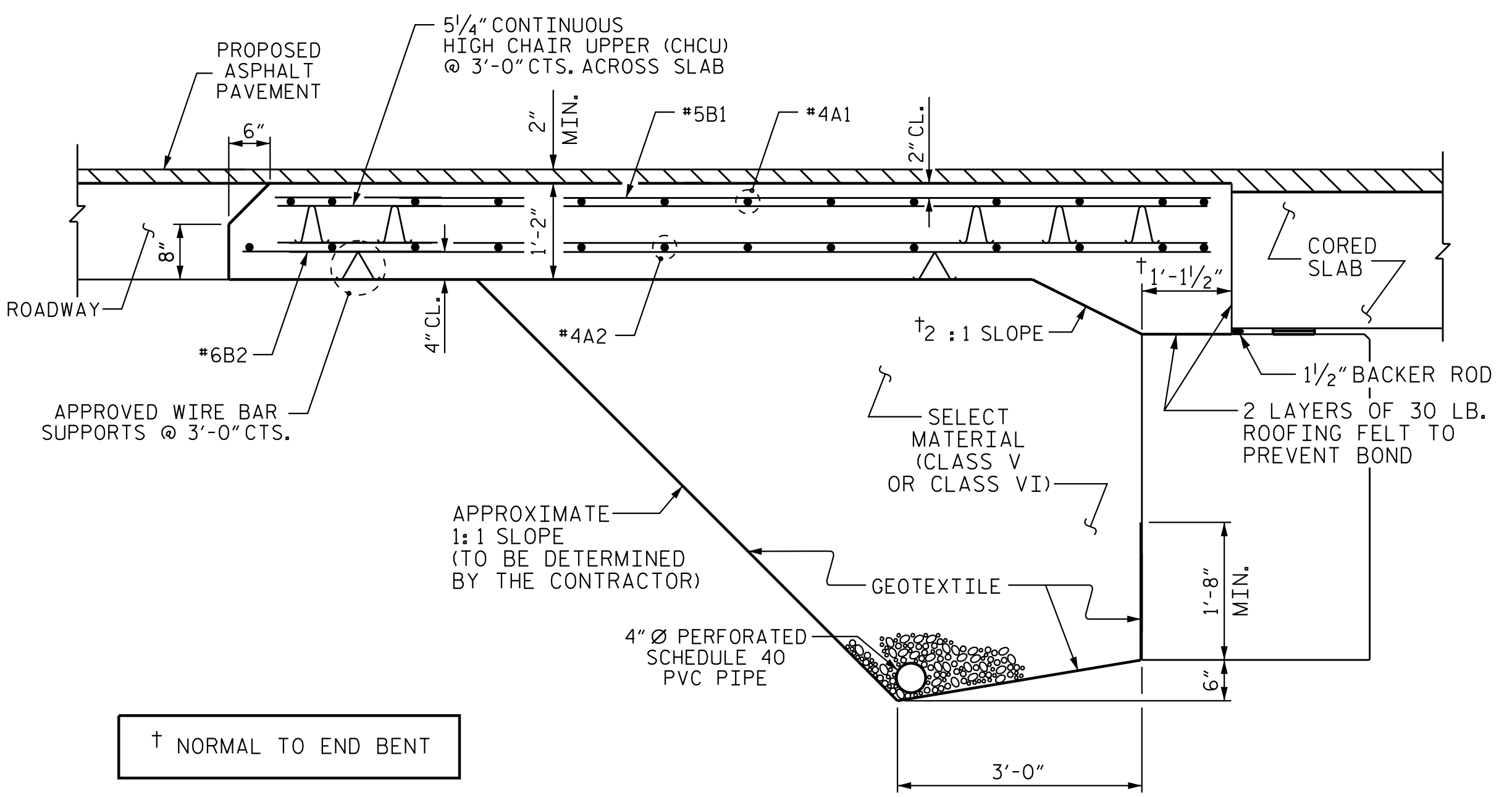
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DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS



**NOTES**

FOR BRIDGE APPROACH FILL INCLUDING GEOTEXTILE, 4" Ø DRAINAGE PIPE, AND SELECT MATERIAL BACKFILL, SEE ROADWAY PLANS.

GEOTEXTILE SHALL BE TYPE 1 IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS SECTION 1056.

SELECT MATERIAL BACKFILL (CLASS V OR CLASS VI) SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS SECTION 1016.

SELECT MATERIAL BACKFILL IS TO BE CONTINUOUS ALONG FILL FACE OF BACKWALL FROM OUTSIDE EDGE TO OUTSIDE EDGE OF APPROACH SLAB.

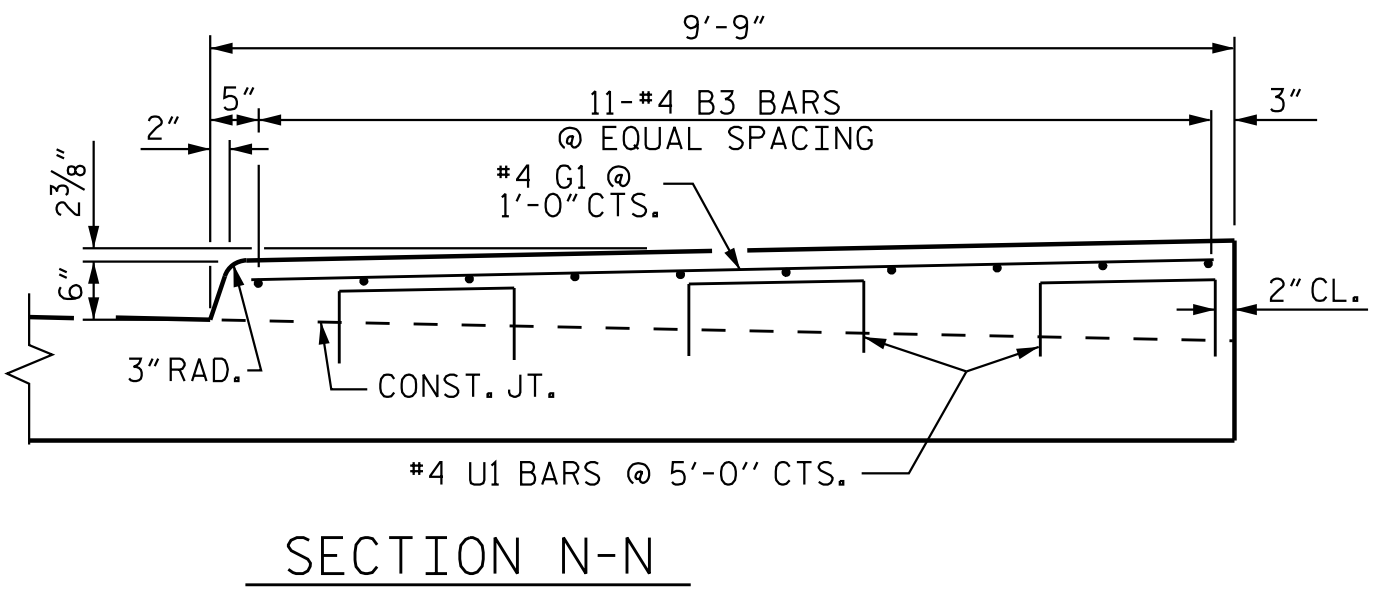
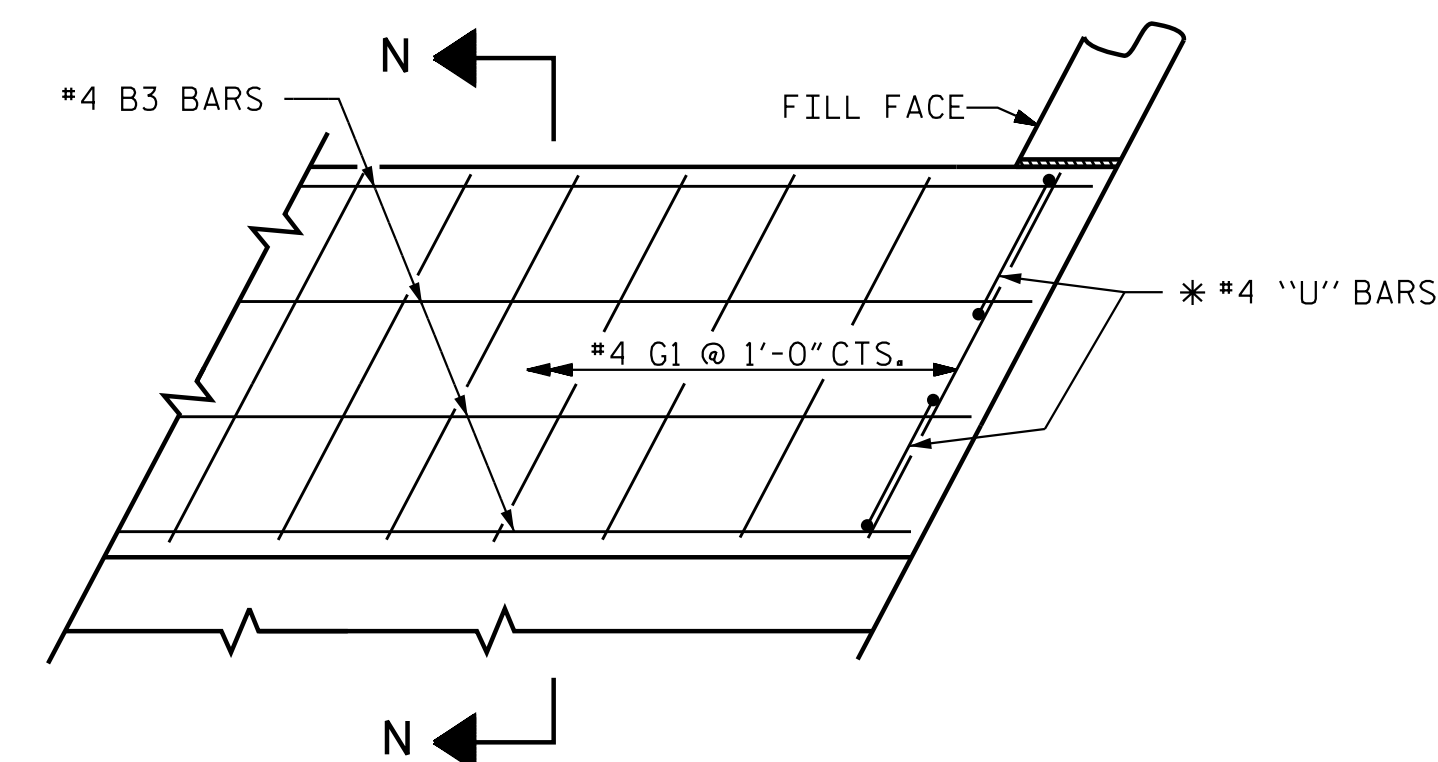
AREA BETWEEN THE WINGWALL AND APPROACH SLAB SHALL BE GRADED TO DRAIN THE WATER AWAY FROM THE FILL FACE OF THE BRIDGE AND SHALL BE PAVED. SEE ROADWAY PLANS.

FOR THE 4" Ø DRAINAGE PIPE OUTLET(S), SEE ROADWAY STANDARD DRAWINGS.

APPROACH SLAB GROOVING IS NOT REQUIRED.

**SPLICE LENGTHS**

BAR SIZE	EPOXY COATED	UNCOATED
#4	2'-0"	1'-7"
#5	2'-5"	2'-0"
#6	3'-7"	2'-5"



**BILL OF MATERIAL**

**APPROACH SLAB AT EB 1**

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
*A1	22	#4	STR	30'-6"	448
A	22	#4	STR	30'-4"	446
*B1	103	#5	STR	11'-2"	1200
B2	103	#6	STR	11'-8"	1805
*B3	22	#4	STR	11'-8"	171
*G1	26	#4	STR	9'-1"	158
*U1	12	#4	1	4'-0"	32
REINFORCING STEEL					LBS. 2251
*EPOXY COATED REINFORCING STEEL					LBS. 2009
CLASS AA CONCRETE					C. Y. 34.6

**APPROACH SLAB AT EB 2**

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
*A1	22	#4	STR	30'-6"	448
A	22	#4	STR	30'-4"	446
*B1	103	#5	STR	11'-2"	1200
B2	103	#6	STR	11'-8"	1805
*B3	22	#4	STR	11'-8"	171
*G1	14	#4	STR	9'-1"	158
*U1	12	#4	1	4'-0"	32
REINFORCING STEEL					LBS. 2251
*EPOXY COATED REINFORCING STEEL					LBS. 2009
CLASS AA CONCRETE					C. Y. 34.6

**BAR TYPES**

ALL BAR DIMENSIONS ARE OUT TO OUT

PROJECT NO. N/A  
 CABARRUS COUNTY  
 STATION: 13+82.50

CITY OF CONCORD, NC  
 STANDARD  
 BRIDGE APPROACH SLAB  
 FOR PRESTRESSED CONCRETE  
 CORED SLAB

DRAWN BY: K. A. WOYAHN DATE: 5/22/23  
 CHECKED BY: T. R. DUDECK DATE: 08/23/23  
 DESIGN ENGINEER OF RECORD: T. R. DUDECK DATE: 02/23/24

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1			3		
2			4		

**SHEET NO.**  
S-25  
**TOTAL SHEETS**  
25



## STANDARD NOTES

### DESIGN DATA:

SPECIFICATIONS	-----	A.A.S.H.T.O. (CURRENT)
LIVE LOAD	-----	SEE PLANS
IMPACT ALLOWANCE	-----	SEE A.A.S.H.T.O.
STRESS IN EXTREME FIBER OF STRUCTURAL STEEL - AASHTO M270 GRADE 36	- -	20,000 LBS. PER SQ. IN.
	- -	27,000 LBS. PER SQ. IN.
	- -	27,000 LBS. PER SQ. IN.
REINFORCING STEEL IN TENSION - GRADE 60	- - -	24,000 LBS. PER SQ. IN.
CONCRETE IN COMPRESSION	-----	1,200 LBS. PER SQ. IN.
CONCRETE IN SHEAR	-----	SEE A.A.S.H.T.O.
STRUCTURAL TIMBER - TREATED OR UNTREATED EXTREME FIBER STRESS	- - -	1,800 LBS. PER SQ. IN.
COMPRESSION PERPENDICULAR TO GRAIN OF TIMBER	- - - - -	375 LBS. PER SQ. IN.
EQUIVALENT FLUID PRESSURE OF EARTH	- - - - -	30 LBS. PER CU. FT. (MINIMUM)

### MATERIAL AND WORKMANSHIP:

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE 2018 "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" OF THE N.C. DEPARTMENT OF TRANSPORTATION.

STEEL SHEET PILING FOR PERMANENT OR TEMPORARY APPLICATIONS SHALL BE HOT ROLLED.

### CONCRETE:

UNLESS OTHERWISE REQUIRED ON PLANS, CLASS A CONCRETE SHALL BE USED FOR ALL PORTIONS OF ALL STRUCTURES WITH THE EXCEPTION THAT: CLASS AA CONCRETE SHALL BE USED IN BRIDGE SUPERSTRUCTURES, ABUTMENT BACKWALLS, AND APPROACH SLABS; AND CLASS B CONCRETE SHALL BE USED FOR SLOPE PROTECTION AND RIP RAP.

### CONCRETE CHAMFERS:

UNLESS OTHERWISE NOTED ON THE PLANS, ALL EXPOSED CORNERS ON STRUCTURES SHALL BE CHAMFERED  $\frac{3}{4}$ " WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO  $\frac{1}{2}$ " RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A  $\frac{1}{4}$ " FINISHING TOOL UNLESS OTHERWISE REQUIRED ON PLANS; AND CORNERS OF EXPANSION JOINTS IN THE ROADWAY FACES AND TOPS OF CURBS AND SIDEWALKS SHALL BE ROUNDED TO A  $\frac{1}{4}$ " RADIUS WITH A FINISHING STONE OR TOOL UNLESS OTHERWISE REQUIRED ON PLANS.

### DOWELS:

DOWELS WHEN INDICATED ON PLANS AS FOR CULVERT EXTENSIONS, SHALL BE EMBEDDED AT LEAST 12" INTO THE OLD CONCRETE AND GROUTED INTO PLACE WITH 1:2 CEMENT MORTAR.

### ALLOWANCE FOR DEAD LOAD DEFLECTION, SETTLEMENT, ETC. IN CASTING SUPERSTRUCTURES:

BRIDGES SHALL BE BUILT ON THE GRADE OR VERTICAL CURVE SHOWN ON PLANS. SLABS, CURBS AND PARAPETS SHALL CONFORM TO THE GRADE OR CURVE.

ALL DIMENSIONS WHICH ARE GIVEN IN SECTION AND ARE AFFECTED BY DEAD LOAD DEFLECTIONS ARE DIMENSIONS AT CENTER LINE OF BEARING UNLESS OTHERWISE NOTED ON PLANS. IN SETTING FORMS FOR STEEL BEAM BRIDGES AND PRESTRESSED CONCRETE GIRDER BRIDGES, ADJUSTMENTS SHALL BE MADE DUE TO THE DEAD LOAD DEFLECTIONS FOR THE ELEVATIONS SHOWN. WHERE BLOCKS ARE SHOWN OVER BEAMS FOR BUILDING UP TO THE SLAB, THE VERTICAL DIMENSIONS OF THE BLOCKS SHALL BE ADJUSTED BETWEEN BEARINGS TO COMPENSATE FOR DEAD LOAD DEFLECTIONS, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER. WHERE BOTTOM OF SLAB IS IN LINE WITH BOTTOM OF TOP FLANGES, DEPTH OF SLAB BETWEEN BEARINGS SHALL BE ADJUSTED TO COMPENSATE FOR DEAD LOAD DEFLECTION, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER.

IN SETTING FALSEWORK AND FORMS FOR REINFORCED CONCRETE SPANS, AN ALLOWANCE SHALL BE MADE FOR DEAD LOAD DEFLECTIONS, SETTLEMENT OF FALSEWORK, AND PERMANENT CAMBER WHICH SHALL BE PROVIDED FOR IN ADDITION TO THE ELEVATIONS SHOWN. AFTER REMOVAL OF THE FALSEWORK, THE FINISHED STRUCTURES SHALL CONFORM TO THE PROFILE AND ELEVATIONS SHOWN ON THE PLANS AND CONSTRUCTION ELEVATIONS FURNISHED BY THE ENGINEER.

DETAILED DRAWINGS FOR FALSEWORK OR FORMS FOR BRIDGE SUPERSTRUCTURE AND ANY STRUCTURE OR PARTS OF A STRUCTURE AS NOTED ON THE PLANS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL BEFORE CONSTRUCTION OF THE FALSEWORK OR FORMS IS STARTED.

### REINFORCING STEEL:

ALL REINFORCING STEEL SHALL BE DEFORMED. DIMENSIONS RELATIVE TO PLACEMENT OF REINFORCING ARE TO CENTERS OF BARS UNLESS OTHERWISE INDICATED IN THE PLANS. DIMENSIONS ON BAR DETAILS ARE TO CENTERS OF BARS OR ARE OUT TO OUT AS INDICATED ON PLANS.

WIRE BAR SUPPORTS SHALL BE PROVIDED FOR REINFORCING STEEL WHERE INDICATED ON THE PLANS. WHEN BAR SUPPORT PIECES ARE PLACED IN CONTINUOUS LINES, THEY SHALL BE SO PLACED THAT THE ENDS OF THE SUPPORTING WIRES SHALL BE LAPPED TO LOCK LEGS ON ADJOINING PIECES.

### STRUCTURAL STEEL:

AT THE CONTRACTOR'S OPTION, HE MAY SUBSTITUTE  $\frac{7}{8}$ "  $\emptyset$  SHEAR STUDS FOR THE  $\frac{3}{4}$ "  $\emptyset$  STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 -  $\frac{7}{8}$ "  $\emptyset$  STUDS FOR 4 -  $\frac{3}{4}$ "  $\emptyset$  STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF  $\frac{7}{8}$ "  $\emptyset$  STUDS ALONG THE BEAM AS SHOWN FOR  $\frac{3}{4}$ "  $\emptyset$  STUDS BASED ON THE RATIO OF 3 -  $\frac{7}{8}$ "  $\emptyset$  STUDS FOR 4 -  $\frac{3}{4}$ "  $\emptyset$  STUDS. STUDS OF THE LENGTH SPECIFIED ON THE PLANS MUST BE PROVIDED. THE MAXIMUM SPACING SHALL BE 2'-0".

EXCEPT AT THE INTERIOR SUPPORTS OF CONTINUOUS BEAMS WHERE THE COVER PLATE IS IN CONTACT WITH BEARING PLATE, THE CONTRACTOR MAY, AT HIS OPTION, SUBSTITUTE FOR THE COVER PLATES DESIGNATED ON THE PLANS COVER PLATES OF THE EQUIVALENT AREA PROVIDED THESE PLATES ARE AT LEAST  $\frac{3}{16}$ " IN THICKNESS AND DO NOT EXCEED A WIDTH EQUAL TO THE FLANGE WIDTH LESS 2" OR A THICKNESS EQUAL TO 2 TIMES THE FLANGE THICKNESS. THE SIZE OF FILLET WELDS SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT ANSI/AASHTO/AWS "BRIDGE WELDING CODE". ELECTROSLAG WELDING WILL NOT BE PERMITTED.

WITH THE SOLE EXCEPTION OF EDGES AT SURFACES WHICH BEAR ON OTHER SURFACES, ALL SHARP EDGES AND ENDS OF SHAPES AND PLATES SHALL BE SLIGHTLY ROUNDED BY SUITABLE MEANS TO A RADIUS OF APPROXIMATELY  $\frac{1}{16}$ " INCH OR EQUIVALENT FLAT SURFACE AT A SUITABLE ANGLE PRIOR TO PAINTING, GALVANIZING, OR METALLIZING.

### HANDRAILS AND POSTS:

METAL STANDARDS AND FACES OF THE CONCRETE END POSTS FOR THE METAL RAIL SHALL BE SET NORMAL TO THE GRADE OF THE CURB, UNLESS OTHERWISE SHOWN ON PLANS. THE METAL RAIL AND TOPS OF CONCRETE POSTS USED WITH THE ALUMINUM RAIL SHALL BE BUILT PARALLEL TO THE GRADE OF THE CURB.

METAL HANDRAILS SHALL BE IN ACCORDANCE WITH THE PLANS. RAILS SHALL BE AS MANUFACTURED FOR BRIDGE RAILING. CASTINGS SHALL BE OF A UNIFORM APPEARANCE. FINIS AND OTHER DEFORMATIONS RESULTING FROM CASTING OR OTHERWISE SHALL BE REMOVED IN A MANNER SO THAT A UNIFORM COLORING OF THE COMPLETED CASTING SHALL BE OBTAINED. CASTINGS WITH DISCOLORATIONS OR OF NON-UNIFORM COLORING WILL NOT BE ACCEPTED. CERTIFIED MILL REPORTS ARE REQUIRED FOR METAL RAILS AND POSTS.

### SPECIAL NOTES:

GENERALLY, IN CASE OF DISCREPANCY, THIS STANDARD SHEET OF NOTES SHALL GOVERN OVER THE SPECIFICATIONS, BUT THE REMAINDER OF THE PLANS SHALL GOVERN OVER NOTES HEREON, AND SPECIAL PROVISIONS SHALL GOVERN OVER ALL. SEE SPECIFICATIONS ARTICLE 105-4.

5:56:13 PM jgelle

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# ENGLISH

JANUARY, 1990

STD. NO. SN



ALPHA & OMEGA GROUP  
CIVIL | STRUCTURAL | WATER RESOURCES

## BRIDGE ANALYSIS & RATING

BRIDGE NO.: 120320

COUNTY: CABARRUS

MUNICIPALITY: CONCORD

I HEREBY CERTIFY THAT THESE CALCULATIONS CONTAINED HEREIN WERE PREPARED BY ME OR UNDER MY DIRECT SUPERVISION.

DocuSigned by:

A handwritten signature in black ink that reads "James J. Barcomb".

A8C764871F8049C...

---

James J Barcomb, PE  
Professional Engineer  
State of North Carolina  
License No. 22997



7/19/2022

...Begin with the End in mind...

RATING SUMMARY SHEET							
BRIDGE NUMBER:		120320		COMPILED BY:		JJB	
MUNICIPALITY:		CONCORD		CHECKED BY:		DMS	
						DATE: 5/26/2022	
						DATE: 7/14/2022	
For Non-Interstate & NC Routes	MEMBER:	STEEL PLANK FLOORS (9"W x 3"D x .25"T)	BEAMS 1-5 INTERIOR BEAM (W21x55)	BEAMS 1-5 EXTERIOR BEAM (W21x55)	BEAMS 1-5 INTERIOR BEAM SHEAR	BEAMS 6-8 INTERIOR BEAM SHEAR	
	Span Length		39.33 FT	39.33 FT	39.33 FT	39.33 FT	
	Beam Spacing		3.00 FT	3.00 FT	3.00 FT	3.00 FT	
	(C=Continuous)						
	Analysis Method		LFR	LFR	LFR	LFR	
HS Inventory Rating		44.5 TONS	42.6 TONS	59.1 TONS	25.6 TONS	0.0 TONS	
HS Operating Rating		55.6 TONS	71.2 TONS	98.8 TONS	33.2 TONS	0.0 TONS	
Comments:	SNSH	13.5	28.0 TONS	38.9 TONS	23.7 TONS	0.0 TONS	
	SNGARBS2	20	33.6 TONS	46.6 TONS	25.9 TONS	0.0 TONS	
	SNAGRIS2	22	36.2 TONS	50.2 TONS	26.9 TONS	0.0 TONS	
	SNCOTTS3	27.25	28.4 TONS	39.4 TONS	24.0 TONS	0.0 TONS	
	SNAGGRS4	34.925	32.5 TONS	45.1 TONS	26.8 TONS	0.0 TONS	
	SNS5A	35.55	32.4 TONS	45.0 TONS	28.2 TONS	0.0 TONS	
	SNS6A	39.95	34.5 TONS	47.9 TONS	29.6 TONS	0.0 TONS	
	SNS7B	42	34.7 TONS	48.2 TONS	31.4 TONS	0.0 TONS	
	TNAGRIT3	33	35.2 TONS	48.8 TONS	28.6 TONS	0.0 TONS	
	TNT4A	33.075	35.3 TONS	48.9 TONS	27.5 TONS	0.0 TONS	
	TNAGRIT4	43	39.4 TONS	54.6 TONS	29.2 TONS	0.0 TONS	
	TNAGT5A	45	38.8 TONS	53.9 TONS	31.8 TONS	0.0 TONS	
	TNAGT5B	45	37.4 TONS	51.8 TONS	39.2 TONS	0.0 TONS	
	TNT6A	41.6	37.9 TONS	52.6 TONS	33.8 TONS	0.0 TONS	
	TNT7A	42	39.0 TONS	54.1 TONS	30.0 TONS	0.0 TONS	
TNT7B	42	39.8 TONS	55.3 TONS	48.6 TONS	0.0 TONS		
Calculated Posting:	SV TONS	TTST TONS		Design Loading:	HS 20		
Controlling Member:	BEAMS 6-8 INTERIOR BEAM SHEAR			Inventory Rating:	HS 0		
Existing Posting:	SV 25 TONS, TTST 30 TONS			Operating Rating:	HS 0		
Recommended Posting:	CLOSE NORTHBOUND LANE			T7B Rating:	0 TONS		
REASON FOR POSTING CHANGE:				Overload Bridge Only:	YES	NO	
WORSENERD CONDITION OF BEAMS 6-8 SIGNIFICANTLY REDUCED SHEAR CAPACITY AT END BENT 1				HS Operating Dropped 3 Tons or More	<b>X</b>		
						Item 70:	1





ALPHA & OMEGA GROU  
CIVIL & STRUCTURAL ENGINEER

Engineer's Project No.: 2022.026  
2022 Bridge Inspection Cycle  
Municipality: Concord  
Rated By: JJB Date: 5/26/2022  
Checked By: DMS Date: 7/14/2022

## Steel Plank Deck Rating Data: 120320

### Analysis and Rating References:

1. AASHTO, *Manual for Condition Evaluation of Bridges*, 1994, with Interim's through 2003.
2. AASHTO, *Standard Specifications for Highway Bridges*, 2002.
3. AISC, *Manual of Steel Construction*, 3rd Edition.

### Units

#### Structure Data:

Girder Spacing:	Space := 3·ft	
Effective Span:	Span := 2.656·ft	
Asphalt Wearing Surface Thickness:	AWS := 4.5·in	(Total thickness including Deck Plank)
Year Built:	Y <sub>built</sub> := 1983	
Plank Thickness:	Pthick := .179·in	(3 Gage)
Plank Depth:	Pdepth := 3·in	
Plank Width:	Pwidth := 9·in	
Plank Flange Width:	Pb <sub>f</sub> := 3.875·in	
Plank Deck Section Modulus:	S <sub>x</sub> := 0.264·in <sup>3</sup>	(per inch width)
Plank Weight:	Pweight := 11.5·psf	
Percent Effective:	PEFF := 95%	

#### Material Data:

Plank Deck Yield Strength:	F <sub>y</sub> := 36000·psi
Asphalt Wearing Surface Unit Weight:	γ <sub>Asp</sub> := 144·pcf



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## Moment Capacity:

Compression Flange Element Check:  $CFE := \frac{Pb_f}{P_{thick}}$   $CFE = 21.65$  (Ref 2, Eq. 10-132)

Limit 1:  $CFE_1 := \frac{6140}{\sqrt{F_y \cdot \frac{1}{psi}}}$  Limit 2:  $CFE_2 := \frac{13300}{\sqrt{F_y \cdot \frac{1}{psi}}}$  (Ref 2, Eq. 10-133)

$CFE_1 = 32.36$   $CFE_2 = 70.1$

Buckling Stress 1:  $c := \frac{13300 - CFE \cdot \sqrt{F_y \cdot \frac{1}{psi}}}{7160}$   $c = 1.28$  (Ref 2, Eq. 10-135)

$F_{cr1} := 0.592 \cdot F_y \cdot \left(1 + 0.687 \cdot \sin\left(\frac{c \cdot \pi}{2}\right)\right)$   $F_{cr1} = 34522 \text{ psi}$  (Ref 2, Eq. 10-134)

Buckling Stress 2:  $F_{cr2} := 105 \cdot \left(\frac{1}{CFE}\right)^2 \cdot 10^6 \cdot \text{psi}$   $F_{cr2} = 2 \times 10^5 \text{ psi}$  (Ref 2, Eq. 10-137)

Design Stress:  $F_{cr} := \begin{cases} F_y & \text{if } CFE \leq CFE_1 \\ F_{cr1} & \text{if } CFE_1 < CFE \wedge CFE \leq CFE_2 \\ F_{cr2} & \text{if } CFE_2 \leq CFE \end{cases}$   $F_{cr} = 36000 \text{ psi}$

Moment Capacity:  $M_u := F_{cr} \cdot S_x \cdot 12$   $M_u = 9504 \cdot \text{lb} \cdot \text{ft}$  (Ref 2, Eq. 10-130)

Inventory Moment Capacity:  $M_{inv} := M_u \cdot PEFF$   $M_{inv} = 9028.8 \cdot \text{lb} \cdot \text{ft}$

Operating Moment Capacity:  $M_{opr} := 1.25 M_{inv}$   $M_{opr} = 11286.00 \cdot \text{lb} \cdot \text{ft}$

## Dead Load Moment:

Plank Dead Load:  $W_{plank} := P_{width} \cdot P_{weight}$   $W_{plank} = 8.63 \cdot \text{plf}$

Asphalt Dead Load:  $W_{asp} := \gamma_{Asp} \cdot \left(AWS - \frac{P_{depth}}{2}\right) \cdot P_{width}$   $W_{asp} = 27.00 \cdot \text{plf}$

Total Dead Load:  $W_{Dead} := W_{plank} + W_{asp}$   $W_{Dead} = 35.63 \cdot \text{plf}$

Dead Load Moment:  $M_{dl} := 0.10 \cdot W_{Dead} \cdot \text{Span}^2$   $M_{dl} = 25.13 \cdot \text{lb} \cdot \text{ft}$



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### Live Load Moment:

Continuity Factor:  $cf := 0.8$

Impact Factor:  $Imp := 1.0$  (Ref. 2, Sec. 3.8)

### Wheel Loads:

Vehicle	Weight (W)	P <sub>live</sub>
SNSH	13.5 tons	11000 lbf
SNGARBS2	20.0 tons	11750 lbf
SNAGRIS2	22.0 tons	11000 lbf
SNCOTTS3	27.25 tons	12500 lbf
SNAGGRS4	34.925 tons	9500 lbf
SNS5A	35.55 tons	10500 lbf
SNS6A	39.95 tons	10500 lbf
SNS7B	42.0 tons	10500 lbf
TNAGRIT3	33.0 tons	11000 lbf
TNT4A	33.075 tons	10500 lbf
TNAGRIT4	43.0 tons	11000 lbf
TNAGT5A	45.0 tons	11000 lbf
TNAGT5B	45.0 tons	10500 lbf
TNT6A	41.6 tons	10500 lbf
TNT7A	42.0 tons	10500 lbf
TNT7B	42.0 tons	10500 lbf
H 20	20	16000 lbf
HS 20	36	16000 lbf

(Ref. 2, Sec. 3.7.5)

(Ref. 2, Sec. 3.7.6)



Tire Contact, perpendicular to Traffic:  $TC_{perp} := 20in$

Distributed Live Load in Span of Deck:  $w_{live} := \frac{P_{live}}{TC_{perp}}$

Reaction at Left Beam:  $R_1 := 0.5 \cdot P_{live}$



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Live Load Moment:

$$a1 := \max\left(0, \frac{\text{Span} - TC_{\text{perp}}}{2}\right)$$

$$i := 0..17 \quad M_{LL_i} := R_{1_i} \cdot \left(a1 + \frac{R_{1_i}}{2 \cdot w_{live_i}}\right) \cdot \text{Imp}$$

(Ref. 3, Tab. 5-17, 4)



Vehicle	Weight (W)	M <sub>live</sub>	P <sub>live</sub>
<b>SNSH</b>	13.5 tons	5.012 kip·ft	11000 lbf
<b>SNGARBS2</b>	20.0 tons	5.354 kip·ft	11750 lbf
<b>SNAGRIS2</b>	22.0 tons	5.012 kip·ft	11000 lbf
<b>SNCOTTS3</b>	27.25 tons	5.696 kip·ft	12500 lbf
<b>SNAGGRS4</b>	34.925 tons	4.329 kip·ft	9500 lbf
<b>SNS5A</b>	35.55 tons	4.785 kip·ft	10500 lbf
<b>SNS6A</b>	39.95 tons	4.785 kip·ft	10500 lbf
<b>SNS7B</b>	42.0 tons	4.785 kip·ft	10500 lbf
<b>TNAGRIT3</b>	33.0 tons	5.012 kip·ft	11000 lbf
<b>TNT4A</b>	33.075 tons	4.785 kip·ft	10500 lbf
<b>TNAGRIT4</b>	43.0 tons	5.012 kip·ft	11000 lbf
<b>TNAGT5A</b>	45.0 tons	5.012 kip·ft	11000 lbf
<b>TNAGT5B</b>	45.0 tons	4.785 kip·ft	10500 lbf
<b>TNT6A</b>	41.6 tons	4.785 kip·ft	10500 lbf
<b>TNT7A</b>	42.0 tons	4.785 kip·ft	10500 lbf
<b>TNT7B</b>	42.0 tons	4.785 kip·ft	10500 lbf
<b>H 20</b>	20	7.291 kip·ft	16000 lbf
<b>HS 20</b>	36	7.291 kip·ft	16000 lbf



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### Moment Rating:

(Ref 1, Sec. 6.5.3)

Rating Factors:

$$A1 := 1.0$$

$$A2_{inv} := 1.0$$

$$A2_{opr} := 1.0$$

$$C_1 := M_{inv}$$

$$D := M_{dl}$$

$$\frac{L}{w} := M_{LL}$$

$$C_2 := M_{opr}$$

$$RF_{inv} := \frac{C_1 - A1 \cdot D}{A2_{inv} \cdot L}$$

$$RT_{inv} = RF_{inv} \cdot W$$

$$RF_{opr} := \frac{C_2 - A1 \cdot D}{A2_{opr} \cdot L}$$

$$RT_{opr} = RF_{opr} \cdot W$$

Vehicle	Weight (W)	RF <sub>inv</sub>	RF <sub>opr</sub>	RT <sub>inv</sub>	RT <sub>opr</sub>	Vehicle
<b>SNSH</b>	13.5 tons	1.796	2.247	24.250 tons	30.330 tons	<b>SNSH</b>
<b>SNGARBS2</b>	20.0 tons	1.682	2.103	33.633 tons	42.065 tons	<b>SNGARBS2</b>
<b>SNAGRIS2</b>	22.0 tons	1.796	2.247	39.519 tons	49.426 tons	<b>SNAGRIS2</b>
<b>SNCOTTS3</b>	27.25 tons	1.581	1.977	43.075 tons	53.874 tons	<b>SNCOTTS3</b>
<b>SNAGGRS4</b>	34.925 tons	2.080	2.601	72.642 tons	90.853 tons	<b>SNAGGRS4</b>
<b>SNS5A</b>	35.55 tons	1.882	2.354	66.899 tons	83.671 tons	<b>SNS5A</b>
<b>SNS6A</b>	39.95 tons	1.882	2.354	75.180 tons	94.027 tons	<b>SNS6A</b>
<b>SNS7B</b>	42.0 tons	1.882	2.354	79.037 tons	98.852 tons	<b>SNS7B</b>
<b>TNAGRIT3</b>	33.0 tons	1.796	2.247	59.278 tons	74.139 tons	<b>TNAGRIT3</b>
<b>TNT4A</b>	33.075 tons	1.882	2.354	62.242 tons	77.846 tons	<b>TNT4A</b>
<b>TNAGRIT4</b>	43.0 tons	1.796	2.247	77.241 tons	96.605 tons	<b>TNAGRIT4</b>
<b>TNAGT5A</b>	45.0 tons	1.796	2.247	80.834 tons	101.098 tons	<b>TNAGT5A</b>
<b>TNAGT5B</b>	45.0 tons	1.882	2.354	84.683 tons	105.913 tons	<b>TNAGT5B</b>
<b>TNT6A</b>	41.6 tons	1.882	2.354	78.285 tons	97.910 tons	<b>TNT6A</b>
<b>TNT7A</b>	42.0 tons	1.882	2.354	79.037 tons	98.852 tons	<b>TNT7A</b>
<b>TNT7B</b>	42.0 tons	1.882	2.354	79.037 tons	98.852 tons	<b>TNT7B</b>
<b>H 20</b>	20	1.235	1.545	24.699	30.891	<b>H 20</b>
<b>HS 20</b>	36	1.235	1.545	44.458	55.604	<b>HS 20</b>





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## Steel Plank Deck Summary Sheet

Year Built:	$Y_{built} = 1983$	Steel Yield Strength:	$F_y = 36000 \cdot \text{psi}$
Beam Spacing:	$\text{Space} = 36.00 \cdot \text{in}$	Continuity Factor:	$cf = 0.8$
Effective Span:	$\text{Span} = 31.87 \cdot \text{in}$	Impact Factor:	$\text{Imp} = 1.00$
Total Uniform Dead Load:	$W_{Dead} = 35.63 \cdot \text{plf}$	Section Modulus:	$S_x = 0.264 \cdot \text{in}^3$
Total Dead Load Moment:	$M_{dl} = 25.13 \cdot \text{lb} \cdot \text{ft}$	Percent Effective:	$\text{PEFF} = 95\%$
		Moment Capacity:	$M_u = 9504 \cdot \text{lb} \cdot \text{ft}$

Vehicle	Weight (W)	RF <sub>inv</sub>	RF <sub>opr</sub>	RT <sub>inv</sub>	RT <sub>opr</sub>	Vehicle
<b>SNSH</b>	13.5 tons	1.796	2.247	24.250 tons	30.330 tons	<b>SNSH</b>
<b>SNGARBS2</b>	20.0 tons	1.682	2.103	33.633 tons	42.065 tons	<b>SNGARBS2</b>
<b>SNAGRIS2</b>	22.0 tons	1.796	2.247	39.519 tons	49.426 tons	<b>SNAGRIS2</b>
<b>SNCOTTS3</b>	27.25 tons	1.581	1.977	43.075 tons	53.874 tons	<b>SNCOTTS3</b>
<b>SNAGGRS4</b>	34.925 tons	2.080	2.601	72.642 tons	90.853 tons	<b>SNAGGRS4</b>
<b>SNS5A</b>	35.55 tons	1.882	2.354	66.899 tons	83.671 tons	<b>SNS5A</b>
<b>SNS6A</b>	39.95 tons	1.882	2.354	75.180 tons	94.027 tons	<b>SNS6A</b>
<b>SNS7B</b>	42.0 tons	1.882	2.354	79.037 tons	98.852 tons	<b>SNS7B</b>
<b>TNAGRIT3</b>	33.0 tons	1.796	2.247	59.278 tons	74.139 tons	<b>TNAGRIT3</b>
<b>TNT4A</b>	33.075 tons	1.882	2.354	62.242 tons	77.846 tons	<b>TNT4A</b>
<b>TNAGRIT4</b>	43.0 tons	1.796	2.247	77.241 tons	96.605 tons	<b>TNAGRIT4</b>
<b>TNAGT5A</b>	45.0 tons	1.796	2.247	80.834 tons	101.098 tons	<b>TNAGT5A</b>
<b>TNAGT5B</b>	45.0 tons	1.882	2.354	84.683 tons	105.913 tons	<b>TNAGT5B</b>
<b>TNT6A</b>	41.6 tons	1.882	2.354	78.285 tons	97.910 tons	<b>TNT6A</b>
<b>TNT7A</b>	42.0 tons	1.882	2.354	79.037 tons	98.852 tons	<b>TNT7A</b>
<b>TNT7B</b>	42.0 tons	1.882	2.354	79.037 tons	98.852 tons	<b>TNT7B</b>
<b>H 20</b>	20	1.235	1.545	24.699	30.891	<b>H 20</b>
<b>HS 20</b>	36	1.235	1.545	44.458	55.604	<b>HS 20</b>



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## Interior/Exterior Steel Beam

### Analysis and Rating References:

1. AASHTO, *Manual for Condition Evaluation of Bridges*, 1994, with Interims through 2003.
2. AASHTO, *Standard Specifications for Highway Bridges*, 2002.



### Structure Data:

Span Length:	SPAN := 39.33·ft	
Beam Spacing:	Interior S <sub>I</sub> := 3·ft	Exterior S <sub>E</sub> := 3·ft
Deck Cantilever Overhang:	SO := .5·ft	
Timber/Concrete Deck Thickness:	DeckT := .375·in (Steel Plank Deck)	
Deck Type:	<div style="border: 1px solid black; padding: 2px;">           Concrete            Wood  <b>Steel</b> </div>	deck <sub>type</sub> = " Steel"
Asphalt Wearing Surface Thickness:	AWS := 3·in	
Clear Roadway Width: (Between Curbs/Sidewalks)	CLRROAD := 22.25·ft	
Number of Live Load Lanes:	NLANES := if(CLRROAD < 16·ft, 1, 2)	NLANES = 2
Total Sidewalk Width:	SIDEW := 0·ft	(Width and thickness of curb/sidewalk portion over ext. beam)
Sidewalk Thickness:	SIDET := 0·in	
Rail Type:	Type 23	
Rail Width:	RAILW := 0·in	
Date Built:	Y <sub>built</sub> := 1971	



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## Steel Beam Data:

Structural Steel Yield Strength:

$$F_y := 36 \cdot \text{ksi}$$

(Ref. 1, Section 6.6.2.1)

▾ AISC Table & Cust. Section Data

W21x55

$$\text{PEFF} := 95\%$$

Percent Effective

▾ Variables Set Here

$$\text{shapeName} = \text{"W21x55"}$$

Section Designation

$$I_x = 1140 \cdot \text{in}^4$$

Moment of Inertia About 'X' Axis

$$\text{beam}_{\text{wt}} = 55 \cdot \text{plf}$$

Beam Weight Per Linear Foot

$$S_x = 110 \cdot \text{in}^3$$

Section Modulus About 'X' Axis

$$A_{\text{cs}} = 16.2 \cdot \text{in}^2$$

Cross Sectional Area

$$r_x = 8.4 \cdot \text{in}$$

Radius of Gyration About 'X' Axis

$$d = 20.8 \cdot \text{in}$$

Section Depth

$$I_y = 48.4 \cdot \text{in}^4$$

Moment of Inertia About 'Y' Axis

$$t_w = 0.375 \cdot \text{in}$$

Web Thickness

$$S_y = 11.8 \cdot \text{in}^3$$

Section Modulus About 'Y' Axis

$$b_f = 8.22 \cdot \text{in}$$

Flange Width

$$r_y = 1.73 \cdot \text{in}$$

Radius of Gyration About 'Y' Axis

$$t_f = 0.522 \cdot \text{in}$$

Flange Thickness

$$Z_x = 126 \cdot \text{in}^3$$

Plastic Section Modulus about 'X' Axis

$$\text{NG} := 10$$

Number of Beams

$$Z_y = 18.4 \cdot \text{in}^3$$

Plastic Section Modulus about 'Y' Axis

$$L_b := 1 \cdot \text{ft}$$

Unbraced Length

$$E := 29000000 \cdot \text{psi}$$

Elastic Modulus





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## Dead Load Data:

Concrete Unit Weight: CONCWT := 150·pcf

Timber Unit Weight: TIMBWT := 50·pcf

Deck Unit Weight: DeckWT = 490·pcf

Asphalt Wearing Surface Unit Weight: AWSWT := 144·pcf

Rail Weight (All Rails):  
(distributed to all beams) RAILWT := 20·plf

Additional Uniform Load on Deck:  
(distributed to all beams) AULD := 0·psf

Additional Line Load on Deck:  
(distributed to all beams) ALLD := 0·plf

Additional Load on Beam:  
(distributed to one beam) ALG := 0·plf

Diaphragm Unit Weight:  
(along diaphragm) Pdiaph := 15.3·plf

Diaphragm Location (SPAN/XDiaph):  
(Number of Diaphragms in Plan View) XDiaph := 3

$XD := \text{if}(XDiaph = 2, 4, \text{if}(XDiaph = 3, 3, 2))$

$XD = 3$



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## Dead Load Data, Cont'd:

Uniform Dead Loads Applied to Beam:

$$SLABWT_{Ext} := \left( \frac{S_E}{2} + SO \right) \cdot DeckT \cdot DeckWT \quad SLABWT_{Ext} = 30.625 \cdot plf$$

Slab Weight:

$$SLABWT_{Int} := S_I \cdot DeckT \cdot DeckWT \quad SLABWT_{Int} = 45.937 \cdot plf$$

Beam Weight:

$$BEAMWT = 55 \cdot plf \quad BEAMWT = 55 \cdot plf$$

Asphalt Wearing Surface:

$$AWSW1_{Int} := S_I \cdot AWS \cdot AWSWT \quad AWSW1_{Int} = 108 \cdot plf$$

$$AWSW1_{Ext} := \left( \frac{S_E}{2} + SO - RAILW - \frac{SIDEW}{2} \right) \cdot AWS \cdot AWSWT \quad AWSW1_{Ext} = 72 \cdot plf$$

$$AWSW2 := \frac{CLRROAD \cdot AWS \cdot AWSWT}{NG} \quad AWSW2 = 80.1 \cdot plf$$

$$AWSW_I := \max(AWSW1_{Int}, AWSW2) \quad AWSW_I = 108 \cdot plf$$

$$AWSW_E := \max(AWSW1_{Ext}, AWSW2) \quad AWSW_E = 80.1 \cdot plf$$

Rail Weight:

$$RAILW_1 := \frac{RAILWT}{3} \quad RAILW_1 = 6.667 \cdot plf$$

Sidewalk Weight:

$$SIDEWT := \frac{SIDEW \cdot SIDET \cdot CONCWT}{3} \quad SIDEWT = 0 \cdot plf$$

Additional Uniform Loads:

$$AULDWT := AULD \cdot S_I \quad AULDWT = 0 \cdot plf$$

Additional Line Loads:

$$ALLDWT := \frac{ALLD}{NG} \quad ALLDWT = 0 \cdot plf$$

Additional Girder Loads:

$$ALG = 0 \cdot plf$$



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## Dead Load Data:

Total Uniform Dead Load:

$$\text{UNIFDL}_I := \text{SLABWT}_{\text{Int}} + \text{BEAMWT} + \text{AWSW}_I + \text{RAILW}_I + \text{SIDEWT} + \text{AULDWT} + \text{ALLDWT} \quad \text{UNIFDL}_I = 215.6 \cdot \text{plf}$$

$$\text{UNIFDL}_E := \text{SLABWT}_{\text{Ext}} + \text{BEAMWT} + \text{AWSW}_E + \text{RAILW}_I + \text{SIDEWT} + \text{AULDWT} + \text{ALLDWT} + \text{ALG}$$

### Interior Beam Moment

$$\text{UNIFDL}_E = 172.4 \cdot \text{plf}$$

Uniform Dead Load Moment:

$$\text{Mdlu}_I := \frac{\text{UNIFDL}_I \cdot \text{SPAN}^2}{8} \quad \text{Mdlu}_I = 41688.384 \cdot \text{lb} \cdot \text{ft}$$

Diaphragm Dead Load Moment:

$$\text{Mdld}_I := \frac{\text{Pdiaph} \cdot S_I \cdot \text{SPAN}}{\text{XD}} \quad \text{Mdld}_I = 601.749 \cdot \text{lb} \cdot \text{ft}$$

Total Dead Load Moment:

$$\text{Mdl}_I := \text{Mdlu}_I + \text{Mdld}_I \quad \text{Mdl}_I = 42290.133 \cdot \text{lb} \cdot \text{ft}$$

### Exterior Beam Moment

Uniform Dead Load Moment:

$$\text{Mdlu}_E := \frac{\text{UNIFDL}_E \cdot \text{SPAN}^2}{8} \quad \text{Mdlu}_E = 33332.982 \cdot \text{lb} \cdot \text{ft}$$

Diaphragm Dead Load Moment:

$$\text{Mdld}_E := \frac{\text{Pdiaph} \cdot S_E \cdot \text{SPAN}}{\text{XD}} \quad \text{Mdld}_E = 601.749 \cdot \text{lb} \cdot \text{ft}$$

Total Dead Load Moment:

$$\text{Mdl}_E := \text{Mdlu}_E + \text{Mdld}_E \quad \text{Mdl}_E = 33934.731 \cdot \text{lb} \cdot \text{ft}$$

## Live Load Factors:

Impact Factor:

$$\text{Imax} := 1.30$$

(Ref. 2, Section 3.8)

$$I := 1 + \frac{50}{\frac{\text{SPAN}}{\text{ft}} + 125}$$

$$I = 1.304$$

$$I := \text{if}(I > \text{Imax}, \text{Imax}, I)$$

$$I = 1.3$$

Wheel Load Distribution Factor:

(Ref. 2, Section 3.23, Table 3.23.1)

Steel Deck: Steel Bridge Corrugated Plank (2" Minimum Depth) ▼

$$\text{DFI} = 0.333$$

$$\text{DFE} = \text{"Reaction"}$$



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## Live Load Factors Cont'd:

Simple Span Wheel Distribution: WHEELSP := 6·ft

Distance from Edge of Lane to Wheel (**Interior**):

$$WLC := \text{if} \left( \text{CLRROAD} < 16\text{-ft}, 2\text{-ft}, \text{if} \left( \text{CLRROAD} \geq 20\text{-ft}, 2\text{-ft}, \frac{\text{CLRROAD} - 2 \cdot \text{WHEELSP}}{4} \right) \right) \quad WLC = 2\text{-ft}$$

$$X1 := S_1 - 2 \cdot \text{WHEELSP} - 2 \cdot WLC \quad \overset{\text{X1}}{\text{M}} := \text{if}(X1 \leq 0\text{-ft}, 0\text{-ft}, X1) \quad X1 = 0\text{-ft}$$

$$X2 := S_1 - \text{WHEELSP} - 2 \cdot WLC \quad \overset{\text{X2}}{\text{M}} := \text{if}(X2 \leq 0\text{-ft}, 0\text{-ft}, X2) \quad X2 = 0\text{-ft}$$

$$X3 := S_1 - \text{WHEELSP} \quad \overset{\text{X3}}{\text{M}} := \text{if}(X3 \leq 0\text{-ft}, 0\text{-ft}, X3) \quad X3 = 0\text{-ft}$$

$$X4 := S_1 \quad X4 = 3\text{-ft}$$

$$X5 := S_1 - 2 \cdot WLC \quad \overset{\text{X5}}{\text{M}} := \text{if}(X5 \leq 0\text{-ft}, 0\text{-ft}, X5) \quad X5 = 0\text{-ft}$$

$$X6 := S_1 - \text{WHEELSP} - WLC \quad \overset{\text{X6}}{\text{M}} := \text{if}(X6 \leq 0\text{-ft}, 0\text{-ft}, X6) \quad X6 = 0\text{-ft}$$

$$X7 := S_1 - \text{WHEELSP} - 4 \cdot WLC \quad \overset{\text{X7}}{\text{M}} := \text{if}(X7 \leq 0\text{-ft}, 0\text{-ft}, X7) \quad X7 = 0\text{-ft}$$

$$DFS := \frac{X1 + X2 + X3 + X4 + X5 + X6 + X7}{S_1 \cdot 2} \quad DFS = 0.5$$

$$DF_I := \text{if}(DFI = \text{"Reaction"}, DFS, DFI) \quad DF_I = 0.333$$

Distance from Edge of Lane to Wheel (**Exterior**):

$$\overset{\text{X1}}{\text{M}} := S_E + (\text{SO} - \text{RAILW}) - \frac{\text{SIDEW}}{2} - WLC$$

$$\overset{\text{X1}}{\text{M}} := \text{if}(X1 \leq 0\text{-ft}, 0\text{-ft}, X1) \quad X1 = 1.5\text{-ft}$$

$$\overset{\text{X2}}{\text{M}} := X1 - \text{WHEELSP}$$

$$\overset{\text{X2}}{\text{M}} := \text{if}(X2 \leq 0\text{-ft}, 0\text{-ft}, X2) \quad X2 = 0\text{-ft}$$

$$\overset{\text{DFS}}{\text{M}} := \frac{X1 + X2}{S_E \cdot 2} \quad DFS = 0.25$$

$$DF_E := \text{if}(DFE = \text{"Reaction"}, DFS, DFE) \quad DF_E = 0.25$$



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## Section Capacities:

### Compact Section

(Ref. 2, Section 10.42)

Compact Section Check:

(Ref. 2, Section 10.48.1)

### Equations From AASHTO Chapter 10

a) Compression Flange Check

$$\text{Compression}_{\text{Flange}} := \frac{b_f}{t_f} \qquad \text{CompFlange}_{\text{Limit}} := \frac{4110}{\sqrt{F_y \cdot \frac{1}{\text{psi}}}} \qquad (10-93)$$

$$\text{CompFlange}_{\text{Ratio}} := \frac{\text{Compression}_{\text{Flange}}}{\text{CompFlange}_{\text{Limit}}} \qquad \text{CompFlange}_{\text{Ratio}} = 0.727$$

$$\text{CompFlange}_{\text{Check}} := \text{if}(\text{CompFlange}_{\text{Ratio}} \leq 1, \text{"Good"}, \text{"No Good"})$$

CompFlange<sub>Check</sub> = "Good"

b) Web Thickness Check

$$\text{Web}_{\text{Thickness}} := \frac{d - 2t_f}{t_w} \qquad \text{Web}_{\text{Limit}} := \frac{19230}{\sqrt{F_y \cdot \frac{1}{\text{psi}}}} \qquad (10-94)$$

$$\text{Web}_{\text{Ratio}} := \frac{\text{Web}_{\text{Thickness}}}{\text{Web}_{\text{Limit}}} \qquad \text{Web}_{\text{Ratio}} = 0.52$$

$$\text{Web}_{\text{Check}} := \text{if}(\text{Web}_{\text{Ratio}} \leq 1, \text{"Good"}, \text{"No Good"})$$

Web<sub>Check</sub> = "Good"

Flange-Web Interaction:

$$\text{Flange}_{\text{Web}} := \frac{d - 2t_f}{t_w} + 4.68 \cdot \frac{b_f}{t_f} \qquad \text{FlangeWeb}_{\text{Limit}} := \frac{33650}{\sqrt{F_y \cdot \frac{1}{\text{psi}}}} \qquad (10-95)$$

$$\text{FlangeWeb}_{\text{Ratio}} := \frac{\text{Flange}_{\text{Web}}}{\text{FlangeWeb}_{\text{Limit}}} \qquad \text{FlangeWeb}_{\text{Ratio}} = 0.713$$

$$\text{FlangeWeb}_{\text{Check}} := \left| \begin{array}{l} \text{if} (\text{CompFlange}_{\text{Ratio}} > 0.75 \wedge \text{Web}_{\text{Ratio}} > 0.75) \\ \quad \left| \begin{array}{l} \text{"Good"} \text{ if } \text{FlangeWeb}_{\text{Ratio}} \leq 1 \\ \text{"No Good"} \text{ otherwise} \end{array} \right. \\ \quad \text{"Good"} \text{ otherwise} \end{array} \right.$$

FlangeWeb<sub>Check</sub> = "Good"



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c) Spacing of Lateral bracing for Compression Flange

(Assume  $M1/\mu = 1.0$ )

$$\text{Lateral}_{\text{Brace}} := \frac{L_b}{r_y}$$

$$\text{LatBrace}_{\text{Limit}} := \frac{[3.6 - 2.2 \cdot (1.0)] \cdot 10^6}{\left(F_y \cdot \frac{1}{\text{psi}}\right)} \quad (10-96)$$

$$\text{LatBrace}_{\text{Ratio}} := \frac{\text{Lateral}_{\text{Brace}}}{\text{LatBrace}_{\text{Limit}}}$$

$$\text{LatBrace}_{\text{Ratio}} = 0.178$$

$$\text{LatBrace}_{\text{Check}} := \text{if}(\text{LatBrace}_{\text{Ratio}} \leq 1, \text{"Good"}, \text{"No Good"})$$

$$\text{LatBrace}_{\text{Check}} = \text{"Good"}$$

Compact Section Check Summary:

$$\text{Section}_{\text{Check}} := \begin{cases} \text{if}(\text{CompFlange}_{\text{Check}} = \text{"Good"} \wedge \text{Web}_{\text{Check}} = \text{"Good"}) \\ \quad \left| \begin{array}{l} \text{"Compact"} \text{ if}(\text{FlangeWeb}_{\text{Check}} = \text{"Good"} \wedge \text{LatBrace}_{\text{Check}} = \text{"Good"}) \\ \text{"NonCompact"} \text{ otherwise} \end{array} \right. \\ \text{"NonCompact"} \text{ otherwise} \end{cases}$$

$$\text{Section}_{\text{Check}} = \text{"Compact"}$$

Compact Section Capacity:

(10-92)

$$\mu_{\text{C}} := F_y \cdot Z_x \cdot \text{PEFF}$$

$$\mu_{\text{C}} = 359.1 \cdot \text{kip} \cdot \text{ft}$$



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## Section Capacities Cont'd:

### Non-Compact Section

Braced Non-Compact Section Check:

(Ref. 2, Section 10.48.2)

$$\mu_{NC1} = F_y \cdot S_{xt} \quad \text{or} \quad \mu_{NC2} = F_y \cdot S_{xc} \cdot R_b$$

#### a) Compression Flange Check

$$\text{Braced}_{\text{CompFlange}} := \frac{bf}{tf} \qquad \text{BracedFlange}_{\text{Limit}} := 24 \qquad (10-100)$$

$$\text{BracedFlange}_{\text{Ratio}} := \frac{\text{Braced}_{\text{CompFlange}}}{\text{BracedFlange}_{\text{Limit}}} \qquad \text{BracedFlange}_{\text{Ratio}} = 0.656$$

$$\text{BracedFlange}_{\text{Check}} := \text{if}(\text{BracedFlange}_{\text{Ratio}} \leq 1, \text{"Good"}, \text{"No Good"})$$

$$\boxed{\text{BracedFlange}_{\text{Check}} = \text{"Good"}}$$

#### b) Web Thickness Check

$$\text{Braced}_{\text{Web}} := \frac{d - 2 \cdot tf}{t_w} \qquad \text{BracedWeb}_{\text{Limit}} := \frac{36500}{\sqrt{F_y \cdot \frac{1}{\text{psi}}}} \qquad (10-104)$$

$$\text{BracedWeb}_{\text{Ratio}} := \frac{\text{Braced}_{\text{Web}}}{\text{BracedWeb}_{\text{Limit}}} \qquad \text{BracedWeb}_{\text{Ratio}} = 0.274$$

$$\text{BracedWeb}_{\text{Check}} := \text{if}(\text{BracedWeb}_{\text{Ratio}} \leq 1, \text{"Good"}, \text{"No Good"})$$

$$\boxed{\text{BracedWeb}_{\text{Check}} = \text{"Good"}}$$

#### c) Spacing of Lateral bracing for Compression Flange

$$\text{Braced}_{\text{LatBrace}} := L_b \qquad \text{BracedLat}_{\text{Limit}} := \frac{20000000 \cdot (bf \cdot tf)}{\left(F_y \cdot \frac{1}{\text{psi}}\right) \cdot d} \qquad (10-101)$$

$$\text{BracedLat}_{\text{Ratio}} := \frac{\text{Braced}_{\text{LatBrace}}}{\text{BracedLat}_{\text{Limit}}} \qquad \text{BracedLat}_{\text{Ratio}} = 0.105$$

$$\text{BracedLat}_{\text{Check}} := \text{if}(\text{BracedLat}_{\text{Ratio}} \leq 1, \text{"Good"}, \text{"No Good"})$$

$$\boxed{\text{BracedLat}_{\text{Check}} = \text{"Good"}}$$

Braced Section Check Summary:

$$\text{Braced}_{\text{Check}} := \begin{cases} \text{"Braced"} & \text{if } (\text{BracedFlange}_{\text{Check}} = \text{"Good"} \wedge \text{BracedWeb}_{\text{Check}} = \text{"Good"} \wedge \text{BracedLat}_{\text{Check}} = \text{"Good"}) \\ \text{"Partially Braced"} & \text{otherwise} \end{cases}$$

$$\boxed{\text{Braced}_{\text{Check}} = \text{"Braced"}}$$



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### Braced Section Capacity:

(10-98, 10-99)

$$F_{cr} := \min \left[ F_y, \left( 4400 \cdot \frac{tf}{bf} \right)^2 \cdot \text{psi} \right]$$

$$F_{cr} = 36000 \cdot \text{psi}$$

$$S_{xt} := \frac{I_x}{0.5 \cdot d} \quad S_{xc} := S_{xt}$$

$$S_{xt} = 109.615 \cdot \text{in}^3$$

$$S_{xc} = 109.615 \cdot \text{in}^3$$

$$D_c := \frac{d - 2 \cdot tf}{2}$$

$$D_c = 9.878 \cdot \text{in}$$

$$f_b := F_y$$

$$f_b = 36000 \cdot \text{psi}$$

$$\lambda := \text{if} \left( D_c \leq \frac{d - 2 \cdot tf}{2}, 15400, 12500 \right)$$

$$\lambda = 15400$$

$$R_{b\_braced} := \min \left[ 1 - .002 \cdot \left( \frac{D_c \cdot t_w}{bf \cdot tf} \right) \cdot \left( \frac{D_c}{t_w} - \frac{\lambda}{\sqrt{f_b \cdot \frac{1}{\text{psi}}}} \right), 1 \right]$$

$$R_{b\_braced} = 1$$

$$Mu_1 := |S_{xt} \cdot F_y|$$

$$Mu_1 = 328.8 \cdot \text{kip} \cdot \text{ft}$$

$$Mu_2 := |F_{cr} \cdot S_{xc} \cdot R_{b\_braced}|$$

$$Mu_2 = 328.8 \cdot \text{kip} \cdot \text{ft}$$

$$Mu_{Braced} := \min(Mu_1, Mu_2) \cdot \text{PEFF}$$

$$Mu_{Braced} = 312.4 \cdot \text{kip} \cdot \text{ft}$$

### 10.48.4.1 Partially Braced Members

$$I_{yc} := \frac{tf \cdot bf^3}{12}$$

$$I_{yc} = 24.16 \cdot \text{in}^4$$

$$I_y = 48.4 \cdot \text{in}^4$$

$$\frac{I_{yc}}{I_y} = 0.499$$

$$\text{if} \left[ \left( 0.1 < \frac{I_{yc}}{I_y} < 0.9 \right), \text{"Good"}, \text{"No Good"} \right] = \text{"Good"}$$

$$r_1 := \sqrt{\frac{I_{yc}}{bf \cdot tf}}$$

$$r_1 = 2.373 \cdot \text{in}$$





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$$L_b = 1 \cdot \text{ft} \quad L_p := \frac{9500 \cdot r_1}{\sqrt{\frac{F_y}{\text{psi}}}} \quad L_p = 9.901 \text{ ft}$$

$$L_r := \sqrt{\frac{572 \cdot 10^6 \cdot I_{yc} \cdot d}{F_y \cdot \frac{1}{\text{psi}} \cdot S_{xc}}} \quad L_r = 22.491 \text{ ft}$$

$$J := \frac{(b_f \cdot t_f^3) + (b_r \cdot t_r^3) + [(d - 2 \cdot t_f) \cdot t_w^3]}{3} \quad J = 1.13 \cdot \text{in}^4$$

$$C_b := 1.75 \quad (\text{Assumed})$$

$$M_{y1} := S_{xc} \cdot F_y \quad M_{y1} = 329 \cdot \text{kip} \cdot \text{ft}$$

$$\frac{D_c}{t_w} = 26.341 \quad \frac{\lambda}{\sqrt{\frac{F_y}{\text{psi}}}} = 81.165$$

$$M_{r1} := \begin{cases} \pi \cdot E \cdot C_b \cdot \left( \frac{I_{yc}}{L_b} \right) \cdot \sqrt{\left( 0.772 \cdot \frac{J}{I_{yc}} \right) + 9.87 \cdot \left( \frac{d}{L_b} \right)^2} & \text{if } \frac{D_c}{t_w} \leq \frac{\lambda}{\sqrt{\frac{F_y}{\text{psi}}}} \end{cases} \quad (10-103c) \quad M_{r1} = 145758 \cdot \text{kip} \cdot \text{ft}$$

$$\text{if } \frac{\lambda}{\sqrt{\frac{F_y}{\text{psi}}}} < \frac{D_c}{t_w}$$

$$\left| \begin{array}{l} M_{y1} \text{ if } L_b \leq L_p \end{array} \right. \quad (10-103d)$$

$$\left| \begin{array}{l} C_b \cdot F_y \cdot S_{xc} \cdot \left( 1 - 0.5 \cdot \frac{L_b - L_p}{L_r - L_p} \right) \text{ if } L_p < L_b \leq L_r \end{array} \right. \quad (10-103e)$$

$$\left| \begin{array}{l} C_b \cdot \frac{F_y \cdot S_{xc}}{2} \cdot \left( \frac{L_r}{L_b} \right)^2 \text{ if } L_r < L_b \end{array} \right. \quad (10-103g)$$

$$M_r := \min(M_{y1}, M_{r1})$$

$$M_r = 328.8 \cdot \text{kip} \cdot \text{ft}$$



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$$A_{fc} := bf \cdot tf \quad A_{fc} = 4.291 \cdot \text{in}^2$$

$$R_{b\_Part} := \min \left[ 1, 1 - .002 \cdot \left( \frac{D_c \cdot t_w}{A_{fc}} \right) \cdot \left( \frac{D_c}{t_w} - \frac{\lambda}{\sqrt{\frac{M_r \cdot 1}{S_{xc} \cdot \text{psi}}}} \right) \right] \quad (10-103b) \quad R_{b\_Part} = 1$$

$$Mu_{Part\_braced} := M_r \cdot R_{b\_Part} \cdot PEFF \quad (10-103a) \quad \boxed{Mu_{Part\_braced} = 312.4 \cdot \text{kip} \cdot \text{ft}}$$

### Section Capacity

$$M_u := \begin{cases} Mu_C & \text{if Section}_{Check} = \text{"Compact"} \\ \begin{cases} Mu_{Braced} & \text{if Braced}_{Check} = \text{"Braced"} \\ Mu_{Part\_braced} & \text{if Braced}_{Check} = \text{"Partially Braced"} \end{cases} & \text{if Section}_{Check} = \text{"NonCompact"} \end{cases}$$

$Mu_C = 359.1 \cdot \text{kip} \cdot \text{ft}$   $\boxed{M_u = 359.1 \cdot \text{kip} \cdot \text{ft}}$   
 $Mu_{Braced} = 312.4 \cdot \text{kip} \cdot \text{ft}$   
 $Mu_{Part\_braced} = 312.4 \cdot \text{kip} \cdot \text{ft}$

Live Load Moment Calculations



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## Interior Beam Live Load Rating:

(Ref. 1, Section 6.5)

### Maximum Strength Rating

Rating Factors:

$$A1 := 1.3$$

$$A2_{inv} := 2.17$$

$$A2_{opr} := 1.3$$

(Ref. 1, Section 6.5.3)

$$M_{II} := M_{lane} \cdot I \cdot DF_I$$

$$C := M_u$$

$$D_I := M d_I$$

$$C = 359.1 \cdot \text{kip} \cdot \text{ft}$$

$$D_I = 42.29 \cdot \text{kip} \cdot \text{ft}$$

$$RF_{inv_I} := \frac{C \cdot PEFF - A1 \cdot D_I}{A2_{inv} \cdot M_{II}}$$

$$RF_{opr_I} := \frac{C \cdot PEFF - A1 \cdot D_I}{A2_{opr} \cdot M_{II}}$$

$$RT_{inv} = W \cdot RF_{inv}$$

$$RT_{opr} = W \cdot RF_{opr}$$

Vehicle	Weight (W)	M <sub>lane</sub>	M <sub>II</sub> (Factored)	RF <sub>inv</sub>	RF <sub>opr</sub>	RT <sub>inv</sub>	RT <sub>opr</sub>	Vehicle
<b>SNSH</b>	13.5 tons	231.6 kip·ft	100.4 kip·ft	1.314	2.193	17.738 tons	29.608 tons	<b>SNSH</b>
<b>SNGARBS2</b>	20.0 tons	286.3 kip·ft	124.0 kip·ft	1.063	1.775	21.262 tons	35.491 tons	<b>SNGARBS2</b>
<b>SNAGRIS2</b>	22.0 tons	292.3 kip·ft	126.7 kip·ft	1.041	1.738	22.903 tons	38.230 tons	<b>SNAGRIS2</b>
<b>SNCOTTS3</b>	27.25 tons	461.4 kip·ft	199.9 kip·ft	0.660	1.101	17.973 tons	30.001 tons	<b>SNCOTTS3</b>
<b>SNAGGRS4</b>	34.925 tons	516.5 kip·ft	223.8 kip·ft	0.589	0.984	20.578 tons	34.349 tons	<b>SNAGGRS4</b>
<b>SNS5A</b>	35.55 tons	527.5 kip·ft	228.6 kip·ft	0.577	0.963	20.508 tons	34.232 tons	<b>SNS5A</b>
<b>SNS6A</b>	39.95 tons	556.7 kip·ft	241.2 kip·ft	0.547	0.913	21.840 tons	36.456 tons	<b>SNS6A</b>
<b>SNS7B</b>	42.0 tons	581.7 kip·ft	252.1 kip·ft	0.523	0.873	21.972 tons	36.677 tons	<b>SNS7B</b>
<b>TNAGRIT3</b>	33.0 tons	450.9 kip·ft	195.4 kip·ft	0.675	1.127	22.271 tons	37.175 tons	<b>TNAGRIT3</b>
<b>TNT4A</b>	33.075 tons	450.9 kip·ft	195.4 kip·ft	0.675	1.127	22.322 tons	37.260 tons	<b>TNT4A</b>
<b>TNAGRIT4</b>	43.0 tons	525.8 kip·ft	227.8 kip·ft	0.579	0.966	24.888 tons	41.543 tons	<b>TNAGRIT4</b>
<b>TNAGT5A</b>	45.0 tons	557.4 kip·ft	241.5 kip·ft	0.546	0.911	24.568 tons	41.010 tons	<b>TNAGT5A</b>
<b>TNAGT5B</b>	45.0 tons	579.3 kip·ft	251.0 kip·ft	0.525	0.877	23.642 tons	39.464 tons	<b>TNAGT5B</b>
<b>TNT6A</b>	41.6 tons	527.5 kip·ft	228.6 kip·ft	0.577	0.963	23.998 tons	40.059 tons	<b>TNT6A</b>
<b>TNT7A</b>	42.0 tons	517.6 kip·ft	224.3 kip·ft	0.588	0.981	24.692 tons	41.216 tons	<b>TNT7A</b>
<b>TNT7B</b>	42.0 tons	507.2 kip·ft	219.8 kip·ft	0.600	1.002	25.202 tons	42.068 tons	<b>TNT7B</b>
<b>H 20</b>	20	339.3 kip·ft	147.0 kip·ft	0.897	1.497	17.939	29.944	<b>H 20</b>
<b>HS 20</b>	36	437.8 kip·ft	189.7 kip·ft	0.695	1.160	25.022	41.767	<b>HS 20</b>



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## Interior Beam Live Load Rating:

(Ref. 1, Section 6.5)

### Overload Rating

Rating Factors:

$$A1_O := 1$$

$$A2_{invO} := 1.67$$

$$A2_{oprO} := 1$$

(Ref. 2, Section 10.57)

$$M_{II} = M_{lane} \cdot I \cdot DF_I$$

$$C_O := 0.80 \cdot F_y \cdot S_x$$

$$D_I = M_{dI}$$

$$C_O = 264 \cdot \text{kip} \cdot \text{ft}$$

$$D_I = 42.29 \cdot \text{kip} \cdot \text{ft}$$

$$RF_{invIO} := \frac{C_O \cdot PEFF - A1_O \cdot D_I}{A2_{invO} \cdot M_{II}}$$

$$RF_{oprIO} := \frac{C_O \cdot PEFF - A1_O \cdot D_I}{A2_{oprO} \cdot M_{II}}$$

$$RT_{invO} = W \cdot RF_{invO} \quad RT_{oprO} = W \cdot RF_{oprO}$$

Vehicle	Weight (W)	M <sub>lane</sub>	M <sub>II</sub> (Factored)	RF <sub>inv</sub>	RF <sub>opr</sub>	RT <sub>inv</sub>	RT <sub>opr</sub>	Vehicle
SNSH	13.5 tons	231.6 kip·ft	100.4 kip·ft	1.244	2.077	16.794 tons	28.045 tons	SNSH
SNGARBS2	20.0 tons	286.3 kip·ft	124.0 kip·ft	1.007	1.681	20.131 tons	33.618 tons	SNGARBS2
SNAGRIS2	22.0 tons	292.3 kip·ft	126.7 kip·ft	0.986	1.646	21.684 tons	36.212 tons	SNAGRIS2
SNCOTTS3	27.25 tons	461.4 kip·ft	199.9 kip·ft	0.624	1.043	17.016 tons	28.417 tons	SNCOTTS3
SNAGGRS4	34.925 tons	516.5 kip·ft	223.8 kip·ft	0.558	0.932	19.483 tons	32.536 tons	SNAGGRS4
SNS5A	35.55 tons	527.5 kip·ft	228.6 kip·ft	0.546	0.912	19.416 tons	32.425 tons	SNS5A
SNS6A	39.95 tons	556.7 kip·ft	241.2 kip·ft	0.518	0.864	20.677 tons	34.531 tons	SNS6A
SNS7B	42.0 tons	581.7 kip·ft	252.1 kip·ft	0.495	0.827	20.803 tons	34.741 tons	SNS7B
TNAGRIT3	33.0 tons	450.9 kip·ft	195.4 kip·ft	0.639	1.067	21.085 tons	35.213 tons	TNAGRIT3
TNT4A	33.075 tons	450.9 kip·ft	195.4 kip·ft	0.639	1.067	21.134 tons	35.293 tons	TNT4A
TNAGRIT4	43.0 tons	525.8 kip·ft	227.8 kip·ft	0.548	0.915	23.563 tons	39.351 tons	TNAGRIT4
TNAGT5A	45.0 tons	557.4 kip·ft	241.5 kip·ft	0.517	0.863	23.261 tons	38.845 tons	TNAGT5A
TNAGT5B	45.0 tons	579.3 kip·ft	251.0 kip·ft	0.497	0.831	22.384 tons	37.381 tons	TNAGT5B
TNT6A	41.6 tons	527.5 kip·ft	228.6 kip·ft	0.546	0.912	22.721 tons	37.944 tons	TNT6A
TNT7A	42.0 tons	517.6 kip·ft	224.3 kip·ft	0.557	0.930	23.378 tons	39.041 tons	TNT7A
TNT7B	42.0 tons	507.2 kip·ft	219.8 kip·ft	0.568	0.949	23.861 tons	39.847 tons	TNT7B
H 20	20	339.3 kip·ft	147.0 kip·ft	0.849	1.418	16.984	28.363	H 20
HS 20	36	437.8 kip·ft	189.7 kip·ft	0.658	1.099	23.690	39.563	HS 20



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## Exterior Beam Live Load Rating:

(Ref. 1, Section 6.5)

### Maximum Strength Rating

Rating Factors:

$$A1 = 1.3$$

$$A2_{inv} = 2.17$$

$$A2_{opr} = 1.3$$

(Ref. 1, Section 6.5.3)

$$M_{II_E} := M_{lane} \cdot I \cdot DF_E$$

$$C = M_u$$

$$D_E := M_{dl_E}$$

$$C = 359.1 \cdot \text{kip} \cdot \text{ft}$$

$$D_E = 33.935 \cdot \text{kip} \cdot \text{ft}$$

$$RF_{inv_E} := \frac{C \cdot PEFF - A1 \cdot D_E}{A2_{inv} \cdot M_{II_E}}$$

$$RF_{opr_E} := \frac{C \cdot PEFF - A1 \cdot D_E}{A2_{opr} \cdot M_{II_E}}$$

$$RT_{inv} = W \cdot RF_{inv}$$

$$RT_{opr} = W \cdot RF_{opr}$$

Vehicle	Weight (W)	M <sub>lane</sub>	M <sub>II</sub> (Factored)	RF <sub>inv</sub>	RF <sub>opr</sub>	RT <sub>inv</sub>	RT <sub>opr</sub>	Vehicle
<b>SNSH</b>	13.5 tons	231.6 kip-ft	75.3 kip-ft	1.818	3.035	24.548 tons	40.976 tons	<b>SNSH</b>
<b>SNGARBS2</b>	20.0 tons	286.3 kip-ft	93.0 kip-ft	1.471	2.456	29.426 tons	49.118 tons	<b>SNGARBS2</b>
<b>SNAGRIS2</b>	22.0 tons	292.3 kip-ft	95.0 kip-ft	1.441	2.405	31.696 tons	52.908 tons	<b>SNAGRIS2</b>
<b>SNCOTTS3</b>	27.25 tons	461.4 kip-ft	150.0 kip-ft	0.913	1.524	24.873 tons	41.519 tons	<b>SNCOTTS3</b>
<b>SNAGGRS4</b>	34.925 tons	516.5 kip-ft	167.9 kip-ft	0.815	1.361	28.479 tons	47.537 tons	<b>SNAGGRS4</b>
<b>SNS5A</b>	35.55 tons	527.5 kip-ft	171.5 kip-ft	0.798	1.333	28.382 tons	47.376 tons	<b>SNS5A</b>
<b>SNS6A</b>	39.95 tons	556.7 kip-ft	180.9 kip-ft	0.757	1.263	30.225 tons	50.452 tons	<b>SNS6A</b>
<b>SNS7B</b>	42.0 tons	581.7 kip-ft	189.1 kip-ft	0.724	1.209	30.409 tons	50.759 tons	<b>SNS7B</b>
<b>TNAGRIT3</b>	33.0 tons	450.9 kip-ft	146.6 kip-ft	0.934	1.559	30.821 tons	51.448 tons	<b>TNAGRIT3</b>
<b>TNT4A</b>	33.075 tons	450.9 kip-ft	146.6 kip-ft	0.934	1.559	30.892 tons	51.566 tons	<b>TNT4A</b>
<b>TNAGRIT4</b>	43.0 tons	525.8 kip-ft	170.9 kip-ft	0.801	1.337	34.443 tons	57.494 tons	<b>TNAGRIT4</b>
<b>TNAGT5A</b>	45.0 tons	557.4 kip-ft	181.2 kip-ft	0.756	1.261	34.001 tons	56.755 tons	<b>TNAGT5A</b>
<b>TNAGT5B</b>	45.0 tons	579.3 kip-ft	188.3 kip-ft	0.727	1.214	32.719 tons	54.616 tons	<b>TNAGT5B</b>
<b>TNT6A</b>	41.6 tons	527.5 kip-ft	171.4 kip-ft	0.798	1.333	33.212 tons	55.439 tons	<b>TNT6A</b>
<b>TNT7A</b>	42.0 tons	517.6 kip-ft	168.2 kip-ft	0.814	1.358	34.172 tons	57.041 tons	<b>TNT7A</b>
<b>TNT7B</b>	42.0 tons	507.2 kip-ft	164.8 kip-ft	0.830	1.386	34.878 tons	58.219 tons	<b>TNT7B</b>
<b>H 20</b>	20	339.3 kip-ft	110.3 kip-ft	1.241	2.072	24.826	41.441	<b>H 20</b>
<b>HS 20</b>	36	437.8 kip-ft	142.3 kip-ft	0.962	1.606	34.629	57.804	<b>HS 20</b>



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## Exterior Beam Live Load Rating:

(Ref. 1, Section 6.5)

### Overload Rating

Rating Factors:

$$A1_O = 1$$

$$A2_{invO} = 1.67$$

$$A2_{oprO} = 1$$

(Ref. 2, Section 10.57)

$$M_{II_E} = M_{lane} \cdot I \cdot DF_E$$

$$C_O = 0.80 \cdot F_y \cdot S_x$$

$$D_E = M_{dl_E}$$

$$C_O = 264 \cdot \text{kip} \cdot \text{ft}$$

$$D_E = 33.935 \cdot \text{kip} \cdot \text{ft}$$

$$RF_{invEO} := \frac{C_O \cdot PEFF - A1_O \cdot D_E}{A2_{invO} \cdot M_{II_E}}$$

$$RF_{oprEO} := \frac{C_O \cdot PEFF - A1_O \cdot D_E}{A2_{oprO} \cdot M_{II_E}}$$

$$RT_{invO} = W \cdot RF_{invO} \quad RT_{oprO} = W \cdot RF_{oprO}$$

Vehicle	Weight (W)	M <sub>lane</sub>	M <sub>II</sub> (Factored)	RF <sub>inv</sub>	RF <sub>opr</sub>	RT <sub>inv</sub>	RT <sub>opr</sub>	Vehicle
SNSH	13.5 tons	231.6 kip-ft	75.3 kip-ft	1.725	2.881	23.289 tons	38.892 tons	SNSH
SNGARBS2	20.0 tons	286.3 kip-ft	93.0 kip-ft	1.396	2.331	27.916 tons	46.620 tons	SNGARBS2
SNAGRIS2	22.0 tons	292.3 kip-ft	95.0 kip-ft	1.367	2.283	30.070 tons	50.217 tons	SNAGRIS2
SNCOTTS3	27.25 tons	461.4 kip-ft	150.0 kip-ft	0.866	1.446	23.597 tons	39.408 tons	SNCOTTS3
SNAGGRS4	34.925 tons	516.5 kip-ft	167.9 kip-ft	0.774	1.292	27.018 tons	45.120 tons	SNAGGRS4
SNS5A	35.55 tons	527.5 kip-ft	171.5 kip-ft	0.757	1.265	26.926 tons	44.966 tons	SNS5A
SNS6A	39.95 tons	556.7 kip-ft	180.9 kip-ft	0.718	1.199	28.675 tons	47.887 tons	SNS6A
SNS7B	42.0 tons	581.7 kip-ft	189.1 kip-ft	0.687	1.147	28.849 tons	48.178 tons	SNS7B
TNAGRIT3	33.0 tons	450.9 kip-ft	146.6 kip-ft	0.886	1.480	29.240 tons	48.832 tons	TNAGRIT3
TNT4A	33.075 tons	450.9 kip-ft	146.6 kip-ft	0.886	1.480	29.308 tons	48.944 tons	TNT4A
TNAGRIT4	43.0 tons	525.8 kip-ft	170.9 kip-ft	0.760	1.269	32.677 tons	54.570 tons	TNAGRIT4
TNAGT5A	45.0 tons	557.4 kip-ft	181.2 kip-ft	0.717	1.197	32.257 tons	53.869 tons	TNAGT5A
TNAGT5B	45.0 tons	579.3 kip-ft	188.3 kip-ft	0.690	1.152	31.041 tons	51.838 tons	TNAGT5B
TNT6A	41.6 tons	527.5 kip-ft	171.4 kip-ft	0.757	1.265	31.509 tons	52.620 tons	TNT6A
TNT7A	42.0 tons	517.6 kip-ft	168.2 kip-ft	0.772	1.289	32.419 tons	54.140 tons	TNT7A
TNT7B	42.0 tons	507.2 kip-ft	164.8 kip-ft	0.788	1.316	33.089 tons	55.259 tons	TNT7B
H 20	20	339.3 kip-ft	110.3 kip-ft	1.178	1.967	23.553	39.333	H 20
HS 20	36	437.8 kip-ft	142.3 kip-ft	0.913	1.524	32.853	54.864	HS 20

▢ Controlling Ratings



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## Beam Summary Sheet

Steel Section:	Name = "W21x55"	Total Uniform Dead Load (Interior Beam):	UNIFDL <sub>I</sub> = 215.6·plf
Span Length:	SPAN = 39.33 ft	Total Dead Load Moment (Interior):	Md <sub>I</sub> = 42290.1·lbf·ft
Girder Spacing:	Interior	S <sub>I</sub> = 3 ft	Total Uniform Dead Load (Exterior Beam):
	Exterior	S <sub>E</sub> = 3 ft	
Deck Thickness:	DeckT = 0.375·in	Total Dead Load Moment (Exterior):	Md <sub>E</sub> = 33934.7·lbf·ft
Total Sidewalk Width:	SIDEW = 0	Distribution Factor:	Interior
Sidewalk Thickness:	SIDET = 0		DF <sub>I</sub> = 0.3333
			Exterior
Structural Steel Yield Strength:	F <sub>y</sub> = 36000·psi	Impact Factor:	I = 1.3
Percent Effective:	PEFF = 95·%	Maximum Section Capacity:	M <sub>u</sub> = 359.1·kip·ft

### Interior Steel Beam

Vehicle	M <sub>lane</sub>	RT <sub>inv</sub>	RT <sub>opr</sub>	Vehicle
SNSH	231.6 kip·ft	16.794 tons	28.045 tons	SNSH
SNGARBS2	286.3 kip·ft	20.131 tons	33.618 tons	SNGARBS2
SNAGRIS2	292.3 kip·ft	21.684 tons	36.212 tons	SNAGRIS2
SNCOTTS3	461.4 kip·ft	17.016 tons	28.417 tons	SNCOTTS3
SNAGGRS4	516.5 kip·ft	19.483 tons	32.536 tons	SNAGGRS4
SNS5A	527.5 kip·ft	19.416 tons	32.425 tons	SNS5A
SNS6A	556.7 kip·ft	20.677 tons	34.531 tons	SNS6A
SNS7B	581.7 kip·ft	20.803 tons	34.741 tons	SNS7B
TNAGRIT3	450.9 kip·ft	21.085 tons	35.213 tons	TNAGRIT3
TNT4A	450.9 kip·ft	21.134 tons	35.293 tons	TNT4A
TNAGRIT4	525.8 kip·ft	23.563 tons	39.351 tons	TNAGRIT4
TNAGT5A	557.4 kip·ft	23.261 tons	38.845 tons	TNAGT5A
TNAGT5B	579.3 kip·ft	22.384 tons	37.381 tons	TNAGT5B
TNT6A	527.5 kip·ft	22.721 tons	37.944 tons	TNT6A
TNT7A	517.6 kip·ft	23.378 tons	39.041 tons	TNT7A
TNT7B	507.2 kip·ft	23.861 tons	39.847 tons	TNT7B
H 20	339.3 kip·ft	16.984	28.363	H 15
HS 20	437.8 kip·ft	23.690	39.563	HS 15

### Exterior Steel Beam

Vehicle	M <sub>lane</sub>	RT <sub>inv</sub>	RT <sub>opr</sub>	Vehicle
SNSH	231.6 kip·ft	23.289 tons	38.892 tons	SNSH
SNGARBS2	286.3 kip·ft	27.916 tons	46.620 tons	SNGARBS2
SNAGRIS2	292.3 kip·ft	30.070 tons	50.217 tons	SNAGRIS2
SNCOTTS3	461.4 kip·ft	23.597 tons	39.408 tons	SNCOTTS3
SNAGGRS4	516.5 kip·ft	27.018 tons	45.120 tons	SNAGGRS4
SNS5A	527.5 kip·ft	26.926 tons	44.966 tons	SNS5A
SNS6A	556.7 kip·ft	28.675 tons	47.887 tons	SNS6A
SNS7B	581.7 kip·ft	28.849 tons	48.178 tons	SNS7B
TNAGRIT3	450.9 kip·ft	29.240 tons	48.832 tons	TNAGRIT3
TNT4A	450.9 kip·ft	29.308 tons	48.944 tons	TNT4A
TNAGRIT4	525.8 kip·ft	32.677 tons	54.570 tons	TNAGRIT4
TNAGT5A	557.4 kip·ft	32.257 tons	53.869 tons	TNAGT5A
TNAGT5B	579.3 kip·ft	31.041 tons	51.838 tons	TNAGT5B
TNT6A	527.5 kip·ft	31.509 tons	52.620 tons	TNT6A
TNT7A	517.6 kip·ft	32.419 tons	54.140 tons	TNT7A
TNT7B	507.2 kip·ft	33.089 tons	55.259 tons	TNT7B
H 20	339.3 kip·ft	23.553	39.333	H 20
HS 20	437.8 kip·ft	32.853	54.864	HS 20





**ALPHA & OMEGA GROUP**  
CIVIL | STRUCTURAL | WATER RESOURCES

Engineer's Project No.: 2022.026  
2022 Bridge Inspection Cycle  
Municipality: Concord  
Rated By: JJB Date: 5/24/2022  
Checked By: DMS Date: 7/14/2022

### Shear Capacity:

$$t_{wr} := 0.1875 \cdot \text{in} \quad k_v := 5.34$$

$$d_{hole} := 3 \text{ in} \quad h := 18.375 \text{ in}$$

$$A_w := d \cdot t_{wr} - d_{hole} \cdot t_{wr}$$

$$A_w = 3.338 \cdot \text{in}^2$$

$$C_v := 1.10 \cdot \frac{\left( k_v \cdot \frac{E}{F_y} \right)^{.5}}{\frac{h}{t_{wr}}} \quad C_v = 0.736$$

$$V_n := 0.6 \cdot F_y \cdot A_w \cdot C_v \quad V_n = 53.071 \cdot \text{kip}$$

$$t_{fl} := 0.25 \text{ in}$$

$$b_f = 8.22 \cdot \text{in}$$

$$A_f := t_{fl} \cdot b_f$$

$$A_f = 2.055 \cdot \text{in}^2$$

$$V_{nf} := 0.6 \cdot A_f \cdot F_y$$

$$V_{nf} = 44.388 \cdot \text{kip}$$

$$S_{xf} := 8.25 \text{ in} \cdot \frac{(0.25 \text{ in}^2)}{6}$$

$$M_{cf} := F_y \cdot S_{xf}$$

$$M_{cf} = 1.031 \cdot \text{kip} \cdot \text{ft}$$

### Applied Shear:

$$i := 1..16$$

$$VL_i := VD := \text{UNIFDL}_1 \cdot \frac{\text{SPAN}}{2} \quad MD := VD \cdot .25 \text{ ft}$$

$$VD = 4.24 \cdot \text{kip}$$

25.25 · kip
34.23 kip
36.3 kip
50.31 kip
57.98 kip
55.9 kip
60.02 kip
59.39 kip
51.15 kip
53.48 kip
65.43 kip
62.85 kip
50.98 kip
54.68 kip
62.12 kip
38.4 kip

### Applied Moment:

$$Mv_i := .25 \text{ ft} \cdot VL_i$$

6.312
8.557
9.075
12.578
14.495
13.975
15.005
14.848
12.787
13.37
16.358
15.712
12.745
13.67
15.53
9.6

$Mv_i =$  ·kip · ft



**ALPHA & OMEGA GROUP**  
CIVIL | STRUCTURAL | WATER RESOURCES

Engineer's Project No.: 2022.026  
2022 Bridge Inspection Cycle  
Municipality: Concord  
Rated By: JJB Date: 5/24/2022  
Checked By: DMS Date: 7/14/2022

$$RFV_i := \frac{V_n}{VL_i}$$

$$Rvf_i := \frac{V_{nf}}{VL_i}$$

$$Rm_i := \frac{M_{cf} - MD}{Mv_i}$$

$$RFV_i =$$

2.102
1.55
1.462
1.055
0.915
0.949
0.884
0.894
1.038
0.992
0.811
0.844
1.041
0.971
0.854
1.382

$$Rvf_i =$$

1.758
1.297
1.223
0.882
0.766
0.794
0.74
0.747
0.868
0.83
0.678
0.706
0.871
0.812
0.715
1.156

$$Rm_i =$$

-0.005
-0.003
-0.003
-0.002
-0.002
-0.002
-0.002
-0.002
-0.002
-0.002
-0.002
-0.002
-0.002
-0.002
-0.002
-0.003

$$VL_{HS} := 38.4\text{kip}$$

$$RFiv_{HS} := \frac{V_n - 1.25 \cdot VD}{1.75 \cdot VL_{HS}}$$

$$RFor_{HS} := \frac{V_n - 1.25 \cdot VD}{1.35 \cdot VL_{HS}}$$

$$RTiv_{HS} := RFiv_{HS} \cdot \frac{36\text{ton}}{\text{ton}}$$

$$RTiv_{HS} = 25.592$$

$$RTor_{HS} := RFor_{HS} \cdot \frac{36\text{ton}}{\text{ton}}$$

$$RTor_{HS} = 33.175$$



**ALPHA & OMEGA GROUP**  
CIVIL | STRUCTURAL | WATER RESOURCES

**Engineer's Project No.:** 2022.026  
**2022 Bridge Inspection Cycle**  
**Municipality:** Concord  
**Rated By:** JJB **Date:** 5/24/2022  
**Checked By:** DMS **Date:** 7/14/2022



**ALPHA & OMEGA GROUP**  
CIVIL | STRUCTURAL | WATER RESOURCES

**Engineer's Project No.:** 2022.026  
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**ALPHA & OMEGA GROUP**  
CIVIL | STRUCTURAL | WATER RESOURCES

Engineer's Project No.: 2022.026

2022 Bridge Inspection Cycle

Municipality: Concord

Rated By: JJB Date: 5/24/2022

Checked By: DMS Date: 7/14/2022

cle
iH
iBS2
iRS2
iTS3
iRS4
5A
6A
7B
iRT3
1A
iRT4
T5A
T5B
3A
7A
7B
0
20





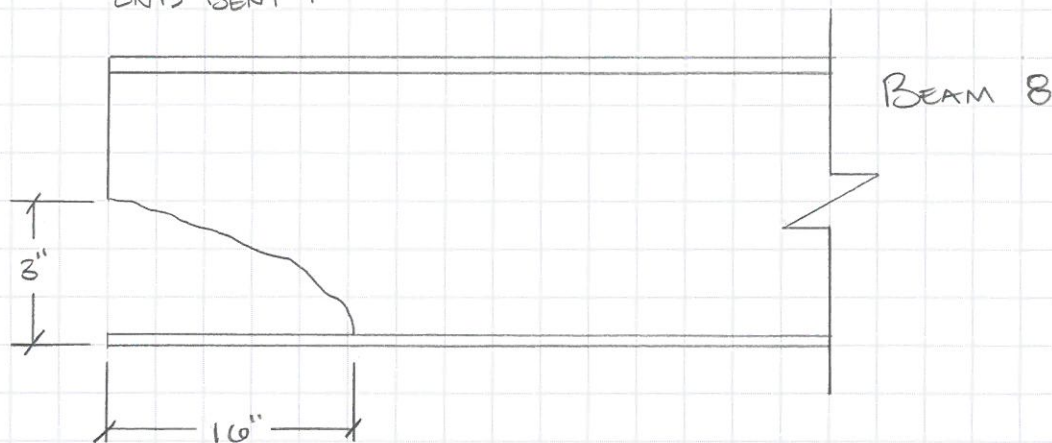
ALPHA & OMEGA GROUP  
CIVIL | STRUCTURAL | WATER RESOURCES

PROJECT NO. 2022.026 SHEET 1 OF       
PROJECT NAME 2022 MUNICIPAL BI  
LOAD RATING BRIDGE 120320  
PREPARED BY DM SHAUT DATE 7-12-22  
CHECKED BY                      DATE                     

Reference:

BRIDGE 120320

END BENT 1



PER 2022 BRIDGE INSPECTION REPORT DATED 6/28/2022:

AT END BENT 1, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (0.40" AVERAGE REMAINING x 4"); LOWER WEB (3/16" AVERAGE REMAINING x 4" x UP TO 4") WITH RUST HOLE (10" x 3")

∴ SHEAR AT END BENT 1 MUST BE RESISTED BY THE BOTTOM FLANGE

BOTTOM FLANGE WIDTH = 8.25"

AVERAGE REMAINING THICKNESS = 0.40"

MOMENT CAPACITY OF BOTTOM FLANGE @ END BENT 1:

$$M_c = \frac{(8.25") (0.5")^2}{6} * 36 \text{ ksi} = 12.375 \text{ k}\cdot\text{IN} = 1.03 \text{ k}\cdot\text{FT}$$

Structure Number: 120320Inspection Date: 06/28/2022

Span 1		Beam 5				
Plate Girder						
Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty
107	Steel Open Girder/Beam	40	0	37	0	3 Feet
515	Steel Protective Coating	520	480	0	0	40 Square Feet
Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty	
107	Corrosion	[MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 1, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (AVERAGE 1/4" REMAINING FOR 1.5' LONG, THEN 0.40" AVERAGE REMAINING FOR NEXT 1.5' LONG'); LOWER WEB (3/16" AVERAGE REMAINING X 2.5' X UP TO 3.5")	4	3	3	Feet
107	Corrosion	along the length of the beam, both flanges and lower 2" of web, areas of rust scale (no measurable loss) at random	2	37		Feet
107	Corrosion	(combined with other notes 2020) 40' OF AREAS OF SURFACE CORROSION THROUGHOUT FULL LENGTH OF BOTH FACES OF WEB AND EDGES OF FLANGES IN VARIOUS LOCATIONS	1			Feet
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	40	8	Square Feet
General Comments						

Span 1		Beam 6				
Plate Girder						
Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty
107	Steel Open Girder/Beam	40	0	37	0	3 Feet
515	Steel Protective Coating	520	480	0	0	40 Square Feet
Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty	
107	Corrosion	[MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 1, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (0.35" AVERAGE REMAINING X 3'); LOWER WEB (3/16" AVERAGE REMAINING X 3' X UP TO 4") WITH RUST HOLE (12" X 1.5")	4	3	3	Feet
107	Corrosion	along the length of the beam, both flanges and lower 2" of web, areas of rust scale (no measurable loss) at random	2	37		Feet
107	Corrosion	(combined with other notes 2020) 40' OF AREAS OF SURFACE CORROSION THROUGHOUT FULL LENGTH OF BOTH FACES OF WEB AND EDGES OF FLANGES IN VARIOUS LOCATIONS	1			Feet
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	40	8	Square Feet
General Comments						

Span 1		Beam 7				
Plate Girder						
Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty
107	Steel Open Girder/Beam	40	0	35	0	5 Feet
515	Steel Protective Coating	520	480	0	0	40 Square Feet
Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty	

Structure Number: **120320**Inspection Date: **06/28/2022**

107	Corrosion	[MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 1, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (0.45" AVERAGE REMAINING X 4.5'); LOWER WEB (1/4" AVERAGE REMAINING X 4.5' X UP TO 4" WITH 1" DIAMETER CORROSION HOLE AT 1' OUT).	4	5	5 Feet
107	Corrosion	along the length of the beam, both flanges and lower 2" of web, areas of rust scale (no measurable loss) at random	2	35	Feet
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	40	8 Square Feet
<b>General Comments</b>					

**Span 1****Beam 8****Plate Girder**

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty
107	Steel Open Girder/Beam	40	0	36	0	4 Feet
515	Steel Protective Coating	520	480	0	0	40 Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty
107	Corrosion	[MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 1, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (0.40" AVERAGE REMAINING X 4'); LOWER WEB (3/16" AVERAGE REMAINING X 4' X UP TO 4") WITH RUST HOLE (16" X 3").	4	4	4 Feet
107	Corrosion	along the length of the beam, both flanges and lower 2" of web, areas of rust scale (no measurable loss) at random	2	36	Feet
107	Corrosion	(combined with other notes 2020) 40' OF AREAS OF SURFACE CORROSION THROUGHOUT FULL LENGTH OF BOTH FACES OF WEB AND EDGES OF FLANGES IN VARIOUS LOCATIONS	1		Feet
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	40	8 Square Feet
<b>General Comments</b>					

**Span 1****Beam 9****Plate Girder**

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty
107	Steel Open Girder/Beam	40	0	38	0	2 Feet
515	Steel Protective Coating	520	480	0	0	40 Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty
107	Corrosion	[MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 1, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (0.45" AVERAGE REMAINING X 2'); LOWER WEB (1/4" AVERAGE REMAINING X 20" X 2.5")	4	2	2 Feet
107	Corrosion	along the length of the beam, both flanges and lower 2" of web, areas of rust scale (no measurable loss) at random	2	38	Feet
107	Corrosion	(combined with other notes 2020) 40' OF AREAS OF SURFACE CORROSION THROUGHOUT FULL LENGTH OF BOTH FACES OF WEB AND EDGES OF FLANGES IN VARIOUS LOCATIONS	2		Feet
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	40	8 Square Feet
<b>General Comments</b>					

Structure: 120320

County: CABARRUS

Date: 06/28/2022

Condition Photos



Span 1 Beam 8: [MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 1, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (0.40" AVERAGE REMAINING X 4'); LOWER WEB (3/16" AVERAGE REMAINING X 4' X UP TO 4") WITH RUST HOLE (16" X 3").





NC DEPARTMENT OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
 STRUCTURE MANAGEMENT UNIT

ATTENTION: CITY OF CONCORD; MUNICIPAL PROMPT ACTION  
 REQUEST; CHANGE IN STRUCTURE DATA

# Structure Safety Report

## Municipal Routine Element Inspection - Contract

STRUCTURE NUMBER: 120320      SAP STRUCTURE NO: 0130320      FHWA STRUCTURE NO: 00000000250320

DIVISION: 10      COUNTY: CABARRUS      INSPECTION DATE: 06/28/2022      FREQUENCY: 24 MONTHS

FACILITY CARRIED: LINCOLN STREET      MILE POST: \_\_\_\_\_

LOCATION: 0.4MI.N.JCT.WILSHIRE AVE

FEATURE INTERSECTED: IRISH BUFFALO CREEK

LATITUDE: 35° 23' 23.9"      LONGITUDE: 80° 34' 51.9"

SUPERSTRUCTURE: STEEL PLANK DECK ON SALVAGED I-BEAMS

SUBSTRUCTURE: END & INTERIOR BENTS: STEEL CAPS ON STEEL PILES, CONCRETE ENCASED

SPANS: 3 SPANS. SEE SPAN PROFILE SHEET FOR SPAN DETAILS

FRACTURE CRITICAL     TEMPORARY SHORING     SCOUR CRITICAL     SCOUR PLAN OF ACTION

GRADES: (Inspector/NBI Coding)    DECK 6/6    SUPERSTRUCTURE 5/5    SUBSTRUCTURE 5/5    CULVERT N/N

POSTED SV: 25      POSTED TTST: 30

OTHER SIGNS PRESENT: (6) DELINEATORS; (1) ADV WEIGHT POSTING



Sign noticed issued for	Number Required
<u>NO</u> WEIGHT LIMIT	<u>0</u>
<u>NO</u> DELINEATORS	<u>0</u>
<u>NO</u> NARROW BRIDGE	<u>0</u>
<u>NO</u> ONE LANE BRIDGE	<u>0</u>
<u>NO</u> LOW CLEARANCE	<u>0</u>

DIRECTION OF INSPECTION      S-N

DIRECTION MATCHES PLANS      \_\_\_\_\_

SOUTH APPROACH LOOKING NORTH

INSPECTED BY ERIC A. PATTERSON	SIGNATURE 	ASSISTED BY    KEITH PROCTOR
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IDENTIFICATION

(1) STATE NAME	NORTH CAROLINA	BRIDGE	120320
(8) STRUCTURE NUMBER (FEDERAL)			0250320
(5) INVENTORY ROUTE (ON/UNDER) ON			50000000
(2) STATE HIGHWAY DEPARTMENT DISTRICT			10
(3) COUNTY CODE (FEDERAL)	25	(4) PLACE CODE	14100
(6) FEATURE INTERSECTED	IRISH BUFFALO CREEK		
(7) FACILITY CARRIED	LINCOLN STREET		
(9) LOCATION	0.4MI.N.JCT.WILSHIRE AVE		
(11) MILEPOINT			0.0
(12) BASE HIGHWAY NETWORK			0
(13) LRS INVENTORY ROUTE & SUBROUTE			0
(16) LATITUDE	35° 23' 23.9"	(17) LONGITUDE	80° 34' 51.9"
(98) BORDER BRIDGE STATE CODE		PERCENT SHARED	
(99) BORDER BRIDGE STRUCTURE NUMBER			

SUFFICIENCY RATING	65.25
STATUS =	
<b>CLASSIFICATION</b>	
(112) NBIS BRIDGE SYSTEM	Y
(104) HIGHWAY SYSTEM	Inventory Route not on NHS
(26) FUNCTIONAL CLASS	Urban Local
(100) STRAHNET HIGHWAY	Not a STRAHNET Route
(101) PARALLEL STRUCTURE	No parallel structure exists
(102) DIRECTION OF TRAFFIC	2-way traffic
(103) TEMPORARY STRUCTURE	
(110) DESIGNATED NATIONAL NETWORK - on national network for trucks	0
(20) TOLL	On Free Road
(21) MAINT -	04
(22) OWNER -	04
(37) HISTORICAL SIGNIFICANCE -	5

STRUCTURE TYPE AND MATERIAL

(43) STRUCTURE TYPE MAIN		Steel
TYPE	Stringer/Multi-beam or girder	CODE 302
(44) STRUCTURE TYPE APPROACH		
TYPE		CODE 0
(45) NUMBER OF SPANS IN MAIN UNIT		3
(46) NUMBER OF SPANS IN APPROACH		0
(107) DECK STRUCTURE TYPE		CODE 6
(108)WEARING SURFACE/PROTECTIVE SYSTEM		
(A) TYPE OF WEARING SURFACE		CODE 6
(B) TYPE OF MEMBRANE		CODE 0
(C) TYPE OF DECK PROTECTION		CODE 0

(20) TOLL	On Free Road	3
(21) MAINT -		04
(22) OWNER -		04
(37) HISTORICAL SIGNIFICANCE -		5
<b>CONDITION</b>		<b>CODE</b>
(58) DECK		6
(59) SUPERSTRUCTURE		5
(60) SUBSTRUCTURE		5
(61) CHANNEL & CHANNEL PROTECTION		5
(62) CULVERTS		N

LOAD RATING AND POSTING

(31) DESIGN LOAD	HS20	5
(63) OPERATING RATING METHOD -	Load Factor	1
(64) OPERATING RATING -	HS-22	39
(65) INVENTORY RATING METHOD -		1
(66) INVENTORY RATING	HS-13	23
(70) BRIDGE POSTING	Posting Required	3
(41) STRUCTURE OPEN, POSTED, OR CLOSED		P
DESCRIPTION	Posted for Load	

APPRAISAL

(67) STRUCTURAL EVALUATION		5
(68) DECK GEOMETRY		N
(69) UNDERCLEARANCES, VERT & HORIZ		N
(71) WATERWAY ADEQUACY		7
(72) APPROACH ROADWAY ALIGNMENT		8
(36) TRAFFIC SAFETY FEATURES		0000
(113) SCOUR CRITICAL BRIDGES		5

PROPOSED IMPROVEMENTS

(75) TYPE OF WORK		CODE
(76) LENGTH OF STRUCTURE IMPROVEMENT		
(94) BRIDGE IMPROVEMENT COST		
(95) ROADWAY IMPROVEMENT COST		
(96) TOTAL PROJECT COST		
(97) YEAR OF IMPROVEMENT COST ESTIMATE		
(114) FUTURE ADT	3,800	YEAR OF FUTURE ADT 2040

NAVIGATION DATA

(38) NAVIGATION CONTROL -		CODE 0
(111) PIER PROTECTION		CODE
(39) NAVIGATION VERTICAL CLEARANCE		0.0
(116) VERT - LIFT BRIDGE NAV MIN VERT CLEAR		0.0
(40) NAVIGATION HORIZONTAL CLEARANCE		0.0

INSPECTION

(90) INSPECTION DATE		(91) FREQUENCY
(92) CRITICAL FEATURE INSPECTION		(93) CFI DATE
A) FRACTURE CRIT DETAIL		A)
B) UNDERWATER INSP		B)
C) OTHER SPECIAL INSP		C)

SCOUR

# Structure Element Scoring

Structure Number: 120320

Inspection Date 6/28/2022

Element Number	Parent Number	Element Name	Location	Total Quantity	Level 1 Quantity	Level 2 Quantity	Level 3 Quantity	Level 4 Quantity
30	0	Steel Deck Corrugated/Orthotropic/Etc.	Deck	3360	2250	1110	0	0
515	30	Steel Protective Coating	Deck	3360	2250	0	0	1110
107	0	Steel Open Girder/Beam	Beam	1200	146	981	4	69
515	107	Steel Protective Coating	Beam	15600	14546	0	0	1054
215	0	Reinforced Concrete Abutment	Abutments	121	82	7	29	3
220	0	Reinforced Concrete Pile Cap/Footing	Footing	76	73	0	3	0
225	0	Steel Pile	Piles and Columns	12	0	12	0	0
515	225	Steel Protective Coating	Piles and Columns	924	888	0	0	36
231	0	Steel Pier Cap	Caps	136	42	34	0	60
515	231	Steel Protective Coating	Caps	640	280	0	0	360
234	0	Reinforced Concrete Pier Cap	Caps	96	90	0	5	1
330	0	Metal Bridge Railing	Bridge Rail	240	233	6	1	0
515	330	Steel Protective Coating	Bridge Rail	540	540	0	0	0
510	0	Wearing Surface	Wearing Surfaces	3388	0	685	2703	0

# Summary of Maintenance Needs

## Maintenance By Defect

Structure Number: 120320

Inspection Date: 06/28/2022

MMS Code	Element Name	Defect Name	Recommended Quantity
3314	Steel Open Girder/Beam	Corrosion	73 Feet
3350	Reinforced Concrete Abutment	Delamination/Spall	14 Feet
3350	Reinforced Concrete Abutment	Cracking (RC and Other)	23 Feet
3350	Reinforced Concrete Abutment	Efflorescence/Rust Staining	2 Feet
3348	Reinforced Concrete Pile Cap/Footing	Delamination/Spall	3 Feet
3354	Steel Pier Cap	Corrosion	60 Feet
3348	Reinforced Concrete Pier Cap	Delamination/Spall	3 Feet
3348	Reinforced Concrete Pier Cap	Cracking (RC and Other)	3 Feet
3322	Metal Bridge Railing	Connection	1 Feet
2816	Wearing Surface	Crack (Wearing Surface)	3354 Square Feet
2816	Wearing Surface	Patched Area/Pothole (Wearing Surface)	16 Square Feet
3342	Steel Protective Coating	Effectiveness (Steel Protective Coatings)	274 Square Feet
3342	Steel Protective Coating	Effectiveness (Steel Protective Coatings)	321 Square Feet

## Element Structure Maintenance Quantities

Structure Number: 120320

Inspection Date 06/28/2022

Location	MMS Code	Description	Maint Quantity	Total Quantity	Severe Quantity	Poor Quantity	Fair Quantity	Good Quantity
Abutments	3350	Maintenance of Concrete Wings and Wall	39	121	3	29	7	82
Beam	3314	Maintenance Steel Superstructure Components	73	1200	69	4	981	146
Beam	3342	Clean and Paint Steel	210	15600	1054	0	0	14546
Bridge Rail	3322	Maintenance of Steel Bridge Rail	1	240	0	1	6	233
Bridge Rail	3342	Clean and Paint Steel	0	540	0	0	0	540
Caps	3342	Clean and Paint Steel	262	640	360	0	0	280
Caps	3348	Maintenance of Concrete Substructure	6	96	1	5	0	90
Caps	3354	Maintenance of Steel Substructure Components	60	136	60	0	34	42
Deck	3328	Maintenance of Steel Plank Bridge Floor	0	3360	0	0	1110	2250
Deck	3342	Clean and Paint Steel	111	3360	1110	0	0	2250
Footing	3348	Maintenance of Concrete Substructure	3	76	0	3	0	73
Piles and Columns	3342	Clean and Paint Steel	12	924	36	0	0	888
Piles and Columns	3354	Maintenance of Steel Substructure Components	0	12	0	0	12	0
Wearing Surfaces	2816	Asphalt Surface Repair	3370	3388	0	2703	685	0

# Priority Actions Request

Structure Number 120320

## Span 1

3314	Beam 1	Plate Girder		
Priority Level	Defect Type	Quantity	Defect Description	
?	Corrosion	3	Span 1 Beam 1: [MUNICIPAL PROMPT ACTION REQUEST] at end bent 1, east face, corrosion with section loss: bottom flange (0.47" average remaining x 15"); lower web (1/4" average remaining x 27" x 2")	
3314	Beam 2	Plate Girder		
Priority Level	Defect Type	Quantity	Defect Description	
?	Corrosion	4	Span 1 Beam 2: [MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 1, CORROSION WITH SECTION LOSS: BRT OTTOM FLANGE (0.40" AVERAGE REMAINING X 4'); LOWER WEB (1/4" AVERAGE REMAINING X 4' X UP TO 4") ; LEFT BOTTOM FLANGE CORROSION [AVERAGE 1/4" REMAINING] WITH KNIFE EDGING FOR 3' LONG.	
3314	Beam 3	Plate Girder		
Priority Level	Defect Type	Quantity	Defect Description	
?	Corrosion	4	Span 1 Beam 3: [MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 1, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (1/4" REMAINING FOR 1.5' LONG, THEN 0.45" AVERAGE REMAINING FOR NEXT 2' LONG); LOWER WEB (1/4" AVERAGE REMAINING X 4' X 3")	
3314	Beam 4	Plate Girder		
Priority Level	Defect Type	Quantity	Defect Description	
?	Corrosion	2	Span 1 Beam 4: [MUNICIPAL PROMPT ACTION REQUEST] at bent 1, top flange, corrosion with section loss (0.38" average remaining x 2')	
?	Corrosion	5	Span 1 Beam 4: [MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 1, CORROSION WITH SECTION LOSS: LEFT BOTTOM FLANGE (0.47" AVERAGE REMAINING X 50"), RIGHT BOTTOM FLANGE (1/4" AVERAGE REMAINING FOR 1.5' LONG, THEN 0.47" AVERAGE REMAINING FOR NEXT 2.5' LONG); LOWER WEB (1/4" AVERAGE REMAINING X 4' X UP TO 4")	
3314	Beam 5	Plate Girder		
Priority Level	Defect Type	Quantity	Defect Description	
?	Corrosion	3	Span 1 Beam 5: [MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 1, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (AVERAGE 1/4" REMAINING FOR 1.5' LONG, THEN 0.40" AVERAGE REMAINING FOR NEXT 1.5' LONG); LOWER WEB (3/16" AVERAGE REMAINING X 2.5' X UP TO 3.5")	
3314	Beam 6	Plate Girder		
Priority Level	Defect Type	Quantity	Defect Description	
?	Corrosion	3	Span 1 Beam 6: [MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 1, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (0.35" AVERAGE REMAINING X 3'); LOWER WEB (3/16" AVERAGE REMAINING X 3' X UP TO 4")	

? Priority Action Request (PAR)
 1 Assigned Routine Maintenance
 2 Assigned Priority Maintenance
 3 Assigned Critical Find



# Priority Actions Request

Structure Number 120320

WITH RUST HOLE (12" X 1.5")

3314	Beam 7	Plate Girder		
Priority Level	Defect Type	Quantity	Defect Description	
?	Corrosion	5	Span 1 Beam 7: [MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 1, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (0.45" AVERAGE REMAINING X 4.5'); LOWER WEB (1/4" AVERAGE REMAINING X 4.5' X UP TO 4" WITH 1" DIAMETER CORROSION HOLE AT 1' OUT).	

3314	Beam 8	Plate Girder		
Priority Level	Defect Type	Quantity	Defect Description	
?	Corrosion	4	Span 1 Beam 8: [MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 1, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (0.40" AVERAGE REMAINING X 4'); LOWER WEB (3/16" AVERAGE REMAINING X 4' X UP TO 4") WITH RUST HOLE (16" X 3").	

3314	Beam 9	Plate Girder		
Priority Level	Defect Type	Quantity	Defect Description	
?	Corrosion	2	Span 1 Beam 9: [MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 1, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (0.45" AVERAGE REMAINING X 2'); LOWER WEB (1/4" AVERAGE REMAINING X 20" X 2.5")	

3314	Beam 10	Plate Girder		
Priority Level	Defect Type	Quantity	Defect Description	
?	Corrosion	5	Span 1 Beam 10: [MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 1, WEST FACE, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (0.37" AVERAGE REMAINING X 2.5'); LOWER WEB (5/16" AVERAGE REMAINING X 3' X UP TO 4"); TOP FLANGE (0.38" AVERAGE REMAINING X 5')	

3322	Left Bridge Rail	Steel Rail		
Priority Level	Defect Type	Quantity	Defect Description	
?	Connection	1	Span 1 Left Bridge Rail: [MUNICIPAL PROMPT ACTION REQUEST] AT FIFTH POST CONNECTION TO BEAM 1, (1) MISSING CONNECTION BOLT	

## Span3

3314	Beam 3	Plate Girder		
Priority Level	Defect Type	Quantity	Defect Description	
?	Corrosion	5	Span 3 Beam 3: [MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 2, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (0.38" AVERAGE REMAINING X 4.5'); LOWER WEB (1/4" AVERAGE REMAINING X 5' X UP TO 3")	

? Priority Action Request (PAR)
 1 Assigned Routine Maintenance
 2 Assigned Priority Maintenance
 3 Assigned Critical Find

# Priority Actions Request

Structure Number 120320

3314	Beam 4	Plate Girder		
Priority Level	Defect Type	Quantity	Defect Description	
?	Corrosion	4	Span 3 Beam 4: [MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 2, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (0.45" AVERAGE REMAINING X 3.5'); LOWER WEB (1/4" AVERAGE REMAINING X 3.5' X UP TO 4").	
3314	Beam 5	Plate Girder		
Priority Level	Defect Type	Quantity	Defect Description	
?	Corrosion	4	Span 3 Beam 5: [MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 2, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (3/8" AVERAGE REMAINING X 3'); LOWER WEB (3/16" AVERAGE REMAINING X 3.5' X UP TO 3")	
3314	Beam 6	Plate Girder		
Priority Level	Defect Type	Quantity	Defect Description	
?	Corrosion	6	Span 3 Beam 6: [MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 2, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (0.35" AVERAGE REMAINING X 6'); LOWER WEB (3/16" AVERAGE REMAINING X 6' X UP TO 4")	
3314	Beam 7	Plate Girder		
Priority Level	Defect Type	Quantity	Defect Description	
?	Corrosion	6	Span 3 Beam 7: [MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 2, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (0.42" AVERAGE REMAINING X UP TO 5.5'); LOWER WEB (3/16" AVERAGE REMAINING X 5.5' X UP TO 4")	
3314	Beam 8	Plate Girder		
Priority Level	Defect Type	Quantity	Defect Description	
?	Corrosion	4	Span 3 Beam 8: [MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 2, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (0.375" AVERAGE REMAINING X UP TO 4'); LOWER WEB (1/8" AVERAGE REMAINING X 3" X UP TO 6" LONG WITH PERFORATIONS, THEN 3/16" REMAINING IN LOWER 3" OF THE WEB FOR THE NEXT 3.5' LONG)	

## Bent 1

3354	Cap 1	Steel Pier Cap		
Priority Level	Defect Type	Quantity	Defect Description	
?	Corrosion	4	Bent 1 Cap 1: [MUNICIPAL PROMPT ACTION REQUEST] south face below bay 3, corrosion with section loss: bottom flange (1/4" average remaining x 39"); lower web (7/16" average remaining x 39" x 2"); web stiffeners (as little as 3/16" average remaining x 5" x 2.5")	

? Priority Action Request (PAR)
 1 Assigned Routine Maintenance
 2 Assigned Priority Maintenance
 3 Assigned Critical Find

# Priority Actions Request

Structure Number 120320

- ? Corrosion 3 Bent 1 Cap 1: [MUNICIPAL PROMPT ACTION REQUEST] south face below beam 2, corrosion with section loss: bottom flange (0.35" average remaining x 2') top flange (0.42" average remaining x 1'); lower web (7/16" average remaining 2.5' x 2"); web stiffener (3/16" average remaining x 5" x 2")
- ? Corrosion 9 Bent 1 Cap 1: [MUNICIPAL PROMPT ACTION REQUEST] south and north faces below bays 7 through 9, corrosion with section loss: bottom flange (5/16" average remaining x 8.5'); lower web (7/16" average remaining x 8' x 2"); web stiffeners (as little as 0.15" average remaining x 5" x up to 5")

3350 Abutment Reinforced Concrete Abutment

Priority Level	Defect Type	Quantity	Defect Description
<span style="color: blue;">?</span>	Delamination/Spall	5	End Bent 1 Abutment: [MUNICIPAL PROMPT ACTION REQUEST] SOUTHEAST WINGWALL ADJACENT TO CURB, SPALL (2.5' X 1.5' X 3" DEEP) WITH EXPOSED RUSTED REBAR. THE CONCRETE SHOWS SIGNS OF ALKALAI SILICA REACTION.

3354 Steel Cap Steel Pier Cap

Priority Level	Defect Type	Quantity	Defect Description
<span style="color: blue;">?</span>	Corrosion	6	End Bent 1 Steel Cap: [MUNICIPAL PROMPT ACTION REQUEST] NORTH FACE IN THE LOWER 3" OF WEB STIFFENERS 4-9, CORROSION WITH 100% SECTION LOSS.
<span style="color: blue;">?</span>	Corrosion	2	End Bent 1 Steel Cap: [MUNICIPAL PROMPT ACTION REQUEST] NORTH TOP FLANGE EAST OF BEAM 7, CORROSION WITH SECTION LOSS (0.28" AVERAGE REMAINING X 18" X 5")
<span style="color: blue;">?</span>	Corrosion	2	End Bent 1 Steel Cap: [MUNICIPAL PROMPT ACTION REQUEST] NORTH TOP FLANGE EAST OF BEAM 8, CORROSION WITH SECTION LOSS (0.28" AVERAGE REMAINING X 1.5' X 4")
<span style="color: blue;">?</span>	Corrosion	1	End Bent 1 Steel Cap: [MUNICIPAL PROMPT ACTION REQUEST] NORTH FACE IN THE THIRD WEB STIFFENER, LOWER 3", CORROSION WITH SECTION LOSS [AVERAGE 1/8" REMAINING].

Bent 2

3354 Cap 1 Steel Pier Cap

Priority Level	Defect Type	Quantity	Defect Description
<span style="color: blue;">?</span>	Corrosion	5	Bent 2 Cap 1: [MUNICIPAL PROMPT ACTION REQUEST] north face below beam 3, corrosion with section loss: bottom flange (0.35" average remaining x 5.5" x 5'); lower web (0.43" average remaining x 3' x 2.5")
<span style="color: blue;">?</span>	Corrosion	9	Bent 2 Cap 1: [MUNICIPAL PROMPT ACTION REQUEST] north face below bays 4 through 6, corrosion with section loss: bottom flange (0.33" average remaining x 5.5" x 9'); lower web (less than 1/16" loss x 9' x 2"); web stiffeners in the lower 2", average 3/16" remains.
<span style="color: blue;">?</span>	Corrosion	4	Bent 2 Cap 1: [MUNICIPAL PROMPT ACTION REQUEST] north face below bay 7, corrosion with section loss: bottom flange (0.35" average remaining x 5.5" x 3.5'); top flange (0.35" average remaining x 5.5" x 3.5'); lower web (less than 1/16" loss x 3.5" x 2"); web stiffeners (less than 1/16" loss x 5" x 2")


3348 Concrete Cap Reinforced Concrete Pier Cap

Priority Level	Defect Type	Quantity	Defect Description
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? Priority Action Request (PAR) 1 Assigned Routine Maintenance 2 Assigned Priority Maintenance 3 Assigned Critical Find

# Priority Actions Request

Structure Number 120320



 Cracking (RC and Steel) 1 End Bent 2 Concrete Cap: [MUNICIPAL PROMPT ACTION REQUEST] west end of concrete cap, fracture (1' long x full width) undermining steel cap (1' long x 2" high x 1' deep)

3354 Steel Cap Steel Pier Cap

Priority Level	Defect Type	Quantity	Defect Description
	Corrosion	1	End Bent 2 Steel Cap: [MUNICIPAL PROMPT ACTION REQUEST] south face, web stiffener below beam 9, corrosion with section loss (0.20" average remaining x 4" x 5")
	Corrosion	2	End Bent 2 Steel Cap: [MUNICIPAL PROMPT ACTION REQUEST] south face of cap below beam 8, corrosion with section loss: top flange (0.29" average remaining x 18" x 5"); upper web (7/16" average remaining x 6" x 2.5"); web stiffener (0.25" average remaining x 5" x 1")
	Corrosion	6	End Bent 2 Steel Cap: [MUNICIPAL PROMPT ACTION REQUEST] south face of cap in bays 3 and 4, corrosion with section loss: top flange (3/16" average remaining x 5.5' x 5"); lower web (7/16" average remaining x 4' x up to 2.5"); bottom flange (7/16" average remaining x 4.5'); web stiffeners (as little as 0.22" average remaining x 5" x up to full height)
	Corrosion	6	End Bent 2 Steel Cap: [MUNICIPAL PROMPT ACTION REQUEST] south face of cap between bays 5 and 6, corrosion with section loss: top flange (1/4" average remaining x 5.5' x 5"); lower web (7/16" average remaining x 6' x up to full height) bottom flange (7/16" average remaining x 5'); web stiffeners (as little as 0.22" average remaining x 5" x full height)

## Slope Protection

3352 Slope Protection Slope Protection

Priority Level	Defect Type	Quantity	Defect Description
		160	[MUNICIPAL PROMPT ACTION REQUEST] AT ABUTMENT 1 IN THE TOP OF THE SLOPE, RIGHT & LEFT SIDES, SCATTERED EROSION [APPROXIMATELY 160 SQUARE FEET TOTAL X UP TO 1.25' DEEP]
		400	[MUNICIPAL PROMPT ACTION REQUEST] NORTHEAST CORNER IN THE FILL SLOPE, EROSION IS PRESENT, REACHING AS CLOSE AS 4' FROM THE EDGE OF PAVEMENT [APPROXIMATELY 40' LONG X UP TO 10' WIDE X UP TO 10' HIGH]

## Element Condition and Maintenance Data

Structure Number: 120320

Inspection Date: 06/28/2022

<b>Span 1</b>	<b>Deck</b>
<b>Steel Deck Corrugated</b>	

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty	
30	Steel Deck Corrugated/Orthotropic/Etc.	1,120	760	360	0	0	Square Feet
515	Steel Protective Coating	1,120	760	0	0	360	Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty	
30	Corrosion	underside of deck adjacent to seems and weep holes, areas of surface rust/ rust scale (no measurable loss) with efflorescence	2	360		Square Feet
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	360	36	Square Feet

General Comments

<b>Span 1</b>	<b>Beam 1</b>
<b>Plate Girder</b>	

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty	
107	Steel Open Girder/Beam	40	0	37	0	3	Feet
515	Steel Protective Coating	520	480	0	0	40	Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty	
107	Corrosion	[MUNICIPAL PROMPT ACTION REQUEST] at end bent 1, east face, corrosion with section loss: bottom flange (0.47" average remaining x 15"); lower web (1/4" average remaining x 27" x 2")	4	3	3	Feet
107	Corrosion	along the length of the beam, both flanges and lower 2" of web, areas of rust scale (no measurable loss) at random	2	37		Feet
107	Corrosion	(combined with other notes 2020) 40' OF AREAS OF SURFACE CORROSION THROUGHOUT FULL LENGTH OF BOTH FACES OF WEB AND EDGES OF FLANGES IN VARIOUS LOCATIONS	1			Feet
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	40	8	Square Feet

General Comments

<b>Span 1</b>	<b>Beam 2</b>
<b>Plate Girder</b>	

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty	
107	Steel Open Girder/Beam	40	0	36	0	4	Feet
515	Steel Protective Coating	520	480	0	0	40	Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty	
107	Corrosion	[MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 1, CORROSION WITH SECTION LOSS: BRT OTTOM FLANGE (0.40" AVERAGE REMAINING X 4'); LOWER WEB (1/4" AVERAGE REMAINING X 4' X UP TO 4") ; LEFT BOTTOM FLANGE CORROSION [AVERAGE 1/4" REMAINING] WITH KNIFE EDGING FOR 3' LONG.	4	4	4	Feet
107	Corrosion	along the length of the beam, both flanges and lower 2" of web, areas of rust scale (no measurable loss) at random	2	36		Feet



107	Corrosion	(combined with other notes 2020) 40' OF AREAS OF SURFACE CORROSION THROUGHOUT FULL LENGTH OF BOTH FACES OF WEB AND EDGES OF FLANGES IN VARIOUS LOCATIONS	1			Feet
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	40	8	Square Feet
General Comments						

## Span 1

## Beam 3

## Plate Girder

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty	
107	Steel Open Girder/Beam	40	0	36	0	4	Feet
515	Steel Protective Coating	520	480	0	0	40	Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty	
107	Corrosion	[MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 1, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (1/4" REMAINING FOR 1.5' LONG, THEN 0.45" AVERAGE REMAINING FOR NEXT 2' LONG); LOWER WEB (1/4" AVERAGE REMAINING X 4' X 3")	4	4	4	Feet
107	Corrosion	along the length of the beam, both flanges and lower 2" of web, areas of rust scale (no measurable loss) at random	2	36		Feet
107	Corrosion	(combined with other notes 2020) 40' OF AREAS OF SURFACE CORROSION THROUGHOUT FULL LENGTH OF BOTH FACES OF WEB AND EDGES OF BOTTOM FLANGE IN VARIOUS LOCATIONS	1			Feet
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	40	8	Square Feet
General Comments						

## Span 1

## Beam 4

## Plate Girder

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty	
107	Steel Open Girder/Beam	40	0	33	0	7	Feet
515	Steel Protective Coating	520	480	0	0	40	Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty	
107	Corrosion	[MUNICIPAL PROMPT ACTION REQUEST] at bent 1, top flange, corrosion with section loss (0.38" average remaining x 2')	4	2	2	Feet
107	Corrosion	[MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 1, CORROSION WITH SECTION LOSS: LEFT BOTTOM FLANGE (0.47" AVERAGE REMAINING X 50"), RIGHT BOTTOM FLANGE (1/4" AVERAGE REMAINING FOR 1.5' LONG, THEN 0.47" AVERAGE REMAINING FOR NEXT 2.5' LONG); LOWER WEB (1/4" AVERAGE REMAINING X 4' X UP TO 4")	4	5	5	Feet
107	Corrosion	along the length of the beam, both flanges and lower 2" of web, areas of rust scale (no measurable loss) at random	2	33		Feet
107	Corrosion	(combined with other notes 2020) 40' OF AREAS OF SURFACE CORROSION THROUGHOUT FULL LENGTH OF BOTH FACES OF WEB AND EDGES OF FLANGES IN VARIOUS LOCATIONS	1			Feet
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	40	8	Square Feet
General Comments						

**Span 1** **Beam 5**  
**Plate Girder**

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty	
107	Steel Open Girder/Beam	40	0	37	0	3	Feet
515	Steel Protective Coating	520	480	0	0	40	Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty	
107	Corrosion	[MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 1, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (AVERAGE 1/4" REMAINING FOR 1.5' LONG, THEN 0.40" AVERAGE REMAINING FOR NEXT 1.5' LONG'); LOWER WEB (3/16" AVERAGE REMAINING X 2.5' X UP TO 3.5")	4	3	3	Feet
107	Corrosion	along the length of the beam, both flanges and lower 2" of web, areas of rust scale (no measurable loss) at random	2	37		Feet
107	Corrosion	(combined with other notes 2020) 40' OF AREAS OF SURFACE CORROSION THROUGHOUT FULL LENGTH OF BOTH FACES OF WEB AND EDGES OF FLANGES IN VARIOUS LOCATIONS	1			Feet
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	40	8	Square Feet
General Comments						

**Span 1** **Beam 6**  
**Plate Girder**

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty	
107	Steel Open Girder/Beam	40	0	37	0	3	Feet
515	Steel Protective Coating	520	480	0	0	40	Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty	
107	Corrosion	[MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 1, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (0.35" AVERAGE REMAINING X 3'); LOWER WEB (3/16" AVERAGE REMAINING X 3' X UP TO 4") WITH RUST HOLE (12" X 1.5")	4	3	3	Feet
107	Corrosion	along the length of the beam, both flanges and lower 2" of web, areas of rust scale (no measurable loss) at random	2	37		Feet
107	Corrosion	(combined with other notes 2020) 40' OF AREAS OF SURFACE CORROSION THROUGHOUT FULL LENGTH OF BOTH FACES OF WEB AND EDGES OF FLANGES IN VARIOUS LOCATIONS	1			Feet
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	40	8	Square Feet
General Comments						

**Span 1** **Beam 7**  
**Plate Girder**

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty	
107	Steel Open Girder/Beam	40	0	35	0	5	Feet
515	Steel Protective Coating	520	480	0	0	40	Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty	
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107	Corrosion	[MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 1, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (0.45" AVERAGE REMAINING X 4.5'); LOWER WEB (1/4" AVERAGE REMAINING X 4.5' X UP TO 4" WITH 1" DIAMETER CORROSION HOLE AT 1' OUT).	4	5	5 Feet
107	Corrosion	along the length of the beam, both flanges and lower 2" of web, areas of rust scale (no measurable loss) at random	2	35	Feet
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	40	8 Square Feet
General Comments					

## Span 1

## Beam 8

## Plate Girder

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty
107	Steel Open Girder/Beam	40	0	36	0	4 Feet
515	Steel Protective Coating	520	480	0	0	40 Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty
107	Corrosion	[MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 1, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (0.40" AVERAGE REMAINING X 4'); LOWER WEB (3/16" AVERAGE REMAINING X 4' X UP TO 4") WITH RUST HOLE (16" X 3").	4	4	4 Feet
107	Corrosion	along the length of the beam, both flanges and lower 2" of web, areas of rust scale (no measurable loss) at random	2	36	Feet
107	Corrosion	(combined with other notes 2020) 40' OF AREAS OF SURFACE CORROSION THROUGHOUT FULL LENGTH OF BOTH FACES OF WEB AND EDGES OF FLANGES IN VARIOUS LOCATIONS	1		Feet
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	40	8 Square Feet
General Comments					

## Span 1

## Beam 9

## Plate Girder

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty
107	Steel Open Girder/Beam	40	0	38	0	2 Feet
515	Steel Protective Coating	520	480	0	0	40 Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty
107	Corrosion	[MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 1, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (0.45" AVERAGE REMAINING X 2'); LOWER WEB (1/4" AVERAGE REMAINING X 20" X 2.5")	4	2	2 Feet
107	Corrosion	along the length of the beam, both flanges and lower 2" of web, areas of rust scale (no measurable loss) at random	2	38	Feet
107	Corrosion	(combined with other notes 2020) 40' OF AREAS OF SURFACE CORROSION THROUGHOUT FULL LENGTH OF BOTH FACES OF WEB AND EDGES OF FLANGES IN VARIOUS LOCATIONS	2		Feet
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	40	8 Square Feet
General Comments					

## Span 1 Beam 10

## Plate Girder

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty
107	Steel Open Girder/Beam	40	0	35	0	5 Feet
515	Steel Protective Coating	520	480	0	0	40 Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty
107	Corrosion	[MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 1, WEST FACE, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (0.37" AVERAGE REMAINING X 2.5'); LOWER WEB (5/16" AVERAGE REMAINING X 3' X UP TO 4"); TOP FLANGE (0.38" AVERAGE REMAINING X 5')	4	5	5 Feet
107	Corrosion	along the length of the beam, both flanges and lower 2" of web, areas of rust scale (no measurable loss) at random	2	35	Feet
107	Corrosion	(combined with other notes 2020) 40' OF AREAS OF SURFACE CORROSION THROUGHOUT FULL LENGTH OF BOTH FACES OF WEB AND EDGES OF FLANGES IN VARIOUS LOCATIONS	1		Feet
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	40	8 Square Feet
General Comments					

## Span 1 Wearing Surface

## Asphalt Wearing Surface

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty
510	Wearing Surface	1,134	0	218	916	0 Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty
510	Crack (Wearing Surface)	at end bent 1, separation/ crack (1" x full width of roadway)	3	33	33 Square Feet
510	Crack (Wearing Surface)	throughout wearing surface, map cracks (up to 1/2" x full width of roadway x full length)	3	875	875 Square Feet
510	Patched Area/Pothole (Wearing Surface)	at southbound lane, 2' from end bent 1, area of breaking up asphalt (14.5' x 6" x 1" deep)	3	8	8 Square Feet
510	Crack (Wearing Surface)	throughout pedestrian path, transverse cracks (up to 1/32" x 4.5') spaced between 1.5' and 2'	2	200	200 Square Feet
510	Patched Area/Pothole (Wearing Surface)	[NEW REPAIR - ASPHALT PATCHING] FORMERLY --> at southbound lane adjacent to bent 1, patched area (4.5' x 4') with cracks (up to 1/8") and potholes (up to 2" x 3" x 1" deep)	2	18	Square Feet

General Comments

## Span 1 Left Bridge Rail

## Steel Rail

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty
330	Metal Bridge Railing	40	39	0	1	0 Feet
515	Steel Protective Coating	90	90	0	0	0 Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty
330	Connection	[MUNICIPAL PROMPT ACTION REQUEST] AT FIFTH POST CONNECTION TO BEAM 1, (1) MISSING CONNECTION BOLT	3	1	1 Feet

General Comments

**Span 2 Deck**  
**Steel Deck Corrugated**

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty	
30	Steel Deck Corrugated/Orthotropic/Etc.	1,120	720	400	0	0	Square Feet
515	Steel Protective Coating	1,120	720	0	0	400	Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty	
30	Corrosion	underside of deck adjacent to seems and weep holes, areas of surface rust/ rust scale (no measurable loss) with efflorescence	2	400		Square Feet
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	400	40	Square Feet

General Comments

**Span 2 Beam 1**  
**Plate Girder**

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty	
107	Steel Open Girder/Beam	40	20	20	0	0	Feet
515	Steel Protective Coating	520	500	0	0	20	Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty	
107	Corrosion	along the length of the beam, both flanges and lower 2" of web, areas of rust scale (no measurable loss) at random	2	20		Feet
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	20	4	Square Feet

General Comments

**Span 2 Beam 2**  
**Plate Girder**

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty	
107	Steel Open Girder/Beam	40	0	40	0	0	Feet
515	Steel Protective Coating	520	480	0	0	40	Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty	
107	Corrosion	along the length of the beam, both flanges and lower 2" of web, areas of rust scale (no measurable loss) at random	2	40		Feet
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	40	8	Square Feet

General Comments

**Span 2 Beam 3**  
**Plate Girder**

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty	
107	Steel Open Girder/Beam	40	0	40	0	0	Feet
515	Steel Protective Coating	520	480	0	0	40	Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty	
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107	Corrosion	along the length of the beam, both flanges and lower 2" of web, areas of rust scale (no measurable loss) at random	2	40	Feet
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	40	8 Square Feet
General Comments					

**Span 2** **Beam 4**  
**Plate Girder**

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty
107	Steel Open Girder/Beam	40	0	40	0	0 Feet
515	Steel Protective Coating	520	480	0	0	40 Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty
107	Corrosion	at bent 1, lower web, corrosion with section loss (5/16" average remaining x 14" x 2.5")	2	2	Feet
107	Corrosion	along the length of the beam, both flanges and lower 2" of web, areas of rust scale (no measurable loss) at random	2	38	Feet
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	40	8 Square Feet
General Comments					

**Span 2** **Beam 5**  
**Plate Girder**

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty
107	Steel Open Girder/Beam	40	0	40	0	0 Feet
515	Steel Protective Coating	520	480	0	0	40 Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty
107	Corrosion	along the length of the beam, both flanges and lower 2" of web, areas of rust scale (no measurable loss) at random	2	40	Feet
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	40	8 Square Feet
General Comments					

**Span 2** **Beam 6**  
**Plate Girder**

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty
107	Steel Open Girder/Beam	40	0	40	0	0 Feet
515	Steel Protective Coating	520	480	0	0	40 Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty
107	Corrosion	along the length of the beam, both flanges and lower 2" of web, areas of rust scale (no measurable loss) at random	2	40	Feet
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	40	8 Square Feet
General Comments					

## Span 2 Beam 7

## Plate Girder

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty
107	Steel Open Girder/Beam	40	20	20	0	0 Feet
515	Steel Protective Coating	520	500	0	0	20 Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty
107	Corrosion	along the length of the beam, both flanges and lower 2" of web, areas of rust scale (no measurable loss) at random	2	20	Feet
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	20	4 Square Feet

General Comments

## Span 2 Beam 8

## Plate Girder

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty
107	Steel Open Girder/Beam	40	20	20	0	0 Feet
515	Steel Protective Coating	520	500	0	0	20 Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty
107	Corrosion	along the length of the beam, both flanges and lower 2" of web, areas of rust scale (no measurable loss) at random	2	20	Feet
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	20	4 Square Feet

General Comments

## Span 2 Beam 9

## Plate Girder

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty
107	Steel Open Girder/Beam	40	10	30	0	0 Feet
515	Steel Protective Coating	520	490	0	0	30 Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty
107	Corrosion	along the length of the beam, both flanges and lower 2" of web, areas of rust scale (no measurable loss) at random	2	30	Feet
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	30	6 Square Feet

General Comments

## Span 2 Beam 10

## Plate Girder

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty
107	Steel Open Girder/Beam	40	0	40	0	0 Feet
515	Steel Protective Coating	520	480	0	0	40 Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty
107	Corrosion	along the length of the beam, both flanges and lower 2" of web, areas of rust scale (no measurable loss) at random	2	40	Feet

515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	40	8	Square Feet
General Comments						

### Span 2 Wearing Surface

#### Asphalt Wearing Surface

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty	
510	Wearing Surface	1,120	0	267	853	0	Square Feet
Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty		
510	Crack (Wearing Surface)	throughout wearing surface, map cracks (up to 1/2" x full width of roadway x full length)	3	845	845		Square Feet
510	Patched Area/Pothole (Wearing Surface)	at northbound lane near midspan, patched area (45" x 2') with cracks (up to 1/32")	3	8	8		Square Feet
510	Crack (Wearing Surface)	throughout pedestrian path, transverse cracks (up to 1/32" x 4.5') spaced between 1.5' and 2'	2	267	267		Square Feet
General Comments							

### Span 3 Deck

#### Steel Deck Corrugated

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty	
30	Steel Deck Corrugated/Orthotropic/Etc.	1,120	770	350	0	0	Square Feet
515	Steel Protective Coating	1,120	770	0	0	350	Square Feet
Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty		
30	Corrosion	underside of deck adjacent to seems and weep holes, areas of surface rust/ rust scale (no measurable loss) with efflorescence	2	350			Square Feet
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	350	35		Square Feet
General Comments							

### Span 3 Beam 1

#### Plate Girder

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty	
107	Steel Open Girder/Beam	40	22	18	0	0	Feet
515	Steel Protective Coating	520	502	0	0	18	Square Feet
Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty		
107	Corrosion	near midspan, east face of top flange, areas of corrosion with section loss (less than 1/16" loss x 1' x 3")	2	8			Feet
107	Corrosion	along the length of the beam, both flanges and lower 2" of web, areas of rust scale (no measurable loss) at random	2	10			Feet
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	18	3		Square Feet
General Comments							

**Span 3** **Beam 2**  
**Plate Girder**

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty	
107	Steel Open Girder/Beam	40	0	40	0	0	Feet
515	Steel Protective Coating	520	480	0	0	40	Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty	
107	Corrosion	along the length of the beam, both flanges and lower 2" of web, areas of surface rust/ rust scale (no measurable loss) at random	2	40		Feet
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	40	8	Square Feet

General Comments

**Span 3** **Beam 3**  
**Plate Girder**

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty	
107	Steel Open Girder/Beam	40	0	33	2	5	Feet
515	Steel Protective Coating	520	480	0	0	40	Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty	
107	Corrosion	[MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 2, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (0.38" AVERAGE REMAINING X 4.5"); LOWER WEB (1/4" AVERAGE REMAINING X 5' X UP TO 3")	4	5	5	Feet
107	Corrosion	at bent 2, top flange, corrosion with section loss (0.40" average remaining x 15")	3	2	2	Feet
107	Corrosion	along the length of the beam, both flanges and lower 2" of web, areas of rust scale (no measurable loss) at random	2	33		Feet
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	40	8	Square Feet

General Comments

**Span 3** **Beam 4**  
**Plate Girder**

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty	
107	Steel Open Girder/Beam	40	16	20	0	4	Feet
515	Steel Protective Coating	520	496	0	0	24	Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty	
107	Corrosion	[MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 2, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (0.45" AVERAGE REMAINING X 3.5"); LOWER WEB (1/4" AVERAGE REMAINING X 3.5' X UP TO 4").	4	4	4	Feet
107	Corrosion	along the length of the beam, both flanges and lower 2" of web, areas of rust scale (no measurable loss) at random	2	20		Feet
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	24	5	Square Feet

General Comments

## Span 3 Beam 5

## Plate Girder

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty
107	Steel Open Girder/Beam	40	6	30	0	4 Feet
515	Steel Protective Coating	520	486	0	0	34 Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty
107	Corrosion	[MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 2, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (3/8" AVERAGE REMAINING X 3'); LOWER WEB (3/16" AVERAGE REMAINING X 3.5' X UP TO 3")	4	4	4 Feet
107	Corrosion	along the length of the beam, both flanges and lower 2" of web, areas of rust scale (no measurable loss) at random	2	30	Feet
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	34	7 Square Feet
General Comments					

## Span 3 Beam 6

## Plate Girder

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty
107	Steel Open Girder/Beam	40	14	20	0	6 Feet
515	Steel Protective Coating	520	494	0	0	26 Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty
107	Corrosion	[MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 2, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (0.35" AVERAGE REMAINING X 6'); LOWER WEB (3/16" AVERAGE REMAINING X 6' X UP TO 4")	4	6	6 Feet
107	Corrosion	along the length of the beam, both flanges and lower 2" of web, areas of rust scale (no measurable loss) at random	2	20	Feet
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	26	5 Square Feet
General Comments					

## Span 3 Beam 7

## Plate Girder

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty
107	Steel Open Girder/Beam	40	14	20	0	6 Feet
515	Steel Protective Coating	520	494	0	0	26 Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty
107	Corrosion	[MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 2, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (0.42" AVERAGE REMAINING X UP TO 5.5'); LOWER WEB (3/16" AVERAGE REMAINING X 5.5' X UP TO 4")	4	6	6 Feet
107	Corrosion	along the length of the beam, both flanges and lower 2" of web, areas of surface rust/ rust scale (no measurable loss) at random	2	20	Feet
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	26	5 Square Feet
General Comments					

## Span 3

## Beam 8

## Plate Girder

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty	
107	Steel Open Girder/Beam	40	4	30	2	4	Feet
515	Steel Protective Coating	520	484	0	0	36	Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty	
107	Corrosion	[MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 2, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (0.375" AVERAGE REMAINING X UP TO 4'); LOWER WEB (1/8" AVERAGE REMAINING X 3" X UP TO 6" LONG WITH PERFORATIONS, THEN 3/16" REMAINING IN LOWER 3" OF THE WEB FOR THE NEXT 3.5' LONG)	4	4	4	Feet
107	Corrosion	at bent 2, corrosion with section loss: top flange (0.43" average remaining x 11"); bottom flange (0.43" average remaining x 16")	3	2	2	Feet
107	Corrosion	along the length of the beam, both flanges and lower 2" of web, areas of rust scale (no measurable loss) at random	2	30		Feet
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	36	7	Square Feet
General Comments						

## Span 3

## Beam 9

## Plate Girder

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty	
107	Steel Open Girder/Beam	40	0	40	0	0	Feet
515	Steel Protective Coating	520	480	0	0	40	Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty	
107	Corrosion	at bent 2, top flange, corrosion with section loss (less than 1/16" loss x 5')	2	5		Feet
107	Corrosion	along the length of the beam, both flanges and lower 2" of web, areas of rust scale (no measurable loss) at random	2	32		Feet
107	Corrosion	at end bent 2, corrosion with section loss: bottom flange (less than 1/16" loss x up to 3'); lower web (5/16" average remaining x 3" x up to 2")	2	3		Feet
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	40	8	Square Feet
General Comments						

## Span 3

## Beam 10

## Plate Girder

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty	
107	Steel Open Girder/Beam	40	0	40	0	0	Feet
515	Steel Protective Coating	520	480	0	0	40	Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty	
107	Corrosion	at bent 2, top flange, west face, corrosion with section loss (less than 1/16" loss x 4' x 4")	2	4		Feet
107	Corrosion	along the length of the beam, both flanges and lower 2" of web, areas of rust scale (no measurable loss) at random	2	36		Feet
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	40	8	Square Feet
General Comments						



**Span 3** **Wearing Surface**  
**Asphalt Wearing Surface**

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty
510	Wearing Surface	1,134	0	200	934	0 Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty
510	Crack (Wearing Surface)	at end bent 2, separation/ crack (3/4" x full width of roadway)	3	33	33 Square Feet
510	Crack (Wearing Surface)	throughout wearing surface, map cracks (up to 1/2" x full width of roadway x full length)	3	901	901 Square Feet
510	Crack (Wearing Surface)	throughout pedestrian path, transverse cracks (up to 1/32" x 4.5') spaced between 1.5' and 2'	2	200	200 Square Feet

General Comments

**Span 3** **Left Bridge Rail**  
**Steel Rail**

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty
330	Metal Bridge Railing	40	38	2	0	0 Feet
515	Steel Protective Coating	90	90	0	0	0 Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty
330	Damage	left bridge rail at 18' from end bent 2, impact damage (2')	2	2	Feet

General Comments

**Span 3** **Right Bridge Rail**  
**Steel Rail**

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty
330	Metal Bridge Railing	40	36	4	0	0 Feet
515	Steel Protective Coating	90	90	0	0	0 Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty
330	Damage	right bridge rail at midspan, impact damage (3.5')	2	4	Feet

General Comments

**Bent 1** **Footing**  
**Reinforced Concrete Footing**

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty
220	Reinforced Concrete Pile Cap/Footing	38	35	0	3	0 Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty
220	Delamination/Spall	north face below pile 5, honeycomb (2.5' x 10" x up to 3/4" deep)	3	3	3 Feet

General Comments

**Bent 1 Cap 1**  
**Steel Pier Cap**

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty
231	Steel Pier Cap	34	0	18	0	16 Feet
515	Steel Protective Coating	210	140	0	0	70 Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty
231	Corrosion	[MUNICIPAL PROMPT ACTION REQUEST] south face below bay 3, corrosion with section loss: bottom flange (1/4" average remaining x 39"); lower web (7/16" average remaining x 39" x 2"); web stiffeners (as little as 3/16" average remaining x 5" x 2.5")	4	4	4 Feet
231	Corrosion	[MUNICIPAL PROMPT ACTION REQUEST] south face below beam 2, corrosion with section loss: bottom flange (0.35" average remaining x 2') top flange (0.42" average remaining x 1'); lower web (7/16" average remaining 2.5' x 2"); web stiffener (3/16" average remaining x 5" x 2")	4	3	3 Feet
231	Corrosion	[MUNICIPAL PROMPT ACTION REQUEST] south and north faces below bays 7 through 9, corrosion with section loss: bottom flange (5/16" average remaining x 8.5'); lower web (7/16" average remaining x 8' x 2"); web stiffeners (as little as 0.15" average remaining x 5" x up to 5")	4	9	9 Feet
231	Corrosion	along the length of the cap, both flanges and lower 2" of web, areas of surface rust/ rust scale (no measurable loss) at random	2	18	Feet
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	70	21 Square Feet

General Comments

**Bent 1 Pile 1**  
**Steel Pile**

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty
225	Steel Pile	1	0	1	0	0 Each
515	Steel Protective Coating	77	74	0	0	3 Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty
225	Corrosion	along the length of the pile, surface rust at random; top of pile, rust scale (no measurable loss)	2	1	Each
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	3	1 Square Feet

General Comments

**Bent 1 Pile 2**  
**Steel Pile**

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty
225	Steel Pile	1	0	1	0	0 Each
515	Steel Protective Coating	77	74	0	0	3 Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty
225	Corrosion	along the length of the pile, surface rust at random; top of pile, rust scale (no measurable loss)	2	1	Each
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	3	1 Square Feet

General Comments

**Bent 1 Pile 3**  
**Steel Pile**

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty	
225	Steel Pile	1	0	1	0	0	Each
515	Steel Protective Coating	77	74	0	0	3	Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty	
225	Corrosion	along the length of the pile, surface rust at random; top of pile, rust scale (no measurable loss)	2	1		Each
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	3	1	Square Feet

General Comments

**Bent 1 Pile 4**  
**Steel Pile**

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty	
225	Steel Pile	1	0	1	0	0	Each
515	Steel Protective Coating	77	74	0	0	3	Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty	
225	Corrosion	along the length of the pile, surface rust at random; top of pile, rust scale (no measurable loss)	2	1		Each
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	3	1	Square Feet

General Comments

**Bent 1 Pile 5**  
**Steel Pile**

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty	
225	Steel Pile	1	0	1	0	0	Each
515	Steel Protective Coating	77	74	0	0	3	Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty	
225	Corrosion	along the length of the pile, surface rust at random; top of pile, rust scale (no measurable loss)	2	1		Each
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	3	1	Square Feet

General Comments

**Bent 1 Pile 6**  
**Steel Pile**

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty	
225	Steel Pile	1	0	1	0	0	Each
515	Steel Protective Coating	77	74	0	0	3	Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty	
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Structure Number: 120320

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225	Corrosion	along the length of the pile, surface rust at random; top of pile, rust scale (no measurable loss)	2	1	Each
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	3	1 Square Feet

General Comments

**End Bent 1 Abutment**

**Reinforced Concrete Abutment**

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty
215	Reinforced Concrete Abutment	60	54	0	3	3 Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty
215	Delamination/Spall	[MUNICIPAL PROMPT ACTION REQUEST] SOUTHEAST WINGWALL ADJACENT TO CURB, SPALL (2.5' X 1.5' X 3" DEEP) WITH EXPOSED RUSTED REBAR. THE CONCRETE SHOWS SIGNS OF ALKALAI SILICA REACTION.	4	3	5 Feet
215	Delamination/Spall	southwest wingwall adjacent to deck, spall (9" x 7" x 2.5" deep)	3	1	1 Feet
215	Efflorescence/Rust Staining	southeast wingwall at east end, delamination (2' x 1.5') with cracks (up to 1/32") with efflorescence buildup	3	2	2 Feet

General Comments

**End Bent 1 Concrete Cap**

**Reinforced Concrete Pier Cap**

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty
234	Reinforced Concrete Pier Cap	48	45	0	3	0 Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty
234	Delamination/Spall	31" X 7" X 1 1/2" DEEP SPALL IN TOP OF CAP BENEATH BEAM 1	3	3	3 Feet

General Comments

**End Bent 1 Steel Cap**

**Steel Pier Cap**

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty
231	Steel Pier Cap	34	23	0	0	11 Feet
515	Steel Protective Coating	110	0	0	0	110 Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty
231	Corrosion	[MUNICIPAL PROMPT ACTION REQUEST] NORTH FACE IN THE LOWER 3" OF WEB STIFFENERS 4-9, CORROSION WITH 100% SECTION LOSS.	4	6	6 Feet
231	Corrosion	[MUNICIPAL PROMPT ACTION REQUEST] NORTH TOP FLANGE EAST OF BEAM 7, CORROSION WITH SECTION LOSS (0.28" AVERAGE REMAINING X 18" X 5")	4	2	2 Feet
231	Corrosion	[MUNICIPAL PROMPT ACTION REQUEST] NORTH TOP FLANGE EAST OF BEAM 8, CORROSION WITH SECTION LOSS (0.28" AVERAGE REMAINING X 1.5' X 4")	4	2	2 Feet
231	Corrosion	[MUNICIPAL PROMPT ACTION REQUEST] NORTH FACE IN THE THIRD WEB STIFFENER, LOWER 3", CORROSION WITH SECTION LOSS [AVERAGE 1/8" REMAINING].	4	1	1 Feet
515	Effectiveness (Steel Protective Coatings)	PROTECTIVE COATING failed	4	110	110 Square Feet

General Comments

**Bent 2 Cap 1**  
**Steel Pier Cap**

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty
231	Steel Pier Cap	34	0	16	0	18 Feet
515	Steel Protective Coating	210	140	0	0	70 Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty
231	Corrosion	[MUNICIPAL PROMPT ACTION REQUEST] north face below beam 3, corrosion with section loss: bottom flange (0.35" average remaining x 5.5" x 5'); lower web (0.43" average remaining x 3' x 2.5")	4	5	5 Feet
231	Corrosion	[MUNICIPAL PROMPT ACTION REQUEST] north face below bays 4 through 6, corrosion with section loss: bottom flange (0.33" average remaining x 5.5" x 9'); lower web (less than 1/16" loss x 9' x 2"); web stiffeners in the lower 2", average 3/16" remains.	4	9	9 Feet
231	Corrosion	[MUNICIPAL PROMPT ACTION REQUEST] north face below bay 7, corrosion with section loss: bottom flange (0.35" average remaining x 5.5" x 3.5'); top flange (0.35" average remaining x 5.5" x 3.5'); lower web (less than 1/16" loss x 3.5' x 2"); web stiffeners (less than 1/16" loss x 5" x 2")	4	4	4 Feet
231	Corrosion	along the length of the cap, both flanges and lower 2" of web, areas of surface rust/ rust scale (no measurable loss) at random	2	16	Feet
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	70	21 Square Feet

General Comments

**Bent 2 Pile 1**  
**Steel Pile**

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty
225	Steel Pile	1	0	1	0	0 Each
515	Steel Protective Coating	77	74	0	0	3 Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty
225	Corrosion	along the length of the pile, surface rust at random; top of pile, rust scale (no measurable loss)	2	1	Each
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	3	1 Square Feet

General Comments

**Bent 2 Pile 2**  
**Steel Pile**

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty
225	Steel Pile	1	0	1	0	0 Each
515	Steel Protective Coating	77	74	0	0	3 Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty
225	Corrosion	along the length of the pile, surface rust at random; top of pile, rust scale (no measurable loss)	2	1	Each
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	3	1 Square Feet

## General Comments

## Bent 2 Pile 3

## Steel Pile

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty	
225	Steel Pile	1	0	1	0	0	Each
515	Steel Protective Coating	77	74	0	0	3	Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty	
225	Corrosion	along the length of the pile, surface rust at random; top of pile, rust scale (no measurable loss)	2	1		Each
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	3	1	Square Feet

## General Comments

## Bent 2 Pile 4

## Steel Pile

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty	
225	Steel Pile	1	0	1	0	0	Each
515	Steel Protective Coating	77	74	0	0	3	Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty	
225	Corrosion	along the length of the pile, surface rust at random; top of pile, rust scale (no measurable loss)	2	1		Each
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	3	1	Square Feet

## General Comments

## Bent 2 Pile 5

## Steel Pile

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty	
225	Steel Pile	1	0	1	0	0	Each
515	Steel Protective Coating	77	74	0	0	3	Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty	
225	Corrosion	along the length of the pile, surface rust at random; top of pile, rust scale (no measurable loss)	2	1		Each
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	3	1	Square Feet

## General Comments



## Bent 2

## Pile 6

## Steel Pile

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty	
225	Steel Pile	1	0	1	0	0	Each
515	Steel Protective Coating	77	74	0	0	3	Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty	
225	Corrosion	along the length of the pile, surface rust at random; top of pile, rust scale (no measurable loss)	2	1		Each
515	Effectiveness (Steel Protective Coatings)	SCATTERED PROTECTIVE COATING FAILURE	4	3	1	Square Feet

General Comments

## End Bent 2

## Abutment

## Reinforced Concrete Abutment

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty	
215	Reinforced Concrete Abutment	61	28	7	26	0	Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty	
215	Delamination/Spall	northwest wingwall adjacent to beam 1, spall/ delamination (3' x 2.5' x up to 2" deep) with cracks (up to 1/4") with efflorescence buildup	3	3	8	Feet
215	Cracking (RC and Other)	bay 1, transverse crack (up to 1/8" x 27")	3	3	3	Feet
215	Cracking (RC and Other)	abutment adjacent to beam 10, vertical crack (1/4" x 2')	3	1	1	Feet
215	Cracking (RC and Other)	bays 8 and 9, diagonal crack (up to 3/16" x 5') with edge spalls (up to 7" x 3" x 1.5" deep)	3	5	5	Feet
215	Cracking (RC and Other)	at base of the abutment between bays 3 through 6, transverse crack (up to 1/4" x 14') with edge spalls (up to 1.5" x 1" deep)	3	14	14	Feet
215	Patched Area	northeast wingwall, previously replaced (7')	2	7		Feet

General Comments

## End Bent 2

## Concrete Cap

## Reinforced Concrete Pier Cap

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty	
234	Reinforced Concrete Pier Cap	48	45	0	2	1	Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty	
234	Cracking (RC and Other)	[MUNICIPAL PROMPT ACTION REQUEST] west end of concrete cap, fracture (1' long x full width) undermining steel cap (1' long x 2" high x 1' deep)	4	1	1	Feet
234	Cracking (RC and Other)	concrete cap below beam 10, vertical cracks (up to 3/16" x full height) with efflorescence buildup	3	2	2	Feet

General Comments

**End Bent 2** **Steel Cap**  
**Steel Pier Cap**

Element Number	Element Name	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty
231	Steel Pier Cap	34	19	0	0	15 Feet
515	Steel Protective Coating	110	0	0	0	110 Square Feet

Element Number	Defect Type	Defect Description	CS	CS Qty	Maint Qty
231	Corrosion	[MUNICIPAL PROMPT ACTION REQUEST] south face, web stiffener below beam 9, corrosion with section loss (0.20" average remaining x 4" x 5")	4	1	1 Feet
231	Corrosion	[MUNICIPAL PROMPT ACTION REQUEST] south face of cap below beam 8, corrosion with section loss: top flange (0.29" average remaining x 18" x 5"); upper web (7/16" average remaining x 6" x 2.5"); web stiffener (0.25" average remaining x 5" x 1")	4	2	2 Feet
231	Corrosion	[MUNICIPAL PROMPT ACTION REQUEST] south face of cap in bays 3 and 4, corrosion with section loss: top flange (3/16" average remaining x 5.5' x 5"); lower web (7/16" average remaining x 4' x up to 2.5"); bottom flange (7/16" average remaining x 4.5'); web stiffeners (as little as 0.22" average remaining x 5" x up to full height)	4	6	6 Feet
231	Corrosion	[MUNICIPAL PROMPT ACTION REQUEST] south face of cap between bays 5 and 6, corrosion with section loss: top flange (1/4" average remaining x 5.5' x 5"); lower web (7/16" average remaining x 6' x up to full height) bottom flange (7/16" average remaining x 5'); web stiffeners (as little as 0.22" average remaining x 5" x full height)	4	6	6 Feet
515	Effectiveness (Steel Protective Coatings)	PROTECTIVE COATING FAILED	4	110	110 Square Feet

General Comments

## Elements Verified

Location	Name	Component	Element Name	Amount
Span 1	Deck	Steel Deck Corrugated	Steel Deck Corrugated/Orthotropic/Etc.	1120
Span 1	Beam 1	Plate Girder	Steel Open Girder/Beam	40
Span 1	Beam 2	Plate Girder	Steel Open Girder/Beam	40
Span 1	Beam 3	Plate Girder	Steel Open Girder/Beam	40
Span 1	Beam 4	Plate Girder	Steel Open Girder/Beam	40
Span 1	Beam 5	Plate Girder	Steel Open Girder/Beam	40
Span 1	Beam 6	Plate Girder	Steel Open Girder/Beam	40
Span 1	Beam 7	Plate Girder	Steel Open Girder/Beam	40
Span 1	Beam 8	Plate Girder	Steel Open Girder/Beam	40
Span 1	Beam 9	Plate Girder	Steel Open Girder/Beam	40
Span 1	Beam 10	Plate Girder	Steel Open Girder/Beam	40
Span 1	Left Bridge Rail	Steel Rail	Metal Bridge Railing	40
Span 1	Right Bridge Rail	Steel Rail	Metal Bridge Railing	40
Span 1	Wearing Surface	Asphalt Wearing Surface	Wearing Surface	1134
Span 2	Deck	Steel Deck Corrugated	Steel Deck Corrugated/Orthotropic/Etc.	1120
Span 2	Beam 1	Plate Girder	Steel Open Girder/Beam	40
Span 2	Beam 2	Plate Girder	Steel Open Girder/Beam	40
Span 2	Beam 3	Plate Girder	Steel Open Girder/Beam	40
Span 2	Beam 4	Plate Girder	Steel Open Girder/Beam	40
Span 2	Beam 5	Plate Girder	Steel Open Girder/Beam	40
Span 2	Beam 6	Plate Girder	Steel Open Girder/Beam	40
Span 2	Beam 7	Plate Girder	Steel Open Girder/Beam	40
Span 2	Beam 8	Plate Girder	Steel Open Girder/Beam	40
Span 2	Beam 9	Plate Girder	Steel Open Girder/Beam	40
Span 2	Beam 10	Plate Girder	Steel Open Girder/Beam	40
Span 2	Left Bridge Rail	Steel Rail	Metal Bridge Railing	40
Span 2	Right Bridge Rail	Steel Rail	Metal Bridge Railing	40
Span 2	Wearing Surface	Asphalt Wearing Surface	Wearing Surface	1120
Span 3	Deck	Steel Deck Corrugated	Steel Deck Corrugated/Orthotropic/Etc.	1120
Span 3	Beam 1	Plate Girder	Steel Open Girder/Beam	40
Span 3	Beam 2	Plate Girder	Steel Open Girder/Beam	40
Span 3	Beam 3	Plate Girder	Steel Open Girder/Beam	40
Span 3	Beam 4	Plate Girder	Steel Open Girder/Beam	40
Span 3	Beam 5	Plate Girder	Steel Open Girder/Beam	40
Span 3	Beam 6	Plate Girder	Steel Open Girder/Beam	40
Span 3	Beam 7	Plate Girder	Steel Open Girder/Beam	40
Span 3	Beam 8	Plate Girder	Steel Open Girder/Beam	40
Span 3	Beam 9	Plate Girder	Steel Open Girder/Beam	40
Span 3	Beam 10	Plate Girder	Steel Open Girder/Beam	40
Span 3	Left Bridge Rail	Steel Rail	Metal Bridge Railing	40
Span 3	Right Bridge Rail	Steel Rail	Metal Bridge Railing	40
Span 3	Wearing Surface	Asphalt Wearing Surface	Wearing Surface	1134
Bent 1	Cap 1	Steel Pier Cap	Steel Pier Cap	34
Bent 1	Pile 1	Steel Pile	Steel Pile	1
Bent 1	Pile 2	Steel Pile	Steel Pile	1

## Elements Verified

Location	Name	Component	Element Name	Amount
Bent 1	Pile 3	Steel Pile	Steel Pile	1
Bent 1	Pile 4	Steel Pile	Steel Pile	1
Bent 1	Pile 5	Steel Pile	Steel Pile	1
Bent 1	Pile 6	Steel Pile	Steel Pile	1
Bent 1	Footing	Reinforced Concrete Footing	Reinforced Concrete Pile Cap/Footing	38
End Bent 1	Steel Cap	Steel Pier Cap	Steel Pier Cap	34
End Bent 1	Concrete Cap	Reinforced Concrete Pier Cap	Reinforced Concrete Pier Cap	48
End Bent 1	Abutment	Reinforced Concrete Abutment	Reinforced Concrete Abutment	60
Bent 2	Cap 1	Steel Pier Cap	Steel Pier Cap	34
Bent 2	Pile 1	Steel Pile	Steel Pile	1
Bent 2	Pile 2	Steel Pile	Steel Pile	1
Bent 2	Pile 3	Steel Pile	Steel Pile	1
Bent 2	Pile 4	Steel Pile	Steel Pile	1
Bent 2	Pile 5	Steel Pile	Steel Pile	1
Bent 2	Pile 6	Steel Pile	Steel Pile	1
Bent 2	Footing	Reinforced Concrete Footing	Reinforced Concrete Pile Cap/Footing	38
End Bent 2	Steel Cap	Steel Pier Cap	Steel Pier Cap	34
End Bent 2	Concrete Cap	Reinforced Concrete Pier Cap	Reinforced Concrete Pier Cap	48
End Bent 2	Abutment	Reinforced Concrete Abutment	Reinforced Concrete Abutment	61

# General Inspection Notes

# National Bridge and NC Inspection Items

Structure Number: 120320

Inspection Date: 06/28/2022

## National Bridge Inventory Items

Item	Grade Scale	Grade
Item 58: Deck	0 - 9 , N	6
Item 59: Superstructure	0 - 9 , N	5
Item 60: Substructure	0 - 9 , N	5
Item 61: Channel and Channel Protection	0 - 9 , N	5
Item 62: Culvert	0 - 9 , N	N
Item 71: Waterway Adequacy	0 - 9 , N	7
Item 72: Approach Roadway Alignment	0 - 9 , N	8

**Note:**  
Items 58,59,60,62 reflect this inspection only.  
  
For overall NBI coding grade, see cover sheet.

*Note: If NBI Inspection Item is not present, code NBI item with "N"*

## NC SMU Inspection Items

Item	Grade Scale	Grade	Maint. Qty.	Maint. Code
Deck Debris	G, F, P, or C	F	3360	3376
Drainage System	G, F, P, or C	G	0	3332
Utilities	G, F, P, or C			
Slope Protection	G, F, P, or C	F	160	3352
Scour	G, F, P, or C	F		
Wingwall	G, F, P, or C		0	3350
Field Scour Evaluation		U		
Drift	G, F, P, or C	F	4	3366
Fender System	G, F, P, or C		0	3364
Movable Span Machinery	G, F, P, or C			
Response to Live Load	G, F, P, or C	F		
Superstructure Paint Code		U		

*Note: If NC SMU Inspection Item is not present, leave NC SMU item blank*

## Inspection Information

Item	Grade Scale	Grade
Sign Noticed Issued	YES/NO	N
Priority Maintenance Request Submitted	YES/NO	Y
Inspection Time	Hours	16
Traffic Control Time	Hours	
Snooper Time	Hours	
Ladder Used	YES/NO	Y
Bucket Truck Used	YES/NO	N
Boat Used	YES/NO	N
Other Equipment Used	YES/NO	N
Portion of Structure in > 3' of water	YES/NO	N



# National Bridge and NC SMU Inspection Item Details

Structure Number: 120320

Inspection Date: 06/28/2022

Item	Deck - Item 58	Grade 6	Maint Code	Qty. 0
Details	GRADING MAINTAINED			
Item	Superstructure - Item 59	Grade 5	Maint Code	Qty. 0
Details	GRADING MAINTAINED			
Item	Substructure - Item 60	Grade 5	Maint Code	Qty. 0
Details	GRADING MAINTAINED			
Item	Channel and Channel Protection - Item 61	Grade 5	Maint Code	Qty. 0
Details	UPSTREAM AND DOWNSTREAM OF THE STRUCTURE THERE IS LOSS OF VEGETATION WITH EXPOSED ROOTS AND SLOUGHING UP TO 10' HIGH			
Item	Field Scour Evaluation	Grade U	Maint Code	Qty. 0
Details	SEE SLOPE PROTECTION NOTES			
Item	Deck Debris	Grade F	Maint Code 3376	Qty. 3360
Details	RIGHT AND LEFT GUTTERLINES, DEBRIS ACCUMULATION ALONG THE LENGTHS			
Item	Slope Protection	Grade F	Maint Code 3352	Qty. 160
Details	<p>[MUNICIPAL PROMPT ACTION REQUEST] AT ABUTMENT 1 IN THE TOP OF THE SLOPE, RIGHT &amp; LEFT SIDES, SCATTERED EROSION [APPROXIMATELY 160 SQUARE FEET TOTAL X UP TO 1.25' DEEP]</p> <p>[MUNICIPAL PROMPT ACTION REQUEST] NORTHEAST CORNER IN THE FILL SLOPE, EROSION IS PRESENT, REACHING AS CLOSE AS 4' FROM THE EDGE OF PAVEMENT [APPROXIMATELY 40' LONG X UP TO 10' WIDE X UP TO 10' HIGH]</p>			
Item	Response to live load	Grade F	Maint Code	Qty. 0
Details	REBOUNDING NOTED UNDER LIVE LOADING			
Item	Drift	Grade F	Maint Code 3366	Qty. 4
Details	AT BENT 1, APPROXIMATELY 1 CUBIC YARD OF DRIFT HAS COLLECTED AGAINST THE PILES			
Item	Scour	Grade F	Maint Code	Qty. 0
Details	SEE SLOPE PROTECTION NOTES			



End Bent 1 Concrete Cap 1: 31" X 7" X 1 1/2" DEEP SPALL IN TOP OF CAP BENEATH BEAM 1



End Bent 1 Steel Cap 1: [MUNICIPAL PROMPT ACTION REQUEST] NORTH FACE IN THE THIRD WEB STIFFENER, LOWER 3", CORROSION WITH SECTION LOSS [AVERAGE 1/8" REMAINING].





End Bent 1 Steel Cap 1: [MUNICIPAL PROMPT ACTION REQUEST] NORTH FACE IN THE LOWER 3" OF WEB STIFFENERS 4-9, CORROSION WITH 100% SECTION LOSS.



End Bent 1 Steel Cap 1: [MUNICIPAL PROMPT ACTION REQUEST] NORTH TOP FLANGE EAST OF BEAM 7, CORROSION WITH SECTION LOSS (0.28" AVERAGE REMAINING X 18" X 5")



End Bent 1 Steel Cap 1: [MUNICIPAL PROMPT ACTION REQUEST] NORTH TOP FLANGE EAST OF BEAM 8, CORROSION WITH SECTION LOSS (0.28" AVERAGE REMAINING X 1.5' X 4")





End Bent 1 Abutment: [MUNICIPAL PROMPT ACTION REQUEST] SOUTHEAST WINGWALL ADJACENT TO CURB, SPALL (2.5' X 1.5' X 3" DEEP) WITH EXPOSED RUSTED REBAR. THE CONCRETE SHOWS SIGNS OF ALKALAI SILICA REACTION.



End Bent 1 Abutment: [MUNICIPAL PROMPT ACTION REQUEST] SOUTHEAST WINGWALL ADJACENT TO CURB, SPALL (2.5' X 1.5' X 3" DEEP) WITH EXPOSED RUSTED REBAR. THE CONCRETE SHOWS SIGNS OF ALKALAI SILICA REACTION.

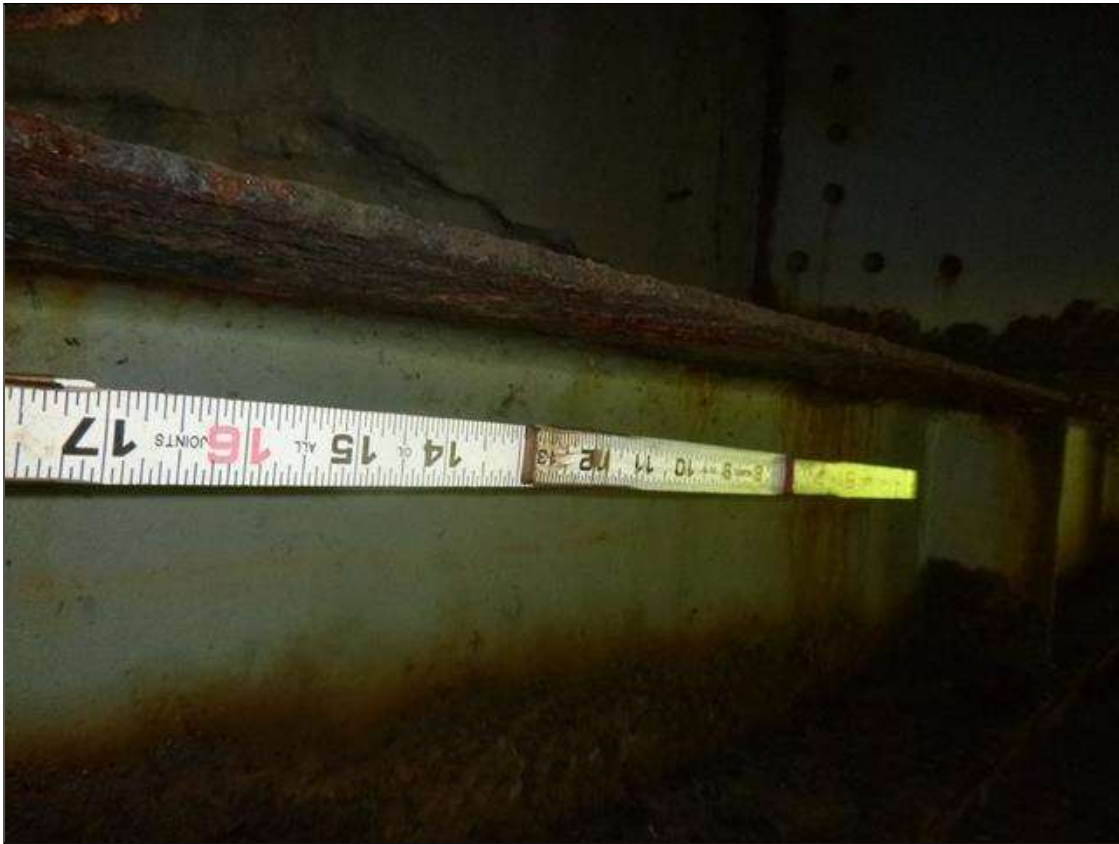




End Bent 1 Abutment: southwest wingwall adjacent to deck, spall (9" x 7" x 2.5" deep)



End Bent 2 Steel Cap 1: [MUNICIPAL PROMPT ACTION REQUEST] south face of cap in bays 3 and 4, corrosion with section loss: top flange (3/16" average remaining x 5.5' x 5"); lower web (7/16" average remaining x 4' x up to 2.5"); bottom flange (7/16" average remaining x 4.5'); web stiffeners (as little as 0.22" average remaining x 5" x up to full height)



End Bent 2 Steel Cap 1: [MUNICIPAL PROMPT ACTION REQUEST] south face of cap between bays 5 and 6, corrosion with section loss: top flange (1/4" average remaining x 5.5' x 5"); lower web (7/16" average remaining x 6' x up to full height) bottom flange (7/16" average remaining x 5'); web stiffeners (as little as 0.22" average remaining x 5' x full height)





End Bent 2 Steel Cap 1: [MUNICIPAL PROMPT ACTION REQUEST] south face of cap below beam 8, corrosion with section loss: top flange (0.29" average remaining x 18" x 5"); upper web (7/16" average remaining x 6" x 2.5"); web stiffener (0.25" average remaining x 5" x 1")



End Bent 2 Steel Cap 1: [MUNICIPAL PROMPT ACTION REQUEST] south face, web stiffener below beam 9, corrosion with section loss (0.20" average remaining x 4" x 5")



End Bent 2 Concrete Cap 1: concrete cap below beam 10, vertical cracks (up to 3/16" x full height) with efflorescence buildup





End Bent 2 Concrete Cap 1: [MUNICIPAL PROMPT ACTION REQUEST] west end of concrete cap, fracture (1' long x full width) undermining steel cap (1' long x 2" high x 1' deep)





Bent 1 Cap 1: [MUNICIPAL PROMPT ACTION REQUEST] south face below beam 2, corrosion with section loss: bottom flange (0.35" average remaining x 2') top flange (0.42" average remaining x 1'); lower web (7/16" average remaining 2.5' x 2"); web stiffener (3/16" average remaining 5" x 2")



Bent 1 Cap 1: [MUNICIPAL PROMPT ACTION REQUEST] south face below bay 3, corrosion with section loss: bottom flange (1/4" average remaining x 39"); lower web (7/16" average remaining x 39" x 2"); web stiffeners (as little as 3/16" average remaining x 5" x 2.5")



Bent 1 Cap 1: [MUNICIPAL PROMPT ACTION REQUEST] south and north faces below bays 7 through 9, corrosion with section loss: bottom flange (5/16" average remaining x 8.5'); lower web (7/16" average remaining x 8' x 2"); web stiffeners (as little as 0.15" average remaining x 5" x up to 5")





Bent 2 Cap 1: [MUNICIPAL PROMPT ACTION REQUEST] north face below bay 7, corrosion with section loss: bottom flange (0.35" average remaining x 5.5" x 3.5'); top flange (0.35" average remaining x 5.5" x 3.5'); lower web (less than 1/16" loss x 3.5' x 2"); web stiffeners (less than 1/16" loss x 5" x 2")



Bent 2 Cap 1: [MUNICIPAL PROMPT ACTION REQUEST] north face below bays 4 through 6, corrosion with section loss: bottom flange (0.33" average remaining x 5.5" x 9"); lower web (less than 1/16" loss x 9' x 2"); web stiffeners in the lower 2", average 3/16" remains.



Bent 2 Cap 1: [MUNICIPAL PROMPT ACTION REQUEST] north face below beam 3, corrosion with section loss: bottom flange (0.35" average remaining x 5.5" x 5'); lower web (0.43" average remaining x 3' x 2.5")





[MUNICIPAL PROMPT ACTION REQUEST] NORTHEAST CORNER IN THE FILL SLOPE, EROSION IS PRESENT, REACHING AS CLOSE AS 4' FROM THE EDGE OF PAVEMENT [APPROXIMATELY 40' LONG X UP TO 10' WIDE X UP TO 10' HIGH]



[MUNICIPAL PROMPT ACTION REQUEST] NORTHEAST CORNER IN THE FILL SLOPE, EROSION IS PRESENT, REACHING AS CLOSE AS 4' FROM THE EDGE OF PAVEMENT [APPROXIMATELY 40' LONG X UP TO 10' WIDE X UP TO 10' HIGH]





Span 1 Beam 1: [MUNICIPAL PROMPT ACTION REQUEST] at end bent 1, east face, corrosion with section loss: bottom flange (0.47" average remaining x 15"); lower web (1/4" average remaining x 27" x 2")



Span 1 Beam 2: [MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 1, CORROSION WITH SECTION LOSS: BRT OTTOM FLANGE (0.40" AVERAGE REMAINING X 4'); LOWER WEB (1/4" AVERAGE REMAINING X 4' X UP TO 4") ; LEFT BOTTOM FLANGE CORROSION [AVERAGE 1/4" REMAINING] WITH KNIFE EDGING FOR 3' LONG.



Span 1 Beam 3: [MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 1, CORROSION WITH SECTION LOSS:  
BOTTOM FLANGE (1/4" REMAINING FOR 1.5' LONG, THEN 0.45" AVERAGE REMAINING FOR NEXT 2' LONG);  
LOWER WEB (1/4" AVERAGE REMAINING X 4' X 3")





Span 1 Beam 4: [MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 1, CORROSION WITH SECTION LOSS: LEFT BOTTOM FLANGE (0.47" AVERAGE REMAINING X 50"), RIGHT BOTTOM FLANGE (1/4" AVERAGE REMAINING FOR 1.5' LONG, THEN 0.47" AVERAGE REMAINING FOR NEXT 2.5' LONG); LOWER WEB (1/4" AVERAGE REMAINING X 4' X UP TO 4")



Span 1 Beam 5: [MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 1, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (AVERAGE 1/4" REMAINING FOR 1.5' LONG, THEN 0.40" AVERAGE REMAINING FOR NEXT 1.5' LONG'); LOWER WEB (3/16" AVERAGE REMAINING X 2.5' X UP TO 3.5")



Span 1 Beam 6: [MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 1, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (0.35" AVERAGE REMAINING X 3'); LOWER WEB (3/16" AVERAGE REMAINING X 3' X UP TO 4") WITH RUST HOLE (12" X 1.5")



Span 1 Beam 7: [MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 1, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (0.45" AVERAGE REMAINING X 4.5'); LOWER WEB (1/4" AVERAGE REMAINING X 4.5' X UP TO 4" WITH 1" DIAMETER CORROSION HOLE AT 1' OUT).





Span 1 Beam 8: [MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 1, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (0.40" AVERAGE REMAINING X 4'); LOWER WEB (3/16" AVERAGE REMAINING X 4' X UP TO 4") WITH RUST HOLE (16" X 3").

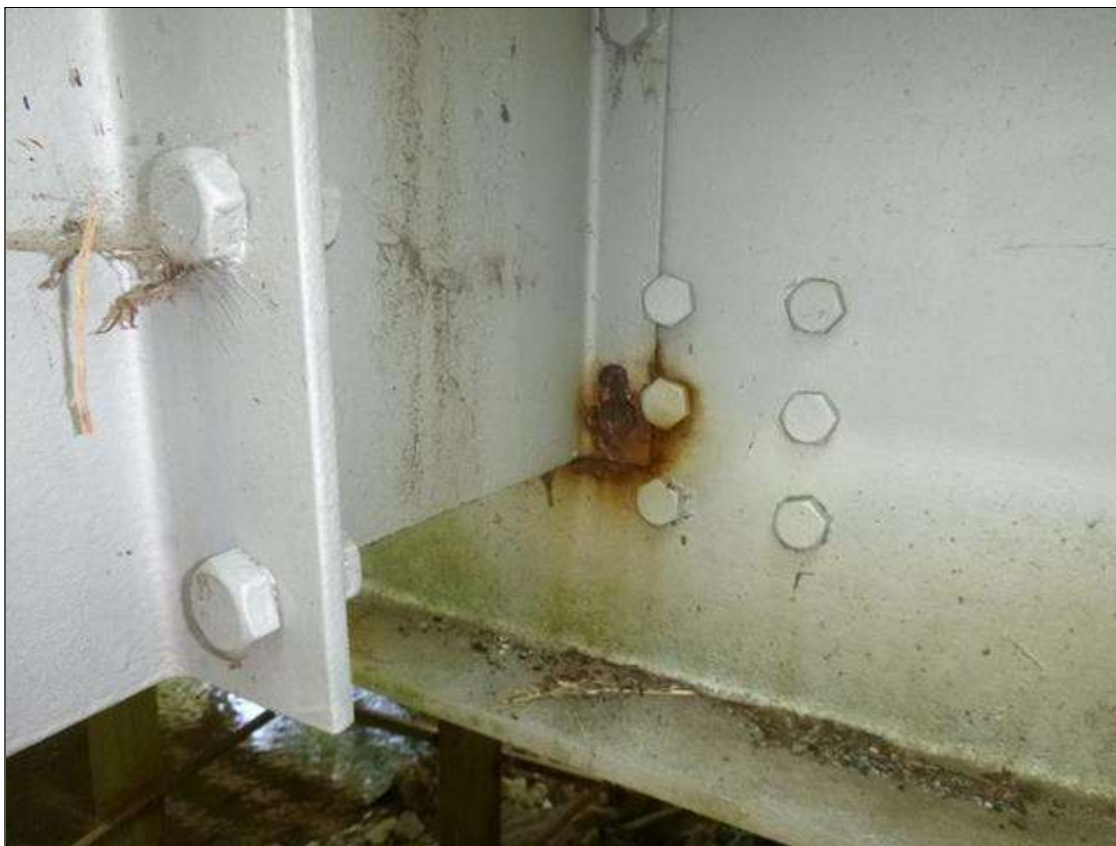




Span 1 Beam 9: [MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 1, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (0.45" AVERAGE REMAINING X 2'); LOWER WEB (1/4" AVERAGE REMAINING X 20" X 2.5")



Span 1 Beam 10: [MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 1, WEST FACE, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (0.37" AVERAGE REMAINING X 2.5'); LOWER WEB (5/16" AVERAGE REMAINING X 3' X UP TO 4"); TOP FLANGE (0.38" AVERAGE REMAINING X 5')



Span 1 Left Bridge Rail: [MUNICIPAL PROMPT ACTION REQUEST] AT FIFTH POST CONNECTION TO BEAM 1, (1) MISSING CONNECTION BOLT





Span 3 Beam 3: [MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 2, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (0.38" AVERAGE REMAINING X 4.5'); LOWER WEB (1/4" AVERAGE REMAINING X 5' X UP TO 3")



Span 3 Beam 4: [MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 2, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (0.45" AVERAGE REMAINING X 3.5'); LOWER WEB (1/4" AVERAGE REMAINING X 3.5' X UP TO 4").





Span 3 Beam 5: [MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 2, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (3/8" AVERAGE REMAINING X 3'); LOWER WEB (3/16" AVERAGE REMAINING X 3.5' X UP TO 3')



Span 3 Beam 6: [MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 2, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (0.35" AVERAGE REMAINING X 6'); LOWER WEB (3/16" AVERAGE REMAINING X 6' X UP TO 4")



Span 3 Beam 7: [MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 2, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (0.42" AVERAGE REMAINING X UP TO 5.5'); LOWER WEB (3/16" AVERAGE REMAINING X 5.5' X UP TO 4")





Span 3 Beam 8: [MUNICIPAL PROMPT ACTION REQUEST] AT END BENT 2, CORROSION WITH SECTION LOSS: BOTTOM FLANGE (0.375" AVERAGE REMAINING X UP TO 4'); LOWER WEB (1/8" AVERAGE REMAINING X 3" X UP TO 6" LONG WITH PERFORATIONS, THEN 3/16" REMAINING IN LOWER 3" OF THE WEB FOR THE NEXT 3.5' LONG)



Span 1 Beam 4: [MUNICIPAL PROMPT ACTION REQUEST] at bent 1, top flange, corrosion with section loss (0.38" average remaining x 2')



Span 1 Wearing Surface: throughout wearing surface, map cracks (up to 1/2" x full width of roadway x full length)





Span 1 Wearing Surface: at end bent 1, separation/ crack (1" x full width of roadway)



Span 1 Wearing Surface: at southbound lane, 2' from end bent 1, area of breaking up asphalt (14.5' x 6" x 1" deep)





RIGHT AND LEFT GUTTERLINES, DEBRIS ACCUMULATION ALONG THE LENGTHS



Span 1 Wearing Surface: [NEW REPAIR - ASPHALT PATCHING] FORMERLY --> at southbound lane adjacent to bent 1, patched area (4.5' x 4') with cracks (up to 1/8") and potholes (up to 2" x 3" x 1" deep)





Span 2 Wearing Surface: at northbound lane near midspan, patched area (45" x 2') with cracks (up to 1/32")



Span 3 Left Bridge Rail: left bridge rail at 18' from end bent 2, impact damage (2')





End Bent 2 Abutment: northwest wingwall adjacent to beam 1, spall/ delamination (3' x 2.5' x up to 2" deep) with cracks (up to 1/4") with efflorescence buildup



AT BENT 1, APPROXIMATELY 1 CUBIC YARD OF DRIFT HAS COLLECTED AGAINST THE PILES





UPSTREAM AND DOWNSTREAM OF THE STRUCTURE THERE IS LOSS OF VEGETATION WITH EXPOSED ROOTS AND SLOUGHING UP TO 10' HIGH



[MUNICIPAL PROMPT ACTION REQUEST] AT ABUTMENT 1 IN THE TOP OF THE SLOPE, RIGHT & LEFT SIDES, SCATTERED EROSION [APPROXIMATELY 160 SQUARE FEET TOTAL X UP TO 1.25' DEEP]





[MUNICIPAL PROMPT ACTION REQUEST] AT ABUTMENT 1 IN THE TOP OF THE SLOPE, RIGHT & LEFT SIDES, SCATTERED EROSION [APPROXIMATELY 160 SQUARE FEET TOTAL X UP TO 1.25' DEEP]

# Stream Bed Soundings

(Profile diagram on following sheet)

County CABARRUS

Structure Number: 120320

Inspection Date 06/28/2022

Sounding recorded from: Top of Bridge Rail

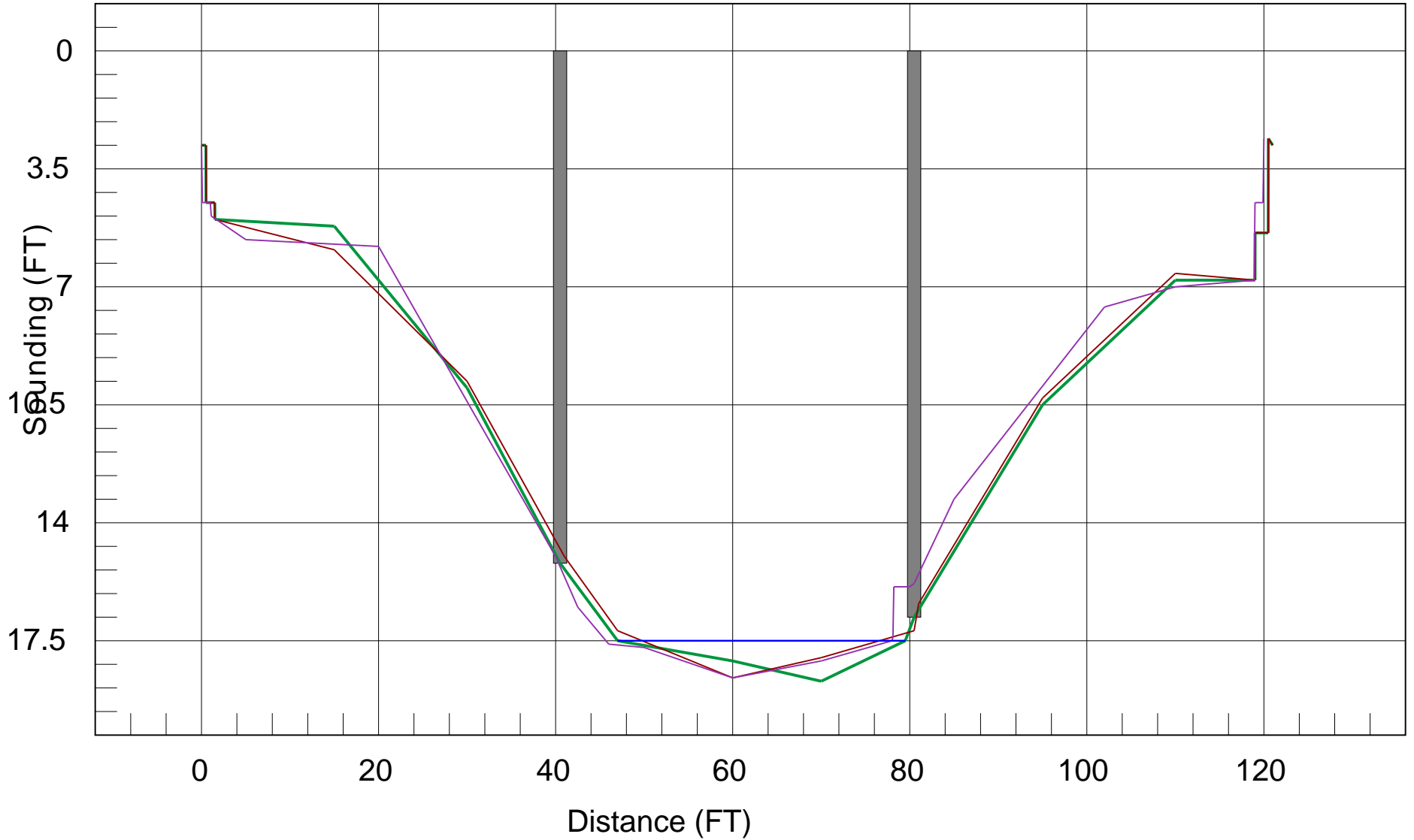
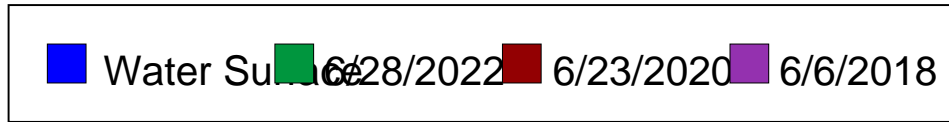
Highwater Mark Distance 6

Location of Highwater Mark DEBRIS ON BANK

Distance (Station) ft.	Downstream Sounding ft.	Upstream Sounding ft.	Description
0.000	2.800	0.000	TOP OF WALL
0.500	2.800	0.000	TOP OF WALL
0.510	4.500	0.000	RAIL TO CAP
1.500	4.500	0.000	RAIL TO CAP
1.510	5.000	5.800	GROUND AT CAP
15.000	5.200	0.000	SLOPE
30.000	10.000	0.000	SLOPE
40.500	15.200	16.600	BENT 1
47.000	17.500	0.000	WSWE
60.000	18.100	0.000	SOUNDING
70.000	18.700	0.000	SOUNDING
79.500	17.500	0.000	WSWE
80.500	16.800	16.200	BENT 2
95.000	10.500	0.000	SLOPE
110.000	6.800	0.000	SLOPE
119.000	6.800	5.800	GROUND AT CAP
119.010	5.400	0.000	RAIL TO CAP
120.500	5.400	0.000	RAIL TO CAP
120.510	2.600	0.000	TOP OF WALL
121.000	2.800	0.000	TOP OF WALL

### STREAMBED PROFILE (Downstream)

Top of Rail = 0FT (Sounding)

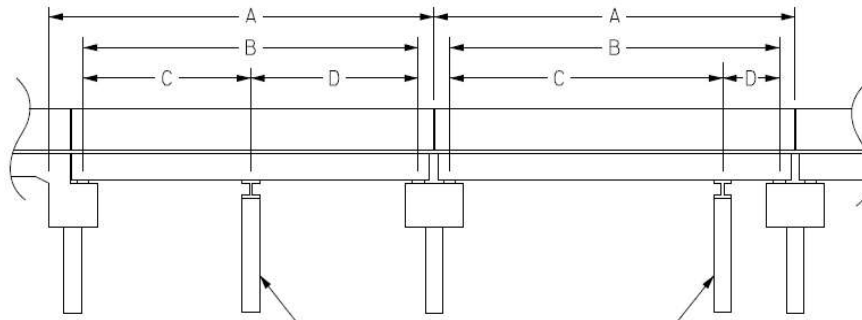


# Structure Data Worksheet

## Span Profile

County: CABARRUS

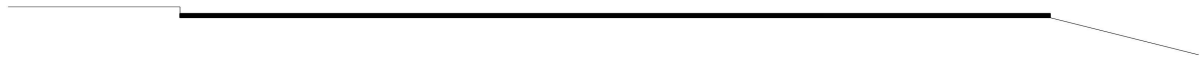
Structure Number: 120320



A: SPAN LENGTH  
 B: BEARING TO BEARING  
 C: DISTANCE FROM NEAR BEARING  
 D: DISTANCE TO FAR BEARING

Span Number	Span Length	Bearing to Bearing	Crutch/ Helper Bent	Distance to Near Bearing	Distance to Far Bearing
1	40.500	39.333			
2	40.000	39.333			
3	40.500	39.333			

# Bridge Inspection Field Sketch



Roadway	23.5ft Wide	2 Paved Lanes	Looking North
Left Shoulder	6ft Wide	2ft Paved	4ft Unpaved
Right Shoulder	4ft Wide		4ft Unpaved
Left Guardrail			
Right Guardrail			

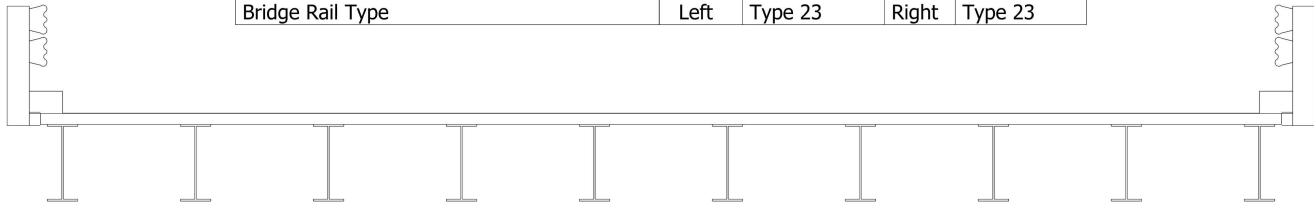
MEASUREMENTS TAKEN APPROXIMATELY 300' SOUTH OF ABUTMENT 1

Title SOUTH APPROACH ROADWAY		Description TYPICAL SECTION	
Structure No: 120320	Drawn By: ERIC A. PATTERSON	Date: 6/28/2022	Filename: S001338000064.wes



# Bridge Inspection Field Sketch

Deck Width/Out to Out	28.00ft	Between Rails	28.5ft	
Clear Roadway	28ft	Wearing Surface		
Median Width		Median Height		
Curb Height		Left	5in	Right 5in
Sidewalk Width		Left		Right
Clear Roadway (Rail to Median)		Left		Right
Guardrail Width		Left	9in	Right 9in
Top of Rail to Deck/Wearing Surface		Left	2.417ft	Right 2.417ft
Bridge Rail Type		Left	Type 23	Right Type 23



Measurements for Span #	1	ALL SPANS SIMILAR	
Deck Thickness	3in	Left Overhang	0.5ft
Top of Rail to Bottom of Beam (Avg)	4.396ft	Right Overhang	0.5ft

Beam #	Beam Type	Width	Height	Spacing	From
1	Plate Girder	8.25in	20.75in	0.5ft	Left Edge of Deck
2	Plate Girder	8.25in	20.75in	3ft	Beam 1
3	Plate Girder	8.25in	20.75in	3ft	Beam 2
4	Plate Girder	8.25in	20.75in	3ft	Beam 3
5	Plate Girder	8.25in	20.75in	3ft	Beam 4
6	Plate Girder	8.25in	20.75in	3ft	Beam 5
7	Plate Girder	8.25in	20.75in	3ft	Beam 6
8	Plate Girder	8.25in	20.75in	3ft	Beam 7
9	Plate Girder	8.25in	20.75in	3ft	Beam 8
10	Plate Girder	8.25in	20.75in	3ft	Beam 9

FLANGE THICKNESS = 1/2"  
WEB THICKNESS = 3/8"

Title  
SUPERSTRUCTURE

Description  
TYPICAL SECTION

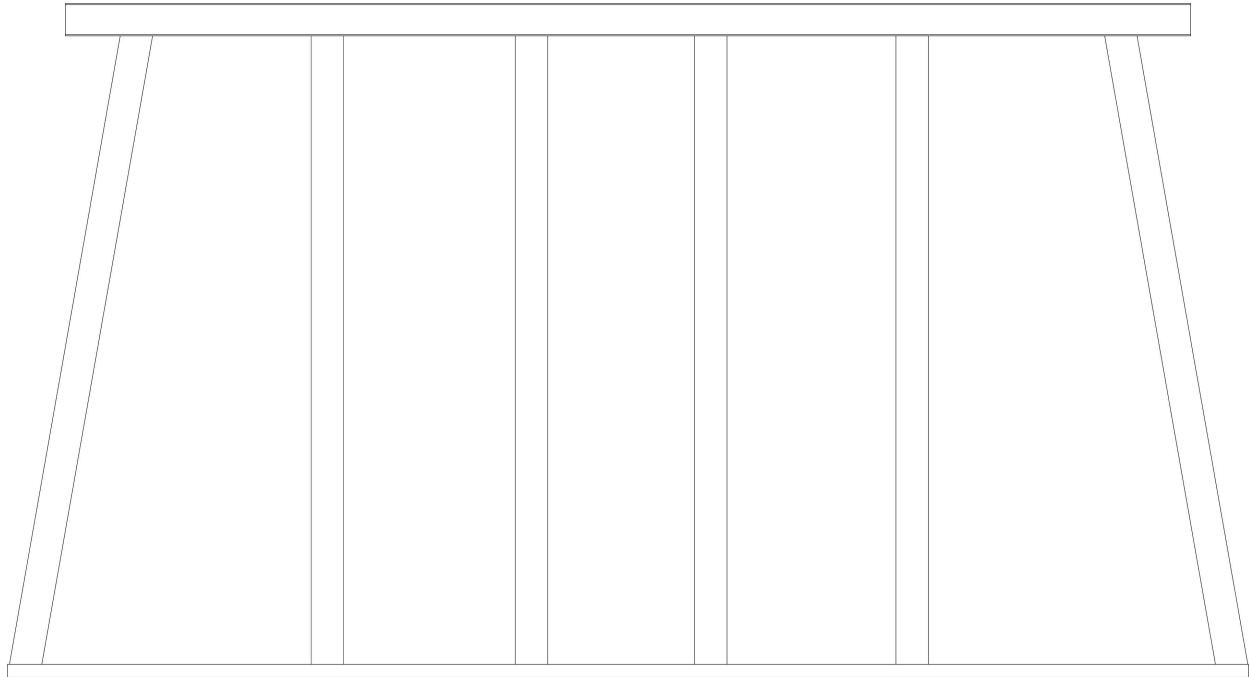
Structure No: 120320

Drawn By: ERIC A. PATTERSON

Date: 6/28/2022

Filename: S001338000065.wes

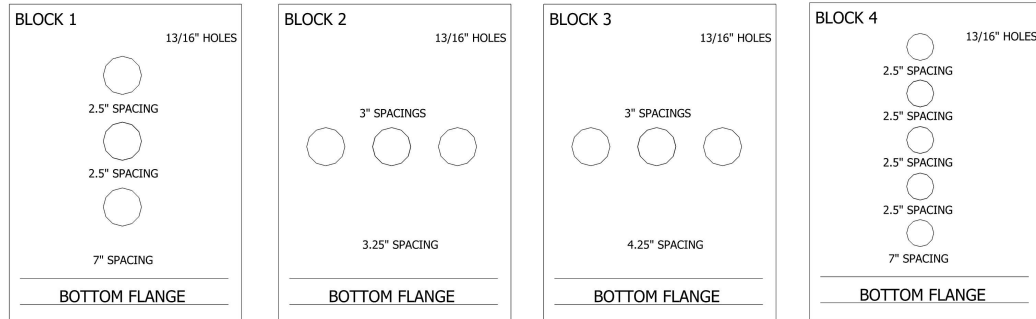
# Bridge Inspection Field Sketch



Caps							
#	Name	Type	Length	Width	Height	Left Beam to End of Cap	Right Beam to End of Cap
1	Cap 1	Steel Pier Cap	34ft	12in	12in	1.417ft	1.417ft
Piles							
#	Name	Type	Spacing	From	Height/Diam.	Width	Length
1	Pile 1	Steel Pile	1.5ft	Left End of Bent	11.746in	11.746in	14ft
2	Pile 2	Steel Pile	6.417ft	Pile 1	11.746in	11.746in	14ft
3	Pile 3	Steel Pile	6.167ft	Pile 2	11.746in	11.746in	14ft
4	Pile 4	Steel Pile	5.417ft	Pile 3	11.746in	11.746in	14ft
5	Pile 5	Steel Pile	6.083ft	Pile 4	11.746in	11.746in	14ft
6	Pile 6	Steel Pile	6.75ft	Pile 5	11.746in	11.746in	14ft
Footings							
#	Name	Type	Length	Width	Height		
1	Footing 1	Reinforced Concrete Footing	37.5ft	2.25ft	2ft		

Title SUBSTRUCTURE - INTERIOR BENTS		Description TYPICAL BENT PROFILE	
Structure No: 120320	Drawn By: ERIC A. PATTERSON	Date: 6/28/2022	Filename: S001338000066.wes

# Bridge Inspection Field Sketch



## SPAN 1 MEASUREMENTS FROM BENT 1

SPAN 1, BEAMS 2-4 & 8-10: BLOCK 1 AT 0.167', 13.85', & 28.67'; BLOCK 3 AT 0.167', 14.51', & 39.37'

SPAN 1, BEAMS 1 & 5-7: BLOCK 1 AT 0.167', 13.85', 27.35' & 28.68'; BLOCK 2 AT 15.22', 15.55', & 28.47'; BLOCK 4 AT 30.8'; SINGLE HOLE AT 1' UP, 5.5' OC BEG AT 0.167' OUT

## SPAN 2 MEASUREMENTS FROM BENT 2

SPAN 2, BEAMS 2-4, 6, 8, & 9: BLOCK 2 AT 0.167', & 28.47'; BLOCK 4 AT 39.37'; SINGLE HOLE AT 1' UP, 5.5' OC BEG AT 0.167' OUT

SPAN 2, BEAMS 5&7: BLOCK 1 AT 13.85' & 27.5'; BLOCK 2 AT 0.167', 13.5' & 28' [BOTH 7.25" UP], & 39.37'; BLOCK 4 AT 0.167'; SINGLE HOLE AT 1' UP AT 0.417' OUT

SPAN 2, BEAM 10: BLOCK 1 AT 0.33', 0.67', 15', 15.33', 26.8', 27.13', 38.96', 39.21', & 39.5'; BLOCK 3 AT 0.917', 14, 27.67', & 38.17'; SINGLE HOLE AT 1' UP AT 0.917' & 14.15' OUT

## SPAN 3 MEASUREMENTS FROM END BENT 2

SPAN 3, BEAMS 1,3, 4 & 6-8: BLOCK 1 AT 16.55', 16.88', 29.9', & 30.2'; BLOCK 3 AT 0.167', 15.8', 30.5', & 39.37'; BLOCK 4 AT 0.25' & 39.75'

SPAN 3, BEAMS 2, 5, 9, & 10: BLOCK 1 AT 0.5', 0.8', 39.17' & 39.5'; BLOCK 3 AT 12.5, 27.5', & 38.17'; SINGLE HOLE AT 1' UP AT 27.75' OUT

Title SALVAGE BEAMS		Description DETAILS	
Structure No: 120320	Drawn By: ERIC A. PATTERSON	Date: 6/28/2022	Filename: S001338000067.wes



APPROXIMATELY 1/2 MILE SOUTH OF ABUT MENT 1, ADVANCE WARNING POSTING



BENT 1 LOOKING NORTH [BENT 2 SIMILAR]





APPROXIMATELY 500' NORTH OF ABUTMENT 2, POSTING



APPROXIMATELY 500' SOUTH OF THE STRUCTURE, POSTING





SOUTH APPROACH LOOKING NORTH



UPSTREAM VIEW, LOOKING WEST





FROM THE DECK, LOOKING SOUTH



FROM THE DECK, LOOKING NORTH





DOWNSTREAM VIEW, LOOKING EAST



NORTH APPROACH LOOKING SOUTH





ABUTMENT 2, LOOKING NORTH



UPSTREAM, LOOKING EAST





ABUTMENT 1, LOOKING SOUTH



SPAN 2 LOOKING NORTH [ALL SPANS SIMILAR]





DOWNSTREAM, LOOKING WEST

STATE	PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	22350061	1	33

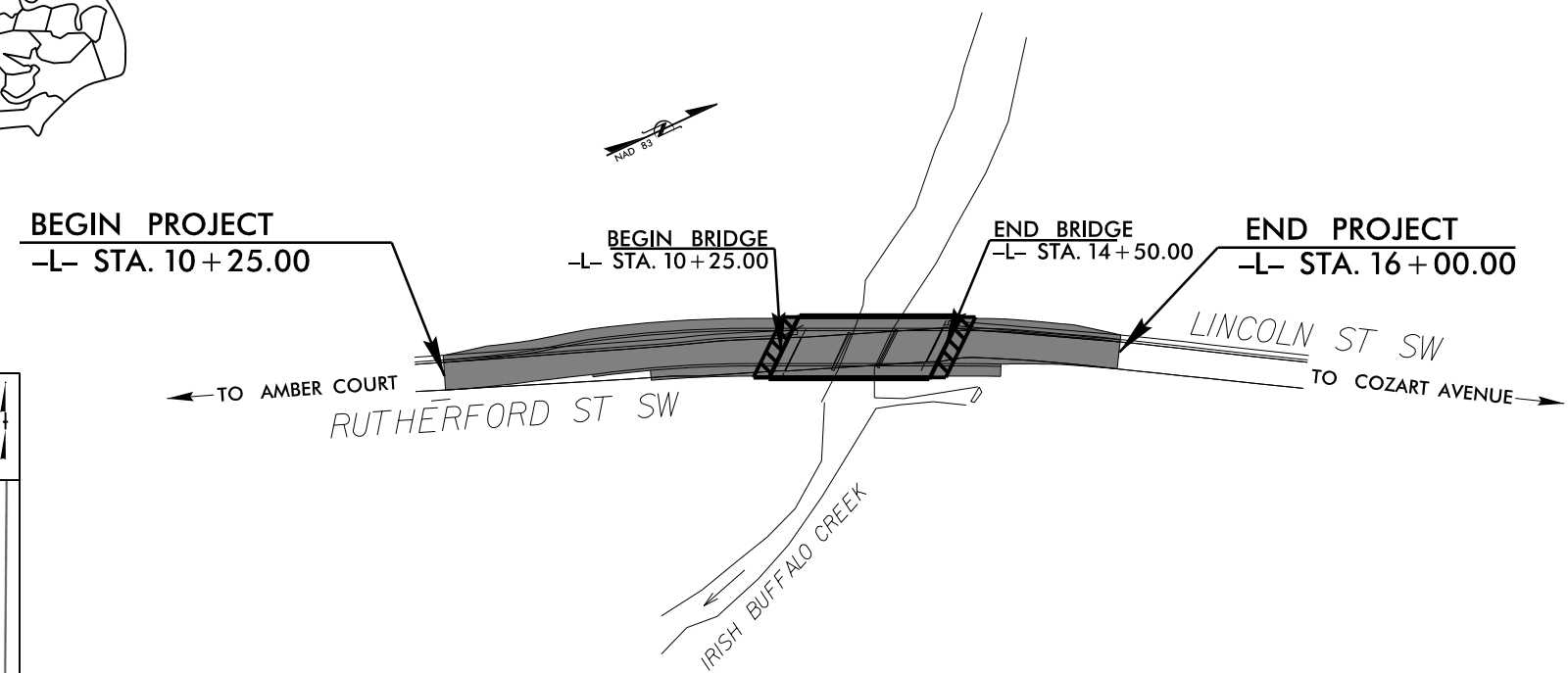
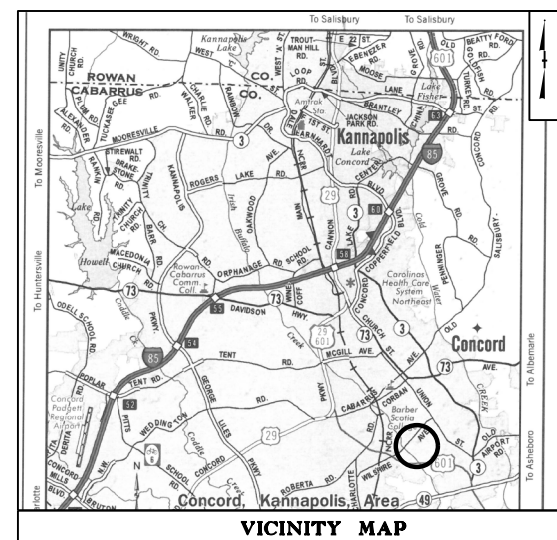
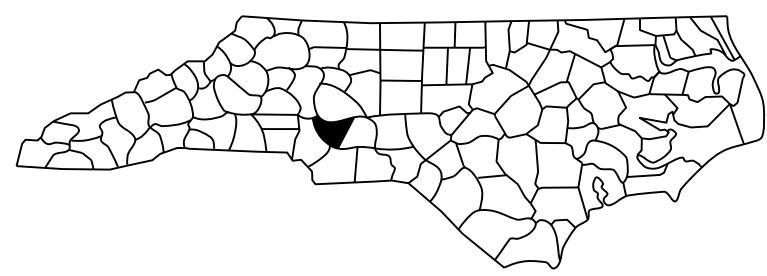
CITY OF CONCORD  
NORTH CAROLINA

# STRUCTURE SUBSURFACE INVESTIGATION

STATE NORTH CAROLINA  
COUNTY CABARRUS  
PROJECT DESCRIPTION REPLACE BRIDGE NO. 120320 ON  
LINCOLN STREET SW OVER IRISH BUFFALO  
CREEK

**CONTENTS**

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
3	SITE PLAN
4	PROFILE
5-8	CROSS SECTIONS
9-13	BORE LOGS AND CORE LOGS
14-16	CORE PHOTOS
17	SOIL TEST RESULTS
18-32	CONSOLIDATION TEST RESULTS
33	SITE PHOTO



PERSONNEL

- J. SWARTLEY
- M. HARTMAN
- J. LITTLE
- D. WEBER

INVESTIGATED BY S&ME, Inc.  
DRAWN BY J. SWARTLEY  
CHECKED BY J. DAILY  
SUBMITTED BY S&ME, Inc.  
DATE JUNE 2023



9751 SOUTHERN PINE BLVD  
CHARLOTTE, NC 28273  
(704) 523-4726

PROJECT: 22350061



SIGNATURE \_\_\_\_\_ DATE \_\_\_\_\_

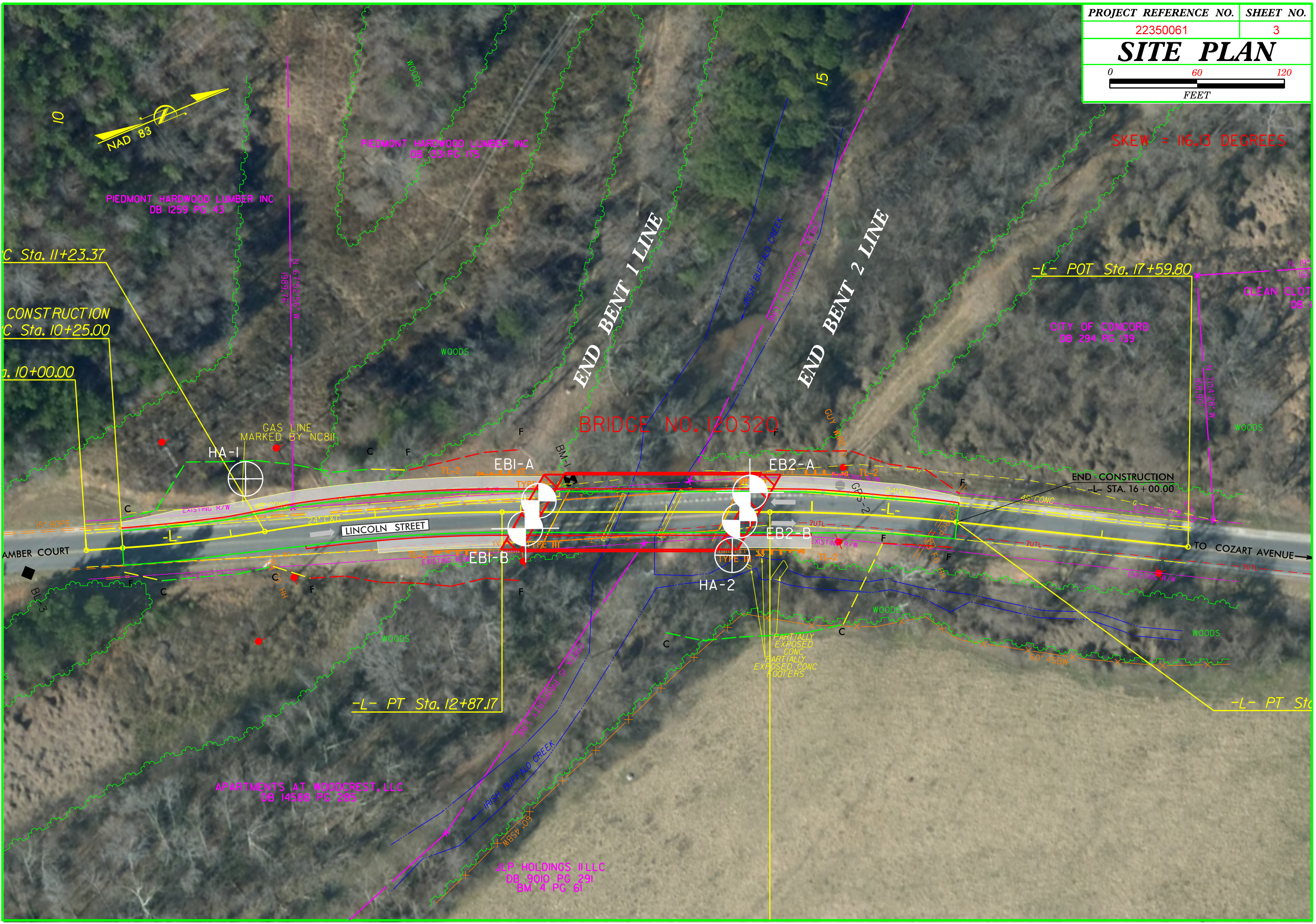
**DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED**

# SUBSURFACE INVESTIGATION

## SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION										GRADATION										ROCK DESCRIPTION										USCS SOIL CLASSIFICATION																																																														
<p>SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</p>										<p>WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.</p>										<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL, SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p>										<p>GW - WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES GP - POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES GM - SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES GC - CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES SW - WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES SP - POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES SM - SILTY SANDS, SAND-SILT MIXTURES SC - CLAYEY SANDS, SAND-CLAY MIXTURES ML - INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY CL - INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS OL - ORGANIC SILTS AND ORGANIC CLAYS OF LOW PLASTICITY MH - INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS, ELASTIC SILTS CH - INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS OH - ORGANIC SILTS AND ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY</p>																																																														
<p><b>SOIL LEGEND AND AASHTO CLASSIFICATION</b></p> <table border="1" style="width: 100%; text-align: center;"> <tr> <th rowspan="2">GENERAL CLASS.</th> <th colspan="5">GRANULAR MATERIALS (≤ 35% PASSING #200)</th> <th colspan="5">SILT-CLAY MATERIALS (&gt; 35% PASSING #200)</th> <th colspan="5">ORGANIC MATERIALS</th> </tr> <tr> <th>A-1</th> <th>A-1-b</th> <th>A-2</th> <th>A-2-4</th> <th>A-2-5</th> <th>A-2-6</th> <th>A-2-7</th> <th>A-4</th> <th>A-5</th> <th>A-6</th> <th>A-7</th> <th>A-1, A-2</th> <th>A-3</th> <th>A-4, A-5</th> <th>A-6, A-7</th> </tr> <tr> <th>GROUP CLASS.</th> <td>A-1-a</td> <td>A-1-b</td> <td>A-2-4</td> <td>A-2-5</td> <td>A-2-6</td> <td>A-2-7</td> <td>A-4</td> <td>A-5</td> <td>A-6</td> <td>A-7</td> <td>A-1, A-2</td> <td>A-3</td> <td>A-4, A-5</td> <td>A-6, A-7</td> <td></td> </tr> <tr> <th>SYMBOL</th> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>										GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)					SILT-CLAY MATERIALS (> 35% PASSING #200)					ORGANIC MATERIALS					A-1	A-1-b	A-2	A-2-4	A-2-5	A-2-6	A-2-7	A-4	A-5	A-6	A-7	A-1, A-2	A-3	A-4, A-5	A-6, A-7	GROUP CLASS.	A-1-a	A-1-b	A-2-4	A-2-5	A-2-6	A-2-7	A-4	A-5	A-6	A-7	A-1, A-2	A-3	A-4, A-5	A-6, A-7		SYMBOL																<p><b>MINERALOGICAL COMPOSITION</b></p> <p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.</p>										<p><b>WEATHERING</b></p> <p>FRESH: ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.</p> <p>VERY SLIGHT (IV SLI): ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.</p> <p>SLIGHT (SLI): ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.</p> <p>MODERATE (MOD.): SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.</p> <p>MODERATELY SEVERE (MOD. SEV.): ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. IF TESTED, WOULD YIELD SPT REFUSAL.</p> <p>SEVERE (SEV.): ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED, WOULD YIELD SPT N VALUES &gt; 100 BPF.</p> <p>VERY SEVERE (IV SEV.): ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF.</p> <p>COMPLETE: ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.</p>									
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<p><b>COLOR</b></p> <p>DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.</p>										<p><b>ROCK HARDNESS</b></p> <p>VERY HARD: CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.</p> <p>HARD: CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.</p> <p>MODERATELY HARD: CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.</p> <p>MEDIUM HARD: CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.</p> <p>SOFT: CAN BE GROOVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.</p> <p>VERY SOFT: CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.</p>																																																																																		
<p><b>FRACTURE SPACING</b></p> <table border="1" style="width: 100%; text-align: center;"> <tr> <th>TERM</th> <th>SPACING</th> </tr> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FOOT</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> </tr> </table>										TERM	SPACING	VERY WIDE	MORE THAN 10 FEET	WIDE	3 TO 10 FEET	MODERATELY CLOSE	1 TO 3 FEET	CLOSE	0.16 TO 1 FOOT	VERY CLOSE	LESS THAN 0.16 FEET	<p><b>BEDDING</b></p> <table border="1" style="width: 100%; text-align: center;"> <tr> <th>TERM</th> <th>THICKNESS</th> </tr> <tr> <td>VERY THICKLY BEDDED</td> <td>4 FEET</td> </tr> <tr> <td>THICKLY BEDDED</td> <td>1.5 - 4 FEET</td> </tr> <tr> <td>THINLY BEDDED</td> <td>0.16 - 1.5 FEET</td> </tr> <tr> <td>VERY THINLY BEDDED</td> <td>0.03 - 0.16 FEET</td> </tr> <tr> <td>THICKLY LAMINATED</td> <td>0.008 - 0.03 FEET</td> </tr> <tr> <td>THINLY LAMINATED</td> <td>&lt; 0.008 FEET</td> </tr> </table>										TERM	THICKNESS	VERY THICKLY BEDDED	4 FEET	THICKLY BEDDED	1.5 - 4 FEET	THINLY BEDDED	0.16 - 1.5 FEET	VERY THINLY BEDDED	0.03 - 0.16 FEET	THICKLY LAMINATED	0.008 - 0.03 FEET	THINLY LAMINATED	< 0.008 FEET																																															
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<p><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <p>FRIABLE: RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</p> <p>MODERATELY INDURATED: GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</p> <p>INDURATED: GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</p> <p>EXTREMELY INDURATED: SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>										<p><b>TERMS AND DEFINITIONS</b></p> <p>ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.</p> <p>ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.</p> <p>CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.</p> <p>CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.</p> <p>FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.</p> <p>FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.</p> <p>LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.</p> <p>ROCK QUALITY DESIGNATION (ROQ) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.</p> <p>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.</p> <p>TOPSOIL (TS) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>																																																																																		
<p><b>NOTES:</b></p> <p>FIAD - FILLED IMMEDIATELY AFTER DRILLING</p>										<p>BENCH MARK: NAIL IN BASE OF 20" SYCAMORE N: 600563 E: 1528755 ELEVATION: 577.740 FEET</p>																																																																																		





SKEW = 116.13 DEGREES

BRIDGE NO. 120320

-L- PT Sta. 12+87.17

-L- POT Sta. 17+59.80

END CONSTRUCTION  
-L- STA. 16+00.00

-L- PT Sta.

C Sta. 11+23.37

CONSTRUCTION  
C Sta. 10+25.00

C Sta. 10+00.00

APARTMENTS AT WOODCREST, LLC  
DB 14588 PG 285

J.P. HOLDINGS LLC  
DB 9000 PG 291  
DM 1 PG 61

PIEDMONT HARDWOOD LUMBER INC  
DB 1259 PG 43

PIEDMONT HARDWOOD LUMBER INC  
DB 1331 PG 175

CITY OF CONCORD  
DB 294 PG 139

CLEAN CLOT  
DB 1



10

15

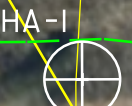
N 25° 16' 00" W  
168.90'

N 71° 14' 28" W  
168.90'

TO COZART AVENUE

AMBER COURT

LINCOLN STREET



HA-2

EBI-A

EB2-A

EBI-B

EB2-B

END BENT 1 LINE

END BENT 2 LINE

IRISH BUFFALO CREEK

IRISH BUFFALO CREEK IS PROPERTY LINE

GUY WOOD

IRISH BUFFALO CREEK IS PROPERTY LINE

GUY WOOD

PARTIALLY EXPOSED CONC  
PARTIALLY EXPOSED CONC  
FOOTERS

WOODS

WOODS

WOODS

WOODS

WOODS

WOODS

WOODS

WOODS

WOODS

WOODS

WOODS

WOODS

N 67° 32' 56" W  
1989.76'

N 25° 16' 00" W  
168.90'

N 71° 14' 28" W  
168.90'

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168.90'

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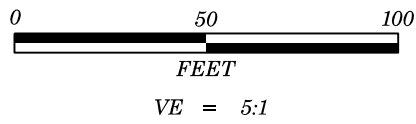
BL 3

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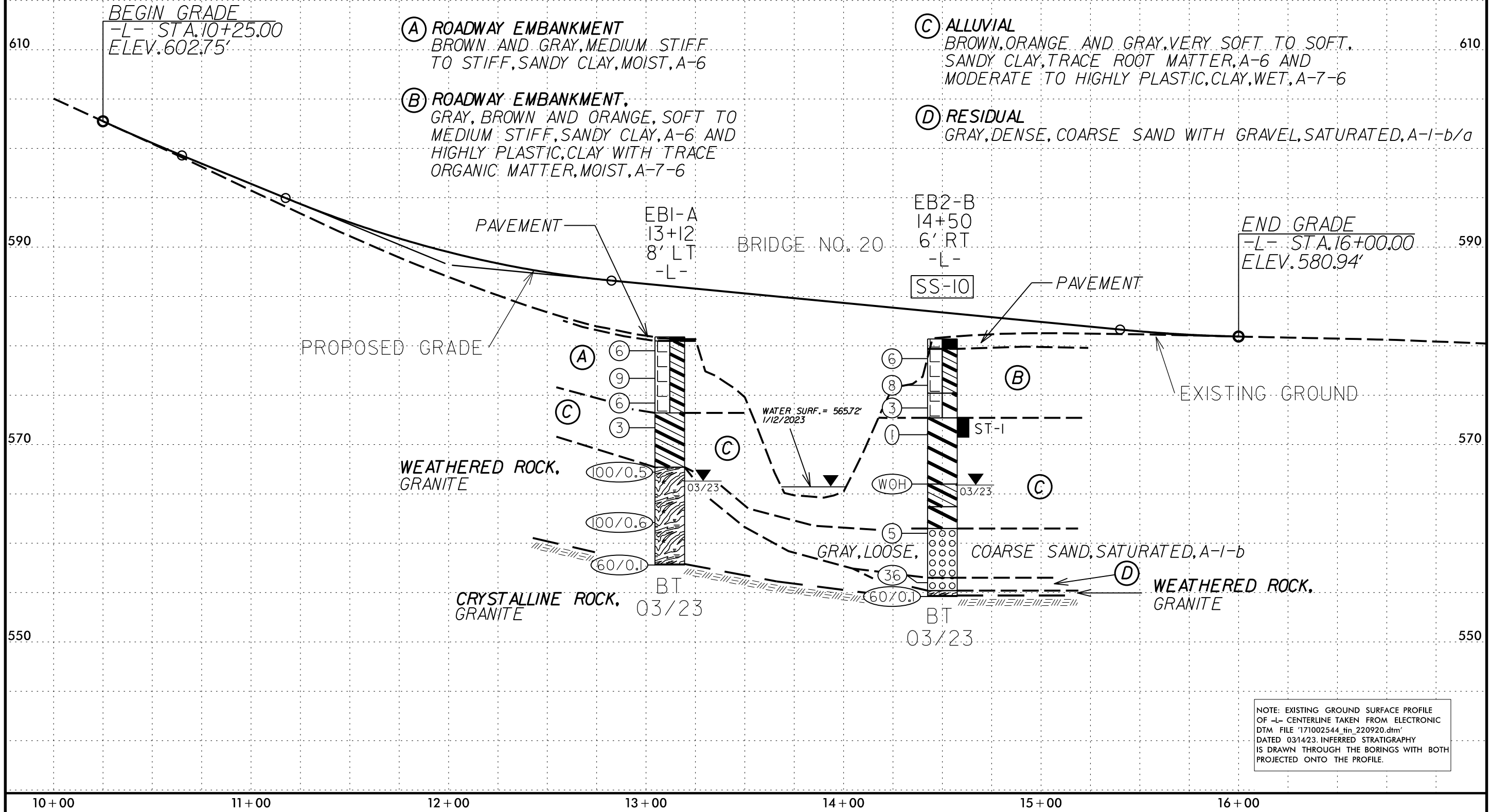


5/14/99

-L-



PROJECT REFERENCE NO.	SHEET NO.
22350061	4
PROFILE PROJECTED ALONG CENTERLINE OF -L-	

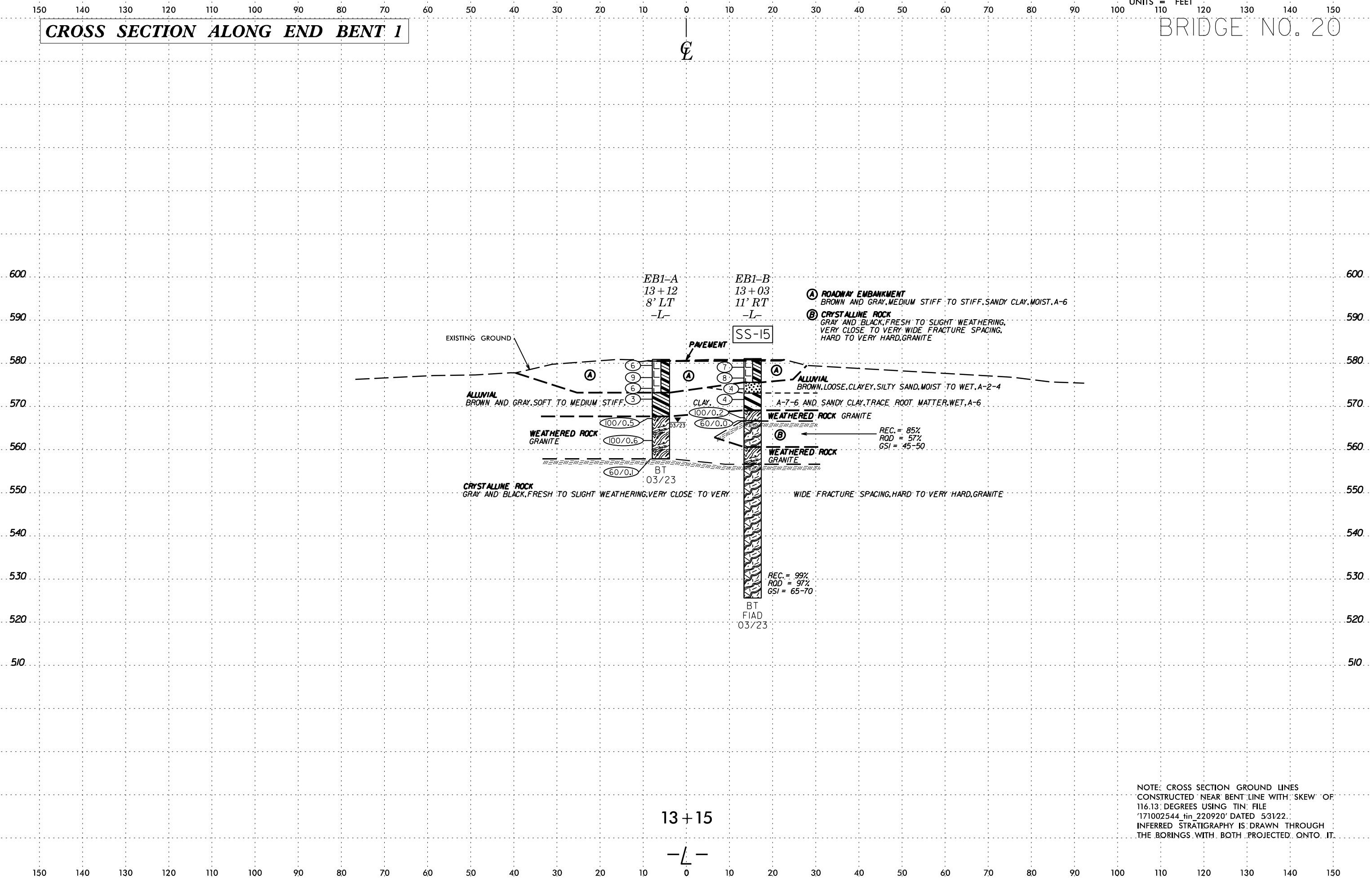


NOTE: EXISTING GROUND SURFACE PROFILE OF -L- CENTERLINE TAKEN FROM ELECTRONIC DTM FILE '171002544\_tin\_220920.dtm' DATED 03/14/23. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.

6/23/16

# CROSS SECTION ALONG END BENT 1

## BRIDGE NO. 20



EXISTING GROUND

EB1-A  
13+12  
8' LT  
-L-

EB1-B  
13+03  
11' RT  
-L-

SS-15

- (A) ROADWAY EMBANKMENT**  
BROWN AND GRAY, MEDIUM STIFF TO STIFF, SANDY CLAY, MOIST, A-6
- (B) CRYSTALLINE ROCK**  
GRAY AND BLACK, FRESH TO SLIGHT WEATHERING, VERY CLOSE TO VERY WIDE FRACTURE SPACING, HARD TO VERY HARD, GRANITE

ALLUVIAL  
BROWN AND GRAY, SOFT TO MEDIUM STIFF

ALLUVIAL  
BROWN, LOOSE, CLAYEY, SILTY SAND, MOIST TO WET, A-2-4

A-7-6 AND SANDY CLAY, TRACE ROOT MATTER, WET, A-6

WEATHERED ROCK  
GRANITE

WEATHERED ROCK  
GRANITE

WEATHERED ROCK  
GRANITE

CRYSTALLINE ROCK  
GRAY AND BLACK, FRESH TO SLIGHT WEATHERING, VERY CLOSE TO VERY

WIDE FRACTURE SPACING, HARD TO VERY HARD, GRANITE

REC. = 85%  
ROD = 57%  
GSI = 45-50

REC. = 99%  
ROD = 97%  
GSI = 65-70

BT

03/23

BT

FIAD

03/23

13+15

-L-

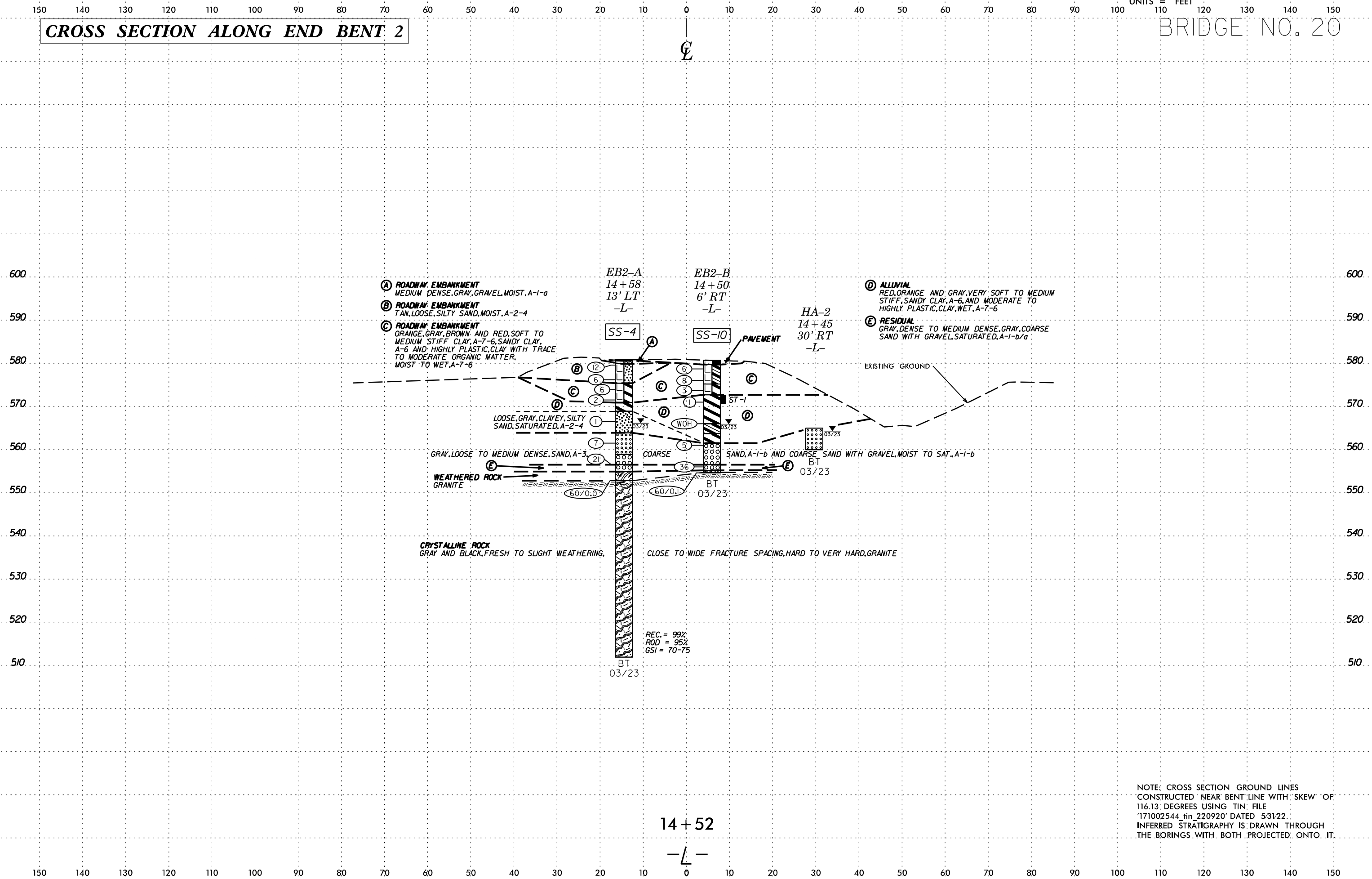
NOTE: CROSS SECTION GROUND LINES  
CONSTRUCTED NEAR BENT LINE WITH SKEW OF  
116.13 DEGREES USING TIN FILE  
'171002544.tin\_220920' DATED 5/31/22.  
INFERRED STRATIGRAPHY IS DRAWN THROUGH  
THE BORINGS WITH BOTH PROJECTED ONTO IT.

SYTIME CONSTRUCTION SOFTWARE

6/23/16

# CROSS SECTION ALONG END BENT 2

## BRIDGE NO. 20

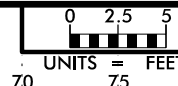


NOTE: CROSS SECTION GROUND LINES CONSTRUCTED NEAR BENT LINE WITH SKEW OF 116.13 DEGREES USING TIN FILE '171002544.tin\_220920' DATED 5/31/22. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO IT.

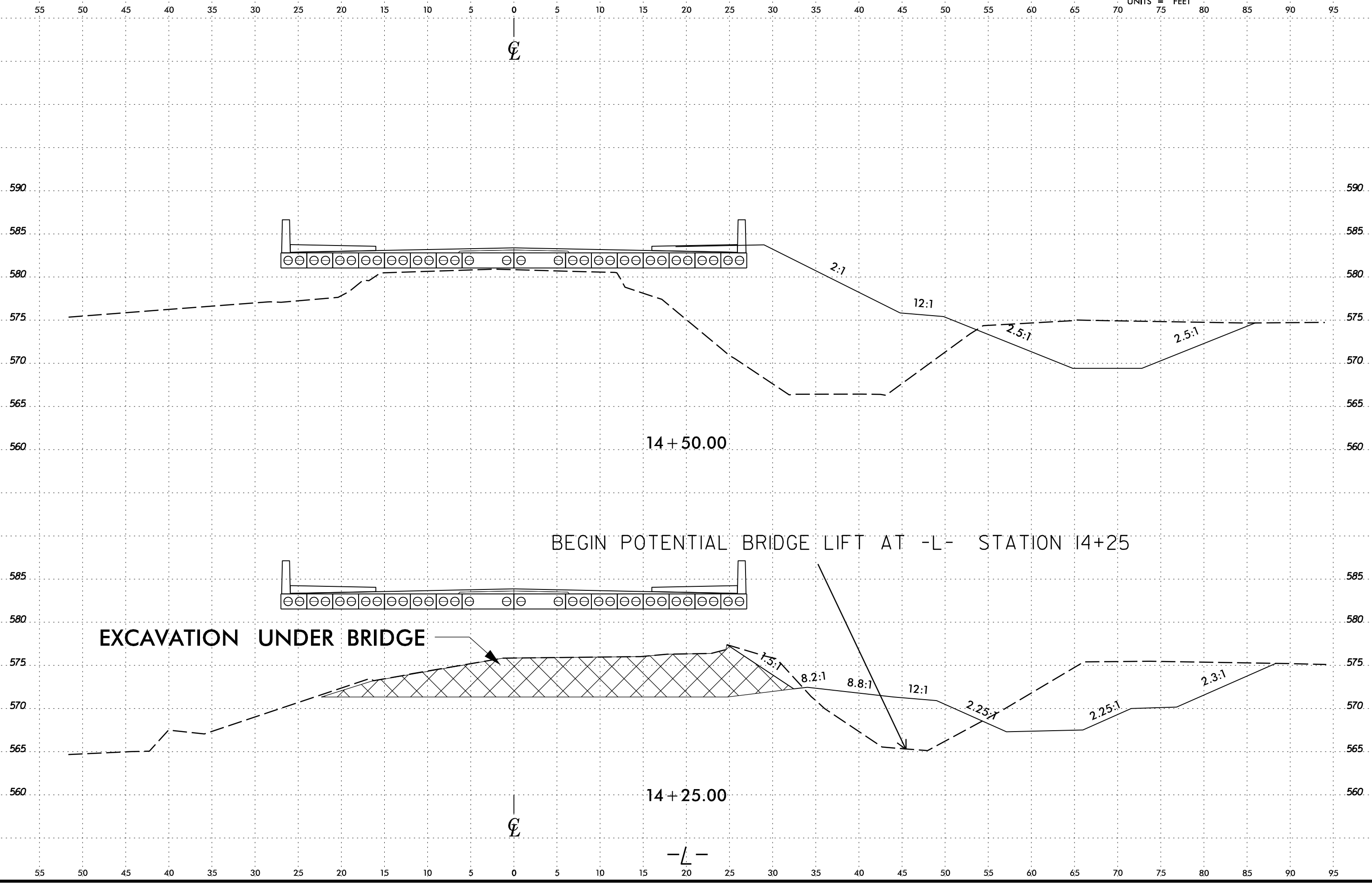
14+52

-L-

6/23/16

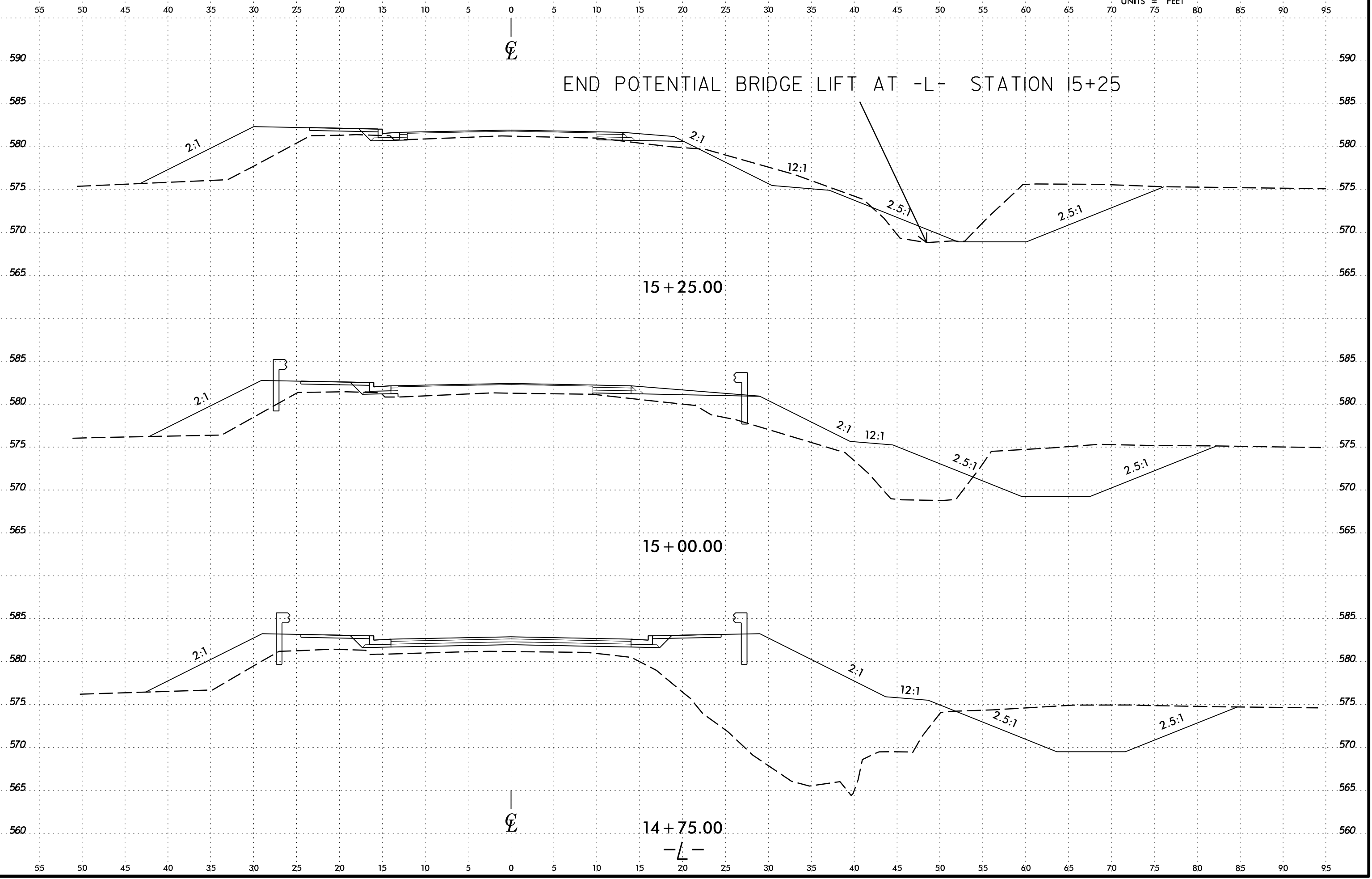


PROJ. REFERENCE NO.	SHEET NO.
22350061	7





### END POTENTIAL BRIDGE LIFT AT -L- STATION 15+25



SCHEMATIC CROSS SECTION  
BRIDGE

# GEOTECHNICAL BORING REPORT

## BORE LOG

WBS N/A		TIP N/A		COUNTY CABARRUS		GEOLOGIST Hartman, M.	
SITE DESCRIPTION BRIDGE NO. 20 ON LINCOLN STREET (-L-) OVER IRISH BUFFALO CREEK							GROUND WTR (ft)
BORING NO. EB1-A		STATION 13+12		OFFSET 8 ft LT		ALIGNMENT -L-	
COLLAR ELEV. 580.9 ft		TOTAL DEPTH 23.1 ft		NORTHING 600,537		EASTING 1,528,760	
DRILL RIGHAMMER EFF./DATE SVE6673 CME-550X 82% 05/11/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic	
DRILLER Little, J.		START DATE 03/23/23		COMP. DATE 03/23/23		SURFACE WATER DEPTH N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
585															
580	580.5	0.4	9	3	3									GROUND SURFACE	0.0
	577.7	3.2	7	5	4									ROADWAY EMBANKMENT (PAVEMENT)	
	575.2	5.7	2	3	3									MEDIUM STIFF TO STIFF, BROWN AND GRAY, SANDY CLAY, A-6	
575	572.7	8.2	2	1	2									ALLUVIAL	7.7
	567.7	13.2	100/0.5											SOFT, BROWN AND GRAY, SANDY CLAY, TRACE ROOT MATTER, A-6	
570	562.7	18.2	75	25/0.1										WEATHERED ROCK (GRANITE)	13.2
565	557.9	23.0	60/0.1											CRYSTALLINE ROCK (GRANITE)	23.0
560														Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 557.8 ft IN CRYSTALLINE ROCK (GRANITE)	23.1

NCDOT BORE DOUBLE LINCOLN STREET.GPJ NC\_DOT.GDT 5/19/23







# GEOTECHNICAL BORING REPORT

## BORE LOG

WBS N/A		TIP N/A		COUNTY CABARRUS		GEOLOGIST Swartley, J.										
SITE DESCRIPTION BRIDGE NO. 20 ON LINCOLN STREET (-L-) OVER IRISH BUFFALO CREEK							GROUND WTR (ft)									
BORING NO. EB2-B		STATION 14+50		OFFSET 6 ft RT		ALIGNMENT -L-	0 HR. N/A									
COLLAR ELEV. 580.7 ft		TOTAL DEPTH 26.1 ft		NORTHING 600,659		EASTING 1,528,826	24 HR. 14.8									
DRILL RIGHAMMER EFF./DATE SVE6673 CME-550X 82% 05/11/2022				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER Little, J.		START DATE 03/22/23		COMP. DATE 03/22/23		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100			ELEV. (ft)	DEPTH (ft)		
585																
580	579.7	1.0	6	3	3							M		580.7	0.0	GROUND SURFACE
														579.7	1.0	ROADWAY EMBANKMENT (PAVEMENT)
	577.0	3.7	3	4	4							M				MEDIUM STIFF, ORANGE, SANDY CLAY, A-6
575	574.7	6.0	1	1	2							W		575.2	5.5	SOFT, GRAY AND BROWN, HIGHLY PLASTIC, CLAY WITH TRACE TO MODERATE ORGANIC MATTER, A-7-6
	572.0	8.7	WOH	WOH	1							W		572.7	8.0	ALLUVIAL
570																VERY SOFT, ORANGE, MODERATE TO HIGHLY PLASTIC, CLAY, A-7-5
	567.0	13.7	WOH	WOH	WOH											
565														566.0	14.7	VERY SOFT, GRAY, SANDY CLAY, A-6
	562.0	18.7	1	2	3									563.7	17.0	VERY SOFT, ORANGE, HIGHLY PLASTIC, CLAY, A-7-6
560													Sat.	561.5	19.2	LOOSE, GRAY, COARSE SAND, A-1-b
	557.0	23.7	5	20	16									556.5	24.2	RESIDUAL
555	554.7	26.0											Sat.	555.2	25.5	DENSE, GRAY, COARSE SAND WITH GRAVEL, A-1-b/a
														554.7	26.0	WEATHERED ROCK (GRANITE)
														554.6	26.1	CRYSTALLINE ROCK (GRANITE)
																Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 554.6 ft IN CRYSTALLINE ROCK (GRANITE)
																Other Samples: ST-1 (8.0 - 10.0)

NCDOT BORE DOUBLE LINCOLN STREET.GPJ NC\_DOT.GDT 5/19/23

# GEOTECHNICAL BORING REPORT

## BORE LOG

WBS N/A		TIP N/A		COUNTY CABARRUS		GEOLOGIST Swartley, J.		
SITE DESCRIPTION BRIDGE NO. 20 ON LINCOLN STREET (-L-) OVER IRISH BUFFALO CREEK							GROUND WTR (ft)	
BORING NO. HA-1		STATION 11+16		OFFSET 38 ft LT		ALIGNMENT -L-		
COLLAR ELEV. 608.2 ft		TOTAL DEPTH 5.1 ft		NORTHING 600,357		EASTING 1,528,668		
DRILL RIG/HAMMER EFF./DATE N/A				DRILL METHOD Hand Auger		HAMMER TYPE Sowers DCP		
DRILLER Swartley, J.		START DATE 03/22/23		COMP. DATE 03/22/23		SURFACE WATER DEPTH N/A		
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	DCP BLOWS			SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION
			1.75"	1.75"	1.75"			
610								
	608.2	0.0	2	3	5			608.2 GROUND SURFACE 0.0
	607.2	1.0	3	4	2			RESIDUAL SOFT, ORANGE, SANDY CLAY, A-6
	606.2	2.0	5	13	24	S-6	24%	
605	605.2	3.0	18	25/1.0"				605.2 DENSE, TAN AND GRAY, SAPROLITIC, SILTY SAND, A-2-4 3.0
	604.2	4.0	25/1.0"			M		
	603.2	5.0	25/1.0"					603.2 Boring Terminated at Elevation 603.2 ft IN DENSE SILTY SAND (RESIDUAL) 5.1

WBS N/A		TIP N/A		COUNTY CABARRUS		GEOLOGIST Swartley, J.								
SITE DESCRIPTION BRIDGE NO. 20 ON LINCOLN STREET (-L-) OVER IRISH BUFFALO CREEK							GROUND WTR (ft)							
BORING NO. HA-2		STATION 14+45		OFFSET 30 ft RT		ALIGNMENT -L-								
COLLAR ELEV. 571.7 ft		TOTAL DEPTH 5.0 ft		NORTHING 600,645		EASTING 1,528,846								
DRILL RIG/HAMMER EFF./DATE N/A				DRILL METHOD Hand Auger		HAMMER TYPE N/A								
DRILLER Swartley, J.		START DATE 03/22/23		COMP. DATE 03/22/23		SURFACE WATER DEPTH N/A								
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)
575														
														571.7 GROUND SURFACE 0.0
														ALLUVIAL LOOSE, GRAY, SAND, A-3
570														566.7 Boring Terminated at Elevation 566.7 ft IN LOOSE SAND (ALLUVIAL) 5.0
														*Hole caving at 5.0 feet due to water table; could not advance with Hand Auger beyond this depth*

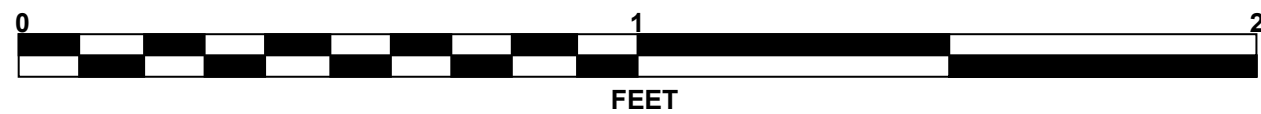
NCDOT BORE DOUBLE LINCOLN STREET.GPJ NC\_DOT.GDT 6/16/23



# CORE PHOTOGRAPHS

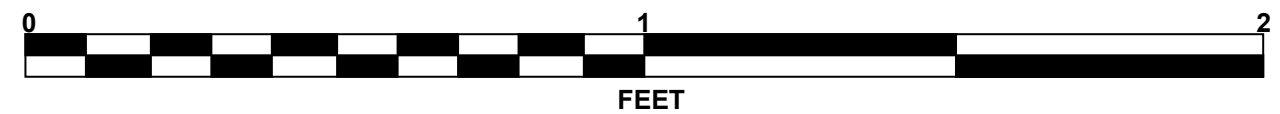
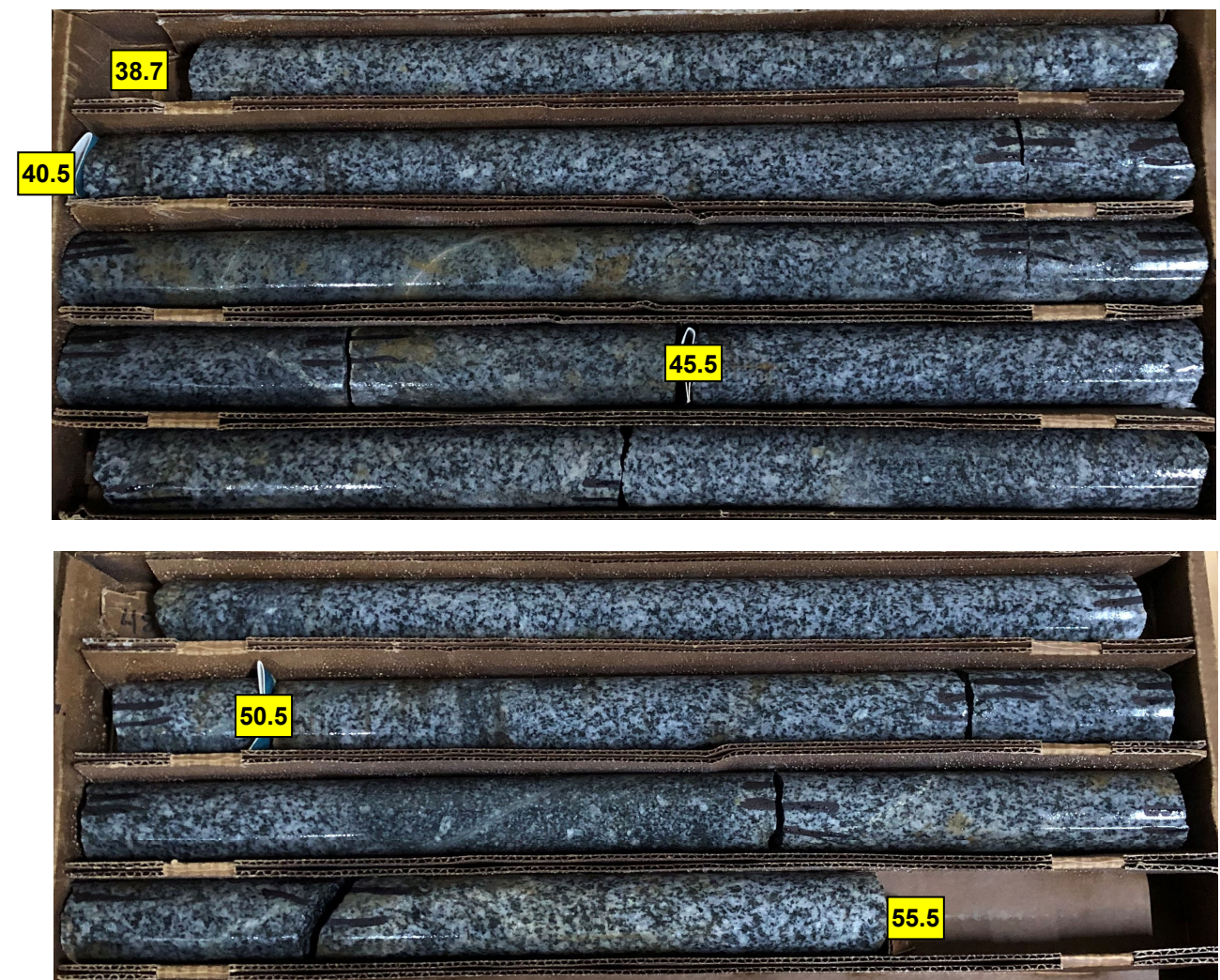
## EB1-B

BOXES 1 & 2: 14.4 - 38.7 FEET



## EB1-B

BOXES 3 & 4: 38.7 - 55.5 FEET

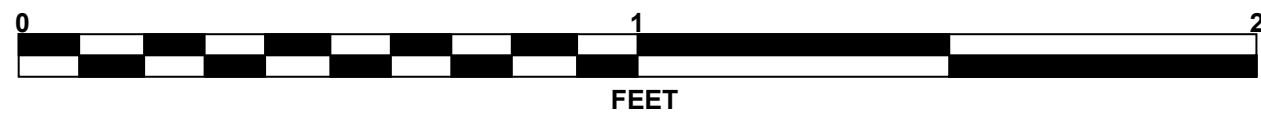
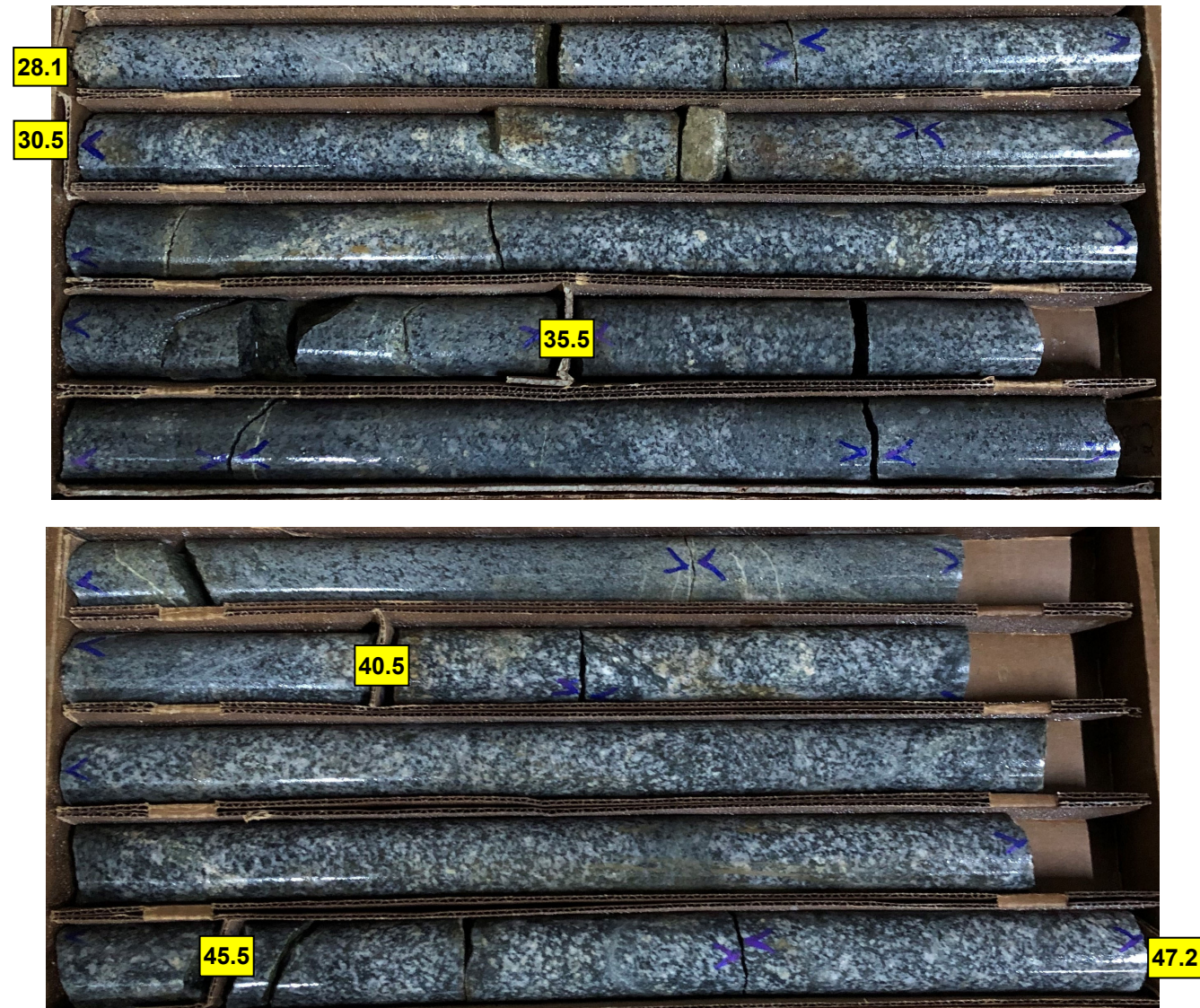




# CORE PHOTOGRAPHS

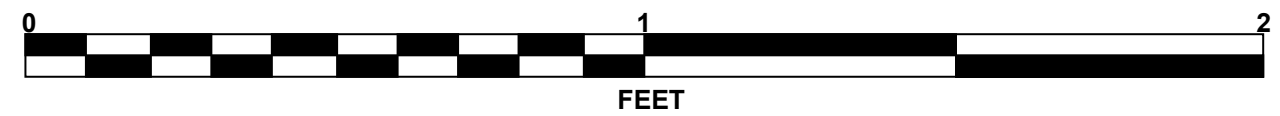
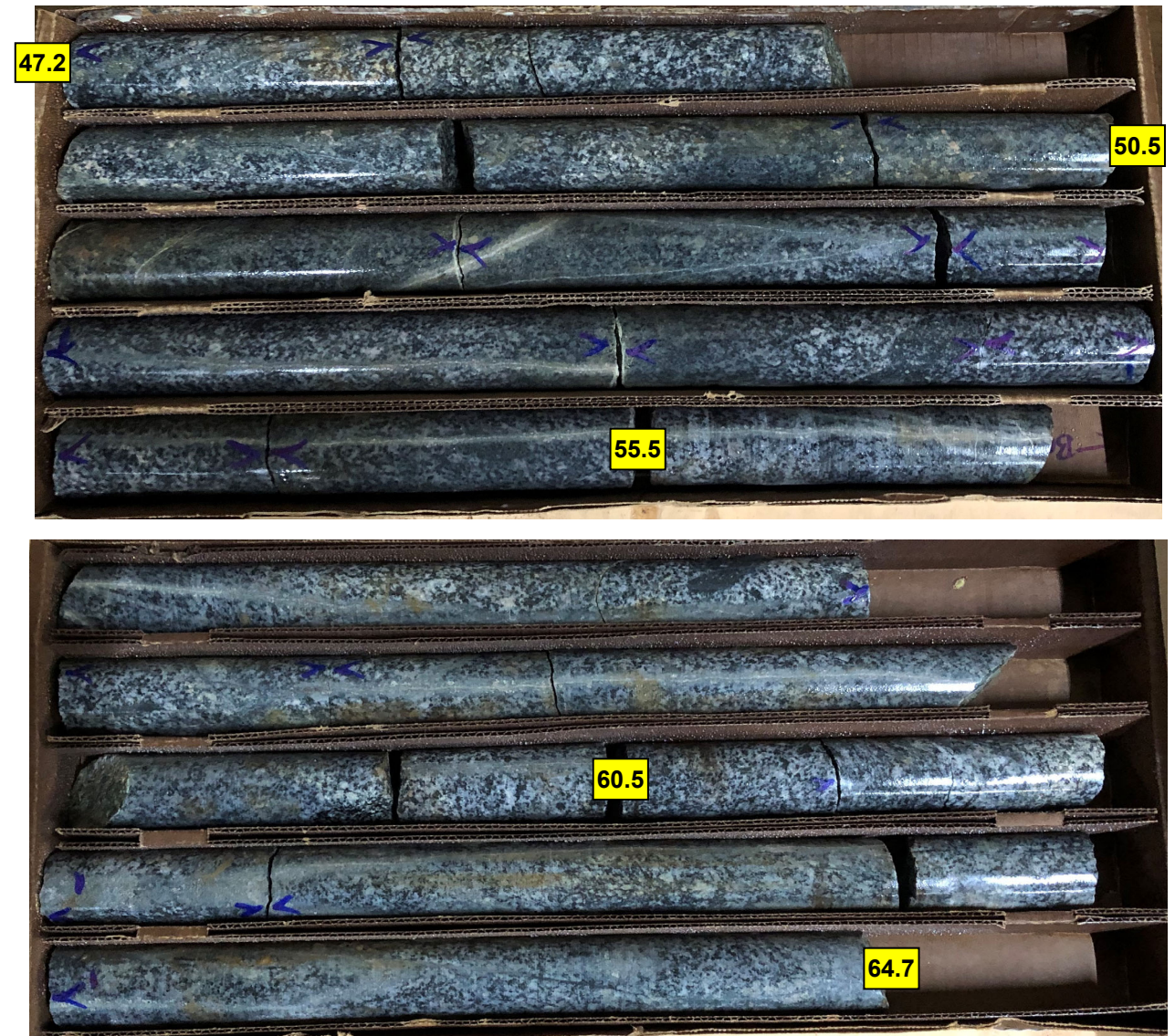
## EB2-A

BOXES 1 & 2: 28.1 - 47.2 FEET



## EB2-A

BOXES 3 & 4: 47.2 - 64.7 FEET

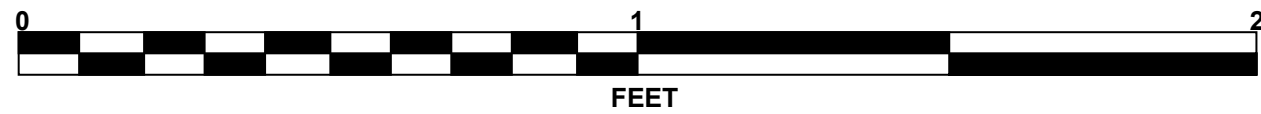
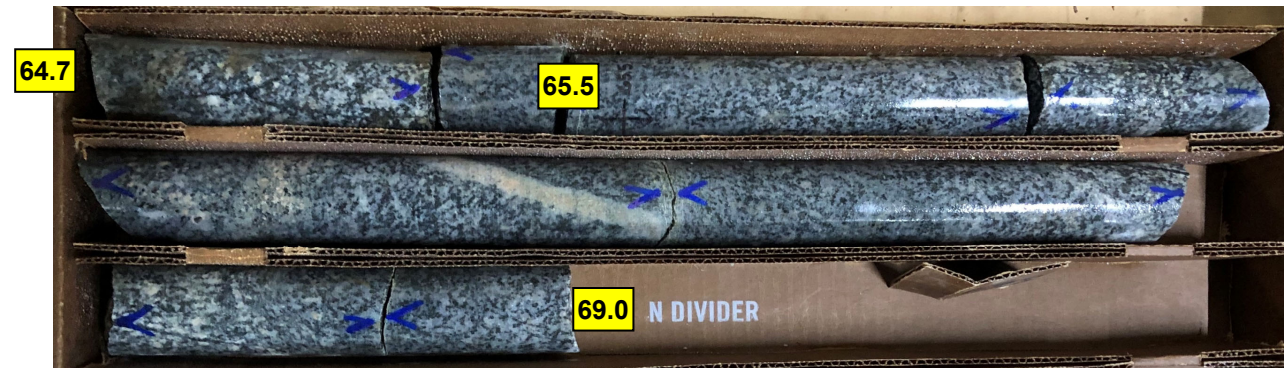




# CORE PHOTOGRAPHS

## EB2-A

BOX 5: 64.7 - 69.0 FEET





### SUMMARY OF LABORATORY TEST DATA

Soil Classification and Gradation

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

S&ME Project #: 22350061 Date Report 5/19/2023

State Project No.: N/A County: Cabarrus Date Tested 5/15 - 5/19/23

Federal ID No.: N/A TIP No.: N/A

Project Name: Lincoln Street Bridge Replacement

Client Name: Stantec, Inc. Client Address: Raleigh, NC

Sample No.	Boring No.	Station No.	Offset	Alignment	Sample Depth (ft)	AASHTO Classification	Total % Passing				Total Mortar Fraction (%)				LL	PL	PI	Moist. %	
							Sieve #				Coarse Sand	Fine Sand	Silt	Clay					
							10	40	60	200									
SS-4	EB2-A	14+58	13' LT	-L-	13.4-14.9	A-2-4 (0)	100	99	89	35.4	11	61	12	16	26	23	3	28.5	
S-6	HA-1	11+15	38' LT	-L-	0.0-3.0	A-6 (3)	97	74	65	44.8	33	25	11	31	38	25	13	24.0	
SS-10	EB2-B	14+50	6' RT	-L-	13.7-14.7	A-7-6 (23)	100	99	98	91.7	2	11	35	52	50	28	22	34.5	
SS-15	EB1-B	13+03	11' RT	-L-	6.0-7.5	A-2-4 (0)	99	87	64	32.5	36	36	11	17	27	25	2	24.1	
ST-1	EB2-B	14+50	6' RT	-L-	8.0-10.0	A-7-5 (30)	100	99	98	95.5	2	4	33	61	56	30	26	31.3	

References / Comments / Deviations: N.P.=Non-Plastic

AASHTO T88: Particle Size Analysis of Soils as Modified by the NCDOT AASHTO T89: Determining the Liquid Limit of Soils

AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils AASHTO T265: Laboratory Determination of Moisture Content of Soils

AASHTO M145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes

<u>Mal Krajan, ET</u>		104-01-0703	<u>Vlad Mitchev, P.E.</u>
Technician Name:	Signature	Certification #	Technical Responsibility:
			<u>Project Manager</u>
			Position

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# Oedometer Settlement Tests

## Sample details

Sketch showing specimen location in original Sample



Depth: 8-10 ft.  
 Description: Brown Silty CLAY (A-7-5) (30)  
 Type: Undisturbed  
 Height  $H_0$  (in): 0.999  
 Diameter  $D_0$  (in): 2.501  
 Weight  $W_0$  (gr): 147.7  
 Bulk Density  $\rho$  (PCF): 114.65  
 Particle Density  $\rho_s$ : 2.671 (measured)

## Initial Conditions

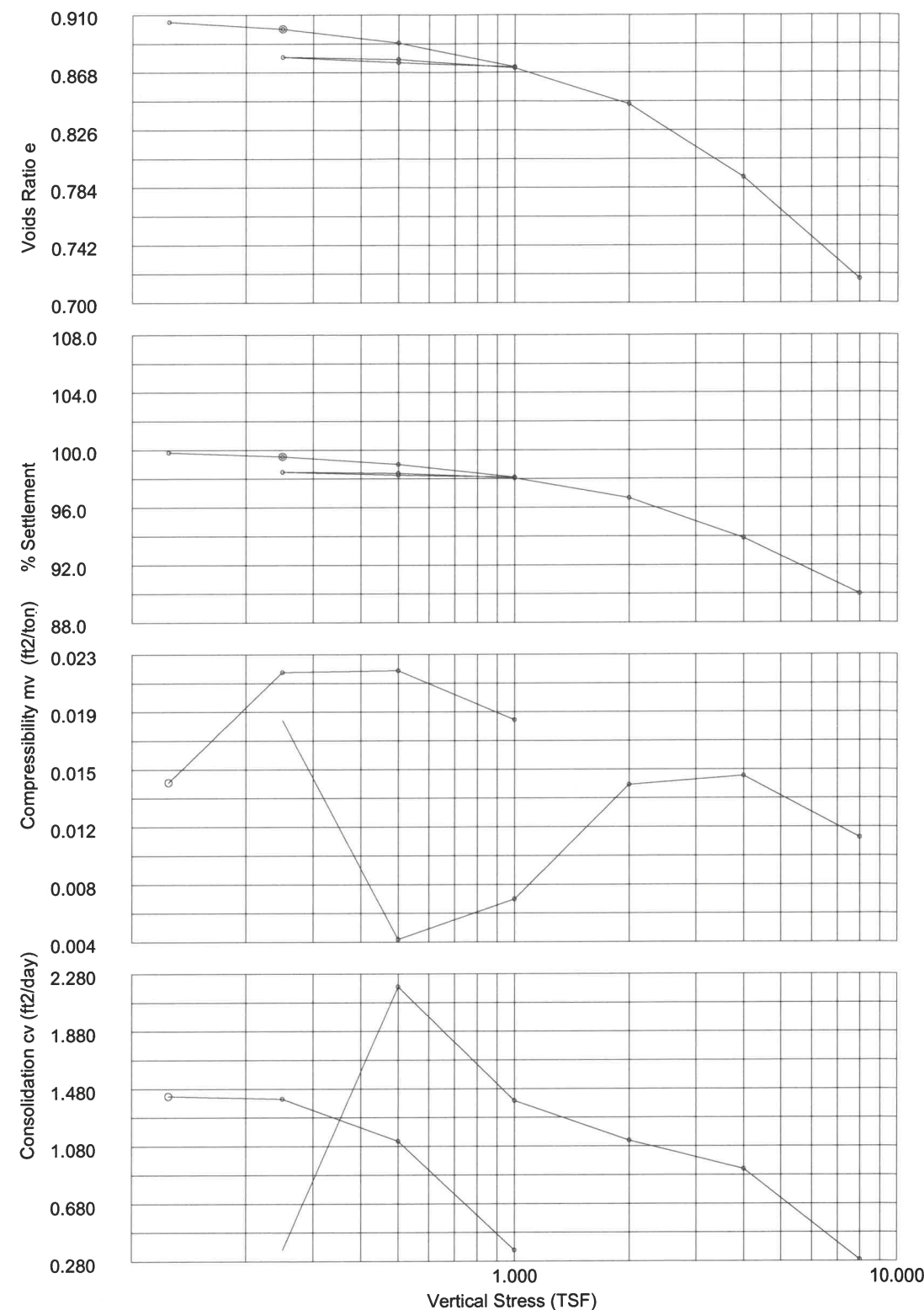
Settlement Channel: 1001  
 Moisture Content  $w_0$ %: 31.3  
 Dry Density  $\rho_d$  (PCF): 87.34  
 Voids Ratio  $e_0$ : 0.9084  
 Deg of Saturation  $S_0$ %: 92.0  
 Swelling Pressure  $S_s$  (TSF): 0.000

## Final Conditions

Moisture Content  $w_f$ %: 27.6  
 Dry Density  $\rho_d$  (PCF): 97.05  
 Voids Ratio  $e_f$ : 0.7174  
 Deg of Saturation  $S_f$ %: 100.00  
 Settlement: (in): 0.10  
 Compression Index  $C_c$ : 0.263

Notes: Test specimen taken from the middle portion of UD tube.

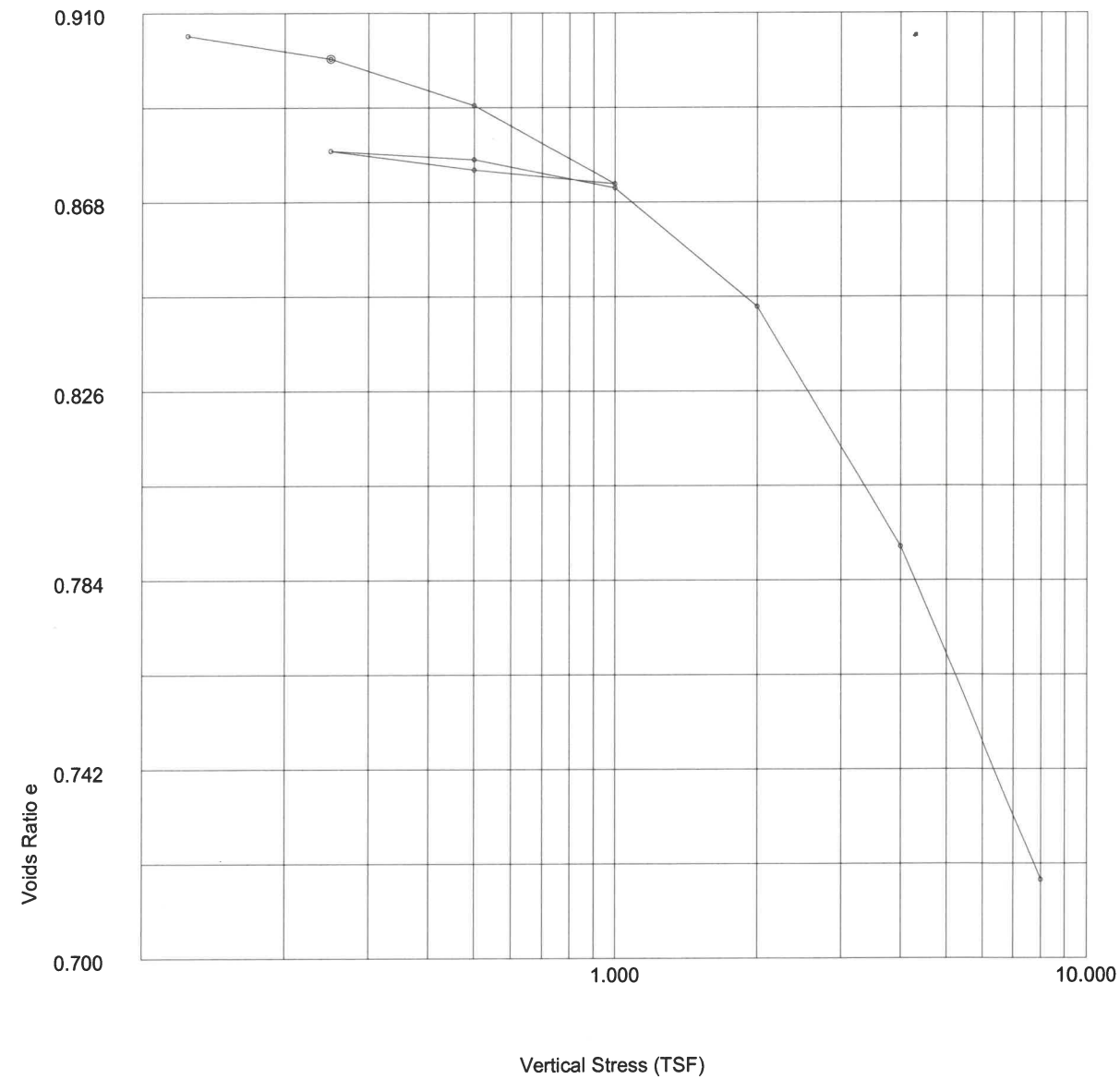
# Oedometer Settlement Tests



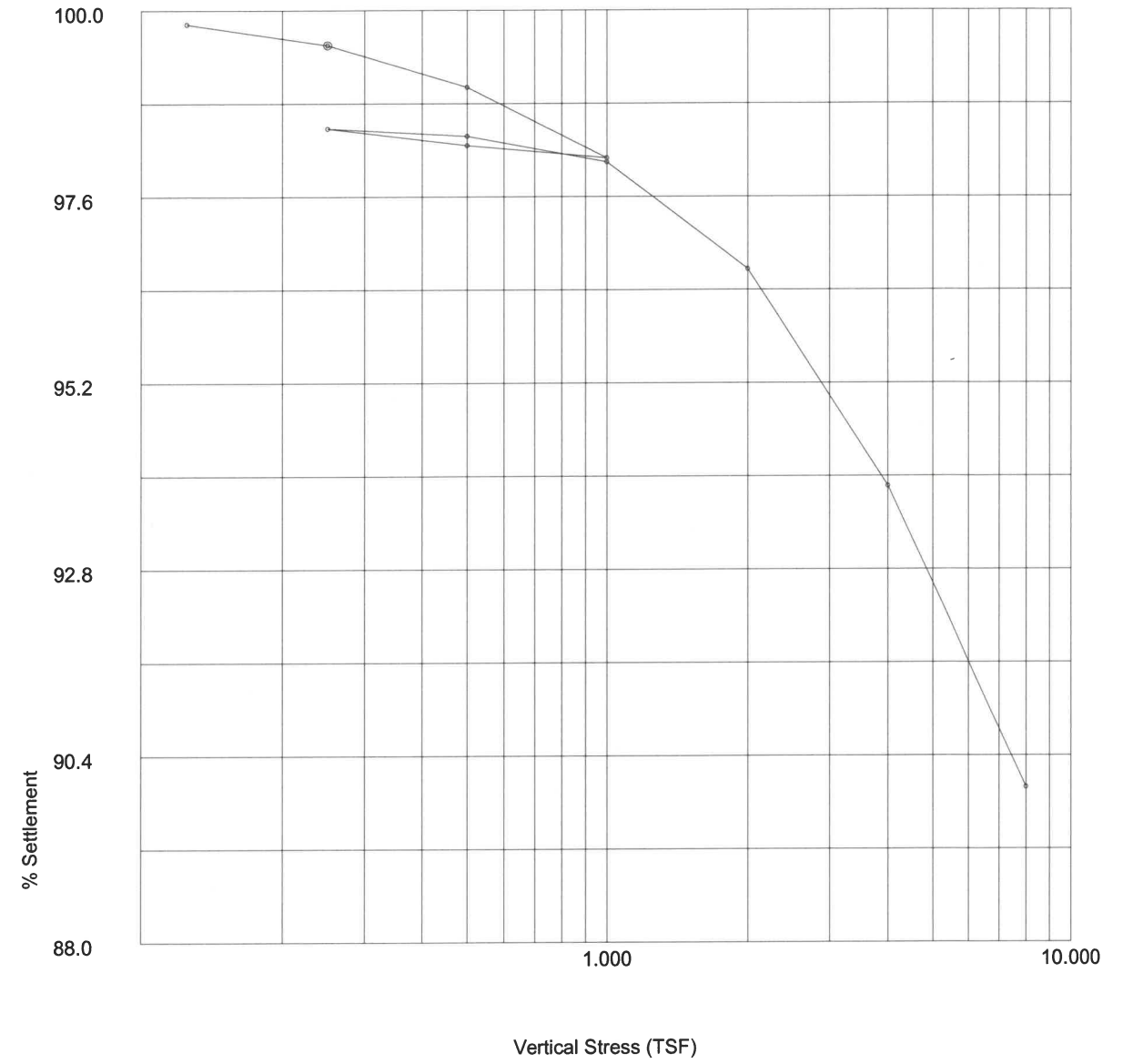
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		Date of Test: 5-17-23
	Site Reference: Lincoln Street Bridge Replacement	Sample: ST-1
	Jobfile: C:\WINCLISP\22350061.JOB	Borehole: EB2-B
Operator: <i>me</i>	Checked: <i>me</i>	Approved:

	ASTM D2435-96	Test name: Consolidation
		Date of Test: 5-17-23
	Site Reference: Lincoln Street Bridge Replacement	Sample: ST-1
	Jobfile: C:\WINCLISP\22350061.JOB	Borehole: EB2-B
Operator: <i>me</i>	Checked: <i>me</i>	Approved:

### Oedometer Settlement Tests



### Oedometer Settlement Tests

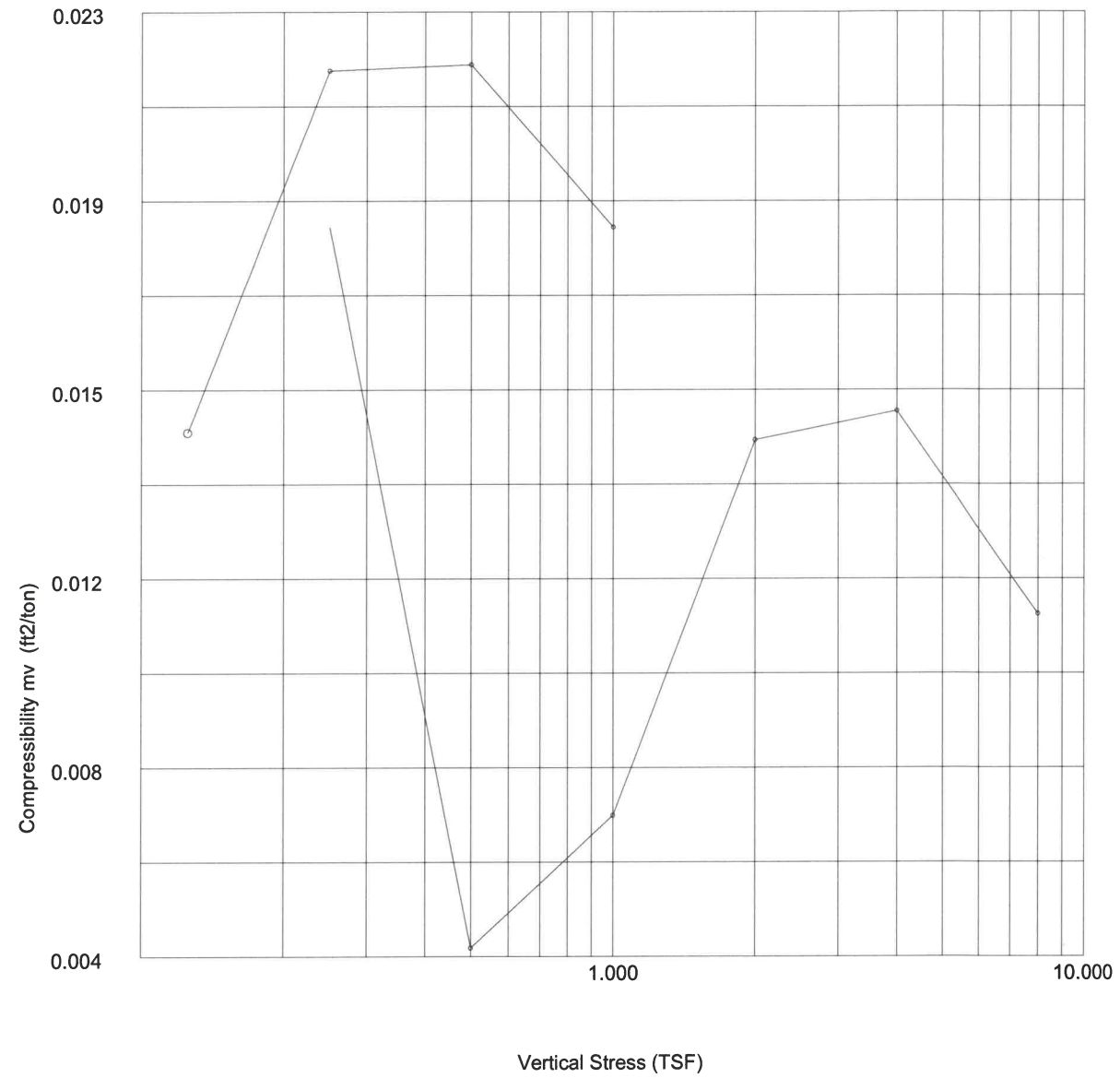


	ASTM D2435-96		Test name	Consolidation
	Site Reference: Lincoln Street Bridge Replacement		Date of Test:	5-17-23
	Jobfile:	C:\WINCLISP\22350061.JOB	Sample:	ST-1
	Operator:	<i>me</i>	Borehole:	EB2-B
	Checked:	<i>me</i>	Approved:	

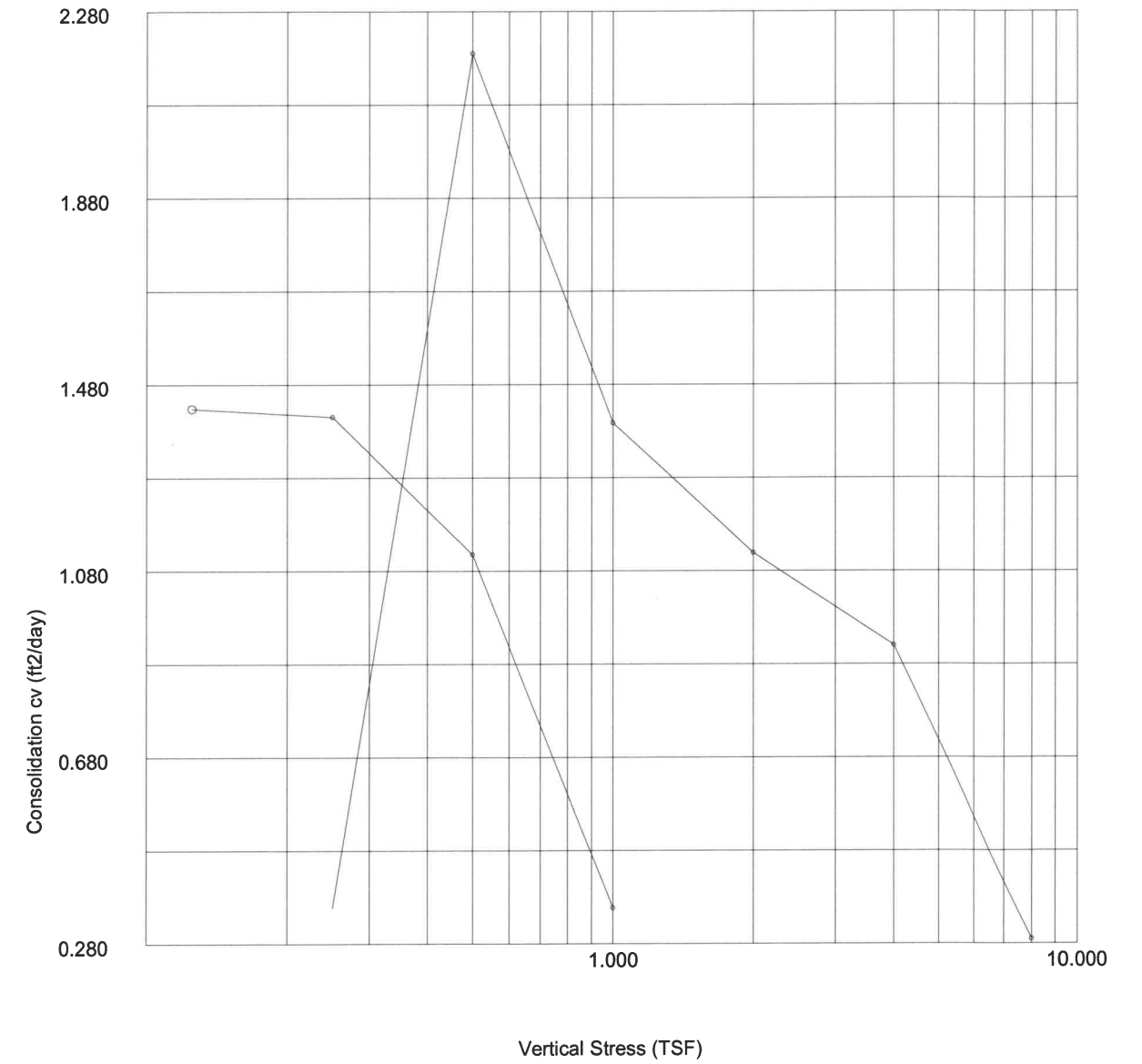
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	Site Reference: Lincoln Street Bridge Replacement		Date of Test:	5-17-23
	Jobfile:	C:\WINCLISP\22350061.JOB	Sample:	ST-1
	Operator:	<i>me</i>	Borehole:	EB2-B
	Checked:	<i>me</i>	Approved:	



### Oedometer Settlement Tests



### Oedometer Settlement Tests



	ASTM D2435-96	Test name	Consolidation
		Date of Test:	5-17-23
	Site Reference: Lincoln Street Bridge Replacement	Sample:	ST-1
	Jobfile: C:\WINCLISP\22350061.JOB	Borehole:	EB2-B
Operator:	<i>me</i>	Checked:	<i>me</i>
		Approved:	

	ASTM D2435-96	Test name	Consolidation
		Date of Test:	5-17-23
	Site Reference: Lincoln Street Bridge Replacement	Sample:	ST-1
	Jobfile: C:\WINCLISP\22350061.JOB	Borehole:	EB2-B
Operator:	<i>me</i>	Checked:	<i>me</i>
		Approved:	

### Oedometer Settlement Tests

Stress (TSF)	Initial Temp. oC	Settlement Total (in)	Cal Corr. (in)	Final Temp. oC	Voids Ratio $e_f$	$t_{90}$ (mins)	Secondary Compr $C_{sec}$	$c_v$ (ft <sup>2</sup> /day)	$m_v$ (ft <sup>2</sup> /ton)
0.125	21.8	0.0018	0.0	21.8	0.9050	1.479	0.00	1.428	0.014
0.250	21.8	0.0045	0.0	21.8	0.8998	1.491	0.00	1.410	0.022
0.500	21.8	0.0099	0.0	21.8	0.8895	1.869	0.00	1.116	0.022
1.000	21.8	0.0190	0.0	21.8	0.8721	5.758	0.00	0.357	0.019
0.500	21.8	0.0174	0.0	21.8	0.8752				0.003
0.250	21.8	0.0152	0.0	21.8	0.8794				0.009
0.500	21.8	0.0162	0.0	21.8	0.8774	0.936	0.00	2.190	0.004
1.000	21.8	0.0195	0.0	21.8	0.8711	1.460	0.00	1.397	0.007
2.000	21.8	0.0333	0.0	21.8	0.8448	1.792	0.00	1.119	0.014
4.000	21.8	0.0612	0.0	21.8	0.7915	2.085	0.00	0.921	0.015
8.000	21.8	0.1000	0.0	21.8	0.7174	6.172	0.00	0.290	0.011

### Oedometer Settlement Tests

No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	0	0.0000	0.0000
2	0.017	2	0.0002	0.0002
3	0.167	13	0.0013	0.0013
4	0.419	15	0.0015	0.0015
5	0.917	16	0.0016	0.0016
6	1.917	17	0.0017	0.0017
7	3.917	18	0.0018	0.0018
8	7.917	18	0.0018	0.0018
9	14.917	18	0.0018	0.0018
10	29.917	18	0.0018	0.0018
11	41.133	18	0.0018	0.0018



ASTM D2435-96  
 Site Reference: Lincoln Street Bridge Replacement  
 Jobfile: C:\WINCLISP\22350061.JOB  
 Operator: *me*

Test name: Consolidation  
 Date of Test: 5-17-23  
 Sample: ST-1  
 Borehole: EB2-B  
 Checked: *me*

Approved:



ASTM D2435-96  
 Site Reference: Lincoln Street Bridge Replacement  
 Jobfile: C:\WINCLISP\22350061.JOB  
 Operator: *me*

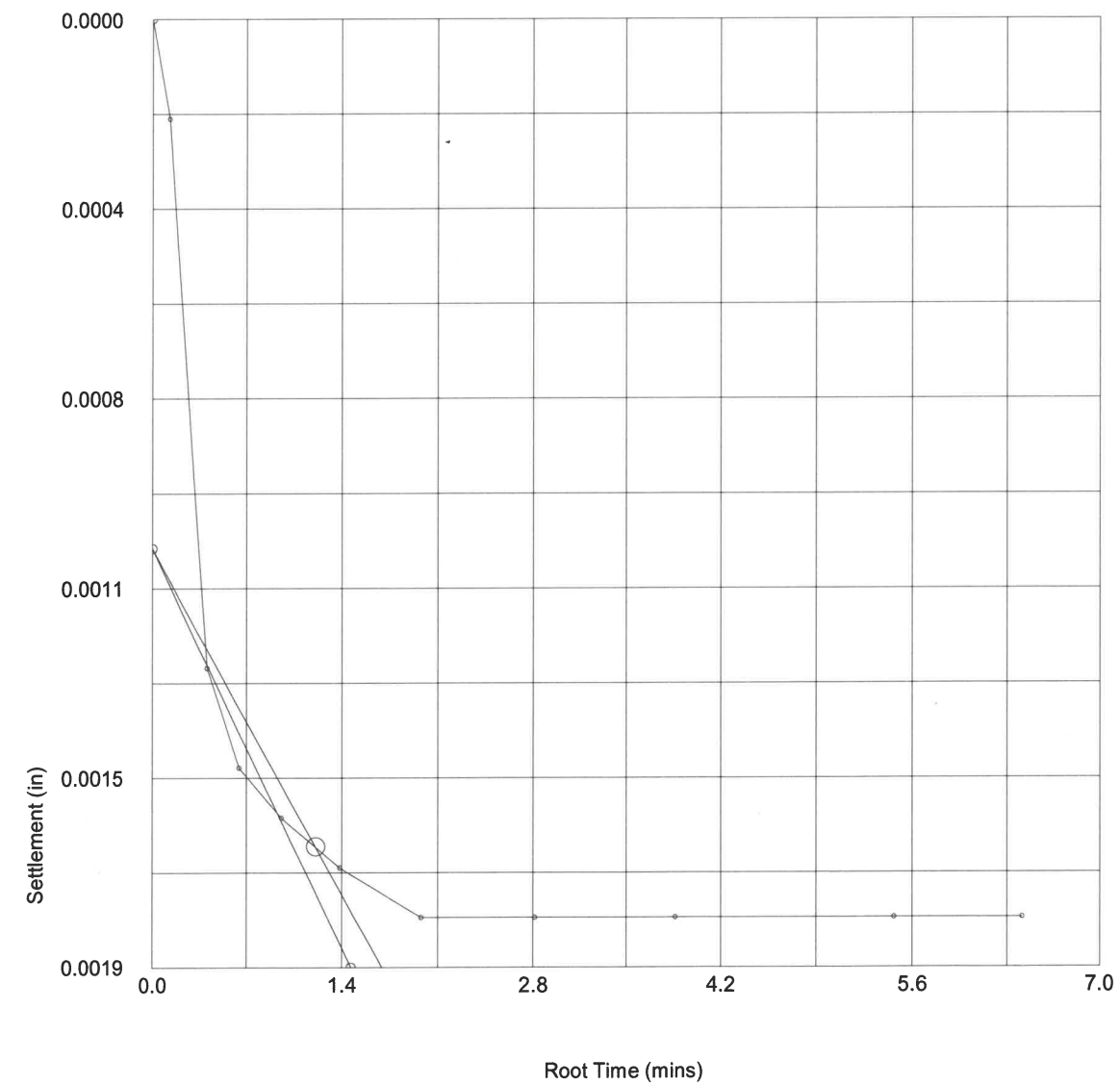
Test name: Consolidation Load: 0.125 (TSF)  
 Date of Test: 5-17-23  
 Sample: ST-1  
 Borehole: EB2-B  
 Checked: *me*

Approved:

# Oedometer Settlement Tests

## Settlement Stage Results

Vertical Stress (TSF)	0.125
Initial Temp oC	21.8
Correction (in)	0.0
Settlement (in)	0.0018
Voids Ratio e	0.9050
Final Temp oC	0.0
$t_{90}$ (mins)	1.48
$c_v$ (ft <sup>2</sup> /day)	1.428
$m_v$ (ft <sup>2</sup> /ton)	0.014
Sec Compression $C_{sec}$	0.00



	ASTM D2435-96	Test name	Consolidation
		Date of Test:	5-17-23
	Site Reference: Lincoln Street Bridge Replacement	Sample:	ST-1
	Jobfile: C:\WINCLISP\22350061.JOB	Borehole:	EB2-B
Operator:	Checked:	Approved:	

# Oedometer Settlement Tests

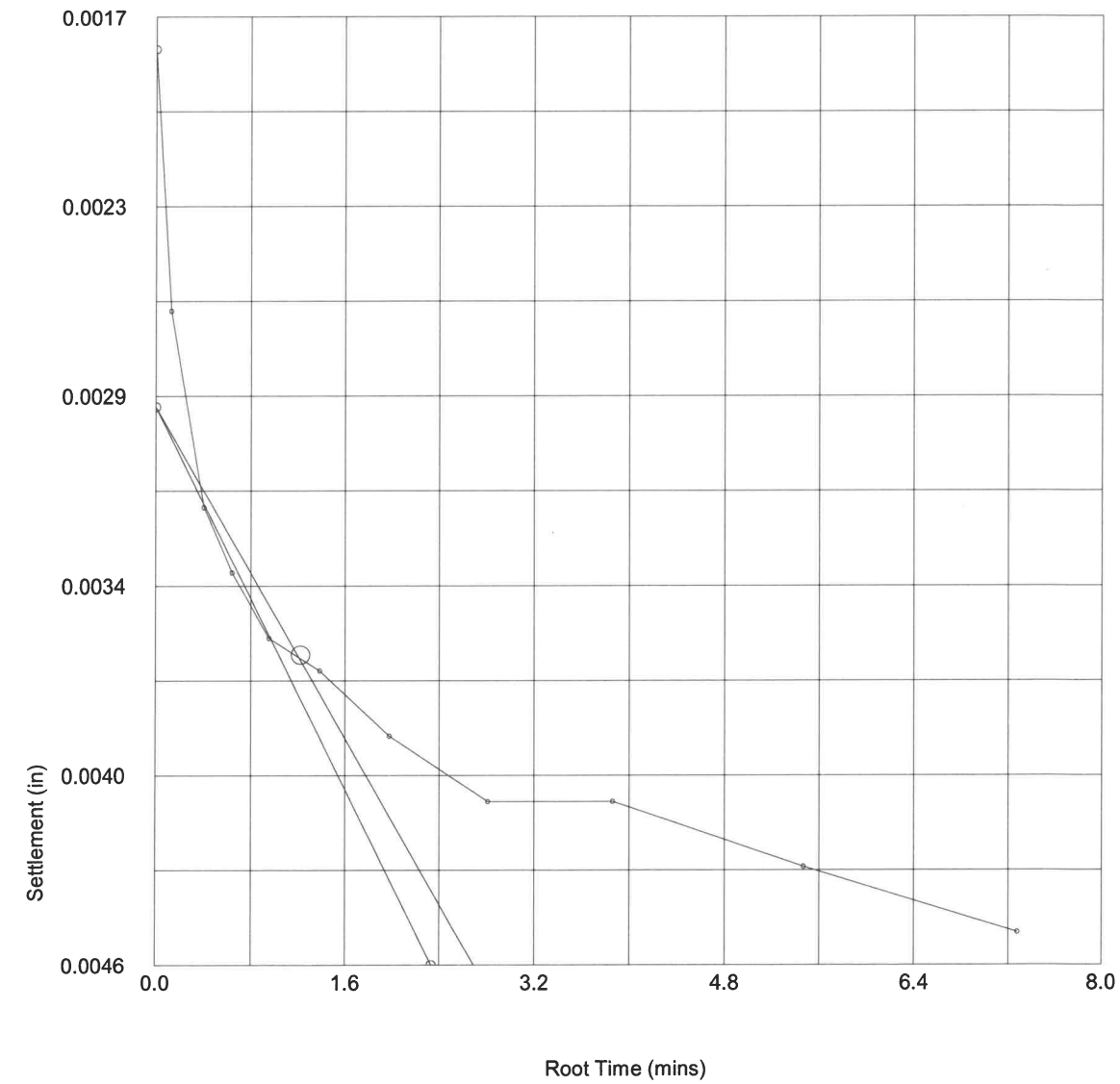
No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	18	0.0018	0.0018
2	0.017	26	0.0026	0.0026
3	0.167	32	0.0032	0.0032
4	0.417	34	0.0034	0.0034
5	0.917	36	0.0036	0.0036
6	1.917	37	0.0037	0.0037
7	3.917	39	0.0039	0.0039
8	7.917	41	0.0041	0.0041
9	14.917	41	0.0041	0.0041
10	29.917	43	0.0043	0.0043
11	52.967	45	0.0045	0.0045

	ASTM D2435-96	Test name	Consolidation Load: 0.250 (TSF)
		Date of Test:	5-17-23
	Site Reference: Lincoln Street Bridge Replacement	Sample:	ST-1
	Jobfile: C:\WINCLISP\22350061.JOB	Borehole:	EB2-B
Operator:	Checked:	Approved:	

# Oedometer Settlement Tests

## Settlement Stage Results

Vertical Stress (TSF)	0.250
Initial Temp oC	21.8
Correction (in)	0.0
Settlement (in)	0.0027
Voids Ratio e	0.8998
Final Temp oC	0.0
$t_{90}$ (mins)	1.49
$c_v$ (ft <sup>2</sup> /day)	1.41
$m_v$ (ft <sup>2</sup> /ton)	0.022
Sec Compression $C_{sec}$	0.00



	ASTM D2435-96	Test name	Consolidation
		Date of Test:	5-17-23
	Site Reference: Lincoln Street Bridge Replacement	Sample:	ST-1
	Jobfile: C:\WINCLISP\22350061.JOB	Borehole:	EB2-B
Operator:	<i>me</i>	Checked:	<i>me</i>
		Approved:	

# Oedometer Settlement Tests

No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	45	0.0045	0.0045
2	0.017	49	0.0049	0.0049
3	0.167	74	0.0074	0.0074
4	0.417	80	0.0080	0.0080
5	0.917	83	0.0083	0.0083
6	1.917	87	0.0087	0.0087
7	3.917	90	0.0090	0.0090
8	7.917	93	0.0093	0.0093
9	14.917	95	0.0095	0.0095
10	29.917	98	0.0098	0.0098
11	47.800	99	0.0099	0.0099

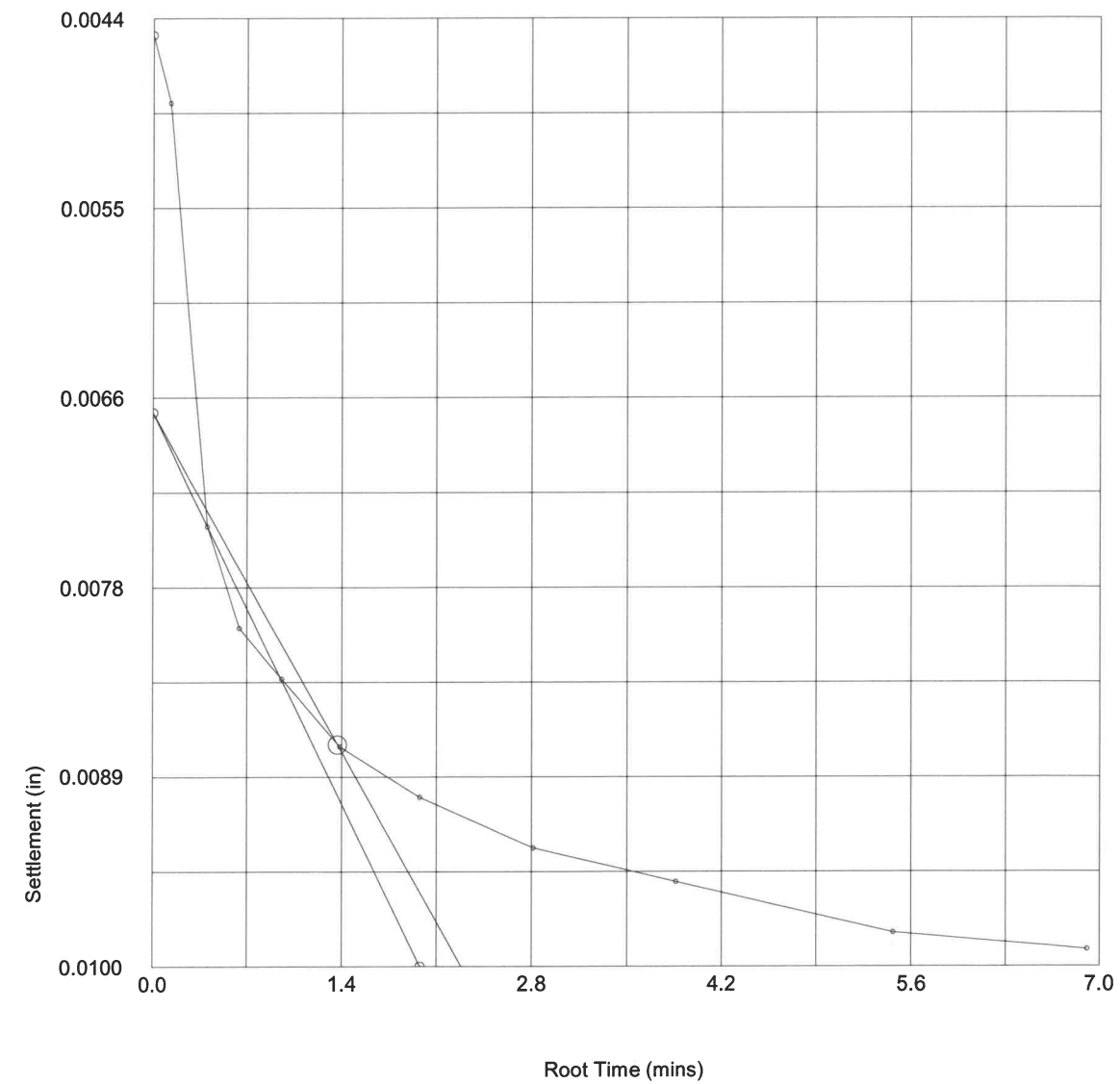
	ASTM D2435-96	Test name	Consolidation Load: 0.500 (TSF)
		Date of Test:	5-17-23
	Site Reference: Lincoln Street Bridge Replacement	Sample:	ST-1
	Jobfile: C:\WINCLISP\22350061.JOB	Borehole:	EB2-B
Operator:	<i>me</i>	Checked:	<i>me</i>
		Approved:	



# Oedometer Settlement Tests

## Settlement Stage Results

Vertical Stress (TSF)	0.500
Initial Temp oC	21.8
Correction (in)	0.0
Settlement (in)	0.0054
Voids Ratio e	0.8895
Final Temp oC	0.0
$t_{90}$ (mins)	1.87
$c_v$ (ft <sup>2</sup> /day)	1.116
$m_v$ (ft <sup>2</sup> /ton)	0.022
Sec Compression $C_{sec}$	0.00



# Oedometer Settlement Tests

No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	99	0.0099	0.0099
2	0.017	102	0.0102	0.0102
3	0.167	130	0.0130	0.0130
4	0.417	142	0.0142	0.0142
5	0.917	157	0.0157	0.0157
6	1.917	168	0.0168	0.0168
7	3.917	174	0.0174	0.0174
8	7.917	178	0.0178	0.0178
9	14.917	182	0.0182	0.0182
10	29.917	186	0.0186	0.0186
11	59.917	189	0.0189	0.0189
12	90.817	190	0.0190	0.0190

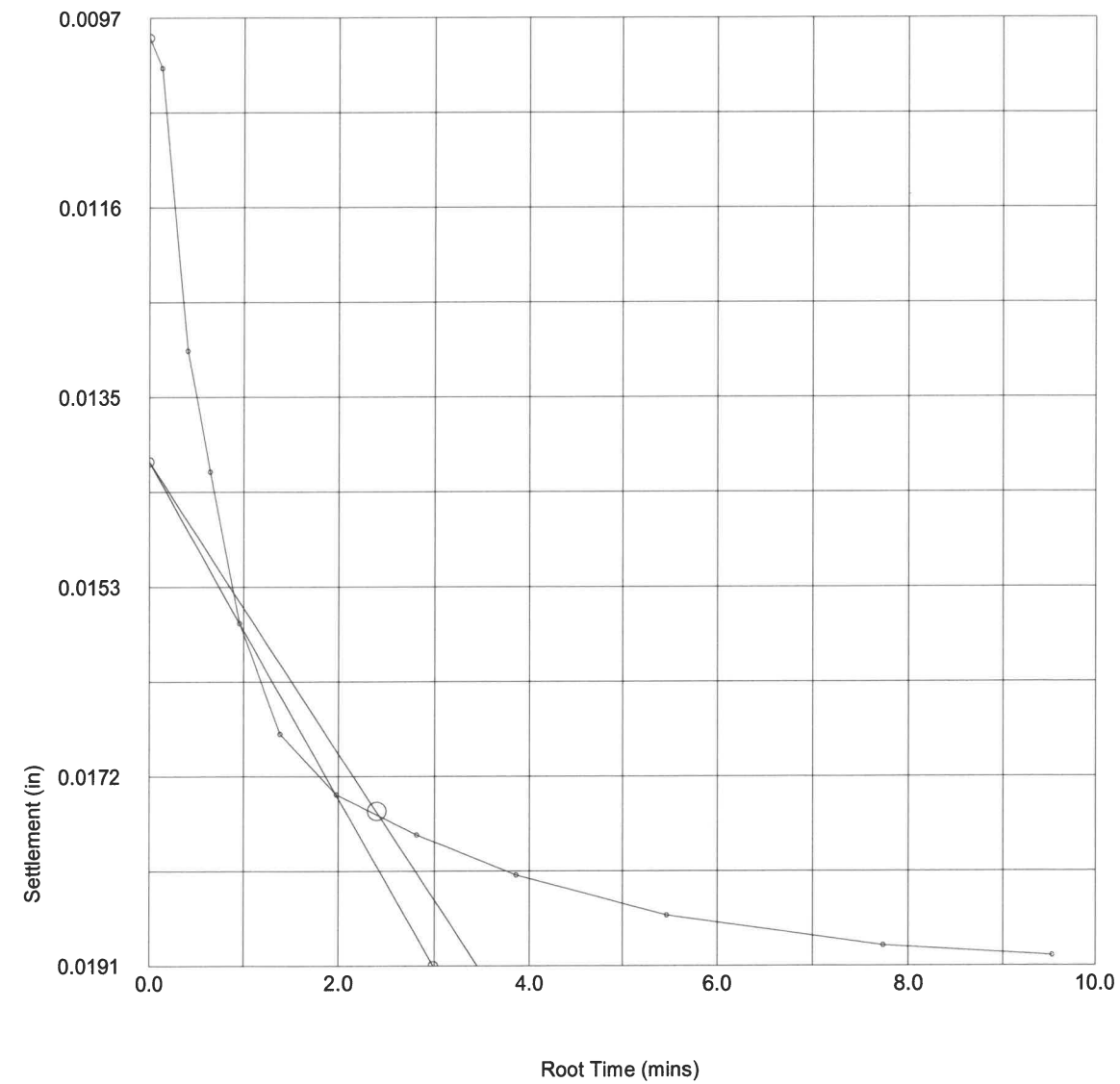
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		Date of Test:	5-17-23
	Site Reference: Lincoln Street Bridge Replacement	Sample:	ST-1
	Jobfile: C:\WINCLISP\22350061.JOB	Borehole:	EB2-B
Operator:	Checked:	Approved:	

	ASTM D2435-96	Test name	Consolidation Load: 1.000 (TSF)
		Date of Test:	5-17-23
	Site Reference: Lincoln Street Bridge Replacement	Sample:	ST-1
	Jobfile: C:\WINCLISP\22350061.JOB	Borehole:	EB2-B
Operator:	Checked:	Approved:	

# Oedometer Settlement Tests

## Settlement Stage Results

Vertical Stress (TSF)	1.000
Initial Temp oC	21.8
Correction (in)	0.0
Settlement (in)	0.0091
Voids Ratio e	0.8721
Final Temp oC	0.0
$t_{90}$ (mins)	5.76
$c_v$ (ft <sup>2</sup> /day)	0.357
$m_v$ (ft <sup>2</sup> /ton)	0.019
Sec Compression $C_{sec}$	0.00



	ASTM D2435-96	Test name	Consolidation
		Date of Test:	5-17-23
	Site Reference: Lincoln Street Bridge Replacement	Sample:	ST-1
	Jobfile: C:\WINCLISP\22350061.JOB	Borehole:	EB2-B
Operator:	Checked:	Approved:	

# Oedometer Settlement Tests

No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	190	0.0190	0.0190
2	0.017	182	0.0182	0.0182
3	0.167	179	0.0179	0.0179
4	0.417	178	0.0178	0.0178
5	0.917	177	0.0177	0.0177
6	1.917	177	0.0177	0.0177
7	3.917	177	0.0177	0.0177
8	7.917	176	0.0176	0.0176
9	14.917	175	0.0175	0.0175
10	29.917	175	0.0175	0.0175
11	59.917	174	0.0174	0.0174
12	65.267	174	0.0174	0.0174

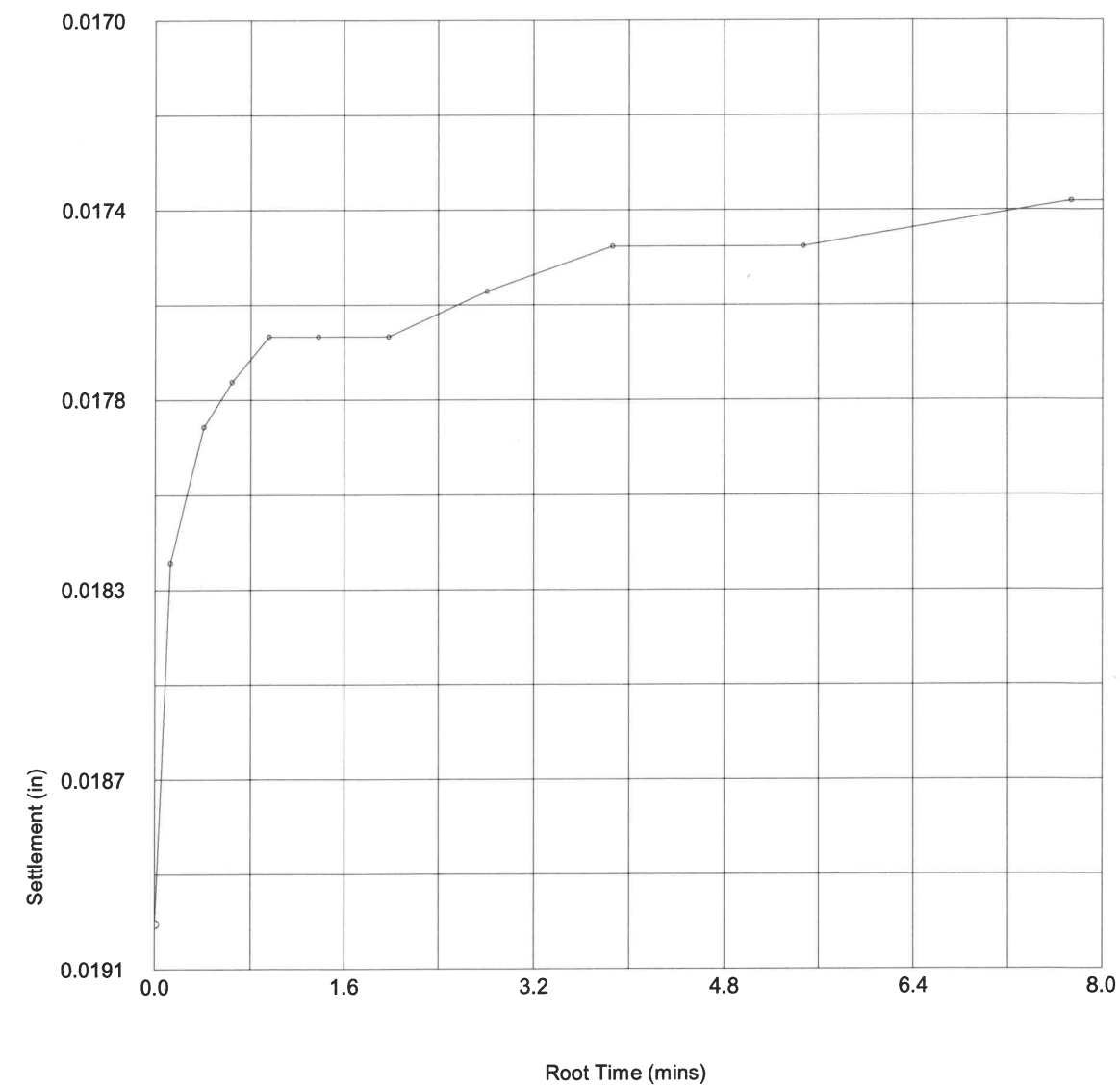
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		Date of Test:	5-17-23
	Site Reference: Lincoln Street Bridge Replacement	Sample:	ST-1
	Jobfile: C:\WINCLISP\22350061.JOB	Borehole:	EB2-B
Operator:	Checked:	Approved:	

### Oedometer Settlement Tests

**Settlement Stage Results**

Vertical Stress (TSF) 0.500  
 Initial Temp oC 21.8  
 Correction (in) 0.0  
 Settlement (in) 0.0016  
 Voids Ratio e 0.8752

Final Temp oC  
 $t_{90}$  (mins)  
 $c_v$  (ft<sup>2</sup>/day)  
 $m_v$  (ft<sup>2</sup>/ton)  
 Sec Compression  $C_{sec}$



	ASTM D2435-96	Test name: Consolidation
	Site Reference: Lincoln Street Bridge Replacement	Date of Test: 5-17-23
	Jobfile: C:\WINCLISP\22350061.JOB	Sample: ST-1
Operator: <i>me</i>	Checked: <i>me</i>	Approved:

### Oedometer Settlement Tests

No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	174	0.0174	0.0174
2	0.017	167	0.0167	0.0167
3	0.167	163	0.0163	0.0163
4	0.417	161	0.0161	0.0161
5	0.917	160	0.0160	0.0160
6	1.917	159	0.0159	0.0159
7	3.917	158	0.0158	0.0158
8	7.917	157	0.0157	0.0157
9	14.917	155	0.0155	0.0155
10	29.917	154	0.0154	0.0154
11	59.917	153	0.0153	0.0153
12	119.917	152	0.0152	0.0152

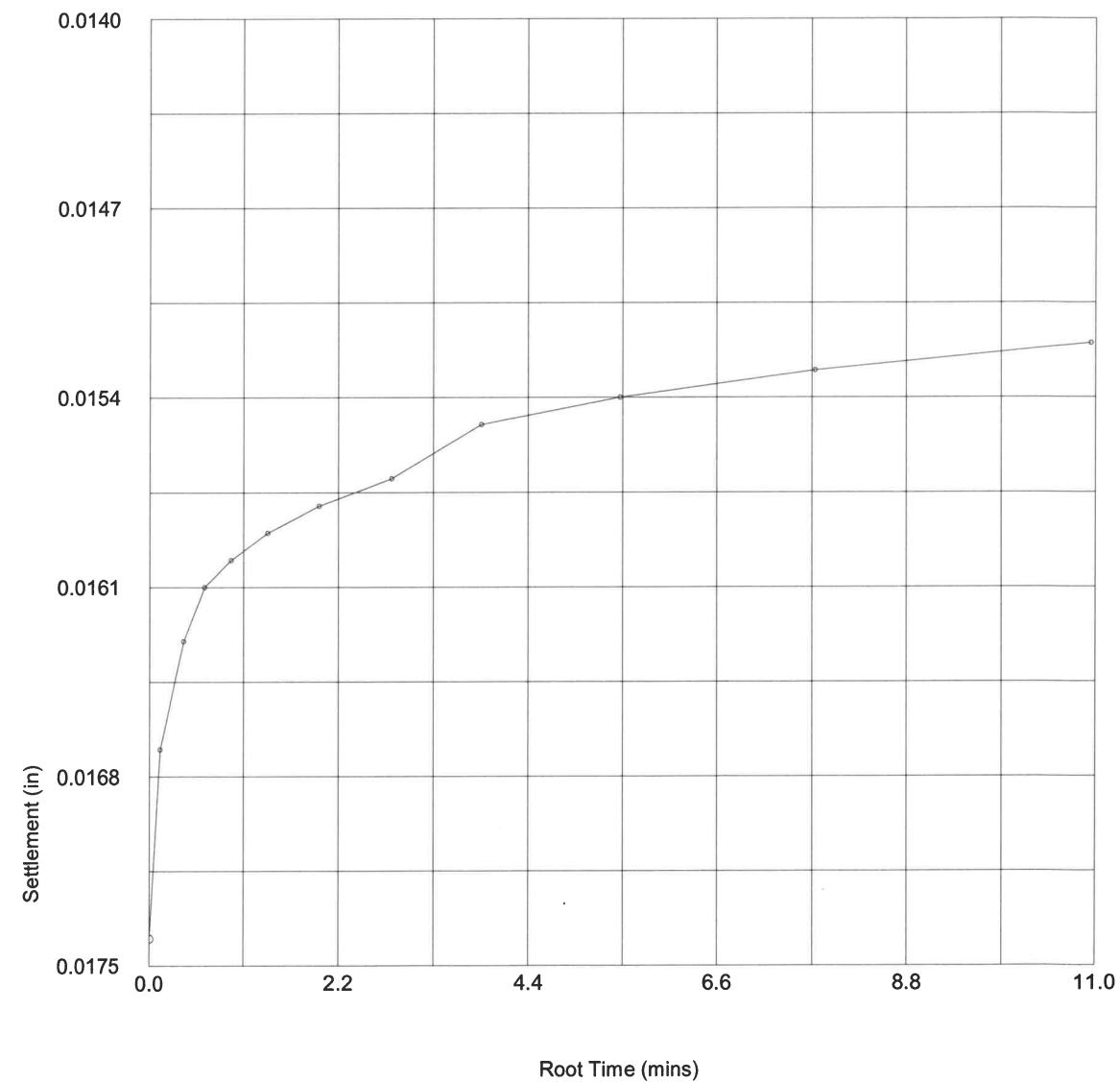
	ASTM D2435-96	Test name: Consolidation Load: 0.250 (TSF)
	Site Reference: Lincoln Street Bridge Replacement	Date of Test: 5-17-23
	Jobfile: C:\WINCLISP\22350061.JOB	Sample: ST-1
Operator: <i>me</i>	Checked: <i>me</i>	Approved:

# Oedometer Settlement Tests

## Settlement Stage Results

Vertical Stress (TSF) 0.250  
 Initial Temp oC 21.8  
 Correction (in) 0.0  
 Settlement (in) 0.0022  
 Voids Ratio e 0.8794

Final Temp oC  
 $t_{90}$  (mins)  
 $c_v$  (ft<sup>2</sup>/day)  
 $m_v$  (ft<sup>2</sup>/ton)  
 Sec Compression  $C_{sec}$



# Oedometer Settlement Tests

No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	152	0.0152	0.0152
2	0.017	156	0.0156	0.0156
3	0.167	159	0.0159	0.0159
4	0.417	159	0.0159	0.0159
5	0.917	160	0.0160	0.0160
6	1.917	160	0.0160	0.0160
7	3.917	161	0.0161	0.0161
8	7.917	161	0.0161	0.0161
9	14.917	161	0.0161	0.0161
10	29.917	162	0.0162	0.0162
11	59.917	162	0.0162	0.0162
12	73.233	162	0.0162	0.0162

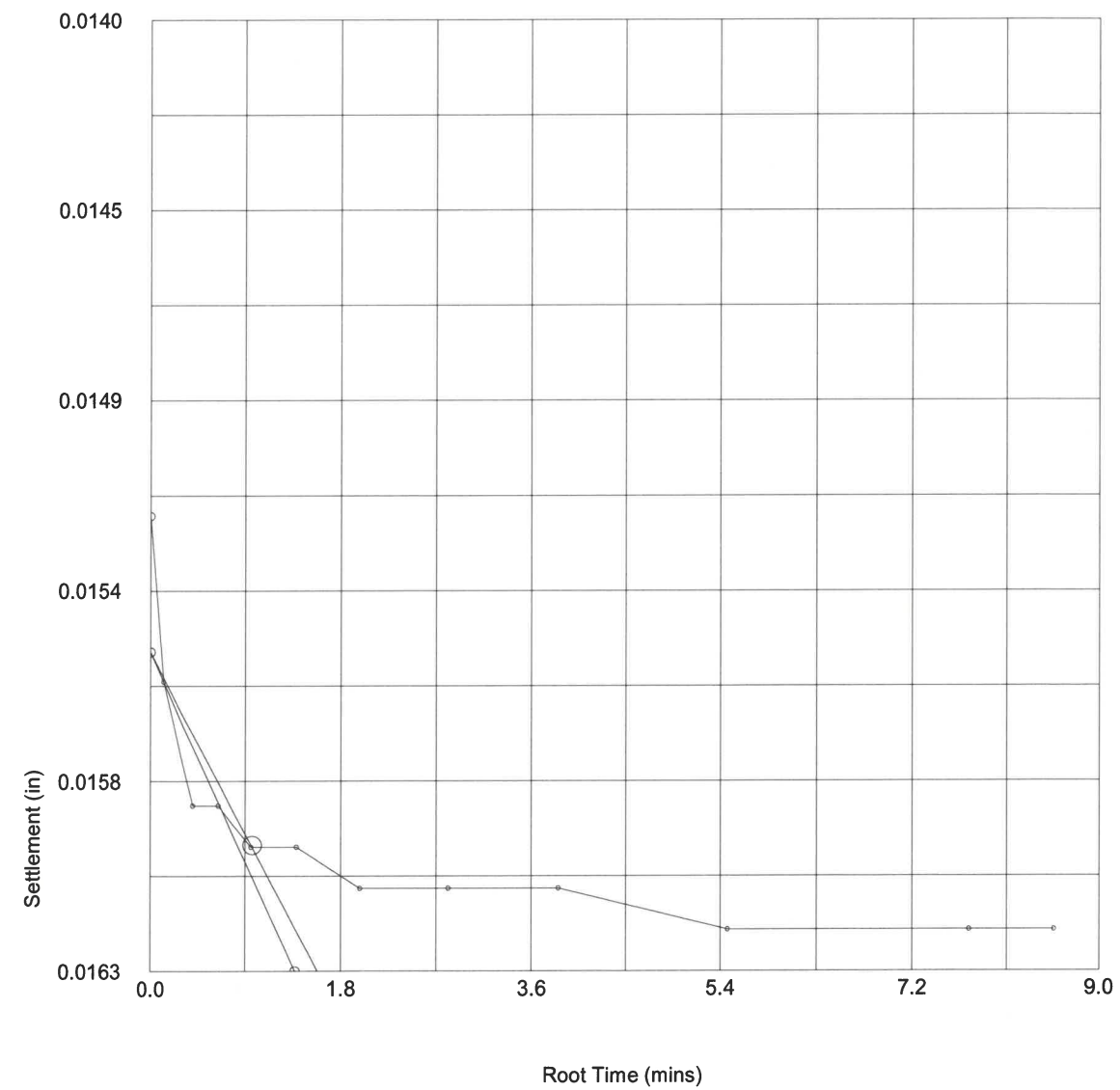
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		Date of Test:	5-17-23
	Site Reference: Lincoln Street Bridge Replacement	Sample:	ST-1
	Jobfile: C:\WINCLISP\22350061.JOB	Borehole:	EB2-B
Operator:	<i>me</i>	Checked:	<i>me</i>
		Approved:	

	ASTM D2435-96	Test name	Consolidation Load: 0.500 (TSF)
		Date of Test:	5-17-23
	Site Reference: Lincoln Street Bridge Replacement	Sample:	ST-1
	Jobfile: C:\WINCLISP\22350061.JOB	Borehole:	EB2-B
Operator:	<i>me</i>	Checked:	<i>me</i>
		Approved:	



### Oedometer Settlement Tests

Settlement Stage Results	
Vertical Stress (TSF)	0.500
Initial Temp oC	21.8
Correction (in)	0.0
Settlement (in)	0.001
Void Ratio e	0.8774
Final Temp oC	0.0
$t_{90}$ (mins)	0.94
$c_v$ (ft <sup>2</sup> /day)	2.19
$m_v$ (ft <sup>2</sup> /ton)	0.004
Sec Compression $C_{sec}$	0.00



	ASTM D2435-96	Test name	Consolidation
		Date of Test:	5-17-23
	Site Reference: Lincoln Street Bridge Replacement	Sample:	ST-1
	Jobfile: C:\WINCLISP\22350061.JOB	Borehole:	EB2-B
Operator:	<i>MLL</i>	Checked:	<i>MLL</i>
		Approved:	

### Oedometer Settlement Tests

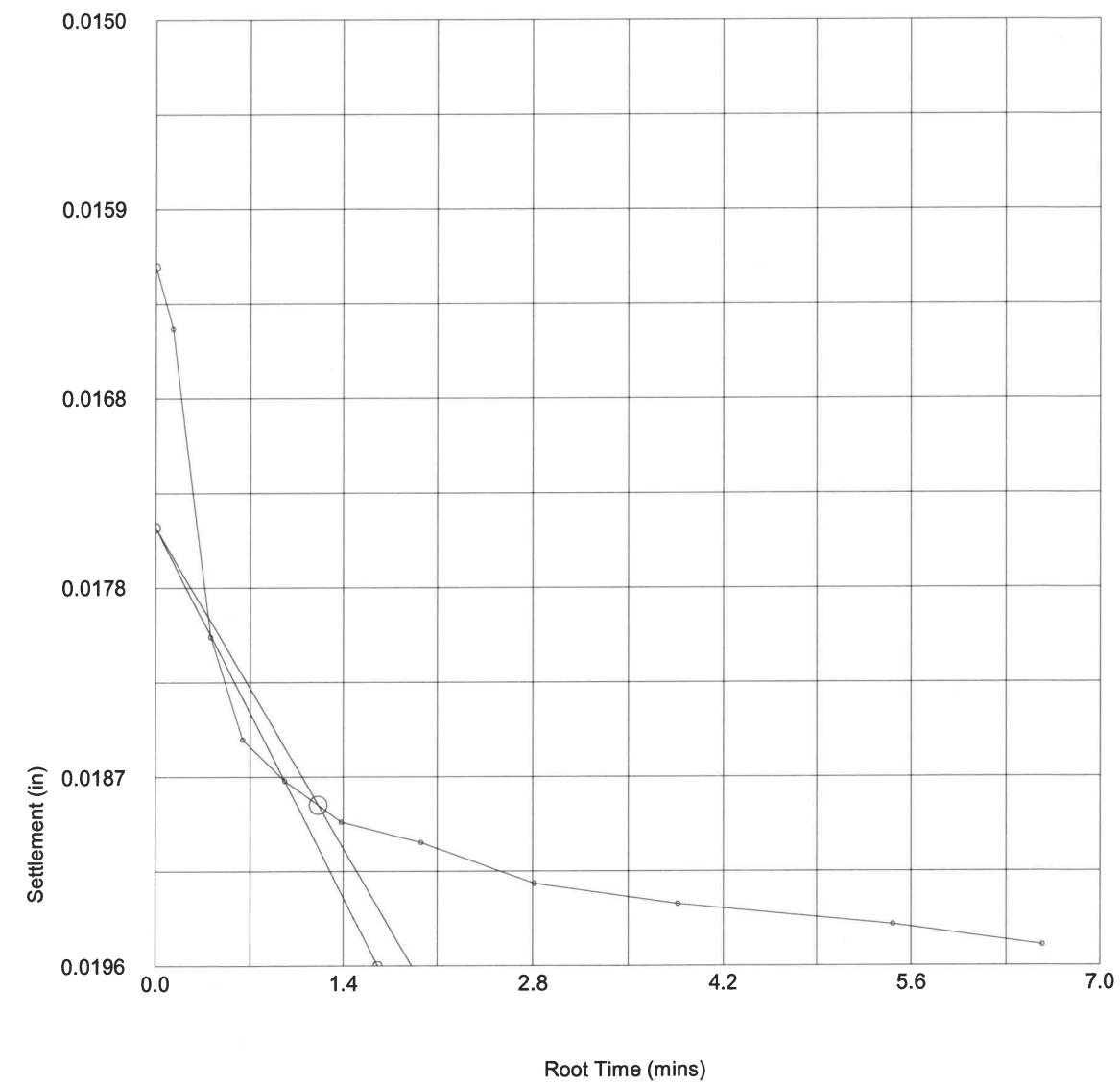
No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	162	0.0162	0.0162
2	0.017	165	0.0165	0.0165
3	0.167	180	0.0180	0.0180
4	0.417	185	0.0185	0.0185
5	0.917	187	0.0187	0.0187
6	1.917	189	0.0189	0.0189
7	3.917	190	0.0190	0.0190
8	7.917	192	0.0192	0.0192
9	14.917	193	0.0193	0.0193
10	29.917	194	0.0194	0.0194
11	43.150	195	0.0195	0.0195

	ASTM D2435-96	Test name	Consolidation Load: 1.000 (TSF)
		Date of Test:	5-17-23
	Site Reference: Lincoln Street Bridge Replacement	Sample:	ST-1
	Jobfile: C:\WINCLISP\22350061.JOB	Borehole:	EB2-B
Operator:	<i>MLL</i>	Checked:	<i>MLL</i>
		Approved:	

### Oedometer Settlement Tests

**Settlement Stage Results**

Vertical Stress (TSF)	1.000
Initial Temp oC	21.8
Correction (in)	0.0
Settlement (in)	0.0033
Void Ratio e	0.8711
Final Temp oC	0.0
$t_{90}$ (mins)	1.46
$c_v$ (ft <sup>2</sup> /day)	1.397
$m_v$ (ft <sup>2</sup> /ton)	0.007
Sec Compression $C_{sec}$	0.00



	ASTM D2435-96	Test name: Consolidation
		Date of Test: 5-17-23
	Site Reference: Lincoln Street Bridge Replacement	Sample: ST-1
Jobfile: C:\WINCLISP\22350061.JOB	Borehole: EB2-B	
Operator: <i>mll</i>	Checked: <i>hlc</i>	Approved:

### Oedometer Settlement Tests

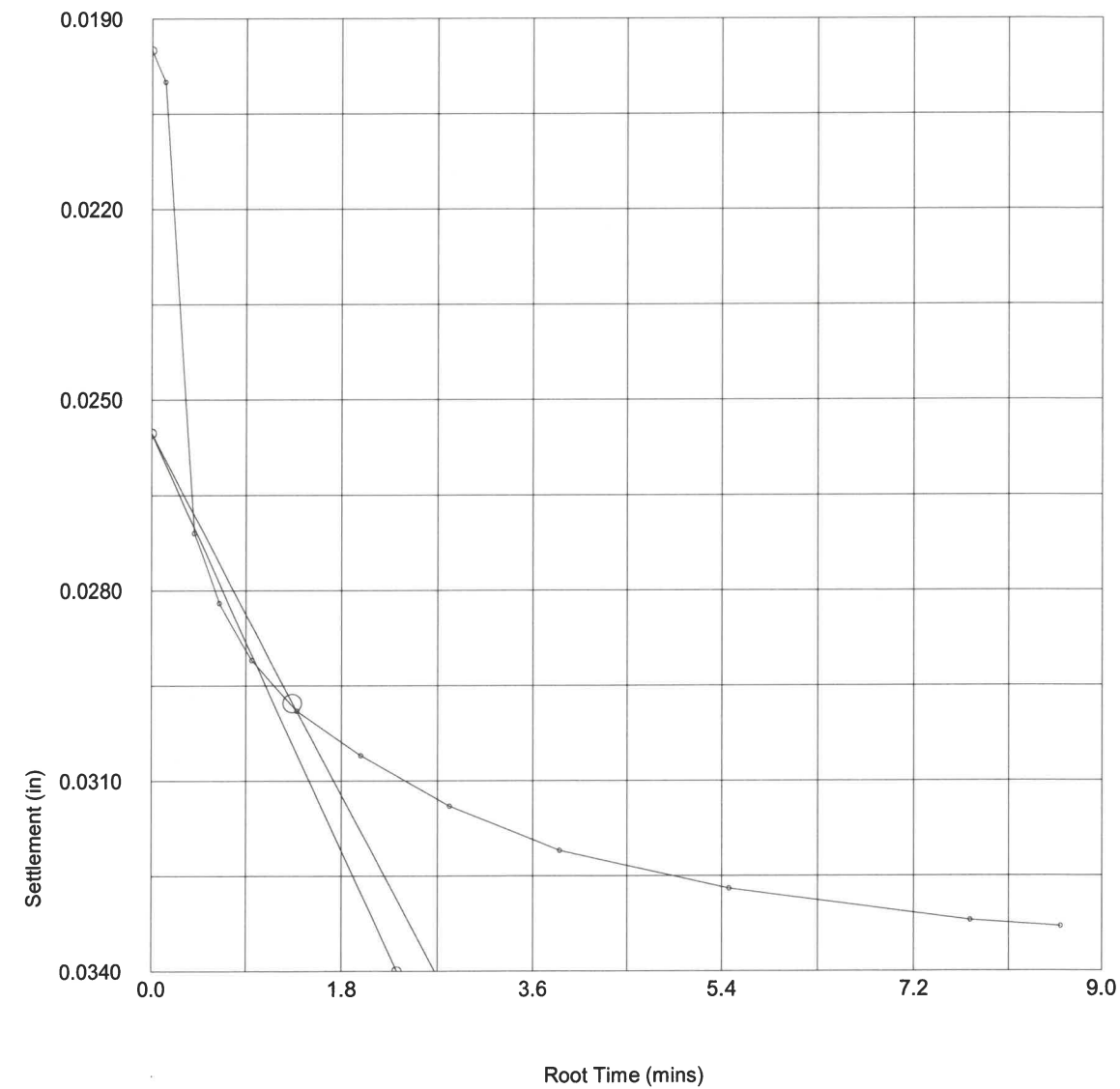
No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	195	0.0195	0.0195
2	0.017	200	0.0200	0.0200
3	0.167	271	0.0271	0.0271
4	0.417	282	0.0282	0.0282
5	0.917	291	0.0291	0.0291
6	1.917	299	0.0299	0.0299
7	3.917	306	0.0306	0.0306
8	7.917	314	0.0314	0.0314
9	14.917	321	0.0321	0.0321
10	29.917	327	0.0327	0.0327
11	59.917	332	0.0332	0.0332
12	73.950	333	0.0333	0.0333

	ASTM D2435-96	Test name: Consolidation Load: 2.000 (TSF)
		Date of Test: 5-17-23
	Site Reference: Lincoln Street Bridge Replacement	Sample: ST-1
Jobfile: C:\WINCLISP\22350061.JOB	Borehole: EB2-B	
Operator: <i>mll</i>	Checked: <i>mll</i>	Approved:

# Oedometer Settlement Tests

## Settlement Stage Results

Vertical Stress (TSF)	2.000
Initial Temp oC	21.8
Correction (in)	0.0
Settlement (in)	0.0138
Voids Ratio e	0.8448
Final Temp oC	0.0
t <sub>90</sub> (mins)	1.79
c <sub>v</sub> (ft <sup>2</sup> /day)	1.119
m <sub>v</sub> (ft <sup>2</sup> /ton)	0.014
Sec Compression C <sub>sec</sub>	0.00



	ASTM D2435-96	Test name	Consolidation
		Date of Test:	5-17-23
	Site Reference: Lincoln Street Bridge Replacement	Sample:	ST-1
	Jobfile: C:\WINCLISP\22350061.JOB	Borehole:	EB2-B
	Operator: <i>mu</i>	Checked: <i>mu</i>	Approved:

# Oedometer Settlement Tests

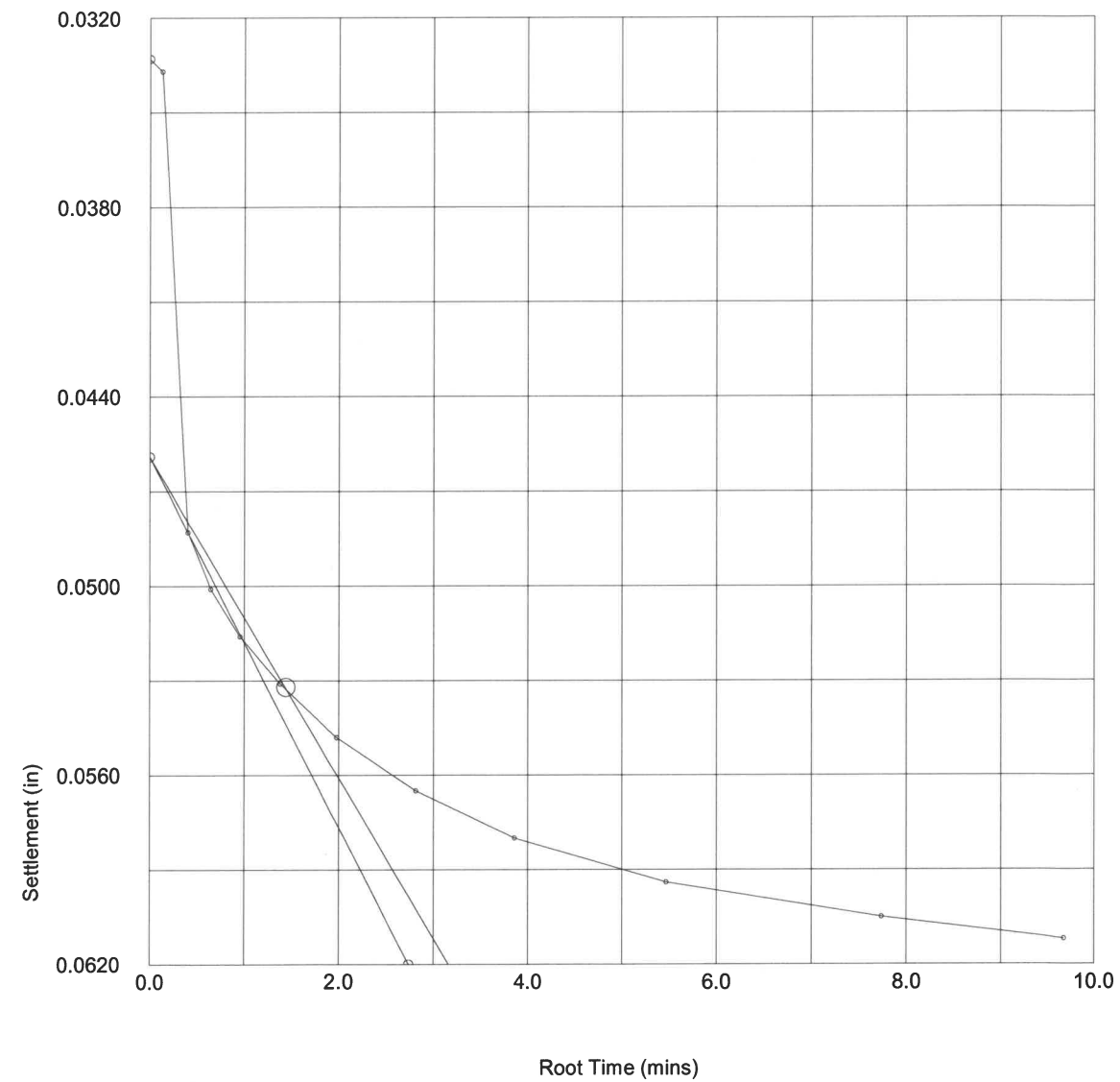
No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	333	0.0333	0.0333
2	0.017	337	0.0337	0.0337
3	0.167	483	0.0483	0.0483
4	0.417	501	0.0501	0.0501
5	0.917	516	0.0516	0.0516
6	1.917	531	0.0531	0.0531
7	3.917	548	0.0548	0.0548
8	7.917	565	0.0565	0.0565
9	14.917	580	0.0580	0.0580
10	29.917	594	0.0594	0.0594
11	59.917	605	0.0605	0.0605
12	93.717	612	0.0612	0.0612

	ASTM D2435-96	Test name	Consolidation Load: 4.000 (TSF)
		Date of Test:	5-17-23
	Site Reference: Lincoln Street Bridge Replacement	Sample:	ST-1
	Jobfile: C:\WINCLISP\22350061.JOB	Borehole:	EB2-B
	Operator: <i>mu</i>	Checked: <i>mu</i>	Approved:

### Oedometer Settlement Tests

**Settlement Stage Results**

Vertical Stress (TSF)	4.000
Initial Temp oC	21.8
Correction (in)	0.0
Settlement (in)	0.0279
Voids Ratio e	0.7915
Final Temp oC	0.0
$t_{90}$ (mins)	2.09
$c_v$ (ft <sup>2</sup> /day)	0.921
$m_v$ (ft <sup>2</sup> /ton)	0.015
Sec Compression $C_{sec}$	0.00



	ASTM D2435-96	Test name	Consolidation
		Date of Test:	5-17-23
	Site Reference: Lincoln Street Bridge Replacement	Sample:	ST-1
	Jobfile: C:\WINCLISP\22350061.JOB	Borehole:	EB2-B
Operator:	Checked:	Approved:	

### Oedometer Settlement Tests

No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	612	0.0612	0.0612
2	0.017	615	0.0615	0.0615
3	0.167	793	0.0793	0.0793
4	0.417	813	0.0813	0.0813
5	0.917	835	0.0835	0.0835
6	1.917	861	0.0861	0.0861
7	3.917	893	0.0893	0.0893
8	7.917	925	0.0925	0.0925
9	14.917	951	0.0951	0.0951
10	29.917	973	0.0973	0.0973
11	59.917	989	0.0989	0.0989
12	116.200	1000	0.1000	0.1000

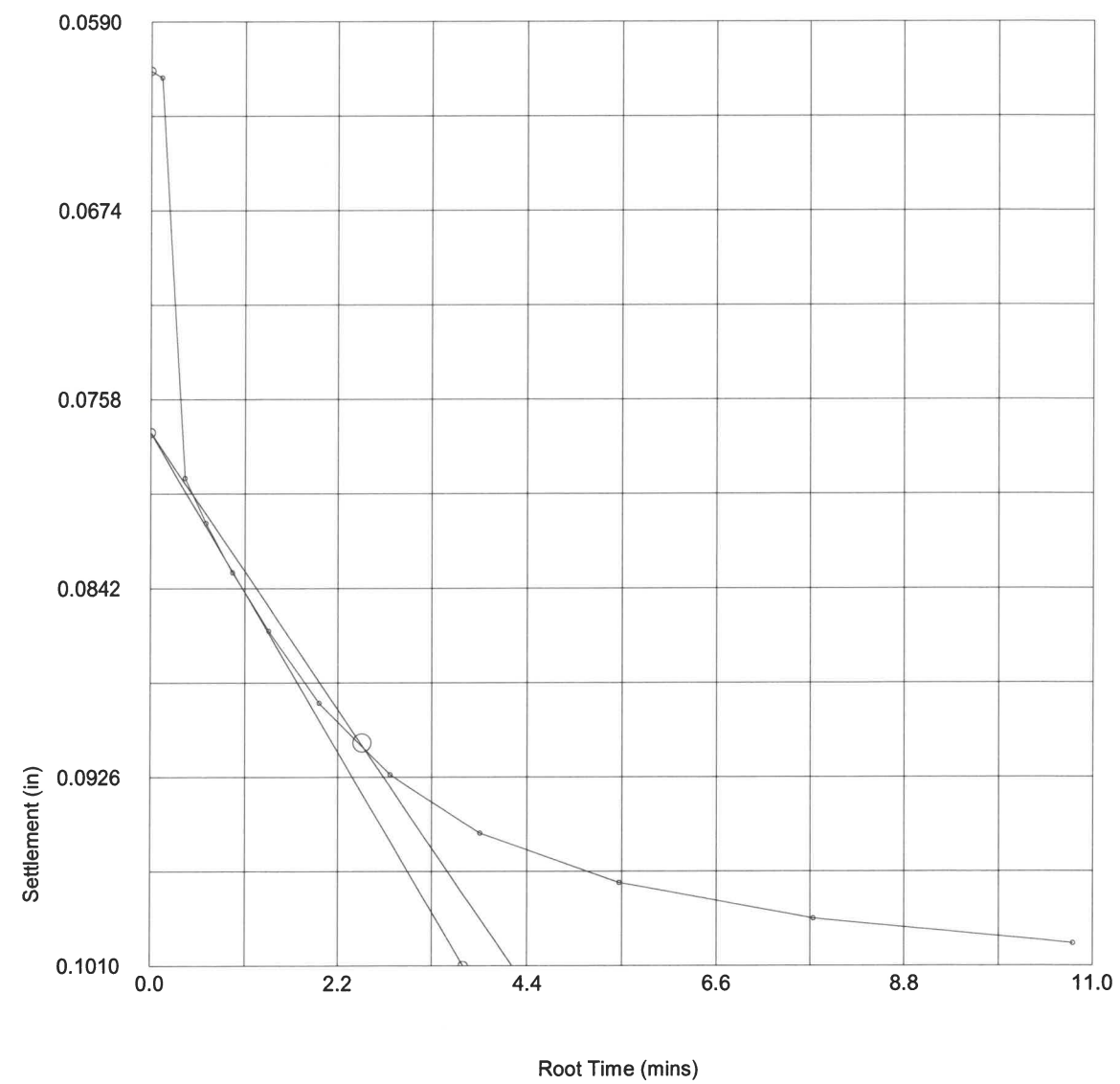
	ASTM D2435-96	Test name	Consolidation Load: 8.000 (TSF)
		Date of Test:	5-17-23
	Site Reference: Lincoln Street Bridge Replacement	Sample:	ST-1
	Jobfile: C:\WINCLISP\22350061.JOB	Borehole:	EB2-B
Operator:	Checked:	Approved:	



# Oedometer Settlement Tests

## Settlement Stage Results

Vertical Stress (TSF)	8.000
Initial Temp oC	21.8
Correction (in)	0.0
Settlement (in)	0.0388
Voids Ratio e	0.7174
Final Temp oC	0.0
$t_{90}$ (mins)	6.17
$c_v$ (ft <sup>2</sup> /day)	0.29
$m_v$ (ft <sup>2</sup> /ton)	0.011
Sec Compression $C_{sec}$	0.00



ASTM D2435-96  
 Site Reference: Lincoln Street Bridge Replacement  
 Jobfile: C:\WINCLISP\22350061.JOB  
 Operator: *MLK*

Test name: Consolidation  
 Date of Test: 5-17-23  
 Sample: ST-1  
 Borehole: EB2-B  
 Checked: *MLK*

Approved:

# SITE PHOTOGRAPH

Bridge No. 20 on -L- (Lincoln Street) over Irish Buffalo Creek



Looking South

City of Concord Lincoln Street Bridge Replacement  
Opinion of Probable Construction Cost

TIP No. Lincoln Street Bridge Replacement  
Route Lincoln Street  
From over Irish Buffalo Creek  
Typical Section 2-Lane C&G

**100%**

County: Cabarrus

<b>CONSTR. COST</b>
<b>\$2,683,700</b>

Prepared By: Stantec  
Requested By:

Note: This estimate is an opinion of probable cost for contractor work only and does not include Right-of-Way costs, nor utility costs for the private utilities. Utility Construction is provided only as a general estimate. Design and quantities for utilities to be coordinated by the City of Concord.

Line Item	Des	Sec No.	Description	Quantity	Unit	Price	Amount
0000100000-N		800	Mobilization	1	LS	\$ 247,567.54	\$ 247,567.54
0000400000-N		801	Construction Surveying	1	LS	\$ 30,000.00	\$ 30,000.00
0043000000-N		226	Grading	1	LS	\$ 125,000.00	\$ 125,000.00
0050000000-E		226	Supplemental Clearing and Grubbing	1	Acre	\$ 8,000.00	\$ 8,000.00
0057000000-E		226	Undercut Excavation	450	CY	\$ 50.00	\$ 22,500.00
0127000000-N		235	Embankment Settlement Gauges	1	EA	\$ 1,250.00	\$ 1,250.00
0134000000-E		240	Drainage ditch Excavation	810	CY	\$ 50.00	\$ 40,500.00
0194000000-E		265	Select Granular Material	400	CY	\$ 37.00	\$ 14,800.00
0196000000-E		270	Geotextile for Soil Stabilization	400	SY	\$ 4.00	\$ 1,600.00
0248000000-N		SP	Type III Reinforced Approach Fill	1	LS	\$ 55,000.00	\$ 55,000.00
0318000000-E		300	Foundation Conditioning Material, Minor Structures	50	Tons	\$ 48.00	\$ 2,400.00
0321000000-E		300	Foundation Conditioning Geotextile	150	SY	\$ 4.00	\$ 600.00
0335200000-E		305	15" Drainage Pipe	88	LF	\$ 70.00	\$ 6,160.00
0335850000-E		305	15" Drainage Pipe Elbow	2	Each	\$ 425.00	\$ 850.00
0448200000-E		310	15" RC Pipe Culv, Class IV	264	LF	\$ 75.00	\$ 19,800.00
0448500000-E		310	30" RC Pipe Culv, Class IV	76	LF	\$ 150.00	\$ 11,400.00
0995000000-E		340	Pipe Removal	307	LF	\$ 30.00	\$ 9,210.00
1004500000-E		505	Geotextile for Subgrade Stabilization	300	SY	\$ 10.00	\$ 3,000.00
1077000000-E		SP	No. 57 Stone for Rock Cross Vane and Step Pool	25	Ton	\$ 70.00	\$ 1,750.00
1099500000-E		505	Shallow Undercut	100	CY	\$ 15.00	\$ 1,500.00
1099700000-E		505	Class IV Subgrade Stabilization	200	Tons	\$ 40.00	\$ 8,000.00
1121000000-E		520	Aggregate Base Course	180	Tons	\$ 50.00	\$ 9,000.00
1220000000-E		545	Incidental Stone Base	50	Tons	\$ 65.00	\$ 3,250.00
1330000000-E		607	Incidental Milling	260	SY	\$ 30.00	\$ 7,800.00
1491000000-E		610	Base Course, Type B 25.0 C	200	Tons	\$ 85.00	\$ 17,000.00
1503000000-E		610	Binder Course, Type I 19.0 C	60	Tons	\$ 80.00	\$ 4,800.00
1519000000-E		610	Surface Course, Type S 9.5 B	320	Tons	\$ 70.00	\$ 22,400.00
1575000000-E		620	AsphBinder for Plant Mix PG64-22	35	Tons	\$ 700.00	\$ 24,500.00
2022000000-E		815	Subdrain Excavation	44.8	CY	\$ 42.00	\$ 1,881.60
2026000000-E		815	Geotextile for Subsurface Drains	200	SY	\$ 8.00	\$ 1,600.00
2036000000-E		815	Subdrain Coarse Aggregate	33.6	CY	\$ 85.00	\$ 2,856.00
2044000000-E		815	6" Perforated Subdrain Pipe	200	LF	\$ 30.00	\$ 6,000.00
2070000000-N		815	Subdrain Pipe Outlet	1	Each	\$ 425.00	\$ 425.00
2077000000-E		815	6" Outlet Pipe	6	LF	\$ 45.00	\$ 270.00
2286000000-N		840	Masonry Drainage Structures	7	Each	\$ 3,500.00	\$ 24,500.00
2308000000-E		840	Masonry Drainage Structures	3.1	LF	\$ 575.00	\$ 1,782.50
2374000000-N		840	Frame w/Grate and Hood 840.03 Type F	2	Each	\$ 1,250.00	\$ 2,500.00
2374000000-N		840	Frame w/Grate and Hood 840.03 Type G	5	Each	\$ 1,250.00	\$ 6,250.00
2549000000-E		846	2'-6" Concrete Curb and Gutter	950	LF	\$ 60.00	\$ 57,000.00
2591000000-E		848	4" Concrete Sidewalk both sides	770	SY	\$ 60.00	\$ 46,200.00
3030000000-E		862	Steel Beam Guardrail	50	LF	\$ 30.00	\$ 1,500.00

City of Concord Lincoln Street Bridge Replacement  
Opinion of Probable Construction Cost

315000000-N		862	Additional Guardrail Posts	5	Each	\$ 50.00	\$ 250.00
321500000-N		862	Guardrail Anchor Units, Type III	4	Each	\$ 2,500.00	\$ 10,000.00
328800000-N		862	Guardrail End Units, Type TL-2	4	Each	\$ 3,500.00	\$ 14,000.00
356900000-E		867	Barbed Wire Fence Reset	180	LF	\$ 25.00	\$ 4,500.00
362800000-E		876	Plain Rip Rap, Class I	30	Ton	\$ 70.00	\$ 2,100.00
364200000-E		876	Plain Rip Rap, Class A	5	Ton	\$ 60.00	\$ 300.00
364900000-E		876	Plain Rip Rap, Class B	40	Ton	\$ 65.00	\$ 2,600.00
365100000-E	SP		Boulders	75	Ton	\$ 150.00	\$ 11,250.00
365600000-E		876	Geotextile for Drainage	985	SY	\$ 4.00	\$ 3,940.00
402500000-E		901	CONTRACTOR FURNISHED, TYPE D SIGN	35.0	SF	\$ 30.00	\$ 1,050.00
402500000-E		901	CONTRACTOR FURNISHED, TYPE E SIGN	28	SF	\$ 30.00	\$ 825.00
407200000-E		903	SUPPORTS, 3-LB STEEL U-CHANNEL	250	LF	\$ 10.00	\$ 2,500.00
409600000-N		904	SIGN ERECTION, TYPE D	2	EA	\$ 300.00	\$ 600.00
410200000-N		904	SIGN ERECTION, TYPE E	5	EA	\$ 200.00	\$ 1,000.00
411610000-N		904	SIGN ERECTION, RELOCATE TYPE E (GROUND MO	3	EA	\$ 250.00	\$ 750.00
415500000-N		907	DISPOSAL OF SIGN SYSTEM, U-CHANNEL	12	EA	\$ 20.00	\$ 240.00
419200000-N		907	DISPOSAL OF SUPPORT, U-CHANNEL	2	EA	\$ 15.00	\$ 30.00
468500000-E		1205	THERMOPLASTIC (4", 90 MILS)	2,000	LF	\$ 1.50	\$ 3,000.00
490000000-N		1251	PERMANENT RAISED PAVEMENT MARKERS	10	EA	\$ 15.00	\$ 150.00
600000000-E		1605	TEMPORARY SILT FENCE	1,625	LF	\$ 2.50	\$ 4,062.50
600600000-E		1610	EROSION CONTROL STONE, CLASS A	90	TON	\$ 55.00	\$ 4,950.00
600900000-E		1610	EROSION CONTROL STONE, CLASS B	135	TON	\$ 50.00	\$ 6,750.00
601200000-E		1610	SEDIMENT CONTROL STONE	290	TON	\$ 45.00	\$ 13,050.00
601500000-E		1615	TEMPORARY MULCHING	1	ACR	\$ 950.00	\$ 950.00
601800000-E		1620	SEED FOR TEMPORARY SEEDING	100	LB	\$ 3.75	\$ 375.00
602100000-E		1620	FERTILIZER FOR TEMPORARY SEEDING	0.5	TON	\$ 1,000.00	\$ 500.00
602900000-E	SP		SAFETY FENCE	320	LF	\$ 2.50	\$ 800.00
603000000-E		1630	SILT EXCAVATION	220	CY	\$ 4.75	\$ 1,045.00
603600000-E		1631	MATTING FOR EROSION CONTROL	7,570	SY	\$ 1.60	\$ 12,112.00
603700000-E		1629	COIR FIBER MAT	100	SY	\$ 5.75	\$ 575.00
604200000-E		1632	1/4" HARDWARE CLOTH	315	LF	\$ 5.50	\$ 1,732.50
607000000-N		1639	SPECIAL STILLING BASINS	10	EA	\$ 900.00	\$ 9,000.00
6071002000-E		1642	Flocculant	25	LB	\$ 7.00	\$ 175.00
608400000-E		1660	SEEDING AND MULCHING	3	ACR	\$ 2,250.00	\$ 6,750.00
608700000-E		1660	MOWING	0.5	ACR	\$ 160.00	\$ 80.00
609300000-E		1661	SEED FOR REPAIR SEEDING	50	LB	\$ 8.00	\$ 400.00
609600000-E		1662	SEED FOR SUPPLEMENTAL SEEDING	50	LB	\$ 6.00	\$ 300.00
610800000-E		1665	FERTILIZER TOPDRESSING	0.5	TON	\$ 1,100.00	\$ 550.00
611100000-E	SP		IMPERVIOUS DIKE	195	LF	\$ 190.00	\$ 37,050.00
611450000-N		1667	SPECIALIZED HAND MOWING	10	MHR	\$ 125.00	\$ 1,250.00
611700000-N		1675	RESPONSE FOR EROSION CONTROL	13	EA	\$ 190.00	\$ 2,470.00
611750000-N	SP		CONCRETE WASHOUT STRUCTURE	2	EA	\$ 1,100.00	\$ 2,200.00
612300000-E		1670	REFORESTATION	1.0	ACR	\$ 3,500.00	\$ 3,500.00
			<b>Structures</b>				
802100000-N	SP		Removal of Existing Structure at 13+82.50	1	LS	\$ 50,000.00	\$ 50,000.00
8105520000-E		411	3'-0" Drilled Piers in Soil	112	LF	\$ 1,400.00	\$ 156,800.00
8105620000-E		411	3'-0" Drilled Piers Not in Soil	52	LF	\$ 1,600.00	\$ 83,200.00
811500000-N		411	CSL Testing	2	Each	\$ 3,000.00	\$ 6,000.00
812100000-N		412	Unclassified Structure Excavation	1	LS	\$ 8,000.00	\$ 8,000.00
818200000-E		420	Class A Concrete	119	CY	\$ 1,150.00	\$ 136,850.00
821000000-N		422	Bridge Approach Slabs	1	LS	\$ 48,000.00	\$ 48,000.00



City of Concord Lincoln Street Bridge Replacement  
Opinion of Probable Construction Cost

8217000000-E		425	Reinforcing Steel	38,833	LBS	\$ 1.50	\$ 58,249.50
8238000000-E		425	Spiral Column Reinforcing Steel	4,422	LBS	\$ 2.85	\$ 12,602.70
8328200000-E		450	Pile Driving Setup for HP 12x53 Steel Piles	20	Each	\$ 1,300.00	\$ 26,000.00
8364000000-E		450	HP 12x53 Steel Piles	400	LF	\$ 75.00	\$ 30,000.00
8391000000-N		450	Steel Pile Points	10	Each	\$ 270.00	\$ 2,700.00
8475000000-E		460	Two Bar Metal Rail	256	LF	\$ 125.00	\$ 31,937.50
8517000000-E		460	1'-2"x3'-4 1/4" Concrete Parapet	270.00	LF	\$ 120.00	\$ 32,400.00
8608000000-E		876	Rip Rap Class II (2'-0" Thick)	622.00	Ton	\$ 60.00	\$ 37,320.00
8622000000-E		876	Geotextile for Drainage	692.00	SY	\$ 3.75	\$ 2,595.00
8657000000-N		430	Elastomeric Bearings	1.00	LS	\$ 30,600.00	\$ 30,600.00
8762000000-E		430	3'-0"x1'-9" Prestressed Concrete Cored Slabs	2,430.00	LF	\$ 205.00	\$ 498,150.00
			<b>Utility Construction (estimated, to be determined by City)</b>				
			Plug Existing 24" Sewer Pipe for Abandonment	4	Each	\$ 100.00	\$ 400.00
			Remove Existing 24" Sewer Pipe	65	LF	\$ 50.00	\$ 3,250.00
			Remove Existing Sewer Manhole	1	Each	\$ 2,500.00	\$ 2,500.00
			Concrete Encasement for Existing 42" Sewer Pipe	50	LF	\$ 1,000.00	\$ 50,000.00
			Adjust Existing Sewer Manhole Rim ~1FT	1	Each	\$ 600.00	\$ 600.00
			Adjust Existing Sewer Manhole Rim ~4FT	1	Each	\$ 3,000.00	\$ 3,000.00

**Lgth**                      **0.11 Mi.**

<b>Contract Cost</b> .....	<b>\$ 2,333,269.34</b>
<b>E. &amp; C. 15%</b> .....	<b>\$ 350,430.66</b>
<b>Construction Cost</b> .....	<b>\$ 2,683,700.00</b>