RJ Corman Railroad Company

101 R.J. Corman Drive
Nicholasville, KY 40356
Phone: (859) 881-7521
Fax: (859) 885-7804

BID INVITATION

DATE: **April 17th, 2020**

LOCATION: **Bridge at MP 334.5 over Crabtree Swamp,**
R.J. Corman Railroad Company / Carolina Lines, Conway SC

PROJECT: **Bridge Replacement**

BID DUE: **May 21st, 2020**

Bidders:

R.J. Corman Railroad Company / Carolina Lines is seeking bridge replacement bids for a Transportation Infrastructure Generating Economic Recovery (TIGER) Project, to be performed in conjunction with Horry County's award of a TIGER grant to upgrade the freight rail corridor owned by R.J. Corman Railroad Company and Horry County. All rules and regulations related to the funding source apply.

This is an invitation to submit a lump sum/unit price proposal for furnishing all tools, equipment, materials, labor, superintendence and transportation, except as otherwise specified, required for the completion of the R.J. Corman Railroad Company / Carolina Lines (RJC) referenced Project in accordance with papers, plans and specifications attached hereto. The bid package in its entirety consists of the following documents:

1. Instructions to Bidders
2. Lump Sum/Unit Price Proposal Bid Sheet and Conceptual Project Schedule
3. Sample RJC Standard Construction Agreement
4. Project Plans – RJC M.P. 334.5 (Conway, SC) Bid Plan Set
5. Geotechnical Report
6. Permitting Documents
7. Project Documentation and Reporting Forms
8. Valuation Map (V.9.SC – 6)
9. Location Map

The project shall be governed by the engineering standards, practices, and specifications established by the American Railway Engineering and Maintenance of Way Association (AREMA). Additionally, the Contractor shall conform to RJC's written standards and procedures that define the criteria for the quality of materials and construction scoped for the Project. Work shall be done in accordance with all applicable Federal, State, and Local Codes.

The quantities, shown on the enclosed "Bid Sheet" form, are for the purpose of preparing and computing bids and are only approximate. RJC assumes no responsibility for their correctness or accuracy, regardless of the variation between them and the actual quantities in the work as determined by measurement. RJC reserves the right to increase, decrease, and change quantities, as it deems necessary for the satisfactory completion of the work. If applicable, all fees, vehicular detours, site access agreements, etc., shall be obtained and paid for by the successful contractor.

Prior to bidding, the Contractor shall be thoroughly familiar with the content of the RJC Standard Construction Contract (copy attached). This document includes requirements of significant importance to the bidding process, including but not limited to, Insurance Coverage, Sales and Use Taxes, Permits, Protection of Services and Facilities, Safety (including FRA "On-Track Worker Safety"), Environmental, Indemnity, Bond(s), and Payment. **In the event that a bidder is unable to accept the terms and conditions of RJC's Construction Contract or requests modifications to the Contract, RJC reserves the right to select another bidder. Any request for modifications must be submitted with the bid.**

The Contractor must indicate with the bid proposal if any:

(a) Directors, owners, officers or employees of the Contractor's firm are in any way associated with RJC or any parent company of RJC and
(b) Employee of RJC is associated or affiliated with the Contractor.

Bidders shall become familiar with the proposed work and any conditions that may be encountered in carrying out the Contract. A Pre-bid Job Showing is not mandatory to be entitled to consideration. However, **if the Contractor is interested in attending a Pre-Bid Job Showing, the site visit shall be scheduled in advance with** james.kelley@rjcorman.com during the time frames offered below. Mr. Cary Pickerell, will be in direct charge of the work and he or his representative will meet the contractor at the scheduled time and location for the Pre-Bid Job Showing:

DATE: 4/20/2020 to 5/5/2020
TIME: 0800-1400 Hours (EST)
SITE: Conway, SC (as shown on the attached Location Maps)

All Contractor representatives attending the job showing must comply with and be FRA Qualified - 49 CFR Part 214, Railroad Workplace Safety. All Contractor representatives must wear personal protective equipment (PPE) during the job showing while on RJC property, which includes at a minimum a high visibility vest with reflective striping, hard hat, approved safety glasses with side shields, and six (6) inch lace up steel toe boots with defined heel. No one will be allowed on RJC property without having proper safety equipment. No Jewelry including finger rings may be worn on RJC property. **There will be no exceptions to these safety requirements.**

To be entitled to consideration, the Contractor's bid must be made on the attached "Lump Sum/Unit Price Bid Sheet" and be accompanied by a Conceptual Project Schedule.

Sealed Bids due by May 21st, 2020, at 12PM EST
Reference Project: 2016 TIGER Subcontractor Services -12
Submit Original Bids in Sealed Envelopes to:
RJ Corman Railroad Company / Carolina Lines
ATTN: Production Team – Public Bid / Confidential 2016 TIGER Subcontractor Services - 12
PO Box 442
Chadbourn, NC 28431
or
103 South Wilson St.
Chadbourn, NC 28431

Bidders take all responsibility to ensure that RJ Corman has possession of bid envelope prior to expiration of bidding period.

A complete list of equipment the Contractor proposes to place on the job shall accompany the bid sheet. The work shall be done with off-track equipment except as otherwise may be provided. Any work proposal with on-track equipment must be clearly identified within the proposal. **RJC will not furnish free rail transportation for Contractor's equipment or its employees.**

Time is important and the successful bidder shall have equipment at the project site within ten (10) calendar days after the notice to proceed. **For scheduling purposes, the Contractor should assume a notice to proceed will be issued by RJC no later than June 21st, 2020.** *Bidder must submit a construction schedule with enough detail to determine the duration of construction. A detailed construction schedule in Gantt Chart format will be furnished by the selected Contractor within ten (10) calendar days after the notice to proceed.*

Any bulletin issued during the time of bidding is to be covered by Addendum to the Bid Invitation and, in closing the contract, will become a part thereof. Contractor shall make note on the bid sheet of all addendum numbers received (if any).

Immediately after award of the contract, the successful bidder shall execute a construction contract with RJC on RJC's standard form of contract. If the Contractor fails to comply with the plans, specifications and/or other provisions of the contract, RJC reserves the right to assess Contractor the cost of such noncompliance. RJC will perform inspections in connection with the project to ensure compliance with the project documents.

R.J. Corman reserves the right to reject any or all bids that do not comply with R.J. Corman's procurement policy for this project.

Any questions concerning the site or project may be clarified by emailing the representative listed below by **May 8th, 2020.** Questions will be answered by addendum posted on R.J. Corman's website at: https://www.rjcorman.com/contact/bidding-opportunities
Answers to questions will be posted on R.J. Corman's website by **May 14th, 2020.**

Mr. Jimmy Kelley
Funded Projects Coordinator
R.J. Corman Railroad Company / Carolina Lines.
Email: james.kelley@rjcorman.com

Due to Covid-19, a face to face bid opening cannot be offered at this time. An electronic bid opening will be offered as further details will be provided in an addendum posted on R.J. Corman's website by May 14, 2020.

RJ Corman Railroad Company

Instructions to Bidders

April 17, 2020

RJ Corman Railroad Company

101 RJ Corman Drive
Nicholasville, KY 40356
Phone: (859) 881-7521
Fax: (859) 885-7804

INSTRUCTIONS TO BIDDERS

1. DOCUMENTS: Bid Documents listed on the Bid Invitation, including Unit Price/Lump Sum Bid Sheets, Drawings, Specifications and any other necessary documents are available to each bidding contractor posted on the following websites:
   https://www.rjcorman.com/contact/bidding-opportunities
   https://procurement.sc.gov/

2. **SITE EXAMINATION: Before submitting a proposal, bidders and sub-bidders shall carefully examine the project site by physical inspection to fully inform themselves as to all existing conditions and limitations. The successful bidder will be required to meet these conditions as they exist, whether or not they are fully described in Specifications.**

3. BULLETINS: All bulletins, clarifications and addenda will be posted on R.J. Corman's website at: https://www.rjcorman.com/contact/bidding-opportunities to be incorporated in the proposal. These documents will become a part of the Construction Contract document. Bidding contractors shall make note on the bid sheet of all addendum numbers received (if any).

4. DISCREPANCIES: Should a bidder find discrepancies in, or omissions from the drawings or documents, or should there be a conflict between the documents and local codes and ordinances, or should the bidder be in doubt as to their meaning, the bidder shall notify at once the Funded Projects Coordinator at James.Kelley@rjcorman.com who will send a written instruction to all bidders. The Funded Projects Coordinator will not be responsible for any oral instructions.

5. SUBSTITUTIONS & EXTRAS:

   a.) The project shall be bid on the basis of the materials, products and equipment described in the bid documents. Bid substitutions may be submitted with the bid.

   b.) If applicable, Request for Substitution shall accompany the bid and shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitute, including drawings, cut sheets, performance and test data, cost and any other information necessary for an evaluation. Written approval for any substitution shall be required from the office of the Funded Projects Coordinator.

   c.) Contractor shall not perform any "Extra" work or make any changes or revisions to the work as specified and shown on the drawings unless changes, revisions, and "Extra" work has first been authorized in writing by the Funded Projects Coordinator.

   d.) Claims by the contractor for "Extra" items of work not authorized by the Funded Projects Coordinator will be rejected.

6. BID SUBMITTALS:

a) Proposals from Contractors for furnishing all labor, materials, equipment, tools and incidentals as called for in the contract documents for the construction of this project shall be received by the Funded Projects Coordinator by the date and time specified in the Bid Invitation.

b) Bid Sheet — In order to be considered, all bids must be submitted on the RJC Bid Sheet for LUMP SUM/UNIT PRICE PROPOSAL as provided within**. To be considered valid, all pages of the Bid Sheet must be filled out in their entirety.**

a.) Project Schedule — All bidders shall provide with their bid a Conceptual Project Schedule, which shows the total number of calendar days required to complete the work as well as the track time required for each task. The schedule shall include a breakdown of time required for major work items and shall be submitted on the prescribed form included with the Bid Sheet as well as in the form of a Gantt chart. **The Contractor may anticipate 3 day train traffic outages weekly, for project scheduling.**

c) Bids shall include a list of the proposed equipment to be used on the project and any subcontractors that will be performing work on the project for the Railroad's approval.

d) RJC reserves the right to reject all proposals or to accept any proposal which it judges to be in the Company's best interest.

7. FORM OF AGREEMENT:

a.) The Construction Contract, between Contractor and RJC will be used for the Contract and is hereby made a part of these specifications.

b.) Prior to bidding the Contractor shall be thoroughly familiar with the content of RJC's Construction Contract (copy attached). In the event that a bidder is unable to accept the terms and conditions of RJC's Construction Contract, or requests modifications to the Contract, RJC reserves the right to select another bidder.

8. PROJECT DOCUMENTATION & REPORTING REQUIREMENTS:

a.) Refer to "07 - Project Documentation & Reporting Forms"

b.) Schedules & Reports – Contractor shall provide Progress Schedule and Daily Status Reports with well documented photos.

c.) Record Documents – Contractor shall provide all required Test Records and As-Built Documents including marked-up drawings, as-built survey, shop drawings, pile driving logs and any other documents which serve as a record of actual field installation and construction different from the original Contract Documents.

d.) Standard Forms – Contractor shall submit Bonding Documents, Proof of Insurance, AIA Applications for Payment, AIA Release of Liens, AIA Consent of Surety Company to Final Payment, etc.

e.) Safety Documentation, Training and Certifications – Contractor shall submit or be able to produce their Project Safety Sheet, Fall Protection Retrieval Plan, Daily Job Safety Analysis Forms, and FRA On-track Roadway Worker Certification.

9. VENDOR MUST PROVIDE CERTIFICATE OF INSURANCE WITH THE FOLLOWING COVERAGE:

1.) Public Liability or Commercial General Liability Insurance ("CGL"), including Contractual Liability Coverage and CG 24 17 "Contractual Liability – Railroads" endorsement, covering all liabilities assumed by the Contractor under this Agreement, without exception or restriction of any kind, with a combined single limit of not less than Two Million Dollars ($2,000,000) for Bodily Injury and/or Property Damage Liability per occurrence, and an aggregate limit of not less than Six Million Dollars ($6,000,000) per annual policy period. Such insurance policy shall be endorsed to provide a Waiver of Subrogation in favor of the Railroad and all parents and affiliated companies and shall name the Railroad and all parents and affiliated companies as Additional Insured. An Umbrella policy may be utilized to satisfy the required limits of liability under this section.

a.) Commercial Automobile Insurance for all owned, non-owned or hired vehicles with a combined single limit of not less than One Million Dollars ($1,000,000) for Bodily Injury and Property Damage Liability. Such policy shall be endorsed to provide a Waiver of Subrogation in favor of the Railroad and all parents and affiliated companies and shall name the Railroad and all parents and affiliated companies as Additional Insured. If hauling hazardous materials, such Policy is to be endorsed with the MCS – 90 endorsement as well as CA 9948 Pollution Liability – Broadened Pollution for Covered Autos.

b.) Statutory Workers' Compensation and Employers' Liability Insurance for its employees (if any) with minimum limits of not less than One Million Dollars ($1,000,000) for Bodily Injury by Accident, Each Accident; One Million Dollars ($1,000,000) for Bodily Injury by Disease, Policy Limit; One Million Dollars ($1,000,000) for Bodily Injury by Disease, Each Employee. Such policy shall be endorsed to provide a Waiver of Subrogation in favor of the Railroad and all parents and affiliated companies.

c.) Railroad Protective Liability Insurance written in favor of Railroad with limits of Two Million Dollars ($2,000,000) each occurrence and Six Million Dollars ($6,000,000) aggregate limit covering all operations within 50 feet of railroad track.

d.) Such policies shall designate RJ Corman Railroad Company / Carolina Lines as an additional insured.

10. ADDITIONAL REQUIREMENTS AND INFORMATION:

a.) Must enter into a Subcontract Agreement prior to performing project work. See "03 - Construction Contract"

b.) Please hold bid valid for 90 days.

c.) Anticipated start is June 2020, weather permitting.

d.) Subcontractors must be FRA Qualified - 49 CFR Part 214, Railroad Workplace Safety.

e.) "R.J. Corman Railroad Company / Carolina Lines, in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 U.S.C. §§ 2000d to 2000d-4) and the Regulations, hereby notifies all bidders that it will affirmatively ensure that for any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full and fair opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award."

f.) Subcontractor will be subject to the provisions and requirements of Appendix A, B, C, D, and the "Contract Provisions for Non-Federal Entity Contracts Under Federal Awards" (See attached).

g.) Key elements of 49 CFR 26 will be incorporated into the solicitation process. When soliciting bids, R.J. Corman will make a good faith effort to include disadvantaged business enterprises. Although not mandatory, suppliers are encouraged to submit a percentage level of DBE commitment with their bid if able.

h.) The Subcontractor must comply with 49 CFR Part 219, Control of Alcohol and Drug Use: Coverage of Maintenance of Way (MOW) and Retrospective Regulatory Review-Based Amendments. (See Appendix E).

i.) Must be a licensed contractor in the state of South Carolina.

j.) Davis-Bacon rates apply. See attached rates or https://www.dol.gov/whd/govcontracts/dbra.htm for more information (See Appendix F). Certified payroll documents must be provided to the Funded Projects Coordinator at R.J. Corman weekly following each pay period (See "07 - Project Documentation & Reporting Forms").

k.) Please ensure all applicable pages are signed and returned with your bid documents. (See Appendix G)

l.) All material must meet AREMA Specifications.

m.) Materials shall comply with 49 U.S.C. 24405 (a). Proper Buy America Certifications shall be provided with all steel, iron, and manufactured goods produced in the United States.

n.) The Contractor will be responsible for disturbance of track structure during pile driving.

o.) RJ Corman will complete the installation of track on the structure.

p.) RJC reserves the right to reject any or all proposals that do not comply with RJC's procurement policy for this project.

APPENDIX A

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

1. **Compliance with Regulations:** The contractor (hereinafter includes consultants) will comply with the Acts and the Regulations relative to Non-discrimination in Federally-assisted programs of the U.S. Department of Transportation, Federal Railroad Administration (FRA), as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.

2. **Non-discrimination:** The contractor, with regard to the work performed by it during the contract, will not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor will not participate directly or indirectly in the discrimination prohibited by the Acts and the Regulations, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 C.F.R. Part 21.

3. **Solicitations for Subcontracts, Including Procurements of Materials and Equipment:** In all solicitations, either by competitive bidding, or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the contractor of the contractor's obligations under this contract and the Acts and the Regulations relative to Non-discrimination on the grounds of race, color, or national origin.

4. **Information and Reports:** The contractor will provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto and will permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Recipient or the FRA to be pertinent to ascertain compliance with such Acts, Regulations, and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish the information, the contractor will so certify to the Recipient or the FRA, as appropriate, and will set forth what efforts it has made to obtain the information.

5. **Sanctions for Noncompliance:** In the event of a contractor's noncompliance with the Non-discrimination provisions of this contract, the Recipient will impose such contract sanctions as it or the FRA may determine to be appropriate, including, but not limited to:

   a. withholding payments to the contractor under the contract until the contractor complies; and/or

   b. cancelling, terminating, or suspending a contract, in whole or in part.

6. **Incorporation of Provisions:** The contractor will include the provisions of paragraphs one through six in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations and directives issued pursuant thereto. The contractor will take action with respect to any subcontract or procurement as the Recipient

or the FRA may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the contractor becomes involved in, or is threatened with litigation by a subcontractor, or supplier because of such direction, the contractor may request the Recipient to enter into any litigation to protect the interests of the Recipient. In addition, the contractor may request the United States to enter into the litigation to protect the interests of the United States.

APPENDIX B

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees to comply with the following non-discrimination statutes and authorities; including but not limited to:

Potentially Pertinent Non-Discrimination Authorities:

- Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d et seq., 78 stat. 252), (prohibits discrimination on the basis of race, color, national origin); and 49 C.F.R. Part 21.

- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 U.S.C. § 4601), (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);

- Federal-Aid Highway Act of 1973, (23 U.S.C. § 324 et seq.), (prohibits discrimination on the basis of sex);

- Section 504 of the Rehabilitation Act of 1973, (29 U.S.C. § 794 et seq.), as amended, (prohibits discrimination on the basis of disability); and 49 C.F.R. Part 27;

- The Age Discrimination Act of 1975, as amended, (42 U.S.C. § 6101 et seq.), (prohibits discrimination on the basis of age);

- Airport and Airway Improvement Act of 1982, (49 U.S.C. § 471, Section 47123), as amended, (prohibits discrimination based on race, creed, color, national origin, or sex);

- The Civil Rights Restoration Act of 1987, (PL 100-209), (Broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, The Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms "programs or activities" to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not);

- Titles II and III of the Americans with Disabilities Act, which prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 U.S.C. §§ 12131 – 12189) as implemented by Department of Transportation regulations at 49 C.F.R. Parts 37 and 38;

- The Federal Aviation Administration's Non-discrimination statute (49 U.S.C. § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);

- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which ensures nondiscrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations;

- Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency (LEP). To ensure compliance with Title

VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100);

- Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 U.S.C. § 1681 et seq).

APPENDIX C

APPLICABLE FEDERAL LAWS AND REGULATIONS

By entering into the agreement for a FY 2016 TIGER Discretionary Grant, the Recipient assures and certifies, with respect to this Grant, that it will comply with all applicable Federal laws, regulations, executive orders, policies, guidelines, and requirements as they relate to the application, acceptance, and use of Federal funds for this Project. Performance under this agreement shall be governed by and in compliance with the following requirements, as applicable, to the type of organization of the Recipient and any applicable sub-recipients. The applicable provisions to the agreement include, but are not limited to, the following:

General Federal Legislation

a. Davis-Bacon Act - 40 U.S.C. §§ 3141, et seq., as applicable under 23 U.S.C. 113
b. Federal Fair Labor Standards Act - 29 U.S.C. §§ 201, et seq.
c. Hatch Act - 5 U.S.C. §§ 1501, et seq.
d. Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 - 42 U.S.C. §§ 4601, et seq.
e. National Historic Preservation Act of 1966 - Section 106 - 54 U.S.C. § 306108
f. Archeological and Historic Preservation Act of 1974 - 54 U.S.C. §§ 312501- 312508
g. Native American Graves Protection and Repatriation Act - 25 U.S.C. §§ 3001, et seq. § 1536 seq. et seq.
h. Clean Air Act, P.L. 90-148, as amended 42 U.S.C. §§ 7401, et. seq.
i. Section 404 of the Clean Water Act, as amended 33 U.S.C. § 1344
j. Section 7 of the Endangered Species Act, P.L. 93-205, as amended - 16 U.S.C.
k. Coastal Zone Management Act, P.L. 92-583, as amended - 16 U.S.C. §§ 1451, et
l. Flood Disaster Protection Act of 1973 - Section 102(a) - 42 U.S.C. § 4012a
m. Age Discrimination Act of 1975 - 42 U.S.C. §§ 6101, et seq.
n. American Indian Religious Freedom Act, P.L. 95-341, as amended
o. Drug Abuse Office and Treatment Act of 1972, as amended, 21 U.S.C. §§ 1101,
p. The Comprehensive Alcohol Abuse and Alcoholism Prevention, Treatment and Rehabilitation Act of 1970, P.L. 91-616, as amended - 42 U.S.C. §§ 4541, et seq.
q. Sections 523 and 527 of the Public Health Service Act of 1912, as amended, 42 U.S.C. §§ 290dd through 290dd-2
r. Architectural Barriers Act of 1968 - 42 U.S.C. § 4151, et seq.
s. Power Plant and Industrial Fuel Use Act of 1978, P.L. 100-42 - Section 403 - 42 U.S.C. § 8373
t. Contract Work Hours and Safety Standards Act - 40 U.S.C. § 3701, et seq.
u. Copeland Anti-kickback Act, as amended - 18 U.S.C. § 874 and 40 U.S.C. § 3145
v. National Environmental Policy Act of 1969 - 42 U.S.C. §§ 4321, et seq.
w. Wild and Scenic Rivers Act, P.L. 90-542, as amended – 16 U.S.C. §§ 1271, et seq.
x. Federal Water Pollution Control Act, as amended - 33 U.S.C. §§ 1251-1376
y. Single Audit Act of 1984 - 31 U.S.C. §§ 7501, et seq.
z. Americans with Disabilities Act of 1990 - 42 U.S.C. § 12101, et seq.
aa. Title IX of the Education Amendments of 1972, as amended - 20 U.S.C. § 1681 through § 1683, and § 1685 through § 1687

bb. Section 504 of the Rehabilitation Act of 1973, as amended - 29 U.S.C. § 794 cc. Title VI of the Civil Rights Act of 1964 - 42 U.S.C. §§ 2000d et seq.
dd. Title IX of the Federal Property and Administrative Services Act of 1949 - 40 U.S.C. §§ 1101 -1104 541, et seq.
ee. Limitation on Use of Appropriated Funds to Influence Certain Federal Contracting and Financial Transactions – 31 U.S.C. § 1352
ff. Freedom of Information Act - 5 U.S.C. § 552, as amended
gg. Magnuson-Stevens Fishery Conservation and Management Act – 16 U.S.C. § 1855
hh. Farmland Protection Policy Act of 1981 – 7 U.S.C. § 4201, et seq.
ii. Noise Control Act of 1972 – 42 U.S.C. § 4901, et seq.
jj. Fish and Wildlife Coordination Act of 1956 – 16 U.S.C. § 661, et seq.
kk. Section 9 of the Rivers and Harbors Act and the General Bridge Act of 1946 - 33 U.S.C. §§ 401 and 525
ll. Section 4(f) of the Department of Transportation Act of 1966, 49 U.S.C. 303 and 23 U.S.C. § 138
mm. Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended --42 U.S.C. §§ 9601-9657
nn. Safe Drinking Water Act -- 42 U.S.C. §§ 300f to 300j-26 oo. Wilderness Act -- 16 U.S.C. §§ 1131-1136
pp. Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976 -- 42 U.S.C. § 6901, et seq.
qq. Migratory Bird Treaty Act 16 U.S.C. § 703, et seq.
rr. The Federal Funding Transparency and Accountability Act of 2006, as amended (Pub. L. 109 -282, as amended by section 6202 of Public Law 110–252)
ss. Cargo Preference Act of 1954 – 46 U.S.C. § 55305

Executive Orders
a. Executive Order 11246 - Equal Employment Opportunity
b. Executive Order 11990 - Protection of Wetlands
c. Executive Order 11988 – Floodplain Management
d. Executive Order 12372 - Intergovernmental Review of Federal Programs
e. Executive Order 12549 – Debarment and Suspension
f. Executive Order 12898 – Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations
g. Executive Order 13166 – Improving Access to Services for Persons with Limited English Proficiency

General Federal Regulations
a. Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards – 2 C.F.R. Parts 200, 1201
b. Non-procurement Suspension and Debarment – 2 C.F.R. Parts 180, 1200
c. Investigative and Enforcement Procedures - 14 C.F.R. Part 13
d. Procedures for predetermination of wage rates - 29 C.F.R. Part 1
e. Contractors and subcontractors on public building or public work financed in whole or part by loans or grants from the United States - 29 C.F.R. Part 3

f. Labor standards provisions applicable to contracts governing federally financed and assisted construction (also labor standards provisions applicable to non-construction contracts subject to the Contract Work Hours and Safety Standards Act) - 29 C.F.R. Part 5
g. Office of FederalContract Compliance Programs, Equal Employment Opportunity, Department of Labor (Federal and federally assisted contracting requirements) - 41 C.F.R. Parts 60, et seq.
h. Contractor Qualifications - 48 C.F.R. Part 9
i. New Restrictions on Lobbying – 49 C.F.R. Part 20
j. Nondiscrimination in Federally Assisted Programs of the Department of Transportation – Effectuation of Title VI of the Civil Rights Act of 1964 – 49 C.F.R. Part 21
k. Uniform relocation assistance and real property acquisition for Federal and Federally assisted programs - 49 C.F.R. Part 24
l. Nondiscrimination on the Basis of Sex in Education Programs or Activities Receiving Federal Financial Assistance - 49 C.F.R. Part 25
m. Nondiscrimination on the Basis of Handicap in Programs and Activities Receiving or Benefiting from Federal Financial Assistance - 49 C.F.R. Part 27
n. DOT's oversight of DOJ's ADA regulations for non-transit programs, including the ADA Accessibility Guidelines, required by the DOJ regulations at 28 C.F.R. Part 35
o. Enforcement of Nondiscrimination on the Basis of Handicap in Programs or Activities Conducted by the Department of Transportation – 49 C.F.R. Part 28
p. Denial of public works contracts to suppliers of goods and services of countries that deny procurement market access to U.S. contractors - 49 C.F.R. Part 30
q. Government wide Requirements for Drug-Free Workplace (Financial Assistance) – 49 C.F.R. Part 32
r. DOT's implementing ADA regulations for transit, including the ADA Accessibility Guidelines in Part 37, Appendix A - 49 C.F.R. Parts 37 and 38
s. Procedures for Transportation Workplace Drug and Alcohol Testing Programs – 49 C.F.R. Part 40

Office of Management and Budget Circulars
a. Any applicable OMB Circular based upon the specific FY 2016 TIGER Discretionary Grant Recipient.

Specific assurances required to be included in grant agreements by any of the above laws, regulations, or circulars are hereby incorporated by reference into the agreement.

APPENDIX D

DISCLOSURE OF LOBBYING ACTIVITIES

Certification for Contracts, Grants, Loans, and Agreements

The undersigned certifies, to the best of his or her knowledge and belief, that:

No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any grant agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or grant agreement.

If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or grant agreement, the undersigned shall complete and submit Standard Form-LLL (Rev. 7-97), "Disclosure of Lobbying Activities," in accordance with its instructions.

The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans and grant agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. § 1352, title. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

CERTIFICATION REGARDING DRUG-FREE WORKPLACE REQUIREMENTS IN THE PERFORMANCE OF THE FY 2016 DISCRETIONARY GRANT PROGRAM

The Recipient certifies that it will, or will continue, to provide a drug-free workplace by:

1. Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession or use of a controlled substance is prohibited in the Recipient's workplace, and specifying the actions that will be taken against employees for violation of such prohibition.

2. Establishing an ongoing drug-free awareness program to inform employees about:

(a) The dangers of drug abuse in the workplace;

(b) The Recipient's policy of maintaining a drug-free workplace;

(c) Any available drug counseling, rehabilitation, and employee assistance programs; and,

(d) The penalties that may be imposed upon employees for drug abuse violations occurring in the workplace;

3. Making it a requirement that each employee to be engaged in the performance of work supported by the grant award be given a copy of the statement required by paragraph 1.

4. Notifying the employee in the statement required by paragraph 1 that, as a condition of employment supported by the grant award, the employee will:

(a) Abide by the terms of the statement; and

(b) Notify the employer in writing of his or her conviction for a violation of a criminal drug statute occurring in the workplace no later than five calendar days after such conviction.

5. Notifying the agency in writing, within ten calendar days after receiving notice under paragraph (d)(2) from an employee or otherwise receiving actual notice of conviction. Employers of convicted employees must provide notice, including position title, to the Department. Notice shall include the order number of the grant award.

6. Taking one of the following actions, within 30 days of receiving notice under paragraph 4(b), with respect to any employee who is so convicted:

(a) Taking appropriate personnel action against such an employee, up to and including termination, consistent with the requirements of the Rehabilitation Act of 1973, as amended, or

(b) Requiring such employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved for such purposes by a Federal, State or local health, law enforcement, or other appropriate agency.

7. Making a good faith effort to continue to maintain a drug-free workplace through implementation of paragraphs (a), (b), (c), (d), (e) and (f).

8. The Recipient may, but is not required to, provide the site for the performance of work done in connection with the specific grant. For the provision of services pursuant to the agreement, workplaces include outstations, maintenance sites, headquarters office locations, training sites and any other worksites where work is performed that is supported by the grant award. If the Recipient does so, please insert in section 17 of Attachment 1 the following information from subsection (a) below:

(a) Identify the Places of Performance by listing the street address, city, county, state, zip code. Also identify if there are workplaces on file that are not identified in this section of the agreement.

CERTIFICATION REGARDING DEBARMENT, SUSPENSION, AND OTHER RESPONSIBILITY MATTERS -- PRIMARY COVERED TRANSACTIONS

2 C.F.R. Parts 180 and 1200 and 48 C.F.R. Part 9

These assurances and certifications are applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, consultant contracts or any other covered transaction requiring FRA approval or that is estimated to cost $25,000 or more – as defined in 2 C.F.R. Parts 180 and 1200.

By signing and submitting the Technical Application and by entering into the agreement under the FY 2016 TIGER Discretionary Grant program, the Recipient is providing the assurances and certifications for First Tier Participants and Lower Tier Participants in the FY 2016 TIGER Discretionary Project, as set out below.

1. Instructions for Certification – First Tier Participants:

a. The prospective first tier participant is providing the certification set out below.

b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective first tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective first tier participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction.

c. The certification in this clause is a material representation of fact upon which reliance was placed when the contracting agency determined to enter into this transaction. If it is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the contracting agency may terminate this transaction for cause of default.

d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

e. The terms “covered transaction,” “civil judgment,” “debarred,” “suspended,” “ineligible,” “participant,” “person,” “principal,” and “voluntarily excluded,” as used in this clause, are defined in 2 C.F.R. Parts 180 and 1200. “First Tier Covered Transactions” refers to any covered transaction between a Recipient or subrecipient of Federal funds and a participant (such as the prime or general contract). “Lower Tier Covered Transactions” refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). “First Tier Participant” refers to the participant who has entered into a covered transaction with a Recipient or subrecipient of Federal funds (such as the prime or general contractor). “Lower Tier Participant” refers to any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

f. The prospective first tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction.

g. The prospective first tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions," provided by the department or contracting agency, entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold.

h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the System for Award Management website (https://www.sam.gov/), which is compiled by the General Services Administration.

i. Nothing contained in the foregoing shall be construed to require the establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of the prospective participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

j. Except for transactions authorized under paragraph (f) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – First Tier Participants:

a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency;

(2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment, including a civil settlement, rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (a)(2) of this certification; and

(4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

2. Instructions for Certification - Lower Tier Participants:

(Applicable to all subcontracts, purchase orders and other lower tier transactions requiring prior FHWA approval or estimated to cost $25,000 or more - 2 C.F.R. Parts 180 and 1200)

a. The prospective lower tier participant is providing the certification set out below.

b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances.

d. The terms “covered transaction,” “civil settlement,” “debarred,” “suspended,” “ineligible,” “participant,” “person,” “principal,” and “voluntarily excluded,” as used in this clause, are defined in 2 C.F.R. Parts 180 and 1200. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations. “First Tier Covered Transactions” refers to any covered transaction between a Recipient or subrecipient of Federal funds and a participant (such as the prime or general contract). “Lower Tier Covered Transactions” refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). “First Tier Participant” refers to the participant who has entered into a covered transaction with a Recipient or subrecipient of Federal funds (such as the prime or general contractor). “Lower Tier Participant” refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled “Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction,” without modification, in all lower tier

covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold.

g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the System for Award Management website (https://www.sam.gov/), which is compiled by the General Services Administration.

h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion -- Lower Tier Participants:

1. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency.

2. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

REQUIREMENTS REGARDING DELINQUENT TAX LIABILITY OR A FELONY CONVICTION UNDER ANY FEDERAL LAW

As required by sections 415 and 416 of Title IV, Division L of the Consolidated Appropriations Act, 2014 (Pub. L. 113-76), and similar provisions in subsequent appropriations acts, the funds provided under this award shall not be used to enter into a contract, memorandum of understanding, or cooperative agreement with, make a grant to, or provide a loan or loan guarantee to, any corporation that:

(1) Has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability, where the awarding agency is aware of the unpaid tax liability, unless an agency has considered suspension or debarment of the corporation and made a determination that suspension or debarment is not necessary to protect the interests of the Government; or

(2) Was convicted of a felony criminal violation under any Federal law within the preceding 24 months, where the awarding agency is aware of the conviction, unless an agency has considered suspension or debarment of the corporation and made a determination that this action is not necessary to protect the interests of the Government.

The Recipient therefore agrees:

1. **Definitions.** For the purposes of this exhibit, the following definitions apply:

"Covered Transaction" means a transaction that uses any funds under this award and that is a contract, memorandum of understanding, cooperative agreement, grant, loan, or loan guarantee.

"Felony Conviction" means a conviction within the preceding 24 months of a felony criminal violation under any Federal law and includes conviction of an offense defined in a section of the United States Code that specifically classifies the offense as a felony and conviction of an offense that is classified as a felony under 18 U.S.C. 3559.

"Participant" means the Recipient, an entity who submits a proposal for a Covered Transaction, or an entity who enters into a Covered Transaction.

"Tax Delinquency" means an unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted, or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability.

2. **Mandatory Check in the System for Award Management.** Before entering a Covered Transaction with another entity, a Participant shall check the System for Award Management (the "SAM") at http://www.sam.gov/ for an entry describing that entity.

3. **Mandatory Certifications.** Before entering a Covered Transaction with another entity, a Participant shall require that entity to:

(1) Certify whether the entity has a Tax Delinquency; and

(2) Certify whether the entity has a Felony Conviction.

4 **Prohibition.** If

(1) the SAM entry for an entity indicates that the entity has a Tax Delinquency or a Federal Conviction;

(2) an entity provides an affirmative response to either certification in section 3; or

(3) an entity's certification under section 3 was inaccurate when made or became inaccurate after being made then a Participant shall not enter or continue a Covered Transaction with that entity unless the USDOT has determined in writing that suspension or debarment of that entity are not necessary to protect the interests of the Government.

5. **Mandatory Notice to the USDOT.**

(a) If the SAM entry for a Participant indicates that the Participant has a Tax Delinquency or a Felony Conviction, the Recipient shall notify the USDOT in writing of that entry.

(b) If a Participant provides an affirmative response to either certification in section 1, the Recipient shall notify the USDOT in writing of that affirmative response.

(c) If the Recipient knows that a Participant's certification under section 1 was inaccurate when made or became inaccurate after being made, the Recipient shall notify the USDOT in writing of that inaccuracy.

6. **Flow Down.** For all Covered Transactions, including all tiers of subcontracts and subawards, the Recipient shall:

(1) require the SAM check in section 2;

(2) require the certifications in section 3;

(3) include the prohibition in section 4; and

(4) require all Participants to notify the Recipient in writing of any information that would require the Recipient to notify the USDOT under section 5.

[END OF ASSURANCES AND CERTIFICATIONS]

Contract Provisions for Non-Federal Entity Contracts Under Federal Awards

In addition to other provisions required by the Federal agency or non-Federal entity, all contracts made by the non-Federal entity under the Federal award must contain provisions covering the following, as applicable.

(A) Contracts for more than the simplified acquisition threshold currently set at $150,000, which is the inflation adjusted amount determined by the Civilian Agency Acquisition Council and the Defense Acquisition Regulations Council (Councils} as authorized by 41 U.S.C. 1908, must address administrative, contractual, or legal remedies in instances where contractors violate or breach contract terms, and provide for such sanctions and penalties as appropriate.

(B) All contracts in excess of $10,000 must address termination for cause and for convenience by the non-Federal entity including the manner by which it will be effected and the basis for settlement.

(C) Equal Employment Opportunity. Except as otherwise provided under 41 CFR Part 60, all contracts that meet the definition of "federally assisted construction contract" in 41 CFR Part 60-1.3 must include the equal opportunity clause provided under 41 CFR 60-1.4(b), in accordance with Executive Order 11246, "Equal Employment Opportunity" (30 FR 12319, 12935, 3 CFR Part, 1964-1965 Comp., p. 339), as amended by Executive Order 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," and implementing regulations at 41 CFR part 60, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor."

(D) Davis-Bacon Act, as amended (40 U.S.C. 3141-3148). When required by Federal program legislation, all prime construction contracts in excess of $2,000 awarded by non-Federal entities must include a provision for compliance with the Davis-Bacon Act (40 U.S.C. 3141-3144, and 3146-3148) as supplemented by Department of Labor regulations (29 CFR Part 5, "Labor Standards Provisions Applicable to Contracts Covering Federally Financed and Assisted Construction"). In accordance with the statute, contractors must be required to pay wages to laborers and mechanics at a rate not less than the prevailing wages specified in a wage determination made by the Secretary of Labor. In addition, contractors must be required to pay wages not less than once a week. The non-Federal entity must place a copy of the current prevailing wage determination issued by the Department of Labor in each solicitation. The decision to award a contract or subcontract must be conditioned upon the acceptance of the wage determination. The non-Federal entity must report all suspected or reported violations to the Federal awarding agency. The contracts must also include a provision for compliance with the Copeland "Anti-Kickback" Act (40 U.S.C. 3145), as supplemented by Department of Labor regulations (29 CFR Part 3, "Contractors and Subcontractors on Public Building or Public Work Financed in Whole or in Part by Loans or Grants from the United States"). The Act provides that each contractor or sub-recipient must be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he or she is otherwise entitled. The non-Federal entity must report all suspected or reported violations to the Federal awarding agency.

(E) Contract Work Hours and Safety Standards Act (40 U.S.C. 3701-3708). Where applicable, all contracts awarded by the non-Federal entity in excess of $100,000 that involve the employment of mechanics or laborers must include a provision for compliance with 40 U.S.C. 3702 and 3704, as supplemented by Department of Labor regulations (29 CFR Part 5). Under 40 U.S.C. 3702 of the Act, each contractor must be required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than one and a half times the basic rate of pay for all hours worked in excess of 40 hours in the work week. The requirements of 40 U.S.C. 3704 are applicable to construction work and provide that no laborer or mechanic must be required to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous. These requirements do not apply to the purchases of supplies or materials or articles ordinarily available on the open market, or contracts for transportation or transmission of intelligence.

(F) Clean Air Act (42 U.S.C. 7401-7671q.) and the Federal Water Pollution Control Act (33 U.S.C. 1251-1387), as amended-Contracts and subgrants of amounts in excess of $150,000 must contain a provision that requires the non-Federal award to agree to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401-7671q) and the Federal Water Pollution Control Act as amended (33 U.S.C. 1251-1387). Violations must be reported to the Federal awarding agency and the Regional Office of the Environmental Protection Agency (EPA).

(G) Debarment and Suspension (Executive Orders 12549 and 12689)-A contract award (see 2 CFR 180.220) must not be made to parties listed on the government-wide exclusions in the System for Award Management (SAM), in accordance with the OMB guidelines at 2 CFR 180 that implement Executive Orders 12549 (3 CFR part 1986 Comp., p. 189) and 12689 (3 CFR part 1989 Comp., p. 235), "Debarment and Suspension." SAM Exclusions contains the names of parties debarred, suspended, or otherwise excluded by agencies, as well as parties declared ineligible under statutory or regulatory authority other than Executive Order 12549.

Each tier must also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the non-Federal award.

(H) Byrd Anti-Lobbying Amendment (31 U.S.C. 1352)-Contractors that apply or bid for an award exceeding $100,000 must file the required certification. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award covered by 31 U.S.C. 1352.

Appendix E

RJ Corman Railroad Company
A Limited Liability Holding Company
101 RJ Corman Drive • PO Box 788 • Nicholasville, KY 40340-0788
(859) 881-7521 • Fax: (859) 885-7804 • www.rjcorman.com

The Federal Railroad Administration (FRA) recently revised its drug and alcohol testing rule (49 CFR Part 219) to cover railroad employees and contractors (including subcontractors) whose employees perform Maintenance of Way (MOW) work. Pursuant to Part 219, a MOW employee is defined as a Roadway Worker, which the FRA has determined shall include:

Any employee of a railroad, or of a contractor to a railroad, whose duties include inspection, construction maintenance or repair of railroad track, bridges, roadway, signal and communication systems, electric traction systems, roadway facilities or roadway maintenance machinery on or near track or with the potential of fouling a track, and flagmen and watchmen/lookouts as defined in this section

You are receiving this letter because our records indicate that your employees, which may include employees of your subcontractors, perform maintenance of way work for one or more of the operating subsidiaries of R. J. Corman Railroad Group, LLC (collectively "R. J. Corman") under conditions making them subject to Part 219. The regulation can be found in the Federal Register at the following citation: 81 Federal Register 37894 (June 10, 2016) or https://www.federalregister.gov/d/2016-13058.

The revised Part 219 becomes effective on June 12. 2017. After that date. RJC will only be able to utilize contractors and subcontractors who have complied with Part 219 to perform MOW work.

Contractors whose employees perform MOW work are required to conduct post-accident, reasonable suspicion, reasonable cause, and random drug and alcohol testing of employees who perform MOW works for RJC. You should review Part 219 to become familiar with all the requirements, but please note the following:

- Before an employee can be assigned to perform MOW work for RJC, the contractor must verify to RJC that the employee has a negative DOT drug test on file with the contractor: and
- A contractor whose employees perform MOW work for RJC must have a compliance program (including a random drug and alcohol testing program) that meets the requirements of the regulation. A contractor can choose to establish its own program or contract with a consortium to administer its program. FRA has developed model drug and alcohol plans. The model program for contractors is currently available on the FRA web site.
- Keep in mind that your subcontractors whose employees perform MOW work for RJC must also meet the requirements of Part 219. R. J. Corman will ask that you submit a list of subcontractors that you would like to use to perform MOW work for, or on behalf of, R. J. Corman.

"General Decision Number: SC20190043 10/04/2019

Superseded General Decision Number: SC20180050

State: South Carolina

Construction Type: Heavy

County: Horry County in South Carolina.

HEAVY CONSTRUCTION PROJECTS

Note: Under Executive Order (EO) 13658, an hourly minimum wage of $10.60 for calendar year 2019 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least $10.60 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2019. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate,if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/04/2019
1	10/04/2019

* IRON0848-001 01/01/2019

	Rates	Fringes
IRONWORKER, STRUCTURAL	$ 26.69	12.90

SUSC2011-041 11/02/2011

	Rates	Fringes
CARPENTER, Includes Form Work	$ 14.85	0.00
LABORER: Common or General	$ 11.56	2.53
LABORER: Pipelayer	$ 12.55	1.82
OPERATOR: Backhoe/Excavator/Trackhoe	$ 15.56	2.19
OPERATOR: Grader/Blade	$ 20.11	1.39
OPERATOR: Loader	$ 10.50	1.98
TRUCK DRIVER	$ 13.85	2.49

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

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this

contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

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

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

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198

indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

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

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

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

Union Average Rate Identifiers

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

for the classifications and rates under that identifier.

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

WAGE DETERMINATION APPEALS PROCESS

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

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

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

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

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

2.) If the answer to the question in 1.) is yes, then an

interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

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

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

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

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

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

==========

END OF GENERAL DECISION"

Required Form

E. FORM OF NON-COLLUSION AFFIDAVIT
(This Affidavit is Part of the Proposal)

STATE OF _____)
)
COUNTY OF _____)

_____
being first duly sworn, deposes and says that he/she is

_____
(Sole owner, a partner, president, secretary, etc.)

of _____

the party making the foregoing Proposal that such Proposal is genuine and not collusive or sham; that said Proposer has not colluded, conspired, connived, or agreed directly or indirectly, with any Proposer or person to put in a sham Proposal, or that such other person shall refrain from offering and has not in any manner, directly or indirectly sought by agreement or collusion, or communication of conference, with any person, to fix the proposal price of affiant or any other Proposer, or to fix any overhead, profit or cost element of said proposal price, or that of any other Proposer to secure any advantage against OWNER any person interested in the proposed Contract; and that all statements in said Proposal are true; and further, that such Proposer has not, directly or indirectly submitted this proposal, or the contents thereof, or divulged information or date relative thereto to any association or to any member or agent thereof.

_____
(Proposer)

Sworn to and subscribed before me this _____ day of _____, 20_____.

_____ State _____ County _____
Notary Public in and for

My commission expires _____, 20_____.

Required Form

F. ACKNOWLEDGEMENT OF ADDENDA

Proposer hereby acknowledges receipt of all Addenda through and including:

Addendum No. _____, dated _____.

Addendum No. _____, dated _____.

Addendum No. _____, dated _____.

Addendum No. _____, dated _____.

Company _____

Authorized Signature _____

Print Name _____

Required Form

G. ANTI-LOBBYING FORM

CERTIFICATION OF RESTRICTIONS ON LOBBYING

I, _____ , hereby certify on behalf of
(name and title of bidder's official)
_____ , that to the best of his or her
(name of bidder)

knowledge and belief that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit standard Form-LLL, "Disclosure Form to Report Lobbying, " in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, sub grants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

Executed this _____ day of _____

By _____
(signature of authorized official)

_____
(title of authorized official)

Required Form

H. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, AND OTHER RESPONSIBILITY MATTERS

Applicants should refer to the regulations cited below to determine the certification to which they are required to attest. Applicants should also review the instructions for certification included in the regulations before completing this form. Signature of this form provides for compliance with certification requirements under the applicable CFR covering New Restrictions on Government-wide Debarment and Suspension (Nonprocurement). The certification shall be treated as a material representation of fact upon which reliance will be placed when the Agency determines to award the covered transaction or cooperative agreement.

As required by Executive Order 12549, Debarment and Suspension, and implemented under the applicable CFR, for prospective participants in covered transactions, as defined in the applicable CFR.

A. The applicant certifies that it and its principals:

(a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, sentenced to a denial of Federal benefits by a State or Federal court, or voluntarily excluded from covered transactions by any Federal department or agency;

(b) Have not within a three-year period preceding this application been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(c) Are not presently indicted for or otherwise criminally or civilly charged by a government entity (Federal State or local) with commission of any of these offenses enumerated in paragraph (1) (b) of this certification; and

(d) Have not within a three-year period preceding this application had one or more public transactions (Federal, State or local) terminated for cause or default; and

B. Where the applicant is unable to certify to any of the statements in this certification, he or she shall attach an explanation to this application.

_____ Address: _____

Contractor's Signature

_____ _____

Printed or Typed Name

_____ _____

Title

Required Form

I. DRUG-FREE WORKPLACE CERTIFICATION

In accordance with Section 44-107-30, South Carolina Code of Laws (1976), as amended, and as a condition precedent to the execution of this agreement, the undersigned will provide drug-free
workplace by:

1. Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensations, possession, or use of a controlled substance is prohibited in the workplace and specifying the actions that will be taken against employees for violations of the prohibition;

2. Establishing a drug-free awareness program to inform employees about:
   a. The dangers of drug abuse in a workplace;
   b. The person's policy of maintaining a drug-free workplace;
   c. Any available drug counseling, rehabilitation, and employee assistance programs; and
   d. The penalties that may be imposed upon employees for drug violation;

3. Making it a requirement that each employee to be engaged in the performance of the agreement be given a copy of the statement required by item 1;

4. Notifying the employee in the statement required by item 1 that, as a condition of employment of this agreement, the employee will:
   a. Abide by the terms of the statement; and
   b. Notify the employer of any criminal drug statute conviction for a violation occurring in the workplace no later than five days after the conviction;

5. Notifying the South Carolina Department of Transportation within ten days after receiving notice under item 4b from an employee or otherwise receiving actual notice of the conviction;

6. Imposing a sanction on, or requiring the satisfactory participation in a drug abuse assistance, or rehabilitation program by, any employee convicted as required in Section 44-107-50; and

7. Making a good faith effort to continue to maintain a drug-free workplace through implementation of items 1,2,3,4,5, and 6.

Contractor Signature	Date
Contractor Name	Company Name

Form **W-9**
(Rev. December 2011)
Department of the Treasury
Internal Revenue Service

Request for Taxpayer Identification Number and Certification

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

Print or type
See **Specific Instructions** on page 2.

Name (as shown on your income tax return)

Business name/disregarded entity name, if different from above

Check appropriate box for federal tax classification:
☐ Individual/sole proprietor ☐ C Corporation ☐ S Corporation ☐ Partnership ☐ Trust/estate

☐ Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=partnership) ▶

☐ Other (see instructions) ▶

☐ Exempt payee

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

Requester's name and address (optional)

City, state, and ZIP code

List account number(s) here (optional)

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on the "Name" line to avoid backup withholding. For individuals, this is your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the Part I instructions on page 3. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN* on page 3.

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

Social security number

			–		–				

Employer identification number

		–							

Part II Certification

Under penalties of perjury, I certify that:

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

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions on page 4.

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

General Instructions

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

Purpose of Form

A person who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) to report, for example, income paid to you, real estate transactions, mortgage interest you paid, acquisition or abandonment of secured property, cancellation of debt, or contributions you made to an IRA.

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN to the person requesting it (the requester) and, when applicable, to:

1. Certify that the TIN you are giving is correct (or you are waiting for a number to be issued),
2. Certify that you are not subject to backup withholding, or
3. Claim exemption from backup withholding if you are a U.S. exempt payee. If applicable, you are also certifying that as a U.S. person, your allocable share of any partnership income from a U.S. trade or business is not subject to the withholding tax on foreign partners' share of effectively connected income.

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

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

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

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

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

- The U.S. owner of a disregarded entity and not the entity,
- The U.S. grantor or other owner of a grantor trust and not the trust, and
- The U.S. trust (other than a grantor trust) and not the beneficiaries of the trust.

Foreign person. If you are a foreign person, do not use Form W-9. Instead, use the appropriate Form W-8 (see Publication 515, Withholding of Tax on Nonresident Aliens and Foreign Entities).

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

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

1. The treaty country. Generally, this must be the same treaty under which you claimed exemption from tax as a nonresident alien.

2. The treaty article addressing the income.

3. The article number (or location) in the tax treaty that contains the saving clause and its exceptions.

4. The type and amount of income that qualifies for the exemption from tax.

5. Sufficient facts to justify the exemption from tax under the terms of the treaty article.

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

If you are a nonresident alien or a foreign entity not subject to backup withholding, give the requester the appropriate completed Form W-8.

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

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

Payments you receive will be subject to backup withholding if:

1. You do not furnish your TIN to the requester,

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

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

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

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

Certain payees and payments are exempt from backup withholding. See the instructions below and the separate Instructions for the Requester of Form W-9.

Also see *Special rules for partnerships* on page 1.

Updating Your Information

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

Penalties

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

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

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

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

Specific Instructions

Name

If you are an individual, you must generally enter the name shown on your income tax return. However, if you have changed your last name, for instance, due to marriage without informing the Social Security Administration of the name change, enter your first name, the last name shown on your social security card, and your new last name.

If the account is in joint names, list first, and then circle, the name of the person or entity whose number you entered in Part I of the form.

Sole proprietor. Enter your individual name as shown on your income tax return on the "Name" line. You may enter your business, trade, or "doing business as (DBA)" name on the "Business name/disregarded entity name" line.

Partnership, C Corporation, or S Corporation. Enter the entity's name on the "Name" line and any business, trade, or "doing business as (DBA) name" on the "Business name/disregarded entity name" line.

Disregarded entity. Enter the owner's name on the "Name" line. The name of the entity entered on the "Name" line should never be a disregarded entity. The name on the "Name" line must be the name shown on the income tax return on which the income will be reported. For example, if a foreign LLC that is treated as a disregarded entity for U.S. federal tax purposes has a domestic owner, the domestic owner's name is required to be provided on the "Name" line. If the direct owner of the entity is also a disregarded entity, enter the first owner that is not disregarded for federal tax purposes. Enter the disregarded entity's name on the "Business name/disregarded entity name" line. If the owner of the disregarded entity is a foreign person, you must complete an appropriate Form W-8.

Note. Check the appropriate box for the federal tax classification of the person whose name is entered on the "Name" line (Individual/sole proprietor, Partnership, C Corporation, S Corporation, Trust/estate).

Limited Liability Company (LLC). If the person identified on the "Name" line is an LLC, check the "Limited liability company" box only and enter the appropriate code for the tax classification in the space provided. If you are an LLC that is treated as a partnership for federal tax purposes, enter "P" for partnership. If you are an LLC that has filed a Form 8832 or a Form 2553 to be taxed as a corporation, enter "C" for C corporation or "S" for S corporation. If you are an LLC that is disregarded as an entity separate from its owner under Regulation section 301.7701-3 (except for employment and excise tax), do not check the LLC box unless the owner of the LLC (required to be identified on the "Name" line) is another LLC that is not disregarded for federal tax purposes. If the LLC is disregarded as an entity separate from its owner, enter the appropriate tax classification of the owner identified on the "Name" line.

Other entities. Enter your business name as shown on required federal tax documents on the "Name" line. This name should match the name shown on the charter or other legal document creating the entity. You may enter any business, trade, or DBA name on the "Business name/ disregarded entity name" line.

Exempt Payee

If you are exempt from backup withholding, enter your name as described above and check the appropriate box for your status, then check the "Exempt payee" box in the line following the "Business name/ disregarded entity name," sign and date the form.

Generally, individuals (including sole proprietors) are not exempt from backup withholding. Corporations are exempt from backup withholding for certain payments, such as interest and dividends.

Note. If you are exempt from backup withholding, you should still complete this form to avoid possible erroneous backup withholding.

The following payees are exempt from backup withholding:

1. An organization exempt from tax under section 501(a), any IRA, or a custodial account under section 403(b)(7) if the account satisfies the requirements of section 401(f)(2),

2. The United States or any of its agencies or instrumentalities,

3. A state, the District of Columbia, a possession of the United States, or any of their political subdivisions or instrumentalities,

4. A foreign government or any of its political subdivisions, agencies, or instrumentalities, or

5. An international organization or any of its agencies or instrumentalities.

Other payees that may be exempt from backup withholding include:

6. A corporation,

7. A foreign central bank of issue,

8. A dealer in securities or commodities required to register in the United States, the District of Columbia, or a possession of the United States,

9. A futures commission merchant registered with the Commodity Futures Trading Commission,

10. A real estate investment trust,

11. An entity registered at all times during the tax year under the Investment Company Act of 1940,

12. A common trust fund operated by a bank under section 584(a),

13. A financial institution,

14. A middleman known in the investment community as a nominee or custodian, or

15. A trust exempt from tax under section 664 or described in section 4947.

The following chart shows types of payments that may be exempt from backup withholding. The chart applies to the exempt payees listed above, 1 through 15.

IF the payment is for . . .	THEN the payment is exempt for . . .
Interest and dividend payments	All exempt payees except for 9
Broker transactions	Exempt payees 1 through 5 and 7 through 13. Also, C corporations.
Barter exchange transactions and patronage dividends	Exempt payees 1 through 5
Payments over $600 required to be reported and direct sales over $5,000 [1]	Generally, exempt payees 1 through 7 [2]

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

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

Part I. Taxpayer Identification Number (TIN)

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

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

If you are a single-member LLC that is disregarded as an entity separate from its owner (see *Limited Liability Company (LLC)* on page 2), enter the owner's SSN (or EIN, if the owner has one). Do not enter the disregarded entity's EIN. If the LLC is classified as a corporation or partnership, enter the entity's EIN.

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

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

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

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

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

Part II. Certification

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

For a joint account, only the person whose TIN is shown in Part I should sign (when required). In the case of a disregarded entity, the person identified on the "Name" line must sign. Exempt payees, see *Exempt Payee* on page 3.

Signature requirements. Complete the certification as indicated in items 1 through 3, below, and items 4 and 5 on page 4.

1. Interest, dividend, and barter exchange accounts opened before 1984 and broker accounts considered active during 1983. You must give your correct TIN, but you do not have to sign the certification.

2. Interest, dividend, broker, and barter exchange accounts opened after 1983 and broker accounts considered inactive during 1983. You must sign the certification or backup withholding will apply. If you are subject to backup withholding and you are merely providing your correct TIN to the requester, you must cross out item 2 in the certification before signing the form.

3. Real estate transactions. You must sign the certification. You may cross out item 2 of the certification.

4. Other payments. You must give your correct TIN, but you do not have to sign the certification unless you have been notified that you have previously given an incorrect TIN. "Other payments" include payments made in the course of the requester's trade or business for rents, royalties, goods (other than bills for merchandise), medical and health care services (including payments to corporations), payments to a nonemployee for services, payments to certain fishing boat crew members and fishermen, and gross proceeds paid to attorneys (including payments to corporations).

5. Mortgage interest paid by you, acquisition or abandonment of secured property, cancellation of debt, qualified tuition program payments (under section 529), IRA, Coverdell ESA, Archer MSA or HSA contributions or distributions, and pension distributions. You must give your correct TIN, but you do not have to sign the certification.

What Name and Number To Give the Requester

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

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

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

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

[4] List first and circle the name of the trust, estate, or pension trust. (Do not furnish the TIN of the personal representative or trustee unless the legal entity itself is not designated in the account title.) Also see *Special rules for partnerships* on page 1.

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

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

Secure Your Tax Records from Identity Theft

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

To reduce your risk:

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

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

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

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

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

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

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

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

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

Privacy Act Notice

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

RJ Corman Railroad Company

Lump Sum/Unit Price Proposal Bid Sheet
and
Conceptual Project Schedule

April 17, 2020

R.J. Corman Railroad Company / Carolina Lines
M.P. 334.5 (Conway, SC)
PAY ITEM NO.
UNIT BID PROPOSAL

DATE:

PAY ITEM NO.	ITEM DESCRIPTION	UNIT	PLAN QUANTITY	CONTRACTOR'S PROPOSAL	
DIVISION 100 – GENERAL					
101	MOBILIZATION	LS.	1	$0.00	$0.00
102	ESTABLISH STAGING AND SITE ACCESS ROAD	LS.	1	$0.00	$0.00
103	TEMPORARY WORK TRESTLE/CAUSEWAY	L.S.	1	$0.00	$0.00
104	REMOVAL OF TEMPORARY WORK TRESTLE/CAUSEWAY	L.S.	1	$0.00	$0.00
105	DEMOLISH AND DISPOSE OF EXISTING BRIDGE	L.S.	1	$0.00	$0.00
106	MATERIALS TESTING	L.S.	1	$0.00	$0.00
107	PDA TESTING	L.S.	1	$0.00	$0.00
DIVISION 200 – SITE WORK					
201	SITE CLEARING	L.S.	1	$0.00	$0.00
202	EXCAVATION AND GRADING	L.S.	1	$0.00	$0.00
203	FURNISH, PLACE, AND COMPACT FILL	L.S.	1	$0.00	$0.00
204	FURNISH AND INSTALL BEDDING STONE / RIPRAP SLOPE PROTECTION	TON	240	$0.00	$0.00
DIVISION 300 – METALS					
301	FURNISH STEEL H-PILE	FT.	2700	$0.00	$0.00
302	INSTALL STEEL H-PILE	FT.	2120	$0.00	$0.00
303	INSTALL STEEL H-PILE (TEST PILE)	FT.	170	$0.00	$0.00
304	FURNISH AND INSTALL PILE PROTECTIVE COATING	S.F.	5800	$0.00	$0.00
305	FURNISH AND INSTALL STEEL H-PILE DRIVING SHOES	EA.	27	$0.00	$0.00
306	FURNISH AND INSTALL STEEL H-PILE SPLICE MATERIAL	EA.	27	$0.00	$0.00
307	FURNISH AND INSTALL STEEL HANDRAIL	FT.	484	$0.00	$0.00
308	BEARING PAD	EA.	48	$0.00	$0.00
DIVISION 400 – CONCRETE					
401	FURNISH AND INSTALL PRECAST CONCRETE END BENT CAPS	EA.	2	$0.00	$0.00
402	FURNISH AND INSTALL PRECAST CONCRETE INTERMEDIATE BENT CAPS	EA.	7	$0.00	$0.00
403	FURNISH AND INSTALL PRECAST CONCRETE WINGWALLS	EA.	4	$0.00	$0.00
404	FURNISH AND INSTALL PRECAST CONCRETE BACKWALLS	EA.	2	$0.00	$0.00
405	FURNISH AND INSTALL PRESTRESSED CONCRETE BOX BEAMS	EA.	24	$0.00	$0.00
406	WATERPROOFING	L.S.	1	$0.00	$0.00
407	PREFORMED EXPANSION JOINT FILLER (1/2" x 1'-0")	FT.	81	$0.00	$0.00
408	PREFORMED EXPANSION JOINT FILLER (1/2" x 2'-9")	FT.	220	$0.00	$0.00
409	TRENCH DRAINS	L.S.	1	$0.00	$0.00
DIVISION 500 – PROJECT DOCUMENTATION					
501	RAILROAD PROTECTIVE LIABILITY INSURANCE	L.S.	1	$0.00	$0.00
502	PROJECT FORMS, PERMITTING, AND MEETINGS	L.S.	1	$0.00	$0.00
503	AS-BUILT DRAWINGS	L.S.	1	$0.00	$0.00

BASE TOTAL = $0.00

All unit quantities are approximate.

All items must comply with current AREMA Standards, Practices and Specifications unless otherwise specified in the contract documents.

Any additional scope items requested by RJC shall be classified as EXTRA WORK and shall be executed according to current AREMA Standards, Practices and Specifications unless otherwise specified in the contract documents. Any deviation from the specifications must be submitted and approved in writing by the authorized RJC representative.

EXTRA WORK costs shall be submitted to RJC in a CHANGE ORDER document under the time and materials payment structure. The allowable mark-up on extra work on this project shall be 10% on labor, materials and company-owned Equipment. No additional mark-up will be allowed on rental equipment.

R.J. Corman Railroad Company / Carolina Lines
M.P. 334.5 (Conway, SC)
PAY ITEM NO.
UNIT BID PROPOSAL

The undersigned bidder hereby proposes and agrees, if this Proposal is accepted, to enter into Agreement with RJC to perform the Work, including the assumption of all obligations, duties, and responsibilities necessary to the successful completion of the Contract.

Are any directors, owners, officers, or employees of the Contractor associated in any way with R.J. Corman Railroad Company or any parent company thereof? Write "None" or List those associated with RJC:
Is any R.J. Corman Railroad Company employee associated or affiliated with the Contractor? Write "None" or List those associated with RJC:

Name: _____

Date: _____

Title: _____

Company Name: _____

Signature: _____

WITH CONTRACTOR LICENSE NUMBER (MUST BE CURRENT IN STATE WORK IS BEING PERFORMED)

R.J. Corman Railroad Company / Carolina Lines
M.P. 334.5 (Conway, SC)
PAY ITEM NO.
CONCEPTUAL PROJECT SCHEDULE

Bid Item		Calendar Days
A. DIVISION 100 - GENERAL	Required Track Time: _____ hours	
B. DIVISION 200 - SITE WORK	Required Track Time: _____ hours	
C. DIVISION 300 - METALS	Required Track Time: _____ hours	
D. DIVISION 400 - CONCRETE	Required Track Time: _____ hours	
TOTAL TIME REQUIRED FOR INSTALLATION: (Does not necessarily need to be the sum of lines A thru E)		
TOTAL TRACK TIME REQUIRED FOR COMPLETION:		**0.0 Track Time**

Attached is a progress schedule, list of subcontractors and equipment proposed to be used on the work.

Name: _____

Date: _____

Title: _____

Company Name: _____

Signature: _____

WITH CONTRACTOR LICENSE NUMBER (MUST BE CURRENT IN STATE WORK IS BEING PERFORMED)

RJ Corman Railroad Company

Sample RJC Standard Construction Agreement

April 17, 2020

CONTRACT BETWEEN

R. J. CORMAN RAILROAD COMPANY/CAROLINA LINES, LLC

AND

[NAME OF SUCCESSFUL BIDDER]

FOR THE REPLACEMENT OF

THE CRABTREE SWAMP BRIDGE NEAR
CONWAY, SOUTH CAROLINA, AT RR MP 334.5

TABLE OF CONTENTS

THIS CONTRACT (this "Agreement") dated and effective as _____, 2020 by and between R. J CORMAN RAILROAD COMPANY/CAROLINA LINES. LLC a South Carolina limited liability company, the address of which, for purposes of this Agreement, is 101 R J Corman Drive, P.O. Box 788, Nicholasville, Kentucky 40340 ("Railroad") and [Name, State of Organization, Entity Type, and Address of Successful Bidder] ("Contractor").

In consideration of the mutual covenants and agreements set forth herein, the parties hereto agree as follows:

1. PROJECT DEFINED AND PERFORMANCE STANDARDS

1.1 Contractor will perform all work more particularly described in Addendum 1 attached hereto and made a part hereof (the "Project"), it being understood that the Project is fully described and set forth in the plans and specifications prepared for this Agreement. Should any work or material not directly or indirectly denoted in the plans and specifications be necessary for the proper carrying out of the obvious intentions thereof, Contractor shall furnish any such material and do any such work as fully as if it were particularly delineated or described in the plans and specifications. The plans and specifications shall control all discrepancies between plans and specifications and this Agreement.

1.2 Contractor shall perform work related to the Project in a professional manner, in accordance with American Railway Engineering and Maintenance-of-Way Association (AREMA) Standards and to the sole satisfaction and acceptance of Railroad and Railroad Standard Construction Specifications in Addendum 1.

1.3 All work shall be performed in a safe manner and in accordance with material safety data sheets (MSDS) and all Federal, state and local laws and regulations, including those established by administrative agencies, so as not to create a safety hazard to Railroad, Contractor, their respective agents, employees or subcontractors, or to property, or to third parties and their property or interfere with the normal use and operation of Railroad property and business.

1.4 Whenever the term "Engineer" is used in this Agreement it means the Chief Engineer of the Railroad or his designee.

2. EQUIPMENT/RAILROAD OPERATIONS

2.1 Contractor at its sole cost and expense shall furnish all labor, tools, equipment and machinery necessary and appropriate to complete the Project in a substantial and workmanlike manner to the sole satisfaction and acceptance of the Railroad.

2.2 Contractor shall provide all equipment necessary to perform the work properly and complete the Project by the required completion date. Equipment shall be in good operating condition and shall conform to the applicable standards prescribed by the Association of American Railroads and the Federal Railroad Administration ("FRA") for such type of equipment (if any). Contractor must comply with all rules and regulations as set forth by the FRA including the sections concerning Roadway Maintenance Machines. Contractor at its sole cost and expense shall be responsible for the maintenance and repair of any and all equipment used by Contractor during the Project.

2.3 Contractor shall furnish, bear and pay, and shall save Railroad free of, any and all labor and expense of, and incident to, compliance with the aforementioned rules, regulations and requirements.

2.4 Whenever the work included in this Project is by the side of or contiguous to railroad tracks used and operated by Railroad, Contractor shall use the utmost vigilance in every stage of the execution of the work related to the Project in order to protect effectively against all accidents and/or damages on said railroad by reason of the Project. Contractor shall at all times during the progress of the Project so manage and execute the same in a manner that minimizes the impact on and possible interference with the operation, management and/or maintenance of said railroad or with the business or traffic of the same.

2.5 The Project shall be managed so as not to interfere with the progress of any contiguous work. Contractor is responsible for scheduling the activities of its forces, its subcontractors and vendors as well as other contractors that may be working on or near Railroad's property or in Railroad's facilities. The Engineer may direct changes in the management of the Project to ensure compliance with this Section 2.

2.6 CONTRACTOR SHALL FAMILIARIZE ITSELF WITH ALL APPLICABLE RAILROAD SAFETY RULES, (THE "SAFETY RULES"), WHICH ARE BY REFERENCE MADE A PART OF THIS AGREEMENT. CONTRACTOR SHALL COMPLY WITH THE SAFETY RULES, TOGETHER WITH ALL STATUTES, REGULATIONS AND ORDINANCES OF ANY FEDERAL, STATE OR LOCAL GOVERNMENTAL AUTHORITY AND SHALL REQUIRE ITS EMPLOYEES AND SUBCONTRACTORS TO COMPLY THEREWITH, AND SHALL RELEASE, PROTECT, DEFEND, INDEMNIFY AND SAVE AND HOLD HARMLESS RAILROAD AND ITS PARENTS, SUBSIDIARIES AND AFFILIATES, AND EACH OF THEIR OFFICERS, DIRECTORS, AGENTS AND EMPLOYEES FROM AND AGAINST ANY AND ALL LOSS, DAMAGE, COST AND EXPENSE AND ALL CLAIMS, ACTIONS AND DEMANDS ARISING OUT OF VIOLATION OF ANY OF SAID SAFETY RULES OR REQUIREMENTS THEREUNDER.

2.7 Whenever work related to the Project in any manner affects the use or operation of lines of Railroad or other entities affiliated with Railroad, Contractor shall, at its own cost and expense, comply with all the conditions that may be imposed by Railroad.

3. PERIOD OF PERFORMANCE AND UNIT PRICES

Work related to the Project shall be commenced on the first date specified on Addendum 1 and shall be completed to Railroad's specification on or before the second date specified on Addendum (the "Completion Date") which Completion Date may only be delayed by Railroad in writing pursuant to the terms hereof. The parties hereto agree that time is of the essence of this Agreement and all provisions hereof. Contractor shall submit to Railroad a detailed schedule for performance of the Project in a form acceptable to Railroad, which schedule shall comply with all scheduling requirements of this Agreement. Railroad, at its sole discretion, may direct Contractor to make modifications and revisions in said schedules to ensure compliance with this Agreement and non-interference with other work. Contractor agrees to commence work under this Agreement upon the date of "notice to proceed" by the Engineer. Contractor shall submit a work schedule to Engineer, with ample time for Engineer to review and make any needed modifications to the same. prior to work start-up. Should Contractor fail to achieve project completion by the Completion Date, as initially set or as delayed in writing by Railroad, Contractor shall pay to Railroad, in addition to and not in lieu of any and all other remedies available under the circumstances, and as liquidated damages for losses and costs not reasonably susceptible of accurate calculation, and not as a penalty, the sum of One Thousand ($1,000) dollars per day (seven

days per week) and Contractor shall reimburse Railroad all costs incurred as a result of that delay. By way of example, and not of limitation, these costs may include: wages and expenses for Railroad inspectors, delays in train operations, interest and penalties to Railroad vendors and other contractors, administrative and legal costs.

3.1 In the event Railroad deems Contractor to not be proceeding according to the Project schedule or becomes aware of the occurrence of any breach of this Agreement or any event that, with notice or lapse of time or both, would constitute a breach of this Agreement ("Breach of Contract"), Railroad may order that the Project be prosecuted in such order, at such points and with such force as shall be adequate to insure its completion by the Completion Date. If required, Contractor, at its own expense, shall work nights, weekends and/or holidays to ensure that the Project is completed on time and no extra compensation shall be demanded by Contractor for such work.

3.2 If at any time Contractor shall refuse or neglect to execute the Project with a force sufficient, in the opinion of the Engineer, to insure its completion within the time specified in the Agreement, or to furnish sufficient materials as needed for that purpose, a Breach of Contract shall exist and Railroad may direct the employment of such additional laborers and foremen, and the purchase of sufficient materials, as it may deem necessary to perform the Project, regardless of the cost of such wages and such prices, and Contractor shall pay all persons so employed for their services and for materials furnished. Any such amount which shall be paid by Railroad may be claimed by Railroad required by this Agreement, without prejudice, however, to any remedy which Railroad may have or may be entitled to have against Contractor for Breach of Contract. The foregoing is not intended and shall not be deemed to limit or modify Contractor's status as an independent contractor.

3.3 Contractor agrees to perform the work as indicated in this Agreement for the unit prices specified in Addendum 2 attached hereto.

4. TERMINATION

4.1 This Agreement may be terminated by either Contractor or the Railroad with ten (10) days' written notice of termination in the event of either Contractor's or the RAILROAD's bankruptcy, insolvency or assignment of this Agreement for the benefit of creditors or with thirty (30) days' written notice in the event of RAILROAD or Contractor's default of the terms of this Agreement or at any time and for any reason by the RAILROAD with a sixty (60) days' written notice. Projects in process will be completed to the satisfaction of the RAILROAD before final payment and the provisions of Sections 11 survive termination.

4.2 If the Contractor insurance required in Section 14 hereof lapses or is cancelled, Railroad may terminate this Agreement effective the next business day upon notice to Contractor.

4.3 Unless otherwise directed by Railroad, upon receipt of any notice of termination from Railroad, Contractor shall stop the terminated work, direct its subcontractors to stop the terminated work, cancel all existing orders for supplies relating to the terminated work, and otherwise take reasonable actions necessary to mitigate costs.

4.4 Within thirty (30) days after termination, Contractor may submit to Railroad its actual costs incurred to the effective date of termination. In no event shall Railroad be liable to Contractor for any costs that exceed the unpaid balance of the Agreement, or for consequential, special, incidental, punitive or indirect damages, including lost or anticipatory profits or

unabsorbed overhead, even if Railroad has been advised of the possibility of such damages.

4.5 Neither termination nor revocation of this Agreement shall affect any claims and liabilities which have arisen or accrued hereunder, and which, at the time of termination or revocation, have not been satisfied; neither party, however, waiving any third-party defenses or actions.

5. PERFORMANCE AND PAYMENT BONDS

5.1 [Option 1] Performance and payment bonds are not required for this Project.

6. CONTRACTUAL STATUS/RELATIONSHIP OF PARTIES

6.1 In performing services under this Agreement, Contractor shall operate as and have the status of an independent contractor. Contractor shall employ, pay from its own funds, and discharge all persons engaged in the performance of the Project and such persons shall be under Contractor's supervision, direction and control. Contractor shall be subject to the general oversight and guidance of the Engineer or whomever he may appoint in order to ensure safety and compliance with this Agreement. Under no circumstances shall this Agreement be interpreted as creating an employer/employee relationship between Contractor and Railroad. Contractor shall not be treated as an employee of Railroad for tax or any other purposes and Contractor shall be responsible for the payment of its own estimated and self-employment tax, if any, for Federal Income Tax purposes. Contractor shall also be responsible for all tax withholdings of its employees.

6.2 Contractor hereby accepts full and exclusive liability for the payment of any and all contributions or taxes for unemployment insurance, medical and old age retirement benefits, pensions or annuities now or hereinafter imposed under any state or Federal laws which are measured by the wages, salaries or other remuneration paid to persons employed by it on the Project. Contractor shall also indemnify and save harmless Railroad from any such contributions or taxes or liability therefor and further shall obey all lawful rules and regulations and meet all lawful requirements which now or hereafter may be issued or promulgated under said respective laws by duly authorized local, state or Federal officials.

6.3 Contractor shall at all times be represented on the Project by a competent superintendent who shall be satisfactory to the Engineer.

6.4 Contractor shall assign personnel with demonstrated competence and experience in the type of work specified in this Agreement. The credentials of such personnel shall be submitted to Railroad for review should Railroad so request. The foregoing is not intended, and shall not be deemed, to limit or modify Contractor's status as an independent contractor, as provided herein.

6.5 This Agreement is placed subject to all the provisions of the Clayton Anti-Trust Act, and if Railroad is advised by its counsel that this Agreement violates or is contrary to the provisions of Section 10 of said Act of Congress, then Railroad shall inform Contractor and thereupon this Agreement shall be terminated.

7. CHANGES: MODIFICATIONS

7.1 All modifications of this Agreement must be approved by authorized representatives of Railroad's Engineer and shall be by written agreement of the parties signed by their duly authorized representatives.

8. CLAIMS

8.1 If at any time during the period of performance of this Agreement, Contractor shall deem itself to have become entitled to make any claim or demand against Railroad other than, or additional to, the compensation expressly stipulated in this Agreement, Contractor shall give notice in writing to Railroad, specifying such claim or demand, the ground thereof, and the amount thereof.

9. TRANSPORTATION

9.1 Contractor shall provide, pay for, and be liable for all transportation for men, equipment, tools and materials.

10. COMPLIANCE WITH LAWS/PERMITS

10.1 Whenever doing any work embraced within the Project it may be necessary to occupy temporarily, use or obstruct any street, highway, or public place or to do anything whatever in connection with public property, or whenever it shall be necessary in order to comply with building laws or orders of courts or governmental agencies, Contractor shall, at its own cost and expense, procure all necessary approvals, licenses and permits therefore, and in performing the Project Contractor shall comply with all applicable Federal, state and local laws, regulations, ordinances, and agency or court orders, including, without limitation, laws and regulations: (i) pertaining to building and construction; and (ii) pertaining to environmental protection, air and water pollution, and disposal of debris and refuge; and (iii) prohibiting discrimination on grounds of race, color, national origin or sex. Contractor shall pay for all charges of any kind related to the performance of the Project.

10.2 CONTRACTOR SHALL BE RESPONSIBLE FOR AND SHALL PROTECT, INDEMNIFY, DEFEND AND HOLD RAILROAD AND ITS PARENTS, SUBSIDIARIES, AND AFFILIATES AND THE OFFICERS, DIRECTORS, AGENTS AND EMPLOYEES OF RAILROAD AND ITS PARENTS, SUBSIDIARIES AND AFFILIATES HARMLESS FROM ANY AND ALL COSTS AND EXPENSES, INCLUDING, WITHOUT LIMITATION, JUDGMENTS, FINES, PENALTIES, COSTS AND LOSS OF EVERY KIND WHATSOEVER, WHICH MAY ARISE OR RESULT FROM, OR BY REASON OF THE VIOLATION OF ANY APPLICABLE CITY, BOROUGH, VILLAGE OR OTHER LOCAL GOVERNMENTAL ORDINANCE, OR OF A LAW OF ANY STATE, OR THE DISTRICT OF COLUMBIA, OR OF THE UNITED STATES, OR OF ANY ORDER OF ANY AGENCY OR COURT, DURING CONTRACTOR'S PERFORMANCE HEREUNDER.

10.3 Contractor warrants that its performance of this Agreement, as of the date of its execution, is not prohibited by or in violation of any law.

11. TRANSFERS/ASSIGNS

11.1 This Agreement shall inure to the benefit of and be binding upon the successors and assigns of the parties hereto; provided, however, that Contractor shall not sell, subcontract, assign, delegate or otherwise transfer this Agreement or any of its rights or obligations hereunder without the prior written consent of Railroad.

11.2 No approved assignment, letting, transfer or subcontract, whether for labor or material or both, shall under any circumstances relieve Contractor of its obligations or liabilities under this Agreement or have any bearing on the granting or refusing of any extension of the

Completion Date, should the subcontractor fail to perform the work undertaken by it. Contractor shall give personal attention and superintendence to the Project.

11.3 Any subcontract or further letting of any right or obligation of Contractor hereunder shall include provisions binding the subcontractor or other third party to all obligations and requirements of Contractor hereunder and shall require such subcontractor or third party to waive any right to assert any claim directly against Railroad and any right to assert any lien against any property of Railroad.

12. INSPECTION

12.1 All materials of every description used under this Agreement and all workmanship pursuant hereto shall be of the grade specified, and where quality is not specified shall be of the best for the purpose that can be obtained. Material and work shall at all times be open to the inspection, acceptance, or rejection by the Engineer and of such person or persons as they may designate to represent them, as hereinbefore provided. No omission or failure on the part of the Engineer to disapprove or reject any work of the Project at the time of a monthly or other estimate, or during the inspection of the Project shall be construed to be an acceptance of any defective work or part of the Project. Contractor shall be required to correct any imperfect work whenever discovered. If any work be condemned by the Engineer as defective or improperly done, such defective or improper work shall be taken down and rebuilt, or the defects otherwise remedied by Contractor, at its sole expense, as the Engineer in charge of the Project may direct; and in default thereof the same may be done by Railroad at Contractor's expense. The provisions of this section shall apply to work done by subcontractors as well as to work done by direct employees of Contractor.

13. WARRANTY

13.1 Contractor warrants that the Project shall be performed in a safe and effective manner and shall be free from latent and patent defects in quality and workmanship and shall be in full conformity with the plans and specifications set forth in Addendum 1. Contractor also warrants that the Project as complete shall be fit for Railroad's purpose as indicted herein and in documents attached hereto or made a part hereof by reference or if otherwise known to Contractor.

13.2 Contractor, without cost to Railroad, shall remedy any defects that are due to workmanship or to Contractor's failure to fulfill any of its obligations under this Agreement which appears within a period of one (1) year from the date when the Project is fully accepted and certified complete. This obligation is without prejudice to any other rights or remedies afforded by law to Railroad in the event of Breach of Contract by Contractor.

13.3 CONTRACTOR SHALL BE RESPONSIBLE FOR AND SHALL PROTECT, INDEMNIFY, DEFEND AND HOLD RAILROAD AND ITS PARENTS, SUBSIDIARIES AND AFFILIATES, AND THE OFFICERS, DIRECTORS, AGENTS AND EMPLOYEES OF RAILROAD AND ITS SUBSIDIARIES AND AFFILIATES, THEIR CUSTOMERS, AND ANY THIRD PARTY HARMLESS FROM INJURY, DEATH, LOSS, DAMAGE OR EXPENSE WHATSOEVER, AS SET FORTH IN SECTION 14 HEREOF, HOWSOEVER ARISING, WHICH MAY BE SUFFERED AS A RESULT OF OR IN CONNECTION WITH A BREACH OF ANY OF THE FOREGOING WARRANTIES, OR AS A RESULT OF ANY ACCIDENTS OR INCIDENT.

14. INSURANCE

14.1 The Contractor shall, at its own cost and expense, prior to entry onto the property of Railroad or the commencement of any of the work related to the Project pursuant to the Agreement, procure and thereafter maintain for the duration of the Agreement the following types and minimum amounts of insurance:

a. Public Liability or Commercial General Liability Insurance ("CGL"), including Contractual Liability Coverage and CG 24 17 "Contractual Liability – Railroads" endorsement, covering all liabilities assumed by the Contractor under this Agreement, without exception or restriction of any kind, with a combined single limit of not less than Two Million Dollars ($2,000,000) for Bodily Injury and/or Property Damage Liability per occurrence, and an aggregate limit of not less than Six Million Dollars ($6,000,000) per annual policy period. Such insurance policy shall be endorsed to provide a Waiver of Subrogation in favor of the Railroad and all parents and affiliated companies and shall name the Railroad and all parents and affiliated companies as Additional Insured. An Umbrella policy may be utilized to satisfy the required limits of liability under this section.

b. Commercial Automobile Insurance for all owned, non-owned or hired vehicles with a combined single limit of not less than One Million Dollars ($1,000,000) for Bodily Injury and Property Damage Liability. Such policy shall be endorsed to provide a Waiver of Subrogation in favor of the Railroad and all parents and affiliated companies and shall name the Railroad and all parents and affiliated companies as Additional Insured. If hauling hazardous materials, such Policy is to be endorsed with the MCS – 90 endorsement as well as CA 9948 Pollution Liability – Broadened Pollution for Covered Autos.

c. Statutory Workers' Compensation and Employers' Liability Insurance for its employees (if any) with minimum limits of not less than One Million Dollars ($1,000,000) for Bodily Injury by Accident, Each Accident; One Million Dollars ($1,000,000) for Bodily Injury by Disease, Policy Limit; One Million Dollars ($1,000,000) for Bodily Injury by Disease, Each Employee. Such policy shall be endorsed to provide a Waiver of Subrogation in favor of the Railroad and all parents and affiliated companies.

d. Railroad Protective Liability Insurance written in favor of Railroad with limits of Two Million Dollars ($2,000,000) each occurrence and Six Million Dollars ($6,000,000) aggregate limit covering all operations within 50 feet of railroad track.

e. If subcontractors are utilized by the Contractor, Contractor shall furnish evidence that, with respect to the operations performed by subcontractors, such subcontractors are in compliance with all requirements of this Section 14.

f. All railroad exclusions shall be removed by policy endorsements.

g. Punitive damages exclusion, if any, must be deleted (and the deletion indicated on the certificate of insurance), unless (1) insurance coverage may not lawfully be obtained for any punitive damages that may arise under this Agreement; or (2) all punitive damages are prohibited by all states in which this Agreement will be performed.

14.2 The insurance specified in this Agreement must be effected under form policies underwritten by insurers licensed in the state where the work is to be performed, and carry a minimum Best's rating of "A-" and size "Class VII" or better. The Railroad reserves the right to reject any insurance coverage provided by an insurer that is rated less than the rating specified in this Section 14.

14.3 All coverages shall be primary and non-contributory to any insurance coverage's maintained by the Railroad.

14.4 All insurance policies shall be endorsed to provide the Railroad with thirty (30) days prior written notice of cancellation, non-renewal or material changes.

14.5 Contractor shall furnish, to Railroad, certificates of insurance evidencing the insurance coverages, terms and conditions required and specified in this Agreement, at least ten days prior to commencement of any activities on or about the property. Said certificates should reference this Agreement by date and shall be furnished to the Railroad at the following address, or such other address as the Railroad may hereafter specify:

R. J. Corman Railroad Company/Carolina Lines, LLC
101 RJ Corman Drive
P.O. Box 788
Nicholasville, Kentucky 40340
Attn: _____

14.6 If any policies providing the required coverage are written on a claims-made basis, the following shall apply:

a. The retroactive date shall be prior to the commencement of the work,

b. The Contractor shall maintain such policies on a continuous basis, and

c. If there is a change in insurer or policies are cancelled or not renewed, the Contractor shall purchase an extended reporting period of not less than three (3) years after the Completion Date.

14.7 Contractor shall arrange for adequate time for reporting of any loss under this Agreement.

14.8 Furnishing of insurance by the Contractor shall not limit Contractor's liability under this Agreement, but shall be additional security therefore.

14.9 The above indicated insurance coverages shall be enforceable by any legitimate claimant after the termination or cancellation of this Agreement, or any amendment hereto, whether by expiration of time, by operation of law or otherwise, so long as the basis of the claim against the insurance company occurred during the period of time when the Agreement was in effect and the insurance was in force.

14.10 Failure to provide the required insurance coverage or endorsement (including contractual liability endorsement) or adequate reporting time shall be at the Contractor's sole risk and Railroad, in its sole discretion, may terminate this Agreement for such failure.

15. INDEMNITY

15.1 AS BETWEEN RAILROAD AND CONTRACTOR, CONTRACTOR SHALL ASSUME ALL RESPONSIBILITY FOR ANY AND ALL LOSS OR DAMAGE ARISING OUT OF OR IN CONNECTION WITH ANY NEGLIGENT ACT OR OMISSION ON THE PART OF CONTRACTOR OR ANY PERSON OR AGENT EMPLOYED BY IT AND ANY ACT OR OMISSION NOT AUTHORIZED BY THIS AGREEMENT ON THE PART OF CONTRACTOR OR ANY PERSON OR AGENT EMPLOYED BY IT.

15.2 CONTRACTOR AGREES TO INDEMNIFY, DEFEND AND HOLD HARMLESS RAILROAD, ITS PARENT, AFFILIATES, SUBSIDIARIES, AND EACH OF THEIR OFFICERS, DIRECTORS, EMPLOYEES, AGENTS, SERVANTS, SUCCESSORS, AND ASSIGNS ("INDEMNITEES") FROM AND AGAINST ANY AND ALL LOSSES AND LIABILITIES, PENALTIES, FINES, FORFEITURES, DEMANDS, CLAIMS, CAUSES OF ACTION, SUITS, COSTS AND EXPENSES INCIDENTAL THERETO (INCLUDING COSTS OF DEFENSE AND ATTORNEYS' FEES), WHICH ANY OR ALL OF THEM MAY HEREAFTER INCUR, BE RESPONSIBLE FOR OR PAY AS A RESULT OF: (A) INJURY OR DEATH OF ANY PERSON, OR DAMAGE TO OR LOSS OF (INCLUDING LOSS OF USE) ANY PROPERTY, INCLUDING PROPERTY OF THE PARTIES HERETO, TO THE EXTENT ARISING OUT OF OR IN ANY DEGREE DIRECTLY OR INDIRECTLY CAUSED BY THE NEGLIGENCE OF CONTRACTOR, CONTRACTOR'S OFFICERS, EMPLOYEES, AGENTS, SUBCONTRACTORS OR REPRESENTATIVES, OR (B) CONTRACTOR'S NEGLIGENT PERFORMANCE OF THE WORK RELATED TO THE PROJECT, OR FAILURE TO PERFORM ITS OBLIGATIONS IN COMPLIANCE WITH THIS AGREEMENT. THERE ARE EXCEPTED FROM THIS OBLIGATION ONLY CLAIMS, DAMAGES OR OTHER LOSSES TO THE EXTENT THAT THE SAME ARE CAUSED BY THE GROSS NEGLIGENCE OR INTENTIONAL WRONGFUL ACT OR OMISSION ONE OR MORE INDEMNITEES.

15.3 CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DAMAGES AND EXPENSES ON ACCOUNT OF INJURIES, (INCLUDING DEATH) TO, AND PROPERTY DAMAGE OF, ANY OF ITS EMPLOYEES, AGENTS, SUBCONTRACTORS OR REPRESENTATIVES WHILE ON THE PREMISES OF RAILROAD, ITS AFFILIATES OR SUBSIDIARIES AND SHALL INDEMNIFY, DEFEND AND HOLD INDEMNITEES HARMLESS FROM ALL CLAIMS OF DAMAGE OR SUITS WHICH MAY ARISE, EXCEPT AND ONLY TO THE EXTENT THAT SUCH CLAIMS, LOSSES, DAMAGES OR EXPENSES ARE CAUSED BY THE GROSS NEGLIGENCE OF THE INDEMNITEES. CONTRACTOR SHALL ALSO REPAIR OR REPLACE ANY PROPERTY OF INDEMNITEES, WHICH IS DAMAGED BY CONTRACTOR'S EMPLOYEES, AGENTS OR SUBCONTRACTORS WHILE PERFORMING THE WORK HEREUNDER.

15.4 Contractor agrees to indemnify and hold harmless Indemnitees irrespective of any fault or negligence on their part, from and against all losses and liabilities, fines, penalties, forfeitures, demands, claims, causes of action, suits, costs and expenses incidental thereto (including reasonable costs of defense and attorneys' fees) which may arise from the existence, discharge, release, and/or disposal of any materials, including any wastes, brought on to the property of Railroad by Contractor, its employees, agents, subcontractor or representatives in connection with performance of work related to the Project pursuant to the Agreement.

15.5 IN NO EVENT SHALL RAILROAD OR ITS PARENTS, AFFILIATES, OR SUBSIDIARIES BE LIABLE TO Contractor FOR ANY PUNITIVE, INCIDENTAL, INDIRECT, OR CONSEQUENTIAL DAMAGES.

16. REMOVAL OF WASTE AND SURPLUS MATERIAL

16.1 Contractor shall be responsible for the removal and proper discarding of all equipment, materials, supplies, explosives, chemicals and debris. All surplus materials that may accumulate on or about the Project and premises occupied by Contractor during the term of this Agreement shall be removed.

16.2 Contractor shall comply with all applicable Federal, state and local laws, ordinances, rules, regulations and all lawful orders of any constituted authority including, without limitation, the Resource, Conservation and Recovery Act (42 U.S.C. S6901 et seq.) and the Toxic Substance Control Act (15 U.S.C. S2601 et seq.) and all other laws pertaining to the generation, transportation, treatment, storage and disposal of solid, hazardous and municipal wastes.

16.3 Railroad's property shall be left in a clean and safe condition as determined by the Engineer and the condition of said premises shall be subject to the approval of Railroad at all times during the course of the Project.

17. AUDIT

17.1 Contractor shall keep and maintain good and accurate records of all matters in any manner pertaining to this Agreement, the performance of the same, payments made to Contractor pursuant hereto, and payments made by Contractor pursuant hereto, including but not limited to payroll and tax liabilities and payments beginning with the effective date of this Agreement and continuing for a period ending three (3) years from the date of final acceptance of all work by Railroad, and shall make those records available for audit and inspection by Railroad or its agents during normal business hours upon seven (7) days notice and request for same.

18. NOTICES

18.1 Notices required or permitted hereunder shall be deemed effective when delivered by commercial overnight courier are electronically:

If to Railroad at:

R. J. Corman Railroad Company/Carolina Lines, LLC
101 RJ Corman Drive
P.O. Box 788
Nicholasville, Kentucky 40340
Attn: _____
_____._____@RJCorman.com

If to Contractor at:

_____
_____
_____
_____
_____._____@_____.com

19. DISPUTE RESOLUTION

19.1 Dispute resolution shall be by arbitration under the Construction Contract Rules of the American Arbitration Association at a neutral location to be chose by a single arbitrator; provided, however that the existence of a dispute shall not entitle Contractor to suspend performance under this Agreement pending the resolution of the dispute and further provided that each party shall be entitled to seek temporary equitable relief from any court otherwise having jurisdiction over such dispute.

20. WAIVER

20.1 No omission or delay by Railroad in enforcing any right or remedy or in requiring performance of any of the term of this Agreement shall constitute or be deemed to constitute a waiver of any such right or remedy, nor shall it in any way affect the right of Railroad to enforce such provisions thereafter unless such right or remedy is specifically waived by Railroad in writing. No single or partial exercise by or of any right or remedy hereunder shall preclude any other or further exercise thereof or the exercise of any other right or remedy.

21. APPLICABLE LAW

21.1 This Agreement shall be governed by and construed in accordance with the laws of the state of South Carolina.

22. SEVERABILITY

22.1 If any provisions of this Agreement shall be held to be invalid, illegal or unenforceable, the validity of all other provisions hereof shall in no way be affected thereby.

23. NON-EXCLUSIVITY

23.1 Contractor acknowledges that nothing in this Agreement shall be construed to give Contractor exclusive rights to perform the type of work or project identified in this Agreement, or any other service, for Railroad. Railroad specifically reserves the right to enter into agreements with other contractors to perform similar, supplemental, additional or other services as deemed appropriate in the opinion of Railroad.

24. HEADINGS

24.1 Section headings are for convenience only and shall not be construed as part of this Agreement.

25. SURVIVAL

25.1 The indemnities and assumptions of liability and responsibility provided in this Agreement, shall continue in full force and effect notwithstanding the termination or cancellation of this Agreement or any attachment hereto whether by expiration of time, by operation of law or otherwise.

26. ENTIRE AGREEMENT

26.1 This Agreement together with all appendices, schedules and exhibits attached hereto constitutes the entire agreement between the parties and supersedes all previous understandings related to the Project.

27. UNDERSTANDING OF REQUIREMENTS

27.1 The parties hereby distinctly and expressly declare and acknowledge that, before the signing of this Agreement, they have carefully read the same, and the whole thereof, together with and in connection with said specifications, and that they have made such examination of this Agreement and specifications, the location where said work is to be done, the nature of the work required to be done, and the material required to be furnished, as to enable them to understand thoroughly the intention of the same, and the requirements, covenants, agreements, stipulations and restrictions contained herein and in said specifications. Contractor shall not hereafter make any claim or demand upon Railroad based upon or arising out of any alleged misunderstanding

or misconception on its part of the said requirements, covenants, stipulations, and restrictions; and that any information (other than through a Supplemental Agreement), given to Contractor by the Engineer or others as to the quantities in the Project prior to, or during the progress of the Project, shall have no bearing or effect whatsoever upon the total amount to be paid for in the final settlement.

28. THIRD-PARTY BENEFICIARIES

28.1 Other than the referenced state where work is performed, there are no third-party beneficiaries to this Agreement. This Agreement shall not confer any rights or remedies upon any person other than the parties, and to the extent expressly set forth herein, their affiliates, and their respective successors and permitted assigns.

The parties hereto have caused this Agreement to be duly executed by their duly authorized officials as of the date first stated above.

R. J. CORMAN RAILROAD COMPANY/ CAROLINA LINES, LLC	[NAME OF SUCCESSFUL BIDDER]
BY: _____	BY: _____
TITLE: _____	TITLE: _____

RJ Corman Railroad Company

Project Plans – RJC M.P. 334.5 (Conway, SC) Bid Plan Set

April 17, 2020

DRAWING NO.	DESCRIPTION
334.5-01	TITLE SHEET
334.5-02	GENERAL NOTES (1 OF 3)
334.5-03	GENERAL NOTES (2 OF 3)
334.5-04	GENERAL NOTES (3 OF 3)
334.5-05	SITE PLAN
334.5-06	GENERAL PLAN AND ELEVATION
334.5-07	TYPICAL SECTIONS
334.5-08	FOUNDATION LAYOUT AND PILE DETAILS
334.5-09	BEARING PAD LAYOUT AND DETAILS
334.5-10	CONSTRUCTION DETAILS (1 OF 2)
334.5-11	CONSTRUCTION DETAILS (2 OF 2)
334.5-12	END BENT ASSEMBLY DETAILS
334.5-13	PRECAST CONCRETE WINGWALL WW1 DETAILS
334.5-14	PRECAST CONCRETE BACKWALL BW2 DETAILS
334.5-15	PRECAST END BENT CAP PCC2 DETAILS
334.5-16	PRECAST INTERMEDIATE BENT CAP PCC1 DETAILS
334.5-17	30'-0" PRESTRESSED CONCRETE BEAM DETAILS (1 OF 2)
334.5-18	30'-0" PRESTRESSED CONCRETE BEAM DETAILS (2 OF 2)
334.5-19	EMBEDDED PLATE DETAILS
334.5-20	END BENT WATERPROOFING AND SLOPE PROTECTION DETAILS
334.5-21	SPAN JOINT DETAILS
334.5-22	HANDRAIL DETAILS
334.5-23	BORING LOG (1 of 2)
334.5-24	BORING LOG (2 of 2)

R.J. CORMAN BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP
CONWAY, SC
BRIDGE REPLACEMENT

PROJECT INFORMATION

EXISTING BRIDGE WIDTH: 14'-0" OUT-TO-OUT TIMBER DECK

EXISTING SPAN LAYOUT: 10'-0" CENTERLINE BENT TO CENTERLINE BENT

PROPOSED WIDTH: SPANS 1-9: 3 PCB BEAMS @ 5'-5"; BRIDGE WIDTH = 16'-4"

PROPOSED SPAN LAYOUT:
SPAN 1: 29'-2" CENTERLINE BENT TO CENTERLINE BENT
SPANS 3-7: 30'-0" CENTERLINE BENT TO CENTERLINE BENT
SPAN 8: 29'-2" CENTERLINE BENT TO CENTERLINE BENT

PROPOSED LIFTING WEIGHTS:
30'-0" EXTERIOR PRESTRESSED CONCRETE BOX BEAM (PCBB) = 50,000 LBS
30'-0" INTERIOR PRESTRESSED CONCRETE BOX BEAM (PCBB) = 44,000 LBS
PRECAST CONCRETE BENT CAP = 38,000 LBS
PRECAST CONCRETE WINGWALL = 10,000 LBS
PRECAST CONCRETE BACKWALL = 8,000 LBS

SPECIFICATION

CONSTRUCTION: PROJECT SPECIFICATIONS.

DIMENSIONS: THESE CONTRACT DRAWINGS ARE BASED UPON AVAILABLE DESIGN DRAWINGS OF THE EXISTING BRIDGE. IT IS THE CONTRACTORS RESPONSIBILITY TO VERIFY ALL DIMENSIONS IN THE FIELD BEFORE FABRICATION TO ENSURE PROPER FIT OF NEW MATERIAL.

DESIGN: 2019 EDITION OF THE AMERICAN RAILWAY ENGINEERING AND MAINTENANCE OF WAY ASSOCIATION (AREMA) "MANUAL FOR RAILWAY ENGINEERING" CHAPTER 15 - STEEL STRUCTURES, CHAPTER 8-CONCRETE STRUCTURES & FOUNDATIONS. RAILROAD INDUSTRY STANDARD ELEMENTS DEVELOPED USING 2015 AREMA "MANUAL FOR RAILWAY ENGINEERING".

DESIGN CRITERIA

DEAD LOAD: WEIGHT OF RAIL AND FASTENINGS, BALLAST, CONCRETE SPANS AND CAPS, HANDRAIL, UTILITIES AND OTHER MISCELLANEOUS FIXTURES

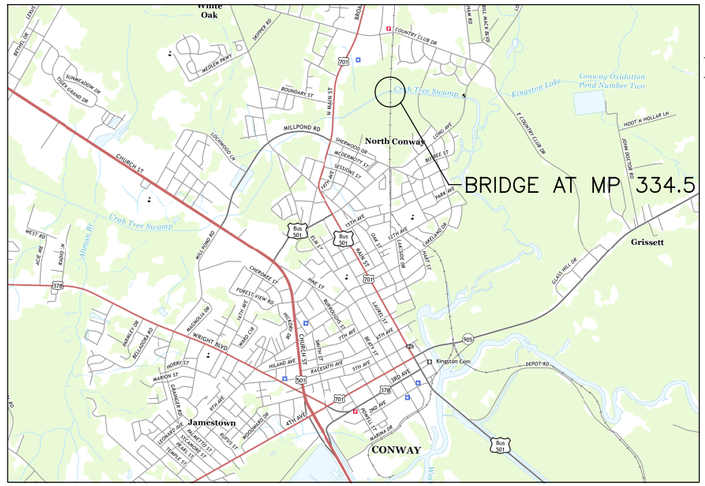
LIVE LOAD: COOPER E-80/ALTERNATE LOADING

IMPACT: APPLICABLE PERCENTAGE FOR ROLLING EQUIPMENT WITHOUT HAMMER BLOW.

FATIGUE: PER AREMA 15-1.3.13 FATIGUE

WIND LOAD: PER AREMA 8-2.2.3, 15-1.3.7 AND 15-1.3.8, AS REQUIRED

SUBSTRUCTURE: CONCRETE SUBSTRUCTURE IS DESIGNED BY LOAD FACTOR METHOD WITH A SAFETY FACTOR OF 2



LATITUDE: 33°51'41.35" N
LONGITUDE: 79°02'57.89" W

LOCATION MAP
SCALE: NTS

ESTIMATED QUANTITIES

QTY.	UNIT	DESCRIPTION	SEE SHEET
4	EACH	PRECAST CONCRETE WINGWALL WW1	334.5-13
2	EACH	PRECAST CONCRETE BACKWALL BW2	334.5-14
2	EACH	PRECAST CONCRETE END BENT CAP PCC2	334.5-15
7	EACH	PRECAST CONCRETE INTERMEDIATE BENT CAP PCC1	334.5-16
24	EACH	29'-11 1/2", 33" DEEP PRESTRESSED CONCRETE BOX BEAM	334.5-17 TO 334.5-18
27	EACH	HP 14x102 x 60'-0"	334.5-08
27	EACH	HP 14x102 x 40'-0"	334.5-08
27	EACH	H-PILE DRIVING SHOE	334.5-08
27	EACH	H-PILE SPLICE MATERIAL	334.5-08
5800	S.F.	PILE SURFACE COATING	334.5-04
32	EACH	LONGITUDINAL JOINT ASSEMBLIES	334.5-11
18	EACH	SPAN JOINT ASSEMBLIES	334.5-21
40	EACH	LATERAL STOPS	334.5-11
16	EACH	HANDRAIL ASSEMBLIES	334.5-10, 334.5-22
81	FT.	PREFORMED EXPANSION JOINT FILLER 1/2" x 12"	334.5-10, 334.5-11
220	FT.	PREFORMED EXPANSION JOINT FILLER 1/2" x 2'-9"	334.5-09
48	EACH	1/2" x 6" x 5'-1" ELASTOMERIC, NEOPRENE BEARING PAD	334.5-09
180	TONS	RIPRAP STONE	334.5-06, 334.5-20
60	TONS	BEDDING STONE	334.5-06, 334.5-20
1	LOT	STRUCTURAL BACKFILL	334.5-04
1	LOT	COLD GALVANIZING SPRAY	334.5-02 TO 334.5-04
1	LOT	WATERPROOFING	334.5-03
120	FT.	6" DIA. PERFORATED CORRUGATED METAL DRAIN PIPE	334.5-20

APPROVED BY R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

Edward Bullis 3/19/20

R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES REPRESENTATIVE DATE

ABBREVIATIONS

ABUT.	ABUTMENT	ELEV.	ELEVATION	NIC	NOT IN CONTRACT
APPROX.	APPROXIMATE	EQ.	EQUAL	OHE	OVERHEAD ELECTRICAL
ASSOC.	ASSOCIATED	EX.	EXISTING	O/O	OUT TO OUT
B.F.	BACK FACE	EXP.	EXPANSION	℄	PLATE
BOT.	BOTTOM	FB	FLOOR BEAM	PROP.	PROPOSED
B/R	BASE OF RAIL	FCM	FRACTURE CRITICAL MEMBER	REQ.	REQUIRED
BRG.	BEARING	F.F.	FAR FACE	ROW	RIGHT OF WAY
C/C	CENTER TO CENTER	FFBW	FRONT FACE BACKWALL	S.E.	SUPERELEVATION
℄	CENTERLINE	FIX.	FIXED	S.F.	SQUARE FOOT
C.F.	CUBIC FOOT	FT.	LINEAR FOOT	SPA.	SPACE
CLR.	CLEAR	GAL.	GALLONS	STA.	STATION
CONC.	CONCRETE	GALV.	GALVANIZED	STD.	STANDARD
CONN.	CONNECTION	HORIZ.	HORIZONTAL	STR	STRAIGHT
CP	CONTROL POINT	INT.	INTERMEDIATE	STR.	STRINGER
C.Y.	CUBIC YARDS	IPS	IRON PIN SET	S.Y.	SQUARE YARD
DIA.	DIAMETER	LBS.	POUNDS	TPG	THROUGH PLATE GIRDER
DIM.	DIMENSION	L.S.	LUMP SUM	TYP.	TYPICAL
DWG.	DRAWING	MAX.	MAXIMUM	T/R	TOP OF RAIL
EA.	EACH	MBF	THOUSAND BOARD FEET	TOR	TOP OF RAIL
E.F.	EACH FACE	MIN.	MINIMUM	UNO.	UNLESS NOTED OTHERWISE
EL.	ELEVATION	N.F.	NEAR FACE	VERT.	VERTICAL

RELEASED FOR BID - NOT FOR CONSTRUCTION

HDR ENGINEERING, INC.
4400 LEEDS AVE., SUITE 450
NORTH CHARLESTON, SC 29405
843-414-3700

APPROVED FOR
R.J. CORMAN RAILROAD COMPANY/
CAROLINA LINES BY
HDR ENGINEERING INC.
OF THE CAROLINAS
(CHARLESTON, SC)
BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020

FILE: 334.5-01.dgn

RJ Corman Railroad Company

REVISIONS

BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP

TITLE SHEET

HORRY COUNTY CONWAY, SC

R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

SCALE: AS SHOWN		VAL. SEC.	DRAWING NO.
DATE: 3/16/2020			334.5-01
DESIGN: TCS			
DRAWN: RGD			
CHECKED: JFM			

CONSTRUCTION NOTES

EXISTING RIGHT–OF–WAY:

40'–0" EACH SIDE OF EXISTING TRACK CENTERLINE.

CONTROL OF WORK:

ALL WORK INVOLVED IN THE CONSTRUCTION OF THE RAILWAY STRUCTURE SHALL BE PERFORMED SATISFACTORY TO THE ENGINEER AND RJ CORMAN. ALL METHODS OF HANDLING WORK AFFECTING THE SAFETY OF RAIL OPERATIONS MUST BE APPROVED BY THE RAILWAY ENGINEER BEFORE PROCEEDING WITH THAT PORTION OF THE WORK. RAIL TRAFFIC SHALL AT ALL TIMES BE MAINTAINED AND PROTECTED.

CONSTRUCTION REQUIREMENTS:

ALL WORK SHALL BE IN ACCORDANCE WITH CURRENT AREMA "MANUAL FOR RAILWAY ENGINEERING" AND THE SPECIFICATIONS FOR THIS CONTRACT.

THE CONTRACTOR SHALL NOT INTERFERE WITH OR PERFORM ANY CONSTRUCTION ON OR NEAR OPERATING TRACKS WITHOUT THE RAILROAD'S PERMISSION. WHEN THE CONTRACTOR IS WORKING NEAR ANY TRACK, HE WILL BE REQUIRED TO HAVE A FLAGMAN FROM THE RAILROAD ON DUTY.

CONTRACTOR SHALL NOT SCALE DIMENSIONS FROM THE CONTRACT PLANS FOR CONSTRUCTION PURPOSES. SCALES ARE SHOWN FOR INFORMATION ONLY. NO CONSTRUCTION JOINTS, EXCEPT THOSE SHOWN ON THE PLANS, WILL BE ALLOWED UNLESS APPROVED BY THE ENGINEER.

STATIONING:

RAIL STATIONING IS BASED ON THE SOUTH FACE OF THE NORTH BACKWALL OF THE EXISTING BRIDGE. THE FRONT FACE OF THE EXISTING NORTH BACKWALL IS DESIGNATED AS STA. 100+00.00.

BENCHMARK:

BENCHMARK: ELEV. 3.79 (NAVD 88), LANDSCAPE NAIL OFFSET 18'–9 ½" LEFT (EAST) AT STA. 100+68.97.

PROFILE:

GRADE RAISE AS SPECIFIED ON DRAWING NO. 334.5–05.

DIVISION OF RESPONSIBILITY

RAILROAD

1. REMOVE TIES, RAIL, AND OTHER TRACK MATERIALS FROM EXISTING BRIDGE.
2. PROVIDE AND INSTALL BALLAST, TIES, RAIL AND OTHER TRACK MATERIALS FOR BRIDGE 334.5 AS REQUIRED.
3. RAISE AND IMPROVE TRACK SURFACE ON BRIDGE APPROACHES AS REQUIRED FOR THE SPECIFIED GRADE RAISE PER DRAWING NO. 334.5–05.
4. PROVIDE AND INSTALL RETAINING WALLS AS REQUIRED TO ACCOMMODATE NEW BRIDGE AND GRADE RAISE. RETAINING WALLS MAY BE INCLUDED OR OMITTED AT THE DISCRETION OF THE RAILROAD.
5. PROVIDE AND INSTALL PRIVATE PROPERTY/NO TRESPASSING SIGNS AT THE BRIDGE. SIGNS INSTALLED AT THE DISCRETION OF THE RAILROAD.

CONTRACTOR

1. COORDINATE ALL CONSTRUCTION ACTIVITIES WITH THE RAILROAD.
2. BEFORE ORDERING ANY MATERIAL, THE CONTRACTOR SHALL MAKE A DETAILED FIELD INSPECTION OF THE SITE VERIFYING ALL PERTINENT DIMENSIONS AND ELEVATIONS AND LOCATION OF PROPOSED BRIDGE. ANY VARIATIONS IN DIMENSIONS OR ELEVATIONS FROM THOSE SHOWN ON THE PLANS SHALL BE REPORTED IMMEDIATELY TO THE ENGINEER.
3. VERIFY THE LOCATION, RELOCATION, ABANDONMENT, AND/OR TEMPORARY SUPPORT OF ALL UTILITIES AFFECTED BY THE CONSTRUCTION OF THE STRUCTURE AND EMBANKMENT AND COORDNATE THESE ACTIVITIES WITH THE APPROPRIATE UTILITY COMPANIES, AGENCIES, AND/OR AUTHORITIES. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY DAMAGE WHICH MIGHT OCCUR DUE TO CONTRACTOR'S FAILURE TO LOCATE AND PRESERVE ANY AND ALL UTILITIES.
4. APPLY FOR AND OBTAIN ANY CONSTRUCTION PERMITS NECESSARY TO PERFORM THE WORK.
5. PROVIDE THE RAILROAD WITH A DETAILED CONSTRUCTION PLAN DETAILING THE ACTIVITY, SCHEDULE AND PROCEDURE FOR EACH ASPECT OF THE WORK. CONSTRUCTION SHALL NOT BEGIN UNTIL THE CONSTRUCTION PLAN HAS BEEN APPROVED BY THE RAILROAD.
6. POSITION AND INSTALL PILES AS SHOWN ON THE PLANS.
7. COORDINATE WITH RJ CORMAN ON INSTALLATION OF THE BALLAST, TIES, RAIL AND OTM FOR PROPOSED TRACK.
8. PROVIDE AND REPLACE ALL FILL MATERIAL PER RJ CORMAN.
9. RESTORE ALL AREAS THROUGHOUT THE LENGTH OF THE BRIDGE TO ORIGINAL CONDITION OR BETTER, AND AS REQUIRED BY RELEVENT PERMITS.
10. PROVIDE ALL TEMPORARY STRUCTURES REQUIRED FOR CONSTRUCTION OR AS REQUIRED TO PROTECT THE EXISTING STRUCTURE. DETAILED DRAWINGS OF THE TEMPORARY STRUCTURES INCLUDING DESIGN CALCULATIONS AND PROCEDURE SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL. ALL TEMPORARY STRUCTURES SHALL BE DESIGNED, SIGNED, AND SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF SOUTH CAROLINA. ALL TEMPORARY STRUCTURES SHALL BE APPROVED BY THE ENGINEER PRIOR TO CONSTRUCTION.
11. PROVIDE AND PLACE RIPRAP SLOPE PROTECTION IN ACCORDANCE WITH THE NOTES AND DETAILS IN THESE DRAWINGS.
12. ACCOMPLISH ALL OF THE TASKS DESCRIBED IN THE CONSTRUCTION SEQUENCE SHOWN ON DRAWING NO. 334.5–03. AN ALTERNATE CONSTRUCTION SEQUENCE MAY BE SUBMITED TO THE RAILROAD AND THE ENGINEER FOR APPROVAL. THE ALTERNATE CONSTRUCTION SEQUENCE, IF PROPOSED, SHALL BE APPROVED BY THE RAILROAD AND THE ENGINEER PRIOR TO BEGINNING CONSTRUCTION.
13. ACCOMPLISH ACTIVITIES WITHIN THE SCHEDULE SPECIFIED IN THE APPROVED CONSTRUCTION PLAN.

FIELD WELDING:

WELDING MUST BE IN COMPLIANCE WITH REQUIREMENTS SPECIFIED IN AWS D1.5, CURRENT EDTION. WELDING MUST BE ACCOMPLISHED WITH THE SMAW PROCESS. WELDING ELECTRODES MUST BE E7018. WELDERS MUST POSSESS VALID CERTIFICATION.

MEASUREMENT AND PAYMENT

WORK ITEMS FOR THIS PROJECT SHALL BE BID BASED ON THE FOLLOWING PAY ITEMS AND ASSOCIATED NOTES.

BRIDGE 334.5 PAY ITEMS

DIVISION 100 – GENERAL			
PAY ITEM NO.	UNIT	DESCRIPTION	NOTE
101	L.S.	MOBILIZATION	
102	L.S.	ESTABLISH STAGING AND SITE ACCESS ROAD	
103	L.S.	TEMPORARY WORK TRESTLE/CAUSEWAY	
104	L.S.	REMOVAL OF TEMPORARY WORK TRESTLE/CAUSEWAY	
105	L.S.	DEMOLISH AND DISPOSE OF EXISTING BRIDGE	
106	L.S.	MATERIALS TESTING	
107	L.S.	PDA TESTING	
DIVISION 200 – SITE WORK			
PAY ITEM NO.	UNIT	DESCRIPTION	NOTE
201	L.S.	SITE CLEARING	1
202	L.S.	EXCAVATION AND GRADING	2
203	L.S.	FURNISH, PLACE, AND COMPACT FILL	3
204	TON	FURNISH AND INSTALL RIPRAP SLOPE PROTECTION	4
DIVISION 300 – METALS			
PAY ITEM NO.	UNIT	DESCRIPTION	NOTE
301	FT.	FURNISH STEEL H–PILE	5
302	FT.	INSTALL STEEL H–PILE	6
303	FT.	INSTALL STEEL H–PILE (TEST PILE)	6
304	S.F.	FURNISH AND INSTALL PILE PROTECTIVE COATING	
305	EA.	FURNISH AND INSTALL STEEL H–PILE DRIVING SHOES	
306	EA.	FURNISH AND INSTALL STEEL H–PILE SPLICE MATERIAL	
307	FT.	FURNISH AND INSTALL STEEL HANDRAIL	
308	EA.	BEARING PADS	
DIVISION 400 – CONCRETE			
PAY ITEM NO.	UNIT	DESCRIPTION	NOTE
401	EA.	FURNISH AND INSTALL PRECAST CONCRETE END BENT CAPS	
402	EA.	FURNISH AND INSTALL PRECAST CONCRETE INTERMEDIATE BENT CAPS	
403	EA.	FURNISH AND INSTALL PRECAST CONCRETE WINGWALLS	
404	EA.	FURNISH AND INSTALL PRECAST CONCRETE BACKWALLS	
405	EA.	FURNISH AND INSTALL PRECAST CONCRETE BOX BEAMS	
406	L.S.	WATERPROOFING	
407	FT.	PREFORMED EXPANSION JOINT FILLER (PEJF) (½" x 1'–0")	
408	FT.	PREFORMED EXPANSION JOINT FILLER (PEJF) (½" x 2'–9")	
409	L.S.	TRENCH DRAINS	
DIVISION 500 – PROJECT DOCUMENTATION			
PAY ITEM NO.	UNIT	DESCRIPTION	NOTE
501	L.S.	RAILROAD PROTECTIVE LIABILITY INSURANCE	
502	L.S.	PROJECT FORMS, PERMITTING, AND MEETINGS	
503	L.S.	AS–BUILT DRAWINGS	

PAY ITEM NOTES:

1. SITE CLEARING SHALL MEAN THE REMOVAL OF TREES AND/OR OTHER VEGETATION NECESSARY FOR CONSTRUCTION ACTIVITIES. SITE CLEARING SHALL BE MINIMIZED TO THE EXTENT POSSIBLE.
2. GRADING SHALL REFER TO THE MOVING OF EARTH AND OTHER MATERIAL FROM CUTS, DITCHES, AND WATERWAYS. PAYMENT FOR TRANSPORTATION OF ANY EXCAVATED MATERIAL OR FILL MATERIAL BROUGHT TO THE SITE SHALL BE INCLUDED IN PAY ITEM NO. 202.
3. FILL MATERIAL SHALL BE MEASURED IN CUBIC YARDS AND PAID BASED ON THE AMOUNT OF COMPACTED MATERIAL PLACED.
4. RIPRAP MEASUREMENT SHALL BE THE NUMBER OF NET TONS OF RIPRAP TRANSPORTED AND COMPACTED IN PLACE AS CALCULATED FROM WEIGH TICKETS. CONTRACTOR IS RESPONSIBLE FOR RETAINING AND SUBMITTING WEIGHT TICKET COPIES WITH INVOICE. FILTER FABRIC SHALL BE CONSIDERED INCIDENTAL TO PAY ITEM 204. PAYMENT SHALL BE FOR NUMBER OF NET TONS IN PLACE AT THE UNIT PRICE.
5. CONTRACT BID PRICE FOR SUPPLIED PILE SHALL BE PAID PER LINEAL FOOT AND SHALL INCLUDE ALL MATERIAL REQUIRED TO MEET MINIMUM DRIVING CRITERIA FOR THE CAPACITIES SPECIFIED IN THESE DRAWINGS.
6. CONTRACT BID PRICE FOR DRIVEN PILE SHALL BE PAID PER LINEAL FOOT AND SHALL INCLUDE THE COST OF LABOR, EQUIPMENT, AND MISCELLANEOUS MATERIAL REQUIRED FOR COMPLETE PILE INSTALLATION AND PILE CUTOFF. THE COST OF THE TOTAL AMOUNT OF CUTOFF PILE (MEASURED FROM PILE CUTOFF TO TOP OF PILE PRIOR TO CUTOFF) SHALL BE A DEDUCTION.
7. COSTS FOR FABRICATION AND INSTALLATION OF STEEL LATERAL STOPS AND DECK JOINT ASSEMBLIES SHALL BE INCLUDED UNDER PAY ITEM 405.

EXISTING BRIDGE DEMOLITION

1. EXISTING TIMBER BRIDGE SHALL BE REMOVED IN ACCORDANCE WITH THE NOTES AND DETAIL ON DRAWING NO. 334.5–06. ALL DEMOLISHED MATERIALS SHALL BE DISPOSED OF OFF–SITE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL LAWS.
2. INADVERTENT OR INTENTIONAL DUMPING, OR PLACEMENT OF DEMOLISHED MATERIALS INTO A WATERWAY OR FLOOD PLAIN IS NOT PERMITTED.
3. ALL MATERIALS REMOVED SHALL BE THE PROPERTY OF THE RAILROAD AND SHALL BE REMOVED FROM THE RAILROAD'S PROPERTY.
4. THE CONTRACTOR SHALL PREPARE THE FOLLOWING DOCUMENTS FOR APPROVAL BY THE ENGINEER. ALL SUBMITTALS MUST BE SIGNED AND SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF SOUTH CAROLINA.
   a. DEMOLITION PLAN
   b. DISPOSAL PLAN

SITE ACCESS

1. CONTRACTOR IS RESPONSIBLE FOR OBTAINING, CONSTRUCTING, MAINTAINING, AND REMOVING SITE ACCESS TO THE PROJECT LOCATION. MATERIALS AND METHODS FOR CONSTRUCTING TEMPORARY ACCESS SHALL BE IN ACCORDANCE WITH ALL APPLICABLE LOCAL REGULATIONS.
2. CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND PERMISSIONS FOR SITE ACCESS.
3. THE CONTRACTOR SHALL MAKE ARRANGEMENTS FOR A TEMPORARY, LOCKED GATE TO SECURE ALL STAGING AREAS AND SITE ACCESS ROADS. TEMPORARY FENCING SHALL BE INSTALLED AROUND THE PROJECT SITE FOR THE DURATION OF CONSTRUCTION. ALL SITE SECURITY GATES AND FENCING SHALL BE REMOVED AFTER PROJECT COMPLETION.
4. THE CONTRACTOR MAY PROPOSE AN ALTERNATE SITE ACCESS PLAN OTHER THAN WHAT IS SHOWN IN THESE DRAWINGS. ANY ALTERNATIVE SITE ACCESS PLAN SHALL BE APPROVED BY THE ENGINEER PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR APPLYING FOR AND OBTAINING ANY ADDITIONAL PERMITS REQUIRED FOR THE ALTERNATE SITE ACCESS PLAN AT NO ADDITIONAL EXPENSE TO THE RAILROAD.
5. TEMPORARY GRADE CROSSINGS MAY NOT BE ESTABLISHED UNLESS APPROVED BY THE RAILROAD. ANY TEMPORARY CROSSING MAY ONLY BE USED WHILE BEING WATCHED BY AN APPROVED RAILROAD FLAGMAN. ANY TEMPORARY CROSSING ESTABLISHED SHALL BE MAINTAINED IN ACCORDANCE WITH RAILROAD DIRECTION AND SHALL BE REMOVED AFTER COMPLETION OF THE PROJECT.
6. ALL AREAS DISTURBED FOR SITE ACCESS OR MATERIALS STAGING SHALL BE RETURNED TO THEIR ORIGINAL CONDITION OR BETTER AFTER PROJECT COMPLETION.

RELEASED FOR BID - NOT FOR CONSTRUCTION

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RJ Corman Railroad Company

APPROVED FOR
R.J. CORMAN RAILROAD COMPANY/
CAROLINA LINES BY
HDR ENGINEERING INC.
OF THE CAROLINAS
(CHARLESTON, SC)
BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020

FILE: 334.5-02.dgn

REVISIONS

BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP

GENERAL NOTES (1 OF 3)

HORRY COUNTY CONWAY, SC

R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

SCALE: AS SHOWN	VAL. SEC.	DRAWING NO.
DATE: 3/16/2020		334.5-02
DESIGN: TCS		
DRAWN: RGD		
CHECKED: JFM		

SLOPE PROTECTION

1. RIPRAP STONE SHALL BE BROKEN STONE PRODUCED FROM SOUND LEDGE OR LARGE BOULDERS WITH AT LEAST THREE FRACTURE FACES ON EACH PIECE AND FREE FROM OVERBURDEN, SPOIL, SHALE, OR ORGANIC MATERIAL.

2. RIPRAP STONE SHALL HAVE A MINIMUM DENSITY OF 150 POUNDS PER CUBIC FOOT. STONES SHALL NOT WEIGH LESS THAN 50 POUNDS AND NOT MORE THAN 200 POUNDS AND SHALL BE REASONABLY WELL GRADED WITH NO MORE THAN 40 PERCENT WEIGHING MORE THAN 100 POUNDS EACH.

3. BROKEN CONCRETE USED AS SLOPE PROTECTION IS NOT PERMITTED.

4. THE CONTRACTOR SHALL SUBMIT A FILTER FABRIC PRODUCT TO THE ENGINEER FOR APPROVAL. THE PRODUCT MUST BE APPROVED PRIOR TO CONSTRUCTION.

PRESTRESSED CONCRETE

MATERIALS

CONCRETE:

1. THE COMPRESSIVE STRENGTH OF THE PRESTRESSED BOX BEAM CONCRETE SHALL EXCEED 8,500 PSI AT 28 DAYS AND 5,500 PSI AT TRANSFER OF PRESTRESSING FORCE (RELEASE).

2. CONCRETE SHALL BE PROPORTIONED SUCH THAT THE WATER – CEMENT RATIO (BY WEIGHT) DOES NOT EXCEED 0.45. CONCRETE SHALL CONTAIN A MINIMUM OF 7 SACKS OF CEMENT PER CUBIC YARD OF CONCRETE.

3. CEMENT SHALL BE TYPE I OR TYPE III PORTLAND CEMENT IN ACCORDANCE WITH ASTM C150 SPECIFICATIONS.

4. ONLY ONE BRAND OF CEMENT MAY BE USED IN ANY PART OF THE STRUCTURE AND CEMENTS OF THE SAME BRAND FROM DIFFERENT MILLS SHALL NOT BE MIXED OR USED IN ANY PART OF THE STRUCTURE, EXCEPT AS PERMITTED BY THE ENGINEER.

5. MAXIMUM SLUMP SHALL BE 3".

6. AGGREGATES SHALL BE GRADED IN ACCORDANCE WITH ASTM C33 SPECIFICATIONS. COARSE AGGREGATE SHALL BE SIZE NO. 67. FINE AGGREGATE SHALL BE NATURAL SAND.

7. AIR CONTENT SHALL BE 6% (BY VOLUME) UNLESS NOTED OTHERWISE AND APPROVED BY THE ENGINEER. USE OF FLY ASH IS PROHIBITED. ADMIXTURES SHALL NOT BE USED WITHOUT APPROVAL BY THE ENGINEER.

STRUCTURAL STEEL:

STRUCTRAL STEEL FOR MISC. EMBEDDED STEEL SHAPES AND PLATES SHALL CONFORM TO ASTM A709, GRADE 36.

SHEAR STUDS SHALL BE C1015, C1017 OR C1020 COLD DRAWN STEEL WHICH CONFORMS TO ASTM A108 SPECIFICATIONS.

REINFORCING STEEL:

REINFORCING STEEL SHALL BE DEFORMED NEW BILLET BARS PER ASTM A615 SPECIFICATIONS AND MEET GRADE 60 REQUIREMENTS.

PRESTRESSING STEEL:

PRESTRESSING STEEL SHALL BE 0.6" DIAMETER LOW RELAXATION, 270 KSI STRANDS CONFORMING TO ASTM SPECIFICATION A416. STRANDS SHALL BE CUT FLUSH WITH END OF SPANS AND COATED WITH ASPHALT MASTIC. INITIAL PRESTRESSING FORCE IS 44 KIPS PER STRAND.

STRUCTURAL BOLTS:

BOLTS SHALL BE STAINLESS STEEL BOLTS AND CONFORM TO THE REQUIREMENTS OF ASTM A193, GRADE B8 CLASS 2.

THREADED INSERTS:

THREADED INSERTS SHALL BE DAYTON SUPEROIR F43 STAINLESS STEEL FERRULES.

PRECAST PRESTRESSED CONCRETE CONSTRUCTION NOTES

1. ALL CONCRETE MATERIALS, PLACEMENT, PRODUCTION AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH CHAPTER 8 OF THE AREMA MANUAL FOR RAILWAY ENGINEERING, 2019 EDITION.

2. EXPOSED SURFACES SHALL BE FORMED IN A MANNER WHICH SHALL PRODUCE A SMOOTH AND UNIFORM APPEARANCE WITHOUT RUBBING OR PLASTERING. ALL CONCRETE CORNERS/EDGES SHALL HAVE A 1" CHAMFER PROVIDED UNLESS OTHERWISE NOTED ON THE PLANS OR WHERE THE EMBEDDED PLATES ARE LOCATED. THE TOP SURFACE IS TO HAVE A SMOOTH FINISH, FREE OF ALL FLOAT OR TROWEL MARKS.

3. CURING SHALL BE ACCOMPLISHED BY WET CURING OR APPLICATION OF A TYPE 2 MEMBRANE.

4. CONCRETE MIX DESIGN AND LABORATORY TEST RESULTS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO FABRICATION.

5. DIMENSIONAL TOLERANCES GOVERNING THE MANUFACTURE OF PRECAST MEMBERS SHALL CONFORM TO DIVISION VII, APPENDIX B OF THE PRECAST/PRESTRESSED CONCRETE INSTITUTE'S MANUAL MNL 116 FOR QUALITY CONTROL FOR THE APPROPRIATE SHAPE WITH THE EXCEPTION OF THE FOLLOWING:
   i. LENGTH SHALL BE +0", – ? ".
   ii. LOCATION OF VOID FROM END OF BEAM SHALL BE +3". –1".
   iii. LOCATION OF LIFTING DEVICES IN ANY DIRECTION SHALL BE +/– ½ "

6. THE FABRICATOR SHALL BE RESPONSIBLE FOR LOADING AND PROPERLY SECURING ALL PRECAST CONCRETE MEMEBERS FOR SHIPMENT. ALL CONCRETE COMPONENTS SHALL BE MADE AVAILABLE FOR INSPECTION BY THE RAILROAD AT THE FABRICATOR'S PLANT PRIOR TO SHIPMENT, AT THE RAILROAD'S DISCRETION.

7. THE CONCRETE CURING COMPOUND SHALL BE IN ACCORDANCE WITH THE NOTES ON THESE DRAWINGS.

8. STUD WELDING SHALL BE PER AWS D1.5.

9. THE FORMWORK FOR THE BOX BEAMS SHALL BE CONSTRUCTED ACCORDING TO THESE DRAWINGS. THE FOLLOWING TOLERANCES ARE ACCEPTABLE FOR THE FINISHED ELEMENT:
   a. LENGTH: +0 INCH, –1/4 INCH.
   b. WIDTH (OVERALL): ±1/4 INCH.
   c. DEPTH (OVERALL): ±1/4 INCH.
   d. THICKNESS: ±1/8 INCH.
   e. FLATNESS OF SURFACES: ±1/8 INCH.
   f. FLATNESS OF MATING SURFACES OR BEARING SURFACES: +0 INCH, –1/16 INCH.
   g. CAMBER DEVIATION: ±1/8 INCH PER 10 FEET.
   h. POSITION OF PRESTRESSING TENDONS: ±1/4 INCH.
   i. POSITION OF STIRRUP BARS: ±1INCH.

10. CONCRETE CURBS SHALL BE CAST NO SOONER THAN 3 DAYS AFTER THE PRESTRESSING TENDONS IN BOX BEAMS HAVE BEEN RELEASED AND THE PRESTRESS FORCE TRANSFERRED TO THE CONCRETE.

11. CONCRETE WATER REPELLENT SHALL BE APPLIED TO THE TOP OF THE DECK, CURBS, AND SIDES OF ALL DECK SLABS PRIOR TO INSTALLATION, AS WELL AS CONCRETE BENT CAPS AND TOP AND SIDES OF WING WALLS.

12. CONCRETE WATER REPELLENT SHALL CONSIST OF A SILANE BASED, ONE PART LIQUID PENETRATING SEALER, IN ACCORDANCE WITH AREMA CHAPTER 8, PART 1 AND IN CONFORMANCE WITH APPLICABLE ASTM DESIGNATIONS.

13. SURFACE PREPARATION FOR AND APPLICATION OF CONCRETE WATER REPELLENT SHALL BE IN ACCORDANCE WITH AREMA CHAPTER 8, PART 1.

LIFTING LOOPS

1. LIFTING LOOPS SHALL CONSIST OF (4) ½ " DIA., 270K STRANDS AND SHALL HAVE A BREAKING STRENGTH OF NOT LESS THAN 30 TONS.

2. THE STRANDS SHALL BE THOROUGHLY CLEANED OF ALL MATTER THAT WOULD PREVENT BONDING STRANDS AND CONCRETE. LIFTING LOOPS SHALL BE COATED WITH A CORROSION RESISTANT EPOXY OR ZINC BASED COATING.

3. ONCE CONCRETE BEAM IS IN PLACE, LIFTING LOOPS SHALL BE CUT OFF BELOW THE TOP OF THE CONCRETE SURFACE. THE 1" RECESS SHALL BE FILLED WITH EPOXY GROUT.

BEARING PADS

NEOPRENE BEARING PADS SHAL LBE 6" WIDE x ½ " THICK x 5'–1" LONG CONFORMING TO ASTM D4014–81, PLAIN ELASTOMERIC BEARINGS FOR BRIDGES, TYPE CR, GRADE 2. MANUFACTURER SHALL CERTIFY THAT THE PHYSICAL PROPERTIES OF THE PADS CONFORM TO ASTM D4014–81.

PRECAST REINFORCED CONCRETE

MATERIALS

CONCRETE:

1. MINIMUM COMPRESSIVE STENGTH AT 7 DAYS SHALL BE 5,000 PSI.

2. CONCRETE SHALL BE PROPORTIONED SUCH THAT THE WATER – CEMENT RATIO (BY WEIGHT) DOES NOT EXCEED 0.45. CONCRETE SHALL CONTAIN A MINIMUM OF 7 SACKS OF CEMENT PER CUBIC YARD OF CONCRETE.

3. CEMENT SHALL BE TYPE I, TYPE IA, TYPE II, TYPE III OR TYPE IIIA PORTLAND CEMENT IN ACCORDANCE WITH ASTM C150 SPECIFICATIONS. AIR–ENTRAINED CONCRETE SHALL CONFORM TO THE REQUIREMENTS OF ASTM C150 AND ASTM C595.

4. ONLY ONE BRAND OF CEMENT MAY BE USED IN ANY PART OF THE STRUCTURE AND CEMENTS OF THE SAME BRAND FROM DIFFERENT MILLS SHALL NOT BE MIXED OR USED IN ANY PART OF THE STRUCTURE, EXCEPT AS PERMITTED BY THE ENGINEER.

5. AGGREGATES SHALL BE GRADED IN ACCORDANCE WITH ASTM C33 SPECIFICATIONS. COARSE AGGREGATE SHALL BE SIZE NO. 67. FINE AGGREGATE SHALL BE NATURAL SAND.

6. AIR CONTENT SHALL BE BETWEEN 5% AND 7% (BY VOLUME) UNLESS OTHERWISE APPROVED BY THE ENGINEER.

7. USE OF FLY ASH IS PROHIBITED. ADMIXTURES SHALL NOT BE USED UNLESS NOTED OTHERWISE. ANY PROPOSED ADMIXTURE SHALL BE APPROVED BY THE ENGINEER PRIOR TO FABRICATION.

STRUCTURAL STEEL:

MISC EMBEDDED STEEL SHAPES AND PLATES SHALL CONFORM TO ASTM A709 GRADE 36. SHEAR STUDS SHALL BE C1015, C1017 OR C1020 COLD DRAWN STEEL WHICH CONFORMS TO ASTM A108 SPECIFICATIONS.

REINFORCING STEEL:

1. REINFORCING STEEL SHALL BE DEFORMED NEW BILLET BARS PER ASTM A615 SPECIFICATIONS AND MEET GRADE 60 REQUIREMENTS.

2. FABRICATION OF REINFORCING STEEL SHALL BE PER CHAPTER 7 OF THE CRSI MANUAL OF STANDARD PRACTICE. DIMENSIONS OF BENDING ARE OUT TO OUT OF BAR.

3. REINFORCING STEEL SHALL BE BLOCKED AND TIED TO PROPER LOCATION AND SECURELY WIRED AGAINST DISPLACEMENT. TIE WIRES SHALL BE INSTALLED AT EVERY OTHER BAR INTERSECTION SO THAT AT LEAST 50% OF THE INTERSECTIONS ARE TIED. TACK WELDING OF REINFOCING IS PROHIBITED. MINIMUM CONCRETE COVER ON REINFORCING NOT OTHERWISE NOTED SHALL MEET THE AREMA MANUAL FOR RAILWAY ENGINEERING REQUIREMENTS.

PRECAST CONCRETE CONSTRUCTION NOTES

1. ALL CONCRETE MATERIALS, PLACEMENT, PRODUCTION AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH CHAPER 8 OF THE AREMA MANUAL FOR RAILWAY ENGINEERING, 2019 EDITION.

2. EXPOSED SURFACES SHALL BE FORMED IN A MANNER WHICH SHALL PRODUCE A SMOOTH AND UNIFORM APPEARANCE WITHOUT RUBBING OR PLASTERING. ALL CONCRETE CORNERS/EDGES SHALL HAVE A 3/4" CHAMFER PROVIDED UNLESS OTHERWISE NOTED ON THE PLANS OR WHERE THE EMBEDDED PLATES ARE LOCATED. THE TOP SURFACE IS TO HAVE A SMOOTH FINISH, FREE OF ALL FLOAT OR TROWEL MARKS.

3. CURING SHALL BE ACCOMPLISHED BY WET CURING OR APPLICATION OF A TYPE 2 MEMBRANE.

4. THE FABRICATOR SHALL STENCIL THE LIFTING WEIGHT AND BRIDGE NUMBERS AT LOCATIONS SHOWN ON THE DRAWINGS. THE FABRICATOR SHALL COMPLETE EMBOSSING OF THE DATE OF FABRICATION AT LOCATIONS SHOWN IN THE DRAWINGS.

5. DIMENSIONAL TOLERANCES GOVERNING THE MANUFACTURE OF PRECAST MEMBERS SHALL CONFORM TO APPENDIX B OF THE PRECAST/PRESTRESSED CONCRETE INSTITUTE'S MANUAL MNL 116 FOR QUALITY CONTROL FOR THE APPROPRIATE SHAPE. TOLERANCE FOR LOCATION OF LIFTING DEVICES SHALL BE +/– 1/2".

6. THE FABRICATOR SHALL BE RESPONSIBLE FOR LOADING AND PROPERLY SECURING ALL PRECAST CONCRETE MEMEBERS FOR SHIPMENT. ALL CONCRETE COMPONENTS SHALL BE MADE AVAILABLE FOR INSPECTION BY THE RAILROAD AT THE FABRICATOR'S PLANT PRIOR TO SHIPMENT, AT THE RAILROAD'S DISCRETION.

7. STUD WELDING SHALL BE PER AWS D1.5.

8. THE FORMWORK FOR PRECAST SUBSTRUCTURE ELEMENTS SHALL BE CONSTRUCTED TO PROVIDE THE FOLLOWING TOLERANCES TO THE FINISHED ELEMENT:
   a. LENGTH AND WIDTH: ±1/8 INCH.
   b. THICKNESS: ±1/8 INCH.
   c. FLATNESS OF SURFACES: ±1/8 INCH.
   d. FLATNESS OF MATING SURFACES OR BEARING SURFACES: +0 INCH, –1/16 INCH.

9. CONCRETE WATER REPELLENT SHALL BE APPLIED TO THE TOP OF THE DECK, CURBS, AND SIDES OF ALL DECK SLABS PRIOR TO INSTALLATION, AS WELL AS CONCRETE BENT CAPS AND TOP AND SIDES OF WING WALLS.

10. CONCRETE WATER REPELLENT SHALL CONSIST OF A SILANE BASED, ONE PART LIQUID PENETRATING SEALER, IN ACCORDANCE WITH AREMA CHAPTER 8, PART 1 AND IN CONFORMANCE WITH APPLICABLE ASTM DESIGNATIONS.

11. SURFACE PREPARATION FOR AND APPLICATION OF CONCRETE WATER REPELLENT SHALL BE IN ACCORDANCE WITH AREMA CHAPTER 8, PART 1.

FALL ARREST WALL ANCHOR

FALL ARREST WALL ANCHORS SHALL BE THALER FARA–92 FALL ARREST WALL ANCHOR OR ENGINEER APPROVED EQUAL AND SHOULD BE INSTALLED PER MANUFACTURER SPECIFICATIONS.

WATERPROOFING

1. ALL WATERPROOFING SHALL BE IN ACCORDANCE WITH THESE NOTES AND ALL APPLICABLE SECTIONS OF AREMA CHAPTER 8, PART 29: WATERPROOFING. SUBSTRUCTURE WATERPROOFING SHALL BE APPLIED AS SPECIFIED IN THESE DRAWINGS. SEE DRAWING NO. 334.5–20.

2. DECK WATERPROOFING SHALL CONSIST OF AMSTED RPS BALLAST MATS OR ENGINEER APPROVED EQUAL WITH DS BROWN "DECKGUARD" SPRAY APPLIED MEMBRANE OR AN ENGINEER APPROVED EQUAL. DECK WATERPROOFING SHALL BE IN ACCORDANCE WITH AREMA CHAPTER 8, PART 29, COLD–APPLIED ELASTOMERIC MEMBRANES.

3. ALL OTHER WATERPROOFING SHALL BE BASF "MASTERSEAL 581" OR ENGINEER APPROVED EQUAL AND SHOULD BE INSTALLED PER MANUFACTURER'S SPECIFICATIONS.

CORRUGATED METAL PIPE

CORRUGATED METAL PIPE SHALL CONFORM TO ASTM A760 "STANDARD SPECIFICATION FOR CORRUGATED STEEL PIPE, METALLIC COATED FOR SEWERS AND DRAINS" AND SHALL BE SIZED AS SHOWN IN THE PLANS.

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RJ Corman Railroad Company

APPROVED FOR
R.J. CORMAN RAILROAD COMPANY/
CAROLINA LINES BY
HDR ENGINEERING INC.
OF THE CAROLINAS
(CHARLESTON, SC)
BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020

FILE: 334.5-03.dgn

REVISIONS

BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP

GENERAL NOTES (2 OF 3)

HORRY COUNTY CONWAY, SC

R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

SCALE: AS SHOWN DATE: 3/16/2020 DESIGN: TCS DRAWN: RGD CHECKED: JFM	VAL. SEC.	DRAWING NO. 334.5-03	

RELEASED FOR BID - NOT FOR CONSTRUCTION

PRECAST AND PRESTRESSED CONCRETE REINFORCING BARS AND EMBEDDED STEEL

REINFORCING BARS

1. FABRICATION, BENDING, AND PLACEMENT OF REINFORCING STEEL SHALL MEET THE REQUIREMENTS OF CHAPTER 8 OF THE AREMA MANUAL FOR RAILWAY ENGINEERING, 2019 EDITION.
2. SIZE, GRADE, SHAPE AND LENGTH SHALL BE AS SHOWN ON THE PLANS.
3. ALL DIMENSIONS FOR REINFORCING BARS REFER TO THE CENTERLINE OF THE BAR EXCEPT ON THE BAR BENDING DETAILS WHERE DIMENSIONS ARE OUT-TO-OUT.
4. BARS SHALL BE FREE FROM DIRT, PAINT, OIL, GREASE, THICK RUST AND OTHER FOREIGN SUBSTANCES.
5. REINFORCING BARS SHALL MEET THE LAP REQUIREMENTS OF CHAPTER 8 OF THE AREMA MANUAL FOR RAILWAY ENGINEERING, 2019 EDITION, SECTION 2.14 AND 2.22.3 FOR CLASS C SPLICE.
6. REINFORCING BARS SHALL BE ACCURATELY COLD BENT TO THE SHAPES AND DIMENSIONS SPECIFIED. THE MINIMUM BEND DIAMETER SHALL BE AS SHOWN BELOW.
   BAR SIZES NO. 3 THROUGH NO. 8: 6 BAR DIAMETERS
   BAR SIZES NO. 9 THROUGH NO. 11: 8 BAR DIAMETERS
   BAR SIZES NO. 14 THROUGH NO. 18: 10 BAR DIAMETERS
7. THE MINIMUM CLEAR DISTANCE FROM THE REINFORCING STEEL TO SURFACE OF THE CONCRETE SHALL BE IN ACCORDANCE WITH CHAPTER 8 OF THE AREMA MANUAL FOR ENGINEERING, 2019 EDITION, SECTION 2.6.1 – MINIMUM CONCRETE COVER UNLESS OTHERWISE SHOWN ON THE PLANS.
8. BARS SHALL BE BENT IN THE PLACE FOR WHICH THEY WERE DESIGNED. MAXIMUM ALLOWABLE DEVIATION FOR THE NUMBER 7 BARS AND UNDER SHALL BE ½" OUT OF PLANE AND FOR NO. 8 BARS AND OVER 1 INCH OUT OF PLANE.
9. REINFORCEMENT SUPPORTS SHALL BE ALL PLASTIC OR ALL STAINLESS STEEL.
10. TIE WIRES USED FOR TYING REINFORCING BARS SHALL BE A MINIMUM DIAMETER OF NO. 16 GAUGE, BLACK, SOFT IRON WIRE.
11. DOWELS SHALL BE MADE FROM NEW DEFORMED BILLET STEEL CONFORMING TO THE REQUIREMENTS OF ASTM A 615, GRADE 60.

EMBEDDED STEEL

1. EMBEDDED STEEL SHAPES AND PLATES SHALL HAVE THEIR SURFACES PREPARED CONFORMING TO THE REQUIREMENTS OF SSPC-SP2 HAND TOOL CLEANING.
2. EMBEDDED STEEL SHAPES AND PLATES SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123. THREADS ON INSERTS SHOULD BE BLOCKED OUT AND KEPT FREE OF GALVANIZING. AFTER GALVANIZING, ALL ELEMENTS SHALL BE FREE OF FINS, ABRASIONS, ROUGH OR SHARP EDGES, AND OTHER SURFACE DEFECTS.

PREFORMED EXPANSION JOINT FILLER

1. PREFORMED EXPANSION JOINT FILLER SHALL BE SIZED AS SHOWN ON THE PLANS AND CONFORM TO THE REQUIREMENTS OF ASTM D1751.
2. THE JOINT FILLER SHALL BE ATTACHED PER MANUFACTURER SPECIFICATION.

PILE SURFACE COATING

1. PAINT SYSTEM: THE STEEL H-PILE SURFACE COATING SHALL CONSIST OF A SINGLE COAT APPLICATON OF CARBOMASTIC 615 OR AN APPROVED EQUAL. COATING THICKNESS SHALL BE A MINIMUM OF 10 MILS. APPLY PER MANUFACTURER'S RECOMMENDATIONS. APPLY COATING TO THE TOP 30 FEET OF THE UPPER SECTION OF PILE AT EACH LOCATION.
2. STORAGE: THE COATINGS SHALL BE STORED AT TEMPERATURES BETWEEN 40° F AND 110° F OR THE MANUFACTURER'S RECOMMENDED LIMITS, WHICHEVER ARE MORE RESTRICTIVE.
3. MIXING OF COATINGS: COATINGS SHALL BE THOROUGHLY MIXED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
4. SURFACE PREPARATION: PREPARE SURFACE ACCORDING TO MANUFACTURER'S RECOMMENDATIONS AND REMOVE ANY OIL, GREASE, OR MILL SCALE FROM THE SURFACE TO BE PAINTED. SURFACE PREPARATION SHALL BE COMPLETED IN ACCORDANCE WITH SSPC-SP2 HAND TOOL CLEANING.
5. THE PRODUCTS OF ONE COATING SYSTEM FROM A SINGLE MANUFACTURER SHALL BE USED FOR ALL FIELD COATING WORK. DO NOT MIX COATING SYSTEMS OF PRODUCTS OF DIFFERENT MANUFACTURERS.
6. FIELD TOUCH-UP REPAIR OF DAMAGED COATING SYSTEM: THE CONTRACTOR SHALL REPAIR ALL AREAS OF DAMAGED COATING AFTER FIELD ERECTION OF THE STRUCTURE IS COMPLETE USING THE SAME COATING SYSTEM AS SPECIFIED HEREIN.

MISCELLANEOUS STEEL NOTES

1. MATERIALS, FABRICATION, AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH CHAPTER 15: STEEL STRUCTURES OF THE AREMA MANUAL FOR RAILWAY ENGINEERING.
2. MISCELLANEOUS STEEL MATERIALS SHALL CONFORM TO THE FOLLOWING:

a. SPAN JOINTS	ASTM A36
b. LONGITUDINAL JOINTS	ASTM A36
c. LATERAL STOPS	ASTM A36
d. HANDRAIL POSTS	ASTM A36
e. HANRAIL	ASTM A53, Gr. B

3. ALL SPAN JOINT ASSEMBLIES, LONGITUDINAL JOINT ASSEMBLIES, HANDRAIL POSTS, AND HANDRAIL SHALL BE HOT-DIPPED GALVANIZED IN ACCORDANCE WITH ASTM A123. COATING WEIGHT SHALL BE 2.3 OZ. PER SQUARE FOOT.
4. LATERAL STOPS SHALL BE SHOP PAINTED WITH A SINGLE COAT OF CARBOMASTIC 615 AL (8-10 MILS DRY FILM THICKNESS, DFT) OR APPROVED EQUAL AFTER FABRICATION.
5. WELDING SHALL BE PERFORMED BY QUALIFIED WELDERS.

PROPOSED CONSTRUCTION SEQUENCE

1. DRIVE HP PILES DURING APPROVED WORK WINDOWS. CUTOFF PILES BELOW BASE OF RAIL ELEVATION FOR END BENTS AND AT FINAL CUTOFF ELEVATION FOR INTERMEDIATE BENTS.
2. CONSTRUCT TEMPORARY CONSTRUCTION ACCESS.
3. INSTALL PRECAST CONCRETE BENT CAPS.
4. TAKE TRACKS OUT OF SERVICE.
5. REMOVE RAIL, TIES, BALLAST, AND OTHER TRACK MATERIALS (RAILROAD).
6. EXCAVATE FOR END BENTS.
7. REMOVE EXISTING BRIDGE AND DISPOSE OF DEBRIS. EXISTING TIMBER PILES MAY BE TEMPORARILY CUT OFF BELOW THE PROPOSED LOW CHORD ELEVATION AT THE CONTRACTOR'S OPTION.
8. GRADE AS REQUIRED AND INSTALL RIPRAP.
9. INSTALL PRECAST CONCRETE BOX BEAM SPANS.
10. INSTALL BRIDGE HANDRAIL.
11. INSTALL BALLAST, RAIL, TIES, AND OTHER TRACK MATERIALS. (RAILROAD)
12. PLACE TRACK IN SERVICE.
13. CUT OFF EXISTING TIMBER PILES A MINIMUM OF 2'-0" BELOW THE GROUND LINE.
14. REMOVE TEMPORARY CONSTRUCTION ACCESS.
15. RETURN AREA TO EXISTING CONDITION OR BETTER.

STRUCTURAL BACKFILL NOTES

1. GRANULAR BACKFILL FOR ABUTMENTS SHALL BE AS SPECIFIED ON DRAWING 334.5-20.
2. BACKFILL FOR OTHER AREAS WITHIN THE PROJECT LIMITS SHALL BE COHESIVE STRUCTURAL FILL COMPACTED TO A MINIMUM OF 95% OF THE MODIFIED PROCTOR MAXIMUM DRY DENSISTY IN ACCORDANCE WITH ASTM D1557.
3. THE MOISTURE CONTENT OF FILL MATERIALS SHOULD BE CONTROLLED WITHIN 3 PERCENT OF THE OPTIUMUM WATER CONTENT AS DETERMINED BY THE MODIFIED PROCTOR TEST IN ACCORDANCE WITH ASTM D1557.
4. SOIL FILL PLACED WITH MACHINE COMPACTORS SHOULD BE PLACED IN LIFTS OF 8 INCHES OR LESS IN LOOSE THICKNESS.
5. SOIL FILL PLACE WITH HAND COMPACTORS SHOULD BE PLACED IN LIFTS OF 4 INCHES OR LISS IN LOOSE THICKNESS.
6. LIFTS THICKER THAN THOSE SPECIFIED IN NOTES 4 AND 5 MAY ONLY BE USED IF APPROVED BY THE GEOTECHNICAL ENGINEER.
7. COMPACTION OF ROCK FILL AND OTHER FILL SUBJECT TO PERFORMANCE CRITERIA SHOULD BE OBSERVED BY THE GEOTECHNICAL ENGINEER.

FOUNDATION INSTALLATION NOTES

1. HP14x102 PILES SHALL BE DRIVEN BY A DELMAG D 46-32 DIESEL PILE HAMMER. THE DELMAG D 46-32 PILE HAMMER HAS A MANUFACTURER'S MAXIMUM ENERGY RATING OF 122.2 KIP-FEET OF ENERGY. IF A PILE HAMMER WITH A MAXIMUM ENERGY RATING DIFFERENT FROM THAT OF A DELMAG D 46-32 IS USED, IT IS RECOMMENDED THAT AN ADDITIONAL DRIVABILITY ANALYSIS BE CONDUCTED AND SHALL BE APPROVED BY THE GEOTECHNICAL ENGINEER.
2. THE STEEL PILES SHALL BE DRIVEN TO AN ULTIMATE DRIVEN CAPACITY OF 395 TONS (INCLUDES A FACTOR OF SAFETY OF 2.5). PILES SHALL BE DRIVEN TO A MINIMUM TIP ELEVATION OF -80 (NAVD 88).
3. THE DRIVEN PILE CAPACITY SHOULD BE VERIFIED USING THE PILE DRIVING ANALYZER (PDA) WITH CAPWAP. A MINIMUM OF 2 PILES SHOULD BE TESTED AT THIS PROJECT SITE.
4. JETTING OF PILES IS NOT PERMITTED.
5. ALL PILES SHALL BE DRIVEN. VIBRATORY DRIVING MAY NOT BE USED UNLESS APPROVED BY THE ENGINEER.
6. ALL PILING SHALL BE DRIVEN USING TEMPLATES AT BOTH TRACK LEVEL AND AT NATURAL GROUND OR NEAR WATER SURFACE AS REQUIRED. THE TEMPLATES SHALL BE ADEQUATELY SECURED TO ENSURE THE PILE'S PROPOSED ALIGNMENT IS MAINTAINED DURING DRIVING.
7. INSTALLED PILES SHALL NOT BE CUT TO FINAL ELEVATION UNTIL THEY HAVE BEEN VERIFIED TO BE INSTALLED WITHIN THE TOLERANCES SPECIFIED ON THESE DESIGN DRAWINGS.
8. THE ENGINEER SHALL BE NOTIFIED IF ANY PILES ARE INSTALLED WITH THE TOP OF PILE DISPLACED BEYOND 2" IN ANY DIRECTION OF ¼" PER FOOT FROM VERTICAL OR BATTER LINE FROM THE LOCATION SPECIFIED IN THESE DRAWINGS. ANY PILE WHICH IS DEEMED UNACCEPTABLE BECAUSE OF THE DIMENSIONAL VARIATIONS SHALL BE REMOVED AND REPLACED OR RE-DRIVEN IN AN ACCEPTABLE POSITION. ALTERNATIVELY, THE ISSUE MAY BE CORRECTED IN AS DIRECTED BY THE ENGINEER.
9. AFTER VERIFICATION AND APPROVAL, THE PILE SHALL BE CUT OFF AND LEVELLED AT THE REQUIRED ELEVATIONS AND THE PRECAST CAP SHALL BE PLACED AND WELDED.

FIELD WELDING

1. FIELD WELDING SHALL BE COMPLETED USING SHIELDED METAL ARC WELDING (SMAW) OR FLUX-CORED ARC WELDING (FCAW) PROCESSES AND SHOULD CONFORM TO THE REQUIREMENTS OF AWS D1.5.
2. FIELD WELDING USING SMAW WELDING PROCESS SHALL BE COMPLETED USING E7108 LOW HYDROGEN ELECTRODES CONFORMING OT THE REQUIREMENTS OF AWS 5.5, "SPECIFICATIONS FOR LOW ALLOY STEEL COVERED ARC WELDING ELECTRODES."
3. FIELD WELDING USING FCAW WELDING PROCESS SHOULD BE COMPLETED USING E71T-8-H16 SELF SHIELDED ELECTRODES CONFORMING TO THE REQUIREMENTS OF AWS A5.29, "SPECIFICATION FOR LOW-ALLOY STEEL ELECTRODES FOR FLUX CORED ARC WELDING."
4. ON-SITE PROTECTION AND USE OF ELECTRODE HEATING UNITS SHOULD CONFORM TO THE CURRENT AWS D1.5 SPECIFICATIONS.

PILE DRIVING SHOE

1. PILE TIPS SHALL BE REINFORCED WITH TIPS PER DRAWING 334.5-08.

PILE PAINTING

1. EXPOSED PILING SHALL BE PAINTED IN ACCORDANCE WITH THE SUFACE COATING NOTES ON DRAWING 334.5-04. PILES SHALL BE PAINTED FROM THE BOTTOM OF THE BENT CAP TO A POINT ONE FOOT BELOW FINAL GROUND. PILES TO BE DRIVEN IN PERMANENT SURFACE WATER SHALL BE PRE-PAINTED A SUFFICIENT DISTANCE BEFORE DRIVING TO ENSURE THAT THE PAINT COAT EXTENDS TO OR LOWER THAN THE LIMIT SPECIFIED ABOVE.

PILE TESTING

1. THE PILES SHALL BE DRIVEN INCORPORATING PILE DRIVING ANALYZER (PDA) TECHNOLOGY. TEST PILES SHALL BE AS DESIGNATED ON THESE DRAWINGS. ALTERNATE TEST PILE LOCATIONS MAY BE USED IF APPROVED BY THE ENGINEER.
2. THE TEST PILE MAY BE DRIVEN AHEAD OF THE PRODUCTION PILES. THE TEST PILE DATA AND DRIVING LOG SHEETS MAY BE USED TO DEVELOP AND/OR CONFIRM THE LENGTHS FOR THE REMAINING PILES UPON APPROVAL FROM THE ENGINEER.
3. PDA TESTING SHALL BE PERFORMED BY A PROFESSIONAL GEOTECHNICAL ENGINEER REGISTERED IN THE STATE OF SOUTH CAROLINA.
4. A COPY OF THE PDA TEST DATA AND ASSOCIATED REPORTS SHALL BE SUBMITTED TO THE ENGINEER AND RJ CORMAN FOR INCLUSION INTO THE CONSTRUCTION RECORDS.

EARTHWORK AND GRADING

1. THE CONTRACTOR MAY REQUEST A COPY OF THE GEOTECHNICAL REPORT FROM THE RAILROAD. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE SUB-SURFACE CONDITIONS PRIOR TO CONSTRUCTION. THE RAILROAD ASSUMES NO RESPONSIBILITY FOR THE CORRECTNESS OF ANY SUB-SURFACE/GEOTECHNICAL INFORMATION PROVIDED TO THE CONTRACTOR.
2. ALL GRADING SHALL BE CONSTRUCTED TO THE LINES, GRADES, SLOPES, AND DIMENSIONS SHOWN IN THESE DRAWINGS. VARIANCES MAY BE PERMITTED IF APPROVED BY THE ENGINEER IN WRITING.
3. SLOPES OF CUTS, DITCHES, OR CHANNELS SHALL BE CONSTRUCTED AND DRESSED TO THE LINES PRESCRIBED ON THE PLANS. VARIANCES REQUIRED TO SUIT LOCAL CONDITIONS MAY BE PERMITTED IF APPROVED BY THE ENGINEER IN WRITING.
4. ALL FILL MATERIAL SHALL BE STOCKPILED WITHIN THE APPROVED STAGING AREAS. THE CONTRACTOR SHALL TAKE MEASURES TO PREVENT OR CONTAIN MATERIAL RUNOFF.
5. ORGANIC SOILS ARE NOT PERMITTED FOR USE AS FILL MATERIALS. REFER TO DRAWING NO. 334.5-19 FOR FILL MATERIAL SPECIFICATIONS.

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APPROVED FOR
R.J. CORMAN RAILROAD COMPANY/
CAROLINA LINES BY
HDR ENGINEERING INC.
OF THE CAROLINAS
(CHARLESTON, SC)
BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020

FILE: 334.5-04.dgn

RJ Corman Railroad Company

REVISIONS

BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP

GENERAL NOTES (3 OF 3)

HORRY COUNTY CONWAY, SC

R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

SCALE: AS SHOWN DATE: 3/16/2020 DESIGN: TCS DRAWN: RGD CHECKED: JFM	VAL. SEC.	DRAWING NO. 334.5-04

RELEASED FOR BID - NOT FOR CONSTRUCTION

CONTROL POINTS

CONTROL POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
CP #1	743.505.36	2592043.070	3.79'	NAIL & WASHER
CP #2	743457.25	2591790.240	8.19'	NAIL & WASHER

NOTE

1. EXISTING PEDESTRIAN TRAIL OWNED BY HORRY COUNTY. CONTRACTOR SHALL COORDINATE WITH HORRY COUNTY AND THE CITY OF CONWAY AS REQUIRED FOR ESTABLISHING STAGING AREA AND ACCESS ROAD.

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DATE: 3/16/2020
FILE: 334.5-05.dgn

REVISIONS

RJ Corman Railroad Company

BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP

SITE PLAN

HORRY COUNTY — CONWAY, SC
R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

SCALE: AS SHOWN
DATE: 3/16/2020
DESIGN: TCS
DRAWN: RGD
CHECKED: JFM

VAL. SEC.

DRAWING NO.
334.5-05

SCALE FACTORS CORRESPOND WITH FULL SIZE (22"x34") DRAWINGS
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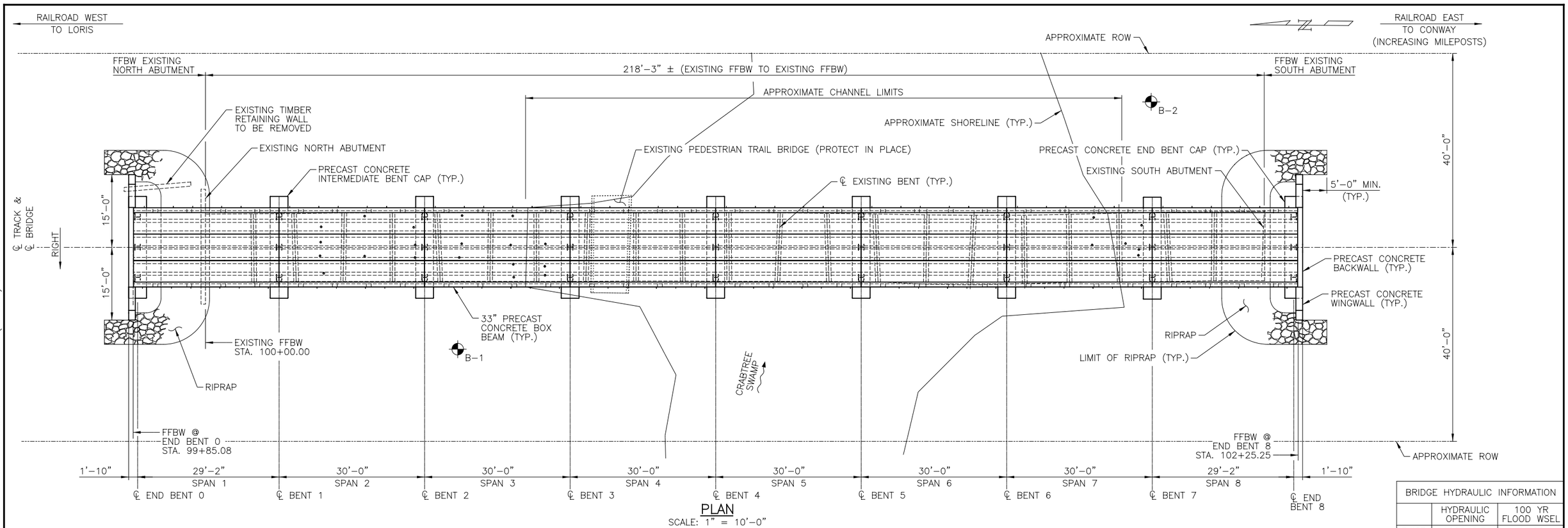
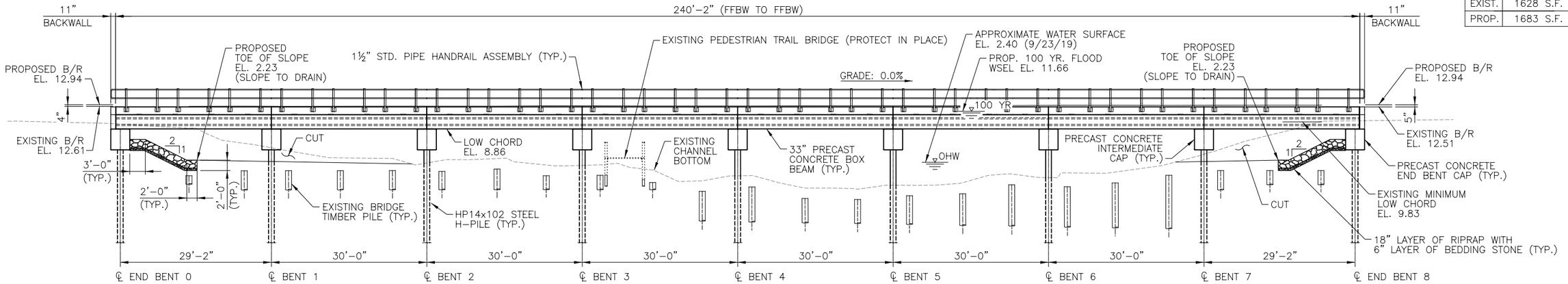


PLAN

SCALE: 1" = 10'–0"

BRIDGE HYDRAULIC INFORMATION		
	HYDRAULIC OPENING	100 YR FLOOD WSEL
EXIST.	1628 S.F.	11.66
PROP.	1683 S.F.	11.66



ELEVATION

SCALE: 1" = 10'–0"

ABANDONED PILES NOT SHOWN FOR CLARITY

NOTES

1. PROPOSED TOP OF RAIL EL. 13.48.
2. SEE DRAWING NO. 334.3–08 FOR FOUNDATION LAYOUT OF PROPOSED PILES AND APPROXIMATE LOCATION OF EXISTING AND ABANDONED PILES. ABANDONED PILES REFERS TO ALL TIMBER PILES PRESENT AT THE BRIDGE SITE NOT SUPPORTING THE EXISTING BRIDGE. PILES SUPPORTING THE EXISTING BRIDGE ARE SHOWN ON THIS SHEET AS CUT OFF IN THEIR FINAL CONDITION AFTER CONSTRUCTION OF THE PROPOSED BRIDGE.
3. SEE DRAWING NO. 334.3–20 FOR RIPRAP SLOPE PROTECTION DETAILS.
4. EXISTING AND ABANDONED PILES SHALL BE CUT OFF A MINIMUM OF 2'–0" BELOW THE EXISTING MUDLINE AFTER CONSTRUCTION OF PROPOSED BRIDGE IS COMPLETE.
5. RAILROAD IS RESPONSIBLE FOR ANY REQUIRED RETAINING WALLS.
6. BENT MAXIMUM DESIGN HEIGHT = 17'–0"
7. BORING B1 LOCATED 21' FROM BRIDGE AND 52' FROM FRONT FACE OF TIMBER ABUTMENT.
8. BORING B2 LOCATED 30' FROM BRIDGE AND 23' FROM FRONT FACE OF TIMBER ABUTMENT.
9. CENTERLINE PROPOSED TRACK TO MATCH LOCATION OF EXISTING TRACK.
10. EXISTING PEDESTRIAN BRIDGE IS THE PROPERTY OF HORRY COUNTY. EXISTING PEDESTRIAN BRIDGE TO REMAIN IN PLACE. CONTRACTOR SHALL TAKE CARE NOT TO DAMAGE EXISTING PEDESTRIAN BRIDGE.
11. WSEL = WATER SURFACE ELEVATION

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BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020

FILE: 334.5-06.dgn

RJ Corman Railroad Company

REVISIONS

BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP

GENERAL PLAN AND ELEVATION

HORRY COUNTY — CONWAY, SC

R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

SCALE: AS SHOWN
DATE: 3/16/2020
DESIGN: TCS
DRAWN: RGD
CHECKED: JFM

VAL. SEC.

DRAWING NO. 334.5-06

SCALE FACTORS CORRESPOND WITH FULL SIZE (22"x34") DRAWINGS

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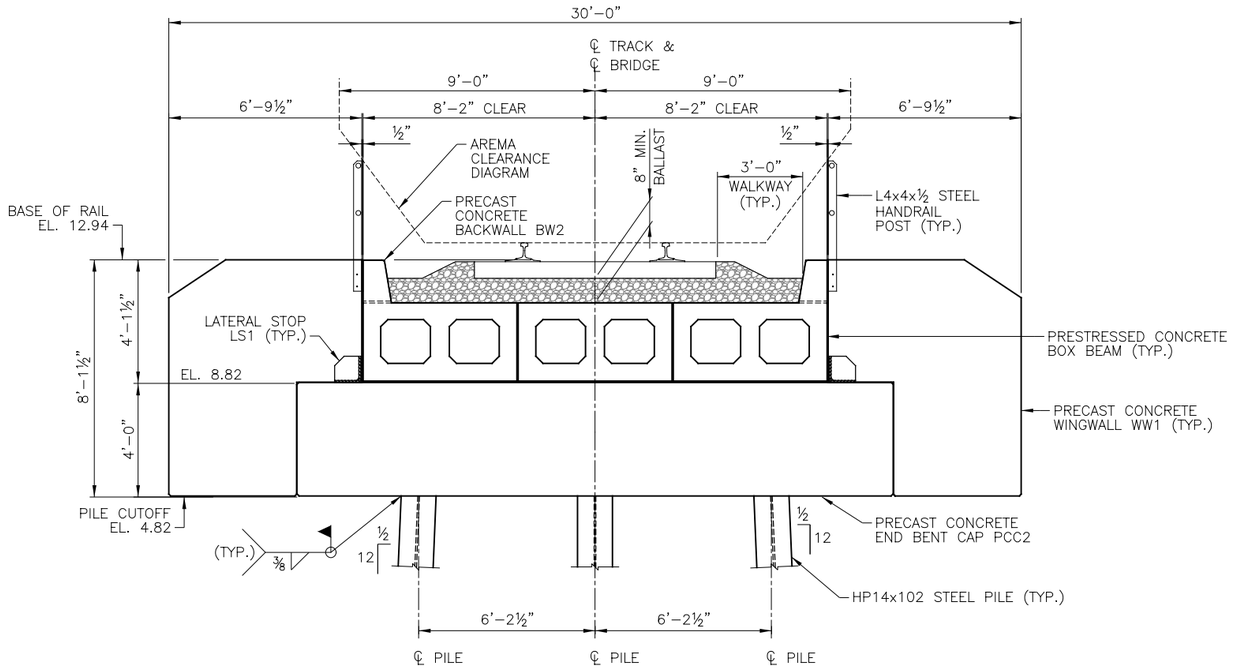
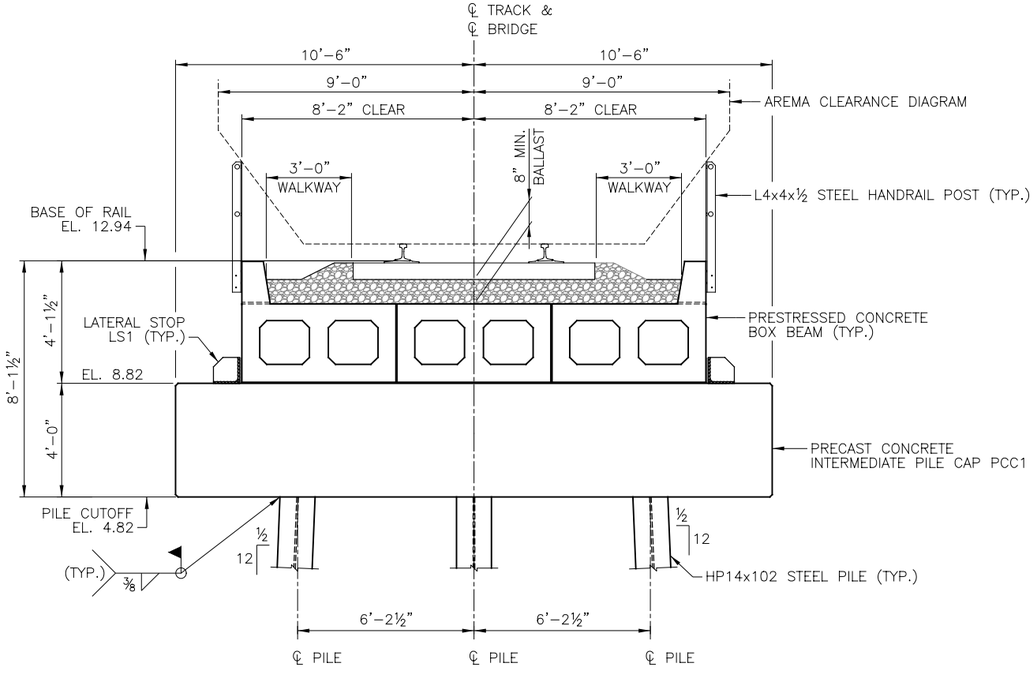


TYPICAL SECTION – END BENT

SCALE: ⅜" = 1'–0"

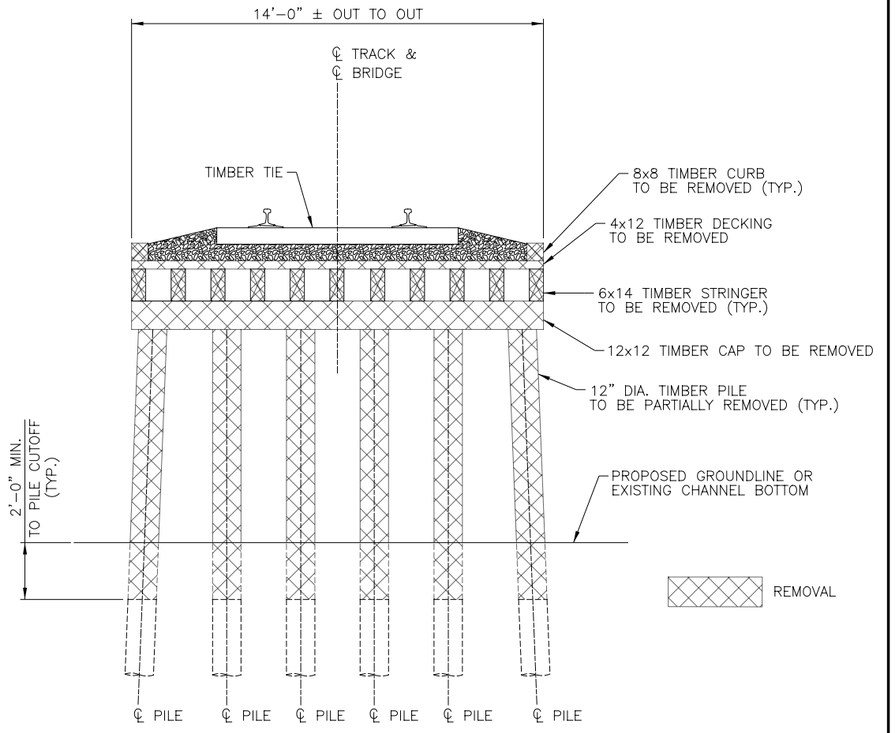


TYPICAL SECTION – INTERMEDIATE BENT

SCALE: ⅜" = 1'–0"

NOTES

1. ALL ELEVATIONS SHOWN ARE REFERENCED TO NAVD 88 VERTICAL DATUM.
2. FOR BEARING PAD PLACEMENT DETAILS, SEE DRAWING NO. 334.5–09.
3. FOR END BENT ASSEMBLY, SEE DRAWING NO. 334.5–12.
4. FOR PRECAST CONCRETE WINGWALL DETAILS, SEE DRAWING NO. 334.5–13.
5. FOR PRECAST CONCRETE BACKWALL DETAILS, SEE DRAWING NO. 334.5–14.
6. FOR PRECAST CONCRETE END BENT CAP DETAILS, SEE DRAWING NO. 334.5–15.
7. FOR PRECAST CONCRETE INTERMEDIATE BENT CAP DETAILS, SEE DRAWING NO. 334.5–16.
8. FOR PRESTRESSED CONCRETE BOX BEAM DETAILS, SEE DRAWING NO. 334.5–17.
9. FOR HANDRAIL DETAILS, SEE DRAWING NO. 334.5–22.



TYPICAL EXISTING BENT REMOVAL DETAIL

SCALE: ⅜" = 1'–0"

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OF THE CAROLINAS
(CHARLESTON, SC)
BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020

FILE: 334.5-07.dgn

REVISIONS

R.J. Corman Railroad Company

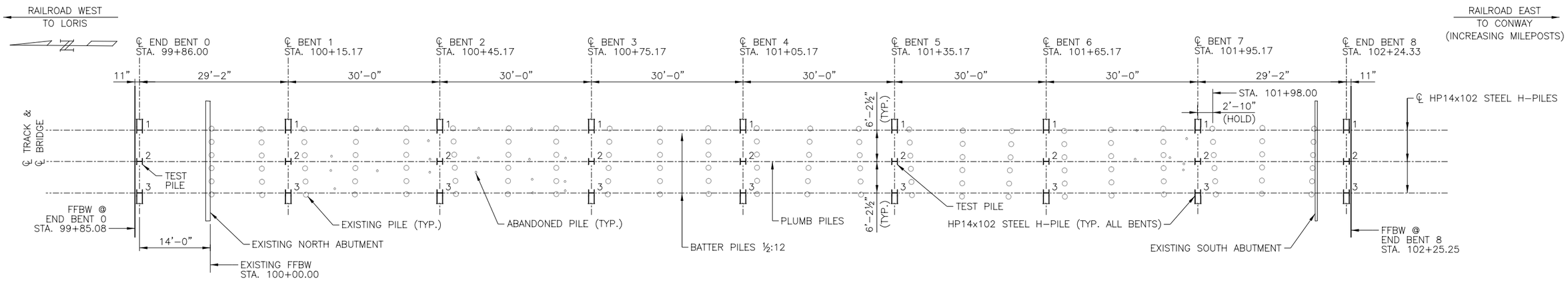
BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP

TYPICAL SECTIONS

HORRY COUNTY — CONWAY, SC

R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

SCALE: AS SHOWN DATE: 3/16/2020 DESIGN: TCS DRAWN: RGD CHECKED: JFM	VAL. SEC.	DRAWING NO. 334.5-07	



PROPOSED FOUNDATION LAYOUT

SCALE: 1" = 10'–0"

NOTES

1. FOR FOUNDATION INSTALLATION NOTES, SEE DRAWING 334.5–04.

APF HP 30000 SPLICER INSTALLATION INSTRUCTIONS:

NOTE: SPLICER IS SHOWN INSTALLED ON UPPER PILE SECTION FIRST. ALTERNATIVELY, SPLICER MAY BE INSTALLED ON LOWER PILE SECTION FIRST.

1. BEVEL FLANGES 45° AND NOTCH THE WEB OF UPPER PILE SECTION ⅞"X2½" TO RECEIVE SPLICER KEY.
2. FIT SPLICER OVER NOTCHED END OF PILE AND FILLET WELD SPLICER TO PILE FLANGE AS SHOWN.
3. PLACE THE UPPER PILE SECTION WITH SPLICER INTO POSITION ON THE LOWER PILE SECTION.
4. COMPLETE FILLET WELD ALONG CORNERS OF SPLICER ON LOWER PILE SECTION AS SHOWN.
5. WELD FLANGE JOINT BETWEEN UPPER AND LOWER PILE SECTIONS. (SINGLE 45° BEVEL W/ 0" TO ⅛" GAP)

1. STEEL:
PILES – ASTM A572 GR. 50
PILE SPLICES – ASTM A992 OR A572 GR. 50
PILE POINT – ASTM A 27 GR. 65

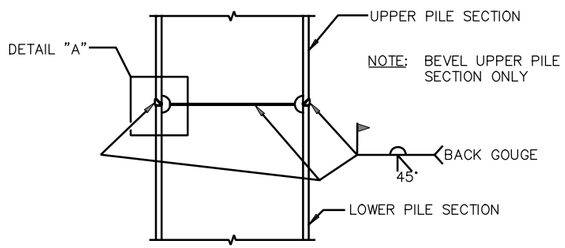
2. WELDING:
ALL WELDS SHALL BE MADE BY EITHER THE SHIELDED METAL ARC WELDING (SMAW) PROCESS OR THE FLUX CORED ARC WELDING (FCAW) PROCESS. SMAW WELDS SHALL BE MADE WITH E7018 ELECTRODES. FCAW WELDS SHALL BE MADE WITH E71T–8–H16 SELF SHIELDED ELECTRODE WIRE FOR USE IN ALL POSITION WELDING.

3. SPLICES:
SPLICES SHALL BE MADE A SUFFICIENT DISTANCE ABOVE THE GROUND OR WATER (NOT LESS THAN ONE FOOT) SO THAT THE SPLICE CAN BE OBSERVED DURING DRIVING. THE NUMBER OF SPLICES SHALL BE KEPT TO A MINIMUM. SPLICING CUT–OFFS OR SHORT PIECES TO MAKE A MAIN BEARING PILE IS NOT PERMITTED. THE PILE SHALL BE DRIVEN SO THAT THE SPLICE IS AT LEAST 10 FEET BELOW THE GROUND SURFACE.

4. DRIVING TOLERANCES:
VARIATIONS GREATER THAN ¼ INCH PER FOOT FROM VERTICAL OR BATTER LINE SHALL NOT BE ALLOWED. THE DEVIATION OF THE TOP OF PILES IN A BENT SHALL NOT EXCEED ONE INCH FROM THE PLAN LOCATION. ROTATION OF PILE ABOUT ITS CENTERLINE SHALL NOT EXCEED 5 DEGREES FROM ITS ORIENTATION AS SHOWN IN PLANS. PILES NOT MEETING TOLERANCE REQUIREMENTS OR OUT OF LINE AS TO IMPAIR USEFULNESS, OR PILES THAT ARE DAMAGED IN DRIVING AS TO IMPAIR STRUCTURAL CAPACITY, SHALL BE PULLED AND RE–DRIVEN.

5. REFUSAL
PILES RESISTING LATERAL LOADS: USING A HAMMER WITH 40,000 FT.–LBS OF FORCE OR GREATER. 10 BLOWS PER INCH FOR 3 CONSECUTIVE INCHES IS CONSIDERED REFUSAL.

PILES RESISTING VERTICAL LOADS: PILES MUST HAVE A PDA PERFORMED TO ENSURE THEY ARE WITHIN ENGINEERS SPECIFICATION AND TO DEVELOP DRIVING CRITERIA FOR THE HAMMER BEING USED. IF ANY PILE CANNOT BE DRIVEN TO ITS DESIGNED CAPACITY, NOTIFY THE DESIGN ENGINEER

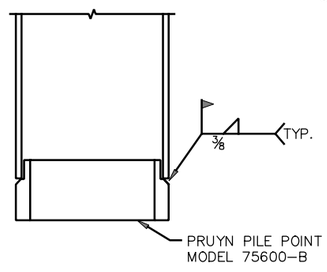


ALTERNATE SPLICER DETAIL

N.T.S.

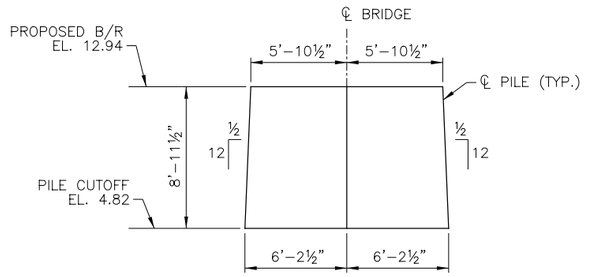
DETAIL "A"

N.T.S.



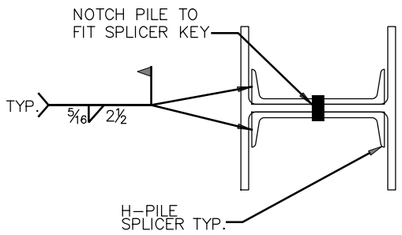
PRUYN PILE POINT DETAIL

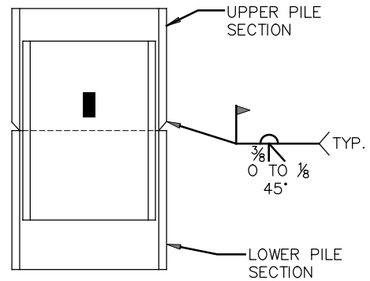
N.T.S.



PILE DRIVING DIAGRAM

N.T.S.

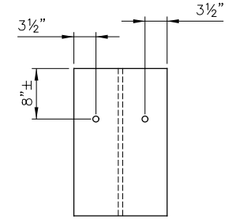




HP 30000 SPLICER DETAIL

N.T.S.

PILE HAMMER



LIFTING HOLE DETAIL

N.T.S.

ALTERNATE PILE SPLICE INSTALLATION INSTRUCTIONS

1. TORCH CUT WEB AND FILLET OF BOTH UPPER & LOWER PILE SECTIONS APPROXIMATELY ⅝" RADIUS. GRIND ALL TORCH CUT SURFACES TO SMOOTH FINISH.
2. GRIND/TORCH FLANGES OF UPPER PILE SECTION AT A 45 DEGREE ANGLE TO ENSURE A QUALITY FULL PENETRATION WELD.
3. WELD FLANGE AND WEB JOINT BETWEEN UPPER AND LOWER PILE SECTIONS. BACK GOUGE ROOTSIDE AND CAP OFF WITH 5⁄16" WELD.

PRUYN PILE TIP INSTALLATION INSTRUCTIONS

1. FIT POINT ONTO SQUARE CUT PILE.
2. WELD POINT TO THE PILE IN EITHER FLAT OR VERTICAL POSITION.
3. FILL THE AREA ACROSS BOTH FLANGES WITH WELD.

RELEASED FOR BID - NOT FOR CONSTRUCTION

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APPROVED FOR
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HDR ENGINEERING INC.
OF THE CAROLINAS
(CHARLESTON, SC)
BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020

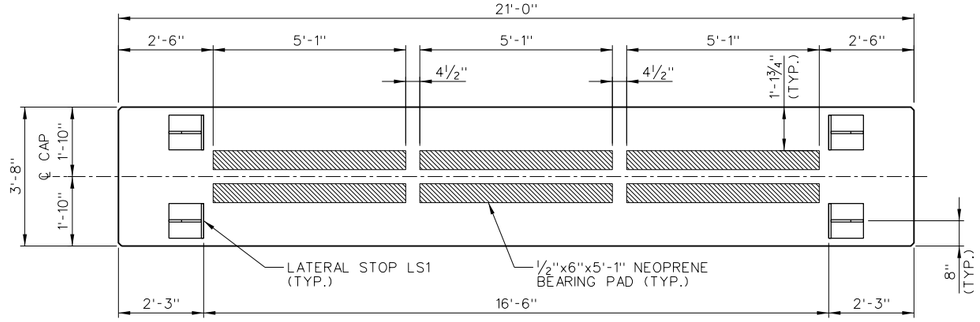
FILE: 334.5-08.dgn

REVISIONS

R.J. Corman Railroad Company

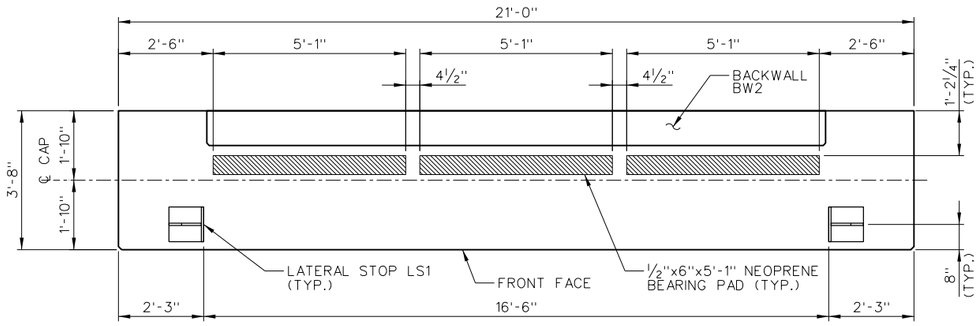
BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP
FOUNDATION LAYOUT
AND PILE DETAILS
HORRY COUNTY CONWAY, SC
R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

SCALE: AS SHOWN	VAL. SEC.	DRAWING NO.
DATE: 3/16/2020		334.5-08
DESIGN: TCS		
DRAWN: RGD		
CHECKED: JFM		



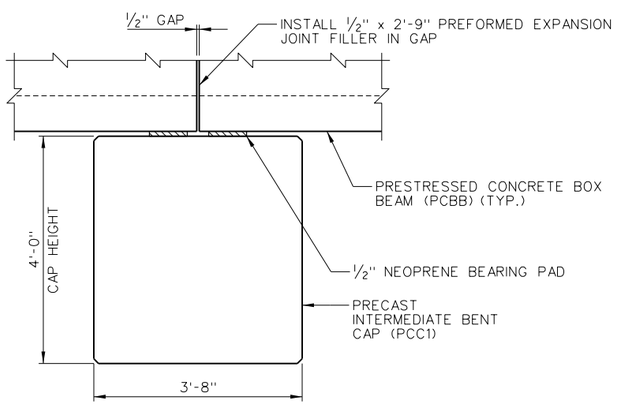
PRECAST INTERMEDIATE BENT CAP - PCC1

SCALE: ½" = 1'-0"
EMBEDDED PLATES NOT SHOWN



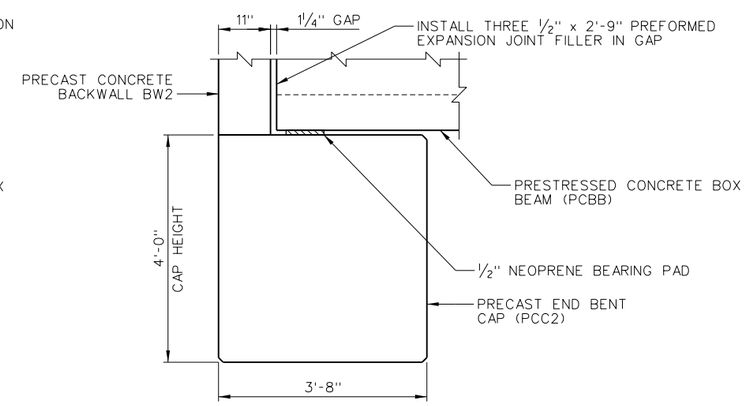
PRECAST END BENT CAP - PCC2

SCALE: ½" = 1'-0"
EMBEDDED PLATES NOT SHOWN



TYPICAL INT. BENT GAP DETAIL

SCALE: NTS



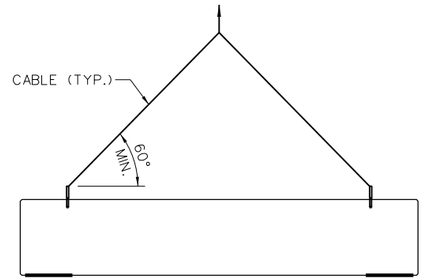
TYPICAL END BENT GAP DETAIL

SCALE: NTS

BEARING PAD QUANTITIES PER CAP				
PIECE MARK	QTY.	UNIT	PAD SIZE	DESCRIPTION
PCC1	6	EACH	½" x 6" x 5'-1"	PRECAST INTERMEDIATE BENT CAP
PCC2	3	EACH	½" x 6" x 5'-1"	PRECAST END BENT CAP

NOTE

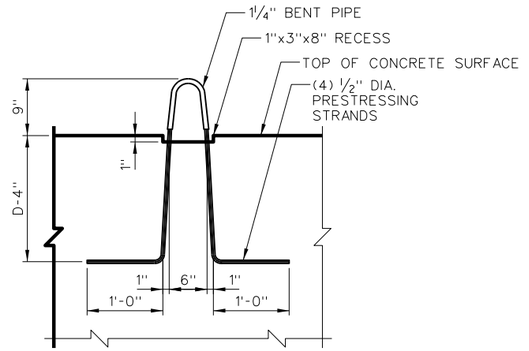
1. FOR BEARING PAD NOTES SEE DRAWING NO. 334.5-03.



ELEVATION

PRECAST CAP 2-POINT PICK UP

SCALE: NTS
PIN OR HOOK FOR ENGAGING LIFTING LOOPS SHALL BE 1" DIA. MINIMUM



LIFTING LOOP DETAIL

SCALE: 1" = 1'-0"
D = DEPTH OF CONCRETE

NOTE:

1. LIFTING LOOPS SHALL CONSIST OF (4) ½" DIA., 270K STRANDS AND SHALL HAVE A BREAKING STRENGTH OF NOT LESS THAN 30 TONS.
2. THE STRANDS SHALL BE THOROUGHLY CLEANED OF ALL MATTER THAT WOULD PREVENT BONDING STRANDS AND CONCRETE. LIFTING LOOPS SHALL BE COATED WITH A CORROSION RESISTANT EPOXY OR ZINC BASED COATING.
3. ONCE CONCRETE ITEM IS IN PLACE, LIFTING LOOPS SHALL BE CUT OFF BELOW THE TOP OF CONCRETE SURFACE. THE 1" RECESS SHALL BE FILLED WITH EPOXY GROUT.

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APPROVED FOR
R.J. CORMAN RAILROAD COMPANY/
CAROLINA LINES BY
HDR ENGINEERING INC.
OF THE CAROLINAS
(CHARLESTON, SC)
BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020
FILE: 334.5-09.dgn

RJ Corman Railroad Company

REVISIONS

BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP

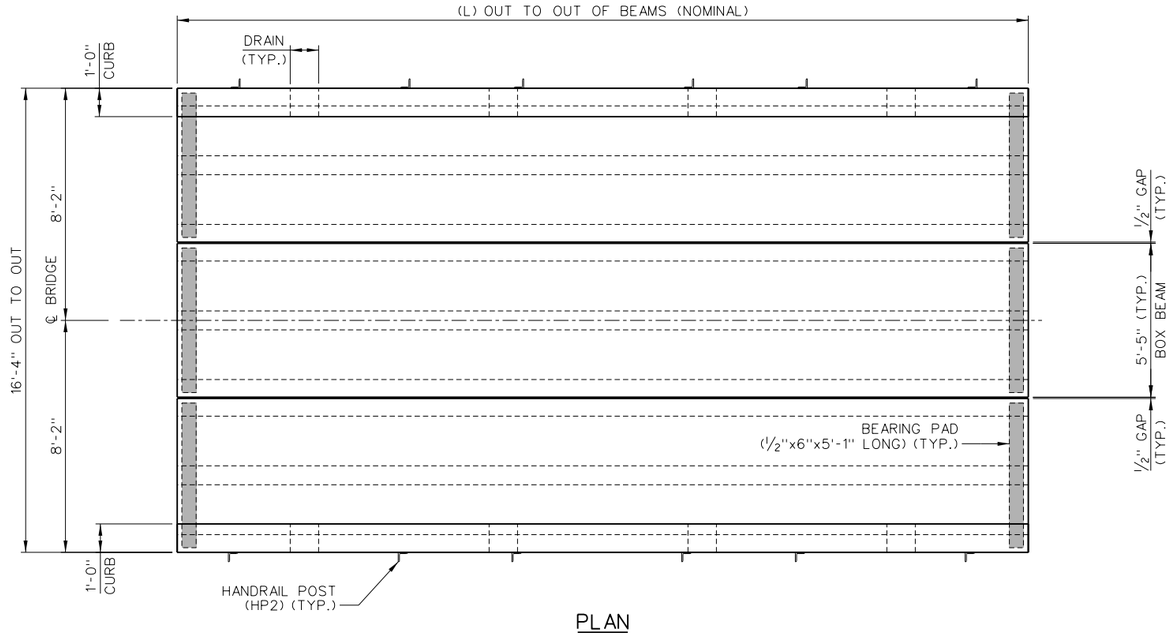
BEARING PAD LAYOUT AND DETAILS

HORRY COUNTY CONWAY, SC
R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

SCALE: AS SHOWN	VAL. SEC.	DRAWING NO.
DATE: 3/16/2020		334.5-09
DESIGN: TCS		
DRAWN: RGD		
CHECKED: JFM		

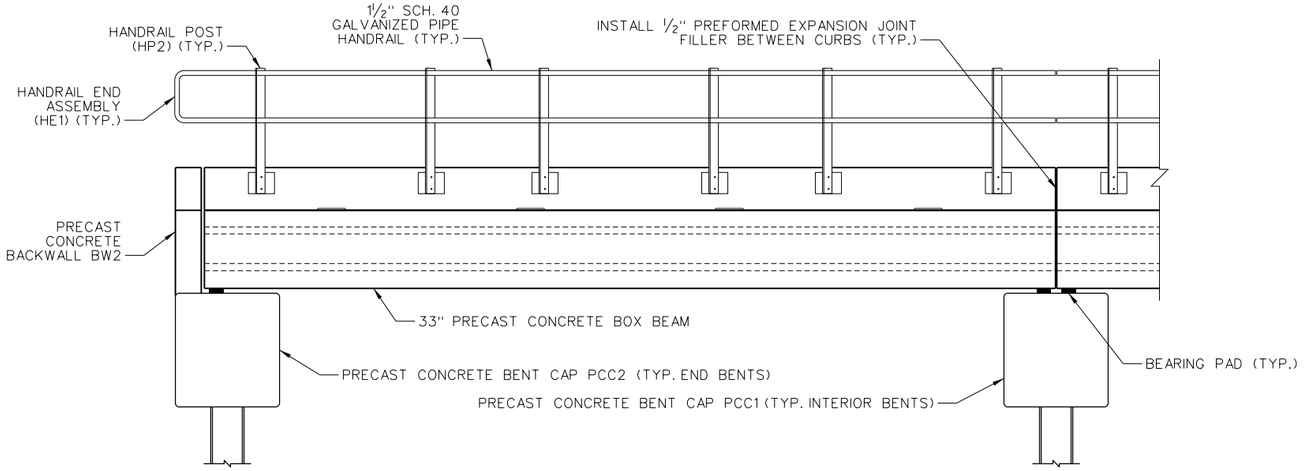
RELEASED FOR BID - NOT FOR CONSTRUCTION

SCALE FACTORS CORRESPOND WITH FULL SIZE (22"x34") DRAWINGS
USER: rdixon
FILENAME: c:\pwworking\east01\d1230212\334.5-09.dgn



PLAN

SCALE: ⅜" = 1'-0"
30' (NOMINAL) SPAN SHOWN.



ELEVATION

SCALE: NTS
30' (NOMINAL) SPAN SHOWN.

NOTES

1. FOR HANDRAIL DETAILS SEE DRAWING NO. 334.5-22.
2. THREADED INSERTS, STUDS AND JOINT PLATES NOT SHOWN FOR CLARITY.
3. SEE DRAWING NO. 334.5-11 AND 334.5-21 FOR LONGITUDINAL JOINT AND SPAN JOINT PLATES.

PCBB QUANTITIES (PER SPAN)					
OUT TO OUT OF BEAMS (L) (NOMINAL)	HANDRAIL POSTS (HP2)	HANDRAIL LENGTH *	HANDRAIL END ASSEMBLY (HE1) **	LATERAL STOPS (LS1) ***	BEARING PADS
30'-0"	12	120	2	4	6

* TOTAL LENGTH OF HANDRAIL GIVEN FOR SINGLE SPAN ONLY.

** HANDRAIL END ASSEMBLY FOR END SPANS ONLY.

*** LATERAL STOPS TO BE SHIPPED WITH PEJF ATTACHED. FOR ADDITIONAL INFORMATION SEE DRAWING NO. 334.5-11.

SPAN COVER PLATE LAYOUT

SCALE: ⅜" = 1'-0"
30' (NOMINAL) SPAN SHOWN.

BILL OF MATERIALS - HANDRAIL

SHOP BILL							SHIPPING BILL		
QTY	UNIT	DESCRIPTION	FT	IN.	MARK	REMARKS	NO	DESCRIPTION	MARK
96	EACH	L4x4x1/2	4	7	HP2	HANDRAIL POST	96	HANDRAIL POST	HP2
32	EACH	PIPE 1 1/2 STD.	30	0	HR1	HANDRAIL	32	HANDRAIL	HR1
4	EACH	PIPE 1 1/2 STD.	3	9	HE1	HANDRAIL END ASSEMBLY	4	HANDRAIL END ASSEMBLY	HE1
1	LOT	SPLICE MATERIALS *	N/A				N/A		

* CONTRACTOR SHALL DETERMINE FINAL SPLICE LENGTHS AND LOCATIONS. HANDRAIL SHALL BE SPLICED BETWEEN SPANS. NO MORE THAN ONE INTERMEDIATE SPLICE SHALL BE PERMITTED BETWEEN SPANS

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OF THE CAROLINAS
(CHARLESTON, SC)
BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020
FILE: 334.5-10.dgn

REVISIONS

RJ Corman Railroad Company

BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP
CONSTRUCTION DETAILS (1 OF 2)
HORRY COUNTY — CONWAY, SC
R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

SCALE: AS SHOWN
DATE: 3/16/2020
DESIGN: TCS
DRAWN: RGD
CHECKED: JFM

VAL. SEC.

DRAWING NO. 334.5-10

SCALE FACTORS CORRESPOND WITH FULL SIZE (22"x34") DRAWINGS
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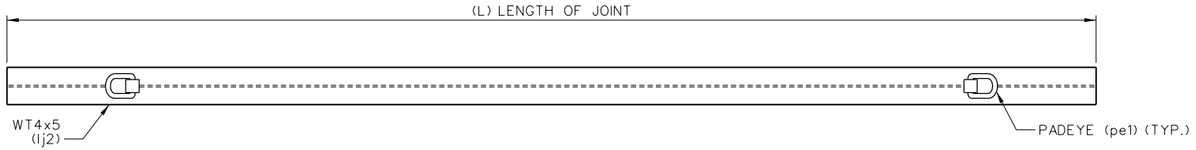
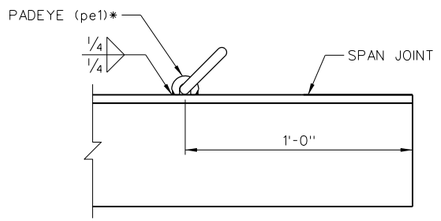
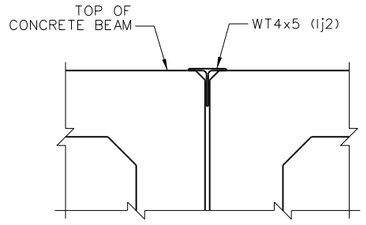
FILENAME: c:\pwworking\east01\d1230212\334.5-10.dgn



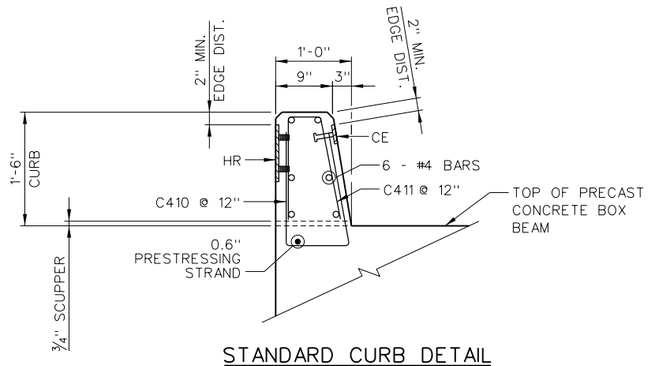
LONGITUDINAL JOINT - LJ1
SCALE: 1" = 1'-0"



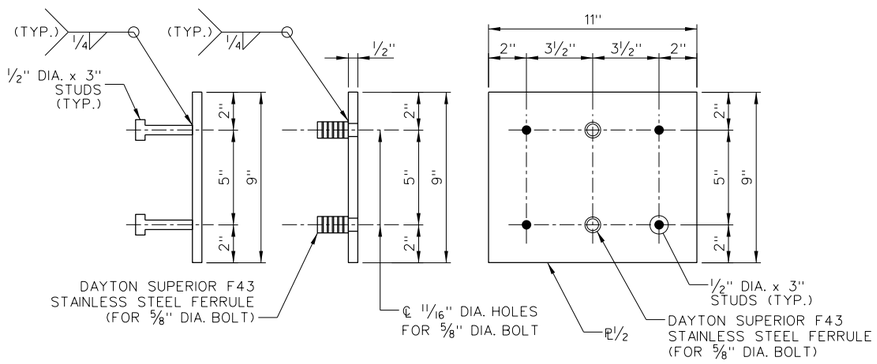
TYPICAL PADEYE DETAIL
SCALE: 3" = 1'-0"
* PADEYES SHALL BE "CROSBY" S-265, WELD-ON PIVOT LINK OR APPROVED EQUAL



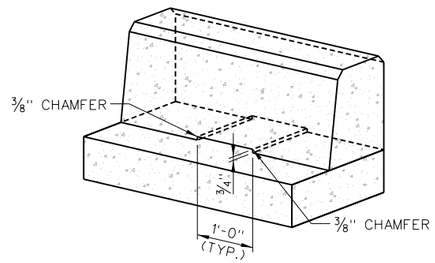
LONGITUDINAL JOINT DETAIL
SCALE: 1½" = 1'-0"



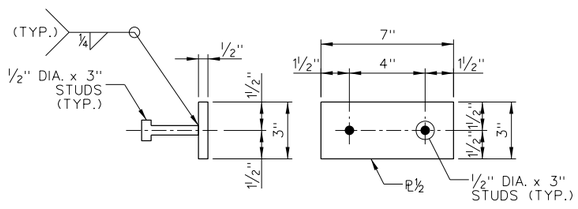
STANDARD CURB DETAIL
SCALE: 1" = 1'-0"



HANDRAIL CONNECTION PLATE - HR
SCALE: 3" = 1'-0"



SCUPPER DETAIL
SCALE: NTS



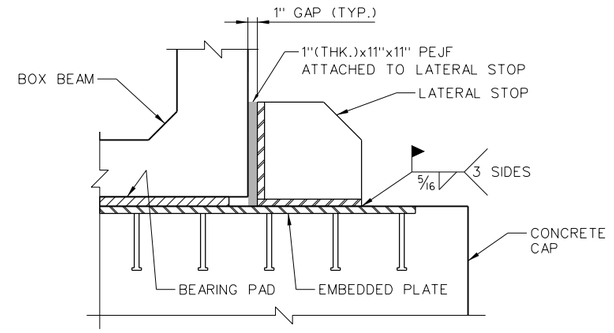
CURB CONNECTION PLATE - CE
SCALE: 3" = 1'-0"

BILL OF MATERIAL - 1 LONGITUDINAL JOINT

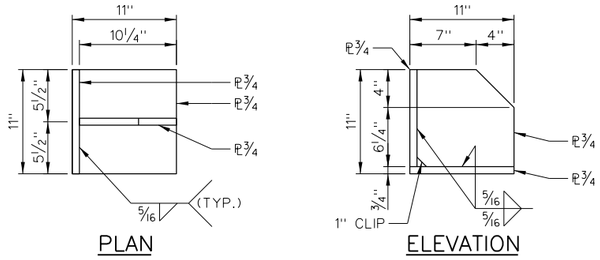
SHOP BILL (TOTAL PIECE QUANTITIES)						SHIPPING BILL		
NO.	DESCRIPTION	FT.	IN.	MARK	REMARKS	NO.	DESCRIPTION	MARK
1	WT4x5	(L)		lj2	LONGITUDINAL JOINT	1	LONGITUDINAL JOINT	LJ1
2	PADEYE	N/A		pe1	PAD EYE			

LONGITUDINAL JOINTS (PER SPAN)

SPAN LENGTH (NOMINAL)	LENGTH OF JT. (L)	NO. OF JOINTS. REQUIRED	UNIT WEIGHT (LBS).
30'	14'-9"	4	74



LATERAL RESTRAINT DETAIL
SCALE: 1" = 1'-0"



LATERAL STOP - LS1
SCALE: 1½" = 1'-0"

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HDR ENGINEERING INC.
OF THE CAROLINAS
(CHARLESTON, SC)
BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020
FILE: 334.5-11.dgn

REVISIONS

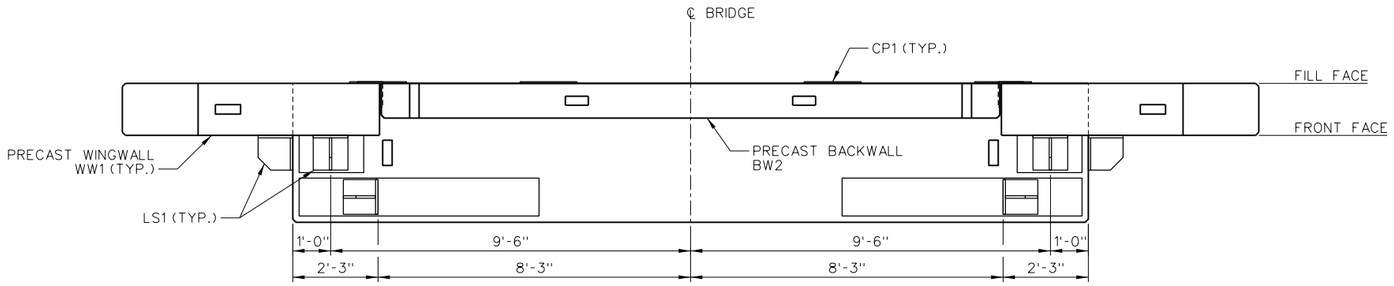
R.J. Corman Railroad Company

BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP
CONSTRUCTION DETAILS (2 OF 2)
HORRY COUNTY CONWAY, SC
R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

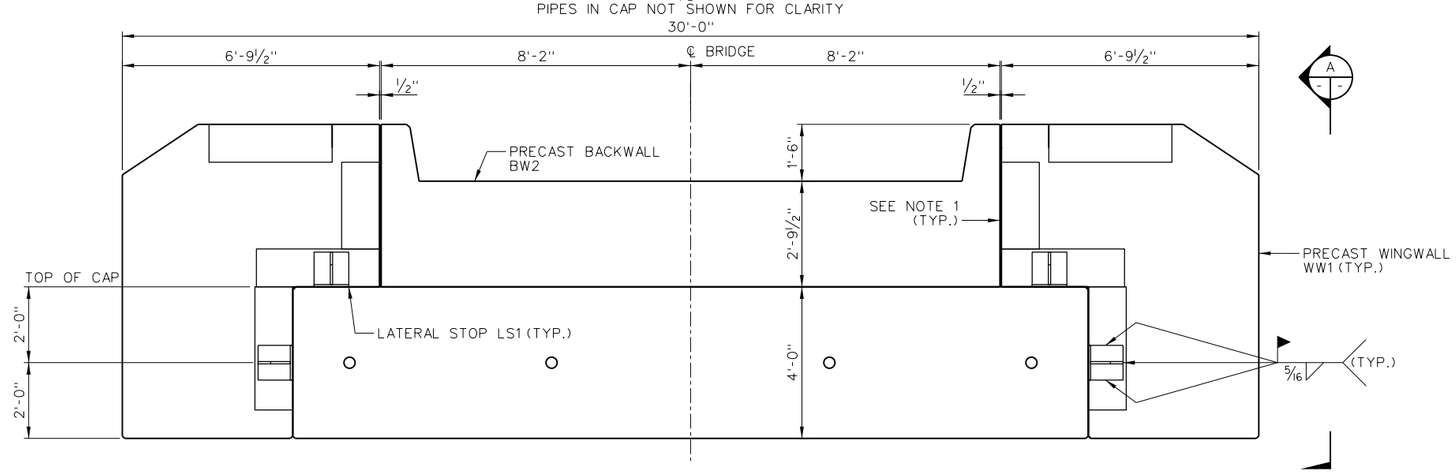
SCALE: AS SHOWN	VAL. SEC.	DRAWING NO.
DATE: 3/16/2020		334.5-11
DESIGN: TCS		
DRAWN: RGD		
CHECKED: JFM		

RELEASED FOR BID - NOT FOR CONSTRUCTION

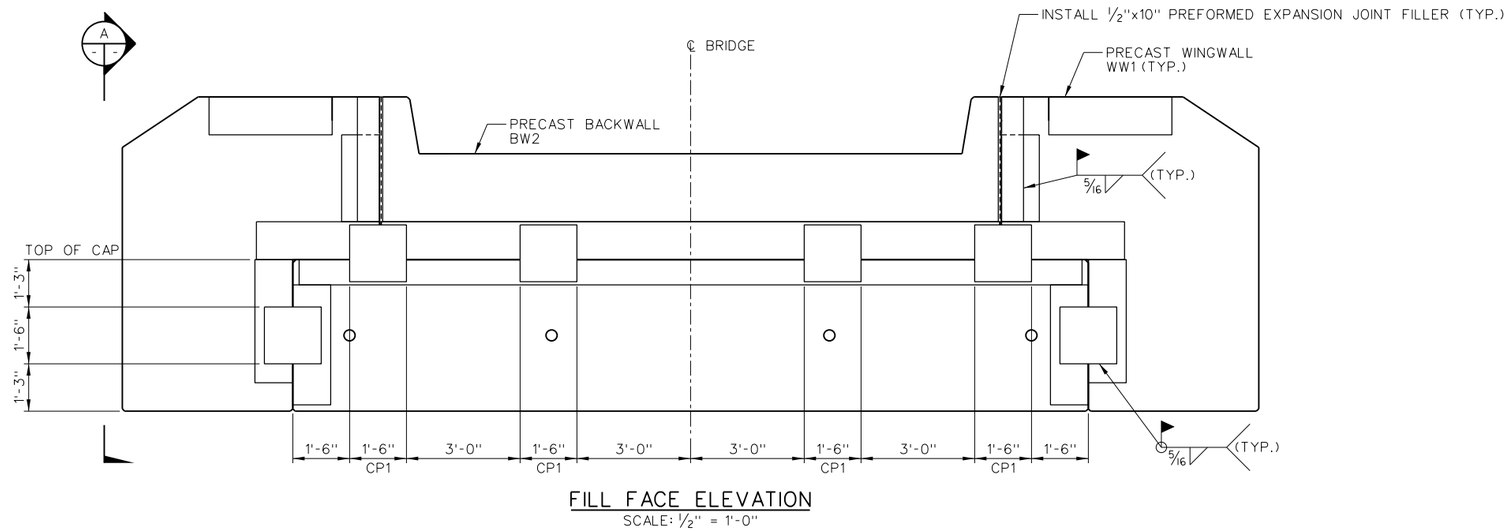
SCALE FACTORS CORRESPOND WITH FULL SIZE (22"x34") DRAWINGS
USER: rdixon
FILENAME: c:\pwworking\east01\d1230212\334.5-11.dgn



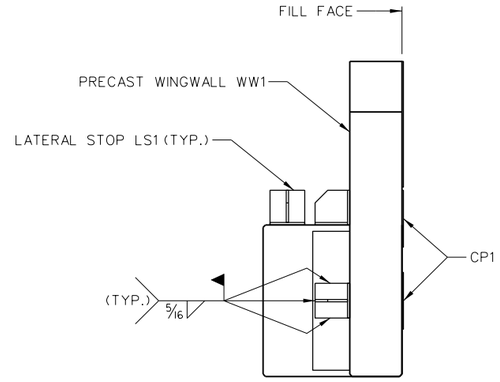
PLAN
SCALE: ½" = 1'-0"
PIPES IN CAP NOT SHOWN FOR CLARITY



FRONT FACE ELEVATION
SCALE: ½" = 1'-0"
LATERAL STOPS FOR PCBB NOT SHOWN FOR CLARITY



FILL FACE ELEVATION
SCALE: ½" = 1'-0"



VIEW
SCALE: ½" = 1'-0"

NOTES

1. ½" THICK BY 10" WIDE PREFORMED EXPANSION JOINT FILLER SHALL BE ATTACHED TO THE BACKWALLL.
2. FILL ANCHOR ROD HOLES USING LOCTITE TITE FOAM OR APPROVED EQUAL. LIFTING HOLES TO BE KEPT OPEN AFTER SETTING.

ESTIMATED QUANTITIES - 1 END BENT ASSEMBLY

PIECE MARK	QTY.	UNIT	DESCRIPTION	REFERENCE PAGE	ESTIMATED UNIT WEIGHT (LBS.)
PCC2	1	EACH	PRECAST END BENT CAP	334.5-14	38,000
BW2	1	EACH	PRECAST BACKWALL	334.5-15	8,000
WW1	2	EACH	PRECAST WINGWALL	334.5-12	10,000
LS1	4	EACH	LATERAL STOPS*	334.5-10	72
CP1	6	EACH	CONNECTION PLATES	334.5-18	46

*LATERAL STOPS FOR PRECAST BOX BEAM CONNECTION NOT INCLUDED

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CAROLINA LINES BY
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OF THE CAROLINAS
(CHARLESTON, SC)
BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020
FILE: 334.5-12.dgn

REVISIONS

R.J. Corman Railroad Company

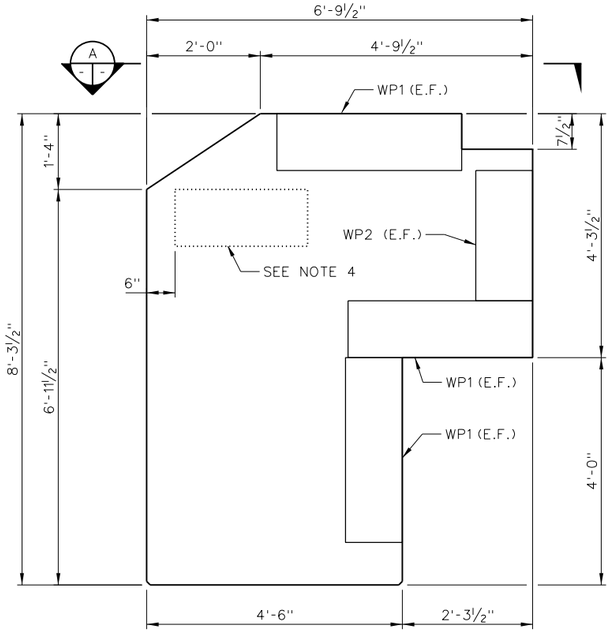
BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP
END BENT ASSEMBLY DETAILS
HORRY COUNTY CONWAY, SC
R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

SCALE: AS SHOWN
DATE: 3/16/2020
DESIGN: TCS
DRAWN: RGD
CHECKED: JFM

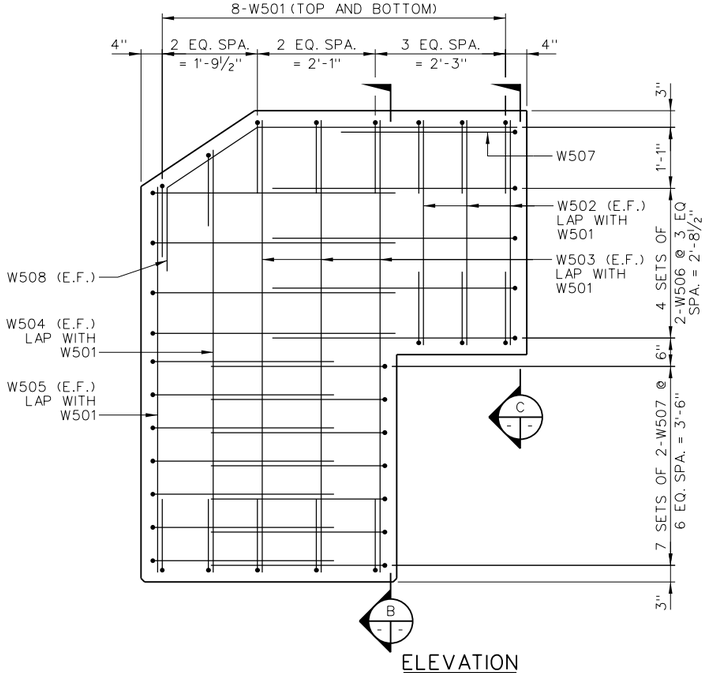
VAL. SEC.

DRAWING NO.
334.5-12

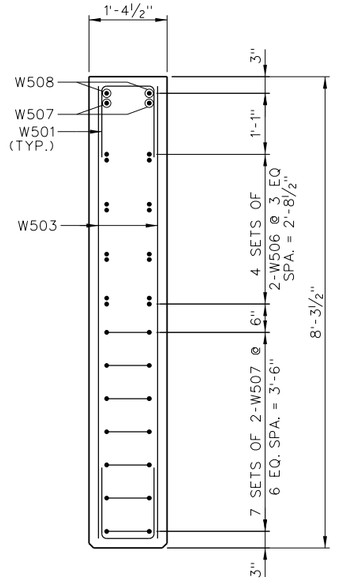
RELEASED FOR BID - NOT FOR CONSTRUCTION



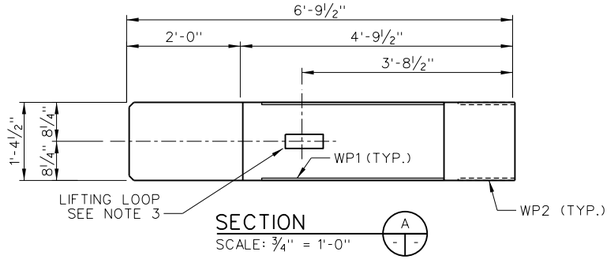
ELEVATION
SCALE: ¾" = 1'-0"
STUDS AND REINFORCING NOT SHOWN



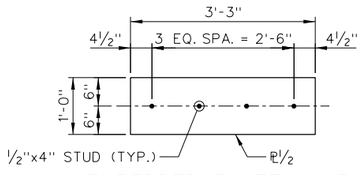
ELEVATION
SCALE: ¾" = 1'-0"
EMBEDDED PLATES NOT SHOWN



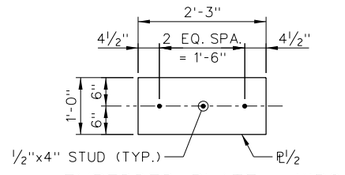
SECTION
SCALE: ¾" = 1'-0"



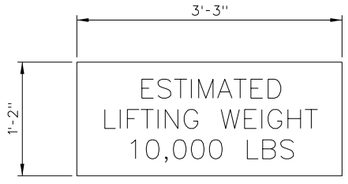
SECTION
SCALE: ¾" = 1'-0"



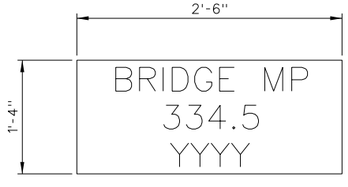
EMBEDDED PLATE - WP1
SCALE: ¾" = 1'-0"
ESTIMATED WEIGHT = 70 LBS.



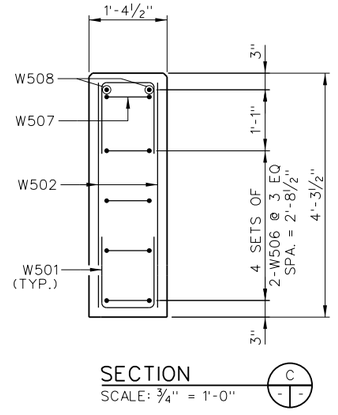
EMBEDDED PLATE - WP2
SCALE: ¾" = 1'-0"
ESTIMATED WEIGHT = 50 LBS.



LIFTING WEIGHT SURFACE MARKING DETAIL
SCALE: NTS
LOCATED ON FILL FACE OF ALL WINGWALLS
STENCIL LETTERING SHALL BE 3" IN HEIGHT



MILEPOST SURFACE EMBOSSMENT DETAIL
SCALE: NTS
LOCATED ON FRONT FACE OF RIGHT WINGWALL
YYYY = YEAR OF FABRICATION
EMBOSSED LETTERING SHALL BE 4" IN HEIGHT

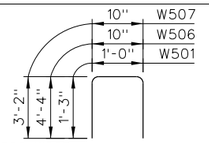


SECTION
SCALE: ¾" = 1'-0"

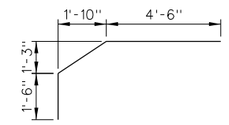
LIFTING WEIGHT	
ITEM	WEIGHT (LBS.)
1 PRECAST WINGWALL - WW1	10,000

REINFORCING STEEL SCHEDULE - 1 WW1							
MARK	BAR NO.	NO. REQ'D	LENGTH FT	LENGTH IN.	TYPE	LOCATION	WEIGHT (LBS.)
W501	#5	16	3	6	⌐	VERTICAL	58
W502	#5	6	3	11	STR.	VERTICAL	25
W503	#5	6	7	11	STR.	VERTICAL	50
W504	#5	2	7	4	STR.	VERTICAL	15
W505	#5	2	6	9	STR.	VERTICAL	14
W506	#5	8	9	6	⌐	HORIZONTAL	79
W507	#5	15	7	2	⌐	HORIZONTAL	112
W508	#5	2	8	3	⌐	TOP	17
						TOTAL	370

BENDING DIAGRAM



W501, W506, W507



W508

ESTIMATED QUANTITIES - 1 WW1		
QTY.	UNIT	DESCRIPTION
2.4	C.Y.	CONCRETE CLASS 5 OR 5 (AE)
370	LBS.	REINFORCING STEEL
2	GAL.	CONCRETE WATERPROOFING
2	GAL.	CONCRETE WATER REPELLENT AND CURING COMPOUND
6	EACH	EMBEDDED PLATE - WP1
2	EACH	EMBEDDED PLATE - WP2
1	EACH	LIFTING LOOP

NOTES

1. MINIMALLY ADJUST REINFORCING AS NEEDED TO AVOID LIFTING LOOP AND STUDS.
2. CONCRETE COVER SHALL BE A MINIMUM OF 2" CLEAR UNLESS NOTED OTHERWISE.
3. FOR LIFTING LOOP DETAILS SEE DRAWING NO. 334.5-09. IF WALKWAY BLOCKOUT IS REQUIRED ADJUST LIFTING LOOP LOCATION ACCORDINGLY.
4. FOR SURFACE MARKING DETAIL SEE THIS DRAWING. SURFACE MARKINGS SHALL BE MADE USING BLACK INDUSTRIAL STRENGTH, FADE RESISTANT PAINT, STENCIL LETTERING SHALL BE 3" IN HEIGHT.
5. FOR SURFACE EMBOSSMENT DETAIL SEE THIS DRAWING. EMBOSSED LETTERING SHALL BE 4" IN HEIGHT x ½" DEEP.

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BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020

FILE: 334.5-13.dgn

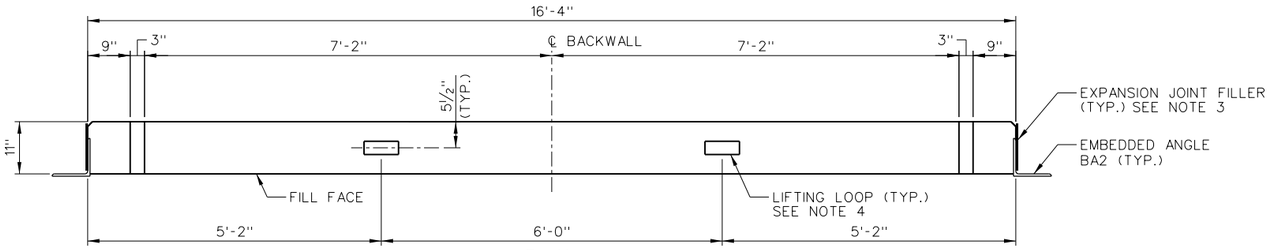
REVISIONS

R.J. Corman Railroad Company

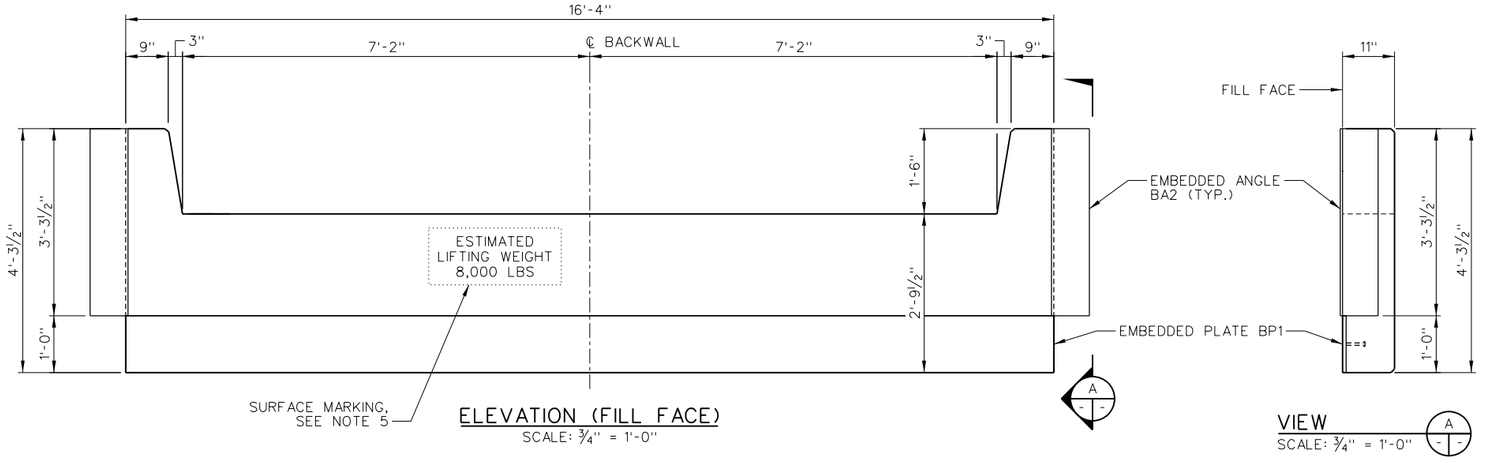
BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP
PRECAST CONCRETE
WINGWALL WW1 DETAILS
HORRY COUNTY CONWAY, SC
R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

SCALE: AS SHOWN	VAL. SEC.	DRAWING NO.
DATE: 3/16/2020		334.5-13
DESIGN: TCS		
DRAWN: RGD		
CHECKED: JFM		

RELEASED FOR BID - NOT FOR CONSTRUCTION

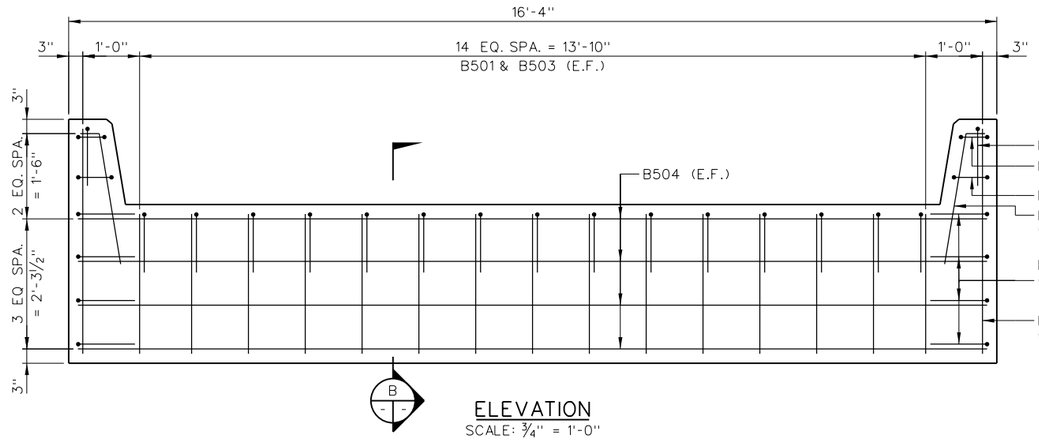


PLAN
SCALE: ¾" = 1'-0"



ELEVATION (FILL FACE)
SCALE: ¾" = 1'-0"

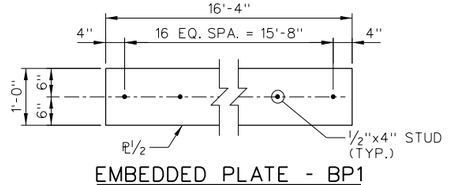
VIEW
SCALE: ¾" = 1'-0"



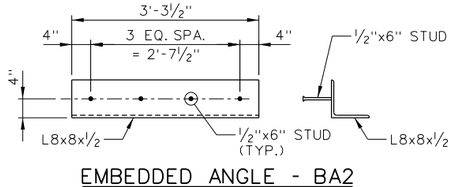
ELEVATION
SCALE: ¾" = 1'-0"

SECTION
SCALE: ¾" = 1'-0"

END SECTION
SCALE: ¾" = 1'-0"



EMBEDDED PLATE - BP1
SCALE: ¾" = 1'-0"
ESTIMATED WEIGHT = 339 LBS.



EMBEDDED ANGLE - BA2
SCALE: ¾" = 1'-0"
ESTIMATED WEIGHT = 90 LBS.

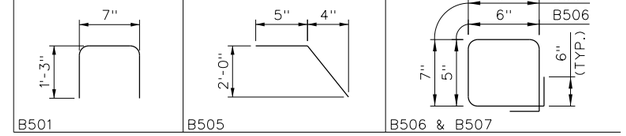
LIFTING WEIGHT

ITEM	WEIGHT (LBS.)
1 PRECAST BACKWALL - BW2	8,000

REINFORCING STEEL SCHEDULE - 1 BW2

MARK	BAR NO.	NO. REQ'D	LENGTH FT	LENGTH IN.	TYPE	LOCATION	WEIGHT (LBS.)
B501	#5	25	3	1	⌐	STIRRUP	81
B502	#5	4	4	0	STR.	VERTICAL	17
B503	#5	30	2	5	STR.	VERTICAL	76
B504	#5	8	16	0	STR.	HORIZONTAL	134
B505	#5	4	2	6	⌐	TOP	11
B506	#5	2	2	4	▢	STIRRUP	5
B507	#5	2	2	8	▢	STIRRUP	6
						TOTAL	330

BENDING DIAGRAM



ESTIMATED QUANTITIES - 1 BW2

QTY.	UNIT	DESCRIPTION
1.7	C.Y.	CONCRETE CLASS 5 OR 5 (AE)
330	LBS.	REINFORCING STEEL
2	GAL.	CONCRETE WATERPROOFING
2	GAL.	CONCRETE WATER REPELLENT AND CURING COMPOUND
2	EACH	LIFTING LOOPS
8.6	FT.	1/2" THICK x 10" WIDE PREFORMED EXPANSION JOINT FILLER
2	EACH	EMBEDDED ANGLE - BA2
1	EACH	EMBEDDED PLATE - BP1

NOTES

1. MINIMALLY ADJUST REINFORCING AS NEEDED TO AVOID LIFTING LOOPS AND STUDS.
2. CONCRETE COVER SHALL BE A MINIMUM OF 2" CLEAR UNLESS NOTED OTHERWISE.
3. EXPANSION JOINT FILLER TO BE EPOXIED TO EACH END OF THE BACKWALL.
4. FOR LIFTING LOOP DETAILS SEE DRAWING NO. 334.5-09.
5. SURFACE MARKINGS SHALL BE MADE USING BLACK INDUSTRIAL STRENGTH, FADE RESISTANT PAINT. STENCIL LETTERING SHALL BE 3" IN HEIGHT.

RELEASED FOR BID - NOT FOR CONSTRUCTION

HDR ENGINEERING, INC.
4400 LEEDS AVE., SUITE 450
NORTH CHARLESTON, SC 29405
843-414-3700

APPROVED FOR
R.J. CORMAN RAILROAD COMPANY/ CAROLINA LINES BY
HDR ENGINEERING INC.
OF THE CAROLINAS
(CHARLESTON, SC)
BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020
FILE: 334.5-14.dgn

REVISIONS

RJ Corman Railroad Company

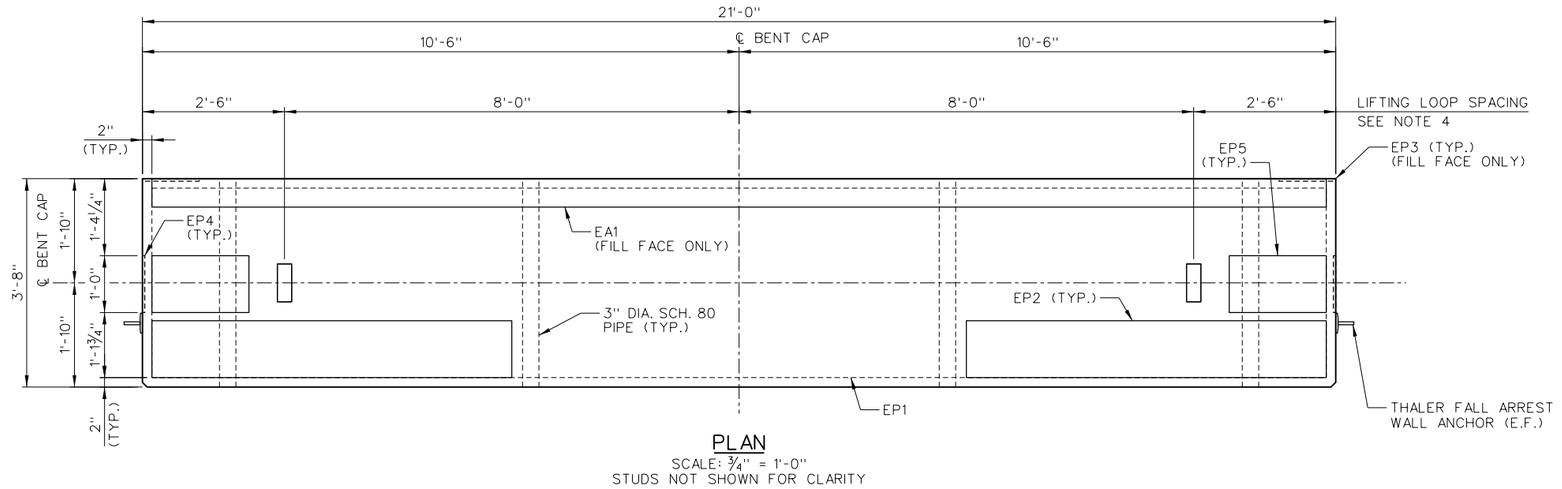
BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP

PRECAST BACKWALL BW2 DETAILS

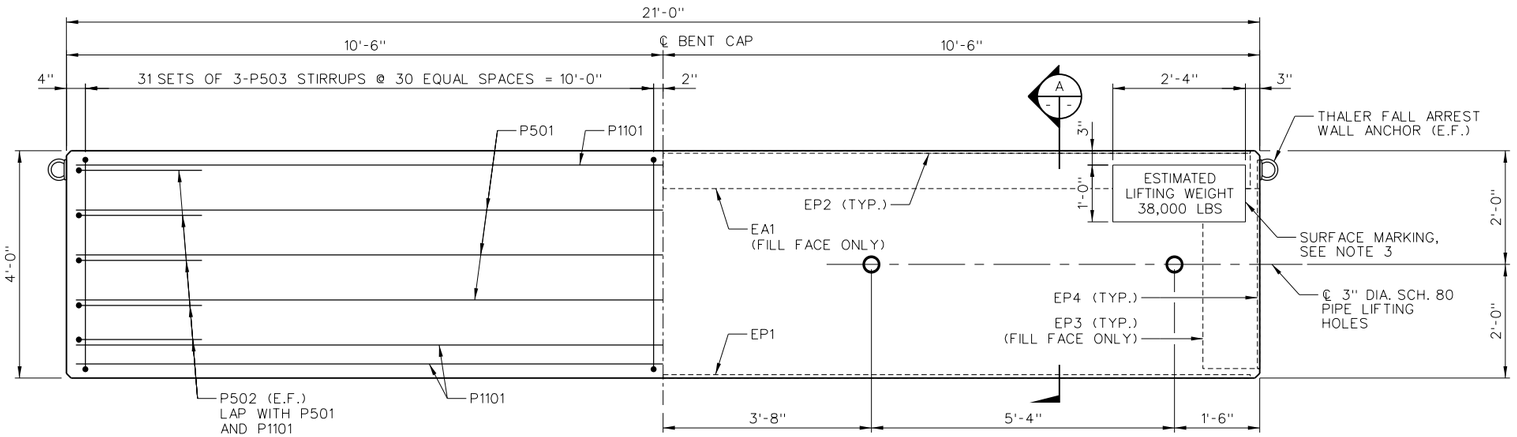
HORRY COUNTY — CONWAY, SC
R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

SCALE: AS SHOWN	VAL. SEC.	DRAWING NO.
DATE: 3/16/2020		334.5-14
DESIGN: TCS		
DRAWN: RGD		
CHECKED: JFM		

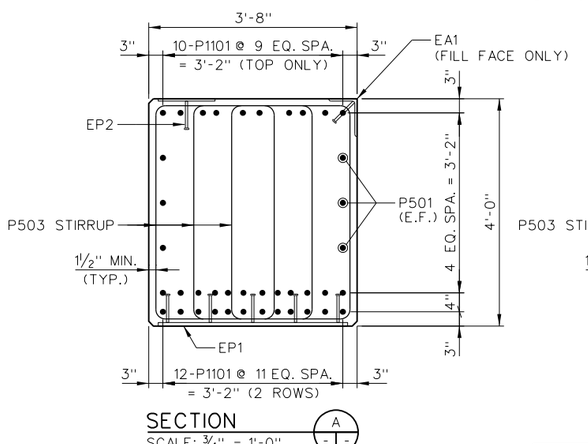
FILENAME: c:\pwworking\east01\d1230212\334.5-14.dgn USER: rdixon SCALE FACTORS CORRESPOND WITH FULL SIZE (22"x34") DRAWINGS



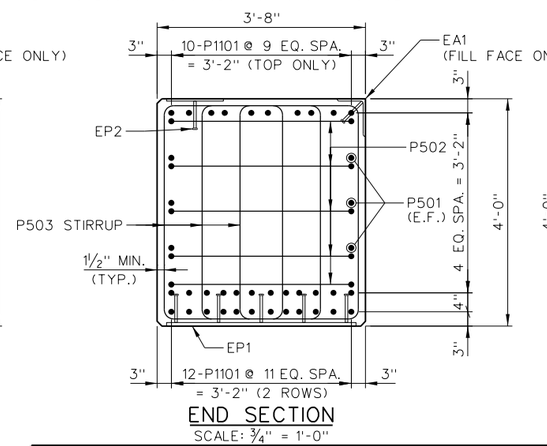
PLAN
SCALE: ¾" = 1'-0"
STUDS NOT SHOWN FOR CLARITY



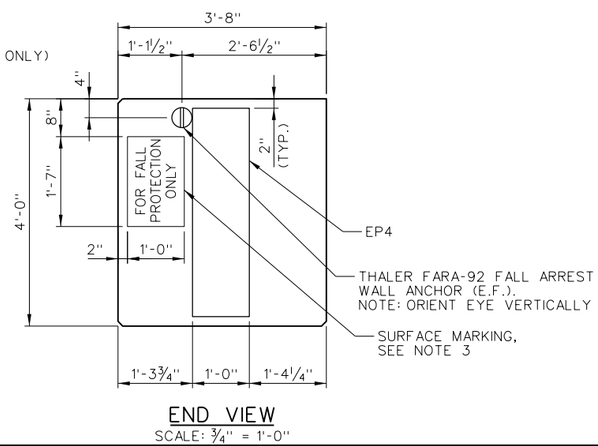
FRONT FACE ELEVATION
SCALE: ¾" = 1'-0"
REINFORCING, EMBEDDED PLATES, ANCHOR BOLT
HOLES AND PIPES SYMMETRICAL ABOUT ℄
LIFTING LOOPS AND STUDS NOT SHOWN FOR CLARITY



SECTION A
SCALE: ¾" = 1'-0"



END SECTION
SCALE: ¾" = 1'-0"



END VIEW
SCALE: ¾" = 1'-0"

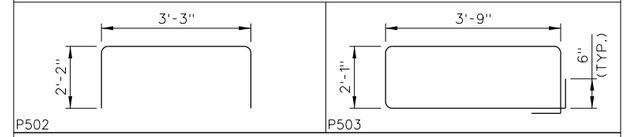
RELEASED FOR BID - NOT FOR CONSTRUCTION

LIFTING WEIGHT	
ITEM	WEIGHT (LBS.)
1 PC CONCRETE BENT CAP (PCC2)	38,000

REINFORCING STEEL SCHEDULE - 1 PCC2

MARK	BAR NO.	NO. REQ'D	LENGTH FT	LENGTH IN.	TYPE	LOCATION	WEIGHT (LBS.)
P1101	#11	34	20	8	STR	TOP AND BOT. HORIZONTAL	3,733
P501	#5	6	20	8	STR	EACH FACE HORIZONTAL	129
P502	#5	10	7	7	⌐	EACH END HORIZONTAL	79
P503	#5	186	12	8	▭	STIRRUP	2,457
						TOTAL	6,398

BENDING DIAGRAM



ESTIMATED QUANTITIES - 1 PCC2

QTY.	UNIT	DESCRIPTION
11.5	C.Y.	CONCRETE CLASS 5 (LWC) OR 5 (AE) (LWC)
6,398	LBS.	REINFORCING STEEL
3	GAL.	CONCRETE WATERPROOFING
3	GAL.	CONCRETE WATER REPELLENT AND CURING COMPOUND
1	EACH	EMBEDDED ANGLE - EA1
1	EACH	EMBEDDED PLATE - EP1
2	EACH	EMBEDDED PLATE - EP2
2	EACH	EMBEDDED PLATE - EP3
2	EACH	EMBEDDED PLATE - EP4
2	EACH	EMBEDDED PLATE - EP5
2	EACH	LIFTING LOOPS
2	EACH	FALL ARREST WALL ANCHORS
15	FT.	3" DIA. SCHEDULE 80 PIPE

NOTES

1. MINIMALLY ADJUST REINFORCING AS NEEDED TO AVOID ANCHOR ROD HOLES, LIFTING LOOPS, PIPES AND STUDS.
2. CONCRETE COVER SHALL BE A MINIMUM OF 2" CLEAR UNLESS NOTED OTHERWISE.
3. SURFACE MARKINGS SHALL BE MADE USING BLACK INDUSTRIAL STRENGTH, FADE RESISTANT PAINT. STENCIL LETTERING SHALL BE 2" IN HEIGHT.
4. FOR LIFTING LOOP DETAILS SEE DRAWING NO. 334.5-09.
5. FOR EMBEDDED PLATE DETAILS SEE DRAWING NO. 334.5-19.
6. LIFTING HOLES TO BE KEPT OPEN AFTER SETTING.

HDR ENGINEERING, INC.
4400 LEEDS AVE., SUITE 450
NORTH CHARLESTON, SC 29405
843-414-3700

APPROVED FOR
R.J. CORMAN RAILROAD COMPANY/
CAROLINA LINES BY
HDR ENGINEERING INC.
OF THE CAROLINAS
(CHARLESTON, SC)
BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020

FILE: 334.5-15.dgn

R J Corman Railroad Company

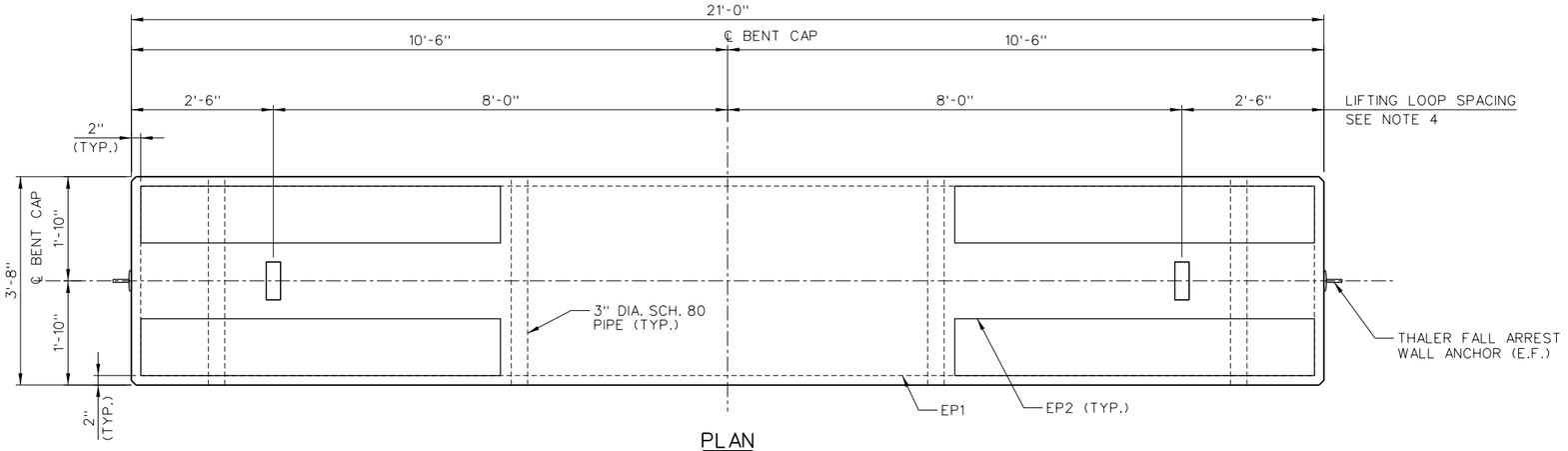
REVISIONS

BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP
PRECAST CONCRETE
END BENT CAP PCC2 DETAILS
HORRY COUNTY CONWAY, SC
R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

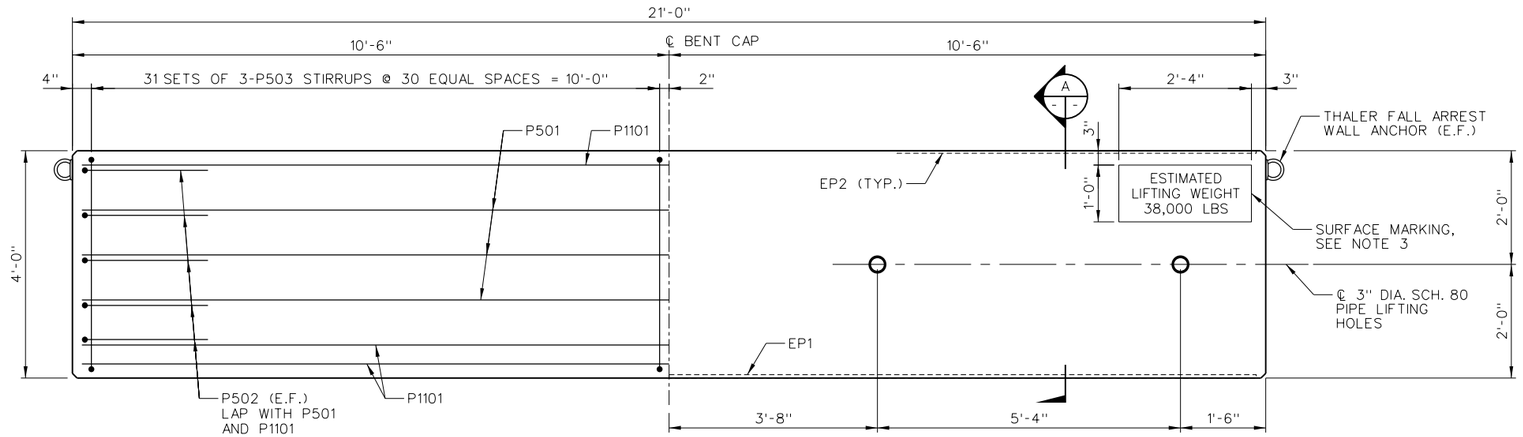
SCALE: AS SHOWN
DATE: 3/16/2020
DESIGN: TCS
DRAWN: RGD
CHECKED: JFM

VAL. SEC.

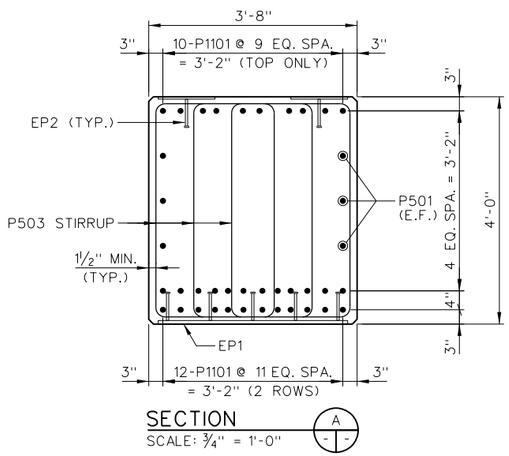
DRAWING NO.
334.5-15



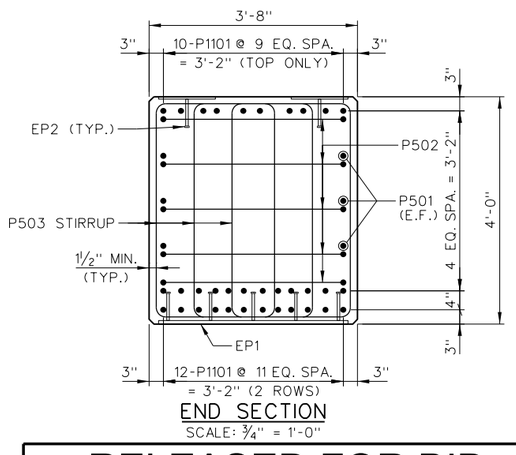
PLAN
SCALE: ¾" = 1'-0"
STUDS NOT SHOWN FOR CLARITY



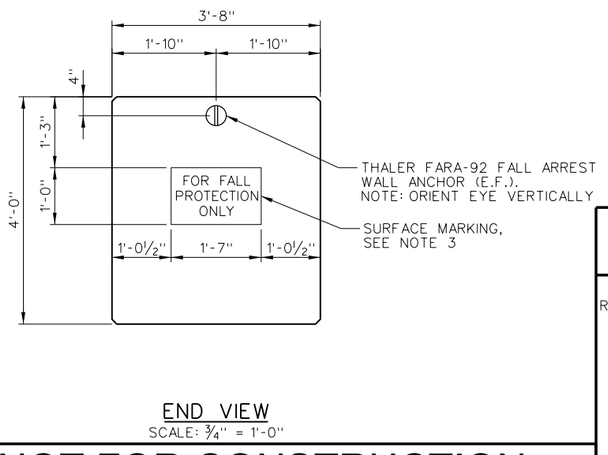
FRONT FACE ELEVATION
SCALE: ¾" = 1'-0"
REINFORCING, EMBEDDED PLATES, ANCHOR BOLT HOLES AND PIPES SYMMETRICAL ABOUT ℄
LIFTING LOOPS AND STUDS NOT SHOWN FOR CLARITY



SECTION A
SCALE: ¾" = 1'-0"



END SECTION
SCALE: ¾" = 1'-0"



END VIEW
SCALE: ¾" = 1'-0"

LIFTING WEIGHT	
ITEM	WEIGHT (LBS.)
1 PC CONCRETE BENT CAP (PCC1)	38,000

REINFORCING STEEL SCHEDULE - 1 PCC1							
MARK	BAR NO.	NO. REQ'D	LENGTH FT	LENGTH IN.	TYPE	LOCATION	WEIGHT (LBS.)
P1101	#11	34	20	8	STR	TOP AND BOT. HORIZONTAL	3,733
P501	#5	6	20	8	STR	EACH FACE HORIZONTAL	129
P502	#5	10	7	7	⌐	EACH END HORIZONTAL	79
P503	#5	186	12	8	▭	STIRRUP	2,457
						TOTAL	6,398

BENDING DIAGRAM

ESTIMATED QUANTITIES - 1 PCC1		
QTY.	UNIT	DESCRIPTION
11.5	C.Y.	CONCRETE CLASS 5 (LWC) OR 5 (AE) (LWC)
6,398	LBS.	REINFORCING STEEL
3	GAL.	CONCRETE WATERPROOFING
3	GAL.	CONCRETE WATER REPELLENT AND CURING COMPOUND
1	EACH	EMBEDDED PLATE - EP1
4	EACH	EMBEDDED PLATE - EP2
2	EACH	LIFTING LOOPS
2	EACH	FALL ARREST WALL ANCHORS
15	FT.	3" DIA. SCHEDULE 80 PIPE

NOTES
1. MINIMALLY ADJUST REINFORCING AS NEEDED TO AVOID ANCHOR ROD HOLES, LIFTING LOOPS, PIPES AND STUDS.
2. CONCRETE COVER SHALL BE A MINIMUM OF 2" CLEAR UNLESS NOTED OTHERWISE.
3. SURFACE MARKINGS SHALL BE MADE USING BLACK INDUSTRIAL STRENGTH, FADE RESISTANT PAINT. STENCIL LETTERING SHALL BE 2" IN HEIGHT.
4. FOR LIFTING LOOP DETAILS SEE DRAWING NO. 334.5-09.
5. FOR EMBEDDED PLATE DETAILS SEE DRAWING NO. 334.5-19.
6. LIFTING HOLES TO BE KEPT OPEN AFTER SETTING.

HDR ENGINEERING, INC.
4400 LEEDS AVE., SUITE 450
NORTH CHARLESTON, SC 29405
843-414-3700

APPROVED FOR
R.J. CORMAN RAILROAD COMPANY/ CAROLINA LINES BY
HDR ENGINEERING INC.
OF THE CAROLINAS
(CHARLESTON, SC)
BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020
FILE: 334.5-16.dgn

R.J. Corman Railroad Company

REVISIONS

BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP
PRECAST CONCRETE INTERMEDIATE BENT CAP PCC1 DETAILS
HORRY COUNTY CONWAY, SC
R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

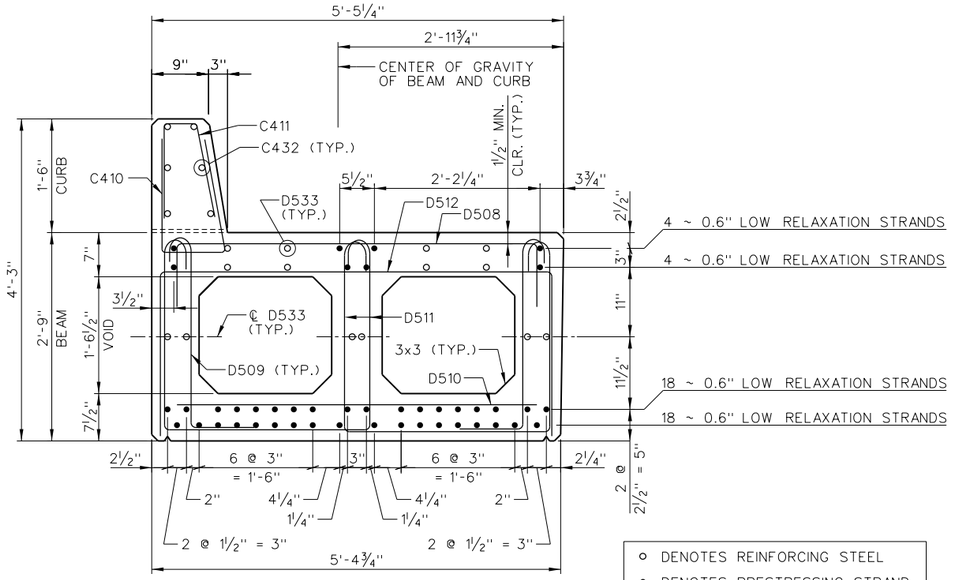
SCALE: AS SHOWN
DATE: 3/16/2020
DESIGN: TCS
DRAWN: RGD
CHECKED: JFM

VAL. SEC.

DRAWING NO. 334.5-16

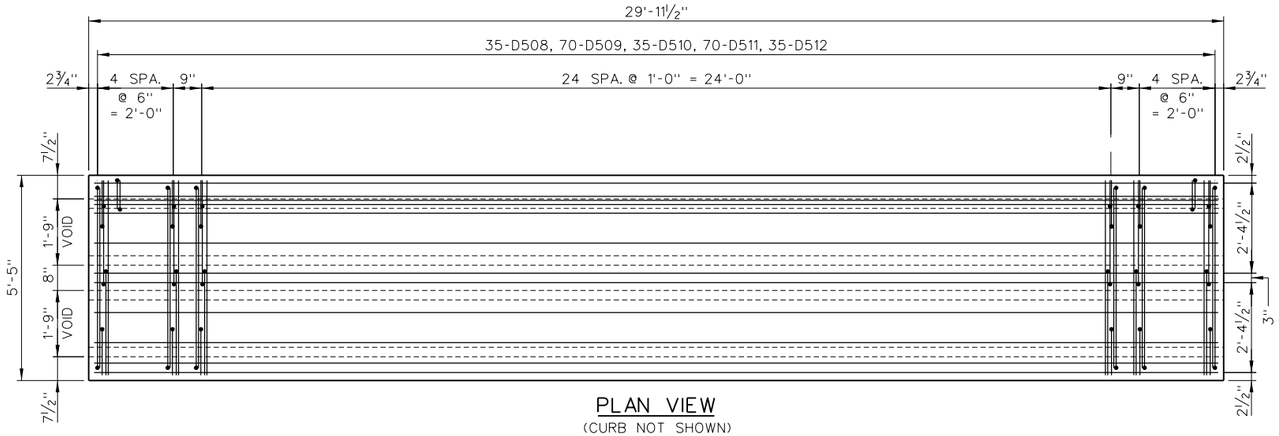
RELEASED FOR BID - NOT FOR CONSTRUCTION

FILENAME: c:\pwworking\east01\d1230212\334.5-16.dgn USER: rdixon SCALE FACTORS CORRESPOND WITH FULL SIZE (22"x34") DRAWINGS



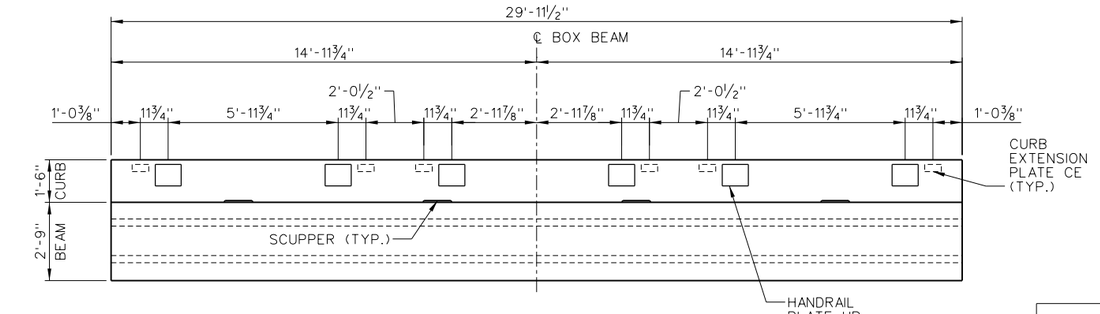
BOX BEAM TYPICAL SECTION

SCALE: 1" = 1'-0"



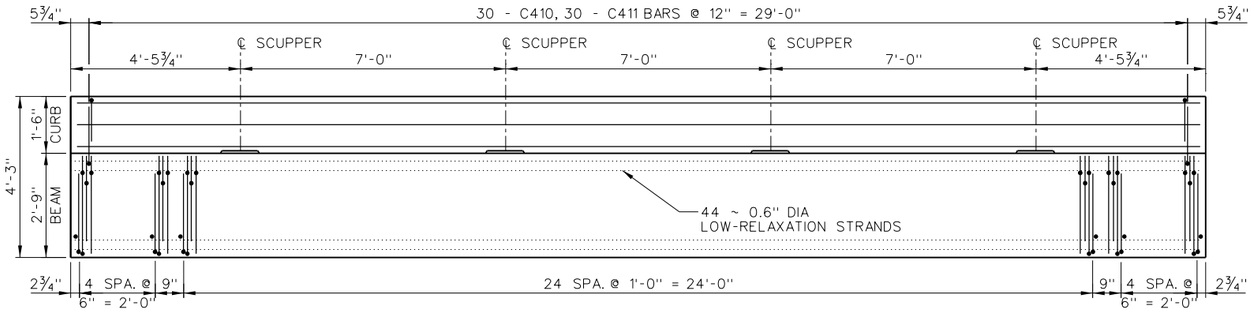
PLAN VIEW

(CURB NOT SHOWN)
SCALE: ½" = 1'-0"



ELEVATION EXTERIOR VIEW

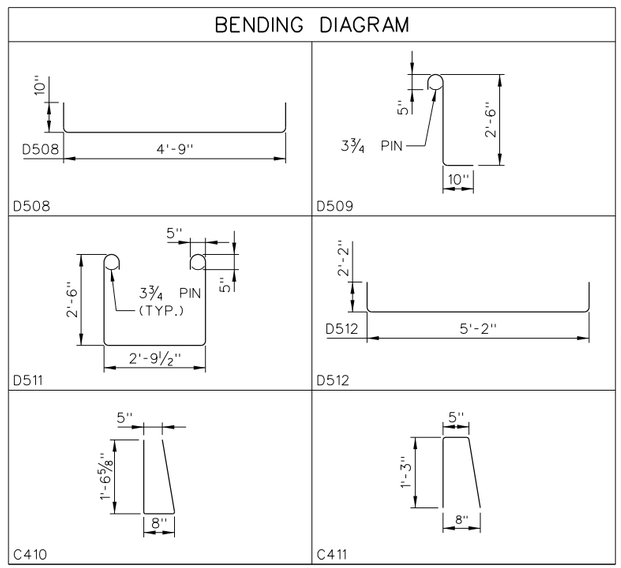
SCALE: ⅜" = 1'-0"



ELEVATION SECTIONAL VIEW

(EMBEDDED PLATES NOT SHOWN FOR CLARITY)
SCALE: ½" = 1'-0"

BENDING DIAGRAM



NOTES

1. ESTIMATED LIFTING WEIGHT OF ONE BB-30EXT BOX BEAM = 49,800 LBS.
2. ESTIMATED LIFTING WEIGHT OF ONE BB-30INT BOX BEAM = 44,000 LBS.
3. MINIMALLY ADJUST BAR SPACING AS NECESSARY TO AVOID SCUPPER LOCATIONS.
4. VOIDS SHALL NOT BE TIED TO PRESTRESSING STRANDS.
5. OMIT CURB ON INTERIOR BOX BEAM.
6. FOR SCUPPER DETAILS, SEE DRAWING NO. 334.5-11.
7. FOR EMBEDDED PLATE DETAILS, SEE DRAWING NO. 334.5-11.

REINFORCING STEEL SCHEDULE - 1 BOX BEAM

MARK	BAR NO.	NO. REQ'D	LENGTH FT	LENGTH IN.	TYPE	LOCATION	WEIGHT (LBS.)
D508	#5	35	6	2	⌐¬	TRANSVERSE	225
D509	#5	70	3	9 1/2	⌐	STIRRUP	277
D510	#5	35	4	9	STR	TRANSVERSE	173
D511	#5	70	8	8 1/2	⌐¬	STIRRUP	636
D512	#5	35	9	3	⌐¬	STIRRUP	338
D533	#5	14	29	7 1/2	STR	LONGITUDINAL	433
						TOTAL	2,082

REINFORCING STEEL SCHEDULE - 1 CURB

MARK	BAR NO.	NO. REQ'D	LENGTH FT	LENGTH IN.	TYPE	LOCATION	WEIGHT (LBS.)
C410	#4	30	3	6	⌊⌋	STIRRUP	70
C411	#4	30	2	9	⌐¬	STIRRUP	55
C432	#4	6	29	7 1/2	STR	LONGITUDINAL	119
						TOTAL	244

EST. QUANTITIES - 1 BOX BEAM

QTY.	UNIT	DESCRIPTION
10.8	C.Y.	CLASS 8.5 (AE) CONCRETE
2,082	LBS.	REINFORCING STEEL
2	EACH	LIFTING LOOPS
44	EACH	0.6" DIA. LOW RELAXATION STRANDS

EST. QUANTITIES - 1 CURB

QTY.	UNIT	DESCRIPTION
1.5	C.Y.	CLASS 8.5 (AE) CONCRETE
244	LBS.	REINFORCING STEEL
6	EACH	HANDRAIL PLATE (HR)
6	EACH	CURB EXTENSION PLATE (CE)

RELEASED FOR BID - NOT FOR CONSTRUCTION

HDR ENGINEERING, INC.
4400 LEEDS AVE., SUITE 450
NORTH CHARLESTON, SC 29405
843-414-3700

APPROVED FOR
R.J. CORMAN RAILROAD COMPANY/
CAROLINA LINES BY
HDR ENGINEERING INC.
OF THE CAROLINAS
(CHARLESTON, SC)
BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020
FILE: 334.5-17.dgn

REVISIONS

R.J. Corman Railroad Company

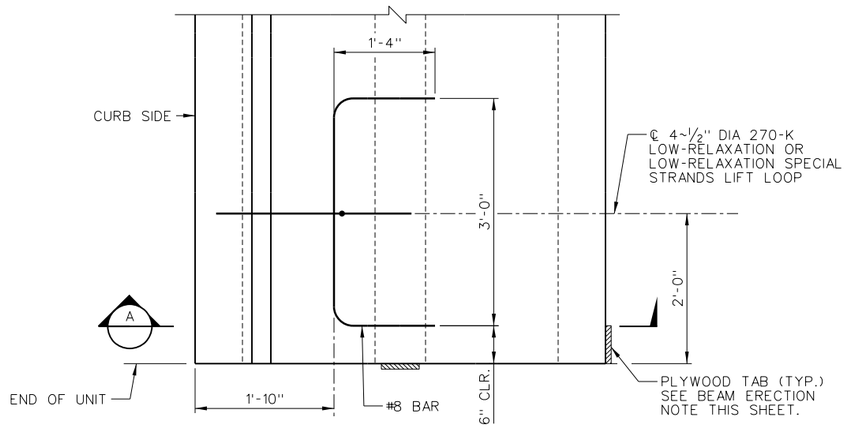
BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP
30'-0" PRESTRESSED CONCRETE
BOX BEAM DETAILS (1 OF 2)
HORRY COUNTY CONWAY, SC
R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

SCALE: AS SHOWN
DATE: 3/16/2020
DESIGN: TCS
DRAWN: RGD
CHECKED: JFM

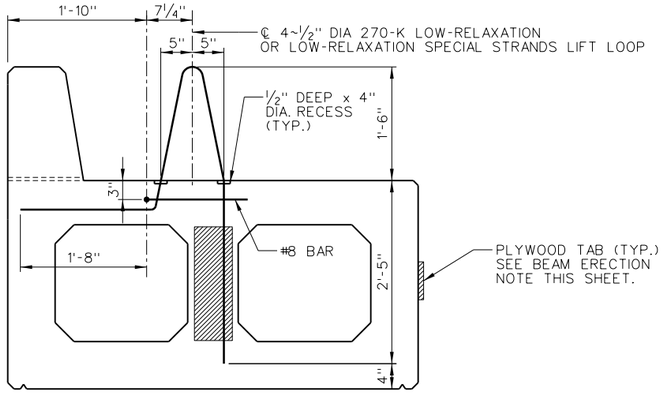
VAL. SEC.

DRAWING NO. 334.5-17

FILENAME: c:\pwworking\east01\d1230212\334.5-17.dgn USER: rdixon SCALE FACTORS CORRESPOND WITH FULL SIZE (22"x34") DRAWINGS

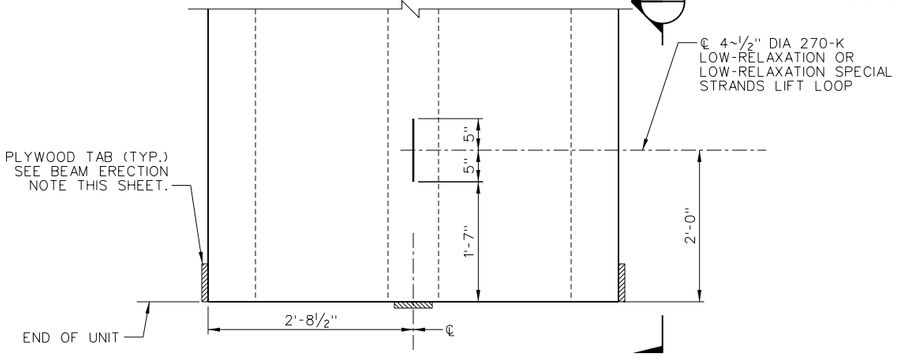


PLAN
EXTERIOR UNIT

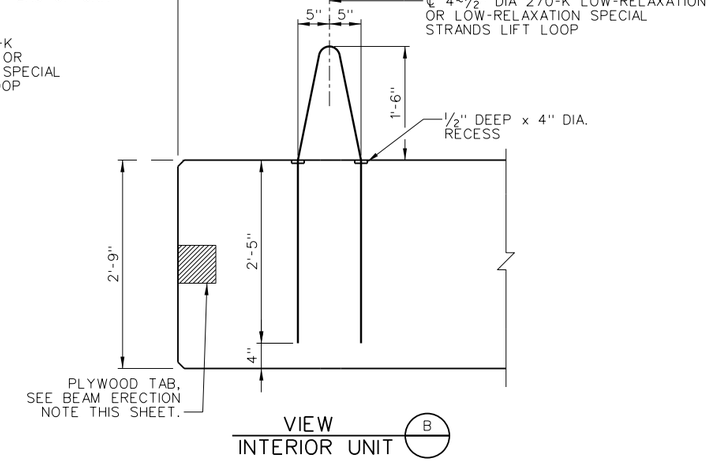


SECTION
EXTERIOR UNIT A

STRAND LIFT LOOP - EXTERIOR UNIT



PLAN
INTERIOR UNIT



VIEW
INTERIOR UNIT B

STRAND LIFT LOOP - INTERIOR UNIT

ERECTION NOTE

USE PLYWOOD TABS, AS NEEDED, TO ASSIST WITH MAINTAINING THE REQUIRED SPACING BETWEEN ADJACENT BEAMS.

RELEASED FOR BID - NOT FOR CONSTRUCTION

HDR ENGINEERING, INC.
4400 LEEDS AVE., SUITE 450
NORTH CHARLESTON, SC 29405
843-414-3700

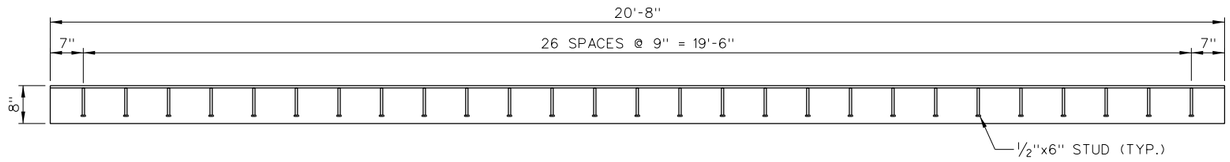
APPROVED FOR
R.J. CORMAN RAILROAD COMPANY/
CAROLINA LINES BY
HDR ENGINEERING INC.
OF THE CAROLINAS
(CHARLESTON, SC)
BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020
FILE: 334.5-18.dgn

R.J. Corman Railroad Company

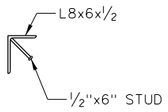
REVISIONS

BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP
30'-0" PRESTRESSED CONCRETE
BOX BEAM DETAILS (2 OF 2)
HORRY COUNTY CONWAY, SC
R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

SCALE: AS SHOWN	VAL. SEC.	DRAWING NO.
DATE: 3/16/2020		334.5-18
DESIGN: TCS		
DRAWN: RGD		
CHECKED: JFM		



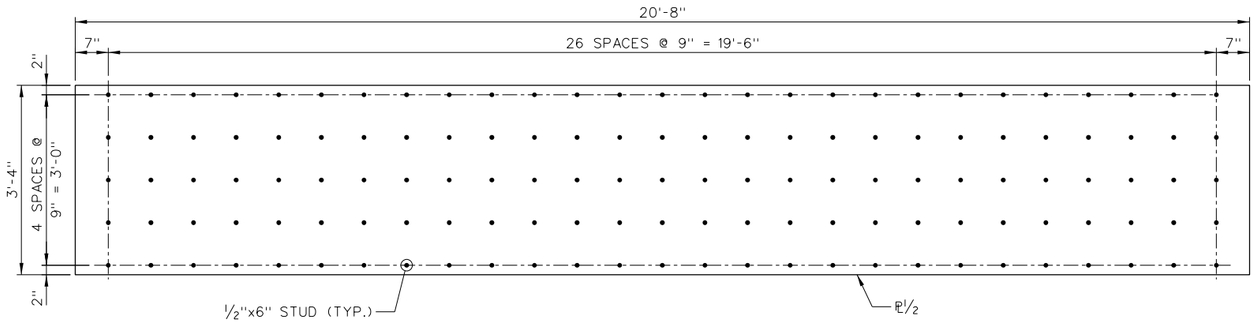
ELEVATION



SECTION

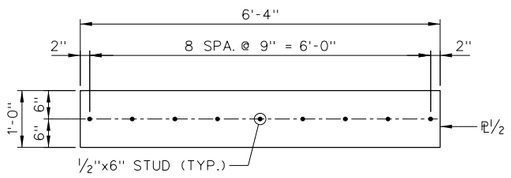
EMBEDDED ANGLE - EA1

SCALE: 3/4" = 1'-0"
ESTIMATED WEIGHT = 500 LBS. EA.



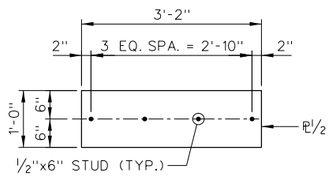
BOTTOM EMBEDDED PLATE - EP1

SCALE: 3/4" = 1'-0"
ESTIMATED WEIGHT = 1478 LBS. EA.



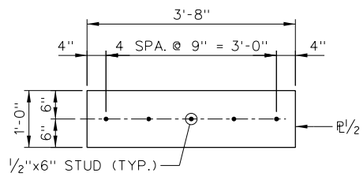
EMBEDDED PLATE - EP2

SCALE: 3/4" = 1'-0"
ESTIMATED WEIGHT = 137 LBS. EA.



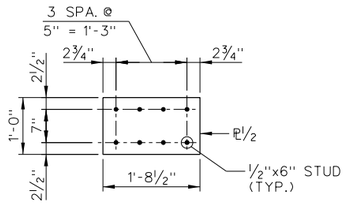
EMBEDDED PLATE - EP3

SCALE: 3/4" = 1'-0"
ESTIMATED WEIGHT = 69 LBS. EA.



EMBEDDED PLATE - EP4

SCALE: 3/4" = 1'-0"
ESTIMATED WEIGHT = 79 LBS. EA.



EMBEDDED PLATE - EP5

SCALE: 3/4" = 1'-0"
ESTIMATED WEIGHT = 37 LBS. EA.

RELEASED FOR BID - NOT FOR CONSTRUCTION

HDR ENGINEERING, INC.
4400 LEEDS AVE., SUITE 450
NORTH CHARLESTON, SC 29405
843-414-3700

APPROVED FOR
R.J. CORMAN RAILROAD COMPANY/
CAROLINA LINES BY
HDR ENGINEERING INC.
OF THE CAROLINAS
(CHARLESTON, SC)
BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020
FILE: 334.5-19.dgn

REVISIONS

R.J. Corman Railroad Company

BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP

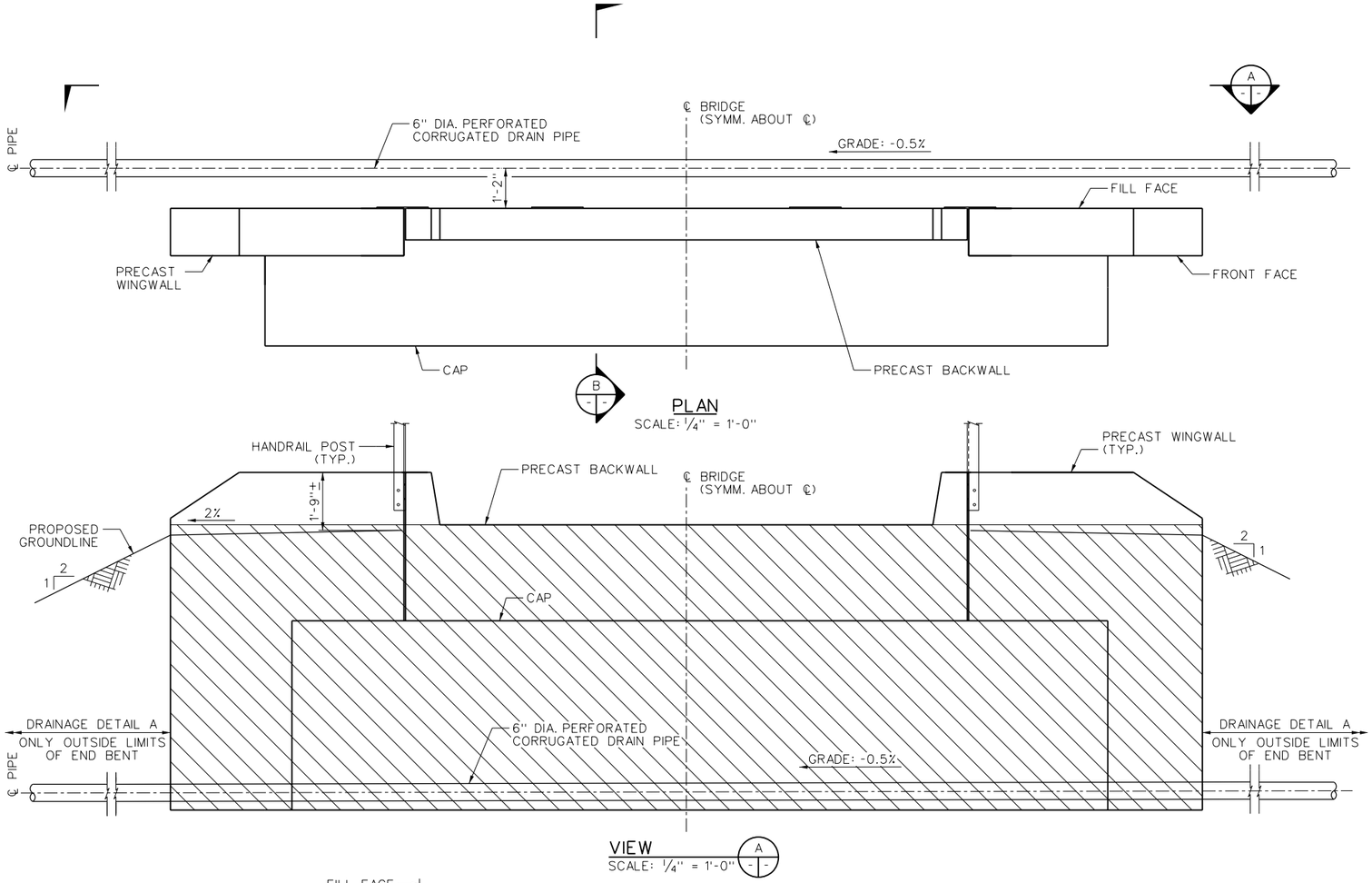
EMBEDDED PLATE DETAILS

HORRY COUNTY — CONWAY, SC

R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

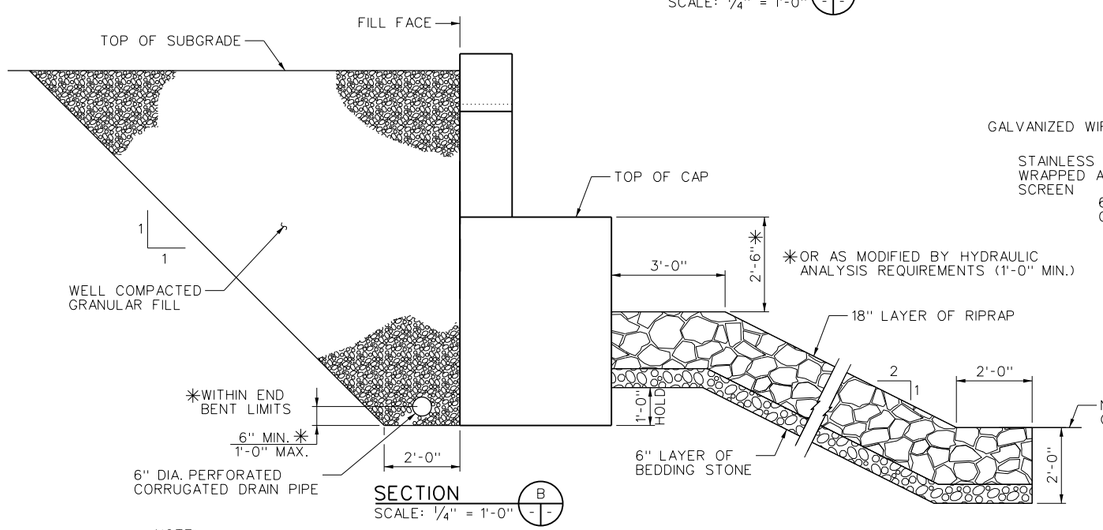
SCALE: AS SHOWN	VAL. SEC.	DRAWING NO.
DATE: 3/16/2020		334.5-19
DESIGN: TCS		
DRAWN: RGD		
CHECKED: JFM		

FILENAME: c:\pwworking\east01\d1230212\334.5-19.dgn USER: rdixon SCALE FACTORS CORRESPOND WITH FULL SIZE (22"x34") DRAWINGS



PLAN
SCALE: 1/4" = 1'-0"

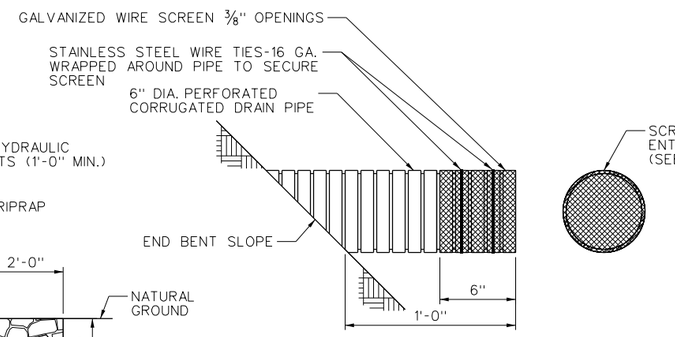
VIEW
SCALE: 1/4" = 1'-0"



SECTION
SCALE: 1/4" = 1'-0"

NOTE:

BACKFILL SECTION AS SHOWN ONLY WITHIN LIMITS OF END BENT.



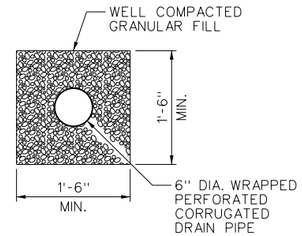
SIDE VIEW END VIEW

TYPICAL SCREEN DETAIL
N.T.S.

NOTES

1. BACKFILL WITH 1½" MAX. SIZE GRANULAR FILL MEETING THE REQUIREMENTS OF ASTM C33 SPECIFICATIONS TO LIMITS SHOWN ON THIS SHEET AND DRAWING NO. 334.5-06.
2. WRAP PIPE WITH NON-WOVEN FILTER FABRIC AND PLACE WITH PERFORATIONS DOWN. DEAD END OF PIPE SHALL BE TIGHTLY CLOSED WITH PLUG. OUTLET END SHALL BE SCREENED.
3. BEDDING STONE SHALL BE CLEAN BALLAST.
4. INDIVIDUAL RIPRAP STONES SHALL VARY IN WEIGHT FROM 25 TO 100 LBS.
5. DEPTH OF RIPRAP PER SECTION B , THIS SHEET. RIPRAP SHALL NOT EXCEED LIMITS AS DETAILED.
6. PORTION OF RIPRAP UNDER THE SUPERSTRUCTURE SHALL BE PLACED BEFORE SPANS ARE SET.
7. RIPRAP AND BEDDING STONE SECTION SHALL WRAP AROUND WINGWALLS AND EXTEND 5'-0" BEYOND THE FILL FACE.
8. PERFORATED CORRUGATED DRAIN PIPE SHALL BE CONTECH EAGLE CORR PE PERFORATED PIPE, OR ENGINEER APPROVED EQUIVALENT. JOINTS SHALL BE MADE PER MANUFACTURER'S RECOMMENDATIONS.
9. NON-WOVEN FILTER FABRIC SHALL BE US 300 MN AS MANUFACTURED BY US FABRICS, OR ENGINEER APPROVED EQUIVALENT. JOINTS SHALL BE MADE PER MANUFACTURER'S RECOMMENDATIONS.
10. WATERPROOFING SHOULD CONFORM WITH NOTES ON DRAWING NO. 334.5-04.

DENOTES LIMITS OF WATERPROOFING



DRAINAGE DETAIL A
SCALE: 1/2"= 1'-0"

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APPROVED FOR
R.J. CORMAN RAILROAD COMPANY/ CAROLINA LINES BY
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OF THE CAROLINAS
(CHARLESTON, SC)
BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020
FILE: 334.5-20.dgn

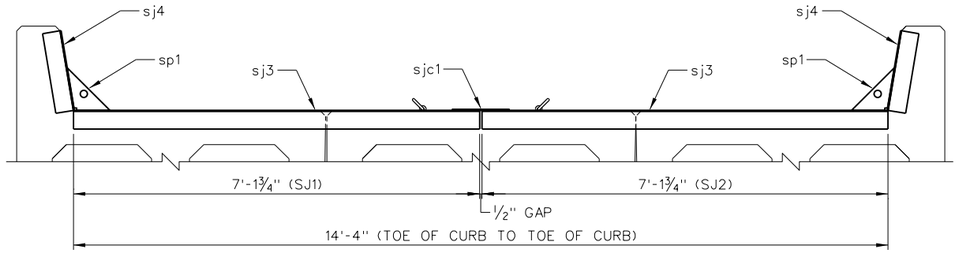
R.J. Corman Railroad Company

REVISIONS

BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP
END BENT WATERPROOFING AND SLOPE PROTECTION DETAILS
HORRY COUNTY CONWAY, SC
R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

SCALE:	AS SHOWN	VAL. SEC.	DRAWING NO.
DATE:	3/16/2020		334.5-20
DESIGN:	TCS		
DRAWN:	RGD		
CHECKED:	JFM		

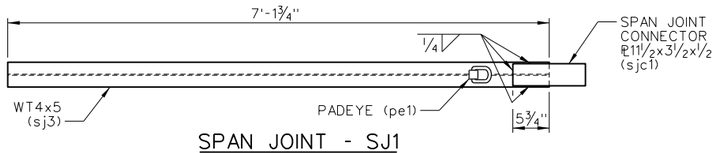
SCALE FACTORS CORRESPOND WITH FULL SIZE (22"x34") DRAWINGS
USER: rdixon
FILENAME: c:\pwworking\east01\d1230212\334.5-20.dgn



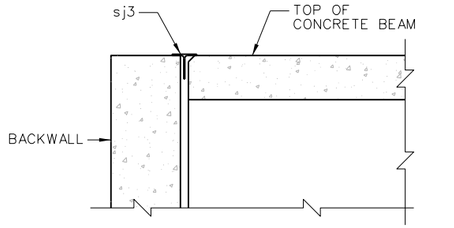
SPAN JOINT SECTION (3 BEAM)
SCALE: ¾" = 1'-0"

BILL OF MATERIAL - 1 SPAN JOINT

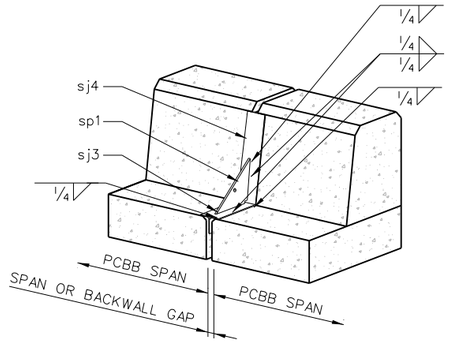
SHOP BILL (TOTAL PIECE QUANTITIES)						SHIPPING BILL		
NO.	DESCRIPTION	FT.	IN.	MARK	REMARKS	NO.	DESCRIPTION	MARK
1	WT4x5	7	1 3/4	sj3	SPAN JOINT	1	SPAN JOINT	SJ1
1	PL1/2x3 1/2	0	11 1/2	sjc1	SPAN JOINT CONNECTOR			
1	WT4x5	1	5	sj4	SPAN CURB JOINT			
1	PL1/2x9	0	9	sp1	STIFFENER PLATE			
1	PADEYE	N/A		pe1	PADEYE			
1	WT4x5	7	1 3/4	sj3	SPAN JOINT	1	SPAN JOINT	SJ2
1	PL1/2x9	0	9	sp1	STIFFENER PLATE			
1	WT4x5	1	5	sj4	SPAN CURB JOINT			
1	PADEYE	N/A		pe1	PADEYE			



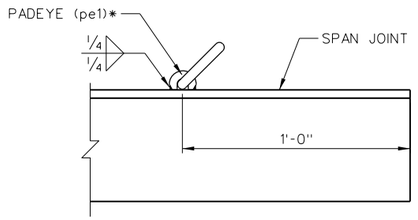
SPAN JOINT - SJ1
SCALE: 1" = 1'-0"
SPAN CURB JOINT AND STIFFENER PLATE NOT SHOWN



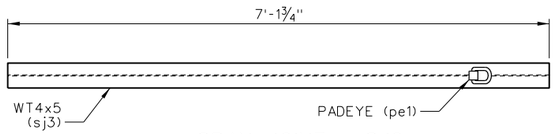
SPAN JOINT DETAIL - AT ABUTMENT
SCALE: NTS



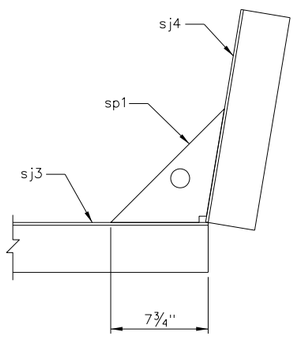
JOINT WELD DETAIL
SCALE: NTS



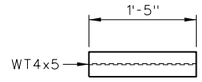
TYPICAL PADEYE DETAIL
SCALE: 3" = 1'-0"
* PADEYES SHALL BE "CROSBY" S-265, WELD-ON PIVOT LINK OR APPROVED EQUAL



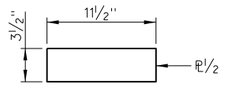
SPAN JOINT - SJ2
SCALE: 1" = 1'-0"
SPAN CURB JOINT AND STIFFENER PLATE NOT SHOWN



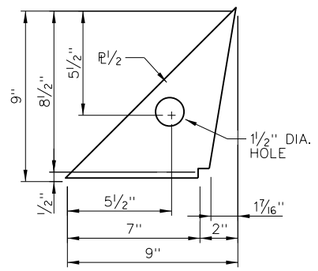
JOINT DETAIL
SCALE: NTS



SPAN CURB JOINT - sj4
SCALE: 1" = 1'-0"



SPAN JOINT CONNECTOR - sjc1
SCALE: 1½" = 1'-0"



STIFFENER PLATE - sp1
SCALE: 3" = 1'-0"

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HDR ENGINEERING, INC.
4400 LEEDS AVE., SUITE 450
NORTH CHARLESTON, SC 29405
843-414-3700

APPROVED FOR
R.J. CORMAN RAILROAD COMPANY/
CAROLINA LINES BY
HDR ENGINEERING INC.
OF THE CAROLINAS
(CHARLESTON, SC)
BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020
FILE: 334.5-21.dgn

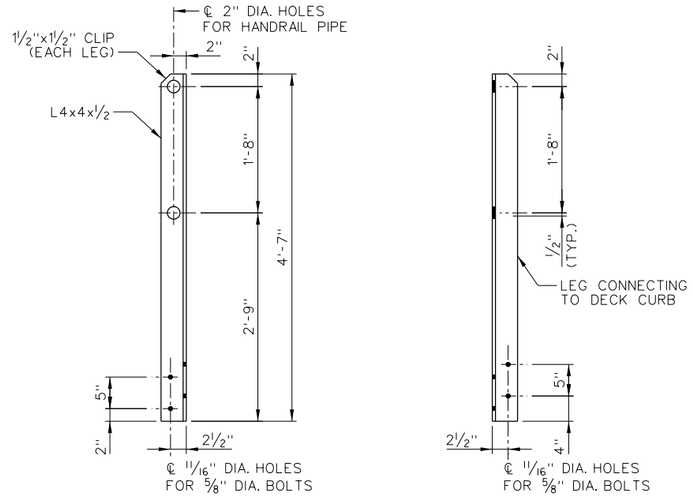
REVISIONS

RJ Corman Railroad Company

BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP
SPAN JOINT DETAILS
HORRY COUNTY CONWAY, SC
R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

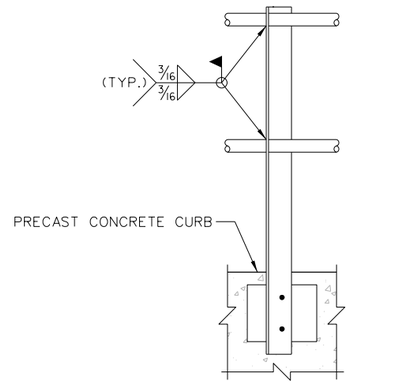
SCALE: AS SHOWN	VAL. SEC.	DRAWING NO.
DATE: 3/16/2020		334.5-21
DESIGN: TCS		
DRAWN: RGD		
CHECKED: JFM		

FILENAME: c:\pwworking\east01\d1230212\334.5-21.dgn USER: rdixon SCALE FACTORS CORRESPOND WITH FULL SIZE (22"x34") DRAWINGS



HANDRAIL DETAIL - HP2

SCALE: 1" = 1'-0"

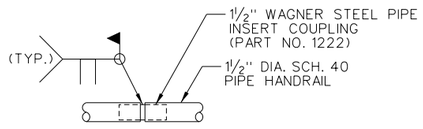


HANDRAIL WELD DETAIL

SCALE: 1" = 1'-0"

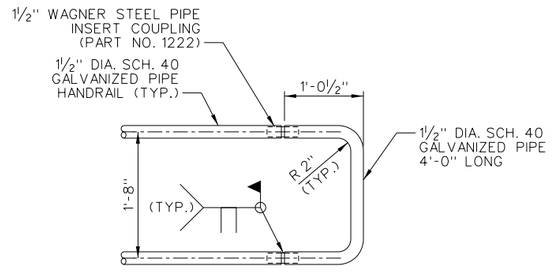
NOTES

1. SEE DRAWING NO. 334.5-04 FOR MISCELLANEOUS STEEL NOTES.
2. HANDRAIL TO BE HOT-DIPPED GALVANIZED SCHEDULE 40 STEEL PIPE.
3. HANDRAIL SHALL BE SPLICED BETWEEN SPANS.
4. HANDRAIL POSTS AND LATERAL STOPS TO BE SHOP PAINTED WITH A SINGLE COAT OF CARBOMASTIC 615 AL (8-10 MILS DRY FILM THICKNESS, DFT) OR APPROVED EQUAL AFTER FABRICATION.
5. PEJF SHOULD BE ATTACHED TO THE LATERAL RESTRAINT PER MANUFACTURER SPECIFICATIONS.
6. AFTER WELDING HANDRAILS, THOROUGHLY COAT AREAS OF EXPOSED STEEL WITH TWO COATS OF COLD GALVANIZING SPRAY.



HANDRAIL SPLICE - HS1

SCALE: 1½" = 1'-0"



HANDRAIL END ASSEMBLY - HE1

SCALE: 1" = 1'-0"

LIST OF HIGH STRENGTH FIELD BOLTS (1 HANDRAIL POST)							
NO. REQ'D	SIZE	THICKNESS			GRIP	LENGTH	PIECES CONNECTED
2	5/8"	1/2"	1/2"		1"	2" *	HANDRAIL POST (HP2), HANDRAIL CONN. PLATE (HR)

* PROVIDE MINIMUM THREAD LENGTH OF 1 1/2"

ALSO REQUIRED:
2 EA. WASHERS FOR 5/8" DIA. BOLT

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BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020
FILE: 334.5-22.dgn

REVISIONS

R.J. Corman Railroad Company

BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP
HANDRAIL DETAILS
HORRY COUNTY CONWAY, SC
R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

SCALE: AS SHOWN
DATE: 3/16/2020
DESIGN: TCS
DRAWN: RGD
CHECKED: JFM

VAL. SEC.

DRAWING NO. 334.5-22

FILENAME: c:\pwworking\east01\d1230212\334.5-22.dgn USER: rdixon SCALE FACTORS CORRESPOND WITH FULL SIZE (22"x34") DRAWINGS

PROJECT: RJ Corman Bridge Replacement over Crabtree Swamp
Conway, South Carolina
S&ME Project No. 1463-19-046

BORING LOG B-1

DATE DRILLED: 10/16/19	ELEVATION:	NOTES: Located 21' from bridge and 52' from front face of timber abutment. Elevation unknown.
DRILL RIG: Trailer	BORING DEPTH: 120.0 ft	
DRILLER: M. Radford	WATER LEVEL: 1.1' ATD, 1.5' 24 hr	
HAMMER TYPE: Automatic	LOGGED BY: W. King	
SAMPLING METHOD: Fixed Head Sample, Split spoon	STATIONING:	OFFSET:
DRILLING METHOD: Mud Rotary		

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	STANDARD PENETRATION TEST DATA (blows/ft) /REMARKS 10 20 30 60/80	N VALUE
0		TOPSOIL - APPROXIMATELY 6 INCHES	2	1		1	1	2		3
		FAT CLAY (CH) - Mostly medium to high plasticity fines, trace fine to medium sand, tan/gray, moist to wet, very soft to soft.		2		2	1	1		2
5				3		1	1	1		2
				4		0	1	6		1
				5		1	1	1	102%	2
10		FAT CLAY WITH SAND (CH) - Mostly medium to high plasticity fines, few fine to medium sands, gray, saturated, very soft.		6		0	0	1		1
15		CLAYEY SAND (SC) - Mostly fine to medium sand, some medium to high plasticity fines, tan/gray, moist to wet, very loose.		7		WOH	WOH	WOH		WOH
20		PEE DEE FORMATION - FAT CLAY (CH) - Mostly medium to high plasticity fines, some fine to medium sand, gray, saturated, firm to stiff.		8		1	3	4		7
25		--- Stiff		9		5	6	9		15
30				10		6	8	12		20

NOTES:
1. THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.
2. BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.
3. STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.
4. WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.

PROJECT: RJ Corman Bridge Replacement over Crabtree Swamp
Conway, South Carolina
S&ME Project No. 1463-19-046

BORING LOG B-1

DATE DRILLED: 10/16/19	ELEVATION:	NOTES: Located 21' from bridge and 52' from front face of timber abutment. Elevation unknown.
DRILL RIG: Trailer	BORING DEPTH: 120.0 ft	
DRILLER: M. Radford	WATER LEVEL: 1.1' ATD, 1.5' 24 hr	
HAMMER TYPE: Automatic	LOGGED BY: W. King	
SAMPLING METHOD: Fixed Head Sample, Split spoon	STATIONING:	OFFSET:
DRILLING METHOD: Mud Rotary		

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	STANDARD PENETRATION TEST DATA (blows/ft) /REMARKS 10 20 30 60/80	N VALUE
40		--- Very stiff		11		5	9	10		19
		PEE DEE FORMATION - SANDY SILT (ML) - Mostly low to medium plasticity fines, some fine to medium sand, gray, saturated, stiff to very hard.		12		5	8	9		17
45				13		5	7	9		16
50				14		5	7	9		16
55		--- Stiff		15		5	5	7		12
60				16		4	6	6		12
65				17		28	50/2			50/2

NOTES:
1. THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.
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PROJECT: RJ Corman Bridge Replacement over Crabtree Swamp
Conway, South Carolina
S&ME Project No. 1463-19-046

BORING LOG B-1

DATE DRILLED: 10/16/19	ELEVATION:	NOTES: Located 21' from bridge and 52' from front face of timber abutment. Elevation unknown.
DRILL RIG: Trailer	BORING DEPTH: 120.0 ft	
DRILLER: M. Radford	WATER LEVEL: 1.1' ATD, 1.5' 24 hr	
HAMMER TYPE: Automatic	LOGGED BY: W. King	
SAMPLING METHOD: Fixed Head Sample, Split spoon	STATIONING:	OFFSET:
DRILLING METHOD: Mud Rotary		

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	STANDARD PENETRATION TEST DATA (blows/ft) /REMARKS 10 20 30 60/80	N VALUE
75		--- Very hard		18		50/3				50/3
		PEE DEE FORMATION - SILTY CLAYEY SAND (SC-SM) - Mostly fine to medium sand, some low to medium plasticity fines, gray, saturated, medium dense to very dense.		19		5	12	28		40
80		--- Dense		20		7	9	14		23
85		--- Medium dense		21		10	11	16		27
90		PEE DEE FORMATION - CLAYEY SAND (SC) - Mostly fine to medium sand, some low to medium plasticity fines, gray, saturated, medium dense to very dense.		22		10	10	17		27
95				23		19	12	19		31
100		--- Dense		24		50/1				50/1

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3. STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.
4. WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.

PROJECT: RJ Corman Bridge Replacement over Crabtree Swamp
Conway, South Carolina
S&ME Project No. 1463-19-046

BORING LOG B-1

DATE DRILLED: 10/16/19	ELEVATION:	NOTES: Located 21' from bridge and 52' from front face of timber abutment. Elevation unknown.
DRILL RIG: Trailer	BORING DEPTH: 120.0 ft	
DRILLER: M. Radford	WATER LEVEL: 1.1' ATD, 1.5' 24 hr	
HAMMER TYPE: Automatic	LOGGED BY: W. King	
SAMPLING METHOD: Fixed Head Sample, Split spoon	STATIONING:	OFFSET:
DRILLING METHOD: Mud Rotary		

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	STANDARD PENETRATION TEST DATA (blows/ft) /REMARKS 10 20 30 60/80	N VALUE
110		--- Very dense		25		5	7	10		17
		PEE DEE FORMATION - SILTY SAND (SM) - Mostly fine to medium sand, some low to medium plasticity fines, gray, saturated, medium dense to very dense.		26		19	19	48		67
115		--- Very dense		27		7	9	12		21
120		--- Medium dense Boring terminated at 120 ft								

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4. WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.

SCALE FACTORS CORRESPOND WITH FULL SIZE (22"x34") DRAWINGS

USER: rdixon

FILENAME: c:\pwworking\east01\d1152259\334.5-23.dgn

RELEASED FOR BID - NOT FOR CONSTRUCTION

RJ Corman Railroad Company

REVISIONS

BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP

BORING LOG (1 OF 2)

HORRY COUNTY CONWAY, SC

R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

HDR ENGINEERING, INC.
4400 LEEDS AVE., SUITE 450
NORTH CHARLESTON, SC 29405
843-414-3700

FILE: 334.5-23.dgn

SCALE: AS SHOWN	VAL. SEC.	DRAWING NO.
DATE: 3/16/2020		334.5-23
DESIGN: TCS		
DRAWN: RGD		
CHECKED: JFM		

PROJECT: **Corman Bridge Replacement over Crabtree Swamp**
Conway, South Carolina
S&ME Project No. 1463-19-046

BORING LOG B-2

DATE DRILLED: **10/18/19** | ELEVATION:
DRILL RIG: **Track** | BORING DEPTH: **120.0 ft**
DRILLER: **G. Elster** | WATER LEVEL: **1.5' ATD, 2.3' 24 hr**
HAMMER TYPE: **Automatic** | LOGGED BY: **K. Fugate**
SAMPLING METHOD: **Fixed Head Sample, Split spoon** | STATIONING: | OFFSET:
DRILLING METHOD: **Mud Rotary**

NOTES: **Located 30' from bridge and 23' from front face of timber abutment. Elevation unknown.**

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	STANDARD PENETRATION TEST DATA (blows/ft) 10 20 30 60/80 /REMARKS	N VALUE
0		TOPSOIL - APPROXIMATELY 5 INCHES		0.3	1		2	2	2		4
		SANDY FAT CLAY (CH) - Mostly medium to high plasticity fines, some fine to medium sand, tan/gray, moist to wet, soft.			2		2	3			5
5		CLAYEY SAND (SC) - Mostly fine to medium sand, some low to medium plasticity fines, gray/tan, wet to saturated, loose.			3		2	4	4		8
		SANDY FAT CLAY (CH) - Mostly medium to high plasticity fines, some fine to medium sand, gray/tan, saturated, firm.			4		2	3			5
10		CLAYEY SAND (SC) - Mostly fine to medium sand, some low to medium plasticity fines, gray, saturated, loose.			5		2	2			4
		POORLY GRADED SAND (SP) - Mostly fine to medium sand, trace fines, gray, saturated, very loose.			6		0	0	1		1
15		FAT CLAY WITH SAND (CH) - Mostly medium to high plasticity fines, few fine to medium sands, gray, saturated, soft to very soft.			7		2	2	2		4
20		SANDY LEAN CLAY (CL) - Mostly low to medium plasticity fines, some fine to medium sand, gray/tan, saturated, soft to very soft.			8		1	1	100%		2
25		POORLY GRADED SAND WITH CLAY (SP-SC) - Mostly fine to medium sand, few low to medium plasticity fines, gray, very loose.			9		6	7	9		16
30		PEE DEE FORMATION - SANDY SILT (ML) - Mostly low to medium plasticity fines, some fine to medium sand, gray, saturated, stiff to very stiff.			10		6	8	8		16

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PROJECT: **Corman Bridge Replacement over Crabtree Swamp**
Conway, South Carolina
S&ME Project No. 1463-19-046

BORING LOG B-2

DATE DRILLED: **10/18/19** | ELEVATION:
DRILL RIG: **Track** | BORING DEPTH: **120.0 ft**
DRILLER: **G. Elster** | WATER LEVEL: **1.5' ATD, 2.3' 24 hr**
HAMMER TYPE: **Automatic** | LOGGED BY: **K. Fugate**
SAMPLING METHOD: **Fixed Head Sample, Split spoon** | STATIONING: | OFFSET:
DRILLING METHOD: **Mud Rotary**

NOTES: **Located 30' from bridge and 23' from front face of timber abutment. Elevation unknown.**

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	STANDARD PENETRATION TEST DATA (blows/ft) 10 20 30 60/80 /REMARKS	N VALUE
40		PEE DEE FORMATION - SANDY SILT (ML) - Mostly low to medium plasticity fines, some fine to medium sand, gray, saturated, stiff to very stiff. *(continued)* - - - Very stiff			11		9	9	13		22
45		PEE DEE FORMATION - FAT CLAY (CH) - Mostly medium to high plasticity fines, trace fine to medium sand, gray, saturated, very stiff.			12		6	9	9		18
50					13		6	8	10		18
55		PEE DEE FORMATION - SANDY SILT (ML) - Mostly low to medium plasticity fines, some fine to medium sand, gray, saturated, stiff to hard.			14		7	7	11		18
60					15		6	8	8		16
65		- - - Stiff			16		6	7	8		15
					17		5	9	30		39

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PROJECT: **Corman Bridge Replacement over Crabtree Swamp**
Conway, South Carolina
S&ME Project No. 1463-19-046

BORING LOG B-2

DATE DRILLED: **10/18/19** | ELEVATION:
DRILL RIG: **Track** | BORING DEPTH: **120.0 ft**
DRILLER: **G. Elster** | WATER LEVEL: **1.5' ATD, 2.3' 24 hr**
HAMMER TYPE: **Automatic** | LOGGED BY: **K. Fugate**
SAMPLING METHOD: **Fixed Head Sample, Split spoon** | STATIONING: | OFFSET:
DRILLING METHOD: **Mud Rotary**

NOTES: **Located 30' from bridge and 23' from front face of timber abutment. Elevation unknown.**

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	STANDARD PENETRATION TEST DATA (blows/ft) 10 20 30 60/80 /REMARKS	N VALUE
75		PEE DEE FORMATION - SANDY SILT (ML) - Mostly low to medium plasticity fines, some fine to medium sand, gray, saturated, stiff to hard. *(continued)* - - - Hard			18		8	9	23		32
80		PEE DEE FORMATION - SILTY CLAYEY SAND (SC-SM) - Mostly fine to medium sand, some low to medium plasticity fines gray, saturated, dense to very dense.			19		50/0				50/0
85		- - - Very dense			20		38	50/3			50/3
90					21		15	50/4			50/4
95		PEE DEE FORMATION - CLAYEY SAND (SC) - Mostly fine to medium sand, some low to medium plasticity fines, gray, medium dense.			22		11	9	12		21
100					23		11	12	13		25
					24		5	6	6		12

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PROJECT: **Corman Bridge Replacement over Crabtree Swamp**
Conway, South Carolina
S&ME Project No. 1463-19-046

BORING LOG B-2

DATE DRILLED: **10/18/19** | ELEVATION:
DRILL RIG: **Track** | BORING DEPTH: **120.0 ft**
DRILLER: **G. Elster** | WATER LEVEL: **1.5' ATD, 2.3' 24 hr**
HAMMER TYPE: **Automatic** | LOGGED BY: **K. Fugate**
SAMPLING METHOD: **Fixed Head Sample, Split spoon** | STATIONING: | OFFSET:
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NOTES: **Located 30' from bridge and 23' from front face of timber abutment. Elevation unknown.**

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	STANDARD PENETRATION TEST DATA (blows/ft) 10 20 30 60/80 /REMARKS	N VALUE
110		PEE DEE FORMATION - CLAYEY SAND (SC) - Mostly fine to medium sand, some low to medium plasticity fines, gray, medium dense. *(continued)*			25		7	6	6		12
115		PEE DEE FORMATION - SILTY SAND (SM) - Mostly fine to medium sand, some low to medium plasticity fines, gray, medium dense to very dense.			26		8	38	50/2		50/2
120		- - - Very dense			27		38	14	16		30
		PEE DEE FORMATION - CLAYEY SAND (SC) - Mostly fine to medium sand, some low to medium plasticity fines, gray, medium dense.									
		Boring terminated at 120 ft									

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SCALE FACTORS CORRESPOND WITH FULL SIZE (22"x34") DRAWINGS

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FILENAME: c:\pwworking\east01\d1152259\334.5-24.dgn

RELEASED FOR BID - NOT FOR CONSTRUCTION

HDR ENGINEERING, INC.
4400 LEEDS AVE., SUITE 450
NORTH CHARLESTON, SC 29405
843-414-3700

FILE: 334.5-24.dgn

RJ Corman Railroad Company

REVISIONS

BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP

BORING LOG (2 OF 2)

HORRY COUNTY — CONWAY, SC

R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

SCALE: AS SHOWN
DATE: 3/16/2020
DESIGN: TCS
DRAWN: RGD
CHECKED: JFM

VAL. SEC.

DRAWING NO. 334.5-24

RJ Corman Railroad Company

Geotechnical Report

April 17, 2020

Geotechnical Design Report

R.J. Corman Railroad Company / Carolina Lines (RJC)

Bridge at MP 334.50

HDR Job No. 10188549
March 18, 2020

March 18, 2020

Mr. Jimmy Kelley
R.J. Corman Railroad Company / Carolina Lines
PO Box 788, 101 RJ Corman Dr
Nicholasville, KY 40340

RE: Geotechnical Design Report
Bridge at MP 334.50 Crossing Crabtree Swamp
R.J. Corman Railroad Company / Carolina Lines (RJC)

Dear Mr. Kelley:

HDR, Inc. is pleased to provide the accompanying report, which presents the results of our geotechnical analyses of the proposed bridge replacement at MP 334.50 crossing Crabtree Swamp near Conway, South Carolina.

This report presents our findings, conclusions, and recommendations for the geotechnical aspects of the proposed construction. It has been our pleasure to serve you on this very important project. Please contact us if you have any questions or comments concerning this information.

Sincerely,

HDR ENGINEERING, Inc.

Lyndsie Janbakhsh, P.E.
Senior Geotechnical Engineer

T. Craig Barnett, P.E.
Geotechnical Section Manager

Stephen Borders, P.E.
Geotechnical Engineer

Enclosure

Contents

Tables

Figures

Appendices

1 Introduction

This report presents the results of the geotechnical investigation and design performed for the proposed R.J. Corman Railroad Company / Carolina Lines (RJC) bridge replacement at Milepost 334.50 over Crabtree Swamp. This project is located in Horry County, South Carolina; north of the town of Conway. HDR Engineering, Inc. (HDR) prepared this report for RJC. The Project Location Map is included as Figure 1.

This report presents HDR's findings, conclusions, and recommendations regarding:

- Geologic Setting;
- Site Conditions;
- Subsurface soil and groundwater conditions;
- Evaluation of the engineering characteristics of the foundation soils; and
- Recommendations for foundation design.

This report was prepared by a civil engineer specializing in geotechnical engineering and reviewed by a registered professional engineer. The recommendations presented herein are based on the applicable standards of the profession at the time of this report within this geographic area. This report has been prepared for the exclusive use of RJC for specific application to the proposed project and in accordance with generally accepted foundation engineering practices.

HDR performed the work in accordance with the current American Railway Engineering and Maintenance of Way Association Manual for Railway Engineering (AREMA 2019) and RJC requirements for foundation design, as well as the generally accepted state of practice.

2 Project and Site Description

The proposed project at MP 334.50 consists of the removal and replacement of the existing timber bridge that crosses Crabtree Swamp. The existing RJC Bridge at MP 334.50 is an approximately 220-foot long, multi-span bridge. The proposed bridge will be an approximately 238-foot long, multi-span bridge founded on new abutments and piers. The superstructure of the proposed bridge will consist of prestressed concrete box beams on precast concrete pile bents supported by driven steel HP14x102 piles. The Project Plan Set is included in Appendix A.

3 Site Topography and Geologic Conditions

The project site is located in the central portion of Horry County, South Carolina within the Atlantic Coastal Plain physiographic region, more specifically the Outer Coastal Plain Province within South Carolina. The Outer Coastal Plain Province is characterized as a broad, relatively flat plain with sandy soils and extends from the Sandhills to the Atlantic

Ocean. Elevations range from approximately 0 to 100 feet above mean sea level (MSL). Site specifically, the elevation ranges from 10 to 20 feet above mean sea level, based on United States Geological Survey 7.5-minute series map of the Conway, SC 2017 Quadrangle.

A custom soil resource report obtained from the United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) indicates that the surficial soil deposits within approximately 72 inches of the ground surface belong to the Meggett soils consisting of loam, clay loam, and sand. The USDA report also indicates that the USCS classification of the surficial soils consist of CL.

Available mapping by the South Carolina Department of Natural Resources indicates the project site to be underlain by unconsolidated Pleistocene fluvial sands, backbarrier muds, and barrier beach sands belonging to the Socastee Formation. The Socastee Formation is described as variegated quartzose sands, argillaceous sands, and clays. The Project Geological Map is included as Figure 2.

4 Subsurface Explorations

The subsurface exploration for the project consisted of drilling two Standard Penetration Test (SPT) sample borings and two Cone Penetration Test (CPT) soundings, designated herein as Boring B-1, B-2, CPT-1, and CPT-2. Boring B-1 and CPT-1 were advanced to the north and Boring B-2 and CPT-2 were advanced south of Crabtree Swamp. Exact location data was not provided for the CPT soundings, however field personnel indicated the CPT soundings were located within approximately 5 feet of the respective SPT boring locations. The typed boring logs for Boring B-1 and B-2 and CPT results for CPT-1 and CPT-2 are included in Appendix B. A Boring Location Map is included as Figure 3.

Boring elevations were estimated using Google Earth satellite imagery and locations were estimated based on the information on the boring logs. Table 4-1 provides a summary of the estimated latitude, longitude, elevations, and depths of the subsurface exploration conducted at the project site.

Table 4-1. Subsurface Exploration Summary

Boring ID	Latitude (DMS)[a]	Longitude (DMS)[a]	Surface Elevation (feet)[a]	Depth to Groundwater Table (feet)[b]	Depth to Refusal (feet)[c]	Boring Termination Depth (feet)	Bottom of Boring Elevation (feet)
B-1	33°51'41.68"N	79°02'58.22"W	8.0	N/A	N/A	120.0	-112.0
B-2	33°51'40.26"N	79°02'57.49"W	16.0	N/A	N/A	120.0	-104.0
CPT-1	33°51'41.68"N	79°02'58.22"W	--	4.0	63.5	63.5	--
CPT-2	33°51'40.26"N	79°02'57.49"W	--	5.0	71.3	71.3	--

[a] Latitude, longitude, and surface elevation based on Google satellite imagery. CPT soundings were estimated to be within 5 feet of the SPT borings, per S&ME.

[b] Groundwater table readings not taken due to mud rotary drilling methods utilized during field operations; however, groundwater readings were taken utilizing the cone in the CPT soundings.

[c] CPT refusal occurred because the reaction weight of the CPT rig was exceeded by the thrust required to push the conical tip further.

S&ME Engineering, Inc. performed the drilling and sampling operations from October 16, 2019 to October 18, 2019 and CPT soundings were performed on October 9th, 2019. The SPT drill crew operated a trailer and track-mounted drill rig equipped with an automatic hammer and mud rotary. SPT samples were collected beginning at the existing ground surface and were continuously sampled in the top 10 feet. SPT samples were then collected at 5.0-foot intervals beginning at a depth of 15.0 feet and continued until boring termination at a depth of 120.0 feet below existing ground surface. Rock coring was not performed for Borings B-1 or B-2. Drilling and sampling techniques were accomplished in accordance with the American Society for Testing and Materials (ASTM) procedures.

CPT soundings were also advanced in general accordance with ASTM D 5778 procedures. The soundings were terminated due to refusal at depths of 63 feet and 71 feet for CPT-1 and CPT-2, respectively. CPT soundings measure several parameters and include the skin friction measured along the cone, tip resistance, pore water pressure, and the friction ratio which is the skin friction divided by the tip resistance. Also, S&ME produced a Normalized Soil Behavior Type Chart (SBT_{FR}) based on the methods introduced by Robertson in 1990 and mentioned in the Canadian Geotechnical Journal in 2009. This parameter estimates the soil type using normalized cone parameters by plotting a chart comparing the cone bearing resistance and the friction ratio.

In addition, S&ME provided an estimate of the average shear wave velocity down to the termination depth in Sounding B-1. This average shear wave velocity was used to determine the Site Class for seismic analyses. CPT results can be viewed in Appendix B.

4.1 Laboratory Testing and Results

HDR reviewed the field boring logs to estimate the depth and thickness of the soil strata. A laboratory testing program was developed to evaluate the engineering properties of the recovered samples and to substantiate the soil classifications determined in the field. The laboratory testing program tested the foundation soils to determine Atterberg Limits (plasticity), grain-size, unconfined compressive strength tests (see results in Table 4-2), and percentage of fines (less than the #200 Sieve). Laboratory tests were conducted in accordance with the ASTM test procedures applicable at the time of testing. Laboratory test results are presented in Appendix B of this report.

Table 4-2. Summary of Unconfined Compressive Strength Test Results

Boring ID	Sample Depth (feet)	Soil Type	Moisture Content (%)	Unit Weight (pcf)	Unconfined Compressive Strength (psf)	Shear Strength (psf)
B-1	10 - 12	CH	56.5	101.1	343	171
B-2	21 - 23	CL	26.2	122.2	1192	596

[a]Tests were performed in accordance with ASTM D2166

5 Subsurface Conditions

The drilling and sampling operations performed at the project site indicate the subsurface materials in the immediate vicinity of the proposed bridge consist of soil deposits greater than 120.0 feet in thickness. In general, the subsurface materials observed during drilling operations consisted of fat clay, lean clay, clayey sand, poorly graded sand, sandy silt, silty clayey sand, and clayey and silty sands extending to boring termination.

UPPER CLAYS AND CLAYEY SANDS (CH, SC, SP, CL) was encountered at existing ground surface and extended to a depth of 23.0 feet (or El. -15.0 feet) in Boring B-1 and to a depth of 27.0 feet (or El. -11.0 feet) in Boring B-2 below existing ground surface. The material was described as tan/gray, gray, trace fine to medium sand, moist to saturated, very soft to firm fat clay; tan/gray, gray, low to high plasticity fines, moist to saturated, very loose to loose, clayey sand; gray, trace fines, saturated, very loose poorly graded sand; gray/tan, fine to medium sand, saturated, soft to very soft, sandy lean clay; and gray, low to medium plasticity fines, very loose, poorly graded sand with clay. Laboratory testing indicates this layer had a fines content (passing #200 sieve) ranging from 61.2 to 90.9 percent and an average fines content of 76.1 percent. Average moisture content and plasticity index values for this layer were found to be 20.8 percent and 18, respectively. The average uncorrected field blow count for this soil layer was 3 bpf.

FAT CLAY (CH) was encountered at depths of 23.0 feet (or El. -15.0 feet) in Boring B-1 and 43.0 feet (or El. -27.0 feet) in Boring B-2. This material extended to a depth of 38.0 feet (or El. -30.0 feet) in Boring B-1 and to a depth of 58.0 feet (or EL. -42.0 feet) in Boring B-2. The material was described as gray, trace to some fine to medium sand, saturated, firm to very stiff fat clay. This layer is known to be included within the Pee Dee Formation as known in South Carolina. Laboratory testing indicates this layer had a fines content (passing #200 sieve) ranging from 90.9 to 96.2 percent and an average fines content of 93.6 percent. Average moisture content and plasticity index values for this layer were found to be 26.8 percent and 41, respectively. The average uncorrected field blow count for this soil layer was 16 bpf.

SANDY SILT (ML) was encountered at depths of 38.0 feet (or El. -30.0 feet) in Boring B-1 and 27.0 feet (or El. -11.0 feet) in Boring B-2. This material extended to a depth of 73.0 feet (or El. -65.0 feet) in Boring B-1. In Boring B-2, this material was split by fat clay material (from 43.0 feet to 58.0 feet) and extended to depths of 43.0 feet (or El. -27.0 feet) and 73.0 feet (or El. -57.0 feet). The material was described as gray, some fine to medium sand, saturated, stiff to hard sandy silt. This layer is known to be included within the Pee Dee

Formation as known in South Carolina. Laboratory testing was not performed on this layer. The average uncorrected field blow count for this soil layer was 24 bpf.

SILTY CLAYEY SAND (SC-SM) was encountered at depths of 73.0 feet (or El. -65.0 feet) in Boring B-1 and 73.0 feet (or El. -57.0 feet) in Boring B-2. This material extended to depths of 88.0 feet (or El. -80.0 feet) at Boring B-1 and to a depth of 92.0 feet (or El. -76.0 feet) at Boring B-2. The material was described as gray, some low to medium plasticity fines, saturated, medium dense to very dense silty clayey sand. This layer is known to be included within the Pee Dee Formation as known in South Carolina. Laboratory testing indicates this layer had an average moisture content and plasticity index values of 19.1 percent and 7, respectively. The average uncorrected field blow count for this soil layer was 71 bpf.

CLAYEY AND SILTY SAND (SC, SM) was encountered at depths of 88.0 feet (or El. -80.0 feet) at Boring B-1 and a depth of 92.0 feet (or El. -76.0 feet) at Boring B-2 and extended to boring termination at depths of 120.0 feet (or El. -112.0 feet in Boring B-1 and El. -104.0 feet in Boring B-2) below the ground surface. The material was described as gray, some low to medium plasticity fines, saturated, medium dense to very dense clayey sand and gray, some low to medium plasticity fines, saturated, medium dense to very dense silty sand in Boring B-1. In Boring B-2 this material was described as gray, some low to medium plasticity fines, medium dense clayey sand and gray, some low to medium plasticity fines, medium dense to very dense silty sand. Laboratory testing indicates this layer had a fines content (passing #200 sieve) ranging from 20.3 to 48.9 percent and an average fines content of 32.8 percent. Average moisture content and plasticity index values for this layer were found to be 21.7 percent and 8, respectively. The average uncorrected field blow count for this soil layer was 38 bpf.

GROUNDWATER was encountered at depths ranging from 1.1 to 1.5 feet during drilling and 1.5 feet to 2.3 feet 24 hours after drilling was completed. The elevation of Crabtree Swamp at the time of survey field operations was 2.40 feet. Fluctuations of the groundwater level, localized zones of perched water and/or an increase in soil moisture should be anticipated during and following the rainy seasons, periods of locally intense rainfall or storm water runoff.

6 Geologic Hazards

The following paragraphs provide an assessment of potential geologic hazards in the vicinity of the project.

6.1 Karst Features

Karst features were not encountered during the field exploration. Upon review of the “Karst in the United States: A Digital Map Compilation and Databased” (USGS, 2014) the site is located within the zone highlighted as unconsolidated calcareous or carbonate rocks buried beneath <300 ft of insoluble sediments. This region is not known to contain karst features near the surface. A Karst Potential Map is included as Figure 4.

6.2 Faults/Seismic Activity

Faults were not encountered during the subsurface investigation. Available mapping by the South Carolina Department of Natural Resources suggests that multiple geophysically inferred faults lie within approximately 10 miles of the project site to the west, east, and south. The Horry Basin, a depression between two normal faults, is located approximately 12 miles to the north of the project site and is also geophysically inferred. Historically, South Carolina experiences between two to five earthquakes per year with magnitudes ranging from 2.0 to 5.0 on the Richter scale and most causing little to no damage. However, the 1886 Charleston earthquake registered between 6.9 and 7.3 on the Richter Scale and remains one of the largest recorded earthquakes in the eastern United States. Unconsolidated sediments, such as those covering the project site, often amplify ground motion produced by seismic waves. Additional mapping by the South Carolina Department of Natural Resources (SCDNR, 1996) indicates the project site to lie in an area with a noted potential for liquefaction. Based on AREMA guidelines, the site classifies as site class D for seismic design (See Section 7.6). A Seismic Hazard Map is included as Figure 5.

6.3 Flood Hazard

Published flood hazard mapping indicates the project is located in an area designated as FEMA Flood Zone AE Regulatory Floodway (FEMA 2019). FEMA regulatory Flood Zone AE is defined as an area in which the adjacent land must be reserved to prevent the cumulative increase in upstream flood elevations. Based on elevations shown near the bridge, the water surface elevation may reach approximately El. 12 feet. A Flood Hazard Map is included as Figure 6.

6.4 Soil Corrosion Potential

The risk of corrosion of concrete and steel were considered for soils within the proposed project site. According to a customized soil report for the site from the United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS), the site is rated as a moderate risk for corrosion of concrete and high risk for corrosion of uncoated steel. However, additional laboratory tests would be necessary to determine the soils actual potential for corrosion of uncoated steel and concrete.

7 Engineering Analyses and Design Recommendations

Engineering analyses are included for the proposed deep foundation design. Based on the geotechnical exploration and laboratory testing program, deep foundation elements will rely primarily on skin friction for axial resistance. Axial resistance recommendations are provided below assuming that the driven steel H-piles, as indicated by the Project Plan Set, will be utilized as the primary foundation elements for the bridge crossing at MP 334.50. Approximate dimensions and elevations of the proposed structure utilized in the

engineering analyses reflect those outlined in the Project Plan Set. HDR utilized the procedures and recommendations outlined in AREMA (2019) Chapter 8.

7.1 Axial Pile Resistance

The axial resistance of the proposed deep foundations are expected to be derived primarily from skin resistance within the underlying soils encountered in Boring B-1 and Boring B-2. The subsurface conditions encountered in Borings B-1 and B-2 are expected to be generally representative of the subsurface conditions along the project alignment.

The recommendations outlined in AREMA (2019) Chapter 8, Section 4 were utilized in the analyses and development of the axial resistance for the steel HP14x102 piles. Allowable axial resistance was developed utilizing a factor of safety (FS) of 2.5 within the soil column and is based on soil parameters derived from the results of the subsurface investigation, and published correlations between SPT data and shear strengths. The computer program APILE (2018) aided in the estimation of the axial resistance for the steel HP14x102 piles.

Axial resistance versus depth graphs for a single driven steel HP14x102 pile at the proposed abutments and intermediate piers are included as Figure 7 and Figure 8, respectively. The axial resistance versus depth graphs include the ultimate axial resistance and allowable resistance based on a FS of 2.5. Any deviations in subsurface conditions, not revealed in the test boring, may affect the length of the piles. The axial resistances presented in this report are based on steel HP14x102 piles. If other pile alternatives are utilized the axial resistance should be reevaluated as the analyses presented herein would not be applicable.

To eliminate axial reduction factors, a minimum spacing requirement for the piles should be three pile diameters (equivalent) center-to-center, per AREMA (2019) Chapter 8, Section 4.2.3.3.a requirements.

7.2 Uplift Resistance

Uplift resistance versus depth graphs for a single driven steel HP14x102 pile at the proposed abutments and intermediate piers are included as Figure 9 and Figure 10, respectively. The allowable uplift resistance was developed by applying a factor of safety of 3.0 to the ultimate skin resistance developed along the interface between the exterior of the pile and the soil. The allowable uplift resistance was determined based on AREMA (2019) Chapter 8, Section 4.2.3.2.

7.3 Lateral Resistance

Lateral resistance analyses were not performed as part of this assessment. If significant lateral loads are anticipated for the piles, it is recommended that HDR be contacted to perform a site specific lateral analysis utilizing LPILE (2019) or FBMultipier computer programs. General soil profiles based on the borings drilled near the proposed bridge to be utilized in LPILE and FBMultipier analyses at the abutments and piers has been provided as Appendix C.

7.4 Hammer Energy

HDR performed drivability analyses to estimate the ultimate driving resistance and damage potential that a single steel HP14x102 pile alternative will experience during installation for the proposed bridge. The drivability analyses were performed utilizing the guidelines presented in the Federal Highway Administration's (FHWA) publication "Soils and Foundations Workshop Manual". Analyses are based on a single steel HP14x102 pile being driven to the maximum depths shown in Figures 7 and 8.

HDR estimated the driving resistances under the assumed condition that no interruptions and no pile set characteristics would be experienced during the driving process. Drivability analyses were conducted utilizing the GRLWEAP (version 2010) computer program that modeled the steel HP14x102 pile driven by a DELMAG D 46 diesel pile hammer utilizing the appropriate gain/loss factors that correlate with the appropriate soil type and setup factors. The DELMAG D 46 pile hammer has a manufacturer's maximum energy rating of 107.1 kip-feet of energy. If a pile hammer with a maximum energy rating different from that of a DELMAG 46 is used, it is recommended that an additional drivability analysis be conducted.

The GRLWEAP analyses indicate the DELMAG D 46 pile hammer can drive a single steel HP14x102 pile to an elevation of -77.6 feet without developing damaging compressive or tensile stresses within the pile and without experiencing an excessive number of hammer blows per foot of driving (more than 144 bpf). Predrilling can be recommended to reduce the resistance during driving thus reducing the required hammer energy and hammer size to drive the piles. If predrilling is desired, additional analyses are required and HDR should be contacted to perform these analyses.

7.5 Settlement and Slope Stability Analyses

The conceptual project plans indicate a minimal amount of new fill material will be placed near the proposed north abutment. Embankment loading stresses resulting in settlement of the foundation soils are expected to be minimal. HDR did not perform settlement or slope stability analyses for the proposed structure. If the final plans indicate placement of large amounts of new fill near the abutments or new embankment slopes are to be constructed, HDR should be contacted to perform updated analyses.

7.6 Seismic Design Considerations

The AREMA (2019) Manual provides guidelines for determining the seismic hazard. The seismic hazard is characterized by the acceleration response spectrum and the site factors associated with the relevant site coefficient. Based on these guidelines, Table 9-1-6, and engineering judgment, the site classifies as Site Class D for seismic design. The peak ground accelerations for typical return periods are provided below in Table 7-1. The peak ground accelerations were determined from Figures 9-1-1, 9-1-4 and 9-1-7 from the AREMA manual. These values should be scaled appropriately for the project Site Class D for seismic design.

Table 7-1. Peak Ground Accelerations

Return Period (years)	Peak Ground Acceleration (g)
100	0.01
475	0.04
2475	0.17

7.7 Negative Skin Friction

While project plans indicate minimal fill material will be placed around the proposed foundations which would create loading stresses that could result in settlement of the foundation soils, excess settlement from liquefaction of subsurface soils during a seismic event was considered. A liquefaction analysis was performed utilizing the SPT based methods developed by Idriss and Boulanger (2010) on borings B-1 and B-2. Liquefaction occurs when vibrations induced by an earthquake increase the pore water pressure within a soil medium causing loss of shear strength. Generally, liquefaction includes all phenomena involving excess deformations or movements as a result of transient or repeated disturbance of saturated cohesionless soils. However, as previously mentioned, the main underlying mechanism is the progressive development of pore pressure in cohesionless soils subjected to cyclic shearing.

The SPT based analysis performed indicated that minimal liquefaction would occur at the site during the design earthquake of magnitude 7.3 (2,500-yr return period) or a Level III event. Soil softening is expected to occur in the upper stratum clays and sands, but minimal liquefaction or seismic settlement is expected to occur within the Socastee or Pee Dee Formation.

Negative skin friction estimates are based on the soil movements (settlement) greater than 0.4 inches. Liquefaction analyses for the proposed site location indicate less than 0.4 inches of settlement is likely to occur, therefore negative skin friction analyses were not performed.

8 Recommendations for Construction

Based on the geotechnical exploration, HDR recommends driving the proposed steel HP14x102 piles to a depth that provides both the required axial and uplift resistance without overstressing the pile during driving. The Designer should utilize Figures 7 and 8 to verify that the required axial resistance is developed at the design pile tip bearing elevation. Likewise, the Designer should utilize Figures 9 and 104 to verify that the required uplift resistance is developed at the design pile tip bearing elevation. The Designer should also verify that the geotechnical axial resistance at the pile tip bearing elevation does not exceed the structural load capacity of the pile. If the geotechnical axial resistance exceeds the structural load capacity of the pile at the pile tip bearing elevation, the pile should be designed based on the structural load capacity of the pile.

The GRLWEAP drivability analyses indicate that a DELMAG D 46 diesel pile hammer with a manufacturer's maximum energy rating of approximately 107.1 kip-feet can drive a steel

HP14x102 pile to an elevation of -77.6 feet with minimal potential for pile damage or excessive hammer blows during installation. Predrilling can be performed to reduce the resistances during driving, thus decreasing the required hammer energy and hammer size. If predrilling is desired, HDR should be contacted to perform additional analyses.

A pile test program should be implemented to provide verification of bearing depths, axial capacities, and driving conditions. The test program should incorporate a Pile Driving Analyzer (PDA) with CAPWAP to estimate bearing capacity and driving stresses, as well as assess the structural integrity of the pile during driving. HDR recommends using a PDA on at least one pile at each bent location to aid in the development of driving criteria.

8.1 Site Preparation

In preparing the site for construction, all topsoil and any other deleterious materials should be completely removed from the construction area and any other areas which are to be cut or receive fill. Topsoil should be removed from the site or utilized as top-dressing in areas to be vegetated. In most places, trees, including root balls, should be removed in their entirety to a minimum depth of two feet below the subgrade elevation. All holes remaining after site preparation shall be backfilled and compacted and the entire area bladed to provide drainage, except, in areas to be immediately excavated. The Engineer may direct that the holes not be backfilled.

8.2 Fill and Backfill Materials

All soil fill and backfill materials should be approved by the geotechnical engineer before use. It is anticipated that most of the new fill material will come from borrow areas near the project and that the material will be similar in consistency to those encountered in the geotechnical investigation.

Any material delivered from an off-site borrow area should be approved prior to delivery to the project site, and shall be clean and free of any contaminated and hazardous materials. In general, acceptable backfill materials include crushed rock, well-graded sand and gravel, and lean clay exhibiting a liquid limit of less than 45 percent and a plasticity index of less than 20 percent. Satisfactory soil materials for structural fill are defined as those complying with ASTM D 2487 soil classification groups GW, GM, SM, SW, ML, and CL and may include GP, GC, SP, and SC soils. Soil fill should not include any rocks larger than 4 inches in diameter or any significant amount of organics or debris. Any rocks in a cohesive fill should be completely contained within a soil matrix.

Material other than those listed above should be considered deleterious material unless HDR personnel state otherwise after visual inspection of the material. Deleterious material should not be utilized in site fills, regardless of whether it is from an onsite source or delivered to the site. Deleterious material will include any organic matter, wood, metal, and metal or plastic piping.

8.3 Placement and Compaction of Fill and Backfill

Cohesive structural fill should be compacted to at least 95 percent of the maximum dry density as determined by the modified Proctor test, ASTM D 1557 for field tests. The moisture content of fill materials should be controlled to within 3 percent of the optimum

water content as determined by the modified Proctor test, ASTM D 1557. All soil fill should be placed in lifts 8 inches or less in loose thickness for machine compactors and 4 inches or less in loose thickness for hand compactors. Thicker lifts should only be utilized with the permission of the geotechnical engineer or his representative, provided that compaction requirements are met. After proof-rolling, the exposed subgrade should be scarified to a minimum depth of 6 inches and properly moistened and re-compacted to site standards before placing fill.

Compaction of rock fill and other fill that will be subject to performance criteria should be observed by the geotechnical engineer.

Construction specifications should require at least one in-place density test of the compacted fill for every 5,000 square feet of fill with a minimum of one test for each lift. For backfill around structures, construction specifications should require at least one in-place density test of the compacted fill for every 150 feet of trench with a minimum of one test for each lift. Each embankment lift shall be tested for compaction compliance before the next lift is placed. Before fill operations begin, representative samples of proposed fill materials should be tested for determination of laboratory compaction characteristics in accordance with ASTM D 1557. Gradation testing should be conducted in accordance with ASTM D 422. Liquid and plastic limit determinations should also be accomplished in accordance with ASTM D 4318 to verify material classification and evaluate shrink/swell potential.

8.4 Erosion Control

Erosion control will be necessary to minimize erosion caused by wind, by intense rainfall events, at culvert inlets and outlets, and at the toe of embankments located parallel to the flow of a watercourse. Erosion control measures should be utilized during construction and adhere to all requirements developed and expressed by federal, state, and local entities. Exposed soil along cut slopes and new embankments must be properly protected from surface erosion using best management and state-of-the-practice methods. Following the completion of grading of cut slopes and new embankments, seed and straw should be applied to the finished slopes to minimize erosion. Erosion control matting may be required to limit erosion of exposed slopes where a 2H:1V slope is to be constructed and maintained. It is recommended that wingwalls and aprons be utilized at culvert outlet and inlet locations to help direct the water into the culvert and protect the adjacent embankment or cut slope from erosion. All locations should be evaluated in the field prior to construction to establish appropriate erosion control methods.

8.5 Control of Surface Water

The control of surface runoff will be necessary to prevent erosion of exposed soils, especially on slopes, and the softening of exposed subgrades in excavations. Surficial drainage of slopes, ditches, trench drains, and pumping from sumps should be utilized as needed to readily remove any surface water, where needed. A drainage control plan to collect, control, and mitigate surface water flow should be developed and implemented prior to site grading. During construction operations, the drainage control plan should be reviewed and adjusted as necessary.

8.6 Construction Monitoring of Existing Structures

Existing nearby structures should be monitored during construction of the proposed foundations. The monitoring program may consist of surveying points positioned along the bridge and existing foundations. If the monitoring program demonstrates that the new construction is adversely impacting the existing bridge, then it may be necessary for the contractor to adjust the construction methods as needed to minimize any impact to the existing structure.

8.7 Pile Driving

All piles should be installed in general accordance with the R.J. Corman Railroad Company / Carolina Lines Standard Specifications. The piles should be driven to the design pile bearing as shown on the plans.

The contractor is responsible to ensure that the pile driving hammer delivers adequate energy to drive the proposed pile alternatives to the required capacities. In order to achieve the required capacity without premature refusal, the specified hammer must be in good operating condition and working at the manufacturer's recommended efficiency. The contractor should submit the specifications for the proposed hammer type, energy and efficiency, cap and anvil weight, cushion coefficient of restitution, and other pertinent parameters as needed to drive piles to required axial capacity without undue risk of damage to the piles during installation. The as-installed pile capacity should be estimated in accordance with the R.J. Corman Railroad Company / Carolina Lines Standard Specifications.

A pile test program should be implemented to provide verification of bearing depths, axial capacities, and driving conditions. During pile driving operations, the Contractor should incorporate a Pile Driving Analyzer (PDA) with CAPWAP at select pile locations. A minimum of two piles should be tested at this project site. Locations may be subject to change during the course of the project. A geotechnical engineer familiar with the site and specifications should observe the installation of the test piles.

The Contractor should have the PDA testing performed by a Professional Geotechnical Engineer. The Contractor should submit a copy of all PDA test data and associated reports to R.J. Corman Railroad Company / Carolina Lines or the authorized representative for inclusion into the construction records for the project.

The contractor should perform the wave equation on the proposed hammers to be utilized for the project.

The Contractor should keep a complete pile driving record for all piles driven. The pile driving record for each pile should include the blow count per foot and fall of the ram for every foot along the full length of the pile. All pertinent information for the pile hammer and any modifications should also be included in the record.

Predrilling may be utilized to reduce the necessary hammer energy to meet the required capacities. Predrilling is defined by drilling a vertical hole, then driving the pile into the hole. The predrill hole should be a small enough diameter so that the pile can be viably driven through and so that the pile has firm contact with the soil. The predrilled hole should be backfilled with flowable fill.

The piles are anticipated to rely primarily on skin resistance within the underlying soils for axial resistance.

9 Limitations

This report presents the findings, conclusions and recommendations for the geotechnical aspects of the proposed bridge replacement for R.J. Corman Railroad Company / Carolina Lines near Milepost 334.50 over Crabtree Swamp. It has been prepared in accordance with generally accepted engineering practice and in a manner consistent with the level of care and skill for this type of project within this geographic area. No warranty, expressed or implied, is made.

The conclusions and recommendations presented herein are based on field reconnaissance, research and available literature, the results of field exploration and laboratory materials testing, and the results of engineering analyses. Two geotechnical borings were drilled for the proposed bridge and the profile may not be representative of the soil conditions across the entire length of the bridge.

Geotechnical engineering and the geologic sciences are characterized by uncertainty. Professional judgments presented herein are based partly on our understanding of the proposed construction, partly on our general experience, and on the state-of-the-practice at the time of this writing.

10 References

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Figures

March 18, 2020

Prepared by:

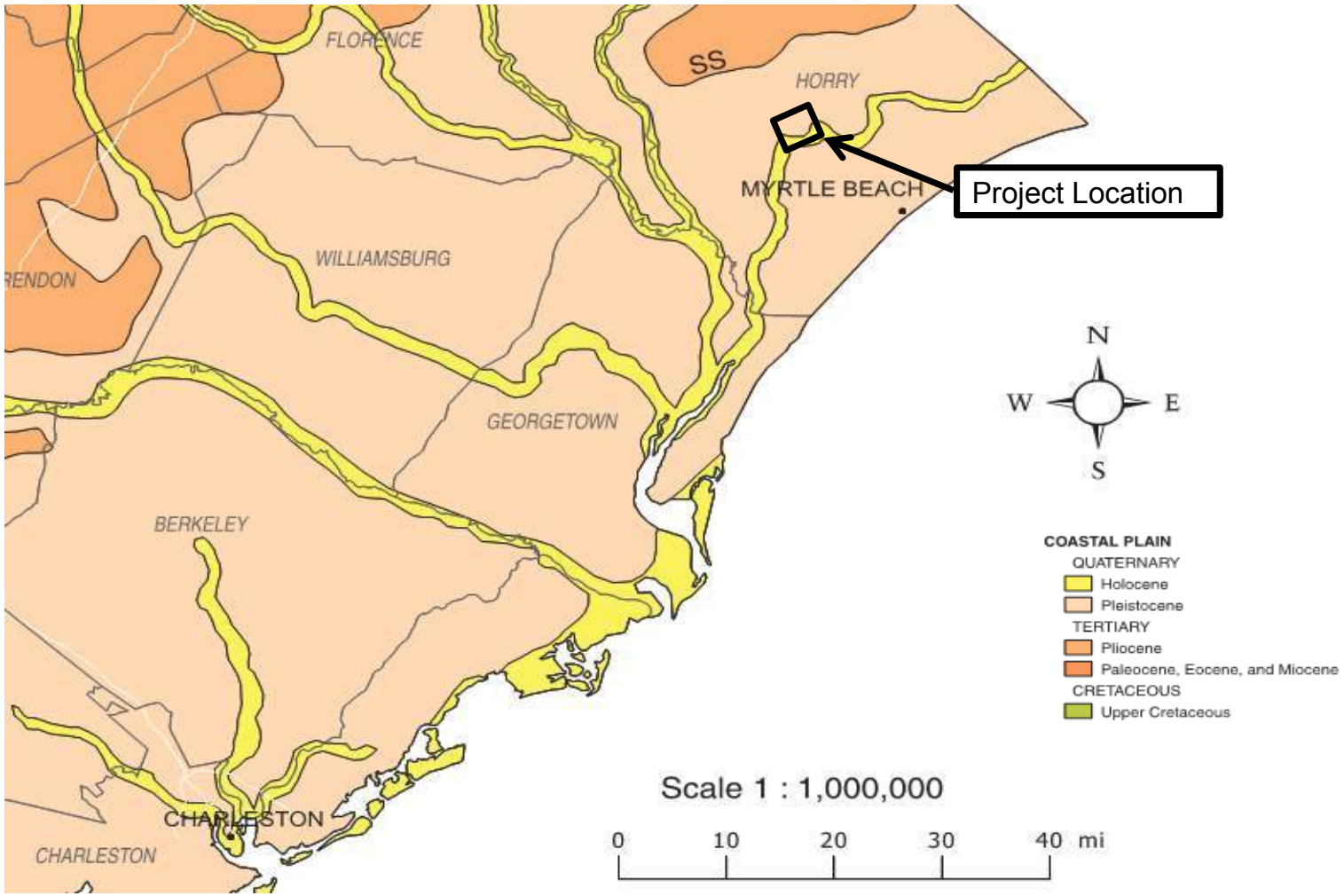
HDR

Prepared for:

RJ Corman Railroad Group

Project Location Map

Project: Bridge at MP 334.50 Crossing Crabtree Swamp
Project No: 10188549
Location: Conway, Horry County, SC
Approved: LAJ **Rev. Date:** 11/5/2019
Drawn By: SKB **Scale:** As Shown
Date: 11/13/2019 **Figure No.** 1



Prepared by:

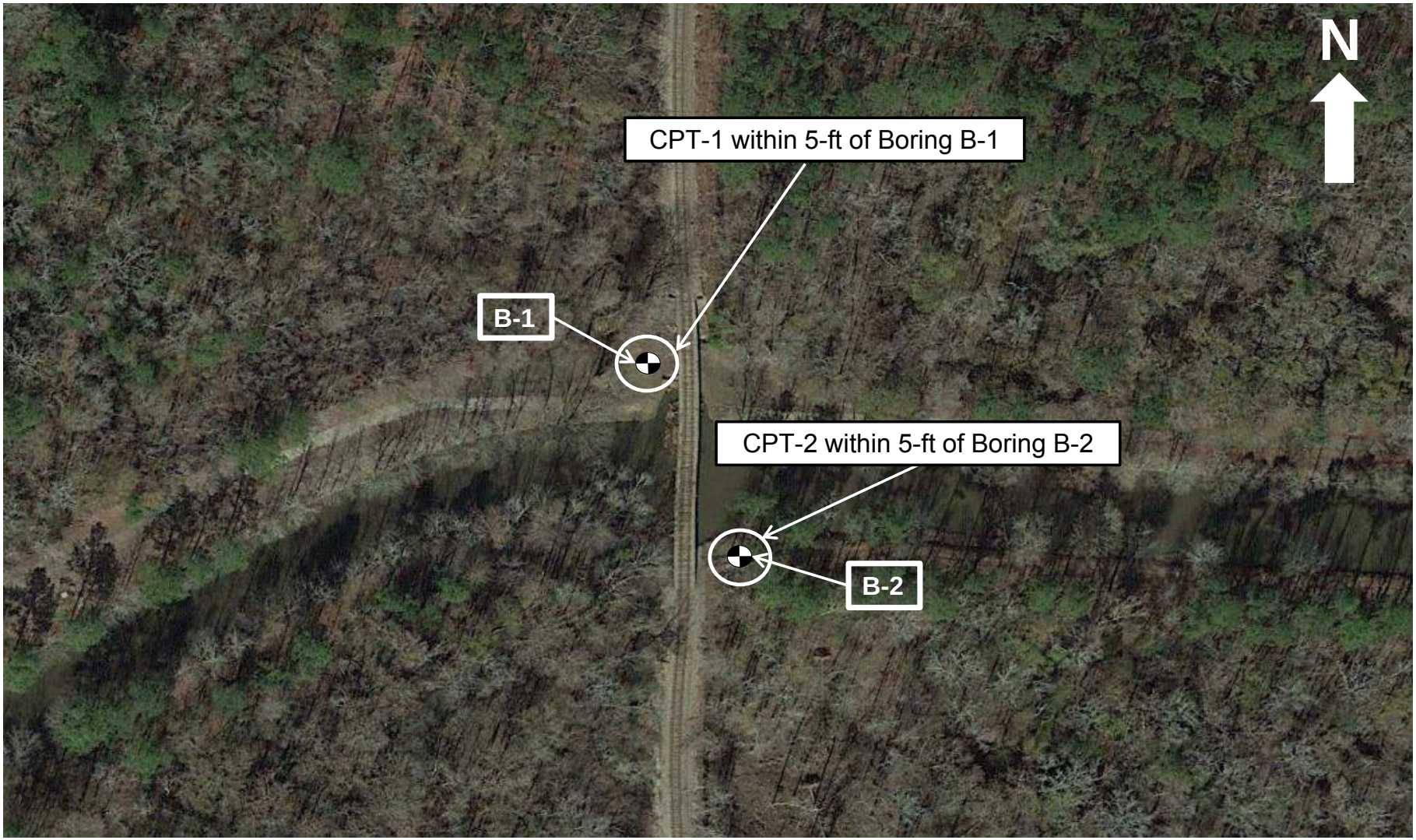
HDR

Prepared for:

RJ Corman Railroad Group

Project Geological Map

Project: Bridge at MP 334.50 Crossing Crabtree Swamp
Project No: 10188549
Location: Conway, Horry County, SC
Approved: LAJ **Rev. Date:** 11/5/2019
Drawn By: SKB **Scale:** As Shown
Date: 11/13/2019 **Figure No.** 2



Prepared by:

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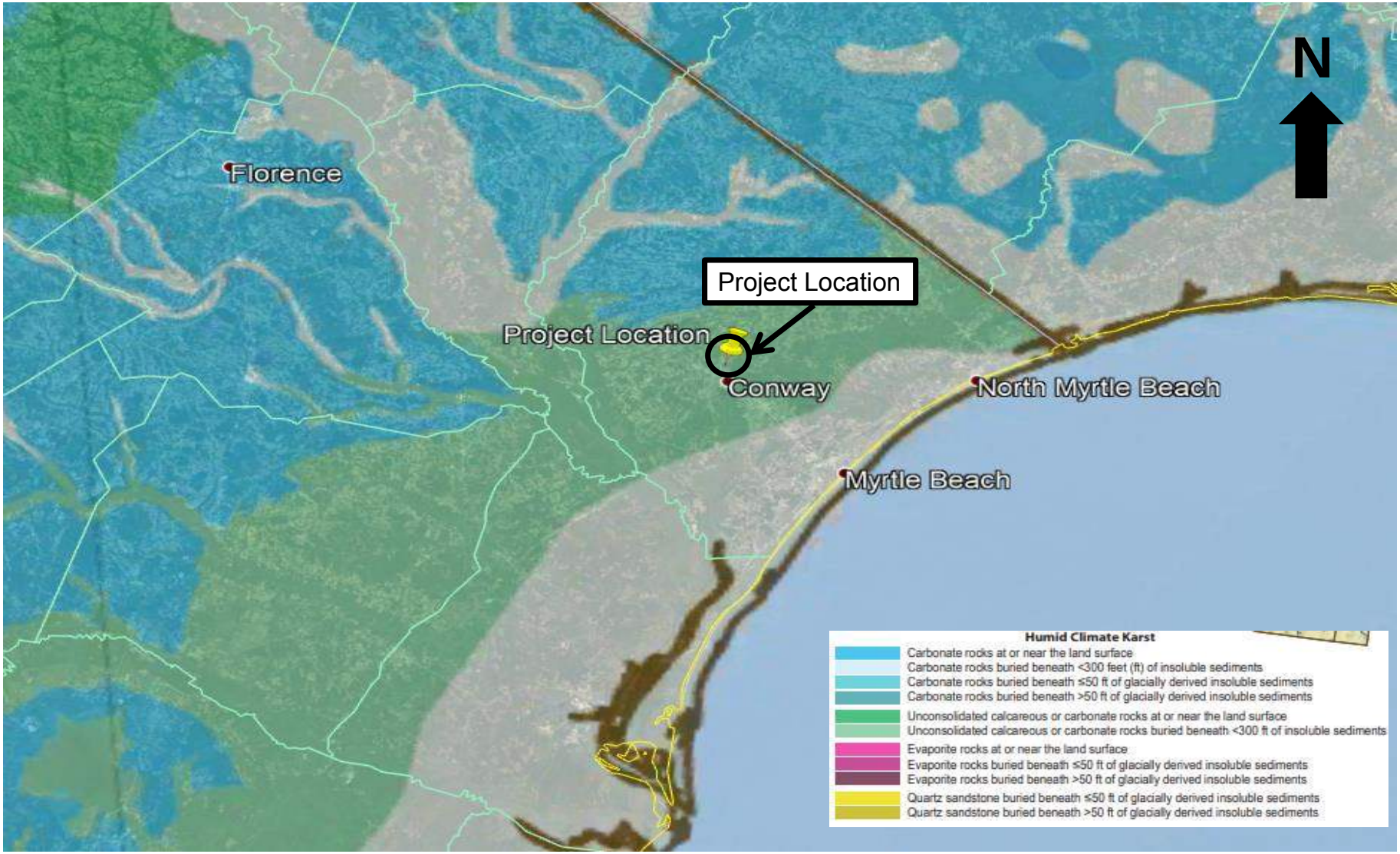
Boring Location Map

Project: Bridge at MP 334.50 Crossing Crabtree Swamp
Project No: 10188549
Location: Conway, Horry County, SC
Approved: LAJ **Rev. Date:** 11/5/2019
Drawn By: SKB **Scale:** As Shown
Date: 11/13/2019 **Figure No.** 3



Prepared by:

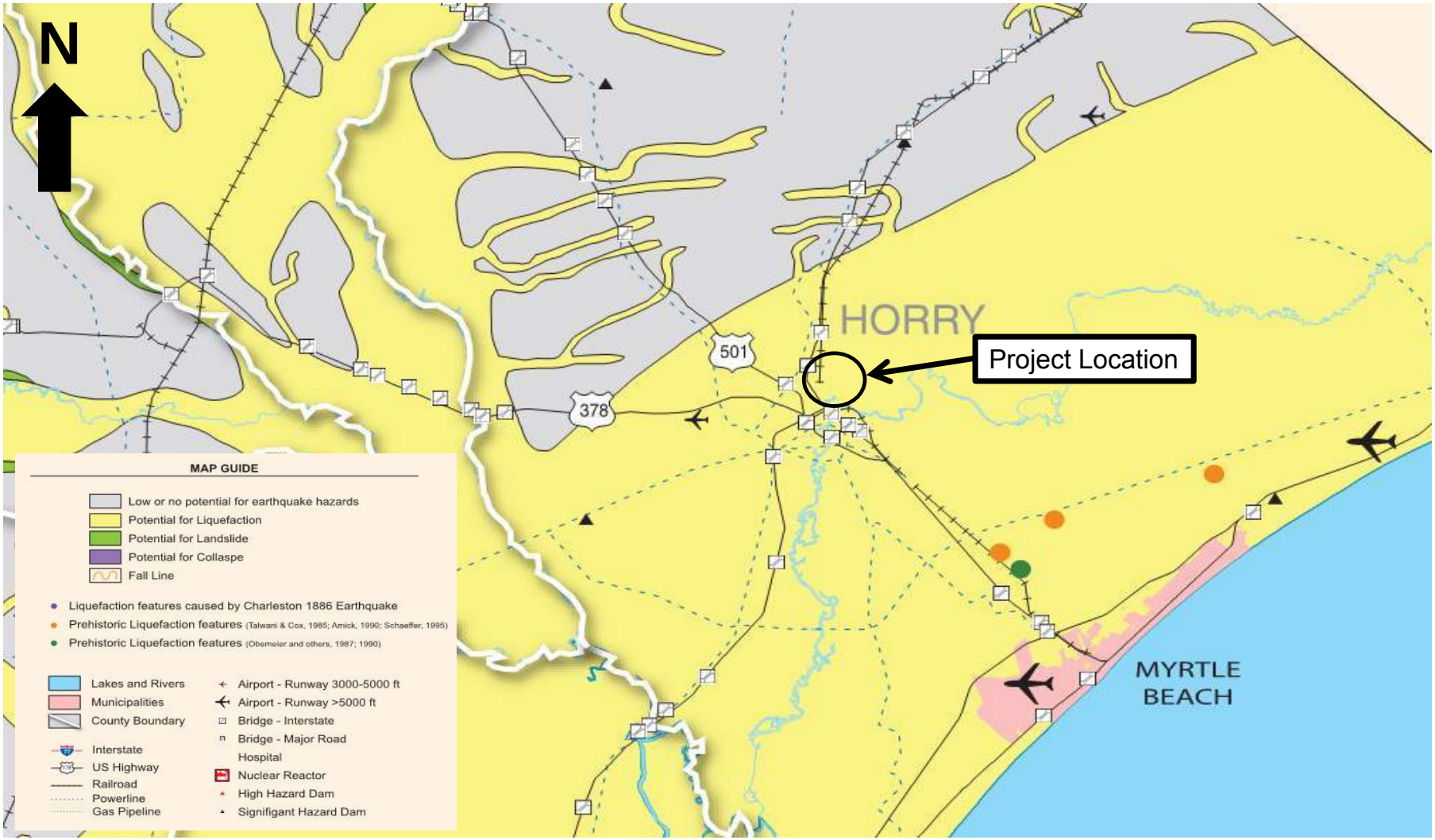
HDR

Prepared for:

RJ Corman Railroad Group

Karst Potential Map

Project: Bridge at MP 334.50 Crossing Crabtree Swamp
Project No: 10188549
Location: Conway, Horry County, SC
Approved: LAJ **Rev. Date:** 11/5/2019
Drawn By: SKB **Scale:** As Shown
Date: 11/13/2019 **Figure No.** 4



Prepared by:

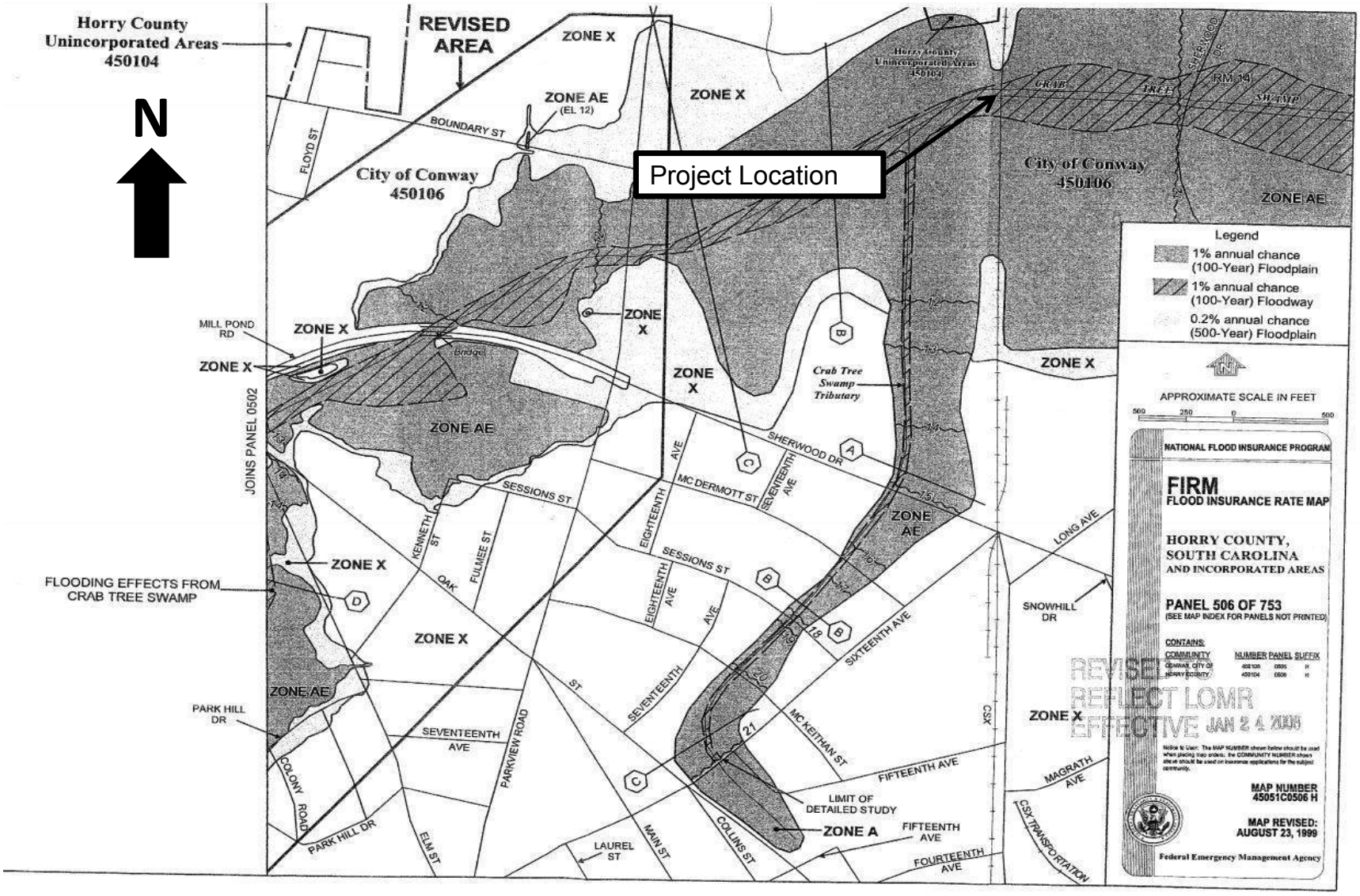
HDR

Prepared for:

RJ Corman Railroad Group

Seismic Hazard Map

Project: Bridge at MP 334.50 Crossing Crabtree Swamp
Project No: 10188549
Location: Conway, Horry County, SC
Approved: LAJ **Rev. Date:** 11/5/2019
Drawn By: SKB **Scale:** As Shown
Date: 11/13/2019 **Figure No.** 5



Prepared by:

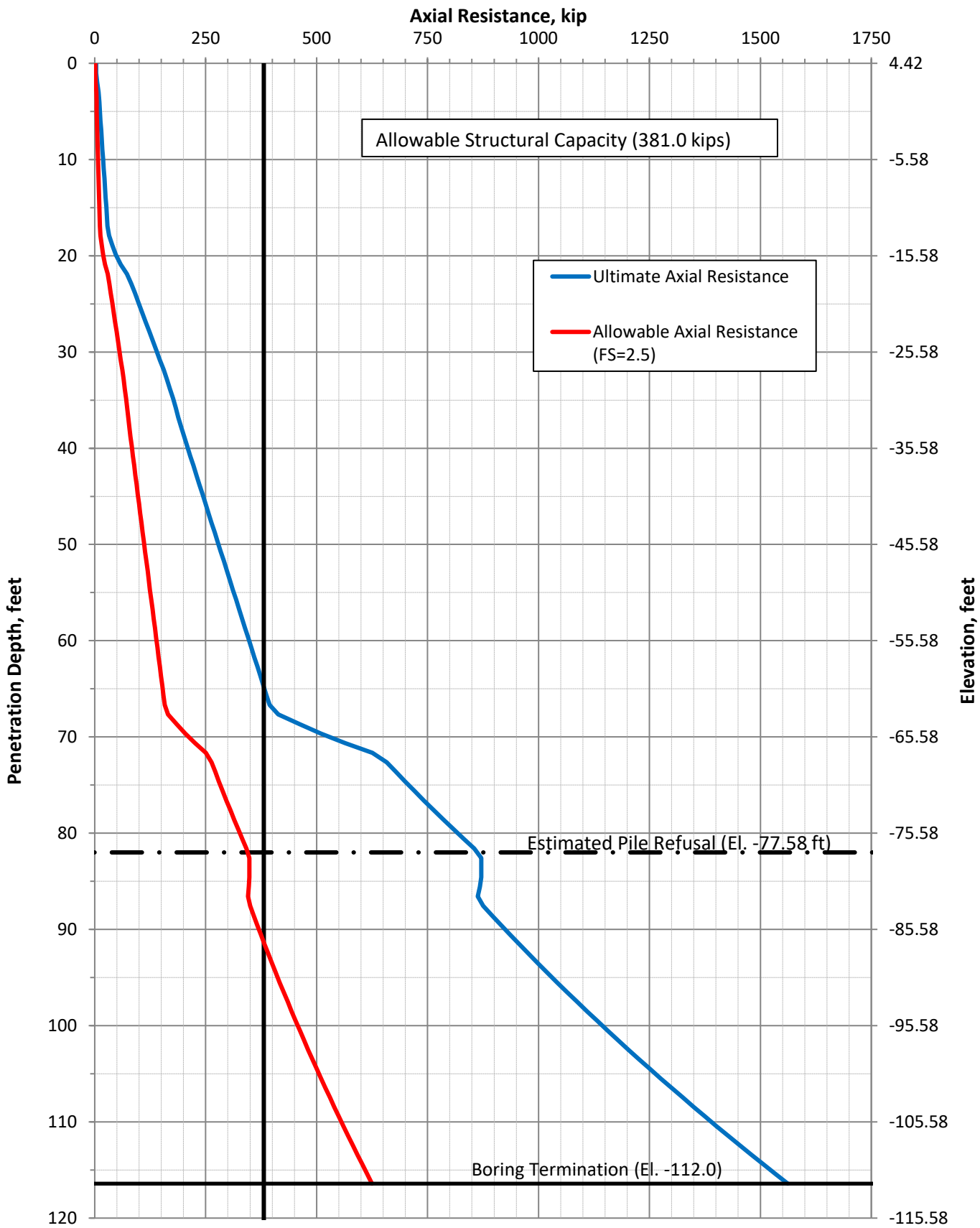
HDR

Prepared for:

RJ Corman Railroad Group

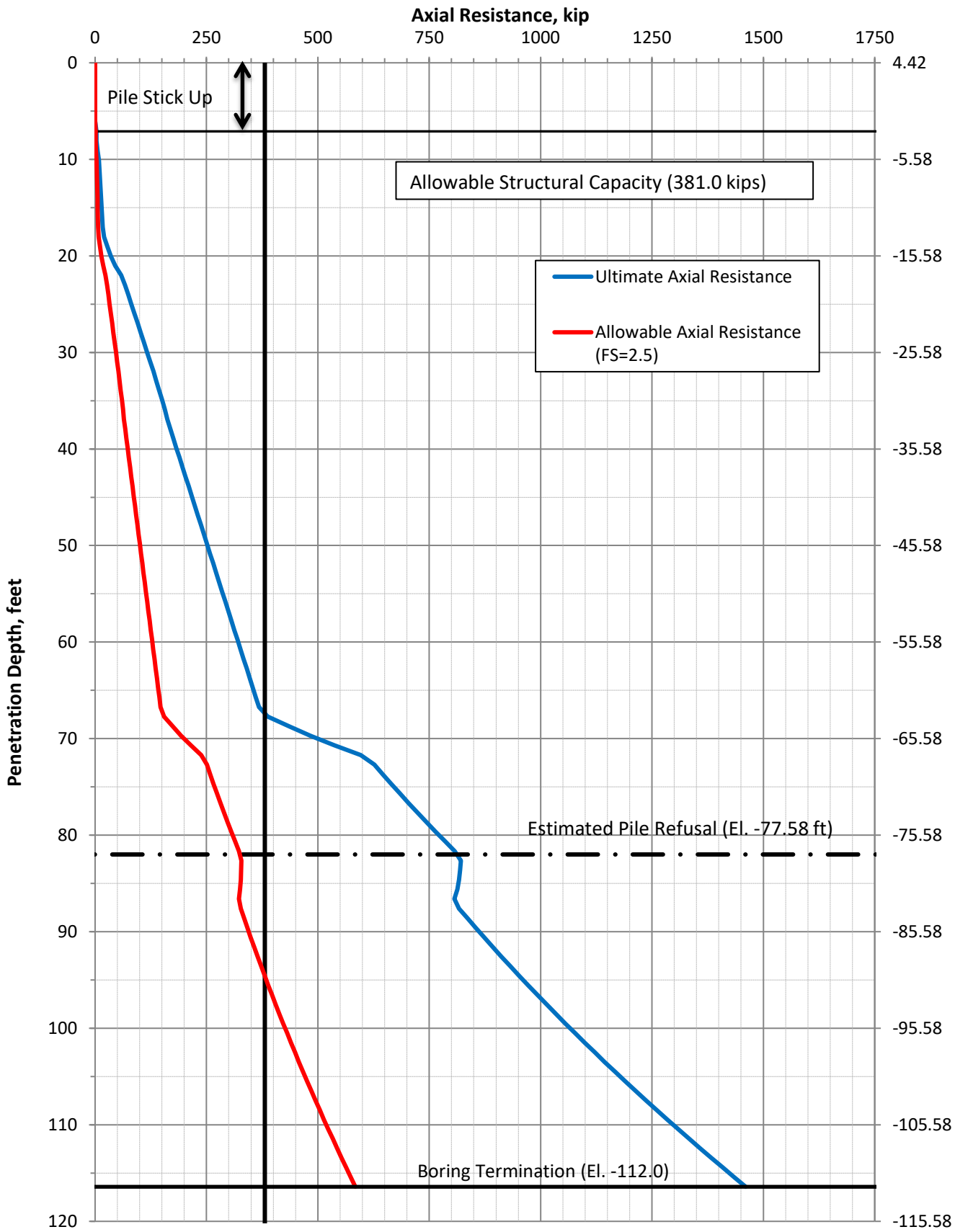
Flood Hazard Map

Project: Bridge at MP 334.50 Crossing Crabtree Swamp
Project No: 10188549
Location: Conway, Horry County, SC
Approved: LAJ **Rev. Date:** 11/5/2019
Drawn By: SKB **Scale:** As Shown
Date: 11/13/2019 **Figure No.** 6



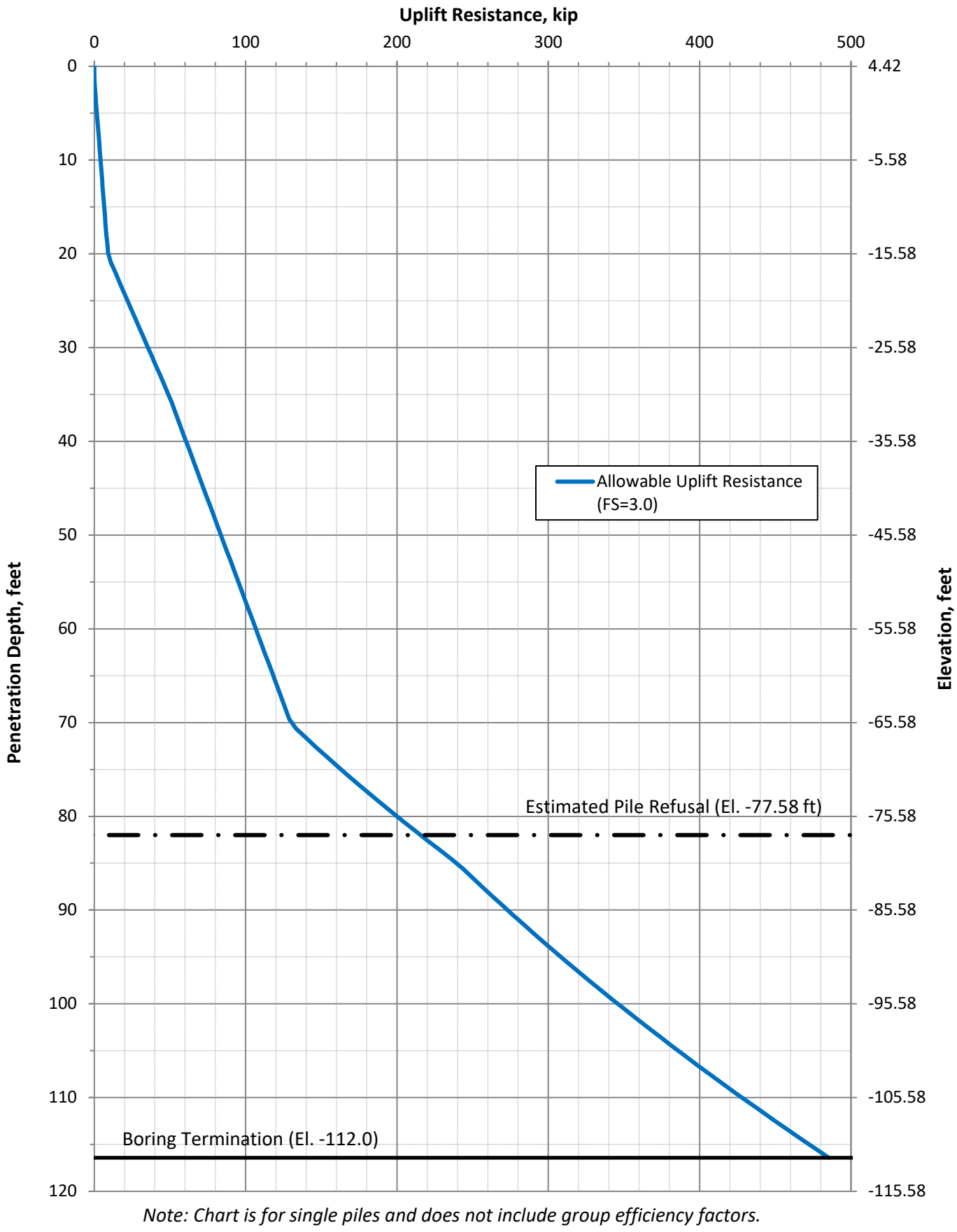
Note: Chart is for single piles and does not include group efficiency factors.

Prepared by:	Prepared for:	**HP14x102 Steel Pile Axial Resistance Graph (Abutment)**
HDR	RJ Corman Railroad Group	**Project:** Bridge at MP 334.50 Crossing Crabtree Swamp **Location:** Conway, SC **Approved:** LAJ **Review Date:** 1/3/2020 **Drawn By:** SKB **Figure No. 7** **Date:** 11/21/2019



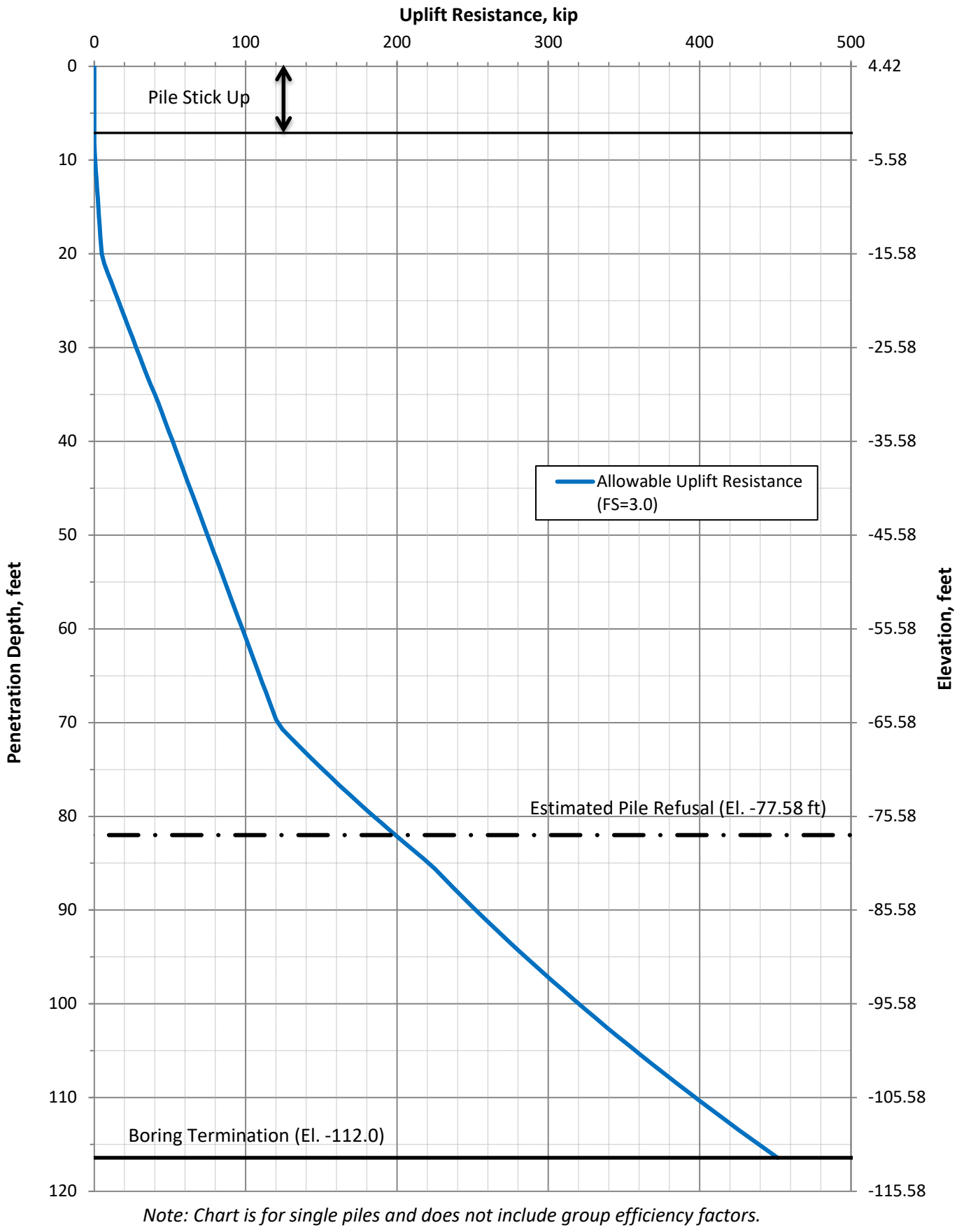
Note: Chart is for single piles and does not include group efficiency factors.

Prepared by:	Prepared for:	**HP14x102 Steel Pile Axial Resistance Graph (Pier)**
HDR	RJ Corman Railroad Group	**Project:** Bridge at MP 334.50 Crossing Crabtree Swamp **Location:** Conway, SC **Approved:** LAJ **Review Date:** 1/3/2020 **Drawn By:** SKB **Figure No. 8** **Date:** 11/21/2019



Note: Chart is for single piles and does not include group efficiency factors.

Prepared by:	Prepared for:	**HP14x102 Steel Pile Uplift Resistance Graph (Abutment)**
HDR	RJ Corman Railroad Group	**Project:** Bridge at MP 334.50 Crossing Crabtree Swamp **Location:** Conway, SC **Approved:** LAJ **Review Date:** 1/3/2020 **Drawn By:** SKB **Figure No. 9** **Date:** 11/21/2019



Note: Chart is for single piles and does not include group efficiency factors.

Prepared by:	Prepared for:	**HP14x102 Steel Pile Uplift Resistance Graph (Pier)**
HDR	RJ Corman Railroad Group	**Project:** Bridge at MP 334.50 Crossing Crabtree Swamp **Location:** Conway, SC **Approved:** LAJ **Review Date:** 1/3/2020 **Drawn By:** SKB **Figure No. 10** **Date:** 11/21/2019

Appendix A
Project Plan Set

March 18, 2020

DRAWING NO.	DESCRIPTION
334.5-01	TITLE SHEET
334.5-02	GENERAL NOTES (1 OF 3)
334.5-03	GENERAL NOTES (2 OF 3)
334.5-04	GENERAL NOTES (3 OF 3)
334.5-05	SITE PLAN
334.5-06	GENERAL PLAN AND ELEVATION
334.5-07	TYPICAL SECTIONS
334.5-08	FOUNDATION LAYOUT AND PILE DETAILS
334.5-09	BEARING PAD LAYOUT AND DETAILS
334.5-10	CONSTRUCTION DETAILS (1 OF 2)
334.5-11	CONSTRUCTION DETAILS (2 OF 2)
334.5-12	END BENT ASSEMBLY DETAILS
334.5-13	PRECAST CONCRETE WINGWALL WW1 DETAILS
334.5-14	PRECAST CONCRETE BACKWALL BW2 DETAILS
334.5-15	PRECAST END BENT CAP PCC2 DETAILS
334.5-16	PRECAST INTERMEDIATE BENT CAP PCC1 DETAILS
334.5-17	30'-0" PRESTRESSED CONCRETE BEAM DETAILS (1 OF 2)
334.5-18	30'-0" PRESTRESSED CONCRETE BEAM DETAILS (2 OF 2)
334.5-19	EMBEDDED PLATE DETAILS
334.5-20	END BENT WATERPROOFING AND SLOPE PROTECTION DETAILS
334.5-21	SPAN JOINT DETAILS
334.5-22	HANDRAIL DETAILS
334.5-23	BORING LOG (1 of 2)
334.5-24	BORING LOG (2 of 2)

R.J. CORMAN BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP
CONWAY, SC
BRIDGE REPLACEMENT

PROJECT INFORMATION

EXISTING BRIDGE WIDTH: 14'-0" OUT-TO-OUT TIMBER DECK

EXISTING SPAN LAYOUT: 10'-0" CENTERLINE BENT TO CENTERLINE BENT

PROPOSED WIDTH: SPANS 1-9: 3 PCB BEAMS @ 5'-5"; BRIDGE WIDTH = 16'-4"

PROPOSED SPAN LAYOUT:
SPAN 1: 29'-2" CENTERLINE BENT TO CENTERLINE BENT
SPANS 3-7: 30'-0" CENTERLINE BENT TO CENTERLINE BENT
SPAN 8: 29'-2" CENTERLINE BENT TO CENTERLINE BENT

PROPOSED LIFTING WEIGHTS:
30'-0" EXTERIOR PRESTRESSED CONCRETE BOX BEAM (PCBB) = 50,000 LBS
30'-0" INTERIOR PRESTRESSED CONCRETE BOX BEAM (PCBB) = 44,000 LBS
PRECAST CONCRETE BENT CAP = 38,000 LBS
PRECAST CONCRETE WINGWALL = 10,000 LBS
PRECAST CONCRETE BACKWALL = 8,000 LBS

SPECIFICATION

CONSTRUCTION: PROJECT SPECIFICATIONS.

DIMENSIONS: THESE CONTRACT DRAWINGS ARE BASED UPON AVAILABLE DESIGN DRAWINGS OF THE EXISTING BRIDGE. IT IS THE CONTRACTORS RESPONSIBILITY TO VERIFY ALL DIMENSIONS IN THE FIELD BEFORE FABRICATION TO ENSURE PROPER FIT OF NEW MATERIAL.

DESIGN: 2019 EDITION OF THE AMERICAN RAILWAY ENGINEERING AND MAINTENANCE OF WAY ASSOCIATION (AREMA) "MANUAL FOR RAILWAY ENGINEERING" CHAPTER 15 - STEEL STRUCTURES, CHAPTER 8-CONCRETE STRUCTURES & FOUNDATIONS. RAILROAD INDUSTRY STANDARD ELEMENTS DEVELOPED USING 2015 AREMA "MANUAL FOR RAILWAY ENGINEERING".

DESIGN CRITERIA

DEAD LOAD: WEIGHT OF RAIL AND FASTENINGS, BALLAST, CONCRETE SPANS AND CAPS, HANDRAIL, UTILITIES AND OTHER MISCELLANEOUS FIXTURES

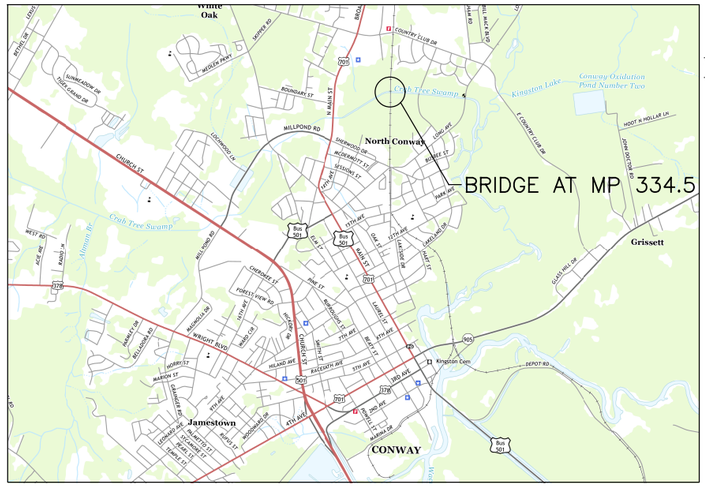
LIVE LOAD: COOPER E-80/ALTERNATE LOADING

IMPACT: APPLICABLE PERCENTAGE FOR ROLLING EQUIPMENT WITHOUT HAMMER BLOW.

FATIGUE: PER AREMA 15-1.3.13 FATIGUE

WIND LOAD: PER AREMA 8-2.2.3, 15-1.3.7 AND 15-1.3.8, AS REQUIRED

SUBSTRUCTURE: CONCRETE SUBSTRUCTURE IS DESIGNED BY LOAD FACTOR METHOD WITH A SAFETY FACTOR OF 2



LATITUDE: 33°51'41.35" N
LONGITUDE: 79°02'57.89" W

LOCATION MAP
SCALE: NTS

ESTIMATED QUANTITIES

QTY.	UNIT	DESCRIPTION	SEE SHEET
4	EACH	PRECAST CONCRETE WINGWALL WW1	334.5-13
2	EACH	PRECAST CONCRETE BACKWALL BW2	334.5-14
2	EACH	PRECAST CONCRETE END BENT CAP PCC2	334.5-15
7	EACH	PRECAST CONCRETE INTERMEDIATE BENT CAP PCC1	334.5-16
24	EACH	29'-11 1/2", 33" DEEP PRESTRESSED CONCRETE BOX BEAM	334.5-17 TO 334.5-18
27	EACH	HP 14x102 x 60'-0"	334.5-08
27	EACH	HP 14x102 x 40'-0"	334.5-08
27	EACH	H-PILE DRIVING SHOE	334.5-08
27	EACH	H-PILE SPLICE MATERIAL	334.5-08
5800	S.F.	PILE SURFACE COATING	334.5-04
32	EACH	LONGITUDINAL JOINT ASSEMBLIES	334.5-11
18	EACH	SPAN JOINT ASSEMBLIES	334.5-21
40	EACH	LATERAL STOPS	334.5-11
16	EACH	HANDRAIL ASSEMBLIES	334.5-10, 334.5-22
81	FT.	PREFORMED EXPANSION JOINT FILLER 1/2" x 12"	334.5-10, 334.5-11
220	FT.	PREFORMED EXPANSION JOINT FILLER 1/2" x 2'-9"	334.5-09
48	EACH	1/2" x 6" x 5'-1" ELASTOMERIC, NEOPRENE BEARING PAD	334.5-09
180	TONS	RIPRAP STONE	334.5-06, 334.5-20
60	TONS	BEDDING STONE	334.5-06, 334.5-20
1	LOT	STRUCTURAL BACKFILL	334.5-04
1	LOT	COLD GALVANIZING SPRAY	334.5-02 TO 334.5-04
1	LOT	WATERPROOFING	334.5-03
120	FT.	6" DIA. PERFORATED CORRUGATED METAL DRAIN PIPE	334.5-20

APPROVED BY R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

Edward Bullis 3/19/20

R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES REPRESENTATIVE DATE

ABBREVIATIONS

ABUT.	ABUTMENT	ELEV.	ELEVATION	NIC	NOT IN CONTRACT
APPROX.	APPROXIMATE	EQ.	EQUAL	OHE	OVERHEAD ELECTRICAL
ASSOC.	ASSOCIATED	EX.	EXISTING	O/O	OUT TO OUT
B.F.	BACK FACE	EXP.	EXPANSION	℄	PLATE
BOT.	BOTTOM	FB	FLOOR BEAM	PROP.	PROPOSED
B/R	BASE OF RAIL	FCM	FRACTURE CRITICAL MEMBER	REQ.	REQUIRED
BRG.	BEARING	F.F.	FAR FACE	ROW	RIGHT OF WAY
C/C	CENTER TO CENTER	FFBW	FRONT FACE BACKWALL	S.E.	SUPERELEVATION
℄	CENTERLINE	FIX.	FIXED	S.F.	SQUARE FOOT
C.F.	CUBIC FOOT	FT.	LINEAR FOOT	SPA.	SPACE
CLR.	CLEAR	GAL.	GALLONS	STA.	STATION
CONC.	CONCRETE	GALV.	GALVANIZED	STD.	STANDARD
CONN.	CONNECTION	HORIZ.	HORIZONTAL	STR	STRAIGHT
CP	CONTROL POINT	INT.	INTERMEDIATE	STR.	STRINGER
C.Y.	CUBIC YARDS	IPS	IRON PIN SET	S.Y.	SQUARE YARD
DIA.	DIAMETER	LBS.	POUNDS	TPG	THROUGH PLATE GIRDER
DIM.	DIMENSION	L.S.	LUMP SUM	TYP.	TYPICAL
DWG.	DRAWING	MAX.	MAXIMUM	T/R	TOP OF RAIL
EA.	EACH	MBF	THOUSAND BOARD FEET	TOR	TOP OF RAIL
E.F.	EACH FACE	MIN.	MINIMUM	UNO.	UNLESS NOTED OTHERWISE
EL.	ELEVATION	N.F.	NEAR FACE	VERT.	VERTICAL

RELEASED FOR BID - NOT FOR CONSTRUCTION

HDR ENGINEERING, INC.
4400 LEEDS AVE., SUITE 450
NORTH CHARLESTON, SC 29405
843-414-3700

APPROVED FOR
R.J. CORMAN RAILROAD COMPANY/
CAROLINA LINES BY
HDR ENGINEERING INC.
OF THE CAROLINAS
(CHARLESTON, SC)
BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020

FILE: 334.5-01.dgn

RJ Corman Railroad Company

REVISIONS

BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP

TITLE SHEET

HORRY COUNTY CONWAY, SC

R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

SCALE: AS SHOWN		VAL. SEC.	DRAWING NO.
DATE: 3/16/2020			334.5-01
DESIGN: TCS			
DRAWN: RGD			
CHECKED: JFM			

CONSTRUCTION NOTES

EXISTING RIGHT–OF–WAY:

40'–0" EACH SIDE OF EXISTING TRACK CENTERLINE.

CONTROL OF WORK:

ALL WORK INVOLVED IN THE CONSTRUCTION OF THE RAILWAY STRUCTURE SHALL BE PERFORMED SATISFACTORY TO THE ENGINEER AND RJ CORMAN. ALL METHODS OF HANDLING WORK AFFECTING THE SAFETY OF RAIL OPERATIONS MUST BE APPROVED BY THE RAILWAY ENGINEER BEFORE PROCEEDING WITH THAT PORTION OF THE WORK. RAIL TRAFFIC SHALL AT ALL TIMES BE MAINTAINED AND PROTECTED.

CONSTRUCTION REQUIREMENTS:

ALL WORK SHALL BE IN ACCORDANCE WITH CURRENT AREMA "MANUAL FOR RAILWAY ENGINEERING" AND THE SPECIFICATIONS FOR THIS CONTRACT.

THE CONTRACTOR SHALL NOT INTERFERE WITH OR PERFORM ANY CONSTRUCTION ON OR NEAR OPERATING TRACKS WITHOUT THE RAILROAD'S PERMISSION. WHEN THE CONTRACTOR IS WORKING NEAR ANY TRACK, HE WILL BE REQUIRED TO HAVE A FLAGMAN FROM THE RAILROAD ON DUTY.

CONTRACTOR SHALL NOT SCALE DIMENSIONS FROM THE CONTRACT PLANS FOR CONSTRUCTION PURPOSES. SCALES ARE SHOWN FOR INFORMATION ONLY. NO CONSTRUCTION JOINTS, EXCEPT THOSE SHOWN ON THE PLANS, WILL BE ALLOWED UNLESS APPROVED BY THE ENGINEER.

STATIONING:

RAIL STATIONING IS BASED ON THE SOUTH FACE OF THE NORTH BACKWALL OF THE EXISTING BRIDGE. THE FRONT FACE OF THE EXISTING NORTH BACKWALL IS DESIGNATED AS STA. 100+00.00.

BENCHMARK:

BENCHMARK: ELEV. 3.79 (NAVD 88), LANDSCAPE NAIL OFFSET 18'–9 ½" LEFT (EAST) AT STA. 100+68.97.

PROFILE:

GRADE RAISE AS SPECIFIED ON DRAWING NO. 334.5–05.

DIVISION OF RESPONSIBILITY

RAILROAD

1. REMOVE TIES, RAIL, AND OTHER TRACK MATERIALS FROM EXISTING BRIDGE.
2. PROVIDE AND INSTALL BALLAST, TIES, RAIL AND OTHER TRACK MATERIALS FOR BRIDGE 334.5 AS REQUIRED.
3. RAISE AND IMPROVE TRACK SURFACE ON BRIDGE APPROACHES AS REQUIRED FOR THE SPECIFIED GRADE RAISE PER DRAWING NO. 334.5–05.
4. PROVIDE AND INSTALL RETAINING WALLS AS REQUIRED TO ACCOMMODATE NEW BRIDGE AND GRADE RAISE. RETAINING WALLS MAY BE INCLUDED OR OMITTED AT THE DISCRETION OF THE RAILROAD.
5. PROVIDE AND INSTALL PRIVATE PROPERTY/NO TRESPASSING SIGNS AT THE BRIDGE. SIGNS INSTALLED AT THE DISCRETION OF THE RAILROAD.

CONTRACTOR

1. COORDINATE ALL CONSTRUCTION ACTIVITIES WITH THE RAILROAD.
2. BEFORE ORDERING ANY MATERIAL, THE CONTRACTOR SHALL MAKE A DETAILED FIELD INSPECTION OF THE SITE VERIFYING ALL PERTINENT DIMENSIONS AND ELEVATIONS AND LOCATION OF PROPOSED BRIDGE. ANY VARIATIONS IN DIMENSIONS OR ELEVATIONS FROM THOSE SHOWN ON THE PLANS SHALL BE REPORTED IMMEDIATELY TO THE ENGINEER.
3. VERIFY THE LOCATION, RELOCATION, ABANDONMENT, AND/OR TEMPORARY SUPPORT OF ALL UTILITIES AFFECTED BY THE CONSTRUCTION OF THE STRUCTURE AND EMBANKMENT AND COORDNATE THESE ACTIVITIES WITH THE APPROPRIATE UTILITY COMPANIES, AGENCIES, AND/OR AUTHORITIES. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY DAMAGE WHICH MIGHT OCCUR DUE TO CONTRACTOR'S FAILURE TO LOCATE AND PRESERVE ANY AND ALL UTILITIES.
4. APPLY FOR AND OBTAIN ANY CONSTRUCTION PERMITS NECESSARY TO PERFORM THE WORK.
5. PROVIDE THE RAILROAD WITH A DETAILED CONSTRUCTION PLAN DETAILING THE ACTIVITY, SCHEDULE AND PROCEDURE FOR EACH ASPECT OF THE WORK. CONSTRUCTION SHALL NOT BEGIN UNTIL THE CONSTRUCTION PLAN HAS BEEN APPROVED BY THE RAILROAD.
6. POSITION AND INSTALL PILES AS SHOWN ON THE PLANS.
7. COORDINATE WITH RJ CORMAN ON INSTALLATION OF THE BALLAST, TIES, RAIL AND OTM FOR PROPOSED TRACK.
8. PROVIDE AND REPLACE ALL FILL MATERIAL PER RJ CORMAN.
9. RESTORE ALL AREAS THROUGHOUT THE LENGTH OF THE BRIDGE TO ORIGINAL CONDITION OR BETTER, AND AS REQUIRED BY RELEVENT PERMITS.
10. PROVIDE ALL TEMPORARY STRUCTURES REQUIRED FOR CONSTRUCTION OR AS REQUIRED TO PROTECT THE EXISTING STRUCTURE. DETAILED DRAWINGS OF THE TEMPORARY STRUCTURES INCLUDING DESIGN CALCULATIONS AND PROCEDURE SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL. ALL TEMPORARY STRUCTURES SHALL BE DESIGNED, SIGNED, AND SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF SOUTH CAROLINA. ALL TEMPORARY STRUCTURES SHALL BE APPROVED BY THE ENGINEER PRIOR TO CONSTRUCTION.
11. PROVIDE AND PLACE RIPRAP SLOPE PROTECTION IN ACCORDANCE WITH THE NOTES AND DETAILS IN THESE DRAWINGS.
12. ACCOMPLISH ALL OF THE TASKS DESCRIBED IN THE CONSTRUCTION SEQUENCE SHOWN ON DRAWING NO. 334.5–03. AN ALTERNATE CONSTRUCTION SEQUENCE MAY BE SUBMITED TO THE RAILROAD AND THE ENGINEER FOR APPROVAL. THE ALTERNATE CONSTRUCTION SEQUENCE, IF PROPOSED, SHALL BE APPROVED BY THE RAILROAD AND THE ENGINEER PRIOR TO BEGINNING CONSTRUCTION.
13. ACCOMPLISH ACTIVITIES WITHIN THE SCHEDULE SPECIFIED IN THE APPROVED CONSTRUCTION PLAN.

FIELD WELDING:

WELDING MUST BE IN COMPLIANCE WITH REQUIREMENTS SPECIFIED IN AWS D1.5, CURRENT EDTION. WELDING MUST BE ACCOMPLISHED WITH THE SMAW PROCESS. WELDING ELECTRODES MUST BE E7018. WELDERS MUST POSSESS VALID CERTIFICATION.

MEASUREMENT AND PAYMENT

WORK ITEMS FOR THIS PROJECT SHALL BE BID BASED ON THE FOLLOWING PAY ITEMS AND ASSOCIATED NOTES.

BRIDGE 334.5 PAY ITEMS

DIVISION 100 – GENERAL			
PAY ITEM NO.	UNIT	DESCRIPTION	NOTE
101	L.S.	MOBILIZATION	
102	L.S.	ESTABLISH STAGING AND SITE ACCESS ROAD	
103	L.S.	TEMPORARY WORK TRESTLE/CAUSEWAY	
104	L.S.	REMOVAL OF TEMPORARY WORK TRESTLE/CAUSEWAY	
105	L.S.	DEMOLISH AND DISPOSE OF EXISTING BRIDGE	
106	L.S.	MATERIALS TESTING	
107	L.S.	PDA TESTING	
DIVISION 200 – SITE WORK			
PAY ITEM NO.	UNIT	DESCRIPTION	NOTE
201	L.S.	SITE CLEARING	1
202	L.S.	EXCAVATION AND GRADING	2
203	L.S.	FURNISH, PLACE, AND COMPACT FILL	3
204	TON	FURNISH AND INSTALL RIPRAP SLOPE PROTECTION	4
DIVISION 300 – METALS			
PAY ITEM NO.	UNIT	DESCRIPTION	NOTE
301	FT.	FURNISH STEEL H–PILE	5
302	FT.	INSTALL STEEL H–PILE	6
303	FT.	INSTALL STEEL H–PILE (TEST PILE)	6
304	S.F.	FURNISH AND INSTALL PILE PROTECTIVE COATING	
305	EA.	FURNISH AND INSTALL STEEL H–PILE DRIVING SHOES	
306	EA.	FURNISH AND INSTALL STEEL H–PILE SPLICE MATERIAL	
307	FT.	FURNISH AND INSTALL STEEL HANDRAIL	
308	EA.	BEARING PADS	
DIVISION 400 – CONCRETE			
PAY ITEM NO.	UNIT	DESCRIPTION	NOTE
401	EA.	FURNISH AND INSTALL PRECAST CONCRETE END BENT CAPS	
402	EA.	FURNISH AND INSTALL PRECAST CONCRETE INTERMEDIATE BENT CAPS	
403	EA.	FURNISH AND INSTALL PRECAST CONCRETE WINGWALLS	
404	EA.	FURNISH AND INSTALL PRECAST CONCRETE BACKWALLS	
405	EA.	FURNISH AND INSTALL PRECAST CONCRETE BOX BEAMS	
406	L.S.	WATERPROOFING	
407	FT.	PREFORMED EXPANSION JOINT FILLER (PEJF) (½" x 1'–0")	
408	FT.	PREFORMED EXPANSION JOINT FILLER (PEJF) (½" x 2'–9")	
409	L.S.	TRENCH DRAINS	
DIVISION 500 – PROJECT DOCUMENTATION			
PAY ITEM NO.	UNIT	DESCRIPTION	NOTE
501	L.S.	RAILROAD PROTECTIVE LIABILITY INSURANCE	
502	L.S.	PROJECT FORMS, PERMITTING, AND MEETINGS	
503	L.S.	AS–BUILT DRAWINGS	

PAY ITEM NOTES:

1. SITE CLEARING SHALL MEAN THE REMOVAL OF TREES AND/OR OTHER VEGETATION NECESSARY FOR CONSTRUCTION ACTIVITIES. SITE CLEARING SHALL BE MINIMIZED TO THE EXTENT POSSIBLE.
2. GRADING SHALL REFER TO THE MOVING OF EARTH AND OTHER MATERIAL FROM CUTS, DITCHES, AND WATERWAYS. PAYMENT FOR TRANSPORTATION OF ANY EXCAVATED MATERIAL OR FILL MATERIAL BROUGHT TO THE SITE SHALL BE INCLUDED IN PAY ITEM NO. 202.
3. FILL MATERIAL SHALL BE MEASURED IN CUBIC YARDS AND PAID BASED ON THE AMOUNT OF COMPACTED MATERIAL PLACED.
4. RIPRAP MEASUREMENT SHALL BE THE NUMBER OF NET TONS OF RIPRAP TRANSPORTED AND COMPACTED IN PLACE AS CALCULATED FROM WEIGH TICKETS. CONTRACTOR IS RESPONSIBLE FOR RETAINING AND SUBMITTING WEIGHT TICKET COPIES WITH INVOICE. FILTER FABRIC SHALL BE CONSIDERED INCIDENTAL TO PAY ITEM 204. PAYMENT SHALL BE FOR NUMBER OF NET TONS IN PLACE AT THE UNIT PRICE.
5. CONTRACT BID PRICE FOR SUPPLIED PILE SHALL BE PAID PER LINEAL FOOT AND SHALL INCLUDE ALL MATERIAL REQUIRED TO MEET MINIMUM DRIVING CRITERIA FOR THE CAPACITIES SPECIFIED IN THESE DRAWINGS.
6. CONTRACT BID PRICE FOR DRIVEN PILE SHALL BE PAID PER LINEAL FOOT AND SHALL INCLUDE THE COST OF LABOR, EQUIPMENT, AND MISCELLANEOUS MATERIAL REQUIRED FOR COMPLETE PILE INSTALLATION AND PILE CUTOFF. THE COST OF THE TOTAL AMOUNT OF CUTOFF PILE (MEASURED FROM PILE CUTOFF TO TOP OF PILE PRIOR TO CUTOFF) SHALL BE A DEDUCTION.
7. COSTS FOR FABRICATION AND INSTALLATION OF STEEL LATERAL STOPS AND DECK JOINT ASSEMBLIES SHALL BE INCLUDED UNDER PAY ITEM 405.

EXISTING BRIDGE DEMOLITION

1. EXISTING TIMBER BRIDGE SHALL BE REMOVED IN ACCORDANCE WITH THE NOTES AND DETAIL ON DRAWING NO. 334.5–06. ALL DEMOLISHED MATERIALS SHALL BE DISPOSED OF OFF–SITE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL LAWS.
2. INADVERTENT OR INTENTIONAL DUMPING, OR PLACEMENT OF DEMOLISHED MATERIALS INTO A WATERWAY OR FLOOD PLAIN IS NOT PERMITTED.
3. ALL MATERIALS REMOVED SHALL BE THE PROPERTY OF THE RAILROAD AND SHALL BE REMOVED FROM THE RAILROAD'S PROPERTY.
4. THE CONTRACTOR SHALL PREPARE THE FOLLOWING DOCUMENTS FOR APPROVAL BY THE ENGINEER. ALL SUBMITTALS MUST BE SIGNED AND SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF SOUTH CAROLINA.
   a. DEMOLITION PLAN
   b. DISPOSAL PLAN

SITE ACCESS

1. CONTRACTOR IS RESPONSIBLE FOR OBTAINING, CONSTRUCTING, MAINTAINING, AND REMOVING SITE ACCESS TO THE PROJECT LOCATION. MATERIALS AND METHODS FOR CONSTRUCTING TEMPORARY ACCESS SHALL BE IN ACCORDANCE WITH ALL APPLICABLE LOCAL REGULATIONS.
2. CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND PERMISSIONS FOR SITE ACCESS.
3. THE CONTRACTOR SHALL MAKE ARRANGEMENTS FOR A TEMPORARY, LOCKED GATE TO SECURE ALL STAGING AREAS AND SITE ACCESS ROADS. TEMPORARY FENCING SHALL BE INSTALLED AROUND THE PROJECT SITE FOR THE DURATION OF CONSTRUCTION. ALL SITE SECURITY GATES AND FENCING SHALL BE REMOVED AFTER PROJECT COMPLETION.
4. THE CONTRACTOR MAY PROPOSE AN ALTERNATE SITE ACCESS PLAN OTHER THAN WHAT IS SHOWN IN THESE DRAWINGS. ANY ALTERNATIVE SITE ACCESS PLAN SHALL BE APPROVED BY THE ENGINEER PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR APPLYING FOR AND OBTAINING ANY ADDITIONAL PERMITS REQUIRED FOR THE ALTERNATE SITE ACCESS PLAN AT NO ADDITIONAL EXPENSE TO THE RAILROAD.
5. TEMPORARY GRADE CROSSINGS MAY NOT BE ESTABLISHED UNLESS APPROVED BY THE RAILROAD. ANY TEMPORARY CROSSING MAY ONLY BE USED WHILE BEING WATCHED BY AN APPROVED RAILROAD FLAGMAN. ANY TEMPORARY CROSSING ESTABLISHED SHALL BE MAINTAINED IN ACCORDANCE WITH RAILROAD DIRECTION AND SHALL BE REMOVED AFTER COMPLETION OF THE PROJECT.
6. ALL AREAS DISTURBED FOR SITE ACCESS OR MATERIALS STAGING SHALL BE RETURNED TO THEIR ORIGINAL CONDITION OR BETTER AFTER PROJECT COMPLETION.

RELEASED FOR BID - NOT FOR CONSTRUCTION

HDR ENGINEERING, INC.
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NORTH CHARLESTON, SC 29405
843-414-3700

RJ Corman Railroad Company

APPROVED FOR
R.J. CORMAN RAILROAD COMPANY/
CAROLINA LINES BY
HDR ENGINEERING INC.
OF THE CAROLINAS
(CHARLESTON, SC)
BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020

FILE: 334.5-02.dgn

REVISIONS

BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP

GENERAL NOTES (1 OF 3)

HORRY COUNTY CONWAY, SC

R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

SCALE: AS SHOWN	VAL. SEC.	DRAWING NO.
DATE: 3/16/2020		334.5-02
DESIGN: TCS		
DRAWN: RGD		
CHECKED: JFM		

SLOPE PROTECTION

1. RIPRAP STONE SHALL BE BROKEN STONE PRODUCED FROM SOUND LEDGE OR LARGE BOULDERS WITH AT LEAST THREE FRACTURE FACES ON EACH PIECE AND FREE FROM OVERBURDEN, SPOIL, SHALE, OR ORGANIC MATERIAL.

2. RIPRAP STONE SHALL HAVE A MINIMUM DENSITY OF 150 POUNDS PER CUBIC FOOT. STONES SHALL NOT WEIGH LESS THAN 50 POUNDS AND NOT MORE THAN 200 POUNDS AND SHALL BE REASONABLY WELL GRADED WITH NO MORE THAN 40 PERCENT WEIGHING MORE THAN 100 POUNDS EACH.

3. BROKEN CONCRETE USED AS SLOPE PROTECTION IS NOT PERMITTED.

4. THE CONTRACTOR SHALL SUBMIT A FILTER FABRIC PRODUCT TO THE ENGINEER FOR APPROVAL. THE PRODUCT MUST BE APPROVED PRIOR TO CONSTRUCTION.

PRESTRESSED CONCRETE

MATERIALS

CONCRETE:

1. THE COMPRESSIVE STRENGTH OF THE PRESTRESSED BOX BEAM CONCRETE SHALL EXCEED 8,500 PSI AT 28 DAYS AND 5,500 PSI AT TRANSFER OF PRESTRESSING FORCE (RELEASE).

2. CONCRETE SHALL BE PROPORTIONED SUCH THAT THE WATER – CEMENT RATIO (BY WEIGHT) DOES NOT EXCEED 0.45. CONCRETE SHALL CONTAIN A MINIMUM OF 7 SACKS OF CEMENT PER CUBIC YARD OF CONCRETE.

3. CEMENT SHALL BE TYPE I OR TYPE III PORTLAND CEMENT IN ACCORDANCE WITH ASTM C150 SPECIFICATIONS.

4. ONLY ONE BRAND OF CEMENT MAY BE USED IN ANY PART OF THE STRUCTURE AND CEMENTS OF THE SAME BRAND FROM DIFFERENT MILLS SHALL NOT BE MIXED OR USED IN ANY PART OF THE STRUCTURE, EXCEPT AS PERMITTED BY THE ENGINEER.

5. MAXIMUM SLUMP SHALL BE 3".

6. AGGREGATES SHALL BE GRADED IN ACCORDANCE WITH ASTM C33 SPECIFICATIONS. COARSE AGGREGATE SHALL BE SIZE NO. 67. FINE AGGREGATE SHALL BE NATURAL SAND.

7. AIR CONTENT SHALL BE 6% (BY VOLUME) UNLESS NOTED OTHERWISE AND APPROVED BY THE ENGINEER. USE OF FLY ASH IS PROHIBITED. ADMIXTURES SHALL NOT BE USED WITHOUT APPROVAL BY THE ENGINEER.

STRUCTURAL STEEL:

STRUCTRAL STEEL FOR MISC. EMBEDDED STEEL SHAPES AND PLATES SHALL CONFORM TO ASTM A709, GRADE 36.

SHEAR STUDS SHALL BE C1015, C1017 OR C1020 COLD DRAWN STEEL WHICH CONFORMS TO ASTM A108 SPECIFICATIONS.

REINFORCING STEEL:

REINFORCING STEEL SHALL BE DEFORMED NEW BILLET BARS PER ASTM A615 SPECIFICATIONS AND MEET GRADE 60 REQUIREMENTS.

PRESTRESSING STEEL:

PRESTRESSING STEEL SHALL BE 0.6" DIAMETER LOW RELAXATION, 270 KSI STRANDS CONFORMING TO ASTM SPECIFICATION A416. STRANDS SHALL BE CUT FLUSH WITH END OF SPANS AND COATED WITH ASPHALT MASTIC. INITIAL PRESTRESSING FORCE IS 44 KIPS PER STRAND.

STRUCTURAL BOLTS:

BOLTS SHALL BE STAINLESS STEEL BOLTS AND CONFORM TO THE REQUIREMENTS OF ASTM A193, GRADE B8 CLASS 2.

THREADED INSERTS:

THREADED INSERTS SHALL BE DAYTON SUPEROIR F43 STAINLESS STEEL FERRULES.

PRECAST PRESTRESSED CONCRETE CONSTRUCTION NOTES

1. ALL CONCRETE MATERIALS, PLACEMENT, PRODUCTION AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH CHAPTER 8 OF THE AREMA MANUAL FOR RAILWAY ENGINEERING, 2019 EDITION.

2. EXPOSED SURFACES SHALL BE FORMED IN A MANNER WHICH SHALL PRODUCE A SMOOTH AND UNIFORM APPEARANCE WITHOUT RUBBING OR PLASTERING. ALL CONCRETE CORNERS/EDGES SHALL HAVE A 1" CHAMFER PROVIDED UNLESS OTHERWISE NOTED ON THE PLANS OR WHERE THE EMBEDDED PLATES ARE LOCATED. THE TOP SURFACE IS TO HAVE A SMOOTH FINISH, FREE OF ALL FLOAT OR TROWEL MARKS.

3. CURING SHALL BE ACCOMPLISHED BY WET CURING OR APPLICATION OF A TYPE 2 MEMBRANE.

4. CONCRETE MIX DESIGN AND LABORATORY TEST RESULTS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO FABRICATION.

5. DIMENSIONAL TOLERANCES GOVERNING THE MANUFACTURE OF PRECAST MEMBERS SHALL CONFORM TO DIVISION VII, APPENDIX B OF THE PRECAST/PRESTRESSED CONCRETE INSTITUTE'S MANUAL MNL 116 FOR QUALITY CONTROL FOR THE APPROPRIATE SHAPE WITH THE EXCEPTION OF THE FOLLOWING:
   i. LENGTH SHALL BE +0", – ? ".
   ii. LOCATION OF VOID FROM END OF BEAM SHALL BE +3". –1".
   iii. LOCATION OF LIFTING DEVICES IN ANY DIRECTION SHALL BE +/– ½ "

6. THE FABRICATOR SHALL BE RESPONSIBLE FOR LOADING AND PROPERLY SECURING ALL PRECAST CONCRETE MEMEBERS FOR SHIPMENT. ALL CONCRETE COMPONENTS SHALL BE MADE AVAILABLE FOR INSPECTION BY THE RAILROAD AT THE FABRICATOR'S PLANT PRIOR TO SHIPMENT, AT THE RAILROAD'S DISCRETION.

7. THE CONCRETE CURING COMPOUND SHALL BE IN ACCORDANCE WITH THE NOTES ON THESE DRAWINGS.

8. STUD WELDING SHALL BE PER AWS D1.5.

9. THE FORMWORK FOR THE BOX BEAMS SHALL BE CONSTRUCTED ACCORDING TO THESE DRAWINGS. THE FOLLOWING TOLERANCES ARE ACCEPTABLE FOR THE FINISHED ELEMENT:
   a. LENGTH: +0 INCH, –1/4 INCH.
   b. WIDTH (OVERALL): ±1/4 INCH.
   c. DEPTH (OVERALL): ±1/4 INCH.
   d. THICKNESS: ±1/8 INCH.
   e. FLATNESS OF SURFACES: ±1/8 INCH.
   f. FLATNESS OF MATING SURFACES OR BEARING SURFACES: +0 INCH, –1/16 INCH.
   g. CAMBER DEVIATION: ±1/8 INCH PER 10 FEET.
   h. POSITION OF PRESTRESSING TENDONS: ±1/4 INCH.
   i. POSITION OF STIRRUP BARS: ±1INCH.

10. CONCRETE CURBS SHALL BE CAST NO SOONER THAN 3 DAYS AFTER THE PRESTRESSING TENDONS IN BOX BEAMS HAVE BEEN RELEASED AND THE PRESTRESS FORCE TRANSFERRED TO THE CONCRETE.

11. CONCRETE WATER REPELLENT SHALL BE APPLIED TO THE TOP OF THE DECK, CURBS, AND SIDES OF ALL DECK SLABS PRIOR TO INSTALLATION, AS WELL AS CONCRETE BENT CAPS AND TOP AND SIDES OF WING WALLS.

12. CONCRETE WATER REPELLENT SHALL CONSIST OF A SILANE BASED, ONE PART LIQUID PENETRATING SEALER, IN ACCORDANCE WITH AREMA CHAPTER 8, PART 1 AND IN CONFORMANCE WITH APPLICABLE ASTM DESIGNATIONS.

13. SURFACE PREPARATION FOR AND APPLICATION OF CONCRETE WATER REPELLENT SHALL BE IN ACCORDANCE WITH AREMA CHAPTER 8, PART 1.

LIFTING LOOPS

1. LIFTING LOOPS SHALL CONSIST OF (4) ½ " DIA., 270K STRANDS AND SHALL HAVE A BREAKING STRENGTH OF NOT LESS THAN 30 TONS.

2. THE STRANDS SHALL BE THOROUGHLY CLEANED OF ALL MATTER THAT WOULD PREVENT BONDING STRANDS AND CONCRETE. LIFTING LOOPS SHALL BE COATED WITH A CORROSION RESISTANT EPOXY OR ZINC BASED COATING.

3. ONCE CONCRETE BEAM IS IN PLACE, LIFTING LOOPS SHALL BE CUT OFF BELOW THE TOP OF THE CONCRETE SURFACE. THE 1" RECESS SHALL BE FILLED WITH EPOXY GROUT.

BEARING PADS

NEOPRENE BEARING PADS SHAL LBE 6" WIDE x ½ " THICK x 5'–1" LONG CONFORMING TO ASTM D4014–81, PLAIN ELASTOMERIC BEARINGS FOR BRIDGES, TYPE CR, GRADE 2. MANUFACTURER SHALL CERTIFY THAT THE PHYSICAL PROPERTIES OF THE PADS CONFORM TO ASTM D4014–81.

PRECAST REINFORCED CONCRETE

MATERIALS

CONCRETE:

1. MINIMUM COMPRESSIVE STENGTH AT 7 DAYS SHALL BE 5,000 PSI.

2. CONCRETE SHALL BE PROPORTIONED SUCH THAT THE WATER – CEMENT RATIO (BY WEIGHT) DOES NOT EXCEED 0.45. CONCRETE SHALL CONTAIN A MINIMUM OF 7 SACKS OF CEMENT PER CUBIC YARD OF CONCRETE.

3. CEMENT SHALL BE TYPE I, TYPE IA, TYPE II, TYPE III OR TYPE IIIA PORTLAND CEMENT IN ACCORDANCE WITH ASTM C150 SPECIFICATIONS. AIR–ENTRAINED CONCRETE SHALL CONFORM TO THE REQUIREMENTS OF ASTM C150 AND ASTM C595.

4. ONLY ONE BRAND OF CEMENT MAY BE USED IN ANY PART OF THE STRUCTURE AND CEMENTS OF THE SAME BRAND FROM DIFFERENT MILLS SHALL NOT BE MIXED OR USED IN ANY PART OF THE STRUCTURE, EXCEPT AS PERMITTED BY THE ENGINEER.

5. AGGREGATES SHALL BE GRADED IN ACCORDANCE WITH ASTM C33 SPECIFICATIONS. COARSE AGGREGATE SHALL BE SIZE NO. 67. FINE AGGREGATE SHALL BE NATURAL SAND.

6. AIR CONTENT SHALL BE BETWEEN 5% AND 7% (BY VOLUME) UNLESS OTHERWISE APPROVED BY THE ENGINEER.

7. USE OF FLY ASH IS PROHIBITED. ADMIXTURES SHALL NOT BE USED UNLESS NOTED OTHERWISE. ANY PROPOSED ADMIXTURE SHALL BE APPROVED BY THE ENGINEER PRIOR TO FABRICATION.

STRUCTURAL STEEL:

MISC EMBEDDED STEEL SHAPES AND PLATES SHALL CONFORM TO ASTM A709 GRADE 36. SHEAR STUDS SHALL BE C1015, C1017 OR C1020 COLD DRAWN STEEL WHICH CONFORMS TO ASTM A108 SPECIFICATIONS.

REINFORCING STEEL:

1. REINFORCING STEEL SHALL BE DEFORMED NEW BILLET BARS PER ASTM A615 SPECIFICATIONS AND MEET GRADE 60 REQUIREMENTS.

2. FABRICATION OF REINFORCING STEEL SHALL BE PER CHAPTER 7 OF THE CRSI MANUAL OF STANDARD PRACTICE. DIMENSIONS OF BENDING ARE OUT TO OUT OF BAR.

3. REINFORCING STEEL SHALL BE BLOCKED AND TIED TO PROPER LOCATION AND SECURELY WIRED AGAINST DISPLACEMENT. TIE WIRES SHALL BE INSTALLED AT EVERY OTHER BAR INTERSECTION SO THAT AT LEAST 50% OF THE INTERSECTIONS ARE TIED. TACK WELDING OF REINFOCING IS PROHIBITED. MINIMUM CONCRETE COVER ON REINFORCING NOT OTHERWISE NOTED SHALL MEET THE AREMA MANUAL FOR RAILWAY ENGINEERING REQUIREMENTS.

PRECAST CONCRETE CONSTRUCTION NOTES

1. ALL CONCRETE MATERIALS, PLACEMENT, PRODUCTION AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH CHAPER 8 OF THE AREMA MANUAL FOR RAILWAY ENGINEERING, 2019 EDITION.

2. EXPOSED SURFACES SHALL BE FORMED IN A MANNER WHICH SHALL PRODUCE A SMOOTH AND UNIFORM APPEARANCE WITHOUT RUBBING OR PLASTERING. ALL CONCRETE CORNERS/EDGES SHALL HAVE A 3/4" CHAMFER PROVIDED UNLESS OTHERWISE NOTED ON THE PLANS OR WHERE THE EMBEDDED PLATES ARE LOCATED. THE TOP SURFACE IS TO HAVE A SMOOTH FINISH, FREE OF ALL FLOAT OR TROWEL MARKS.

3. CURING SHALL BE ACCOMPLISHED BY WET CURING OR APPLICATION OF A TYPE 2 MEMBRANE.

4. THE FABRICATOR SHALL STENCIL THE LIFTING WEIGHT AND BRIDGE NUMBERS AT LOCATIONS SHOWN ON THE DRAWINGS. THE FABRICATOR SHALL COMPLETE EMBOSSING OF THE DATE OF FABRICATION AT LOCATIONS SHOWN IN THE DRAWINGS.

5. DIMENSIONAL TOLERANCES GOVERNING THE MANUFACTURE OF PRECAST MEMBERS SHALL CONFORM TO APPENDIX B OF THE PRECAST/PRESTRESSED CONCRETE INSTITUTE'S MANUAL MNL 116 FOR QUALITY CONTROL FOR THE APPROPRIATE SHAPE. TOLERANCE FOR LOCATION OF LIFTING DEVICES SHALL BE +/– 1/2".

6. THE FABRICATOR SHALL BE RESPONSIBLE FOR LOADING AND PROPERLY SECURING ALL PRECAST CONCRETE MEMEBERS FOR SHIPMENT. ALL CONCRETE COMPONENTS SHALL BE MADE AVAILABLE FOR INSPECTION BY THE RAILROAD AT THE FABRICATOR'S PLANT PRIOR TO SHIPMENT, AT THE RAILROAD'S DISCRETION.

7. STUD WELDING SHALL BE PER AWS D1.5.

8. THE FORMWORK FOR PRECAST SUBSTRUCTURE ELEMENTS SHALL BE CONSTRUCTED TO PROVIDE THE FOLLOWING TOLERANCES TO THE FINISHED ELEMENT:
   a. LENGTH AND WIDTH: ±1/8 INCH.
   b. THICKNESS: ±1/8 INCH.
   c. FLATNESS OF SURFACES: ±1/8 INCH.
   d. FLATNESS OF MATING SURFACES OR BEARING SURFACES: +0 INCH, –1/16 INCH.

9. CONCRETE WATER REPELLENT SHALL BE APPLIED TO THE TOP OF THE DECK, CURBS, AND SIDES OF ALL DECK SLABS PRIOR TO INSTALLATION, AS WELL AS CONCRETE BENT CAPS AND TOP AND SIDES OF WING WALLS.

10. CONCRETE WATER REPELLENT SHALL CONSIST OF A SILANE BASED, ONE PART LIQUID PENETRATING SEALER, IN ACCORDANCE WITH AREMA CHAPTER 8, PART 1 AND IN CONFORMANCE WITH APPLICABLE ASTM DESIGNATIONS.

11. SURFACE PREPARATION FOR AND APPLICATION OF CONCRETE WATER REPELLENT SHALL BE IN ACCORDANCE WITH AREMA CHAPTER 8, PART 1.

FALL ARREST WALL ANCHOR

FALL ARREST WALL ANCHORS SHALL BE THALER FARA–92 FALL ARREST WALL ANCHOR OR ENGINEER APPROVED EQUAL AND SHOULD BE INSTALLED PER MANUFACTURER SPECIFICATIONS.

WATERPROOFING

1. ALL WATERPROOFING SHALL BE IN ACCORDANCE WITH THESE NOTES AND ALL APPLICABLE SECTIONS OF AREMA CHAPTER 8, PART 29: WATERPROOFING. SUBSTRUCTURE WATERPROOFING SHALL BE APPLIED AS SPECIFIED IN THESE DRAWINGS. SEE DRAWING NO. 334.5–20.

2. DECK WATERPROOFING SHALL CONSIST OF AMSTED RPS BALLAST MATS OR ENGINEER APPROVED EQUAL WITH DS BROWN "DECKGUARD" SPRAY APPLIED MEMBRANE OR AN ENGINEER APPROVED EQUAL. DECK WATERPROOFING SHALL BE IN ACCORDANCE WITH AREMA CHAPTER 8, PART 29, COLD–APPLIED ELASTOMERIC MEMBRANES.

3. ALL OTHER WATERPROOFING SHALL BE BASF "MASTERSEAL 581" OR ENGINEER APPROVED EQUAL AND SHOULD BE INSTALLED PER MANUFACTURER'S SPECIFICATIONS.

CORRUGATED METAL PIPE

CORRUGATED METAL PIPE SHALL CONFORM TO ASTM A760 "STANDARD SPECIFICATION FOR CORRUGATED STEEL PIPE, METALLIC COATED FOR SEWERS AND DRAINS" AND SHALL BE SIZED AS SHOWN IN THE PLANS.

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RJ Corman Railroad Company

APPROVED FOR
R.J. CORMAN RAILROAD COMPANY/
CAROLINA LINES BY
HDR ENGINEERING INC.
OF THE CAROLINAS
(CHARLESTON, SC)
BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020

FILE: 334.5-03.dgn

REVISIONS

BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP

GENERAL NOTES (2 OF 3)

HORRY COUNTY CONWAY, SC

R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

SCALE: AS SHOWN DATE: 3/16/2020 DESIGN: TCS DRAWN: RGD CHECKED: JFM	VAL. SEC.	DRAWING NO. 334.5-03	

RELEASED FOR BID - NOT FOR CONSTRUCTION

PRECAST AND PRESTRESSED CONCRETE REINFORCING BARS AND EMBEDDED STEEL

REINFORCING BARS

1. FABRICATION, BENDING, AND PLACEMENT OF REINFORCING STEEL SHALL MEET THE REQUIREMENTS OF CHAPTER 8 OF THE AREMA MANUAL FOR RAILWAY ENGINEERING, 2019 EDITION.
2. SIZE, GRADE, SHAPE AND LENGTH SHALL BE AS SHOWN ON THE PLANS.
3. ALL DIMENSIONS FOR REINFORCING BARS REFER TO THE CENTERLINE OF THE BAR EXCEPT ON THE BAR BENDING DETAILS WHERE DIMENSIONS ARE OUT-TO-OUT.
4. BARS SHALL BE FREE FROM DIRT, PAINT, OIL, GREASE, THICK RUST AND OTHER FOREIGN SUBSTANCES.
5. REINFORCING BARS SHALL MEET THE LAP REQUIREMENTS OF CHAPTER 8 OF THE AREMA MANUAL FOR RAILWAY ENGINEERING, 2019 EDITION, SECTION 2.14 AND 2.22.3 FOR CLASS C SPLICE.
6. REINFORCING BARS SHALL BE ACCURATELY COLD BENT TO THE SHAPES AND DIMENSIONS SPECIFIED. THE MINIMUM BEND DIAMETER SHALL BE AS SHOWN BELOW.
   BAR SIZES NO. 3 THROUGH NO. 8: 6 BAR DIAMETERS
   BAR SIZES NO. 9 THROUGH NO. 11: 8 BAR DIAMETERS
   BAR SIZES NO. 14 THROUGH NO. 18: 10 BAR DIAMETERS
7. THE MINIMUM CLEAR DISTANCE FROM THE REINFORCING STEEL TO SURFACE OF THE CONCRETE SHALL BE IN ACCORDANCE WITH CHAPTER 8 OF THE AREMA MANUAL FOR ENGINEERING, 2019 EDITION, SECTION 2.6.1 – MINIMUM CONCRETE COVER UNLESS OTHERWISE SHOWN ON THE PLANS.
8. BARS SHALL BE BENT IN THE PLACE FOR WHICH THEY WERE DESIGNED. MAXIMUM ALLOWABLE DEVIATION FOR THE NUMBER 7 BARS AND UNDER SHALL BE ½" OUT OF PLANE AND FOR NO. 8 BARS AND OVER 1 INCH OUT OF PLANE.
9. REINFORCEMENT SUPPORTS SHALL BE ALL PLASTIC OR ALL STAINLESS STEEL.
10. TIE WIRES USED FOR TYING REINFORCING BARS SHALL BE A MINIMUM DIAMETER OF NO. 16 GAUGE, BLACK, SOFT IRON WIRE.
11. DOWELS SHALL BE MADE FROM NEW DEFORMED BILLET STEEL CONFORMING TO THE REQUIREMENTS OF ASTM A 615, GRADE 60.

EMBEDDED STEEL

1. EMBEDDED STEEL SHAPES AND PLATES SHALL HAVE THEIR SURFACES PREPARED CONFORMING TO THE REQUIREMENTS OF SSPC-SP2 HAND TOOL CLEANING.
2. EMBEDDED STEEL SHAPES AND PLATES SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123. THREADS ON INSERTS SHOULD BE BLOCKED OUT AND KEPT FREE OF GALVANIZING. AFTER GALVANIZING, ALL ELEMENTS SHALL BE FREE OF FINS, ABRASIONS, ROUGH OR SHARP EDGES, AND OTHER SURFACE DEFECTS.

PREFORMED EXPANSION JOINT FILLER

1. PREFORMED EXPANSION JOINT FILLER SHALL BE SIZED AS SHOWN ON THE PLANS AND CONFORM TO THE REQUIREMENTS OF ASTM D1751.
2. THE JOINT FILLER SHALL BE ATTACHED PER MANUFACTURER SPECIFICATION.

PILE SURFACE COATING

1. PAINT SYSTEM: THE STEEL H-PILE SURFACE COATING SHALL CONSIST OF A SINGLE COAT APPLICATON OF CARBOMASTIC 615 OR AN APPROVED EQUAL. COATING THICKNESS SHALL BE A MINIMUM OF 10 MILS. APPLY PER MANUFACTURER'S RECOMMENDATIONS. APPLY COATING TO THE TOP 30 FEET OF THE UPPER SECTION OF PILE AT EACH LOCATION.
2. STORAGE: THE COATINGS SHALL BE STORED AT TEMPERATURES BETWEEN 40° F AND 110° F OR THE MANUFACTURER'S RECOMMENDED LIMITS, WHICHEVER ARE MORE RESTRICTIVE.
3. MIXING OF COATINGS: COATINGS SHALL BE THOROUGHLY MIXED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
4. SURFACE PREPARATION: PREPARE SURFACE ACCORDING TO MANUFACTURER'S RECOMMENDATIONS AND REMOVE ANY OIL, GREASE, OR MILL SCALE FROM THE SURFACE TO BE PAINTED. SURFACE PREPARATION SHALL BE COMPLETED IN ACCORDANCE WITH SSPC-SP2 HAND TOOL CLEANING.
5. THE PRODUCTS OF ONE COATING SYSTEM FROM A SINGLE MANUFACTURER SHALL BE USED FOR ALL FIELD COATING WORK. DO NOT MIX COATING SYSTEMS OF PRODUCTS OF DIFFERENT MANUFACTURERS.
6. FIELD TOUCH-UP REPAIR OF DAMAGED COATING SYSTEM: THE CONTRACTOR SHALL REPAIR ALL AREAS OF DAMAGED COATING AFTER FIELD ERECTION OF THE STRUCTURE IS COMPLETE USING THE SAME COATING SYSTEM AS SPECIFIED HEREIN.

MISCELLANEOUS STEEL NOTES

1. MATERIALS, FABRICATION, AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH CHAPTER 15: STEEL STRUCTURES OF THE AREMA MANUAL FOR RAILWAY ENGINEERING.
2. MISCELLANEOUS STEEL MATERIALS SHALL CONFORM TO THE FOLLOWING:

a. SPAN JOINTS	ASTM A36
b. LONGITUDINAL JOINTS	ASTM A36
c. LATERAL STOPS	ASTM A36
d. HANDRAIL POSTS	ASTM A36
e. HANRAIL	ASTM A53, Gr. B

3. ALL SPAN JOINT ASSEMBLIES, LONGITUDINAL JOINT ASSEMBLIES, HANDRAIL POSTS, AND HANDRAIL SHALL BE HOT-DIPPED GALVANIZED IN ACCORDANCE WITH ASTM A123. COATING WEIGHT SHALL BE 2.3 OZ. PER SQUARE FOOT.
4. LATERAL STOPS SHALL BE SHOP PAINTED WITH A SINGLE COAT OF CARBOMASTIC 615 AL (8-10 MILS DRY FILM THICKNESS, DFT) OR APPROVED EQUAL AFTER FABRICATION.
5. WELDING SHALL BE PERFORMED BY QUALIFIED WELDERS.

PROPOSED CONSTRUCTION SEQUENCE

1. DRIVE HP PILES DURING APPROVED WORK WINDOWS. CUTOFF PILES BELOW BASE OF RAIL ELEVATION FOR END BENTS AND AT FINAL CUTOFF ELEVATION FOR INTERMEDIATE BENTS.
2. CONSTRUCT TEMPORARY CONSTRUCTION ACCESS.
3. INSTALL PRECAST CONCRETE BENT CAPS.
4. TAKE TRACKS OUT OF SERVICE.
5. REMOVE RAIL, TIES, BALLAST, AND OTHER TRACK MATERIALS (RAILROAD).
6. EXCAVATE FOR END BENTS.
7. REMOVE EXISTING BRIDGE AND DISPOSE OF DEBRIS. EXISTING TIMBER PILES MAY BE TEMPORARILY CUT OFF BELOW THE PROPOSED LOW CHORD ELEVATION AT THE CONTRACTOR'S OPTION.
8. GRADE AS REQUIRED AND INSTALL RIPRAP.
9. INSTALL PRECAST CONCRETE BOX BEAM SPANS.
10. INSTALL BRIDGE HANDRAIL.
11. INSTALL BALLAST, RAIL, TIES, AND OTHER TRACK MATERIALS. (RAILROAD)
12. PLACE TRACK IN SERVICE.
13. CUT OFF EXISTING TIMBER PILES A MINIMUM OF 2'-0" BELOW THE GROUND LINE.
14. REMOVE TEMPORARY CONSTRUCTION ACCESS.
15. RETURN AREA TO EXISTING CONDITION OR BETTER.

STRUCTURAL BACKFILL NOTES

1. GRANULAR BACKFILL FOR ABUTMENTS SHALL BE AS SPECIFIED ON DRAWING 334.5-20.
2. BACKFILL FOR OTHER AREAS WITHIN THE PROJECT LIMITS SHALL BE COHESIVE STRUCTURAL FILL COMPACTED TO A MINIMUM OF 95% OF THE MODIFIED PROCTOR MAXIMUM DRY DENSISTY IN ACCORDANCE WITH ASTM D1557.
3. THE MOISTURE CONTENT OF FILL MATERIALS SHOULD BE CONTROLLED WITHIN 3 PERCENT OF THE OPTIUMUM WATER CONTENT AS DETERMINED BY THE MODIFIED PROCTOR TEST IN ACCORDANCE WITH ASTM D1557.
4. SOIL FILL PLACED WITH MACHINE COMPACTORS SHOULD BE PLACED IN LIFTS OF 8 INCHES OR LESS IN LOOSE THICKNESS.
5. SOIL FILL PLACE WITH HAND COMPACTORS SHOULD BE PLACED IN LIFTS OF 4 INCHES OR LISS IN LOOSE THICKNESS.
6. LIFTS THICKER THAN THOSE SPECIFIED IN NOTES 4 AND 5 MAY ONLY BE USED IF APPROVED BY THE GEOTECHNICAL ENGINEER.
7. COMPACTION OF ROCK FILL AND OTHER FILL SUBJECT TO PERFORMANCE CRITERIA SHOULD BE OBSERVED BY THE GEOTECHNICAL ENGINEER.

FOUNDATION INSTALLATION NOTES

1. HP14x102 PILES SHALL BE DRIVEN BY A DELMAG D 46-32 DIESEL PILE HAMMER. THE DELMAG D 46-32 PILE HAMMER HAS A MANUFACTURER'S MAXIMUM ENERGY RATING OF 122.2 KIP-FEET OF ENERGY. IF A PILE HAMMER WITH A MAXIMUM ENERGY RATING DIFFERENT FROM THAT OF A DELMAG D 46-32 IS USED, IT IS RECOMMENDED THAT AN ADDITIONAL DRIVABILITY ANALYSIS BE CONDUCTED AND SHALL BE APPROVED BY THE GEOTECHNICAL ENGINEER.
2. THE STEEL PILES SHALL BE DRIVEN TO AN ULTIMATE DRIVEN CAPACITY OF 395 TONS (INCLUDES A FACTOR OF SAFETY OF 2.5). PILES SHALL BE DRIVEN TO A MINIMUM TIP ELEVATION OF -80 (NAVD 88).
3. THE DRIVEN PILE CAPACITY SHOULD BE VERIFIED USING THE PILE DRIVING ANALYZER (PDA) WITH CAPWAP. A MINIMUM OF 2 PILES SHOULD BE TESTED AT THIS PROJECT SITE.
4. JETTING OF PILES IS NOT PERMITTED.
5. ALL PILES SHALL BE DRIVEN. VIBRATORY DRIVING MAY NOT BE USED UNLESS APPROVED BY THE ENGINEER.
6. ALL PILING SHALL BE DRIVEN USING TEMPLATES AT BOTH TRACK LEVEL AND AT NATURAL GROUND OR NEAR WATER SURFACE AS REQUIRED. THE TEMPLATES SHALL BE ADEQUATELY SECURED TO ENSURE THE PILE'S PROPOSED ALIGNMENT IS MAINTAINED DURING DRIVING.
7. INSTALLED PILES SHALL NOT BE CUT TO FINAL ELEVATION UNTIL THEY HAVE BEEN VERIFIED TO BE INSTALLED WITHIN THE TOLERANCES SPECIFIED ON THESE DESIGN DRAWINGS.
8. THE ENGINEER SHALL BE NOTIFIED IF ANY PILES ARE INSTALLED WITH THE TOP OF PILE DISPLACED BEYOND 2" IN ANY DIRECTION OF ¼" PER FOOT FROM VERTICAL OR BATTER LINE FROM THE LOCATION SPECIFIED IN THESE DRAWINGS. ANY PILE WHICH IS DEEMED UNACCEPTABLE BECAUSE OF THE DIMENSIONAL VARIATIONS SHALL BE REMOVED AND REPLACED OR RE-DRIVEN IN AN ACCEPTABLE POSITION. ALTERNATIVELY, THE ISSUE MAY BE CORRECTED IN AS DIRECTED BY THE ENGINEER.
9. AFTER VERIFICATION AND APPROVAL, THE PILE SHALL BE CUT OFF AND LEVELLED AT THE REQUIRED ELEVATIONS AND THE PRECAST CAP SHALL BE PLACED AND WELDED.

FIELD WELDING

1. FIELD WELDING SHALL BE COMPLETED USING SHIELDED METAL ARC WELDING (SMAW) OR FLUX-CORED ARC WELDING (FCAW) PROCESSES AND SHOULD CONFORM TO THE REQUIREMENTS OF AWS D1.5.
2. FIELD WELDING USING SMAW WELDING PROCESS SHALL BE COMPLETED USING E7108 LOW HYDROGEN ELECTRODES CONFORMING OT THE REQUIREMENTS OF AWS 5.5, "SPECIFICATIONS FOR LOW ALLOY STEEL COVERED ARC WELDING ELECTRODES."
3. FIELD WELDING USING FCAW WELDING PROCESS SHOULD BE COMPLETED USING E71T-8-H16 SELF SHIELDED ELECTRODES CONFORMING TO THE REQUIREMENTS OF AWS A5.29, "SPECIFICATION FOR LOW-ALLOY STEEL ELECTRODES FOR FLUX CORED ARC WELDING."
4. ON-SITE PROTECTION AND USE OF ELECTRODE HEATING UNITS SHOULD CONFORM TO THE CURRENT AWS D1.5 SPECIFICATIONS.

PILE DRIVING SHOE

1. PILE TIPS SHALL BE REINFORCED WITH TIPS PER DRAWING 334.5-08.

PILE PAINTING

1. EXPOSED PILING SHALL BE PAINTED IN ACCORDANCE WITH THE SUFACE COATING NOTES ON DRAWING 334.5-04. PILES SHALL BE PAINTED FROM THE BOTTOM OF THE BENT CAP TO A POINT ONE FOOT BELOW FINAL GROUND. PILES TO BE DRIVEN IN PERMANENT SURFACE WATER SHALL BE PRE-PAINTED A SUFFICIENT DISTANCE BEFORE DRIVING TO ENSURE THAT THE PAINT COAT EXTENDS TO OR LOWER THAN THE LIMIT SPECIFIED ABOVE.

PILE TESTING

1. THE PILES SHALL BE DRIVEN INCORPORATING PILE DRIVING ANALYZER (PDA) TECHNOLOGY. TEST PILES SHALL BE AS DESIGNATED ON THESE DRAWINGS. ALTERNATE TEST PILE LOCATIONS MAY BE USED IF APPROVED BY THE ENGINEER.
2. THE TEST PILE MAY BE DRIVEN AHEAD OF THE PRODUCTION PILES. THE TEST PILE DATA AND DRIVING LOG SHEETS MAY BE USED TO DEVELOP AND/OR CONFIRM THE LENGTHS FOR THE REMAINING PILES UPON APPROVAL FROM THE ENGINEER.
3. PDA TESTING SHALL BE PERFORMED BY A PROFESSIONAL GEOTECHNICAL ENGINEER REGISTERED IN THE STATE OF SOUTH CAROLINA.
4. A COPY OF THE PDA TEST DATA AND ASSOCIATED REPORTS SHALL BE SUBMITTED TO THE ENGINEER AND RJ CORMAN FOR INCLUSION INTO THE CONSTRUCTION RECORDS.

EARTHWORK AND GRADING

1. THE CONTRACTOR MAY REQUEST A COPY OF THE GEOTECHNICAL REPORT FROM THE RAILROAD. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE SUB-SURFACE CONDITIONS PRIOR TO CONSTRUCTION. THE RAILROAD ASSUMES NO RESPONSIBILITY FOR THE CORRECTNESS OF ANY SUB-SURFACE/GEOTECHNICAL INFORMATION PROVIDED TO THE CONTRACTOR.
2. ALL GRADING SHALL BE CONSTRUCTED TO THE LINES, GRADES, SLOPES, AND DIMENSIONS SHOWN IN THESE DRAWINGS. VARIANCES MAY BE PERMITTED IF APPROVED BY THE ENGINEER IN WRITING.
3. SLOPES OF CUTS, DITCHES, OR CHANNELS SHALL BE CONSTRUCTED AND DRESSED TO THE LINES PRESCRIBED ON THE PLANS. VARIANCES REQUIRED TO SUIT LOCAL CONDITIONS MAY BE PERMITTED IF APPROVED BY THE ENGINEER IN WRITING.
4. ALL FILL MATERIAL SHALL BE STOCKPILED WITHIN THE APPROVED STAGING AREAS. THE CONTRACTOR SHALL TAKE MEASURES TO PREVENT OR CONTAIN MATERIAL RUNOFF.
5. ORGANIC SOILS ARE NOT PERMITTED FOR USE AS FILL MATERIALS. REFER TO DRAWING NO. 334.5-19 FOR FILL MATERIAL SPECIFICATIONS.

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APPROVED FOR
R.J. CORMAN RAILROAD COMPANY/
CAROLINA LINES BY
HDR ENGINEERING INC.
OF THE CAROLINAS
(CHARLESTON, SC)
BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020

FILE: 334.5-04.dgn

RJ Corman Railroad Company

REVISIONS

BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP

GENERAL NOTES (3 OF 3)

HORRY COUNTY CONWAY, SC

R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

SCALE: AS SHOWN DATE: 3/16/2020 DESIGN: TCS DRAWN: RGD CHECKED: JFM	VAL. SEC.	DRAWING NO. 334.5-04

RELEASED FOR BID - NOT FOR CONSTRUCTION

CONTROL POINTS

CONTROL POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
CP #1	743.505.36	2592043.070	3.79'	NAIL & WASHER
CP #2	743457.25	2591790.240	8.19'	NAIL & WASHER

NOTE

1. EXISTING PEDESTRIAN TRAIL OWNED BY HORRY COUNTY. CONTRACTOR SHALL COORDINATE WITH HORRY COUNTY AND THE CITY OF CONWAY AS REQUIRED FOR ESTABLISHING STAGING AREA AND ACCESS ROAD.

RELEASED FOR BID - NOT FOR CONSTRUCTION

HDR ENGINEERING, INC.
4400 LEEDS AVE., SUITE 450
NORTH CHARLESTON, SC 29405
843-414-3700

APPROVED FOR
R.J. CORMAN RAILROAD COMPANY/
CAROLINA LINES BY
HDR ENGINEERING INC.
OF THE CAROLINAS
(CHARLESTON, SC)
BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020
FILE: 334.5-05.dgn

R.J. Corman Railroad Company

REVISIONS

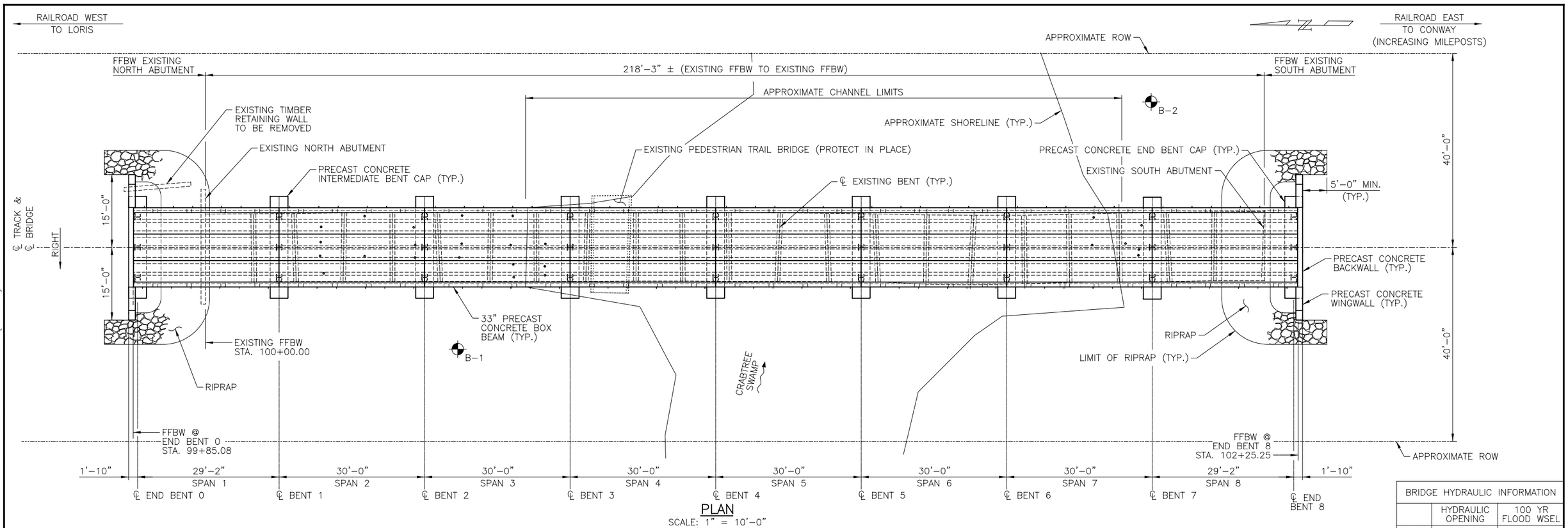
BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP

SITE PLAN

HORRY COUNTY CONWAY, SC

R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

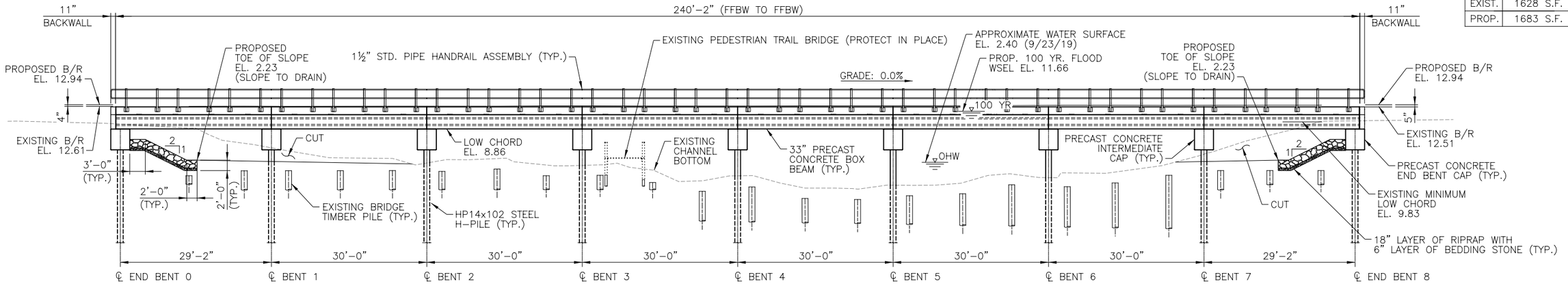
SCALE:	AS SHOWN	VAL. SEC.	DRAWING NO.
DATE:	3/16/2020		334.5-05
DESIGN:	TCS		
DRAWN:	RGD		
CHECKED:	JFM		



PLAN

SCALE: 1" = 10'–0"

BRIDGE HYDRAULIC INFORMATION		
	HYDRAULIC OPENING	100 YR FLOOD WSEL
EXIST.	1628 S.F.	11.66
PROP.	1683 S.F.	11.66



ELEVATION

SCALE: 1" = 10'–0"

ABANDONED PILES NOT SHOWN FOR CLARITY

NOTES

1. PROPOSED TOP OF RAIL EL. 13.48.
2. SEE DRAWING NO. 334.3–08 FOR FOUNDATION LAYOUT OF PROPOSED PILES AND APPROXIMATE LOCATION OF EXISTING AND ABANDONED PILES. ABANDONED PILES REFERS TO ALL TIMBER PILES PRESENT AT THE BRIDGE SITE NOT SUPPORTING THE EXISTING BRIDGE. PILES SUPPORTING THE EXISTING BRIDGE ARE SHOWN ON THIS SHEET AS CUT OFF IN THEIR FINAL CONDITION AFTER CONSTRUCTION OF THE PROPOSED BRIDGE.
3. SEE DRAWING NO. 334.3–20 FOR RIPRAP SLOPE PROTECTION DETAILS.
4. EXISTING AND ABANDONED PILES SHALL BE CUT OFF A MINIMUM OF 2'–0" BELOW THE EXISTING MUDLINE AFTER CONSTRUCTION OF PROPOSED BRIDGE IS COMPLETE.
5. RAILROAD IS RESPONSIBLE FOR ANY REQUIRED RETAINING WALLS.
6. BENT MAXIMUM DESIGN HEIGHT = 17'–0"
7. BORING B1 LOCATED 21' FROM BRIDGE AND 52' FROM FRONT FACE OF TIMBER ABUTMENT.
8. BORING B2 LOCATED 30' FROM BRIDGE AND 23' FROM FRONT FACE OF TIMBER ABUTMENT.
9. CENTERLINE PROPOSED TRACK TO MATCH LOCATION OF EXISTING TRACK.
10. EXISTING PEDESTRIAN BRIDGE IS THE PROPERTY OF HORRY COUNTY. EXISTING PEDESTRIAN BRIDGE TO REMAIN IN PLACE. CONTRACTOR SHALL TAKE CARE NOT TO DAMAGE EXISTING PEDESTRIAN BRIDGE.
11. WSEL = WATER SURFACE ELEVATION

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BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020

FILE: 334.5-06.dgn

RJ Corman Railroad Company

REVISIONS

BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP

GENERAL PLAN AND ELEVATION

HORRY COUNTY — CONWAY, SC

R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

SCALE: AS SHOWN
DATE: 3/16/2020
DESIGN: TCS
DRAWN: RGD
CHECKED: JFM

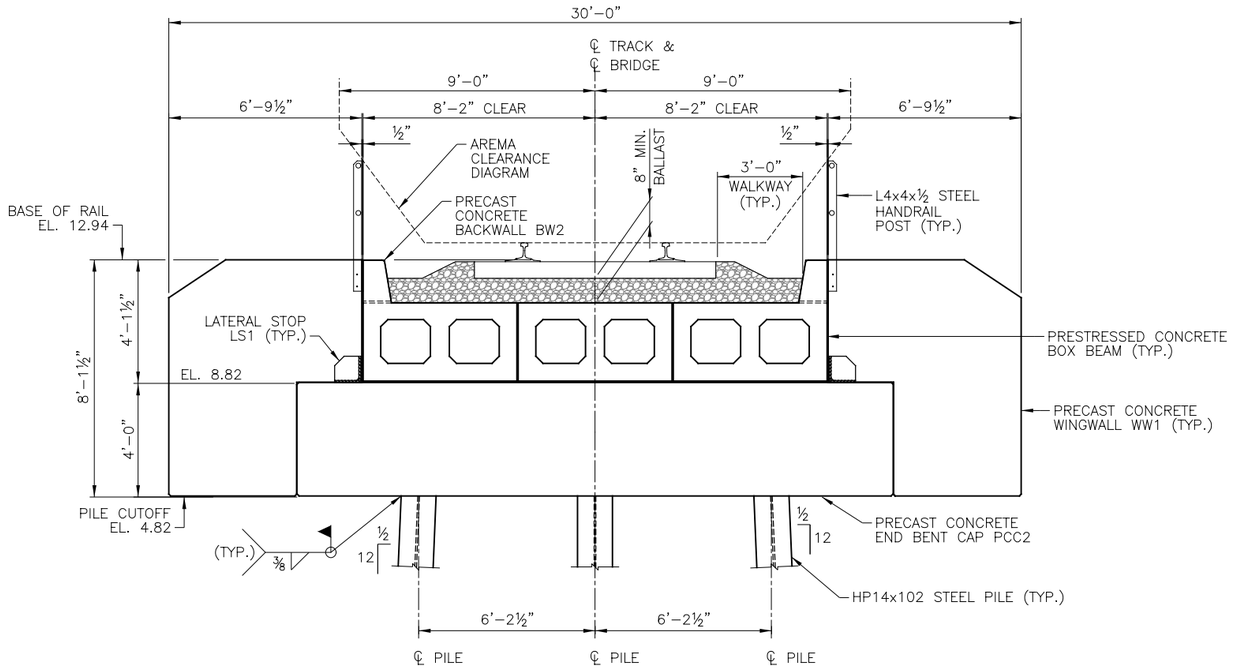
VAL. SEC.

DRAWING NO. 334.5-06

SCALE FACTORS CORRESPOND WITH FULL SIZE (22"x34") DRAWINGS

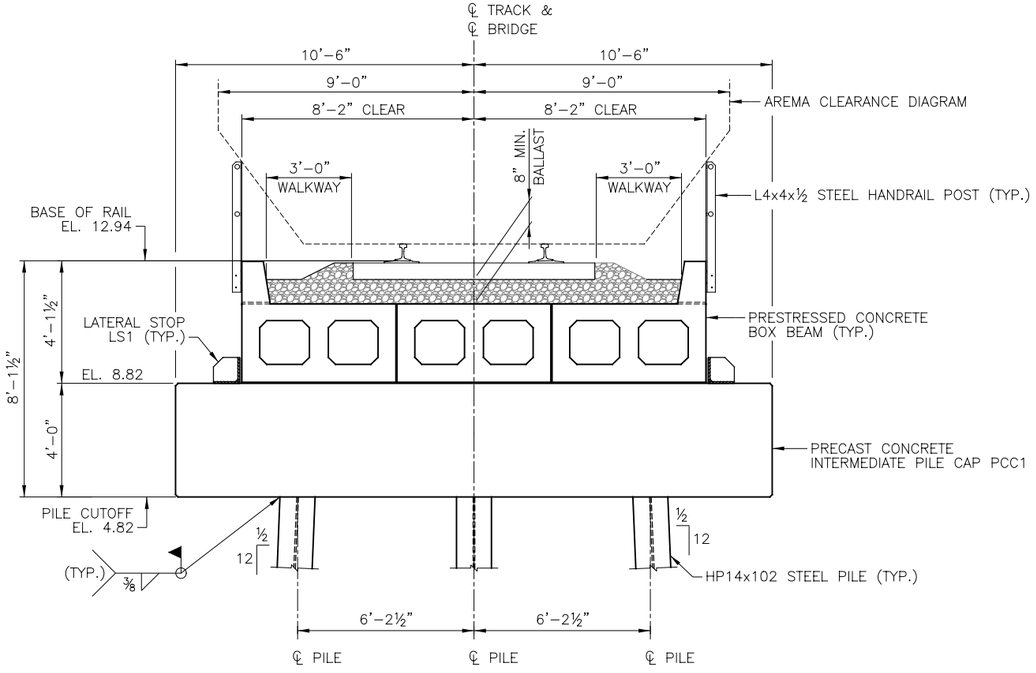
USER: rdixon

FILENAME: c:\pwworking\east01\d1152259\334.5-06.dgn



TYPICAL SECTION – END BENT

SCALE: ⅜" = 1'–0"

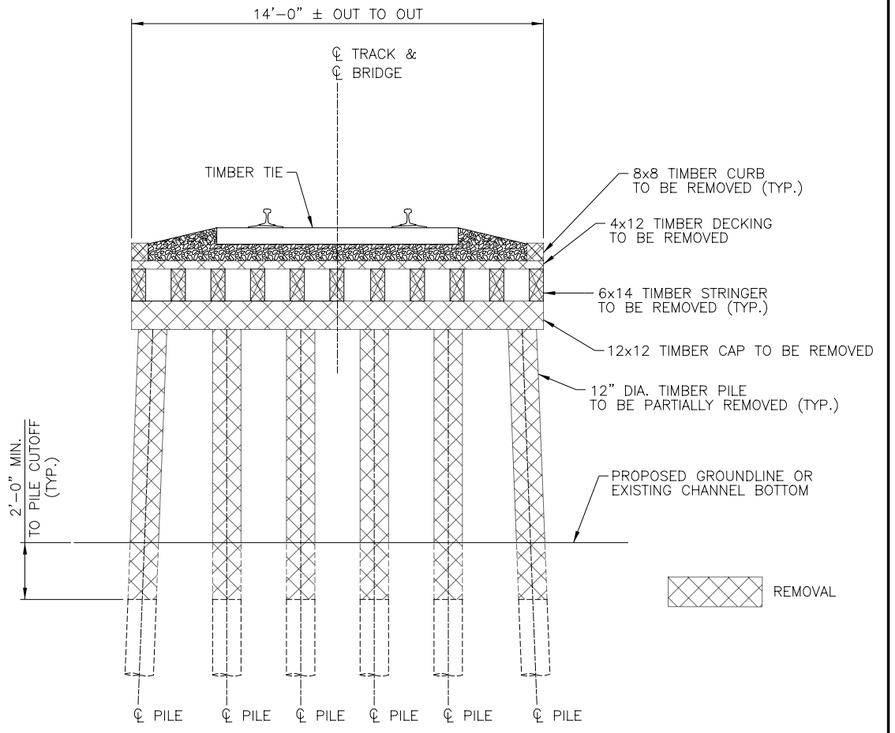


TYPICAL SECTION – INTERMEDIATE BENT

SCALE: ⅜" = 1'–0"

NOTES

1. ALL ELEVATIONS SHOWN ARE REFERENCED TO NAVD 88 VERTICAL DATUM.
2. FOR BEARING PAD PLACEMENT DETAILS, SEE DRAWING NO. 334.5–09.
3. FOR END BENT ASSEMBLY, SEE DRAWING NO. 334.5–12.
4. FOR PRECAST CONCRETE WINGWALL DETAILS, SEE DRAWING NO. 334.5–13.
5. FOR PRECAST CONCRETE BACKWALL DETAILS, SEE DRAWING NO. 334.5–14.
6. FOR PRECAST CONCRETE END BENT CAP DETAILS, SEE DRAWING NO. 334.5–15.
7. FOR PRECAST CONCRETE INTERMEDIATE BENT CAP DETAILS, SEE DRAWING NO. 334.5–16.
8. FOR PRESTRESSED CONCRETE BOX BEAM DETAILS, SEE DRAWING NO. 334.5–17.
9. FOR HANDRAIL DETAILS, SEE DRAWING NO. 334.5–22.



TYPICAL EXISTING BENT REMOVAL DETAIL

SCALE: ⅜" = 1'–0"

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OF THE CAROLINAS
(CHARLESTON, SC)
BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020

FILE: 334.5-07.dgn

REVISIONS

R.J. Corman Railroad Company

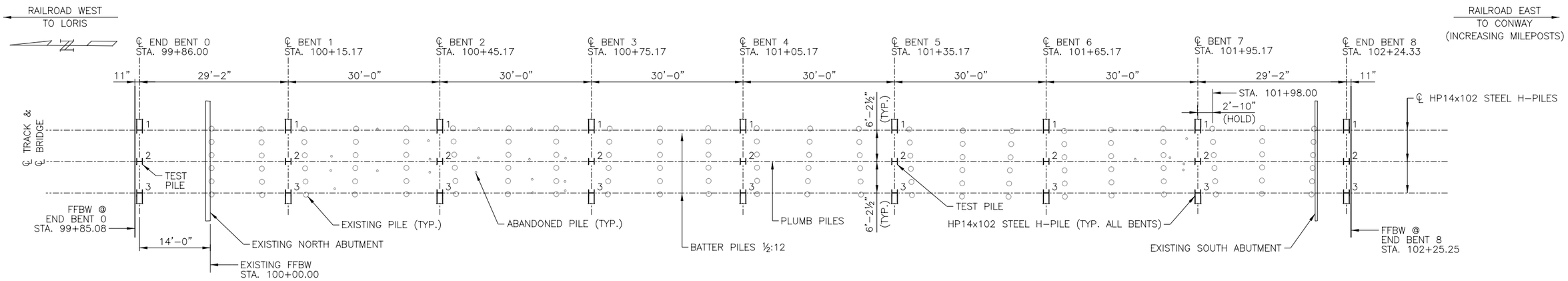
BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP

TYPICAL SECTIONS

HORRY COUNTY — CONWAY, SC

R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

SCALE: AS SHOWN DATE: 3/16/2020 DESIGN: TCS DRAWN: RGD CHECKED: JFM	VAL. SEC.	DRAWING NO. 334.5-07	



PROPOSED FOUNDATION LAYOUT

SCALE: 1" = 10'–0"

NOTES

1. FOR FOUNDATION INSTALLATION NOTES, SEE DRAWING 334.5–04.

APF HP 30000 SPLICER INSTALLATION INSTRUCTIONS:

NOTE: SPLICER IS SHOWN INSTALLED ON UPPER PILE SECTION FIRST. ALTERNATIVELY, SPLICER MAY BE INSTALLED ON LOWER PILE SECTION FIRST.

1. BEVEL FLANGES 45° AND NOTCH THE WEB OF UPPER PILE SECTION ⅞"X2½" TO RECEIVE SPLICER KEY.
2. FIT SPLICER OVER NOTCHED END OF PILE AND FILLET WELD SPLICER TO PILE FLANGE AS SHOWN.
3. PLACE THE UPPER PILE SECTION WITH SPLICER INTO POSITION ON THE LOWER PILE SECTION.
4. COMPLETE FILLET WELD ALONG CORNERS OF SPLICER ON LOWER PILE SECTION AS SHOWN.
5. WELD FLANGE JOINT BETWEEN UPPER AND LOWER PILE SECTIONS. (SINGLE 45° BEVEL W/ 0" TO ⅛" GAP)

1. STEEL:
PILES – ASTM A572 GR. 50
PILE SPLICES – ASTM A992 OR A572 GR. 50
PILE POINT – ASTM A 27 GR. 65

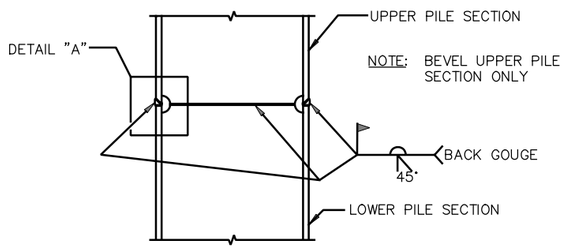
2. WELDING:
ALL WELDS SHALL BE MADE BY EITHER THE SHIELDED METAL ARC WELDING (SMAW) PROCESS OR THE FLUX CORED ARC WELDING (FCAW) PROCESS. SMAW WELDS SHALL BE MADE WITH E7018 ELECTRODES. FCAW WELDS SHALL BE MADE WITH E71T–8–H16 SELF SHIELDED ELECTRODE WIRE FOR USE IN ALL POSITION WELDING.

3. SPLICES:
SPLICES SHALL BE MADE A SUFFICIENT DISTANCE ABOVE THE GROUND OR WATER (NOT LESS THAN ONE FOOT) SO THAT THE SPLICE CAN BE OBSERVED DURING DRIVING. THE NUMBER OF SPLICES SHALL BE KEPT TO A MINIMUM. SPLICING CUT–OFFS OR SHORT PIECES TO MAKE A MAIN BEARING PILE IS NOT PERMITTED. THE PILE SHALL BE DRIVEN SO THAT THE SPLICE IS AT LEAST 10 FEET BELOW THE GROUND SURFACE.

4. DRIVING TOLERANCES:
VARIATIONS GREATER THAN ¼ INCH PER FOOT FROM VERTICAL OR BATTER LINE SHALL NOT BE ALLOWED. THE DEVIATION OF THE TOP OF PILES IN A BENT SHALL NOT EXCEED ONE INCH FROM THE PLAN LOCATION. ROTATION OF PILE ABOUT ITS CENTERLINE SHALL NOT EXCEED 5 DEGREES FROM ITS ORIENTATION AS SHOWN IN PLANS. PILES NOT MEETING TOLERANCE REQUIREMENTS OR OUT OF LINE AS TO IMPAIR USEFULNESS, OR PILES THAT ARE DAMAGED IN DRIVING AS TO IMPAIR STRUCTURAL CAPACITY, SHALL BE PULLED AND RE–DRIVEN.

5. REFUSAL
PILES RESISTING LATERAL LOADS: USING A HAMMER WITH 40,000 FT.–LBS OF FORCE OR GREATER. 10 BLOWS PER INCH FOR 3 CONSECUTIVE INCHES IS CONSIDERED REFUSAL.

PILES RESISTING VERTICAL LOADS: PILES MUST HAVE A PDA PERFORMED TO ENSURE THEY ARE WITHIN ENGINEERS SPECIFICATION AND TO DEVELOP DRIVING CRITERIA FOR THE HAMMER BEING USED. IF ANY PILE CANNOT BE DRIVEN TO ITS DESIGNED CAPACITY, NOTIFY THE DESIGN ENGINEER

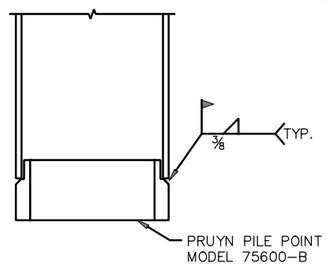


ALTERNATE SPLICER DETAIL

N.T.S.

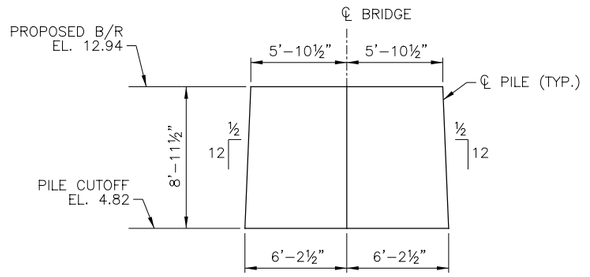
DETAIL "A"

N.T.S.



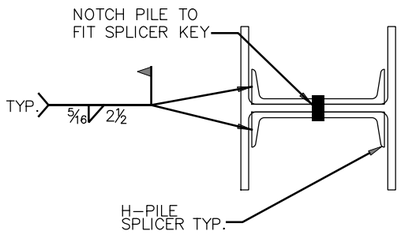
PRUYN PILE POINT DETAIL

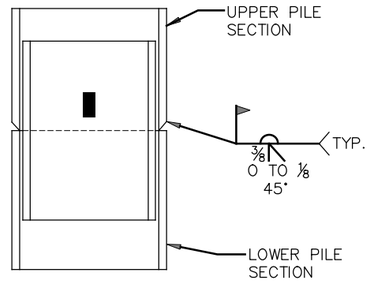
N.T.S.



PILE DRIVING DIAGRAM

N.T.S.

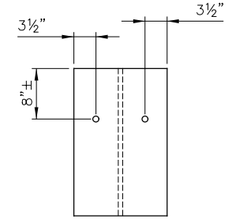




HP 30000 SPLICER DETAIL

N.T.S.

PILE HAMMER



LIFTING HOLE DETAIL

N.T.S.

ALTERNATE PILE SPLICE INSTALLATION INSTRUCTIONS

1. TORCH CUT WEB AND FILLET OF BOTH UPPER & LOWER PILE SECTIONS APPROXIMATELY ⅝" RADIUS. GRIND ALL TORCH CUT SURFACES TO SMOOTH FINISH.
2. GRIND/TORCH FLANGES OF UPPER PILE SECTION AT A 45 DEGREE ANGLE TO ENSURE A QUALITY FULL PENETRATION WELD.
3. WELD FLANGE AND WEB JOINT BETWEEN UPPER AND LOWER PILE SECTIONS. BACK GOUGE ROOTSIDE AND CAP OFF WITH 5⁄16" WELD.

PRUYN PILE TIP INSTALLATION INSTRUCTIONS

1. FIT POINT ONTO SQUARE CUT PILE.
2. WELD POINT TO THE PILE IN EITHER FLAT OR VERTICAL POSITION.
3. FILL THE AREA ACROSS BOTH FLANGES WITH WELD.

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APPROVED FOR
R.J. CORMAN RAILROAD COMPANY/ CAROLINA LINES BY
HDR ENGINEERING INC.
OF THE CAROLINAS
(CHARLESTON, SC)
BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020

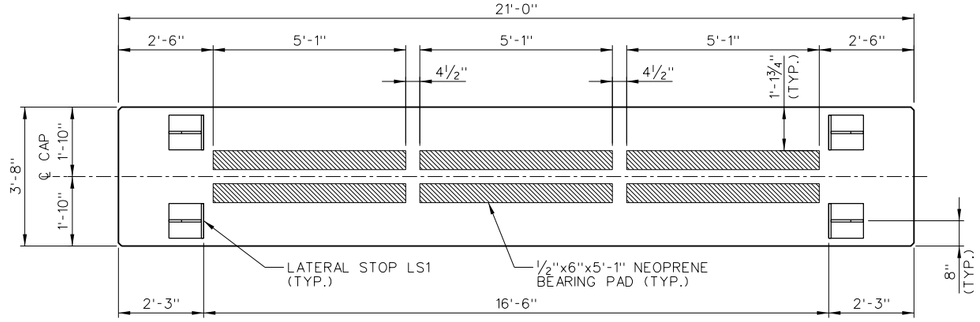
FILE: 334.5-08.dgn

REVISIONS

R.J. Corman Railroad Company

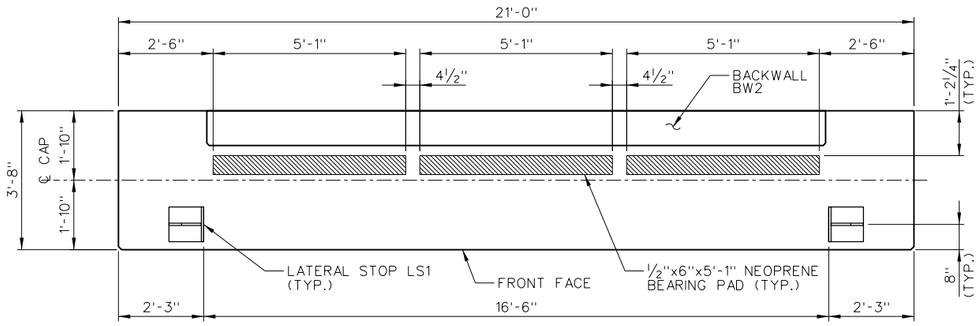
BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP
FOUNDATION LAYOUT
AND PILE DETAILS
HORRY COUNTY CONWAY, SC
R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

SCALE: AS SHOWN	VAL. SEC.	DRAWING NO.
DATE: 3/16/2020		334.5-08
DESIGN: TCS		
DRAWN: RGD		
CHECKED: JFM		



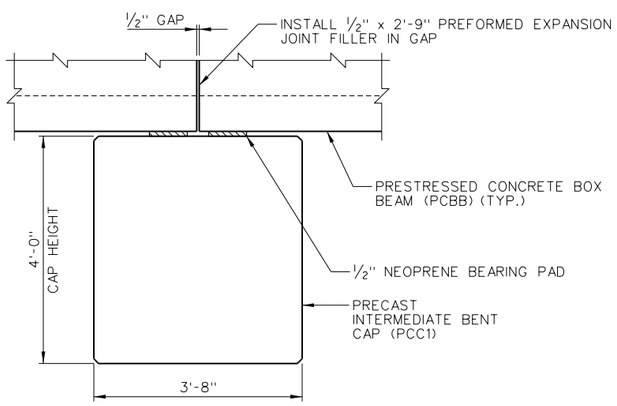
PRECAST INTERMEDIATE BENT CAP - PCC1

SCALE: ½" = 1'-0"
EMBEDDED PLATES NOT SHOWN



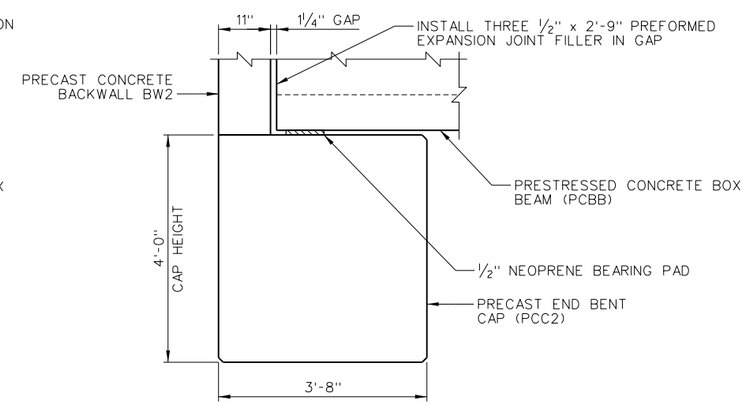
PRECAST END BENT CAP - PCC2

SCALE: ½" = 1'-0"
EMBEDDED PLATES NOT SHOWN



TYPICAL INT. BENT GAP DETAIL

SCALE: NTS



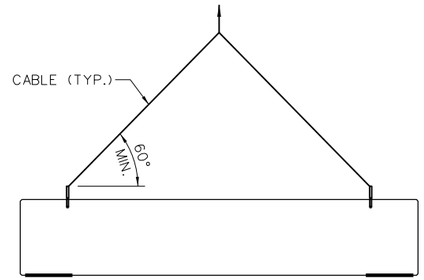
TYPICAL END BENT GAP DETAIL

SCALE: NTS

BEARING PAD QUANTITIES PER CAP				
PIECE MARK	QTY.	UNIT	PAD SIZE	DESCRIPTION
PCC1	6	EACH	½" x 6" x 5'-1"	PRECAST INTERMEDIATE BENT CAP
PCC2	3	EACH	½" x 6" x 5'-1"	PRECAST END BENT CAP

NOTE

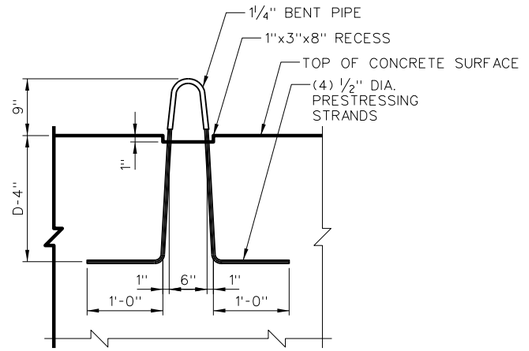
1. FOR BEARING PAD NOTES SEE DRAWING NO. 334.5-03.



ELEVATION

PRECAST CAP 2-POINT PICK UP

SCALE: NTS
PIN OR HOOK FOR ENGAGING LIFTING LOOPS SHALL BE 1" DIA. MINIMUM



LIFTING LOOP DETAIL

SCALE: 1" = 1'-0"
D = DEPTH OF CONCRETE

NOTE:

1. LIFTING LOOPS SHALL CONSIST OF (4) ½" DIA., 270K STRANDS AND SHALL HAVE A BREAKING STRENGTH OF NOT LESS THAN 30 TONS.
2. THE STRANDS SHALL BE THOROUGHLY CLEANED OF ALL MATTER THAT WOULD PREVENT BONDING STRANDS AND CONCRETE. LIFTING LOOPS SHALL BE COATED WITH A CORROSION RESISTANT EPOXY OR ZINC BASED COATING.
3. ONCE CONCRETE ITEM IS IN PLACE, LIFTING LOOPS SHALL BE CUT OFF BELOW THE TOP OF CONCRETE SURFACE. THE 1" RECESS SHALL BE FILLED WITH EPOXY GROUT.

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BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020
FILE: 334.5-09.dgn

RJ Corman Railroad Company

REVISIONS

BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP

BEARING PAD LAYOUT AND DETAILS

HORRY COUNTY CONWAY, SC
R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

SCALE: AS SHOWN	VAL. SEC.	DRAWING NO.
DATE: 3/16/2020		334.5-09
DESIGN: TCS		
DRAWN: RGD		
CHECKED: JFM		

RELEASED FOR BID - NOT FOR CONSTRUCTION

SCALE FACTORS CORRESPOND WITH FULL SIZE (22"x34") DRAWINGS
USER: rdixon
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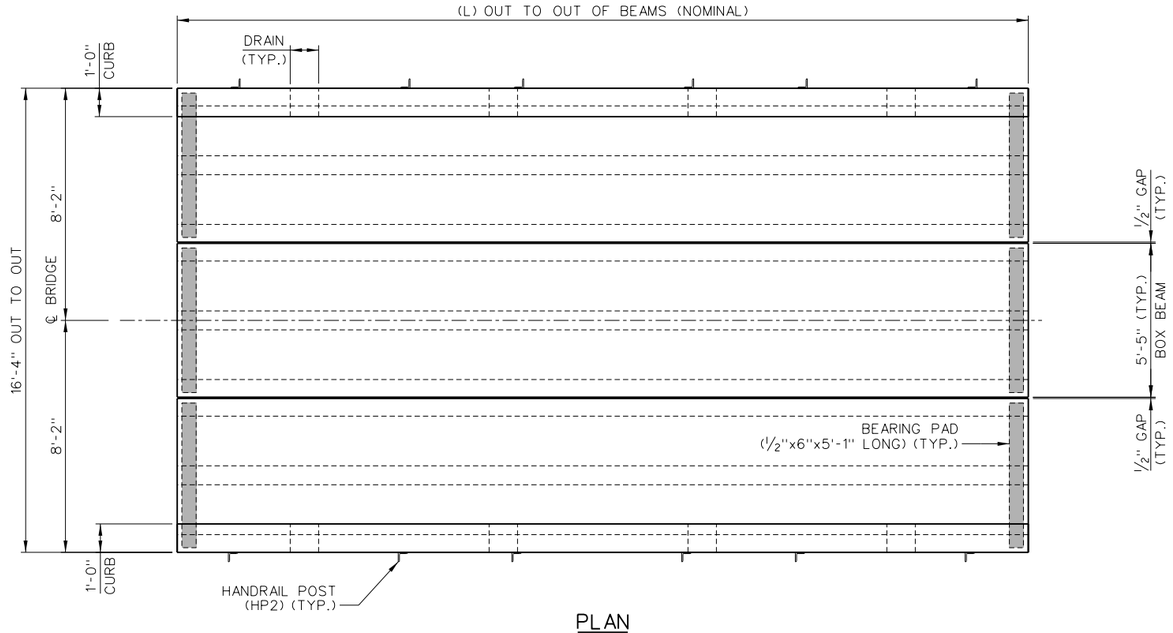
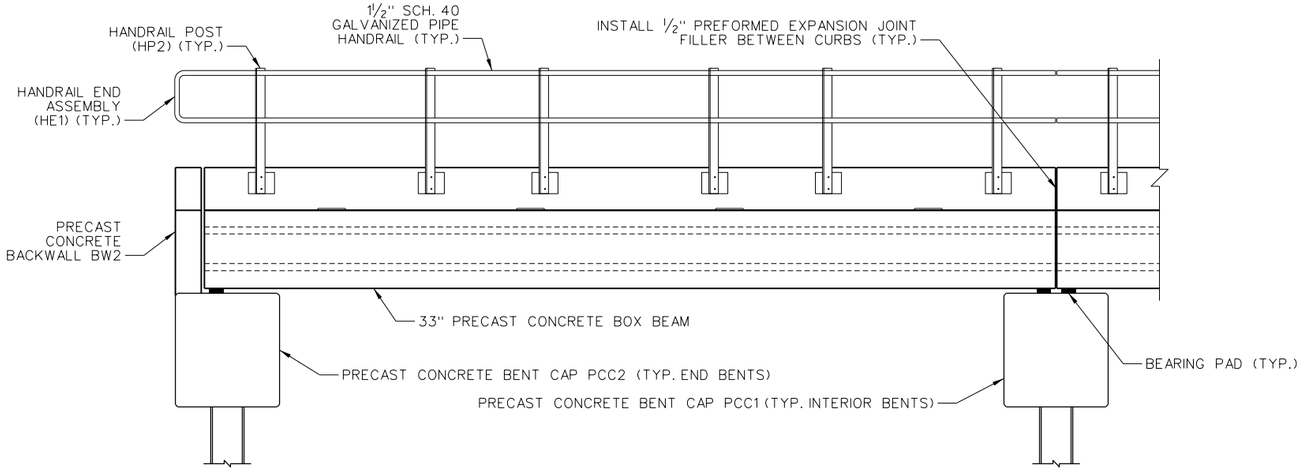


PLAN

SCALE: ⅜" = 1'-0"
30' (NOMINAL) SPAN SHOWN.



ELEVATION

SCALE: NTS
30' (NOMINAL) SPAN SHOWN.

NOTES

1. FOR HANDRAIL DETAILS SEE DRAWING NO. 334.5-22.
2. THREADED INSERTS, STUDS AND JOINT PLATES NOT SHOWN FOR CLARITY.
3. SEE DRAWING NO. 334.5-11 AND 334.5-21 FOR LONGITUDINAL JOINT AND SPAN JOINT PLATES.

PCBB QUANTITIES (PER SPAN)					
OUT TO OUT OF BEAMS (L) (NOMINAL)	HANDRAIL POSTS (HP2)	HANDRAIL LENGTH *	HANDRAIL END ASSEMBLY (HE1) **	LATERAL STOPS (LS1) ***	BEARING PADS
30'-0"	12	120	2	4	6

* TOTAL LENGTH OF HANDRAIL GIVEN FOR SINGLE SPAN ONLY.

** HANDRAIL END ASSEMBLY FOR END SPANS ONLY.

*** LATERAL STOPS TO BE SHIPPED WITH PEJF ATTACHED. FOR ADDITIONAL INFORMATION SEE DRAWING NO. 334.5-11.

SPAN COVER PLATE LAYOUT

SCALE: ⅜" = 1'-0"
30' (NOMINAL) SPAN SHOWN.

BILL OF MATERIALS - HANDRAIL

SHOP BILL							SHIPPING BILL		
QTY	UNIT	DESCRIPTION	FT	IN.	MARK	REMARKS	NO	DESCRIPTION	MARK
96	EACH	L4x4x1/2	4	7	HP2	HANDRAIL POST	96	HANDRAIL POST	HP2
32	EACH	PIPE 1 1/2 STD.	30	0	HR1	HANDRAIL	32	HANDRAIL	HR1
4	EACH	PIPE 1 1/2 STD.	3	9	HE1	HANDRAIL END ASSEMBLY	4	HANDRAIL END ASSEMBLY	HE1
1	LOT	SPLICE MATERIALS *	N/A				N/A		

* CONTRACTOR SHALL DETERMINE FINAL SPLICE LENGTHS AND LOCATIONS. HANDRAIL SHALL BE SPLICED BETWEEN SPANS. NO MORE THAN ONE INTERMEDIATE SPLICE SHALL BE PERMITTED BETWEEN SPANS

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ENGINEER'S NAME
DATE: 3/16/2020
FILE: 334.5-10.dgn

REVISIONS

RJ Corman Railroad Company

BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP
CONSTRUCTION DETAILS (1 OF 2)
HORRY COUNTY — CONWAY, SC
R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

SCALE: AS SHOWN
DATE: 3/16/2020
DESIGN: TCS
DRAWN: RGD
CHECKED: JFM

VAL. SEC.

DRAWING NO. 334.5-10

SCALE FACTORS CORRESPOND WITH FULL SIZE (22"x34") DRAWINGS
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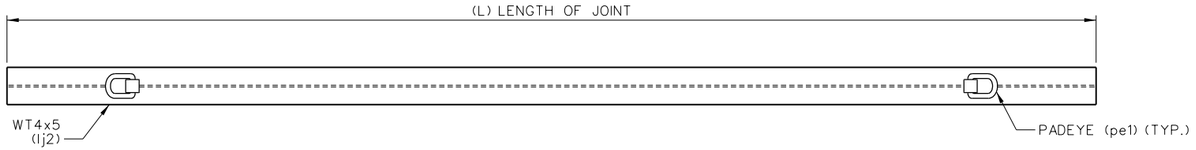
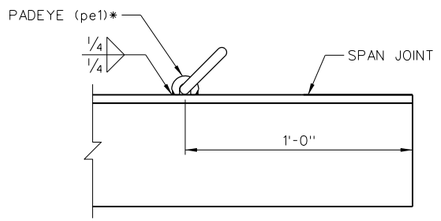
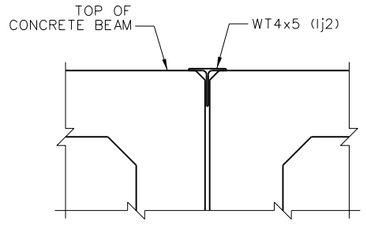


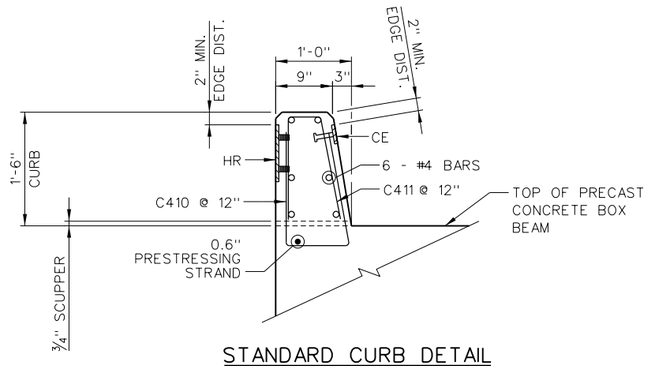
LONGITUDINAL JOINT - LJ1
SCALE: 1" = 1'-0"



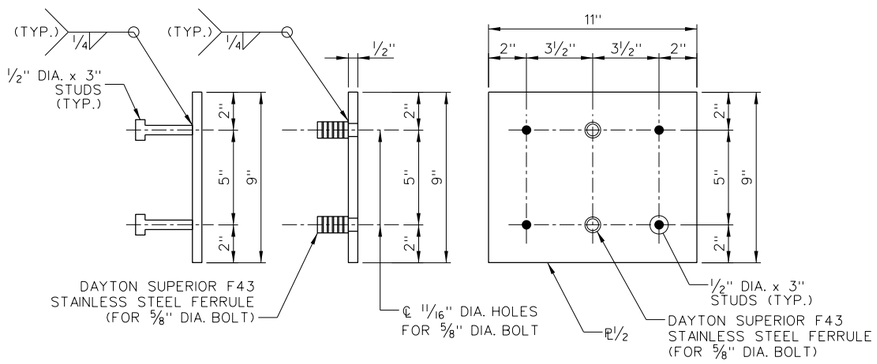
TYPICAL PADEYE DETAIL
SCALE: 3" = 1'-0"
* PADEYES SHALL BE "CROSBY" S-265, WELD-ON PIVOT LINK OR APPROVED EQUAL



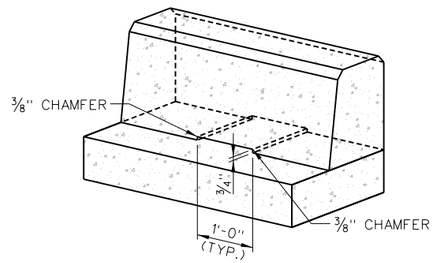
LONGITUDINAL JOINT DETAIL
SCALE: 1½" = 1'-0"



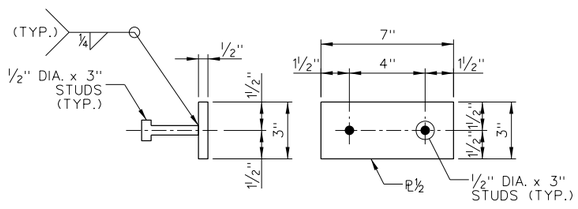
STANDARD CURB DETAIL
SCALE: 1" = 1'-0"



HANDRAIL CONNECTION PLATE - HR
SCALE: 3" = 1'-0"



SCUPPER DETAIL
SCALE: NTS



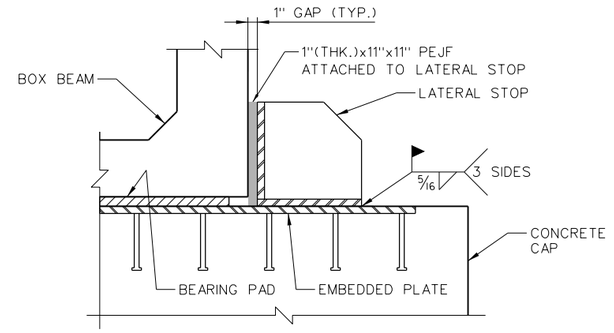
CURB CONNECTION PLATE - CE
SCALE: 3" = 1'-0"

BILL OF MATERIAL - 1 LONGITUDINAL JOINT

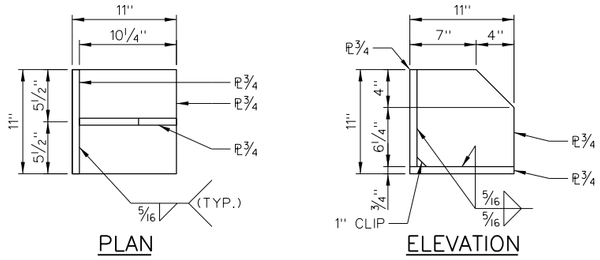
SHOP BILL (TOTAL PIECE QUANTITIES)						SHIPPING BILL		
NO.	DESCRIPTION	FT.	IN.	MARK	REMARKS	NO.	DESCRIPTION	MARK
1	WT4x5	(L)		lj2	LONGITUDINAL JOINT	1	LONGITUDINAL JOINT	LJ1
2	PADEYE	N/A		pe1	PAD EYE			

LONGITUDINAL JOINTS (PER SPAN)

SPAN LENGTH (NOMINAL)	LENGTH OF JT. (L)	NO. OF JOINTS. REQUIRED	UNIT WEIGHT (LBS).
30'	14'-9"	4	74



LATERAL RESTRAINT DETAIL
SCALE: 1" = 1'-0"



LATERAL STOP - LS1
SCALE: 1½" = 1'-0"

HDR ENGINEERING, INC.
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843-414-3700

APPROVED FOR
R.J. CORMAN RAILROAD COMPANY/ CAROLINA LINES BY
HDR ENGINEERING INC.
OF THE CAROLINAS
(CHARLESTON, SC)
BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020
FILE: 334.5-11.dgn

REVISIONS

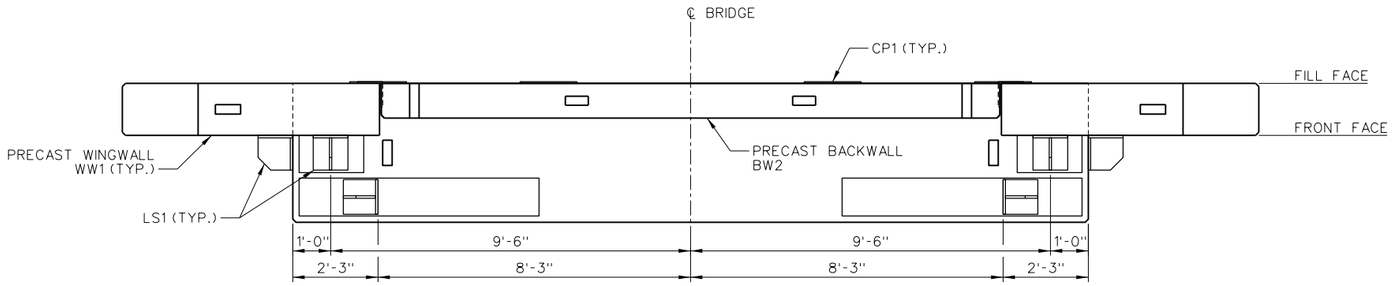
R.J. Corman Railroad Company

BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP
CONSTRUCTION DETAILS (2 OF 2)
HORRY COUNTY CONWAY, SC
R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

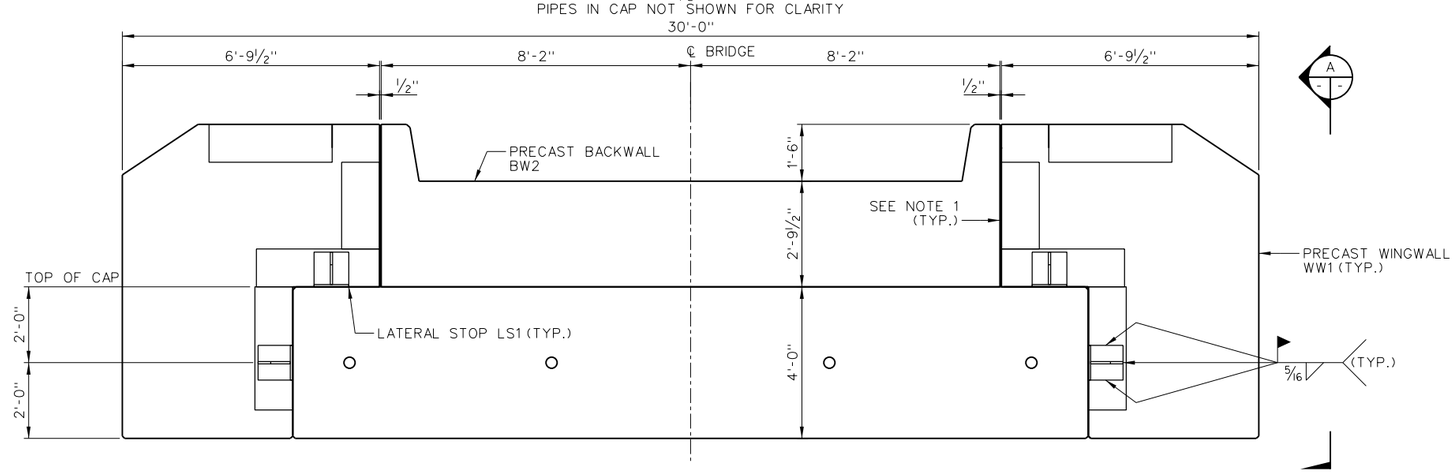
SCALE: AS SHOWN	VAL. SEC.	DRAWING NO.
DATE: 3/16/2020		334.5-11
DESIGN: TCS		
DRAWN: RGD		
CHECKED: JFM		

RELEASED FOR BID - NOT FOR CONSTRUCTION

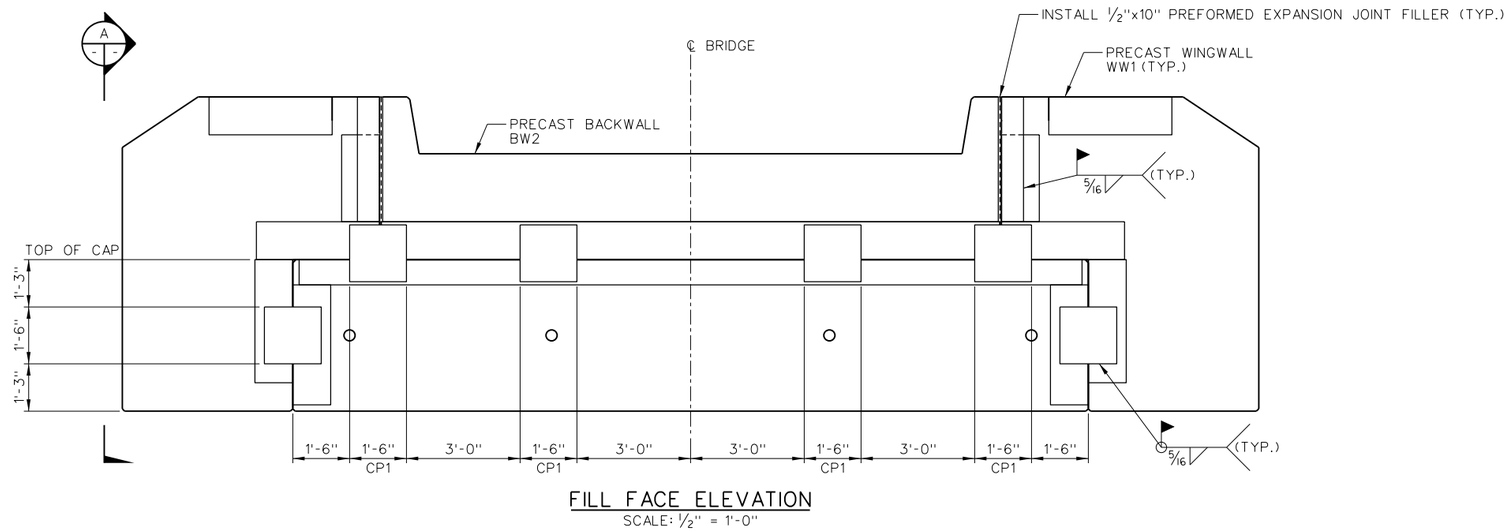
SCALE FACTORS CORRESPOND WITH FULL SIZE (22"x34") DRAWINGS
USER: rdixon
FILENAME: c:\pwworking\east01\d1230212\334.5-11.dgn



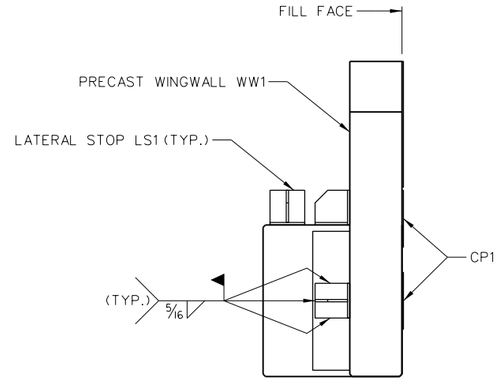
PLAN
SCALE: ½" = 1'-0"
PIPES IN CAP NOT SHOWN FOR CLARITY



FRONT FACE ELEVATION
SCALE: ½" = 1'-0"
LATERAL STOPS FOR PCBB NOT SHOWN FOR CLARITY



FILL FACE ELEVATION
SCALE: ½" = 1'-0"



VIEW
SCALE: ½" = 1'-0"

NOTES

1. ½" THICK BY 10" WIDE PREFORMED EXPANSION JOINT FILLER SHALL BE ATTACHED TO THE BACKWALLL.
2. FILL ANCHOR ROD HOLES USING LOCTITE TITE FOAM OR APPROVED EQUAL. LIFTING HOLES TO BE KEPT OPEN AFTER SETTING.

ESTIMATED QUANTITIES - 1 END BENT ASSEMBLY

PIECE MARK	QTY.	UNIT	DESCRIPTION	REFERENCE PAGE	ESTIMATED UNIT WEIGHT (LBS.)
PCC2	1	EACH	PRECAST END BENT CAP	334.5-14	38,000
BW2	1	EACH	PRECAST BACKWALL	334.5-15	8,000
WW1	2	EACH	PRECAST WINGWALL	334.5-12	10,000
LS1	4	EACH	LATERAL STOPS*	334.5-10	72
CP1	6	EACH	CONNECTION PLATES	334.5-18	46

*LATERAL STOPS FOR PRECAST BOX BEAM CONNECTION NOT INCLUDED

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CAROLINA LINES BY
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OF THE CAROLINAS
(CHARLESTON, SC)
BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020
FILE: 334.5-12.dgn

REVISIONS

R.J. Corman Railroad Company

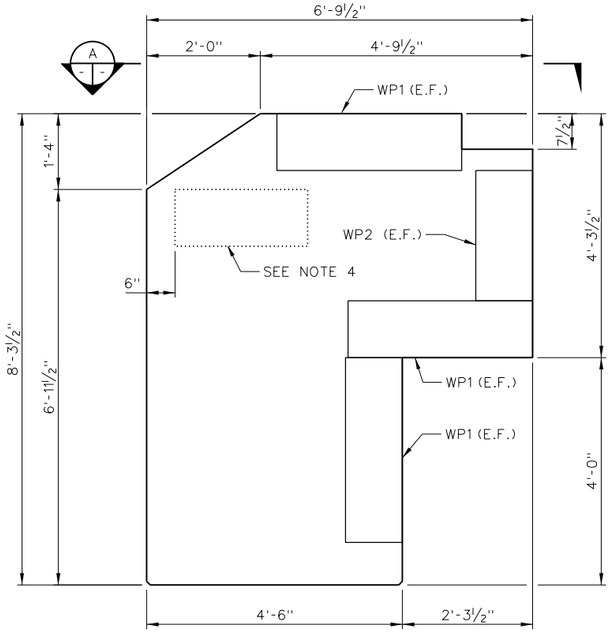
BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP
END BENT ASSEMBLY DETAILS
HORRY COUNTY CONWAY, SC
R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

SCALE: AS SHOWN
DATE: 3/16/2020
DESIGN: TCS
DRAWN: RGD
CHECKED: JFM

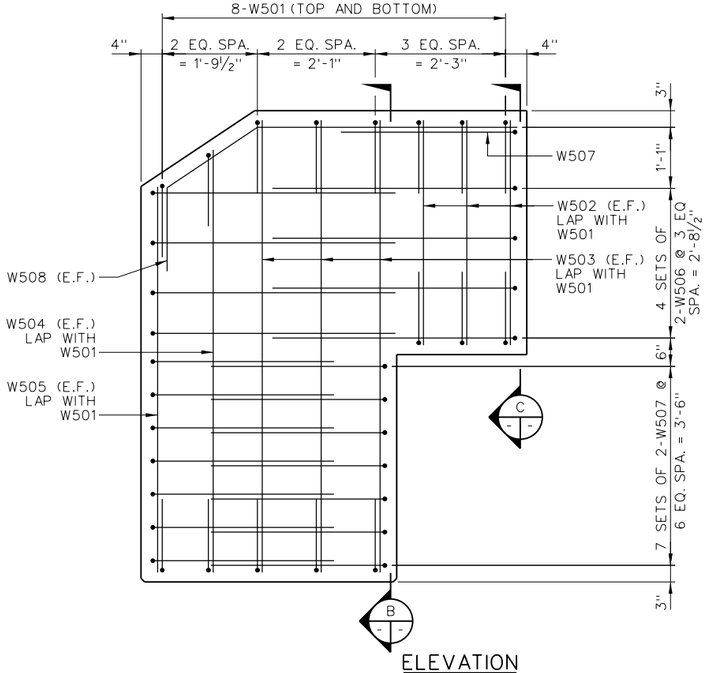
VAL. SEC.

DRAWING NO.
334.5-12

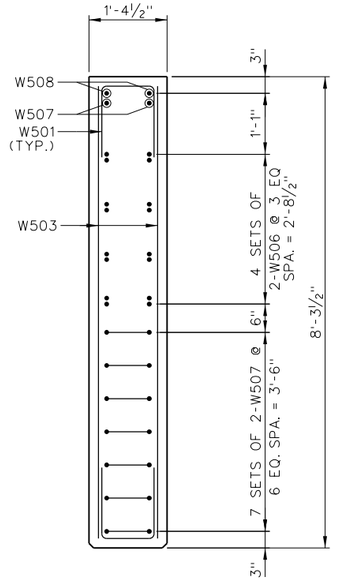
RELEASED FOR BID - NOT FOR CONSTRUCTION



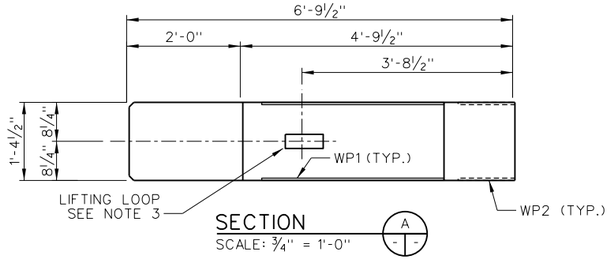
ELEVATION
SCALE: ¾" = 1'-0"
STUDS AND REINFORCING NOT SHOWN



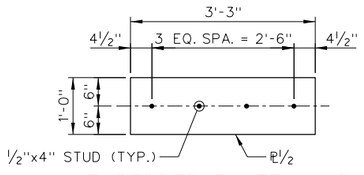
ELEVATION
SCALE: ¾" = 1'-0"
EMBEDDED PLATES NOT SHOWN



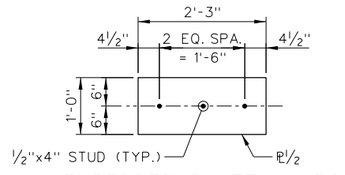
SECTION
SCALE: ¾" = 1'-0"



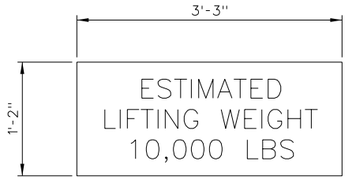
SECTION
SCALE: ¾" = 1'-0"



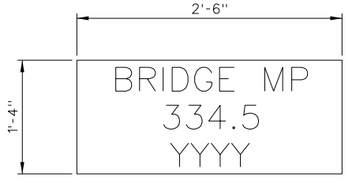
EMBEDDED PLATE - WP1
SCALE: ¾" = 1'-0"
ESTIMATED WEIGHT = 70 LBS.



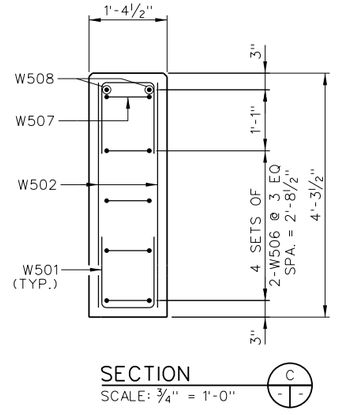
EMBEDDED PLATE - WP2
SCALE: ¾" = 1'-0"
ESTIMATED WEIGHT = 50 LBS.



LIFTING WEIGHT SURFACE MARKING DETAIL
SCALE: NTS
LOCATED ON FILL FACE OF ALL WINGWALLS
STENCIL LETTERING SHALL BE 3" IN HEIGHT



MILEPOST SURFACE EMBOSSMENT DETAIL
SCALE: NTS
LOCATED ON FRONT FACE OF RIGHT WINGWALL
YYYY = YEAR OF FABRICATION
EMBOSSED LETTERING SHALL BE 4" IN HEIGHT

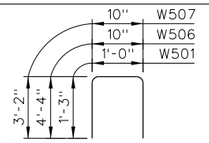


SECTION
SCALE: ¾" = 1'-0"

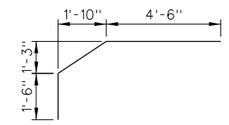
LIFTING WEIGHT	
ITEM	WEIGHT (LBS.)
1 PRECAST WINGWALL - WW1	10,000

REINFORCING STEEL SCHEDULE - 1 WW1							
MARK	BAR NO.	NO. REQ'D	LENGTH FT	LENGTH IN.	TYPE	LOCATION	WEIGHT (LBS.)
W501	#5	16	3	6	⌐	VERTICAL	58
W502	#5	6	3	11	STR.	VERTICAL	25
W503	#5	6	7	11	STR.	VERTICAL	50
W504	#5	2	7	4	STR.	VERTICAL	15
W505	#5	2	6	9	STR.	VERTICAL	14
W506	#5	8	9	6	⌐	HORIZONTAL	79
W507	#5	15	7	2	⌐	HORIZONTAL	112
W508	#5	2	8	3	⌐	TOP	17
						TOTAL	370

BENDING DIAGRAM



W501, W506, W507



W508

ESTIMATED QUANTITIES - 1 WW1		
QTY.	UNIT	DESCRIPTION
2.4	C.Y.	CONCRETE CLASS 5 OR 5 (AE)
370	LBS.	REINFORCING STEEL
2	GAL.	CONCRETE WATERPROOFING
2	GAL.	CONCRETE WATER REPELLENT AND CURING COMPOUND
6	EACH	EMBEDDED PLATE - WP1
2	EACH	EMBEDDED PLATE - WP2
1	EACH	LIFTING LOOP

NOTES

1. MINIMALLY ADJUST REINFORCING AS NEEDED TO AVOID LIFTING LOOP AND STUDS.
2. CONCRETE COVER SHALL BE A MINIMUM OF 2" CLEAR UNLESS NOTED OTHERWISE.
3. FOR LIFTING LOOP DETAILS SEE DRAWING NO. 334.5-09. IF WALKWAY BLOCKOUT IS REQUIRED ADJUST LIFTING LOOP LOCATION ACCORDINGLY.
4. FOR SURFACE MARKING DETAIL SEE THIS DRAWING. SURFACE MARKINGS SHALL BE MADE USING BLACK INDUSTRIAL STRENGTH, FADE RESISTANT PAINT, STENCIL LETTERING SHALL BE 3" IN HEIGHT.
5. FOR SURFACE EMBOSSMENT DETAIL SEE THIS DRAWING. EMBOSSED LETTERING SHALL BE 4" IN HEIGHT x ½" DEEP.

HDR ENGINEERING, INC.
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APPROVED FOR
R.J. CORMAN RAILROAD COMPANY/
CAROLINA LINES BY
HDR ENGINEERING INC.
OF THE CAROLINAS
(CHARLESTON, SC)
BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020

FILE: 334.5-13.dgn

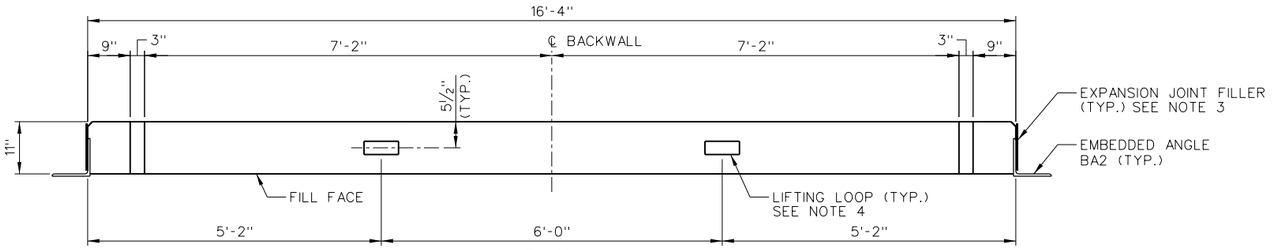
REVISIONS

R.J. Corman Railroad Company

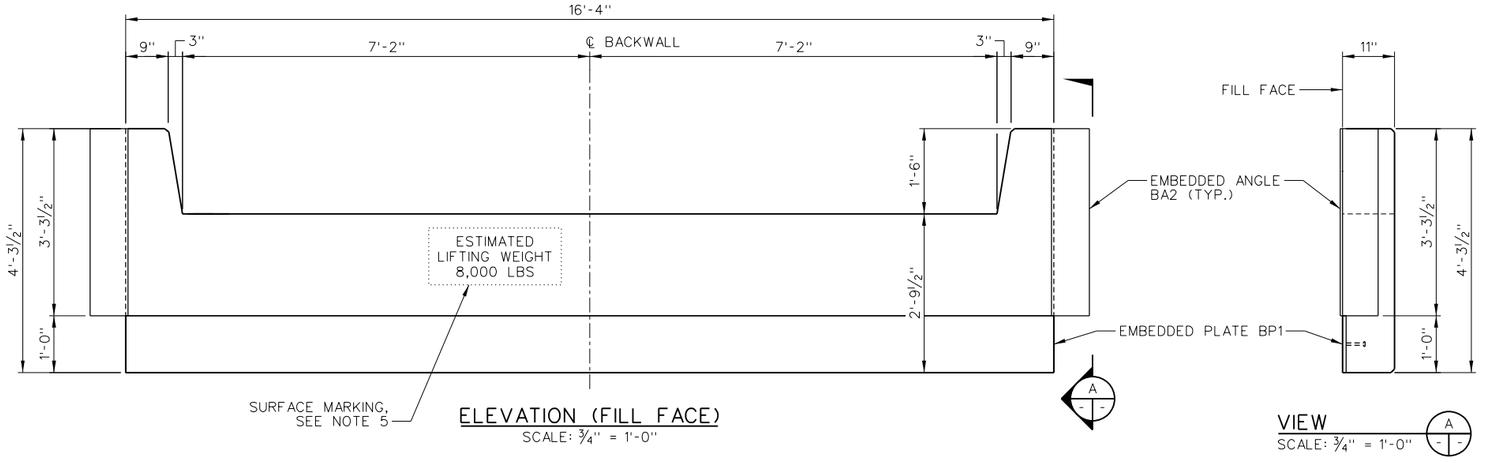
BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP
PRECAST CONCRETE
WINGWALL WW1 DETAILS
HORRY COUNTY CONWAY, SC
R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

SCALE: AS SHOWN	VAL. SEC.	DRAWING NO.
DATE: 3/16/2020		334.5-13
DESIGN: TCS		
DRAWN: RGD		
CHECKED: JFM		

RELEASED FOR BID - NOT FOR CONSTRUCTION

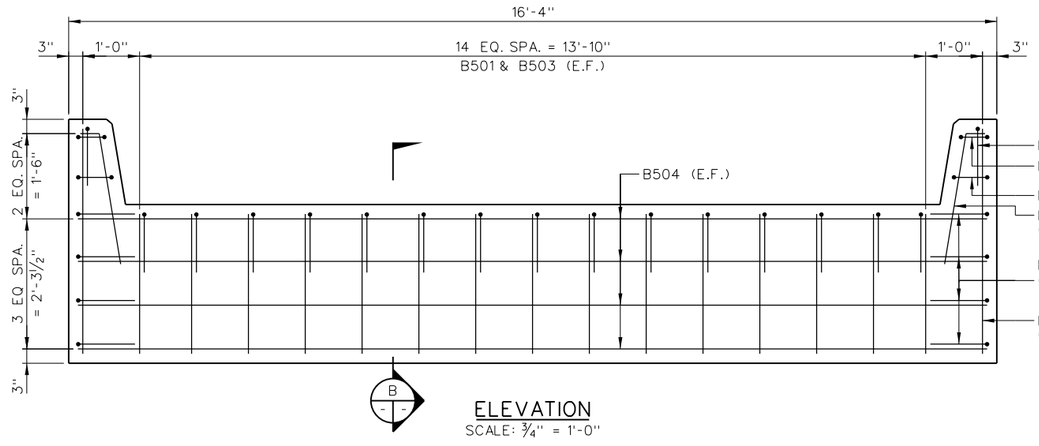


PLAN
SCALE: ¾" = 1'-0"



ELEVATION (FILL FACE)
SCALE: ¾" = 1'-0"

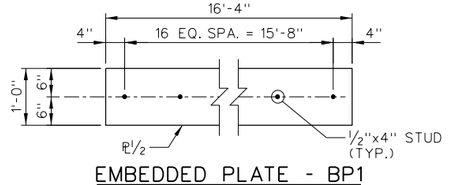
VIEW
SCALE: ¾" = 1'-0"



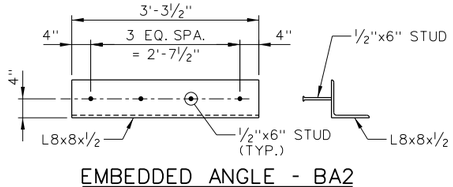
ELEVATION
SCALE: ¾" = 1'-0"

SECTION
SCALE: ¾" = 1'-0"

END SECTION
SCALE: ¾" = 1'-0"



EMBEDDED PLATE - BP1
SCALE: ¾" = 1'-0"
ESTIMATED WEIGHT = 339 LBS.



EMBEDDED ANGLE - BA2
SCALE: ¾" = 1'-0"
ESTIMATED WEIGHT = 90 LBS.

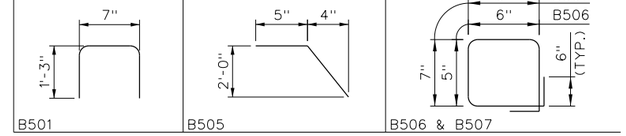
LIFTING WEIGHT

ITEM	WEIGHT (LBS.)
1 PRECAST BACKWALL - BW2	8,000

REINFORCING STEEL SCHEDULE - 1 BW2

MARK	BAR NO.	NO. REQ'D	LENGTH FT	LENGTH IN.	TYPE	LOCATION	WEIGHT (LBS.)
B501	#5	25	3	1	⌐	STIRRUP	81
B502	#5	4	4	0	STR.	VERTICAL	17
B503	#5	30	2	5	STR.	VERTICAL	76
B504	#5	8	16	0	STR.	HORIZONTAL	134
B505	#5	4	2	6	⌐	TOP	11
B506	#5	2	2	4	▢	STIRRUP	5
B507	#5	2	2	8	▢	STIRRUP	6
						TOTAL	330

BENDING DIAGRAM



ESTIMATED QUANTITIES - 1 BW2

QTY.	UNIT	DESCRIPTION
1.7	C.Y.	CONCRETE CLASS 5 OR 5 (AE)
330	LBS.	REINFORCING STEEL
2	GAL.	CONCRETE WATERPROOFING
2	GAL.	CONCRETE WATER REPELLENT AND CURING COMPOUND
2	EACH	LIFTING LOOPS
8.6	FT.	1/2" THICK x 10" WIDE PREFORMED EXPANSION JOINT FILLER
2	EACH	EMBEDDED ANGLE - BA2
1	EACH	EMBEDDED PLATE - BP1

NOTES

1. MINIMALLY ADJUST REINFORCING AS NEEDED TO AVOID LIFTING LOOPS AND STUDS.
2. CONCRETE COVER SHALL BE A MINIMUM OF 2" CLEAR UNLESS NOTED OTHERWISE.
3. EXPANSION JOINT FILLER TO BE EPOXIED TO EACH END OF THE BACKWALL.
4. FOR LIFTING LOOP DETAILS SEE DRAWING NO. 334.5-09.
5. SURFACE MARKINGS SHALL BE MADE USING BLACK INDUSTRIAL STRENGTH, FADE RESISTANT PAINT. STENCIL LETTERING SHALL BE 3" IN HEIGHT.

RELEASED FOR BID - NOT FOR CONSTRUCTION

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843-414-3700

APPROVED FOR
R.J. CORMAN RAILROAD COMPANY/ CAROLINA LINES BY
HDR ENGINEERING INC.
OF THE CAROLINAS
(CHARLESTON, SC)
BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020
FILE: 334.5-14.dgn

REVISIONS

RJ Corman Railroad Company

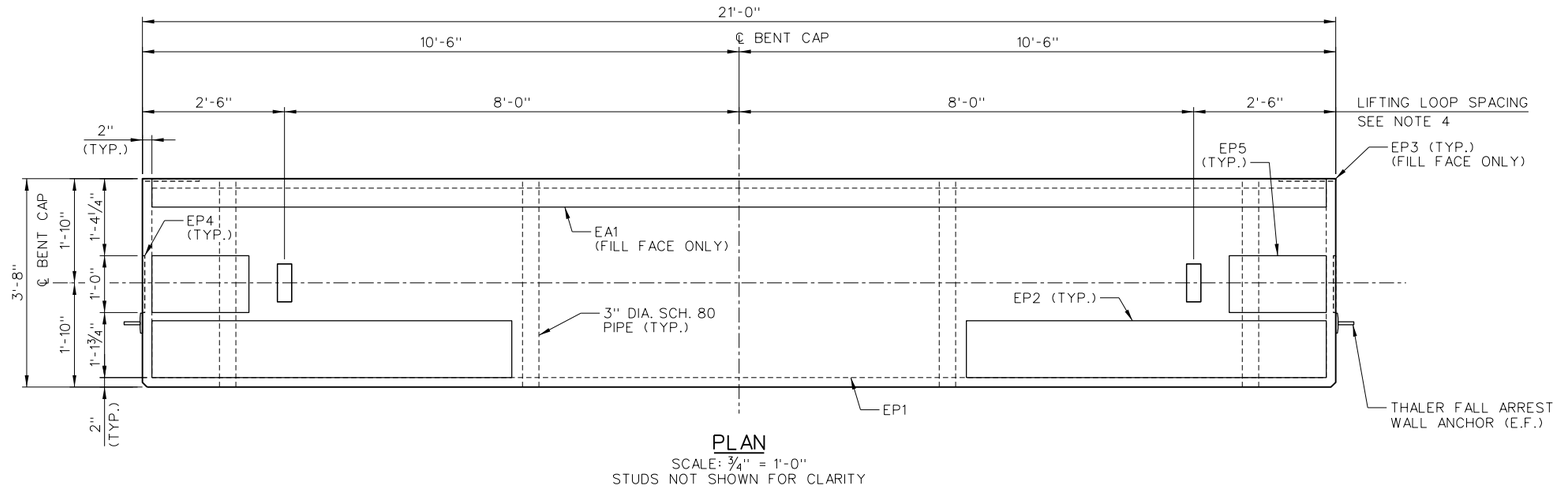
BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP

PRECAST BACKWALL BW2 DETAILS

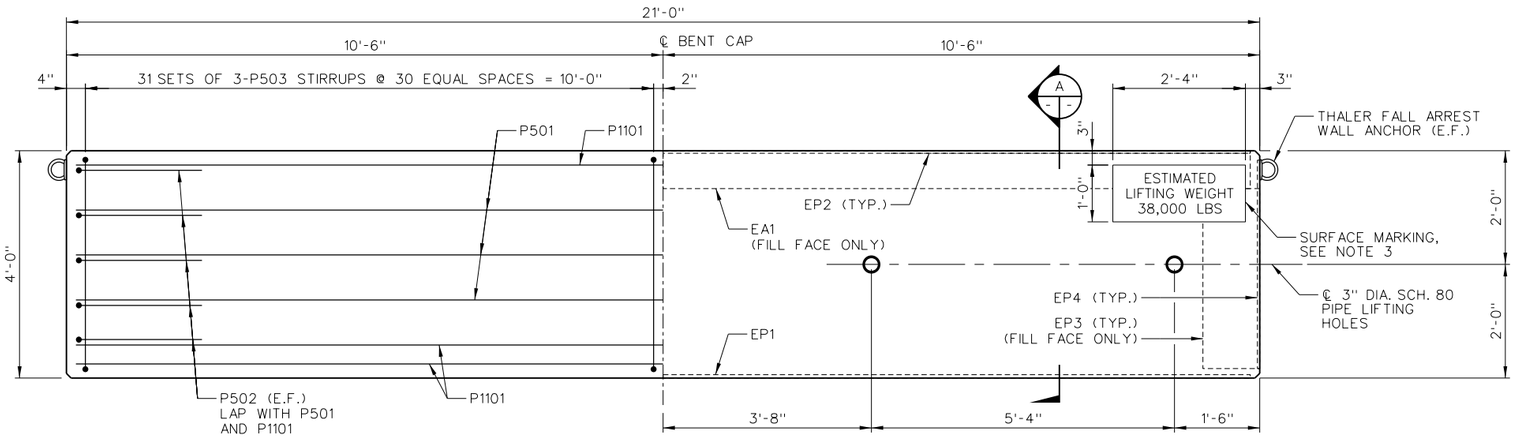
HORRY COUNTY — CONWAY, SC
R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

SCALE: AS SHOWN	VAL. SEC.	DRAWING NO.
DATE: 3/16/2020		334.5-14
DESIGN: TCS		
DRAWN: RGD		
CHECKED: JFM		

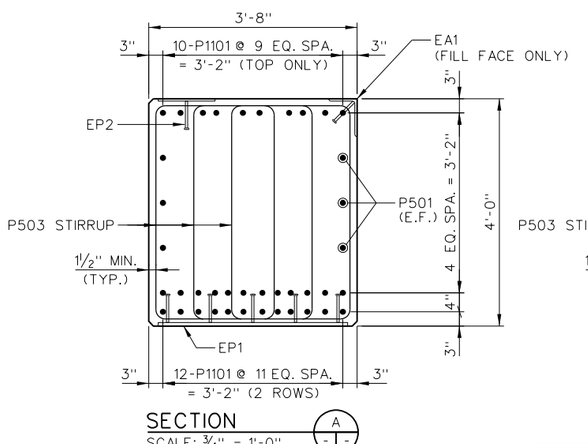
FILENAME: c:\pwworking\east01\d1230212\334.5-14.dgn USER: rdixon SCALE FACTORS CORRESPOND WITH FULL SIZE (22"x34") DRAWINGS



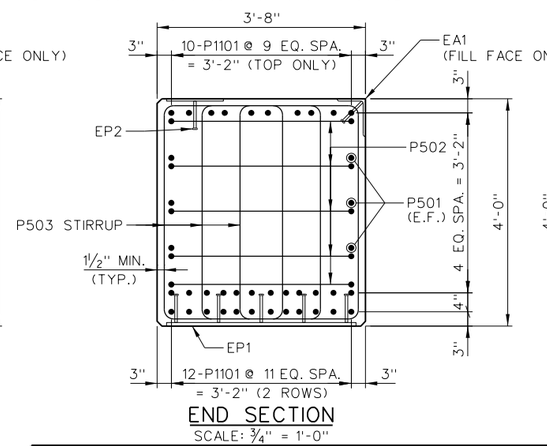
PLAN
SCALE: ¾" = 1'-0"
STUDS NOT SHOWN FOR CLARITY



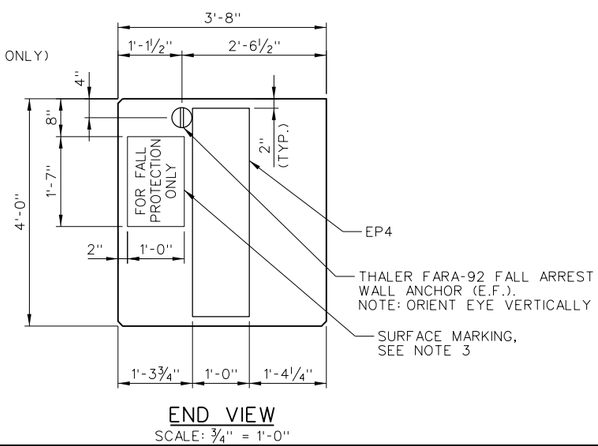
FRONT FACE ELEVATION
SCALE: ¾" = 1'-0"
REINFORCING, EMBEDDED PLATES, ANCHOR BOLT
HOLES AND PIPES SYMMETRICAL ABOUT ℄
LIFTING LOOPS AND STUDS NOT SHOWN FOR CLARITY



SECTION A
SCALE: ¾" = 1'-0"



END SECTION
SCALE: ¾" = 1'-0"



END VIEW
SCALE: ¾" = 1'-0"

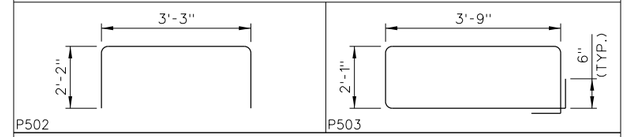
RELEASED FOR BID - NOT FOR CONSTRUCTION

LIFTING WEIGHT	
ITEM	WEIGHT (LBS.)
1 PC CONCRETE BENT CAP (PCC2)	38,000

REINFORCING STEEL SCHEDULE - 1 PCC2

MARK	BAR NO.	NO. REQ'D	LENGTH FT	LENGTH IN.	TYPE	LOCATION	WEIGHT (LBS.)
P1101	#11	34	20	8	STR	TOP AND BOT. HORIZONTAL	3,733
P501	#5	6	20	8	STR	EACH FACE HORIZONTAL	129
P502	#5	10	7	7	⌐	EACH END HORIZONTAL	79
P503	#5	186	12	8	▭	STIRRUP	2,457
						TOTAL	6,398

BENDING DIAGRAM



ESTIMATED QUANTITIES - 1 PCC2

QTY.	UNIT	DESCRIPTION
11.5	C.Y.	CONCRETE CLASS 5 (LWC) OR 5 (AE) (LWC)
6,398	LBS.	REINFORCING STEEL
3	GAL.	CONCRETE WATERPROOFING
3	GAL.	CONCRETE WATER REPELLENT AND CURING COMPOUND
1	EACH	EMBEDDED ANGLE - EA1
1	EACH	EMBEDDED PLATE - EP1
2	EACH	EMBEDDED PLATE - EP2
2	EACH	EMBEDDED PLATE - EP3
2	EACH	EMBEDDED PLATE - EP4
2	EACH	EMBEDDED PLATE - EP5
2	EACH	LIFTING LOOPS
2	EACH	FALL ARREST WALL ANCHORS
15	FT.	3" DIA. SCHEDULE 80 PIPE

NOTES

1. MINIMALLY ADJUST REINFORCING AS NEEDED TO AVOID ANCHOR ROD HOLES, LIFTING LOOPS, PIPES AND STUDS.
2. CONCRETE COVER SHALL BE A MINIMUM OF 2" CLEAR UNLESS NOTED OTHERWISE.
3. SURFACE MARKINGS SHALL BE MADE USING BLACK INDUSTRIAL STRENGTH, FADE RESISTANT PAINT. STENCIL LETTERING SHALL BE 2" IN HEIGHT.
4. FOR LIFTING LOOP DETAILS SEE DRAWING NO. 334.5-09.
5. FOR EMBEDDED PLATE DETAILS SEE DRAWING NO. 334.5-19.
6. LIFTING HOLES TO BE KEPT OPEN AFTER SETTING.

HDR ENGINEERING, INC.
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843-414-3700

APPROVED FOR
R.J. CORMAN RAILROAD COMPANY/
CAROLINA LINES BY
HDR ENGINEERING INC.
OF THE CAROLINAS
(CHARLESTON, SC)
BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020

FILE: 334.5-15.dgn

R J Corman Railroad Company

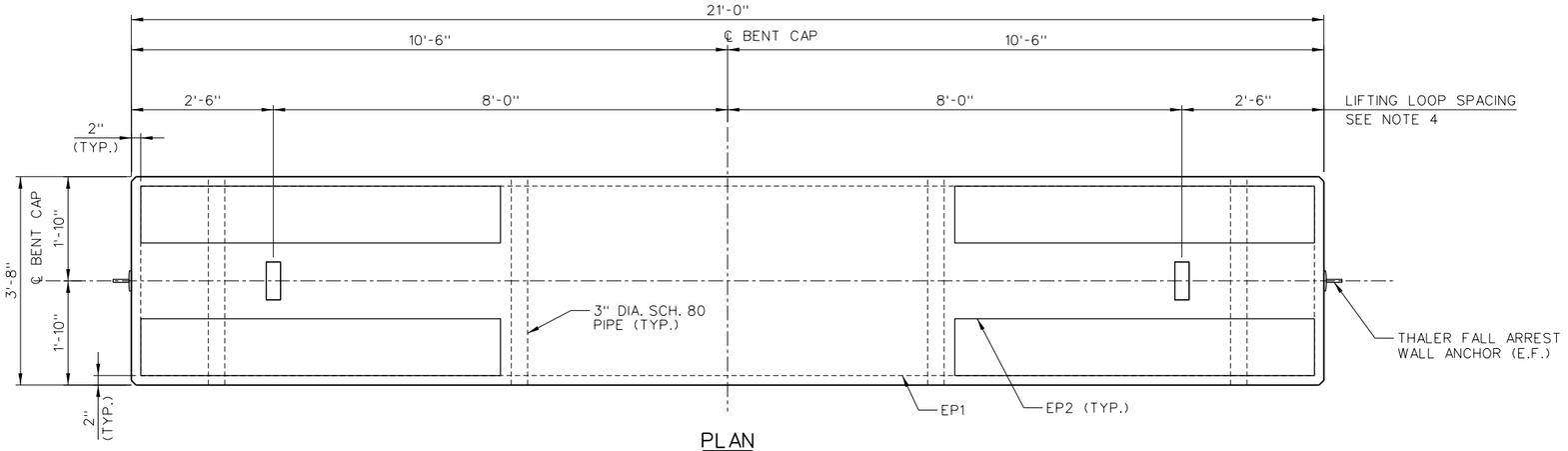
REVISIONS

BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP
PRECAST CONCRETE
END BENT CAP PCC2 DETAILS
HORRY COUNTY CONWAY, SC
R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

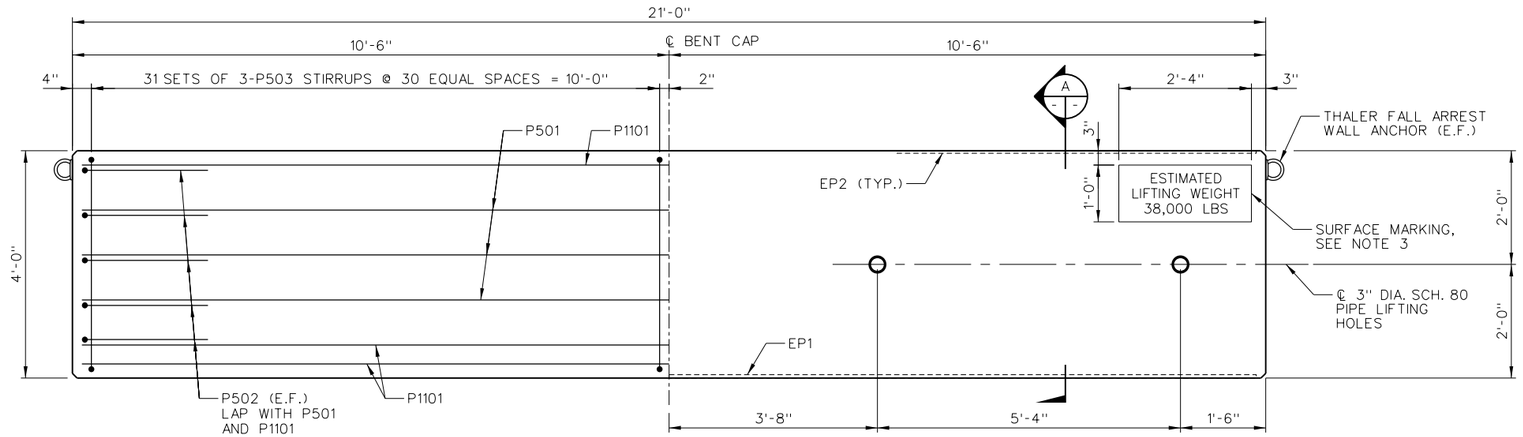
SCALE: AS SHOWN
DATE: 3/16/2020
DESIGN: TCS
DRAWN: RGD
CHECKED: JFM

VAL. SEC.

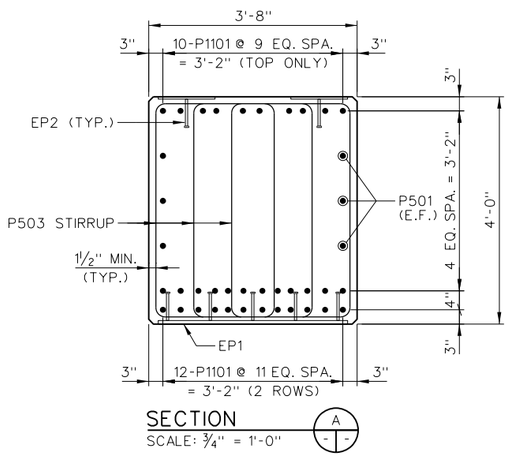
DRAWING NO.
334.5-15



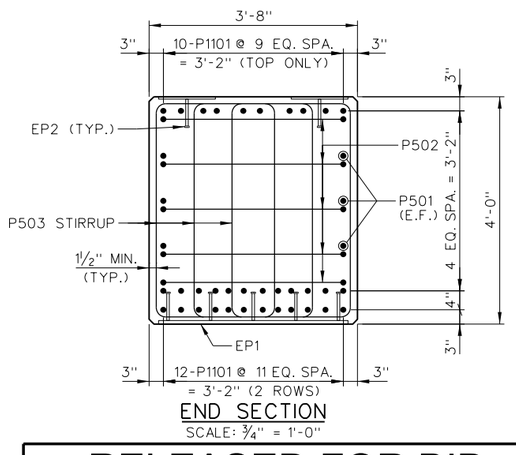
PLAN
SCALE: ¾" = 1'-0"
STUDS NOT SHOWN FOR CLARITY



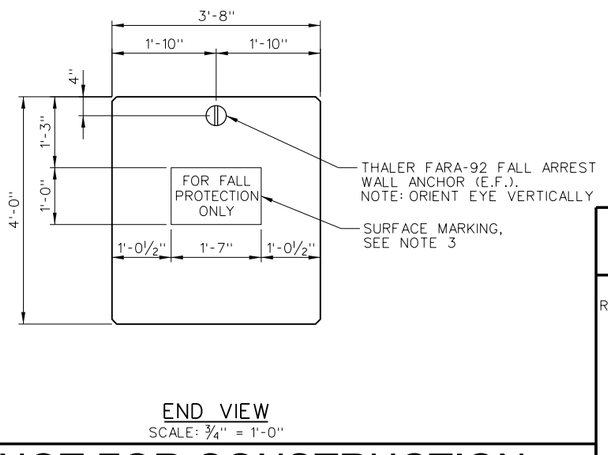
FRONT FACE ELEVATION
SCALE: ¾" = 1'-0"
REINFORCING, EMBEDDED PLATES, ANCHOR BOLT HOLES AND PIPES SYMMETRICAL ABOUT ℄
LIFTING LOOPS AND STUDS NOT SHOWN FOR CLARITY



SECTION A
SCALE: ¾" = 1'-0"



END SECTION
SCALE: ¾" = 1'-0"



END VIEW
SCALE: ¾" = 1'-0"

LIFTING WEIGHT	
ITEM	WEIGHT (LBS.)
1 PC CONCRETE BENT CAP (PCC1)	38,000

REINFORCING STEEL SCHEDULE - 1 PCC1							
MARK	BAR NO.	NO. REQ'D	LENGTH FT	LENGTH IN.	TYPE	LOCATION	WEIGHT (LBS.)
P1101	#11	34	20	8	STR	TOP AND BOT. HORIZONTAL	3,733
P501	#5	6	20	8	STR	EACH FACE HORIZONTAL	129
P502	#5	10	7	7	⌐	EACH END HORIZONTAL	79
P503	#5	186	12	8	▭	STIRRUP	2,457
						TOTAL	6,398

BENDING DIAGRAM

ESTIMATED QUANTITIES - 1 PCC1		
QTY.	UNIT	DESCRIPTION
11.5	C.Y.	CONCRETE CLASS 5 (LWC) OR 5 (AE) (LWC)
6,398	LBS.	REINFORCING STEEL
3	GAL.	CONCRETE WATERPROOFING
3	GAL.	CONCRETE WATER REPELLENT AND CURING COMPOUND
1	EACH	EMBEDDED PLATE - EP1
4	EACH	EMBEDDED PLATE - EP2
2	EACH	LIFTING LOOPS
2	EACH	FALL ARREST WALL ANCHORS
15	FT.	3" DIA. SCHEDULE 80 PIPE

NOTES
1. MINIMALLY ADJUST REINFORCING AS NEEDED TO AVOID ANCHOR ROD HOLES, LIFTING LOOPS, PIPES AND STUDS.
2. CONCRETE COVER SHALL BE A MINIMUM OF 2" CLEAR UNLESS NOTED OTHERWISE.
3. SURFACE MARKINGS SHALL BE MADE USING BLACK INDUSTRIAL STRENGTH, FADE RESISTANT PAINT. STENCIL LETTERING SHALL BE 2" IN HEIGHT.
4. FOR LIFTING LOOP DETAILS SEE DRAWING NO. 334.5-09.
5. FOR EMBEDDED PLATE DETAILS SEE DRAWING NO. 334.5-19.
6. LIFTING HOLES TO BE KEPT OPEN AFTER SETTING.

HDR ENGINEERING, INC.
4400 LEEDS AVE., SUITE 450
NORTH CHARLESTON, SC 29405
843-414-3700

APPROVED FOR
R.J. CORMAN RAILROAD COMPANY/ CAROLINA LINES BY
HDR ENGINEERING INC.
OF THE CAROLINAS
(CHARLESTON, SC)
BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020
FILE: 334.5-16.dgn

R.J. Corman Railroad Company

REVISIONS

BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP
PRECAST CONCRETE INTERMEDIATE BENT CAP PCC1 DETAILS
HORRY COUNTY CONWAY, SC
R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

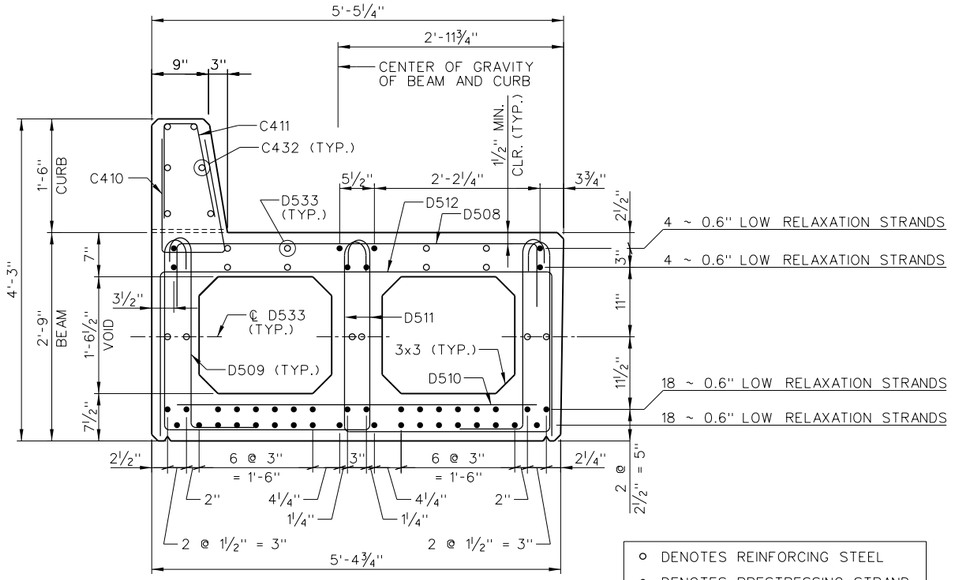
SCALE: AS SHOWN
DATE: 3/16/2020
DESIGN: TCS
DRAWN: RGD
CHECKED: JFM

VAL. SEC.

DRAWING NO. 334.5-16

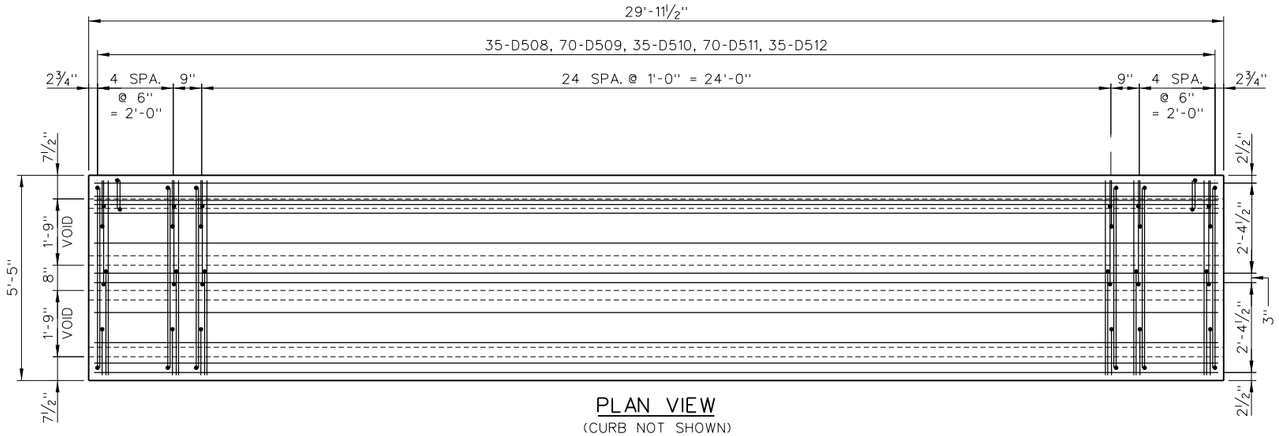
RELEASED FOR BID - NOT FOR CONSTRUCTION

FILENAME: c:\pwworking\east01\d1230212\334.5-16.dgn USER: rdixon SCALE FACTORS CORRESPOND WITH FULL SIZE (22"x34") DRAWINGS



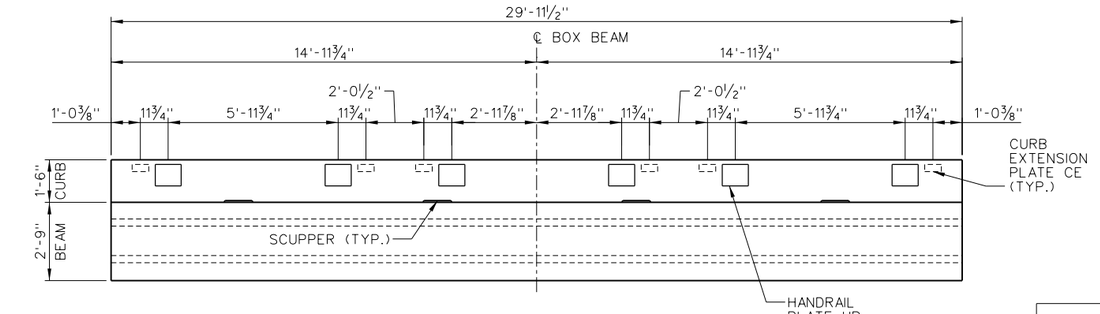
BOX BEAM TYPICAL SECTION

SCALE: 1" = 1'-0"



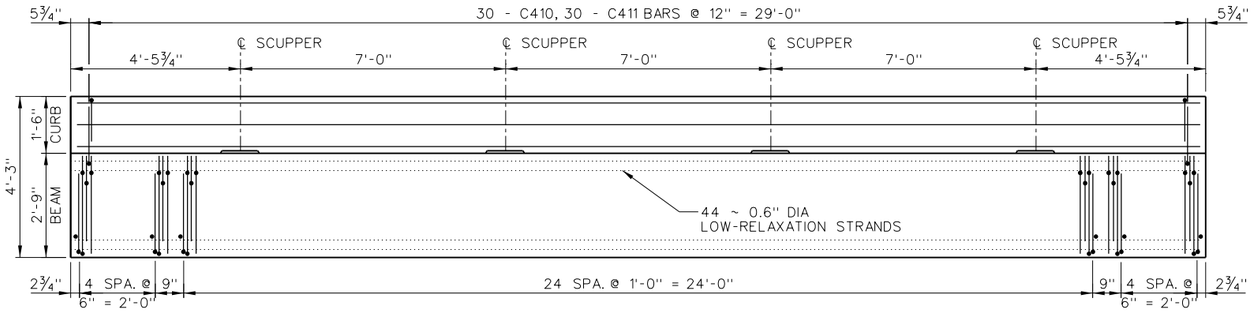
PLAN VIEW

(CURB NOT SHOWN)
SCALE: ½" = 1'-0"



ELEVATION EXTERIOR VIEW

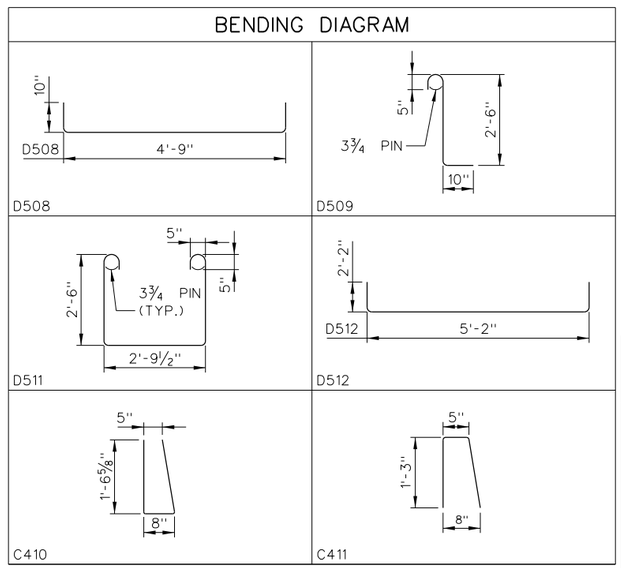
SCALE: ⅜" = 1'-0"



ELEVATION SECTIONAL VIEW

(EMBEDDED PLATES NOT SHOWN FOR CLARITY)
SCALE: ½" = 1'-0"

BENDING DIAGRAM



NOTES

1. ESTIMATED LIFTING WEIGHT OF ONE BB-30EXT BOX BEAM = 49,800 LBS.
2. ESTIMATED LIFTING WEIGHT OF ONE BB-30INT BOX BEAM = 44,000 LBS.
3. MINIMALLY ADJUST BAR SPACING AS NECESSARY TO AVOID SCUPPER LOCATIONS.
4. VOIDS SHALL NOT BE TIED TO PRESTRESSING STRANDS.
5. OMIT CURB ON INTERIOR BOX BEAM.
6. FOR SCUPPER DETAILS, SEE DRAWING NO. 334.5-11.
7. FOR EMBEDDED PLATE DETAILS, SEE DRAWING NO. 334.5-11.

REINFORCING STEEL SCHEDULE - 1 BOX BEAM

MARK	BAR NO.	NO. REQ'D	LENGTH FT	LENGTH IN.	TYPE	LOCATION	WEIGHT (LBS.)
D508	#5	35	6	2	⌐¬	TRANSVERSE	225
D509	#5	70	3	9 1/2	⌐	STIRRUP	277
D510	#5	35	4	9	STR	TRANSVERSE	173
D511	#5	70	8	8 1/2	⌐¬	STIRRUP	636
D512	#5	35	9	3	⌐¬	STIRRUP	338
D533	#5	14	29	7 1/2	STR	LONGITUDINAL	433
						TOTAL	2,082

REINFORCING STEEL SCHEDULE - 1 CURB

MARK	BAR NO.	NO. REQ'D	LENGTH FT	LENGTH IN.	TYPE	LOCATION	WEIGHT (LBS.)
C410	#4	30	3	6	⌊⌋	STIRRUP	70
C411	#4	30	2	9	⌐¬	STIRRUP	55
C432	#4	6	29	7 1/2	STR	LONGITUDINAL	119
						TOTAL	244

EST. QUANTITIES - 1 BOX BEAM

QTY.	UNIT	DESCRIPTION
10.8	C.Y.	CLASS 8.5 (AE) CONCRETE
2,082	LBS.	REINFORCING STEEL
2	EACH	LIFTING LOOPS
44	EACH	0.6" DIA. LOW RELAXATION STRANDS

EST. QUANTITIES - 1 CURB

QTY.	UNIT	DESCRIPTION
1.5	C.Y.	CLASS 8.5 (AE) CONCRETE
244	LBS.	REINFORCING STEEL
6	EACH	HANDRAIL PLATE (HR)
6	EACH	CURB EXTENSION PLATE (CE)

RELEASED FOR BID - NOT FOR CONSTRUCTION

HDR ENGINEERING, INC.
4400 LEEDS AVE., SUITE 450
NORTH CHARLESTON, SC 29405
843-414-3700

APPROVED FOR
R.J. CORMAN RAILROAD COMPANY/
CAROLINA LINES BY
HDR ENGINEERING INC.
OF THE CAROLINAS
(CHARLESTON, SC)
BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020
FILE: 334.5-17.dgn

REVISIONS

R.J. Corman Railroad Company

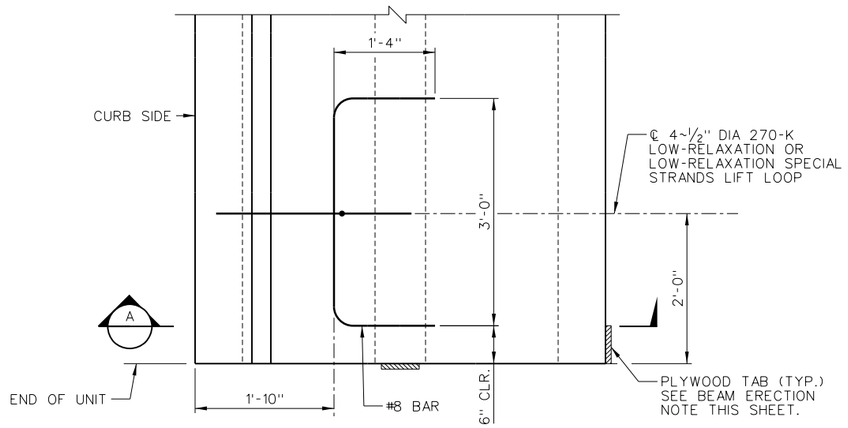
BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP
30'-0" PRESTRESSED CONCRETE
BOX BEAM DETAILS (1 OF 2)
HORRY COUNTY CONWAY, SC
R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

SCALE: AS SHOWN
DATE: 3/16/2020
DESIGN: TCS
DRAWN: RGD
CHECKED: JFM

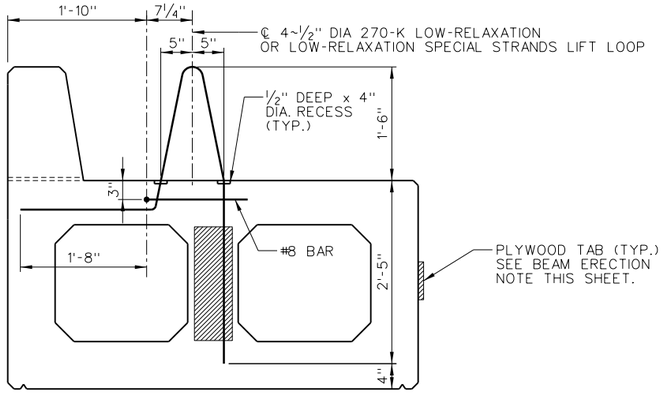
VAL. SEC.

DRAWING NO. 334.5-17

FILENAME: c:\pwworking\east01\d1230212\334.5-17.dgn USER: rdixon SCALE FACTORS CORRESPOND WITH FULL SIZE (22"x34") DRAWINGS

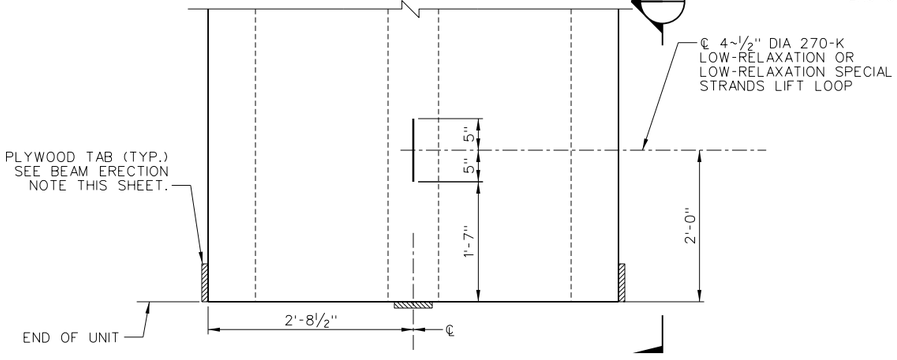


PLAN
EXTERIOR UNIT

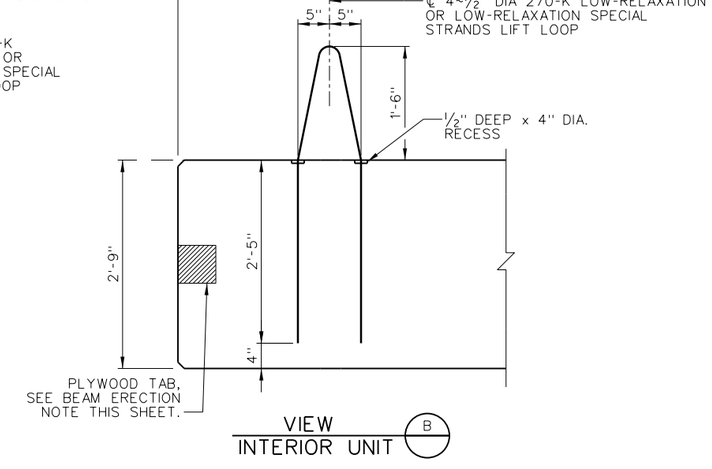


SECTION
EXTERIOR UNIT A

STRAND LIFT LOOP - EXTERIOR UNIT



PLAN
INTERIOR UNIT



VIEW
INTERIOR UNIT B

STRAND LIFT LOOP - INTERIOR UNIT

ERECTION NOTE

USE PLYWOOD TABS, AS NEEDED, TO ASSIST WITH MAINTAINING THE REQUIRED SPACING BETWEEN ADJACENT BEAMS.

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HDR ENGINEERING, INC.
4400 LEEDS AVE., SUITE 450
NORTH CHARLESTON, SC 29405
843-414-3700

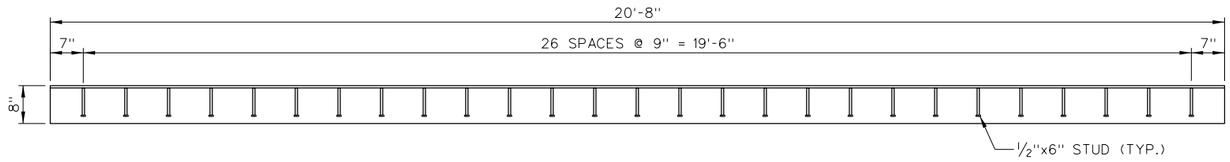
APPROVED FOR
R.J. CORMAN RAILROAD COMPANY/
CAROLINA LINES BY
HDR ENGINEERING INC.
OF THE CAROLINAS
(CHARLESTON, SC)
BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020
FILE: 334.5-18.dgn

R.J. Corman Railroad Company

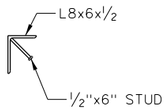
REVISIONS

BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP
30'-0" PRESTRESSED CONCRETE
BOX BEAM DETAILS (2 OF 2)
HORRY COUNTY CONWAY, SC
R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

SCALE: AS SHOWN	VAL. SEC.	DRAWING NO.
DATE: 3/16/2020		334.5-18
DESIGN: TCS		
DRAWN: RGD		
CHECKED: JFM		



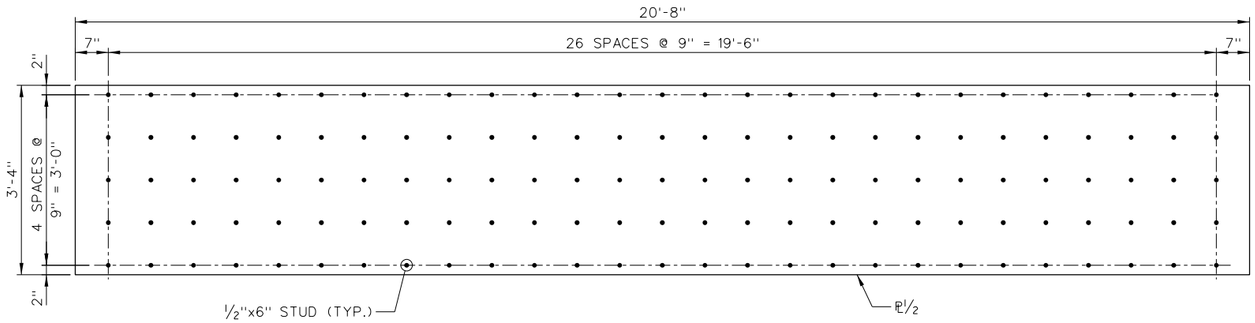
ELEVATION



SECTION

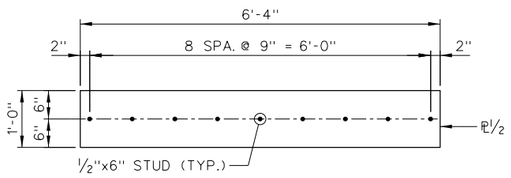
EMBEDDED ANGLE - EA1

SCALE: 3/4" = 1'-0"
ESTIMATED WEIGHT = 500 LBS. EA.



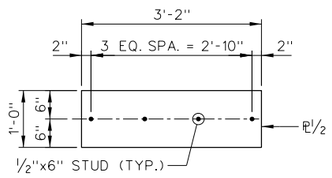
BOTTOM EMBEDDED PLATE - EP1

SCALE: 3/4" = 1'-0"
ESTIMATED WEIGHT = 1478 LBS. EA.



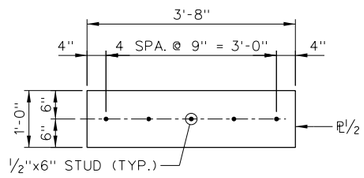
EMBEDDED PLATE - EP2

SCALE: 3/4" = 1'-0"
ESTIMATED WEIGHT = 137 LBS. EA.



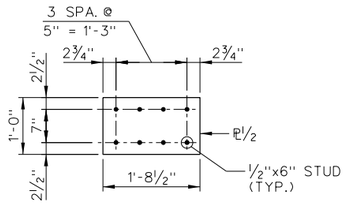
EMBEDDED PLATE - EP3

SCALE: 3/4" = 1'-0"
ESTIMATED WEIGHT = 69 LBS. EA.



EMBEDDED PLATE - EP4

SCALE: 3/4" = 1'-0"
ESTIMATED WEIGHT = 79 LBS. EA.



EMBEDDED PLATE - EP5

SCALE: 3/4" = 1'-0"
ESTIMATED WEIGHT = 37 LBS. EA.

RELEASED FOR BID - NOT FOR CONSTRUCTION

HDR ENGINEERING, INC.
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843-414-3700

APPROVED FOR
R.J. CORMAN RAILROAD COMPANY/
CAROLINA LINES BY
HDR ENGINEERING INC.
OF THE CAROLINAS
(CHARLESTON, SC)
BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020
FILE: 334.5-19.dgn

REVISIONS

R.J. Corman Railroad Company

BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP

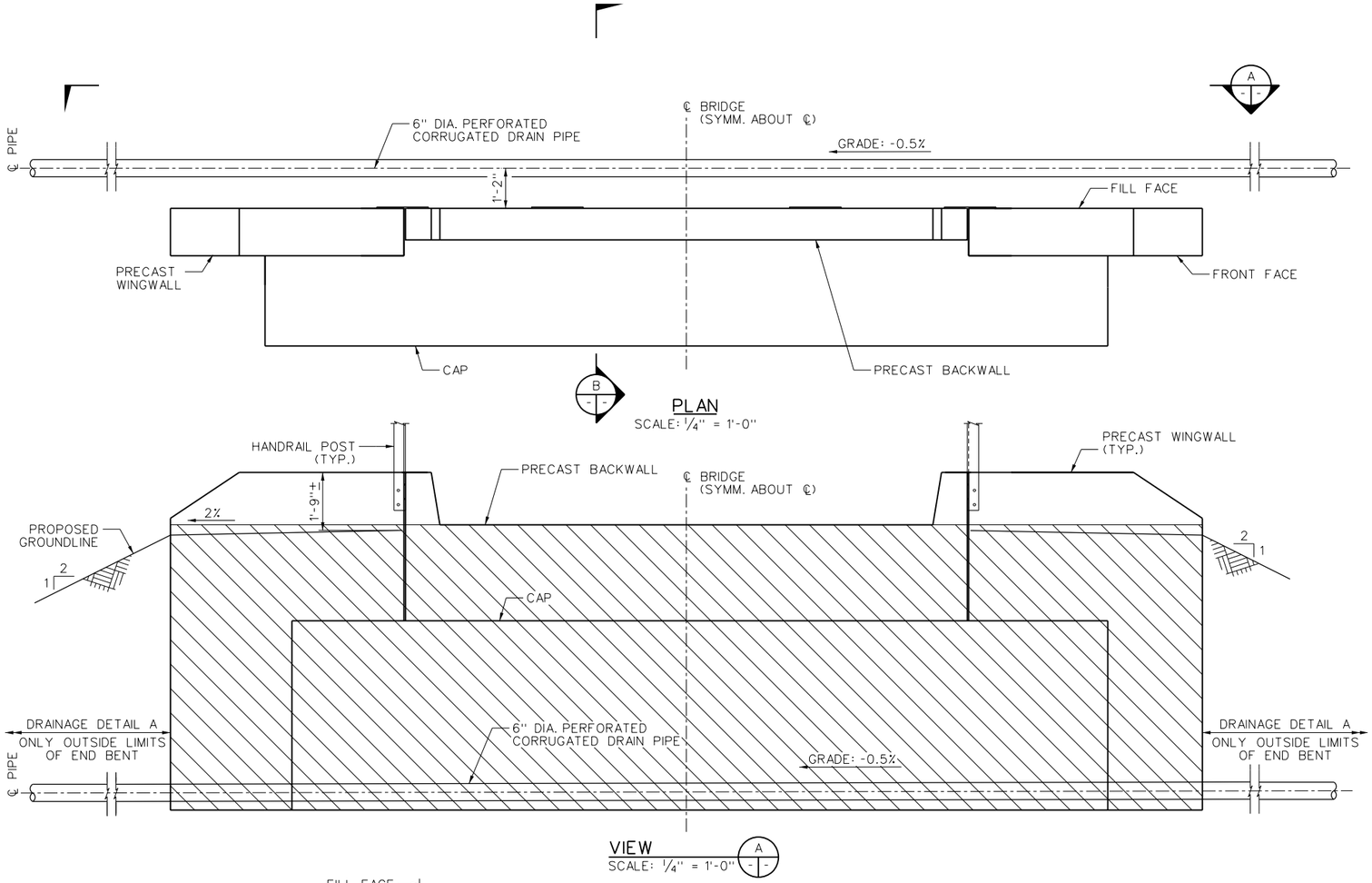
EMBEDDED PLATE DETAILS

HORRY COUNTY — CONWAY, SC

R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

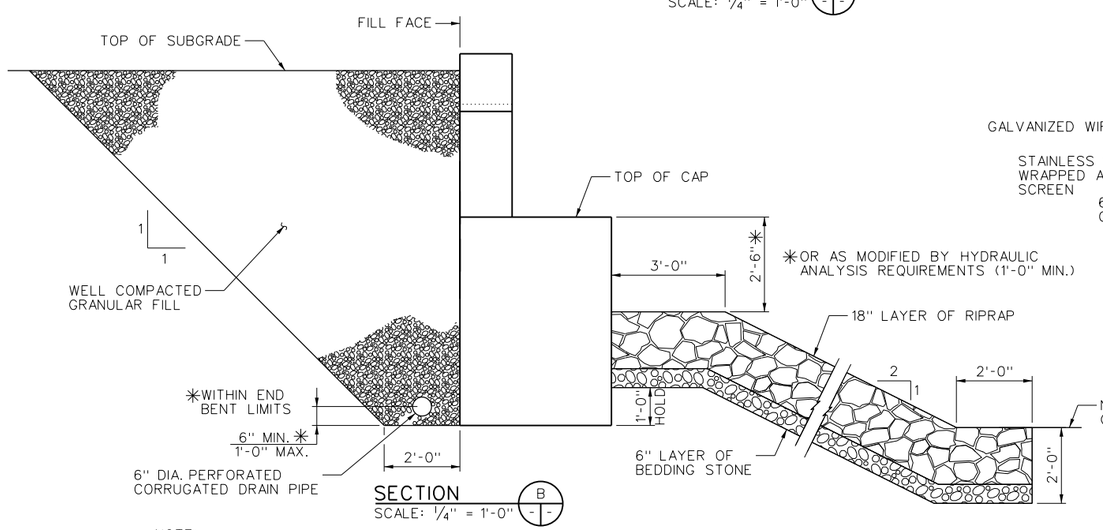
SCALE: AS SHOWN	VAL. SEC.	DRAWING NO.
DATE: 3/16/2020		334.5-19
DESIGN: TCS		
DRAWN: RGD		
CHECKED: JFM		

FILENAME: c:\pwworking\east01\d1230212\334.5-19.dgn USER: rdixon SCALE FACTORS CORRESPOND WITH FULL SIZE (22"x34") DRAWINGS



PLAN
SCALE: 1/4" = 1'-0"

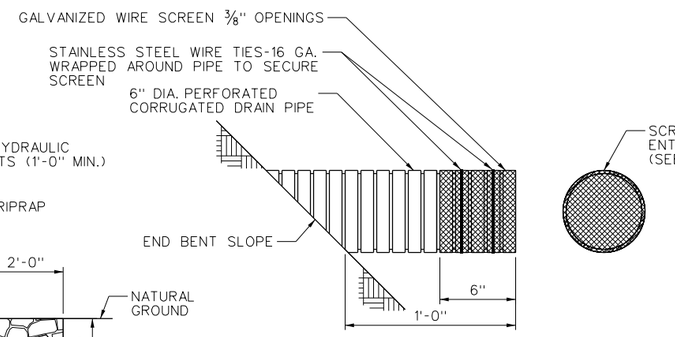
VIEW
SCALE: 1/4" = 1'-0"



SECTION
SCALE: 1/4" = 1'-0"

NOTE:

BACKFILL SECTION AS SHOWN ONLY WITHIN LIMITS OF END BENT.



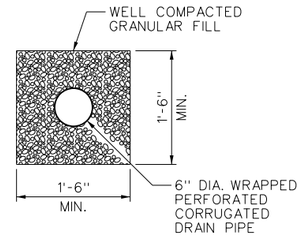
SIDE VIEW END VIEW

TYPICAL SCREEN DETAIL
N.T.S.

NOTES

1. BACKFILL WITH 1½" MAX. SIZE GRANULAR FILL MEETING THE REQUIREMENTS OF ASTM C33 SPECIFICATIONS TO LIMITS SHOWN ON THIS SHEET AND DRAWING NO. 334.5-06.
2. WRAP PIPE WITH NON-WOVEN FILTER FABRIC AND PLACE WITH PERFORATIONS DOWN. DEAD END OF PIPE SHALL BE TIGHTLY CLOSED WITH PLUG. OUTLET END SHALL BE SCREENED.
3. BEDDING STONE SHALL BE CLEAN BALLAST.
4. INDIVIDUAL RIPRAP STONES SHALL VARY IN WEIGHT FROM 25 TO 100 LBS.
5. DEPTH OF RIPRAP PER SECTION B , THIS SHEET. RIPRAP SHALL NOT EXCEED LIMITS AS DETAILED.
6. PORTION OF RIPRAP UNDER THE SUPERSTRUCTURE SHALL BE PLACED BEFORE SPANS ARE SET.
7. RIPRAP AND BEDDING STONE SECTION SHALL WRAP AROUND WINGWALLS AND EXTEND 5'-0" BEYOND THE FILL FACE.
8. PERFORATED CORRUGATED DRAIN PIPE SHALL BE CONTECH EAGLE CORR PE PERFORATED PIPE, OR ENGINEER APPROVED EQUIVALENT. JOINTS SHALL BE MADE PER MANUFACTURER'S RECOMMENDATIONS.
9. NON-WOVEN FILTER FABRIC SHALL BE US 300 MN AS MANUFACTURED BY US FABRICS, OR ENGINEER APPROVED EQUIVALENT. JOINTS SHALL BE MADE PER MANUFACTURER'S RECOMMENDATIONS.
10. WATERPROOFING SHOULD CONFORM WITH NOTES ON DRAWING NO. 334.5-04.

DENOTES LIMITS OF WATERPROOFING



DRAINAGE DETAIL A
SCALE: 1/2"= 1'-0"

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HDR ENGINEERING, INC.
4400 LEEDS AVE., SUITE 450
NORTH CHARLESTON, SC 29405
843-414-3700

APPROVED FOR
R.J. CORMAN RAILROAD COMPANY/ CAROLINA LINES BY
HDR ENGINEERING INC.
OF THE CAROLINAS
(CHARLESTON, SC)
BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020
FILE: 334.5-20.dgn

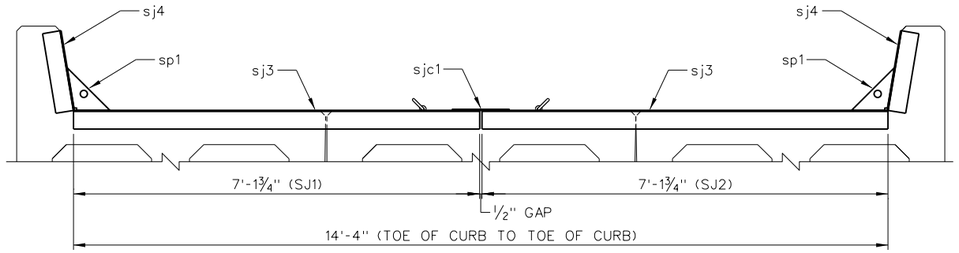
R.J. Corman Railroad Company

REVISIONS

BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP
END BENT WATERPROOFING AND SLOPE PROTECTION DETAILS
HORRY COUNTY CONWAY, SC
R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

SCALE:	AS SHOWN	VAL. SEC.	DRAWING NO.
DATE:	3/16/2020		334.5-20
DESIGN:	TCS		
DRAWN:	RGD		
CHECKED:	JFM		

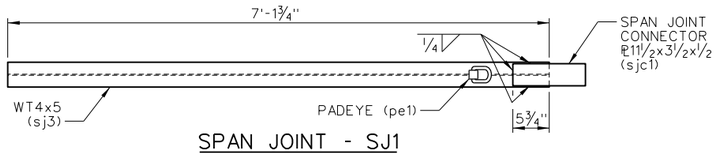
SCALE FACTORS CORRESPOND WITH FULL SIZE (22"x34") DRAWINGS
USER: rdixon
FILENAME: c:\pwworking\east01\d1230212\334.5-20.dgn



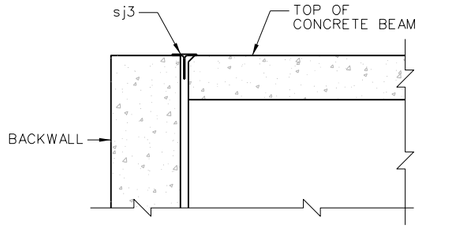
SPAN JOINT SECTION (3 BEAM)
SCALE: ¾" = 1'-0"

BILL OF MATERIAL - 1 SPAN JOINT

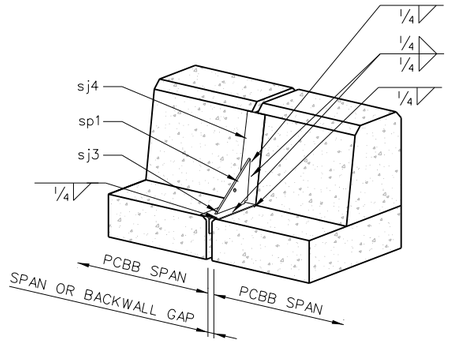
SHOP BILL (TOTAL PIECE QUANTITIES)						SHIPPING BILL		
NO.	DESCRIPTION	FT.	IN.	MARK	REMARKS	NO.	DESCRIPTION	MARK
1	WT4x5	7	1 3/4	sj3	SPAN JOINT	1	SPAN JOINT	SJ1
1	PL1/2x3 1/2	0	11 1/2	sjc1	SPAN JOINT CONNECTOR			
1	WT4x5	1	5	sj4	SPAN CURB JOINT			
1	PL1/2x9	0	9	sp1	STIFFENER PLATE			
1	PADEYE	N/A		pe1	PADEYE			
1	WT4x5	7	1 3/4	sj3	SPAN JOINT	1	SPAN JOINT	SJ2
1	PL1/2x9	0	9	sp1	STIFFENER PLATE			
1	WT4x5	1	5	sj4	SPAN CURB JOINT			
1	PADEYE	N/A		pe1	PADEYE			



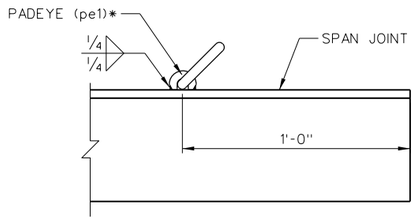
SPAN JOINT - SJ1
SCALE: 1" = 1'-0"
SPAN CURB JOINT AND STIFFENER PLATE NOT SHOWN



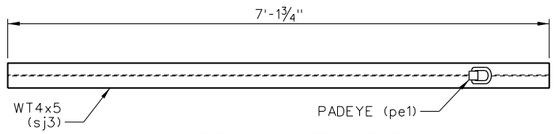
SPAN JOINT DETAIL - AT ABUTMENT
SCALE: NTS



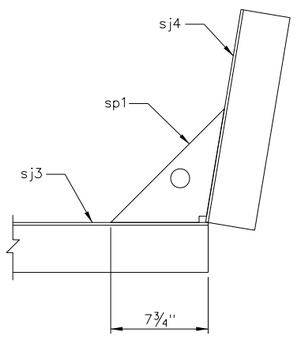
JOINT WELD DETAIL
SCALE: NTS



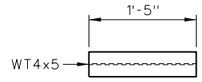
TYPICAL PADEYE DETAIL
SCALE: 3" = 1'-0"
* PADEYES SHALL BE "CROSBY" S-265, WELD-ON PIVOT LINK OR APPROVED EQUAL



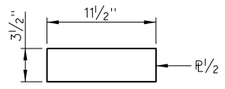
SPAN JOINT - SJ2
SCALE: 1" = 1'-0"
SPAN CURB JOINT AND STIFFENER PLATE NOT SHOWN



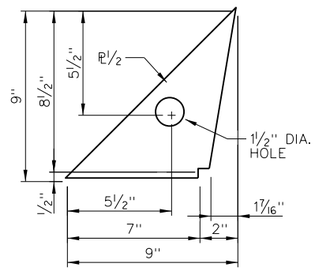
JOINT DETAIL
SCALE: NTS



SPAN CURB JOINT - sj4
SCALE: 1" = 1'-0"



SPAN JOINT CONNECTOR - sjc1
SCALE: 1½" = 1'-0"



STIFFENER PLATE - sp1
SCALE: 3" = 1'-0"

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843-414-3700

APPROVED FOR
R.J. CORMAN RAILROAD COMPANY/
CAROLINA LINES BY
HDR ENGINEERING INC.
OF THE CAROLINAS
(CHARLESTON, SC)
BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020
FILE: 334.5-21.dgn

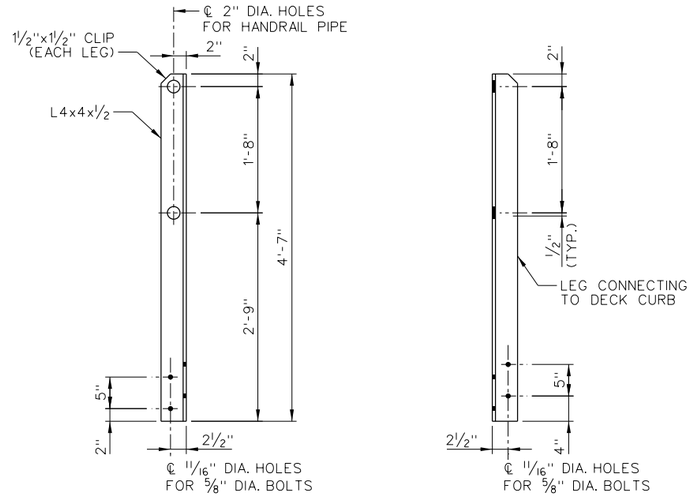
REVISIONS

RJ Corman Railroad Company

BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP
SPAN JOINT DETAILS
HORRY COUNTY CONWAY, SC
R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

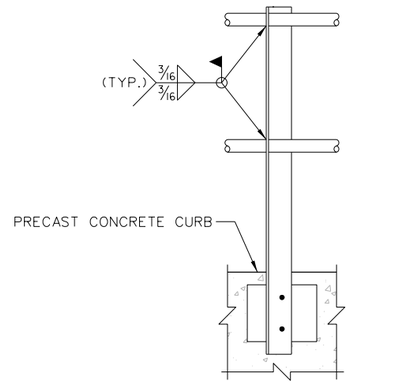
SCALE: AS SHOWN	VAL. SEC.	DRAWING NO.
DATE: 3/16/2020		334.5-21
DESIGN: TCS		
DRAWN: RGD		
CHECKED: JFM		

FILENAME: c:\pwworking\east01\d1230212\334.5-21.dgn USER: rdixon SCALE FACTORS CORRESPOND WITH FULL SIZE (22"x34") DRAWINGS



HANDRAIL DETAIL - HP2

SCALE: 1" = 1'-0"

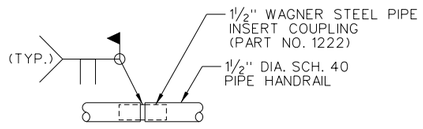


HANDRAIL WELD DETAIL

SCALE: 1" = 1'-0"

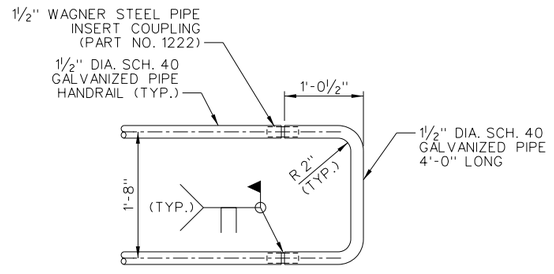
NOTES

1. SEE DRAWING NO. 334.5-04 FOR MISCELLANEOUS STEEL NOTES.
2. HANDRAIL TO BE HOT-DIPPED GALVANIZED SCHEDULE 40 STEEL PIPE.
3. HANDRAIL SHALL BE SPLICED BETWEEN SPANS.
4. HANDRAIL POSTS AND LATERAL STOPS TO BE SHOP PAINTED WITH A SINGLE COAT OF CARBOMASTIC 615 AL (8-10 MILS DRY FILM THICKNESS, DFT) OR APPROVED EQUAL AFTER FABRICATION.
5. PEJF SHOULD BE ATTACHED TO THE LATERAL RESTRAINT PER MANUFACTURER SPECIFICATIONS.
6. AFTER WELDING HANDRAILS, THOROUGHLY COAT AREAS OF EXPOSED STEEL WITH TWO COATS OF COLD GALVANIZING SPRAY.



HANDRAIL SPLICE - HS1

SCALE: 1½" = 1'-0"



HANDRAIL END ASSEMBLY - HE1

SCALE: 1" = 1'-0"

LIST OF HIGH STRENGTH FIELD BOLTS (1 HANDRAIL POST)							
NO. REQ'D	SIZE	THICKNESS			GRIP	LENGTH	PIECES CONNECTED
2	5/8"	1/2"	1/2"		1"	2" *	HANDRAIL POST (HP2), HANDRAIL CONN. PLATE (HR)

* PROVIDE MINIMUM THREAD LENGTH OF 1 1/2"

ALSO REQUIRED:
2 EA. WASHERS FOR 5/8" DIA. BOLT

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NORTH CHARLESTON, SC 29405
843-414-3700

APPROVED FOR
R.J. CORMAN RAILROAD COMPANY/
CAROLINA LINES BY
HDR ENGINEERING INC.
OF THE CAROLINAS
(CHARLESTON, SC)
BY: TIMOTHY STRICKLAND, P.E.
ENGINEER'S NAME
DATE: 3/16/2020
FILE: 334.5-22.dgn

REVISIONS

R.J. Corman Railroad Company

BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP
HANDRAIL DETAILS
HORRY COUNTY CONWAY, SC
R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

SCALE: AS SHOWN
DATE: 3/16/2020
DESIGN: TCS
DRAWN: RGD
CHECKED: JFM

VAL. SEC.

DRAWING NO. 334.5-22

FILENAME: c:\pwworking\east01\d1230212\334.5-22.dgn USER: rdixon SCALE FACTORS CORRESPOND WITH FULL SIZE (22"x34") DRAWINGS

PROJECT: RJ Corman Bridge Replacement over Crabtree Swamp
Conway, South Carolina
S&ME Project No. 1463-19-046

BORING LOG B-1

DATE DRILLED: 10/16/19	ELEVATION:	NOTES: Located 21' from bridge and 52' from front face of timber abutment. Elevation unknown.
DRILL RIG: Trailer	BORING DEPTH: 120.0 ft	
DRILLER: M. Radford	WATER LEVEL: 1.1' ATD, 1.5' 24 hr	
HAMMER TYPE: Automatic	LOGGED BY: W. King	
SAMPLING METHOD: Fixed Head Sample, Split spoon	STATIONING:	OFFSET:
DRILLING METHOD: Mud Rotary		

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS	N VALUE
0		TOPSOIL - APPROXIMATELY 6 INCHES		1		1	1	2		3
		FAT CLAY (CH) - Mostly medium to high plasticity fines, trace fine to medium sand, tan/gray, moist to wet, very soft to soft.		2		2	1	1		2
5				3		1	1	1		2
				4		1	1	1		2
				5		1	1	1	100%	2
10		FAT CLAY WITH SAND (CH) - Mostly medium to high plasticity fines, few fine to medium sands, gray, saturated, very soft.		6		0	0	1		1
		CLAYEY SAND (SC) - Mostly fine to medium sand, some medium to high plasticity fines, tan/gray, moist to wet, very loose.		7		WOH	WOH	WOH		WOH
15				8		1	3	4		7
		PEE DEE FORMATION - FAT CLAY (CH) - Mostly medium to high plasticity fines, some fine to medium sand, gray, saturated, firm to stiff.								
20				9		3	5	6		11
		--- Stiff								
25				10		5	6	9		15
										20

NOTES:
1. THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.
2. BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.
3. STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.
4. WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.

PROJECT: RJ Corman Bridge Replacement over Crabtree Swamp
Conway, South Carolina
S&ME Project No. 1463-19-046

BORING LOG B-1

DATE DRILLED: 10/16/19	ELEVATION:	NOTES: Located 21' from bridge and 52' from front face of timber abutment. Elevation unknown.
DRILL RIG: Trailer	BORING DEPTH: 120.0 ft	
DRILLER: M. Radford	WATER LEVEL: 1.1' ATD, 1.5' 24 hr	
HAMMER TYPE: Automatic	LOGGED BY: W. King	
SAMPLING METHOD: Fixed Head Sample, Split spoon	STATIONING:	OFFSET:
DRILLING METHOD: Mud Rotary		

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS	N VALUE
40		--- Very stiff		11		5	9	10		19
		PEE DEE FORMATION - SANDY SILT (ML) - Mostly low to medium plasticity fines, some fine to medium sand, gray, saturated, stiff to very hard.		12		5	8	9		17
50				13		5	7	9		16
				14		5	7	9		16
60		--- Stiff		15		5	5	7		12
				16		4	6	6		12
70				17		28	50/2			50/2

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3. STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.
4. WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.

PROJECT: RJ Corman Bridge Replacement over Crabtree Swamp
Conway, South Carolina
S&ME Project No. 1463-19-046

BORING LOG B-1

DATE DRILLED: 10/16/19	ELEVATION:	NOTES: Located 21' from bridge and 52' from front face of timber abutment. Elevation unknown.
DRILL RIG: Trailer	BORING DEPTH: 120.0 ft	
DRILLER: M. Radford	WATER LEVEL: 1.1' ATD, 1.5' 24 hr	
HAMMER TYPE: Automatic	LOGGED BY: W. King	
SAMPLING METHOD: Fixed Head Sample, Split spoon	STATIONING:	OFFSET:
DRILLING METHOD: Mud Rotary		

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS	N VALUE
70		--- Very hard		18		50/3				50/3
		PEE DEE FORMATION - SILTY CLAYEY SAND (SC-SM) - Mostly fine to medium sand, some low to medium plasticity fines, gray, saturated, medium dense to very dense.		19		5	12	28		40
80		--- Dense		20		7	9	14		23
		--- Medium dense		21		10	11	16		27
90		PEE DEE FORMATION - CLAYEY SAND (SC) - Mostly fine to medium sand, some low to medium plasticity fines, gray, saturated, medium dense to very dense.		22		10	10	17		27
				23		19	12	19		31
100		--- Dense		24		50/1				50/1

NOTES:
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PROJECT: RJ Corman Bridge Replacement over Crabtree Swamp
Conway, South Carolina
S&ME Project No. 1463-19-046

BORING LOG B-1

DATE DRILLED: 10/16/19	ELEVATION:	NOTES: Located 21' from bridge and 52' from front face of timber abutment. Elevation unknown.
DRILL RIG: Trailer	BORING DEPTH: 120.0 ft	
DRILLER: M. Radford	WATER LEVEL: 1.1' ATD, 1.5' 24 hr	
HAMMER TYPE: Automatic	LOGGED BY: W. King	
SAMPLING METHOD: Fixed Head Sample, Split spoon	STATIONING:	OFFSET:
DRILLING METHOD: Mud Rotary		

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS	N VALUE
110		--- Very dense		25		5	7	10		17
		PEE DEE FORMATION - SILTY SAND (SM) - Mostly fine to medium sand, some low to medium plasticity fines, gray, saturated, medium dense to very dense.		26		10	15	48		63
115		--- Very dense		27		7	9	12		21
		--- Medium dense								
120		Boring terminated at 120 ft								

NOTES:
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NORTH CHARLESTON, SC 29405
843-414-3700

FILE: 334.5-23.dgn

RJ Corman Railroad Company

REVISIONS

BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP

BORING LOG (1 OF 2)

HORRY COUNTY CONWAY, SC

R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

SCALE: AS SHOWN DATE: 3/16/2020 DESIGN: TCS DRAWN: RGD CHECKED: JFM	VAL. SEC.	DRAWING NO. 334.5-23	

PROJECT: RJ Corman Bridge Replacement over Crabtree Swamp
Conway, South Carolina
S&ME Project No. 1463-19-046

BORING LOG B-2

DATE DRILLED: 10/18/19	ELEVATION:	NOTES: Located 30' from bridge and 23' from front face of timber abutment. Elevation unknown.
DRILL RIG: Track	BORING DEPTH: 120.0 ft	
DRILLER: G. Elster	WATER LEVEL: 1.5' ATD, 2.3' 24 hr	
HAMMER TYPE: Automatic	LOGGED BY: K. Fugate	
SAMPLING METHOD: Fixed Head Sample, Split spoon	STATIONING:	OFFSET:
DRILLING METHOD: Mud Rotary		

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (Feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS	N VALUE
0		TOPSOIL - APPROXIMATELY 5 INCHES	2	1		2	2	2		4
		SANDY FAT CLAY (CH) - Mostly medium to high plasticity fines, some fine to medium sand, tan/gray, moist to wet, soft.		2		2	3	2		5
5		CLAYEY SAND (SC) - Mostly fine to medium sand, some low to medium plasticity fines, gray/tan, wet to saturated, loose.		3		2	4	4		8
		SANDY FAT CLAY (CH) - Mostly medium to high plasticity fines, some fine to medium sand, gray/tan, saturated, firm.		4		2	3	3		5
10		CLAYEY SAND (SC) - Mostly fine to medium sand, some low to medium plasticity fines, gray, saturated, loose.		5		3	2	2		4
		POORLY GRADED SAND (SP) - Mostly fine to medium sand, trace fines, gray, saturated, very loose.		6		0	0	1		1
15		FAT CLAY WITH SAND (CH) - Mostly medium to high plasticity fines, few fine to medium sands, gray, saturated, soft to very soft.								
		SANDY LEAN CLAY (CL) - Mostly low to medium plasticity fines, some fine to medium sand, gray/tan, saturated, soft to very soft.		7		2	2	2		4
20										
25		POORLY GRADED SAND WITH CLAY (SP-SC) - Mostly fine to medium sand, few low to medium plasticity fines, gray, very loose.		8		1	1	1		2
30		PEE DEE FORMATION - SANDY SILT (ML) - Mostly low to medium plasticity fines, some fine to medium sand, gray, saturated, stiff to very stiff.		9		6	7	9		16
				10		5	8	8		16

NOTES:
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3. STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.
4. WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.

PROJECT: RJ Corman Bridge Replacement over Crabtree Swamp
Conway, South Carolina
S&ME Project No. 1463-19-046

BORING LOG B-2

DATE DRILLED: 10/18/19	ELEVATION:	NOTES: Located 30' from bridge and 23' from front face of timber abutment. Elevation unknown.
DRILL RIG: Track	BORING DEPTH: 120.0 ft	
DRILLER: G. Elster	WATER LEVEL: 1.5' ATD, 2.3' 24 hr	
HAMMER TYPE: Automatic	LOGGED BY: K. Fugate	
SAMPLING METHOD: Fixed Head Sample, Split spoon	STATIONING:	OFFSET:
DRILLING METHOD: Mud Rotary		

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (Feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS	N VALUE
40		PEE DEE FORMATION - SANDY SILT (ML) - Mostly low to medium plasticity fines, some fine to medium sand, gray, saturated, stiff to very stiff. *(continued)* - - - Very stiff		11		8	9	12		21
		PEE DEE FORMATION - FAT CLAY (CH) - Mostly medium to high plasticity fines, trace fine to medium sand, gray, saturated, very stiff.		12		8	9	9		18
50				13		8	8	10		18
55		PEE DEE FORMATION - SANDY SILT (ML) - Mostly low to medium plasticity fines, some fine to medium sand, gray, saturated, stiff to hard.		14		7	7	11		18
60				15		8	8	8		16
65		- - - Stiff		16		6	7	8		15
				17		5	9	30		39

NOTES:
1. THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.
2. BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.
3. STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.
4. WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.

PROJECT: RJ Corman Bridge Replacement over Crabtree Swamp
Conway, South Carolina
S&ME Project No. 1463-19-046

BORING LOG B-2

DATE DRILLED: 10/18/19	ELEVATION:	NOTES: Located 30' from bridge and 23' from front face of timber abutment. Elevation unknown.
DRILL RIG: Track	BORING DEPTH: 120.0 ft	
DRILLER: G. Elster	WATER LEVEL: 1.5' ATD, 2.3' 24 hr	
HAMMER TYPE: Automatic	LOGGED BY: K. Fugate	
SAMPLING METHOD: Fixed Head Sample, Split spoon	STATIONING:	OFFSET:
DRILLING METHOD: Mud Rotary		

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (Feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS	N VALUE
70		PEE DEE FORMATION - SANDY SILT (ML) - Mostly low to medium plasticity fines, some fine to medium sand, gray, saturated, stiff to hard. *(continued)* - - - Hard		18		8	9	23		32
75		PEE DEE FORMATION - SILTY CLAYEY SAND (SC-SM) - Mostly fine to medium sand, some low to medium plasticity fines gray, saturated, dense to very dense.		19		50/0				50/0
80		- - - Very dense		20		38	50/3			50/3
85				21		15	50/4			50/4
90		PEE DEE FORMATION - CLAYEY SAND (SC) - Mostly fine to medium sand, some low to medium plasticity fines, gray, medium dense.		22		11	9	12		21
95				23		11	12	13		25
100				24		5	6	6		12

NOTES:
1. THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.
2. BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.
3. STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.
4. WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.

PROJECT: RJ Corman Bridge Replacement over Crabtree Swamp
Conway, South Carolina
S&ME Project No. 1463-19-046

BORING LOG B-2

DATE DRILLED: 10/18/19	ELEVATION:	NOTES: Located 30' from bridge and 23' from front face of timber abutment. Elevation unknown.
DRILL RIG: Track	BORING DEPTH: 120.0 ft	
DRILLER: G. Elster	WATER LEVEL: 1.5' ATD, 2.3' 24 hr	
HAMMER TYPE: Automatic	LOGGED BY: K. Fugate	
SAMPLING METHOD: Fixed Head Sample, Split spoon	STATIONING:	OFFSET:
DRILLING METHOD: Mud Rotary		

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (Feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS	N VALUE
110		PEE DEE FORMATION - CLAYEY SAND (SC) - Mostly fine to medium sand, some low to medium plasticity fines, gray, medium dense. *(continued)*		25		7	6	6		12
		PEE DEE FORMATION - SILTY SAND (SM) - Mostly fine to medium sand, some low to medium plasticity fines, gray, medium dense to very dense.		26		8	38	50/2		50/2
115		- - - Very dense		27		38	14	16		30
120		PEE DEE FORMATION - CLAYEY SAND (SC) - Mostly fine to medium sand, some low to medium plasticity fines, gray, medium dense.								
		Boring terminated at 120 ft								

NOTES:
1. THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.
2. BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.
3. STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.
4. WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.

RELEASED FOR BID - NOT FOR CONSTRUCTION

HDR ENGINEERING, INC.
4400 LEEDS AVE., SUITE 450
NORTH CHARLESTON, SC 29405
843-414-3700

FILE: 334.5-24.dgn

RJ Corman Railroad Company

REVISIONS

BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP

BORING LOG (2 OF 2)

HORRY COUNTY CONWAY, SC

R.J. CORMAN RAILROAD COMPANY / CAROLINA LINES

SCALE: AS SHOWN DATE: 3/16/2020 DESIGN: TCS DRAWN: RGD CHECKED: JFM	VAL. SEC.	DRAWING NO. 334.5-24	

Appendix B

Boring Logs, CPT Soundings and Laboratory Testing Results

March 18, 2020

Report of Boring Logs and Laboratory Testing
RJ Corman Bridge Replacement over
Crabtree Swamp
Conway, South Carolina
S&ME Project No. 1463-19-046

PREPARED FOR:

HDR
555 Fayetteville Street, Suite 900
Raleigh, North Carolina 27601

PREPARED BY:

S&ME, Inc.
1330 Highway 501 Business
Conway, SC 29526

November 20, 2019

November 20, 2019

HDR
555 Fayetteville Street, Suite 900
Raleigh, North Carolina 27601

Attention: Ms. Lyndsie Janbakhsh, P.E.

Reference: **Report of Boring Logs and Laboratory Testing**
RJ Corman Bridge Replacement over Crabtree Swamp
Conway, South Carolina
S&ME Project No. 1463-19-046

Dear Ms. Janbakhsh:

We have completed our boring logs and laboratory testing for the referenced project in Conway, South Carolina. Our exploration was performed in general accordance with the Geotech Subconsultant Agreement between HDR Engineering and S&ME, dated September 30, 2019 and our Revised Proposal for Boring Logs and Laboratory Testing, Proposal No. 14-1900248.R2, dated September 26, 2019.

The purpose of this exploration was to evaluate subsurface conditions within the future bridge footprint and perform laboratory testing. This report presents our understanding of the proposed construction, the site and subsurface conditions encountered, and our laboratory test results. This report does not include bridge foundation recommendations.

♦ Project Information

Project information was initially provided during a pre-bid meeting on site on April 10, 2019. The site is located at the existing railroad bridge over Crabtree Swamp in Conway, South Carolina (see Figure 1 in the appendix for a Site Vicinity Map). We understand that a new, replacement bridge will be constructed adjacent to the existing bridge, within the existing railroad right-of-way. The existing bridge is of unknown age and is assumed to be supported on driven timber piles.

Additional information was provided during telephone conversations between Lyndsie Janbakhsh (HDR) and Worth King (S&ME) on July 9 and August 29, 2019. HDR requested two standard penetration test (SPT) soil borings to a target depth of 120 feet each, with continuous split-spoon sampling in the upper 10 feet, and split-spoon samples every 5 feet of depth thereafter. S&ME also recommended including two cone penetration test (CPT) soundings, advanced to refusal depth, in order to gather additional information for seismic design that is not supported by SPT borings. Our scope of services includes providing boring logs, sounding logs, and laboratory testing only. We understand that the geotechnical design will be performed by HDR.

♦ Exploration Procedures

Field Exploration

Our exploration included a site reconnaissance by a geotechnical engineer and the performance of two standard penetration test (SPT) soil borings in general accordance with ASTM D 1586 procedures. Borings B-1 and B-2 were advanced using mud-rotary drilling methods to a depth of 120 feet each below the existing ground surface. Test locations were established in the field measuring perpendicular and parallel distances from the existing bridge. The approximate test locations are shown on the Test Location Sketch (Figure 2) in the appendix.

At test location B-1 we also performed one seismic cone penetration test (SCPT) sounding, which was advanced to refusal[1] at a depth of 63 feet. One additional cone penetration test (CPT) sounding without seismic testing was performed at test location B-2 and advanced to refusal at a depth of 71 feet. Each test sounding was performed in general accordance with ASTM D 5778 procedures.

Representative split-spoon and thin-walled push tube samples were collected and transported back to our laboratory. The recovered soil samples were classified in general accordance with the visual-manual method described in ASTM D 2488, "*Standard Practice for Description and Identification of Soils (Visual-Manual Method)*" or the Unified Soil Classification System method described in ASTM D 2487, "*Standard Practice for Classification of Soils for Engineering Purposes*", where laboratory testing is performed.

A more detailed description of our field-testing procedures and the boring and sounding logs are also included in the appendix.

Laboratory Testing

A summary of the laboratory tests performed on select soil samples to determine various engineering properties is presented in the following paragraphs. All laboratory testing was performed in general accordance with applicable ASTM testing standards. The Laboratory Testing Procedures in the appendix provide details on the test methods.

1. Atterberg Limits (ASTM D 4318): Twelve (12) Atterberg Limits plasticity tests were performed. Samples were tested for Liquid Limit (LL), Plastic Limit (PL) and Plasticity Index (PI). The PL and LL represent the moisture contents at which a cohesive soil changes from a semi-solid to a plastic state and from a plastic state to a liquid state, respectively.
2. Grain Size Analysis with Hydrometer (ASTM D 422): Six (6) grain size analyses were performed. This test measures the particle size distribution versus percent passing by weight for various sieve sizes.
3. Grain Size Analysis without Hydrometer (ASTM D 6913): Two (2) grain size analyses without hydrometer were performed. This test measures the particle size distribution versus percent passing by weight for various sieve sizes down to the No. 200 size.

[1] Refusal is defined as the depth beyond which the drill tooling refuses to advance any further under the maximum downcrowd pressure applied by the rig.

4. Unconfined Compressive Strength (ASTM D 2166): Two (2) unconfined compressive strength tests were performed. This test method measures the unconfined compressive strength of the intact soil.

A summary of the laboratory procedures used to perform these tests is presented in the appendix. The individual test results are also included in the appendix.

♦ Site and Subsurface Conditions

Site Conditions

The existing railroad bridge was surrounded by trees measuring up to about 50 feet in height and medium dense underbrush. Crabtree Swamp measured roughly 50 feet wide at the time of our field work, based on visual observation. The immediate vicinity of our test locations was cleared of trees, with grasses measuring up to about 6 inches in height. Topsoil thickness ranged from about 5 inches to 6 inches at our test locations. Topsoil thickness may be greater in unexplored areas of the site.

Local Geology

The site lies within the Coastal Terraces Region of the Lower Coastal Plain of South Carolina. The topography of this region is dominated by a series of archaic beach terraces, exposed by uplifting of the local area over the last one million years. The lower coastal plain terraces are relatively young Quaternary features, exhibit only minor surface erosion, and can be traced large distances on the basis of surface elevation. Each terrace forms a thin veneer over older, consolidated marine shelf or terrestrial Coastal Plain residual soils that are Cretaceous to Tertiary in age.

Materials comprising the terraces typically consist of a strand or beach ridge deposit of clean sands at the seaward margin. Between the strand and the toe of the next inland terrace are mainly finely interlayered clays and sands termed backbarrier deposits. In most areas, the terrace deposits are sufficiently old for a fully developed residual soil profile to have formed from the parent material, but old swamp deposits, stumps, and buried trees have in some areas been covered by the terraces and are usually not evident at the surface.

Over wide areas in Horry County, seams of poorly consolidated silts or clays occur near the base of the terrace sediments. These sediments were weathered or eroded from the underlying Pee Dee Formation and redeposited a short distance away in a low-energy environment. Under these conditions, the in-place soils often exhibit little strength and can be highly compressible. These soils comprise “Stratum I” at this site.

The lower stratum at this site is the Pee Dee Formation, which consists of a thick, massive bedded, dark gray to green, calcareous clays, silts, and clay-sand mixtures. Ledges of thin limestone or cemented soils are often encountered and where present may range from just a few inches thick to several feet thick. The Pee Dee Formation is estimated to be late Cretaceous age, about 65 million years old. This layer generally forms the bearing layer for deep foundations supporting heavy structures in the area and is rarely penetrated fully by geotechnical borings.

Subsurface Conditions

The generalized subsurface conditions at the site are described below. For more detailed descriptions and stratifications at test locations, the respective boring and sounding logs should be reviewed in the appendix.

Interpreted Subsurface Soil Profile

One subsurface cross-sectional profile of the site soils is attached as Figure 3 in the appendix to illustrate a general representation of the subsurface conditions in the proposed construction area. The profile is oriented generally northwest to southeast and shown as looking northeasterly. The orientation of the profile in plan view is marked as A–A' on Figure 2. Note that the profile is not to scale and was prepared for illustrative purposes only. Subsurface stratifications may be more gradual than indicated, and conditions may vary between test locations. The strata encountered are labeled on the soil profile to allow their properties to be systematically described.

Details of the subsurface conditions encountered by the borings are shown on the logs in the appendix. These logs represent our interpretation of the subsurface conditions based upon field data. Stratification lines on the logs represent approximate boundaries between soil types; however, the actual transition may be gradual. The general subsurface conditions and their pertinent characteristics are discussed in the following paragraphs.

Stratum I: Upper Clays and Clayey Sands

Beneath the topsoil, the borings primarily encountered fat clays (CH), fat clays with sand (CH), sandy fat clays (CH), sandy lean clays (CL), and clayey sands (SC), to depths of about 23 to 28 feet below the existing ground surface. A seam of poorly graded sand (SP) was also encountered in boring B-2 between depths of 8 and 9.5 feet, and a seam of poorly graded sand with clay (SP-SC) was encountered in boring B-2 between depths of 24 and 27 feet.

The soils of this stratum were moist to wet where located above the subsurface water table and saturated where located below, and coloration was primarily tan and gray. SPT N-values in this stratum ranged from sufficiently soft to be penetrated by the static hammer weight (WOH) to 8 bpf, indicating a very soft to firm consistency within the cohesive soils and a very loose to loose relative density within the granular soils. In the cone soundings, tip resistance measurements within this stratum ranged from about 10 to 100 tsf, and typically ranged from about 10 to 20 tsf.

Stratum II: Pee Dee Formation

Underlying Stratum I and beginning at depths of about 23 to 28 feet, soils of the Pee Dee Formation were encountered to our deepest exploration depth of 120 feet. The Pee Dee Formation consisted of fat clays (CH), sandy silts (ML), clayey sands (SC), silty sands (SM), and silty clayey sands (SC-SM). These soils were gray in color and were saturated, and were reactive to dilute muriatic acid. SPT N-value measurements ranged from 7 bpf to greater than 100 bpf, indicating firm to very hard consistency within the cohesive soils and loose to very dense relative density within the granular soils. In the cone soundings, tip resistance measurements within this stratum ranged from about 40 to 200 tsf, and typically ranged from about 40 to 80 tsf. Tip resistances peaked near 200 tsf at the sounding refusal depths of 63 to 71 feet below the ground surface. Each boring and sounding was terminated within this stratum.

Subsurface Water

Subsurface water levels measured in the boreholes at the time of drilling ranged from 1.1 to 1.5 feet below the ground surface. After a period of at least 24 hours after drilling, subsurface water levels measured to range from 1.5 to 2.3 feet below the ground surface. Due to the mud-rotary method of drilling, the 24-hour water levels are typically considered more representative of in-situ water levels at the site. Subsurface water levels within the soundings were interpreted from pore pressure measurements at depths of 4 to 5 feet. Water levels may fluctuate seasonally at the site, being influenced by rainfall variation, construction activity, and other factors.

Summary of Laboratory Test Results

We performed laboratory testing on selected split-spoon samples and thin-walled push tube samples to measure the engineering index properties of the subsurface soils. The laboratory soil index test results are presented in the appendix and are summarized in the following table.

Table 1 – Summary of Laboratory Soil Index Testing Results

Boring/ (Sample No.)	Sample Depth (Feet)	Natural Moisture Content (%)	Percent Passing No. 200 Sieve by Weight	Unconfined Compressive Strength (lbs./sq.ft.)	Atterberg Plasticity Limits (%)			USCS Soil Classification
					LL	PL	PI	
B-1 (S-7)	18.5 – 20	---	---	---	30	21	9	SC
B-1 (S-9)	28.5 – 30	---	90.9	---	64	24	40	CH
B-1 (S-19)	78.5 – 80	---	---	---	26	19	7	SC-SM
B-1 (S-23)	98.5 – 100	---	35.4	---	27	17	10	SC
B-1 (S-25)	108.5 – 110	---	26.5	---	25	23	2	SM
B-1 (UD-1)	10 – 12	56.5	90.9	343	61	25	36	CH
B-2 (S-2)	2 – 4	---	---	---	25	16	9	SC
B-2 (S-13)	48.5 – 50	---	96.2	---	71	30	41	CH
B-2 (S-21)	88.5 – 90	---	---	---	25	19	6	SC-SM
B-2 (S-25)	108.5 – 110	---	20.3	---	30	25	5	SM
B-2 (S-27)	118.5 - 120	---	48.9	---	38	22	16	SC
B-2 (UD-2)	21 – 23	26.2	61.2	1,192	48	27	21	CL

NP = non-plastic

Closure

S&ME, Inc. appreciates the opportunity to be of service to you on this project. Please call if you have questions concerning this report or any of our services.

Sincerely,

S&ME, Inc.

W. Worth King, P.E.
Project Engineer

Ronald P. Forest, Jr., P.E.
Senior Engineer

Attachments: Appendix

Appendix

Site Vicinity Map

Test Location Sketch

Subsurface Cross-Sectional Profile

Summary of Exploration Procedures

SPT Soil Classification Chart

SPT Boring Logs

CPT Soil Classification Legend

CPT Sounding logs

Shear Wave Velocity Profile

Summary of Laboratory Procedures

Laboratory Test Results

Site Vicinity Map

RJ Corman Bridge Replacement over Crabtree Swamp
Conway, South Carolina

SCALE: AS SHOWN

DATE: 11/19/2019

PROJECT NUMBER 1463-19-046

FIGURE NO. 1

Test Location Sketch

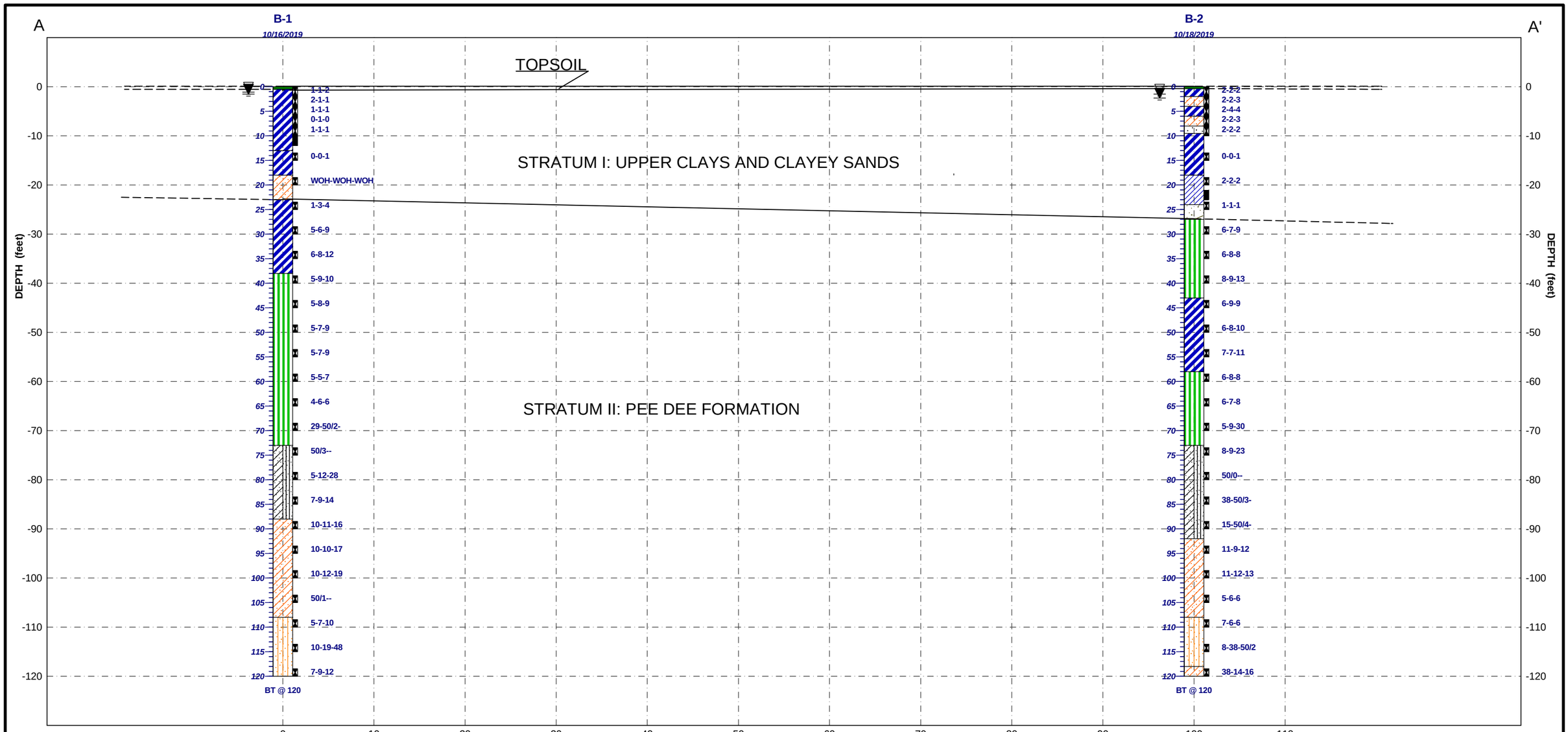
RJ Corman Bridge Replacement over Crabtree Swamp
Conway, South Carolina

SCALE: AS SHOWN

DATE: 11/19/2019

PROJECT NUMBER 1463-19-046

FIGURE NO. 2

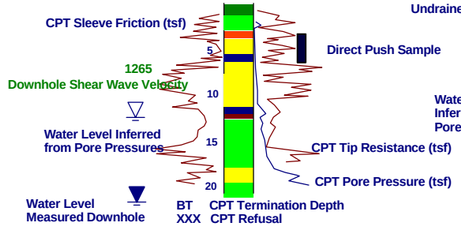


CPT/DMT MATERIAL GRAPHICS

- Sensitive Fine Grained Soils
- Organic Soils, Peats
- Clay to Silty Clay
- Clayey Silt to Silty Clay
- Silty Sand to Sandy Silt
- Clean Sand to Silty Sand
- Gravelly Sand to Sand
- OC Sand to Clayey Sand
- OC Fine Grained Soils

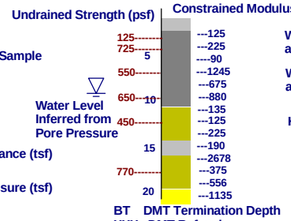
ELECTRONIC CONE PENETROMETER SOUNDINGS

C-3 Sounding Number
123.0 Elevation at GS



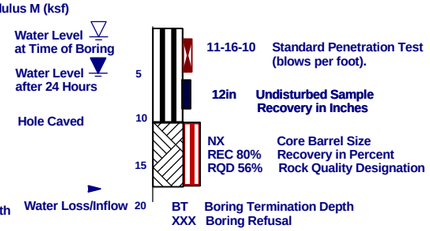
MARCHETTI DILATOMETER SOUNDINGS

DMT-3 Sounding Number
123.0 Elevation at GS



SOIL TEST BORINGS

B-3 Boring Number
123.0 Elevation at GS



FACING EAST

LEGEND OF MATERIAL GRAPHICS for SOIL TEST BORINGS

- Topsoil
- SC/SM, Clayey Sand
- SP/SC, Poorly-graded Sand with Clay
- CH, High Plasticity Clay
- SM, Silty Sand
- SC, Clayey Sand
- SP, Poorly-graded Sand
- ML, Low Plasticity Silt
- CL, Low Plasticity Clay

The depicted stratigraphy is shown for illustrative purposes only and is not warranted. Separations between different strata may be gradual and likely vary considerably from those shown. Profiles between nearby borings have been estimated using reasonable engineering care and judgment. The actual subsurface conditions will vary between boring locations.

SUBSURFACE PROFILE

Diagram: Figure 3: Profile A-A'

PROJECT: RJ Corman Bridge Rplcmnt over Crabtree Swamp

LOCATION: Conway, South Carolina

JOB NO: 1463-19-046

DATE: 11/14/19

♦ Summary of Exploration Procedures

The American Society for Testing and Materials (ASTM) publishes standard methods to explore soil, rock and ground water conditions in Practice D-420-18, "*Standard Guide for Site Characterization for Engineering Design and Construction Purposes.*" The boring and sampling plan must consider the geologic or topographic setting. It must consider the proposed construction. It must also allow for the background, training, and experience of the geotechnical engineer. While the scope and extent of the exploration may vary with the objectives of the client, each exploration includes the following key tasks:

- Reconnaissance of the Project Area
- Preparation of Exploration Plan
- Layout and Access to Field Sampling Locations
- Field Sampling and Testing of Earth Materials
- Laboratory Evaluation of Recovered Field Samples
- Evaluation of Subsurface Conditions

The standard methods do not apply to all conditions or to every site. Nor do they replace education and experience, which together make up engineering judgment. Finally, ASTM D 420 does not apply to environmental investigations.

♦ Reconnaissance of the Project Area

We walked over the site to note land use, topography, ground cover, and surface drainage. We observed general access to proposed sampling points and noted any existing structures.

Checks for Hazardous Conditions - State law requires that we notify the South Carolina 811 (SC-811) before we drill or excavate at any site. SC-811 is operated by the major water, sewer, electrical, telephone, CATV, and natural gas suppliers of South Carolina. SC-811 forwarded our location request to the participating utilities. Location crews then marked buried lines with colored flags within 72 hours. They did not mark utility lines beyond junction boxes or meters. We checked proposed sampling points for conflicts with marked utilities, overhead power lines, tree limbs, or man-made structures during the site walkover.

♦ Boring and Sampling

Standard Penetration Testing with Rotary Wash

A rotary drilling process was used to advance the holes using rotary wash drilling. For rotary drilling, a heavy drilling fluid was circulated in the bore holes to stabilize the sides and flush the cuttings.

Soil sampling and penetration testing were performed in general accordance with ASTM D 1586, *"Standard Test Method for Penetration Test and Split Barrel Sampling of Soils.* At regular intervals, drilling tools were removed and soil samples were obtained with a standard 1.4-inch I. D., two-inch O. D., split barrel sampler. The sampler was first seated six inches to penetrate any loose cuttings, then driven an additional 12 to 18 inches (depending on whether an 18-inch or 24-inch split-spoon was being used) with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler through the two final six-inch increments was

recorded as the penetration resistance (SPT N) value. The N-value, when properly interpreted by qualified professional staff, is an index of the soil strength and foundation support capability.

Undisturbed (UD) Sampling

Split spoon or split barrel sampling provide samples suitable for visual examination and classification tests but not sufficiently intact for quantitative laboratory testing. To provide samples for quantitative tests, relatively undisturbed samples were obtained by pushing sections of three-inch O. D., 16-gauge, steel tubing (Shelby tube) into the soil at the desired sampling intervals. The procedures used generally followed those described in ASTM D 1587, *"Standard Practice for Thin-Walled Tube Geotechnical Sampling of Soils*." Each tube, together with the encased soil, was carefully removed from the ground and the length of the recovered soil measured. Locations and depths of undisturbed samples were recorded on each field test boring record.

Electronic Cone Penetrometer (CPT) Soundings

CPT soundings consist of a conical pointed penetrometer which is hydraulically pushed into the soil at a slow, measured rate. Procedures for measurement of the tip resistance and side friction resistance to push generally follow those described by ASTM D-5778, "*Standard Test Method for Performing Electronic Friction Cone and Piezocone Penetration Testing of Soils*."

A penetrometer with a conical tip having a 60 degree apex angle and a cone base area of 10 cm^2 was advanced into the soil at a constant rate of 20 mm/s. The force on the conical point required to penetrate the soil was measured electronically every 50 mm penetration to obtain the *cone resistance* q_c. A friction sleeve is present on the penetrometer immediately behind the cone tip. The force exerted on the sleeve was measured electronically at a minimum of every 50 mm penetration and divided by the surface area of the sleeve to obtain the *friction sleeve resistance value* f_s A pore pressure element mounted immediately behind the cone tip was used to measure the pore pressure induced during advancement of the cone into the soil.

CPT Soil Stratification

Using ASTM D-5778 soil samples are not obtained. Soil classification was made on the basis of comparison of the tip resistance, sleeve resistance and pore pressure values to values measured at other locations in known soil types, using experience with similar soils and exercising engineering judgment.

Plots of normalized tip resistance versus friction ratio and normalized tip resistance versus penetration pore pressure were used to determine soil classification (Soil Behavior Type, SBT) as a function of depth using empirical charts developed by P.K. Robertson (1990). The friction ratio soil classification is determined from the chart in the appendix using the normalized corrected tip stress and the normalized corrected tip stress and the normalized friction ratio.

At some depths, the CPT data fell outside of the range of the classification chart. When this occurred, no data was plotted and a break was shown in the classification profile. This occasionally occurred at the top of a penetration as the effective vertical stress is very small and commonly produced normalized tip resistances greater than 1000.

To provide a simplified soil stratigraphy for general interpretation and for comparison to standard boring logs, a statistical layering and classification system was applied the field classification values. Layer thicknesses were determined based on the variability of the soil classification profile, based upon changes in the standard deviation

of the SBT classification number with depth. The average SBT number was determined for each successive 6-inch layer, beginning at the surface. Whenever an additional 6-inch increment deviated from the previous increment, a new layer was started, otherwise, this material was added to the layer above and the next 6-inch section evaluated. The soil behavior type for the layer was determined by the mean value for the complete layer.

Refusal to CPT Push

Refusal to the cone penetrometer equipment occurred when the reaction weight of the CPT rig was exceeded by the thrust required to push the conical tip further into the ground. At that point the rig tended to lift off the ground. Refusal may have resulted from encountering hard cemented or indurated soils, soft weathered rock, coarse gravel, cobbles or boulders, thin rock seams, or the upper surface of sound continuous rock. Where fills are present, refusal to the CPT rig may also have resulted from encountering buried debris, building materials, or objects.

Water Level Measurement

Subsurface water levels in the boreholes were measured during the onsite exploration and after a period of about 24 hours by measuring depths from the existing grade to the current water level using a tape.

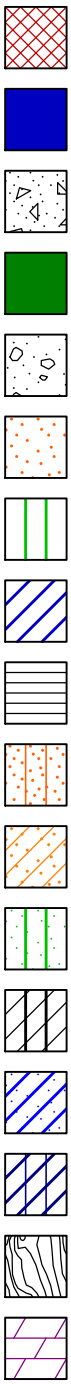
Backfilling of Borings

Once subsurface water levels were obtained, boring spoils were backfilled into the open bore holes. Hand auger bore holes were backfilled to the existing ground surface with soil cuttings. CPT sounding holes were not backfilled, since these holes are only 2 inches in diameter.

LEGEND TO SOIL CLASSIFICATION AND SYMBOLS

SOIL TYPES

(Shown in Graphic Log)



- Fill
- Asphalt
- Concrete
- Topsoil
- Gravel
- Sand
- Silt
- Clay
- Organic
- Silty Sand
- Clayey Sand
- Sandy Silt
- Clayey Silt
- Sandy Clay
- Silty Clay
- Partially Weathered Rock
- Cored Rock

WATER LEVELS

(Shown in Water Level Column)

▽ = Water Level At Termination of Boring
▼ = Water Level Taken After 24 Hours
◄ = Loss of Drilling Water
HC = Hole Cave

CONSISTENCY OF COHESIVE SOILS

CONSISTENCY	STD. PENETRATION RESISTANCE BLOWS/FOOT
Very Soft	0 to 2
Soft	3 to 4
Firm	5 to 8
Stiff	9 to 15
Very Stiff	16 to 30
Hard	31 to 50
Very Hard	Over 50

RELATIVE DENSITY OF COHESIONLESS SOILS

RELATIVE DENSITY	STD. PENETRATION RESISTANCE BLOWS/FOOT
Very Loose	0 to 4
Loose	5 to 10
Medium Dense	11 to 30
Dense	31 to 50
Very Dense	Over 50

SAMPLER TYPES

(Shown in Samples Column)

- Shelby Tube
- Split Spoon
- Rock Core
- No Recovery

TERMS

Standard Penetration Resistance - The Number of Blows of 140 lb. Hammer Falling 30 in. Required to Drive 1.4 in. I.D. Split Spoon Sampler 1 Foot. As Specified in ASTM D-1586.

REC - Total Length of Rock Recovered in the Core Barrel Divided by the Total Length of the Core Run Times 100%.

RQD - Total Length of Sound Rock Segments Recovered that are Longer Than or Equal to 4" (mechanical breaks excluded) Divided by the Total Length of the Core Run Times 100%.

PROJECT: **RU Corman Bridge Replacement over Crabtree Swamp**
Conway, South Carolina
S&ME Project No. 1463-19-046

BORING LOG B-1

DATE DRILLED: **10/16/19**	ELEVATION:	NOTES: **Located 21' from bridge and 52' from front face of timber abutment. Elevation unknown.**
DRILL RIG: **Trailer**	BORING DEPTH: **120.0 ft**	
DRILLER: **M. Radford**	WATER LEVEL: **1.1' ATD, 1.5' 24 hr**	
HAMMER TYPE: **Automatic**	LOGGED BY: **W. King**	
SAMPLING METHOD: **Fixed Head Sample, Split spoon**		STATIONING: / OFFSET:
DRILLING METHOD: **Mud Rotary**		

DEPTH (feet)	MATERIAL DESCRIPTION	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
	TOPSOIL - APPROXIMATELY 6 INCHES	1		1	1	2	3
	FAT CLAY (CH) - Mostly medium to high plasticity fines, trace fine to medium sand, tan/gray, moist to wet, very soft to soft.	2		2	1	1	2
5		3		1	1	1	2
		4		0	1	0	1
		5		1	1	1	2
10					100%		
	FAT CLAY WITH SAND (CH) - Mostly medium to high plasticity fines, few fine to medium sands, gray, saturated, very soft.	6		0	0	1	1
15							
	CLAYEY SAND (SC) - Mostly fine to medium sand, some medium to high plasticity fines, tan/gray, moist to wet, very loose.	7		WOH	WOH	WOH	WOH
20							
	PEE DEE FORMATION - FAT CLAY (CH) - Mostly medium to high plasticity fines, some fine to medium sand, gray, saturated, firm to stiff.	8		1	3	4	7
25							
		9		5	6	9	15
30	- - - Stiff						
		10		6	8	12	20

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS
10 20 30 60 80

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3. ***STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.***
4. ***WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.***

PROJECT: **RU Corman Bridge Replacement over Crabtree Swamp**
Conway, South Carolina
S&ME Project No. 1463-19-046

BORING LOG B-1

DATE DRILLED: **10/16/19**	ELEVATION:	NOTES: **Located 21' from bridge and 52' from front face of timber abutment. Elevation unknown.**
DRILL RIG: **Trailer**	BORING DEPTH: **120.0 ft**	
DRILLER: **M. Radford**	WATER LEVEL: **1.1' ATD, 1.5' 24 hr**	
HAMMER TYPE: **Automatic**	LOGGED BY: **W. King**	
SAMPLING METHOD: **Fixed Head Sample, Split spoon**		STATIONING: / OFFSET:
DRILLING METHOD: **Mud Rotary**		

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS	N VALUE
		- - - Very stiff									
40		PEE DEE FORMATION - SANDY SILT (ML) - Mostly low to medium plasticity fines, some fine to medium sand, gray, saturated, stiff to very hard.			11		5	9	10		19
45					12		5	8	9		17
50					13		5	7	9		16
55					14		5	7	9		16
60		- - - Stiff			15		5	5	7		12
65					16		4	6	6		12
					17		29	50/2		50/2	

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PROJECT: **RU Corman Bridge Replacement over Crabtree Swamp**
Conway, South Carolina
S&ME Project No. 1463-19-046

BORING LOG B-1

DATE DRILLED: **10/16/19**	ELEVATION:	NOTES: **Located 21' from bridge and 52' from front face of timber abutment. Elevation unknown.**
DRILL RIG: **Trailer**	BORING DEPTH: **120.0 ft**	
DRILLER: **M. Radford**	WATER LEVEL: **1.1' ATD, 1.5' 24 hr**	
HAMMER TYPE: **Automatic**	LOGGED BY: **W. King**	
SAMPLING METHOD: **Fixed Head Sample, Split spoon**		STATIONING: / OFFSET:
DRILLING METHOD: **Mud Rotary**		

DEPTH (feet)	MATERIAL DESCRIPTION	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
	- - - Very hard						
75	PEE DEE FORMATION - SILTY CLAYEY SAND (SC-SM) - Mostly fine to medium sand, some low to medium plasticity fines, gray, saturated, medium dense to very dense.	18		50/3			50/3
80	- - - Dense	19		5	12	28	40
85	- - - Medium dense	20		7	9	14	23
90	PEE DEE FORMATION - CLAYEY SAND (SC) - Mostly fine to medium sand, some low to medium plasticity fines, gray, saturated, medium dense to very dense.	21		10	11	16	27
95		22		10	10	17	27
100	- - - Dense	23		10	12	19	31
		24		50/1			50/1

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS
10 20 30 60 80

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PROJECT: **RU Corman Bridge Replacement over Crabtree Swamp**
Conway, South Carolina
S&ME Project No. 1463-19-046

BORING LOG B-1

DATE DRILLED: **10/16/19**	ELEVATION:	NOTES: **Located 21' from bridge and 52' from front face of timber abutment. Elevation unknown.**
DRILL RIG: **Trailer**	BORING DEPTH: **120.0 ft**	
DRILLER: **M. Radford**	WATER LEVEL: **1.1' ATD, 1.5' 24 hr**	
HAMMER TYPE: **Automatic**	LOGGED BY: **W. King**	
SAMPLING METHOD: **Fixed Head Sample, Split spoon**		STATIONING: / OFFSET:
DRILLING METHOD: **Mud Rotary**		

DEPTH (feet)	MATERIAL DESCRIPTION	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
	- - - Very dense						
110	PEE DEE FORMATION - SILTY SAND (SM) - Mostly fine to medium sand, some low to medium plasticity fines, gray, saturated, medium dense to very dense.	25		5	7	10	17
115	- - - Very dense	26		10	19	48	67
120	- - - Medium dense	27		7	9	12	21
	Boring terminated at 120 ft						

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS
10 20 30 60 80

S&ME BORING LOG \ 1463-16-046 SPT.GPJ \ LIBRARY 2011_06_28.GDT \ 11/20/19

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4. ***WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.***

PROJECT: **RU Corman Bridge Replacement over Crabtree Swamp**
Conway, South Carolina
S&ME Project No. 1463-19-046

BORING LOG B-2

DATE DRILLED: **10/18/19**	ELEVATION:	NOTES: **Located 30' from bridge and 23' from front face of timber abutment. Elevation unknown.**
DRILL RIG: **Track**	BORING DEPTH: **120.0 ft**	
DRILLER: **G. Eister**	WATER LEVEL: **1.5' ATD, 2.3' 24 hr**	
HAMMER TYPE: **Automatic**	LOGGED BY: **K. Fugate**	
SAMPLING METHOD: **Fixed Head Sample, Split spoon**		STATIONING: / OFFSET:
DRILLING METHOD: **Mud Rotary**		

DEPTH (feet)	MATERIAL DESCRIPTION	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
	TOPSOIL - APPROXIMATELY 5 INCHES	1		2	2	2	4
	SANDY FAT CLAY (CH) - Mostly medium to high plasticity fines, some fine to medium sand, tan/gray, moist to wet, soft.	2		2	2	3	5
5	CLAYEY SAND (SC) - Mostly fine to medium sand, some low to medium plasticity fines, gray/tan, wet to saturated, loose.	3		2	4	4	8
	SANDY FAT CLAY (CH) - Mostly medium to high plasticity fines, some fine to medium sand, gray/tan, saturated, firm.	4		2	2	3	5
10	CLAYEY SAND (SC) - Mostly fine to medium sand, some low to medium plasticity fines, gray, saturated, loose.	5		2	2	2	4
	POORLY GRADED SAND (SP) - Mostly fine to medium sand, trace fines, gray, saturated, very loose.	6		0	0	1	1
15	FAT CLAY WITH SAND (CH) - Mostly medium to high plasticity fines, few fine to medium sands, gray, saturated, soft to very soft.	7		2	2	2	4
20	SANDY LEAN CLAY (CL) - Mostly low to medium plasticity fines, some fine to medium sand, gray/tan, saturated, soft to very soft.	8		1	100%	1	2
25	POORLY GRADED SAND WITH CLAY (SP-SC) - Mostly fine to medium sand, few low to medium plasticity fines, gray, very loose.	9		6	7	9	16
30	PEE DEE FORMATION - SANDY SILT (ML) - Mostly low to medium plasticity fines, some fine to medium sand, gray, saturated, stiff to very stiff.	10		6	8	8	16

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS
10 20 30 60 80

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PROJECT: **RU Corman Bridge Replacement over Crabtree Swamp**
Conway, South Carolina
S&ME Project No. 1463-19-046

BORING LOG B-2

DATE DRILLED: **10/18/19**	ELEVATION:	NOTES: **Located 30' from bridge and 23' from front face of timber abutment. Elevation unknown.**
DRILL RIG: **Track**	BORING DEPTH: **120.0 ft**	
DRILLER: **G. Eister**	WATER LEVEL: **1.5' ATD, 2.3' 24 hr**	
HAMMER TYPE: **Automatic**	LOGGED BY: **K. Fugate**	
SAMPLING METHOD: **Fixed Head Sample, Split spoon**		STATIONING: / OFFSET:
DRILLING METHOD: **Mud Rotary**		

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS	N VALUE
40		PEE DEE FORMATION - SANDY SILT (ML) - Mostly low to medium plasticity fines, some fine to medium sand, gray, saturated, stiff to very stiff. *(continued)* - - - Very stiff			11		8	9	13		22
45		PEE DEE FORMATION - FAT CLAY (CH) - Mostly medium to high plasticity fines, trace fine to medium sand, gray, saturated, very stiff.			12		6	9	9		18
50					13		6	8	10		18
55					14		7	7	11		18
60		PEE DEE FORMATION - SANDY SILT (ML) - Mostly low to medium plasticity fines, some fine to medium sand, gray, saturated, stiff to hard.			15		6	8	8		16
65		- - - Stiff			16		6	7	8		15
					17		5	9	30		39

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS: 10 20 30 60 80

S&ME BORING LOG \ 1463-16-046 SPT.GPJ \ LIBRARY 2011_06_28.GDT \ 11/20/19

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PROJECT: **RU Corman Bridge Replacement over Crabtree Swamp**
Conway, South Carolina
S&ME Project No. 1463-19-046

BORING LOG B-2

DATE DRILLED: **10/18/19**	ELEVATION:	NOTES: **Located 30' from bridge and 23' from front face of timber abutment. Elevation unknown.**
DRILL RIG: **Track**	BORING DEPTH: **120.0 ft**	
DRILLER: **G. Eister**	WATER LEVEL: **1.5' ATD, 2.3' 24 hr**	
HAMMER TYPE: **Automatic**	LOGGED BY: **K. Fugate**	
SAMPLING METHOD: **Fixed Head Sample, Split spoon**		STATIONING: / OFFSET:
DRILLING METHOD: **Mud Rotary**		

DEPTH (feet)	MATERIAL DESCRIPTION	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
75	PEE DEE FORMATION - SANDY SILT (ML) - Mostly low to medium plasticity fines, some fine to medium sand, gray, saturated, stiff to hard. *(continued)*	18		8	9	23	32
	- - - Hard						
	PEE DEE FORMATION - SILTY CLAYEY SAND (SC-SM) - Mostly fine to medium sand, some low to medium plasticity fines, gray, saturated, dense to very dense.	19		50/0			50/0
80	- - - Very dense						
		20		38	50/3		50/3
85							
		21		15	50/4		50/4
90							
	PEE DEE FORMATION - CLAYEY SAND (SC) - Mostly fine to medium sand, some low to medium plasticity fines, gray, medium dense.	22		11	9	12	21
95							
		23		11	12	13	25
100							
		24		5	6	6	12

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS
10 20 30 60 80

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PROJECT: **RU Corman Bridge Replacement over Crabtree Swamp**
Conway, South Carolina
S&ME Project No. 1463-19-046

BORING LOG B-2

DATE DRILLED: **10/18/19**	ELEVATION:	NOTES: **Located 30' from bridge and 23' from front face of timber abutment. Elevation unknown.**
DRILL RIG: **Track**	BORING DEPTH: **120.0 ft**	
DRILLER: **G. Eister**	WATER LEVEL: **1.5' ATD, 2.3' 24 hr**	
HAMMER TYPE: **Automatic**	LOGGED BY: **K. Fugate**	
SAMPLING METHOD: **Fixed Head Sample, Split spoon**	STATIONING:	OFFSET:
DRILLING METHOD: **Mud Rotary**		

DEPTH (feet)	MATERIAL DESCRIPTION	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
	PEE DEE FORMATION - CLAYEY SAND (SC) - Mostly fine to medium sand, some low to medium plasticity fines, gray, medium dense. *(continued)*						
110	PEE DEE FORMATION - SILTY SAND (SM) - Mostly fine to medium sand, some low to medium plasticity fines, gray, medium dense to very dense.	25		7	6	6	12
115	- - - Very dense	26		8	38	50/2	50/2
120	PEE DEE FORMATION - CLAYEY SAND (SC) - Mostly fine to medium sand, some low to medium plasticity fines, gray, medium dense.	27		38	14	16	30
	Boring terminated at 120 ft						

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS
10 20 30 60 80

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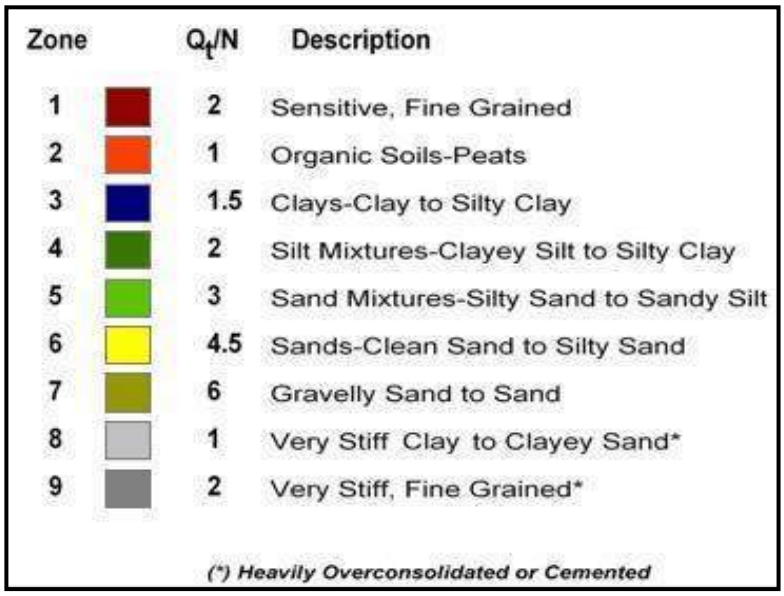
4. *WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.*

CPT Soil Classification Legend



Robertson's Soil Behavior Type (SBT), 1990			
Group #	**Description**	**Ic**	
		Min	**Max**
1	Sensitive, fine grained	N/A	
2	Organic soils - peats	3.60	N/A
3	Clays - silty clay to clay	2.95	3.60
4	Silt mixtures - clayey silt to silty clay	2.60	2.95
5	Sand mixtures - silty sand to sandy silt	2.05	2.60
6	Sands - clean sand to silty sand	1.31	2.05
7	Gravelly sand to dense sand	N/A	1.31
8	Very stiff sand to clayey sand (High OCR or cemented)	N/A	
9	Very stiff, fine grained (High OCR or cemented)	N/A	

Soil behavior type is based on empirical data and may not be representative of soil classification based on plasticity and grain size distribution.

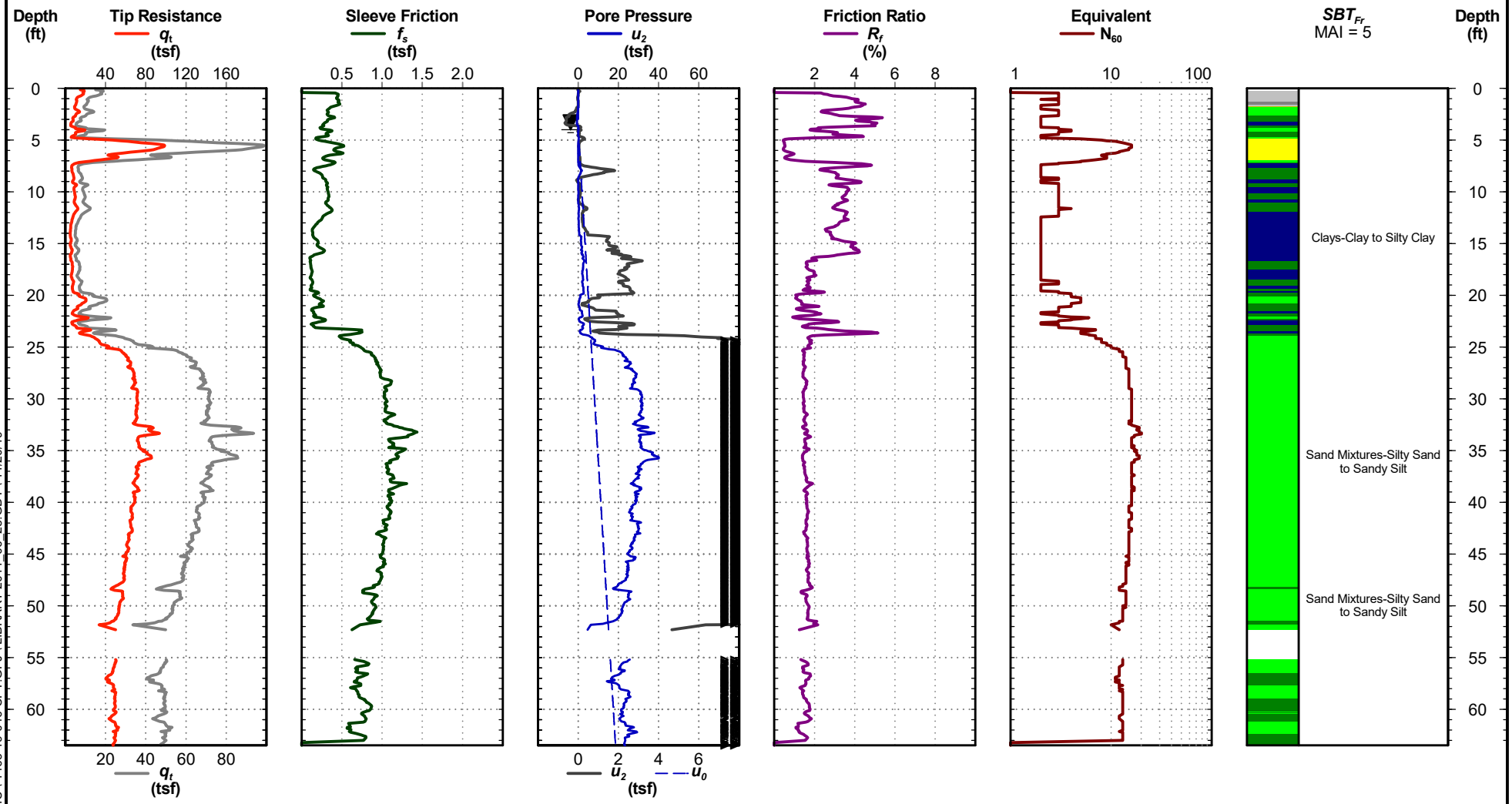
Relative Density and Consistency Table			
SANDS		SILTS and CLAYS	
Cone Tip Stress, qt (tsf)	Relative Density	Cone Tip Stress, qt (tsf)	Consistency
Less than 20	Very Loose	Less than 5	Very Soft
20 - 40	Loose	5 - 15	Soft to Firm
40 - 120	Medium Dense	15 - 30	Stiff
120 - 200	Dense	30 - 60	Very Stiff
Greater than 200	Very Dense	Greater than 60	Hard

RJ Corman Bridge Replacement over Crabtree Swamp
Conway, South Carolina
S&ME Project No: 1463-19-046

Sounding ID: B-1

Date: Oct. 9, 2019
Estimated Water Depth: 4 ft
Rig/Operator: Track / T. Chew

Total Depth: 63.5 ft
Termination Criteria: Maximum Reaction Force
Cone Size: 1.75



Cone Penetration Test

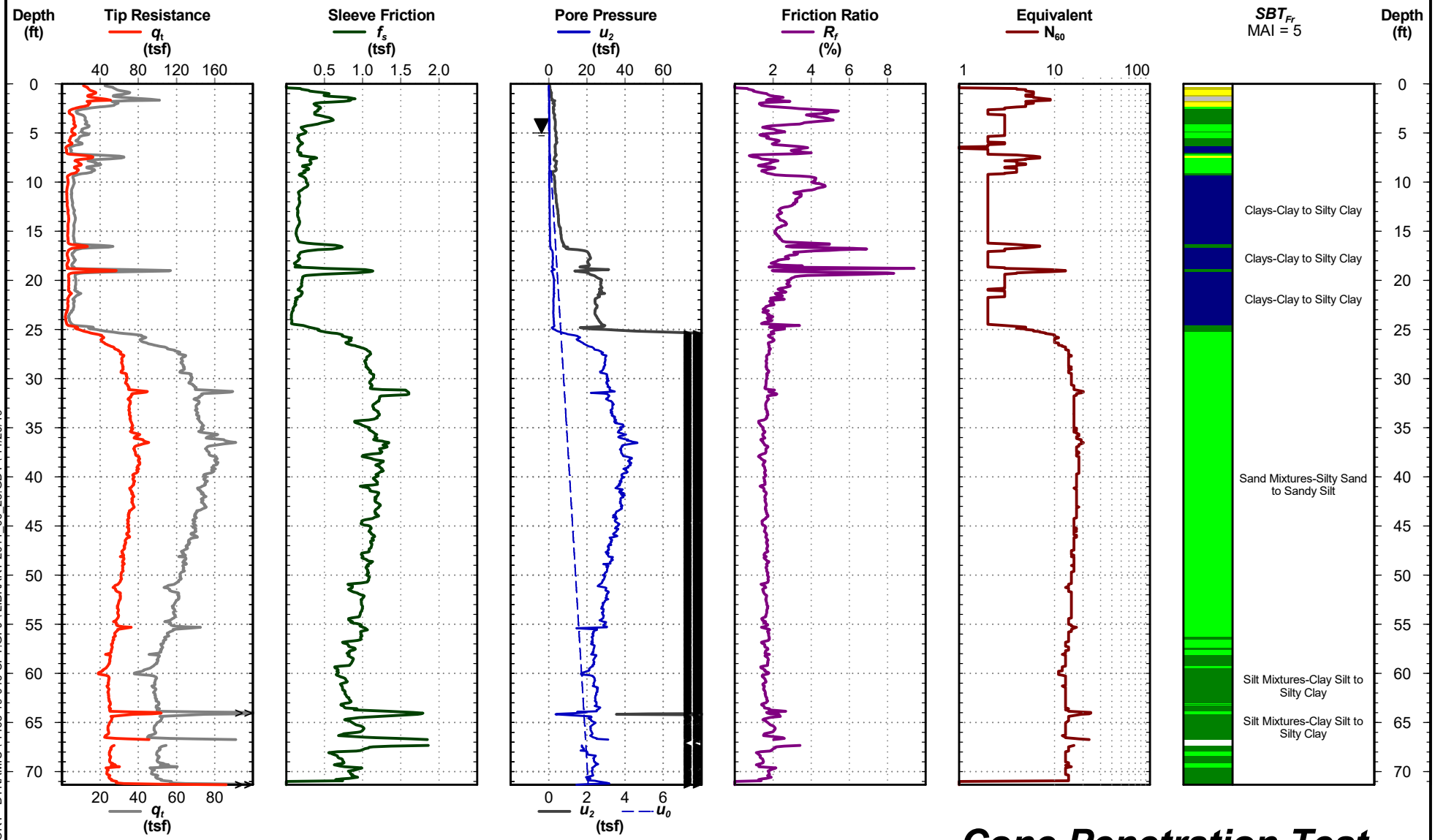
Electronic Filename: B-1(001)_PD.DAT

RJ Corman Bridge Replacement over Crabtree Swamp
Conway, South Carolina
S&ME Project No: 1463-19-046

Sounding ID: B-2

Date: Oct. 9, 2019
Estimated Water Depth: 5 ft
Rig/Operator: Track / T. Chew

Total Depth: 71.3 ft
Termination Criteria: Maximum Reaction Force
Cone Size: 1.75



Cone Penetration Test

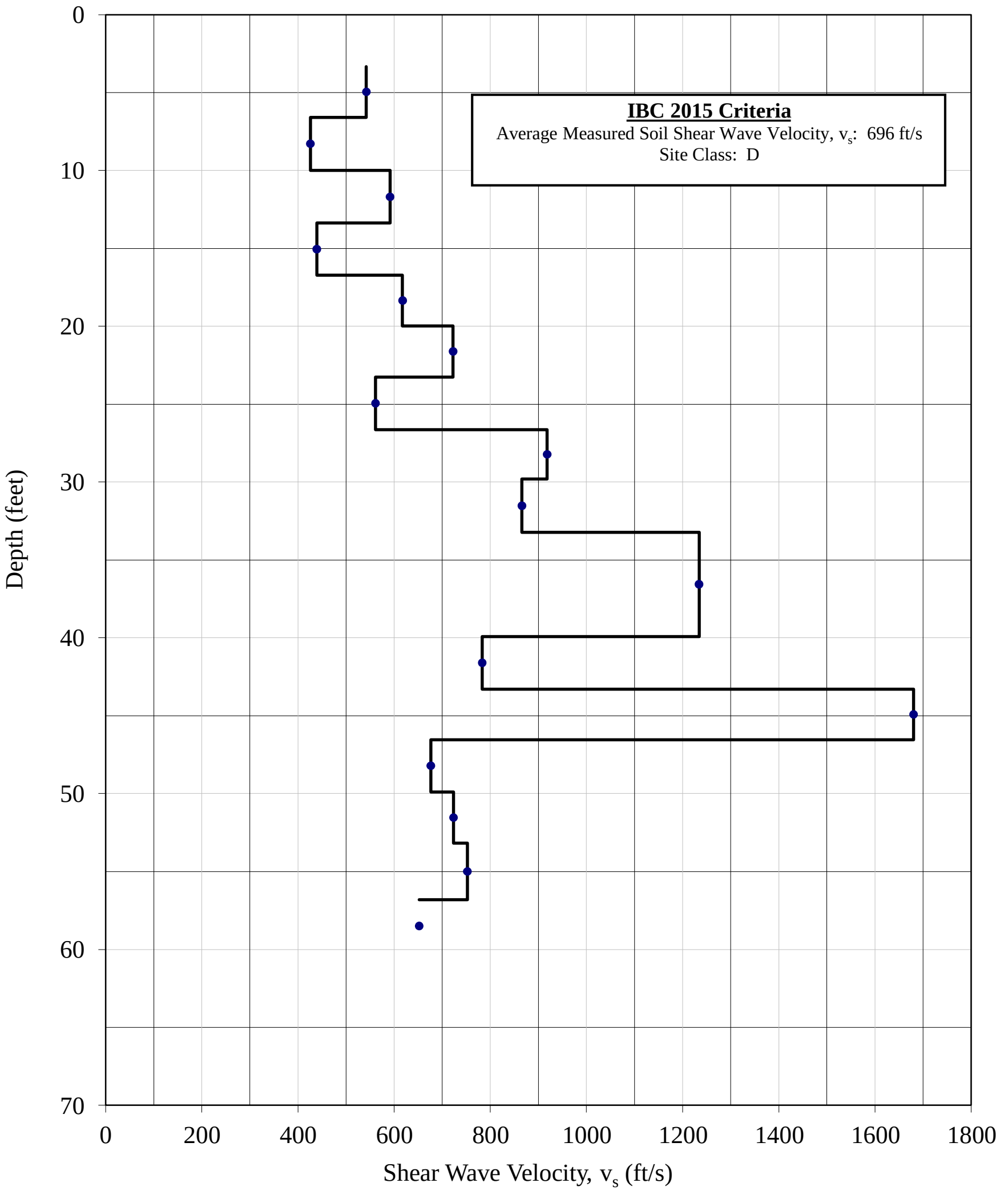
Electronic Filename: B-2(003)_PD.DAT

Shear Wave Velocity Calculations

RJ Corman Bridge Replacement over Crabtree Swamp
Conway, South Carolina

Sounding ID: **B-1**
Date: 10/10/09

Project Number: **1463-19-046**



* Site Class based on 2015 International Building Code - *Table 1613.5.2 - SITE CLASS DEFINITIONS*

♦ Summary of Laboratory Procedures

Examination of Recovered Soil Samples

Soil and field records were reviewed in the laboratory by the geotechnical professional. Soils were classified in general accordance with the visual-manual method described in ASTM D 2488, "*Standard Practice for Description and Identification of Soils (Visual-Manual Method)*". Representative soil samples were selected for classification testing to provide grain size and plasticity data to allow classification of the samples in general accordance with the Unified Soil Classification System method described in ASTM D 2487, "*Standard Practice for Classification of Soils for Engineering Purposes*". The geotechnical professional also prepared the final boring and sounding records enclosed with this report.

Moisture Content Testing of Soil Samples by Oven Drying

Moisture content was determined in general conformance with the methods outlined in ASTM D 2216, "*Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil or Rock by Mass*." This method is limited in scope to Group B, C, or D samples of earth materials which do not contain appreciable amounts of organic material, soluble solids such as salt or reactive solids such as cement. This method is also limited to samples which do not contain contamination.

A representative portion of the soil was divided from the sample using one of the methods described in Section 9 of ASTM D 2216. The split portion was then placed in a drying oven and heated to approximately 110 degrees C overnight or until a constant mass was achieved after repetitive weighing. The moisture content of the soil was then computed as the mass of water removed from the sample by drying, divided by the mass of the sample dry, times 100 percent. No attempt was made to exclude any particular particle size from the portion split from the sample.

Liquid and Plastic Limits Testing

Atterberg limits of the soils was determined generally following the methods described by ASTM D 4318, "*Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.*" Albert Atterberg originally defined "limits of consistency" of fine-grained soils in terms of their relative ease of deformation at various moisture contents. In current engineering usage, the *liquid lim*it of a soil is defined as the moisture content, in percent, marking the upper limit of viscous flow and the boundary with a semi-liquid state. The *plastic limit* defines the lower limit of plastic behavior, above which a soil behaves plastically below which it retains its shape upon drying. The *plasticity index* (PI) is the range of water content over which a soil behaves plastically. Numerically, the PI is the difference between liquid limit and plastic limit values.

Representative portions of fine-grained Group A, B, C, or D samples were prepared using the wet method described in Section 10.1 of ASTM D 4318. The liquid limit of each sample was determined using the multipoint method (Method A) described in Section 11. The liquid limit is by definition the moisture content where 25 drops of a hand operated liquid limit device are required to close a standard width groove cut in a soil sample placed in the device. After each test, the moisture content of the sample was adjusted and the sample replaced in the device. The test was repeated to provide a minimum of three widely spaced combinations of N versus moisture content. When plotted on semilog paper, the liquid limit moisture content was determined by straight line interpolation between the data points at N equals 25 blows.

The plastic limit was determined using the procedure described in Section 17 of ASTM D 4318. A selected portion of the soil used in the liquid limit test was kneaded and rolled by hand until it could no longer be rolled to a 3.2 mm thread on a glass plate. This procedure was repeated until at least 6 grams of material was accumulated, at which point the moisture content was determined using the methods described in ASTM D 2216.

Grain Size Analysis of Samples

The distribution of particle sizes greater than 75 mm was determined in general accordance with the procedures described by ASTM D 421, "*Standard Practice for Dry Preparation of Soil Samples for Particle-Size Analysis and Determination of Soil Constants", and D 422, "Standard Test Method for Particle Size Analysis of Soils*." During preparation samples were divided into two portions. The material coarser than the No. 30 U.S. sieve size fraction was dry sieved through a nest of standard sieves as described in Article 6. Material passing the No. 30 sieve was independently passed through a nest of sieves down to the No. 200 size.

Percent Fines Determination of Samples

A selected specimen of soils was washed over a No. 200 sieve after being thoroughly mixed and dried. This test was conducted in general accordance with ASTM D 1140, "*Standard Test Method for Amount of Material Finer Than the No. 200 Sieve*." Method A, using water to wash the sample through the sieve without soaking the sample for a prescribed period of time, was used and the percentage by weight of material washing through the sieve was deemed the "percent fines" or percent clay and silt fraction.

Grain Size Analysis of Samples with Hydrometer

The distribution of particle sizes was determined in general accordance with the procedures described by ASTM D 421, "*Standard Practice for Dry Preparation of Soil Samples for Particle-Size Analysis and Determination of Soil Constants", and D 422, "Standard Test Method for Particle Size Analysis of Soils."* During preparation samples were divided into two portions. The material coarser than the No. 10 U.S. sieve size fraction was dry sieved through a nest of standard sieves as described in Article 6. Material passing the No. 10 sieve was soaked in demineralized water and a dispersing agent, then the soil-water slurry placed in a glass sedimentation chamber and the specific gravity of the slurry recorded at various time intervals. The grain size distribution was calculated from the time rate of sedimentation of the various size particles. After the final hydrometer reading was obtained, the suspension was washed through the No. 200 sieve. The remaining material retained on the No. 200 sieve was oven dried, and then passed through a standard nest of sieves.

Unconfined Compressive Strength Tests of Undisturbed Cohesive Samples

The unconfined compressive strength of relatively undisturbed cohesive soils was determined generally following the procedures described by ASTM D 2166, "*Standard Test Method for Unconfined Compressive Strength of Cohesive Soil*." Relatively undisturbed Group C samples of cohesive soils were extruded from the sampler and examined as described above. Representative portions of each sample were split from the extruded material and prepared using the procedures described in Section 6.2 of ASTM D 2166. The ends of the specimen were carved by hand and trimmed as necessary to provide a surface perpendicular to the specimen's long axis, but the ends were not capped.

The prepared sample was placed in a compressive testing machine and the specimen compressed in the platen at a rate of 1 to 2 percent strain per minute. Deformation and loading of the sample were recorded at regular

intervals until the load values began to decrease with increasing axial strain, or a total strain of 15 percent of the original sample length was attained. Sample stress was corrected at each load increment for the change in cross sectional area produced by deformation of the sample using the formula in sections 8.2 and 8.3 of ASTM D 2166.

Form No. TR-D4318-T89-90
Revision No. 1
Revision Date: 7/26/17

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX

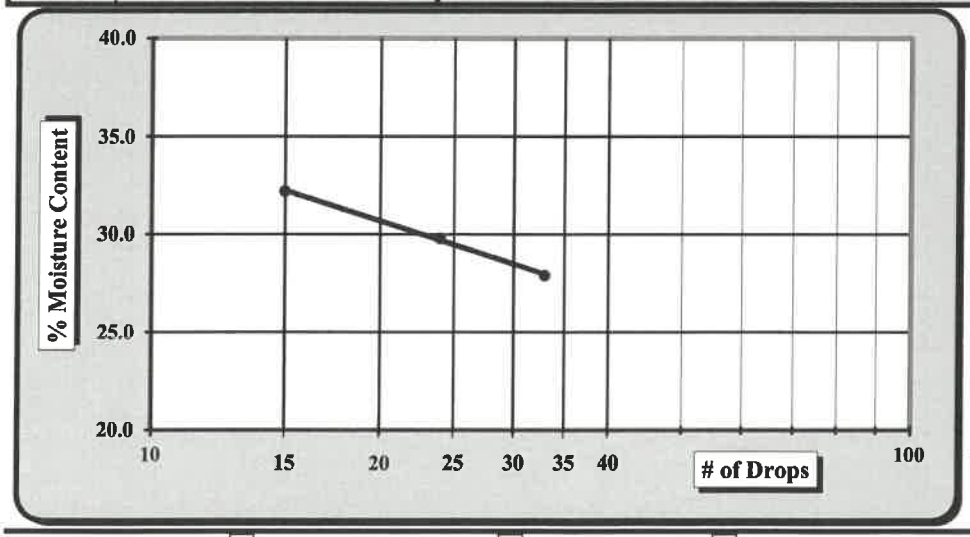
ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐

S&ME, Inc. - Myrtle Beach: 1330 Highway 501 Business, Conway, SC 29526

Project #:	1463-19-046	Report Date:	11/7/2019
Project Name:	RJ Corman Railroad Bridge	Test Date(s)	11/4/2019
Client Name:	HDR Engineering, Carolinas		
Client Address:	555 Fayetteville St, Ste 900; Raleigh, NC 27601		
Boring #:	B-1	Sample #: S-7	Sample Date: 10/16-18/2019
Location:	Borings	LAB #: 6033	Depth: 18.5'-20'
Sample Description:	Gray Clayey Sand (SC)		

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	00401	2/28/2019	Grooving tool	11368	9/1/2018
LL Apparatus	18801	9/1/2018			
Oven	17745	4/8/2019			

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	44	35	19				80	83	
A	Tare Weight	14.89	14.96	14.83				14.76	14.55	
B	Wet Soil Weight + A	26.86	27.12	27.22				17.03	17.22	
C	Dry Soil Weight + A	24.25	24.33	24.20				16.64	16.76	
D	Water Weight (B-C)	2.61	2.79	3.02				0.39	0.46	
E	Dry Soil Weight (C-A)	9.36	9.37	9.37				1.88	2.21	
F	% Moisture (D/E)*100	27.9%	29.8%	32.2%				20.7%	20.8%	
N	# OF DROPS	33	24	15				*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	*Average*							**20.8%**		



One Point Liquid Limit			
N	**Factor**	**N**	**Factor**
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐

Liquid Limit	**30**
Plastic Limit	**21**
Plastic Index	**9**
Group Symbol	**SC**

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

W. King, P.E.	WK	Project Engineer	11/13/19
Technical Responsibility	*Signature*	*Position*	*Date*

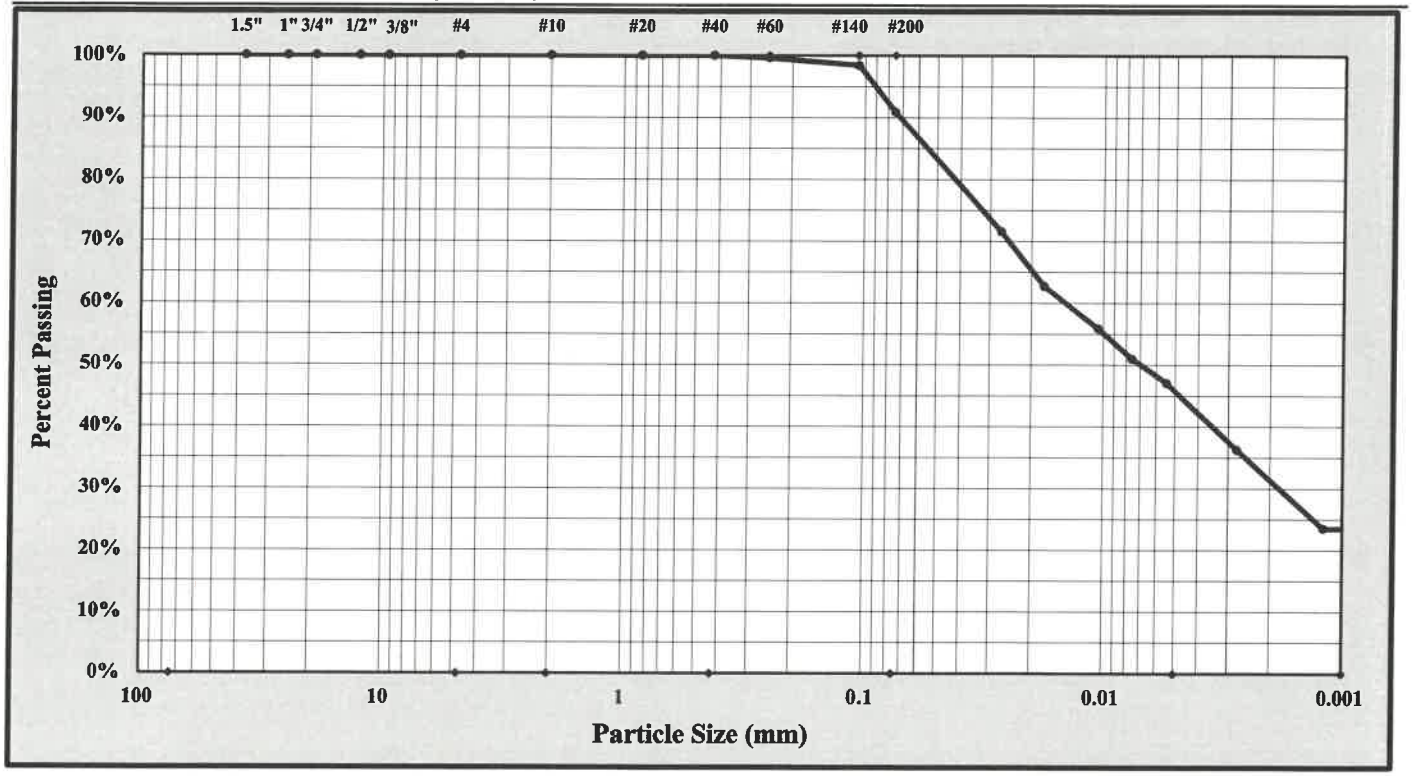
Form No. TR-D422-3
Revision No. 2
Revision Date: 08/29/17

PARTICLE SIZE ANALYSIS OF SOIL

ASTM D422

S&ME, Inc. - Myrtle Beach: 1330 Highway 501 Business, Conway, SC 29526

S&ME Project #:	1463-19-046	Report Date:	11/7/2019
Project Name:	RJ Corman Railroad Bridge	Test Date(s):	11/6/2019
Client Name:	HDR Engineering, Carolinas		
Address:	555 Fayetteville St, Ste 900; Raleigh, NC 27601		
Boring #:	B-1 Sample #: S-9	Sample Date:	10/16-18/2019
Location:	Borings LAB #: 6033	Depth:	28.5'-30'
Sample Description:	Gray Fat Clay (CH)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	#4	Gravel:	0.0%	Silt	43.9%
Silt & Clay (% Passing #200):	90.9%	Total Sand:	9.1%	Clay	**47.0%**
Apparent Relative Density	2.624	Moisture Content	--	Colloids	**23.5%**
Liquid Limit	64	Plastic Limit	24	Plastic Index	40
Coarse Sand:	0.0%	Medium Sand:	0.0%	Fine Sand:	9.1%

Description of Sand and Gravel	Rounded ☒	Angular ☐	Hard & Durable ☒	Soft ☐	Weathered & Friable ☒		
Apparatus B: Air Jet Dispersion	Dispersion Period:	1 min.	Dispersing Agent:	Sodium Hexametaphosphate:	40 g./ Liter		

References / Comments / Deviations: AASTM D 4318, D 854, D 2487

W. King, P.E.	WK	Project Engineer	11/13/19
Technicol Responsibility	*Signature*	*Position*	*Date*

Form No. TR-D422-2
Revision No. 2
Revision Date: 08/29/17

PARTICLE SIZE ANALYSIS OF SOIL

ASTM D 422

S&ME, Inc. - Myrtle Beach: 1330 Highway 501 Business, Conway, SC 29526

Project #:	1463-19-046			Report Date:	11/7/2019
Project Name:	RJ Corman Railroad Bridge			Test Date(s):	11/6/2019
Client Name:	HDR Engineering, Carolinas			Address:	555 Fayetteville St, Ste 900; Raleigh, NC 27601
Boring #:	B-1	Sample #:	S-9	Sample Date:	10/16-18/2019
Location:	Borings	LAB #:	6033	Depth:	28.5'-30'
Sample Description:	Gray Fat Clay (CH)				

	Beaker #:	AA		**Apparent Relative Density**		**2.624**
	Tare #:	Black				
Pan Tare Weight (grams):		84.33		**Moisture Content**	Hygroscopic	Natural
Total Sample Air Dried Wt. + tare wt. (grams):		150.21		Tare #	69	
Weight of Total Sample Air Dried:		65.88	A	Tare Wt.	14.71	
Weight of Air Dried Hydrometer Sample (g):		51.70	B	Wet Wt. + A	28.85	
Total Sample Oven Dried:		65.65	C	Dry Wt. + A	28.80	
Hydrometer Sample Oven Dried (**W**):		51.52	D	Water Wt. (B-C)	0.05	
% Passing #10:		100.0%	E	Dry Wt. (C-A)	14.09	
Correction Factor a (Table 1):		1.01		% Moisture (100 x D/E)	0.35%	

Sieve	Retained Wt.	Percent Passing	
3.0"	0.0	Pan # (washed)	100.0%
1.5"	0.0		100.0%
1.0"	0.0		100.0%
3/4"	0.0	EEE	100.0%
1/2"	0.0		100.0%
3/8"	0.0	Soil Mortar	100.0%
#4	0.0		100.0%
#10	0.0	**100.0%**	100.0%
#20	0.0	100.0%	100.0%
#40	0.0	100.0%	100.0%
#60	0.2	99.6%	99.6%
#100	0.8	98.4%	98.4%
#200	4.7	90.9%	90.9%

Description of Sand & Gravel Particles: Rounded ☒ Angular ☐ Hard & Durable ☒ Soft ☐ Weathered & Friable ☒

Stirring Apparatus: A ☐ B ☒ Dispersion Time: 1 min. Sodium Hexametaphosphate: 40 g./ Liter

Balance: *ID No.* 401 *Cal. Date:* 3/5/2019 Hydrometer: *ID No.* 19616 *Cal. Date:* 9/10/2016

Control Cylinder ☒ **Composite Correction** ☐ **Type:** **151H** ☐ **152H** ☒

Time	Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
T (Min.)	(1.0 F)	Reading	Control Cylinder	Composite	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x ((L/T)$^{1/2}$
2	72.0	40.5	4.0		36.50	71.6%	71.6%	9.7	0.01227	0.02695
5	72.0	36.0	4.0		32.00	62.7%	62.7%	10.4	0.01227	0.01768
15	72.0	32.5	4.0		28.50	55.9%	55.9%	11.0	0.01227	0.01049
30	72.0	30.0	4.0		26.00	51.0%	51.0%	11.4	0.01227	0.00755
60	72.0	28.0	4.0		24.00	47.1%	47.1%	11.7	0.01227	0.00542
250	72.0	22.5	4.0		18.50	36.3%	36.3%	12.6	0.01227	0.00275
1440	72.0	16.0	4.0		12.00	23.5%	23.5%	13.7	0.01227	0.00120
2880	72.0	16.0	4.0		12.00	23.5%	23.5%	13.7	0.01227	0.00085

References / Comments / Deviations ASTM D 422, D 2487, D 4318

W. King, P.E. — *Technician Name*
WK — *Signature*
Project Engineer — *Position*
11/13/19 — *Date*

Form No. TR-D4318-T89-90
Revision No. 1
Revision Date: 7/26/17

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX

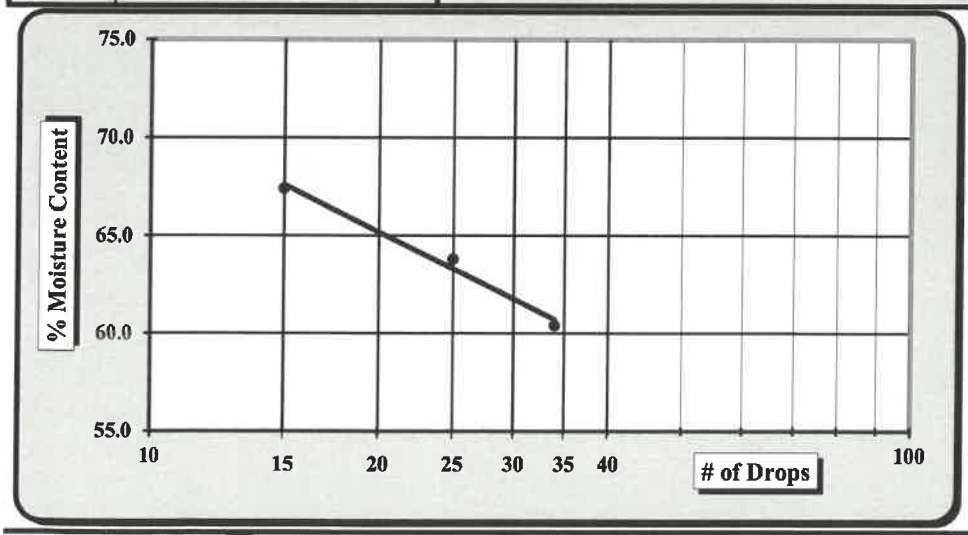
ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐

S&ME, Inc. - Myrtle Beach: 1330 Highway 501 Business, Conway, SC 29526

Project #:	1463-19-046	Report Date:	11/7/2019
Project Name:	RJ Corman Railroad Bridge	Test Date(s)	11/4/2019
Client Name:	HDR Engineering, Carolinas		
Client Address:	555 Fayetteville St, Ste 900; Raleigh, NC 27601		
Boring #:	B-1	Sample #: S-9	Sample Date: 10/16-18/2019
Location:	Borings	LAB #: 6033	Depth: 28.5'-30'
Sample Description:	Gray Fat Clay (CH)		

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	00401	2/28/2019	Grooving tool	11368	9/1/2018
LL Apparatus	18801	9/1/2018			
Oven	17745	4/8/2019			

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	88	108	96				68	29	
A	Tare Weight	14.50	14.66	14.72				14.59	14.80	
B	Wet Soil Weight + A	27.54	27.63	27.69				15.59	15.38	
C	Dry Soil Weight + A	22.63	22.58	22.47				15.40	15.27	
D	Water Weight (B-C)	4.91	5.05	5.22				0.19	0.11	
E	Dry Soil Weight (C-A)	8.13	7.92	7.75				0.81	0.47	
F	% Moisture (D/E)*100	60.4%	63.8%	67.4%				23.5%	23.4%	
N	# OF DROPS	34	25	15				*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	*Average*							**23.5%**		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐

Liquid Limit	64
Plastic Limit	24
Plastic Index	40
Group Symbol	CH

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

W. King, P.E.	WK	Project Engineer	11/13/19
Technicol Respansibility	*Signature*	*Position*	*Dote*

Form No. TR-D4318-T89-90
Revision No. 1
Revision Date: 7/26/17

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX

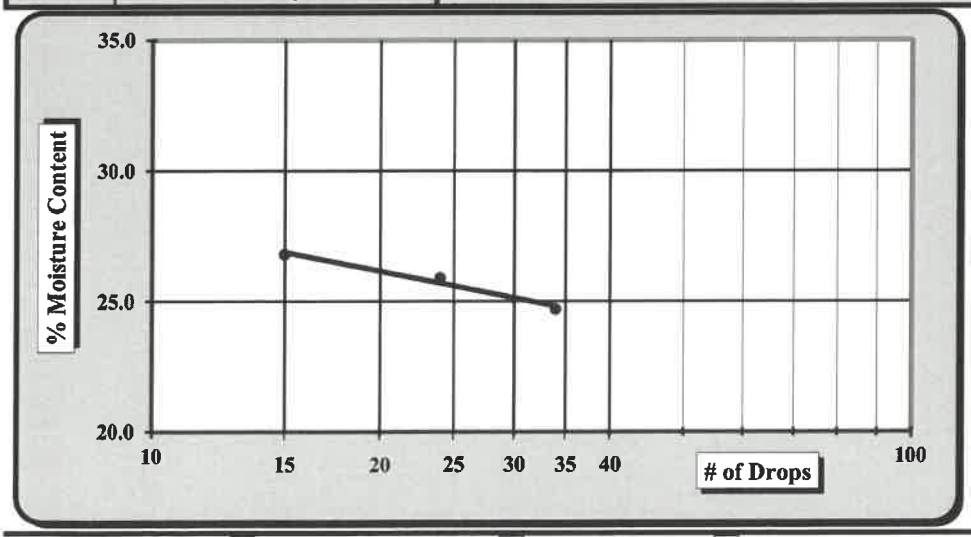
ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐

S&ME, Inc. - Myrtle Beach: 1330 Highway 501 Business, Conway, SC 29526

Project #:	1463-19-046	Report Date:	11/7/2019
Project Name:	RJ Corman Railroad Bridge	Test Date(s)	11/4/2019
Client Name:	HDR Engineering, Carolinas		
Client Address:	555 Fayetteville St, Ste 900; Raleigh, NC 27601		
Boring #:	B-1	Sample #: S-19	Sample Date: 10/16-18/2019
Location:	Borings	LAB #: 6033	Depth: 78.5'-80'
Sample Description:	Gray Silty Clayey Sand (SC-SM)		

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	00401	2/28/2019	Grooving tool	11368	9/1/2018
LL Apparatus	18801	9/1/2018			
Oven	17745	4/8/2019			

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	110	102	94				10	19	
A	Tare Weight	14.50	14.68	14.35				11.10	11.19	
B	Wet Soil Weight + A	31.20	31.38	31.42				12.37	12.39	
C	Dry Soil Weight + A	27.89	27.94	27.81				12.17	12.20	
D	Water Weight (B-C)	3.31	3.44	3.61				0.20	0.19	
E	Dry Soil Weight (C-A)	13.39	13.26	13.46				1.07	1.01	
F	% Moisture (D/E)*100	24.7%	25.9%	26.8%				18.7%	18.8%	
N	# OF DROPS	34	24	15				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**18.8%**		



One Point Liquid Limit			
N	**Factor**	**N**	**Factor**
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐

Liquid Limit	**26**
Plastic Limit	**19**
Plastic Index	**7**
Group Symbol	**CL-ML**

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

W. King, P.E. — *Technical Responsibility*
WK — *Signature*
Project Engineer — *Position*
11/13/19 — *Date*

Form No: TR-D6913-SSSS-1
Revision No. 1
Revision Date: 9/5/17

SOIL SIEVE ANALYSIS USING SINGLE SIEVE-SET SIEVING

Single Portion

ASTM D6913

S&ME, Inc. - Myrtle Beach: 1330 Highway 501 Business, Conway, SC 29526

Project No:	1463-19-046	Report Date:	11/7/2019
Project Name:	RJ Corman Railroad Bridge	**Lab #:**	6033
Client Name:	HDR Engineering, Carolinas	Test Date:	11/6/2019
Client Address:	555 Fayetteville St, Ste 900; Raleigh, NC 27601	Date Sampled:	10/16-18/2019
Boring #:	B-1	Sample#:	S-23
Location:	Borings	Depth:	98.5'-100'

Sample Description: Gray Clayey Sand (SC)

Estimate Max. Particle Size (99% Passing):		**#4**	Testing Dates:	11/6/19					
Method A (1%)	☐	Method B (0.1%)	☑	Material Excluded?	None				
Procedure for obtaining Specimen:		Moist	☑	Air-Dried	☐	Oven-Dried	☑		
Sampling Method	Stockpile:	☑	Mechanically Split:	☐		Quartered:	☐		
Dispersion Process?	Soaked without Dispersant	☐	Soaked with Dispersant	☐		Ultrasonic Bath	☐		
Estimated Wet Mass of specimen required:		200				Shaking Apparatus	☑		

Specimen:	Pan No.	**TTT**	B) Tare Wt.	**82.6**	Method B of ASTM D1140 or D6913 Sec. 11.4.3		
A) Total Specimen Wet Wt. + Tare Wt. (g.)				**177.0**	Pan No. **TTT**	Tare Wt.	**82.6**
C) Total Specimen Dry Wt. + Tare Wt. (g.)				**159.8**	Dry Mass of Washed Sample +Tare Wt.		**132.5**
D = (C-B) Total Specimen Dry Weight **(S,M_d)**				**77.2**	Dry Mass of Washed Sample **(S_wM_d)**		**49.9**
E = (A-B) Moist Specimen Mass **(S,M_m)**				**94.4**	Dry Mass passing #200		**27.3**
F=(E-D)/D) Water Content of Specimen				**22.3%**	% Passing #200		**35.4%**

Sieve Size		Cumulative Mass Retained	Increment Mass Retained	SPECS	**% Retained**	**% Passing**
					Total Sample Cumulative Percentages	
Standard	mm.	*CMR_N*	*MR_N*	*SCDOT*	*CPR_N*	*PP_N (Method A)*
1.0"	25.00	0.0	0.00		0.0%	100.0%
3/4"	19.00	0.0	0.00		0.0%	100.0%
1/2"	12.50	0.0	0.00		0.0%	100.0%
3/8"	9.50	0.0	0.00		0.0%	100.0%
#4	4.750	0.0	0.00		0.0%	100.0%
#10	2.000	0.0	0.00		0.0%	100.0%
#30	0.600	1.7	1.70		2.2%	97.8%
#40	0.425	5.7	4.00		7.4%	92.6%
#60	0.250	17.6	11.90		22.8%	77.2%
#100	0.150	40.0	22.40		51.8%	48.2%
#200	0.075	49.9	9.90		64.6%	35.4%
Pan	<0.075	49.9	0.0			

Notes/Deviations/References: $PP_N = 100\ (1-(CMR_N / S,M_d))$

W. King, P.E. — *Technical Responsibility*
WK — *Signature*
Project Engineer — *Position*
11/13/19 — *Date*

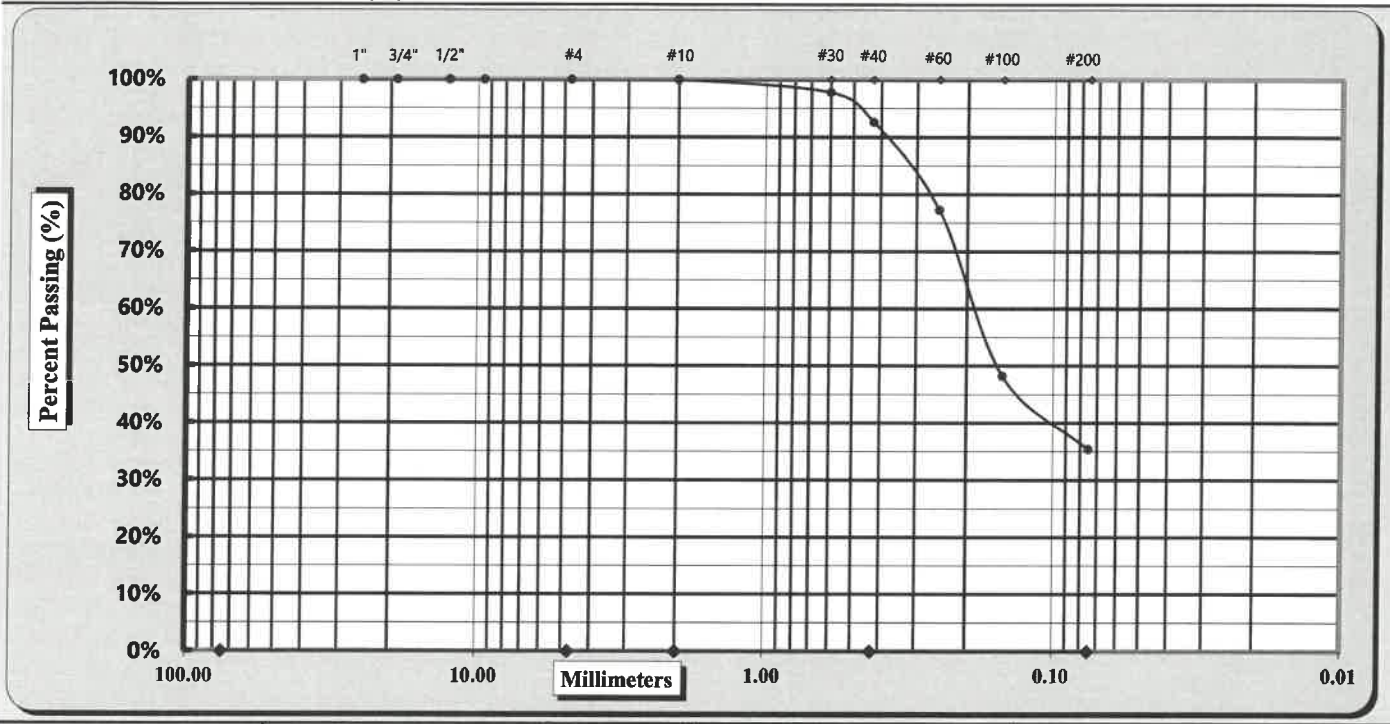
Form No TR-D6913-GR-01
Revision No. 1
Revision Date: 9/5/17

SIEVE ANALYSIS OF SOIL

Single sieve set ASTM D6913

S&ME, Inc. - Myrtle Beach: 1330 Highway 501 Business, Conway, SC 29526

Project #:	1463-19-046	Report Date:	11/7/2019
Project Name:	RJ Corman Railroad Bridge	Lab #:	6033
Client Name:	HDR Engineering, Carolinas	Test Date:	11/6/2019
Client Address:	555 Fayetteville St, Ste 900; Raleigh, NC 27601	Date Sampled:	10/16-18/2019
Boring #:	B-1	Sample #: S-23	
Location:	Borings	Depth:	98.5'-100'
Sample Description:	Gray Clayey Sand (SC)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Method: A Procedure for obtaining Specimen: Moist

Maximum Particle Size	#4	Coarse Sand	0%	Fine Sand	62%
Gravel	0%	Medium Sand	2%	Silt & Clay	35%
Liquid Limit	27	Plastic Limit	17	Plastic Index	10

Notes / Deviations / References:

W. King, P.E. — *Technical Responsibility*
WK — *Signature*
Project Engineer — *Position*
11/13/19 — *Date*

Form No. TR-D4318-T89-90
Revision No. 1
Revision Date: 7/26/17

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX

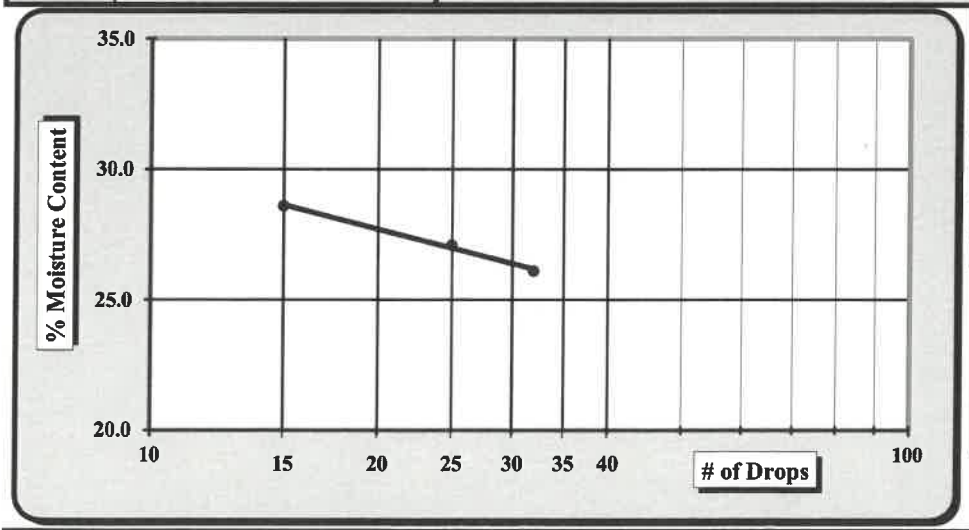
ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐

S&ME, Inc. - Myrtle Beach: 1330 Highway 501 Business, Conway, SC 29526

Project #:	1463-19-046	Report Date:	11/7/2019
Project Name:	RJ Corman Railroad Bridge	Test Date(s)	11/4/2019
Client Name:	HDR Engineering, Carolinas		
Client Address:	555 Fayetteville St, Ste 900; Raleigh, NC 27601		
Boring #:	B-1	Sample #: S-23	Sample Date: 10/16-18/2019
Location:	Borings	LAB #: 6033	Depth: 98.5'-100'
Sample Description:	Gray Clayey Sand (SC)		

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	00401	2/28/2019	Grooving tool	11368	9/1/2018
LL Apparatus	18801	9/1/2018			
Oven	17745	4/8/2019			

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	116	84	11				12	74	
A	Tare Weight	14.71	14.78	14.92				11.14	11.18	
B	Wet Soil Weight + A	28.73	28.79	28.83				11.68	11.73	
C	Dry Soil Weight + A	25.83	25.80	25.74				11.60	11.65	
D	Water Weight (B-C)	2.90	2.99	3.09				0.08	0.08	
E	Dry Soil Weight (C-A)	11.12	11.02	10.82				0.46	0.47	
F	% Moisture (D/E)*100	26.1%	27.1%	28.6%				17.4%	17.0%	
N	# OF DROPS	32	25	15				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**17.2%**		



One Point Liquid Limit			
N	**Factor**	**N**	**Factor**
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐

Liquid Limit	**27**
Plastic Limit	**17**
Plastic Index	**10**
Group Symbol	**SC**

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

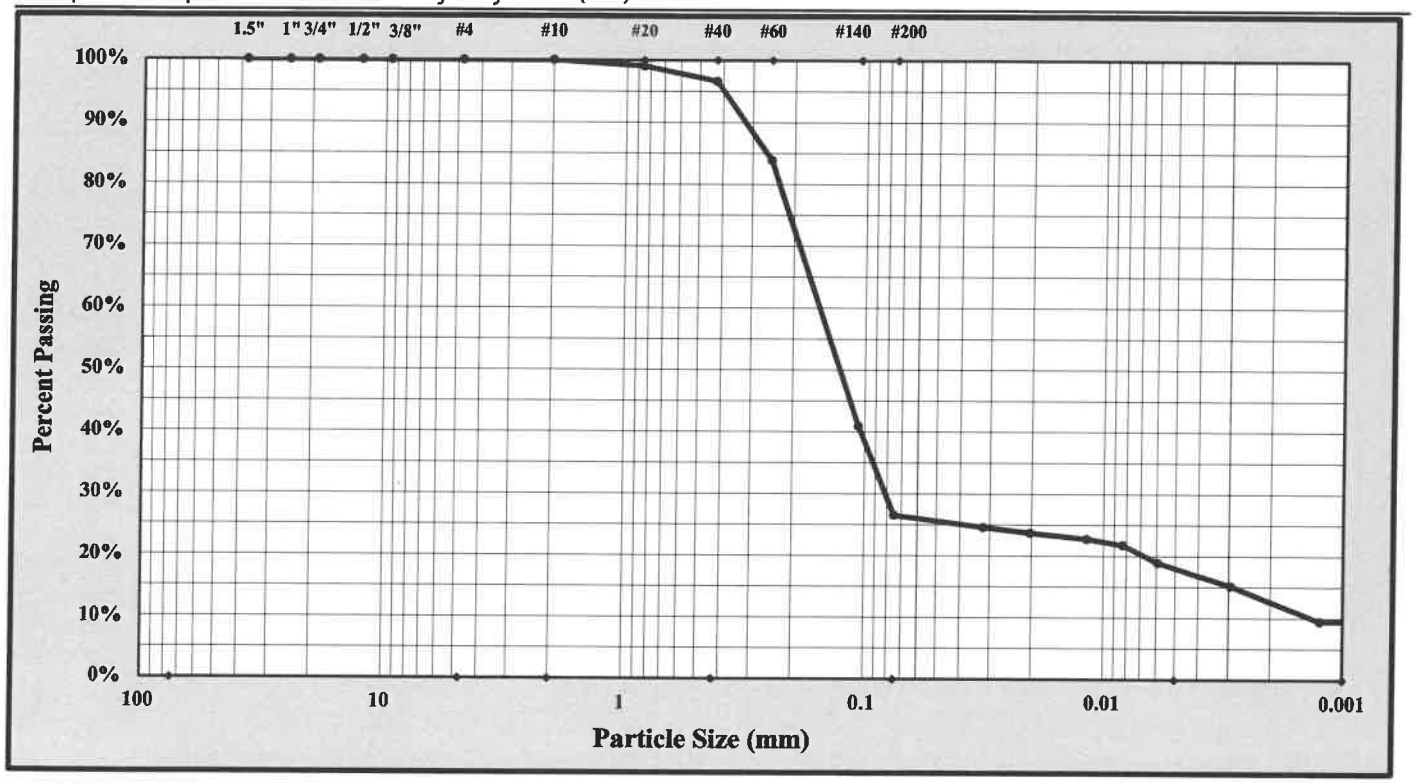
W. King, P.E. — *Technical Responsibility*
WK — *Signature*
Project Engineer — *Position*
11/13/19 — *Date*

Form No. TR-D422-3
Revision No. 2
Revision Date: 08/29/17

PARTICLE SIZE ANALYSIS OF SOIL

ASTM D422

	S&ME, Inc. - Myrtle Beach:	1330 Highway 501 Business, Conway, SC 29526			
S&ME Project #:	1463-19-046			Report Date:	11/7/2019
Project Name:	RJ Corman Railroad Bridge			Test Date(s):	11/6/2019
Client Name:	HDR Engineering, Carolinas				
Address:	555 Fayetteville St, Ste 900; Raleigh, NC 27601				
Boring #:	B-1	Sample #:	S-25	Sample Date:	10/16-18/2019
Location:	Borings	LAB #:	6033	Depth:	108.5'-110'
Sample Description:	Gray Silty Sand (SM)				



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	#4	Gravel:	0.0%	Silt	9.3%
Silt & Clay (% Passing #200):	26.5%	Total Sand:	73.5%	Clay	**17.2%**
Apparent Relative Density	2.624	Moisture Content	--	Colloids	**9.5%**
Liquid Limit	25	Plastic Limit	23	Plastic Index	2
Coarse Sand:	0.0%	Medium Sand:	3.4%	Fine Sand:	70.1%

Description of Sand and Gravel	Rounded ☒	Angular ☐	Hard & Durable ☒	Soft ☐	Weathered & Friable ☒		
Apparatus B: Air Jet Dispersion	Dispersion Period:	1 min.	Dispersing Agent:	Sodium Hexametaphosphate:	40 g./ Liter		

References / Comments / Deviations: AASTM D 4318, D 854, D 2487

W. King, P.E.	WK	Project Engineer	11/13/19
Technical Responsibility	*Signature*	*Position*	*Date*

Form No. TR-D422-2
Revision No. 2
Revision Date: 08/29/17

PARTICLE SIZE ANALYSIS OF SOIL

ASTM D 422

S&ME, Inc. - Myrtle Beach: 1330 Highway 501 Business, Conway, SC 29526

Project #:	1463-19-046			Report Date:	11/7/2019
Project Name:	RJ Corman Railroad Bridge			Test Date(s):	11/6/2019
Client Name:	HDR Engineering, Carolinas			Address:	555 Fayetteville St, Ste 900; Raleigh, NC 27601
Boring #:	B-1	Sample #:	S-25	Sample Date:	10/16-18/2019
Location:	Borings	LAB #:	6033	Depth:	108.5'-110'
Sample Description:	Gray Silty Sand (SM)				

	Beaker #:	BB		**Apparent Relative Density**		**2.624**
	Tare #:	E				
Pan Tare Weight (grams):		83.71		**Moisture Content**	Hygroscopic	Natural
Total Sample Air Dried Wt. + tare wt. (grams):		194.15		Tare #	80	
Weight of Total Sample Air Dried:		110.44	A	Tare Wt.	14.71	
Weight of Air Dried Hydrometer Sample (g):		53.47	B	Wet Wt. + A	31.34	
Total Sample Oven Dried:		110.17	C	Dry Wt. + A	31.30	
Hydrometer Sample Oven Dried (**W**):		53.34	D	Water Wt. (B-C)	0.04	
% Passing #10:		100.0%	E	Dry Wt. (C-A)	16.59	
Correction Factor a (Table 1):		1.01		% Moisture (100 x D/E)	0.24%	

Sieve	Retained Wt.	Percent Passing	
3.0"	0.0	Pan # (washed)	100.0%
1.5"	0.0		100.0%
1.0"	0.0		100.0%
3/4"	0.0	EEE	100.0%
1/2"	0.0		100.0%
3/8"	0.0	Soil Mortar	100.0%
#4	0.0		100.0%
#10	0.0	**100.0%**	100.0%
#20	0.5	99.1%	99.1%
#40	1.8	96.6%	96.6%
#60	8.6	83.9%	83.9%
#100	31.5	40.9%	40.9%
#200	39.2	26.5%	26.5%

Description of Sand & Gravel Particles: Rounded ☒ Angular ☐ Hard & Durable ☒ Soft ☐ Weathered & Friable ☒

Stirring Apparatus: A ☐ B ☒ Dispersion Time: 1 min. Sodium Hexametaphosphate: 40 g./ Liter

Balance: *ID No.* 401 *Cal. Date:* 3/5/2019 Hydrometer: *ID No.* 19616 *Cal. Date:* 9/10/2016

Control Cylinder ☒ **Composite Correction** ☐ **Type:** **151H** ☐ **152H** ☒

Time	Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
T (Min.)	(1.0 F)	Reading	Control Cylinder	Composite	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x ((L/T)$^{1/2}$
2	72.0	17.0	4.0		13.00	24.6%	24.6%	13.5	0.01227	0.03188
5	72.0	16.5	4.0		12.50	23.7%	23.7%	13.6	0.01227	0.02022
15	72.0	16.0	4.0		12.00	22.7%	22.7%	13.7	0.01227	0.01171
30	72.0	15.5	4.0		11.50	21.8%	21.8%	13.8	0.01227	0.00831
60	72.0	14.0	4.0		10.00	18.9%	18.9%	14.0	0.01227	0.00593
250	72.0	12.0	4.0		8.00	15.1%	15.1%	14.3	0.01227	0.00294
1440	72.0	9.0	4.0		5.00	9.5%	9.5%	14.8	0.01227	0.00124
2880	72.0	9.0	4.0		5.00	9.5%	9.5%	14.8	0.01227	0.00088

References / Comments / Deviations ASTM D 422, D 2487, D 4318

W. King, P.E. — *Technician Name*

WK — *Signature*

Project Engineer — *Position*

11/13/19 — *Date*

Form No. TR-D4318-T89-90
Revision No. 1
Revision Date: 7/26/17

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX

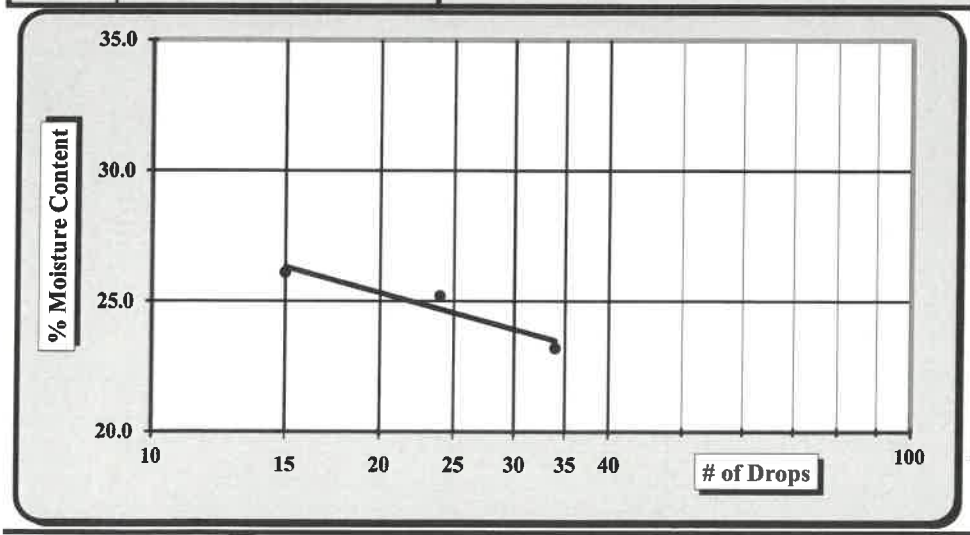
ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐

S&ME, Inc. - Myrtle Beach: 1330 Highway 501 Business, Conway, SC 29526

Project #:	1463-19-046	Report Date:	11/7/2019
Project Name:	RJ Corman Railroad Bridge	Test Date(s)	11/4/2019
Client Name:	HDR Engineering, Carolinas		
Client Address:	555 Fayetteville St, Ste 900; Raleigh, NC 27601		
Boring #:	B-1	Sample #: S-25	Sample Date: 10/16-18/2019
Location:	Borings	LAB #: 6033	Depth: 108.5'-110'
Sample Description:	Gray Silty Sand (SM)		

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	00401	2/28/2019	Grooving tool	11368	9/1/2018
LL Apparatus	18801	9/1/2018			
Oven	17745	4/8/2019			

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	63	19	16				4	8	
A	Tare Weight	10.99	10.96	10.92				11.09	11.12	
B	Wet Soil Weight + A	27.12	26.18	26.23				13.14	13.19	
C	Dry Soil Weight + A	24.08	23.12	23.06				12.76	12.80	
D	Water Weight (B-C)	3.04	3.06	3.17				0.38	0.39	
E	Dry Soil Weight (C-A)	13.09	12.16	12.14				1.67	1.68	
F	% Moisture (D/E)*100	23.2%	25.2%	26.1%				22.8%	23.2%	
N	# OF DROPS	34	24	15				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**23.0%**		



One Point Liquid Limit			
N	**Factor**	**N**	**Factor**
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐

Liquid Limit	25
Plastic Limit	23
Plastic Index	2
Group Symbol	SM

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

W. King, P.E. — *Technical Responsibility*
WK — *Signature*
Project Engineer — *Position*
11/13/19 — *Date*

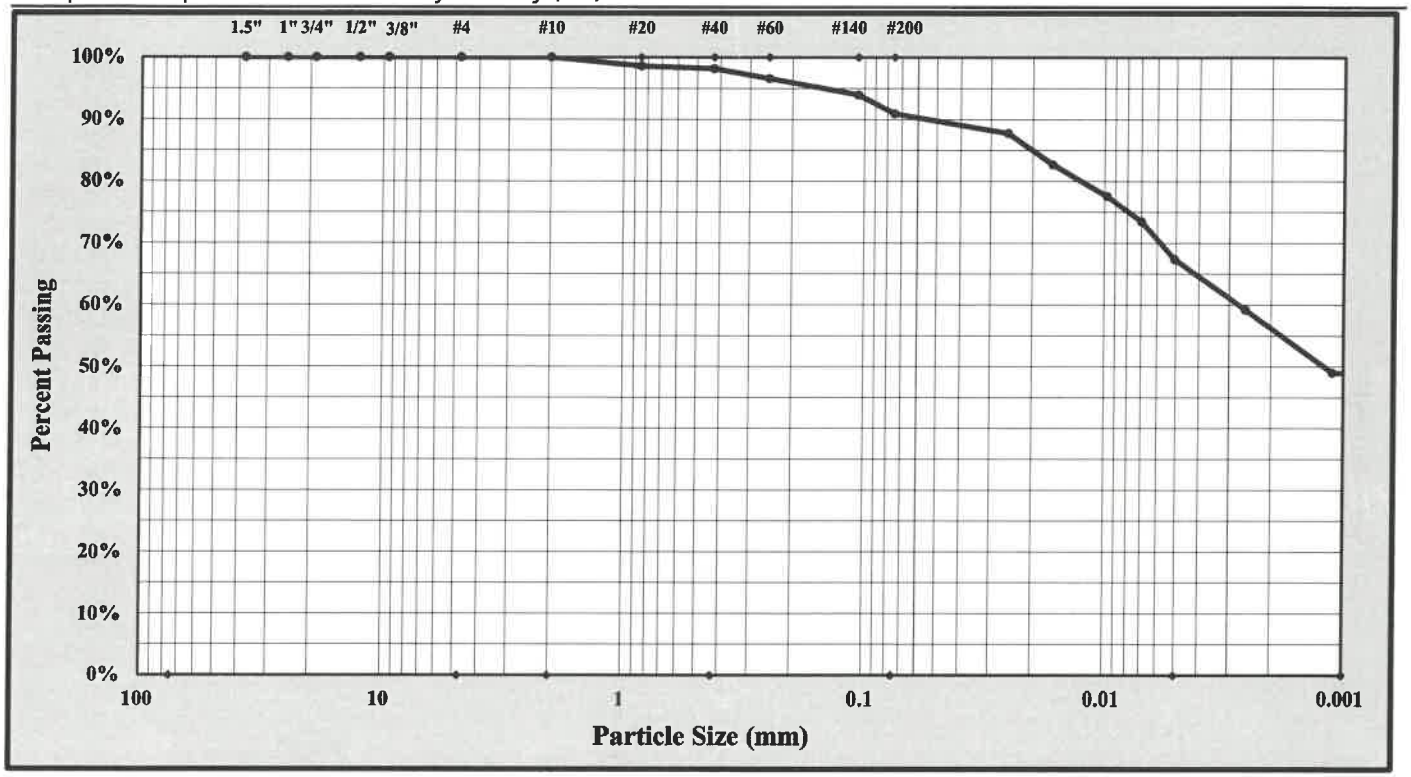
Form No. TR-D422-3
Revision No. 2
Revision Date: 08/29/17

PARTICLE SIZE ANALYSIS OF SOIL

ASTM D422

S&ME, Inc. - Myrtle Beach: 1330 Highway 501 Business, Conway, SC 29526

S&ME Project #:	1463-19-046	Report Date:	11/7/2019
Project Name:	RJ Corman Railroad Bridge	Test Date(s):	11/6/2019
Client Name:	HDR Engineering, Carolinas		
Address:	555 Fayetteville St, Ste 900; Raleigh, NC 27601		
Boring #:	B-1	Sample #: UD-1	Sample Date: 10/16-18/2019
Location:	Borings	LAB #: 6033	Depth: 10'-12'
Sample Description:	Gray Fat Clay (CH)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	#4	Gravel:	0.0%	Silt	23.6%
Silt & Clay (% Passing #200):	90.9%	Total Sand:	9.1%	Clay	**67.3%**
Apparent Relative Density	2.624	Moisture Content	--	Colloids	**49.0%**
Liquid Limit	61	Plastic Limit	25	Plastic Index	36
Coarse Sand:	0.0%	Medium Sand:	1.8%	Fine Sand:	7.3%

Description of Sand and Gravel	Rounded ☒	Angular ☐	Hard & Durable ☒	Soft ☐	Weathered & Friable ☒		
Apparatus B: Air Jet Dispersion	Dispersion Period:	1 min.	Dispersing Agent:	Sodium Hexametaphosphate:	40 g./ Liter		

References / Comments / Deviations: AASTM D 4318, D 854, D 2487

W. King, P.E.	WK	Project Engineer	11/13/19
Technical Responsibility	*Signature*	*Position*	*Date*

Form No. TR-D422-2
Revision No. 2
Revision Date: 08/29/17

PARTICLE SIZE ANALYSIS OF SOIL

ASTM D 422

S&ME, Inc. - Myrtle Beach: 1330 Highway 501 Business, Conway, SC 29526

Project #:	1463-19-046			Report Date:	11/7/2019
Project Name:	RJ Corman Railroad Bridge			Test Date(s):	11/6/2019
Client Name:	HDR Engineering, Carolinas			Address:	555 Fayetteville St, Ste 900; Raleigh, NC 27601
Boring #:	B-1	Sample #:	UD-1	Sample Date:	10/16-18/2019
Location:	Borings	LAB #:	6033	Depth:	10'-12'
Sample Description:	Gray Fat Clay (CH)				

	Beaker #:	EE		**Apparent Relative Density**		**2.624**
	Tare #:	F				
Pan Tare Weight (grams):		86.30		**Moisture Content**	Hygroscopic	Natural
Total Sample Air Dried Wt. + tare wt. (grams):		153.24		Tare #	72	
Weight of Total Sample Air Dried:		66.94	A	Tare Wt.	14.64	
Weight of Air Dried Hydrometer Sample (g):		49.72	B	Wet Wt. + A	31.86	
Total Sample Oven Dried:		66.63	C	Dry Wt. + A	31.78	
Hydrometer Sample Oven Dried (**W**):		49.49	D	Water Wt. (B-C)	0.08	
% Passing #10:		100.0%	E	Dry Wt. (C-A)	17.14	
Correction Factor a (Table 1):		1.01		% Moisture (100 x D/E)	0.47%	

Sieve	Retained Wt.	Percent Passing	
3.0"	0.0	Pan # (washed)	100.0%
1.5"	0.0		100.0%
1.0"	0.0		100.0%
3/4"	0.0	EEE	100.0%
1/2"	0.0		100.0%
3/8"	0.0	Soil Mortar	100.0%
#4	0.0		100.0%
#10	0.0	**100.0%**	100.0%
#20	0.7	98.6%	98.6%
#40	0.9	98.2%	98.2%
#60	1.7	96.6%	96.6%
#100	3.0	93.9%	93.9%
#200	4.5	90.9%	90.9%

Description of Sand & Gravel Particles: Rounded ☒ Angular ☐ Hard & Durable ☒ Soft ☐ Weathered & Friable ☒

Stirring Apparatus: A ☐ B ☒ Dispersion Time: 1 min. Sodium Hexametaphosphate: 40 g./ Liter

Balance: *ID No.* 401 *Cal. Date:* 3/5/2019 Hydrometer: *ID No.* 19616 *Cal. Date:* 9/10/2016

Control Cylinder ☒ **Composite Correction** ☐ **Type:** **151H** ☐ **152H** ☒

Time	Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
T (Min.)	(1.0 F)	Reading	Control Cylinder	Composite	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x ((L/T)$^{1/2}$
2	72.0	47.0	4.0		43.00	87.8%	87.8%	8.6	0.01227	0.02542
5	72.0	44.5	4.0		40.50	82.7%	82.7%	9.0	0.01227	0.01646
15	72.0	42.0	4.0		38.00	77.6%	77.6%	9.4	0.01227	0.00971
30	72.0	40.0	4.0		36.00	73.5%	73.5%	9.7	0.01227	0.00699
60	72.0	37.0	4.0		33.00	67.3%	67.3%	10.2	0.01227	0.00506
250	72.0	33.0	4.0		29.00	59.2%	59.2%	10.9	0.01227	0.00256
1440	72.0	28.0	4.0		24.00	49.0%	49.0%	11.7	0.01227	0.00111
2880	72.0	28.0	4.0		24.00	49.0%	49.0%	11.7	0.01227	0.00078

References / Comments / Deviations ASTM D 422, D 2487, D 4318

W. King, P.E. — *Technician Name*

WK — *Signature*

Project Engineer — *Position*

11/13/19 — *Date*

Form No. TR-D4318-T89-90
Revision No. 1
Revision Date: 7/26/17

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX

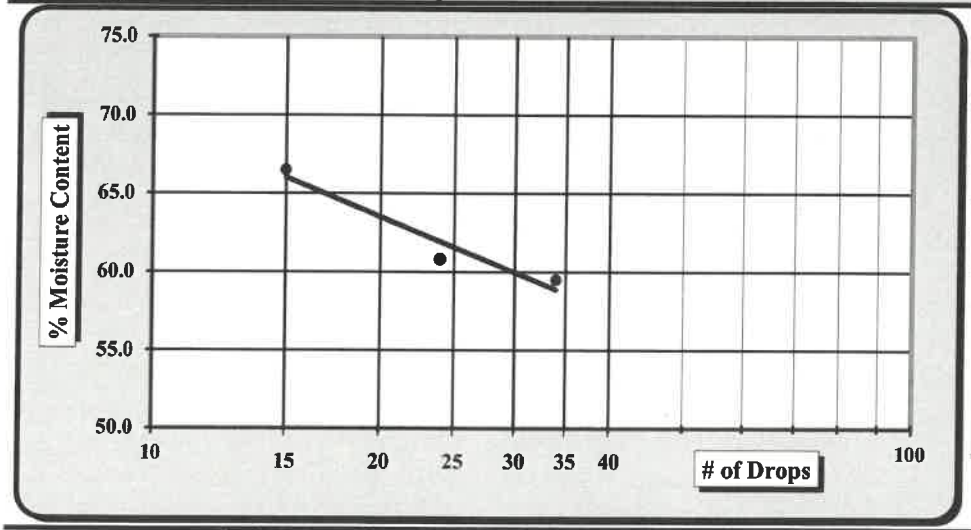
ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐

S&ME, Inc. - Myrtle Beach: 1330 Highway 501 Business, Conway, SC 29526

Project #:	1463-19-046	Report Date:	11/7/2019
Project Name:	RJ Corman Railroad Bridge	Test Date(s)	11/4/2019
Client Name:	HDR Engineering, Carolinas		
Client Address:	555 Fayetteville St, Ste 900; Raleigh, NC 27601		
Boring #:	B-1	Sample #: UD-1	Sample Date: 10/16-18/2019
Location:	Borings	LAB #: 6033	Depth: 10'-12'
Sample Description:	Gray Fat Clay (CH)		

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	00401	2/28/2019	Grooving tool	11368	9/1/2018
LL Apparatus	18801	9/1/2018			
Oven	17745	4/8/2019			

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	24	33	108				92	107	
A	Tare Weight	14.77	14.84	14.87				14.38	14.39	
B	Wet Soil Weight + A	21.55	21.69	21.78				17.33	17.39	
C	Dry Soil Weight + A	19.02	19.10	19.02				16.74	16.78	
D	Water Weight (B-C)	2.53	2.59	2.76				0.59	0.61	
E	Dry Soil Weight (C-A)	4.25	4.26	4.15				2.36	2.39	
F	% Moisture (D/E)*100	59.5%	60.8%	66.5%				25.0%	25.5%	
N	# OF DROPS	34	24	15				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**25.3%**		



One Point Liquid Limit			
N	**Factor**	**N**	**Factor**
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐

Liquid Limit	**61**
Plastic Limit	**25**
Plastic Index	**36**
Group Symbol	**CH**

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

W. King, P.E.	WK	Project Engineer	11/13/19
Technicol Responsibility	*Signature*	*Position*	*Dote*

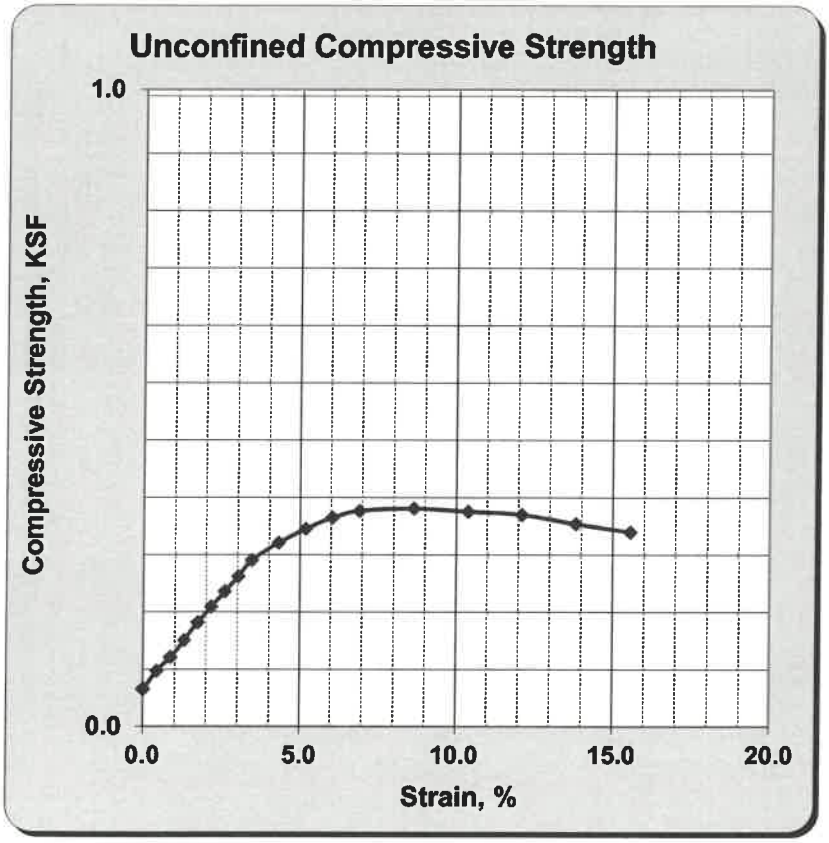
Form No. TR-D2166-01
Revision No. : 1
Revision Date: 08/16/17

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS

ASTM D2166

S&ME, Inc. - Myrtle Beach: 1330 Highway 501 Business, Conway, SC 29526

Project No.:	1463-19-046	Report Date:	11/7/2019
Project Name:	RJ Corman Railroad Bridge	Test Date(s):	11/6/2019
Client Name:	HDR Engineering, Carolinas		
Client Address:	555 Fayetteville St, Ste 900; Raleigh, NC 27601		
Boring #:	B-1 Sample #: UD-1	Sample Date:	10/16-18/2019
Location:	Borings LAB #: 6033	Depth:	10'-12'
Sample Description:	Gray Fat Clay (CH)		



Failed Specimen

Type of Sample: Intact
Source of Moisture Sample: Test Specimen

Initial Dry Unit Weight: 64.6 pcf
Initial Water Content: 56.5%
Unconfined Compressive Strength, q_u: **0.343** KSF
Undrained Shear Strength, s_u: **0.171** KSF

Liquid Limit: 25
Plasticity Index: 36
Height to Diameter Ratio: 2.0
Rate of Strain (%/min.): 0.1
Strain at Failure: 15.6

References / Comments / Deviations:

W. King, P.E.	WK	Project Engineer	11/13/19
Technical Responsibility	*Signature*	*Position*	*Date*

Form No. TR-D2166-01-C
Revision No. : 1
Revision Date: 08/16/17

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS

ASTM D2166

S&ME, Inc. - Myrtle Beach: 1330 Highway 501 Business, Conway, SC 29526

Project #:	1463-19-046	Report Date:	11/7/2019
Project Name:	RJ Corman Railroad Bridge	Test Date(s):	11/6/2019
Client Name:	HDR Engineering, Carolinas		
Client Address:	555 Fayetteville St, Ste 900; Raleigh, NC 27601		
Boring #:	B-1	Sample #: UD-1	Sample Date: 10/16-18/2019
Location:	Borings	LAB #: 6033	Depth: 10'-12'
Sample Description:	Gray Fat Clay (CH)		

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.1 gram)	19608	05/13/19	Load Cell 500 bs.	18730	9/27/19
Calipers (0.001 inches)	19601	09/29/19			
Load Frame	17750	09/29/19			

Sample Uncompressed:			*Moisture Content of Sample*			
Total Weight of Wet Sample:	981.0	g	A	Tare Weight	*320.4*	g.
Average Diameter:	2.8533	in	B	Wet Soil Weight + A	1299.5	g
Average Height:	5.7827	in	C	Dry Soil Weight + A	946.2	g
Cross Sectional Area:	6.3943	in^2	F	Moisture Content %	56.5%	

Load Data:				Stress Data:	
Deformation (in.)	Axial Strain (%)	A (in^2)	Load (lbf)	PSI	KSF
0.000	0.0	6.394	2.6	0.4	0.059
0.025	0.4	6.422	3.9	0.6	0.087
0.050	0.9	6.450	4.9	0.8	0.109
0.075	1.3	6.478	6.1	0.9	0.135
0.100	1.7	6.507	7.4	1.1	0.164
0.125	2.2	6.536	8.5	1.3	0.188
0.150	2.6	6.565	9.7	1.5	0.212
0.175	3.0	6.594	10.8	1.6	0.236
0.200	3.5	6.623	12.0	1.8	0.261
0.250	4.3	6.683	13.4	2.0	0.289
0.300	5.2	6.744	14.5	2.2	0.310
0.350	6.1	6.806	15.5	2.3	0.328
0.400	6.9	6.870	16.2	2.4	0.339
0.500	8.6	7.000	16.7	2.4	0.343
0.600	10.4	7.135	16.7	2.3	0.338
0.700	12.1	7.275	16.8	2.3	0.333
0.800	13.8	7.421	16.4	2.2	0.318
0.900	15.6	7.573	16.1	2.1	0.306
1.000	17.3	7.731	15.8	2.0	0.294

Specimen Type:	Intact	Height 1 (in.):	5.7830	Diameter 1 (in.):	2.8540
Source of Moisture Sample:	Test Specimen	Height 2 (in.):	5.7820	Diameter 2 (in.):	2.8540
Rate of strain (%/min.)	0.1	Height 3 (in.):	5.7830	Diameter 3 (in.):	2.8520

W. King, P.E.	WK	Project Engineer	11/13/19
Technician Name	*Technical Responsibility*	*Signature*	*Date*

Form No. TR-D4318-T89-90
Revision No. 1
Revision Date: 7/26/17

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX

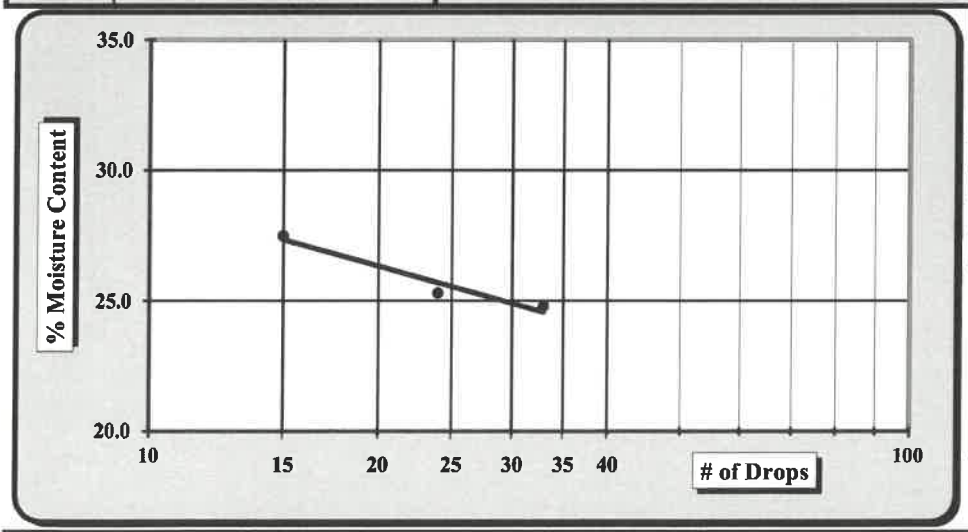
ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐

S&ME, Inc. - Myrtle Beach: 1330 Highway 501 Business, Conway, SC 29526

Project #:	1463-19-046	Report Date:	11/7/2019
Project Name:	RJ Corman Railroad Bridge	Test Date(s)	11/4/2019
Client Name:	HDR Engineering, Carolinas		
Client Address:	555 Fayetteville St, Ste 900; Raleigh, NC 27601		
Boring #:	B-2	Sample #: S-2	Sample Date: 10/16-18/2019
Location:	Borings	LAB #: 6033	Depth: 2'-4'
Sample Description:	Brown Clayey Sand (SC)		

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	00401	2/28/2019	Grooving tool	11368	9/1/2018
LL Apparatus	18801	9/1/2018			
Oven	17745	4/8/2019			

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	90	78	109				58	61	
A	Tare Weight	14.52	14.48	14.62				14.81	14.82	
B	Wet Soil Weight + A	33.87	34.09	34.22				16.99	17.03	
C	Dry Soil Weight + A	30.02	30.13	29.99				16.69	16.72	
D	Water Weight (B-C)	3.85	3.96	4.23				0.30	0.31	
E	Dry Soil Weight (C-A)	15.50	15.65	15.37				1.88	1.90	
F	% Moisture (D/E)*100	24.8%	25.3%	27.5%				16.0%	16.3%	
N	# OF DROPS	33	24	15				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**16.2%**		



One Point Liquid Limit			
N	**Factor**	**N**	**Factor**
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐

Liquid Limit	**25**
Plastic Limit	**16**
Plastic Index	**9**
Group Symbol	**SC**

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

W. King, P.E. — *Technical Responsibility*
WK — *Signature*
Project Engineer — *Position*
11/13/19 — *Date*

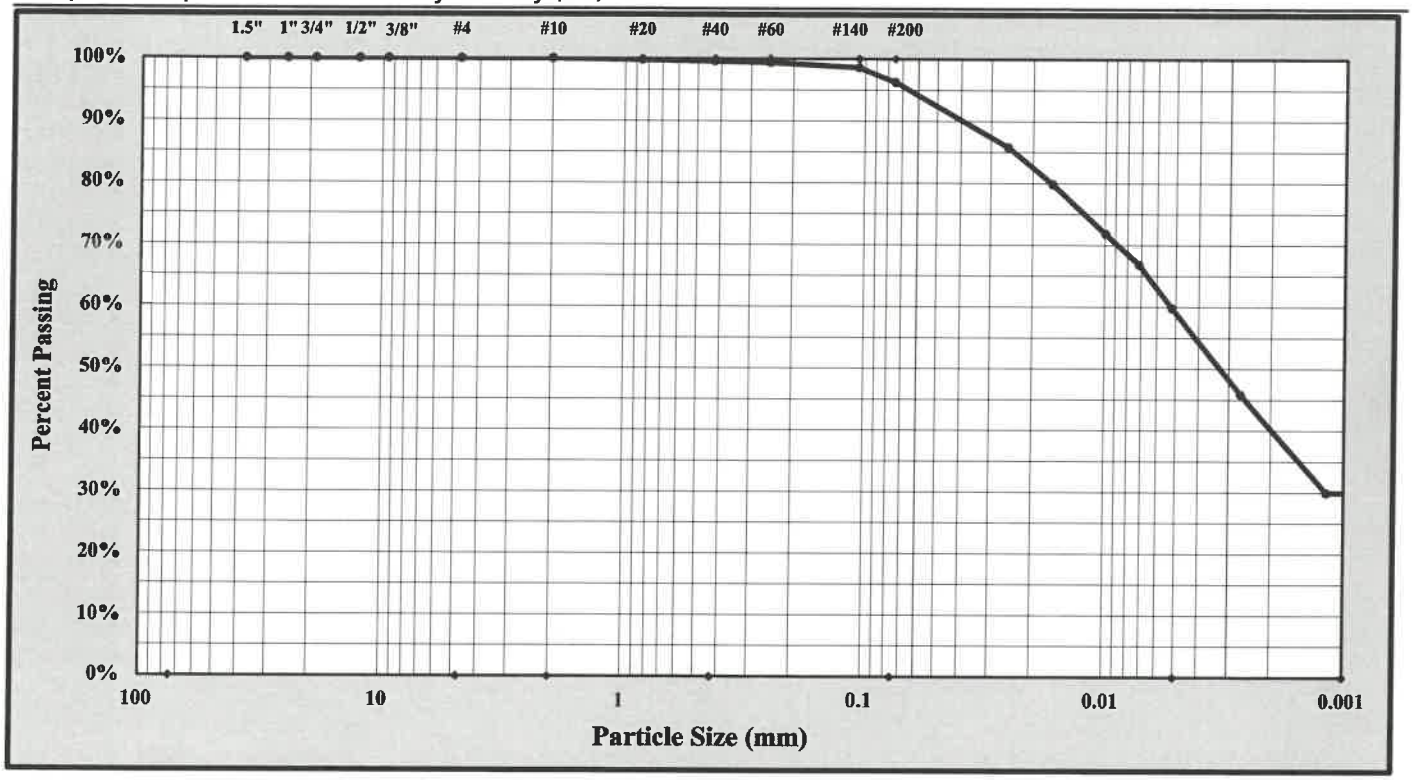
Form No. TR-D422-3
Revision No. 2
Revision Date: 08/29/17

PARTICLE SIZE ANALYSIS OF SOIL

ASTM D422

S&ME, Inc. - Myrtle Beach: 1330 Highway 501 Business, Conway, SC 29526

S&ME Project #:	1463-19-046	Report Date:	11/7/2019
Project Name:	RJ Corman Railroad Bridge	Test Date(s):	11/6/2019
Client Name:	HDR Engineering, Carolinas		
Address:	555 Fayetteville St, Ste 900; Raleigh, NC 27601		
Boring #:	B-2 Sample #: S-13	Sample Date:	10/16-18/2019
Location:	Borings LAB #: 6033	Depth:	48.5'-50'
Sample Description:	Gray Fat Clay (CH)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	#4	Gravel:	0.0%	Silt	79.0%
Silt & Clay (% Passing #200):	96.2%	Total Sand:	3.8%	Clay	**17.2%**
Apparent Relative Density	2.624	Moisture Content	--	Colloids	**60.0%**
Liquid Limit	71	Plastic Limit	30	Plastic Index	41
Coarse Sand:	0.0%	Medium Sand:	0.4%	Fine Sand:	3.4%

Description of Sand and Gravel	Rounded	☒	Angular	☐	Hard & Durable	☒	Soft	☐	Weathered & Friable ☒
Apparatus B: Air Jet Dispersion	Dispersion Period:	1 min.	Dispersing Agent:	Sodium Hexametaphosphate:	40 g./ Liter				

References / Comments / Deviations: AASTM D 4318, D 854, D 2487

W. King, P.E.	WK	Project Engineer	11/13/19
Technical Responsibility	*Signature*	*Position*	*Date*

Form No. TR-D422-2
Revision No. 2
Revision Date: 08/29/17

PARTICLE SIZE ANALYSIS OF SOIL

ASTM D 422

S&ME, Inc. - Myrtle Beach: 1330 Highway 501 Business, Conway, SC 29526

Project #:	1463-19-046			Report Date:	11/7/2019
Project Name:	RJ Corman Railroad Bridge			Test Date(s):	11/6/2019
Client Name:	HDR Engineering, Carolinas			Address:	555 Fayetteville St, Ste 900; Raleigh, NC 27601
Boring #:	B-2	Sample #:	S-13	Sample Date:	10/16-18/2019
Location:	Borings	LAB #:	6033	Depth:	48.5'-50'
Sample Description:	Gray Fat Clay (CH)				

	Beaker #:	CC		**Apparent Relative Density**		**2.624**
	Tare #:	J				
Pan Tare Weight (grams):		82.46	**Moisture Content**		Hygroscopic	Natural
Total Sample Air Dried Wt. + tare wt. (grams):		147.02		Tare #	54	
Weight of Total Sample Air Dried:		64.56	A	Tare Wt.	14.52	
Weight of Air Dried Hydrometer Sample (g):		50.76	B	Wet Wt. + A	28.29	
Total Sample Oven Dried:		64.42	C	Dry Wt. + A	28.26	
Hydrometer Sample Oven Dried (**W**):		50.65	D	Water Wt. (B-C)	0.03	
% Passing #10:		100.0%	E	Dry Wt. (C-A)	13.74	
Correction Factor a (Table 1):		1.01		% Moisture (100 x D/E)	0.22%	

Sieve	Retained Wt.	Percent Passing	
3.0"	0.0	Pan # (washed)	100.0%
1.5"	0.0		100.0%
1.0"	0.0		100.0%
3/4"	0.0	EEE	100.0%
1/2"	0.0		100.0%
3/8"	0.0	Soil Mortar	100.0%
#4	0.0		100.0%
#10	0.0	**100.0%**	100.0%
#20	0.1	99.8%	99.8%
#40	0.2	99.6%	99.6%
#60	0.3	99.4%	99.4%
#100	0.7	98.6%	98.6%
#200	1.9	96.2%	96.2%

Description of Sand & Gravel Particles: Rounded ☒ Angular ☐ Hard & Durable ☒ Soft ☐ Weathered & Friable ☒

Stirring Apparatus: A ☐ B ☒ Dispersion Time: 1 min. Sodium Hexametaphosphate: 40 g./ Liter

Balance: *ID No.* 401 *Cal. Date:* 3/5/2019 Hydrometer: *ID No.* 19616 *Cal. Date:* 9/10/2016

Control Cylinder ☒ **Composite Correction** ☐ **Type:** **151H** ☐ **152H** ☒

Time	Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
T (Min.)	(1.0 F)	Reading	Control Cylinder	Composite	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x ((L/T)$^{1/2}$
2	72.0	47.0	4.0		43.00	85.7%	85.7%	8.6	0.01227	0.02542
5	72.0	44.0	4.0		40.00	79.8%	79.8%	9.1	0.01227	0.01653
15	72.0	40.0	4.0		36.00	71.8%	71.8%	9.7	0.01227	0.00988
30	72.0	37.5	4.0		33.50	66.8%	66.8%	10.1	0.01227	0.00713
60	72.0	34.0	4.0		30.00	59.8%	59.8%	10.7	0.01227	0.00518
250	72.0	27.0	4.0		23.00	45.9%	45.9%	11.9	0.01227	0.00267
1440	72.0	19.0	4.0		15.00	29.9%	29.9%	13.2	0.01227	0.00117
2880	72.0	19.0	4.0		15.00	29.9%	29.9%	13.2	0.01227	0.00083

References / Comments / Deviations ASTM D 422, D 2487, D 4318

W. King, P.E. — *Technicion Nome*

WK — *Signature*

Project Engineer — *Position*

11/15/19 — *Date*

Form No. TR-D4318-T89-90
Revision No. 1
Revision Date: 7/26/17

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX

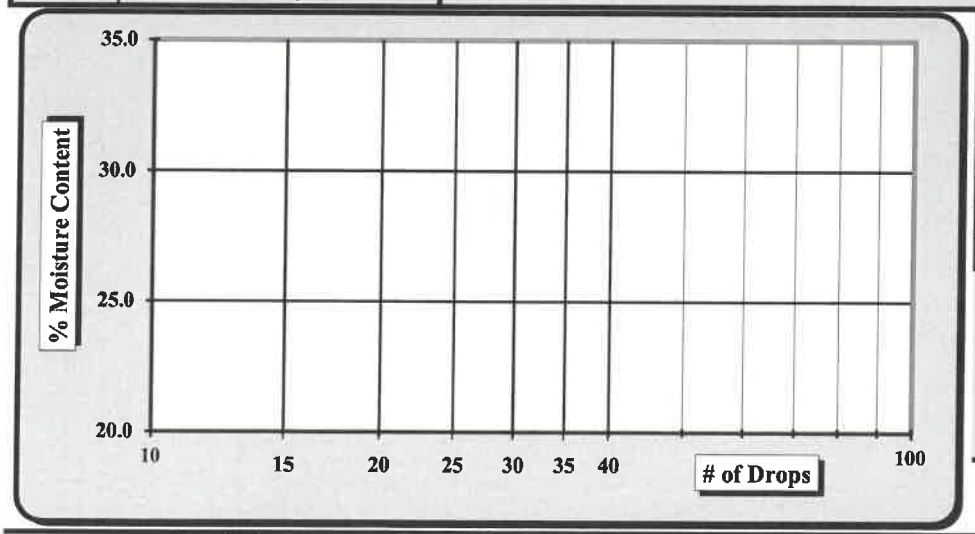
ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐

S&ME, Inc. - Myrtle Beach: 1330 Highway 501 Business, Conway, SC 29526

Project #:	1463-19-046	Report Date:	11/7/2019
Project Name:	RJ Corman Railroad Bridge	Test Date(s)	11/4/2019
Client Name:	HDR Engineering, Carolinas		
Client Address:	555 Fayetteville St, Ste 900; Raleigh, NC 27601		
Boring #: B-2	Sample #: S-13	Sample Date: 10/16-18/2019	
Location: Borings	LAB #: 6033	Depth: 48.5'-50'	
Sample Description:	Gray Fat Clay (CH)		

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	00401	2/28/2019	Grooving tool	11368	9/1/2018
LL Apparatus	18801	9/1/2018			
Oven	17745	4/8/2019			

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	96	47	94				54	74	
A	Tare Weight	14.67	14.69	14.72				14.51	14.63	
B	Wet Soil Weight + A	27.01	27.33	27.49				15.81	15.84	
C	Dry Soil Weight + A	22.18	22.08	22.00				15.51	15.56	
D	Water Weight (B-C)	4.83	5.25	5.49				0.30	0.28	
E	Dry Soil Weight (C-A)	7.51	7.39	7.28				1.00	0.93	
F	% Moisture (D/E)*100	64.3%	71.0%	75.4%				30.0%	30.1%	
N	# OF DROPS	35	24	15				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**30.1%**		



One Point Liquid Limit			
N	**Factor**	**N**	**Factor**
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐

Liquid Limit	**71**
Plastic Limit	**30**
Plastic Index	**41**
Group Symbol	**CH**

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

W. King, P.E.	WK	Project Engineer	11/13/19
Technicol Responsibility	*Signoture*	*Position*	*Dote*

Form No. TR-D4318-T89-90
Revision No. 1
Revision Date: 7/26/17

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX

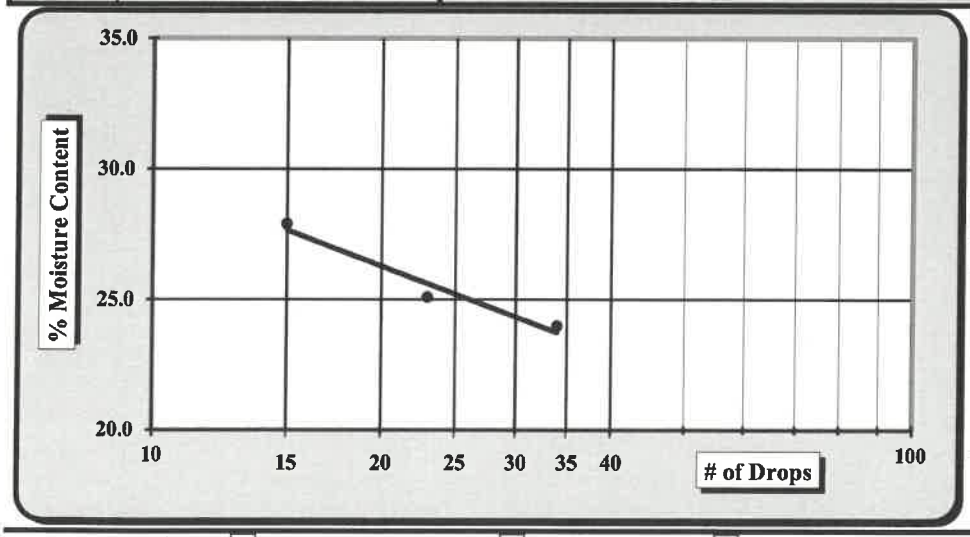
ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐

S&ME, Inc. - Myrtle Beach: 1330 Highway 501 Business, Conway, SC 29526

Project #:	1463-19-046	Report Date:	11/7/2019
Project Name:	RJ Corman Railroad Bridge	Test Date(s)	11/4/2019
Client Name:	HDR Engineering, Carolinas		
Client Address:	555 Fayetteville St, Ste 900; Raleigh, NC 27601		
Boring #:	B-2	Sample #: S-21	Sample Date: 10/16-18/2019
Location:	Borings	LAB #: 6033	Depth: 88.5'-90'
Sample Description:	Gray Silty Clayey Sand (SC-SM)		

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	00401	2/28/2019	Grooving tool	11368	9/1/2018
LL Apparatus	18801	9/1/2018			
Oven	17745	4/8/2019			

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	94	63	54				23	19	
A	Tare Weight	14.87	14.87	14.89				10.89	10.92	
B	Wet Soil Weight + A	29.24	29.44	29.52				13.21	13.19	
C	Dry Soil Weight + A	26.46	26.52	26.33				12.84	12.82	
D	Water Weight (B-C)	2.78	2.92	3.19				0.37	0.37	
E	Dry Soil Weight (C-A)	11.59	11.65	11.44				1.95	1.90	
F	% Moisture (D/E)*100	24.0%	25.1%	27.9%				19.0%	19.5%	
N	# OF DROPS	34	23	15				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**19.3%**		



One Point Liquid Limit			
N	**Factor**	**N**	**Factor**
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐

Liquid Limit	**25**
Plastic Limit	**19**
Plastic Index	**6**
Group Symbol	**SC-SM**

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

W. King, P.E.	WK	Project Engineer	11/13/19
Technical Responsibility	*Signature*	*Position*	*Date*

Form No: TR-D6913-SSSS-1
Revision No. 1
Revision Date: 9/5/17

SOIL SIEVE ANALYSIS USING SINGLE SIEVE-SET SIEVING

Single Portion ASTM D6913

S&ME, Inc. - Myrtle Beach: 1330 Highway 501 Business, Conway, SC 29526

Project No:	1463-19-046	Report Date:	11/7/2019
Project Name:	RJ Corman Railroad Bridge	**Lab #:**	6033
Client Name:	HDR Engineering, Carolinas	Test Date:	11/6/2019
Client Address:	555 Fayetteville St, Ste 900; Raleigh, NC 27601	Date Sampled:	10/16-18/2019
Boring #:	B-2	Sample#: S-25	
Location:	Borings	Depth:	108.5'-110'

Sample Description:	Gray Silty Sand (SM)							
Estimate Max. Particle Size (99% Passing):		**#4**	Testing Dates:	11/6/19				
Method A (1%)	☐	Method B (0.1%)	☑	Material Excluded?	None			
Procedure for obtaining Specimen:		Moist	☑	Air-Dried	☐	Oven-Dried	☑	
Sampling Method	Stockpile:	☑	Mechanically Split:	☐		Quartered:	☐	
Dispersion Process?	Soaked without Dispersant	☐	Soaked with Dispersant	☐		Ultrasonic Bath	☐	
Estimated Wet Mass of specimen required:		200				Shaking Apparatus	☑	

Specimen:	Pan No.	**PPP**	B) Tare Wt.	**85.1**	Method B of ASTM D1140 or D6913 Sec. 11.4.3		
A) Total Specimen Wet Wt. + Tare Wt. (g.)				**169.3**	Pan No. **PPP**	Tare Wt.	**85.1**
C) Total Specimen Dry Wt. + Tare Wt. (g.)				**153.2**	Dry Mass of Washed Sample +Tare Wt.		**139.4**
D = (C-B) Total Specimen Dry Weight **(S,M_d)**				**68.1**	Dry Mass of Washed Sample **(S_wM_d)**		**54.3**
E = (A-B) Moist Specimen Mass **(S,M_m)**				**84.2**	Dry Mass passing #200		**13.8**
F=(E-D)/D) Water Content of Specimen				**23.6%**	% Passing #200		**20.3%**

Sieve Size		Cumulative Mass Retained	Increment Mass Retained	SPECS	**% Retained**	**% Passing**
					Total Sample Cumulative Percentages	
Standard	mm.	CMR_N	MR_N	*SCDOT*	CPR_N	PP_N *(Method A)*
1.0"	25.00	0.0	0.00		0.0%	100.0%
3/4"	19.00	0.0	0.00		0.0%	100.0%
1/2"	12.50	0.0	0.00		0.0%	100.0%
3/8"	9.50	0.0	0.00		0.0%	100.0%
#4	4.750	0.0	0.00		0.0%	100.0%
#10	2.000	0.7	0.70		1.0%	99.0%
#30	0.600	2.2	1.50		3.2%	96.8%
#40	0.425	5.6	3.40		8.2%	91.8%
#60	0.250	18.5	12.90		27.2%	72.8%
#100	0.150	44.2	25.72		64.9%	35.1%
#200	0.075	54.3	10.08		79.7%	20.3%
Pan	<0.075	54.3	0.0			

Notes/Deviations/References: $PP_N = 100\ (1-(CMR_N / S,M_d))$

W. King, P.E. — *Technical Responsibility*
WK — *Signature*
Project Engineer — *Position*
11/13/19 — *Date*

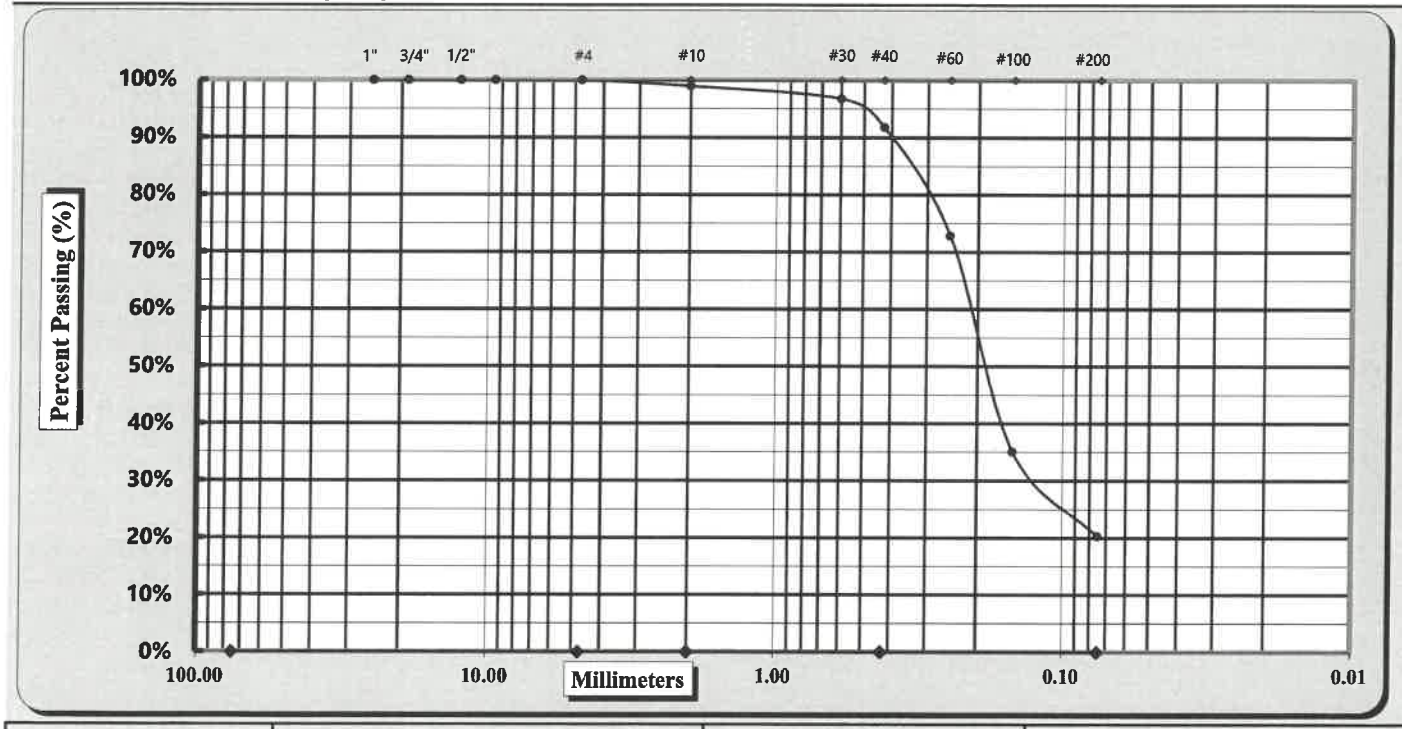
Form No TR-D6913-GR-01
Revision No. 1
Revision Date: 9/5/17

SIEVE ANALYSIS OF SOIL

Single sieve set ASTM D6913

S&ME, Inc. - Myrtle Beach: 1330 Highway 501 Business, Conway, SC 29526

Project #:	1463-19-046	Report Date:	11/7/2019
Project Name:	RJ Corman Railroad Bridge	Lab #:	6033
Client Name:	HDR Engineering, Carolinas	Test Date:	11/6/2019
Client Address:	555 Fayetteville St, Ste 900; Raleigh, NC 27601	Date Sampled:	10/16-18/2019
Boring #:	B-2	Sample #: S-25	
Location:	Borings	Depth:	108.5'-110'
Sample Description:	Gray Silty Sand (SM)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Method: A Procedure for obtaining Specimen: Moist

Maximum Particle Size	#4	Coarse Sand	0%	Fine Sand	77%
Gravel	0%	Medium Sand	3%	Silt & Clay	20%
Liquid Limit	30	Plastic Limit	25	Plastic Index	5

Notes / Deviations / References:

W. King, P.E. — *Technicol Responsibility*
WK — *Signature*
Project Engineer — *Position*
11/13/19 — *Date*

Form No. TR-D4318-T89-90
Revision No. 1
Revision Date: 7/26/17

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX

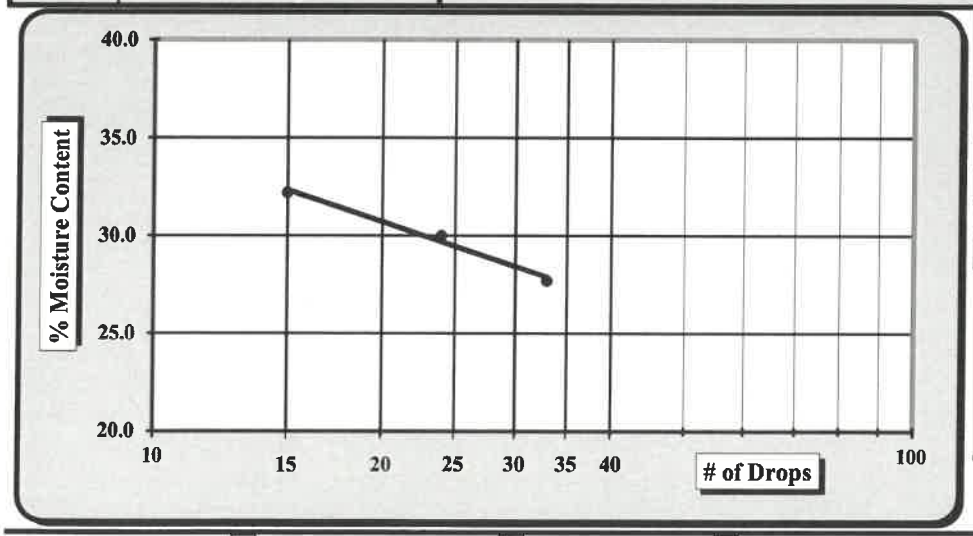
ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐

S&ME, Inc. - Myrtle Beach: 1330 Highway 501 Business, Conway, SC 29526

Project #:	1463-19-046	Report Date:	11/7/2019
Project Name:	RJ Corman Railroad Bridge	Test Date(s)	11/4/2019
Client Name:	HDR Engineering, Carolinas		
Client Address:	555 Fayetteville St, Ste 900; Raleigh, NC 27601		
Boring #:	B-2	Sample #: S-25	Sample Date: 10/16-18/2019
Location:	Borings	LAB #: 6033	Depth: 108.5'-110'
Sample Description:	Gray Silty Sand (SM)		

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	00401	2/28/2019	Grooving tool	11368	9/1/2018
LL Apparatus	18801	9/1/2018			
Oven	17745	4/8/2019			

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	40	39	65				82	90	
A	Tare Weight	14.74	14.58	14.63				14.54	14.62	
B	Wet Soil Weight + A	31.22	31.35	31.42				21.16	21.19	
C	Dry Soil Weight + A	27.65	27.48	27.33				19.87	19.89	
D	Water Weight (B-C)	3.57	3.87	4.09				1.29	1.30	
E	Dry Soil Weight (C-A)	12.91	12.90	12.70				5.33	5.27	
F	% Moisture (D/E)*100	27.7%	30.0%	32.2%				24.2%	24.7%	
N	# OF DROPS	33	24	15				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**24.5%**		



One Point Liquid Limit			
N	**Factor**	**N**	**Factor**
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐

Liquid Limit	**30**
Plastic Limit	**25**
Plastic Index	**5**
Group Symbol	**SM**

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

W. King, P.E.	WK	Project Engineer	11/13/19
Technicol Responsibility	*Signature*	*Position*	*Date*

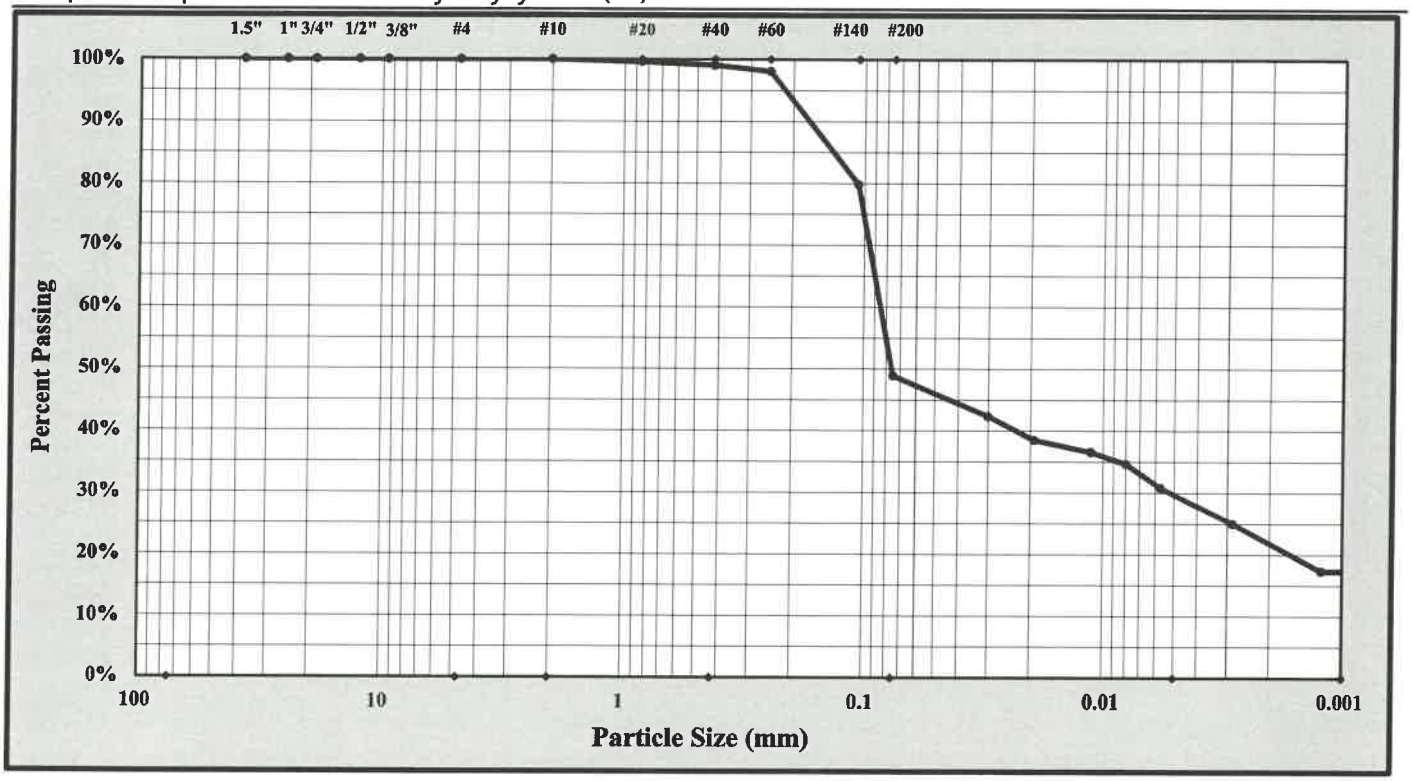
Form No. TR-D422-3
Revision No. 2
Revision Date: 08/29/17

PARTICLE SIZE ANALYSIS OF SOIL

ASTM D422

S&ME, Inc. - Myrtle Beach: 1330 Highway 501 Business, Conway, SC 29526

S&ME Project #:	1463-19-046	Report Date:	11/7/2019
Project Name:	RJ Corman Railroad Bridge	Test Date(s):	11/6/2019
Client Name:	HDR Engineering, Carolinas		
Address:	555 Fayetteville St, Ste 900; Raleigh, NC 27601		
Boring #:	B-2	Sample #: S-27	Sample Date: 10/16-18/2019
Location:	Borings	LAB #: 6033	Depth: 118.5'-120'
Sample Description:	Gray Clayey Sand (SC)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	#4	Gravel:	0.0%	Silt	20.4%
Silt & Clay (% Passing #200):	48.9%	Total Sand:	51.1%	Clay	**28.5%**
Apparent Relative Density	2.624	Moisture Content	--	Colloids	**17.3%**
Liquid Limit	38	Plastic Limit	22	Plastic Index	16
Coarse Sand:	0.0%	Medium Sand:	1.0%	Fine Sand:	50.1%

Description of Sand and Gravel	Rounded	☒	Angular	☐	Hard & Durable	☒	Soft	☐	Weathered & Friable ☒
Apparatus B: Air Jet Dispersion	Dispersion Period:	1 min.	Dispersing Agent:	Sodium Hexametaphosphate:	40 g./ Liter				

References / Comments / Deviations: AASTM D 4318, D 854, D 2487

W. King, P.E.	WK	Project Engineer	11/13/19
Technical Responsibility	*Signature*	*Position*	*Date*

Form No. TR-D422-2
Revision No. 2
Revision Date: 08/29/17

PARTICLE SIZE ANALYSIS OF SOIL

ASTM D 422

S&ME, Inc. - Myrtle Beach: 1330 Highway 501 Business, Conway, SC 29526

Project #:	1463-19-046			Report Date:	11/7/2019
Project Name:	RJ Corman Railroad Bridge			Test Date(s):	11/6/2019
Client Name:	HDR Engineering, Carolinas			Address:	555 Fayetteville St, Ste 900; Raleigh, NC 27601
Boring #:	B-2	Sample #:	S-27	Sample Date:	10/16-18/2019
Location:	Borings	LAB #:	6033	Depth:	118.5'-120'
Sample Description:	Gray Clayey Sand (SC)				

	Beaker #:	DD		**Apparent Relative Density**		**2.624**
	Tare #:	Puce				
Pan Tare Weight (grams):		86.14	**Moisture Content**		Hygroscopic	Natural
Total Sample Air Dried Wt. + tare wt. (grams):		173.72		Tare #	126	
Weight of Total Sample Air Dried:		87.58	A	Tare Wt.	14.97	
Weight of Air Dried Hydrometer Sample (g):		52.60	B	Wet Wt. + A	30.54	
Total Sample Oven Dried:		87.36	C	Dry Wt. + A	30.50	
Hydrometer Sample Oven Dried (**W**):		52.46	D	Water Wt. (B-C)	0.04	
% Passing #10:		100.0%	E	Dry Wt. (C-A)	15.53	
Correction Factor a (Table 1):		1.01		% Moisture (100 x D/E)	0.26%	

Sieve	Retained Wt.	Percent Passing	
3.0"	0.0	Pan # (washed)	100.0%
1.5"	0.0		100.0%
1.0"	0.0		100.0%
3/4"	0.0	EEE	100.0%
1/2"	0.0		100.0%
3/8"	0.0	Soil Mortar	100.0%
#4	0.0		100.0%
#10	0.0	**100.0%**	100.0%
#20	0.2	99.6%	99.6%
#40	0.5	99.0%	99.0%
#60	1.0	98.1%	98.1%
#100	10.6	79.8%	79.8%
#200	26.8	48.9%	48.9%

Description of Sand & Gravel Particles — Rounded ☒ Angular ☐ Hard & Durable ☒ Soft ☐ Weathered & Friable ☒

Stirring Apparatus: A ☐ B ☒ Dispersion Time: 1 min. Sodium Hexametaphosphate: 40 g./ Liter

Balance: *ID No.* 401 *Cal. Date:* 3/5/2019 Hydrometer: *ID No.* 19616 *Cal. Date:* 9/10/2016

Control Cylinder ☒ **Composite Correction** ☐ **Type:** **151H** ☐ **152H** ☒

Time	Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
T (Min.)	(1.0 F)	Reading	Control Cylinder	Composite	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x ((L/T)$^{1/2}$
2	72.0	26.0	4.0		22.00	42.4%	42.4%	12.0	0.01227	0.03009
5	72.0	24.0	4.0		20.00	38.5%	38.5%	12.4	0.01227	0.01929
15	72.0	23.0	4.0		19.00	36.6%	36.6%	12.5	0.01227	0.01121
30	72.0	22.0	4.0		18.00	34.7%	34.7%	12.7	0.01227	0.00798
60	72.0	20.0	4.0		16.00	30.8%	30.8%	13.0	0.01227	0.00571
250	72.0	17.0	4.0		13.00	25.0%	25.0%	13.5	0.01227	0.00285
1440	72.0	13.0	4.0		9.00	17.3%	17.3%	14.2	0.01227	0.00122
2880	72.0	13.0	4.0		9.00	17.3%	17.3%	14.2	0.01227	0.00086

References / Comments / Deviations ASTM D 422, D 2487, D 4318

W. King, P.E. — *Technician Name*

WK — *Signature*

Project Engineer — *Position*

11/13/19 — *Date*

Form No. TR-D4318-T89-90
Revision No. 1
Revision Date: 7/26/17

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX

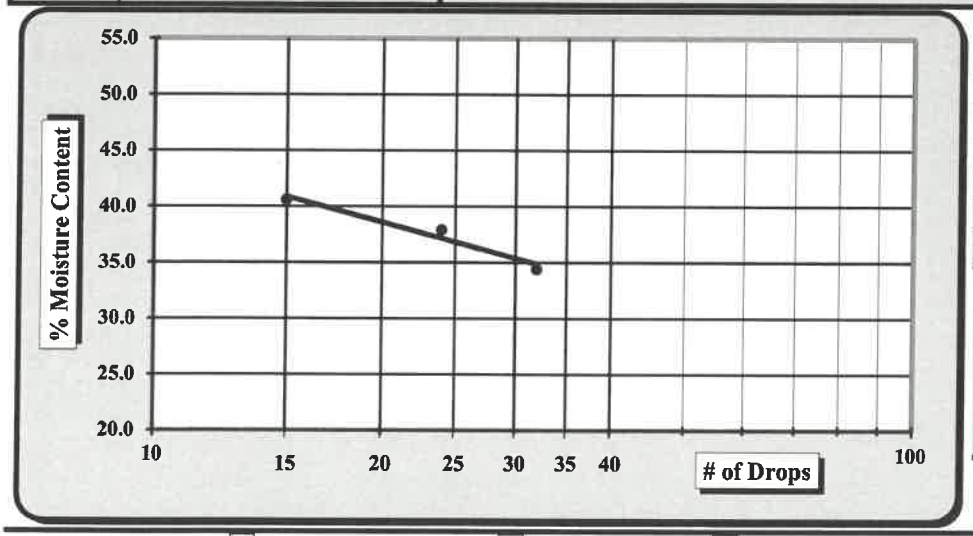
ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐

S&ME, Inc. - Myrtle Beach: 1330 Highway 501 Business, Conway, SC 29526

Project #:	1463-19-046	Report Date:	11/7/2019
Project Name:	RJ Corman Railroad Bridge	Test Date(s)	11/4/2019
Client Name:	HDR Engineering, Carolinas		
Client Address:	555 Fayetteville St, Ste 900; Raleigh, NC 27601		
Boring #:	B-2	Sample #: S-27	Sample Date: 10/16-18/2019
Location:	Borings	LAB #: 6033	Depth: 118.5'-120'
Sample Description:	Gray Clayey Sand (SC)		

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	00401	2/28/2019	Grooving tool	11368	9/1/2018
LL Apparatus	18801	9/1/2018			
Oven	17745	4/8/2019			

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	126	108	68				66	19	
A	Tare Weight	14.97	14.97	14.99				14.48	14.52	
B	Wet Soil Weight + A	29.32	29.42	29.53				16.70	16.77	
C	Dry Soil Weight + A	25.65	25.45	25.33				16.30	16.36	
D	Water Weight (B-C)	3.67	3.97	4.20				0.40	0.41	
E	Dry Soil Weight (C-A)	10.68	10.48	10.34				1.82	1.84	
F	% Moisture (D/E)*100	34.4%	37.9%	40.6%				22.0%	22.3%	
N	# OF DROPS	32	24	15				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**22.2%**		



One Point Liquid Limit			
N	**Factor**	**N**	**Factor**
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐

Liquid Limit	**38**
Plastic Limit	**22**
Plastic Index	**16**
Group Symbol	**SC**

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

W. King, P.E. — *Technical Responsibility*
WK — *Signature*
Project Engineer — *Position*
11/13/19 — *Date*

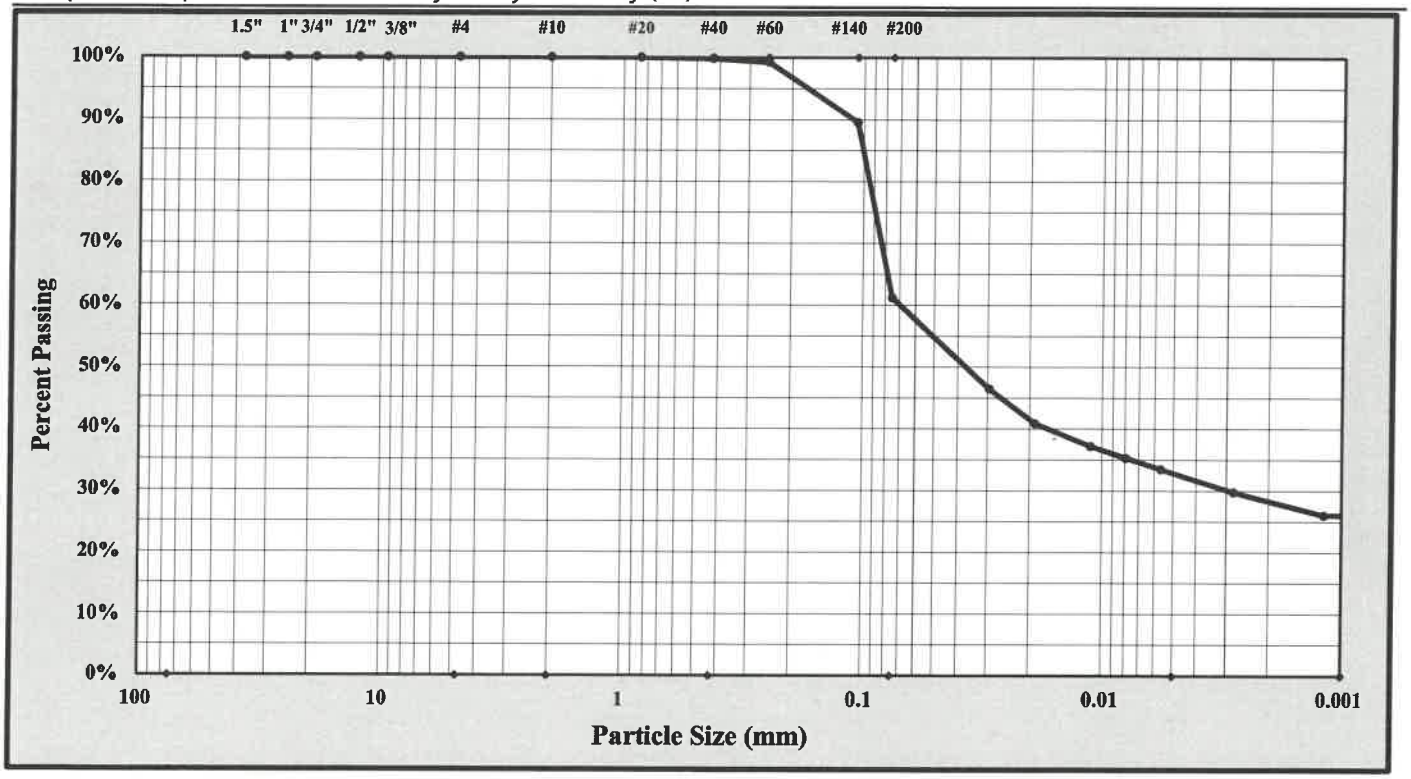
Form No. TR-D422-3
Revision No. 2
Revision Date: 08/29/17

PARTICLE SIZE ANALYSIS OF SOIL

ASTM D422

S&ME, Inc. - Myrtle Beach: 1330 Highway 501 Business, Conway, SC 29526

S&ME Project #:	1463-19-046			Report Date:	11/7/2019
Project Name:	RJ Corman Railroad Bridge			Test Date(s):	11/6/2019
Client Name:	HDR Engineering, Carolinas				
Address:	555 Fayetteville St, Ste 900; Raleigh, NC 27601				
Boring #:	B-2	Sample #:	UD-2	Sample Date:	10/16-18/2019
Location:	Borings	LAB #:	6033	Depth:	21'-23'
Sample Description:	Gray Sandy Lean Clay (CL)				



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	#4	Gravel:	0.0%	Silt	28.2%
Silt & Clay (% Passing #200):	61.2%	Total Sand:	38.8%	Clay	**33.0%**
Apparent Relative Density	2.624	Moisture Content	--	Colloids	**26.0%**
Liquid Limit	48	Plastic Limit	27	Plastic Index	21
Coarse Sand:	0.0%	Medium Sand:	0.2%	Fine Sand:	38.7%

Description of Sand and Gravel	Rounded	☒	Angular	☐	Hard & Durable	☒	Soft	☐	Weathered & Friable ☒
Apparatus B: Air Jet Dispersion	Dispersion Period:	1 min.	Dispersing Agent:	Sodium Hexametaphosphate:	40 g./ Liter				

References / Comments / Deviations: AASTM D 4318, D 854, D 2487

W. King, P.E.	WK	Project Engineer	11/13/19
Technical Responsibility	*Signature*	*Position*	*Date*

Form No. TR-D422-2
Revision No. 2
Revision Date: 08/29/17

PARTICLE SIZE ANALYSIS OF SOIL

ASTM D 422

S&ME, Inc. - Myrtle Beach: 1330 Highway 501 Business, Conway, SC 29526

Project #:	1463-19-046			Report Date:	11/7/2019
Project Name:	RJ Corman Railroad Bridge			Test Date(s):	11/6/2019
Client Name:	HDR Engineering, Carolinas			Address:	555 Fayetteville St, Ste 900; Raleigh, NC 27601
Boring #:	B-2	Sample #:	UD-2	Sample Date:	10/16-18/2019
Location:	Borings	LAB #:	6033	Depth:	21'-23'
Sample Description:	Gray Sandy Lean Clay (CL)				

		Beaker #:	FF	**Apparent Relative Density**		**2.624**
		Tare #:	Pink			
Pan Tare Weight (grams):			83.42	**Moisture Content**	Hygroscopic	Natural
Total Sample Air Dried Wt. + tare wt. (grams):			226.36		Tare #	78	
Weight of Total Sample Air Dried:			142.94	A	Tare Wt.	14.48	
Weight of Air Dried Hydrometer Sample (g):			54.54	B	Wet Wt. + A	34.78	
Total Sample Oven Dried:			142.38	C	Dry Wt. + A	34.70	
Hydrometer Sample Oven Dried (**W**):			54.33	D	Water Wt. (B-C)	0.08	
% Passing #10:			100.0%	E	Dry Wt. (C-A)	20.22	
Correction Factor a (Table 1):			1.01		% Moisture (100 x D/E)	0.40%	

Sieve	Retained Wt.	Percent Passing	
3.0"	0.0	Pan # (washed)	100.0%
1.5"	0.0		100.0%
1.0"	0.0		100.0%
3/4"	0.0	EEE	100.0%
1/2"	0.0		100.0%
3/8"	0.0	Soil Mortar	100.0%
#4	0.0		100.0%
#10	0.0	**100.0%**	100.0%
#20	0.0	100.0%	100.0%
#40	0.1	99.8%	99.8%
#60	0.4	99.3%	99.3%
#100	5.7	89.5%	89.5%
#200	21.1	61.2%	61.2%

Description of Sand & Gravel Particles: Rounded ☒ Angular ☐ Hard & Durable ☒ Soft ☐ Weathered & Friable ☒

Stirring Apparatus: A ☐ B ☒ Dispersion Time: 1 min. Sodium Hexametaphosphate: 40 g./ Liter

Balance: *ID No.* 401 *Cal. Date:* 3/5/2019 Hydrometer: *ID No.* 19616 *Cal. Date:* 9/10/2016

Control Cylinder ☒ **Composite Correction** ☐ **Type:** **151H** ☐ **152H** ☒

Time	Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
T (Min.)	(1.0 F)	Reading	Control Cylinder	Composite	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x $((L/T)^{1/2}$
2	72.0	29.0	4.0		25.00	46.5%	46.5%	11.5	0.01227	0.02947
5	72.0	26.0	4.0		22.00	40.9%	40.9%	12.0	0.01227	0.01903
15	72.0	24.0	4.0		20.00	37.2%	37.2%	12.4	0.01227	0.01113
30	72.0	23.0	4.0		19.00	35.3%	35.3%	12.5	0.01227	0.00793
60	72.0	22.0	4.0		18.00	33.5%	33.5%	12.7	0.01227	0.00564
250	72.0	20.0	4.0		16.00	29.7%	29.7%	13.0	0.01227	0.00280
1440	72.0	18.0	4.0		14.00	26.0%	26.0%	13.3	0.01227	0.00118
2880	72.0	18.0	4.0		14.00	26.0%	26.0%	13.3	0.01227	0.00083

References / Comments / Deviations ASTM D 422, D 2487, D 4318

W. King, P.E. — *Technician Name*

WK — *Signature*

Project Engineer — *Position*

11/13/19 — *Date*

Form No. TR-D4318-T89-90
Revision No. 1
Revision Date: 7/26/17

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX

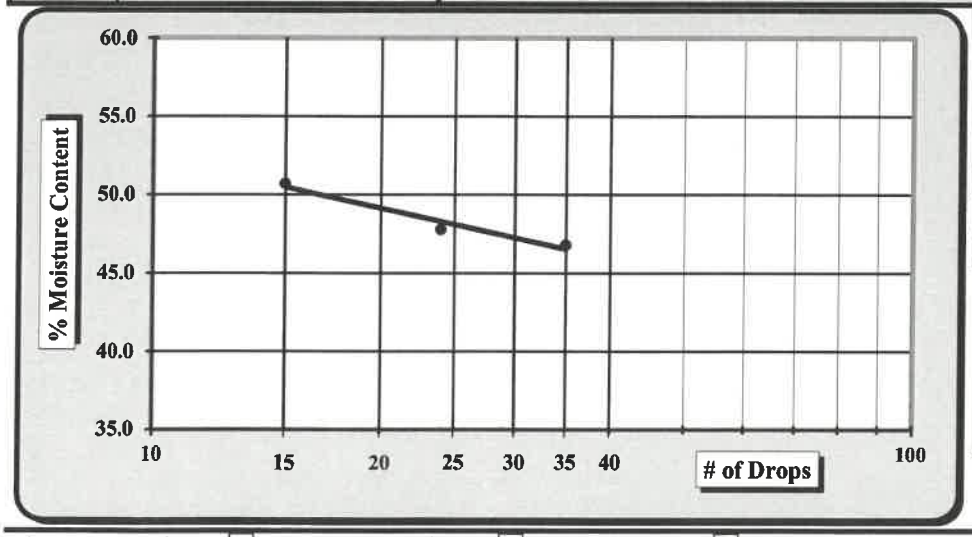
ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐

S&ME, Inc. - Myrtle Beach: 1330 Highway 501 Business, Conway, SC 29526

Project #:	1463-19-046	Report Date:	11/7/2019
Project Name:	RJ Corman Railroad Bridge	Test Date(s)	11/4/2019
Client Name:	HDR Engineering, Carolinas		
Client Address:	555 Fayetteville St, Ste 900; Raleigh, NC 27601		
Boring #:	B-2	Sample #: UD-2	Sample Date: 10/16-18/2019
Location:	Borings	LAB #: 6033	Depth: 21'-23'
Sample Description:	Gray Sandy Lean Clay (CL)		

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	00401	2/28/2019	Grooving tool	11368	9/1/2018
LL Apparatus	18801	9/1/2018			
Oven	17745	4/8/2019			

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	85	63	108				119	125	
A	Tare Weight	14.74	14.69	14.83				14.85	14.93	
B	Wet Soil Weight + A	28.66	28.75	28.94				21.22	21.36	
C	Dry Soil Weight + A	24.22	24.20	24.19				19.87	19.99	
D	Water Weight (B-C)	4.44	4.55	4.75				1.35	1.37	
E	Dry Soil Weight (C-A)	9.48	9.51	9.36				5.02	5.06	
F	% Moisture (D/E)*100	46.8%	47.8%	50.7%				26.9%	27.1%	
N	# OF DROPS	35	24	15				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**27.0%**		



One Point Liquid Limit			
N	**Factor**	**N**	**Factor**
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐

Liquid Limit	**48**
Plastic Limit	**27**
Plastic Index	**21**
Group Symbol	**CL**

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

W. King, P.E.	WK	Project Engineer	11/13/19
Technical Responsibility	*Signature*	*Position*	*Date*

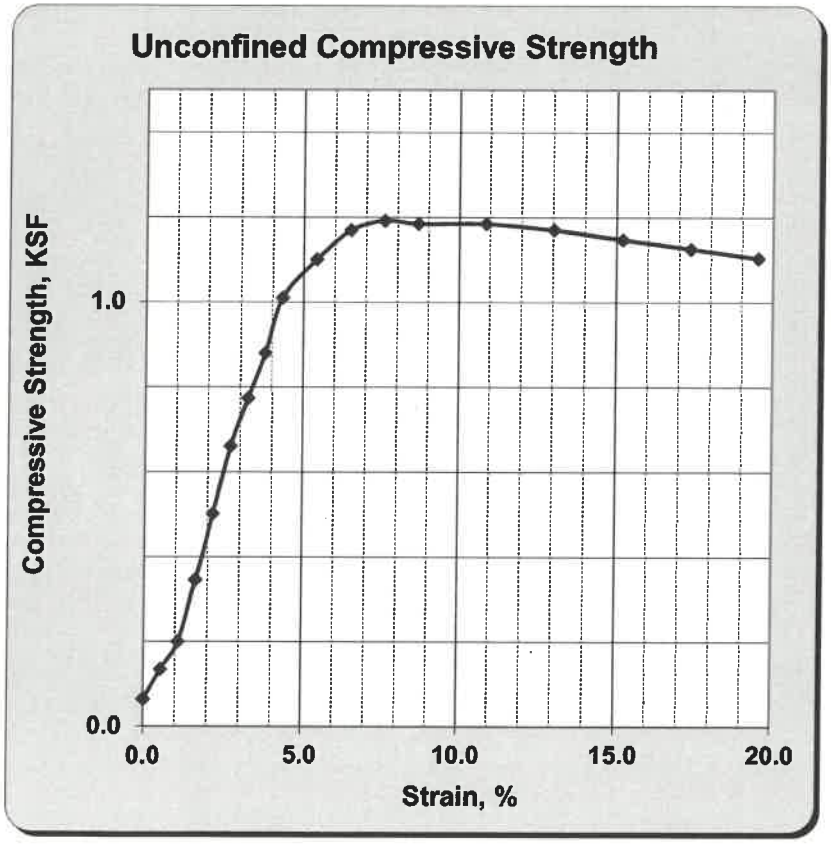
Form No. TR-D2166-01
Revision No. : 1
Revision Date: 08/16/17

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS

ASTM D2166

S&ME, Inc. - Myrtle Beach: 1330 Highway 501 Business, Conway, SC 29526

Project No.:	1463-19-046			Report Date:	11/7/2019
Project Name:	RJ Corman Railroad Bridge			Test Date(s):	11/6/2019
Client Name:	HDR Engineering, Carolinas				
Client Address:	555 Fayetteville St, Ste 900; Raleigh, NC 27601				
Boring #:	B-2	Sample #:	UD-2	Sample Date:	10/16-18/2019
Location:	Borings	LAB #:	6033	Depth:	21'-23'
Sample Description:	Gray Sandy Lean Clay (CL)				



Failed Specimen

Type of Sample: Intact
Source of Moisture Sample: Test Specimen

Initial Dry Unit Weight: 96.8 pcf
Initial Water Content: 26.2%
Unconfined Compressive Strength, q_u: **1.192** KSF
Undrained Shear Strength, s_u: **0.596** KSF

Liquid Limit: 48
Plasticity Index: 21
Height to Diameter Ratio: 1.6
Rate of Strain (%/min.): 0.5
Strain at Failure: 56.5

References / Comments / Deviations:

W. King, P.E.	WK	Project Engineer	11/13/19
Technical Responsibility	*Signature*	*Position*	*Date*

Form No. TR-D2166-01-C
Revision No. : 1
Revision Date: 08/16/17

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS

ASTM D2166

S&ME, Inc. - Myrtle Beach: 1330 Highway 501 Business, Conway, SC 29526

Project #:	1463-19-046	Report Date:	11/7/2019
Project Name:	RJ Corman Railroad Bridge	Test Date(s):	11/6/2019
Client Name:	HDR Engineering, Carolinas		
Client Address:	555 Fayetteville St, Ste 900; Raleigh, NC 27601		
Boring #:	B-2	Sample #: UD-2	Sample Date: 10/16-18/2019
Location:	Borings	LAB #: 6033	Depth: 21'-23'
Sample Description:	Gray Sandy Lean Clay (CL)		

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.1 gram)	19608	05/13/19	Load Cell 500 bs.	18730	9/27/19
Calipers (0.001 inches)	19601	09/29/19			
Load Frame	17750	09/29/19			

Sample Uncompressed:			*Moisture Content of Sample*			
Total Weight of Wet Sample:	931.0	g	A	Tare Weight	*327.5*	g.
Average Diameter:	2.8327	in	B	Wet Soil Weight + A	1258.2	g
Average Height:	4.6070	in	C	Dry Soil Weight + A	1064.7	g
Cross Sectional Area:	6.3020	in^2	F	Moisture Content %	26.2%	

Load Data:				Stress Data:	
Deformation (in.)	Axial Strain (%)	A (in^2)	Load (lbf)	PSI	KSF
0.000	0.0	6.302	2.8	0.5	0.065
0.025	0.5	6.336	5.9	0.9	0.135
0.050	1.1	6.371	8.9	1.4	0.200
0.075	1.6	6.406	15.4	2.4	0.345
0.100	2.2	6.442	22.4	3.5	0.501
0.125	2.7	6.478	29.7	4.6	0.661
0.150	3.3	6.514	35.0	5.4	0.774
0.175	3.8	6.551	40.0	6.1	0.880
0.200	4.3	6.588	46.2	7.0	1.010
0.250	5.4	6.664	50.9	7.6	1.101
0.300	6.5	6.741	54.8	8.1	1.170
0.350	7.6	6.820	56.5	8.3	1.192
0.400	8.7	6.901	56.8	8.2	1.185
0.500	10.9	7.069	58.2	8.2	1.185
0.600	13.0	7.246	58.9	8.1	1.170
0.700	15.2	7.431	59.2	8.0	1.148
0.800	17.4	7.626	59.6	7.8	1.126
0.900	19.5	7.832	60.0	7.7	1.104
1.000	21.7	8.049	59.8	7.4	1.070

Specimen Type:	Intact	Height 1 (in.):	4.6070	Diameter 1 (in.):	2.8330
Source of Moisture Sample:	Test Specimen	Height 2 (in.):	4.6070	Diameter 2 (in.):	2.8330
Rate of strain (%/min.)	0.5	Height 3 (in.):	4.6070	Diameter 3 (in.):	2.8320

W. King, P.E.	WK	Project Engineer	11/13/19
Technician Name	*Technical Responsibility*	*Signature*	*Date*

Appendix C

Generalized Soil Profiles for LPILE and FBMultipier

March 18, 2020

SOIL PROFILE LEGEND SHEET

R.J. Corman Railroad Company / Carolina Lines
Bridge at MP 334.50

SUMMARY OF PARAMETERS DEVELOPED FOR SOIL PROFILE

Parameter	Units	Description and Reference
γ_t	lb/ft^3	Total Unit Weight
γ_e	lb/ft^3	Effective Unit Weight
c_u	lb/ft^2	Undrained Shear Strength
ϕ	(°)	Angle of Internal Friction
FB-MULTIPIER COMPUTER PROGRAM INPUTS		
$\bar{N}_{60}$	bpf	Average Corrected SPT N-Value
k_s / k_c	lb/in^3	Modulus of Subgrade Reaction {FB-Multipier Version 5.0 Technical Manual}
ε_{50}	in/in	Strain {Strain at 50% failure from unconfined compression test}
ε_{100}	in/in	Strain {Strain at 100% failure from unconfined compression test}
q_u	lb/ft^2	Unconfined Compression Strength {From unconfined compression test}
$f_{s(ult.)}$	lb/ft^2	Ultimate Unit Skin Friction {FB-Multipier Soil Table}
$q_{b(ult.)}$	lb/ft^2	Ultimate Unit End Bearing {FB-Multipier Soil Table}
ν	--	Poisson's Ratio {FB-Multipier Version 5.0 Technical Manual and Soil Table}
G	kip/in^2	Shear Modulus {FB-Multipier Version 5.0 Technical Manual and Soil Table}
LPILE COMPUTER PROGRAM INPUTS		
k_c	lb/in^3 (soil)	Secant Modulus (cyclic for clay) {computer program LPILEPLUS}
k	lb/in^3	Secant Modulus (static and cyclic for sands)
E_{50}	lb/in^2	Strain, {Value of strain at 50% of the maximum stress}

SOIL PROFILE AT ABUTMENT

R.J. Corman Railroad Company / Carolina Lines
Bridge at MP 334.50
(Based on Boring B-1)

Approximate Elevation (ft)	Approximate Depth (ft)	STRATA		
		Description	Parameters	Material Model
4.4	0.0			
	▽ GWT = 2.40 ft			
		Layer 1: Upper Clays and Clayey Sands (CH, SC, SP, CL)	γ_t (lb/ft^3) = 110.0 γ_e (lb/ft^3) = 47.6 c_u (psf) = 500 E_{50} = 0.007 k_c (lb/in^3) = 200 $f_{s(ult.)}$ (psf) = 303 $q_{b(ult.)}$ (ksi) = 0.04	ν = 0.45 G (ksi) = 0.60 $\bar{N}_{160}$ (bpf) = 4
-15.0	19.4			Stiff Clay (Reese)
		Layer 3: Fat Clay (CH)	γ_t (lb/ft^3) = 120.0 γ_e (lb/ft^3) = 57.6 c_u (psf) = 2600 E_{50} = 0.005 k_c (lb/in^3) = 400 $f_{s(ult.)}$ (psf) = 1690 $q_{b(ult.)}$ (ksi) = 0.15	ν = 0.50 G (ksi) = 4.63 $\bar{N}_{160}$ (bpf) = 19
-30.0	34.4			Stiff Clay with Free Water (Reese)
		Layer 4: Sandy Silt (ML)	γ_t (lb/ft^3) = 110.0 γ_e (lb/ft^3) = 47.6 c_u (psf) = 2150 E_{50} = 0.005 k_c (lb/in^3) = 400 $f_{s(ult.)}$ (psf) = 1440 $q_{b(ult.)}$ (ksi) = 0.20	ν = 0.50 G (ksi) = 4.63 $\bar{N}_{160}$ (bpf) = 26
-65.0	69.4			Stiff Clay with Free Water (Reese)
		Layer 5: Silty Clayey Sand (SC-SM)	γ_t (lb/ft^3) = 125.0 γ_e (lb/ft^3) = 62.6 ϕ (°) = 36 k (lb/in^3) = 125 $f_{s(ult.)}$ (psf) = 5050 $q_{b(ult.)}$ (ksi) = 0.90	ν = 0.30 G (ksi) = 4.07 $\bar{N}_{160}$ (bpf) = 63
-80.0	84.4			Sand (Reese)
		Layer 6: Clayey Sand and Silty Sand (SC, SM)	γ_t (lb/ft^3) = 125.0 γ_e (lb/ft^3) = 62.6 ϕ (°) = 34 k (lb/in^3) = 125 $f_{s(ult.)}$ (psf) = 5770 $q_{b(ult.)}$ (ksi) = 0.51	ν = 0.25 G (ksi) = 2.40 $\bar{N}_{160}$ (bpf) = 29
-112.0	116.4			Sand (Reese)
		Boring Termination		

SOIL PROFILE AT PIER LOCATIONS

R.J. Corman Railroad Company / Carolina Lines
Bridge at MP 334.50
(Based on Boring B-1)

Approximate Elevation (ft)	Approximate Depth (ft)	STRATA Description	Parameters	Material Model
4.4	0.0			
		▽ GWT = 2.40 ft		
		PILE STICK UP		
-2.6	7.1			
		Layer 1: Upper Clays and Clayey Sands (CH, SC, SP, CL)	γ_t (lb/ft^3) = 110.0 γ_e (lb/ft^3) = 47.6 c_u (psf) = 500 E_{50} = 0.007 k_c (lb/in^3) = 200 $f_{s(ult.)}$ (psf) = 303 $q_{b(ult.)}$ (ksi) = 0.04	ν = 0.45 G (ksi) = 0.60 $\bar{N}_{160}$ (bpf) = 4
-15.0	19.4			Stiff Clay (Reese)
		Layer 3: Fat Clay (CH)	γ_t (lb/ft^3) = 120.0 γ_e (lb/ft^3) = 57.6 c_u (psf) = 2600 E_{50} = 0.005 k_c (lb/in^3) = 400 $f_{s(ult.)}$ (psf) = 1690 $q_{b(ult.)}$ (ksi) = 0.15	ν = 0.50 G (ksi) = 4.63 $\bar{N}_{160}$ (bpf) = 19
-30.0	34.4			Stiff Clay with Free Water (Reese)
		Layer 4: Sandy Silt (ML)	γ_t (lb/ft^3) = 110.0 γ_e (lb/ft^3) = 47.6 c_u (psf) = 2150 E_{50} = 0.005 k_c (lb/in^3) = 400 $f_{s(ult.)}$ (psf) = 1440 $q_{b(ult.)}$ (ksi) = 0.20	ν = 0.50 G (ksi) = 4.63 $\bar{N}_{160}$ (bpf) = 26
-65.0	69.4			Stiff Clay with Free Water (Reese)
		Layer 5: Silty Clayey Sand (SC-SM)	γ_t (lb/ft^3) = 125.0 γ_e (lb/ft^3) = 62.6 ϕ (°) = 36 k (lb/in^3) = 125 $f_{s(ult.)}$ (psf) = 5050 $q_{b(ult.)}$ (ksi) = 0.90	ν = 0.30 G (ksi) = 4.07 $\bar{N}_{160}$ (bpf) = 63
-80.0	84.4			Sand (Reese)
		Layer 6: Clayey Sand and Silty Sand (SC, SM)	γ_t (lb/ft^3) = 125.0 γ_e (lb/ft^3) = 62.6 ϕ (°) = 34 k (lb/in^3) = 125 $f_{s(ult.)}$ (psf) = 5770 $q_{b(ult.)}$ (ksi) = 0.51	ν = 0.25 G (ksi) = 2.40 $\bar{N}_{160}$ (bpf) = 29
-112.0	116.4			Sand (Reese)
		Boring Termination		

Permitting Documents

April 17, 2020

City of CONWAY
SOUTH CAROLINA

PUBLIC WORKS DEPARTMENT

April 1, 2020

Mr. Robert Baysden
HDR Engineering of the Carolinas Inc.
440 South Church St, STE 100
Charlotte NC, 28202

Ref: RJ Cormaan Bridge Over Crabtree Creek

Mr. Baysden:

The Public Works Department of the City of Conway has reviewed the stormwater submittals for the aforementioned project located within the City of Conway MS4 jurisdiction. The submittal has been found to be compliant with the minimum standards and criteria set forth in the 2012 National Pollution Discharge and Elimination System (NPDES) Construction General Permit and the City of Conway's stormwater management ordinance.

If you have any questions or comments regarding this approval, please contact me at my office.

Sincerely,

Kevin Chestnut
City of Conway
Public Works Director

2940 Jerry Barnhill Blvd. ◊ Post Office Box 1075
Conway, South Carolina 29528-1075
Telephone (843) 248-1730 ◊ Fax (843) 397-2885
www.cityofconway.com

NOTICE OF INTENT (NOI)
For Coverage(s) of Primary Permittees Under South Carolina NPDES General Permit For Stormwater Discharges From Construction Activities SCR100000
(Maintain As Part of On-Site SWPPP)

Approved for Construction
City of Conway Stormwater Dept.
By: [signature] Date: 4-2-20

For Official Use Only
File Number: _____
Permit Number: SCR10_____
Submittal Package Complete: _____

Submission of this Notice of Intent constitutes notice that the Applicant identified in Section II intends to be authorized as a Primary Permittee in the state of South Carolina under NPDES General Permit SCR1000000. ***Fees required for review and NPDES coverage of each application type are as listed on page 2 of the Instructions.***

Date: 02/10/2020
Project/Site Name: RJ Corman Bridge Over Crabtree creek (MP 334.5) **County:** Horry
(Modification or Change of Information Only) **Prior Approved NPDES Permit or File Number:** _____

Do you want this project to be considered for the Expedited Review Program (ERP)? ☐ **Yes or** ☑ **No (See instructions)**

I. Notice of Intent (NOI) Application Type(s)

A. **Project (Application/Review) Type(s)** (Select ALL that apply):
- ☑ New Project (Initial Notification) Ongoing Project: ☐ Permitted or ☐ Un-Permitted
- ☐ Late Notification ☐ Low Impact Development (LID) or Project Design Above Regulatory Requirements
- ☐ New Owner/Operator or Company Name Change **(see instructions, attach Form A (Transfer of Ownership))**
- ☐ Major Modification: **(see instructions, attach Form B (Major Modifications))**
- ☑ MS4 Project Review
- ☑ Ocean and Coastal Resource Management (OCRM) Review
- ☐ Change of Information/Other (Specify): _____

B. If Applicable, identify the entity designated as **MS4 Reviewer and MS4 Operator** (i.e., Lexington County, City of Greer, etc.): **MS4 Reviewer** CITY OF CONWAY **MS4 Operator** CITY OF CONWAY

II. Primary Permittee Information ☐ Change of Information

☐ Person or ☑ Company | If a Company, are you a ☐ Lending Institution or ☐ Government Entity? Company EIN **(If applicable):** EIN: _____

A. **Primary Permittee Name:** R.J. CORMAN
Mailing Address: 101 R.J. CORMAN DRIVE City: NICHOLASVILLE State: KY Zip: 40340
Phone: 859-881-2699 Fax: _____ Email Address: EDWARD.QUILLIAN@RJCORMAN.COM

B. **Contact /ODSA Name** (If different from above OR if owner is a company): _____
Mailing Address: _____ City: _____ State: _____ Zip: _____
Phone: _____ Fax: _____ Email Address: _____

C. **Property Owner Name** (If different from above): _____
Mailing Address: _____ City: _____ State: _____ Zip: _____
Phone: _____ Fax: _____ Email Address: _____

III. Comprehensive Stormwater Pollution Prevention Plan (C-SWPPP) Preparer Information ☐ Change of Information

A. **C-SWPPP Preparer Name:** ROBERT BAYSDEN
B. **Registered Professional** ☑ Engineer ☐ Landscape Architect ☐ Tier B Land Surveyor **S. C. Registration #:** 27528
C. **Company/Firm Name:** HDR ENGINEERING OF THE CAROLINAS, INC. **S. C. COA # :** C0318
Mailing Address: 440 SOUTH CHURCH ST., STE. 100 City: CHARLOTTE State: NC Zip: 28202
Phone: 704-973-6883 Fax: _____ Email Address: ROBERT.BAYSDEN@HDRINC.COM

IV. Project/Site Information ☐ Change of Information

A. **Type of Construction Activity(ies)** (Select ALL that apply):
- ☐ Commercial ☐ Industrial ☐ Institutional ☐ Mass Grading ☐ Linear ☑ Utility/Infrastructure
- ☐ Residential: Single-family ☐ Residential: Multi-family ☐ Multi-use (Commercial & Residential)
- ☑ Site Preparation (No New Impervious Area) ☐ Other (Specify) _____

B. **Site Address/Location** (street address, nearest intersection, etc.) _____
City/Town (If in limits): CONWAY Zip Code: 29526
Latitude: 33 ° 51 ' 42 " N Longitude: - 72 ° 2 ' 57 " W (Source): ☐ GPS ☑ Web Site: _____
Tax Map Number (s) (List all): _____

C. Is this site located on **Indian Land?** ☐ Yes ☑ No

D. **Proposed Start Date:** 01/06/2020 **Proposed Completion Date:** 3/31/2020

E. **Disturbed Area** (nearest tenth of an acre): 2.3 **Total Area** (acres): 2.3

F. **Modification Only:**(nearest tenth of an acre): **Disturbed Area: Current (Approved) Area:** _____
Disturbed Area Change (Increase Only): _____ **Total Disturbed Area (After Change):** _____

G. Is this project part of a **Larger Common Plan for Development or Sale (LCP)**? ☐ Yes ☑ No
LCP/ Overall Development Name: _____ Check here if this is the **First Phase.** ☐

Previous State Permit/File Number: _____ **Previous NPDES Coverage Number:** SCR10 _____

H. Any **Flooding Problems** exist downstream of or adjacent to this site? ☐ Yes ☑ No (If yes, provide detailed description of flooding problems and applicable floodway/flood zone information in the C-SWPPP).

I. Active **S.C. DHEC Warning Notice, Notice to Comply or Notice of Violation** for this site or LCP? ☐ Yes ☑ No

J. List Relevant **State and Federal Environmental Permits or Approvals** applied for or obtained for this site (e.g., **RCRA, USACOE, Nationwide**, etc.). **If None, list None.**
NONE

K. **Any Waiver(s)/Variances/Exceptions Requested for this Project?** (If yes, identify below and include **Waiver Request and Justifications** in the C-SWPPP for each proposed request).

1. Small Construction Activity Waiver(s) From NPDES permitting **(Section 1.4 & Appendix B)**? ☑ Yes ☐ No
If yes, Identify requested waiver: ☐ Rainfall Erosivity Waiver ☐ TMDL Waiver ☐ Equivalent Analysis Waiver

2. Detention Waiver **(72-302(B)**? ☑ Yes ☐ No | 3. Other (Specify): Note there is no stream classification for this site

V. Waterbody Information (Attach additional sheet(s) as needed) ☐ Change of Information

A. **Receiving Waterbody(s) (RWB) Information** (List the nearest and next nearest receiving waterbodies to which the sites stormwater discharges will drain. If stormwater discharges drain to multiple waterbodies, list all such waterbodies).

1. Name of Receiving Waterbodies (RWB)	2. Distance to RWB (feet)	3. Classification of RWB
a. Nearest: CRABTREE CREEK	0	n/a
b. Next Nearest: Kingston Lake	3,700	
c. Coastal Zone ONLY: Coastal Receiving Water (CRW): not within 1/2 mile		Not Applicable
d. Other Waterbodies:		

B. **Waters of the U.S. / State Information** (Attach additional sheet(s) as needed)

Waters of the U.S./ State	1. On the site?	2. Delineated/ Identified?	3. Impacts?	4. Amount of impacts
a. Jurisdictional wetlands	☑ Yes ☐ No	☑ Yes ☐ No	☐ Yes ☑ No	0 Ac
b. Non-jurisdictional wetlands	☐ Yes ☑ No	☐ Yes ☑ No	☐ Yes ☑ No	_____ Ac
c. Other Water(s): _____	☐ Yes ☑ No	☐ Yes ☑ No	☐ Yes ☑ No	_____ Ac _____ Feet
d. Coastal Zone ONLY: Direct Critical Area	☐ Yes ☑ No	☐ Yes ☑ No	☐ Yes ☑ No	_____ Ac _____ Feet

5. If yes for impacts in B.3, describe each impact and activity, and list all permits (e.g., USACOE Nationwide Permit, DHEC General Permit) and certifications that have been applied for or obtained for each impact:

C. **S.C. Navigable Waters (SCNW) Information (Section 2.6.5)** The Department will address any issues related to State Navigable Waters' Program under SC Regulation 19-450 during the review of the C-SWPPP for activities that will **NOT** require a 404 permit or a 401 certification. (Attach additional sheet(s) as needed).

1. **Are S. C. Navigable Waters (SCNW) on the site:** ☑ Yes ☐ No
a. If **no**, do not complete this question. Proceed to Section D (Impaired Waterbodies).
b. If **yes**, provide the name of S.C. Navigable Waters (SCNW) on the site: CRABTREE CREEK/SWAMP

2. If **yes for C.1**, will construction activities cross over or occur in, under, or thru the SCNW? ☑ Yes ☐ No
If yes, describe SCNW activities (e.g., road crossing, sub-aqueous utility line, temporary or permanent structures, etc.) and proceed to Section C.3: RAILROAD CROSSING REPLACEMENT OVER THE SCNW. PERMANENT REPLACEMENT

3. Identify permits providing coverage of SCNW activities proposed for your site. If NONE, list none.

Permits/Certifications	Permit or Certification No.	Corresponding Covered SCNW Activity(ies)
a. DHEC General/ Other DHEC Permit	NONE	
b. USACOE **404 Permit or 401 Certification**	NONE	
c. **SCNW Permit** If applied for or issued, identify **Date applied for or issued:** _____	NONE	☐ **All Activities** or ☐ **Some Activities (Describe):**

d. **If a SCNW Permit has NOT been applied for** provide an additional plan sheet that shows plan and profile views (drawn to scale) of the SCNW and associated activities. Include a description of all proposed activities on this plan.

D. **Impaired Waterbodies Information** (Attach additional sheet(s) as needed)

1. 303(d) Listed Impaired Waterbodies

a. Name of **Nearest DHEC Water Quality Monitoring Stations (WQMS)(s)** that receives stormwater from your construction site and/or thru an MS4 and the **Name of the Corresponding Waterbody?**		b. **Is this WQMS(s) listed on the most current 303(d) List? If No, proceed to Section 2 of this table. If Yes, complete items c thru f.**	c. List the pollutant(s) identified as **"CAUSES"** of the impairment	d. Will any pollutants causing the impairment be present in your site's construction stormwater discharges?	e. If **yes for d,** list the **"USE SUPPORT"** impairment(s) affected by the pollutant(s) identified in c.
Nearest DHEC WQMS(s)	**Corresponding Waterbody**				
MD-158	CRAB TREE SWAMP	☑ Yes ☐ No	DO/e coli	☐ Yes ☑ No	
RS-04375 (upstream)	CRAB TREE SWAMP	☑ Yes ☐ No	e.coli	☐ Yes ☑ No	
		☐ Yes ☑ No		☐ Yes ☐ No	

f. If **yes for d** above, **will use of the BMPs proposed for your project ensure the site's discharges will NOT contribute to or cause further WQS violations for the impairment(s) listed in c?** ☐ Yes ☐ No
(NOTE: **If no for f, this site is NOT eligible for coverage under the CGP).** See instructions.

2. TMDL Impaired Waterbodies

a. Name of **Nearest DHEC Water Quality Monitoring Stations (WQMS)(s)** that receives stormwater from your construction site and/or thru an MS4?	b. Has a TMDL(s) been developed for this WQMS(s)? **If No, identify as such below and proceed to Section VI. If Yes, complete items c thru f of this table.**	c. **If yes for b,** what pollutants are listed as **"CAUSES"** or causing the impairment?	d. If **yes for b**, has the standard been **"ATTAINED" or " Fully Supported"** for the impairment(s)?	e. If **no for d (Not Attained),** will any pollutants causing the impairment be present in your site's construction stormwater discharges?
MD-158	☐ Yes ☑ No		☐ Yes ☐ No	☐ Yes ☐ No
RS-04375 (upstream)	☐ Yes ☑ No		☐ Yes ☐ No	☐ Yes ☐ No
	☐ Yes ☐ No		☐ Yes ☐ No	☐ Yes ☐ No

f. If **yes for e** above, **are your discharges consistent with the assumptions and requirements of the TMDL(s)?** ☐ Yes ☐ No
(NOTE: **If no for f, this site is NOT eligible for coverage under the CGP).** See Instructions.

VI. **Signatures and Certifications** DO **NOT** SIGN IN BLACK INK! **Read the Certifications below (in entirety). Provide date, printed name, and signatures below.** If you are a **New Owner/Operator,** as Primary Permittee you must also sign and date the applicable Comprehensive SWPPP Acceptance & Compliance Agreement below.

C-SWPPP PREPARER: "One copy of the C-SWPPP, all specifications and supporting calculations, forms, and reports are herewith submitted and made a part of this application. I have placed my signature and seal on the design documents submitted signifying that I accept responsibility for the design of the system. Further, I certify to the best of my knowledge and belief that the design is consistent with the requirements of Title 48, Chapter 14 of the Code of Laws of SC, 1976 as amended, pursuant to Regulation 72-300 et seq. (if applicable), and in accordance with the terms and conditions of SCR100000." **(This should be the person identified in Section III).**

ROBERT M. BAYSDEN — **Printed Name of C-SWPPP Preparer**

Signature of C-SWPPP Preparer

27528 — **S. C. Registration #**

PRIMARY PERMITTEE: "I or I (on behalf of my company and its contractors and agents), as the case may be, certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I understand that DHEC enforcement actions may be taken if the terms and conditions of the C-SWPPP are not met and I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

"I or I (on behalf of my company and its contractors and agents), as the case may be, also hereby certify that all land-disturbing construction and associated activity pertaining to this site shall be accomplished pursuant to and in keeping with the terms and conditions of the approved plans and SCR100000. I also certify that a responsible person will be assigned to the project for day-to-day control. I hereby grant authorization to the to S. C. Department of Health and Environmental Control (DHEC) and/or the local implementing agency the right of access to the site at all times for the purpose of on site inspections during the course of construction and to perform maintenance inspections following the completion of the land-disturbing activity." **(See Section 122.22 of S.C. Reg. 61-9 for signatory authority information.)** Having understood the above information, I am signing this certification as Primary Permittee to the aforementioned NPDES general permit."

Edward Quillian — **Printed Name of Primary Permittee**

Chief Engineer — **Title/Position**

Edward Quillian — **Signature of Primary Permittee**

2/10/20 — **Date Signed**

DEPARTMENT OF THE ARMY
CHARLESTON DISTRICT, CORPS OF ENGINEERS
1949 INDUSTRIAL PARK ROAD, ROOM 140
CONWAY, SOUTH CAROLINA 29526

March 13, 2020

Regulatory Division

Mr. Ed Quillian
RJ Corman Railroad Company
101 R.J. Corman Drive
Nicholasville, South Carolina 40340
edward.quillian@rjcorman.com

Dear Mr. Quillian:

This is in response to a Pre-Construction Notification (PCN) (SAC-2019-01985) received on December 3, 2019. In submitting the PCN, you requested verification the proposed project is authorized by a Department of the Army (DA) Nationwide Permit (NWP).

The work affecting waters of the United States is part of an overall project known as RJC Bridge Replacement. The activities in waters of the United States include grading and the placement of 0.006 acre of rip rap adjacent to new abutments associated with the replacement of an existing railway bridge. The project involves impacts to not more than 0.006 acre of waters of the United States. The project is located on Crabtree Swamp at milepost 345.5 on the RJ Corman Railroad Company/Carolina Line in Conway, Horry County, South Carolina (Latitude: 33.861 °, Longitude: -79.0492 °). (NOTE: This letter authorizes the fill material (i.e. grading and rip-rap) associated with the bridge replacement. The removal, replacement, and temporary use of the pile-supported structures is not a regulated activity pursuant to Section 404 of the Clean Water Act; therefore, no Department of the Army permit is required for that work at this location. See SAC 2016-01854 “No Permit Required Letter”, issued to RJ Corman Railroad Group on February 3, 2017.)

The PCN also includes the following supplemental information:

a. Drawing sheets 1-6 of 6 titled “SAC-2019-01985 / RJC Bridge Replacement / Applicant: RJ Corman Railroad Company / Horry County, South Carolina" and dated November 26, 2019.

b. A delineation of wetlands, other special aquatic sites, and other waters.

Based on a review of the PCN, including the supplemental information indicated above, the Corps has determined the proposed activity will result in minimal individual and cumulative adverse environmental effects and is not contrary to the public interest. Furthermore, the activity meets the terms and conditions of Nationwide Permit #3.

For this authorization to remain valid, the project must comply with the enclosed NWP General Conditions, Charleston District Regional Conditions, and the following special conditions:

a. **That prior to beginning the authorized work the permittee must obtain and provide the Corps with a copy of all appropriate state certifications and/or authorizations (e.g., 401 Water Quality Certification, Coastal Zone Management Act concurrence, State Navigable Waters Permit, etc.). This PROVISIONAL NWP is NOT VALID until the permittee obtains and provides the requisite state certification(s) and/or authorization(s) in accordance with this special condition.**

b. **That impacts to aquatic areas do not exceed those specified in the above mentioned PCN, including any supplemental information or revised permit drawings that were submitted to the Corps by the permittee.**

c. **That the construction, use, and maintenance of the authorized activity is in accordance with the information given in the PCN, including the supplemental information listed above, and is subject to any conditions or restrictions imposed by this letter.**

d. **That the permittee shall submit the attached signed compliance certification to the Corps within 30 days following completion of the authorized work.**

e. **That the permittee shall use only clean fill material obtained from an upland source.**

f. **That the permittee shall incorporate Best Management Practices (BMPs) during construction to protect adjacent wetlands and Waters of the United States from sediment and erosion during construction. BMPs to be utilized, independently or in combination, may include but are not limited to; erosion control matting, mulch, silt fences, sediment tubes, and other devices. BMPs shall be maintained until the fill material is stabilized.**

g. **Prior to beginning the authorized work, the permittee must coordinate with the local NFIP flood plain manager and comply with FEMA requirements. A list of NFIP floodplain managers may be found at: http://www.dnr.sc.gov/water/flood/index.html.**

This verification is valid until March 18, 2022, unless the district engineer modifies, suspends, or revokes the NWP authorization in accordance with 33 CFR 330.5(d). If prior to this date, the NWP authorization is reissued without modification or the activity complies with any subsequent modification of the NWP authorization, the verification continues to remain valid until March 18, 2022. If you commence, or are under contract to commence this activity before the NWP expires, or the NWP is modified, suspended, or revoked by the Chief of Engineers or division engineer in accordance with 33 CFR 330.5(b) or (c), respectively, in such a way that the activity would no longer comply with the terms and conditions of the NWP, you will have 12 months after the date the NWP expires or is modified, suspended, or revoked, to complete the activity under the present terms and conditions of this NWP.

This NWP is verified based on information you provided. It is your responsibility to read the attached NWP(s) along with the General, Regional, and Special Conditions before you

begin work. If you determine your project will not be able to meet the NWP and the conditions, you must contact the Corps before you proceed.

In all future correspondence, please refer to file number SAC-2019-01985. A copy of this letter is forwarded to State and/or Federal agencies for their information. If you have any questions, please contact Erica L. Stone, Project Manager, at (843) 365-4239, or by email at Erica.L.Stone@usace.army.mil.

Sincerely,

Date:
2020.03.13
08:56:31 -04'00'

Erica L. Stone
Project Manager

Attachments
Permit Drawings
Nationwide Permit #3
Nationwide Permit General Conditions
Nationwide Permit Regional Conditions
Compliance Certification Form

Copies Furnished:

Mr. Josh Fletcher
HDR, Inc.
4400 Leeds Avenue
North Charleston, South Carolina 29405
joshua.fletcher@hdrinc.com

SC DHEC - Bureau of Water
2600 Bull Street
Columbia, South Carolina 29201
WQCWetlands@dhec.sc.gov

SC DHEC - OCRM
1362 McMillan Avenue, Suite 400
North Charleston, South Carolina 29405
OCRMPermitting@dhec.sc.gov

C. Nationwide Permit General Conditions

Note: To qualify for NWP authorization, the prospective permittee must comply with the following general conditions, as applicable, in addition to any regional or case-specific conditions imposed by the division engineer or district engineer. Prospective permittees should contact the appropriate Corps district office to determine if regional conditions have been imposed on an NWP. Prospective permittees should also contact the appropriate Corps district office to determine the status of Clean Water Act Section 401 water quality certification and/or Coastal Zone Management Act consistency for an NWP. Every person who may wish to obtain permit authorization under one or more NWPs, or who is currently relying on an existing or prior permit authorization under one or more NWPs, has been and is on notice that all of the provisions of 33 CFR 330.1 through 330.6 apply to every NWP authorization. Note especially 33 CFR 330.5 relating to the modification, suspension, or revocation of any NWP authorization.

1. *Navigation.* (a) No activity may cause more than a minimal adverse effect on navigation. (b) Any safety lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, must be installed and maintained at the permittee's expense on authorized facilities in navigable waters of the United States. (c) The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

2. *Aquatic Life Movements.* No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. All permanent and temporary crossings of waterbodies shall be suitably culverted, bridged, or otherwise designed and constructed to maintain low flows to sustain the movement of those aquatic species. If a bottomless culvert cannot be used, then the crossing should be designed and constructed to minimize adverse effects to aquatic life movements.

3. *Spawning Areas.* Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (*e.g.*, through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized.

4. *Migratory Bird Breeding Areas.* Activities in waters of the United States that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.

5. *Shellfish Beds.* No activity may occur in areas of concentrated shellfish populations, unless the activity is directly related to a shellfish harvesting activity authorized by NWPs 4 and 48, or is a shellfish seeding or habitat restoration activity authorized by NWP 27.

6. *Suitable Material.* No activity may use unsuitable material (*e.g.*, trash, debris, car bodies, asphalt, etc.). Material used for construction or discharged must be free from toxic pollutants in toxic amounts (see section 307 of the Clean Water Act).

7. *Water Supply Intakes.* No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.

8. *Adverse Effects From Impoundments.* If the activity creates an impoundment of water, adverse effects to the aquatic system due to accelerating the passage of water, and/or restricting its flow must be minimized to the maximum extent practicable.

9. *Management of Water Flows.* To the maximum extent practicable, the preconstruction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization, storm water management activities, and temporary and permanent road crossings, except as provided below. The activity must be constructed to withstand expected high flows. The activity must not restrict or impede the passage of normal or high flows, unless the primary purpose of the activity is to impound water or manage high flows. The activity may alter the preconstruction course, condition, capacity, and location of open waters if it benefits the aquatic environment (*e.g.*, stream restoration or relocation activities).

10. *Fills Within 100-Year Floodplains.* The activity must comply with applicable FEMA-approved state or local floodplain management requirements.

11. *Equipment.* Heavy equipment working in wetlands or mudflats must be placed on mats, or other measures must be taken to minimize soil disturbance.

12. *Soil Erosion and Sediment Controls.* Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are encouraged to perform work within waters of the United States during periods of low-flow or no-flow, or during low tides.

13. *Removal of Temporary Fills.* Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The affected areas must be revegetated, as appropriate.

14. *Proper Maintenance.* Any authorized structure or fill shall be properly maintained, including maintenance to ensure public safety and compliance with applicable NWP general conditions, as well as any activity-specific conditions added by the district engineer to an NWP authorization.

15. *Single and Complete Project.* The activity must be a single and complete project. The same NWP cannot be used more than once for the same single and complete project.

16. *Wild and Scenic Rivers.* (a) No NWP activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a ''study river'' for possible inclusion in the system while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status. (b) If a proposed NWP activity will occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a ''study river'' for possible inclusion in the system while the river is in an official study status, the permittee must submit a pre-construction notification (see general condition 32). The district engineer will coordinate the PCN with the Federal agency with direct management responsibility for that river. The permittee shall not begin the NWP activity until notified by the district engineer that the Federal agency with direct management responsibility for that river has determined in writing that the proposed NWP activity will not adversely affect the Wild and Scenic River designation or study status. (c) Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency responsible for the designated Wild and Scenic River or study river (*e.g.*, National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service). Information on these rivers is also available at: *http://www.rivers.gov/.*

17. *Tribal Rights.* No NWP activity may cause more than minimal adverse effects on tribal rights (including treaty rights), protected tribal resources, or tribal lands.

18. *Endangered Species.* (a) No activity is authorized under any NWP which is likely to directly or indirectly jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will directly or indirectly destroy or adversely modify the critical habitat of such species. No activity is authorized under any NWP which ''may affect'' a listed species or critical habitat, unless ESA section 7consultation addressing the effects of the proposed activity has been completed. Direct effects are the immediate effects on listed species and critical habitat caused by the NWP activity. Indirect effects are those effects on listed species and critical habitat that are caused by the NWP activity and are later in time, but still are reasonably certain to occur. (b) Federal agencies should follow their own procedures for complying with the requirements of the ESA. If preconstruction notification is required for the proposed activity, the Federal permittee must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will verify that the appropriate documentation has been submitted. If the appropriate documentation has not been submitted, additional ESA section 7 consultation may be necessary for the activity and the respective federal agency would be responsible for fulfilling its obligation under section 7 of the ESA. (c) Non-federal permittees must submit a pre-construction notification to the district engineer if any listed species or designated critical habitat might be affected or is in the vicinity of the activity, or if the activity is located in designated critical habitat, and shall not begin work on the activity until notified by the district engineer that the requirements of the ESA have been satisfied and that the activity is authorized. For activities that might affect Federally-listed endangered or threatened species or designated critical habitat, the pre-construction notification must include the name(s) of the endangered or threatened species that might be affected by the proposed activity or that utilize the designated critical habitat that might be affected by the proposed activity. The district

engineer will determine whether the proposed activity ‘‘may affect’’ or will have ‘‘no effect’’ to listed species and designated critical habitat and will notify the non-Federal applicant of the Corps’ determination within 45 days of receipt of a complete pre-construction notification. In cases where the non-Federal applicant has identified listed species or critical habitat that might be affected or is in the vicinity of the activity, and has so notified the Corps, he applicant shall not begin work until the Corps has provided notification that the proposed activity will have ‘‘no effect’’ on listed species or critical habitat, or until ESA section 7 consultation has been completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps. (d) As a result of formal or informal consultation with the FWS or NMFS the district engineer may add species specific permit conditions to the NWPs. (e) Authorization of an activity by an NWP does not authorize the ‘‘take’’ of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (*e.g.,* an ESA Section 10 Permit, a Biological Opinion with ‘‘incidental take’ provisions, etc.) from the FWS or the NMFS, the Endangered Species Act prohibits any person subject to the jurisdiction of the United States to take a listed species, where ‘‘take’’ means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The word ‘‘harm’’ in the definition of ‘‘take’’ means an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering. (f) If the non-federal permittee has a valid ESA section 10(a)(1)(B) incidental take permit with an approved Habitat Conservation Plan for a project or a group of projects that includes the proposed NWP activity, the non-federal applicant should provide a copy of that ESA section 10(a)(1)(B) permit with the PCN required by paragraph (c) of this general condition. The district engineer will coordinate with the agency that issued the ESA section 10(a)(1)(B) permit to determine whether the proposed NWP activity and the associated incidental take were considered in the internal ESA section 7 consultation conducted for the ESA section 10(a)(1)(B) permit. If that coordination results in concurrence from the agency that the proposed NWP activity and the associated incidental take were considered in the internal ESA section 7 consultation for the ESA section 10(a)(1)(B) permit, the district engineer does not need to conduct a separate ESA section 7 consultation for the proposed NWP activity. The district engineer will notify the non-federal applicant within 45 days of receipt of a complete pre-construction notification whether the ESA section 10(a)(1)(B) permit covers the proposed NWP activity or whether additional ESA section 7 consultation is required. (g) Information on the location of threatened and endangered species and their critical habitat can be obtained directly from the offices of the FWS and NMFS or their worldwide Web pages at *http://www.fws.gov/* or *http://www.fws.gov/ipac* and *http://www.nmfs.noaa.gov/pr/species/esa/* respectively.

19. *Migratory Birds and Bald and Golden Eagles.* The permittee is responsible for ensuring their action complies with the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. The permittee is responsible for contacting appropriate local office of the U.S. Fish and Wildlife Service to determine applicable measures to reduce impacts to migratory birds or eagles, including whether ‘‘incidental take’’ permits are necessary and available under the Migratory Bird Treaty Act or Bald and Golden Eagle Protection Act for a particular activity.

20. *Historic Properties.* (a) In cases where the district engineer determines that the activity may have the potential to cause effects to properties listed, or eligible for listing, in the National Register of Historic Places, the activity is not authorized, until the requirements of Section 106 of the National Historic Preservation Act (NHPA) have been satisfied. (b) Federal permittees should follow their own procedures for complying with the requirements of section 106 of the National Historic Preservation Act. If pre-construction notification is required for the proposed NWP activity, the Federal permittee must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will verify that the appropriate documentation has been submitted. If the appropriate documentation is not submitted, then additional consultation under section 106 may be necessary. The respective federal agency is responsible for fulfilling its obligation to comply with section 106. (c) Non-federal permittees must submit a pre-construction notification to the district engineer if the NWP activity might have the potential to cause effects to any historic properties listed on, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places, including previously unidentified properties. For such activities, the preconstruction notification must state which historic properties might have the potential to be affected by the proposed NWP activity or include a vicinity map indicating the location of the historic properties or the potential for the presence of historic properties. Assistance regarding information on the location of, or potential for, the presence of historic properties can be sought from the State Historic Preservation Officer, Tribal Historic Preservation Officer, or designated tribal representative, as appropriate, and the National Register of Historic Places (see 33 CFR 330.4(g)). When reviewing pre-construction notifications, district engineers will comply with the current procedures for addressing the requirements of section 106 of the National Historic Preservation Act. The district engineer shall make a reasonable and good faith effort to carry out appropriate identification efforts, which may include background research, consultation, oral history interviews, sample field investigation, and field survey. Based on the information submitted in the PCN and these identification efforts, the district shall determine whether the proposed NWP activity has the potential to cause effects on the historic properties. Section 106 consultation is not required when the district engineer determines that the activity does not have the potential to cause effects on historic properties (see 36 CFR 800.3(a)). Section 106 consultation is required when the district engineer determines that the activity has the potential to cause effects on historic properties. The district engineer will conduct consultation with consulting parties identified under 36 CFR 800.2(c) when he or she makes any of the following effect determinations for the purposes of section 106 of the NHPA: no historic properties affected, no adverse effect, or adverse effect. Where the non-Federal applicant has identified historic properties on which the activity might have the potential to cause effects and so notified the Corps, the non-Federal applicant shall not begin the activity until notified by the district engineer either that the activity has no potential to cause effects to historic properties or that NHPA section 106 consultation has been completed. (d) For non-federal permittees, the district engineer will notify the prospective permittee within 45 days of receipt of a complete pre-construction notification whether NHPA section 106 consultation is required. If NHPA section 106 consultation is required, the district engineer will notify the non-Federal applicant that he or she cannot begin the activity until section 106consultation is completed. If the non- Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps. (e) Prospective permittees should be aware that section 110k of the

NHPA (54 U.S.C. 306113) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the Corps is required to notify the ACHP and provide documentation specifying the circumstances, the degree of damage to the integrity of any historic properties affected, and proposed mitigation. This documentation must include any views obtained from the applicant, SHPO/THPO, appropriate Indian tribes if the undertaking occurs on or affects historic properties on tribal lands or affects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.

21. *Discovery of Previously Unknown Remains and Artifacts.* If you discover any previously unknown historic, cultural or archeological remains and artifacts while accomplishing the activity authorized by this permit, you must immediately notify the district engineer of what you have found, and to the maximum extent practicable, avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The district engineer will initiate the Federal, Tribal, and state coordination required to determine if the items or remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

22. *Designated Critical Resource Waters.* Critical resource waters include, NOAA-managed marine sanctuaries and marine monuments, and National Estuarine Research Reserves. The district engineer may designate, after notice and opportunity for public comment, additional waters officially designated by a state as having particular environmental or ecological significance, such as outstanding national resource waters or state natural heritage sites. The district engineer may also designate additional critical resource waters after notice and opportunity for public comment. (a) Discharges of dredged or fill material into waters of the United States are not authorized by NWPs 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, 44, 49, 50, 51, and 52 for any activity within, or directly affecting, critical resource waters, including wetlands adjacent to such waters. (b) For NWPs 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37, 38, and 54, notification is required in accordance with general condition 32, for any activity proposed in the designated critical resource waters including wetlands adjacent to those waters. The district engineer may authorize activities under these NWPs only after it is determined that the impacts to the critical resource waters will be no more than minimal.

23. *Mitigation.* The district engineer will consider the following factors when determining appropriate and practicable mitigation necessary to ensure that the individual and cumulative adverse environmental effects are no more than minimal: (a) The activity must be designed and constructed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States to the maximum extent practicable at the project site (*i.e.,* on site). (b) Mitigation in all its forms (avoiding, minimizing, rectifying, reducing, or compensating for resource losses) will be required to the extent necessary to ensure that the individual and cumulative adverse environmental effects are no more than minimal. (c) Compensatory

mitigation at a minimum one-for-one ratio will be required for all wetland losses that exceed 1⁄10-acre and require preconstruction notification, unless the district engineer determines in writing that either some other form of mitigation would be more environmentally appropriate or the adverse environmental effects of the proposed activity are no more than minimal, and provides an activity-specific waiver of this requirement. For wetland losses of 1⁄10-acre or less that require preconstruction notification, the district engineer may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in only minimal adverse environmental effects. (d) For losses of streams or other open waters that require pre-construction notification, the district engineer may require compensatory mitigation to ensure that the activity results in no more than minimal adverse environmental effects. Compensatory mitigation for losses of streams should be provided, if practicable, through stream rehabilitation, enhancement, or preservation, since streams are difficult to-replace resources (see 33 CFR 332.3(e)(3)). (e) Compensatory mitigation plans for NWP activities in or near streams or other open waters will normally include a requirement for the restoration or enhancement, maintenance, and legal protection (*e.g.,* conservation easements) of riparian areas next to open waters. In some cases, the restoration or maintenance/protection of riparian areas may be the only compensatory mitigation required. Restored riparian should consist of native species. The width of the required riparian area will address documented water quality or aquatic habitat loss concerns. Normally, the riparian area will be 25 to 50 feet wide on each side of the stream, but the district engineer may require slightly wider riparian areas to address documented water quality or habitat loss concerns. If it is not possible to restore or maintain/protect a riparian area on both sides of a stream, or if the waterbody is a lake or coastal waters, then restoring or maintaining/protecting riparian area along a single bank or shoreline may be sufficient. Where both wetlands and open waters exist on the project site, the district engineer will determine the appropriate compensatory mitigation (*e.g.,* riparian areas and/or wetlands compensation) based on what is best for the aquatic environment on a watershed basis. In cases where riparian areas are determined to be the most appropriate form of minimization or compensatory mitigation, the district engineer may waive or reduce the requirement to provide wetland compensatory mitigation for wetland losses. (f) Compensatory mitigation projects provided to offset losses of aquatic resources must comply with the applicable provisions of 33 CFR part 332. (1) The prospective permittee is responsible for proposing an appropriate compensatory mitigation if compensatory mitigation is necessary to ensure that the activity results in no more than minimal adverse environmental effects. For the NWPs, the preferred mechanism for providing compensatory mitigation is mitigation bank credits or in-lieu fee program credits (see 33 CFR 332.3(b)(2) and (3)). However, if an appropriate number and type of mitigation bank or in-lieu credits are not available at the time the PCN is submitted to the district engineer, the district engineer may approve the use of permittee-responsible mitigation. (2) The amount of compensatory mitigation required by the district engineer must be sufficient to ensure that the authorized activity results in no more than minimal individual and cumulative adverse environmental effects (see 33 CFR 330.1(e)(3)). (See also 33 CFR 332.3(f)). (3) Since the likelihood of success is greater and the impacts to potentially valuable uplands are reduced, aquatic resource restoration should be the first compensatory mitigation option considered for permittee-responsible mitigation. (4) If permittee-responsible mitigation is the proposed option, the prospective permittee is responsible for submitting a mitigation plan. A conceptual or detailed mitigation plan may be used by the district engineer to make the decision on the NWP verification request, but a final mitigation plan that addresses the applicable requirements of 33

CFR 332.4(c)(2) through (14) must be approved by the district engineer before the permittee begins work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation (see 33 CFR 332.3(k)(3)). (5) If mitigation bank or in-lieu fee program credits are the proposed option, the mitigation plan only needs to address the baseline conditions at the impact site and the number of credits to be provided. (6) Compensatory mitigation requirements (*e.g.*, resource type and amount to be provided as compensatory mitigation, site protection, ecological performance standards, monitoring requirements) may be addressed through conditions added to the NWP authorization, instead of components of a compensatory mitigation plan (see 33CFR 332.4(c)(1)(ii)). (g) Compensatory mitigation will not be used to increase the acreage losses allowed by the acreage limits of the NWPs. For example, if an NWP has an acreage limit of 1/2-acre, it cannot be used to authorize any NWP activity resulting in the loss of greater than 1/2- acre of waters of the United States, even if compensatory mitigation is provided that replaces or restores some of the lost waters. However, compensatory mitigation can and should be used, as necessary, to ensure that an NWP activity already meeting the established acreage limits also satisfies the no more than minimal impact requirement for the NWPs. (h) Permittees may propose the use of mitigation banks, in-lieu fee programs, or permittee-responsible mitigation. When developing a compensatory mitigation proposal, the permittee must consider appropriate and practicable options consistent with the framework at 33 CFR 332.3(b). For activities resulting in the loss of marine or estuarine resources, permittee responsible mitigation may be environmentally preferable if there are no mitigation banks or in-lieu fee programs in the area that have marine or estuarine credits available for sale or transfer to the permittee. For permittee responsible mitigation, the special conditions of the NWP verification must clearly indicate the party or parties responsible for the implementation and performance of the compensatory mitigation project, and, if required, its long-term management. (i) Where certain functions and services of waters of the United States are permanently adversely affected by a regulated activity, such as discharges of dredged or fill material into waters of the United States that will convert a forested or scrub-shrub wetland to a herbaceous wetland in a permanently maintained utility line right-of-way, mitigation may be required to reduce the adverse environmental effects of the activity to the no more than minimal level.

24. *Safety of Impoundment Structures.* To ensure that all impoundment structures are safely designed, the district engineer may require non-Federal applicants to demonstrate that the structures comply with established state dam safety criteria or have been designed by qualified persons. The district engineer may also require documentation that the design has been independently reviewed by similarly qualified persons, and appropriate modifications made to ensure safety.

25. *Water Quality.* Where States and authorized Tribes, or EPA where applicable, have not previously certified compliance of an NWP with CWA section 401, individual 401 Water Quality Certification must be obtained or waived (see 33 CFR 330.4(c)). The district engineer or State or Tribe may require additional water quality management measures to ensure that the authorized activity does not result in more than minimal degradation of water quality.

26. *Coastal Zone Management.* In coastal states where an NWP has not previously received a state coastal zone management consistency concurrence, an individual state coastal zone management consistency concurrence must be obtained, or a presumption of concurrence must occur (see 33 CFR 330.4(d)). The district engineer or a State may require additional measures to ensure that the authorized activity is consistent with state coastal zone management requirements.

27. *Regional and Case-By-Case Conditions.* The activity must comply with any regional conditions that may have been added by the Division Engineer (see 33 CFR 330.4(e)) and with any case specific conditions added by the Corps or by the state, Indian Tribe, or U.S. EPA in its section 401 Water Quality Certification, or by the state in its Coastal Zone Management Act consistency determination.

28. *Use of Multiple Nationwide Permits.* The use of more than one NWP for a single and complete project is prohibited, except when the acreage loss of waters of the United States authorized by the NWPs does not exceed the acreage limit of the NWP with the highest specified acreage limit. For example, if a road crossing over tidal waters is constructed under NWP 14, with associated bank stabilization authorized by NWP 13, the maximum acreage loss of waters of the United States for the total project cannot exceed 1/3-acre.

29. *Transfer of Nationwide Permit Verifications.* If the permittee sells the property associated with a nationwide permit verification, the permittee may transfer the nationwide permit verification to the new owner by submitting a letter to the appropriate Corps district office to validate the transfer. A copy of the nationwide permit verification must be attached to the letter, and the letter must contain the following statement and signature: When the structures or work authorized by this nationwide permit are still in existence at the time the property is transferred, the terms and conditions of this nationwide permit, including any special conditions, will continue to be binding on the new owner(s) of the property. To validate the transfer of this nationwide permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

_____

(Transferee)

_____

(Date)

30. *Compliance Certification.* Each permittee who receives an NWP verification letter from the Corps must provide a signed certification documenting completion of the authorized activity and implementation of any required compensatory mitigation. The success of any required permittee-responsible mitigation, including the achievement of ecological performance standards, will be addressed separately by the district engineer. The Corps will provide the permittee the certification document with the NWP verification letter. The certification document will include: (a) A statement that the authorized activity was done in accordance with the NWP authorization, including any general, regional, or activity-specific conditions; (b) A statement that the implementation of any required compensatory mitigation was completed in accordance with the

permit conditions. If credits from a mitigation bank or in-lieu fee program are used to satisfy the compensatory mitigation requirements, the certification must include the documentation required by 33 CFR 332.3(l)(3) to confirm that the permittee secured the appropriate number and resource type of credits; and (c) The signature of the permittee certifying the completion of the activity and mitigation. The completed certification document must be submitted to the district engineer within 30 days of completion of the authorized activity or the implementation of any required compensatory mitigation, whichever occurs later.

31. *Activities Affecting Structures or Works Built by the United States.* If an NWP activity also requires permission from the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers (USACE) federally authorized Civil Works project (a‘ ‘USACE project’’), the prospective permittee must submit a preconstruction notification. See paragraph (b)(10) of general condition 32. An activity that requires section 408 permission is not authorized by NWP until the appropriate Corps office issues the section 408 permission to alter, occupy, or use the USACE project, and the district engineer issues a written NWP verification.

32. *Pre-Construction Notification.* (a) *Timing.* Where required by the terms of the NWP, the prospective permittee must notify the district engineer by submitting a pre-construction notification (PCN) as early as possible. The district engineer must determine if the PCN is complete within 30 calendar days of the date of receipt and, if the PCN is determined to be incomplete, notify the prospective permittee within that 30 day period to request the, additional information necessary to make the PCN complete. The request must specify the information needed to make the PCN complete. As a general rule, district engineers will request additional information necessary to make the PCN complete only once. However, if the prospective permittee does not provide all of the requested information, then the district engineer will notify the prospective permittee that the PCN is still incomplete and the PCN review process will not commence until all of the requested information has been received by the district engineer. The prospective permittee shall not begin the activity until either: (1) He or she is notified in writing by the district engineer that the activity may proceed under the NWP with any special conditions imposed by the district or division engineer; or (2) 45 calendar days have passed from the district engineer’s receipt of the complete PCN and the prospective permittee has not received written notice from the district or division engineer. However, if the permittee was required to notify the Corps pursuant to general condition 18 that listed species or critical habitat might be affected or are in the vicinity of the activity, or to notify the Corps pursuant to general condition 20 that the activity might have the potential to cause effects to historic properties, the permittee cannot begin the activity until receiving written notification from the Corps that there is ‘‘no effect’’ on listed species or ‘‘no potential to cause effects’’ on historic properties, or that any consultation required under Section 7 of the Endangered Species Act (see 33 CFR 330.4(f)) and/or section 106 of the National Historic Preservation Act (see 33 CFR 330.4(g)) has been completed. Also, work cannot begin under NWPs 21, 49, or 50 until the permittee has received written approval from the Corps. If the proposed activity requires a written waiver to exceed specified limits of an NWP, the permittee may not begin the activity until the district engineer issues the waiver. If the district or division engineer notifies the permittee in writing that an individual permit is required within 45 calendar days of receipt of a complete PCN, the permittee cannot begin the activity until an individual permit has been obtained. Subsequently, the permittee’s

right to proceed under the NWP may be modified, suspended, or revoked only in accordance with the procedure set forth in 33 CFR 330.5(d)(2). (b) *Contents of Pre-Construction Notification:* The PCN must be in writing and include the following information:
(1) Name, address and telephone numbers of the prospective permittee;
(2) Location of the proposed activity;
(3) Identify the specific NWP or NWP(s) the prospective permittee wants to use to authorize the proposedactivity;
(4) A description of the proposed activity; the activity's purpose; direct and indirect adverse environmental effects the activity would cause, including the anticipated amount of loss of wetlands, other special aquatic sites, and other waters expected to result from the NWP activity, in acres, linear feet, or other appropriate unit of measure; a description of any proposed mitigation measures intended to reduce the adverse environmental effects caused by the proposed activity; and any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity, including other separate and distant crossings for linear projects that require Department of the Army authorization but do not require pre-construction notification. The description of the proposed activity and any proposed mitigation measures should be sufficiently detailed to allow the district engineer to determine that the adverse environmental effects of the activity will be no more than minimal and to determine the need for compensatory mitigation or other mitigation measures. For single and complete linear projects, the PCN must include the quantity of anticipated losses of wetlands, other special aquatic sites, and other waters for each single and complete crossing of those wetlands, other special aquatic sites, and other waters. Sketches should be provided when necessary to show that the activity complies with the terms of the NWP. (Sketches usually clarify the activity and when provided results in a quicker decision. Sketches should contain sufficient detail to provide an illustrative description of the proposed activity (*e.g.,* a conceptual plan), but do not need to be detailed engineering plans); (5) The PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site. Wetland delineations must be prepared in accordance with the current method required by the Corps. The permittee may ask the Corps to delineate the special aquatic sites and other waters on the project site, but there may be a delay if the Corps does the delineation, especially if the project site is large or contains many wetlands, other special aquatic sites, and other waters. Furthermore, the 45 day period will not start until the delineation has been submitted to or completed by the Corps, as appropriate; (6) If the proposed activity will result in the loss of greater than 1⁄10-acre of wetlands and a PCN is required, the prospective permittee must submit a statement describing how the mitigation requirement will be satisfied, or explaining why the adverse environmental effects are no more than minimal and why compensatory mitigation should not be required. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan. (7) For non-Federal permittees, if any listed species or designated critical habitat might be affected or is in the vicinity of the activity, or if the activity is located in designated critical habitat, the PCN must include the name(s) of those endangered or threatened species that might be affected by the proposed activity or utilize the designated critical habitat that might be affected by the proposed activity. For NWP activities that require pre-construction notification, Federal permittees must provide documentation demonstrating compliance with the Endangered Species Act; (8) For non-Federal permittees, if the NWP activity might have the potential to cause effects to a historic property listed on, determined to be eligible for listing on, or potentially eligible for

listing on, the National Register of Historic Places, the PCN must state which historic property might have the potential to be affected by the proposed activity or include a vicinity map indicating the location of the historic property. For NWP activities that require pre-construction notification, Federal permittees must provide documentation demonstrating compliance with section 106 of the National Historic Preservation Act; (9) For an activity that will occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a ''study river'' for possible inclusion in the system while the river is in an official study status, the PCN must identify the Wild and Scenic River or the ''study river'' (see general condition 16); and (10) For an activity that requires permission from the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers federally authorized civil works project, the pre-construction notification must include a statement confirming that the project proponent has submitted a written request for section 408 permission from the Corps office having jurisdiction over that USACE project. (c) *Form of Pre-Construction Notification:* The standard individual permit application form (Form ENG 4345) may be used, but the completed application form must clearly indicate that it is an NWP PCN and must include all of the applicable information required in paragraphs (b)(1) through (10) of this general condition. A letter containing the required information may also be used. Applicants may provide electronic files of PCNs and supporting materials if the district engineer has established tools and procedures for electronic submittals. (d) *Agency Coordination:* (1) The district engineer will consider any comments from Federal and state agencies concerning the proposed activity's compliance with the terms and conditions of the NWPs and the need for mitigation to reduce the activity's adverse environmental effects so that they are no more than minimal. (2) Agency coordination is required for: (i) All NWP activities that require pre-construction notification and result in the loss of greater than 1/2-acre of waters of the United States; (ii) NWP 21, 29, 39, 40, 42, 43, 44, 50, 51, and 52 activities that require pre-construction notification and will result in the loss of greater than 300 linear feet of streambed; (iii) NWP 13 activities in excess of 500 linear feet, fills greater than one cubic yard per running foot, or involve discharges of dredged or fill material into special aquatic sites; and (iv) NWP 54 activities in excess of 500 linear feet, or that extend into the waterbody more than 30 feet from the mean low water line in tidal waters or the ordinary high water mark in the Great Lakes. (3) When agency coordination is required, the district engineer will immediately provide (*e.g.*, via email, facsimile transmission, overnight mail, or other expeditious manner) a copy of the complete PCN to the appropriate Federal or state offices (FWS, state natural resource or water quality agency, EPA, and, if appropriate, the NMFS). With the exception of NWP 37, these agencies will have 10 calendar days from the date the material is transmitted to notify the district engineer via telephone, facsimile transmission, or email that they intend to provide substantive, site-specific comments. The comments must explain why the agency believes the adverse environmental effects will be more than minimal. If so contacted by an agency, the district engineer will wait an additional 15 calendar days before making a decision on the preconstruction notification. The district engineer will fully consider agency comments received within the specified time frame concerning the proposed activity's compliance with the terms and conditions of the NWPs, including the need for mitigation to ensure the net adverse environmental effects of the proposed activity are no more than minimal. The district engineer will provide no response to the resource agency, except as provided below. The district engineer will indicate in the administrative record associated with each pre-construction notification that the resource agencies' concerns were

considered. For NWP 37, the emergency watershed protection and rehabilitation activity may proceed immediately in cases where there is an unacceptable hazard to life or a significant loss of property or economic hardship will occur. The district engineer will consider any comments received to decide whether the NWP 37 authorization should be modified, suspended, or revoked in accordance with the procedures at 33 CFR 330.5. (4) In cases of where the prospective permittee is not a Federal agency, the district engineer will provide a response to NMFS within 30 calendar days of receipt of any Essential Fish Habitat conservation recommendations, as required by section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act. (5) Applicants are encouraged to provide the Corps with either electronic files or multiple copies of preconstruction notifications to expedite agency coordination.

2017 APPROVED
NATIONWIDE PERMIT REGIONAL GENERAL CONDITIONS
FOR SOUTH CAROLINA (REVISED)

The following Regional Conditions have been approved by the Charleston District for the Nationwide Permits (NWP) published in the January 6, 2017, Federal Register as authorized under General Condition #27. Regional conditions are authorized to modify NWPs by adding conditions on a generic basis applicable to certain activities or specific geographic areas. Certain terminologies used in the following conditions are identified in *italics* and are defined in the above referenced Federal Register under Definitions.

Note: The acronym "*PCN*" used throughout the Regional Conditions refers to *Pre-Construction Notification*.

For All Nationwide Permits:

1. The applicant must implement *best management practices* during and after all construction to minimize erosion and migration of sediments off site. These practices may include use of devices capable of preventing erosion and migration of sediments in waters of the United States., including wetlands. These devices must be maintained in a functioning capacity until the area is permanently stabilized. All disturbed land surfaces must be stabilized upon project completion. Stabilization refers to the minimization of erosion and migration of sediments off site.

2. All wetland and stream crossings must be stabilized immediately following completion of construction/installation and must be aligned and designed to minimize the *loss of waters of the United States.*

3. Necessary measures must be taken to prevent oil, tar, trash, debris and other pollutants from entering waters of the United States, including wetlands that are adjacent to the authorized activity.

4. Any excess excavated materials not utilized as authorized back fill must be placed and contained on uplands and permanently stabilized to prevent erosion into waters of the United States, including wetlands.

5. Placement and/or stockpiling (double handling) of excavated material in waters of the United States, including wetlands, is prohibited unless specifically authorized in the nationwide permit verification. Should double handling be authorized, the material must be placed in a manner that does not impede circulation of water and will not be dispersed by currents or other erosive forces.

6. Once project construction is initiated, it must be carried to completion in an expeditious manner in order to minimize the period of disturbance to aquatic resources and the surrounding environment.

7. If you discover any previously unknown historic, cultural or archeological remains and

artifacts while accomplishing the activity authorized by this permit, you must immediately notify the district engineer of what you have found, and to the maximum extent *practicable*, avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The district engineer will initiate the Federal, Tribal, and state coordination required to determine if the items or remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places. Archeological remains consist of any materials made or altered by man, which remain from past historic or prehistoric times (i.e., older than 50 years). Examples include old pottery fragments, metal, wood, arrowheads, stone implements or tools, human burials, historic docks, *structure*s, or non-recent (i.e., older than 100 years) vessel ruins.

8. Use of nationwide permits does not obviate requirements to obtain all other applicable Federal, State, county, and local government authorizations.

9. No NWP is authorized in areas known or suspected to have sediment contamination, with the exception of NWP 38, and NWP 53 when used in combination with NWP 38.

10. In accordance with General Condition #31, "Activities Affecting *Structure*s or Works Built by the United States," a *PCN* must be submitted if a NWP activity also requires permission from the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers (USACE) federally authorized Civil Works project (a "USACE" project"). See General Condition #32 for *PCN* content and timing requirements and particularly paragraph (b)(10) for an activity that requires permission from the Corps pursuant to 33 U.S.C. 408. An activity in South Carolina that requires section 408 permission is not authorized by a NWP until the Charleston District issues the section 408 permission to alter, occupy, or use the USACE project, and the District Engineer issues a written NWP verification.

11. For all proposed activities that would be located in or adjacent to an authorized Federal Navigation project, as listed in Regional Condition #18, the *PCN* must include project drawings that have the following information: a) location of the edges of the Federal channel; b) setback distances from the edge of the channel; c) the distance from watermost edge of the proposed *structure* or fill to the nearest edge of the channel and the Mean High and Mean Low water lines; and d) coordinates of both ends of the watermost edge of the proposed *structure* or fill (NAD 83 State Plane Coordinates in decimal degrees). This notification requirement is in addition to the *PCN* requirements listed in General Condition #32.

12. For all proposed activities that would be located in waters that are designated critical habitat under section 7 of the Endangered Species Act, and waters that are proposed critical habitat, the prospective permittee must submit a *PCN* to the District Engineer in accordance with General Condition #32. Refer to the following National Oceanic and Atmospheric Administration (NOAA) Fisheries website for the most up-to-date information regarding Critical Habitat designations under the jurisdiction of the National Marine Fisheries Service (NMFS):
http://sero.nmfs.noaa.gov/protected_resources/section_7/threatened_endangered/

13. For all proposed activities that would be located within a FEMA designated floodway, the prospective permittee must submit a *PCN* to the District Engineer in accordance with General Condition #32.

14. The permittee must comply with all FEMA regulations and requirements. The permittee is advised that the National Flood Insurance Program (NFIP) prohibits any development within a designated floodway within the FEMA Special Flood Hazard Area (SFHA), including placement of fill, without a "No Impact Certification" approved by the local NFIP flood plain manager. If the proposed action is located in a designated FEMA SFHA (e.g.,100 year flood plain), the permittee must coordinate with the local NFIP flood plain manager and comply with FEMA requirements prior to initiating construction. A list of NFIP floodplain managers may be found at: http://www.dnr.sc.gov/water/flood/index.html.

15. The permittee must comply with all FEMA regulations and requirements. The permittee is advised that development activities in a designated FEMA Special Flood Hazard Area (SFHA) are subject to the floodplain management regulations of the National Flood Insurance Program (NFIP). If the proposed action is located in a designated FEMA SFHA (e.g.,100 year flood plain), the permittee must coordinate with the local NFIP flood plain manager and comply with FEMA requirements prior to initiating construction. A list of NFIP floodplain managers may be found at: http://www.dnr.sc.gov/water/flood/index.html.

For Specific Nationwide Permits:

16. **For NWPs 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, 44, 49, 50, 51 and 52,** in accordance with General Condition # 22(a), Designated Critical Resource Waters, the discharges of dredged or fill material into waters of the United States within, or directly affecting, critical resource waters, including wetlands adjacent to such waters, are NOT authorized by these NWPs. Note: The ACE Basin National Estuarine Research Reserve and the North Inlet Winyah Bay National Estuarine Research Reserve are Designated Critical Resource Waters.

17. **For NWPs 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37, 38 and 54,** in accordance with General Condition # 22(b), Designated Critical Resource Waters, a *PCN* is required for any activity proposed in designated critical resource waters including wetlands adjacent to those waters. Refer to General Condition #32 for *PCN* requirements. Note: The ACE Basin National Estuarine Research Reserve and the North Inlet Winyah Bay National Estuarine Research Reserve are Designated Critical Resource Waters.

18. **For NWPs 1, 3, 5, 7, 8, 10, 11, 12, 13, 14, 15, 19 and 36,** the prospective permittee must submit a *PCN* to the District Engineer for any activity that would be located in or adjacent to an authorized Federal Navigation project. These Federal navigation areas include Adams Creek, Atlantic Intracoastal Waterway (AIWW), Ashley River, Brookgreen Garden Canal, Calabash Creek Charleston Harbor (including the Cooper River and Town Creek), Folly River, Georgetown Harbor (Winyah Bay, Sampit River, and Bypass Canal), Jeremy Creek, Little River Inlet, Murrells Inlet (Main Creek), Port Royal Harbor, Savannah River, Shem Creek

(including Hog Island Channel & Mount Pleasant Channel), Shipyard Creek, Village Creek and the Wando River.

19. **For NWPs 3, 11, 12, 13, 14, 15, 20, 22 and 33,** temporary *structure*s, fills, and/or work, including the use of temporary mats, are only authorized for a period of 90 days per temporary impact area and/or phase of the overall project. The permittee may submit a written request at least 15 days prior to the expiration of the original period of 90 days requesting an extension of up to an additional 90 days. The Charleston District Engineer may extend the 90-day period up to an additional 90 days, not to exceed more than a total of 180 days, where appropriate. After expiration of the authorized period (i.e., initial 90 days or up to an additional 90 days), all temporary *structure*s, fills, and/or work, including the use of temporary mats, for the temporary impact area and/or phase of the overall project must be removed and the disturbed areas restored to pre-disturbance conditions. Activities that require the use of temporary *structure*s, fills, and/or work, including the use of temporary mats, in excess of 180 days will require Individual Permit authorization from the Corps prior to construction.

20. **For NWPs 3, 11, 12, 13, 14, 15, 20, 22 and 33,** that require *PCN*s and that involve temporary *structure*s, fills, and/or work, including the use of temporary mats, the *PCN* must include a written description and/or drawings of the proposed temporary activities that will be used during project construction. This requirement is in addition to the *PCN* requirements listed in General Condition #32.

21. **For NWPs 29, 39, 40, 42, 43, 44, 51 and 52,** impacts to stream beds** must be provided in both linear feet and acreage.

22. **NWPs 12, 14, 29, 39, 43, 51 and 52,** will not be used in conjunction with one another for an activity that is considered a *single and complete project.*

23. **For NWPs 12, 14, 29, 39, 46, 51 and 52,** all *PCN*s must include appropriately sized and positioned culverts that meet the requirements of General Conditions #2, #9 and #10 for each individual crossing of waters of the United States. This requirement is in addition to the *PCN* requirements listed in General Condition #32.

24. **For NWPs 12, 14, 29, 39, 46, 51 and 52,** that include the new construction and/or replacement of culverted road crossings, at a minimum, the width of the base flow culvert(s) shall be approximately equal to the average channel width and will not reduce or increase stream depth. This is a minimum requirement that does not replace local and State requirements for roadway design.

25. **For NWPs 12, 14, 18 and 27,** the *discharge* must not cause the *loss* of more than 300 linear feet of stream bed**, unless for *intermittent* and *ephemeral* stream beds the District Engineer waives the 300 linear foot limit by making a written determination concluding that the *discharge* will result in no more than minimal adverse environmental effects.

26. **For NWPs 12, 14, 18 and 27,** the *discharge* cannot cause the *loss* of more than 300 linear feet

of *perennial stream* beds**.

27. **For NWPs 12, 14, and 18,** the prospective permittee must submit a *PCN* to the District Engineer in accordance with General Condition #32, prior to commencing the activity if the proposed *discharge* will impact more than 25 linear feet of streambed. This notification requirement is in addition to the *PCN* requirements listed in General Condition #32.

28. **For NWP 3,** paragraph (a) and (c) activities, the prospective permittee must submit a *PCN* to the District Engineer in accordance with General Condition # 32, if the proposed *discharge* of dredged or fill material will cause the loss of greater than 1/10-acre of waters of the United States or if the proposed *discharge* of dredged or fill material will be located within a special aquatic site, which includes but is not limited to, wetlands, mudflats, vegetated shallows, *riffle and pool complex*es, sanctuaries, and refuges.

29. **For NWP 3,** paragraph (a) activities, the prospective permittee must submit a *PCN* to the District Engineer in accordance with General Condition # 32, for the repair, rehabilitation or replacement of existing utility lines constructed over *navigable waters* of the United States (i.e., Section 10 waters) and existing utility lines routed in or under *navigable waters* of the United States (i.e., Section 10 waters), even if no *discharge* of dredged or fill material occurs.

30. **For NWP 3,** paragraph (b) activities, excavation of accumulated sediment or other material is not authorized in areas within the immediate vicinity of existing *structure*s (e.g., private or commercial dock facilities, piers, canals dug for boating access, marinas, boat slips, etc.).

31. **For NWPs 7 and 12,** the associated intake *structure* must be screened to prevent entrainment of juvenile and larval organisms, and the inflow velocity of the associated intake *structure*s cannot exceed 0.5 feet/second.

32. Activities authorized by **NWP 7** must occur in the immediate vicinity of the outfall, and must be necessary for the overall construction or modification of the outfall. **NWP 7** shall not be used to authorize ancillary activities such as construction of access roads, installation of utility lines leading to or from the outfall or intake *structure*s, construction of buildings, distant activities, etc.

33. **For utility line activities authorized by NWP 12** (**as well as utility lines associated with projects authorized by NWP 29 and 39)** that involve horizontal directional drilling beneath *navigable waters* of the United States (i.e., section 10 waters), the *PCN* must include a proposed remediation plan (i.e., frac-out plan). This requirement is in addition to the *PCN* requirements listed in General Condition #32.

34. **For utility line activities authorized by NWP 12 (as well as utility lines associated with projects authorized by NWP 29 and 39),** excavated material shall be returned to the trench and any remaining material shall be relocated and retained on an upland disposal site. Substrate containing roots, rhizomes, seeds, and other natural material must be kept viable and replaced at the surface of the excavated site. Impacted wetlands will be replanted with native wetland

species or allowed to naturally re-vegetate from the replaced substrate, as long as the resulting vegetation is native.

35. **For utility line activities authorized by NWP 12 (as well as utility lines associated with projects authorized by NWP 29 and 39),** stream banks that are cleared of vegetation will be stabilized using bioengineering techniques and/ or the planting of deep-rooted native species.

36. **For utility line activities authorized by NWP 12 (as well as utility lines associated with projects authorized by NWP 29 and 39),** construction techniques to prevent draining, such as anti-seep collars, will be required for utility lines buried in waters of the United States when necessary. If no construction techniques to prevent draining are proposed, the prospective permittee must provide appropriate documentation to support that such techniques are not required to prevent drainage of waters of the United States.

37. **For NWP 12,** the prospective permittee must submit a *PCN* to the District Engineer in accordance with General Condition #32 prior to commencing the activity if the activity will involve temporary *structure*s, fills, and/or work. To be complete, the *PCN* must also include the specifications of how pre-construction contours will be re-established and verified after construction. This notification requirement is in addition to the notification criteria listed for this NWP.

38. **For utility line activities authorized by NWP 12, (as well as utility lines associated with projects authorized by NWP 29 and 39),** the prospective permittee must submit a *PCN* to the District Engineer in accordance with General Condition #32, prior to commencing the activity if the activity will involve maintained utility crossings. To be complete, the *PCN* must also include a justification for the required width of the maintained crossing that impacts waters of the United States. This notification requirement is in addition to the notification criteria listed for this NWP.

39. **For NWP 12,** the prospective permittee must submit a *PCN* to the District Engineer in accordance with General Condition #32 prior to commencing the activity if the activity will involve the construction of a sub-station in waters of the United States. To be complete, the *PCN* must also include a statement of avoidance and minimization for the *loss of waters of the United States* impacted by the utility line sub-station. This requirement is in addition to the *PCN* requirements listed in General Condition #32.

40. **For NWP 12,** the prospective permittee must submit a *PCN* to the District Engineer in accordance with General Condition #32 prior to commencing the activity if the activity will involve the permanent conversion of forested wetlands to herbaceous wetlands. To be complete, the *PCN* must also include the acreage of conversion impacts of waters of the United States and a *compensatory mitigation* proposal or a statement of why *compensatory mitigation* should not be required. This requirement is in addition to the *PCN* requirements listed in General Condition #32.

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41. **For NWP 13 activities, NWP 54 activities, and living shoreline projects authorized by NWP 27** that require submittal of a *PCN*, the *PCN* must include the following information:

    a. Habitat type along the shoreline;
    b. The presence of stabilization *structure*s in the vicinity of the project;
    c. Cause/s, extent, and approximate rate of erosion (if known);
    d. Site specific information which may include: shoreline orientation, slope, bank height, tidal range, nearshore bathymetry, fetch, substrate stability, etc.;
    e. Rationale for selecting the preferred stabilization technique;
    f. A statement that structural materials toxic to aquatic organisms will not be used and if stone is proposed, a statement that only clean stone, free of exposed rebar, asphalt, plastic, soil, etc., will be used; and
    g. A statement that filter fabric will be used as appropriate when stone or other heavy material is proposed.

    These requirements are in addition to the *PCN* requirements listed in General Condition #32.

42. Projects qualifying for **NWP 27 and/or NWP 54** will require coordination with appropriate Federal, State, and local agencies. The coordination activity will be conducted by the Corps of Engineers. Agencies will generally be granted 15 days to review and provide comments unless the District Engineer determines that an extension of the coordination period is reasonable and prudent.

43. **For NWP 29,** the *loss of waters of the United States* is limited to a maximum of ¼-acre for a single family residence.

44. **For NWPs 29 and 39,** the *discharge*s of dredged or fill material for the construction of *stormwater management facilities* in *perennial streams* are not authorized.

45. **For NWP 33,** the prospective permittee must submit a *PCN* to the District Engineer in accordance with General Condition #32, for temporary construction, access, and dewatering activities that occur in non-tidal waters of the United States, including wetlands. In addition, the *PCN* shall include a restoration plan.

46. **For NWP 36,** only one boat ramp may be constructed on a single lot or tract of land (e.g., each lot within a subdivision).

47. **For NWP 38,** the *PCN* must contain the following information:

    a. documentation that the specific activities are required to effect the containment, stabilization, or removal of hazardous or toxic waste materials as performed, ordered, or sponsored by a government agency with established legal or regulatory authority;

    b. a narrative description indicating the size and location of the areas to be restored, the work involved and a description of the anticipated results from the restoration; and

c. a plan for the monitoring, operation, or maintenance of the restored area.

This requirement is in addition to the *PCN* requirements listed in General Condition #32.

48. **For NWP 41,** a *PCN* must be submitted to the District Engineer for projects that require mechanized land clearing in waters of the United States, including wetlands, in order to access or perform reshaping activities.

49. **NWP 41** is prohibited in channelized streams or stream relocation projects that exhibit natural stream characteristics and/or perform natural stream functions.

50. **For NWP 48,** changing from bottom culture to floating or suspended culture will require submittal of a *PCN* to the District Engineer. Additionally, new aquaculture activities involving suspended or floating culture will require submittal of a *PCN* to the District Engineer. Refer to the *PCN* requirements listed in General Condition #32. Note: If the District Engineer determines that the proposed floating or suspended culture will result in more than minimal adverse environmental effects, an Individual Permit will be required for the proposed activity.

51. **For NWP 48,** when a new commercial shellfish aquaculture activity will occur adjacent to property that is not owned by the prospective permittee, the activity will require submittal of a *PCN* to the District Engineer. The *PCN* must include the following information in addition to the *PCN* requirements listed in General Condition #32:

    a. A map or depiction that shows the adjacent property(ies) and adjacent property owners' contact information. Note: This information may be obtained online from the applicable county's tax information pages.

    b. A signed letter(s) of "no objection" to the proposed commercial shellfish activity from each of the adjacent property owner(s). Each letter shall include the name, mailing address, property address, property Tax Map Parcel (TMS) number, and signature of the property owner.

52. **For NWP 53,** the *PCN* must include a Tier I evaluation, in accordance with the Inland Testing Manual, for the project area immediately upstream of the low-head dam. If the Tier I evaluation indicates contaminated sediments are present, a Tier II evaluation may be required.

53. **For NWP 54 projects and living shoreline and/or oyster restoration projects authorized by NWP 27,** the *PCN* must include the following information in addition to the *PCN* requirements listed in General Condition #32:

    a. A plan view project sketch that shows the proposed project footprint; the Mean High Water (MHW) Line; the Mean Low Water (MLW) Line; marsh line (if applicable); shoreline; width of the waterway at the project location; location of adjacent *structure*s,

such as docks and boat ramps (if applicable); distance of the project footprint from the MHW line; distance of the project footprint from adjacent *structure*s; and proposed location of informational or navigation markers. Refer to c. and d. below, if applicable. Note: Refer to Regional Condition #11 if the proposed project is located in or adjacent to an authorized Federal Navigation project for the additional information that will be required.

b. A cross-section sketch that shows the height of the proposed project above substrate and the water depth at MHW Line and MLW Line in relation to the proposed project.

c. For projects that are 18 inches or less in height above substrate AND consist of hard *structure*s or fill material, such as, but not limited to, riprap, oyster castles, bagged oyster shell and wooden sills, informational signs to alert boaters to the presence of the project area will be required. The *PCN* must include a depiction and description of proposed informational signs. The signs must be made of reflective material or must include reflective tape on the sign or sign post. The signs must be located at each end of the project area and at 100-foot increments along the project area, if applicable. Note 1: Projects that include ONLY the use of loose shell will not require the installation of informational or navigational signs. Note 2: The prospective permittee shall be made aware that the U.S. Coast Guard (USCG) may require the project area to be marked. Prior to commencing work, the permittee shall contact the USCG at U. S. Coast Guard Charleston District Seven, Waterways Management Branch, 909 SE 1st Ave, Suite 406, Miami, FL 33131, or by phone at 305-415-6755 or 305-415-6750, regarding possible markers and/or lighting requirements. The permittee shall install all markers and/or lighting as required by the USCG. In the event that the USCG does not require markers or lighting, the permittee shall mark the project area with Corps approved informational signs as described above. Note 3: These requirements will be added to the NWP verification as special conditions.

d. For projects that are more than 18 inches in height above substrate AND consist of hard *structure*s or fill material, such as, but not limited to, riprap, oyster castles, bagged oyster shell, and wooden sills, the prospective permittee must mark the project area with diamond-shaped white day markers with orange border and black print stating “Danger Obstruction”. The signs shall be located at each end of the project area and at 100-foot increments along the project area, if applicable. Note 1: Projects that include ONLY the use of loose shell will not require the installation of informational or navigational signs. Note 2: Prior to commencing work, the permittee shall contact the USCG at U. S. Coast Guard Charleston District Seven, Waterways Management Branch, 909 SE 1st Ave, Suite 406, Miami, FL 33131, or by phone at 305-415-6755 or 305-415-6750, regarding potential project specific approval of the markers. The permittee shall install all markers and/or lighting as required by the USCG. In the event the USCG does not require these or other markers and/or lighting, the “Danger Obstruction” markers are still required by the Corps. Note 3: These requirements will be added to the NWP verification as special conditions.

2017 APPROVED
NATIONWIDE PERMIT REGIONAL GENERAL CONDITIONS
FOR SOUTH CAROLINA (REVISED)

** For the purpose of these regional conditions, the term “stream bed” also includes features determined to be a “tributary” and a “relatively permanent water.”

Note 1: For the purpose of these regional conditions, bankfull is defined as the top-of-bank to top-of bank of the channel in a cross-sectional view.

Note 2: Regional conditions # 14, #15, and #53d were revised on September 7, 2017.

2017 Nationwide Permit

Please read this Nationwide Permit along with the General, Regional, and Special conditions that may be associated with this permit. It is your responsibility to insure your project meets this nationwide permit and the conditions at all times. If changes are needed or if you cannot meet these requirements, please notify the Corps before proceeding with the work.

3. Maintenance.
(a) The repair, rehabilitation, or replacement of any previously authorized, currently serviceable structure or fill, or of any currently serviceable structure or fill authorized by 33 CFR 330.3, provided that the structure or fill is not to be put to uses differing from those uses specified or contemplated for it in the original permit or the most recently authorized modification. Minor deviations in the structure's configuration or filled area, including those due to changes in materials, construction techniques, requirements of other regulatory agencies, or current construction codes or safety standards that are necessary to make the repair, rehabilitation, or replacement are authorized. This NWP also authorizes the removal of previously authorized structures or fills. Any stream channel modification is limited to the minimum necessary for the repair, rehabilitation, or replacement of the structure or fill; such modifications, including the removal of material from the stream channel, must be immediately adjacent to the project. This NWP also authorizes the removal of accumulated sediment and debris within, and in the immediate vicinity of, the structure or fill. This NWP also authorizes the repair, rehabilitation, or replacement of those structures or fills destroyed or damaged by storms, floods, fire or other discrete events, provided the repair, rehabilitation, or replacement is commenced, or is under contract to commence, within two years of the date of their destruction or damage. In cases of catastrophic events, such as hurricanes or tornadoes, this two-year limit may be waived by the district engineer, provided the permittee can demonstrate funding, contract, or other similar delays. (b) This NWP also authorizes the removal of accumulated sediments and debris outside the immediate vicinity of existing structures (e.g., bridges, culverted road crossings, water intake structures, etc.). The removal of sediment is limited to the minimum necessary to restore the waterway in the vicinity of the structure to the approximate dimensions that existed when the structure was built, but cannot extend farther than 200 feet in any direction from the structure. This 200 foot limit does not apply to maintenance dredging to remove accumulated sediments blocking or restricting outfall and intake structures or to maintenance dredging to remove accumulated sediments from canals associated with outfall and intake structures. All dredged or excavated materials must be deposited and retained in an area that has no waters of the United States unless otherwise specifically approved by the district engineer under separate authorization. (c) This NWP also authorizes temporary structures, fills, and work, including the use of temporary mats, necessary to conduct the maintenance activity. Appropriate measures must be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable, when temporary structures, work, and discharges, including cofferdams, are necessary for construction activities, access fills, or dewatering of construction sites. Temporary fills must consist of materials, and be placed in a manner, that will not be eroded by expected high flows. After conducting the maintenance activity, temporary fills must be removed in their entirety and the affected areas returned to preconstruction elevations. The areas affected by temporary fills must be revegetated, as appropriate. (d) This NWP does not authorize maintenance dredging for the primary purpose of navigation. This NWP does not authorize beach restoration. This NWP does not authorize new stream channelization or stream relocation projects.
Notification: For activities authorized by paragraph (b) of this NWP, the permittee must submit a preconstruction notification to the district engineer prior to commencing the activity (see general

condition 32). The pre-construction notification must include information regarding the original design capacities and configurations of the outfalls, intakes, small impoundments, and canals. (**Authorities:** Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act)

Note: This NWP authorizes the repair, rehabilitation, or replacement of any previously authorized structure or fill that does not qualify for the Clean Water Act section 404(f) exemption for maintenance.

Joint Federal and State Application Form
For Activities Affecting Waters of the United States
Or Critical Areas of the State of South Carolina

This Space for Official Use Only
Application No._____
Date Received_____
Project Manager_____
Watershed # _____

RECEIVED
By Dorothy Swearingin at 1:47 pm, Dec 03, 2019

Authorities: 33 USC 401, 33 USC 403, 33 USC 407, 33 USC 408, 33 USC 1341, 33 USC 1344, 33 USC 1413 and Section 48-39-10 et. Seq of the South Carolina Code of Laws. These laws require permits for activities in, or affecting, navigable waters of the United States, the discharge of dredged or fill material into waters of the United States, and the transportation of dredged material for the purpose of dumping it into ocean waters. The Corps of Engineers and the State of South Carolina have established a joint application process for activities requiring both Federal and State review or approval. Under this joint process, you may use this form, together with the required drawings and supporting information, to apply for both the Federal and/or State permit(s).

Drawings and Supplemental Information Requirements: In addition to the information on this form, you must submit a set of drawings and, in some cases, additional information. A completed application form together with all required drawings and supplemental information is required before an application can be considered complete. See the attached instruction sheets for details regarding these requirements. You may attach additional sheets if necessary to provide complete information.

1. Applicant Last Name: Quillian	11. Agent Last Name (agent is not required): Fletcher
2. Applicant First Name: Ed	12. Agent First Name: Josh
3. Applicant Company Name: RJ Corman Railroad Company	13. Agent Company Name: HDR
4. Applicant Mailing Address: 101 R. J. Corman Drive	14. Agent Mailing Address: 4400 Leeds Avenue, Suite 450
5. Applicant City: Nicholasville	15. Agent City: North Charleston
6. Applicant State: Kentucky / 7. Applicant Zip: 40340	16. Agent State: South Carolina / 17. Agent Zip: 29405-7547
8. Applicant Area Code and Phone No.: 859-881-2499	18. Agent Area Code and Phone No.: 843-414-3738
9. Applicant Fax No.: 859-881-2699	19. Agent Fax No.:
10. Applicant E-mail: Edward.Quillian@RJCorman.com	20. Agent E-mail: joshua.fletcher@hdrinc.com

21. Project Name: Replacement of RJ Corman Bridge 334.5 over Crabtree Creek	22. Project Street Address: Conway
23. Project City: Conway / 24. Project County: Horry	25. Project Zip Code: 29526 / 26. Nearest Waterbody: Crabtree Creek
27. Tax Parcel ID: N/A-railroad right-of-way	28. Property Size (acres): 4.2
29. Latitude: 33.861678	30. Longitude: -79.049295

31. Directions to Project Site (Include Street Numbers, Street Names, and Landmarks and attach additional sheet if necessary):

From downtown Conway, head north on US 701. Approximately 0.2 miles after crossing Mill Pond Road, and approximately 395 feet after crossing Crabtree Creek, turn off on an access road to the right. There is a small parking area, and from there, one can walk/drive the trail that leads east to bridge 334.5, approximately 0.4 miles from the parking area.

32. Description of the Overall Project and of Each Activity in or Affecting U.S. Waters or State Critical Areas (attach additional sheets if needed)

The project will replace the railroad bridge over Crabtree Creek at MP 334.5. The bridge replacement will remove 72 (12" diameter) timber piles from the stream (existing piles will be cut off at a minimum of one foot below the existing mudline) and will place 15.5 20" diameter steel pipe piles for a total of 25.8 linear feet of new piers in the stream. See cover letter for additional details.

33. Overall Project Purpose and the Basic Purpose of Each Activity In or Affecting U.S. Waters (attach additional sheets if needed):

The purpose of the project is to replace the railroad bridge over Crabtree Creek at MP 334.5. The bridge has exceeded its design life and is in need of replacement for safe and reliable railroad transportation.

34. Type and quantity of Materials to Be Discharged

Dirt or Topsoil:	_____	☐ cubic yards
Clean Sand:	_____	☐ cubic yards
Mud:	_____	☐ cubic yards
Clay:	_____	☐ cubic yards
Gravel, Rock, or Stone:	_____	☐ cubic yards
Concrete:	_____	☐ cubic yards
Other (describe):	_____	☐ cubic yards
TOTAL:	_____	cubic yards

35. Type and Quantity of Impacts to U.S. Waters (including wetlands).

Filling:	0.0868	■ acres	☐ sq.ft.	_____	☐ cubic yards
Backfill & Bedding:	_____	☐ acres	☐ sq.ft	_____	☐ cubic yards
Landclearing:	_____	☐ acres	☐ sq.ft	_____	☐ cubic yards
Dredging:	_____	☐ acres	☐ sq.ft.	_____	☐ cubic yards
Flooding:	_____	☐ acres	☐ sq.ft.	_____	☐ cubic yards
Draining/Excavation:	_____	☐ acres	☐ sq.ft.	_____	☐ cubic yards
Shading:	_____	☐ acres	☐ sq.ft.	_____	☐ cubic yards

TOTALS: 0.0868 acres _____ sq.ft. _____ cubic yards

36. Individually list wetland impacts including mechanized clearing, fill, excavation, flooding, draining, shading, etc. and attach a site map with location of each impact (attach additional sheets if needed).

Impact No.	Wetland Type	Distance to Receiving Water body (LF)	Purpose of Impact (road crossing, impoundment, flooding, etc)	Impact Size (acres)
Wetland A	Wetland	110	Rip rap at bridge abutment	0.0006
Wetland B	Wetland	97	Rip rap at bridge abutment	0.0016
Wetland D (temporary)	Wetland	0	Temporary construction trestle	0.0146
			Total Wetland Impacts (acres)	0.0168

37. Individually list all seasonal and perennial stream impacts and attach a site map with location of each impact (attach additional sheets)

Impact No.	Seasonal or Perennial Flow	Average Stream Width (LF)	Impact Type (road crossing, impoundment, flooding, etc)	Impact Length (LF)
Crabtree Creek (non-tidal)	Perennial	66	Bridge piles	25.8
Crabtree Creek (non-tidal); temporary	Perennial	66	Temporary construction trestle	32
Non-Wetland Water 2 (non-tidal)	Perennial	5	Rip rap at bridge abutment	8.49
			Total Stream Impacts (Linear Feet)	66.29

38. Have you commenced work on the project site? ☐ YES ■ NO If yes, describe all work that has occurred and provide dates.

39. Describe measures taken to avoid and minimize impacts to Waters of the United States:

Complete avoidance of waters of the U.S. is not feasible in order to fulfill the project purpose which is to replace a railroad bridge over Crabtree Creek. The construction trestle will be located adjacent to the secondary staging area so that material handling can be minimized. In order to access the south end of the bridge, a temporary construction trestle will be constructed within the railroad right-of-way (ROW) on the west side of the bridge. The crane will move along the temporary construction trestle as required for construction. Minor improvements, such as placement of rock material, will be required in both staging areas as well as along the pedestrian trail to limit damage caused by heavy equipment and staging of materials. All temporary materials, fills, and construction trestle will be entirely removed after construction is complete. Affected areas will be returned to their pre-construction elevations and re-vegetated as required.

40. Provide a brief description of the proposed mitigation plan to compensate for impacts to aquatic resources or provide justification as to why mitigation should not be required (Attach a copy of the proposed mitigation plan for review).

The unavoidable permanent fill impact (0.0068 acres) is below the compensatory mitigation threshold of 0.10 acre. Also, the number of piles in the water is decreased from 72 to 15.5, reducing overall footprint in the water and improving hydraulic and habitat conditions.

41. See the attached sheet to list the names and addresses of adjacent property owners.

42. List all Corps Permit Authorizations and other Federal , State, or Local Certifications, Approvals, Denials received for work described in this application.

No other permits have been received to date.

43. Authorization of Agent. I hereby authorize the agent whose name is given on page one of this application to act in my behalf in the processing of this application and to furnish supplemental information in support of this application. [1]

Ed Quill 12/2/19

Applicant's Signature Date

44. Certification. Application is hereby made for a permit or permits to authorize the work and uses of the work as described in this application. I certify that the information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent for the applicant. [1]

Ed Quill 12/2/19 Fletcher, Joshua Nicholas Digitally signed by Fletcher, Joshua Nicholas Date: 2019.12.02 08:38:08 -05'00' 12/2/19

Applicant's Signature Date Agent's Signature Date

[1]**The application must be signed by the person who desires to undertake the proposed activity or it may be signed by a duly authorized agent if the authorization statement in blocks 11 and 43 have been completed and signed. 18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.**

#41- Adjacent Property Owner Mailing List

NOTE: A depiction of the adjacent properties with identifying corresponding property owner names must accompany this mailing list.
(Attach additional sheets if necessary)

Applicant Name: RJ Corman Railroad Company

Project Name: Replacement of RJ Corman Bridge 334.5 over Crabtree Creek

Property Owner Name	Mailing Address
1. Jordan, Charles B.	612 Lakeside Drive Conway, SC 29526
2. Snow Hill Company	PO Box 1605 Conway, SC 29528
3. Snow Hill Company	PO Box 1605 Conway, SC 29528
4. Conway Feed & Grain Company Inc.	PO Pox 497 Conway, SC 29528
5. Lester, Richard E.	1303 Azalea Ct Myrtle Beach, SC 29577
6. Boyd John B Etal	P.O. Box 1802 Conway , SC 29528
7. City of Conway	P.O. Box 1075 Conway , SC 29528
8. City of Conway	P.O. Box 1075 Conway , SC 29528
9. Williams Family Heirs LLC	539 S Main St Findlay, OH 45840
10. Kingston Land Inc.	P.O. Box 1939 Conway , SC 29528
11. City of Conway	229 Main St Conway, SC 29526

Project Number: **SAC-2020-01985**

Ed Quillian
Name of Permittee: **RJ Corman Railroad Company**

Date of Issuance: **March 13, 2020**

Upon completion of the activity authorized by this Nationwide Permit/General Permit authorization letter, including any compensatory mitigation, sign this certification and return it to the following address:

U.S. Army Corps of Engineers
Regulatory Division – Northeast Branch
1949 Industrial Park Road, Suite 140
Conway, South Carolina 29526

Please note that the authorized activity is subject to a compliance inspection by an U.S. Army Corps of Engineers representative. If you fail to comply with the terms and conditions of your Nationwide Permit authorization letter this office may suspend, modify, or revoke this authorization.

PM:ES

==========

***I hereby certify that the work authorized by the above referenced Nationwide Permit/General Permit authorization letter has been completed in accordance with the terms and conditions of said authorization letter, including the performance of any required compensatory mitigation*.**

_____
Signature of Permittee

DRAWING NO.	DESCRIPTION
334.3-01	TITLE SHEET
334.3-02	GENERAL NOTES (1 OF 2)
334.3-03	GENERAL NOTES (2 OF 2) AND BRIDGE DETAILS
334.3-04	SITE PLAN
334.3-05	GENERAL PLAN AND ELEVATION
334.3-06	TYPICAL SECTIONS
334.3-07	FOUNDATION LAYOUT
334.3-08	PRECAST CONCRETE WINGWALL DETAILS
334.3-09	PRECAST CONCRETE BACKWALL DETAILS
334.3-10	PRECAST CONCRETE END BENT CAP DETAILS
334.3-11	PRECAST CONCRETE INTERIOR BENT CAP DETAILS
334.3-12	EMBEDDED PLATE DETAILS
334.3-13	30'-0" PRESTRESSED CONCRETE BOX BEAM (1 of 2)
334.3-14	30'-0" PRESTRESSED CONCRETE BOX BEAM (2 of 2)
334.3-15	SPAN JOINT DETAILS
334.3-16	PRECAST CONCRETE TRESTLE DETAILS (1 of 2)
334.3-17	PRECAST CONCRETE TRESTLE DETAILS (2 of 2)
334.3-18	HANDRAIL DETAILS
334.3-19	BORING LOGS

R.J. CORMAN BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP
CONWAY, SC
BRIDGE REPLACEMENT

ESTIMATED QUANTITIES			
QTY.	UNIT	DESCRIPTION	SEE SHEET
24	EACH	29'-11 1/2" SPAN, 33" DEEP PRESTRESSED CONCRETE BOX BEAM	
9	EACH	PRECAST CONCRETE PILE CAP	
2	EACH	PRECAST CONCRETE BACKWALL	
4	EACH	PRECAST CONCRETE WINGWALL	
30	EACH	20" DIA. x 5/8" WALL THICKNESS PIPE PILE	
30	EACH	20" DIA. OPEN ENDED CUTTING SHOE	
XXX	FT.	PREFORMED EXPANSION JOINT FILLER 2'-9" x 1/2"	
	TONS	RIPRAP STONE	
1	LOT	HANDRAIL ASSEMBLIES	

PERMITTED PLANS

PROJECT INFORMATION

EXISTING BRIDGE WIDTH: 14'-0" OUT-TO-OUT TIMBER DECK

EXISTING SPAN LAYOUT: 10'-0" CENTERLINE BENT TO CENTERLINE BENT

PROPOSED WIDTH: SPANS 1-9: 3 PCB BEAMS @ 5'-5"; BRIDGE WIDTH = 16'-4"

PROPOSED SPAN LAYOUT: SPAN 1: 29'-2" CENTERLINE BENT TO CENTERLINE BENT
SPANS 3-7: 30'-0" CENTERLINE BENT TO CENTERLINE BENT
SPAN 8: 29'-2" CENTERLINE BENT TO CENTERLINE BENT

PROPOSED LIFTING WEIGHTS: 33" PRECAST CONCRETE BOX BEAM (PCB) =50,000 LBS
PRECAST CONCRETE BENT CAP =38,000 LBS
PRECAST CONCRETE WINGWALL =10,000 LBS
PRECAST CONCRETE BACKWALL =8,000 LBS

SPECIFICATION

CONSTRUCTION: PROJECT SPECIFICATIONS.

DIMENSIONS: THESE CONTRACT DRAWINGS ARE BASED UPON AVAILABLE DESIGN DRAWINGS OF THE EXISTING BRIDGE. IT IS THE CONTRACTORS RESPONSIBILITY TO VERIFY ALL DIMENSIONS IN THE FIELD BEFORE FABRICATION TO ENSURE PROPER FIT OF NEW MATERIAL.

DESIGN: 2019 EDITION OF THE AMERICAN RAILWAY ENGINEERING AND MAINTENANCE OF WAY ASSOCIATION (AREMA) "MANUAL FOR RAILWAY ENGINEERING" CHAPTER 15 – STEEL STRUCTURES, CHAPTER 8-CONCRETE STRUCTURES & FOUNDATIONS.

DESIGN CRITERIA

DEAD LOAD: WEIGHT OF RAIL AND FASTENINGS, BALLAST, STEEL DECK, WALKWAY, UTILITIES AND OTHER MISCELLANEOUS FIXTURES

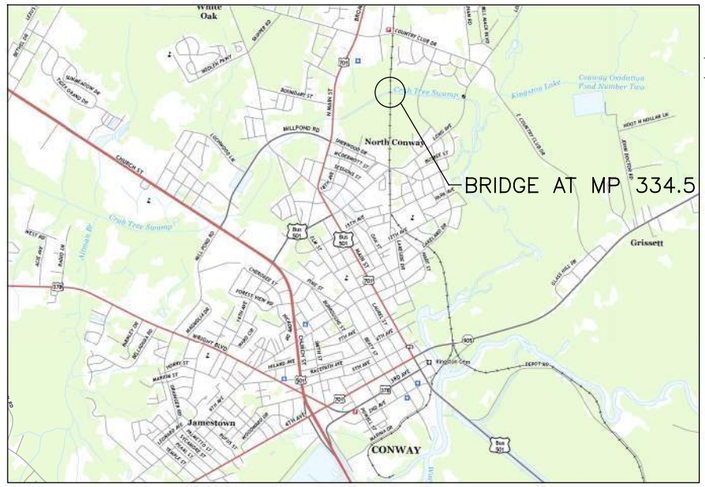
LIVE LOAD: COOPER E-80/ALTERNATE LOADING

IMPACT: APPLICABLE PERCENTAGE FOR ROLLING EQUIPMENT WITHOUT HAMMER BLOW.

FATIGUE: PER AREMA 15-1.3.13 FATIGUE

WIND LOAD: PER AREMA 8-2.2.3, 15-1.3.7 AND 15-1.3.8, AS REQUIRED

SUBSTRUCTURE: CONCRETE SUBSTRUCTURE IS DESIGNED BY LOAD FACTOR METHOD WITH A SAFETY FACTOR OF 2



LATITUDE: 33°51'41.35" N
LONGITUDE: 79°02'57.89" W

LOCATION MAP
SCALE: NTS

ABBREVIATIONS

ABUT.	ABUTMENT	ELEV.	ELEVATION	NIC	NOT IN CONTRACT
APPROX.	APPROXIMATE	EQ.	EQUAL	OHE	OVERHEAD ELECTRICAL
ASSOC.	ASSOCIATED	EX.	EXISTING	O/O	OUT TO OUT
B.F.	BACK FACE	EXP.	EXPANSION	℄	PLATE
BOT.	BOTTOM	FB	FLOOR BEAM	PROP.	PROPOSED
B/R	BASE OF RAIL	FCM	FRACTURE CRITICAL MEMBER	REQ.	REQUIRED
BRG.	BEARING	F.F.	FAR FACE	ROW	RIGHT OF WAY
C/C	CENTER TO CENTER	FFBW	FRONT FACE BACKWALL	S.E.	SUPERELEVATION
℄	CENTERLINE	FIX.	FIXED	S.F.	SQUARE FOOT
C.F.	CUBIC FOOT	FT.	LINEAR FOOT	SPA.	SPACE
CLR.	CLEAR	GAL.	GALLONS	STA.	STATION
CONC.	CONCRETE	GALV.	GALVANIZED	STD.	STANDARD
CONN.	CONNECTION	HORIZ.	HORIZONTAL	STR	STRAIGHT
CP	CONTROL POINT	INT.	INTERMEDIATE	STR.	STRINGER
C.Y.	CUBIC YARDS	IPS	IRON PIN SET	S.Y.	SQUARE YARD
DIA.	DIAMETER	LBS.	POUNDS	TPG	THROUGH PLATE GIRDER
DIM.	DIMENSION	L.S.	LUMP SUM	TYP.	TYPICAL
DWG.	DRAWING	MAX.	MAXIMUM	T/R	TOP OF RAIL
EA.	EACH	MBF	THOUSAND BOARD FEET	TOR	TOP OF RAIL
E.F.	EACH FACE	MIN.	MINIMUM	UNO.	UNLESS NOTED OTHERWISE
EL.	ELEVATION	N.F.	NEAR FACE	VERT.	VERTICAL

SAC-2019-01985
RJC Bridge Replacement
Applicant: RJ Corman Railroad Company
Horry County, South Carolina

November 26, 2019 Sheet 1 of 6

90% F

HDR ENGINEERING, INC.
4400 LEEDS AVE., SUITE 450
NORTH CHARLESTON, SC 29405
843-414-3700

APPROVED FOR
R.J. CORMAN RAILROAD
BY
HDR ENGINEERING INC.
OF THE CAROLINAS
(CHARLESTON, SC)
BY: X
ENGINEER'S NAME
DATE: 11/12/2019

FILE: 334.5-01.dgn

RJ Corman Railroad Group

REVISIONS

BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP
TITLE SHEET
HORRY COUNTY CONWAY, SC
DIVISION: RJCK

SCALE: AS SHOWN	VAL. SEC.	DRAWING NO.
DATE: 11/12/2019		334.5-01
DESIGN: TCS		
DRAWN: RGD		
CHECKED: JFM		

FILENAME: c:\pwworking\east01\d1152259\334.5-01.dgn USER: rdixon SCALE FACTORS CORRESPOND WITH FULL SIZE (22"x34") DRAWINGS

CONTROL POINTS

CONTROL POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
CP #1	743.505.36	2592043.070	3.79'	NAIL & WASHER
CP #2	473457.250	2591790.240	8.19'	NAIL & WASHER
CP #3	data not provided	in survey file		

NOTE

1. EXISTING PEDESTRIAN TRAIL OWNED BY HORRY COUNTY. CONTRACTOR SHALL COORDINATE WITH HORRY COUNTY AND THE CITY OF CONWAY AS REQUIRED FOR ESTABLISHING STAGING AREA AND ACCESS ROAD.

90%

SAC-2019-01985
RJC Bridge Replacement
Applicant: RJ Corman Railroad Company
Horry County, SouthCarolina

November 26, 2019 Sheet 2 of 6

HDR ENGINEERING, INC.
4400 LEEDS AVE., SUITE 450
NORTH CHARLESTON, SC 29405
843-414-3700

APPROVED FOR
R.J. CORMAN RAILROAD
BY
HDR ENGINEERING INC.
OF THE CAROLINAS
(CHARLESTON, SC)
BY: X
ENGINEER'S NAME
DATE: 11/12/2019
FILE: 334.5-04.dgn

RJ Corman Railroad Group

REVISIONS

BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP
SITE PLAN
HORRY COUNTY CONWAY, SC
DIVISION: RJCK

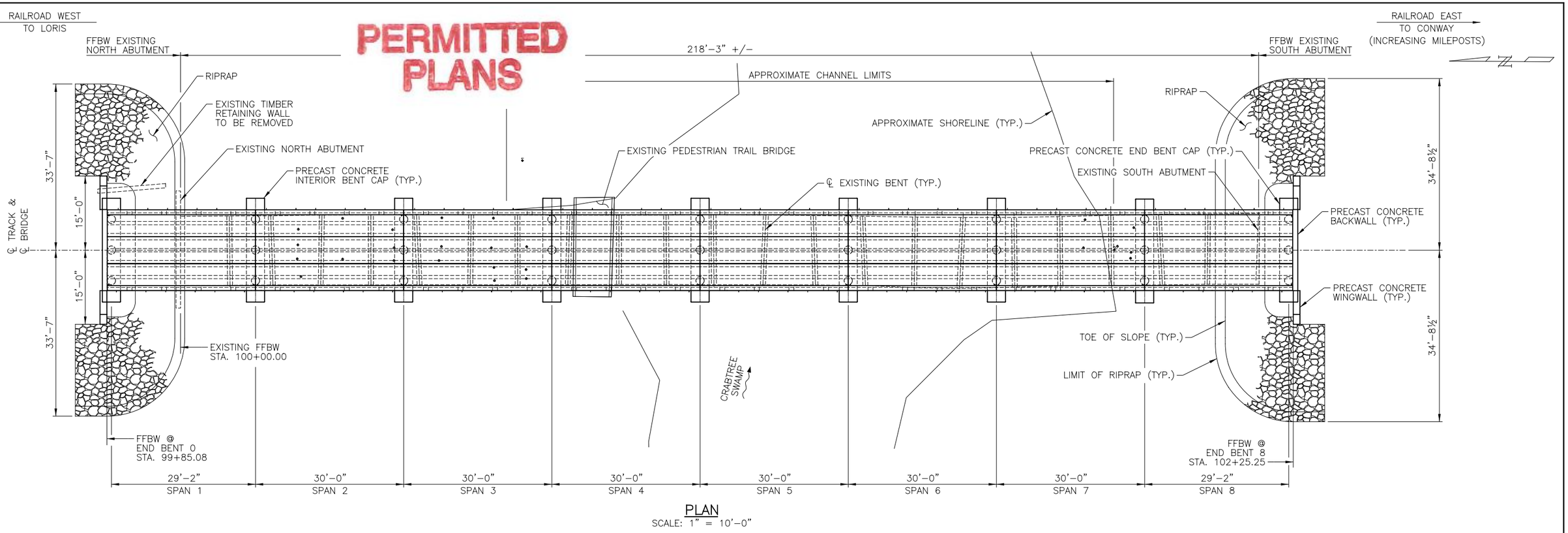
SCALE:	AS SHOWN
DATE:	11/12/2019
DESIGN:	TCS
DRAWN:	RGD
CHECKED:	JFM

VAL. SEC.

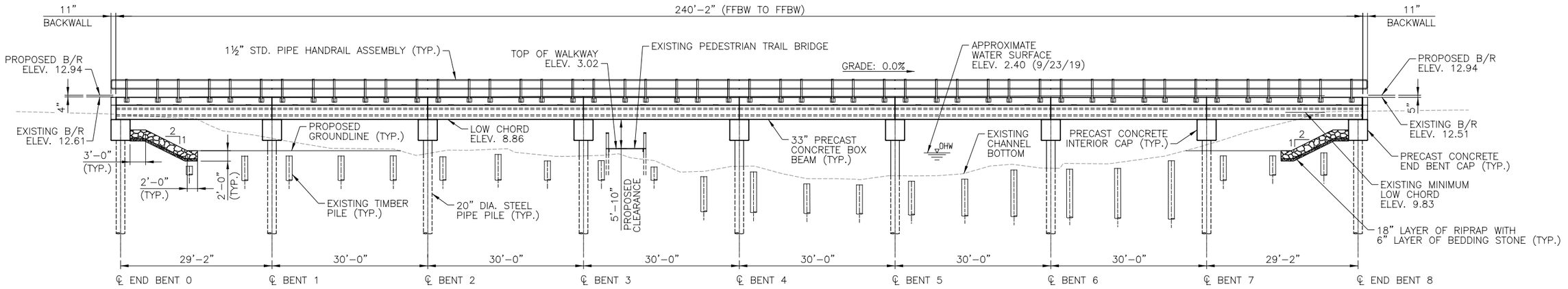
DRAWING NO. 334.5-04

SCALE FACTORS CORRESPOND WITH FULL SIZE (22"x34") DRAWINGS
USER: rdixon
FILENAME: c:\pwworking\east01\d1152259\334.5-04.dgn

PERMITTED PLANS



PLAN
SCALE: 1" = 10'–0"



ELEVATION

NOTES

1. PROPOSED TOP OF RAIL ELEV. 13.48.
2. EXISTING PEDESTRIAN TRAIL BRIDGE VERTICAL CLEARANCE = 6'–9".
3. SEE DRAWING NO. 334.3–07 FOR FOUNDATION LAYOUT OF PROPOSED PILES AND APPROXIMATE LOCATION OF EXISTING AND ABANDONED PILES.
4. EXISTING AND ABANDONED PILES SHALL CUT OFF A MINIMUM OF 1'–0" BELOW THE EXISTING MUDLINE AFTER CONSTRUCTION OF PROPOSED BRIDGE IS COMPLETE.
5. RAILROAD IS RESPONSIBLE FOR ANY RETAINING WALLS REQUIRED FOR GRADE RAISE.
6. BENT MAXIMUM DESIGN HEIGHT = X'–X"

SAC-2019-01985
RJC Bridge Replacement
Applicant: RJ Corman Railroad Company
Horry County, South Carolina

November 26, 2019 Sheet 3 of 6

HDR ENGINEERING, INC.
4400 LEEDS AVE., SUITE 450
NORTH CHARLESTON, SC 29405
843-414-3700

APPROVED FOR
R.J. CORMAN RAILROAD
BY
HDR ENGINEERING INC.
OF THE CAROLINAS
(CHARLESTON, SC)
BY: X
ENGINEER'S NAME
DATE: 11/12/2019

FILE: 334.5-05.dgn

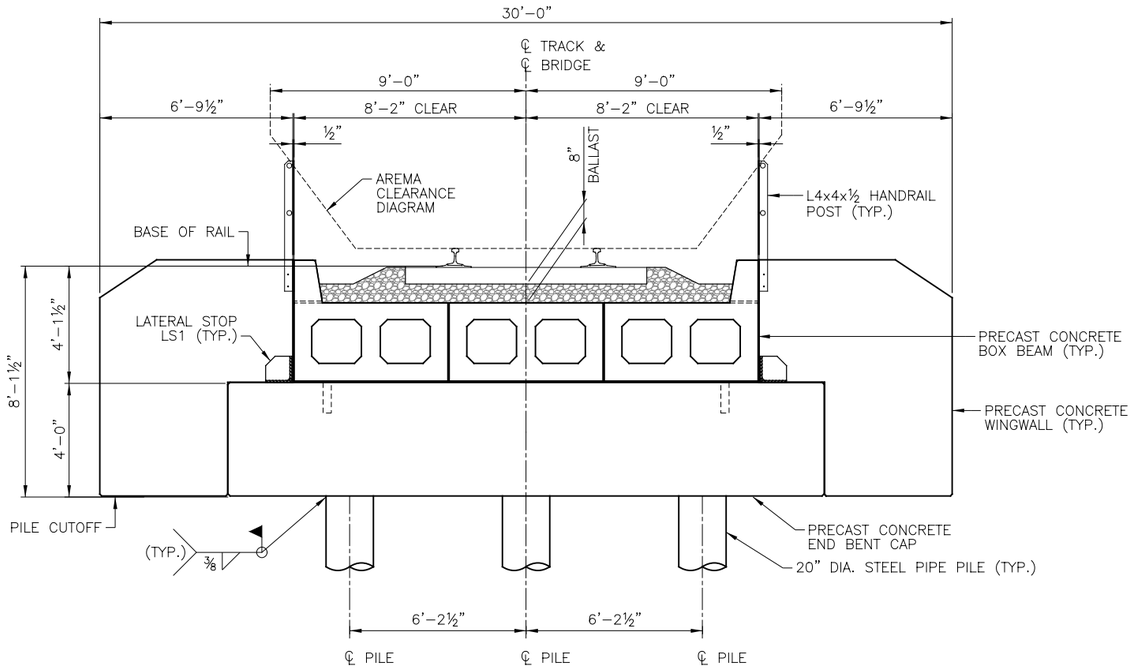
REVISIONS

RJ Corman Railroad Group

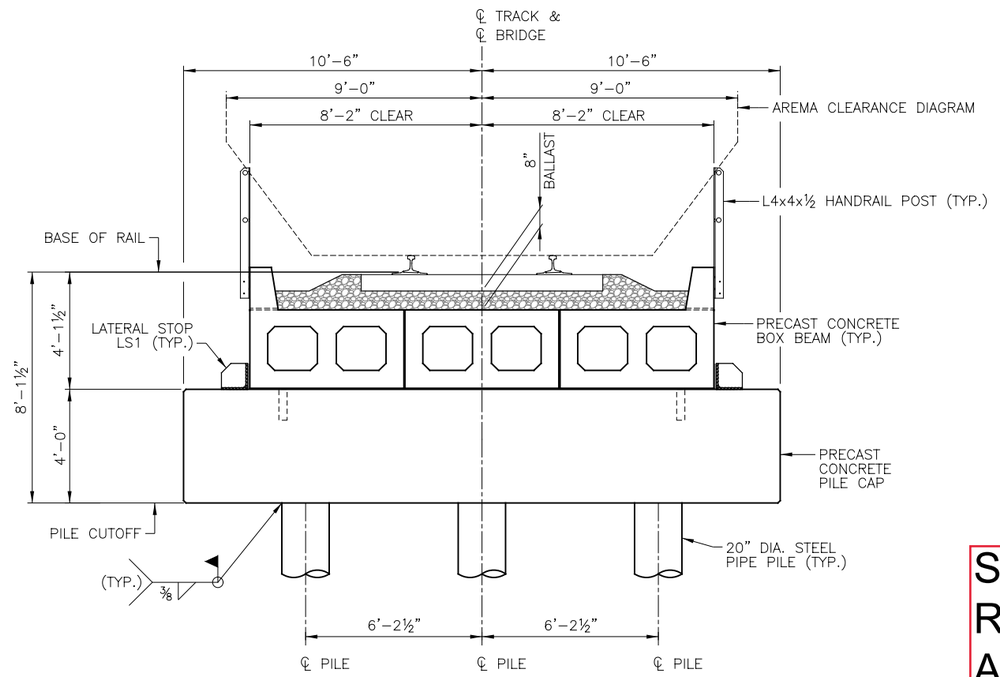
BRIDGE AT MP 334.5
CROSSING CRABTREE SWAMP
GENERAL PLAN AND ELEVATION
HORRY COUNTY CONWAY, SC
DIVISION: RJCK

SCALE: AS SHOWN	VAL. SEC.	DRAWING NO.
DATE: 11/12/2019		334.5-05
DESIGN: TCS		
DRAWN: RGD		
CHECKED: JFM		

FILENAME: c:\pwworking\east01\d1152259\334.5-05.dgn USER: rdixon SCALE FACTORS CORRESPOND WITH FULL SIZE (22"x34") DRAWINGS



TYPICAL SECTION – END BENT
SCALE: ⅜" = 1'–0"

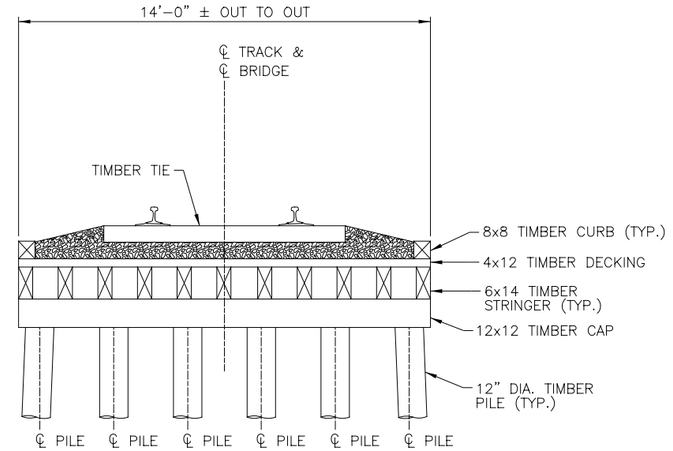


TYPICAL SECTION – INTERIOR BENT
SCALE: ⅜" = 1'–0"

NOTE

1. ALL HANDRAIL ASSEMBLIES TO BE GALVANIZED AFTER FABRICATION.

PERMITTED PLANS



TYPICAL SECTION – EXISTING BENT
SCALE: ⅜" = 1'–0"

90% PLAN SET - NOT FOR CONSTRU

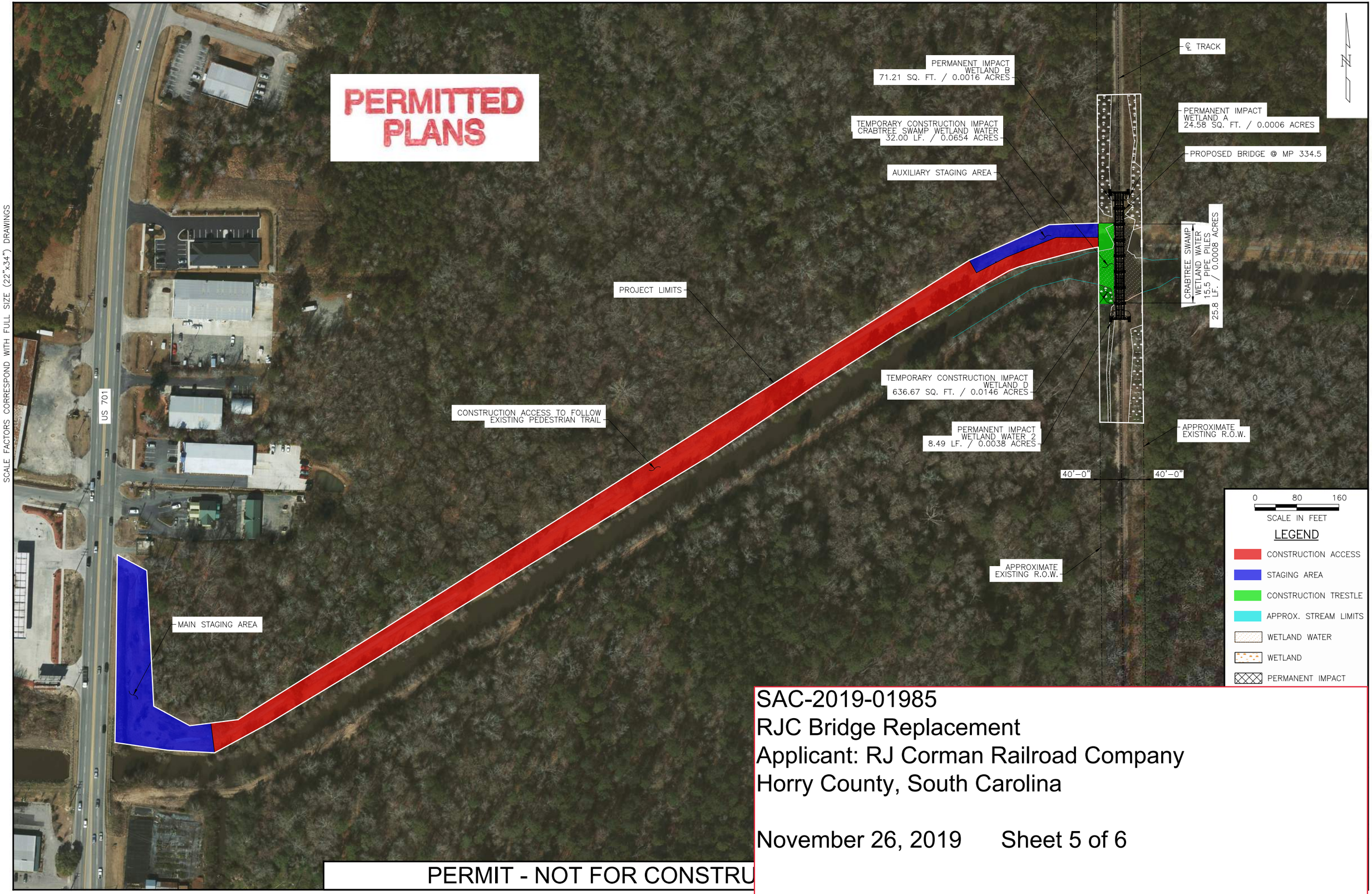
SAC-2019-01985
RJC Bridge Replacement
Applicant: RJ Corman Railroad Company
Horry County, South Carolina

November 26, 2019 Sheet 4 of 6

FILENAME: c:\pwworking\east01\d1152259\334.5–06.dgn USER: rdixon SCALE FACTORS CORRESPOND WITH FULL SIZE (22"x34") DRAWINGS

SCALE FACTORS CORRESPOND WITH FULL SIZE (22"x34") DRAWINGS

PERMITTED PLANS



PERMIT - NOT FOR CONSTRU

SAC-2019-01985
RJC Bridge Replacement
Applicant: RJ Corman Railroad Company
Horry County, South Carolina

November 26, 2019 Sheet 5 of 6

SCALE FACTORS CORRESPOND WITH FULL SIZE (22"x34") DRAWINGS

PERMITTED PLANS

℄ TRACK

PERMANENT IMPACT
WETLAND B
71.21 SQ. FT. / 0.0016 ACRES

PERMANENT IMPACT
WETLAND A
24.58 SQ. FT. / 0.0006 ACRES

PROPOSED BRIDGE @ MP 334.5

TEMPORARY CONSTRUCTION IMPACT
CRABTREE SWAMP WETLAND WATER
32.00 LF. / 0.0654 ACRES

AUXILIARY STAGING AREA

PROJECT LIMITS

CRABTREE SWAMP
WETLAND WATER
15.5 PIPE PILES
25.8 LF. / 0.0008 ACRES

CONSTRUCTION ACCESS TO FOLLOW
EXISTING PEDESTRIAN TRAIL

TEMPORARY CONSTRUCTION IMPACT
WETLAND D
636.67 SQ. FT. / 0.0146 ACRES

PERMANENT IMPACT
WETLAND WATER 2
8.49 LF. / 0.0038 ACRES

APPROX
EXISTIN

40'-0"

40'-0"

APPROXIMATE
EXISTING R.O.W.

0 40 80
SCALE IN FEET

LEGEND

- CONSTRUCTION ACCESS
- STAGING AREA
- CONSTRUCTION TRESTLE
- APPROX. STREAM LIMITS
- WETLAND WATER
- WETLAND
- PERMANENT IMPACT
- TEMPORARY IMPACT

PERMIT - NOT FOR CONSTRUCTION

SAC-2019-01985
RJC Bridge Replacement
Applicant: RJ Corman Railroad Company
Horry County, South Carolina

November 26, 2019 Sheet 6 of 6

RJ Corman Railroad Company

Project Documentation and Reporting Forms

April 17, 2020

PROJECT DOCUMENTATION & REPORTING FORMS

Table of Contents

**RJ Corman will accept an alternative "Project Daily Production Report" form upon approval.*

RJ Corman Railroad Company

Daily Production Report

Job Number: _____

Date: _____

Supervisor: _____

Work Location: _____

PRODUCTION NARRATIVE

Material Installed					
Type	Description	Unit	QTY Allocated	QTY Installed	Location (MP)
Material with asterisk is non-reimbursable					

Crossing/Bridge List			
Crossing/Bridge	Street	DOT#	MP

SURFACING PERFORMED				
Location Type	Begin MP	End MP	QTY(LF)	Notes

LABOR UTILIZATION					
Name	Emp ID	Start Time	End Time	Total Hrs	Per Diem
			Total	0	

VEHICLE UTILIZATION				
Type	Unit #	Start Mileage	End Mileage	Total Hrs Operated

Equipment UTILIZATION				
Type	Unit #	Start Hrs	End Hrs	Total Hrs Operated
			Total	0

A 30 minute break is to be deducted from Hours Worked if time exceeds six (6) hours

RJ Corman Railroad
Daily Time Sheet Sign-Off
Job Number:
Supervisor:
Date:

Employee Name	Emp. ID.	Time IN	Deduct Lunch Break	Time OUT	Hours Worked	Exception/ Comment	Employee Signature	Supervisor Initials

JOB SAFETY ANALYSIS

JOB SAFETY ANALYSIS INFORMATION

Date/Time: _____

Location: _____

Weather: _____

Employee in Charge: _____

EIC Phone # : _____

EMPLOYEES PRESENT

Headcount: _____

AT RISK EMPLOYEES (<90 DAYS)

New to Company: ☐ Area: ☐ Job: ☐

EMERGENCY CONTACT

First Aid / CPR: _____

AED/First Aid Kit Location: _____

Nearest Hospital: _____

Nearest Road Crossing: _____

TRACK PROTECTION

Type : ☐ Controlled ☐ Non Controlled

☐ Track Authority ☐ Inaccessible Track

☐ Rule 707 ☐ Other:_____

Limits: MP/track _____ to MP/track _____

Time: from _____ to_____

Authority#: _____ OK By:_____ OK Time: _____

Work Location: _____

☐ Derails: _____ ☐ Switch Locked _____

☐ Blue Flag: _____ ☐ Lone Worker: _____

☐ Approach Warning: _____

- Sight Distance: _____

SPECIAL CONDITIONS

☐ Hot Work Permit ☐ Fall Protection

☐ Industry Specific: _____

☐ Other: _____

FOLLOW-UP

Follow-up when:

- Track Protection Changes
- New Employees Arrive on Site
- If Scope of Work Changes
- If Additional Tools/Equipment are Required
- Any Change in Job Conditions/Requirements

Any Changes? (explain) ☐ Yes ☐ No

_____

_____

_____

_____

_____

DEBRIEFING

Everyone Accounted for? ☐ Yes ☐ No

Job Site Clean & Safe? ☐ Yes ☐ No

Track Safe? Derails/ switches set ☐ Yes ☐ No

Near Misses? (explain) ☐ Yes ☐ No

_____

_____

_____

_____

Plan for Tomorrow? ☐ Yes ☐ No

_____

_____

_____

_____

ACKNOWLEDGE & UNDERSTAND

HAZARD ANALYSIS

Review the following and check for items that are potential hazards and discuss them during the briefing:

1. Active Track	e) lighting	k) elevated work	b) lifting objects
a) limits	**3. Activity Hazards**	l) respiratory injury	c) repetitive motion
b) adjacent tracks	a) welding/grinding	**4. Equipment onsite**	**6. PPE Requirements**
c) crossings	b) burn/heat source	a) inspection/ELD	a) safety glasses
d) public traffic control	c) compressed gas	b) eye contact w/ operator	b) face shield/ goggles
e) passing train inspection	d) electrical hazard	c) red zones	c) reflectorized apparel
2. Environmental Hazards	e) chemical hazard	d) 3 points of contact	d) Safety footwear
a) weather conditions	f) Hand/ power tool condition	e) 200' traveling distance	e) gloves
b) heat/cold stress	g) lockout procedure	f) radio procedures	f) hearing protection
c) other workers in area	h) overhead power lines	**5. Hazards**	g) hard hat
d) walking conditions	i) underground utilities	a) pinch points	i) additional PPE

Task: What task will we be performing today?

EQUIPMENT	PPE

EVALUATE all Potential hazards

ELIMINATE or control potential hazards listed

Bridge Work Safety and Rescue Plan

Date:	**City:**	**Supervisor:**
Bridge Mile Post:	**RR/Subdivision:**	**Employee in Charge:**

Name/address/phone no. of closest medical facility:	**Local 1st responders notified:** **1. Fire & Rescue—number:_____** **2. EMS—number:_____**

RR Dispatch Radio Channel:	**Crew Radio Channel:**	**Host RR Emergency Contact Phone #:**
RJC Emergency Contact Phone #	**Supervisor Phone#**	**Alternative Emergency Contact Phone #:**

Emergency Response Directions – Type and location of fall rescue equipment, location of medication for employee allergies, location of first aid kit, Emergency muster point, Posting location of this document etc.:

Fall Retrieval/Rescue Plan – Rescue equipment location, identify all equipment (retrieval system, boat, life vests, throw rings, ect.) needed for fall rescue, outline responsibilities and designate back-ups, ID who is 1st aid/CPR trained:

☐ Reviewed in the pre job/work safety briefing:_____ (supervisor's signature)

U.S. Department of Labor
Wage and Hour Division

Exhibit C

PAYROLL

(For Contractor's Optional Use; See Instructions at www.dol.gov/whd/forms/wh347instr.htm)

Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number.

U.S. Wage and Hour Division

Rev. Dec. 2008

NAME OF CONTRACTOR ☐ OR SUBCONTRACTOR ☐ | ADDRESS | OMB No.:1235-0008 Expires: 04/30/2021

PAYROLL NO. | FOR WEEK ENDING | PROJECT AND LOCATION | PROJECT OR CONTRACT NO.

(1) NAME AND INDIVIDUAL IDENTIFYING NUMBER (e.g., LAST FOUR DIGITS OF SOCIAL SECURITY NUMBER) OF WORKER	(2) NO. OF WITHHOLDING EXEMPTIONS	(3) WORK CLASSIFICATION	OT. OR ST.	(4) DAY AND DATE HOURS WORKED EACH DAY	(5) TOTAL HOURS	(6) RATE OF PAY	(7) GROSS AMOUNT EARNED	(8) DEDUCTIONS FICA	WITH-HOLDING TAX			OTHER	TOTAL DEDUCTIONS	(9) NET WAGES PAID FOR WEEK
			O											
			S											
			O											
			S											
			O											
			S											
			O											
			S											
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			S											

While completion of Form WH-347 is optional, it is mandatory for covered contractors and subcontractors performing work on Federally financed or assisted construction contracts to respond to the information collection contained in 29 C.F.R. §§ 3.3, 5.5(a). The Copeland Act (40 U.S.C. § 3145) contractors and subcontractors performing work on Federally financed or assisted construction contracts to "furnish weekly a statement with respect to the wages paid each employee during the preceding week." U.S. Department of Labor (DOL) regulations at 29 C.F.R. § 5.5(a)(3)(ii) require contractors to submit weekly a copy of all payrolls to the Federal agency contracting for or financing the construction project, accompanied by a signed "Statement of Compliance" indicating that the payrolls are correct and complete and that each laborer or mechanic has been paid not less than the proper Davis-Bacon prevailing wage rate for the work performed. DOL and federal contracting agencies receiving this information review the information to determine that employees have received legally required wages and fringe benefits.

Public Burden Statement

We estimate that is will take an average of 55 minutes to complete this collection, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. If you have any comments regarding these estimates or any other aspect of this collection, including suggestions for reducing this burden, send them to the Administrator, Wage and Hour Division, U.S. Department of Labor, Room S3502, 200 Constitution Avenue, N.W. Washington, D.C. 20210

(over)

Date _____

I, _____ _____
(Name of Signatory Party) (Title)

do hereby state:

(1) That I pay or supervise the payment of the persons employed by

_____ on the
(Contractor or Subcontractor)

_____; that during the payroll period commencing on the
(Building or Work)

_____ day of _____, _____, and ending the _____ day of _____, _____,

all persons employed on said project have been paid the full weekly wages earned, that no rebates have been or will be made either directly or indirectly to or on behalf of said

_____ from the full
(Contractor or Subcontractor)

weekly wages earned by any person and that no deductions have been made either directly or indirectly from the full wages earned by any person, other than permissible deductions as defined in Regulations, Part 3 (29 C.F.R. Subtitle A), issued by the Secretary of Labor under the Copeland Act, as amended (48 Stat. 948, 63 Stat. 108, 72 Stat. 967; 76 Stat. 357; 40 U.S.C. § 3145), and described below:

_____

_____

_____

_____

(2) That any payrolls otherwise under this contract required to be submitted for the above period are correct and complete; that the wage rates for laborers or mechanics contained therein are not less than the applicable wage rates contained in any wage determination incorporated into the contract; that the classifications set forth therein for each laborer or mechanic conform with the work he performed.

(3) That any apprentices employed in the above period are duly registered in a bona fide apprenticeship program registered with a State apprenticeship agency recognized by the Bureau of Apprenticeship and Training, United States Department of Labor, or if no such recognized agency exists in a State, are registered with the Bureau of Apprenticeship and Training, United States Department of Labor.

(4) That:

(a) WHERE FRINGE BENEFITS ARE PAID TO APPROVED PLANS, FUNDS, OR PROGRAMS

☐ – in addition to the basic hourly wage rates paid to each laborer or mechanic listed in the above referenced payroll, payments of fringe benefits as listed in the contract have been or will be made to appropriate programs for the benefit of such employees, except as noted in section 4(c) below.

(b) WHERE FRINGE BENEFITS ARE PAID IN CASH

☐ – Each laborer or mechanic listed in the above referenced payroll has been paid, as indicated on the payroll, an amount not less than the sum of the applicable basic hourly wage rate plus the amount of the required fringe benefits as listed in the contract, except as noted in section 4(c) below.

(c) EXCEPTIONS

EXCEPTION (CRAFT)	EXPLANATION

REMARKS:

NAME AND TITLE	SIGNATURE

THE WILLFUL FALSIFICATION OF ANY OF THE ABOVE STATEMENTS MAY SUBJECT THE CONTRACTOR OR SUBCONTRACTOR TO CIVIL OR CRIMINAL PROSECUTION. SEE SECTION 1001 OF TITLE 18 AND SECTION 231 OF TITLE 31 OF THE UNITED STATES CODE.

RJ Corman Railroad Company

Valuation Map (V.9.SC – 6)

April 17, 2020

HORRY COUNTY, S.C.

SCHEDULE OF PROPERTY

Map No. S.	GRANTOR	GRANTEE	INSTRUMENT	DATE	RECORD	AREA	CUST. No.	REMARKS
1.	No Record of Conveyance					38.78		Possession under Charter.
1a.	No Record of Conveyance					—		Possession Under Charter 0.97 Ac. Transferred to ... See Map No. S-6 - S-7-Z. V. 9. S.C.
2.	Burroughs & Collins Co.	A.C.L. R.R. Co.	Easement	Dec. 20, 1937	D.B. N-6 Page 414, Feb. 8, 1938	0.03		

NOTE:- Western Union Telegraph Line 25' East of ℄ R.R. Track

Sheet No. 6 of V-9-SC of Atlantic Coast Line Railroad Conway Branch N.C. State Line to Conway from survey station 3493+26 to survey station 3704+46

ENGINEER

RIGHT-OF-WAY AND TRACK MAP

ATLANTIC COAST LINE R. R. CO.
CONWAY BRANCH
N.C. STATE LINE TO CONWAY
STATION 3493+26 TO STATION 3704+46
SCALE 1 IN. = 400 FT. JUNE 30 1917
OFFICE OF VALUATION ENGINEER
WILMINGTON, N. C.

V.9.S.C. 6

11-B-26
~~4-A-48~~

RJ Corman Railroad Company

Location Map

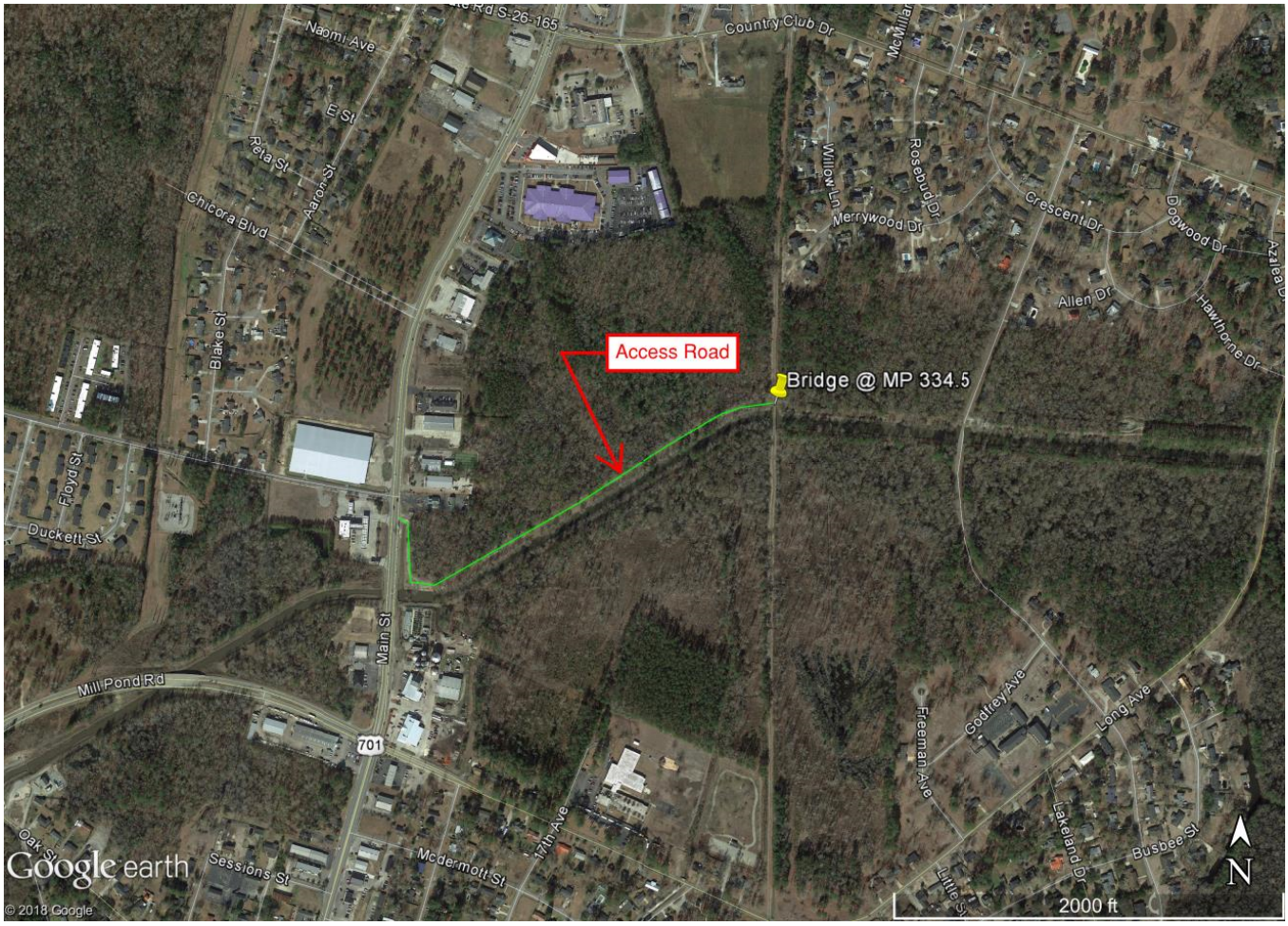
April 17, 2020

RJ Corman Railroad Company

Bridge at MP 334.5 over Crabtree Swamp (Conway, SC)
RJ Corman Railroad Company / Carolina Lines

Nearest Street Address:
2408 US-701
Conway, SC 29526

Bridge Location in Google Maps



Latitude: 33.861486, Longitude: -79.049414