

Project Manual
For

Pennies for Progress 3

Widening SC Route 72 from 0.2 Miles West of S-46-163 (East Rambo Rd.) to SC Rte. 901 (Mt. Holly Rd.) #11149-014

October 2023

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District 3: Tommy Adkins
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York County Engineering Reference No. 11149-014

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DIVISION I

BID AND CONTRACT DOCUMENTS

DIVISION I - SECTION 3A

BID BOND FORM

SAMPLE

BID BOND
(EXAMPLE FORMAT)

STATE OF SOUTH CAROLINA
COUNTY OF YORK

KNOW ALL MEN BY THESE PRESENTS, that _____
as Principal, and _____, as Surety, a
Corporation chartered and existing under the laws of the State of _____, with
its principal offices in the City of _____, and authorized to do business in the State of
South Carolina are held and firmly bound unto the OWNER, _____
_____ in the penal Sum of _____
_____ Dollars (\$ _____) lawful money of the United States, for
the payment of which sum will and truly to be made, we bind ourselves, our heirs, executors,
administrators, and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Principal has submitted to the
OWNER the accompanying bid, dated _____, 2023, for:

**Widening SC Route 72 from 0.2 Miles West of S-46-163 (East Rambo Rd.) to SC
Rte. 901 (Mt. Holly Rd.) #11149-014**

NOW, THEREFORE,

- A. If said Bid shall be rejected, or
- B. If the principal shall not withdraw said Bid within twenty-four (24) hours after date of opening of the same, and shall within ten (10) days after the prescribed forms are presented to him for signature, enter into a written contract with the OWNER in accordance with the Bid as accepted, and give bonds with good and sufficient surety or sureties, as may be required, for the faithful performance and proper fulfillment of such contract, then the above obligations shall be void and of no effect, otherwise to remain in full force and effect.
- C. In the event of the withdrawal of said Bid within the period specified, or the failure to enter into such contract and give such bonds within the time specified, if the principal shall pay the OWNER the difference between the amount specified in said bid and the amount for which the OWNER may procure the required work and supplies, if the latter amount be in excess of the former, then the above obligations shall be void and of no effect, otherwise to remain in full force and effect.

IN WITNESS WHEREOF, the above bounded parties have executed this instrument under their several seals, this ____ day of _____, A.D., 2023, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

WITNESS: (If Sole Ownership or Partnership, two (2) Witnesses required).
(If Corporation, Secretary only will attest and affix seal).

WITNESSES:

PRINCIPAL:

Name of Firm

Signature of Authorized Officer
(Affix Seal)

Title

Business Address

City State

WITNESS:

SURETY:

Corporate Surety

(Affix Attorney-in-Fact Seal)

Business Address

City State

Name of Local Insurance Agency

CERTIFICATES AS TO CORPORATE PRINCIPAL

I, _____, certify that I am the Secretary of the Corporation named as Principal in the within bond; that _____ who signed the said bond on behalf of the principal, was then _____ of said corporation; that I know his signature, and his signature hereto is genuine; and that said bond was duly signed, sealed, and attested for and in behalf of said corporation by authority of its governing body.

(Corporate Secretary Seal)

STATE OF SOUTH CAROLINA
COUNTY OF YORK

Before me, a Notary Public duly commissioned, qualified and acting, personally appeared _____ to me well known, who being by me first duly sworn upon oath, says that he is the Attorney-in-Fact, for the _____ and that he has been authorized by _____ to execute the foregoing bond on behalf of the Contractor named therein in favor of the OWNER, the _____.

Subscribed and sworn to before me this ____ day of _____, 2023, A.D.

(Attach Power of Attorney
to original Bid Bond)

Notary Public
State of South Carolina-at-Large

My Commission Expires: _____

END OF SECTION

DIVISION I - SECTION 4
CONTRACT DOCUMENTS

DIVISION I - SECTION 4A

AGREEMENT BETWEEN CONTRACTOR AND OWNER

AGREEMENT

THIS AGREEMENT, made and entered into this _____ day of _____, 2023 A.D., by and between the York County Government, party of the first part (hereinafter sometimes called the "OWNER"), and _____, party of the second part (hereinafter sometimes called the "CONTRACTOR").

WITNESSETH: That the parties hereto, for the consideration hereinafter set forth, mutually agree as follows:

1. SCOPE OF THE WORK

- 1.1. The CONTRACTOR shall furnish all labor, materials, equipment, machinery, tools, apparatus, and transportation and perform all of the Work shown on the Drawings and described in the Specifications entitled:

***Pennies for Progress Project 3
Widening SC Route 72 from 0.2 Miles West of S-46-163 (East Rambo Rd.) to SC Rte. 901 (Mt. Holly Rd.) #11149-014***

as prepared by York County Engineering Department acting as, and in the Contract Documents entitled the ENGINEER, and shall do everything required by this Contract and the other Contract Documents.

2. THE CONTRACT SUM

- 2.1. The OWNER shall pay to the CONTRACTOR for the faithful performance of the Contract, in lawful money of the United States, and subject to addition and deductions as provided in the Contract Documents, a total sum as follows:

Based upon the prices shown in the Bid heretofore submitted to the OWNER by the CONTRACTOR, a copy of said Proposal being a part of these Contract Documents, the aggregate amount of this Contract (obtained from either the lump sum price, the application of unit prices to the quantities shown in the Bid, or the combination of both) being the sum of

(\$ _____).

3. COMMENCEMENT AND COMPLETION OF WORK

- 3.1. The CONTRACTOR shall commence Work and the Contract Time will commence to run on the date fixed in the Notice to Proceed.
- 3.2. The CONTRACTOR shall prosecute the Work with faithfulness and diligence and shall be completed and ready for final payment within **730 calendar days** after commencement date fixed in the Notice to Proceed.

4. CONTRACTOR'S ACCEPTANCE OF CONDITIONS

- 4.1. The CONTRACTOR hereby agrees that, by virtue of submitting a completed Bid including his declarations therein of full satisfaction, knowledge and understanding of the Contract Documents, site conditions (surface and subsurface) and all other conditions affecting the Work, he assumes full responsibility for performance of the Work as required under this Contract. It is expressly agreed that under no circumstances, conditions or situations shall this Contract be more strongly construed against the OWNER than against the CONTRACTOR and his Surety.

4.2. It is understood and agreed that the passing, approval and/or acceptance of any part of the Work or material by the OWNER, ENGINEER, or by any agent or representative, as being in compliance with the terms of this Contract and/or of the Contract Documents, shall not operate as a waiver by the OWNER of strict compliance with the terms of this Contract, and/or the Contract Documents covering said Work; and the OWNER may require the CONTRACTOR and/or his surety to repair, replace, restore and/or make to comply strictly and in all things with this Contract and the Contract Documents any and all of said Work and/or materials which within a period of two years from and after the date of the acceptance of any such Work or material, are found to be defective or to fail in any way to comply with this Contract or with the Contract Documents. This provision shall not apply to materials or equipment normally expected to deteriorate or wear out and become subject to normal repair and replacement before their condition is discovered. Failure on the part of the CONTRACTOR and/or his Surety, immediately after notice to either, to repair or replace any such defective materials and workmanship shall entitle the OWNER, if it sees fit, to replace or repair the same and recover the reasonable cost of such replacement and/or repair from the CONTRACTOR and/or his surety, who shall in any event be jointly and severally liable to the OWNER for all damage, loss and expense caused to the OWNER by reason of the CONTRACTOR's breach of this Contract and/or his failure to comply strictly and in all things with this Contract.

5. LIQUIDATED DAMAGES

5.1. It is mutually agreed that time is of the essence of this Contract and should the CONTRACTOR fail to complete the work within the specified time, or any authorized extension thereof, there shall be deducted from the compensation otherwise to be paid to the CONTRACTOR, and the OWNER will retain the amount of *One Thousand, Eight Hundred Dollars (\$1,800.00)* per calendar day as fixed, agreed, and liquidated damages for each calendar day elapsing beyond the specified time for substantial completion or any authorized extension thereof, which sum shall represent the actual damages which the OWNER will have sustained by failure of the CONTRACTOR to complete the work within the specified time. After substantial completion, if the CONTRACTOR shall neglect, refuse, or fail to complete the remaining Work within the Contract Time or any proper extension thereof granted by OWNER, Contractor shall pay OWNER *One Thousand, Eight Hundred Dollars (\$1,800.00)* per for each calendar day that expires after the date specified for Final Completion and readiness for final payment until the work is complete and ready for final payment. It being further agreed that said sum is not a penalty, but is the stipulated amount of damages sustained by the OWNER in the event of such default by the CONTRACTOR.

5.2. For the purposes of this Article, the day of final acceptance of the Work shall be considered a day of delay, and the scheduled day of completion of the work shall be considered a day scheduled for production.

6. PARTIAL AND FINAL PAYMENTS

6.1. In accordance with the provisions fully set forth in the General Conditions, and subject to additions and deductions as provided, the OWNER shall pay the CONTRACTOR as follows:

6.1.1. Within 30 days after receipt by the OWNER of the CONTRACTOR's request for partial payment, the OWNER shall make partial payments to the CONTRACTOR, on the basis of the estimate of Work as approved by the ENGINEER, for work performed during the preceding calendar month, less five percent (5%) of the amount of such estimate which is to be retained by the OWNER until all Work has been performed strictly in accordance with this Agreement and until such Work has been accepted by the OWNER.

6.1.2. Upon submission by the CONTRACTOR of evidence satisfactory to the OWNER that all payrolls, material bills and other costs incurred by the CONTRACTOR in connection with

the construction of the Work have been paid in full, including all retainage to subcontractors on the project, and also after all guarantees that may be required in the specifications have been furnished and are found acceptable by the OWNER, final payment on account of this Agreement shall be made within sixty (60) days after completion by the CONTRACTOR of all Work covered by this Agreement and acceptance of such Work by the OWNER.

6.1.3. Retainage will be released in full at Final Completion.

7. ADDITIONAL BOND

7.1. It is further mutually agreed between the parties hereto that if, at any time after the execution of this Agreement and the Performance and Payment Bonds hereto attached for its faithful performance, the OWNER shall deem the surety or sureties upon such bonds to be unsatisfactory, or if, for any reason, such bond(s) ceases to be adequate to cover the performance of the Work, the CONTRACTOR shall, at his expense, and within three days after the receipt of notice from the OWNER to do so, furnish an additional bond or bonds, in such form and amount, and with such sureties as shall be satisfactory to the OWNER. In such event, no further payment to the CONTRACTOR shall be deemed due under this Agreement until such new or additional security for the faithful performance of the Work shall be furnished in manner and form satisfactory to the OWNER.

8. CONTRACT DOCUMENTS

8.1. The Contract Documents, as stated in the Instructions to Bidders, including this Project Manual and General Conditions, and the accompanying Contract Drawings, shall form the Contract and are as fully a part of this Contract as if herein repeated.

IN WITNESS WHEREOF the parties hereto have executed this Agreement on the day and date first above written in three (3) counterparts, each of which shall, without proof or accounting for the other counterparts, be deemed an original Contract.*

Owner
By: _____

Contractor
By: _____

[Corporate Seal]

[Corporate Seal]

Attest: _____

Attest: _____

Address for giving notices:

Address for giving notices:

License No. _____

Agent for service of process: _____

(*) In the event that the CONTRACTOR is a Corporation, a certificate of resolution of the Board of Directors of the Corporation, authorizing the officer who signs the Contract to do so in its behalf shall be completed and submitted with this form.

END OF SECTION

DIVISION I - SECTION 4B

GENERAL CONDITIONS OF THE CONTRACT

GENERAL CONDITIONS

1. DEFINITIONS

1.1. Whenever used in any of the Contract Documents, the following meanings shall be given to the terms herein defined:

1.1.1. *Addendum or Addenda* - Written or graphic instruments issued prior to the opening of Bids which clarify, correct or change the Bidding Requirements or the Contract Documents.

1.1.2. *Agreement* - The written contract between OWNER and CONTRACTOR covering the Work to be performed; other Contract Documents are attached to the Agreement and made a part thereof as provided therein.

1.1.3. *Application for Payment* - The form accepted by ENGINEER which is to be used by CONTRACTOR in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

1.1.4. *Bid* - The offer or proposal of the bidder on the prescribed Bid Form setting forth the prices for the Work to be performed.

1.1.5. *Bidder* - One who submits a Bid directly to OWNER, as distinct from sub-bidder, who submits a Bid to a Bidder.

1.1.6. *Bidding Documents* - The Invitation for Bids, Instruction to Bidders, the Bid Form, and the proposed Contract Documents (including all Addenda issued prior to receipt of Bids).

1.1.7. *Bonds* - Performance and Indemnity and Payment Bonds and other instruments of security.

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

1.1.9. *Contract Documents* - Executed Agreement, Addenda (if any), Invitation for Bids, Instructions to Bidders, Signed Copy of Bid, Bid Guarantee, Statement of Bidder's Qualifications, Performance and Indemnity Bond, Payment Bond, Certification of Insurance, General Conditions, Supplemental Conditions (if any), Special Conditions (if any), Technical Specifications, and Drawings (as listed in the Index of Drawings).

1.1.10. *Contract Price* - The moneys payable by OWNER for completion of the Work in accordance with the Contract Documents.

1.1.11. *Contract Times* - The numbers of days or the dates stated in the Agreement: (i) to achieve Substantial Completion, and (ii) to complete the work so that it is ready for final payment as evidenced by ENGINEER's written records.

1.1.12. *CONTRACTOR* - The person, firm, or corporation entering into Contract with the OWNER to construct and install the improvements embraced in this Contract.

1.1.13. *Defective* - An adjective which when modifying the word Work refers to Work that is unsatisfactory, faulty or deficient, in that it does not conform to the Contract Documents, or does not meet the requirements of any inspection, reference standard, test or approval referred to in the Contract Documents, or had been damaged prior to ENGINEER's recommendation or final payment.

1.1.14. *Drawings* - The construction drawings which graphically show the scope, extent, and character of the Work to be furnished and performed by the CONTRACTOR and which have been prepared or approved by ENGINEER and are referred to in the Contract Documents. These Drawings are listed in the Index of Drawings.

1.1.15. *ENGINEER* – The person, firm or corporation serving the OWNER with Engineering services, his successors, or any other person or persons, employed by said OWNER for the purpose of directing or having charge of the work embraced in this Contract.

1.1.16. *Laws and Regulations; Laws or Regulations* – Any and all applicable laws, rules, regulations, ordinances codes and orders of any and all governmental bodies, agencies, authorities and courts having jurisdiction.

1.1.17. *Liens* - Liens, charges, security interests or encumbrances upon project funds, real property or personal property.

1.1.18. *Local Government* - York County, South Carolina, within which the Project Areas are situated.

1.1.19. *Milestone* - A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

1.1.20. *Notice of Award* - The written notice by OWNER to the apparent successful Bidder stating that upon compliance by the apparent successful Bidder with the conditions precedent enumerated therein, within the time specified, OWNER will sign and deliver the agreement.

1.1.21. *Notice to Proceed* - A written notice given by OWNER to CONTRACTOR (with a copy to ENGINEER) fixing the date on which the Contract Times will commence to run and on which CONTRACTOR shall start to perform, CONTRACTOR's obligations under the Contract Documents.

1.1.22. *OWNER* - The York County Government, which is authorized to undertake this Contract.

1.1.23. *Partial Utilization* - Use by OWNER of a substantially completed part of the Work for the purpose for which it is intended (or a related purpose) prior to Substantial Completion of all the Work.

1.1.24. *Project* - The total construction of which the Work to be provided under the Contract Documents may be the whole, or a part as indicated elsewhere in the Contract Documents.

1.1.25. *Project Area* - The area within which are the specified limits of the improvements to be constructed in whole or in part under this Contract.

1.1.26. *Project Manual* – The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.

1.1.27. *Resident Project Representative* – The authorized representative of ENGINEER who may be assigned to the Site or any part thereof.

1.1.28. *Samples* - Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.

1.1.29. *Site* – Lands or areas indicated in the Contract Documents as being furnished by OWNER upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by OWNER which are designated for the use of the CONTRACTOR.

1.1.30. *Shop Drawings* - All drawings, diagrams, illustrations, schedules and other data or information which are specifically prepared or assembled by or for CONTRACTOR and submitted by CONTRACTOR to illustrate some portion of the Work.

1.1.31. *Special Conditions* - The part of the Contract Documents that amends or supplements the Technical Specifications.

1.1.32. *Subcontractor* - An individual, firm or corporation having a direct contract with CONTRACTOR or with any other Subcontractor for the performance of a part of the Work at the site.

1.1.33. *Substantial Completion* - The Work (or specified part thereof) has progressed to the point where, in the opinion of ENGINEER as evidenced by ENGINEER's definitive certification of Substantial Completion, it is sufficiently complete, in accordance with the Contract Documents, so that the Work (or specified part) can be utilized for the purposes for which it is intended; or if no such certificate is issued, when the Work is complete and ready for final payment as evidenced by ENGINEER's written recommendation of final payment. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

1.1.34. *Successful Bidder* - The lowest, qualified, responsible and responsive Bidder to whom OWNER (on the basis of OWNER's evaluation as hereinafter provided) makes an award.

1.1.35. *Supplier* – A manufacturer, fabricator, supplier, distributor, material man or vendor having a direct contract with CONTRACTOR or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by CONTRACTOR or any Subcontractor.

1.1.36. *Supplemental Conditions* - The part of the Contract Documents that amends or supplements these General Conditions.

1.1.37. *Technical Specifications* - The part of the Contract Documents that describes, outlines, and stipulates: the quality of materials, equipment and systems to be furnished; the quality of workmanship required; and the methods to be used in carrying out the construction work to be performed under this Contract.

1.1.38. *Underground Facilities* - All pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels or other such facilities or attachments, and any encasements containing such facilities which have been installed underground to furnish any of the following services or materials: electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, sewage and drainage removal, traffic or other control systems, or water.

1.1.39. *Unit Price Work* - Work to be paid for on the basis of unit prices.

1.1.40. *Work* - The entire completed construction or the various separately identifiable parts thereof required to be furnished under the Contract Documents. Work includes and is the result of performing or furnishing and incorporating materials and equipment into the construction, and furnishing, installing and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

1.2 Other technical terms not specifically defined within the Contract Documents shall have the meanings given in AIA Document "Glossary of Construction Industry Terms," current edition. Technical terms not

defined as above and used to describe items of the Work, and which so applied have a well-known technical or trade meaning, shall be deemed to have such recognized meaning.

2. CONTRACTOR'S OBLIGATIONS

2.1. All work shall be done in strict accordance with the Contract Documents. Observations, construction reviews, tests, recommendations or approvals by the ENGINEER or persons other than the CONTRACTOR, shall in no way relieve the CONTRACTOR of his obligations to complete all work in accordance with the Contract Documents. All work shall be done under the direct supervision of the CONTRACTOR. The CONTRACTOR shall be responsible for construction means, methods, techniques, and procedures, and for providing a safe place for the performance of the work by the CONTRACTOR, Subcontractors, suppliers, and their employees and for access, use, work, or occupancy by all authorized persons.

3. LANDS BY CONTRACTOR

3.1. OWNER shall furnish the Site. OWNER shall notify CONTRACTOR of any encumbrances or restrictions not of general application, but specifically related to the use of the Site with which the CONTRACTOR must comply in performing work.

3.2. Any land and access thereto not specifically shown to be furnished by the OWNER that may be required for temporary construction facilities or for storage of materials and equipment shall be provided by the CONTRACTOR with no liability to the OWNER. The CONTRACTOR shall confine his apparatus and storage to such additional areas as he may provide at his expense.

3.3. The CONTRACTOR shall not enter upon private property for any purpose without obtaining permission, and he shall be responsible for the preservation of all public property, trees, monuments, structures and improvements, along and adjacent to the street and/or right-of-way, and shall use every precaution necessary to prevent damage or injury thereto. He shall use suitable precautions to prevent damage to pipes, conduits, and other underground structures, and shall protect carefully from disturbance or damage all monuments and property marks until an authorized agent has witnessed or otherwise referenced their location and shall not remove them until directed.

4. SURVEYS BY CONTRACTOR

4.1. Based upon the Construction Documents and any additional information provided by the OWNER, the CONTRACTOR shall develop and make all detailed surveys necessary for construction, including working points, lines and elevations.

5. PUBLIC UTILITIES

5.1. The elevation and location of all public utilities shown on the Drawings were taken from existing public records. It shall be the duty of the CONTRACTOR to make final and exact determination of the location and extent of all utilities and he will be liable for any expense resulting from damage to them.

6. SUPERINTENDENT

6.1. A qualified superintendent, who is acceptable to the OWNER, shall be maintained on the Work and shall give efficient supervision to the Work until its completion. The superintendent shall have full authority to act in behalf of the CONTRACTOR, and all instruction given to the superintendent shall be considered as given to the CONTRACTOR. It shall be the responsibility of this CONTRACTOR's superintendent to coordinate the Work of all the Subcontractors. The superintendent shall be present on the site at all times required to perform adequate supervision and coordination.

7. SUBCONTRACTORS

7.1. At the time set forth in the Contract Documents or when requested by the OWNER, the CONTRACTOR shall submit in writing for review of the OWNER the names of the Subcontractors proposed for the work. Subcontractors may not be changed except at the request or with the approval of the OWNER. The CONTRACTOR is responsible to the OWNER for the acts and deficiencies of his Subcontractors, and of their direct and indirect employees, to the same extent as he is responsible for the acts and deficiencies of his employees. The Contract Documents shall not be construed as creating any contractual relation between any Subcontractor and the OWNER. The CONTRACTOR shall bind every Subcontractor by the terms of the Contract Documents.

8. ASSIGNMENTS

8.1. The CONTRACTOR shall not assign the whole or any part of this Contract or any moneys due or to become due hereunder without written consent of the OWNER. In case the CONTRACTOR assigns all or any part of any moneys due or to become due under this Contract, the instrument of assignment shall contain a clause substantially to the effect that it is agreed that the right of the assignee in and to any moneys due or to become due to the CONTRACTOR shall be subject to prior claims of all persons, firms, and corporations for services rendered or materials supplied for the performance of the work called for in this Contract.

9. MUTUAL RESPONSIBILITY OF CONTRACTORS

9.1. If through acts of neglect on the part of the CONTRACTOR, any other CONTRACTOR or any Subcontractor shall suffer loss or damage on the work, the CONTRACTOR agrees to settle with such other CONTRACTOR or Subcontractor by agreement or arbitration if such other CONTRACTOR or Subcontractor will so settle. If such other CONTRACTOR or Subcontractor shall assert any claim against the OWNER on account of any damage alleged to have been sustained, the OWNER shall notify the CONTRACTOR, who shall indemnify and save harmless the OWNER against any such claim.

10. ORAL AGREEMENTS

10.1. No oral order, objection, claim or notice by any party to the others shall affect or modify any of the terms or obligations contained in any of the Contract Documents, and none of the provisions of the Contract Documents shall be held to be waived or modified by reason of any act whatsoever, other than by a definitely agreed waiver or modification thereof in writing, and no evidence shall be introduced in any proceeding of any other waiver or modification.

11. MATERIALS, SERVICE AND FACILITIES

11.1. It is understood that except as otherwise specifically stated in the Contract Documents, the CONTRACTOR shall provide and pay for all materials, labor, tools, equipment, water, gas, light, power, transportation, superintendence, taxes, insurance, temporary construction of every nature, and all other services and facilities of every nature whatsoever necessary to execute, complete, and deliver the work within the specified time.

11.2. Any work necessary to be performed after regular working hours, on Sundays or Legal Holidays, shall be performed without additional expense to the OWNER.

12. MATERIALS AND EQUIPMENT

The materials and equipment installed in the work shall meet the requirements of the Contract Documents and no materials or equipment shall be ordered until reviewed by the ENGINEER. The CONTRACTOR shall furnish all materials and equipment not otherwise specifically indicated or provided by the OWNER.

The CONTRACTOR shall guarantee all materials and equipment he provides in accordance with Section 16 of these GENERAL CONDITIONS.

12.1. Substitutions: In order to establish standards of Quality, the ENGINEER has, in the detailed Specifications, referred to certain products by name and catalog number without consideration of possible substitute or "or equal" items. This procedure is not to be construed as eliminating from competition other products of equal or better quality by other manufacturers where fully suitable in design.

12.1.1. Whenever it is indicated in the Drawings or specified in the specifications that a substitute or "or-equal" item of material or equipment may be furnished or used by the CONTRACTOR, application for such acceptance will not be considered by the ENGINEER until after the Effective Date of the agreement. The CONTRACTOR shall furnish the complete list of proposed desired substitutions, together with such engineering and catalog data as the ENGINEER may require. All proposals for substitutions shall be submitted in writing by the General Contractor and not by individual trades or material suppliers. The ENGINEER will review proposed substitutions and make his recommendations in writing within reasonable time.

12.1.2. The CONTRACTOR shall abide by the ENGINEER's recommendation when proposed substitute materials or items of equipment are not recommended for installation and shall furnish the specified material or item of equipment in such case.

12.2. Space Requirements: It shall be the responsibility of the CONTRACTOR to insure that materials and equipment to be furnished fit the space available. He shall make necessary field measurements to ascertain space requirements, including those for connections, and shall order such sizes and shapes of equipment that the final installation shall suit the true intent and meaning of the Contract Documents.

12.3. Arrangement: Where equipment requiring different arrangement of connections from those shown is approved, it shall be the responsibility of the CONTRACTOR to install the equipment to operate properly, and in harmony with the intent of the work required by such arrangement.

12.4. Unacceptable Materials and Equipment: Materials and equipment which do not conform to the requirements of the Contract Documents, or are not equal to samples reviewed by the ENGINEER, or are in any way unsatisfactory or unsuited to the purpose for which they are intended, shall not be furnished nor installed.

12.5. Storage: Materials and equipment shall be so stored as to insure the preservation of their quality and fitness for the work. When considered necessary, they shall be placed on wooden platforms or other hard, clean surfaces, and not on the ground and/or they shall be placed under cover. Stored materials and equipment shall be located so as to facilitate prompt inspection. Private property shall not be used for storage purposes without the written permission of the property owner or leasee. Materials, equipment, construction machinery, fuel, and oils shall not be stored or parked within the drip-line of any trees in or adjacent to the project site or additional off-site easements and right-of-ways.

12.6. Manufacturer's Directions: Manufactured articles, materials and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned as directed by the manufacturer.

13. INSPECTION AND TESTING OF MATERIALS

13.1. Unless otherwise specifically provided for in the specifications, the inspection and testing of material and finished articles to be incorporated in the work at the site shall be made by bureaus, laboratories, or agencies approved by the OWNER. The cost of such inspection and testing shall be paid by the CONTRACTOR. The CONTRACTOR shall furnish evidence satisfactory to the OWNER that the material and finished articles have passed the required tests prior to the incorporation of such materials

and finished articles in the work. The CONTRACTOR shall promptly segregate and remove rejected material and finished articles from the site of the work.

14. SAMPLES

14.1. All samples called for in the Specifications or required by the ENGINEER shall be furnished by the CONTRACTOR and shall be submitted to the ENGINEER for his review. Samples shall be furnished so as not to delay fabrication, allowing the ENGINEER reasonable time for the consideration of the samples submitted.

14.1.1. Samples for Tests: CONTRACTOR shall furnish such samples of material as may be required for examination and test. All samples of materials for tests shall be taken according to standard methods or as provided in the Contract Documents.

14.1.2. CONTRACTOR's Guaranty: All samples shall be submitted by the CONTRACTOR with a covering letter indicating that such samples are recommended by the CONTRACTOR for the service intended and that the CONTRACTOR's Guaranty will fully apply.

14.1.3. All materials, equipment and workmanship shall be in accordance with samples guaranteed by the CONTRACTOR and reviewed by the ENGINEER.

15. SHOP DRAWINGS

15.1. The CONTRACTOR shall provide shop drawings, setting schedules and such other drawings as may be necessary for the prosecution of the work in the shop and in the field as required by the Drawings, Specifications or the ENGINEER's instructions. Deviations from the Drawings and Specifications shall be called to the attention of the ENGINEER at the time of the first submission of shop drawings and other drawings for consideration. The ENGINEER's review of any drawings shall not release the CONTRACTOR from responsibility for such deviations. Shop drawings shall be submitted according to a schedule prepared jointly by the CONTRACTOR and the ENGINEER.

15.1.1. CONTRACTOR's Certification: When submitted for the ENGINEER's review, shop drawings shall bear the CONTRACTOR's certification that he has reviewed, checked and approved the shop drawings, that they are in harmony with the requirements of the Project and with the provisions of the Contract Documents, and that he has verified all field measurements and construction criteria, materials, catalog numbers and similar data. CONTRACTOR shall also certify that the work represented by the shop drawings is recommended by the CONTRACTOR and the CONTRACTOR's Guaranty will fully apply.

16. GUARANTY

16.1. The CONTRACTOR shall guarantee all materials and equipment furnished and work performed for a period of one years from the date of final payment of the work.

16.1.1. The Performance and Indemnity Bond shall remain in full force and effect during the guaranty period.

16.1.2. Correction of faulty work after final payment shall be as provided in Paragraph 41.

17. INSURANCE

17.1. The CONTRACTOR shall not commence any work until he obtains, at his own expense, all required insurance. Such insurance must have the approval of the OWNER as to the limit, form, and amount. The CONTRACTOR will not permit any Subcontractor to commence work on this project until such Subcontractor has complied with the same insurance requirements.

Types: The types of insurance the CONTRACTOR is required to obtain and maintain for the full period of the Contract will be: Workmen's Compensation Insurance, Automobile and Comprehensive General Liability Insurance as detailed in the following portions of this specification.

17.1.2. Evidence: As evidence of specified insurance coverage, the OWNER may, in lieu of actual policies, accept certificates issued by the insurance carrier showing such policies in force for the specified period. Each policy or certificate will bear an endorsement or statement waiving right of cancellation or reduction in coverage within ten days' notice in writing to be delivered by registered mail to the OWNER. Should any policy be cancelled before final payment by the OWNER to the CONTRACTOR and the CONTRACTOR fails immediately to procure other insurance as specified, the OWNER reserves the right to procure such insurance and to deduct the cost thereof from any sum due the CONTRACTOR under this Contract.

17.1.3. Adequacy of Performance: Any insurance bearing on adequacy of performance shall be maintained after completion of the project for the full guaranty period. Should such insurance be cancelled before the end of the guaranty period and the CONTRACTOR fails immediately to procure other insurance as specified, the OWNER reserves the right to procure such insurance and to charge the cost thereof to the CONTRACTOR.

17.1.4. Payment of Damages: Nothing contained in these insurance requirements is to be construed as limiting the extent of the CONTRACTOR's responsibility for payment of damages resulting from his operations under this Contract.

18. WORKMEN'S COMPENSATION INSURANCE

18.1. Before the Agreement between the OWNER and the CONTRACTOR is entered into, the CONTRACTOR shall submit written evidence that he and all Subcontractors have obtained, for the period of the Contract, full Workman's Compensation Insurance coverage for all persons whom they employ or may employ in carrying out the work under this Contract. This insurance shall be in strict accordance with the requirements and statutory limits of the most current and applicable South Carolina Workman's Compensation Insurance Laws.

19. COMPREHENSIVE GENERAL LIABILITY AND AUTOMOBILE INSURANCE

19.1. Before commencement of the work, the CONTRACTOR shall submit written evidence that he and all his Subcontractors have obtained for the period of the Contract, full Comprehensive General Liability Insurance and automobile coverage. This coverage shall provide for both bodily injury and property damage.

19.1.1. Comprehensive General Liability Insurance shall include coverage for bodily injury, sickness or disease, death, or property damage arising directly or indirectly out of or in connection with the performance of work under this Contract, and shall provide for a combined single limit of not less than one million (\$1,000,000) dollars for all damages arising out of bodily injury, sickness or disease, death, or property damage for each occurrence.

19.1.2. Automobile insurance shall include coverage for bodily injury and property damage arising directly or indirectly out of or in connection with the performance of work under this Contract, and shall provide for a combined single limit of not less than one million (\$1,000,000) dollars for all damages arising out of bodily injury or property damage for each occurrence.

19.1.3. Indemnity: Included in such insurance will be contractual coverage sufficiently broad to insure the provisions of Paragraph 20.

20. INDEMNITY

20.1. The CONTRACTOR shall hold harmless, indemnify and defend the OWNER, its successors and assigns, the ENGINEER, their consultants, and each of their officers and employees and agents, from any and all liability claims, losses or damage arising or alleged to arise from the performance of the work described herein, but not including the sole negligence of the OWNER or the ENGINEER.

21. PATENTS AND ROYALTIES

21.1. If any design, device, material or process covered by letters, patent or copyright is used by the CONTRACTOR, he shall provide for such use by legal agreement with the OWNER of the patent or a duly authorized licensee of such OWNER, and shall save harmless the OWNER, and the ENGINEER, from any and all loss or expense on account thereof, including its use by the OWNER.

22. PERMITS

22.1. All permits and licenses necessary for the prosecution of the work shall be secured and paid for by the CONTRACTOR. This shall include all Business Licenses required by the Local Government.

23. LAWS TO BE OBSERVED

23.1. The CONTRACTOR shall give all notices and comply with all Federal, State and local laws, ordinances and regulations in any manner affecting the conduct of the work, and all such orders and decrees as exist, or may be enacted by bodies or tribunals having any jurisdiction or authority over the work, and shall indemnify and save harmless the OWNER its successors and assigns, the ENGINEER, their consultants, and each of their officers and employees and agents against any claim or liability arising from, or based on, the violation of any such law, ordinance, regulation, order or decree, whether by himself or his employees.

24. WARNING SIGNS AND BARRICADES

24.1. The CONTRACTOR shall provide adequate signs, barricades, red lights and watchmen and take all necessary precautions for the protection of the work and the safety of the public. All barricades and obstructions shall be kept burning from sunset to sunrise. Barricades shall be of substantial construction and shall be placed and illuminated at night as to show in advance where construction, barricades, or detours exist.

25. PUBLIC CONVENIENCE

25.1. The CONTRACTOR shall at all times so conduct his work as to insure the least possible obstruction to traffic and inconvenience to the general public and the residents in the vicinity of the work, and to insure the protection of persons and property. No road or street shall be closed to the public except with permission of the proper authorities. Fire hydrants on or adjacent to the work shall be kept accessible to fire-fighting equipment at all times. Temporary provisions shall be made by the CONTRACTOR to insure the use of sidewalks and the proper functioning of all gutters, sewer inlets, drainage ditches, and irrigation ditches, which shall not be obstructed.

26. SAFETY

26.1. The CONTRACTOR shall be solely and completely responsible for the conditions of the job site, including safety of all persons and property affected directly or indirectly by his operation during the performance of the work. This requirement will not be limited to normal working hours but will only apply continuously 24 hours per day until written acceptance of the work by the OWNER and shall not be limited to normal working hours.

26.2. The ENGINEER's construction reviews of the CONTRACTOR's performance is not intended to include review of the adequacy of the CONTRACTOR's safety measures in, on, or near the construction site.

27. NOTICE TO PROCEED

27.1. Following the execution of the Contract by the OWNER and the CONTRACTOR, written Notice to Proceed with the work shall be given by the OWNER to the CONTRACTOR. The CONTRACTOR shall begin and shall prosecute the work regularly and uninterruptedly thereafter (except as provided for herein) with such force as to secure the completion of the work within the Contract Time.

28. TIME FOR COMPLETION AND LIQUIDATED DAMAGES

28.1. It is hereby understood and mutually agreed, by and between the CONTRACTOR and the OWNER, that the date of beginning and the time for completion as specified in the Contract of the work to be done hereunder are ESSENTIAL CONDITIONS of this Contract; and it is further mutually understood and agreed that the work embraced in this Contract shall be commenced on a date to be specified in the Notice to Proceed.

28.2. The CONTRACTOR agrees that said work shall proceed regularly, diligently, and uninterruptedly at such rate of progress as will insure full completion thereof within the time specified. It is expressly understood and agreed, by and between the CONTRACTOR and the OWNER, that the time for the completion of the work described herein is a reasonable time for the completion of the same, taking into consideration the average climatic range and usual industrial conditions prevailing in this locality.

28.3. If said CONTRACTOR shall neglect, fail, or refuse to complete the work within the time herein specified, or any proper extension thereof granted by the OWNER, then the CONTRACTOR does hereby agree, as a part consideration for the awarding of this Contract, to pay to the OWNER the amount specified in the Contract, not as a penalty but as liquidated damages for such breach of contract as hereinafter set forth, for each and every calendar day that the CONTRACTOR shall be in default after the time stipulated in the Contract for completing the work.

28.4. The said amount is fixed and agreed upon by and between the CONTRACTOR and the OWNER because of the impracticability and extreme difficulty of fixing and ascertaining the actual damages the OWNER would in such event sustain, and said amount is agreed to be the amount of damages which the OWNER would sustain and said amount shall be retained from time to time by the OWNER from current periodical estimates.

28.5. It is further agreed that time is of the essence of each and every portion of this Contract and of the Specifications wherein a definite and certain length of time is fixed for the performance of any act whatsoever; and where under the Contract an additional time is allowed for the completion of any work, the new time limit fixed by such extension shall be of the essence of this Contract. PROVIDED, that the CONTRACTOR shall not be charged with liquidated damages or any excess cost when the delay in completion of the work is due to the following:

28.5.1. Any preference, priority or allocation order duly issued by the Federal or State Government.

28.5.2. Unforeseeable cause beyond the control and without the fault or negligence of the CONTRACTOR, including, but not restricted to, acts of God, or of the public enemy, acts of the OWNER, acts of another CONTRACTOR in the performance of a contract with the OWNER, fires, flood, epidemics, quarantine restrictions, strikes, freight embargoes and unusually severe weather; and

28.5.3. Any delays of Subcontractors or suppliers occasioned by any of the causes specified in subsection 28.5.1. and 28.5.2. of this article:

PROVIDED, FURTHER, that the CONTRACTOR shall, within 10 days from the beginning of such delay, unless the OWNER shall grant a further period of time prior to the date of final settlement of the contract, notify the OWNER, in writing, of the causes of the delay, who shall ascertain the facts and extent of the delay and notify the CONTRACTOR within a reasonable time of its decision in the matter, and grant such extension of time as the OWNER shall deem equitable and just.

29. CONSTRUCTION SCHEDULE AND PERIODIC ESTIMATES

29.1. Immediately after execution and delivery of the contract, and before the first partial payment is made, the CONTRACTOR shall deliver to the OWNER an estimated construction progress schedule in a form satisfactory to the OWNER, showing the proposed dates of commencement and completion of each of the various subdivisions of work required under the Contract Documents.

30. EXTENSION OF CONTRACT TIME

30.1. A delay beyond the CONTRACTOR's control occasioned by an Act of God, by act or omission on the part of the OWNER or by strikes, lockouts, fire, etc., may entitle the CONTRACTOR to any extension of time in which to complete the work as agreed by the OWNER, provided, however, that the CONTRACTOR shall immediately give written notice to the OWNER of the cause of such delay.

30.2. Act of God shall mean an earthquake, flood, cyclone, or other cataclysmic phenomenon. Storms of normal intensity for the locality shall not be construed as an Act of God and no reparation shall be made to the CONTRACTOR for damages to the work resulting there from.

31. EXTRA WORK

31.1. New and unforeseen items of work found to be necessary, and which cannot be covered by any item or combination of items for which there is a Contract price, shall be classed as Extra Work. It shall be the responsibility of the CONTRACTOR to identify necessary work items classed as Extra Work and for which no previous contract price has been arranged and advise the ENGINEER and the OWNER of the need for the aforesaid necessary Extra Work. The CONTRACTOR shall do such Extra Work and furnish such materials as may be required for the proper completion or construction of the whole work contemplated, upon written order from the OWNER as approved by the ENGINEER. In the absence of such written order, no claim for Extra Work shall be considered.

31.2. Extra Work shall be performed in accordance with these Contract Documents where applicable and work not covered by such shall be done in accordance with the best construction practice and in a workmanlike manner.

31.3. Extra Work required in an emergency to protect life and property shall be performed by the CONTRACTOR as required.

32. CLEANING UP

32.1. The CONTRACTOR shall at all times, keep the premises clean and shall remove from the OWNER's property, and from all public and private property, temporary structures, rubbish, waste materials resulting from his operation or caused by his employees, and all surplus materials, leaving the site smooth, clean and true to line and grade and in the same condition as existed prior to the work performed by the CONTRACTOR or his Subcontractors and as approved by the OWNER. Failure to maintain a clean project site or to complete clean-up of the project site at the completion of the work shall

be cause for the OWNER to perform the necessary clean-up and the costs thereof shall be charged to the CONTRACTOR.

33. REQUEST FOR PAYMENT

33.1. The CONTRACTOR may submit to the OWNER periodically, but not more than once each month, a Request for Payment for work done and materials delivered to and stored on the site. The CONTRACTOR shall furnish the OWNER all reasonable information required for obtaining the necessary data relative to the progress and execution of the work. Payment for materials stored on the site will be conditioned upon evidence submitted to establish the OWNER's title to such materials. Each Request for Payment shall be computed on the basis of work completed on all items listed in the Detailed Breakdown of Contract (or on unit prices, as the case may be), less retainage as stated in Special Provisions until final completion and acceptance of the work and less previous payments.

34. ENGINEER'S ACTION ON REQUEST FOR PAYMENT

34.1. All CONTRACTOR's Requests for Payment shall be referred to the ENGINEER for his review and, within a reasonable period, the ENGINEER shall:

34.1.1. Recommend payment by the OWNER of the Request for Payment as submitted.

34.1.2. Recommend payment by the OWNER of such other amount as the ENGINEER shall consider as due the CONTRACTOR, informing the OWNER and the CONTRACTOR in writing of his reasons for recommending the amended amount.

34.1.3. Recommend to the OWNER that payment of the Request for Payment be withheld, informing the CONTRACTOR and the OWNER in writing of his reasons, for so recommending.

35. OWNER'S ACTION ON REQUEST FOR PAYMENT

35.1. Within thirty days after receipt of a Request for Payment from the CONTRACTOR, the OWNER shall:

35.1.1. Pay the Request for Payment as recommended by the ENGINEER.

35.1.2. Pay such other amount, in accordance with Paragraph 36, as he shall decide is due the CONTRACTOR, informing the CONTRACTOR and the ENGINEER in writing of this reasons for paying the amended amount.

35.1.3. Withhold payment in accordance with Paragraph 36, informing the CONTRACTOR and the ENGINEER of his reasons for withholding payment.

36. OWNER'S RIGHT TO WITHHOLD PAYMENT OF A REQUEST FOR PAYMENT

36.1. The OWNER may withhold payment, in whole or in part, of a Request for Payment to the extent necessary to protect himself from loss on account of any of the following:

36.1.1. Defective work.

36.1.2. Evidence indicating the probable filing of claims by other parties against the CONTRACTOR that may adversely affect the OWNER.

36.1.3. Failure of the CONTRACTOR to make payments due to Subcontractors, material suppliers, or employees.

36.1.4. Damage to another CONTRACTOR.

37. PAYMENT FOR EXTRA WORK

37.1. Written notice of claims for payment for Extra Work shall be given by the CONTRACTOR within ten days after receipt of instructions from the OWNER to proceed with the Extra Work and also before any work is commenced, except in emergency endangering life or property. No claim shall be valid unless so made. In all cases, the CONTRACTOR's itemized estimate sheets showing all labor and material shall be submitted to the OWNER. The OWNER's order for Extra Work shall specify any extension of the Contract Time and one of the following methods of payment:

37.1.1. Unit prices or combination of unit prices which formed the basis of the original Contract.

37.1.2. A lump sum based on the CONTRACTOR's estimate and accepted by the OWNER.

37.1.3. Actual cost plus 15 percent for overhead and profit. Actual costs are defined as follows:

37.1.3.1. Labor costs, including time of foreman while engaged directly upon extra work.

37.1.3.2. Labor insurance and taxes.

37.1.3.3. Materials and supplies actually used on the work.

37.1.3.4. Associated General Contractors of America standard rental rates on each piece of equipment having a value in excess of \$50.00. Equipment and tools of lesser value are considered "small tools" and, as such, are considered to be part of overhead.

38. ACCEPTANCE AND FINAL PAYMENT

38.1. When the CONTRACTOR has completed the work in accordance with the terms of the Contract Documents, he shall certify completion of the work to the OWNER and submit a final Request for Payment, which shall be the Contract Amount plus all approved additions, less all approved deductions and less previous payments made. The CONTRACTOR shall furnish evidence that he has fully paid all debts for labor, materials, and equipment incurred in connection with the work, and upon acceptance by the OWNER, the OWNER will release the CONTRACTOR except as to the conditions of the Performance and Indemnity Bond and the Labor and Material Payment Bond, any legal rights of the OWNER, required guaranties, and Correction of Faulty Work after Final Payment, and will pay the CONTRACTOR's final Request of Payment. The CONTRACTOR shall allow sufficient time between the time of completion of the work and approval of the final Request for Payment for the ENGINEER to assemble and check the necessary data.

38.1.1. Release of Liens: The CONTRACTOR shall deliver to the OWNER a complete release of all liens arising out of this Contract before the retained percentage or before the final Request for Payment is paid. If any liens remains unsatisfied after all payments are made, the CONTRACTOR shall refund to the OWNER such amounts as the OWNER may have been compelled to pay in discharging such liens including all costs and a reasonable attorney's fees.

39. OWNER'S RIGHT TO TERMINATE AGREEMENT

39.1. The OWNER shall have the right to terminate his agreement with the CONTRACTOR after giving ten days' written notice of termination to the CONTRACTOR in the event of any default by the CONTRACTOR.

39.1.1 Default by CONTRACTOR: It shall be considered a default by the CONTRACTOR whenever he shall:

39.1.1.1. Declare bankruptcy, become insolvent, or assign his assets for the benefit of his creditors.

39.1.1.2. Disregard or violate provisions of the Contract Documents or fail to prosecute the work according to the agreed Schedule of Completion, including extensions thereof.

39.1.1.3. Fail to provide a qualified superintendent, competent workmen or Subcontractors, or proper materials, or fail to make prompt payment thereof.

39.1.2. Completion by the OWNER: In the event of termination of the Agreement by the OWNER because of default by the CONTRACTOR, the OWNER may take possession of the work and of all materials and equipment thereon and may finish the work by whatever method and means he may select.

40. TERMINATION OF CONTRACTOR'S RESPONSIBILITY

40.1. The Contract will be considered complete when all work has been finished and the project accepted in writing by the OWNER. The CONTRACTOR's responsibility shall then cease, except as set forth in his Performance and Indemnity Bond, as provided in Paragraph 16, Guaranty, and as provided in Paragraph 41, Correction of Faulty Work After Final Payment.

41 CORRECTION OF FAULTY WORK AFTER FINAL PAYMENT

41.1. The making of the final payment by the OWNER to the CONTRACTOR shall not relieve the CONTRACTOR of responsibility for faulty materials or workmanship. The CONTRACTOR shall promptly replace any such defects, as determined by the ENGINEER, discovered within two years from the date of final payment of the work.

42. INSPECTION

42.1. The authorized representatives of the ENGINEER and OWNER shall be permitted to inspect all materials, workmanship, and other relevant project records and data. Materials and workmanship will be subject to the approval of the OWNER and/or his representative.

43. CORRECTION OF WORK

43.1. All work, all materials, whether incorporated in the work or not, all processes of manufacture, and all methods of construction shall be, at all times and places, subject to the inspection of the ENGINEER who shall be the final judge of the quality and suitability of the work, materials, process of manufacturer, and methods of construction for the purposes for which they are used. Should they fail to meet his approval, they shall be forthwith reconstructed, made good, replaced and/or corrected, as the case may be, by the CONTRACTOR at his own expense. Rejected material shall immediately be removed from the site. If, in the opinion of the ENGINEER, it is undesirable to replace any defective or damaged materials or to reconstruct or correct any portion of the work injured or not performed in accordance with the Contract hereunder shall be reduced by such amount as in the judgment of the ENGINEER shall be equitable.

44. SUBSURFACE CONDITIONS FOUND DIFFERENT

44.1. Should the CONTRACTOR encounter subsurface and/or latent conditions at the site materially differing from those shown on the Plans or indicated in the Specifications, he shall immediately give notice to the ENGINEER of such conditions before they are disturbed. The ENGINEER will thereupon promptly investigate the conditions, and if he finds and so determines that they materially differ from those

shown on the Plans or indicated in the Specifications, he will at once make such changes in the Plans and/or Specifications, as he may find necessary. Any increase or decrease of cost resulting from such changes are to be adjusted in the manner provided in Paragraph 37 of the General Conditions.

45. CONTRACT SECURITY

45.1. The CONTRACTOR shall furnish a Performance Indemnity Bond and Payment Bond (forms attached) in an amount at least equal to 100% of the contract prices as security for the faithful performance of this Contract, as the security for the payment of all persons performing labor on the project under this Contract, and furnishing materials in connection with this Contract. The Performance and Indemnity Bond and the Payment Bond may be in one or in separate instruments in accordance with local law. Before final acceptance, each bond must be approved by the OWNER.

46. DISPUTE RESOLUTION

46.1 OWNER and CONTRACTOR agree to negotiate all disputes between them in good faith prior to exercising their rights under law.

46.2 Any claim, dispute or other matter in question arising from or related to this Agreement or the performance or breach thereof, which cannot be resolved through direct discussions between parties shall be subject to mediation as a condition precedent to the institution of legal or equitable proceedings by either party, and only after both parties have completed the mediation process.

46.3 Through mediation, CONTRACTOR and OWNER shall endeavor to resolve claims, disputes, or other matters in question between them by mediation in an informal process in which a third-party mediator facilitates discussion between the parties. The parties may designate a mediator mutually agreeable to both CONTRACTOR and OWNER to conduct the mediation. If the parties are unable to agree upon a mediator, mediation shall be conducted in accordance with the mediation provision of the South Carolina Circuit Court Alternative Dispute Resolution Rules. The mediation shall be conducted in York County, South Carolina. A request for mediation shall be filed in writing with the other party to this Agreement, and legal or equitable proceedings shall be stayed pending mediation for a period of sixty (60) days from the date of the request for mediation is filed, unless stayed for a longer period of time by agreement of the parties or court order. The cost of a third-party mediator will be shared equally by the parties.

46.4 If the parties reach an agreement during the mediation process, they shall reduce the agreement to writing and sign it with their attorneys, if any. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

46.5 In any action or proceedings to enforce or interpret any provision of this Agreement, or where any provision herein is validity asserted as a defense, each Party shall bear its own attorney fees, costs, and expenses.

47. CONTRACTOR'S/SUBCONTRACTOR'S PERSONNEL

47.1 Contractor warrants that all Contractor/Subcontractor personnel engaged in the performance of Work under this Contract shall possess sufficient experience and/education to perform the services requested by the County. County expressly retains the right to have any of the Contractor/Subcontractor personnel removed from performing services under this Contract. Contractor shall effectuate the removal of the specified Contractor/Subcontractor personnel from providing any services to the County under this Contract within one business day of notification by County. County shall submit the request in writing to

the Contractor's Project Manager. The County is not required to provide any reason, rationale or additional factual information if it elects to request any specific Contractor personnel be removed from performing services under this Contract.

END OF SECTION

DIVISION I - SECTION 4C

SPECIAL CONDITIONS

SPECIAL CONDITIONS

1. All work performed by the Contractor must be in accordance with the South Carolina Department of Transportation (SCDOT) 2007 Standard Specification for Highway Construction, SCDOT Supplemental Technical Specifications, and SCDOT Special Provisions, unless directed otherwise in the plans or by the Engineer. A full version of the 2007 Edition SCDOT Standard Specifications For Highway Construction may be viewed or downloaded on SCDOT's website at www.scdot.org.
2. All work performed by the Contractor shall be constructed using the SCDOT'S Current Standard Drawings with all updates effective at the time of the letting, unless directed otherwise in the plans or by the Engineer. The Standard Drawings are available for download on SCDOT's website www.scdot.org. All drawings that are updated are labeled with their effective letting date in red.
3. Remove and dispose of the structure at 2555 Saluda Ave, Rock Hill, SC in accordance with Section 202 of the SCDOT Specifications. The contractor is to obtain necessary city and/or county demolition permits. Payment for the removal and satisfactory disposal of the structure, including necessary permits, shall be included in the lump sum bid item of "Removal and Disposal of Structures and Obstructions."
4. Remove existing fence and construct new fence and driveway gates per New Fence Item No. 1 on tract 65. Existing fencing shall not be reused. The new fence or a temporary fence must be installed at the new location prior to the old fence being removed and work commencing on the property. The new fence will be placed at the top of the cut line and tie to existing fencing at the sides of the property. The fence will also allow for two driveway entrances and the walkway in the middle of the yard with gates. The new fence will be a new 5-foot galvanized steel, 9-gauge chain link fence. If a temporary fence is to be used, it will be constructed as a 5-foot galvanized steel, 9-gauge chain link fence and placed as required. Payment for a temporary fence, if used, shall be included in the bid items for New Fence Item No. 1, no separate payment will be made.
5. There are no known underground storage tanks within the right-of-way. However, it is the Contractor's responsibility to investigate the project site prior to bidding to determine all structures and obstructions requiring removal. In accordance with Section 202 of SCDOT Specifications, payment for the removal and satisfactory disposal of all underground storage tanks shall be included in the lump sum bid item of "Removal of Structures and Obstructions."

Any additional items including tanks encountered within the construction limits will be removed and payment shall be included in the lump sum price.

All work shall be performed in accordance with the Department of Health and Environmental Control (DHEC) requirements by contracting personnel certified by DHEC. The Contractor will be required to obtain all permits and provide the required closure reports for all tank removals.

6. The Contractor shall be liable and responsible for payment of fines assessed by any regulatory agency due to non-compliance with applicable permit requirements and/or regulations by the Contractor. In the event that Owner is fined due to non-compliance with permit requirements, the Owner will charge the Contractor the cost of the fine by deducting an equal amount from the next progress pay estimate.
7. In the Bid Proposal Form and Schedule, Division I-Section 3, contract items given a unique seven (7) digit Item Number shall be constructed in accordance with SCDOT Standard Specifications. The first three (3) digits correspond to sections of the SCDOT Standard Specifications. The remaining four (4) digits are for individual identification of each contract item. Contract items that are identified with Item Numbers beginning with W, S, F, and SP shall be constructed in accordance with specifications contained within this document.
8. Construction conditions requiring minor vertical adjustments (0-2 ft.) to existing water line valve boxes, sanitary sewer manholes, and other minor appurtenances shall be the responsibility of the Contractor. The costs for the adjustments shall be the Contractor's responsibility and shall be included in Bid Item, Mobilization. Other utilities requiring relocation or adjustment for construction activities will be the responsibility of the utility owner.
9. Reconstruction of driveways and other special provisions on properties, included in the right-of-way acquisition, shall be coordinated with the Engineer. Contractor shall notify Engineer prior to construction of driveways.

10. The Owner will obtain the South Carolina Department of Health and Environmental Control (DHEC) Notice of Intent (NOI) for the project. The Contractor's signature is required on several documents necessary for obtaining the permit including, but not limited to, the NOI application, weekly inspection reports and Co-Permittee Agreements. The Contractor shall cooperate with the Owner in providing the required signatures. The Contractor shall be responsible for posting at the project site and keeping on file, permit approvals and other notices as required by permits for the project. The NOI also requires that on-site preconstruction conferences be held for the Prime Contractor and all subcontractors. The Contractor shall participate in these meetings as required by the NOI.
11. Testing shall be conducted by the Owner/Engineer in accordance with the procedures defined in the SCDOT Standard Specifications, and applicable Supplemental Specifications.
12. The Contractor shall provide all record drawing information to the Engineer prior to final approval.
13. Commercial advertising signs (realtor signs) within the construction limits should be removed and left on adjacent property - Do not reinstall. No direct payment will be made for removing these signs as the work is considered incidental to the item of clearing and grubbing.
14. Mailboxes are to be relocated at the direction of the Engineer. No direct payment will be made for the relocation of mailboxes.
15. The removal or relocation of billboards is not the Contractor's responsibility.
16. Non-conforming signs that are not to be relocated shall be removed and placed on the property beyond the construction limits.
17. In the interest of closing out this project in a prompt and timely manner, the Contractor shall complete item 1090200 (as-built construction plans) within 45 days of the substantial completion or final acceptance of the project. The final pay request as required in Section 4.37 of the General Conditions shall be submitted within 120 calendar days of the Owner's final acceptance of the project. The Owner shall impose a \$200 per calendar day penalty for failure on the Contractor's part to complete and submit final closeout documents including the final pay request within the required 120 days. This late penalty shall be deducted from the project retainage for each calendar day beyond the allowed 120 days.
18. Temporary lane closure shall be conducted in accordance with SCDOT standard details and as directed by the Engineer. The Contractor shall submit a lane closure plan to the Engineer seven (7) calendar days prior to a lane closure. The Contractor shall notify all agencies responsible for emergency services of the lane closure schedule seven (7) calendar days prior to closure.
19. Partial Payments – The following retainage will be withheld pending final completion and final payment. A percentage based on the amount of the contract completed, shall be retained on each estimate until payment of the final estimate. The retainage shall be 5 percent until the project is 75 percent complete, at which time the retainage will be reduced to 2.5 percent. However, when the Contractor has completed at least 99 percent of the work, the Owner may, at his discretion, further reduce the retainage to an amount which will be adequate to complete the remaining work plus any anticipated liquidated damage. The Contractor may be required to furnish consent of surety before the retained amount is reduced to less than 2.5 percent.
20. The Geotechnical Reports included as part of this manual were prepared to assist the Owner in preparing the project design. The reports have been included for general information and are not intended to be used to determine the nature of the unclassified materials on the project. The Owner, CDM Smith Inc., nor guarantee the accuracy or accept liability for information contained there-in. Any use of the geotechnical reports shall be at the Contractor's own risk as it is the Contractor's responsibility to make his own investigations and determinations.
21. The Contractor shall develop and submit prior to beginning construction, a schedule of work which will allow construction of the project while maintaining vehicular access to all adjacent parcels during the construction period.

22. The Contractor shall be responsible for abandoning wells, septic tanks and drain fields in accordance with DHEC and other applicable requirements. Payment for all work associated with the abandonment removal and capping of wells and septic tanks and drain fields shall be included in the clearing and grubbing pay item.
23. The Contractor shall be aware of the following special conditions related to right-of-way settlements with property owners adjacent to the project limits. The Contractor shall be responsible for coordinating with property owners to meet the conditions stipulated below:

**2011 YORK COUNTY CAPITAL PROJECTS SALES AND USE TAX PROGRAM
 Widening SC Route 72 from 0.2 Miles West of S-46-163 (East Rambo Rd.)
 to SC Rte. 901 (Mt. Holly Rd.) #11149-014
 RIGHT-OF-WAY SPECIAL CONDITIONS**

Tract	OWNER/CONTACT INFO	CONDITIONS
37	Mary K. Barber	In-Ground Sprinkler System Coordinate with Property Owner for relocation of sprinkler system
46	Georgetta McGuire	Well Water System Coordinate with Property Owner for relocation of well water system.
65	Tonya K. Kennedy	Coordinate with Property Owner prior to removing existing fence. New or temporary fence must be in place prior to existing fence being removed due to dogs on property.

24. A summary of the known utilities within the project limits of the project is included in Section 4D: Utilities Special Conditions. While the Owner has coordinated utility relocation work with the utilities prior to the letting of this contract, it will be the successful low bidder's responsibility to coordinate the construction work with the utilities work during construction.
25. For this project, the following will be eligible for adjustments:
 - A.C. Binder Adjustments for Liquid Asphalt Binder (PG 64-22)

Base date for adjustment will be determined at the Preconstruction meeting dependent on the bid date for this project.
26. Contractor shall comply with all general and regional conditions identified in the nationwide permit.
27. A summary of the known utilities within the limits of the project is included in the attached Utility Report of this Project Manual. While the Owner has coordinated utility relocation work with the utilities prior to the letting of this contract, it will be the successful low bidder's responsibility to coordinate the construction work with the utilities work during construction.
28. The Roadway Boring Logs included as part of the attached Geotechnical Report were prepared to assist the Owner with preparing the project design. They have been included for general information and are not intended to be used to determine the nature of the unclassified materials on the project. The Owner, CDM Smith Inc. does not guarantee the accuracy or accept liability for information contained there-in. This information shall be used at the Contractor's own risk as it is the Contractor's responsibility to make his own investigation and determination of unclassified excavation material.
29. Moving Items – Certain items will need to be moved from within the project limits to allow for the construction of the project. It is the Contractor's responsibility to investigate the various project sites prior to bidding to determine the items requiring removal.

30. Mobilization shall be paid in accordance with Section 103.11 of the SCDOT 2007 Standard Specifications For Highway Construction.
31. The Contractor shall be responsible for abandoning wells, septic tanks and drain fields in accordance with DHEC and other applicable requirements. Payment for all work associated with the abandonment, removal and capping of wells, septic tanks and drain fields shall be included in the Clearing and Grubbing pay item, unless it is provided by other pay items included in this contract.
32. The contractor shall read the Section 404 General Permit included in this Project Manual and comply with all appropriate conditions during construction.
33. PAYMENT FOR MATERIAL TO BE USED IN THE WORK

Material Delivered on the Project

When so authorized by York County/SCDOT, partial payments will be made up to 95% of the delivered cost of materials on hand that are to be incorporated in the work, provided that such materials have been delivered on or in close proximity to the project and stored in an acceptable manner. Material payments will be allowed when 95% of the accumulated costs of unpaid invoices are equal to or greater than \$10,000, materials have been inspected and approved by York County/SCDOT

Material Stored at Fabricator's Facilities or Contractor's Facilities

When so authorized by York County/SCDOT, partial payments will be made up to 95% of the invoiced cost, exclusive of delivery cost, for bulky materials requiring fabrication at an offsite location that are durable in nature and represent a significant portion of the project cost, if it has been determined by York County/SCDOT, that the material cannot be reasonably stockpiled in the vicinity of the work. Material payments will be allowed when the materials have been inspected and approved by York County/SCDOT

Materials with Delayed Delivery to the Project

When so authorized by York County/SCDOT, partial payments will be made up to 95% of the invoiced cost of materials that have been ordered by the contractor but will be more than 45 days before being delivered to the project.

Required Documents

- (1) Written consent of surety to make such partial payments,
- (2) Bill of Sale from the Contractor to the Department, and
- (3) Copy of invoice from material supplier verifying the cost of the material.

General Requirements

The partial payments will be made on the conditional basis that the material meets the requirements of the contract and will be incorporated into the project. The Contractor shall reimburse the Department for all partial payments for material paid, but not incorporated into the project.

Partial payments for materials on hand or already ordered but not yet delivered to the project will not constitute acceptance, and any faulty material will be rejected even though previous payment may have been made for same in the estimates.

Partial payment will not be made for fuel, supplies, form lumber, falsework, or used materials.

Partial payments will not be made on seed or any living or perishable plant materials except that when such materials have been planted or otherwise incorporated in the work, payment may be made, not as materials, but as work done as part of a contract item for which a contract unit or lump sum price has been established.

Partial payments will not exceed 95% of the contract unit or lump sum prices for the work.

DIVISION I - SECTION 4D

UTILITIES SPECIAL PROVISIONS/CONDITIONS

UTILITY SPECIAL PROVISIONS/CONDITIONS
COORDINATION OF RELOCATION WORK WITH HIGHWAY CONSTRUCTION

Widening SC Route 72 from 0.2 Miles West of S-46-163 (East Rambo Rd.) to SC Rte. 901 (Mt. Holly Rd.) #11149-014 SCDOT PROJECT ID P029515

The following Utility Companies may need help defining the locations for the clearing and time constraints needed to complete their work:

- **Rock Hill Power**
- **York Electric Cooperative**
- **York County Natural Gas Authority**
- **Comporium (Cable and Telephone)**
- **Crestwood Equity Partners LP**

The utilities anticipate that the areas within the NPDES limits will be cleared by the time they begin their work. In some cases the contractor will be expected to locate where a proposed drainage facility will occur or define the NPDES line as well as the right of way.

Use or Occupation of Dominion Carolina Gas Easements by Contractor:

Dominion Carolina Gas owns and operates two natural gas transmission pipelines located in easements which cross the SC Hwy 72 project site in two locations. First as SC Hwy 72 at approximate Station 56+55. Second, at Oakdale Road at approximate Station 15+30.

- Contractor will not occupy for storage or other purposes or operate equipment on these gas transmission pipeline easements without first contacting and receiving approval from Dominion Carolina Gas.
- Contractor will not perform construction of roadway, drainage, water main, or any other facility on these gas transmission pipeline easements without first contacting and arranging for Dominion Carolina Gas to have a representative on-site during the construction.
- Contractor to contact Mr. C. Shawn McAlhany at 803-960-9119 and at c.mcalhany@dominionenergy.com to make the above arrangements with Dominion Carolina Gas.

In Contract Services:

City of Rock Hill Water and Sewer has requested in contract services for this project. Specifications and Design Drawings for this effort are included along with the Memorandum of Understanding.

DIVISION I - SECTION 4E
PERFORMANCE AND INDEMNITY BOND

PERFORMANCE AND INDEMNITY BOND

STATE OF SOUTH CAROLINA
COUNTY OF YORK

KNOW ALL MEN BY THESE PRESENTS that _____
_____ as Principal, hereinafter called Contractor, and _____
_____ as Surety, hereinafter
called Surety, are held and firmly bound unto the York County Government, as Obligee, hereinafter called
owner, in the amount of _____
_____ Dollars (\$_____) for the payment whereof Contractor and Surety bind
themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by
these presents.

WHEREAS, Contractor has by written agreement dated _____, 2023, entered
into a Contract with Owner for:

***Pennies for Progress Project 3
Widening SC Route 72 from 0.2 Miles West of S-46-163 (East Rambo Rd.) to SC Rte. 901 (Mt. Holly
Rd.) #11149-014***

in accordance with Drawings and Specifications prepared by York County Engineering Department,
ENGINEER, which Contract is by reference made a part hereof and is hereinafter referred to as the
Contract.

NOW, THEREFORE, THE CONDITIONS OF THIS OBLIGATION ARE SUCH, that, if the
Principal shall in all respects promptly and faithfully perform and comply with the terms and conditions of
said Contract and his obligations thereunder and shall indemnify the OWNER and the ENGINEER and
save either or all of them harmless against and from all costs, expenses and damages arising from the
performance of said Contract or the repair of any work thereunder, then this obligation shall be void;
otherwise, this Bond shall remain in full force and effect, in accordance with the following terms and
conditions:

A. The Principal and Surety jointly and severally agree to pay the OWNER any difference
between the sum to which the said Principal would be entitled on the completion of the Contract, and that
sum which the OWNER may be obliged to pay for the completion of said work by Contract or otherwise,
and any damages, direct or indirect or consequential, which the said OWNER may sustain on account of
such work, or on account of the failure of said CONTRACTOR to properly and in all things, keep and
execute all of the provisions of said Contract.

B. And this Bond shall remain in full force and effect for a period of two (2) years from the
date of final payment of the project by the OWNER and shall provide that the CONTRACTOR guarantees
to repair or replace for said period of one (1) years all work performed and materials and equipment
furnished that were not performed or furnished according to the terms of the Contract, and shall make
good, defects thereof which have become apparent before the expiration of said period of two (2) years.
If any part of the project, in the judgment of the OWNER, for the reasons above stated needs to be
replaced, repaired or made good during that time, the OWNER shall so notify the CONTRACTOR in
writing. If the CONTRACTOR refuses or neglects to do such work within five (5) days from the date of
service of such Notice, the OWNER shall have the work done by others and the cost thereof shall be paid

by the CONTRACTOR or his Surety. After the one year warranty period and after all warranty work has been completed satisfactorily to the Owner, the Contractor may request that this Bond be terminated.

C. And the said Surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the work to be performed thereunder or the specifications accompanying the same shall in any way affect its obligations on this bond, and it does hereby waive Notice of any change, extension of time, alteration or addition to the terms of the Contract or to the Work or to the Specifications.

D. The surety represents and warrants to the OWNER that they have a minimum Best's Key Rating Guide General Policyholder's Rating of "A-" and Financial Category of "Class VIII".

IN WITNESS WHEREOF, the above bounded parties executed this instrument under their several seals, this ____ day of _____ 2023, A.D., the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

WITNESS: (If Sole Ownership or Partnership, two (2) Witnesses required).
(If Corporation, Secretary only will attest and affix seal).

PRINCIPAL:

Signature of Authorized Officer
(Affix Seal)

WITNESSES:

Title

Business Address

City State

SURETY:

WITNESS:

Corporate Surety

Attorney-in-Fact (Affix Seal)

Business Address

City State

Name of Local Insurance Agency

CERTIFICATES AS TO CORPORATE PRINCIPAL

I, _____, certify that I am the Secretary of the Corporation named as Principal in the within bond; that _____ who signed the said bond on behalf of the Principal, was then _____ of said Corporation; that I know his signature, and his signature hereto is genuine; and that said bond was duly signed, sealed, and attested for and in behalf of said Corporation by authority of its governing body.

Secretary

Corporate
Seal

STATE OF SOUTH CAROLINA

COUNTY OF YORK

Before me, a Notary Public, duly commissioned, qualified and acting, personally appeared _____ to me well known, who being by me first duly sworn upon oath, says that he is the Attorney-in-Fact, for the _____ and that he has been authorized by _____ to execute the foregoing bond on behalf of the Contractor named therein in favor of the _____.

Subscribed and sworn to before me this . day of _____, 2023 A.D.

(Attach Power of Attorney)

Notary Public
State of South Carolina-at-Large

My Commission Expires:

END OF SECTION

DIVISION I - SECTION 4F

PAYMENT BOND

PAYMENT BOND

STATE OF SOUTH CAROLINA
COUNTY OF YORK

KNOW ALL MEN BY THESE PRESENTS that _____
_____ as Principal, hereinafter called CONTRACTOR,
and _____ as Surety, hereinafter called
Surety, are held and firmly bound unto the York County Government, as Obligee, hereinafter
called OWNER, in the amount of _____
_____ Dollars(\$_____) for the
payment whereof CONTRACTOR and Surety bind themselves, their heirs, executors,
administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, CONTRACTOR has by written agreement dated _____, 2023, entered
into a Contract with OWNER for:

***Pennies for Progress Project 3
Widening SC Route 72 from 0.2 Miles West of S-46-163 (East Rambo Rd.) to SC Rte. 901
(Mt. Holly Rd.) #11149-014***

in accordance with Drawings and Specifications prepared by York County Engineering
Department, ENGINEER, which Contract is by reference made a part hereof and is hereinafter
referred to as the Contract.

NOW, THEREFORE, THE CONDITIONS OF THIS OBLIGATION ARE SUCH, that, if the
Principal shall promptly make payments to all claimants, as herein below defined, then this
obligation shall be void; otherwise, this Bond shall remain in full force and effect, subject to the
following terms and conditions:

- A. A claimant is defined as any person supplying the Principal with labor, material and
supplies, used directly or indirectly by the said Principal or any subcontractor in the
prosecution of the work provided for in said Contract.
- B. The above named Principal and Surety hereby jointly and severally agree with the
OWNER that every claimant as herein defined, who has not been paid in full before the
expiration of a period of ninety (90) days after performance of the labor or after complete
delivery of materials and supplies by such claimant, may sue on this Bond for the use of
such claimant, prosecute the suit to final judgment for such sum or sums as may be justly
due claimant, and have execution thereon. The OWNER shall not be liable for the
payment of any costs or expenses of any such suit.
- C. No suit or action shall be commenced hereunder by any claimant:
 - 1. Unless claimant, other than one having a direct contract with the Principal, shall
within forty-five (45) days after beginning to furnish labor, materials or supplies
for the prosecution of the work, furnish the Principal with a notice that he intends
to look to this bond for protection.
 - 2. Unless claimant, other than one having a direct contract with the Principal, shall
within ninety (90) days after such claimant's performance of the labor or complete

delivery of materials and supplies, deliver to the Principal written notice of the performance of such labor or delivery of such material and supplies and the nonpayment therefore.

3. After the expiration of one (1) year from the performance of the labor or completion of delivery of the materials and supplies; it being understood, however, that if any limitation embodied in this Bond is prohibited by any law controlling the construction hereof such limitations shall be deemed to be amended so as to be equal to the minimum period of limitation permitted by such law.
 4. Other than in a state court of competent jurisdiction in and for the county or other political subdivision of the state in which the project, or any part thereof, is situated, or in the United States District Court for the district in which the project, or any part thereof, is situated, and not elsewhere.
- D. The Principal and the Surety jointly and severally, shall repay the OWNER any sum which the OWNER may be compelled to pay because of any lien for labor or materials furnished for any work included in or provided by said Contract.
- E. The Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration of or addition to the terms of the Contract or to the work to be performed thereunder or the Specifications applicable thereto shall in any way affect its obligations on this Bond, and the Surety hereby waives notice of any such change, extension of time, alterations of or addition to the terms of the Contract, or to the work or to the Specifications.
- F. The Surety represents and warrants to the Owner that they have a minimum Best's Key Rating Guide General Policyholder's rating of " A - " and Financial Category of "Class VIII ".

IN WITNESS WHEREOF, the above bounded parties executed this instrument under their several seals, this ____ day of _____ 2023, A.D., the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

WITNESS: (If Sole Ownership or Partnership, two (2) Witnesses required).
(If Corporation, Secretary only will attest and affix seal).

PRINCIPAL:

Signature of Authorized Officer
(Affix Seal)

WITNESSES:

Title

Business Address

City

State

WITNESS:

SURETY:

Corporate Surety

Attorney-in-Fact
(Affix Seal)

Business Address

City

State

Name of Local Insurance Agency

CERTIFICATES AS TO CORPORATE PRINCIPAL

I, _____, certify that I am the Secretary of the Corporation named as Principal in the within bond; that _____ who signed the said bond on behalf of the Principal, was then _____ of said Corporation; that I know his signature, and his signature hereto is genuine; and that said bond was duly signed, sealed, and attested for and in behalf of said Corporation by authority of its governing body.

Secretary

Corporate
Seal

STATE OF SOUTH CAROLINA
COUNTY OF YORK

Before me, a Notary Public, duly commissioned, qualified and acting, personally appeared _____ to me well known, who being by me first duly sworn upon oath, says that he is the Attorney-in-Fact, for the _____ and that he has been authorized by _____ to execute the foregoing bond on behalf of the CONTRACTOR named therein in favor of the _____.

Subscribed and sworn to before me this ____ day of _____, 2023, A.D.

(Attach Power of Attorney)

Notary Public
State of South Carolina-at-Large
My Commission Expires: _____

END OF SECTION

DIVISION I - SECTION 4G

NOTICE OF AWARD

NOTICE OF AWARD

TO: _____

FROM: York County Engineering _____
P.O. Box 148 _____
York, SC 29745 _____

PROJECT TITLE: Pennies for Progress Project 3

PROJECT DESCRIPTION: Widening SC Route 72 from 0.2 Miles West of S-46-163 (East Rambo Rd.) to SC Rte. 901 (Mt. Holly Rd.)

The Owner has considered the Bid submitted by you for the above described work in response to its Advertisement for Bids dated _____ and Information for Bidders.

You are hereby notified that your Bid has been accepted for items in the amount of

\$ _____

(\$ _____).

You are required by the Information for Bidders to execute the Agreement and furnish the required Contractor's Performance Bond, Payment Bond and certificates of insurance within ten (10) calendar days from the date of this Notice to you.

If you fail to execute said Agreement and to furnish said Bonds within ten (10) days from the date of this Notice, said Owner will be entitled to consider all your rights arising out of the Owner's acceptance of your Bid as abandoned and as forfeiture of your Bid Bond. The Owner will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this Notice of Award to the Owner.

Dated this ____ day of _____,

On behalf of the York County Council

By: _____

Title: _____

ACCEPTANCE OF NOTICE

Receipt of the above Notice of Award is hereby acknowledged

By: _____

Title: _____

This _____ day of _____,

DIVISION I - SECTION 4H

NOTICE TO PROCEED

NOTICE TO PROCEED

Date: _____

To: _____

Project:

***Pennies for Progress Project 3
Widening SC Route 72 from 0.2 Miles West of S-46-163 (East Rambo Rd.) to SC Rte. 901 (Mt. Holly Rd.) #11149-014***

You are hereby notified to commence work in accordance with the Agreement dated

_____ on or before _____, and you are to

complete the work within **730** consecutive calendar days thereafter. The date of completion of all work is therefore _____.

On behalf of the

YORK COUNTY GOVERNMENT

By: _____

Title: York County Engineer _____

ACCEPTANCE OF NOTICE

Receipt of the above Notice to Proceed is hereby acknowledged by _____, this
the _____ day of _____, _____.

By: _____

Title: _____

DIVISION I - SECTION 4I
NON-COLLUSION AFFIDAVIT

DIVISION I - SECTION 4J
CERTIFICATE OF INSURANCE

CERTIFICATE OF INSURANCE
(May also use applicable Accord form)

THIS IS TO CERTIFY THAT THE _____
Insurance Company

Address _____

Of _____

has issued policies of insurance, as described below and identified by a policy number, to the insured named below; and to certify that such policies are in full force and effect at this time. It is agreed that none of these policies will be cancelled or changed so as to affect the interest(s) of the York County Government (hereinafter sometimes called the OWNER) until thirty (30) days after written notice of such cancellation or change has been delivered to the ENGINEER.

Insured: _____

Address: _____

Status of Insured
_____ Corporation _____ Partnership _____ Individual

Insured: _____

Description of Work: _____

INSURANCE POLICIES IN FORCE

<u>Forms of Coverage</u>	<u>Policy Number</u>	<u>Expiration Date</u>
*Worker's Comp./Employers' Liability	_____	_____
**Comprehensive Auto Liability	_____	_____
***Excess Liability	_____	_____
Other (Please specify type)	_____	_____

POLICY INCLUDES COVERAGE FOR:	YES	NO
1. Additional Insured: OWNER and ENGINEER	_____	_____
2. *Liability under the United States Longshore-men's and Harbor Workers' Compensation Act.	_____	_____
3. **All owned, hired, or non-owned automotive equipment used in connection with work done for the Owner.	_____	_____
4. Contractual Liability	_____	_____
5. Damage caused by explosion, collapse or structural injury, and damage to underground utilities.	_____	_____
6. Products/Completed Operations	_____	_____
7. Owners and Contractors Protective Liability	_____	_____
8. Personal Injury Liability	_____	_____
9. ***Excess Liability applies excess of:		
(a) Employers' Liability	_____	_____
(b) Comprehensive General Liability	_____	_____
(c) Comprehensive Automobile Liability	_____	_____

<u>Types of Coverage</u>	<u>Forms of Coverage</u>	<u>Minimum Limits of Liability</u>	
Workers' Compensation	Bodily Injury	\$ 1,000,000	Statutory
Employers' Liability	Bodily Injury	\$ 500,000	Each Accident
	Disease	\$ 500,000	Each Person
	Disease	\$ 500,000	Policy Limit
Comprehensive Auto Liability	Combined Single Limit BI/PD	\$ 1,000,000	Each Accident
Comprehensive General Liability	Bodily Injury	\$ 1,000,000	Each Occurrence
		\$ 5,000,000	Aggregate

The Insurance Company hereby agrees to deliver, within ten (10) days, two (2) copies of the above policies to the Engineer when so requested.

NOTE: Entries on this certificate are limited to the Authorized Agent or Insurance Company Representative.

Date _____ (SEAL) _____
Insurance Company

Issued at _____
Authorized Representative

Insurance Agent or Company

- Send original and one copy to:

York County Engineering
Post Office Box 148
6 South Congress Street
York, South Carolina 29745

END OF SECTION

DIVISION I - SECTION 4K
APPLICATION FOR PAYMENT

APPLICATION FOR PAYMENT No. _____

Date: _____ Contractor: _____

Project: _____ Project Number: _____

Purchase Order Number: _____ For Period _____ To _____

Total value of work completed to date (see attached sheet) \$ _____

Total value of materials stored for project (see attached sheet) \$ _____

SUB TOTAL \$ _____

LESS _____ %RETAINED \$ _____

TOTAL \$ _____

LESS PREVIOUS PAYMENTS \$ _____

Other Changes, additions, or deductions
(see attached sheet) \$ _____

TOTAL AMOUNT DUE THIS PAYMENT \$ _____

Previous Payments:				
1	6	11	16	
2	7	12	17	
3	8	13	18	
4	9	14	19	
5	10	15	20	

Submitted By:

I hereby certify to the best of the Contractor's knowledge, information and belief, the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, and that all amounts have been paid by the Contractor for Work which previous Applications for Payment were issued and payments received from the Owner, that current payment shown herein is now due.

Contractor: _____ Notarized: _____

Signed By: _____ My Commission expires: _____

Date: _____ Affix seal:

Recommended By:

Architect/Engineer: _____ Date: _____

Certified Amount: \$ _____

The Certified amount is payable only to the Contractor named herein. Issuance, payment, and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.

Accepted By:

Owner: _____ Date: _____

DIVISION I - SECTION 4L

CHANGE ORDER FORM

CONTRACT CHANGE ORDER

CHANGE ORDER NO: _____

PROJECT: _____

DATE OF ISSUANCE: _____

DESCRIPTION OF CHANGE: _____

CONTRACT AMOUNT		CONTRACT TIME (Calendar Days)	
Original	\$ _____	Original Durations	_____ Days
Previous Change Orders (Add/Deduct)	\$ _____	Previous Change Order (Add/Deduct)	_____ Days
This Change Order (Add/Deduct)	\$ _____	This Change Order (Add/Deduct)	_____ Days
Revised Contract Amount	\$ _____	Revised Contract Time	_____ Days
REVISED CONTRACT COMPLETION DATE IS: _____, 20__			

	OWNER	CONTRACTOR	ENGINEER
SIGNATURE			
PRINT NAME			
COMPANY			
DATE			

DIVISION I - SECTION 4M

**RELEASE AND WAIVER OF CLAIM BY PRIME
CONTRACTOR**

**RELEASE AND WAIVER OF CLAIM
BY PRIME CONTRACTOR**

Know all men by these presents that the undersigned, _____ of _____ 20__ first being duly sworn, states that all payrolls, materials bills, sales tax, privilege tax or license, old age benefits tax, state and federal unemployment insurance, and other liabilities incurred for use in the performance of the contract for the ***Pennies for Progress Project: Widening SC Route 72 from 0.2 Miles West of S-46-163 (East Rambo Rd.) to SC Rte. 901 (Mt. Holly Rd.) #11149-014*** located in York County, South Carolina have been paid in full and waives any and all claims and releases York County Government (York County, South Carolina) from any rights or claims for debts due and owing by virtue of the furnishing of any material or supplies or any lien thereon.

(Name of Company)

By: _____

Its: _____

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

Notary Public for _____

My Commission expires: _____

DIVISION I - SECTION 4N
VALUE ENGINEERING INCENTIVE

VALUE ENGINEERING INCENTIVE

INTENT AND OBJECTIVE

- (1) This Subarticle applies to any cost reduction proposal (hereinafter referred to as a Value Engineering Change Proposal or VECP) initiated and developed by the Contractor for the purpose of refining the contract documents so as to contribute to design cost effectiveness or significantly improve the quality of the end result. This Subarticle does not, however, apply to any such proposal unless it is identified by the Contractor, at the time of its submission to the County, as a proposal submitted pursuant to this Subarticle.
- (2) VECPs contemplated are those that would result in net savings to the County by providing either: (A) a decrease in the cost of performance of the Contract, or; (B) a reduction in cost of ownership (hereinafter referred to as collateral costs) of the work provided by this Contract, regardless of acquisition costs. VECPs must result in savings without impairing essential functions and characteristics such as safety, service, life, reliability, economy of operation, ease of maintenance, aesthetics and necessary standard design features. However, nothing herein prohibits the submittal of VECPs where the required functions and characteristics could be combined, reduced or eliminated as being nonessential or excessive. Plan errors which are identified by the Contractor and which result in a cost reduction, will not qualify for submittal as a VECP.
- (3) The County reserves the right to reject at its discretion any VECP submitted which proposes a change in the design of the pavement system or which would require additional right-of-way. Substitution of another design alternate, which is detailed in the plans, for the one on which the Contractor bid, will not be allowed under this Subarticle. Pending execution of a formal supplemental agreement, implementing an approved VECP, the Contractor shall remain obligated to perform in accordance with the terms of the existing contract. No time extensions will be granted due to the time required to review a VECP.

SUBCONTRACTORS

- (1) The Contractor is encouraged to include the provisions of this Subarticle in contracts with subcontractors. The Contractor shall encourage submission of VECPs from subcontractors, however, it is not mandatory that VECPs be submitted nor is it mandatory that the Contractor accept or transmit to the County VECPs proposed by his subcontractors.

DATA REQUIREMENTS

- (1) A description of the difference between the existing contract requirement and the proposed change, and the comparative advantages and disadvantages.
- (2) Separate detailed cost estimates for both the existing contract requirement and the proposed change. The cost estimates shall be broken down by contract item numbers indicating quantity increases or decreases and deleted pay items. Additional proposed work, not covered by contract items, shall be identified by current County pay item numbers. In preparing the estimate, the Contractor shall include overhead, profit, and bond. No separate

pay item(s) for these costs will be allowed.

- (3) An itemization of plan details, plan sheets, design standards and Specifications that must be changed or added if the VECP is adopted. Preliminary plan drawings must be sufficient to describe the proposed changes.
- (4) An estimate of the effects the VECP would have on collateral costs to the County.
- (5) Engineering or other analysis in sufficient detail to identify and describe specific features of the contract which must be changed if the VECP is accepted, with a proposal as to how these changes can be accomplished and an assessment of their effect on other project elements. The County may require that engineering analyses be performed by a prequalified consultant in the applicable class of work. Any design changes which result from the VECP must be supported by computations sealed by a Professional Engineer registered in the State of South Carolina.
- (6) A statement of the time by which approval of the VECP must be issued by the County to obtain the total estimated cost reduction during the remainder of this Contract, noting any effect on the contract completion time or delivery schedule.

PROCESSING PROCEDURES

- (1) Two copies of each VECP shall be submitted, one to the Engineer, or his duly authorized representative, and one to the County's Value Engineering Office. VECPs will be processed expeditiously; however, the County will not be liable for any delay in acting upon a VECP submitted pursuant to this Subarticle. The Contractor may withdraw, in whole or in part, a VECP not accepted by the County within the period specified in the VECP. The County shall not be liable for any VECP development cost in the case where a VECP is rejected or withdrawn.

The Engineer shall be the sole judge of the acceptability of a VECP and of the estimated net savings in construction and/or collateral costs from the adoption of all or any part of such proposal. In determining the estimated net savings, the right is reserved to disregard the contract bid prices if, in the judgment of the Engineer, such prices do not represent a fair measure of the value of work to be performed or to be deleted.

Prior to approval, the Engineer may modify a VECP, with the concurrence of the Contractor, to make it acceptable. If any modification increases or decreases the net savings resulting from the VECP as modified and upon determination of final quantities, the new savings shall be computed by subtracting the revised total cost of all bid items affected by the VECP design from the total cost of the same bid items as represented in the original contract.

Prior to approval of the VECP, which initiates the supplemental agreement, the Contractor shall provide acceptable contract quality plan sheets revised to show all details consistent with the VECP design.

COMPUTATIONS FOR CHANGE IN CONTRACT COST OF PERFORMANCE

Contractor development and implementation costs for the VECP will not be recoverable. If the VECP is adopted, the Contractor's share of the net savings as defined hereinafter shall be considered full compensation to the Contractor for the VECP.

County costs of processing or implementation of a VECP will not normally be considered in the estimate. However, the County reserves the right, where it deems such action appropriate, to require the Contractor to pay the County's cost of investigating and implementing a VECP submitted by the Contractor as a condition of considering such proposal. Where such a condition is imposed, the Contractor shall indicate his acceptance thereof in writing, and such acceptance shall constitute full authority for the County to deduct amounts payable to the County from any monies due or that may become due to the Contractor under the contract.

COMPUTATIONS FOR COLLATERAL COSTS

When collateral cost savings are sought by the Contractor, separate estimates must be prepared for collateral costs of both the existing contract requirement and the proposed change. Each estimate shall consist of an itemized breakdown of all costs and the basis for the data used in the estimate. Cost benefits to the County include, but are not limited to: reduced costs of operation, maintenance or repair, and extended useful service life. Increased collateral costs include the converse of such factors.

Computations shall be as follows:

- (1) Costs shall be calculated over a 20-year period on a uniform basis for each estimate.
- (2) If the difference in the estimates as approved by the County indicates a savings, the Contractor shall divide the resultant amount by 20 to arrive at the average annual net collateral savings. The resultant savings shall be shared as stipulated in Sharing Arrangements.

SHARING ARRANGEMENTS

If a VECP is approved by the County, the Contractor may be entitled to share in both construction savings and collateral savings to the full extent provided for in this Subarticle.

Except for innovative ideas, the Contractor and County shall each receive 50 percent of net reduction in the cost of performance of this Contract. For innovative ideas, the reduction in the cost of performance shall be shared as follows:

Accrued Net Savings	Contractor's Share %	County's Share %
Less than \$25,000	100	0
\$25,000 to \$50,000	75	25
Over \$50,000	50	50

If an approved change is identical or similar to a previously submitted VECP or an idea previously utilized by the County it will not be considered an innovative idea, thus will only qualify for a 50 percent sharing of savings.

When collateral savings occur, the Contractor shall receive 20 percent of the average one year's net collateral savings.

The Contractor shall not receive construction savings or collateral savings on optional work listed in this Contract, until the County exercises its option to obtain that work.

DIVISION II
TECHNICAL SPECIFICATIONS

DIVISION II - SECTION 1

SCDOT TECHNICAL SPECIFICATIONS REFERENCE

SCDOT Specifications and Standard Drawings Reference

Widening of SC Route 72 from 0.2 Miles West of S-163 (Rambo Rd.) to SC Rte. 901 (Mt. Holly Rd.) York County, SC

The Contractor shall execute all work on this project in accordance with The South Carolina Department of Transportation, Standard Specifications, Supplemental Specifications, Supplemental Technical Specifications, and Standard Drawings in effect at the time of letting. They may be found here:

2007 Standard Specifications for Highway Construction

<https://www.scdot.org/business/standard-specifications.aspx>

2007 Supplemental Specifications

<https://www.scdot.org/business/road-supplemental-specs.aspx>

Supplemental Technical Specifications

<https://www.scdot.org/business/road-technical-specs.aspx>

Standard Drawings

<https://www.scdot.org/business/standard-drawings.aspx>

DIVISION II - SECTION 2
TRAFFIC CONTROL SPECIAL PROVISIONS

TRAFFIC CONTROL SPECIAL PROVISIONS

TRAFFIC CONTROL:

The Contractor shall execute the item of Traffic Control as required by the Standard Specifications, the plans, the Standard Drawings For Road Construction, these special provisions, all supplemental specifications, the MUTCD, and the Engineer. This is an amendment to the Standard Specifications to require the following:

GENERAL REGULATIONS -

These special provisions shall have priority to the plans and comply with the requirements of the MUTCD and the standard specifications. Revisions to the traffic control plan through modifications of the special provisions and the plans shall require approval by the department. **Final approval of any revisions to the traffic control plan shall be pending upon review by the Director of Traffic Engineering.**

Install and utilize changeable message signs in all lane closures installed on high volume high-speed multilane roadways. Use of changeable message signs in lane closures installed on low volume low speed multilane roadways is optional unless otherwise directed by the plans and the Engineer. Install and use a changeable message sign within a lane closure set-up as directed by the *Standard Drawings For Road Construction*. When a lane closure is not present for any time to exceed 24 hours, remove the changeable message sign from the roadway. Place the sign in a predetermined area on the project site, as approved by the Engineer, where the sign is not visible to passing motorists. Utilize preprogrammed messages in accordance with the *Standard Drawings For Road Construction* when using the changeable message sign as part of the traffic control set-up for lane closures. Only those messages pertinent to the requirements of the traffic control situation and the traffic conditions are permitted for display on a changeable message sign at all times. At no time will the messages displayed on a changeable message sign duplicate the legends on the permanent construction signs.

During operation of changeable message signs, place the changeable message sign on the shoulder of the roadway no closer than 6 feet between the sign and the near edge of the adjacent travel lane. When the sign location is within 30' of the near edge of a travel lane open to traffic, supplement the sign location with no less than 5 portable plastic drums placed between the sign and the adjacent travel lane for delineation of the sign location. Install and maintain the drums no closer than 3 feet from the near edge of the adjacent travel lane. This requirement for delineation of the sign location shall apply during all times the sign location is within 30' of the near edge of a travel lane open to traffic, including times of operation and non-operation. Oversized cones are prohibited as a substitute for the portable plastic drums during this application.

On multilane primary routes, avoid placement of signs mounted on portable sign supports within paved median areas utilized for two-way left turns unless otherwise directed by the RCE.

When mounting signs on multiple ground mounted sign supports, ensure that each post is of the same type. Combining and installing both ground mounted u-section and square steel tube posts within the same sign assembly is prohibited.

When mounting signs on ground mounted u-section or square steel tube posts, utilize either a sign support / ground support post combination with an approved breakaway assembly or a single direct driven post for each individual sign support of a sign assembly installation. Do not combine a sign support / ground support post combination and a direct driven post on the same sign assembly installation that contains two or more sign supports. Regarding sign support / ground support post combination installations, ensure that post lengths, stub heights and breakaway assemblies comply with the manufacturer's requirements and specifications. Use approved breakaway assemblies found on the *Approved Products List For Traffic Control Devices in Work Zones*.

When covering signs with opaque materials, the Department prohibits attaching a covering material to the face of the sign with tape or a similar product or any method that will leave a residue on the retroreflective sheeting. Residue from tape or similar products, as well as many methods utilized to remove such residue, damages the effective reflectivity of the sign. Therefore, contact of

tape or a similar product with the retroreflective sheeting will require replacement of the sign. Cost for replacement of a sign damaged by improper covering methods will be considered incidental to providing and maintaining the sign; no additional payment will be made.

Overlays are prohibited on all rigid construction signs. The legends and borders on all rigid construction signs shall be either reversed screened or direct applied.

Signs not illustrated on the typical traffic control standard drawings designated for permanent construction signs shall be considered temporary and shall be included in the lump sum price bid item for "Traffic Control" unless otherwise specified.

Install "Grooved Pavement" signs (W8-15-48) supplemented with the "Motorcycle" plaque (W8-15P-30) in advance of milled or surface planed pavement surfaces. On primary routes, install these signs no further than 500 feet in advance of the beginning of the pavement condition. On interstate routes, install these signs no less than 500 feet in advance of the beginning of the pavement condition. Install two sign assemblies at each sign location, one on each side of the roadway, on multilane roadways when the pavement condition is present. Install these signs immediately upon creation of this pavement condition and maintain these signs until this pavement condition is eliminated.

Install "Steel Plate Ahead" signs (W8-24-48) in advance of an area of roadway where temporary steel plates are present. Install these signs no further than 300 feet in advance of locations where steel plates are present. On multilane roadways, comply with the same guidelines as applied to all other advance warning signs and install two sign assemblies at each sign location, one on each side of the roadway, when roadway conditions warrant. Install these signs immediately upon installation of a temporary steel plate and maintain the signs until the temporary steel plates are removed.

Install and maintain any necessary detour signing as specified by the typical traffic control standard drawings designated for detour signing, Part VI of the MUTCD, these Special Provisions, and the Engineer. The lump sum price bid item for "Traffic Control" includes payment for installation and maintenance of the detour signing.

The Contractor shall maintain the travel patterns as directed by the traffic control plans and shall execute construction schedules expeditiously. The Contractor shall provide the Resident Engineer with no less than a two-week prior notification of changes in traffic patterns.

During nighttime flagging operations, flaggers shall wear a safety vest and safety pants that comply with the requirements of ANSI / ISEA 107 standard performance for Class 3 risk exposure, latest revision, and a fluorescent hard hat. The safety vest and the safety pants shall be retroreflectorized and the color of the background material of the safety vest and safety pants shall be fluorescent orange-red or fluorescent yellow-green.

During nighttime flagging operations, the contractor shall illuminate each flagger station with any combination of portable lights, standard electric lights, existing street lights, etc., that will provide a minimum illumination level of 108 Lx or 10 fc.

During nighttime flagging operations, supplement the array of advance warning signs with a changeable message sign for each approach. These changeable message signs are not required during daytime flagging operations. Install the changeable message signs 500' in advance of the advance warning sign arrays. Messages should be "Flagger Ahead" and "Prepare To Stop".

During surface planing and milling operations, grade elevation differences greater than 1 inch in areas with pavements composed of hot mixed asphalt (HMA) base courses, intermediate courses or surface courses and Portland cement concrete are PROHIBITED unless otherwise directed by the Department. However, during surface planing and milling operations for removal of Open-Graded Friction courses ONLY, a grade elevation difference of 1½ inches between adjacent travel lanes opened to traffic may exist unless otherwise directed by the Department.

During surface planing and milling operations, lane closures are required at all times where grade elevation differences and drop-offs greater than the acceptable measurements specified heretofore exist adjacent to or between travel lanes open to traffic unless otherwise specified by the department. If a grade elevation difference in excess of the specified acceptable ranges exist, either mill the adjacent travel lane or pave the milled travel lane as necessary to eliminate the grade elevation difference prior to opening the travel lane to traffic at these locations. Maintain the lane closure restrictions at all times unless otherwise directed by these special provisions.

During surface planing and milling operations, the length of roadway with an acceptable grade elevation difference less than or equal to 1" shall not exceed 4 miles.

During paving operations, the Department requires lane closures at all times where grade elevation differences and drop-offs greater than 2" exist adjacent to or between the travel lanes of a roadway opened to traffic, unless otherwise specified by these special provisions. Maintain lane closure restrictions at all times unless otherwise directed by these special provisions.

During paving operations, the length of roadway with an acceptable grade elevation difference less than or equal to 2" shall not exceed 4 miles.

Upon completion of the final riding surface on each road, the Contractor will be allowed up to 3 calendar days to begin eliminating shoulder drop-offs greater than 2" and work continuously until these drop-offs are eliminated.

Supplement and delineate the shoulder edges of travel lanes through work zones with traffic control devices to provide motorists with a clear and positive travel path. Utilize portable plastic drums unless otherwise directed by the Department. Vertical panels may be used where specified by the plans and directed by the RCE. The installation of traffic control devices are required in all areas where those areas immediately adjacent to a travel lane open to traffic have been altered in any manner by work activities, including but not limited to activities such as grading, milling, etc. Install the traffic control devices immediately upon initiating any alterations to the areas immediately adjacent to or within 15 feet of the near edge line of the adjacent travel lane. When sufficient space is available, place the traffic control devices no closer than 3 feet from the near edge of the traffic control device to the near edge line on the adjacent travel lane. When sufficient space is unavailable, place the traffic control device at the maximum distance from the near edge of the adjacent travel lane available.

LANE CLOSURE RESTRICTIONS -

The lane closure restrictions stated below are project specific. For all other restrictions see supplemental specification "Closure Restrictions" dated July 1, 2019.

The Contractor shall install all lane closures as directed by the Standard Specifications For Highway Construction (latest edition), the Standard Drawings For Road Construction, these special provisions, the MUTCD, and the Engineer. The Contractor shall close the travel lanes of two-lane two-way roadways by installing flagging operations. The Contractor shall close the travel lanes of multilane primary and secondary routes as directed by the typical traffic control standard drawings designated for lane closures on primary routes.

The Department prohibits lane closures on primary and secondary routes during any time of the day that traffic volumes in the travel lanes remaining open to traffic exceed 800 vehicles per hour per lane per direction. The Department reserves the right to suspend a lane closure if any resulting traffic backups are deemed excessive by the Engineer. Maintain all lane closure restrictions as directed by the plans, these special provisions, and the Engineer.

Flagging operations are considered to be lane closures for two-lane two-way operations and shall be subject to all restrictions for lane closures as specified by this contract.

Lane closures, including flagging operations, are restricted to maximum distances of 2 miles, except where noted as less on the contract drawings. Install all lane closures according to the typical

traffic control standard drawings. On occasions when daytime lane closures must be extended into the nighttime hours, substitute the nighttime lane closure standards for the daytime lane closure standards.

Installation and maintenance of a lane closure is PROHIBITED when the Contractor is not actively engaged in work activities specific to the location of the lane closure unless otherwise specified and approved by the Engineer. The length of the lane closure shall not exceed the length of roadway anticipated to be subjected to the proposed work activities within the work shift time frame or the maximum lane closure length specified unless otherwise approved by the Engineer. Also, the maximum lane closure length specified does not warrant installation of the specified lane closure length when the length of the lane closure necessary for conducting the work activity is less. The length and duration of each lane closure, within the specified parameters, shall require approval by the Engineer prior to installation. The length and duration of each lane closure may be reduced by the Engineer if the work zone impacts generated by a lane closure are deemed excessive or unnecessary.

The presence of temporary signs, portable sign supports, traffic control devices, trailer mounted equipment, truck mounted equipment, vehicles and vehicles with trailers relative to the installation or removal of a closure and personnel are prohibited within the 15 to 30 foot clear zone based upon the roadway speed limit during the prohibitive hours for lane closures specified by these special provisions.

SHOULDER CLOSURE RESTRICTIONS -

The Department prohibits the Contractor from conducting work within 15' of the near edge of the adjacent travel lane on the outside shoulders or the median areas of interstate and primary routes during the hours when lane closures are prohibited. The hourly restrictions for lane closures shall also apply to work activities conducted under a shoulder closure within 15' of the near edge of an adjacent travel lane or a median area. The Department reserves the right to suspend work conducted under a shoulder closure if any traffic backups develop and are deemed excessive by the Engineer. Maintain all shoulder closure restrictions as directed by the plans, these special provisions, and the Engineer.

On primary and secondary roadways, the Department prohibits the Contractor from conducting work within 1' or less of the near edge of an adjacent travel lane under a shoulder closure. All work that may require the presence of personnel, tools, equipment, materials, vehicles, etc., within 1' of the near edge of an adjacent travel lane shall be conducted under a lane closure.

The Contractor shall install all shoulder closures as directed by the typical traffic control standard drawings designated for shoulder closures, and the Engineer. Substitution of the portable plastic drums with oversized cones during nighttime shoulder closures is PROHIBITED.

MOBILE OPERATIONS -

A mobile operation moves continuously at all times at speeds 3 mph or greater without any stops. The minimal traffic flow impacts generated by these operations involve brief traffic flow speed reductions and travel path diversions. Conduct work operations that cannot be performed at speeds of 3 mph or greater under standard stationary lane closures.

The Department prohibits the Contractor from conducting mobile operations during the hours when lane closures are prohibited. The hourly restrictions for lane closures shall also apply to work activities conducted under mobile operations. The Department reserves the right to suspend work conducted under mobile operations if any traffic backups develop and are deemed excessive by the Engineer. Maintain all mobile operation restrictions as directed by the plans, these special provisions, and the Engineer.

The distance intervals between the vehicles, as indicated in the *Standard Drawings For Road Construction*, may require adjustments to compensate for sight distance obstructions created by hills and

curves and any other conditions that may obstruct the sight distance between the vehicles. However, adjustments to the distance intervals between the vehicles should be maintained within the range of variable distance intervals indicated in the standard drawings unless otherwise directed by the Engineer.

Maintain two-way radio communication between all vehicles in the vehicle train operating in a mobile operation.

Supplement the work vehicles and the shadow vehicles with amber colored flashing dome lights. The vehicles may also be supplemented with advance warning arrow panels and truck mounted attenuators as directed in the *Standard Drawings For Road Construction* and the Standard Specifications.

The Contractor shall install, operate and maintain all advance warning arrow panels, truck mounted attenuators and truck mounted changeable message signs as required by these special provisions, the manufacturer's specifications, the *Standard Drawings For Road Construction*, the Standard Specifications, the plans and the Engineer.

TYPICAL TRAFFIC CONTROL STANDARD DRAWINGS -

The typical traffic control standard drawings of the "Standard Drawings For Road Construction", although compliant with the MUTCD, shall take precedence over the MUTCD. The typical traffic control standard drawings of the "Standard Drawings For Road Construction" shall apply to all projects let to contract.

Install the permanent construction signs as shown on the typical traffic control standard drawings designated for permanent construction signing.

GENERAL SIDEWALK IMPACTS -

Coordinate work activities to minimize the duration of impacts to existing sidewalks and curb ramps and phase sidewalk impacts to maintain access to all adjacent properties as directed by the Engineer. Maintain existing pedestrian routes including existing access to all businesses and residences in accordance with MUTCD Chapters 6D, 6F, 6G-05, and as directed by the Engineer: refer to MUTCD Chapter 6H Typical Applications TA-28 and TA-29 for additional guidance on temporary pedestrian detours/diversions; pedestrians may be temporarily diverted to a closed travel lane with a corresponding lane closure in accordance with the standard drawings and in compliance with the contract restrictions; provide asphalt wedging, pre-fabricated curb ramps, or field-fabricated curb ramps, at no steeper than 12:1 slope, where necessary to eliminate temporary elevation differences greater than 1/4" within the temporary pedestrian path; provide detectable edging along diversions and on all sidewalk closure barricades; if access to push buttons temporarily can't be maintained at existing signalized intersections the pedestrian signal phases shall be temporarily set to recall. Use a Type III Barricade, water-filled barrier, or similar traffic control device for closing the sidewalk; do not use devices whose supports protrude into the open pedestrian path as these may create a trip hazard. Where pedestrians need to pass the sidewalk detour/diversion location to access a business or residence place the sidewalk closure and pedestrian detour signage adjacent to the sidewalk on posts or Type II Barricades so as not to obstruct the walking path to those properties; place the devices necessary for closing the sidewalk after the last accessible business or residence as directed by the Engineer. All items related to maintaining pedestrian access shall be part of the traffic control lump sum.

ADDENDUMS

(Addendums to the "2007 Standard Specifications for Highway Construction")

(A) Construction (Sub-section 601.4) –

Sub-section 601.4.2 Construction Vehicles (paragraph 2) -

When working within the rights-of-way of access-controlled roadways such as Interstate highways, the Contractor's vehicles may only change direction of travel at interchanges. These vehicles are prohibited

from crossing the roadway from right side to the median or vice versa. Use a flagger to control the Contractor's vehicles when these vehicles attempt to enter the roadway from a closed lane or the median area. Ensure the flagger does not stop roadway traffic, cause roadway traffic to change lanes, or affect roadway traffic in any manner. The Contractor's vehicles may not disrupt the normal flow of roadway traffic or enter the travel lane of the roadway until a sufficient gap is present.

The Contractor shall have flaggers available to control all construction vehicles entering or crossing the travel lanes of secondary and primary routes. The RCE shall determine the necessity of these flaggers for control of these construction vehicles. The RCE shall consider sight distance, vertical and horizontal curves of the roadway, prevailing speeds of roadway traffic, frequency of construction vehicles entering or crossing the roadway and other site conditions that may impact the safety of the workers and motorists when determining the necessity of these flaggers. Ensure these flaggers do not stop roadway traffic, cause roadway traffic to change lanes or affect roadway traffic in any manner. The Contractor's vehicles may not disrupt the normal flow of roadway traffic or enter the travel lane of the roadway until a sufficient gap is present.

When working within the rights-of-way of access-controlled roadways with posted regulatory speed limits of 55 MPH or greater and average daily traffic volumes {ADT} of 10,000 vehicles per day or greater, i.e. Interstate highways, all construction and work vehicles possessing any one or more of the vehicular characteristics listed below are only permitted to enter and exit a right or left shoulder work area during the presence of active lane closures unless otherwise directed by the RCE. These vehicles are not permitted to enter or exit these work areas without the presence of active lane closures unless otherwise directed by the RCE. Shoulder closures are unacceptable and insufficient methods for control of traffic at ingress / egress areas for these vehicles. The restrictive vehicular characteristics include the following:

- Over six (6) tires
- Tandem rear axles
- A base curb weight greater than 8000 lbs.
- A gross vehicular weight greater than 12000 lbs. unless performing duties as a shadow vehicle while supporting a truck mounted attenuator
- A trailer in tow except under the following conditions:
 - Trailers transporting traffic control devices (including but not limited to standard and 42" oversized traffic cones, portable plastic drums, signs, portable sign supports, u-channel and square steel tube sign posts) relative to the installation of lane closures, shoulder closures or other traffic control operations approved by the RCE
 - Trailer mounted traffic control devices (including but not limited to advance warning arrow panels, changeable message signs, temporary traffic signals, highway advisory radios, work zone intelligent transportation systems and trailer towed truck mounted attenuators)

(B) Construction (Sub-section 601.4) –

Sub-section 601.4.2 Construction Vehicles -

Auxiliary Warning Lights for Vehicles and Equipment -

Supplement all construction and/or construction-related vehicles and equipment that operate in a stationary or mobile work zone within or adjacent to a roadway within the highway rights-of-way with AMBER or YELLOW colored high intensity rotating or strobe type flashing auxiliary warning light devices. Utilize, install, operate and maintain a single or multiple lighting devices as necessary to provide visibility to approaching motorists.

All auxiliary warning light models shall meet *Society of Automotive Engineers* (SAE) Class I standards and SAE Standard J575 relative to *Tests for Motor Vehicle Lighting Devices and Components* and these specifications.

The amber/yellow color of the dome/lens of an auxiliary warning light device shall meet SAE Standard J578 for amber/yellow color specifications.

Auxiliary warning lights with parabolic reflectors that rotate shall rotate around a halogen lamp at a rate to produce approximately 175 flashes per minute. The parabolic reflector shall produce a minimum 80,000 candle power and a minimum 54,000 candela through an SAE Standard J846 approved amber dome.

Equip strobe type flashing auxiliary warning light devices with photosensitive circuit controls to adjust the lighting intensity in response to changes in ambient light conditions such as from day to night. These lights shall have a double-flash capability rated at approximately 80 double flashes per minute and produce a minimum 24 joules of flash energy at the highest power level setting.

Acceptable auxiliary warning light models shall provide sufficient light output to be clearly recognizable at a minimum distance of 1750 feet.

Mount all auxiliary warning light devices intended to function as the auxiliary warning light system or as an element thereof on vehicles and equipment at locations no less than 3 feet above the ground and in conspicuous locations to provide visibility to approaching motorists.

Auxiliary warning light devices and/or models that mount in the locations of the standard vehicle lighting system are unacceptable as the specified auxiliary warning light system due to restrictive simultaneous visibility capabilities from multiple sight angles. However, auxiliary warning light devices that mount in the standard vehicle lighting system locations are acceptable as supplements to the specified lighting devices mounted in locations that do meet the minimum height requirements and provide simultaneous visibility capabilities from multiple sight angles.

Standard vehicle hazard warning lights are only permitted as supplements to the specified auxiliary warning light devices.

(C) General Requirements for Providing and Maintaining Traffic Control Devices in the Work Zone (Section 602) –

Sub-section 602.4 Construction (paragraph 8) -

Mount flat sheet signs straight and level and with the face of the signs perpendicular to the surface of the roadway. This requirement applies to flat sheet signs whether they are portable or have the embedded supports. Mount advance construction signs 2 feet from the edge of a paved shoulder or the face of a curb, or if no paved shoulder exists, 6 feet to 12 feet from the edge of an adjacent travel lane to the nearest edge of the signs. The mounting height of single signs mounted on ground embedded sign supports is no less than 7 feet or no greater than 8 feet from the bottom edge of the sign to the grade elevation of the near edge of the adjacent travel lane or sidewalk when a sidewalk is present. Any secondary sign on the same assembly has a minimum mounting height of 6 feet from the ground to the bottom edge of the secondary sign. Ensure that signs mounted on portable sign supports, including advance construction signs, regulatory signs, warning signs, etc., have a minimum mounting height of 5 feet from the ground to the bottom edge of the sign. Provide special sign mounting assemblies, when necessary, in areas of double-layered guardrail, concrete median barrier, or bridge parapet walls.

(D) Category I Traffic Control Devices (Section 603) –

Sub-section 603.2.2 Oversized Traffic Cones (paragraph 6) -

Reflectorize each oversized traffic cone with 4 retroreflective bands: 2 orange and 2 white retroreflective bands. Alternate the orange and white retroreflective bands, with the top band always being orange. Make each retroreflective band not less than 6 inches wide. Utilize Type III – Microprismatic retroreflective sheeting for retroreflectorization on all projects let to contract after May 1, 2010 unless otherwise specified. Separate each retroreflective band with not more than a 2-inch non-reflectorized area. Do not splice the retroreflective sheeting to create the 6-inch retroreflective bands. Apply the retroreflective sheeting directly to the cone surface. Do not apply the retroreflective sheeting over a pre-existing layer of retroreflective sheeting.

Sub-section 603.2.3 Portable Plastic Drums (paragraph 3) -

Reflectorize each drum with Type III – Microprismatic retroreflective sheeting: 2 orange and 2 white retroreflective bands, 6 inches wide on all projects let to contract after May 1, 2010 unless otherwise specified. Alternate the orange and white retroreflective bands with the top band always being orange. Ensure that any non-reflectorized area between the orange and white retroreflective bands does not exceed 2 inches. Do not splice the retroreflective sheeting to create the 6-inch retroreflective bands. Apply the retroreflective sheeting directly to the drum surface. Do not apply the retroreflective sheeting over a pre-existing layer of retroreflective sheeting.

(E) Category II Traffic Control Devices (Section 604) –

Sub-section 604.2.1 Type I and Type II Barricades (paragraph 3) -

Reflectorize these barricades with Type VIII or IX Prismatic retroreflective sheeting on all projects let to contract after May 1, 2012 unless otherwise specified. Ensure that the retroreflective sheeting has alternate orange and white stripes sloping downward at a 45-degree angle in the direction of passing traffic. The stripes shall be 6 inches wide.

Sub-section 604.2.2 Type III Barricades (paragraph 3) -

Reflectorize these barricades with Type VIII or IX Prismatic retroreflective sheeting on all projects let to contract after May 1, 2012 unless otherwise specified. Ensure that the retroreflective sheeting has alternate orange and white stripes sloping downward at a 45-degree angle. Apply the sloping orange and white stripes in accordance with the requirements of the Plans, SCDOT Standard Drawings and the MUTCD. The stripes shall be 6 inches wide.

(F) Temporary Concrete Barrier (Sub-section 605.2.3.2) –

Sub-section 605.2.3.2 Temporary Concrete Barrier (paragraph 6) -

Previously used temporary concrete barrier walls are subject to inspection and approval by the RCE before use. Ensure that previously used temporary concrete barrier walls are in good condition. Defects to a temporary concrete barrier wall that may disqualify a section of wall for use include gouges, cracks, chipped, or spalled areas. A defect that exposes reinforcing steel warrants immediate disqualification. A disqualification grade type defect shall consist of measurements in excess of 1 inch, entirely or partially within the boundaries of the end connection areas and the drainage slot areas as illustrated in the “Standard Drawings for Road Construction”, and/or in excess of 4 inches for all areas beyond the end connection areas. To warrant disqualification, these measurements shall exceed the specified dimensions in all three directions, width, height, and depth. A defect that exceeds the specified dimensions in only one or two of the three directions does not warrant disqualification.

Temporary concrete barrier walls with defects less than 6 inches in all three directions, width, height, and depth that do not expose reinforcing steel may be repaired in accordance with the following requirements. Repair is prohibited on temporary concrete barrier walls with defects 6 inches or greater in all three directions, width, height and depth.

For repair of temporary concrete barrier walls with defects less than 6 inches in all three directions, width, height, and depth that do not expose reinforcing steel, repair the defect with a premanufactured patching material specifically fabricated for patching structural concrete. The strength of the patch must meet or exceed the design strength of the class 3000 concrete of the temporary concrete barrier wall. Perform the repair procedures in accordance with all requirements and instructions from the manufacturer of the patch material. Use a bonding compound between the patch material and the concrete unless specifically stated by the manufacturer that a bonding compound is not required. If the manufacturer states that application of a bonding compound is optional, SCDOT requires application of a bonding compound compatible with the patch material. If cracking occurs within the patched area, remove the patch material completely and repeat the repair process. The contractor shall submit documentation stating all repairs have been conducted in accordance with these requirements prior to installing any temporary concrete barrier walls with repairs. Utilization of temporary concrete barrier walls with repairs shall require approval by the RCE prior to installation.

The Contractor shall submit certification documents for the patch material utilized for repairs to the Engineer prior to placing temporary concrete barrier walls that have been repaired on the project site.

Sub-section 605.2.3.2 Temporary Concrete Barrier (paragraph 5) -

In regard to projects let to contract after January 1, 2017, ALL *NCHRP Report 350* compliant temporary concrete barrier walls placed on a project site SHALL comply with the requirements for the recessed approval stamp as directed by the *SCDOT Standard Drawings*. Those *NCHRP Report 350* compliant temporary concrete barrier walls with the original recessed approval stamp that reads "SCDOT 350" will continue to be acceptable on projects let to contract after January 1, 2017. However, those temporary concrete barriers with the "SCDOT 350" identification plate attached to the side of the barrier walls with mechanical anchors previously grandfathered will no longer be acceptable on projects let to contract after January 1, 2017.

(G) Construction Signs (Sub-section 605.4.1.1) –

On all projects relative to **interstate highways** let to contract after January 1, 2016, all signs attached to portable sign supports on and/or adjacent to **interstate highways** shall be rigid. Fabricate each of these rigid signs from an approved aluminum laminate composite rigid sign substrate approved by the Department. Utilization of signs fabricated from roll-up fabric substrates attached to portable sign supports installed on and/or adjacent to **interstate highways** will no longer be acceptable on projects let to contract after January 1, 2016.

ONLY those portable sign supports specified and approved for support of rigid signs fabricated from approved aluminum laminated composite rigid sign substrates and included on the *Approved Products List for Traffic Control Devices in Work Zones*, latest edition, are acceptable. To facilitate location of acceptable portable sign supports, the listing of portable sign supports is now separated into two (2) sections; "Portable Sign Supports for Use with Roll-Up Signs ONLY" and "Portable Sign Supports for Use with Roll-Up Sign Substrates and Rigid Sign Substrates".

The trade names of the approved aluminum laminate composite rigid sign substrates are "Acopan", "Alpolic", "Dibond" and "Reynolite". These rigid sign substrates are restricted to thicknesses no greater than 2 millimeters.

Rigid signs fabricated from standard aluminum sign blanks or any other rigid material other than Acopan, Alpolic, Dibond or Reynolite are PROHIBITED for attachment to portable sign supports. However, rigid signs fabricated from standard 0.080 and 0.100 inches thick aluminum sign blanks will continue to be acceptable for mounting on ground mounted sign supports.

Signs fabricated from roll-up fabric substrates approved by the Department will continue to be acceptable for use on and/or adjacent to secondary and primary roadways unless otherwise directed by the Department.

The minimum mounting height of signs mounted on these portable sign supports shall continue to be 5 feet from the ground to the bottom edge of the sign except where a minimum 7 foot mounting height is required in accordance with the standard specifications, the standard drawings, these special provisions and the MUTCD, latest edition.

(H) Truck-Mounted Attenuator (Sub-section 605.4.2.2) –

Sub-section 605.2.2.2.3.3 Color (paragraph 1) -

Use industrial grade enamel paint for cover of the metal aspects of the unit. Provide and attach supplemental striping to the rear face of the unit with a minimum Type III high intensity retroreflective sheeting unless otherwise directed by the Department. Utilize an alternating 4 to 8 inch black and 4 to 8 inch yellow 45-degree striping pattern that forms an inverted "V" at the center of the unit that slopes down and to the sides of the unit in both directions from the center.

(I) Truck-Mounted Attenuator (Sub-section 605.4.2.2) –

Sub-section 605.4.2.2 Truck-Mounted Attenuators (paragraph 6) -

A direct truck mounted truck mounted attenuator is mounted and attached to brackets or similar devices connected to the frame of a truck with a minimum gross vehicular weight (GVW) of 15,000 pounds (actual weight) unless otherwise directed. A trailer towed truck mounted attenuator is towed from behind and attached via a standard pintle hook / hitch to the frame of a truck with a minimum gross vehicular weight (GVW) of 10,000 pounds (actual weight) unless otherwise directed.

Each truck utilized with a truck mounted attenuator shall comply with the manufacturer's requirements to ensure proper operation of the attenuator. The minimum gross vehicular weight (GVW) (actual weight) for each truck shall comply with these specifications unless otherwise directed within the "Remarks" column of the *Approved Products List For Traffic Control Devices in Work Zones* in regard to specific requirements for the device in question.

If the addition of supplemental weight to the vehicle as ballast is necessary, contain the material within a structure constructed of steel. Construct this steel structure to have a minimum of four sides and a bottom to contain the ballast material in its entirety. A top is optional. Bolt this structure to the frame of the truck. Utilize a sufficient number of fasteners for attachment of the steel structure to the frame of the truck to ensure the structure will not part from the frame of the truck during an impact upon the attached truck mounted attenuator. Utilize either dry loose sand or steel reinforced concrete for ballast material within the steel structure to achieve the necessary weight. The ballast material shall remain contained within the confines of the steel structure in its entirety and shall not protrude from the steel structure in any manner.

(J) Trailer-Mounted Changeable Message Signs (Sub-section 606.3.2) -

Sub-section 606.3.2.7 Controller (paragraphs 1-4) -

The controller shall be an electronic unit housed in a weatherproof, rust resistant box with a keyed lock and a light for night operation. Provide the unit with a jack that allows direct communications between the on-board controller and a compatible personal computer. The unit shall have a LCD display screen that allows the operator to review messages prior to displaying the message on the sign.

The controller shall have the capability to store 199 factory preprogrammed messages and up to 199 additional messages created by the user in a manner that does not require a battery to recall the messages. Also, the controller shall allow the operator the capability to program the system to display multiple messages in sequence.

Provide the controller with a selector switch to allow the operator to control the brightness or intensity level of the light source of the sign panel. The selector switch shall include "bright," "dim" and "automatic" modes; inclusion of additional modes is permissible. When the selector switch is in the "automatic" mode, a photosensitive circuit shall control the brightness or intensity level of the light source in response to changes in ambient light such as from day to night and other various sources of ambient light.

Equip each sign with remote communications capabilities, such as utilization of cellular telephone or internet browser technology, to allow the operator to revise or modify the message selection from the office or other remote location. Also, provide protection to prohibit unauthorized access to the controller, (i.e. password protection).

Sub-section 606.5 Measurement (paragraph 2) -

Trailer-mounted changeable message signs are included in the lump sum item for Traffic Control in accordance with **Subsections 107.12** and **601.5** of the "2007 Standard Specifications for Highway Construction". No separate measurement will be made for trailer-mounted changeable message signs unless the contract includes a specific pay item for trailer-mounted changeable message signs.

The Contractor shall provide, install, operate, and maintain the trailer-mounted changeable message sign per traffic control set-up as directed by the Plans, the "Standard Drawings for Road Construction", these Special Provisions, the Specifications, and the Engineer.

Sub-section 606.6 Payment (paragraph 2) -

In addition to **Subsections 107.12** and **601.6**, the payment for Traffic Control is full compensation for providing, installing, removing, relocating, operating, and maintaining trailer-mounted advance warning arrow panels and trailer-mounted changeable message signs as specified or directed and includes providing the units' primary power source; repairing or replacing damaged or malfunctioning units within the specified time; providing traffic control necessary for installing, operating, and maintaining the units; and all other materials, labor, hardware, equipment, tools, supplies, transportation, incidentals, and any miscellaneous items necessary to fulfill the requirements of the pay item in accordance with the Plans, the Specifications, and other items of the Contract.

Sub-section 606.6 Payment (paragraph 3) -

Disregard this paragraph unless the Contract includes a specific pay item for trailer-mounted changeable message signs.

(K) Temporary Pavement Markings (Sub-section 609.4.1) –

Sub-section 609.4.1.1.1 Application Requirements General (in addition to paragraph 3) -

On two-lane two-way roadways, apply and place temporary or permanent pavement markings, as specified hereupon, prior to the end of each day's work or shift or reopening a closed travel lane to traffic. These pavement markings shall include 4-inch wide solid lines on edge lines and solid center lines and 4-inch wide by 10 feet long broken lines with a 30-foot gap for broken center lines and lane lines unless otherwise specified. The center line pavement markings shall be either double yellow solid lines, yellow broken lines or an appropriate combination of a yellow solid line and yellow broken lines for passing / no passing zones. Placement of a singular yellow solid line for a center line pavement marking is unacceptable. The edge line pavement markings shall be a white solid line.

On multilane primary and secondary roadways, apply and place temporary or permanent pavement markings, as specified hereupon, to the travel lanes prior to reopening a closed travel lane to traffic. These pavement markings shall include 4-inch wide solid lines, utilized for edge lines and solid center lines, and 4-inch wide by 10 feet long broken lines with a 30-foot gap, utilized for lane lines and turn lanes, unless otherwise specified. The center line pavement markings shall be either double yellow solid lines or an appropriate combination of a yellow solid line and 4-inch wide by 10 feet long yellow broken lines for two-way left turn median areas. The right edge line pavement markings shall be a white solid line and the left edge line shall be a yellow solid line except in areas where the travel lanes separate to create a gore type situation and then the color schemes shall comply with SCDOT application practices for gore areas. The lane lines between travel lanes and turn lanes shall be 4-inch wide by 10 feet long white broken lines with a 30-foot gap.

However, on two-lane two-way and multilane primary and secondary roadways, application of a 4-inch wide solid line utilized for an edge line adjacent to an earth shoulder, white or yellow, may be delayed up to 72 hours after eradication of the original line when the length of eradicated line at a single location is no longer than 250 feet. In the event of multiple locations along the same line, each location must be separated from the adjacent location by no less than 250 feet with a cumulative total distance of eradicated line of no more than 1300 feet within any continuous 1 (one) mile length of roadway measured from a selected location. If the length of eradicated line exceeds 250 feet at any single location, the distance interval between multiple adjacent locations is less than 250 feet or a cumulative total distance of multiple locations of eradicated line exceeds 1300 feet within any continuous 1 (one) mile length of roadway measured from a selected location, replace the eradicated line(s) prior to reopening the adjacent travel lane to traffic.

On interstate roadways, apply and place temporary or permanent pavement markings, as specified hereupon, to the travel lanes prior to reopening a closed travel lane to traffic. These pavement markings shall include 6-inch wide solid lines, utilized for edge lines, and 6-inch wide by 10 feet long white broken lines with a 30-foot gap, utilized for lane lines between travel lanes and auxiliary lanes, unless otherwise specified. The right edge line pavement markings shall be a white solid line and the left edge line shall be a yellow solid line except in areas where the travel lanes separate to create a gore type situation and then the color schemes shall comply with SCDOT application practices for gore areas.

On all roadways, apply and place white stop bars and white triangle yield bars in all locations where previous stop bars and triangle yield bars have been eradicated by the work. Apply and place white stop bars

and white triangle yield bars at intersections controlled by stop and yield signs within 72 hours of the eradication of the original pavement marking. Apply and place white stop bars at signalized intersections controlled by traffic control signals and at railroad crossings prior to reopening a closed travel lane to traffic.

Within the limits of existing turn lanes on all roadways, apply and place white arrows in all locations where previous arrows have been eradicated by the work unless otherwise directed by the RCE. Apply and place white arrows within 72 hours of the eradication of the original pavement markings. However, in regard to newly constructed turn lanes, apply and place white arrows the within turn lanes as directed by the RCE.

Within the limits of existing lane-drop sites on all roadways, apply and place white arrows in all locations where previous arrows have been eradicated by the work prior to the end of each day's work or shift or reopening the closed travel lane to traffic. In regard to newly constructed lane-drop sites, apply and place white arrows within the travel lane to be terminated prior to opening the travel lane to traffic and as directed by the RCE.

(L) Temporary Pavement Markings (Sub-section 609.4.1) –

Sub-section 609.4.1.1 Application Requirements General (Revision to paragraph 8) -

On two-lane, two-way roadways, passing zones may be eliminated within the work zone through application of 4-inch double yellow centerline pavement markings if determined feasible and directed to do so by the Plans and/or the RCE. Apply no passing zone markings as specified by the Plans, the Specifications, the MUTCD and the RCE.

(M) Flagging Operations (Sub-section 610.4.1) –

Sub-section 610.4.1.1 Flagging Operations (paragraph 1) -

Use a flagging operation to control the flow of traffic when two opposing directions of traffic must share a common travel lane. A flagging operation may be necessary during a lane closure on a two-lane two-way roadway, an intermittent ramp closure or an intermittent encroachment of equipment onto a portion of the roadway. Utilize flagging operations to direct traffic around work activities and maintain continuous traffic flow at reduced speeds when determined to be appropriate by the RCE. As stated above, flagging operations shall direct traffic around the work activities and maintain continuous traffic flow, therefore, stopped traffic shall not be required to stop for time durations greater than those listed below unless otherwise directed by the RCE. Begin measurement of the time interval immediately upon the moment the Flagger rotates the Stop/Slow paddle to display the "Stop" condition to the approaching motorists.

LENGTH OF CLOSURE	MAXIMUM TIME DURATION FOR STOPPED TRAFFIC
1 MILE or LESS	5 Minutes
1 to 2 MILES	7 ½ Minutes

If the work activities require traffic to be stopped for periods greater than 5 to 7 ½ minutes as stated above, consider alternate work methods, conducting work activities during times of lowest traffic volumes such as during the hours of darkness or complete road closure with detour installation.

(N) Paving and Resurfacing (Sub-section 611.4.1) –

Sub-section 611.4.1.2 Requirements (paragraph 8) -

Whenever travel lanes with acceptable grade elevation differences are open to traffic, provide "Uneven Lanes" signs (W8-11-48) or "Uneven Pavement" signs (W8-11A-48). Reflectorize these signs with a

fluorescent orange colored prismatic retroreflective sheeting unless otherwise specified. Install these signs adjacent to roadways with uneven pavement surfaces between travel lanes or between travel lanes and the adjacent paved shoulders. Install these signs at intervals no greater than 2600 feet.

DIVISION II - SECTION 3

**TRAFFIC SIGNALS - SIGNAL INSTALLATION
GUIDELINES**

INSTALLATION OF TRAFFIC SIGNALS

In order to provide uniformity in the manner in which signals are installed and placed in operation, all District Electrical Personnel should use the following procedure for the installation or replacement of new traffic signals.

1. Install poles, guys, overhead cable including signal head connections, but do not install signal heads until ready to place in flashing mode.
2. Install controller cabinet, cut loops and complete incidental work necessary to place signal in flashing mode.
3. Install heads and “bag” if necessary until the head can be placed in flashing mode and flash for at least 3 and not more than 7 days. Bag signal heads only in the event where all of the heads can not be installed within the same work day or if the intersection is a replacement of a closed loop system where the entire system is to be placed in operation at one time and the existing system will remain in operation until the switch over is initiated. **In the event where signalized intersections are replaced with new equipment, there is no mandatory flash period required.**
4. On the day the signal is to be placed in stop and go operation, erect “Signal Ahead” signs ([MUTCD W3-3](#)) on all approaches with a “NEW” plaque above the signs. When the signal is placed into operation, remove the “Stop” signs from the side street and “Stop Ahead” signs if applicable. Supplement the “Signal Ahead” signs with portable flashers and/or orange flags to draw attention to the signs.
5. The signal should be placed into operation on a normal workday, after the morning peak hour and prior to the afternoon peak hour.
6. The flags or flashers and the “NEW” plaques should be removed approximately two months after the signal is placed in operation.

DIVISION II - SECTION 4

**SCDOT TRAFFIC SIGNAL SPECIAL PROVISIONS
& SUPPLEMENTAL TECHNICAL SPECIAL
SPECIFICATIONS**

Signal Heads, Pedestrian Treatments, Illuminated signs, solar flashing assemblies:

Cabinet Items:

Service Items:

4. EQUIPMENT (Only needed if SCDOT is providing equipment to be installed by contractor.)

6.1 SCDOT Provided Equipment (Provide a list of equipment, location of equipment, details concerning equipment & installation)

6.2 Faulty Equipment

- When SCDOT supplied equipment is designated faulty by the Engineer, the Contractor shall return it to the Manufacturer for replacement if it is under warranty, The Manufacturer shall furnish a replacement unit.
- When SCDOT supplied equipment is designated faulty by the Engineer and it is not under warranty, SCDOT shall replace the equipment.

5. SIGNAL INTEGRATION (Only needed if different than the default. The default wording in the Supplemental Specifications (675.0 General Provisions 1.10) indicates SCDOT or local government signal maintenance staff will perform integration. If different than that, list what entity will perform integration.)

- The _____ will perform integration in accordance with the Supplemental Specifications, 675.0 General Provisions.

6. MAINTENANCE DURING CONSTRUCTION – (Only needed if different than the default. The default wording in the Supplemental Specifications (675.0 General Provisions 1.5) indicates that this begins at the contract NTP (notice to proceed) for all signals in the contract. If different than that, list whether maintenance begins at:

- a. When a work order is assigned by construction office
- b. When the contractor begins work at a signal
- c. Other option

7. CONTRACT SCHEDULE – (Only needed if different than the default. The default wording in the Supplemental Specifications indicates that contractor will to provide weekly schedule for all signal work. If SCDOT determines a need to set the schedule, indicate such below:)

Example wording:

This is a "TURN-KEY" project where work is assigned using a work order system. Once work orders have been assigned to the **CONTRACTOR**, he shall furnish the Engineer with a **WEEKLY SCHEDULE** for all active traffic signal construction work orders, each Friday, for the week to come, listing the location and date of each intended activity. This will permit scheduling signal inspection personnel. Deviation from this schedule may cause the Department to delay Inspection and Payments.

SUPPLEMENTAL TECHNICAL SPECIFICATIONS

SCDOT TRAFFIC SIGNALS

1/1/2021

APPROVED:

Division Administrator

THADDEUS
W KITOWICZ

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THADDEUS W KITOWICZ
Date: 2020.10.21 14:41:58
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By: _____

FEDERAL HIGHWAY ADMINISTRATION

Traffic Signal Supplemental Technical Specifications

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Supplemental Technical Specification for General Provisions for Traffic Signals

SCDOT Designation: SC-M -675

1.1 Description

1.1.1 General

This specification details the construction method for traffic signals in accordance with the latest edition of the South Carolina Department of Transportation "Standard Specifications for Highway Construction", the SCDOT Standard Traffic Signal Drawings, the latest revision of the "Manual on Uniform Traffic Control Devices for Streets and Highways", the SCDOT Traffic Signal Design Guidelines, and the PLANS.

Unless noted otherwise on the plans or in the Special Provisions this is a "turn-key" project, with the contractor furnishing and installing all equipment, complete and operational to the satisfaction of the Department. The CONTRACTOR shall install the traffic signal(s) to provide a complete modern and operational installation.

The PLANS are schematic in nature, showing what is generally expected at each intersection. The CONTRACTOR must devise/refine the final details, working within the Specifications, the Standard Drawings, and with the Department. Deviations from the Plans must be approved by the Department.

Prior to the beginning of construction, the CONTRACTOR shall schedule in a "Pre-Construction Conference" at a time and place to be coordinated by the Department. Any work performed without notification of the proper parties in the Department, will be treated as unauthorized work (see Section 105.11 of the Standard Specifications), and could result in nonpayment to the CONTRACTOR for that work.

After the completion of the project, the CONTRACTOR shall furnish to the District Traffic Engineer, three (3) "red-lined" sets of "as-built" plans detailing deviations from the plans and showing the exact locations and sizes of all conduits, poles, pedestals, splice boxes, detectors, and the routing and destination of all wires leaving the control cabinets.

1.1.2 Maintenance of Operation

Existing traffic signals shall REMAIN IN OPERATION until the new/modified installation has been satisfactorily tested, and placed in operation. The testing shall be accomplished without hazard to the traveling public and while the signal heads are suitably BAGGED WITH BURLAP. All signal heads that are in place but not in use, shall be covered with BURLAP or an alternative approved by the Department. Plastic bags are NOT acceptable.

After approval is received from the Department, the new signal heads shall be switched into service during the controller phase that is being displayed by the existing equipment and the existing equipment shall be turned off simultaneously. Immediately after the new signal equipment has been made operational, the existing signal heads shall be turned off and removed.

The CONTRACTOR shall completely coordinate work between the sub-contractors and shall carefully stage the project to minimize the impact to traffic.

1.1.3 Operation, Maintenance, and Emergency Service

The CONTRACTOR shall be responsible for the operations of all existing and newly installed signals from the "NOTICE TO PROCEED" until final acceptance of the project. This shall include all daily maintenance of signals and any emergencies which may arise. The CONTRACTOR is also responsible and liable for proper and safe operation of the traffic signal(s). Maintenance of signal operations is considered incidental to the pay item "Traffic Control" if a separate pay item is not provided for these activities.

Maintenance of Detection is required for all signals. Detection of Signals identified as Adaptive/Responsive or High Priority in the plans or special provisions must be maintained and will be paid for in accordance with Table 1 of Section 688.2. Detection of Signals not identified as Adaptive/Responsive or High Priority in the plans or special provisions must be maintained and will be paid for in accordance with Table 1 of Section 688.2.

- I. Restriction – The CONTRACTOR shall not change the phasing or other operation of a signalized intersection without Departmental approval.
- II. Procedure – The Contractor and a representative of the Department shall perform a walk thru of all signals to determine if any repairs are needed prior to the Contractor assuming maintenance responsibility. Prior to construction activities that may affect the operation of the signal, the CONTRACTOR shall request the Department's concurrence and the CONTRACTOR shall assume responsibility for operations and maintenance of the traffic signal. This request shall be in writing to the Department and shall have a written response. In the absence of the request, any activity of the CONTRACTOR, which effect the operation of a signal shall be deemed evidence of the CONTRACTOR's assumption of responsibility for the operation and maintenance of the signal. In addition to accepting maintenance responsibility, the CONTRACTOR also assumes financial responsibility for repairs until final acceptance.
- III. New Signals – Signals installed by the CONTRACTOR shall be maintained by the CONTRACTOR until the Department formally accepts the work (see Final Inspection & Final Acceptance).
- IV. Requirement – The CONTRACTOR shall perform EMERGENCY REPAIRS AND SERVICES as required, to ensure continuity of operation of the traffic signal(s) and associated equipment. This shall include re- placement of malfunctioning LED modules.
- V. Technician – The CONTRACTOR shall provide at least one (1) qualified LOCAL signal technician, subject to on-call at all times, to provide emergency services as required to assure continuous and efficient operation of signal installations and systems. This shall include non-business hours, weekends, and holidays. The Technician shall be fully qualified to trouble-shoot, service, repair and/or replace traffic controllers and components, both electro-mechanical and solid-state. At the PRE-CONSTRUCTION CONFERENCE, the Contractor shall furnish the Resident Construction Engineer with a LIST OF THE SIGNAL TECHNICIANS who will be responsible for performing the emergency service, and the LOCAL PHONE NUMBER(S) of the Contractor's agent(s) (answering service, etc.), who will receive emergency calls during and after the Contractor's normal business hours.
- VI. Response Time – The CONTRACTOR shall be ON-SITE of the malfunctioning signal for emergency service within 4 hours of notification by SCDOT.
- VII. Restoration of Normal Service – Once the Contractor has started repair work/emergency service, the CONTRACTOR shall restore a malfunctioning signal to normal phase operations uninterrupted.
- VIII. Time Changes (EST/DST) – As part of Maintenance, the CONTRACTOR shall reset all time clocks to local legal time.
- IX. Records – The CONTRACTOR shall maintain a LOG of all trouble calls received, the response time, and the corrective action taken. The records and logs shall be available to Department personnel for review during normal working hours. All records and logs shall be turned over to the Department at FINAL ACCEPTANCE.
- X. Failure to Perform – In the event the Contractor fails to perform in accordance with requirements and schedules of this Specification, the Department reserves the right, without notice to the

Contractor, to engage a Third Party to perform the maintenance and emergency service necessary to assure continuous traffic signal operation. Further, all expenses incurred by the Department in implementing this option, shall be deducted from the payment due the Contractor. In addition the Contractor shall pay liquidated damages to SCDOT in the amount of **ONE THOUSAND, FIVE HUNDRED (\$1,500) DOLLARS FOR EACH OCCASION, FOR EACH DAY (UNTIL CORRECTED).**

1.1.4 Utility Coordination

Prior to the beginning of any construction activities, the CONTRACTOR shall coordinate as necessary with the Utility Company to provide power and any necessary attachment agreements, as well as, ensuring all utilities are identified and avoided during construction.

1.1.5 Contract Schedule

Unless noted otherwise in the *Special Provisions*, the CONTRACTOR shall furnish the Department with a **WEEKLY SCHEDULE** for the **TRAFFIC SIGNAL CONSTRUCTION** work, each Friday, for the **TWO (2) WEEKS** to come, listing the location and date of each intended activity. This will permit scheduling signal inspection personnel. Deviation from this schedule may cause the Department to delay Inspection and Payments.

Any work performed without notification of the proper parties in the Department, will be treated as unauthorized work (see Section 105.11 of the Standard Specifications), and could result in nonpayment to the Contractor for that work.

1.1.6 Permits, Codes, Licenses, and Abilities

All work shall be performed in a safe and workmanlike manner, to meet the highest industry standards, in accordance with the requirements of the latest editions of the National Electrical Code (NEC), the National Electrical Safety Code (NESC), the Illuminating Engineering Society (IES), the American National Standards Institute (ANSI), the National Electrical Manufacturer's Association (NEMA), and the regulations and standards of the local power company.

The prime contractor or subcontractor responsible for the performance of the work must be licensed by the SC Licensing Board For Contractors and possess a Journeyman Card issued by the South Carolina Municipal Association or as required by the city in which work occurs at the time work is performed

Further, at least one 'ON-SITE' field supervisor shall have LEVEL II or higher, Traffic Signal Certification by the International Municipal Signal Association (IMSA). Photo copies of the license and certificate (for both above) shall be submitted to the District Electrical Supervisor at the preconstruction meeting or before work commences. The CONTRACTOR shall retain employee(s) holding the above certificate for the duration of the project; and the employee(s) shall be present DAILY and at the FINAL INSPECTION

The CONTRACTOR shall employ persons capable of programming traffic signal controllers of the type used by this project. The CONTRACTOR shall possess both a desktop and a portable (laptop) computer, and be capable of using them to upload and download signal operating parameters.

1.1.7 Integration

Integration will be performed by the Department or local government signal maintenance staff. The CONTRACTOR shall coordinate with the Department to determine project schedule and time frame for integration. The CONTRACTOR shall provide a minimum of two weeks' notice to the Department or local government signal maintenance staff for integration to allow adequate time for delivery of cabinets, controllers, and conflict monitors.

Signal maintainers will contact the Contractor with any issues regarding the provided equipment. The CONTRACTOR will replace deficient equipment within a reasonable time frame and to meet project schedules.

1.1.8 Equipment

The Department will not furnish signal equipment, unless noted otherwise in the Special Provisions or on the Plans.

The Contractor shall furnish all NEW equipment (submittal of invoices required), including incidental items. Used and refurbished equipment or any equipment with less than 80% of the warranty remaining at installation will not be accepted.

To ensure compatibility, any additional equipment required during the life of this contract due to a Change Order or Extra Work, shall be purchased by the CONTRACTOR from the same manufacturer as the original item. When installing equipment such as signal heads or pedestrian equipment, where some existing equipment is being retained, the CONTRACTOR shall provide the same type of equipment for visual compatibility.

The CONTRACTOR shall submit for approval a list of equipment including make, model number, manufacturer serial numbers, warranty information, purchase invoice, and purchase date. Documentation must be submitted for the furnish items required for this contract. At the time of such submission, the CONTRACTOR shall provide a copy of the Transmittal Letter to the Department. The CONTRACTOR shall provide letters from the manufacturers of the cabinet and controller indicating the submitted equipment is on the SCDOT Qualified Product List. All warranties, serial numbers, documentation, and receipts shall be provided with the cabinet assembly and controller delivery.

The CONTRACTOR shall submit for approval, catalog descriptions and documentation--THREE (3) COPIES--for each class of signal equipment and materials furnished by the Contractor that is not on the SCDOT Qualified Product List. The documents are to be submitted a minimum of TWO WEEKS PRIOR TO INSTALLATION to the Department's Resident Construction Engineer FOR APPROVAL. At the time of such submission, the CONTRACTOR shall provide a copy of the Transmittal Letter to the Resident Construction Engineer.

Equipment substitutions in the life of the contract are only allowed if the contractor can show a valid hardship in remaining with the originally submitted equipment. A valid hardship may include non-availability of type of equipment due to unforeseen delivery or material shortages (contractor ordering equipment late does not apply) and/or vendor going out of business. The Department may allow equipment substitutions for the following reasons:

- The product is determined by the Department to be of better quality than the originally submitted equipment.
- The Contractor is replacing non-QPL items with QPL items or SCDOT Equipment Contract items.
- The equipment is experimental in nature and the Department wants to test it.

The Department will not pay for furnish and/or installation costs of any materials installed without prior approval and acceptance.

1.1.9 Inspection

Quality Acceptance and Inspection is the responsibility of the Department. The Department will designate those individuals responsible for inspection, which may include the District Electrical Supervisor (DES). Also, local government personnel may be involved in the inspection of traffic signals that are part of a signal maintenance agreement with the Department. The Contractor is advised that in any dispute between the Contractor and the Manufacturer concerning the operation/maintainability/reparability of any piece of equipment THE DECISION OF THE DEPARTMENT SHALL BE FINAL.

The Department's designated inspector will provide a punch list of outstanding items to be addressed prior to Final Inspection.

1.1.10 Final Inspection and Final Acceptance

The CONTRACTOR shall request a final inspection only after all the punch list items are completed. The CONTRACTOR shall provide a minimum of one week notice prior to the desired date of the final inspection. The Resident Construction Engineer shall receive confirmation from the Contractor forty-eight (48) hours before to the final inspection that the project is on schedule and ready for inspection.

Upon completion of the Final Inspection and correction of any deficiencies, the work will be subject to a sixty (60) day operational test. Any problems that arise during this period must be resolved and a NEW sixty (60) day test period shall begin. The CONTRACTOR remains responsible for the maintenance and repairs of any deficiencies to the signal until Final Acceptance. Final Acceptance occurs after sixty (60) days of faultless operation. All signal equipment and warranties will be transferred to the Department at Final Acceptance. The Department will become responsible for the signal operations and maintenance upon Final Acceptance of the entire project.

1.1.11 Maintenance of Traffic (Traffic Control)

The CONTRACTOR shall execute the item of Traffic Control as required by the Standard Specifications, the Plans, the Standard Drawings for Road Construction, these supplemental specifications, the MUTCD, and the Department.

1.2 Mobilization

Section 103.10 and 103.11 of the STANDARD SPECIFICATIONS is amended as indicated below for traffic signal projects.

- Pay Item Number 1031000 Mobilization (LS) includes all the signals and signal related work in the contract.
- Pay Item Number 1031010 Mobilization (EA) will be paid per traffic signal or per ¼ mile for fiber installation (Each).
- These Pay Items include demobilization.

1031000	MOBILIZATION	LS
1031010	MOBILIZATION	EA

The Pay Item Numbers associated with Mobilization of Material addresses payment for using special equipment to move large items furnished by the Department from a location designated by the Department to the project site.

9610021	MOBILIZATION OF MATERIAL PER WORK ORDER, 1-100 MILES FROM LOCATION TO WORKSITE	EA
9610022	MOBILIZATION OF MATERIAL PER WORK ORDER, 101-250 MILES FROM LOCATION TO WORKSITE	EA
9610023	MOBILIZATION OF MATERIAL PER WORK ORDER, 250+ MILES FROM LOCATION TO WORKSITE	EA

1.3 Payment for Materials on Hand

Section 109.7 of the STANDARD SPECIFICATIONS is amended to include the following paragraphs.

When permitted by the Department, partial payment will be made for major traffic signal items that are being furnished by the Contractor. Certain items, such as wooden poles and other very heavy units not readily movable or vandalized, may be stored in unsecured locations either ON- or OFF-SITE. Other items (signal heads, detector amplifiers, controllers, cabinets, etc.) may be stored in a secured/protected location either ON- or OFF-SITE. The equipment shall be labeled SCDOT with the Project Name. Other requirements of Paragraph 109.8 remain applicable. Payment shall be in accordance with the following criteria:

- The Contractor may be paid at FIFTY (50%) PERCENT of the contract unit price of the items and not to exceed the paid invoice amount.
- Only items measured by 'EACH' shall be eligible
- Only items with unit prices exceeding one thousand and five hundred (\$1500) dollars shall be eligible.

Supplemental Technical Specification for

Electrical Conduit

SCDOT Designation: 675.1

1.1 Description

This work shall consist of furnishing and installing Electrical Conduit and fittings of the types and sizes specified herein, at locations shown on the Plans, or as established by the ENGINEER in accordance with these Specifications.

1.2 Materials

- Use rigid, heavy-wall, galvanized steel conduit, meeting the requirements of Federal Specification WW-C-581, and American Standards Association Specifications USAS C-80.1-1966.
- Use sunlight resistant PVC (Polyvinyl chloride) Conduit SCHEDULE 80, meeting the requirements of National Electrical Manufacturing Association (NEMA) Specification TC-2 and Underwriter Laboratory (UL) standards UL-514; and/or ASTM D-1784. Fittings shall meet NEMA TC-3 and UL-514.
- Use SCHEDULE 80 HDPE (High Density Polyethylene) Rolled Conduit.
- Use Flexible Weather-Tight Steel Conduit consisting of flexible single strip, helically wound, interlocking galvanized steel. Ensure the steel conduit is made liquid-tight using an extruded polyvinyl chloride jacket and that it meets the requirements of UL-360.
- Use fittings that are made of the same material and quality as the conduit run, including conduit bodies, 90° bends, weatherheads, elbows, nipples, couplings, and other hardware.
- Use Conduit Junction Boxes that are non-metallic PVC molded junction box with a weather tight screw-down cover, of nominal size 6"W x 6"L x 4"D.
- Use threaded Grounding Bushings made of malleable iron, galvanized steel, or brass; and shall have an insulating plastic insert, and lay-in lugs to hold No. 6 AWG copper wire.
- Use a Pulling Line made of Polypropylene Rope, having a minimum tensile strength of 240 pounds.
- Use Underground Warning Tape that is Heavy duty B-720 polyethylene, 0.89 mm (3.5 mils) thick, by 76 mm (3 in) wide, with APWA color RED, for electric lines.
- Use minimum 14 Ga. Tracer Wire

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Electrical Conduit.
- Install conduit as Riser, or Underground.
- Install Underground Conduit as Trenched, Bored and Jack or Directional Bored in accordance with the plans and Standard Drawings.
- Concrete used for patching pavement shall be DOT STANDARD SPECIFICATION CLASS X according to Sections 701,702,703, and 704.
- Bituminous Concrete for patching pavement shall be DOT STANDARD SPECIFICATIONS, Section 400 and 403.
- All materials will be subject to inspection for condition by the ENGINEER, just prior to incorporation into the work.
- Use standard bends, elbows, or by bending the steel conduit to make changes in direction of conduit. Steel conduit, if bent, shall have a uniform radius which will fit the location, with a minimum radius of six (6) times the internal diameter of the pipe. Sharp kinks in the conduit or the substitution of unlike materials will not be permitted.

- Use standard manufactured conduit bodies, condulets, weatherheads, elbows, nipples, tees, reducers, bends, couplings, unions, etc., of the same materials and treatment as the straight conduit, as required throughout the conduit line. Tightly connect all fittings to the conduit. Use a SOLVENT-WELD CEMENT for fitting connections with PVC conduit. Where steel conduit mates PVC, use an adapter coupling and waterproof seal.

1.3.2 Riser

- Use nipples to eliminate cutting and threading where short lengths of conduit are required. Where it is necessary to cut and thread steel conduit, no exposed threads will be permitted. All conduit fittings shall be free from burrs and rough places; and all cut conduits shall be reamed before fittings and cables are installed. All conduit runs ending in a junction box, hand box, or other approved junction point, shall be provided with a bushing to protect the cable from abrasion. Cap future use conduit.
- Attach conduit risers to wood poles; or where specified, to the outside of steel poles. Use stainless steel bands for steel poles. Use conduit clamps/straps and galvanized screws on wood poles. Attachment shall be in accordance with the plans or Standard Drawings. Furnish each Riser with a weatherhead, which shall not be measured.

1.3.3 Trenched

- Unless shown otherwise, place conduits at a minimum depth of 18 inches below surface grade, and slope at a minimum rate of 6 inches per 100 feet of length, to a splice box/junction box hole or drain. Clean and swab all conduit runs before installing cables. Use DUCT-SEAL in poles, cabinets, and buildings to seal the opening.
- Where conduit passes under a curb, cut an 'X' in the curb, over the conduit. Where there is no curb, drive a stake in the ground at the end of the conduit to mark its location. Cut an 'X' to indicate the side the conduit enters, where conduit is placed in a signal pole foundation for future use.
- Restore all cuts, trenches, and openings to the original condition. Replace grass surfaces with pre-grown, cut turf (sod), in existing lawns. Rake, seed and fertilize other dirt areas. Replace any damaged trees and shrubs.

1.3.3.1 Trenching (Non-Paved Surface)

- Excavate the trenches to such depth as necessary to provide 18 inches minimum cover over the conduit. Cinders, broken concrete, or other hard abrasive materials will not be permitted in the back-filling. Clear the trench of such materials before placing the conduit. No conduit shall be placed prior to inspection by the ENGINEER. Compact the back-fill and restore the surface.

1.3.3.2 Trenching (In Paved Surface)

- Cleanly saw cut trenches across driveways or streets about 6 inches wide. Place the conduit and compact the back-fill. Provide and install the patch of like material and thickness as was removed. NO additional payment shall be made for the bituminous or concrete patching material, unless a pay item has been established for such.

1.3.3.3 Bored and Jack (Pushing)

- If pay item is provided, place steel conduit under existing roadways, driveways, sidewalks or other paved surfaces by Bore and Jack method. Such conduit shall be placed by jacking, boring, pushing, or other means approved by the ENGINEER, without cutting or removing pavement.

1.3.3.4 Trenchless (Directional Bored)

- If pay item is provided, place Schedule 80 PVC or Schedule 80 HDPE conduit under existing roadways, driveways, sidewalks or other paved surfaces by directional bore method. Conduit shall be buried at a minimum of 36 inches. Payment will not be made for damaged or crumpled conduit. An acceptable alternative material can be **SCHEDULE 80 HDPE CONDUIT (TRENCHLESS)**.

1.3.3.5 Placed Before Pouring

- Install PVC conduit w/ Flexible Weather Tight conduit firmly attached to the bottom reinforcement bar mat or to the bottom wire mat, using plastic tie-wraps every 2 feet, at locations where conduit

is placed before concrete placement in a bridge deck. At expansion joints, use 4 feet (typical) of Flexible Weather Tight steel conduit to accommodate movement. Install to NEC standards for concrete structural installations and usage, including any recommended lubricants and sleeves. Plug all conduit ends to prevent concrete penetration. When used on a bridge, provide a splice-box(es) near the center line, and terminate the conduit in hand-boxes at each end.

1.3.3.6 Open Cuts in Roadway

- Open cuts are typically not allowed, and every effort to bore under roadways and driveways shall be attempted. If utility conflicts require open cuts for installation of conduit, and where approved by the Engineer, conduit may be placed in an open cut and open cuts shall be repaired in accordance with the SCDOT Utility Accommodations Policy.

1.4 Measurement

- Electrical Conduit will be measured by LINEAR FEET, for the type, size, and method of installation specified, along the center line of the conduit from end to end, including trenched, risers, and bored-and-jacked.
- Conduit bends, conduit bodies, (condulets), 90° bends, elbows, conduit junction boxes for detector loops, miscellaneous fittings, couplings, weatherheads, adapters, bushings, locknuts, and other items shall be incidental to conduit installation and shall NOT be measured.
- Unless otherwise specified, trenching, back-filling, and patching will NOT be measured for payment.
- If more than one conduit is installed within a directional bore, payment will be made for the directional bore from box to box. The additional runs of conduit will be paid per LF of additional conduit (pay item 675027Z) from box to box.
- F&I Encased Conduit work includes all equipment, manpower and materials to furnish and install conduit in an open cut paved area within a travel way; this work is paid by linear feet (LF):

1.5 Payment

For conduit either Trenched or Riser:

6750005	FURNISH & INSTALL 1.0" GALVANIZED RIGID CONDUIT	LF
6750015	FURNISH & INSTALL 2.0" GALVANIZED RIGID CONDUIT	LF
6750025	FURNISH & INSTALL 3.0" GALVANIZED RIGID CONDUIT	LF
6750181	FURNISH & INSTALL 1.0" ALUMINUM CONDUIT	LF

For bored and jacked:

6750078	FURNISH & INSTALL 1.0" GALVANIZED RIGID CONDUIT (BORED AND JACKED)	LF
6750085	FURNISH & INSTALL 2.0" GALVANIZED RIGID CONDUIT (BORED AND JACKED)	LF
6750090	FURNISH & INSTALL 3.0" GALVANIZED RIGID CONDUIT (BORED AND JACKED)	LF

For high accuracy directional boring:

675027S	FURNISH & INSTALL 2.0" SCHEDULE 80 PVC CONDUIT (DIRECTIONAL BORED)	LF
675027V	FURNISH & INSTALL 3.0" SCHEDULE 80 PVC CONDUIT(DIRECTIONAL BORED)	LF
675027Y	FURNISH & INSTALL 4.0" SCHEDULE 80 PVC CONDUIT(DIRECTIONAL BORED)	LF
675027Z	FURNISH ADDITIONAL CONDUIT WITHIN DIRECTIONAL BORE	LF
6760050	FURNISH & INSTALL 1" SCHEDULE 80 HDPE CONDUIT (TRENCHLESS)	LF

6760060	FURNISH & INSTALL 2" SCHEDULE 80 HDPE CONDUIT (TRENCHLESS)	LF
6760070	FURNISH & INSTALL 3" SCHEDULE 80 HDPE CONDUIT (TRENCHLESS)	LF
6760080	FURNISH & INSTALL 4" SCHEDULE 80 HDPE CONDUIT (TRENCHLESS)	LF

For flexibility:

6750175	FURNISH & INSTALL 1.0" FLEXIBLE GALVANIZED STEEL CONDUIT - WEATHER TIGHT	LF
6750179	FURNISH & INSTALL 2.0" FLEXIBLE GALVANIZED STEEL CONDUIT - WEATHER TIGHT	LF
675017D	FURNISH & INSTALL 3.0" FLEXIBLE GALVANIZED STEEL CONDUIT - WEATHER TIGHT	LF

Open Cut:

6750262	FURNISH & INSTALL ENCASED CONDUIT (2-2" PVC, SCHEDULE 40)	LF
6750263	FURNISH & INSTALL ENCASED CONDUIT (3-2" PVC, SCHEDULE 40)	LF

Supplemental Technical Specification for

Electrical Cable

SCDOT Designation: SC-M -677.1 (6/20)

1.1 Description

This work shall consist of furnishing and installing traffic signal, loop lead-in, pedestrian signal, and pedestrian push button Electrical Cable of the size and type shown on the Plans or detailed in the Standard Drawings.

1.2 Materials

Acceptable materials can be found on the current SCDOT Qualified Products List http://info.scdot.org/Construction_D/sitePages/qualifiedProducts3.aspx.

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Electrical Cable.

1.3.2 Field Wiring

- Install SPLICE-FREE cable runs. Make all connections at terminal blocks, or in the controller cabinet.
- Install all field wiring in accordance with applicable Electrical Codes--National, State, and Local. Where required, arranging for PERMITS and/or electrical INSPECTION is the responsibility of the Contractor.
- Provide at least 3 feet of cable slack at each splice box, strain pole base, and cabinet. Neatly coil and bind the slack with a nylon tie.
- At the cabinet end, label each cable, using nylon cable markers, and indelible pen, indicating the Phase and/or Approach (NB, EB, etc.).
- Cabinet connections shall correspond to the COLOR-CODE shown on the Standard Drawings for Electrical Wiring Assignments (677-100-001 to 677-100-004); (green wire to green signal circuit, etc.).
- Replace the entire length of cables damaged during installation, without further cost to the Department.
- All electrical cable installed in conduit shall be drawn in place, free from electrical and mechanical injury. When a lubricating agent is needed, use a wire pulling compound compatible with the cable insulation.
- Install in conduit any vertical cable runs mounted on the outside of poles as shown on the plans or in the Standard Drawings.
- Use weather service heads wherever electrical cable directly enters a strain pole or a vertical conduit run.
- Provide drip loops of at least 8 inches at all overhead entrance points such as signal heads, strain poles, or weather heads.
- If any splices in homerun cables are detected, all work will cease by the contractor in that district until new wire is pulled to replace the spliced joint.

1.3.3 Traffic Signal Wiring Cable

- Install each cable run with the number of conductors indicated in the Standard Drawing 677-100-001 Electrical Wiring Assignment – Signal Heads. These include the provision of spare conductors. The substitution of additional cables to attain the required number of conductors shall not be permitted.
- Run a separate cable for each phase or approach in accordance with Standard Drawing 677-100-001 Electrical Cable Wiring Assignment – Signal Heads.
- The list below is a guide to general usage--

Signal: Jumpers	4 pair (8 conductor) BLACK
Signal: To Each Approach	4 pair (8 conductor) BLACK
FYA: To Each Approach	6 pair (12 conductor) BLACK

1.3.4 Loop lead-in Wiring

- Install each cable run with the number of conductors indicated in the Standard Drawing 677-100-004 Electrical Cable Wiring Assignment – Vehicle Detection –Inductance Loops. These include the provision of spare conductors. The substitution of additional cables to attain the required number of conductors shall not be permitted.
- Run a separate cable to each corner of the intersection in accordance with Standard Drawing 677-100-004 Electrical Cable Wiring Assignment – Vehicle Detection –Inductance Loops.
- The list below is a guide to general usage--

Loop: To Each Corner	4 pair (8 conductor) GRAY
Loop Lead-in	2 pair (4 conductor) GRAY

1.3.5 Pedestrian Signal Head Wiring

- Install each cable run with the number of conductors indicated in the Standard Drawing 677-100-003 Electrical Cable Wiring Assignment – Pedestrian Heads and Pedestrian Buttons 2. These include the provision of spare conductors. The substitution of additional cables to attain the required number of conductors shall not be permitted.
- Run cable for each phase or approach in accordance with Standard Drawing 677-100-002 Electrical Cable Wiring Assignment – Pedestrian Heads and Pedestrian Buttons 1.
- The list below is a guide to general usage--

Option A – For pedestrian heads that reside on separate poles

Pedestrian Signal	2 pair (4 conductor) BLACK
Pedestrian Push Button	2 pair (4 conductor) GRAY

Option B – For pedestrian heads that reside on the same pole

Pedestrian Signal	4 pair (8 conductor) BLACK
Pedestrian Push Button	4 pair (8 conductor) GRAY

1.3.6 Push Button Wiring

- Install each cable run with the number of conductors in accordance with Standard Drawing 677-100-003 Electrical Cable Wiring Assignment – Pedestrian Heads and Pedestrian Buttons 2. These include the provision of spare conductors. The substitution of additional cables to attain the required number of conductors shall not be permitted.

- Run cable for each phase or approach in accordance with Standard Drawing 677-100-002 Electrical Cable Wiring Assignment – Pedestrian Heads and Pedestrian Buttons 1.
- The list below is a guide to general usage--

Option A – For push buttons that reside on separate poles

Pedestrian Push Button 2 pair (4 conductor) GRAY

Option B – For push buttons that reside on the same pole

Pedestrian Push Button 4 pair (8 conductor) GRAY

1.3.7 Electrical Conduit

All conduit and elbows shall be installed as described in the appropriate Specification.

See 675.1 ELECTRICAL CONDUIT.

See 688.7 CONTROLLER AND CABINET ASSEMBLY.

See 688.5 STEEL STRAIN POLE AND FOUNDATION.

1.4 Measurement

- With the exception of the electrical service cable, electrical cable lengths of the size and numbers of conductors specified, shall be measured by LINEAR FEET as actually furnished and installed, completely in place and accepted, with each size cable being a separate pay item.

1.5 Payment

6770388	FURNISH & INSTALL NO. 14 COPPER WIRE, 4 CONDUCTOR - BLACK	LF
6770389	FURNISH & INSTALL NO. 14 COPPER WIRE, 4 CONDUCTOR - GRAY	LF
6770393	FURNISH & INSTALL NO. 14 COPPER WIRE, 8 CONDUCTOR - BLACK	LF
6770394	FURNISH & INSTALL NO. 14 COPPER WIRE, 8 CONDUCTOR - GRAY	LF
	FURNISH & INSTALL NO. 14 COPPER WIRE, 12 CONDUCTOR - BLACK	LF

Supplemental Technical Specification for

Fiber Optic Cable

SCDOT Designation: 677.3

1.1 Description

This work shall consist of furnishing and installing single-mode fiber optic (SMFO) cable in conduit and risers or overhead lashed to new messenger cable.

1.2 Materials

Acceptable single-mode fiber optic (SMFO) cable shall meet all requirements stated in RUS-90 and shall be an accepted product of the United States Department of Agriculture Rural Utility Service as meeting the requirements of RUS-PE-90. The cable shall be new, unused, and of current design and manufacture. More information concerning these industry standards can be found on the SCDOT website, *677.3 Fiber Optic Cable Industry Standards*, <http://www.scdot.org/doing/publications/Traffic.aspx>.

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Fiber Optic Cable.
- The CONTRACTOR shall furnish all materials and attachment hardware and installation guides necessary to install the fiber optic cable in accordance with Standard Drawings 677-300-01 Communications – Overhead Fiber Interconnect and 677-300-02 Communications – Underground Fiber Interconnect. Install fiber optic cable where, and in the manner indicated on the Plans, or as needed to maintain communications in an existing fiber network, in accordance with the standard drawings.
- The CONTRACTOR shall order cable in reel lengths that are of sufficient length to require no intermediate splicing of the cable.
- Prior to installation, the CONTRACTOR SHALL PROVIDE certified TEST RESULTS from the manufacturer showing the cable furnished has been tested and meets Industry Standards, 677.3 Fiber Optic Cable.
- The CONTRACTOR shall take every precaution to ensure the fiber optic cable is not damaged during storage and installation. Do not step on the fiber optic cable or run over the fiber optic cable by any vehicle or equipment. Do not pull the fiber optic cable along the ground or over or around obstructions.
- Ensure the fiber optic cable is packaged on wooden reels. These reels shall not contain imperfections such as broken flanges or nails that may cause damage to the cable as it is unreeled.
- Each cable reel shall have a durable weatherproof label that shows the actual length of cable on the reel.
- The CONTRACTOR shall coordinate his overhead and underground construction activities

on a continuing basis with each of the utility agencies which have facilities in the immediate vicinity.

1.3.2 Bends and Tensioning

- During installation, the CONTRACTOR shall provide cable blocks at least every 50 feet to guide the cable and reduce pulling tension. All pulling equipment and hardware that will contact the cable during installation must maintain the minimum bend radius of the fiber optic cable as listed in Table 1. Corner blocks, appropriately sized to ensure that the minimum bending radius of the cable is maintained, shall be provided whenever fiber optic cable must be pulled around a corner.

Table 1 Fiber Optic Minimum Bend Radius Chart

Nominal Cable Diameter		Minimum Bend Radius (No Tension) Installed		Minimum Bend Radius (Under Tension)	
Millimeters	Inches	Centimeters	Inches	Centimeters	Inches
6.0 – 10.0	(1/4 – 3/8)	10.0	(4.0)	15.0	(6.0)
10.1 – 15.0	(4/10 – 6/10)	15.0	(6.0)	22.5	(9.0)
15.1 – 20.0	(10/16 – 8/10)	20.0	(8.0)	25.0	(10.0)
20.1 – 23.0	(13/16 – 9/10)	23.0	(9.0)	25.0	(10.0)
23.1 – 25.0	(15/16 – 1.0)	25.0	(10.0)	30.0	(12.0)

- Fiber optic cable shall not be pulled through any intermediate junction box, manhole, pull box, pole base or any other opening in the conduit unless specifically required by the ENGINEER in specific facilities. The necessary length of cable to be installed shall be pulled from one junction box, manhole, pull box, pole base, or cabinet to the immediate next downstream manhole, box, pole base, or cabinet. The remaining length of cable to be installed in the next conduit shall be carefully stored in a manner that is not hazardous to pedestrian or vehicular traffic yet ensures that no damage to the cable shall occur. The cable shall be stored in a manner that shall allow that length of cable to be safely pulled into the next conduit. The ENGINEER shall approve the storing methods to be used.
- Cable reel lagging shall remain on the cable reels until they arrive at the pulling site. If the lagging has been removed, the CONTRACTOR shall securely fasten the cable ends to avoid damage during transit.
- If the cable must be unreeled during installation, use the “figure-eight” configuration to prevent kinking or twisting of the fiber optic cable. The preferred size of the “figure-eight” is 15 feet with each loop about eight (8) feet in diameter. The fiber optic cable shall not be coiled in a continuous direction except for lengths of 100 feet or less.
- The CONTRACTOR shall not increase the tension on the messenger cable to which the fiber optic cable has already been lashed.
- At the completion of a day’s installation, the CONTRACTOR shall protect the cable from moisture by placing a cable cap and/or several wraps of tape on the tip of the cable.
- The CONTRACTOR shall record the cable meter marks at every other pole location and at the fiber splice points on a set of as-built plans. Two (2) copies of the plans showing the meter marks shall be provided to the ENGINEER. The meter marks are most easily obtained while forming drip loops.
- The CONTRACTOR shall route the fiber optic cable on the inside of messenger intersections at dead ends and crossovers.

1.3.3 Aerial Installation

- Where the plans call for aerial installation, the CONTRACTOR shall furnish new messenger cable (see 682.3 Steel Cable) and shall lash the fiber optic cable to the new messenger.

- Install aerial cable either manually or by using the moving reel method. If the CONTRACTOR proposes to use the moving reel method, the CONTRACTOR shall submit to the ENGINEER the cable manufacturer's recommended procedures for this installation technique at least seven (7) days prior to beginning the installation of the fiber optic cable.
- Maintain the required clearances between the fiber optic cable and the utility features as follows unless otherwise noted on the PLANS:
 - 4 inches minimum vertical clearance and 12 inches minimum total (diagonal) separation to the telephone and/or cable vision facilities.
 - 40 inches minimum vertical clearance to all electrical transformers.
 - 40 inches minimum vertical clearance to all electric lines (including street light circuits).
- Where called for on the PLANS or as directed by the ENGINEER, furnish fiberglass extension arms and utilize to install the new fiber optic cable. Provide MIF PH6-2 fiberglass extension arms or approved equal.
- Where called for on the PLANS, the CONTRACTOR shall install down guys, sidewalk guys, and aerial guys in accordance with 682.2 Back Guy and as shown in the standard drawings.
- The CONTRACTOR shall use a Kellems® (or approved equal) grip wire mesh pulling grip and swivel to prevent damage to the cable during cable pulls.
- The CONTRACTOR shall provide drip loops for the fiber optic cable at all utility poles to which the fiber optic cable is attached. The drip loops must be of the "smooth-curve" type and shall be at least of the recommended dimensions for a drip loop in the typical details. Form drip loops by hand or by using an expansion loop-forming tool. Support the cable with straps and spacers in the absence of lashing wire support and to hold the cable bundles together. Install the strap and spacer no closer than 4 inches to the first bend in the drip loop.
- Where called for on the PLANS, the CONTRACTOR shall install backlashes in the Fiber Optic cable as necessary. The CONTRACTOR shall utilize 16 inch Fiber Optic Strand Storage Bracket (Multilink model number 2116-SSPTB or approved equivalent) which are also known as "Fiber Optic Sno Shoes". All hardware necessary for the installation of the backlash including the "Fiber Optic Sno Shoes", and lashing of the additional cable shall be incidental to the cost of Furnishing and Installing the Fiber Optic cable.
- The straps and spacers used for drip loops and other fiber optic cable handling purposes shall be hand-tight only. The strap and spacer must be loose enough to allow longitudinal travel by the cable, but tight enough to prevent the strap and spacer from moving on the messenger cable.
- Over lash the fiber optic cable to the messenger cable (See 682.3 Steel Cable - 1/4" galvanized steel cable). Use aluminum wrapping tape spaced at intervals not exceeding 380 mm or with 1.5 mm (minimum) diameter galvanized steel spiral cable wrap for lashing. Wrapping tape, if used shall be 1.3 mm x 7.6 mm. Use at least 4 turns. Accomplish the lashing in the manner that results in the wire and the cable appearing to be an integral part of the support cable. Install fiber optic cable without loose lashing, twisting or weaving along the messenger
- The CONTRACTOR shall terminate the lashing wire with a lashing wire clamp as the cable run is lashed up, span-by-span. Terminate the lashing wires as follows:
 - 1) Place a cable spacer between the fiber optic cable and the messenger.
 - 2) Locate lashing wire clamp 2 inches from strap and spacer. Pull enough lashing wire out of lasher to terminate into the lashing wire clamp.
 - 3) Wrap the lashing wire 3 times around only the messenger between the lashing wire clamp and the planned location of the first wrap around both the strand and fiber optic cable.
 - 4) Secure the lashing wire as shown in the typical details.

1.3.4 Underground Installation

Where shown on the PLANS, install the fiber optic cable in new underground conduit and risers.

- Seven (7) days prior to the installation of fiber optic cable in conduit is performed, the CONTRACTOR shall provide the ENGINEER with 4 copies of the cable manufacturer's

recommended and maximum pulling tensions and a list of the cable manufacturer's approved pulling lubricants. Only use those lubricants in the quantity recommended by the fiber optic cable manufacturer.

- When installing the cable in underground conduit, the maximum allowable pulling tension for the cable installation by the CONTRACTOR shall not exceed 70 percent of the manufacturer's maximum pulling tension. If the cable is pulled by mechanical means, use a dynamometer (clutch device) approved by the ENGINEER to ensure that a maximum allowable pulling tension is not exceeded at any time during installation.
- Fiber optic cable shall not be pulled over edges or corners, over or around obstructions or through unnecessary curves or bends. Use approved cable guides, feeders, shoes and bushings to prevent damage to the cable during installation.
- Use sealing bushings rather than weather heads on all risers containing fiber optic cable. The sealing bushings shall conform to the typical detail shown.
- Ensure conduit bends and cabinet entrance fittings used by the fiber optic cable network are designed to accommodate the bending radius limitations of the fiber optic cable used.

1.3.5 Splice

Splice the fiber optic cable only at those points shown in the PLANS. The designated splices proposed for installation in each controller cabinet consist of one of the following:

- Fibers Interconnect Centers – This splice in the cabinet shall be installed in accordance with 677.4 Fiber Interconnect Center
- The CONTRACTOR shall pull an adequate amount of fiber optic cable into the controller cabinet to perform splicing and to provide approximately 50 feet of slack cable (approximately 25 feet from the entering and 25 feet from the exiting cable). After the fiber optic cable has been spliced, the cable shall be neatly coiled (with tie-wraps placed on the cable) and placed on top of the fiber interconnect center or on the bottom of the cabinet. The cable shall be readily accessible to enable maintenance personnel to perform splicing of the cable in a vehicle located near the controller cabinet.
- Factory Terminated Patch Panel – This aerial splice and plug into cabinet shall be installed in accordance with 677.6 Factory Terminated Patch Panel
- Fiber optic cable runs shall be continuous between allowable splice points. The CONTRACTOR shall carefully determine the length of fiber optic cable necessary to reach from termination point to termination point. Splicing of fiber optic cable in conduit, pole bases, manholes, or pull boxes shall not be permitted.

1.3.6 Utilities

- Relocation of overhead utilities will be made by others and is not a part of this Contract.
- Where fiber optic cable is to be installed on overhead poles, the CONTRACTOR shall exercise care in temporary placement of installation equipment to provide safety to the public and to prevent damage to existing facilities. Should the CONTRACTOR cause damage to any existing cables and/or equipment, the CONTRACTOR shall immediately notify the ENGINEER and the affected owner and the CONTRACTOR shall repair or have the repair made at no additional cost.

1.3.7 Grounding and Bonding

- All metal conduits shall be grounded.
- All conduit, terminal cabinets, anchor bolts and reinforcing bar cages shall be made mechanically and electrically secure to form a continuous system and shall be effectively grounded. Use #6 AWG bare stranded copper wires for the grounding or bonding conductor.
- Bonding of metallic conduit in pull boxes and other installations, where the conduit is not coupled, shall be coupled with metallic conduit ground bushings having smoothly rounded molded insulated inserts and bonding jumpers.
- The CONTRACTOR shall furnish and install all grounding facilities.

1.3.8 Fiber Optic Cable Tests

- Continuity - Prior to the installation of any fiber optic cable, the CONTRACTOR shall test the continuity of each fiber using an Optical Time Domain Reflectometer (OTDR). The test shall be conducted while the fiber is still on the reel and the test results shall be provided to the ENGINEER.
- Contractor shall provide documentation indicating that all optic fibers have been proof tested by the fiber manufacturer at a minimum load of 50 kpsi.
- Contractor to provide documentation that all optical fibers have been 100% attenuation tested by the manufacturer. The attenuation of each fiber shall be provided with each cable reel.
- Splice Loss - After the installation of the fiber optic cable, the CONTRACTOR shall test the dB loss for every splice of the fiber optic cable in accordance with procedures established in the OTDR operator's manual. The testing may be done in conjunction with the splicing of the cable. Any splice that has a splice loss >0.09 dB shall be re-spliced.
- The CONTRACTOR shall provide hardcopy test results to the ENGINEER that identify the location of the splice (Intersection name, splice tray #), the fiber (by buffer tube and fiber color), and the splice loss in dB.
- Connector/End Splice Testing - The CONTRACTOR shall test each connector/end splice loss in one (1) direction using an OTDR in accordance with procedures established in the OTDR operator's manual. The average mated connector/end splice loss shall be <0.5 dB. Individual mated connector pair/end loss shall be <0.7 dB. Any connector/end splice with a loss greater than 0.7 dB shall be replaced, by the CONTRACTOR. Any replacement connectors/ends shall also be tested.
- End-to-End Attenuation Testing - The CONTRACTOR shall perform end-to-end testing of each fiber between each place point at 1310 nm and 1550 nm in one (1) direction in accordance with EIA/TIA 526-7.
- The CONTRACTOR shall provide hardcopy test results to the ENGINEER that identify the two (2) ends of the test site, the fiber tested, the wavelength tested, the reference power output, and the system attenuation in dB.
- The CONTRACTOR shall provide OTDR Signature traces of all fibers between all intersections for system documentation and restoration purposes.

1.4 Measurement

- Fiber optic cable, of the type and size specified will be measured by linear feet of cable actually furnished and installed, completely in place and accepted, using an "OTDR" (optical time-domain reflectometer). Such payment shall be full compensation for furnishing all material, labor, hardware, equipment and incidentals necessary for furnishing and installing communications cable and completing the work as specified.
- Note that electrical conduit, splice boxes, splice cabinets, and steel span wire are listed elsewhere as separate pay items.

1.5 Payment

6770470	FURNISH & INSTALL 12 STRAND FIBER OPTIC CABLE – SINGLE MODE	LF
677046D	FURNISH & INSTALL SELF SUPPORTING 12 STRAND FIBER OPTIC CABLE - SINGLE MODE	LF

Supplemental Technical Specification for

Fiber Interconnect Centers

SCDOT Designation: 677.4

1.1 Description

This work shall consist of furnishing and installing a Fiber Interconnect Center, including splicing the fiber optic cable and all necessary material to accomplish this work in accordance with this specification and standard drawings.

1.2 Materials

The Fiber Interconnect Center shall include ST adapter panel, strain relief hardware, be rack mountable, have the capacity for 4 Fusion Splice Trays and termination/connection capacity for 24 fibers in 4 modules. The Center shall be a Systimax 600G2-1U-UP-SD or approved equivalent.

The interconnect center shall be equipped with 2 fiber optic modular connector panels with 24 factory-installed interconnection sleeves. The modular interconnection panels shall be clearly labeled (transmit/receive). The interconnection sleeves shall be types ST compatible, with ceramic insert, and composite housing for single-mode fiber optic cable. These shall be Systimax MODG2-6ST-SM-PT-A and MODG2-6ST-SM-PT-B or approved equivalent.

Each interconnect center shall be furnished with 3 Fusion Splice Trays. The trays shall be capable of accepting 12 fusion and 6 mechanical splices. The tray shall be a Systimax RS-2AF-16SS or approved equivalent.

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Fiber Interconnect Center.
- Multiple splices may be required to connect all incoming fibers to traffic signal network.

1.3.2 Cabinet

- Install the Fiber Interconnect Center in the controller cabinet. Place the Fiber Interconnect Center in the cabinet such that the slack fiber optic cable stored on top of the fiber interconnect center (in accordance with 677.3 Fiber Optic Cable) can be easily removed (along with the fiber interconnect center) from the cabinet and taken to a maintenance vehicle for splicing.
- Provide all necessary materials and hardware including furnishing and installing splice trays, interconnection sleeves, jumpers, and connectors needed for connecting the fiber optic cable to the signal communications network.

1.3.3 Splicing Methods

- Use the fusion-splice technique to perform all splicing, which induces less than 0.3 dB attenuation, unless noted otherwise in the special provisions. Recoat bare fibers with a protective RTV gel or similar substance prior to application of the sleeve or housing to protect the fiber from scoring, dirt, or microbending. Package each spliced fiber in a heat shrink protective sleeve or housing. Perform all splices in accordance with the cable manufacturer's and the splice manufacturer's recommendations. During splicing, the CONTRACTOR shall maintain the continuity of the buffer tube and fiber color.

- Provide incoming fibers with 5 feet of coiled slack and splice to a pigtail of the same type fiber. Pigtails shall have a minimum length of 5 feet and shall have a factory-installed ST compatible connector. The pigtails shall have an attenuation of less than 0.3 dB. The ST connector shall mate with the connector panels installed in the fiber interconnect center.
- Protect unused optical fibers with sealed end caps.
- The CONTRACTOR shall record the meter marks on the cable sheath at each splice point. Provide these marks to the Engineer as part of the as-built system plans at the completion of the project.

1.3.4 Jumpers

- The CONTRACTOR shall furnish and install 2 single-mode fiber optic cable assemblies with connectors factory-installed on each end (jumpers). These assemblies will be used to connect the fiber optic modem to the connector panel. These jumpers will not be paid for directly but shall be considered incidental to the item Furnish and Install Fiber Optic Modem.

1.3.5 Future Applications

- The fiber optic communications network shall accommodate future applications. As shown in the standard drawings, fusion splice all six fibers in one buffer tube of the entering cable through to the six fibers in one of the buffer tubes leaving the cabinet. Maintain the continuity of the buffer tube and fiber color. Splice these fibers in a separate splice tray. The cable entering and exiting the cabinet will contain another buffer tube that contains six fibers. Fusion-splice three of the incoming and three of the outgoing fibers to pigtail assemblies with factory-installed type ST compatible connectors. Place these six splices in a second splice tray. Fusion-splice the remaining three incoming and three outgoing fibers to pigtail assemblies with factory-installed type ST compatible connectors and placed in a third tray. Connect all pigtail assemblies to the connector panels installed in the Fiber Interconnect Center. Clearly label the Transmit and Receive designations of each fiber pair on the front of the connector panel. Test each fiber termination/connection for attenuation.

1.3.6 Fiber Optic Cable Tests

- Continuity - Prior to the installation of any fiber optic cable, the CONTRACTOR shall test the continuity of each fiber using an Optical Time Domain Reflectometer (OTDR). Conduct the test while the fiber is still on the reel and provide the test results to the ENGINEER.
- Splice Loss - After the installation of the fiber optic cable, the CONTRACTOR shall test the dB loss for every splice of the fiber optic cable in accordance with procedures established in the OTDR operator's manual. The testing may be done in conjunction with the splicing of the cable. Any splice that has a splice loss >0.09 dB shall be re-spliced.
- The CONTRACTOR shall provide hardcopy test results to the ENGINEER that identify the location of the splice (Intersection name, splice tray #), the fiber (by buffer tube and fiber color), and the splice loss in dB.
- Connector/End Splice Testing - The CONTRACTOR shall test each connector/end splice loss in one (1) direction using an OTDR in accordance with procedures established in the OTDR operator's manual. The average mated connector/end splice loss shall be <0.5 dB. Individual mated connector pair/end loss shall be <0.7 dB. Replace any connector/end splice with a loss greater than 0.7 dB. Test any replacement connectors/ends.
- End-to-End Attenuation Testing - The CONTRACTOR shall perform end-to-end testing of each fiber between each place point at 1310 nm and 1550 nm in one (1) direction in accordance with EIA/TIA 526-7.
- The CONTRACTOR shall provide hardcopy test results to the ENGINEER that identify the two (2) ends of the test site, the fiber tested, the wavelength tested, the reference power output, and the system attenuation in dB.
- The CONTRACTOR shall provide OTDR Signature traces of all fibers between all intersections for system documentation and restoration purposes.

1.4 Measurement

- This item shall include the labor, equipment, and materials necessary to furnish and install the fiber optic interconnect centers in accordance with the PLANS and Standard Drawings. This item shall

be measured by the number of each installed, which shall be full compensation for furnishing and installing the fiber interconnect centers into the signal controller cabinets and making the necessary connections. The fusion splicing of the cable, furnishing and installing the splice trays, pigtail assemblies, connector panels and interconnection sleeves shall be considered incidental to this item and will not be paid directly.

- Pay item 6770486 may be used to pay for additional fiber splices required if more than one fiber trunk is to be interconnected at signal. This pay item includes all necessary items needed to provide this interconnection.

1.5 Payment

6770476	FURNISH & INSTALL FIBER OPTIC INTERCONNECT CENTER	EA
6888092	INSTALL FIBER OPTIC INTERCONNECT CENTER	EA
6770486	FIBER OPTIC REPAIR SPLICE OH/UG	EA

Supplemental Technical Specification for Factory Terminated Patch Panel

SCDOT Designation: 677.6

1.1 Description

This work shall consist of furnishing and installing a Factory Terminated Patch Panel, including splicing the fiber optic cable and all necessary material to accomplish this work in accordance with this specification and standard drawings.

1.2 Materials

Acceptable materials can be found on the current SCDOT Qualified Products List http://info.scdot.org/Construction_D/sitePages/qualifiedProducts3.aspx.

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Factory Terminated Patch Panel.
- The Contractor shall furnish the ENGINEER with any warranties on materials that are provided by the Manufacturer or Vendor as normal trade practice.
- Multiple splices may be required to connect all incoming fibers to traffic signal network.

1.3.2 Cabinet

- The factory terminated patch panel shall be installed by the CONTRACTOR between the controller cabinet and the overhead fiber optic cable run. The factory terminated patch panel shall be located in the cabinet such that the slack fiber optic cable is safely stored (in accordance with 677.3 Fiber Optic Cable).
- Provide all necessary materials and hardware including furnishing and installing interconnection sleeves, jumpers, and connectors needed for connecting the fiber optic cable to the signal communications network.

1.3.3 Splicing Methods

- When using a preterminated, molded patch panel unit that serves as the drop cable and fiber interconnect center (patch panel/fusion splice containment) the free end shall be spliced to the trunk fiber optic cable in an approved aerial enclosure according to the splice plan. The overhead splice and enclosure and all necessary materials and hardware is incidental and should be included in pay item.
- Use the fusion- splice technique to perform all splicing, which induces less than 0.3 dB attenuation, unless noted otherwise in the special provisions. Recoat bare fibers with a protective RTV gel or similar substance prior to application of the sleeve or housing to protect the fiber from scoring, dirt, or microbending. Package each spliced fiber in a heat shrink protective sleeve or housing. Perform all splices in accordance with the cable manufacturer's and the splice manufacturer's recommendations. During splicing, the CONTRACTOR shall maintain the continuity of the buffer tube and fiber color.
- Protect unused optical fibers with sealed end caps.

- The CONTRACTOR shall record the meter marks on the cable sheath at each splice point. Provide these marks to the Engineer as part of the as-built system plans at the completion of the project.

1.3.4 Jumpers

- The CONTRACTOR shall furnish and install 2 single-mode fiber optic cable assemblies with connectors factory-installed on each end (jumpers). These assemblies will be used to connect the fiber optic modem to the Factory terminated patch panel. These jumpers will not be paid for directly but shall be considered incidental to the item Furnish and Install Factory terminated patch panel.

1.3.5 Future Applications

- Splice all fiber strands and connect to accommodate future applications.

1.3.6 Fiber Optic Cable Tests

- Continuity - Prior to the installation of any fiber optic cable, the CONTRACTOR shall test the continuity of each fiber using an Optical Time Domain Reflectometer (OTDR). Conduct the test while the fiber is still on the reel and provide the test results to the ENGINEER.
- Splice Loss - After the installation of the fiber optic cable, the CONTRACTOR shall test the dB loss for every splice of the fiber optic cable in accordance with procedures established in the OTDR operator's manual. The testing may be done in conjunction with the splicing of the cable. Any splice that has a splice loss >0.09 dB shall be re-spliced.
- The CONTRACTOR shall provide hardcopy test results to the ENGINEER that identify the location of the splice (Intersection name, splice tray #), the fiber (by buffer tube and fiber color), and the splice loss in dB.
- Connector/End Splice Testing - The CONTRACTOR shall test each connector/end splice loss in one (1) direction using an OTDR in accordance with procedures established in the OTDR operator's manual. The average mated connector/end splice loss shall be <0.5 dB. Individual mated connector pair/end loss shall be <0.7 dB. Replace any connector/end splice with a loss greater than 0.7 dB. Test any replacement connectors/ends.
- End-to-End Attenuation Testing - The CONTRACTOR shall perform end-to-end testing of each fiber between each place point at 1310 nm and 1550 nm in one (1) direction in accordance with EIA/TIA 526-7.
- The CONTRACTOR shall provide hardcopy test results to the ENGINEER that identify the two (2) ends of the test site, the fiber tested, the wavelength tested, the reference power output, and the system attenuation in dB.
- The CONTRACTOR shall provide OTDR Signature traces of all fibers between all intersections for system documentation and restoration purposes.

1.4 Measurement

- The bid for the Factory terminated patch panel shall include the cost of furnishing and installing the Factory terminated patch panel into the signal controller cabinets, splicing into fiber trunk overhead and making all the necessary connections.
- The fusion splicing of the cable, pigtail assemblies, connector panels and interconnection sleeves shall be considered incidental to this item and will not be paid directly.
- This item shall include the labor, equipment, and materials necessary to install the Factory terminated patch panel in accordance with the PLANS and Project Special Provisions. This item shall be measured by the number of each installed.
- Pay item 6770486 may be used to pay for additional fiber splices required if more than one fiber trunk is to be interconnected at signal. This pay item includes all necessary items needed to provide this interconnection.

1.5 Payment

6888082	FURNISH & INSTALL FACTORY TERMINATED PATCH PANEL	EA
6888093	INSTALL FACTORY TERMINATED PATCH PANEL	EA
6770486	FIBER OPTIC REPAIR SPLICE OH/UG	EA

Supplemental Technical Specification for

Wireless Network Communications Link

SCDOT Designation: 677.7

1.1 Description

This work shall consist of installing a Wireless Network Communications Link with all necessary hardware in accordance with the plans and standard drawings to provide a data link between field devices (i.e. Traffic Signal Controllers).

1.2 Materials

Wireless Communications Equipment provided by others (generally SCDOT). Cable shall be as follows or equal:

Superior Essex	Cabling	CAT 5e Ethernet cable
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1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Wireless Network Communications Link.
- The Contractor shall furnish the ENGINEER with any warranties on materials provided by the Manufacturer or Vendor as normal trade practice.
- A Wireless Network Communications Link is used to network two Traffic Signal Cabinets together. Each link consists of Master ODU (Out Door Unit, *Antenna*) connected to a data switch within one of the signal cabinets and a Slave ODU connected to a data switch within the other signal cabinet. Each ODU is aligned to face the opposing ODU. The cable length between the ODU and its associated data switch may not exceed 300 feet.
- Wireless Network Communications Link components at each of the linked traffic signal cabinets includes an ODU, a LPU (Lightning Protection Unit), power supply mounting hardware, and CAT 5e cabling. The ODU is pole mounted per manufacturer's specifications. The LPU and power supply are mounted within the traffic signal cabinet. CAT 5e cable is installed between the ODU and LPU.

1.3.2 Site Survey

- **Perform a radio path Site Survey test before installing any equipment.** For the applicable frequency spectrum of the radios being deployed, perform a spectrum analysis to ensure no competing equipment in the area. Ensure the radio path site survey test is performed using the supplied brand of radio equipment to be deployed. Typically, if the ODUs can be mounted with clear line of sight between them, this is sufficient to ensure proper operation. If this is not possible, it may be determined that a repeater station is necessary to complete the intended link. Provide the test results to the ENGINEER for review and approval. Submit copies of the test results and colored copies of the frequency spectrum scan along with an electronic copy of this information. The ENGINEER will approve final locations of the ODUs and any necessary repeater stations.

1.3.3 Antenna

- Install each ODU in such a manner that avoids conflicts with other utilities (separation distances in accordance with the guidelines of the NESC) and as specified in the ODU manufacturer's recommendations. Secure the ODU mounting hardware to the pole and route the CAT 5E cable such that no strain is placed on the RJ-45 connectors. Align each antenna/radio to be perpendicular to the ground (using bubble level) and to face the opposing radio

1.3.4 Cable

- Install Cat 5E cable between the ODU and the LPU. Terminate each end with compatible RJ-45 connector. Perform end-to-end continuity test and 1 GigaBit/sec transmission tests using Ethernet Twisted Pair test gear. Provide test results to ENGINEER.
- Lightning Protection Unit (LPU)- Install LPU in Signals cabinet per manufacturer's instructions. Connect CAT 5e cable to LPU

1.4 Measurement

- Pay Item 677048B INSTALL WIRELESS NETWORK COMMUNICATIONS LINK BETWEEN TWO TRAFFIC SIGNALS is measured as EACH unit. This pay item includes furnishing mounting hardware and cable for ODU, installing ODU and cable, installing cabinet equipment, and adjusting ODU as needed for optimum communications for both ends of the link (Master ODU at one signal and Slave ODU at the other signal. Actual ODUs and associated equipment provided by others (generally SCDOT).

1.5 Payment

677048B	INSTALL WIRELESS NETWORK COMMUNICATIONS LINK BETWEEN TWO SIGNALS	EA
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Supplemental Technical Specification for

Detector Loop

SCDOT Designation: 678.1

1.1 Description

This work shall consist of furnishing and installing a Detector Loop within and alongside the roadway, at the locations shown on the Plans, and in accordance with Standard Drawing 678-100-01 Vehicle Detection – Inductive Detection. A Detector Loop installation shall consist of: installing the required conduit runs; making the pavement saw cut; placing the required number of turns of loop wire in the saw cut; creating a twisted pigtail; splicing the pigtail to the shielded, twisted pair lead-in cable; connecting the lead-in cable to the back-panel terminals at the controller cabinet; verifying proper detection of traffic; and sealing the saw cut. Several items used to create a complete detector installation are specified elsewhere. They are: FURNISH AND INSTALL ELECTRICAL CONDUIT; and FURNISH AND INSTALL SPLICE BOXES/ JUNCTION BOXES. The "junction point" referred to in the specifications below, is defined to be a splice box, or a conduit junction box as specified on the Plans.

1.2 Materials

Acceptable materials can be found on the current SCDOT Qualified Products List http://info.scdot.org/Construction_D/sitePages/qualifiedProducts3.aspx.

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Detector Loop.
- The LOCATION and SIZE of each loop shall conform to the Plans and to the Standard Drawings.
- The front of each loop shall typically be located 12 to 36 inches in front of the Stop Line, however, the final location will be determined by the ENGINEER based on field conditions.
- Center loops in the traffic lane in accordance with the Standard Drawings and as shown on the Plans.
- Stage loop installation so that each entire loop installation (from saw cut to sealing) is completed within the same working day with minimum blockage of traffic.
- Cut all presence loops, left turn lanes and side streets, in a quadrupole design, in accordance with the standard drawings.
- Provide a 5-year workmanship warranty for the loops following Final Acceptance. The CONTRACTOR will return to repair or replace any loops rising up or pulling from the pavement or not functioning within warranty period at no additional cost.

1.3.2 Saw Cuts

- Prior to cutting, mark the intended saw cut using paint or chalk on the pavement and obtain approval from the ENGINEER.
- The Contractor shall slot the roadway using a diamond or abrasive rotary power-saw with a blade approximately 3/8 INCH IN WIDTH.
- Use a power-driven walk-along model saw, not a hand-tool.
- The MINIMUM DEPTH of each Saw cut shall be:
 - 2 INCHES DEEP in CONCRETE; and
 - 2-1/2 INCHES DEEP in BITUMINOUS pavement; and
 - 3 INCHES DEEP for any Quadrupole loop or loop with 4 turns.

- Cut the corners diagonally to prevent sharp edges in accordance with the standard drawings. Extend the saw cuts to provide full-depth.
- Wash out and blow dry saw cuts to ensure the cut is free from dust, grit, oil and moisture before the placement of wire. Use compressed air to blow dry.
- If the Engineer gives written approval, the curb and gutter may be saw cut. If saw cutting of curb and gutter is not permitted, drill a 1 ½-inch hole under the curb at a 45 degree angle.
- Avoid pavement seams or cracks. However, when it is necessary to traverse a crack, drill a 2-inch diameter hole at least 3 inches deep, and provide slack in the loop wire to allow for expansion and contraction.

1.3.3 Loop Wire

- Install each loop wire in a continuous and splice-free manner.
- Do not install or provide any wire with cuts, breaks, or nicks in the insulation. The Engineer will not accept damaged loop wire.
- Wire all loops in one direction, counter-clockwise only.
- Each loop shall have the number of turns shown below, or as indicated on the Plans.
 - 6' x 6' , 6' x 10' – 4 turns
 - 6' x 15', 6' x 20', 6' x 30', 10' x 20', 10' x 30' – 3 turns
 - 6' x 40', 6' x 50', 10' x 40' – 2 turns
 - Quadrupole loops shall have twice the turns in the middle cut, and be wired in a figure eight pattern, counter-clockwise only
- Form each Detector Loop by installing one continuous length of single conductor (loop) wire in a separate saw cut, from the nearest approved "junction point", around the loop the specified number of turns, then back to the "junction point".
- Place the wire in the cut so that there are no kinks or curls, and no straining or stretching of the insulation around the corner of the slot, or at the junction.
- Press the wire to the bottom of the saw cut slot, using a roller or a blunt-stick (similar to a paint stirrer), to seat the loop wire at the bottom of the slot or channel. Do not use a screwdriver or similar sharp tool as this may damage the loop wire insulation.
- After placing the wire in the slot, recheck it for slack, raised portions, and tightness.
- Use 1 INCH LENGTHS of 1/2 inch closed-cell foam-plastic (BACKER-ROD) at 2 foot spacings, to hold the wire at the bottom of the slot. DO NOT use backer-rod around the entire perimeter!
- Form the "pigtail" by twisting together the two ends of the loop wire from the corner of the loop to the "junction point"; Twist the two ends with a pitch of 15 TURNS PER YARD;
- Enclose the loop wire pigtail in conduit from the roadway edge to the "junction point".
- TEST each loop BEFORE SEALING, to ensure inductance is in the range of 50 to 2500 micro-Henrys. Ensure the insulation resistance measured to earth ground is greater than 100 megohms at 500 volts DC. Provide MEGGER TEST and INDUCTANCE TEST before and after sealing, and provide a written record of the test to the ENGINEER on company letterhead.

1.3.4 Lead-In Cable

- Install the lead-in cable in a continuous run, splice-free, and free from cuts or nicks in the insulation.
- At the specified "junction point", splice the twisted "pigtail" from the loop wire to the shielded, (twisted-pair) lead-in cable that runs from the "junction point" to the controller cabinet (terminal).
- Provide an electrically permanent and waterproof seal at the "junction point" splice. Remove 1-1/2 inches of insulation from each wire. Use either a crimped-on or twisted and soldered splice. No wire nuts are allowed. Waterproof seal the entire splice using a method described below:
 - a. Normal Splice – Splice each individual pair (pair of twisted loop wires meeting pair of loop lead-in wires), by using either a crimp-on or a soldered joint. Seal the junctions in a low-voltage, waterproof splice kit. Install the splice kit per the manufacturer's instructions.
 - b. Underwater Splice - Where required on the Plans, install an underwater splice kit according to the manufacturer's instructions.
- The ENGINEER must be present to witness the splicing. Any splices made without the presence of the ENGINEER are unacceptable, and shall be re-spliced.

- Leave sufficient slack in both the lead-in cable and the loop wire, to allow movement of 3 feet from the front of the "junction point". Neatly coil and nylon-tie the slack after completion of the splice.
- In the controller cabinet, label the lead-in cable on an insulated, preprinted-sleeve, slipped over the wire before attachment of a spade-lug connector. Crimp on a spade-lug connector onto each loop lead-in wire.
- In the controller cabinet, do not connect the ground (drain) wire from each lead-in cable; instead, cut it off at the cable sheath, and leave it floating.
- Run the lead-in cable in conduit (in accordance with 675.1 Electrical Conduit) from the "junction point" to the nearest signal pole, or directly to the cabinet if in the same quadrant.
- Run the lead in cable inside a conduit (riser) or metal pole, across span wires, and then down inside a conduit (riser) or metal pole, to the cabinet.
- Install one of the following for the conduit for lead-in cable required to be installed under sidewalks and curbs
 - Rigid Galvanized Steel Conduit
 - SCHEDULE 80 PVC Conduit
 - SCHEDULE 80 HDPE Rolled Conduit
 - Flexible Weather-Tight Steel Conduit

1.3.5 Sealant

- Use QPL approved Loop Sealant in all loops unless specified by the ENGINEER.
- Mix and apply Loop Sealant according to the manufacturer's directions.
- Do not pour Loop Sealant into saw cuts during precipitation of any kind, or at temperatures below 10° C (50° F).
- Completely fill the saw cut and drilled holes with Loop Sealant; do not allow bubbles below the surface; do not over fill the cut, ensuring only a minimum spillover along the joint. Use Duct-Seal to prevent sealant from flowing into conduit ends.
- When the sealant hardens, ensure there is neither a bulge nor depression, but rather a smooth road surface. Ensure the sealant is not over-poured, preventing bulges or bumps higher than the surrounding surface of the roadway. Wipe the area smooth with a squeegee.
- Ensure the sealant has hardened before allowing traffic to move over the area.

1.4 Measurement

- Detector loops shall be measured by LINEAR FEET of: loop wire, lead-in cable, and saw cut as actually placed, including sealant, electrical connections, testing, and incidental hardware. Note that conduit and splice boxes are measured elsewhere as separate items.

1.5 Payment

Loop Wire:

6770413	FURNISH & INSTALL NO. 14 COPPER WIRE, 1-CONDUCTOR FOR LOOP WIRE	LF
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Loop Lead-in cable:

See 677.1 Electrical Cable

6770389	FURNISH & INSTALL NO. 14 COPPER WIRE, 4 CONDUCTOR - GRAY	LF
6770394	FURNISH & INSTALL NO. 14 COPPER WIRE, 8 CONDUCTOR - GRAY	LF

Saw Cut:

6780495	SAWCUT FOR LOOP DETECTOR	LF
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Supplemental Technical Specification for

Wireless Vehicle Detection System

SCDOT Designation: 678.2

1.1 Description

This work shall consist of furnishing a Wireless Vehicle Detection System to detect vehicles on a roadway by using battery-powered magnetometer-type SENSORS that communicate their detection data by RADIO RECEIVER &/OR REPEATERS to a CABINET INTERFACE before the data is relayed to a local traffic controller and, optionally, a central software system or a data server, or interface to such, as may be desired.

1.2 Materials

1.2.1 Overview

- The Wireless Battery-Powered Magnetometer Vehicle Detection System shall consist of one or more SENSORS installed in each traffic lane where presence detection is required, avoiding sources of magnetic noise such as underground power cables, overhead high tension power cables, light rail or subway tracks, and power generation stations and sub-stations. The SENSORS shall be located as specified by the intersection plans, with each SENSOR'S supporting CABINET INTERFACE or REPEATER installed as necessary to provide communications. Each SENSOR in an installation shall be capable of being individually configured with its own sensitivity level. A single SENSOR shall be capable of being configured with a sensitivity level that approximates the detection zone of a standard 6' x 6' inductive loop. Each SENSOR shall be capable of being configured with relatively higher or lower sensitivity levels as may be required to detect bicycles, motorcycles, or light rail. As an option as directed by the plans, up to two SENSORS properly configured shall be capable of detecting motorcycles in a standard traffic lane and bicycles in a designated bicycle lane. A CABINET INTERFACE shall support the relay of SENSOR detection data through several interfaces as required by the application.
- Communications between a SENSOR and RADIO RECEIVER can be direct, via a single REPEATER, or via two REPEATERS operating in tandem. Communications between the SENSORS and the RADIO RECEIVER or REPEATER and between the REPEATER and RADIO RECIEVER or another REPEATER shall be via radio. Detection data shall be relayed from each CABINET INTERFACE to a local traffic controller for real- time vehicle presence detection using contact closure signals or serial communication interface.
- As an option, data shall be capable of being relayed from each CABINET INTERFACE to a central software system or central server over standard IP (Internet Protocol) networks. An option to provide data via a web page interface may be required.

1.2.2 Radio Link

The radio links between each SENSOR and RADIO RECEIVER or REPEATER and between each REPEATER and RADIO RECEIVER or each REPEATER and REPEATER shall conform to the following requirements.

- The physical layer of the radio links (i.e., the over-the-air data rate(s), modulation type(s), forward error correction, bit interleaving, channel coding, and other aspects of the transmitted signal) shall conform to published standards (e.g., IEEE, ITU-T, etc.).
 - The center frequencies, bandwidths, and transmit power levels of the radio links shall allow operation in an unlicensed frequency band.
 - Frequency channels shall be employed by the SENSORS, CABINET INTERFACE, and REPEATERS to avoid interference with other devices operating in the unlicensed band.
 - Either user-configurable frequency assignments or frequency hopping technology shall be provided. If frequency channels are user-configurable, at least 16 frequency channels shall be supported. If spread-spectrum/frequency hopping technology is provided ensure technology can address potentially interfering radio transmissions in the unlicensed band.
-
- The link budget (i.e., transmit power plus transmit antenna gain plus receive antenna gain minus receive sensitivity, where receive sensitivity shall assume a 1% packet error rate) for all radio links shall be 93 dB or greater.

1.2.3 Components

The Wireless Vehicle Detection System shall consist of one or more of the following:

- **SENSORS** - installed in-pavement in each traffic lane.
- **RADIO RECEIVER** - mounted on the side of the roadway.
- **CABINET INTERFACE**- CABINET INTERFACE located in traffic signal cabinet will provide SENSOR information processing and support the interface between a RADIO RECEIVER and a standard traffic controller using contact closure signals or standard serial communication interface such as NEMA TS2 Port 1.
- **EXTENSION MODULE** - to provide additional detector outputs to a traffic controller.
- **REPEATER/ANTENNAS** - Wireless REPEATERS/ANTENNAS mounted on the side of the roadway, either at the intersection or adjacent to set back sensors, serving to extend the radio range of a RADIO RECEIVER.
- EPOXY, CAT5 / ETHERNET CABLE, ELECTRIC CABLE , SOFTWARE (Incidentals)

1.2.4 Sensor

- Each SENSOR shall detect a vehicle by measuring changes in the earth's magnetic field near the SENSOR as caused by a stopped or passing vehicle (i.e., magnetometer-type detection). The SENSOR shall sample the earth's magnetic field at a rate of 128 Hz. The SENSOR shall communicate time-stamped ON and OFF vehicle detection events. Each SENSOR shall automatically recalibrate in the event of a detector lock. Each SENSOR shall communicate by radio to a nearby RADIO RECEIVER or REPEATER RADIO. Each SENSOR shall transmit its detection data within 150 ms of a detected event. Each SENSOR shall automatically re-transmit a detected event if no acknowledgement is received from the access point. Each SENSOR may stop retransmission after 8 attempts. Each SENSOR shall transmit a unique identifying code. Each SENSOR shall respond within 100 seconds when the access point is powered on and transmitting. When no RADIO RECEIVER or REPEATER is present or powered on and transmitting, the SENSORS are not required to detect vehicles.
- All SENSOR components shall be contained within a single housing. The SENSOR housing shall conform to NEMA Type 6P and IEC IP68 standard. The SENSOR components shall be fully encapsulated within the housing to prevent moisture from degrading the components. The SENSOR housing shall be capable of being installed in a 4 to 4.5 inch diameter hole with a minimum 2.25 inches. A SENSOR shall operate at temperatures from -37 F /-38.3°C to +176 F / +80°C. A SENSOR shall be battery-powered with an average lifetime of ten (10) years when the SENSOR is configured for and operating under normal traffic conditions.

1.2.5 Radio Receiver (At Intersection)

- A RADIO RECEIVER shall support at least 48 SENSORS with a 0.125 second latency. A RADIO RECEIVER shall meet the temperature and humidity requirements of section 2.1.5 of NEMA Standard TS2-2003. All RADIO RECEIVER components (not including antennas) shall be contained within a single housing. The RADIO RECEIVER housing shall conform to NEMA Type 4X and IEC IP67 standards. A RADIO RECEIVER shall be no larger than 12”H x 8”W x 7”D.
- The RADIO RECEIVER shall communicate to the CABINET INTERFACE utilizing a standard CAT5e or higher Ethernet cable. The RADIO RECEIVER shall have a weatherproof Ethernet connector on the bottom. The Ethernet connector shall be shipped with a cover firmly attached to provide protection from the elements prior to cable connection. The weatherproof connector shall not require any specialized tools for installation.
- A means shall be provided for surge suppression and isolation between the radio receiver and the cabinet interface for a wired connection. Electrical isolation of 1000V or greater and transient / surge protection shall be provided for the interface between the Cabinet Interface and Radio Receiver. This may be provided integral to the devices or as a separate unit, or combination thereof.

1.2.6 Cabinet Interface

- Detection data shall be communicated to a standard roadside traffic controller via a CABINET INTERFACE capable of being installed in a standard 170 cabinet. Type 170, Type 2070 and ATC controller types shall be supported. As an option, detection data shall be communicated over TCP/IP via an integrated 10Base-T Ethernet interface or a NEMA TS2-2003 Port 1 serial interface. The CABINET INTERFACE shall be capable of simultaneously communicating detection data via the contact closure interface and other interfaces.
- Each CABINET INTERFACE shall be capable of communicating with at least 2 RADIO RECEIVERS. EXTENSION MODULES shall provide additional contact closures (user configurable from 1 to 4 outputs each). The CABINET INTERFACE shall provide all the higher level processing and interface functions of the system. Each CABINET INTERFACE shall provide detector data as contact closure signals to the traffic controller or via a serial communications interface. A CABINET INTERFACE shall connect to standard 170/2070 input files or NEMA detector racks. One or more EXTENSION MODULES shall provide up to 64 channels of detection data from a single CABINET INTERFACE’s supported SENSORS, where each channel comprises an optically isolated contact closure relay and, if configured for TS2 operation, an additional output meeting TS2 requirements, to indicate the channel status. Each CABINET INTERFACE and EXTENSION MODULE shall be configurable. A CCI card shall provide contact closure signals in either presence or pulse mode. A CCI card shall provide up to 31 seconds of delay timing. A CCI card shall provide up to 7.5 seconds of extension (carryover) timing. The CCI and EXTENSION MODULE front panel shall provide status LEDs to monitor Detection channel status, and Faults. The CCI and EXTENSION MODULE front panel shall be either software or via front panel switches configurable to provide Presence or pulse mode, Delay timing and Extension timing.
- A CABINET INTERFACE or EXTENSION MODULE shall be powered by the input file/detector rack backplane via an 11- 26 VDC input. Power Consumption for a CABINET INTERFACE (without optional cellular interfaces) shall be under 5 watts. An EXTENSION MODULE shall be surge protected to GR-1089 standards. A CABINET INTERFACE and EXTENSION MODULE shall meet the requirements of NEMA TS2-2003, section 2.1.5 Temperature and Humidity, and section 2.1.7 Transients, Input-Output Terminals.

1.2.7 Extention Module

- An EXTENSION MODULE shall be available to allow additional detector outputs to be interfaced to the traffic controller. When interfacing through the detector card rack, the extension module shall allow up to four detector outputs to be interfaced to detector card slot(s).

1.2.8 Repeater/Antenna

- A REPEATER/ANTENNA radio communicating directly to a CABINET INTERFACE shall support at least 10 SENSORS. A REPEATER/ANTENNA communicating to a CABINET INTERFACE via an intermediate REPEATER (i.e., tandem operation) shall support at least 6 SENSORS. A REPEATER/ANTENNA shall be battery-powered, solar powered or a combination of the two. The REPEATER/ANTENNA battery shall be long-term (5+ years) and field replaceable. A

REPEATER/ANTENNA shall meet the requirements of NEMA TS2-2003, section 2.1.5 Temperature and Humidity. All REPEATER/ANTENNA components shall be contained within a single housing.

1.2.9 Epoxy

- The epoxy shall be a two part poly-urea based joint sealant. It shall have self-leveling characteristics. The surface the epoxy will be bonding to shall be free of debris, moisture and anything else which might interfere with the bonding process. The epoxy shall be approved by the manufacturer of the detection system. Epoxy is an incidental item to be included in installation of SENSORS.

1.2.10 Software

- Each SENSOR, access point contact closure, RADIO RECEIVER and REPEATER/ANTENNA shall be capable of accepting software and firmware upgrades. The Wireless Battery-Powered Magnetometer Vehicle Detection System shall provide software operating on conventional notebook/portable PCs or utilize a standard web browser program to support configuration of a SENSOR, to support configuration of an access point, to support configuration of a REPEATER, to store and retrieve detection data.

1.2.11 Certification

- The Contractor SHALL FURNISH, the design details and drawings prior to installation in sufficient detail for complete evaluation and comparison with these Specifications.

1.2.12 Warranty

- Performance shall be warranted for a period of **60 months** of the date of purchase and shall include repair or replacement of any component of the Wireless Vehicle Detection System. Failure due to workmanship, materials, and manufacturing defects shall be warranted for repair or replacement of the first 60 months of the date of purchase. The vendor shall replace any failed components within 30 calendar days of notification.
- During the warranty period, technical support shall be available from the supplier via telephone within 2 business days of the time a call is made by a user, where this support shall be provided by factory-authorized personnel or factory-authorized installers.
- During the warranty period, standard updates to the software shall be available from the supplier without charge.

1.3 Construction

- Install wireless detection system in accordance with manufacturer's instructions.
- Install wireless detectors using coring and fill hole with epoxy to obtain flush mounted installation
- Install overhead receivers/ repeaters to ensure proper communications with detectors
- Coordinate with manufacturer or their representative to ensure proper system installation

1.4 Measurement

Pay Item 677049C, 677049D, 677049E, and 677049F includes furnishing and installing all necessary hardware, software, mounting hardware, equipment, cables, and components required to obtain detection zones complying with this specification and as shown on the plans or listed in the special provisions. Such payment shall be full compensation for installing all equipment, labor, and incidentals necessary to complete the work as specified. The other pay items listed below are specifically for furnishing and installing that item, and include any necessary mounting hardware, cable and other incidental items necessary for installation of that item.

1.5 Payment

677049C	FURNISH WIRELESS DETECTION SYSTEM W/O SENSORS (INC SETBACK DETECTION CAPABILITY FOR 2 DIRECTIONS	EA
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677049D	FURNISH WIRELESS DETECTION SYSTEM W/O SENSORS (INC SETBACK DETECTION CAPABILITY FOR 3 DIRECTIONS	EA
677049E	FURNISH WIRELESS DETECTION SYSTEM W/O SENSORS (INC SETBACK DETECTION CAPABILITY FOR 4 DIRECTIONS	EA
677049F	FURNISH WIRELESS DETECTION SYSTEM W/O SENSORS (w/o SETBACK DETECTION CAPABILITY)	EA
677049G	FURNISH MANUFACTURER TECHNICIAN ASSISTANCE	HR
6770494	FURNISH & INSTALL FLUSH MOUNTED WIRELESS SENSOR INC EPOXY	EA
6887961	INSTALL FLUSH MOUNTED WIRELESS SENSOR	EA
6887962	REMOVE FLUSH MOUNTED WIRELESS SENSOR	EA
6887963	INSTALL SET BACK LOOP EQUIPMENT	EA
6887964	INSTALL CABINET EQUIPMENT	EA

Supplemental Technical Specification for

Electric Service

SCDOT Designation: 680.1

1.1 Description

This work shall consist of furnishing and installing an Electric Service to provide electric power to traffic signals, at locations shown on the Plans, and in accordance with the Standard Drawings and Power Company procedures.

1.2 Materials

- All materials shall be NEC compliant.
- Meter, Meter Box (Pan type), Hub Access.
- Power Connection – Single-phase, 120/240 Volt, 3-Wire, 60-Hertz alternating current supply.
- Cable - 3-Wire (W, BL, RD), THHN/THWN, No.6 AWG
- Disconnect Switch - NEMA Standard Type 3R, weatherproof, Circuit Breaker Type, with a tab for pad-locking the cover closed, 3-Wire Design (2-circuit), with solid neutral. The panel shall be completely enclosed; there shall be no gaps in the panel with the door shut.

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Electric Service.
- Perform all work in accordance with the Plans, the Standard Drawings and the REQUIREMENTS OF THE LOCAL POWER COMPANY. All work shall be in accordance with the National Electric Code (NEC), and applicable local Codes.
- Coordinate with the ENGINEER and the Power Company Representative as necessary to arrange the schedule for power connection.
- The Engineer will provide contact information for the Power Company.
- Make all necessary arrangements with the Power Company to insure having the needed power available at the TIME OF SIGNAL TURN-ON. Immediately report any difficulties in securing the service of the Power Company to the Engineer.
- Coordinate with the Engineer and the Power Company to determine the exact location of the electric service. The Electric Service is generally located as indicated below:
 - a) Overhead service drop to controller pole;
 - b) Overhead service drop to service pole, then underground to controller cabinet (isolated);
 - c) Underground Power Company feed, to service on the back of controller cabinet.
- The CONTRACTOR shall obtain all ELECTRIC PERMITS required; and shall arrange for INSPECTION at completion.
- Use 1-inch diameter SCHEDULE 80 PVC Conduit and Fittings or Rigid Metallic Conduit for the Electric Service; install it to extend from the point of Power Company attachment, through the meter and disconnect assembly, to the controller cabinet, in accordance with 675.1 ELECTRICAL CONDUIT.
- Install a weather head to the above conduit for overhead service connections. Install a strain Clevis, to create a 1 feet minimum drip loop.
- Use rustproof hardware; use stainless steel or galvanized steel parts; use STAINLESS STEEL BANDS for attachment to steel poles.

- Space the bands a maximum of 3 feet and at the top and bottom of the pole.
- When specifically required by the Utility Company or on wood poles, substitute Conduit Clamps/strap, fastened with galvanized screws, for the bands

1.3.2 Meter

- Provide a Meter for the electric service, unless otherwise directed by the Engineer. Provide the necessary hardware accordingly.
- The CONTRACTOR shall furnish and install the METER BOX (PAN), and the HUB.
- Provide power connection that is a SINGLE-PHASE, 120/240 VOLT, 3-WIRE, 60-Hertz alternating current supply.

1.3.3 Disconnect Switch

- Provide disconnect switch that is NEMA STANDARD TYPE 3R, weatherproof. It shall be CIRCUIT BREAKER TYPE, and have a tab for pad-locking the cover closed. It shall be of 3-WIRE DESIGN (2-circuit), with solid neutral.
- The CONTRACTOR shall twist a No. 6 AWG wire through the padlock tab, to prevent unauthorized entry and until SCDOT installs a padlock.

1.3.4 Electric Service

- Provide electrical service with components having the ratings stated in the following table, to provide a maximum of future flexibility and a minimum of voltage-drop to the lamps:

<u>ITEM</u>		<u>USAGE</u>	
		<i>Flashing Beacons</i>	<i>Traffic Signal</i>
Disconnect Breaker			
	Box Rating (for uniformity):	60 AMP	60 AMP
	Circuit Breaker (one side):	20 AMP	50 AMP
Cable			
	3-Wire (W, BL, RD), THHN/THWN	No.6 AWG	No.6 AWG
Conduit			
	Schedule 80 PVC (Wood Poles)	1 inch	1 inch
	Rigid metallic (galvanized or aluminum) for steel or concrete poles	1 inch	1 inch

- Install Electrical Service Cable (Type THHN/THWN, sized per above table, 3-WIRE, (White, Black, red) 600 Volt, Copper only, stranded, with cable lugs) from the point of Power Company attachment to the Meter. From the meter to the cabinet install white, (black or red) and green. Install Electrical Service Cable in separate conduit from all other Electric Cable that connects to signal heads, pedestrian head or detection. At no place shall the service cable be in the same conduit as signal cables or loop lead-ins.

1.3.5 Ground System

- Ensure the resistivity of the electrical system EARTH GROUND shall be 15 OHMS OR LESS, as measured with an appropriate instrument which was calibrated not more than 60 days prior to the date of performing such tests.

- Ensure the poles, ground rods, ground wires, span wires, etc. forming the traffic signal, form a "GROUNDING ELECTRODE SYSTEM" as defined by Article 250 of the NATIONAL ELECTRIC CODE.
- Provide a 16 mm by 5/8 inch by 8 feet (minimum) ground rod, copper-clad, with brass or bronze ground rod clamp. EXOTHERMICALLY WELD the service ground rod; Connect all other ground rods with clamps.
- Provide grounding wire for the service that is No. 6 AWG, Bare, solid or stranded copper wire Exothermically Welded. (Note that this is in addition to the solid grounding wire running down each wooden pole.)

1.4 Measurement

- Complete Electrical Service shall be measured by EACH service installed in place, as shown on the Plans. It shall include all necessary conduit (trenched and/or riser), cable, conduit fittings, hardware, ground rod, banding, clamps, lugs, and all other materials and equipment specified or directed by the ENGINEER or Power Company. (Usually, there shall be no additional measurement of electrical cable used; there shall be no additional measurement of conduit used.) When an "Isolated electric service" is required by the Plans, an item and quantity will have been provided for wooden pole, as required.

1.5 Payment

6800499	FURNISH & INSTALL ELECTRICAL SERVICE FOR TRAFFIC SIGNAL	EA
6800500	MODIFY EXISTING ELECTRICAL SERVICE FOR TRAFFIC SIGNAL	EA

Supplemental Technical Specification for

Splice Box / Junction Box

SCDOT Designation: 680.2

1.1 Description

This work shall consist of furnishing and installing a Splice Box or Junction Box at the locations shown on the Plans in accordance with these specifications and Standard Drawing 675-100-01 Splice Box – Installation Details.

1.2 Materials

Acceptable materials can be found on the current SCDOT Qualified Products List http://info.scdot.org/Construction_D/sitePages/qualifiedProducts3.aspx.

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Electrical Conduit.
- Provide a Splice Box including a Box and Cover, installed over aggregate, in accordance with the Standard Drawings.
- Install the Splice Box for use as a signal cable electrical enclosure.
- Install the Junction Box, where indicated on plans, for use as a loop detector “junction point”. Unless shown mounted on a pole, install the junction box in the dirt, at the depth of the conduit run, and covered with earth.

1.3.2 Splice Box

- Construct the Splice Box in accordance with the Standard Drawings, at locations shown on the Plans.
- Construct the Splice Box such that when the Box and Cover are in place, they are flush with the adjacent pavement, ground, or sidewalk, as shown in the Standard Drawings.
- Place patching Concrete around any Box installed in pavement.
- Place boxes at least 1 foot behind the curb-line or edge of roadway or as shown on the plans.

1.3.3 Placed Before Pouring.

- Where shown on the Plans, place Custom Splice Boxes in roadways or structures, prior to pouring the concrete. Typical usage would be in a bridge deck. Firmly attach the incoming conduit to the bottom reinforcement bar mat, or to the bottom wire-mat, using plastic tie-wraps every 2 feet. CAUTION: COMPLETELY PLUGG/BLOCK/SEAL THE BOTTOM OF THE SPLICE BOX AND THE CONDUIT ENDS TO PREVENT CONCRETE PENETRATION. When used on a bridge, install the Splice Boxes near the center line, and terminate the conduit in Splice Boxes at each end.

1.3.4 Conduit

- Install conduit (in accordance with 675.1 ELECTRICAL CONDUIT) to enter the Box at the bottom and to extend at least 2 inches beyond the inside wall.
- Install conduit to enter from the direction of the run unless otherwise permitted by the ENGINEER.
- Ensure all metallic conduit ends within the Box have grounding bushings with plastic inserts; and ensure they are bonded using #6 AWG bare copper ground wire. Provide end bushings to prevent chaffing in plastic conduits.

- After placing the electrical cable, pack the completed conduit ends with "duct-seal" or other equivalent material to prevent water from entering the conduit. Insert steel wool at conduit ends to prevent rodent/pest intrusion. Cap spare conduit.

1.4 Measurement

- Furnishing and installing Splice Boxes will be measured by EACH Box placed complete, including Box, Cover, aggregate, patching concrete, ground wire, ground bushings, sealing, and all miscellaneous hardware and incidentals required.
- Furnishing and installing Junction Boxes will be measured incidental to the conduit to which it is used with.

1.5 Payment

6800518	FURNISH & INSTALL 13"X24"X18"D.ELEC.FLUSH UNDGRD.ENCLOSURE-(STR.POLY.CONC.) HD	EA
680052C	FURNISH & INSTALL 17"X30"X24"D.ELEC.FLUSH UNDGRD.ENCLOSURE-(STR.POLY.CONC.) HD	EA
6800508	FURNISH & INSTALL 12"X12"X12"D.ELEC.FLUSH UNDGRD.ENCLOSURE-(STR.POLY.CONC.) HD	EA
6888100	INSTALL ELECTRICAL FLUSH UNDERGROUND ENCLOSURE	EA

Supplemental Technical Specification for

Wood Pole / Back Guy Assembly

SCDOT Designation: 682.1

1.1 Description

This work shall consist of furnishing and installing CCA treated Wood Poles and Back-Guy cable assemblies, of the types and sizes shown on the Plans, in accordance with these Specifications, and in close conformity with the lines shown on the Plans and in accordance with the Standard Drawing 682-300-01 Steel Cable – Wood Pole and Span Wire Service Grounding and Bonding. Each wood pole installation shall include all related overhead and underground hardware, and back guy assemblies as provided elsewhere.

1.2 Materials

Furnish a wood pole meeting the following requirements:

- Southern Yellow Pine that is cut, stored, seasoned, and manufactured in accordance with specification ANSI 05, 1-19-79.
- Prohibited defects include:
 - Red heart
 - Shakes in the tops of poles
 - Short crooks
 - Double-sweep
 - Splits or through-checks
 - Nails or spikes
 - Excessive knots
 - Scars deeper than 1 inch or longer than 3 feet
 - Excessive butt-swell
 - More than one twist per pole length
 - Sweep in two planes
- All poles shall be straight to the extent that a line drawn from the center of the butt end, to the center of the tip end shall lie within the middle two-thirds of the body of the pole at all points.
- Poles shall also be free from short crooks, in which the surface deviation from straightness in any 5 feet of length exceeds 1.5 inches at any location, as determined by a straight edge.
- Each pole shall be prepared and pressure-treated in accordance with American Wood Preservers Association (AWPA) Standards C1, C3, C4, and M1. Treatment shall be "SALT TREATED", CCA- CHROMATED COPPER ARSENATE, and shall conform to AWPA Standard P5. The retention of the treatment shall be tested in accordance with AWPA Standard M2. The minimum penetration shall be 3 inches, or 90 percent of the sap-wood. The retention shall be at least 0.60 POUNDS PER CUBIC FOOT, as determined by AWPA Standards.
- Provide Class II pole in the length specified in pay item.

- Each pole shall have a "brand" 12 feet above the butt-end, showing the Manufacturer, Plant-location with month and year of treatment, "Southern Pine CCA", and the Pole Class and Length. A Metal Tag showing Pole Length and Class shall be fixed to the butt-end; and the Length and Class shall be stamped on the top-end.
- Each pole shall have the "Brand Mark" of an inspection-company that has been approved by the Department.

Furnish Back-Guy Assembly as follows:

- From the top-down, a Back-Guy Assembly shall consist of: eye-type thru-bolt, guy-hook, strandvise (or 3-bolt clamp), jumper-bonding clamp, the steel cable (3/8-inch guy-cable stranded), another strandvise (or 3-bolt clamp), and a Screw-type guy anchor.
- All parts shall be as shown on the Installation Details or the Standards. All hardware shall be hot-dip galvanized in accordance with ASTM Standard A-153 to ensure rust proof.
- Acceptable parts are:
 - a) Guy Anchors - One piece screw type guy-anchors, shall conform to EEI-TD-2, 1 inch diameter, 8- FEET LONG, thimble eye type. (Joslyn No. J-6550-WCA or approved equal)
 - b) Guy Guards shall conform to REA Item "AT" yellow plastic (PVC) sunlight resistant, 8 feet long.
 - c) Spool Insulators shall conform to REA Item "CM".
 - d) Insulators shall conform to REA Item "W".
 - e) Machine Bolts shall conform to REA Item "C".
 - f) `J' hooks - Reliable No. 5552 (or approved equal).
 - g) Guy and Messenger Cable Dead Ends - Reliable Universal Strandvise (or approved equal)
 - h) Thimbleye Bolts shall conform to EEI-TD-4.
 - i) Thimble Nuts shall conform to EEI-TDJ-5.
 - j) Washers shall conform to EEI-TDJ-10.
 - k) Angle Thimbleye shall conform to REA Item 5.
 - l) Cable- 3/8 INCH DIAMETER CABLE (682.3 STEEL CABLE)
 - m) Cable Clamps: 3-bolt clamps shall conform to EEI-TDJ-23, (4 inch and 6 inch sizes)
 - n) Clevises shall conform to EEI-TD-20.
 - o) Side-walk Bridge-over shall be a stress supporting spreader-type, bolting to the wood pole.

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Wood Poles and/or Back-Guy Assemblies.

1.3.2 Utility Poles

- Install poles used for joint-use UTILITIES, in accordance with all local codes, and with the requirements of the Utility Company. Provide Cross Arms if required by the Utility Company.

1.3.3 Location

- Install the pole in the general location shown on the Plans.
- Coordinate with the Engineer to stake the field location of the pole, considering the property lines, underground utilities, and overhead clearances (including the guy anchor assembly).
- Engineer will approve staked locations, however contractor is responsible for locating utilities.
- If utility conflicts are discovered, relocate pole in coordination with the Engineer's approval.
- The pole location may have to be moved based on unmarked utilities.

1.3.4 Hole

- Drill a 6-foot DEEP hole, unless indicated otherwise in standard drawings.
- The diameter of the hole shall be larger than the pole by approximately 4 inches all around.
- Ensure the hole is a uniform diameter, and cleanly augured.

1.3.5 Installation

- Install poles to be vertical; if poles are corner signal poles, RAKE the pole away from the strain, 2 to 4 inches per 10 feet length.
- Install back guy assembly in line with the strain of each span wire.
- After installing, back-fill the hole with clean earth or sand (no rocks or debris), placed in 1 foot layers; moisten and compact each layer.
- Remove excess earth from the site; A 2-inch mound around the pole base is acceptable.

1.3.6 Sidewalk

- When installing the pole in a sidewalk, cleanly cut out the sidewalk 6 inches larger than the pole on all sides.
- Install conduit runs in the cut.
- Install as indicated in 1.3.5 Installation, leaving 4 inches for concrete placement.
- Install expansion joint material around the pole and tack in place, after installation of the pole and back filling the hole.
- Pour concrete around the pole to a depth of 4 inches; neatly troweled level. This work is incidental to pole installation.

1.3.7 Grounding

- Ground each pole in accordance with the Standard Drawings.
- Install a No. 6 AWG, SOLID, bare-copper ground wire (ASTM B2) to run the entire length of wooden poles, and extend 6 inches above the top end.
- Securely attach and bond the ground wire to the pole while it is lying on the ground.
- Ensure the ground wire extends 6 inches above the top end with a 2-foot coil (slack) at the top end, and extends down to the bottom with another 2-foot coil on the bottom end.
- Attach the ground wire (and the coils) using galvanized 1-1/2 inch wire staples, on (2 foot) centers above 14 feet, and on 1 foot centers below 14 feet. (The spacing change will be at 8 feet above grade.)
- Provide Ground Rods that are copper-clad, conforming to EEI-TDJ-30, having a minimum size of 5/8 inch by 8 feet in length.
- Use a ground rod clamp that is heavy-duty bronze or brass.
- Provide a GROUND ROD on one wood pole at each intersection, typically on the pole having the electrical service from the Power Company.
- Drive the ground rod vertically into the earth, until it extends about 2 inches above local grade.
- Use a separate No. 6 AWG bare, STRANDED/SOLID copper wire to bond the electrical service and the overhead cable (and pole ground wire) system to the ground rod, using a grounding clamp.

1.3.8 Back- Guy Assembly

- Back Guy each wood pole used to support signal span wires.
- Install Back-Guy Assemblies on wood poles used to support messenger cables especially at turns, and as directed by the ENGINEER.
- Install sufficient numbers of back-guy assemblies to ensure the stability of wood pole installations. This may include:
 - Double-guying
 - Extra-large anchors
 - Re-guying Utility Company poles.
- Install a Back-Guy Assembly:
 - a) Where shown on the plans;
 - b) In conjunction with installation of Steel Cable as span wire;
 - c) In conjunction with the installation of a wooden pole;
 - d) Where required by the Utility Company to "dress" pole to which signal equipment is attached; or,
 - e) At corner/turning wood poles that are used for messenger cable runs.

- A separate pay item is provided for Back Guy installation
- Inform the ENGINEER when additional back guy assemblies are required.
- Ensure the number and size of Back-Guy assemblies is fully sufficient to anchor every wood signal pole, corner messenger cable pole, and Utility Company pole (where required).
- Stage the installation of the wood pole, Back-Guy Assembly, and the span wire, for the safety of the motorist, pedestrian, and signal construction worker.
- Stretch, adjust, and then RE-ADJUST the span wire and Back-Guy Assembly to produce the specified amount of span wire sag, the proper signal head road-clearance, and still create a nearly vertical wood pole.
- Ensure the Back-Guy Assembly is sufficiently strong to handle the pull of all span wires, considering the earth/soil type into which the ground anchor is buried. Provide EXTRA LARGE ANCHORS and/or MULTIPLE-ANCHOR ASSEMBLIES if needed. Use special anchors for solid rock.
- Where a pedestrian sidewalk is adjacent to a wood pole, furnish a sidewalk "bridge-over" assembly.
- Ensure the compass angle of the Back-Guy is reasonably IN LINE with the strain of the overhead cable: that is, in line with each span wire. For corner signal wood poles, install two (2) Back-Guys, installed at right angles to each other. Using a single diagonal Back-Guy is generally unacceptable, unless approved by the ENGINEER.
- Install the Back-Guy (wherever possible) to provide as a minimum: rise=2 / run=1 (i.e. 2/1). For example, if the Back-Guy is attached at 26 feet, the anchor should be at a minimum of 13 feet from the pole. This corresponds to an angle with the earth of about 60 degrees.
- Perform all work within the public Right of Way, and take particular to assure that the Back-Guy does not extend into private property.
- Install the Back-Guy where it will not interfere with traffic, giving particular attention to private driveways. Where damage is likely (e.g. edge of driveway) install a STEEL GUY GUARD to protect the cable. When shown on the Plans, place a CONCRETE TIRE/WHEEL STOP (curb) at the base of the Back-Guy, anchored/pinned with 2 feet pieces of reinforcement bar.
- Do not splice the steel cable used in the Back-Guy assembly.

1.3.9 Inspection

- The ENGINEER will inspect each installation of wood pole, span wire, signal heads, and Back-Guy, for proper clearance, dress, and tension. At the direction of the ENGINEER, the CONTRACTOR shall re-install or replace improper installations, without further compensation.

1.3.10 Acceptance

- Acceptance of each wood pole shall include checking for the pressure-treatment inspection company Brand Mark, plus visual inspection by the ENGINEER.
- The visual inspection shall be made of the pole, overhead cables, grounding, and back guy assembly.
- The complete installation shall be structurally sound, and the final pole placement shall be vertical, or raked as specified.
- Contractor shall replace any poles NOT meeting this inspection, without further cost to the project.

1.4 Measurement

- Furnishing and installing wood poles, will be measured by EACH, of the Size specified, erected in place as shown on the Plans, including grounding, and all miscellaneous hardware and related work activity as required.
- Furnishing and installing Back-Guy Assemblies, will be measured by EACH, erected in place in accordance with the Specifications and as shown on the Plans, including all miscellaneous hardware as required.
- Additional Back-Guy Assemblies that are installed for reason of situations or conditions that arise during construction, will be paid, and shall be measured by EACH.

1.5 Payment

Wood Pole

6825020	FURNISH & INSTALL 35' WOOD POLE - CLASS II - CCA TREATED(0.60)	EA
6825021	FURNISH & INSTALL 40' WOOD POLE - CLASS II - CCA TREATED(0.60)	EA
6825023	FURNISH & INSTALL 50' WOOD POLE - CLASS II - CCA TREATED(0.60)	EA
6825025	FURNISH & INSTALL 60' WOOD POLE - CLASS II - CCA TREATED(0.60)	EA

Back-Guy Assembly

6825045	FURNISH & INSTALL 3/8" BACK GUY FOR WOOD POLE	EA
6825046	FURNISH & INSTALL 3/8" SIDEWALK GUY	EA
6825047	FURNISH & INSTALL 3/8" AERIAL GUY	EA

Supplemental Technical Specification for

Steel Cable

SCDOT Designation: 682.3

1.1 Description

This work shall consist of furnishing and installing splice-free lengths of Steel Cable with cable supports, for mounting signal heads, signs, interconnect runs at locations shown on the Plans and in accordance with the Standard Drawings.

1.2 Materials

Acceptable materials can be found on the current SCDOT Qualified Products List http://info.scdot.org/Construction_D/sitePages/qualifiedProducts3.aspx.

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Steel Cable.

1.3.2 Span Wire

- Install all Span Wire as shown on the plans and in accordance with the Standard Drawings. Note that different methods and materials are required for Wood Poles and Steel Poles.
- Before erecting the Span Wire, the Contractor shall determine the length of cable required to span the distance indicated on the Plans. Allow sufficient additional length to compensate for sag, pole connections, and adjustments, to make the whole assembly consistent with the plans and the Standard Drawings. NO MID-SPAN SPLICES SHALL BE PERMITTED.
- Set the Span Wire so that the height of the installed signal heads, including all hardware, shall conform to the clearances shown on the Standard Drawings.
- Do not permanently "tied-off" the Span Wire until all signal heads, signs, and cables are in place.
- Do not erect any Span Wire which lays on, or is likely to rub a Utility Company's cable. Protect any Span Wire erected within 6 inches of any other cable, wire, or structure with plastic wire-guards.
- When required by the Utility Company, or by the applicable electrical Code, install strain-type fiberglass insulators.
- **Cables from STEEL POLES**
 - a) Steel Poles are essentially electrical conductors.
 - b) Use a Roller Type Pole Clamp attached at the proper height.
 - c) Secure the free-end of the cable with a 6 inch galvanized steel clamp, with 5/8 inch galvanized bolts. Place the clamp approximately 1 foot from the pole. Cable-grips are not permitted.
 - d) Cover the ends of the cable with "servisleaves" to prevent unraveling.
 - e) The SAG shall be 3%, TO 5%, fully loaded.
- **Cables from WOODEN POLES**
 - a) Wooden poles are essentially electrical insulators, and thus require extensive GROUNDING and BONDING procedures, in accordance with the Standard Drawings.
 - b) The SAG shall be typically 5%, fully loaded.
 - c) The height of attachment shall be sufficient to provide the required road-clearance, including sag.
 - d) Shall be installed in accordance with the requirements of the Utility Company.
 - e) May require the installation of a back guy assembly as required in 682.1 WOOD POLE/BACK GUY ASSEMBLY.

f) Shall be electrically bonded.

1.3.3 Messenger Wire

- Where Messenger Wire is attached to traffic signal poles, install it in the same manner as specified for span wire, but with relatively little sag.
- Where Messenger Wire is attached to utility poles, install it in accordance with the UTILITY COMPANY'S SPECIFICATIONS.

1.3.4 Tether Wire

- Where Steel Cable is specified to tether signal heads and/or traffic signs, install it in accordance with the Standard Drawings. Galvanized S-hooks should be used at the pole ends to permit "break-away" action.

1.3.5 Cable Supports

- Use Cable Supports to support electrical cables from span wire and messenger wire. Place Cable Supports at 10 INCH INTERVALS.
- When Aluminum Tie-Wraps are used, install by wrapping 3-full turns TIGHTLY around the bundle formed by the steel cable and all electrical cables then cutting off from the tape coil.

1.4 Measurement

- Measure Steel Cable of the SIZE specified by the LINEAR FEET of material as actually placed, which shall include cable supports, clamps, insulators, and all other miscellaneous hardware and fittings. (or other sizes as shown on the plans), and such payment shall be full compensation for furnishing and placing the cable, support rings, clamps, S-hooks, turnbuckles, and other incidentals required to complete the work as specified.

1.5 Payment

6825092	FURNISH AND INSTALL 3/8" GALVANIZED STEEL CABLE (Span Wire)	LF
6825090	FURNISH AND INSTALL 1/4" GALVANIZED STEEL CABLE (Messenger Wire)	LF

Supplemental Technical Specification for

Pedestrian Pole and Base

SCDOT Designation: 682.4

1.1 Description

This work shall consist of furnishing and installing a Pedestrian Pedestal Pole and Base in accordance with these Specifications and the Standard Drawing 686-300-01 Pedestrian Treatments – Pedestrian Head/Button Mounting Types and Foundations.

1.2 Materials

Acceptable materials can be found on the current SCDOT Qualified Products List http://info.scdot.org/Construction_D/sitePages/qualifiedProducts3.aspx.

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Pedestrian Pole and Base.
- Install Pedestrian Pedestal Poles where shown on the Plans and as needed to accommodate pedestrian movements.
- Mount Pedestrian Pedestal Poles so that no portion of the assembly (including the pedestrian head) is closer than 24" inches to the face of the curb.
- Powder-coating may be required if pay item is provided or if specified in the special provisions or on the signal plans. Perform the powder-coating over the aluminum poles at the factory or during the manufacturing process.

1.3.2 Installation

- Construct the foundation to the dimensions shown on Standard Drawings.
- Capp two 1- inch conduit elbows at both ends and secured in place in the excavation before pouring any concrete. The size and number of elbows shall be that necessary to mate with the incoming runs.
- Ensure all conduit elbows shall extend beyond the side of the finished foundation by approximately twelve inches, in the direction of, and at a depth matching the incoming conduit.
- Set 4 Anchor Bolts using pre-formed templates (wood or metal), to provide a "bolt-circle" in accordance with the Dimension Chart, or with recommendations of the base manufacturer. Leave the templates in place for two days (48 hours) or until the forms are removed.
- Mix, place and test concrete in accordance with applicable portions of SCDOT STANDARD SPECIFICATIONS Sections 701, 702, 703, and 704.
- Fasten the pedestrian pole base to the concrete foundation using appropriate hardware.
- Erect and tightly screw the aluminum pole into the base.
- Tighten the setscrew to prevent counter rotation of the aluminum pole.

1.4 Measurement

- Furnishing and installing pay items include pedestrian pedestal pole, base, and foundation installation by EACH including all required incidental hardware and work to install.

1.5 Payment

6825480	FURNISH & INSTALL 4' BREAK-AWAY ALUMINUM PEDESTAL POLE AND BASE	EA
6825482	FURNISH & INSTALL 8' BREAK-AWAY ALUMINUM PEDESTAL POLE AND BASE	EA
6825484	FURNISH AND INSTALL 10' BREAK-AWAY ALUMINUM PEDESTAL POLE AND BASE	EA

Powder-coating Option:

6888192	POWDERCOATING OPTION FOR 4' ALUMINUM PEDESTAL POLE	EA
6888193	POWDERCOATING OPTION FOR 8' ALUMINUM PEDESTAL POLE	EA
6888194	POWDERCOATING OPTION FOR 10' ALUMINUM PEDESTAL POLE	EA

Foundation Only:

Only for use where pedestrian pole and base is provided by others.

6825486	INSTALL CONCRETE FOUNDATION FOR ALUMINUM PEDESTAL POLE	EA
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Supplemental Technical Specification for

Battery Backup System

SCDOT Designation: 684.1

1.1 Description

This work shall consist of installing and/or furnishing Battery Back-Up Systems for installation at traffic signals in accordance with these Specifications, at the locations shown on the Plans, and in accordance with manufacturers specification and Standard Drawings. This item shall include all electrical accessories and other items specified.

1.2 Materials

Acceptable materials shall meet Material Specification M684.1 Battery Back-up System, http://www.scdot.org/doing/technicalPDFs/publicationsManuals/trafficEngineering/TrafficSignal_MaterialSpecs.pdf.

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Battery Back-Up System.
- The Contractor shall furnish the Engineer with any warranties on materials that are provided by the Manufacturer or Vendor as normal trade practice or the match warranty on existing state contract items.

1.3.2 Cabinet/ Foundation

Install cabinet enclosure in accordance with manufacturers specifications and instructions, including any foundation or mounting assemblies.

1.3.3 Battery Back-up System

Install Battery Back-Up System in accordance with manufacturers' specifications and instructions, to operate traffic signal during power outages or at specified times. Contractor shall test Battery Back-up System for SCDOT approval prior to payment.

1.4 Measurement

- Battery Back-up System will be measured by EACH including all equipment, cables, conduit, cabinet enclosures and foundations/mounting elements, and batteries.

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1.5 Payment

6845518	FURNISH & INSTALL BATTERY BACK-UP SYSTEM, INCLUDING FOUNDATION	EA
6888243	INSTALL BATTERY BACK-UP SYSTEM, INCLUDING FOUNDATION	EA

Supplemental Technical Specification for

Signal Heads

SCDOT Designation: 686.1

1.1 Description

This work shall consist of furnishing and installing Signal Heads, LED Modules or Backplates of the types, sizes, and mounting specified, in accordance with these Specifications, the plans and in accordance with the Standard Drawings (686-000-01, 686-100-01, 686-100-02, 686-100-03, and 686-100-05).

1.2 Materials

Acceptable materials can be found on the current SCDOT Qualified Products List http://info.scdot.org/Construction_D/sitePages/qualifiedProducts3.aspx.

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Signal Heads.
- The Contractor shall furnish the ENGINEER with any warranties on materials provided by the Manufacturer or Vendor as normal trade practice, including a minimum 5-year warranty for the LED modules.
- In addition, the Contractor shall provide a EIGHTEEN (18) MONTHS workmanship warranty following the FINAL ACCEPTANCE. If any signal head fails by reason of defective material or workmanship, including cracking, falling, peeling or fading, the Contractor shall furnish and install replacement signal heads at no expense to the Department.
- Signal LED modules shall have the incandescent look. Pixelated LED modules shall be supplied as replacement modules only as directed by the ENGINEER.
- The red section in the five section head shall be powder coated.
- Provide fully assembled Signal Heads with LED Modules and the appropriate mounting hardware
- Install Signal Heads where shown on the plans and positioned in accordance with the Standard Drawings.
- Ensure the top section of all vehicle signal heads mounted on the same pole or pedestal is within 6 inches of being the same height unless otherwise specified.
- Install all multi-section/ combination signal heads with their top sections at the same elevation as other signal heads.

1.3.2 Wiring

- Connect electrical cable to the terminals in each signal head to provide the proper display indication.
- Do not externally splice the cable.
- Run electrical cable in accordance with the Standard Drawings.

1.3.3 Mounting

- Provide mounting hardware that is from one manufacturer. The DEPARTMENT will not accept mix-matched mounting assembly parts.
- Tighten mounting assembly to manufacturer standards prior to installing.
- If overhead adjustments are required for aiming, contractor shall field tighten using spanner wrench; Contractor shall ensure that signal heads are securely mounted on span wire or mast arms.

- Mount all traffic signal heads as shown on the plans and in accordance with the Standard Drawings.
- Aim signal faces to ensure good visibility, and to the satisfaction of the ENGINEER.

1.3.4 Signal Backplate

- Fasten Signal Backplates using appropriate hardware recommended by the signal head manufacturer.
- Provide a Signal Backplate that matches signal head without cutting, bending, or breaking. Drilling holes to match screw patterns is acceptable.
- Provide a Signal Backplate in accordance with Standard Drawing.

1.4 Measurement

- The pay items for furnish and install Signal Heads will be measured using the EACH unit and includes furnishing and installing Signal Heads with LED modules as specified on the plans and including ALL mounting hardware, internal electrical connections and ALL required incidental hardware.

1.5 Payment

6865710	Furnish and Install 12" 5 Section Signal Head	EA
6865720	Furnish and Install 12" 4 Section Signal Head	EA
6865723	Furnish and Install 12" 3 Section Signal Head	EA
6865834	FURNISH & INSTALL BACKPLATE W/ RETROREFL.BORDERS FOR TRAFFIC SIGNAL	EA

Supplemental Technical Specification for

Pedestrian Signal Head

SCDOT Designation: 686.3

1.1 Description

This work shall consist of furnishing and installing Pedestrian Signal Heads, Pedestrian LED Modules of the types, sizes, and mounting specified, in accordance with these Specifications, the plans and in accordance with the Standard Drawings. (675-105-02, 675-105-03, 675-110-00).

1.2 Materials

Acceptable materials can be found on the current SCDOT Qualified Products List http://info.scdot.org/Construction_D/sitePages/qualifiedProducts3.aspx.

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Pedestrian Signal Heads.
- The Contractor shall furnish the ENGINEER with any warranties on materials provided by the Manufacturer or Vendor as normal trade practice, including a minimum 5-year warranty for the LED modules.
- In addition, the Contractor shall provide a EIGHTEEN (18) MONTHS workmanship warranty following the FINAL ACCEPTANCE. If any pedestrian signal head fails by reason of defective material or workmanship, including cracking, falling, peeling or fading, the Contractor shall furnish and install replacement pedestrian signal heads at no expense to the Department.
- Pedestrian Signal LED modules shall have the incandescent look. Supply pixelated LED modules as replacement modules only as directed by the ENGINEER.
- The pedestrian head and the mounting hardware are stated as one item.
- Install pedestrian signal heads where shown on the Plans or as needed to accommodate pedestrian movements.
- If multiple Pedestrian Signal Heads are required on the same pole or pedestal, mount within 6 INCHES of being the same height unless otherwise specified on the Plans.
- Mount Pedestrian Signal Heads so that no portion of the assembly is closer than 24 INCHES to the face of the curb.
- Mount Pedestrian Signal Heads to provide a clearance of 9 to 10 feet from the surface grade.

1.3.2 Wiring

- Connect electrical cable to the terminals in each Pedestrian Signal Head to provide the proper display indication when energized by the signal controller.
- Do not externally splice the cable.
- Run electrical cable in accordance with the Standard Drawings.

1.3.3 Mounting

- Use non-corrosive material in all hardware.
- Use FEDERAL YELLOW painted brackets, arms, and other hardware, unless noted otherwise in the plans or special provisions.
- Mount all pedestrian signal heads as shown on the Plans and Standard Drawings.

- See Standard Drawings for mounting information on Clamshell Mount, Side of Pole Mount, Single Post Top Mount, and Dual Post Top Mount.

1.4 Measurement

- The pay items for furnish and install Pedestrian Signal Heads will be measured using the EACH unit and includes furnishing and installing Pedestrian Signal Heads with LED modules as specified on the plans and including ALL mounting hardware, internal electrical connections and ALL required incidental hardware.
- There are separate pay items for furnishing and installing Pedestrian LED modules in existing pedestrian signal heads using the EACH unit.

1.5 Payment

6865782	FURNISH & INSTALL PEDESTRIAN SIGNAL HEAD	EA
6865783	FURNISH & INSTALL COUNTDOWN PEDESTRIAN SIGNAL HEAD	EA

Supplemental Technical Specification for

Pedestrian Push Button Station Assembly with Sign

SCDOT Designation: 686.4

1.1 Description

This work shall consist of furnishing and installing a PEDESTRIAN PUSH BUTTON STATION ASSEMBLY AND PUSH BUTTON SIGN, of the types, sizes, and mountings specified in accordance with these Specifications, at locations shown on the Plans and in accordance with the Standard Drawings.

1.2 Materials

Acceptable materials can be found on the current SCDOT Qualified Products List http://info.scdot.org/Construction_D/sitePages/qualifiedProducts3.aspx.

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Pedestrian Push Button Assembly.
- The Contractor shall furnish the ENGINEER with any warranties on materials that are provided by the Manufacturer or Vendor as normal trade practice.
- Install Push Button Station Assemblies where shown on the Plans, or as necessary to accommodate pedestrian movements.

1.3.2 Installation

- Install Push Button Station Assemblies on poles in a height of 3-1/2 to 4 feet ABOVE GRADE.
- Orient and wire the Push Button Station Assembly in such a manner to clearly indicate to the pedestrian, the crosswalk with which it is associated.
- Attach Push Button Station Assemblies to poles using 1 inch stainless steel bands or galvanized screwed directly to pole.
- If dual push button station assemblies are required, a single dual mounting bracket shall be used to allow for two push button station assemblies to be mounted with the buttons positioned below the sign.
- Firmly secure the finished assembly to the pole.
- Connect each Push Button Station Assembly with the appropriate electrical cable, and wire to actuate the proper phase of the controller. The necessary cable is specified as a separate item, in accordance with 677.1 ELECTRICAL CABLE.
- Do not splice the cable.
On metal poles, bring the cable for the push buttons through the rear of the assembly directly into the pole or controller cabinet. On wooden poles, use electrical conduit to bring the cable to the assembly.

1.3.3 Push Button Signs

- Install each push button sign on the station assembly to reflect the proper intention of the pedestrian movement.

1.4 Measurement

- The pay items for furnish and install Push Button Station Assembly with Sign will be measured using the EACH unit and includes furnishing and installing the Push Button, Push Button

Assembly and Sign as specified on the plans and including ALL mounting hardware, internal electrical connections and ALL required incidental hardware.

1.5 Payment

6865793	FURNISH & INSTALL PEDESTRIAN PUSH BUTTON MICROSWITCH TYPE STATION ASSEMBLY (9"x12") AND SIGN (R-10-3E)	EA
6865794	FURNISH & INSTALL PEDESTRIAN PUSH BUTTON MICROSWITCH TYPE STATION ASSEMBLY (9"x15") AND SIGN (R-10-3E)	EA
6865796	FURNISH & INSTALL PEDESTRIAN PUSH BUTTON SOLID STATE WITH LIGHT AND TONE STATION ASSEMBLY (9"x12") AND SIGN (R-10-3E)	EA
6865797	FURNISH & INSTALL PEDESTRIAN PUSH BUTTON SOLID STATE WITH LIGHT AND TONE STATION ASSEMBLY (9"x15") AND SIGN (R-10-3E)	EA
6865798	FURNISH & INSTALL PEDESTRIAN PUSH BUTTON SOLID STATE WITH LIGHT AND TONE	EA

Supplemental Technical Specification for

LED Blankout Sign

SCDOT Designation: 686.5

1.1 Description

This work shall consist of furnishing and installing a LED Blankout Sign of Clam-Shell configuration, with Sun Visor and designated mounting hardware. of the types, sizes, and mounting specified, in accordance with these Specifications, the plans and in accordance with the Standard Drawings.

1.2 Materials

Acceptable materials can be found on the current SCDOT Qualified Products List http://info.scdot.org/Construction_D/sitePages/qualifiedProducts3.aspx.

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to LED Blankout Sign.
- The Contractor shall furnish the ENGINEER with any warranties on materials that are provided by the Manufacturer or Vendor as normal trade practice.
- The Blankout Sign and the mounting hardware are stated as one item.
- Install the Blankout Signs where shown on the Plans, positioned according to the Standard Drawings.
- Hang Blankout Sign to ensure good visibility, to the satisfaction of the Engineer.

1.3.2 Wiring

- Connect electrical cable to the terminals in each Blankout sign to provide the proper display indication.
- Do not externally splice the cable.
- Run electrical cable in accordance with the Standard Drawings.
- Electrical cable shall be splice-free lengths of, NO. 14 COPPER WIRE, 4 CONDUCTOR, BLACK, see 677.1 Electric Cable

1.3.3 Mounting

- Use hardware that is non-corrosive material, or chemically compatible with the item being used.
- Use adjustable signal brackets to rigidly mount Blankout Signs.
- Use brackets and suspensions that are painted Federal YELLOW unless directed otherwise by the Engineer (Except mast arm mounts).
- Mount all Blankout Signs as shown on the Standards Drawings.

1.4 Measurement

- The pay items for furnish and install Blankout Signs will be measured using the EACH unit and includes furnishing and installing Blankout Sign housing, with appropriate LED module as specified on the plans and including ALL mounting hardware, internal electrical connections and ALL required incidental hardware.

- There are separate pay items for furnishing and installing Blankout LED modules in existing Blankout sign housing using the EACH unit and includes weather tight neoprene gasket and any other hardware or material necessary to complete installation.

1.5 Payment

6865820	FURNISH & INSTALL NO RIGHT/LEFT TURN SYMBOLIC LED BLANKOUT SIGN W/ SPAN WIRE MOUNTING	EA
6865821	FURNISH & INSTALL NO RIGHT/LEFT TURN SYMBOLIC LED MODULE	EA

Supplemental Technical Specification for

Removal Salvage and Disposal of Equipment and Materials

SCDOT Designation: 688.1

1.1 Description

This work consists of the removal and salvage or removal and disposal of equipment, materials or refuse that are not designated or permitted to remain. The engineer will instruct the contractor of what equipment or materials will be salvaged and where the contractor should deliver salvaged equipment/materials. The engineer will instruct the contractor of what equipment, materials and refuse to be disposed of. Contractor will dispose of these items in a manner that complies with all state and federal regulations governing disposal.

1.2 Materials

n/a

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Removal, Salvage and Disposal of Equipment and Materials.
- Carefully remove the items to be salvaged from the job site and return to the Department. The Contractor shall deliver, and obtain a RECEIPT for, the salvaged equipment, to one of the SCDOT District Signal Shops or one of the Local Government Signal Shops ([see link](#))
- Remove equipment or material to be Disposed and properly dispose at an APPROVED LAND FILL (or material reclamation yard). Any materials designated as HAZARDOUS WASTE shall be disposed in accordance with regulations enforced by the SC Department of Health and Environmental Control (DHEC).
- Any equipment or material to be Disposed shall not be re-sold by contractor as anything other than scrap material.
- Fill every hole caused by removing old equipment on THE SAME DAY. Back-fill, compact, and reseed/sod, to the satisfaction of the ENGINEER. Cleanly side-trim holes in PAVEMENT then bring to grade and finish with the same paving material as the adjacent pavement. Completely replace sidewalk "squares" (complete square), using forms and expansion material.
- Underground conduit and detector loops not utilized, shall be abandoned in place.
- FINAL ACCEPTANCE and Final Payment will be withheld, if the Contractor has not removed unneeded equipment from the job site, and if the Contractor cannot present RECEIPTS from SCDOT or Local Government showing that the salvaged equipment has been delivered to SCDOT.

1.3.2 Items that are generally Removed and Disposed of:

1.3.2.1 Concrete foundations

- Remove the foundations of ground-mounted cabinets completely. The Engineer may direct the contractor to clear the foundation to a minimum depth of 18 inches below surface grade.
- Remove the foundations of signal support poles completely. The Engineer may direct the contractor to clear the foundation to a minimum depth of 18 inches below surface grade.

1.3.2.2 Damaged Equipment

- Remove and Dispose any signal equipment/material that is deemed by the Engineer as damaged beyond salvaging.

1.3.2.3 Miscellaneous Equipment

- Remove minor equipment from the site and dispose.
- This includes steel cable, electrical cable, conduit, concrete pads, back guys and pullboxes / handboxes not utilized in the new signalization.

1.3.3 Items that are determined whether to Salvage or Disposed of in the field by the Engineer

1.3.3.1 Wood Poles

- Remove Wood Poles that are not utilized in the new signalization and are not required by other utilities
- The ENGINEER shall make the determination whether each wooden pole shall be salvaged or disposed.
- If wood pole is to be salvaged, tag it with information concerning what location it was removed from.

Items that are generally Removed and Salvaged

1.3.3.2 Cabinet Assembly

- Prior to removal, clearly tag every cabinet, controller, conflict monitor, and any other major cabinet equipment item with the intersection name from which it is being removed. (*Fiber interconnect center, video detection cabinet equipment, Ethernet switch, fiber modem, radio cabinet equipment*)
- Record serial numbers for each cabinet, controller, and conflict monitor serial numbers and transmit to the Department.

1.3.3.3 Signal Heads

- Prior to removal, clearly tag each signal head with the intersection name from which it is being removed.
- Carefully dismounted signal heads keeping as much of the mounting hardware intact as possible.
- During the removal and delivery, take special care to prevent damage to the lenses and visors.

1.3.3.4 Pedestrian Equipment

- Prior to removal, clearly tag each pedestrian head, pedestrian pole and pedestrian button assembly with the intersection name from which it is being removed.
- Carefully dismount pedestrian heads and button assemblies keeping as much of the mounting hardware intact as possible.
- Ensure removal of pedestal pole includes related hardware (nuts, base).
- During the removal and delivery, take special care to prevent damage to the lenses and visors.

1.3.3.5 Metal Poles

- Prior to removal, clearly tag each steel strain pole with the intersection name from which it is being removed.
- Ensure removal of strain poles includes their related hardware (pole caps, bolt covers, hand hole covers, nuts, transformer bases, etc.).
- Bag related hardware and attach to steel strain pole and pedestrian pole to ensure materials remain together.

1.3.3.6 Splice Boxes

- Prior to removal, clearly tag each splice box with the intersection name from which it is being removed.

1.3.3.7 Signs

- Remove and salvage highway signs on existing span wires after the replacement signs have been installed

1.4 Measurement

This item shall be paid as a lump sum per contract or as an each, which relates to remove, salvage, disposal items per signal. The lump sum pay item includes all signals named in the contract. Costs relating to transportation, disposal, pavement and grading repairs should be included in pay item. The cost for removing foundations for steel strain poles is either provided as lump sum (which is all removals needed per contract) or each, which is all removals needed per steel strain pole foundation removal. The related costs of transportation, disposal, concrete, pavement repair, etc., will not be measured for payment, but shall be included in the bid price of Removal, Salvage, and Disposal.

1.5 Payment

6885990	REMOVAL, SALVAGE,& DISP.OF EXISTING TRAF. SIGNAL EQUIPMENT	LS
6885991	REMOVAL, SALVAGE,& DISP.OF EXISTING TRAF. SIGNAL EQUIPMENT	EA

6885982	REMOVE FOUNDATION OF STEEL STRAIN POLE - 18" BELOW GRADE	LS
6887941	REMOVE FOUNDATION OF STEEL STRAIN POLE - 18" BELOW GRADE	EA

Supplemental Technical Specification for

Temporary Adjustment of Traffic Signal Equipment and Timings

SCDOT Designation: 688.2

1.1 Description

1.1.1 General

This work consists of the Temporary Adjustment of traffic control signal equipment and materials during the construction of the project. This item has been established to cover the equipment, materials, and labor that may be required to temporarily adjust the physical location of traffic signal features, such as poles, controller, steel cable, electrical cable, signal heads, detection, etc. This item is also used to cover the installation and removal of a TEMPORARY CONSTRUCTION SIGNAL.

Temporary Adjustment may be necessary at all signalized intersections within the limits of the construction project. After all Temporary Adjustments have been made and after the road construction has been completed, the final result shall be the traffic signals shown in the Plans.

The amount of work required by this item will vary greatly between projects. The Contractor should carefully study the Plans and Specifications to understand the work required.

1.1.2 Continuity of Signal Operation

The Maintenance of Traffic (as provided in the Traffic Control Plan), and the SAFETY OF TRAFFIC is of prime importance. Safety will be enhanced by providing for the continuous operation of traffic signals. Full Continuity of Operation shall be maintained by the CONTRACTOR and temporary signal devices shall be in place prior to construction activities that will affect signal operation. Damage to or failure of the existing traffic detection during the project shall be repaired by the CONTRACTOR, in accordance with Table 1.

Signals shall NOT be arbitrarily turned off for the convenience of the CONTRACTOR. When the Department gives permission to briefly turn off a signal, complete intersection control using a flagger and/or Police to direct traffic shall be provided.

Any damage to or failure of the detection of High Priority intersections shall require the contractor to be onsite and ACTIVELY repairing or replacing the detection with temporary detection within THIRTY-SIX (36) HOURS. The CONTRACTOR shall provide temporary detection equipment until the final detection is installed and operational. Upon installation of the final detection equipment, the CONTRACTOR shall remove the temporary detection equipment. If the temporary detection equipment will be used as the permanent detection equipment in the final configuration, payment will be made for both TEMPORARY

ADJUSTMENT OF TRAFFIC SIGNAL EQUIPMENT and the applicable permanent detection pay items.

Traffic Adaptive and Traffic Responsive signal systems shall maintain detection for the life of the project. Any damage to or failure of the detection of these systems shall require the contractor to be onsite and ACTIVELY repairing or replacing the detection with temporary detection within FOUR (4) HOURS. At traffic signals using wireless detection, which could be damaged by the project, the CONTRACTOR shall remove the roadway sensors and install temporary detection prior to construction activities. The CONTRACTOR shall ensure the roadway sensors for the wireless detection is replaced in the specific lane and location for which it is coded.

The table below details the requirements for all signalized intersections and the associated liquidated damages for failure to re-establish detection.

Table 1:

Intersection Type (as identified in Plans or Special Provisions)	Contractor Onsite and Actively Re-establishing Detection	Temporary Adjustment Pay Item	Permanent Detection Pay Item	Liquidated Damages for Failure to Perform / Maintain Detection
Adaptive/Responsive	4 hours	6885993	Per Contract	\$1500 per Intersection per day
High Priority	36 hours	6885993	Per Contract	\$1500 per Intersection per day
All others	14 days	1071000	Per Contract	\$1500 per Intersection per day

The CONTRACTOR shall coordinate installation and removal of temporary detection equipment with the Department's designated signal inspectors.

Unless noted otherwise on the Plans or stated in the Special Provisions, it is not permissible to adopt "uncoordinated" operation of adjacent signals. Damage to the interconnection cable between adjacent signals shall be repaired immediately by the CONTRACTOR, at no cost to the Department

When necessary the District Traffic ENGINEER should be requested to provide temporary controller timing settings. These temporary time settings may occur throughout the project life and therefore the contract will be paid for each site visit as necessary by bid item: **TEMPORARY TIMING ADJUSTMENT PER SITE VISIT**. This work shall include all intersections needing timing adjustments per site visit. Site shall be defined as project limits.

Temporary Signals shall be fully reliable, fully functional, and of professional appearance. This includes placing the signal heads at the proper HEIGHT above the road, correctly ALLIGNING the signal heads with the lanes of traffic, and placing the signal heads at the proper DISTANCE from the stop line (see SCDOT Standard Drawings). The installation of a temporary Controller shall include transferring operation while simultaneously turning off the old controller

1.1.3 Coordination of Work

The CONTRACTOR is advised to completely coordinate work between sub-

contractors and to carefully stage the project to minimize the work required by this item.

1.1.4 Final Configuration

Signal equipment that has been relocated or adjusted shall be considered as "temporary". The CONTRACTOR shall plan and stage the work so that the end result is a traffic signal installation conforming to the plans and using all NEW equipment.

1.1.5 Operation, Maintenance and Emergency Service (as indicated in 675 General Provisions)

There is no separate pay item for Operation, Maintenance and Emergency Service. However, it is required as part of the contract for projects that involve signal construction or operations.

1.1.6 Specific Items

1.1.6.1 Possession

All TEMPORARY signal heads, signs, detection, and poles shall revert to the CONTRACTOR at the end of the Project. All temporary NEW Controllers and Cabinets shall revert to the Department or to the Jurisdiction at the end of the project.

1.1.6.2 Signal Heads

Signal heads not in use shall be covered with a burlap bag. Signal heads shall be shifted side-to-side to be over traffic lanes as they are opened or closed to traffic.

1.1.6.3 Poles

The location of temporary and final signal poles shall be approved by the Department.

1.1.6.4 Joint Use Poles

Poles used for traffic signals are often owned and used by other overhead cable utility companies. Full coordination and cooperation with those utilities shall be maintained when staging the signal work. The CONTRACTOR shall furnish the temporary and final poles as necessary for Continuity of Operation. Back Guys shall be provided for wood poles to sufficiently keep the pole vertical.

1.1.6.5 Temporary Detection

Temporary Detection may include microwave, infrared, sonic, magnetometers, video, or inductance loops. The equipment shall be installed per the manufacturer's specifications. Temporary detection equipment shall be compatible with the traffic signal equipment, but shall not reside on the SCDOT network.

1.1.6.6 Detector Loops

Final Detector Loops shall only be installed after completion of all work activities which might damage the inductance loops.

1.1.6.7 Miscellaneous Equipment

Minor equipment may be RE-USED in temporary adjusted configurations, but not in the final configuration. This includes steel cable, electrical cable, conduit, pedestrian buttons and signs, temporary detection, and spliceboxes/pullboxes/handboxes not utilized in the new signalization. The CONTRACTOR shall furnish sufficient steel cable and electrical cable to provide Continuity of Operation.

1.1.6.8 Signs

Highway signs on existing steel cable (span wires), shall be transferred to the adjusted spans, and placed in the same physical alignment. The Contract will usually specify new signs for the final configuration. (Ground mounted signs are covered in Section 107.11 of the STANDARD SPECIFICATIONS.)

1.1.6.9 Electric Service

The CONTRACTOR shall install temporary electric service(s) as necessary to operate the signal(s). Coordination with the local power company and with the Department is the responsibility of the CONTRACTOR, as well as, all permits and licenses.

1.1.6.10 Communication Service

The CONTRACTOR shall maintain communication service(s) as necessary to operate the signal(s). Communications between the signal(s) and the SCDOT NETWORK in accordance with ITS standards shall be kept at all times.

1.2 Measurement

Temporary Adjustment of Traffic Signal Equipment will be measured as EACH, one per intersection for the life of the project. This includes adjustment of traffic signal equipment (signal heads, overhead signs, span wire, etc.), and installation of temporary signal equipment (signal heads, detection, poles, etc.) impacted or necessitated by Construction Operations, as often as necessary.

Temporary Timing Adjustments will be measured as EACH. This work shall include all intersections needing timing adjustments per site visit which signal timings are properly adjusted as directed. Site shall be defined as project limits.

The CONTRACTOR shall provide all signal materials and related equipment to adjust these features as often as necessary during the course of the project.

1.3 Payment

Temporary Adjustment of traffic signals shall be paid at the line item Contract price. The line item includes the Installation AND Removal of all temporary traffic signal equipment:

6885993	TEMPORARY ADJUSTMENT OF TRAFFIC SIGNAL EQUIPMENT	EA
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Temporary Timing Adjustment of traffic signals shall be paid at the line item Contract price:

6885996	TEMPORARY TIMING ADJUSTMENTS PER SITE VISIT	EA
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Pay Item Notes

This specification is not limited to these pay items. Other pay items may be applicable.

Supplemental Technical Specification for

Video Detection System

SCDOT Designation: 688.3

1.6 Description

This work consists of furnishing and installing video detection systems with all necessary hardware and software in accordance with the plans and Standard Drawings.

1.7 Materials

Acceptable materials can be found on the current SCDOT Qualified Products List http://info.scdot.org/Construction_D/sitePages/qualifiedProducts3.aspx.

1.8 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Video Detection System.
- The Contractor shall furnish the ENGINEER with any warranties on materials that are provided by the Manufacturer or Vendor as normal trade practice.
- Arrange and conduct site surveys with SCDOT personnel to determine proper camera sensor unit selection and placement.
- Provide SCDOT at least 3 working days notice before conducting site surveys.
- Upon completion of the site surveys, provide SCDOT with revised plans reflecting the findings of the site survey.
- As determined during the site survey, install sensor junction boxes with nominal 6 x 10 x 6 inches dimensions at each sensor location. Provide terminal blocks and tie points for power cable
- Place into operation loop emulator detection systems. Configure loop emulator detection systems to achieve required detection in designated zones. Have a certified manufacturer's representative on site to supervise and assist with installation, set up, and testing of the system.
- Perform modifications to camera sensor unit for gain, sensitivity, and iris limits necessary to complete the installation.
- Do not install camera sensor units on signal poles unless approved by the ENGINEER
- Install a power cable appropriately sized to meet the power requirements of the sensors. At a minimum, provide three conductor 120 VAC field power cable.
- Install the necessary cables from each sensor to the signal controller cabinet along signal cabling routes.
- Install surge protection where coaxial video cables and other cables are required between the camera sensor and other components located in the controller cabinet. Terminate all cable conductors.
- Relocate camera sensor units and reconfigure detection zones as necessary according to the plans for construction phases.

1.9 Measurement

- Furnishing and Install Video Detection System shall be measured as EACH unit and shall include one camera, the cabinet equipment, and all mounting hardware and necessary cable to connect camera to cabinet equipment.
- Furnish and Install Add'l Camera with Hardware & Lead In shall be measured as EACH unit and includes furnishing and installing 1 camera and all mounting hardware and necessary cables to connect to cabinet equipment.

1.10 Payment

6886039	FURNISH & INSTALL VIDEO DETECTION CAMERA MOUNTING HARDWARE	EA
6886040	FURNISH & INSTALL VIDEO DETECTION SYSTEM W/HARDWARE & LEAD-IN	EA
6886041	INSTALL VIDEO DETECTION SYSTEM	EA
6886042	FURNISH & INSTALL VIDEO DETECTION CAMERA W/ HARDWARE & LEAD-IN	EA

Supplemental Technical Specification for

Radar Detection System

SCDOT Designation: 688.4

1.1 Description

1.1.1 General

This work shall consist of furnishing and/or installing a Radar Detection System (RDS) to detect vehicles on a roadway by transmitting electromagnetic radar signals through the air. The signals bounce off vehicles in their paths and part of the signal is returned to the Radar Detection System. The returned signals are then processed to determine traffic parameters. A Radar Detection System (RDS) shall interface with a 170 Traffic Signal Controller cabinet/ 2070 Controller. The system shall be installed per the manufacturers recommended installation requirements.

The Radar Presence Detector (RDS) system will include the following equipment:

- Radar Units (Stop bar radar, Set back radar, Speed/volume side-fire radar)
 - Sensor Outputs
 - Enclosure
- Radar Cabinet Interface
 - System Hardware
 - Interface panel
 - Contact closure input file cards
 - Communication ports
 - Software
- Sensor Cable

1.1.2 Maintenance

- The RDS shall not require cleaning or adjustment to maintain performance.
- The RDS shall not rely on battery backup to store configuration information, thus eliminating any need for battery replacement. Once the RDS is calibrated, it shall not require recalibration to maintain performance unless the roadway configuration changes. The mean time between failures shall be 10 years.

1.1.3 Operating Conditions

- The RDS shall maintain accurate performance in all weather conditions, including rain, freezing rain, snow, wind, dust, fog and changes in temperature and light, including direct light on sensor at dawn and dusk.
- RDS operation shall continue in rain up to 1 in. (2.5 cm) per hour.
- The RDS shall be capable of continuous operation over an ambient temperature range of -40°F to 165.2°F (-40°C to 74°C). The RDS shall be capable of continuous operation over a relative humidity range of 5% to 95% (non-condensing).

1.1.4 Manufacturing

- The RDS shall be manufactured and assembled in the USA.
- The internal electronics of the RDS shall utilize automation for surface mount assembly, and shall comply with the requirements set forth in IPC-A-610C Class 2, Acceptability of Electronic Assemblies.

- The RDS shall undergo a rigorous sequence of operational testing to ensure product functionality and reliability. Testing shall include the following:
 - Functionality testing of all internal sub-assemblies
 - Unit level burn-in testing of 48 hours' duration or greater
 - Final unit functionality testing prior to shipment
- Test results and all associated data for the above testing shall be provided for each purchased RDS by serial number, upon request.

1.1.5 Certification

- Each RDS shall be certified by the Federal Communications Commission (FCC) under CFR 47, part 15, section 15.249 as an intentional radiator.
- The FCC certification shall be displayed on an external label on each RDS according to the rules set forth by the FCC. The RDS shall comply with FCC regulations under all specified operating conditions and over the expected life of the RDS.

1.1.6 Support

Contractor shall ensure the RDS manufacturer provides both training and technical support services.

1.1.7 Training

The manufacturer-provided training shall be sufficient to fully train installers and operators in the installation, configuration, and use of the RDS to ensure accurate RDS performance as specified in 689.3 Traffic Signal System Training of the Traffic Signal Supplemental Specifications.

1.1.8 Network Compatibility

RDS must be approved by SCDOT IT Department to reside on SCDOT Traffic Signal Communications Network. For the protection of the SCDOT, all networkable devices are required to be hardened and secured using an industry standard. SCDOT uses the National Institute of Standards and Technology Cybersecurity framework, but recognizes that other comparable frameworks and standards exist. Among these frameworks are:

- NIST RMF
- NIST CSF
- ISO IES 27001/ISO 27002
- SOC 2
- IASME Governance
- CIS Controls version 7
- COBIT 5
- FedRAMP
- HIPAA
- GDPR
- FISMA
- NERC CIP
- HITRUST CSF

1.1.9 Warranty

There shall be a two-year warranty provided against material and workmanship defects.

1.2 Materials

1.2.1 Radar Detection System (Radar Units, Radar Cabinet Interface, Cable)

- Radar Operating frequency of 24.0 to 24.25 GHz (K-band) utilizing a matrix of radars
- Two half-duplex RS-485 com ports with dedicated detection communication
- Power consumption less than 10 watts @ 9-28 VDC
- Ambient operating temperature: -29°F to 165°F with humidity: Up to 95% RH
- Must have Onboard surge protection
- Weight less than 5 lbs. (2.27 kg)

1.2.2 Radar Unit Types

1.2.2.1 Stop Bar Detection Units

- The RDS shall present real-time presence data in 10 lanes. The RDS shall support a minimum of 16 zones.
- The RDS shall support a minimum of 16 channels.
- The RDS shall be able to detect and report presence in lanes with boundaries as close as 6 ft. (1.8 m) from the base of the pole on which the RDS is mounted.
- The RDS shall be able to detect and report presence in lanes located within the 140 ft. (42.7 m) arc from the base of the pole on which the RDS is mounted.
- The RDS shall be able to detect and report presence for vehicles within a 90-degree field of view.
- The RDS shall be able to detect and report presence in up to 10 lanes.
- The RDS shall be able to detect and report presence in curved lanes and areas with islands and medians.
- The RDS shall work in the 24GHz frequency range, providing 245 MHz of detection bandwidth.

1.2.2.2 Set Back Advance Detection Units

- The Set Back RDS shall provide up to 900' detection zone for trucks, and up to 600' for cars.
- The Set Back RDS shall provide detection at 50' from mounting with a 50' lateral detection zone.
- The Set Back RDS Detection unit shall work in the 10 GHz frequency range or higher.
- The Set Back RDS shall provide continuous tracking from initial detection point to the intersection.
- The Set Back RDS shall provide dynamic Estimated Time of Arrival ETA, to the intersection, providing dilemma zone protection as an optional functionality.

1.2.2.2 Speed/Volume Side-Fire Detection

- The Speed/Volume Side-Fire RDS shall provide detection for speed and volume data collected by lane for minimum of 10 lanes of multi-directional traffic
- The Speed/Volume Side-Fire RDS shall provide detection from 6' from mounting up to 250' in a 65 degree vertical field of view.
- The Speed/Volume Side-Fire RDS shall work in the 24 GHz frequency range, providing 245 MHz of detection bandwidth.

1.2.3 Radar Unit Properties

1.2.3.1 Sensor Outputs

- The RDS shall support user-selectable zone to channel mapping.
- The RDS shall be able to trigger channels when all selected zones are active.
- The RDS shall be able to combine multiple zones to a channel output, and shall have channel output extend and delay functionality.
- The RDS algorithms shall mitigate detections from wrong way or cross traffic.

- The RDS system shall have fail-safe mode capabilities for contact closure outputs if communication is lost

1.2.3.2 External Properties

- All external parts of the RDS shall be ultraviolet-resistant, corrosion-resistant, and protected from fungus growth and moisture deterioration.

1.2.3.3 Enclosure

- The RDS shall be enclosed in a Lexan EXL polycarbonate.
- The enclosure shall be classified "f1" outdoor weather ability in accordance with UL 746C. The RDS shall be classified as watertight according to the NEMA 250 standard.
- The RDS enclosure shall conform to test criteria set forth in the NEMA 250 standard for type 4X enclosures. Test result shall be provided for each of the following type 4X criteria:
 - External icing (NEMA 250 clause 5.6)
 - Hose-down (NEMA 250 clause 5.7)
 - 4X corrosion protection (NEMA 250 clause 5.10)
 - Gasket (NEMA 250 clause 5.14)
- The RDS shall be able to withstand a drop of up to 5 ft. (1.5 m.) without compromising its functional and structural integrity.
- The RDS enclosure shall include a connector that meets the MIL-C-26482 specification. The MIL-C-26482 connector shall provide contacts for all data and power connections.

1.2.3.4 Radar Design

- The RDS shall be designed with multiple radars, enabling the sensor to provide detection over a large area and to discriminate lanes for stop bar radar and side-fire radar accuracy.

1.2.3.5 Frequency Stability

- The circuitry shall be void of any manual tuning elements that could lead to human error and degraded performance over time.
- All transmit modulated signals shall be generated by means of digital circuitry, such as a direct digital synthesizer, that is referenced to a frequency source that is at least 50 parts per million (ppm) stable over the specified temperature range, and ages less than 6 ppm per year. Any up conversion of a digitally generated modulated signal shall preserve the phase stability and frequency stability inherent in the digitally generated signal.
- The RDS shall not rely on temperature compensation circuitry to maintain transmit frequency stability.
- The bandwidth of the transmit signal of the RDS shall not vary by more than 1% under all specified operating conditions and over the expected life of the RDS.

1.2.3.6 Antenna Design

- The RDS antennas shall be designed on printed circuit boards.
- The vertical beam width of the RDS at the 6 dB points of the two-way pattern shall be 65 degrees or greater. The antennas shall cover a 90-degree horizontal field of view.
- The side lobes in the RDS two-way antenna pattern shall be -40 dB or less.

1.2.3.7 Resolution

- The RDS shall transmit a signal with a bandwidth of at least 245 MHz.

1.2.4 Radar Cabinet Interface

1.2.4.1 System Hardware

- Each RDS shall have a traffic cabinet preassembled backplate or integrated cabinet device with the following:

- AC/DC power conversion
- Surge protection
- Terminal blocks for cable landing
- Communication connection points
- Ethernet TCP/IP communication
- SDLC (Optional) communication
- The preassembled backplate for the RDS shall be a cabinet side mount or rack mount.
- The integrated cabinet device for the RDS shall be a shelf mount with an option to cabinet side mount.

1.2.4.2 Contact Closure Input File Cards

- The RDS shall use contact closure input file cards with 2 or 4 channel capabilities.
- The contact closure input file cards for the RDS shall be compatible with industry standard detector racks.

1.2.4.3 Electrical

- The RDS shall consume less than 10 W.
- The RDS shall operate with a DC input between 10 VDC and 28 VDC. The RDS shall have onboard surge protection.

1.2.4.4 Communication Ports

- The RDS shall have two communication ports, and both ports shall communicate independently and simultaneously.
- The RDS shall support the upload of new firmware into the RDS's over either communication port. The RDS shall support the user configuration of the following:
 - Response delay
 - Push port
- The communication ports shall support a 9600 bps baud rate.

1.2.4.5 RF Channels

- The RDS shall provide at least 8 RF channels so that multiple units can be mounted in the same vicinity without causing interference between them.

1.2.4.6 Verification

- The RDS shall have a self-test that is used to verify correct hardware functionality. The RDS shall have a diagnostics mode to verify correct system functionality.

1.2.4.7 Configuration

- *Auto-configuration.* The RDS shall have a method for automatically defining traffic lanes, stop bars and zones without requiring user intervention. This auto-configuration process shall execute on a processor internal to the RDS and shall not require an external PC or other processor. The auto-configuration process shall work under normal intersection operation and may require several cycles to complete.
- *Manual Configuration.* The auto-configuration method shall not prohibit the ability of the user to manually adjust the RDS configuration. The RDS shall support the configuring of lanes, stop bars and detection zones in 1-ft. (0.3-m) increments. When lanes have variable widths or have variable spacing (e.g. gore between lanes), precise resolution is necessary.

1.2.4.8 Software Compliance

- The RDS shall include graphical user interface software that displays all configured lanes and the current traffic pattern using a graphical traffic representation.
- The RDS shall include the ability to do counting and pulsed channels.
- The graphical interface shall be Microsoft Windows compliant.
- The software shall be installed and operate on a SCDOT provided Windows operating system.
- The software shall support the following functionality:
 - Operate over a TCP/IP connection
 - Give the operator the ability to save/back up the RDS configuration to a file or load/restore the RDS configuration from a file
 - Allow the backed-up sensor configurations to be viewed and edited
 - Provide zone and channel actuation display
 - Provide a virtual connection option so that the software can be used without connecting to an actual sensor.
- Local or remote sensor firmware upgradability.

1.2.4.9 Sensor Cable

- The cable shall be the Orion Wire Combo-22042002-PVCGY or an equivalent cable that conforms to the following specifications:
 - 6-conductor cable that attaches to an 8-pin MIL-C-26482 connector
 - The RS-485 conductors shall be 2 twisted pairs.
 - The RS-485 conductors shall have nominal capacitance conductor to conductor of less than 40 pF/ft at 1 kHz.
 - The RS-485 conductors shall have nominal conductor DC resistance of less than 16.7 ohms/1000 ft. at 68°F.
 - The power conductors shall be a twisted pair.
 - The power conductors shall have nominal conductor DC resistance of less than 11 ohms/1000 ft. at 68°F.
 - The entire cable shall be shielded with an aluminum/mylar shield with a drain wire.
 - The cable shall have a diameter of 0.41 in. The power wires in the cable shall be 20 AWG; the communications wires shall be 22 AWG.
 - The cable shall be UV resistant, as per the UL 720 Hour Sunlight Resistance Test

1.3 Construction

- Installation shall be in accordance with manufacturer's instructions.
- Mounting hardware for RDS's will not drill into the existing signal support poles.
- Cable will be continuous from RDS to the controller cabinet.
- Contractor shall provide post installation testing to the Engineer for consideration and approval.
- Stop bar detection RDS shall be mounted between 15' - 35' on a vertical pole or mast arm.
- Setback detection RDS shall be mounted between 17' - 40' on a vertical pole or mast arm.
- Speed / volume detection RDS shall be mounted between 17' - 40' on a vertical pole or mast arm.

1.4 Measurement

Furnishing and/or Installing Components of a Radar Detection System shall be measured as EACH unit and includes all hardware and cables necessary for installation and operation, and license.

1.5 Payment

	FURNISH & INSTALL RADAR DETECTION SYSTEM for STOP BAR DETECTION INC. 150' CABLE & MOUNTING HARDWARE	EA
	FURNISH & INSTALL CABINET INTERFACE COMPONENTS for STOP BAR DETECTION	EA
	FURNISH & INSTALL RADAR DETECTION SYSTEM for SET BACK DETECTION INC. 150' CABLE & MOUNTING HARDWARE	EA
	FURNISH & INSTALL CABINET INTERFACE COMPONENTS for SET BACK DETECTION	EA
	FURNISH & INSTALL RADAR FOR SPEED/VOLUME DETECTION INC 150' CABLE & MOUNTING HARDWARE	EA
	FURNISH & INSTALL CABINET INTERFACE COMPONENTS for SPEED/VOLUME DETECTION	EA
	FURNISH & INSTALL RADAR DETECTION CABLE TO CROSS ROADWAY	LF

Supplemental Technical Specification for Steel Strain Pole and Foundation

SCDOT Designation: 688.5

1.1 Description

This work shall consist of furnishing and installing Steel Strain Poles for traffic signal supports at the locations shown on the Plans and in accordance with the Standard Drawings, with anchor bolts and all miscellaneous hardware. This work shall also consist of installing a foundation for the steel strain pole in accordance with the Standard Drawings.

1.2 Materials

Acceptable materials can be found on the current SCDOT Qualified Products List http://info.scdot.org/Construction_D/sitePages/qualifiedProducts3.aspx.

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Steel Strain Pole.
- The Contractor shall furnish the ENGINEER with any warranties on materials that are provided by the Manufacturer or Vendor as normal trade practice.
- Repair galvanized surfaces (poles) which have been scratched or abraded so that bare metal is exposed, by applying 2 coats of 90% (minimum) Zinc-rich, cold-galvanizing compound; to the satisfaction of the ENGINEER.

1.3.2 Location

- Install the pole in the general location shown on the Plans.
- Coordinate with the Engineer to stake the field location of the pole, considering the property lines, underground utilities, and overhead clearances.
- ENGINEER will approve staked locations, however contractor is responsible for locating utilities.
- If utility conflicts are discovered, relocate pole in coordination with the Engineer's approval.
- The pole location may have to be moved based on unmarked utilities.

1.3.3 Foundation

- Drill a hole, as indicated in the Standard Drawings.
- The hole shall be augured (earth-auger), and the concrete poured in UN-disturbed earth.
- Ensure the hole is a uniform diameter, and cleanly augured.
- If foundation cannot be constructed to meet Standard Drawings, provide an alternative foundation design signed and sealed by a SC PE.
- It may be necessary to use a jack-hammer in BED-ROCK; it may be necessary to use a heavy walled CAISSON to line the hole and to pump it dry in high water table areas or areas where springs are encountered. These materials, tools and additional labor are incidental to the project.
- Where shown on the Plans, or as determined by the location of underground utilities, it may be necessary to excavate a hole BY HAND. NO additional payment shall be made UNLESS an item has been established in the BID or Proposal for UNCLASSIFIED EXCAVATION (hand excavation of hole) - CUBIC YARDS.
- Construct the foundation as shown in Standard Drawing 688-500-01 including the rebar cage and conduit.

- Mix, place, pour and test the concrete in accordance with SCDOT Standard Specifications, Sections 701, 702, 703, and 704.
- Provide CLASS 5000 for the foundation. Place the concrete in one continuous pour with vibration.
- Set the Anchor Bolts using pre-formed templates (wood or metal), to provide a "bolt-circle" in accordance with the Standard Drawings or with recommendations of the pole Manufacturer. Leave the templates in place for 2 days (48 hours).
- Capp conduit elbows at both ends, and secure in place in the excavated hole before pouring any concrete.
- Each foundation shall have a minimum of 1-3", 3-2" and 2-1" conduits placed in accordance with the Standard Drawings. Provide additional conduits if shown on the plans. These conduits are incidental to the work.
- Terminate all conduit provided in foundation in a 13"X24"X18"splice box; the splice box shall be installed in accordance with 680.2 Splice Boxes / Junction Boxes. The splice box shall be paid separately.
- Ensure all conduit elbows extend beyond the side of the finished foundation by a minimum of 12 inches, in the direction of, and at a depth matching the incoming conduit. Where a conduit elbow is placed for future use, scribe an "X" in the foundation to indicate the side where such conduit enters. Ensure the conduit protrudes a minimum of 6 inches above the top of the finished concrete foundation.

1.3.4 Grounding

- Furnish and install ground rods and grounding wire with each foundation.
- Configure the ground rod with the foundation, as shown on the Standard Drawings.
- Use grounding clamps of brass or bronze to secure the grounding wire to the ground rod.
- Use a continuous ground wire to bond all metal parts together--pole ground stud; pedestal pole nut; pole-mounted controller cabinet ground; metal conduits; etc.

1.3.5 Installation

- Do not place the steel pole on the foundation for a minimum of 2 days (48 hours after individual pour)
- Do not place strain on the steel pole for a minimum of 7 days (168 hours after individual pour) or as otherwise directed by the ENGINEER.
- Rake each pole away from the line of span wire pull, by adjusting the nuts on the Anchor Bolts.
- When final load is applied, ensure there is a 6 inch (plus or minus one inch) rake at the top of the pole, opposing the direction of the stress.
- Restore the site to prime condition after the pole installation, back filling the area surrounding the pole with topsoil, raking it level and seeding. If the area is sloped, then use landscape turf.

1.3.6 Sidewalk/Island Installation

- When installing the pole in a sidewalk, cleanly cut out the entire "square" of the sidewalk and install the foundation as indicated above.
- Replace the sidewalk using expansion joint material to separate different "pours" and old/new concrete. This work is incidental, unless an item has been established for CONCRETE PATCH or for SIDEWALK.
- In concrete islands, saw-cut out a square opening 4 feet x 4 feet for the pole base and repair as stated above.
- When installed in SIDEWALKS or CONCRETE ISLANDS, contour the entire area and hand-finish to produce a neat visual line. Sharp edges or pedestrian hazards shall not be allowed.

1.3.7 Acceptance

- Acceptance of each pole shall include foundation strength testing plus visual inspection by the ENGINEER.
- The visual inspection shall be made of the pole, overhead cables, and grounding.
- The complete installation shall be structurally sound, and the final pole placement shall be vertical, or raked as specified.

- Contractor shall replace any poles NOT meeting this inspection, without further cost to the project.

1.4 Measurement

- Furnishing and installing 13" Diameter Steel Strain Poles and Foundations, will be measured by EACH, of the size(s) specified, and erected in place as shown on the plans. This shall include foundation, anchor bolts, nut covers, pole cap, reinforcing steel, ground rod, ground wire, and all miscellaneous hardware as required.
- Installing Concrete Foundation for Steel Strain Pole, will be measured by each, shall include reinforcing steel, ground rod, ground wire, and all miscellaneous hardware as required.

1.5 Payment

682505A	FURNISH & INSTALL 26' STEEL STRAIN POLE AND FOUNDATION	EA
6825050	FURNISH & INSTALL 26' STEEL STRAIN POLE (POWDER COATED) AND FOUNDATION	EA
6825056	FURNISH & INSTALL 26' STEEL STRAIN POLE (POWDER COATED OVER GALVANIZED) & FOUNDATION	EA
682505B	FURNISH & INSTALL 28' STEEL STRAIN POLE AND FOUNDATION	EA
6825051	FURNISH & INSTALL 28' STEEL STRAIN POLE (POWDER COATED) AND FOUNDATION	EA
6825057	FURNISH & INSTALL 28' STEEL STRAIN POLE (POWDER COATED OVER GALVANIZED) AND FOUNDATION	EA
682505D	FURNISH & INSTALL 32' STEEL STRAIN POLE AND FOUNDATION	EA
6825052	FURNISH & INSTALL 32' STEEL STRAIN POLE (POWDER COATED) AND FOUNDATION	EA
6825058	FURNISH & INSTALL 32' STEEL STRAIN POLE (POWDER COATED OVER GALVANIZED) AND FOUNDATION	EA

Supplemental Technical Specification for

Concrete Strain Pole

SCDOT Designation: 688.6

1.1 Description

This work shall consist of furnishing and installing pre-stressed Concrete Strain Poles for traffic signal supports at the locations shown on the Plans and in accordance with the Standard Drawings, with all miscellaneous hardware. These poles shall be of the type intended for direct embedding, with the hole back filled with concrete.

1.2 Materials

Acceptable materials can be found on the current SCDOT Qualified Products List http://info.scdot.org/Construction_D/sitePages/qualifiedProducts3.aspx.

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Concrete Strain Pole.
- The Contractor shall furnish the ENGINEER with any warranties on materials that are provided by the Manufacturer or Vendor as normal trade practice.
- Patch any concrete surfaces which have been chipped, chunked or damaged to the satisfaction of the ENGINEER with a commercial grade vinyl or epoxy based on concrete patching compound, according to manufacturer's instructions.
- CAUTION – Concrete poles are very heavy, quite long and are difficult to handle. Perform transportation, site handling and erection with acceptable equipment and methods and by qualified personnel. The Contractor is cautioned to have cranes, pole trailers and sufficient manpower to perform this work with total safety to the crew and to the motoring public. The Contractor shall review the manufacturer's shop drawings to identify proper pick-up points for lifting.

1.3.2 Location

- Install the pole in the general location shown on the Plans.
- Coordinate with the Engineer to stake the field location of the pole, considering the property lines, underground utilities, and overhead clearances.
- ENGINEER will approve staked locations, however contractor is responsible for locating utilities.
- If utility conflicts are discovered, relocate pole in coordination with the Engineer's approval.
- The pole location may have to be moved based on unmarked utilities.

1.3.3 Hole

- Augur the hole in undisturbed earth of the diameter and to the depth (at least) listed in the standard drawings or as recommended by the manufacturer (whichever is larger). Construct the embedding foundation as shown in Standard Drawing 688-600-01.
- Measure the depth and diameter of the hole with a tape measure to ensure it meets the required dimensions.
- If hole dimensions and backfill foundation cannot be constructed to meet Standard Drawings, provide an alternative foundation design signed and sealed by a SC PE.
- It may be necessary to use a jack-hammer in BED-ROCK; it may be necessary to use a heavy walled CAISSON to line the hole and to pump it dry in high water table areas or areas where springs

are encountered. In Wet-lands or loose-sand, it may also be necessary to auger a larger hole. These materials, tools and additional labor are incidental to the project.

- Where shown on the Plans, or as determined by the location of underground utilities, it may be necessary to excavate a hole BY HAND. NO additional payment shall be made UNLESS an item has been established in the BID or Proposal for UNCLASSIFIED EXCAVATION (hand excavation of hole) - CUBIC YARDS.
- In bed-rock, a hole shall be jack-hammered out and be of sufficient depth to hold the design embedded length and a diameter to provide 3 inch clearance all around the concrete pole.

1.3.4 Grounding

- Furnish and install ground rods and grounding wire with each concrete pole.
- Drive the ground rod adjacent to the poured concrete embedding as shown on the Standard Drawing.
- Use grounding clamps of brass or bronze to secure the grounding wire to the ground rod.
- Use a continuous ground wire to bond all metal parts together--pole ground stud; pedestal pole nut; pole-mounted controller cabinet ground; metal conduits; etc.

1.3.5 Installation

- Place the concrete pole in the hole.
- Lift the pole into place, using a sling. A single point lift shall NEVER be used and such misuse could result in the ENGINEER rejecting that pole.
- Next, to lower the pole into the hole, insert a bar into the chocker hole (1/3 down the pole)(to prevent the strap from slipping) and use a single strap to raise one end of the pole vertically and jostle the butt end into the hole.
- Lower the pole into the hole and hold vertically by the crane.
- Using a pry bar through the "CANT" hole, rotate the pole so that all holes are at the proper compass orientation angle with the street and incoming conduit runs.
- Rake each pole slightly away (leaned away) from the direction of the span wire pull. For a concrete pole this will typically mean that the back side of the pole is vertically plumb.
- Backfill the hole back with concrete while supporting the concrete pole vertically with a pole or boom truck until the poured embedding concrete begins to set. This will typically be 15 to 20 minutes.
- Mix, place, pour and test the concrete in accordance with SCDOT Standard Specifications, Sections 701, 702, 703, and 704.
- Provide CLASS 3000 for the foundation; Place the concrete in one continuous pour.
- Plug/cover the underground cable entrance hole and any conduit openings to prevent concrete intrusion.
- After installation, the Contractor shall plug or cap all unused openings and couplings on the concrete pole using a threaded plug or a cemented PVC cap.
- Capp at both ends and secure in place any conduit elbows in the excavation before pouring any concrete.
- Each foundation shall have a minimum of 1-3", 3-2" and 2-1" conduits placed in accordance with the Standard Drawings. Provide additional conduits if shown on the plans. These conduits are incidental to the work.
- Terminate all conduit provided in foundation in a 13"X24"X18"splice box; the splice box shall be installed in accordance with 680.2 Splice Boxes / Junction Boxes. The splice box shall be paid separately.
- Ensure all conduit elbows shall extend beyond the side of the finished foundation by a minimum of 12 inches in the direction of and at a depth matching the incoming conduit.
- Do not place stress (steel cables) on the pole until the poured embedding concrete has hardened (typically 72 hours).
- Restore the site to prime condition after the pole installation, back filling the area surrounding the pole with topsoil, raking it level and seeding. If the area is sloped, then use landscape turf.

1.3.6 Sidewalk/Island Installation

- When installing the pole in a sidewalk, cleanly cut out the entire “square” of the sidewalk and install the concrete pole embedded in poured concrete; back fill with tamped dirt to 4 inches below the ground line foundation as indicated above.
- Replace the sidewalk using expansion joint material to separate different "pours" and old/new concrete. This work is incidental, unless an item has been established for CONCRETE PATCH or for SIDEWALK.
- In concrete islands, saw-cut out a square opening 4 feet x 4 feet for the pole base and repair as stated above.
- When installed in SIDEWALKS or CONCRETE ISLANDS, contour the entire area and hand-finish to produce a neat visual line. Sharp edges or pedestrian hazards shall not be allowed.

1.3.7 Acceptance

- Acceptance of each pole shall include foundation strength testing plus visual inspection by the ENGINEER.
- The visual inspection shall be made of the pole, overhead cables, and grounding.
- The complete installation shall be structurally sound, and the final pole placement shall be vertical, or raked as specified.
- Contractor shall replace any poles NOT meeting this inspection, without further cost to the project.

1.4 Measurement

- Furnishing and installing concrete strain poles will be measured by EACH of the length specified. This shall include pole cap and all miscellaneous hardware as required.
- Conduit elbows shall be considered to be incidental to the installation of the concrete pole.

1.5 Payment

6825061	FURNISH & INSTALL 35' CONCRETE STRAIN POLE	EA
6825062	FURNISH & INSTALL 40' CONCRETE STRAIN POLE	EA
6825064	FURNISH & INSTALL 45' CONCRETE STRAIN POLE	EA

Supplemental Technical Specification for Controller and Cabinet Assembly

SCDOT Designation: 688.7

1.1 Description

This work shall consist of furnishing and installing Cabinet Assembly, Cabinet Foundation and Controller in accordance with these Specifications, at the locations shown on the Plans, and in accordance with the Standard Drawings. This item shall include all electrical accessories and other items specified.

1.2 Materials

Acceptable materials can be found on the current SCDOT Qualified Products List http://info.scdot.org/Construction_D/sitePages/qualifiedProducts3.aspx.

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Controller and Cabinet Assembly.
- The Contractor shall furnish the ENGINEER with any warranties on materials that are provided by the Manufacturer or Vendor as normal trade practice or to match warranty on existing state contract items.

1.3.2 Concrete Foundation

- Construct the foundation to the dimensions shown on the Standard Drawing 688-700-01 Signal Cabinet – Base Mounted Cabinet.
- Set bolt pattern in accordance with the recommendations of the Cabinet Manufacturer.
- Set templates for setting anchor bolts and leave in place until the forms are removed.
- Concrete lag bolts drilled into pad are allowed.
- Mix, place and test concrete in accordance with applicable portions of SCDOT STANDARD SPECIFICATIONS Sections 701, 702, 703, and 704. Provide CLASS 3000 concrete.
- Set base mounted cabinets on a bead of silicone caulk.

1.3.3 Ground Rod and Ground Wire

- Furnish and install a ground rod and ground wire with each Cabinet.
- Place the 5/8 INCH by 8 feet (minimum) Copper-clad ground rods near the cabinet's concrete foundation, external to the cabinet pad in a splice box. If additional ground rods are required, place nearby and EXOTHERMICALLY WELD together.
- Place a 1-INCH PVC conduit and elbow in foundation prior to pouring as shown in the Standard Drawing.
- Run ground wires (No. 6 AWG bare, stranded copper wire) continuously from the ground rod to the Controller Cabinet (chassis ground on the AC ground bar) through this conduit; and run ground wires continuously from the ground rod to the foundation anchor bolts, to the conduit bends, etc.
- EXOTHERMICALLY WELD ground wires TO THE GROUND ROD.
- Use grounding bushings on metal conduit.
- For Cabinets mounted on strain poles, connect the grounding stud on the pole.
- The entire ground rod shall be driven below the grade or place in a junction box.

1.3.4 Conduit Elbows

- Do not encase the conduit entering the cabinet in concrete. (See Standard Drawing 688-700-01 Signal Cabinet – Base Mounted Cabinet)
- Set Conduit Elbows in the footing excavation before the concrete is poured.
- The size and number of elbows shall be that necessary to mate with the incoming runs and in accordance with the plans and the Standard Drawings. Run conduit in accordance with Standard Drawing 688-700-01 Signal Cabinet – Base Mounted Cabinet from pole to splice box and from pole to cabinet where the steel pole is adjacent to a base mounted cabinet.
- Conduit shall extend beyond the side of the finished foundation by a minimum of 12 inches, in the direction of, and at a depth matching the incoming conduit.
- The conduit shall extend beyond the top of the finished foundation into the pole or Cabinet, in accordance with Standard Drawings.
- Cover and protect the open-ends and threads on the conduit bends during construction activities.

1.3.5 Electrical Wiring

- Install all required equipment in the Cabinet, and neatly wire with tied or wrapped harnesses. Force-fitted or mutually interfering equipment is not acceptable.
- Label cable harnesses and terminals legibly.
- Terminate all bare wires in a "spade-lug" prior to connection to a terminal strip. 'Crimp-on' the "spade-lug" using a ratchet-type crimping tool.
- Tie wires not facilitating equipment movement to the back or side-panel.
- Install and position equipment for easy access.
- Ensure opening and closing the Cabinet door shall not chaff the wiring.
- Ensure the field (lamp) wiring shall have 3 feet of slack cable in each cabinet.
- Coil the slack and tie neatly in the bottom of the Cabinet.
- Separate signal cables from detector lead-in cables as much as possible, to reduce interference.

1.4 Measurement

- Local Controller and Cabinet furnished and/or installed will be measured by EACH TYPE Controller and Cabinet (mounting specified); and erected in place as shown on the Plans including miscellaneous electronics, load switches, wiring, electrical connection, ground rod, ground wire, and all related hardware.
- Furnishing and/or Installing a Concrete Cabinet Foundation will be measured by EACH and will include anchor bolts and all necessary hardware.

1.5 Payment

6845510	FURNISH AND INSTALL CONTROLLER AND 336 CABINET ASSEMBLY - POLE MOUNTED	EA
6845511	FURNISH AND INSTALL CONTROLLER AND 332/336 CABINET ASSEMBLY - BASE MOUNTED	EA
6888220	INSTALL CONTROLLER AND 336 CABINET - POLE MOUNTED	EA
6888225	INSTALL CONTROLLER AND 332/336 CABINET - BASE MOUNTED-INCLUDING FOUNDATION	EA
6888226	INSTALL CONTROLLER AND 332/336 CABINET ASSEMBLY-BASE MOUNTED CABINET ON EXISTING FOUNDATION	EA
6845520	FURNISH AND INSTALL 2070 CONTROLLER UNIT IN EXISTING CABINET	EA
6845614	INSTALL 2070 CONTROLLER UNIT &/OR CONFLICT MONITOR IN EXISTING CABINET	EA

6887951	FURNISH AND INSTALL CONCRETE CABINET FOUNDATION	EA
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Supplemental Technical Specification for

Flasher Cabinet Assembly

SCDOT Designation: 688.8

1.1 Description

This work shall consist of furnishing and installing Splice/Flasher Cabinet as indicated on the plans and in accordance with these Specifications and the Standard Drawings.

1.2 Materials

Acceptable materials for Flasher Cabinet Assembly includes an aluminum flasher box, complete with mounting brackets, police lock and key, minimum dimensions of 14" x 14" x 11". Flasher Cabinet Assembly shall have terminal lugs included. Flasher Cabinet Assembly shall be Pre-wired for Time Switch and include a back panel pre-wired for

- 8 position terminal block
- 10 amp circuit breaker
- SPA-100T lightning surge protector
- Toggle switch for a variety of operation times
- 30 amp isolation relay
- NEMA flasher.

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Flasher Cabinet.
- The Contractor shall furnish the ENGINEER with any warranties on materials that are provided by the Manufacturer or Vendor as normal trade practice or to match warranty on existing state contract items.
- Provide all components or hardware made of corrosion-resistant material, or be of the same materials as the item being installed.
- Provide a cabinet designed for pole or pedestal-pole mounting. It shall be furnished with all related corrosion resistant hardware, including top and bottom mounting brackets, or pole-hub. Straps used shall be stainless steel.
- Install a Flasher Cabinet Assembly to operate overhead or shoulder mounted flashers that are powered with electricity.

1.3.2 Mounting/ Foundation

Mount the Cabinet as shown in the Standards Drawings.

1.3.3 Grounding-

- GROUNDING AND SURGE/LIGHTNING PROTECTION SHALL BE PROVIDED in every Flasher Cabinet Assembly (unless specifically forbidden by the Manufacturer).
- The Protector shall be Telephone Company grade, and be conformable with the Terminal Block
- Ground the cable shield.
- Run a No. 6 AWG bare stranded copper Ground Wire continuously from the Cabinet to the ground rod at the pole base. Where design requires, drive a new ground rod; and install a ground wire from the Cabinet to the ground rod.

1.3.4 Electrical Wiring

- Connect electrical cables to the terminals in accordance with the signal equipment Manufacturer recommendations.

1.4 Measurement

- Furnishing and/or Installing Flasher Cabinet Assembly, shall be measured by EACH housing, erected and placed as shown on the Plans, including miscellaneous electronics, electrical connections, etc. NOTE: The furnishing, installation, and payment of the conduit, poles, electrical service, and other major items are specified elsewhere.

1.5 Payment

6845655	FURNISH & INSTALL FLASHER CABINET ASSEMBLY	EA
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Supplemental Technical Specification for Solar Powered Flasher Assembly

SCDOT Designation: 688.9

1.1 Description

This work shall consist of installing and/or furnishing a Solar Powered Flasher Assembly and performing all related wiring necessary, in accordance with these Specifications and the Standard Drawings.

1.2 Materials

Acceptable materials can be found on the current SCDOT Qualified Products List http://info.scdot.org/Construction_D/sitePages/qualifiedProducts3.aspx.

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Solar Powered Flasher Assembly.
- The Contractor shall furnish the ENGINEER with any warranties on materials provided by the Manufacturer or Vendor as normal trade practice, including a minimum 5-year warranty for the LED modules.
- The types of Solar Flasher Assembly is listed below:
 - 24/7 Single Solar 24 Hour Flashing Beacon
 - 24/7 Single Compact Solar 24 Hour Flashing Beacon
 - Dual 24 Hour Solar Powered Flashing Beacon
 - Dual Solar Powered School Flashing Beacon
 - Dual Compact Solar School Zone Flasher

1.3.2 Installation

- Install the entire assembly, including solar engine, signal housing and LED modules with all necessary hardware for mounting to one of the following pole types:
 - Pedestrian Pole
 - Side-of-pole arm
- If the sign is larger than 36 inches, install the assembly using two square perforated posts.
- Install Pedestrian Pole in accordance with 682.4 Pedestrian Pole and Base and the Standard Drawings.
- The entire assembly shall mount at one point. Separate mounting for the signal head or any other component shall not be required.

1.4 Measurement

Furnishing and Installing a Solar Powered Flasher Assembly, shall be measured by EACH, erected and placed as shown on the Plans, which shall include all electrical connections and all required incidental hardware and all necessary bases and foundations for poles.

Separate pay items for Pedestrian Poles are in accordance with 682.4 Pedestrian Pole and Base.

1.5 Payment

6865700	FURNISH & INSTALL SOLAR POWERED FLASHER ASSEMBLY - SINGLE BEACON	EA
6865701	FURNISH & INSTALL SOLAR POWERED FLASHER ASSEMBLY - DUAL BEACON	EA
6865702	FURNISH & INSTALL SOLAR POWERED FLASHER ASSEMBLY	EA

Supplemental Technical Specification for Working Crew with Equipment

SCDOT Designation: 689.1

1.1 Description

This item shall consist of performing work for the SCDOT, on a per hour bases for equipment and labor. This will include the contractor furnishing a crew of four persons, one bucket truck, one line truck and one foreman's vehicle to be worked at the line item price for working crew with equipment. The crew will need to be able to perform duties in the field of traffic signal installation and revisions. This item will be used for emergency calls and unforeseen work which cannot be predicted and there is no pay for. All work under this item, shall be approved by the ENGINEER, prior to engaging in any work where this item may be used. The ENGINEER reserves the right to refuse or engage this item. While engaged in this line item, there shall be no other line engaged by the contractor. The ENGINEER reserves the right to engage Primary Traffic Control while working under this line item. Engaging in any other line items in this contract while working under this line item will need the approval of the ENGINEER.

1.2 Construction

All work performed under this item shall have written approval from the ENGINEER before engaging in any work under this item. This item is to be used when there are unforeseen problems such as wet holes, borrowing roadways, rock holes and any other deemed problems or emergencies. In case of an emergency, the ENGINEER will call the CONTRACTOR in line for assistance with the installation or maintenance of an intersection, in this case both parties must agree on engaging this item. The ENGINEER will issue a work order and grant permission in writing to engage in this item.

1.3 Measurement

Working Crew With Equipment will be measured per HOUR.

1.4 Payment

Working Crew With Equipment accepted and measured as provided above, will be paid at the contract unit price bid for:

6887990	WORKING CREW WITH EQUIPMENT	HR
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Payment for working crew with equipment will be made per work order for the total hours worked on that work order. If the work order begins after the normal workday or on the weekend, time can be

charged at a rate of 1 ½ times pay per hour. This extra pay rate must be agreed on between the contractor and the ENGINEER prior to beginning work.

Pay Item Notes

This specification is not limited to these pay items. Other pay items may be applicable.

Supplemental Technical Specification for Traffic Signal System Training

SCDOT Designation: 689.3

1.1 Description

This work consists of providing Traffic Signal System Training.

1.2 Materials

1.2.1 General

The **CONTRACTOR** shall provide complete training for **DEPARTMENT** and maintaining agency personnel and representatives in the operation and maintenance of the traffic signal system components. The training program shall consist of formal classroom lectures and "hands-on" workshops with central and field equipment. The **CONTRACTOR** shall provide all personnel and instructors necessary for all training. The instructors shall be employees of the manufacturer(s) of the traffic signal system components, or approved equal.

All training classes must be completed prior to the beginning of any system/intersection operational testing. Training classes shall not overlap without prior approval of the **DEPARTMENT**. Training class schedules shall be consistent with the working schedules of the class attendees. Training shall only be scheduled on weekdays and training days shall generally consist of six (6) to eight (8) hours.

The **CONTRACTOR** shall develop and provide all necessary training materials, aids, and manuals.

The **CONTRACTOR** shall provide training and training materials for up to 15 people in each training class. The **DEPARTMENT** shall provide a listing of the expected trainees for each training session once the proposed training materials are approved.

As part of the **CONTRACT** materials submission requirements, the **CONTRACTOR** shall submit for approval copies of all training program subjects, training materials, aids, manuals, class agendas, class schedules (includes dates and times) and training locations. All submission materials must be approved by the **DEPARTMENT** before permission to begin training is given.

1.2.2 Training Program Subjects

The **CONTRACTOR** shall provide training on the subjects listed in the special provisions. The **CONTRACTOR** shall address the theory of operation and the technical and practical aspects of each component. Specific and thorough attention should be afforded to day-to-day operation, programming, testing, fault-diagnosis and repair of each component. Training related to specific hardware components shall include hands-on demonstrations utilizing sample components identical to those components installed in the field. Training on the proper use of specific tools utilized during installation, testing, and maintenance of various system components shall be addressed.

1.2.3 Acceptance of Training

Within 7 calendar days of the completion of each training class, the **DEPARTMENT** shall provide acceptance or non-acceptance of the training program. If the training program is not accepted, the **CONTRACTOR** shall correct the deficiencies in the training program and provide again the necessary class(es) at his expense. Acceptance of system training of each training program subject will be based on the following criteria:

- Thoroughness and completeness of instructional coverage of the training program subject;
- Thoroughness and appropriateness of the training program subject materials, including class demonstration and audio/visual aids, to the instructional coverage; and,
- Class instructor's ability to answer class attendees and clarify training material to the satisfaction of the class attendees.

The **DEPARTMENT** reserves the right to halt an ongoing class, if that class will clearly not be accepted.

For all training classes that are not acceptable, the **DEPARTMENT** shall provide information on which training classes are not acceptable and specify why within 7 calendar days of the completion of each training class. Within 15 calendar days of notification of non-acceptance of the training program, the **CONTRACTOR** shall submit for approval revised training program materials that correct the deficiencies in the non-accepted training classes. These materials shall clearly demonstrate the **CONTRACTOR's** revisions to the training program and shall include a new training program schedule. All of the **CONTRACTOR's** requirements and responsibilities for the original training program shall be borne by the **CONTRACTOR**.

Once the revised training program is approved, the **CONTRACTOR** shall again provide the training classes for the original class attendees or specific substitutes for original attendees. The **CONTRACTOR** is only responsible for providing subsequent training classes for those classes that were not accepted as part of the original training program.

1.3 Measurement

This item shall be measured and paid on an HOURLY rate.

1.4 Payment

Training shall be paid for at the Contract price bid for the item established for:

6886020	TRAINING BEING SIGNAL RELATED SYSTEM TRAINING	HR
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to be paid at the conclusion of the training, which shall be full compensation for the provision of signal system training, including all materials and incidentals to perform the work as specified.

Pay Item Notes

This specification is not limited to these pay items. Other pay items may be applicable.

Supplemental Technical Specification for

Steel Pole with Mast-Arm

SCDOT Designation: 690.1

1.1 Description

This work shall consist of designing (foundations, lengths of arms, size of support arms), furnishing and installing Steel Traffic Signal Poles with Mast-Arm(s). Concrete footings with reinforcing steel, anchor bolts, ground rods, conduit elbows, and miscellaneous hardware shall be designed and installed with each pole as required. **Steel mast-arm poles, its components, adapter plates and foundations shall be stamped and sealed by a licensed South Carolina Professional Engineer.**

1.2 Materials

Material Specifications are located at

http://www.scdot.org/doing/technicalPDFs/publicationsManuals/trafficEngineering/TrafficSignal_MaterialS_pecs.pdf .

1.3 Construction

1.3.1 General

- The requirements detailed in this specification cover any other pay item not listed in Payment but pertaining to Mast Arms.
- The CONTRACTOR shall furnish the Engineer with all warranties on equipment and material offered by the Manufacturer as normal trade practice.
- Repair poles, which have been scratched or abraded so that bare metal is exposed, to the satisfaction of the Engineer. Repair holes drilled in poles or Mast-Arms
- Use hardware or components made of a non-corrosive material, or be of the same material as the item being installed.
- Install signal head using rigid signal head mount brackets. The bracket shall consist of a top- and bottom-arm, an extruded aluminum vertical tube, a vertical tube clamp, and a mast-arm clamp, with all hardware. The Bracket shall be COMPLETELY RUST PROOF, and shall be fully adjustable in all dimensions and angles.
- Where required by the Plans, install signs using a rust proof mounting bracket.
- Powdercoating Color and type will be specified on the plans or in the Special Provisions.
- Decorative options will be specified on the plans or in the Special Provisions.
- Luminaires generally require a taller pole, per Standard Drawing or as noted in Special Provisions or Signal Plans.
- Luminaire to be furnished and/or installed must be provided by the same manufacturer as the mast arm, unless noted otherwise. Luminaire design and/or color should match mast arm design and/or color unless noted otherwise in Special Provisions or on Plans.
- Luminaires are metered separately from traffic signal, unless noted otherwise on the plans or in the special provisions.

1.3.2 Location

- Install the pole in the general location shown on the Plans.
- Coordinate with the Engineer to stake the field location of the pole, considering the property lines, underground utilities, and overhead clearances.
- ENGINEER will approve staked locations, however contractor is responsible for locating utilities.
- If utility conflicts are discovered, relocate pole in coordination with the Engineer's approval.

- The pole location may have to be moved based on unmarked utilities.
- The design of the mast arm is based on the location, length and soil type. Contractor shall not order mast arm poles until final pole location is determined free of utilities and is approved by the Engineer.
- Provide soil boring at each signal location to the satisfaction of the Engineer of Record designing the mast arm assembly and foundation. A minimum of one soil boring per signal to a 15' depth is required.

1.3.3 Foundation

- Contractor to provide foundation design (see 1.3.9), including depth and diameter of foundation, reinforcing cage design, strength of concrete;
- Drill a hole, as indicated in the foundation design.
- The hole shall be augured (earth-auger), and the concrete poured in UN-disturbed earth.
- Ensure the hole is a uniform diameter, and cleanly augured.
- The foundation shall be constructed with a circular reinforcing cage (**either tied together, or tack welded**) installed, in accordance with foundation design.
- Steel reinforcement shall conform to the requirements of DOT STANDARD SPECIFICATIONS, Section 703.2.1. The bars shall be of the size and type shown on the foundation design.
- The finished square surface above ground shall be as shown on the Standard Drawings.
- It may be necessary to use a jack-hammer in BED-ROCK; it may be necessary to use a heavy walled CAISSON to line the hole and to pump it dry in high water table areas or areas where springs are encountered. These materials, tools and additional labor are incidental to the project.
- Where shown on the Plans, or as determined by the location of underground utilities, it may be necessary to excavate a hole BY HAND. NO additional payment shall be made UNLESS an item has been established in the BID or Proposal for UNCLASSIFIED EXCAVATION (hand excavation of hole) - CUBIC YARDS.
- Mix, place, pour and test the concrete in accordance with SCDOT Standard Specifications, Sections 701, 702, 703, and 704.
- Use design concrete strength, minimum of CLASS 5000 for the foundation. Place the concrete in one continuous pour with vibration.
- Set the Anchor Bolts using pre-formed templates (wood or metal), to provide a "bolt-circle" in accordance with the Standard Drawings or with recommendations of the pole Manufacturer. Leave the templates in place for 2 days (48 hours).
- Capp conduit elbows at both ends, and secure in place in the excavated hole before pouring any concrete.
- Each foundation shall have a minimum of 1-3", 3-2" and 2-1" conduits placed in accordance with the Standard Drawings. Provide additional conduits if shown on the plans. These conduits are incidental to the work.
- Terminate all conduit provided in foundation in a 13"X24"X18"splice box; the splice box shall be installed in accordance with 680.2 Splice Boxes / Junction Boxes. The splice box shall be paid separately.
- Ensure all conduit elbows extend beyond the side of the finished foundation by a minimum of 12 inches, in the direction of, and at a depth matching the incoming conduit. Where a conduit elbow is placed for future use, scribe an "X" in the foundation to indicate the side where such conduit enters. Ensure the conduit protrudes a minimum of 6 inches above the top of the finished concrete foundation.

1.3.4 Grounding

- Furnish and install ground rods and grounding wire with each foundation.
- Configure the ground rod with the foundation, as shown on the Standard Drawings.
- Use grounding clamps of brass or bronze to secure the grounding wire to the ground rod.
- Use a continuous ground wire to bond all metal parts together--pole ground stud; pedestal pole nut; pole-mounted controller cabinet ground; metal conduits; etc.

1.3.5 Anchor Bolts

- Provide hooked anchor bolts at least 90 inches long with each steel pole with mast arms.

- Thread and hot dip galvanize the top 12 inches of the anchor bolt.
- Provide two hot dipped galvanized nuts and two washers per anchor bolt.

1.3.6 Adapter Plate

- Provide adapter plate with each mast arm that has a different anchor bolt pattern from SCDOT's standard steel pole pattern.
- **Note: Adapter plate(s), bolts, nuts, and washers not required if steel pole with mast arm is designed to be supported by current SCDOT signal foundation (concrete foundation with (4) 2" dia. anchor bolts on a 18-inch dia. bolt circle), and the design meets the design criteria requirements of this specification.**
- With each steel pole with mast arms, provide a 2" thick, hot dipped galvanized steel adapter to allow a pole with a 19" square base plate and 18" dia. bolt circle to be installed. Plate shall be pre-drilled with (4) 2 3/8" dia. bolt holes on the 18" dia. bolt circle. A 10" dia. minimum hole shall be provided in the center of the adapter plate.
- Provide (4) hot dipped galvanized 2" x 10" hex head cap screws, (12) nuts, and (8) washers in a **BURLAP** bag for each adapter plate. Bolts and nuts shall be of sufficient strength to support a 32-foot tall steel pole with steel strain wire supporting signal heads and signs for the intersection in case the steel pole with mast arms is damaged and has to be removed and replaced.
- Adapter plate(s), bolt, and nut selection and design shall be stamped and sealed by a licensed South Carolina Professional Engineer.
- Provide a **BURLAP** bag containing the adapter plate nuts, bolts, and washers inside each steel pole with mast arms.
- Place the adapter plate, if required, between the leveling nuts and the steel pole with mast arms base.

1.3.7 Installation

- Do not place the mast arm pole on the foundation for a minimum of 2 days (48 hours after individual pour)
- Do not place a load on the mast arm poles for a minimum of 7 days (168 hours after individual pour) or as otherwise directed by the ENGINEER.
- Each Pole shall be raked away from the line of the Mast-Arm pull, by adjusting the nuts on the anchor bolts.
- When final load is applied, there shall be an essentially vertical appearance as determined by the Engineer.
- Provide 22' minimum vertical clearance between the bottom of the overhead traffic signal mast arm and the pavement and shoulders, unless otherwise shown on the plans.
- Restore the site to prime condition after the pole installation, back filling the area surrounding the pole with topsoil, raking it level and seeding. If the area is sloped, then use landscape turf.

1.3.8 Sidewalk/Island Installation

- When installing the pole in a sidewalk, cleanly cut out the entire "square" of the sidewalk and install the foundation as indicated above.
- Replace the sidewalk using expansion joint material to separate different "pours" and old/new concrete. This work is incidental, unless an item has been established for CONCRETE PATCH or for SIDEWALK.
- In concrete islands, saw-cut out a square opening 4 feet x 4 feet for the pole base and repair as stated above.
- When installed in SIDEWALKS or CONCRETE ISLANDS, contour the entire area and hand-finish to produce a neat visual line. Sharp edges or pedestrian hazards shall not be allowed.

1.3.9 Acceptance

- Acceptance of each pole shall include foundation strength testing plus visual inspection by the ENGINEER.
- The visual inspection shall be made of the pole, overhead cables, and grounding.
- The complete installation shall be structurally sound, and the final pole placement shall be vertical, or raked as specified.

- Contractor shall replace any poles NOT meeting this inspection, without further cost to the project.

1.3.10 Design Criteria

AASHTO Standards

- Ensure the Mast-Arm traffic signal Pole is designed to meet the requirements of the "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals"; American Association of State Highway And Transportation Officials (AASHTO), latest edition.
- Design all components of the Mast-Arm Pole assemblies to include and to address the following:
 - Mast Arm Length
 - Soil type
 - Design Life – minimum 25-year mean recurrence interval
 - Basic wind speed in accordance with AASHTO Wind Speed map (latest edition)
 - Ice loading
 - Fatigue category II (2)
 - Natural wind gust pressure loads
 - Truck-induced gust pressure loads
 - Mast arm loading as follows in 1.10.2.

Minimum Loading Assumptions

- For design, minimum loading assume there is a 4-section polycarbonate, rigidly mounted signal head with backplate centered per lane including auxiliary lanes, an 24" x 8' illuminated street name sign on each arm, and additional 24" x 36" signs adjacent to each signal head. See plans to determine if additional loading is required. Design mast arms for the most stringent loading.

Design And Drawings

- The CONTRACTOR SHALL FURNISH pole design details, calculations, and shop-drawings in sufficient detail for complete evaluation and comparison with these Specifications.
- Any exceptions to these Specifications must be stated in writing.
- The design, calculations, and shop drawings shall be stamped and sealed by a licensed South Carolina Professional Engineer.
- The CONTRACTOR SHALL FURNISH a concrete foundation design details and calculations adequate for local soil type and steel pole with mast arm loading.
- Mast arm loading shall be the greater of the Minimum Loading Assumptions or the loading shown on the Plans.
- The design and calculations shall be stamped and sealed by a licensed South Carolina Professional Engineer.
- **Provide CATALOG CUTS ARE REQUIRED FOR REVIEW AND APPROVAL PRIOR TO FABRICATION.**

Miscellaneous Items

Steel pole with mast arms design drawing shall include the following:

- 4" x 6" minimum reinforced handhole,
- ½" coarse thread grounding stud located on interior of pole handhole,
- strain relief j-hook at top of pole, rain cap,
- holes in steel poles and mast arms for wiring to be routed to traffic signals,
- holes for wiring to be protected with full circumference grommets,
- nut covers to be provided to cover anchor bolt nuts,
- tapered poles and mast arms shall taper uniformly along their length
- additional requirements as shown on the signal plans for the intersections

1.4 Measurement

The following pay items will be measured by Each (EA) erected in place as shown on the plans:

- Design shall include all necessary services to completely design mast arm installation, including necessary geotechnical work, utility research, foundation design, mast arm upright and arm structural design and determining length of mast arms.
- Furnish includes delivery costs and all necessary components necessary to provide and install a fully functional mast arm, including all hardware Adapter Plates (if applicable), Anchor Bolts, Nut Covers, Pole Cap, reinforcing steel, ground rod, ground wire, and all miscellaneous hardware as required.
- Install pay items including foundation include all materials and work necessary to completely install mast arm structure, including rebar, concrete, conduit, and forms.
- Install pay item without foundation includes all work necessary to install mast arm on existing foundation.
- Powdercoating pay items include providing a color option for mast arms, either over the base mast arm material or over the galvanized mast arm material
- Decorative option per mast arm includes providing decorative features such as ornamental pole bases (skirts), fluted options, banner arms or curved options, in accordance with the special provisions or plans.
- Luminaire option for mast arm includes the additional cost for a taller pole (27'), if luminaire is to be mounted above the signal heads.
- Furnish and install mounting assembly pay items include installing the mounting hardware for signs and for signal heads on the mast arm, including all necessary hardware.
- Furnish and install Luminaire includes all necessary materials, equipment and labor for full operational luminaire assembly, including electrical cable, conduit and meter pan if metered separately from traffic signal.
- Pay items for mast arms designating the height and length of the mast arms will only be used when the Engineer has designed full mast arm plans; payment and will be paid for at the contract unit price Each (EA), and include all materials, hardware, manpower and equipment to fully install a functional mast arm assembly.

The following pay item will be measured by cubic yard (CY):

- Install Foundation for Mast Arm includes all materials and work necessary to completely install mast arm foundation, including rebar, concrete, conduit, and forms.

1.5 Payment

6888179	DESIGN, FURNISH & INSTALL STEEL POLE WITH MAST ARM INCLUDING FOUNDATION	EA
6888172	DESIGN, FURNISH & INSTALL STEEL POLE WITH MAST ARM WITHOUT FOUNDATION	EA
6888177	DESIGN, FURNISH & INSTALL STEEL POLE WITH TWIN MAST ARMS INCLUDING FOUNDATION	EA
6888178	DESIGN, FURNISH & INSTALL STEEL POLE WITH TWIN MAST ARMS WITHOUT FOUNDATION	EA
6888166	POWDERCOATING PER MAST ARM OVER BASE	EA
6888167	POWDERCOATING PER MAST ARM OVER GALVANIZED	EA
6888168	DECORATIVE OPTION PER MAST ARM	EA
6888169	LUMINAIRE OPTION FOR MAST ARM - TO ACCOUNT FOR TALLER POLE	EA
6513020	FURNISH & INSTALL MOUNTING ASSEMBLY FOR FLAT SHEET SIGN ERCTD ON MAST ARM	EA
6865831	FURNISH & INSTALL VEHICLE TRAFFIC SIGNAL HEAD MOUNTING ASSEMBLY FOR MAST ARM	EA
6888164	FURNISH & INSTALL DUAL LUMINAIRE INCLUDING LUMINAIRE ARMS AND ALL ASSOCIATED HARDWARE	EA
6888165	FURNISH & INSTALL SINGLE LUMINAIRE INCLUDING LUMINAIRE ARMS AND ALL ASSOCIATED HARDWARE	EA
6888174	INSTALL FOUNDATION FOR MAST ARM INCLUDING CONCRETE AND REBAR	CY

	FURNISH & INSTALL __' STEEL POLE WITH __' MAST ARM INCLUDING FOUNDATION	EA
	FURNISH & INSTALL __' STEEL POLE WITH TWIN MAST ARMS (__'X__')AT __ DEG. INCLUDING FOUNDATION	EA

Supplemental Technical Specification for

Short-Range Radio Device Detector System

SCDOT Designation: 699.1

1.1 Description

This work shall consist of furnishing and/or installing a Short- Range Radio Device Detector System to detect vehicles on a roadway by using battery- powered magnetometer- type sensors that communicate their detection data by radio to a roadside communications hub before the data is relayed to a local traffic controller and, optionally, a central software system or a data server as may be desired.

The Short- Range Radio Device Detection System shall be capable of monitoring and measuring vehicular and pedestrian movement by identifying and comparing unique Bluetooth (BT) MAC (Media Access Control) addresses associated with Short- Range Radio enabled electronic devices. The system can be used to collect high quality, high- density travel times by sampling a portion of actual travel activity from the traffic stream of a predetermined route. The BT MAC address received by a sequence of two or more Short- Range Radio Device receivers shall be matched and used to develop a sample of travel time for that particular segment of the roadway, based on the relative detection times recorded by the adjacent units. The BT MAC address being detected shall be both discoverable and non-discoverable.

1.2 Materials

The Short- Range Radio enabled device (sensor) shall be an anonymous Short- Range Radio Device BT MAC address, which is a hardware identifier for the manufacturer and specific electronic device type. BT MAC addresses are not associated with any specific user account or any specific vehicle. The BT MAC address shall not be linked to a specific person through any type central database, but is assigned by the Short- Range Radio Device electronic chip manufacturer and shall not be tracked through the sales chain. Privacy concerns typically associated with alternative probe systems shall be eliminated.

A. Requirements (Type A, Type B, and Type C)

The Short- Range Radio Device Detection System shall be connected to, and work in conjunction with the support data processing system, located in a designated server. All The Short- Range Radio Device Detection units shall adhere to the following requirements:

- } Short- Range Radio Device: Class 1 Transceiver with 4 dB to 8 dB Omni Directional Antenna
- } Environmental: - 30°C to +65°C, 5 – 90% humidity
- } Connectivity: IP/Ethernet 10/100 Base- T (minimum)
- } I/O ports: minimum one (1) RJ45 Ethernet port

a. Short- Range Radio Device Detection System, Type A

Provide a Short- Range Radio Device Detection System that can be installed in a typical signal or ITS cabinet. The unit shall be enclosed in its own housing and sit on a shelf within the cabinet. Utilize a conduit, as shown on the plans, for routing the antenna cable, and attach the antenna at the location shown on the plans. The power for the Short- Range Radio Device Detection System, Type A unit shall come from typical cabinet power (110 VAC) receptacles or terminal block. Supply all wiring for the Short- Range Radio Device Detection System Type A unit. Should the unit require a POE adapter or transformer to VDC, submit the adapter or transformer to the Department for review. The Contractor shall supply all surge protection devices for the external POE adapter or transformer.

b. Short- Range Radio Device Detection System, Type B

Provide a Short- Range Radio Device Detection System that is self enclosed in a NEMA 4X enclosure that can be mounted to a pole, mast arm or cabinet structure. The voltage input shall be between 6 and 30 VDC, or be able to connect to 110 VAC with appropriate transformers and adapters, as determined by the Department. The Short- Range Radio Device Detection System Type B unit shall be wired to a cabinet or approved communication/power source, as shown on the plans. The unit shall not reside within the cabinet. Provide all grounding, wiring, adapters, transformers, and surge protection devices needed to support the Short- Range Radio Device Detection System Type B unit, as installed.

c. Short- Range Radio Device Detection System, Type C

Provide a Short- Range Radio Device Detection System that is self enclosed in a NEMA 4X enclosure that can be mounted to a pole, mast arm or cabinet structure. Provide a Solar Power Array, which includes the solar panel, charging unit and batteries necessary for solar power. The Short- Range Radio Device Detection System Type C unit shall also include a GSM cellular modem with antennas, or approved equivalent. This Short- Range Radio Device Detection System type shall be a completely wireless installation. Provide all grounding, wiring, adapters, transformers, and surge protection devices needed to support the Short- Range Radio Device Detection System Type C unit, as installed.

d. Short- Range Radio Device Detection System Support Data System Software and Database

Provide a Support Data System software package, including all necessary database 3rd party software required in order for the software to run as intended in support and conjunction of the Short- Range Radio Device sensor system. The software shall be installed on a server designated by the Department. It is the Contractor's responsibility to populate and configure the database for each field Short- Range Radio Device Detection System, and to test the accuracy of the data. The data shall be in an XML format compatible with the Department's central software. The software shall also display a real time chart or graph showing calculated travel time and speeds of the sampled vehicles and BT MAC address counts. The Short- Range Radio Device Detection System support software is required for all new Short- Range Radio Device Detection System installations, but shall not be required for additional Short- Range Radio Device Detection System sensor installations on an existing network.

B. **Functional Requirements for the Short- Range Radio Device Detection System**

The sensor shall be capable of delivering data from both an Ethernet connection and a wireless cellular modem. The Short- Range Radio Device Detection sensor working in conjunction with the network's support data processing system must deliver real- time speed and travel time information in XML format to the central software system for routes where the sensors are deployed. The system shall be able to add multiple pairs of Short- Range Radio Device Detection sensors to form a network of manageable travel routes. Each route will display the data for the first and last sensor in addition to the travel- time and speed information for that segment. The Short- Range Radio Device Detection sensor shall be able to detect, at a minimum, within a radius of 300 feet when mounted on a pole or mast arm. The data processing shall be able to filter and 'throw out' BT MAC addresses that do not supply accurate information when compared to other device time stamps of the segment between two Short- Range Radio Detection devices. The data shall be smoothed, and be able to process median and mean average speeds. The following data shall be able to be compared and filtered, as needed, to deliver the most accurate information:

1. Pedestrians
2. Oversize Vehicles
3. Mass Transit (i.e. nearby trains or buses)

The Short- Range Radio Device Detection System equipment shall contain advanced features designed to allow the unit to operate efficiently in a remote environment. Diagnostic and configuration information shall be able to be viewed remotely, such that the health and operating status of the sensor is known. The system shall be designed to be able to automatically or remotely "reboot" if a condition is detected that requires such action.

1.3 Construction

Installation

- A. Installation shall be in accordance with manufacturer's instructions.

Testing

- A. Develop and submit plans for post- installation testing to the Engineer for consideration and approval. Ensure the plans test all functional requirements .
- B. Provide the Engineer with the appropriate XML data interface, as necessary, for testing of the travel time accuracy and integration into the central software.
1. Post- installation test procedures: Utilize the following test procedures after the Short- Range Radio Device Detection System has been installed in its entirety as shown on the Plans. Commence no post- installation testing until all Short- Range Radio Device Detection sensors systems in the project have been configured, calibrated and programmed to communicate on the SCDOT network to the support data system software. At a minimum, provide the following on the test plan to be submitted and approved by the Engineer:
- Inspect all Short- Range Radio Device Detection System field components to ensure proper installation and cable termination.
 - Inspect the quality and tightness of ground and surge protector connections.
 - Check power supply voltage and outputs and ensure device connections are as specified in the Plans.
 - Verify that the installation of cables and connections between all Short- Range Radio Device units, antennas and field cabinets and/or components are as specified in the Plans
 - Demonstrate that each Short- Range Radio Device unit is fully operational and gathering the required data types at the specified and necessary interval.

1.4 Measurement

Furnishing and/or Installing Components of a Short- Range Radio Device Detector System shall be measured as EACH unit and includes all hardware and cables necessary for installation and operation, and license.

1.5 Payment

6990000	Short-Range Radio Device Detection System Support Data System Software and Database	LS
6990010	Short-Range Radio Device Detector System Type A- w/ License	EA
6990011	Short-Range Radio Device Detector System Type B - w/ License	EA
6990012	Short-Range Radio Device Detector System Type C - w/ License	EA

DIVISION II - SECTION 5

Right-of-Way Plat Special Provisions

SECTION 809: RIGHT OF WAY PLAT:

Description:

The contractor by the “Substantial Work Complete” date shall prepare a right of way plat signed and sealed by a Professional Land Surveyor (PLS) licensed to practice in the state of South Carolina. The right of way plat shall be in accordance with the requirements of Section 49-460-A “General Property Survey” as outlined in the South Carolina “Standards of Practice Manual” for land surveyors. A copy of the plat will be recorded, by the contractor, in the Register Mesne Conveyance (RMC) office of the county or counties in which the project resides. The contractor will provide one copy of the plat on a full sized plan sheet(s) (22” X 36”) and submit to the resident construction engineer to be included in the as-built plans. In addition, the contractor shall furnish one PDF copy of the plat sheet(s) and one copy of the cad file(s) of the plat to York County.

Materials: Rebar Cap R/W Marker

Materials used shall comply with those listed on SCDOT Standard Drawing Nos. 809-105-00 or 809-110-00.

Construction Requirements:

The PLS shall set right of way markers along all new right of way lines as well as along any present right of way being retained by the Department at intervals listed on the SCDOT Standard Drawings. Right of way markers shall not be placed at points common to side property lines and/or corners. In the event that the plan reflects a break in the right of way along a side property line the right of way marker will not be set without the side property line being retraced and established by way of survey. The PLS shall prepare a plat documenting the location of all Right of Way Markers set and reflecting the as-built station and offset from the plan alignment. The plat shall show the entire project corridor as an enclosed strip or parcel of land to include the mainline and all side roads as defined on the project plan.

Measurement and Basis of Payment:

The item Right of Way Plat is paid on a lump sum (LS) basis; and therefore, there is no specific measurement for this item. The unit price bid for Property Right of Way Plat shall include all costs for labor, materials, equipment, services of a PLS and any related fees or costs associated with producing a plat, recording the plat at the RMC office, and all required copies. Each marker placed in accordance with the Standard Drawings complete and accepted will be measured and paid at the unit price bid.

Item No.	Description	Unit
8091010	RIGHT OF WAY MARKER (REBAR AND CAP)	EA
8091000	RIGHT OF WAY MARKER (REINFORCED CONCRETE)	EA
8091050	RIGHT OF WAY PLAT	LS

DIVISION II - SECTION 6

**CITY OF ROCK HILL
WATER AND SEWER
STANDARD DETAILS AND SPECIFICATIONS**

**City of Rock Hill
Water and Sewer
Standard Details and Specifications**

**Widening of SC Route 72 from 0.2 Miles
West of S-163 (Rambo Rd.) to SC Rte. 901
(Mt. Holly Rd.)
York County, SC**

The Contractor shall execute all work on this project in accordance with Standard Details and Specifications in effect at the time of letting. They may be found here:

<https://www.cityofrockhill.com/departments/planning-and-development/applications-and-checklists/standard-details-and-drawings>

DIVISION III
ATTACHMENTS

DIVISION III

SCDHEC STORMWATER NOTICE OF INTENT (NOI)

GP APPROVAL

The Notice of Intent has been submitted to SCDHEC. A copy of the application form is provided herein. A copy of the approval will be provided to the successful bidder.



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)

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: 05/22/2018
 Project/Site Name: SC 72 Widening County: York
 (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** York County **MS4 Operator** York County

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: 57-6000418

- A. **Primary Permittee Name:** York County
 Mailing Address: 6 S. Congress Street City: York State: SC Zip: 29745
 Phone: 803-684-8571 Fax: _____ Email Address: _____
- B. **Contact /ODSA Name** (If different from above OR if owner is a company): Lisa Hagood, PE
 Mailing Address: 6 S. Congress Street City: York State: SC Zip: 29745
 Phone: 803-684-8571 Fax: _____ Email Address: lisa.hagood@yorkcountygov.com
- 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:** Patterson Gambill
- B. **Registered Professional** Engineer Landscape Architect Tier B Land Surveyor **S. C. Registration #:** 16549
- C. **Company/Firm Name:** CDM Smith **S. C. COA #:** 0402
 Mailing Address: 1441 Main Street, Suite 1000 City: Columbia State: SC Zip: 29201
 Phone: 803-758-4762 Fax: _____ Email Address: gambillpx@cdmsmith.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.) Approx 0.2 mi. West of S-46-163 (E. Rambo Rd) to SC-901(Mt Holly Rd)
 City/Town (If in limits): Rock Hill Zip Code: 29730
 Latitude: 34 ° 53 ' 21 " N Longitude: - 81 ° 02 ' 47 " W (Source): GPS Web Site: Google Earth
Tax Map Number (s) (List all): Reference plan sheets 4 through 4K

- C. Is this site located on **Indian Land**? Yes No
- D. **Proposed Start Date:** October 1, 2023 **Proposed Completion Date:** October 1, 2026
- E. **Disturbed Area** (nearest tenth of an acre): 27.9 **Total Area** (acres): 30.9
- 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)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, Identify requested waiver: <input type="checkbox"/> Rainfall Erosivity Waiver <input type="checkbox"/> TMDL Waiver <input type="checkbox"/> Equivalent Analysis Waiver	
2. Detention Waiver (72-302(B))? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	3. Other (Specify): _____

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: <u>Taylor Creek</u>	<u>6,472</u>	<u>FW</u>
b. Next Nearest: <u>Fishing Creek</u>	<u>11,263</u>	<u>FW</u>
c. Coastal Zone ONLY: Coastal Receiving Water (CRW): _____		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	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	___ Ac
b. Non-jurisdictional wetlands	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	___ Ac
c. Other Water(s): _____	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	___ Ac ___ Feet
d. Coastal Zone ONLY: Direct Critical Area	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> 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: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> 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: _____		
2. If yes for C.1, will construction activities cross over or occur in, under, or thru the SCNW? <input type="checkbox"/> Yes <input type="checkbox"/> 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: _____		
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		
b. USACOE 404 Permit or 401 Certification		
c. SCNW Permit If applied for or issued, identify Date applied for or issued: _____		<input type="checkbox"/> All Activities or <input type="checkbox"/> 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				
CW-695	Taylor Creek	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	BIO	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
CW-654	Fishing Creek	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	BIO	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
CW-233	Fishing Creek	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		<input type="checkbox"/> Yes <input type="checkbox"/> 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?
CW-695	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
CW-654	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
CW-233	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	FC	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

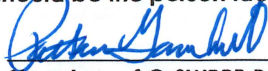
f. If yes for e above, are your discharges consistent with the assumptions and requirements of the TMDL(s)? Yes No
(NOTE: If no for f, this site is NOT eligible for coverage under the CGP). See Instructions.

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).**

Patterson Gambill

Printed Name of C-SWPPP Preparer


Signature of C-SWPPP Preparer

16549

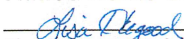
S. C. Registration #

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."

Lisa Hagood, PE

Printed Name of Primary Permittee


Signature of Primary Permittee

County Engineer

Title/Position

5/26/2023

Date Signed

NPDES CGP FEE SCHEDULE A

(All Counties **EXCEPT** Beaufort, Berkeley, Charleston, Colleton, Dorchester, Georgetown, Horry, and Jasper)

The schedule should be attached to DHEC Form 2617. Do not send payment in window envelope. **DO NOT MAIL CASH.** DHEC will notify the Project Owner/ Operator if the submitted check or credit card payment cannot be processed. **The review clock will start when acceptable payment is received.**

1. Identify (✓) the Project Review Type(s) Enter NPDES Coverage Fee of \$125 in the right-hand column if <u>any</u> of the following project/review types apply to this application. Proceed to Item 2.	(✓)	NPDES Coverage Fee
a. Project or LCP (Item IV.G) that will ultimately disturb one (1) acre or more Note: If your project will ultimately disturb less than one (1) acre AND is NOT a part of a Larger Common Plan, coverage under SCR100000 is <u>not</u> required; see http://www.scdhec.gov/administration/library/d-2628.pdf (Notification Form for Sites Disturbing Less Than 1-Acre Not Part of a Larger Common Plan, Non-Coastal County"	<input checked="" type="checkbox"/>	\$ <u>125</u> .00
b. New Owner/Operator (Transfer of Ownership)/Company Name Change (\$125 NPDES Coverage fee is required by the Department for Transfers of Ownership and Company Name Changes)	<input type="checkbox"/>	
c. Unpermitted Ongoing Project or Late Notification	<input type="checkbox"/>	
d. MS4 Project Review (Item I.A and I.B) (\$125 payable to Department thru MS4 Reviewer)	<input checked="" type="checkbox"/>	
e. Other (Specify): _____	<input type="checkbox"/>	

2. Determine the Project Review Fees (Review fees cannot exceed \$2000 for a project)		
PROJECT OR LCP THAT WILL ULTIMATELY DISTURB ONE (1) ACRE OR MORE	(✓)	Review Fees
a. Enter the disturbed area (Item IV.E) for this project. Proceed to Items 2.b and 2.c.	<u>27.9</u> (Nearest tenth of an acre)	
b. Will this project or LCP (Item IV.G) ultimately disturb more than 1.0 acres	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
c. Is this project exempt from S. C. Reg. 72-300 et seq.?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
1. If this project will not ultimately disturb more than 1.0 acre, and is not part of an LCP, your project is automatically covered under this permit and the NPDES coverage fee and review fee are not required. See the BOW-SPWS for "Less Than 1-Acre of Land Disturbance – Non-Coastal Counties". 2. If this project will ultimately disturb more than 1.0 acre, proceed to Item 2.d.		
d. Enter the project review fees (based on \$100/disturbed area) in the right-hand column. (Multiply the disturbed area (Item 2.a) by \$100/disturbed area). If the disturbed area for this project (Item 2.a.) totals 20.0 acres or more, enter \$2000 in the right-hand column. <u>Review fees cannot exceed \$2000 for a project.</u>		\$ <u>NA</u> .00

3. Total Required Fees Add the values in the right-hand columns of Items 1 and 2.d. Proceed to Item 4. (The Department will not review this project until all required fees are received).	\$ <u>125</u> .000
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4. Identify the Method of Payment:

Payment by Check:

Attach a **signed and dated check payable to S.C. DHEC** to the **front** of this Fee Schedule.

Please note that all checks must be **less than 30 days old** and must be for the **entire required fees**.

Payment by Credit Card: (Check here if you wish to pay via credit card using the on-line payment system).

The Department will contact you to provide instructions and the invoice number necessary for online payment.

Please provide an e-mail address where the invoice number may be sent: lisa.hagood@yorkcountygov.com

For official use only: Invoice Number _____

NPDES CGP FEE SCHEDULE B

(ONLY for Beaufort, Berkeley, Charleston, Colleton, Dorchester, Georgetown, Horry, and Jasper Counties)

Submit payment for NPDES Coverage fees only to DHEC.

The schedule should be attached to DHEC Form 2617. Do not send payment in window envelope. **DO NOT MAIL CASH.** DHEC will notify the Project Owner/ Operator if the check or credit card payment cannot be processed. **The review clock will start when acceptable payment is received and after the project is deemed consistent with the S.C. Coastal Zone Management Plan.**

1. Identify (✓) the Project/Review Types		(✓)	NPDES Coverage Fee(s)
(NOTE: You may ONLY select Item 1.a OR 1.b BELOW). Enter NPDES coverage fee of \$125 in the right-hand column if any of the following project/review types apply to this application. Proceed to Item 2.			
a. Project or LCP that is located within ½ mile of CRW (Item V.A) that will ultimately disturb more than 0.5 acres (if select a, do not select b)	<input type="checkbox"/>		\$ _____ .00
b. Project or LCP that is NOT located within ½ mile of CRW (Item V.A) that will ultimately disturb one (1) acre or more (if select b, do not select a)	<input type="checkbox"/>		
c. New Owner/Operator (Transfer of Ownership)/Company Name Change (<u>\$125 NPDES Coverage fee is required by the Department for Transfers of Ownership and Company Name Changes</u>)	<input type="checkbox"/>		
d. Unpermitted Ongoing Project or Late Notification	<input type="checkbox"/>		
e. MS4 Project Review (Item I.A and I.B)	<input type="checkbox"/>		
f. Other (Specify): _____	<input type="checkbox"/>		
2. Determine the Project Review Fees (Review fees cannot exceed \$2000 for a project). NOTE: COMPLETE ITEM 2.a BELOW. COMPLETE EITHER SECTION 3 OR SECTION 4. DO NOT COMPLETE BOTH SECTIONS.			
a. Enter the disturbed area (Item IV.E) for this project. Proceed to Item 3 OR Item 4.	_____ (nearest tenth of an acre)		
3. PROJECT OR LCP LOCATED WITHIN ½ MILE OF A CRW (ITEM V.A)		(✓)	Review Fees
a. Will this project or LCP (Item IV.G) ultimately disturb more than 0.5 acres?	<input type="checkbox"/> Yes <input type="checkbox"/> No		
b. Is this project exempt from S. C. Reg. 72-300 et seq.?	<input type="checkbox"/> Yes <input type="checkbox"/> No		
<p>1. If this project will NOT ultimately disturb more than 0.5 acres and is not part of an LCP, your project is automatically covered under this permit and the NPDES coverage fee and review fee are not required. See section 1.3.1.B. See the BOW-SPWS for "Less Than 1-Acre of Land Disturbance - Coastal Counties".</p> <p>2. If this project or LCP will ultimately disturb more than 0.5 acres, proceed to Item 3.c.</p>			
c. Enter the project review fees (based on \$100/ disturbed acre) in the right-hand column. (Multiply the disturbed area (Item 2.a.) by \$100/disturbed area). If the disturbed area for this project (Item 2.a.) totals 20.0 acres or more, enter \$2000 in the right-hand column. <u>Review fees cannot exceed \$2000 for a project. Proceed to item 3.d</u>	\$ _____ .00		
d. Total Required Fees (Coastal Project located WITHIN ½ mile of a CRW (Item V.A) Add the values in the right-hand columns of Items 1 and 3.c. (The Department will not review this project until all required fees are received). Proceed to Item 5.	\$ _____ .00		
4. PROJECT OR LCP NOT LOCATED WITHIN ½ MILE OF A CRW (ITEM V.A)		(✓)	Review Fees
a. Will this project or LCP (Item IV.G) ultimately disturb one (1) acre or more?	<input type="checkbox"/> Yes <input type="checkbox"/> No		
b. Is this project exempt from S. C. Reg. 72-300 et seq.?	<input type="checkbox"/> Yes <input type="checkbox"/> No		
<p>1. If this project will NOT ultimately disturb one (1) acre or more, and is not part of an LCP, coverage under SCR100000 is NOT required; see the BOW-SPWS for "Less Than 1-Acre of Land Disturbance - Coastal Counties".</p> <p>2. If this project or LCP will ultimately disturb one (1) acre or more, proceed to Item 4.c.</p>			
c. Enter the project review fees (based on \$100/ disturbed acre) in the right-hand column. (Multiply the disturbed area (Item 2.a.) by \$100/disturbed area). If the disturbed area for this project (Item 2.a.) totals 20.0 acres or more, enter \$2000 in the right-hand column. <u>Review fees cannot exceed \$2000 for a project. Proceed to item 4.d.</u>	\$ _____ .00		
d. Total Required Fees (Coastal Project NOT located WITHIN ½ mile of a CRW (Item V.A) Add the values in the right-hand columns of Items 1 and 4.c. (The Department will not review this project until all required fees are received). Proceed to Item 5.	\$ _____ .00		

5. Identify the Method of Payment: **Payment by Check:** (Attach a signed and dated check payable to S.C. DHEC to the front of this fee schedule. All checks must be less than 30 days old and must be for the entire amount of required fees). **Payment by Credit Card:** (Check here if you wish to pay via credit card using the on-line payment system). The Department will contact you via e-mail to provide instructions and the invoice number necessary for online payment. **Please provide an e-mail address where the invoice number may be sent:**

For official use only: Invoice Number _____

Instructions for Completing the Notice or Intent (NOI)

If you are uncertain whether you need to obtain coverage under the NPDES General Permit for Stormwater Discharges from Construction Activities, SCR100000 (CGP), if you cannot access the websites listed on the NOI and instructions, or if you have any other questions, contact the Stormwater Permitting Section (SWP) at (803) 898-4300 or Coastal Stormwater Permitting Section (CSWP) at (843) 953-0200. Projects located in the S.C. Coastal Zone (SCCZ – Beaufort, Berkeley, Charleston, Colleton, Dorchester, Georgetown, Horry, and Jasper counties) are reviewed by CSWP. Please see the Bureau of Water, Stormwater Permitting website (BOW-SPWS): <http://www.scdhec.gov/environment/water/swater/> for guidance and additional information regarding the CGP.

Who Must File a NOI:

- If S.C. Department of Transportation (SCDOT) is the Primary Permittee (Owner/ Operator), this NOI form (Form 2617) should not be used.
- The Owner/ Operator of a single project or larger common plan for development or sale (LCP—see item IV.G of instructions) that will ultimately disturb 1 acre or more (all counties).
- In the SCCZ, the Owner/Operator of a single project or LCP that is located within ½ mile of a coastal receiving water (CRW) (See item V.A of the instructions) and will ultimately disturb more than 0.5 acres.
- See the BOW-SPWS for “Less Than 1-Acre of Land Disturbance - Non-Coastal Counties” and “Less Than 1-Acre of Land Disturbance - Coastal Counties”.

Where to File:

See the BOW-SPWS for a current list of the areas that are reviewed by Municipal Separate Storm Sewer System (MS4) operators and entities that have delegated review authority. For projects in these areas, the initial submittal should be made to the MS4 operator; if initial submittal is made to DHEC for projects in these areas, the review process may be delayed. Please contact the appropriate entity for additional information and requirements; for example, the MS4 operator may require that a different application form be submitted. If a project crosses jurisdictional boundaries (e.g., sewer line in Greenville County and the city of Mauldin), then submittals to all appropriate MS4 operators, delegated entities, and DHEC must be coordinated.

Projects Located in the SCCZ	All Other Areas
S.C. DHEC—Bureau of Water Coastal Stormwater Permitting Section 1362 McMillan Ave., Suite 400 Charleston, S.C. 29405	S.C. DHEC—Bureau of Water Stormwater Permitting Section 2600 Bull Street Columbia, SC 29201-1708

Submittal Package for SWP and CSWP:

- When DHEC performs a full technical review, you must include the original, signed NOI form, appropriate fee schedule (A or B) with required fees, one (1) copy of the Comprehensive Stormwater Pollution Prevention Plan (C-SWPPP), and one (1) copy of all other supporting documentation with the initial submittal. For projects in the **non coastal counties** disturbing **greater than or equal to 1 acre and less than or equal to 2 acres**, one (1) copy of the C-SWPPP and one (1) copy of supporting documentation can be submitted with the initial submittal. In the **SCCZ**, applications for Coastal Zone Consistency certification are to be filed with requests for NPDES construction coverage and will then be routed internally to the Office of Ocean and Coastal Resource Management (OCRM) for review. OCRM submittal requirements can be located at: <http://www.scdhec.gov/environment/ocrm/czc.htm>
- When a regulated MS4 or entity implementing Regulation 72-300 performs the technical review, you must include a copy of the MS4 approved NOI form or MS4 approved application, the \$125 NPDES fee, and one (1) copy of the MS4 approval. In the **SCCZ**, applications for Coastal Zone Consistency certification are to be filed with requests for NPDES construction coverage and will then be routed internally to OCRM for review.
- For projects ultimately disturbing more than 1 acres, the checklist must be completed and attached when DHEC reviews your C-SWPPP. In the **SCCZ**, for projects ultimately disturbing more than 0.5 acres and located within ½ mile of a CRW, the checklist must be completed and attached. See BOW-SPWS for the most current version of the checklist. If this project will **NOT** ultimately disturb more than 0.5 acres (Coastal Counties) or more than 1.0 acre (Non-Coastal Counties) AND is not part of an LCP, **your project is automatically covered under this permit and the NPDES coverage fee and review fee are not required.** See the BOW-SPWS for “Less Than 1-Acre of Land Disturbance - Coastal Counties AND “Less Than 1-Acre of Land Disturbance – Non-Coastal Counties.
- For Modification projects where DHEC performs a technical review, see Section I of the instructions and Form B. Complete the applicable sections of the NOI Form. Complete the Form B Checklist. Submit an original, signed NOI form, appropriate fee schedule (C) with required fees, one (1) copy of SWPPP revisions, and one (1) copy of all other supporting documentation, including necessary engineering calculations. **No review clock is required for Modification reviews.**

Authorization to discharge is granted based on the timeframes specified in the table below. For project sites located in the SCCZ, the timeframes provided below do not commence until a Coastal Zone Consistency determination has been issued for the site.

Review Type	Allotted Review Time Frame
Regulated MS4 or entity implementing Regulation 72-300	7 business days of DHEC receipt of a complete NOI and fee payment.
DHEC (when construction site is subject to State C-SWPPP reviews)	20 business days of DHEC receipt of a complete NOI and fee payment.

S. C. Coastal Zone (SCCZ) Requirements:

For projects that are located within ½ mile of a CRW and involve greater than 0.5 acres of land disturbance, a registered engineer, landscape architect, or Tier B surveyor must prepare, amend when necessary, certify, and stamp the C-SWPPP as required and allowed by the qualified individual's respective act and regulations. Regulation 72-307(C)(5)(g) establishes additional requirements for projects located in the **SCCZ**. The additional water quality measures are outlined in Chapter III, Section XIII of the South Carolina Coastal Zone Management Program, as refined available at <http://www.scdhec.gov/environment/ocrm/czmp.htm>

Fee Schedules:

Make sure to answer all applicable questions on the appropriate Fee Schedule. **Complete Fee Schedule A for Non-Coastal projects; Schedule B for Coastal projects. Attach Form A, as required, for Transfer of Ownership. Attach Form B for major modifications to a prior approved project with Fee Schedule C if DHEC reviews your modification.**

Office Mechanics and Filing:

The original NOI form for projects located outside of MS4 areas and supporting documentation will be kept in the Central Office files (hard copy or digitized copy) in accordance with the Retention Schedule.

Date: Enter today's date.

Project/Site Name: The Project/ Site Name should be a unique or distinguishing name (e.g., not Proposed Subdivision).

NOTE: DHEC must be notified in writing if the Project/ Site Name changes.

County: If the project is in multiple counties, list the county in which the majority of the site is located. If part of the project is in the **SCCZ**, then list the coastal county in which the majority of the site is located and submit the project to **CSWP**; see the "Where to File" section. List the other counties in which the site is located in the C-SWPPP.

Prior Approved NPDES Permit Number (Major Modification or Change of Information Only): Provide the NPDES permit number (SCR number) or File Number previously assigned to the project or LCP.

Expedited Review Program (ERP): For additional information about ERP, see the ERP website <http://www.scdhec.gov/environment/water/swater/expeditedReview.htm>. DHEC will notify the Project Owner/ Operator if the project is selected for review in the ERP. There are additional required fees for participation in this program; these ERP fees should not be submitted until DHEC has notified the Project Owner/ Operator that the project was selected for participation in the ERP. In the SCCZ, please note that projects impacting Geographic Areas of Particular Concern (GAPCs) and/or wetlands may not eligible for participation. Consult OCRM staff.

I. **Notice of Intent (NOI) Application Type(s)** (See Section 2.4 of CGP for submission deadlines and notification requirements)

A. **Project (Application) Type** - Select **ALL** applicable application types that best describe your project or application. Section 2 of the Construction General Permit (CGP) may be reviewed for further information on each type of application listed in this section. As an example, if your project is one that is a new startup, then "New Project" should be selected. If your project is a new startup that will be located in Beaufort County, that will also be expedited, then "New Project", "OCRM Project Review", and "Expedited Review Program" should each be selected to describe your application. To determine if the project design is considered to be above regulatory requirements or Low Impact Development, see the "Expedited Review Standard Operating Procedures" document. If **none** of the application types listed in this section apply or clearly define the intent of your project, select "Other" and provide specific details that clearly describe the intent of your NOI application.

NOTE: DHEC must be notified in writing within fourteen (14) business days of a new Owner (person, lending institution, government institution, etc.) taking title to or ownership of a prior approved ongoing NPDES construction project/site. A new Property Owner must complete all applicable sections of Form A (Transfer of Ownership) and submit this form to the Department or respective MS4 with the NOI application. Written notification is also required when the Owner or Developer's company name changes for a prior approved construction permit.

NOTE: Major Modifications allowed by the Department are listed in Section 3.1.7 of the CGP. If your project is a major modification, complete Form B, Fee Schedule C, and applicable sections of the NOI per directions identified on Form B. Please note that Section V (Waterbody Information) of the prior approved NOI must be reviewed for changes prior to submitting any modification request to the Department. If changes have occurred, identify as Change of Information on the NOI form and provide the revised information in this section. Attach a detailed Narrative and revised C-SWPPP documents to the major modification request.

A. **MS4 Reviewer and MS4 Operator** - If this project is located inside a Municipal Separate Storm Sewer System (MS4) and must be reviewed and approved by a MS4 entity prior to submission to DHEC, then select "MS4 Project Review" as application type in Item A and provide the names of the entities that will perform the review and the MS4 Operator. Urbanized area boundary maps are available at <http://cfpub.epa.gov/npdes/stormwater/urbanmapresult.cfm?state=SC>. See the following website for information about MS4s: <http://www.scdhec.gov/environment/water/swnsms4.htm>. Note: Some MS4s have increased their review jurisdiction boundaries beyond the original urbanized area map. Please confirm with the appropriate MS4 regarding review jurisdiction.

II. **Primary Permittee Information**

Identify whether the Primary Permittee is a person or a company. If a company, identify if it is a lending institution or government entity. Provide the Employer Identification Number (EIN) as established by the U.S. Internal Revenue Service for the company. The EIN is commonly referred to as the taxpayer ID. If the company does not have an EIN (e.g., single member LLC, sole proprietorship). **DO NOT list a Social Security number**

- A. **Primary Permittee Name** - Provide the complete, legal name of the person or entity (company) that will be the Primary Permittee (Owner/Operator, O/O) for the project. If a person, provide the Title or Position. If a company, provide the complete, legal name of the company. **Do not list the D/B/A (Doing Business As) name.** **NOTE: If S.C. Department of Transportation (SCDOT) is the O/O, this NOI form (Form 2617) should NOT be used.** Provide the complete mailing address of the person/company identified in II.A as the Primary Permittee.
- B. **Contact/ODSA Name** – Complete if different from II. A or O/O is a company. Provide the complete legal name of the person identified as the Contact or Operator of Daily Site Activities (ODSA) for the project. This can be someone other than the person that has signatory authority for the company. Often the Contact person is also referred to as the ODSA. Provide the complete mailing address for the person, other than the permittee, the Department may contact. This address can be different from the mailing address entered for the O/O.
- C. **Property Owner Name** – If different from II.A or B, list the complete, legal name of the current Property Owner(s) of the site. Enter the complete mailing address for the Property Owner. **NPDES coverage will be issued to the Primary Permittee identified in Section II.A, not the Property Owner, unless same entity.** If there are multiple Property Owners, attach additional sheets with all information requested in Section II.C.

III. **Comprehensive Stormwater Pollution Prevention Plan (C-SWPPP) Preparer Information**

- A. **C-SWPPP Preparer Name** – Provide the name of the C-SWPPP Preparer for this project.
- B. **Registered Professional** – Identify whether the C-SWPPP Preparer is a Registered South Carolina Professional Engineer, Tier B Surveyor, or Landscape Architect. For projects disturbing more than 2 acres, the C-SWPPP preparer must be one of the listed professionals or federal government employee as described in Title 40, Chapter 22, and as required and allowed by the qualified individual's respective act and regulations. **In the SCCZ, projects that are located within ½ mile of a CRW and that involve greater than 0.5 acres of land disturbance, the C-SWPPP preparer must be one of the listed professionals or federal government employee as described in Title 40, Chapter 22, and as required and allowed by the qualified individual's respective act and regulations.**
- C. **Company/Firm Name** - Provide the complete, legal name of the company and S.C. Certificate of Authorization (S.C. COA number). Enter the complete mailing address. DHEC may contact the C-SWPPP Preparer via email. See the following websites for information about COA requirements for Landscape Architecture firms <http://www.dnr.sc.gov/land/LandscArch/LALicense.html> and Engineering and Surveying firms <http://www.lir.state.sc.us/POL/Engineers/>. Enter N/A for S.C. COA if the firm is not required to have a COA.

IV. **Project/Site Information**

- A. **Type of Construction Activity (ies)** - Select **ALL** activity types that best describe the development proposed for the site. "Institutional" includes schools and other publicly owned projects, except linear projects. "Site Preparation" includes clearing, grubbing, and grading only; no new impervious areas should be proposed if this activity type is selected. If none describe the development, then select "Other" and list the activity.
- B. **Site Address/Location** - List the site address. If the site address is unknown, list the road name(s) on which the site is located, the nearest intersection, or other detailed description of the site location. List a city/town only if the site is within the city/ town limits. List zip code (if known). Provide the latitude/longitude and tax map numbers. See the following website for assistance in obtaining latitude/ longitude coordinates: http://www.epa.gov/tri/report/siting_tool/index.htm. Latitude (from 32° to 35°) and longitude (-78° to -83°) should be for the center of the site. Minutes (') and seconds (") should be from 0 to 59. Identify the lat/long data source.
- C. **Indian Lands** – Identify if this site is located on Indian lands.
- D. **Proposed Start Date/Completion Date** – Provide proposed project start and completion dates.
- E. **Disturbed Area/Total Area** - Enter the disturbed area for the project and the total area for the site. The disturbed areas must be **rounded to the nearest tenth of an acre**. For subdivisions, if the exact build-out is not known, the disturbed area can be estimated using the following equation:
Disturbed area= 2(Maximum Footprint of House)(# of lots) + Road/ Right-of-Way areas + Other easements/ disturbance. **NOTE: Provide written notification if the actual disturbed area exceeds the disturbed area on the approved NOI.**
- F. **Modification Only: Change to Disturbed Area** – If your modification to a prior approved project will increase or decrease the disturbed area, complete this section and see Section I of the Instructions. Enter the current approved disturbed area and proposed increase (+) or decrease (-) to the disturbed area. If no change, enter 0.0. Enter the new total disturbed area (after change). Round each entry to the nearest tenth of an acre.
- G. **Larger Common Plan for Development or Sale (LCP)** - The plan in LCP is "broadly defined as any announcement or piece of documentation (including a sign, public notice or hearing, sales pitch, advertisement, drawing, permit application, zoning request, computer design, etc.) or physical demarcation (including boundary signs, lot stakes, surveyor markings, etc.) indicating construction activities may occur on a specific plot." [63 Federal Register No. 128, July 6, Page 6 1998, p. 36491] For example, if master calculations have been prepared and/ or submitted for an entire site, then all phases and parcels at that site would be considered part of an LCP. If the site is part of a subdivision, industrial park, commercial park, etc., then it is considered to be part of an LCP. List a unique, distinguishing LCP/ Overall Development name. This name should not reference a specific phase. This LCP/ Overall Development name should also be listed on all NOIs for future projects that are part of this LCP, including subsequent phases. Check the box if this is the first phase of the LCP. List the previous state permit/ file number and previous NPDES coverage number if applicable. **(DO NOT enter SCR100000).** **If not known, contact the Department for assistance.**

- H. **Flooding Problems** – Identify whether flooding problems exist on the site, or downstream or adjacent to the site. If yes, provide detailed explanation of the extent and impact in your C-SWPPP. **NOTE:** All C-SWPPP applications must include a Floodway Map/FEMA Flood Insurance Map (See Checklist) with an outline of the project boundary on the map. **NOTE:** The Department does not regulate the placement of fill in floodplains. Contact local city or county official.
- I. **Active S. C. DHEC Warning Notice/Notice to Comply/Notice of Violation** – Select yes if DHEC has issued a Warning Notice, Notice to Comply, or Notice of Violation for the site or any site within the LCP. Provide additional information about the Notice (e.g., Order number) and a copy of correspondence with DHEC regarding the Notice in your C-SWPPP.
- J. **State and Federal Environmental Permits or Approvals** – List relevant state and federal permits applied for. See §122.21(f) of S.C. Regulation 61-9 <http://www.scdhec.gov/environment/water/regs/r61-9.pdf> for a list of permits, approvals, and programs that should be considered. If inaccurate, NPDES coverage may be invalid.
- K. **Waiver(s)** - Identify any waivers requested for your project or construction site. Provide details and required justifications in the C-SWPPP.

V. Waterbody Information

A. Receiving Waterbody(s) (RWB) Information

1. The **Nearest** receiving waterbody (RWB) is the nearest Waters of the State (WoS). See definition in §122.2 of S.C. Regulation 61-9 - <http://www.scdhec.gov/environment/water/regs/r61-9.pdf> to which the site's stormwater discharges will drain. The nearest RWB must be listed in reference to a named waterbody, if the RWB is unnamed. For example, if the site's stormwater discharges drain to a stream on the site, then the nearest RWB would be the stream. If the stream is not named, then determine the nearest named waterbody (e.g., Grove Creek) into which the stream will flow and list the nearest RWB as a tributary to the named waterbody (e.g., Tributary to Grove Creek). Then, the **Next Nearest** named RWB would be Grove Creek. If the site's stormwater discharges drain to multiple waterbodies, then list all such waterbodies; attach additional sheets, if necessary.
2. Provide the **distance**, in feet to each receiving waterbody.
3. Provide the **classification** for each named waterbody. See S.C. Regulation 61-69 (<http://www.scdhec.gov/environment/water/regs/r61-69.pdf>) for a list of classifications of waterbodies within S.C. If the nearest RWB is unnamed, then search the document for the nearest named RWB. If the nearest, named RWB is not listed, then continue searching the document for the next, named waterbody, proceeding downstream from the site. For example, a site in Anderson County drains to a tributary of Hornbuckle Creek, then to Hornbuckle Creek, then to Middle Branch, and then to Brushy Creek/ Big Brushy Creek. First, search the document for Hornbuckle Creek, then Middle Branch, then Brushy Creek. Because there are 3 listings for Brushy Creek, the next, named waterbody (Saluda River) must be determined. Note that the county for this record for Brushy Creek is listed as Pickens because the headwaters of Brushy Creek are in Pickens County. The classification of the tributary to Hornbuckle Creek is "FW—Freshwaters".
4. **SCCZ Only:** Provide the **Coastal Receiving Water (CRW)** to which the site's stormwater discharges will drain. This distance is used to determine permitting requirements. Coastal Receiving Water is defined as a receiving water body as defined in the *Policies and Procedures of the South Carolina Coastal Zone Management Program*, updated July 1995. *This includes all regularly tidally influenced salt and fresh water marsh areas, all lakes or ponds which are used primarily for public recreation or a public drinking water supply, and other water bodies within the coastal zone, excluding wetlands, swamps, ditches and stormwater management ponds which are not contiguous via an outfall or similar structure with a tidal water body.*
5. Provide the distance, in feet to the CRW. **Classification of RWB is not applicable for CRW.**

B. Waters of the U. S. /State Information (See Section 2.6.2 thru 2.6.6 of the CGP)

1. Complete the "**On the Site?**" column for items a-d. If yes is selected for that column, then the next 3 columns must be completed. If there are other waters of the U.S./ State (WoS) on the site not listed in items a and b (e.g., stream, river, lake, pond), then list those in item c. Jurisdictional wetlands are under ACOE jurisdiction.
2. **Delineation** means identification by U.S. Army Corps of Engineers (USACOE) or wetlands consultant. Also, see the checklist for information about delineation requirements. If there are WoS within 100' of the disturbed area that were not delineated/identified, then explain this in the narrative; this includes WoS that are not on the project site but are within 100' of the disturbed area. **For Direct Critical Area in the SCCZ, delineation means identification by OCRM or wetlands consultant. OCRM staff may require identification of Direct Critical Area by OCRM staff as part of its Coastal Zone Consistency review.**
3. **Impacts** - If construction activities will occur in and/ or will impact WoS, then select yes for "Impacts?"
4. **Amount of Impacts** - List the amount of impacts to WoS. Provide an additional, separate plan sheet that shows all WoS on the site and the impacted areas. If there are proposed impacts to WoS, please contact USACOE (866-329-8187) and S.C. DHEC Water Quality Certification, Standards & Wetlands Programs Section (803-898-4300) to determine additional requirements before submitting this NOI. **In the SCCZ, also contact S.C. DHEC OCRM Wetlands Section (843-953-0200). Please note that it is the Project Owner/ Operator's responsibility to ensure that all WoS are shown and identified in the C-SWPPP. See Sections 2.6**
6. **If yes for impacts in B.3, describe each impact and activity, and list all permits** (e.g., U.S. Army Corps of Engineers (USACOE) Nationwide Permit, DHEC General Permit) and certifications that have been applied for or obtained for each impact. Describe the activity(s), whether the impact is permanent or temporary, and any other relevant information. Provide a copy of all permits and certifications for and correspondence with USACOE and DHEC for the impacts. Include all plats referenced in the permits or correspondence.

C. S. C. Navigable Waters (SCNW) Information

1. **Are SCNW on the site?** See <http://www.scdhec.gov/environment/water/navwater.htm> for the definition of SCNW and other information related to SCNW. Or, contact S.C. DHEC Water Quality Certification, Standards & Wetlands Programs Section at (803) 898-4300 for assistance determining the navigability of the waters on your site or with questions related to SCNW. **If yes to C.1**, list the **name of the SCNW**. If the SCNW is not named, then provide a description that references the nearest, named waterbody (e.g., tributary to Grove Creek). **If no to C.1**, do not complete questions C.2 thru C.3 of this section.
2. If yes to C.1 and construction activities proposed by your project will cross over or occur in, under, or thru the SCNW, describe SCNW activities (e.g., road crossing, sub-aqueous utility line, temporary or permanent structures, etc.). This includes temporary and permanent crossings with roads, utility lines, etc.
3. Identify permits providing SCNW Activity(ies) coverages for your site.
 - a. Identify proposed activities covered under a DHEC General Permit or other DHEC permit. Identify permit number(s) and corresponding activities covered under each. See the following website for a list of DHEC General Permits for activities in some SCNW: <http://www.scdhec.gov/environment/water/docs/gp/gp.xls>. See the "Notes" column to determine what types of activities are covered under each permit.
 - b. Identify **USACOE 404 Permit or 401 Certification** issued for the site. Identify permit number(s) or certification(s) and corresponding activities covered under each.
 - c. If applicable, identify the date the **SCNW permit** was applied for. Identify whether the permit applied for will cover ALL activities listed in C.2 of some activities listed in C.2. List covered activities.
 - d. If a **SCNW permit** has NOT already been applied for or issued for all of the activities in SCNW for this site, then those activities and conditions can be addressed during the review of the C-SWPPP, and a separate State Navigable Waters permit is not required. **Provide an additional plan sheet with plan and profile views (drawn to scale) of SCNW and associated activities; include activities description on the plan sheet.**

D. Impaired Waterbodies Information (Section 3.2.12)

NOTE: The TMDL, 303(d), and Non-Point Source water quality tool is a mapping system showing detailed information on WQMS locations, water quality status, and much more. The tool is available at the following website along with instructions for using the tool: <http://www.scdhec.gov/environment/water/tmdl/>.

In the SCCZ, list the nearest upstream and downstream DHEC WQMS(s) and corresponding waterbody(ies). Additionally, shellfish stations only monitor for Fecal coliform bacteria. Include both the nearest shellfish monitoring station(s) and full WQMS(s) on the NOI for both upstream and downstream locations when shellfish monitoring stations are present. If a shellfish monitoring site is not present then you only need to list the full WQMS(s). When a shellfish monitoring station is present, everything but Fecal coliform bacteria needs to be assessed at the full WQMS(s). Shellfish monitoring stations begin with numbers and full WQMS(s) begin with letters.

1. 303(d) Listed Impaired Waterbodies

- a. List the **nearest SCDHEC Water Quality Monitoring Station(s)** to which the site's construction stormwater discharges will drain and its **corresponding waterbody**. See the following website for the most current 303(d) List for Impaired Waters and related information: <http://www.scdhec.gov/environment/water/tmdl/>. **NOTE: DHEC has determined that construction SW discharges are expected to contain pollutants causing the following impairments: TURBIDITY, BIO (Macroinvertebrate), TP (Total Phosphorus), TN (Total Nitrogen), Chlorophyll-a, and FC (Fecal coliform) in Shellfish Harvesting Waters in the SCCZ.** Carefully evaluate whether the site's construction SW discharges will contain any pollutants causing other impairments not explicitly listed above. You should also consider previous land uses at the site in answering this question. For example, if the previous land use was a copper processing facility and the impairment at the nearest WQMS is copper, then you should carefully evaluate whether the site's construction SW discharges would contain copper.
- b. Identify whether this **WQMS is listed on the most current 303(d) List**. The 303(d) list is available in Microsoft Excel and Adobe Reader formats. WQMS locations are available for each watershed at the website provided in 1.a as well using the **TMDL, 303(d), and Non-Point Source water quality tool**. To search the 303(d) list to determine whether a WQMS is listed, select "Edit" from the top toolbar of your web browser. Then, select "Find". Enter the WQMS exactly as listed on the map and hit enter. **If none of the WQMS(s) are found, then select "No" and proceed to item V.D.2 (TMDL Impaired Waterbodies). If any of the WQMS(s) are found, then select "Yes" and proceed to item c.**
- c. **If yes for b**, list the impairment(s) or pollutants identified as cause(s) of the impairment (see last column labeled "CAUSE") for the WQMS(s) and proceed to item d.
- d. Identify whether the site's stormwater discharges contain any pollutants causing the impairment(s). **If no for d, proceed to item V.D.2 (TMDL Impaired Waterbodies).** **If yes to d and the receiving water is listed on the most current 303(d) List of Impaired Waters** for a sediment or a sediment-related parameter, BIO (macroinvertebrate), turbidity, Total Phosphorous, Total Nitrogen, Chlorophyll-a, or Fecal coliform in Shellfish Harvesting Waters in the SCCZ. You must carefully evaluate all selected BMPs and their performance to ensure that the construction site's Stormwater discharges will not contribute to or cause a violation of water quality standards. **If yes for d and the disturbed area is less than 25 acres**, include an evaluation of the Best Management Practices (BMPs) proposed for the site as described in Section 3.2.12.B(l) of the CGP in the C-SWPPP. **If yes for d and the disturbed area is greater than or equal to 25 acres**, then provide a written qualitative and quantitative assessment of the BMPs proposed in the C-SWPPP for the site as

described in section 3.2.12.B(II) of the CGP. For more information on this subject, please see the DHEC publication entitled "Antidegradation for Activities Contributing to NonPoint Source Pollution to Impaired Waters." This publication can be downloaded at the following DHEC WEB site www.scdhec.gov/eac/water/pubs/antidegnps.pdf.

- e. **If yes to d, list the "USE" support impairment (AL, FISH, REC, SHELLFISH) affected by the pollutant or impairment listed in item c.**
- f. **If yes for d, will use of the BMPs proposed for your project ensure the stormwater discharges leaving the site will NOT contribute to or cause further water quality standard violations for the impairment(s) listed in c? NOTE: If your answer to item f is NO, this site is NOT eligible for coverage under the CGP. You may contact the Department to determine if an individual permit application is necessary or you may revise your project to include appropriate Best Management Practices, controls, and procedures to bring your discharge into compliance**

2. TMDL Impaired Waterbodies

- a. List the **nearest SCDHEC water quality monitoring station(s)** to which the site's construction stormwater discharges will drain. List WQMS identified in part V.D.1.a of this table.
- b. Identify whether a TMDL is listed for this WQMS. NOTE: See the following website for a list of all WQMS with Approved S.C. Total Maximum Daily Loads (TMDLs): <http://www.scdhec.gov/environment/water/tmdl/>. Select "Approved SC TMDLS", then select "[Sites Covered Under an Approved TMDL and Corresponding WQ Attainment Status](#)". Select "Edit" from the top toolbar. Then, select "Find". Enter the WQMS exactly as listed and hit enter.
If a WQMS is NOT found, then select "No," Stop and proceed to Section VI. If a WQMS is found, then select "Yes" and proceed to item c.
- c. **If yes for b, identify and list the impairment(s) or pollutants listed as CAUSE(S) of the impairment (see 7th column labeled "CAUSE") and proceed to item d. If the WQMS(s) is impaired for more than one parameter, then the WQMS will be listed multiple times on successive rows.**
- d. **If yes for b, identify whether the standard has been ATTAINED for the impairment(s). NOTE: See the 8th column labeled "USE SUPPORT" to determine if the standard has been attained for each impairment for each WQMS. "FULLY SUPPORTED" means the standard has been attained for the impairment listed in the "CAUSE" column. "NOT SUPPORTED" means that the standard has NOT been attained for that impairment. If no for d (the standard has NOT been attained (NOT SUPPORTED) for all impairments for all WQMS(s)), proceed to item e. If yes for d (the standard has been attained for all impairments for all WQMS(s)), proceed to Section VI.**
- e. Identify whether the site's stormwater discharges contain any pollutants causing the impairment(s). **If no for e, proceed to Section VI. If yes for e, proceed to f.**
- f. If yes for e, **are your discharges consistent with the assumptions and requirements of the TMDL(s)? NOTE: If your answer to item f is NO, this site is NOT eligible for coverage under the CGP. You may contact the Department to confirm that adherence to a C-SWPPP that meets the requirements of the CGP will be consistent with the TMDL. Where a TMDL has not specified a WLA applicable to construction stormwater discharges, but has not specifically excluded these discharges, adherence to a C-SWPPP that meets the requirements of the CGP will generally be assumed to be consistent with the approved TMDL. If the TMDL specifically precludes such discharges, the site is not eligible for coverage under the CGP.**

VI. Signatures and Certifications **DO NOT SIGN IN BLACK INK!** The NOI must have original signatures unless the application being submitted to DHEC is one approved by an MS4.

C-SWPPP Preparer - The same registered professional must sign and seal the NOI form, C-SWPPP, calculations, and supporting documentation.

Primary Permittee - If the Primary Permittee or Project Owner/ Operator is a company, print the name of the person who is signing the NOI for the Owner/ Operator. A person with signatory authority for the Owner/ Operator must sign the application. The C-SWPPP Preparer cannot sign the application for the Owner/ Operator. The C-SWPPP, all reports, including monthly reports, and any information requested by DHEC must be prepared under the direction or supervision of a person with signatory authority for the Owner/ Operator or a duly authorized representative.

See below for a summary and §122.22 of S.C. Reg. 61-9 (Appendix C of the CGP) for complete information about signatory authority requirements.

- Corporation: A responsible corporate officer (e.g., president, vice-president, certain managers)
- Partnership or Sole Proprietorship: A general partner or the proprietor, respectively
- Municipality, State, Federal or Other Public Agency: Principal executive officer or ranking elected official.

DIVISION III

SC 72 FINAL UTILITY REPORT

DIVISION III

**UTILITY LETTERS AND
RELOCATION PLANS**

**CITY OF ROCK HILL POWER
RELOCATION SKETCHES**

PROJECT NO.	DIST.	COUNTY	ROUTE	SHEET NO.	TOTAL SHEETS
18	3	YORK	SC 72	7	7


SC 72 (SALUDA RD.)

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33

RELOCATE S-163 BETWEEN
STA. 184+93.03 AND STA. 189+43.20

INTERSECTION DS VEHICLE=WB-62 W/50' DESIGN RADIUS
SEE SHEET 38 FOR SC 72 PROFILE
SEE SHEET 49 FOR RELOC S-163 PROFILE
SEE SHEET D2 FOR DRAINAGE AND EROSION CONTROL NOTES

 REMOVE & DISPOSE OF EXISTING ASPHALT
PAVEMENT AS SHOWN BY CROSS HATCHING.
GRADE AND SEED.

+73.20 RELOC-S-163
50.00
+50.00 RELOC-SC-72
-70.00
RELOC STA 189+23.70
END CONSTRUCTION
S-163 (E.RAMBO RD.)

Pole Impacted at 187+40
CORH Pole 37662
Relocated

CORH Pole 37663
Doesn't appear to be
impacted.

CORH Pole 36771
Doesn't appear to
be impacted

CORH Pole 36772
Doesn't appear to
be impacted

CORH Pole 36398
Doesn't appear to
be impacted

CORH Pole 37658
Appears to be
impacted by
sidewalk.

Plans 1726.S4.87-28.dgn
P.L.L.O.T.E.A.
3/12/2020

REV. NO.	BY	CHKD.	DATE	DESCRIPTION OF REVISION
ROW6	CMC	SAS	11/2/2019	TRACT 9 - CONVERT PERMISSIONS TO TEMPORARY CONSTRUCTION EASEMENT
ROW9	CAF	CMC	3/12/2020	TRACT 23 - CONVERT PERMISSIONS TO TEMPORARY CONSTRUCTION EASEMENT



PLANS PREPARED BY
CDM Smith
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS
SC 72 PLAN
STA 15+00 TO STA 21+00
SCALE: 1" = 20'
SHEET NO. 7

PLAT NO.	BLK.	COUNTY	ROUTE	SHEET
3	S.C.	YORK	SC 72	9

SC 72 (SALUDA RD.)

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33

SEE SHEET 39 FOR SC 72 PROFILE
SEE SHEET D4 FOR DRAINAGE AND EROSION CONTROL NOTES

CONSTRUCT OUTFALL DITCH 1
APPROX. 100 L.F.
EST. EXC. = XX CY.
CLEAR AND GRUB
OBTAIN PERMISSION

CONSTRUCT OUTFALL DITCH 2
APPROX. 34 L.F.
EST. EXC. = XX CY.
CLEAR AND GRUB
OBTAIN PERMISSION

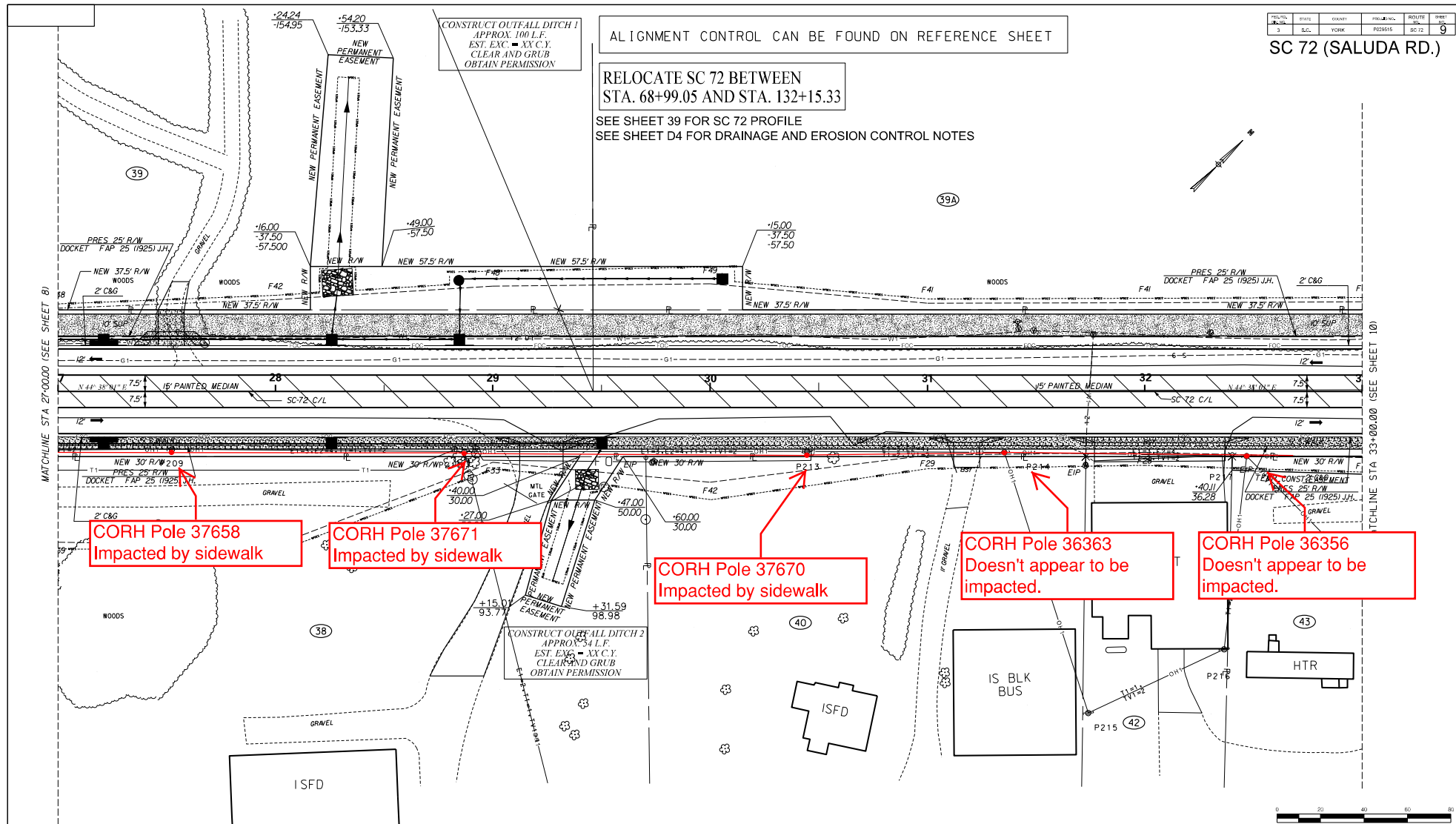
CORH Pole 37658
Impacted by sidewalk

CORH Pole 37671
Impacted by sidewalk

CORH Pole 37670
Impacted by sidewalk

CORH Pole 36363
Doesn't appear to be impacted.

CORH Pole 36356
Doesn't appear to be impacted.



Plans 1726.541.81-28.dgn
PELLDTEA
1/24/2020

REV. NO.	BY	CHKD.	DATE	DESCRIPTION OF REVISION
ROW 1	SAS	CMC	7-10-2019	REVISED TRACT 39, ADDED TRACT 39A REVISED TRACT 41
ROW 2	CAP	CMC	8-9-2019	REVISED R/W AND PERMANENT EASEMENT CALLOUTS ON TRACTS 38 & 39
ROW 7	CAP	CMC	1-15-2020	TRACT 43 - CONVERT PERMISSIONS TO TEMPORARY CONSTRUCTION EASEMENT



PLANS PREPARED BY
CDM Smith

YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS

SC 72 PLAN
STA 27+00 TO STA 33+00

SCALE: 1" = 20'

SHEET NO. 9

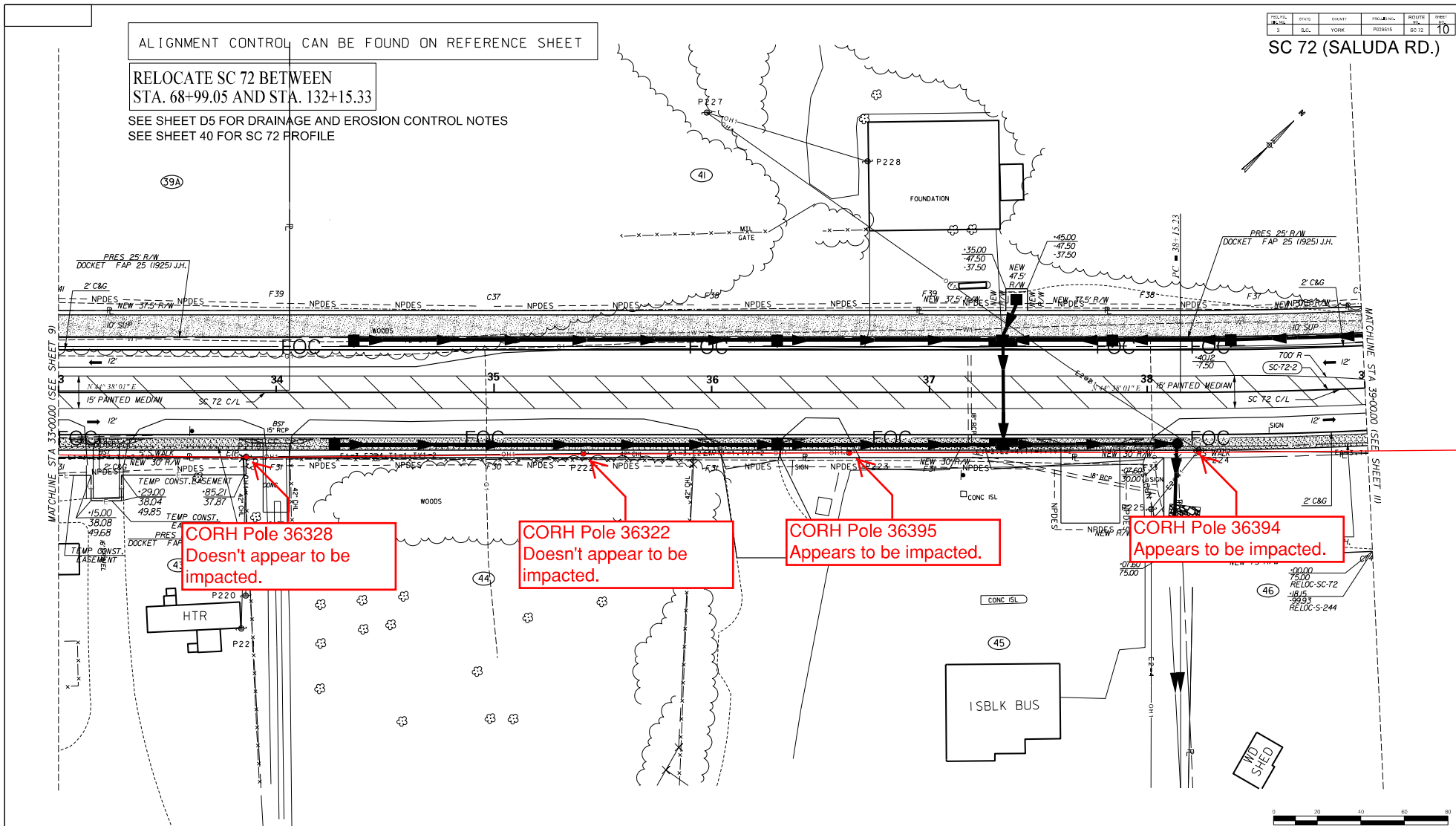
PLAT NO.	SHEET	COUNTY	PROJECT NO.	ROUTE	SHEET
3	S.C.	YORK	PC0915	SC 72	10

SC 72 (SALUDA RD.)

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33

SEE SHEET D5 FOR DRAINAGE AND EROSION CONTROL NOTES
SEE SHEET 40 FOR SC 72 PROFILE



CORH Pole 36328
Doesn't appear to be impacted.

CORH Pole 36322
Doesn't appear to be impacted.

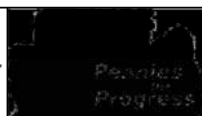
CORH Pole 36395
Appears to be impacted.

CORH Pole 36394
Appears to be impacted.

\\P\plans\726_SH_18-28.dgn
User: J.CASIDY\JCM
5/21/2020

REV. NO.	BY	CHKD.	DATE	DESCRIPTION OF REVISION
ROW 1	SAS	CMC	7-10-2019	REVISED TRACT 39, ADDED TRACT 39A REVISED TRACT 41
ROW 7	SAS	CMC	1-15-2020	TRACT 43 - CONVERT PERMISSIONS TO TEMPORARY CONSTRUCTION EASEMENT
ROW 10	CAP	CMC	05-12-2020	TRACT 45 - REVISE NEW ROW

ORIGINATOR	NAME	DATE
CHECKED		
REVISED		
VERIFIED		



PLANS PREPARED BY
CDM Smith

YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS
SC 72 PLAN
STA 33+00 TO STA 39+00
SCALE: 1" = 20' SH. NO. 10

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33

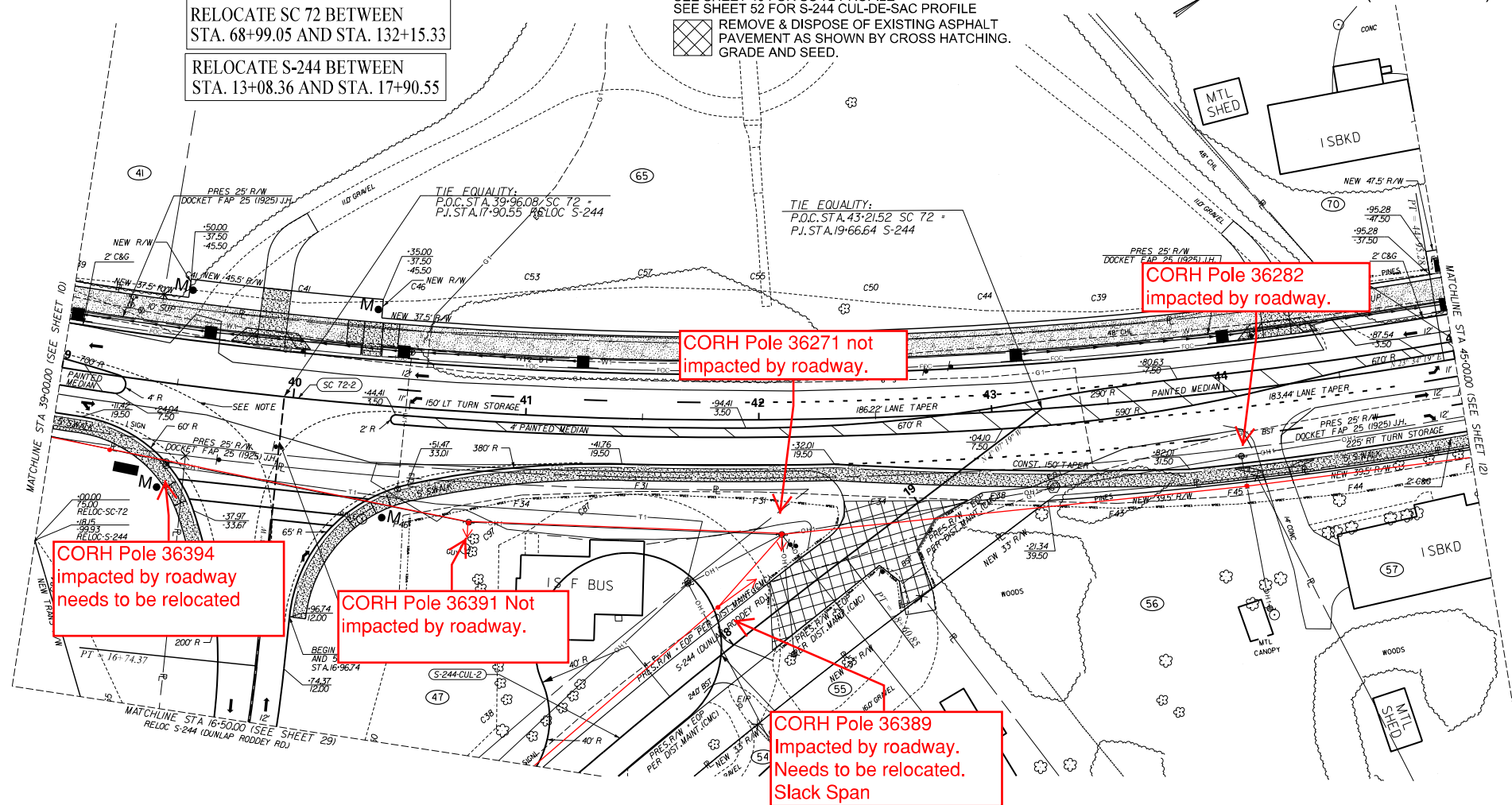
RELOCATE S-244 BETWEEN
STA. 13+08.36 AND STA. 17+90.55

INTERSECTION DS VEHICLE = WB-62 W/ 50' DS RADIUS
SEE SHEET D6 FOR DRAINAGE AND EROSION CONTROL NOTES
SEE SHEET 51 FOR RELOC S-244 PROFILE
SEE SHEET 40 FOR SC 72 PROFILE
SEE SHEET 52 FOR S-244 CUL-DE-SAC PROFILE

REMOVE & DISPOSE OF EXISTING ASPHALT
PAVEMENT AS SHOWN BY CROSS HATCHING.
GRADE AND SEED.

PLN NO.	SHEET	COUNTY	PROJECT NO.	ROUTE	SHEET
1724	3	S.C.	YORK	FD2815	11

SC 72 (SALUDA RD.)



CORH Pole 36282
impacted by roadway.

CORH Pole 36271 not
impacted by roadway.

CORH Pole 36394
impacted by roadway
needs to be relocated

CORH Pole 36391 Not
impacted by roadway.

CORH Pole 36389
Impacted by roadway.
Needs to be relocated.
Slack Span

Plans 1724_S4.11-28.dgn
RELD/TEA
1/24/2020

REV. NO.	BY	CHKD.	DATE	DESCRIPTION OF REVISION
ROW 7	CAP	CMC	1-15-2020	TRACT 65 - REV PROPERTY LINE TO 33' R/W PER PB A242




YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS

SC 72 PLAN
STA 39+00 TO STA 45+00

SCALE: 1" = 20' SH. NO. 11

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

 REMOVE & DISPOSE OF EXISTING ASPHALT PAVEMENT AS SHOWN BY CROSS HATCHING. GRADE AND SEED.

RELOCATE SC 72 BETWEEN STA. 68+99.05 AND STA. 132+15.33

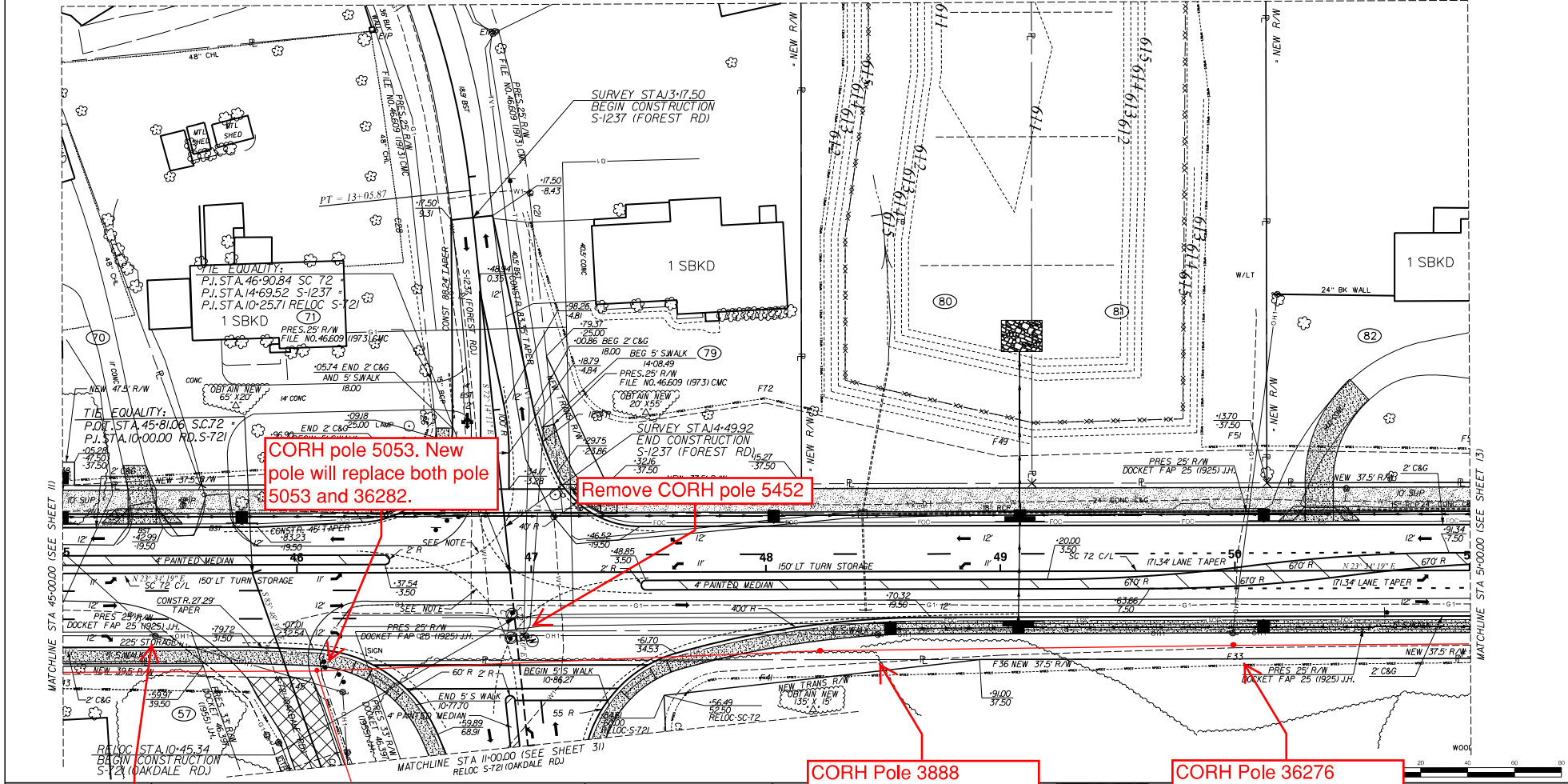
RELOCATE S-721 BETWEEN STA. 10+25.74 AND STA. 15+90.50

FOREST RD. INTERSECTION DS VEHICLE = S-BUS-40 W/36' DS RADIUS
 RELOC S-721 INTERSECTION DS VEHICLE = WB-62 W/50' DS RADIUS
 SEE SHEET 53 FOR RELOC S-721 PROFILE
 SEE SHEET 41 FOR SC 72 PROFILE
 SEE SHEET 52 FOR S-1237 PROFILE
 SEE SHEET D7 FOR DRAINAGE AND EROSION CONTROL NOTES

PROJECT NO.	SHEET	COUNTY	SCALE	DATE
12	3	YORK	P20615	SC 72

SC 72 (SALUDA RD.)

MATCHLINE STA (SEE SHEET 35)



CORH pole 5053. New pole will replace both pole 5053 and 36282.

Remove CORH pole 5452

CORH Pole 3888 Impacted by sidewalk. Will need to be relocated

CORH Pole 36276 Impacted by sidewalk. Will need to be relocated

CORH Pole 36282 Impacted by road will need to be relocated closer to Oakdale Rd

DATE	REVISIONS	DESCRIPTION OF REVISION

YORK County
south carolina

smith

COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS

SC 72 PLAN
STA 45+00 TO STA 51+00

SCALE: 1" = 20' SH. NO. 12

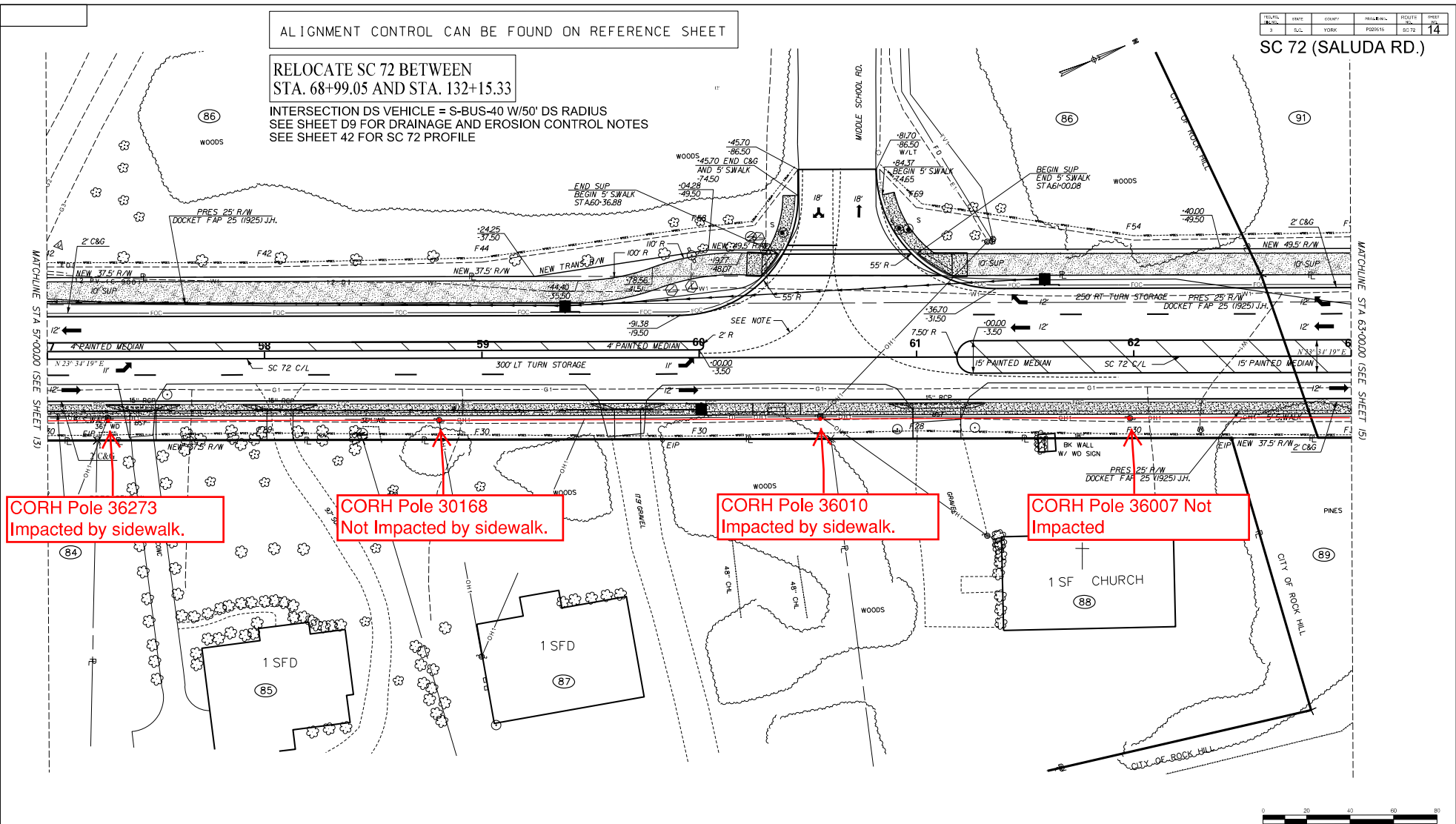
ROUTE	SHEET	COUNTY	SCALE	DATE
3	S.C.	YORK	PG2615	SC72

SC 72 (SALUDA RD.)

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33

INTERSECTION DS VEHICLE = S-BUS-40 W/50' DS RADIUS
SEE SHEET D9 FOR DRAINAGE AND EROSION CONTROL NOTES
SEE SHEET 42 FOR SC 72 PROFILE



CORH Pole 36273
Impacted by sidewalk.

CORH Pole 30168
Not Impacted by sidewalk.

CORH Pole 36010
Impacted by sidewalk.

CORH Pole 36007 Not
Impacted

\\P\plans\726_S4.14-28.dgn
SWANSONGA
1/11/2014

REV. NO.	BY	CHKD.	DATE	REVISIONS:	DESCRIPTION OF REVISION



YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS

SC 72 PLAN
STA 57+00 TO STA 63+00

SCALE: 1" = 20' SH. NO. 14

REMOVE & DISPOSE OF EXISTING ASPHALT PAVEMENT AS SHOWN BY CROSS HATCHING. GRADE AND SEED.

SEE SHEET D10 FOR DRAINAGE AND EROSION CONTROL NOTES.
SEE SHEET 42 FOR SC 72 PROFILE.
SEE SHEET 32 FOR LIMITS OF PAVEMENT REMOVAL ON S-1576.
SEE SHEET 33 FOR INTERSECTION PLAN AT S-147.

PLAT NO.	SHEET	COUNTY	PROJECT NO.	ROUTE	SHEET
3	S.C.	YORK	FD0516	SC 72	15

SC 72 (SALUDA RD.)

CORH Pole 30166 to be removed

CORH Pole 36014 Impacted by sidewalk. Relocate pole and guywire into private easement

CORH Pole 36005 Appears to be impacted by the sidewalk

CORH Pole 36036 Not in conflict

CORH Pole 36006 Not in conflict

CORH Pole 36012 Not in conflict

RELOCATE SC 72 BETWEEN STA. 68+99.05 AND STA. 132+15.33

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

\\Plans\1726_S4\15-28.dgn
PELLDTEA
1/24/2020

REV. NO.	BY	CHKD.	DATE	REVISIONS	DESCRIPTION OF REVISION
ROW. 7	SAB	CMC	1/15/2020	REMOVED RELOC S-1576 (HARPER GAULT RD)	



YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS
SC 72 PLAN
STA 63+00 TO STA 69+00
SCALE: 1" = 20'
SH. NO. 15

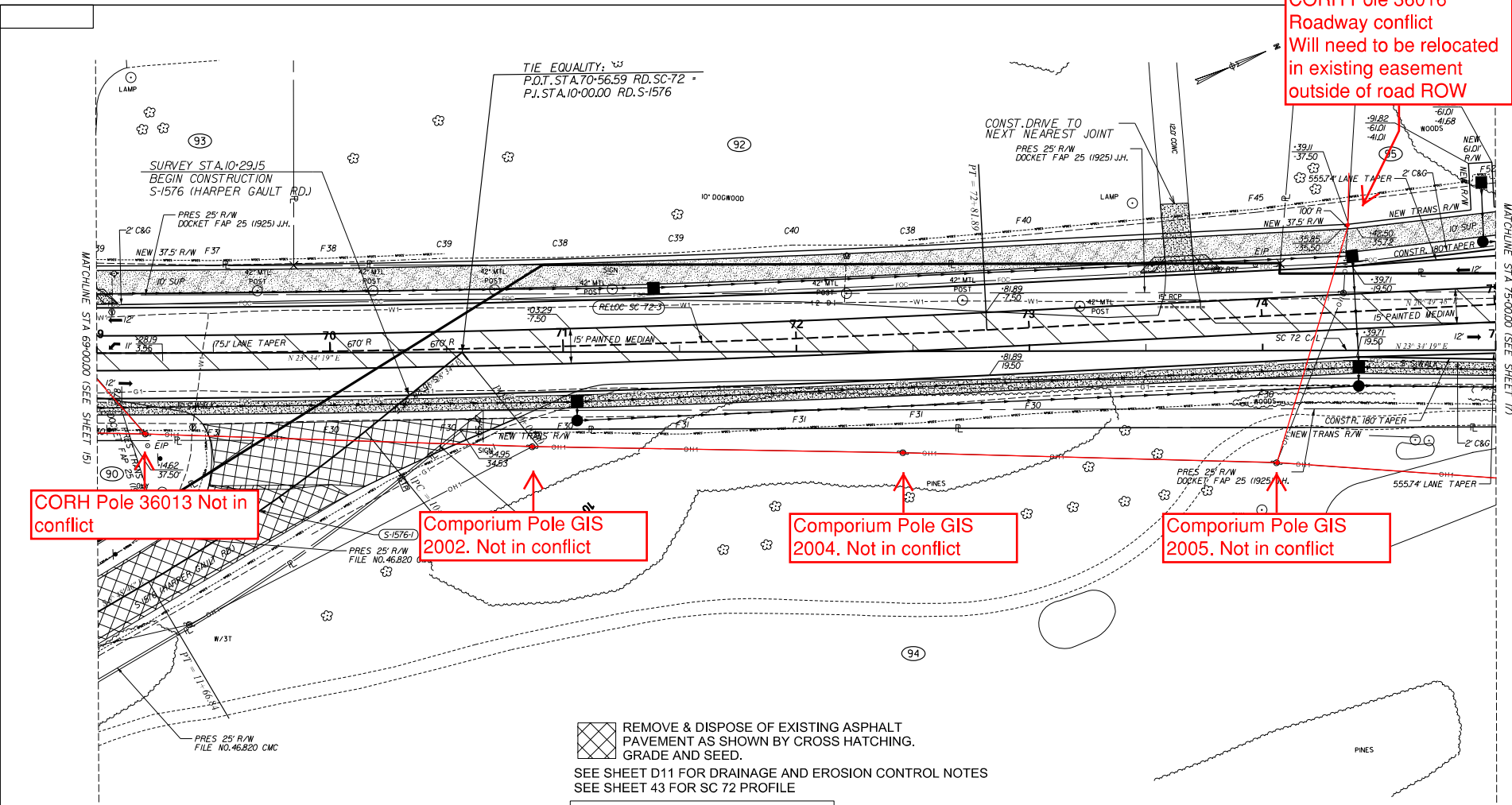
CORH Pole 36016
 Roadway conflict
 Will need to be relocated
 in existing easement
 outside of road ROW


CORH Pole 36013 Not in conflict

Comporium Pole GIS 2002. Not in conflict

Comporium Pole GIS 2004. Not in conflict

Comporium Pole GIS 2005. Not in conflict



 REMOVE & DISPOSE OF EXISTING ASPHALT PAVEMENT AS SHOWN BY CROSS HATCHING. GRADE AND SEED.

SEE SHEET D11 FOR DRAINAGE AND EROSION CONTROL NOTES
 SEE SHEET 43 FOR SC 72 PROFILE

**RELOCATE SC 72 BETWEEN
 STA. 68+99.05 AND STA. 132+15.33**

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

Plans\1726_S4.16-28.dgn
 RLLDTEA
 1/24/2020

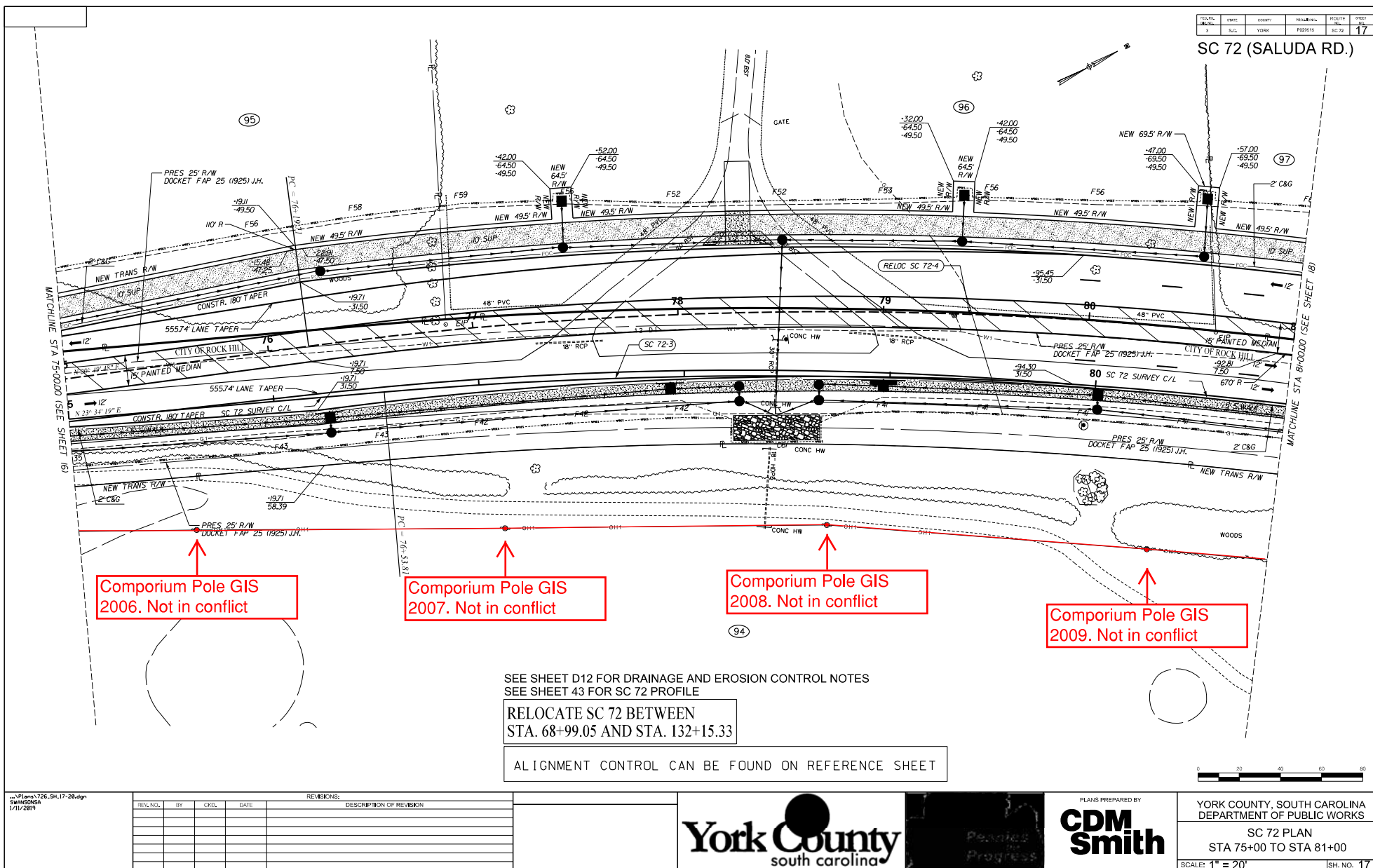
REV. NO.	BY	CHKD.	DATE	DESCRIPTION OF REVISION
ROW 2	CAP	CMC	6-9-2019	REVISED ROW AND PERMANENT EASEMENT CALLOUTS ON TRACT 94
ROW 7	SAS	CMC	1-15-2020	REMOVED RELOC S-1576 (HARPER GAULT RD) ALIGNMENT



PLANS PREPARED BY
**YORK COUNTY, SOUTH CAROLINA
 DEPARTMENT OF PUBLIC WORKS**
 SC 72 PLAN
 STA 69+00 TO STA 75+00
 SCALE: 1" = 20' SH. NO. 16

SCALE	SHEET	COUNTY	PROJECT	DATE
1" = 20'	17	YORK	SC 72	11/1/2014

SC 72 (SALUDA RD.)



SEE SHEET D12 FOR DRAINAGE AND EROSION CONTROL NOTES
 SEE SHEET 43 FOR SC 72 PROFILE

RELOCATE SC 72 BETWEEN
 STA. 68+99.05 AND STA. 132+15.33

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

\\P\plans\726_S4.17-28.dgn
 SWANSONA
 1/11/2014

REV. NO.	BY	CHKD.	DATE	REVISIONS:	DESCRIPTION OF REVISION



PLANS PREPARED BY
CDM Smith
 YORK COUNTY, SOUTH CAROLINA
 DEPARTMENT OF PUBLIC WORKS
 SC 72 PLAN
 STA 75+00 TO STA 81+00
 SCALE: 1" = 20' SH. NO. 17

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33

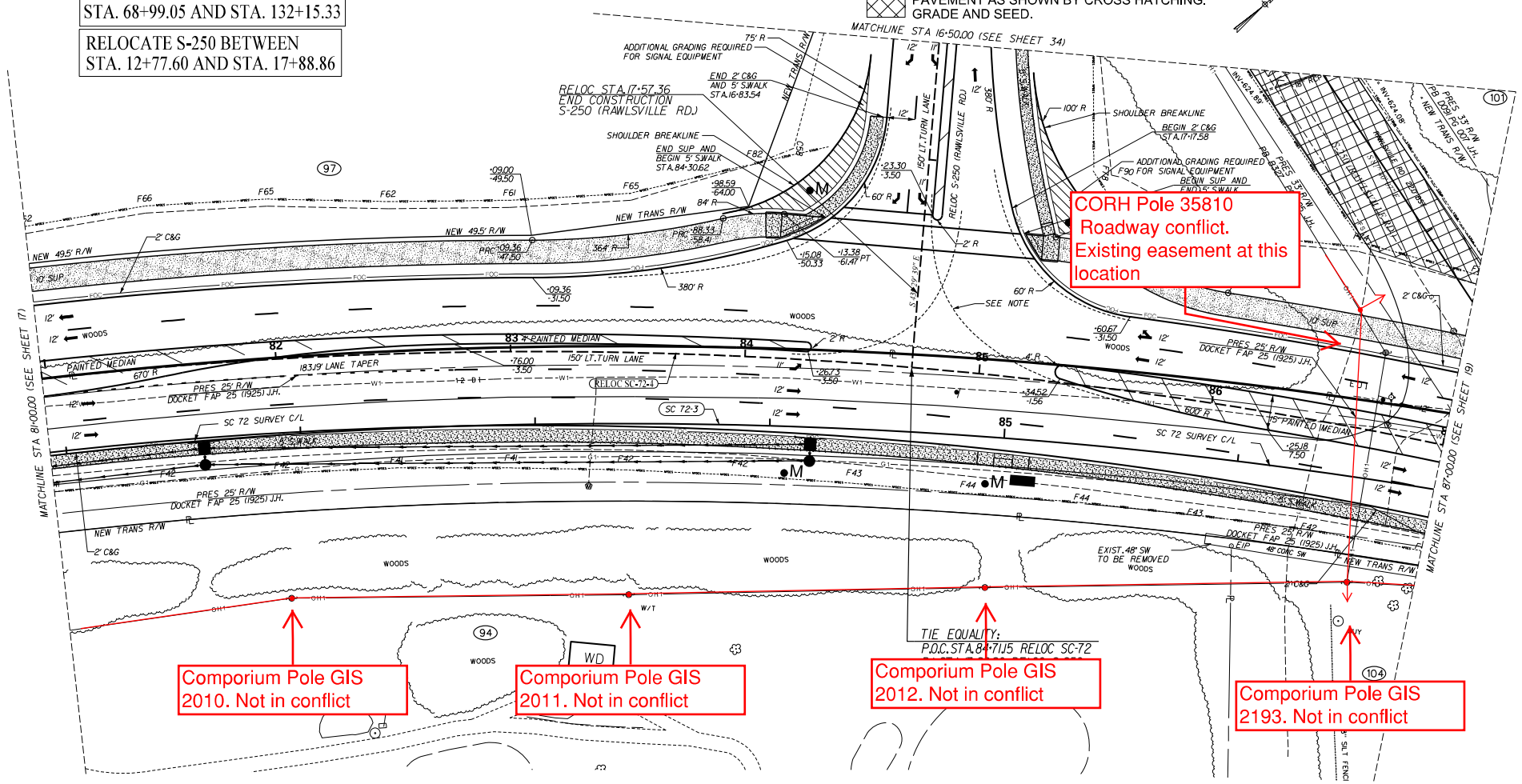
RELOCATE S-250 BETWEEN
STA. 12+77.60 AND STA. 17+88.86

INTERSECTION DS VEHICLE = WB-62 W/50' DS RADIUS
SEE SHEET D13 FOR DRAINAGE AND EROSION CONTROL WORKS
SEE SHEET 44 FOR SC 72 PROFILE
SEE SHEET 55 FOR RELOC S-250 PROFILE

REMOVE & DISPOSE OF EXISTING ASPHALT
PAVEMENT AS SHOWN BY CROSS HATCHING.
GRADE AND SEED.

SCALE	SHEET	COUNTY	PROJECT	DATE
3	S-2	YORK	PG2615	SC 72

SC 72 (SALUDA RD.)



\\Plans\726_S4.18-28.dgn
SWANSONA
1/11/2014

REV. NO.	BY	CHKD.	DATE	REVISIONS	DESCRIPTION OF REVISION



YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS

SC 72 PLAN
STA 81+00 TO STA 87+00

SCALE: 1" = 20' SH. NO. 18

SHEET NO.	DIST.	COUNTY	PROJECT NO.	ROUTE	SHEET
3	S.C.	YORK	FD2615	SC 72	19

SC 72 (SALUDA RD.)

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

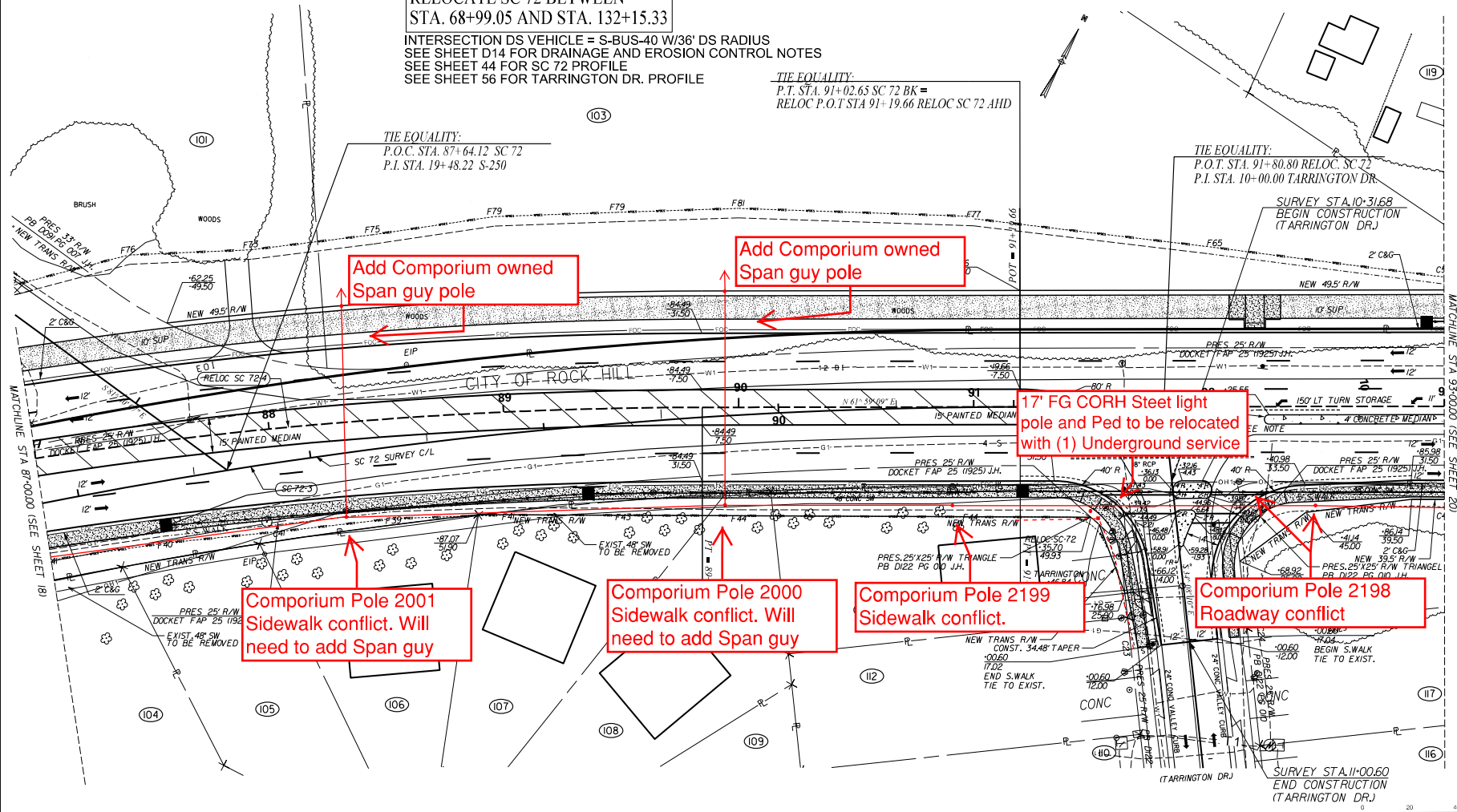
RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33

INTERSECTION DS VEHICLE = S-BUS-40 W/36' DS RADIUS
SEE SHEET D14 FOR DRAINAGE AND EROSION CONTROL NOTES
SEE SHEET 44 FOR SC 72 PROFILE
SEE SHEET 56 FOR TARRINGTON DR. PROFILE

TIE EQUALITY:
P.T. STA. 91+02.65 SC 72 BK =
RELOC P.O.T. STA 91+19.66 RELOC SC 72 AHD

TIE EQUALITY:
P.O.C. STA. 87+64.12 SC 72
P.I. STA. 19+48.22 S-250

TIE EQUALITY:
P.O.T. STA. 91+80.80 RELOC. SC 72
P.I. STA. 10+00.00 TARRINGTON DR.



Plans 1726.S4.19-28.dgn
P.L.L.O.T.E.A.
1/24/2020

REV. NO.	BY	CHKD.	DATE	DESCRIPTION OF REVISION
ROW 7	CAP	CMC	12/3/19	UPDATED RAW ON TRACTS 106, 107, 108 AND 113



PLANS PREPARED BY
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS
SC 72 PLAN
STA 87+00 TO STA 93+00
SCALE: 1" = 20'
SHEET NO. 19

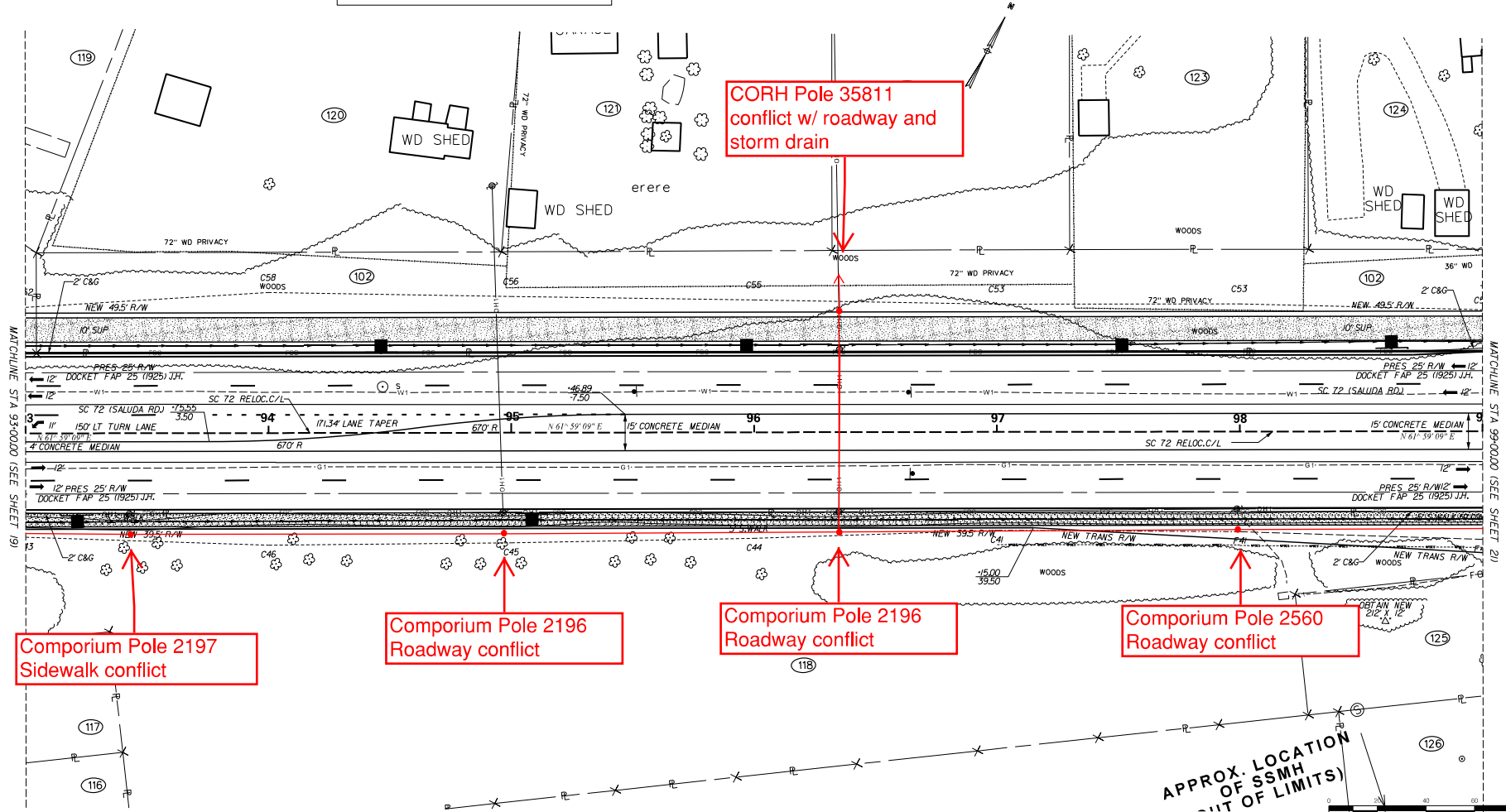
ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

SEE SHEET D15 FOR DRAINAGE AND EROSION CONTROL NOTES
SEE SHEET 45 FOR SC 72 PROFILE

SCALE	SHEET	COUNTY	PROJECT	SHEET
3"	S-2	YORK	PG&E15	20

RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33

SC 72 (SALUDA RD.)



Comporium Pole 2197
Sidewalk conflict

Comporium Pole 2196
Roadway conflict

Comporium Pole 2196
Roadway conflict

Comporium Pole 2560
Roadway conflict

APPROX. LOCATION
OF SSMH
(OUT OF LIMITS)

\\Plans\726_S4_28-28.dwg
SWANSONA
1/11/2014

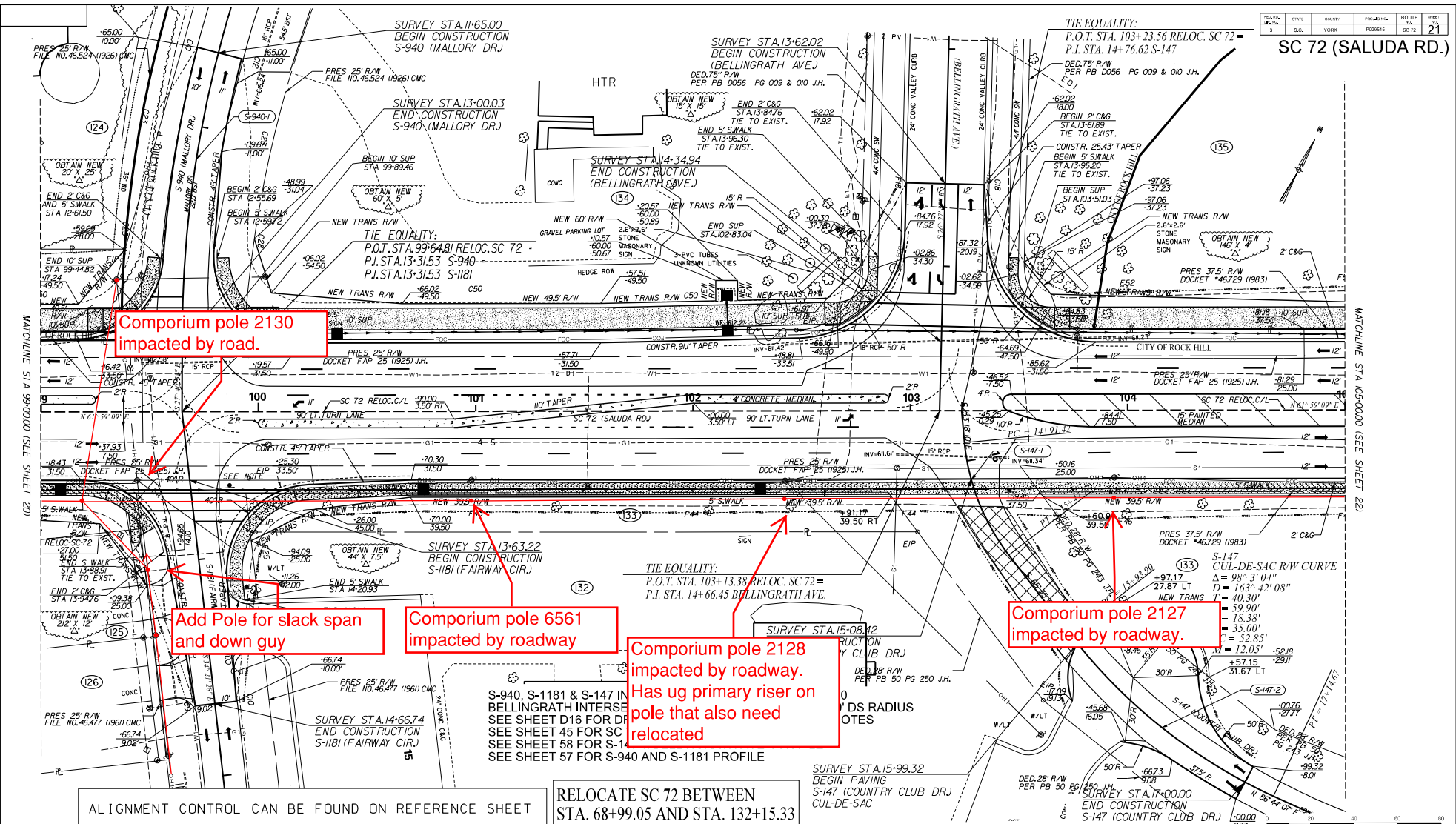
REV. NO.	BY	CHKD.	DATE	REVISIONS	DESCRIPTION OF REVISION



PLANS PREPARED BY
CDM Smith
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS
SC 72 PLAN
STA 93+00 TO STA 99+00
SCALE: 1" = 20'
SH. NO. 20

FILE NO.	DIST.	COUNTY	PROJECT NO.	ROUTE	SHEET
3	S.C.	YORK	FD2616	SC 72	21

SC 72 (SALUDA RD.)



Comporium pole 2130 impacted by road.

Add Pole for slack span and down guy

Comporium pole 6561 impacted by roadway

Comporium pole 2128 impacted by roadway. Has ug primary riser on pole that also need relocated

Comporium pole 2127 impacted by roadway.

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

RELOCATE SC 72 BETWEEN STA. 68+99.05 AND STA. 132+15.33

S-940, S-1181 & S-147 IN BELLINGRATH INTERSE. SEE SHEET D16 FOR DR. SEE SHEET 45 FOR SC. SEE SHEET 58 FOR S-147. SEE SHEET 57 FOR S-940 AND S-1181 PROFILE

Plans 1726, S4.21-28.dgn
PELLOTTA
1/24/2020

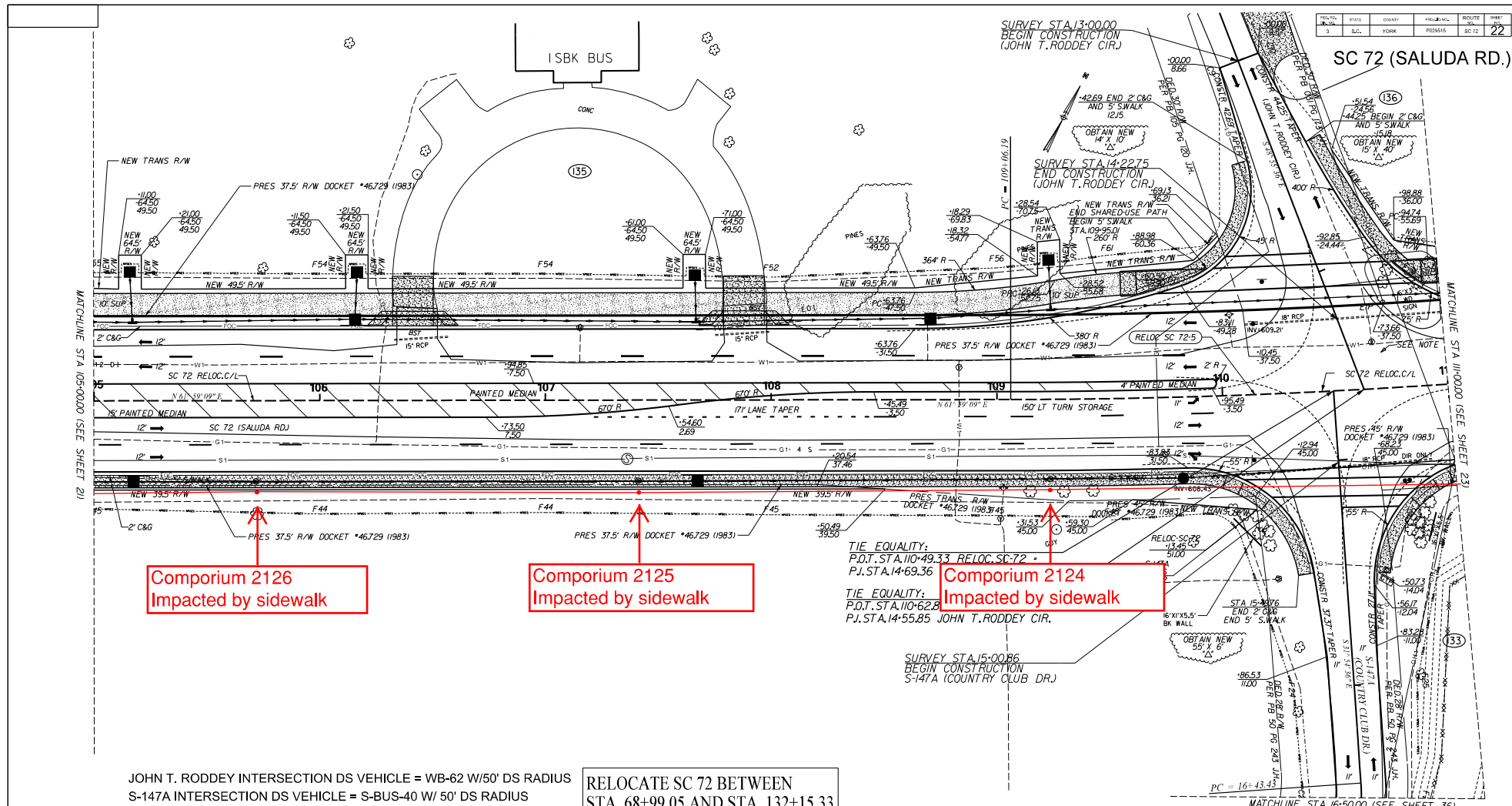
REV. NO.	BY	CHKD.	DATE	REVISIONS	DESCRIPTION OF REVISION
ROW 7	SAS	CMC	12-20-20	REPLACED S-147	INTERSECTION WITH SC 72 WITH CUL-DE-SAC
ROW 7	SAS	CMC	12-20-20	REVISED SC 72	MEDIAN FROM TARRINGTON TO BELLINGRATH



PLANS PREPARED BY
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS
SC 72 PLAN
STA 99+00 TO STA 105+00
SCALE: 1" = 20'
SH. NO. 21

FILE NO.	SHEET	COUNTY	PROJECT NO.	ROUTE	SHEET
3	S.C.	YORK	PD2615	SC 72	22

SC 72 (SALUDA RD.)



JOHN T. RODDEY INTERSECTION DS VEHICLE = WB-62 W/50' DS RADIUS
 S-147A INTERSECTION DS VEHICLE = S-BUS-40 W/ 50' DS RADIUS
 SEE SHEET D17 FOR DRAINAGE AND EROSION CONTROL NOTES
 SEE SHEET 46 FOR SC 72 PROFILE
 SEE SHEET 59 FOR S-147A & JOHN T. RODDEY CIR. PROFILES

RELOCATE SC 72 BETWEEN
 STA. 68+99.05 AND STA. 132+15.33

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

Plans 1726_S4_22-28.dgn
 PELLOTEA
 1/24/2020

REV. NO.	BY	CHKD.	DATE	DESCRIPTION OF REVISION
ROW 7	SAB	CMC	1/15/2020	REVISED MEDIAN S147 TO S147A



PLANS PREPARED BY
CDM Smith
 YORK COUNTY, SOUTH CAROLINA
 DEPARTMENT OF PUBLIC WORKS
 SC 72 PLAN
 STA 105+00 TO STA 111+00
 SCALE: 1" = 20' SH. NO. 22

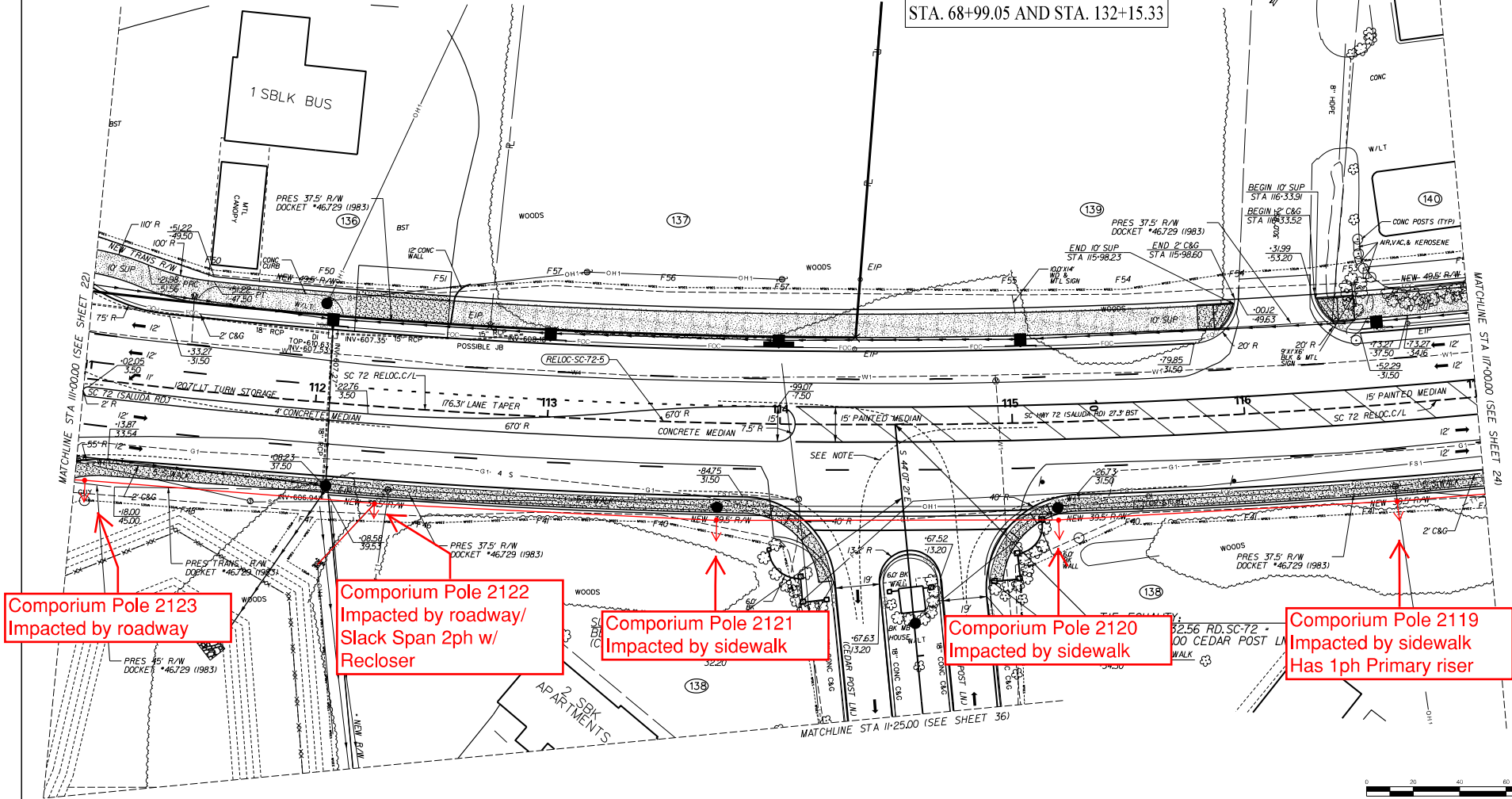
CEDAR POST LN INTERSECTION DS VEHICLE = S-BUS-40 W/36' DS RADIUS
 SEE SHEET D18 FOR DRAINAGE AND EROSION CONTROL NOTES
 SEE SHEET 46 FOR SC 72 PROFILE
 SEE SHEET 60 FOR CEDAR POST LN PROFILE

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

RELOCATE SC 72 BETWEEN
 STA. 68+99.05 AND STA. 132+15.33

PROJECT	SHEET	COUNTY	SCALE	DATE	NO.
SC 72	3	YORK	P2615	SC 72	23

SC 72 (SALUDA RD.)



Comporium Pole 2123
 Impacted by roadway

Comporium Pole 2122
 Impacted by roadway/
 Slack Span 2ph w/
 Recloser

Comporium Pole 2121
 Impacted by sidewalk

Comporium Pole 2120
 Impacted by sidewalk

Comporium Pole 2119
 Impacted by sidewalk
 Has 1ph Primary riser

Plans 126_S4_23-28.dwg
 SWANSONA
 1/11/2014

REV. NO.	BY	CHKD.	DATE	REVISIONS	DESCRIPTION OF REVISION



YORK COUNTY, SOUTH CAROLINA
 DEPARTMENT OF PUBLIC WORKS

SC 72 PLAN
 STA 111+00 TO STA 117+00

SCALE: 1" = 20' SH. NO. 23

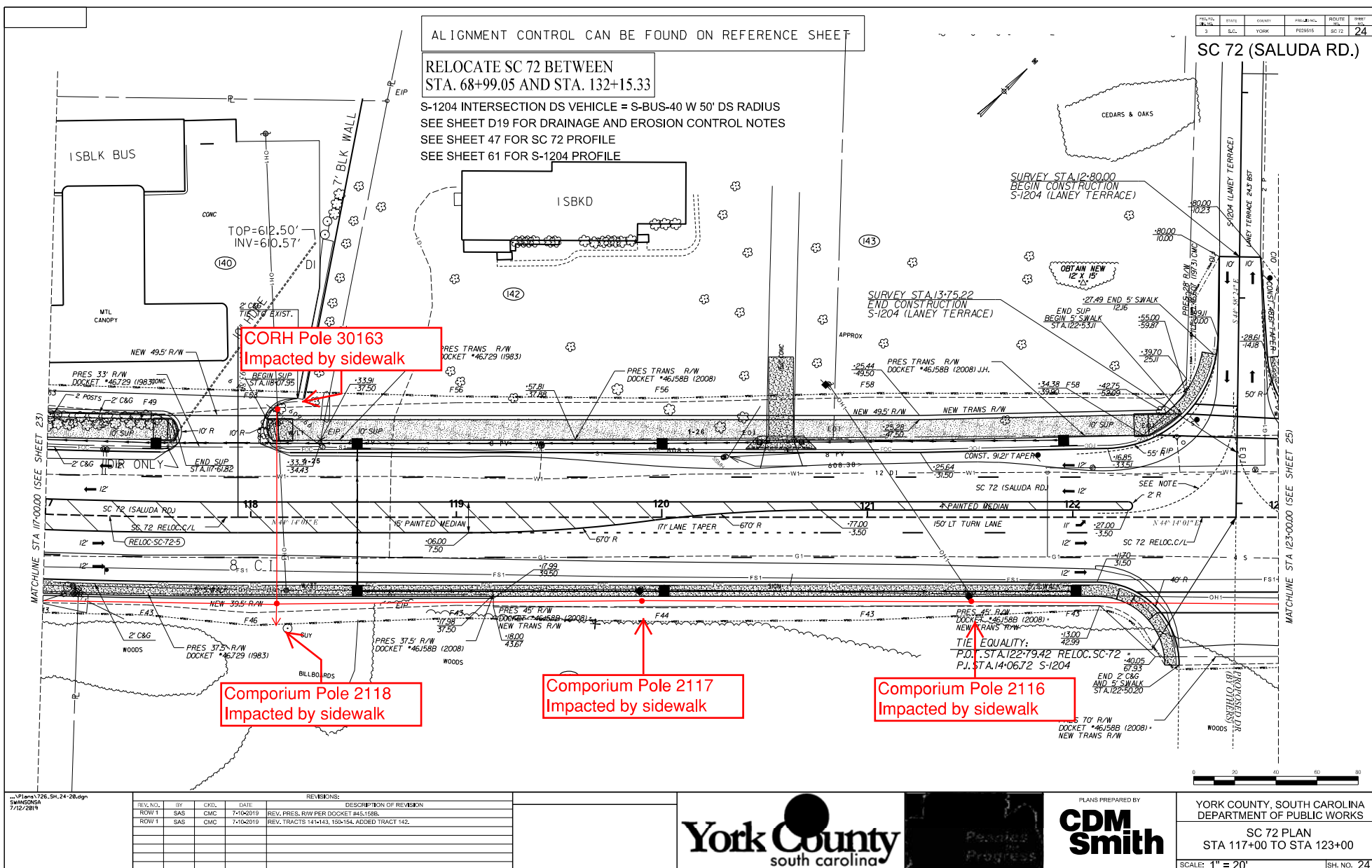
PLN. NO.	SHEET	COUNTY	PROJ. NO.	ROUTE	SHEET
3	S.C.	YORK	FD2615	SC 72	24

SC 72 (SALUDA RD.)

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33

S-1204 INTERSECTION DS VEHICLE = S-BUS-40 W 50' DS RADIUS
SEE SHEET D19 FOR DRAINAGE AND EROSION CONTROL NOTES
SEE SHEET 47 FOR SC 72 PROFILE
SEE SHEET 61 FOR S-1204 PROFILE



CORH Pole 30163
Impacted by sidewalk

Comporium Pole 2118
Impacted by sidewalk

Comporium Pole 2117
Impacted by sidewalk

Comporium Pole 2116
Impacted by sidewalk

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SWINSONSA
7/12/2019

REV. NO.	BY	CHKD.	DATE	DESCRIPTION OF REVISION
ROW 1	SAS	CMC	7-10-2019	REV. PRES. R/W PER DOCKET #45,158B.
ROW 1	SAS	CMC	7-10-2019	REV. TRACTS 141+143, 150-154, ADDED TRACT 142.



YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS

SC 72 PLAN
STA 117+00 TO STA 123+00

SCALE: 1" = 20' SH. NO. 24

FILE NO.	DIST.	COUNTY	PROJECT NO.	ROUTE	SHEET
3	S.C.	YORK	POB515	SC 72	25

SC-72 (SALUDA RD.)

New underground feeder required as the original is in conflict. (2" bore @36" depth)

New underground feeder required as the original is in conflict. (2" bore @36" depth)

New underground feeder required as the original is in conflict. (2" bore @36" depth)

St light 6889
New st light location.
Sidewalk conflict

St light 6888
New st light location.
Sidewalk conflict

St light 6887
New st light location.
Sidewalk conflict

Comporium Pole 2115 w/
1ph Ug Riser, 3ph OH tap
Roadway Conflict

Comporium Pole 2114
No Conflict

Comporium Pole 6336
No Conflict

Comporium Pole 2111
No Conflict

CORH Fg Street light
pole and Ug secondary,
sidewalk conflict

RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

Plans 1726, SH. 25-28, 29
P.L.L. 1/24/2020

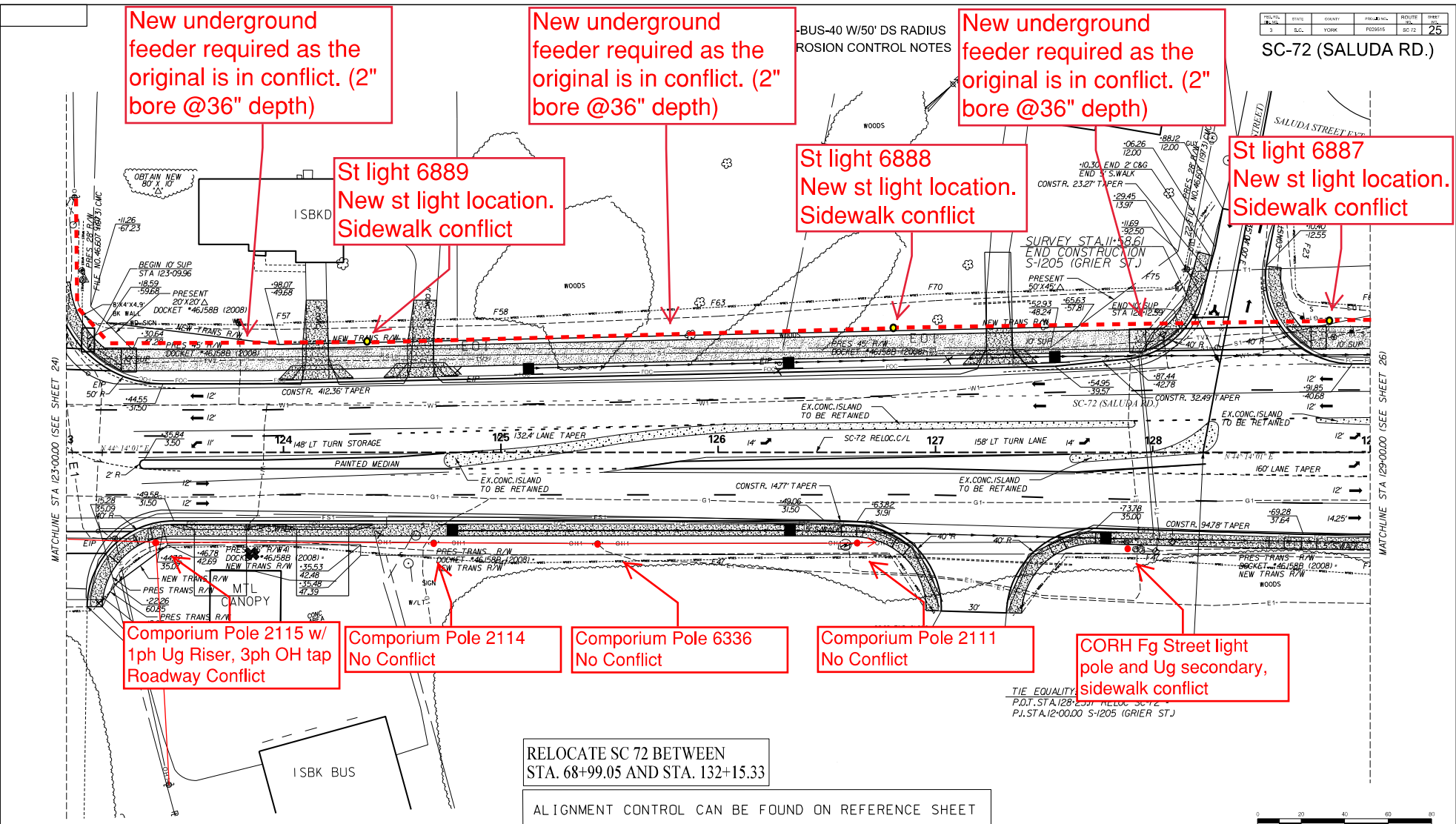
REV. NO.	BY	CHKD.	DATE	REVISIONS	DESCRIPTION OF REVISION
ROW 1	SAS	CMC	7-10-2019	REV. PRES. R/W PER DOCKET #43, 158B, TRACTS 141+143, 150+154 AND 159.	
ROW 1	SAS	CMC	7-10-2019	REV. GRIER ST. INTERSECTION	
ROW 5	CAP	CMC	9-20-2019	TRACTS 153, 154 AND 155 COMBINED INTO TRACT 157	
ROW 7	CAP	CMC	1-15-2020	TRACT 152 REVISED DRIVEWAYS	



YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS

SC 72 PLAN
STA 123+00 TO STA 129+00

SCALE: 1" = 20' SH. NO. 25



ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

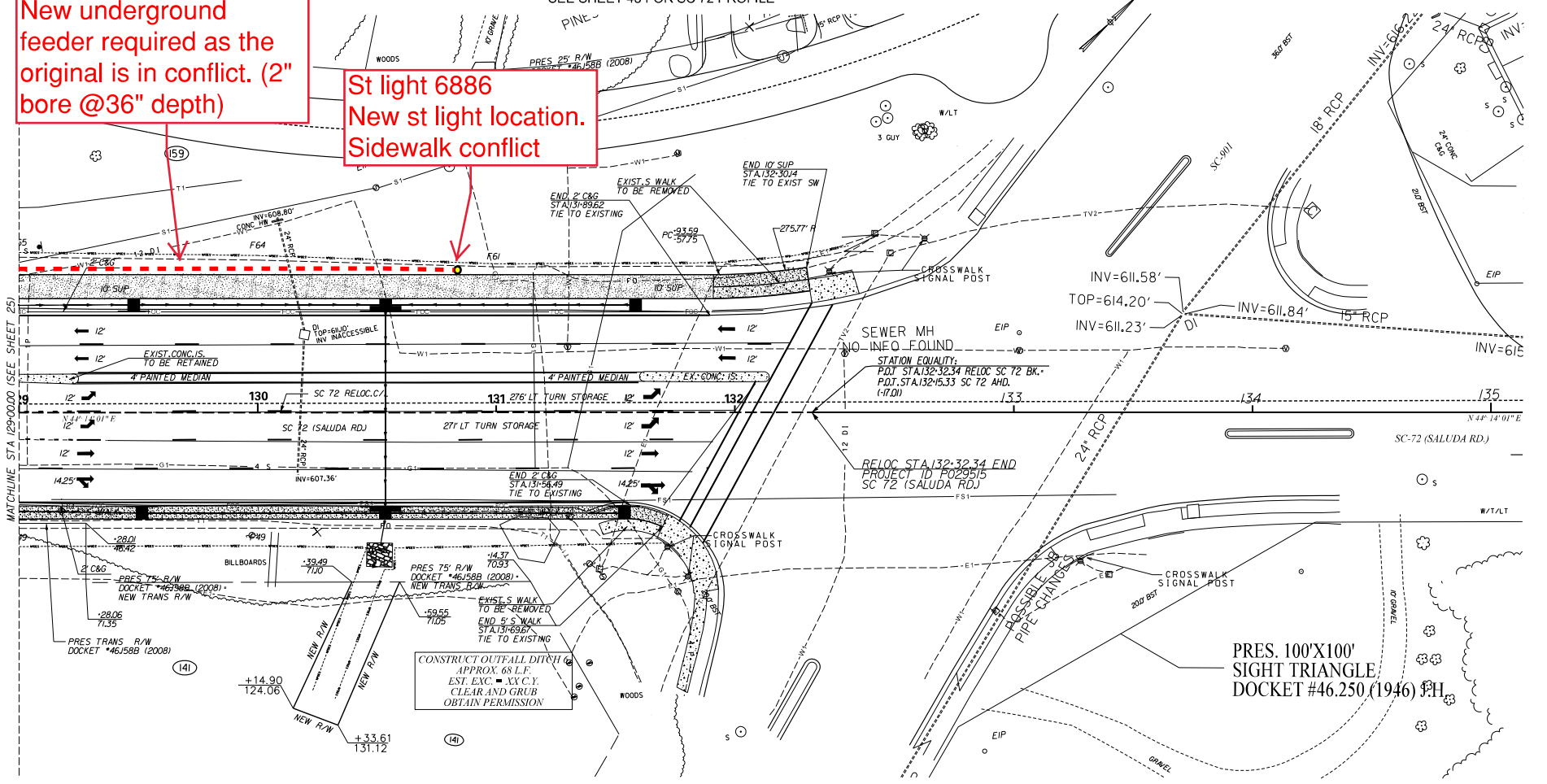
RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33

PLN. NO.	SHEET	COUNTY	PROJECT NO.	ROUTE	SHEET
3	S.C.	YORK	PO29515	SC 72	26

SC 72 (SALUDA RD.)

New underground feeder required as the original is in conflict. (2" bore @36" depth)

St light 6886
New st light location.
Sidewalk conflict



Plans 1726.S4.26-28.dgn
PLOT DATE
1/28/2020

REV. NO.	BY	CHKD.	DATE	DESCRIPTION OF REVISION
ROW 1	SAB	CMC	7-10-2019	REV. PRES R/W PER DOCKET #45, 158B, TRACTS 141+143, 150+154 AND 159.
ROW 2	CAP	CMC	8-9-2019	REVISED R/W AND PERMANENT EASEMENT CALLOUTS ON TRACT 141
ROW 3	CAP	CMC	1-28-2020	TRACT 141 - REVISED PERM. EASEMENT CALLOUT TO READ 'NEW R/W'



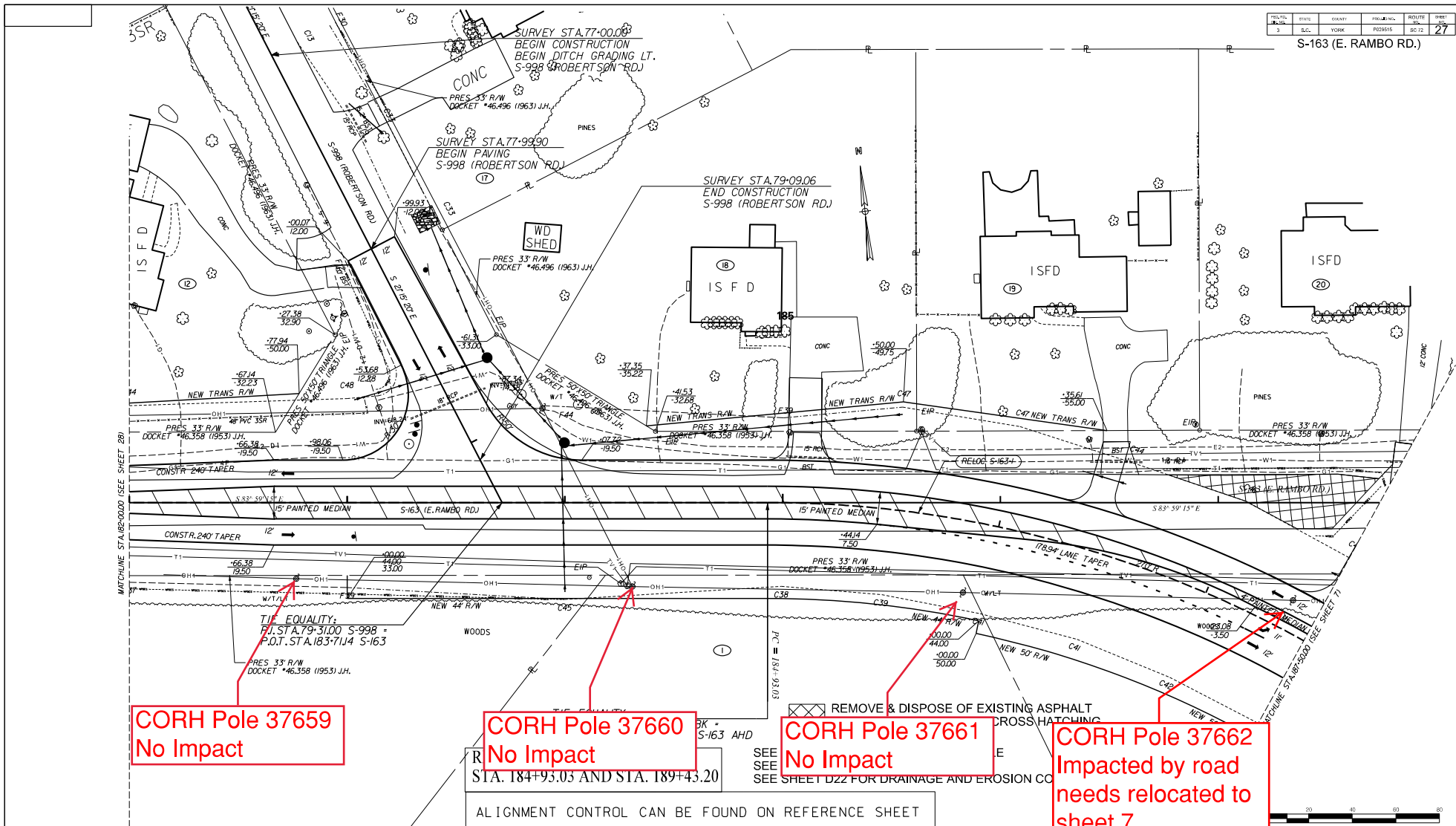
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS

SC 72 PLAN
STA 129+00 TO 132+32.34

SCALE: 1" = 20' SH. NO. 26

PLAT NO.	SHEET	COUNTY	PROJECT NO.	ROUTE	SHEET
3	S.C.	YORK	FD2915	SC 72	27

S-163 (E. RAMBO RD.)



CORH Pole 37659
No Impact

CORH Pole 37660
No Impact

CORH Pole 37661
No Impact

CORH Pole 37662
Impacted by road
needs relocated to
sheet 7

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

\\plans\726_S127-28.dgn
SWINSONA
7/12/2019

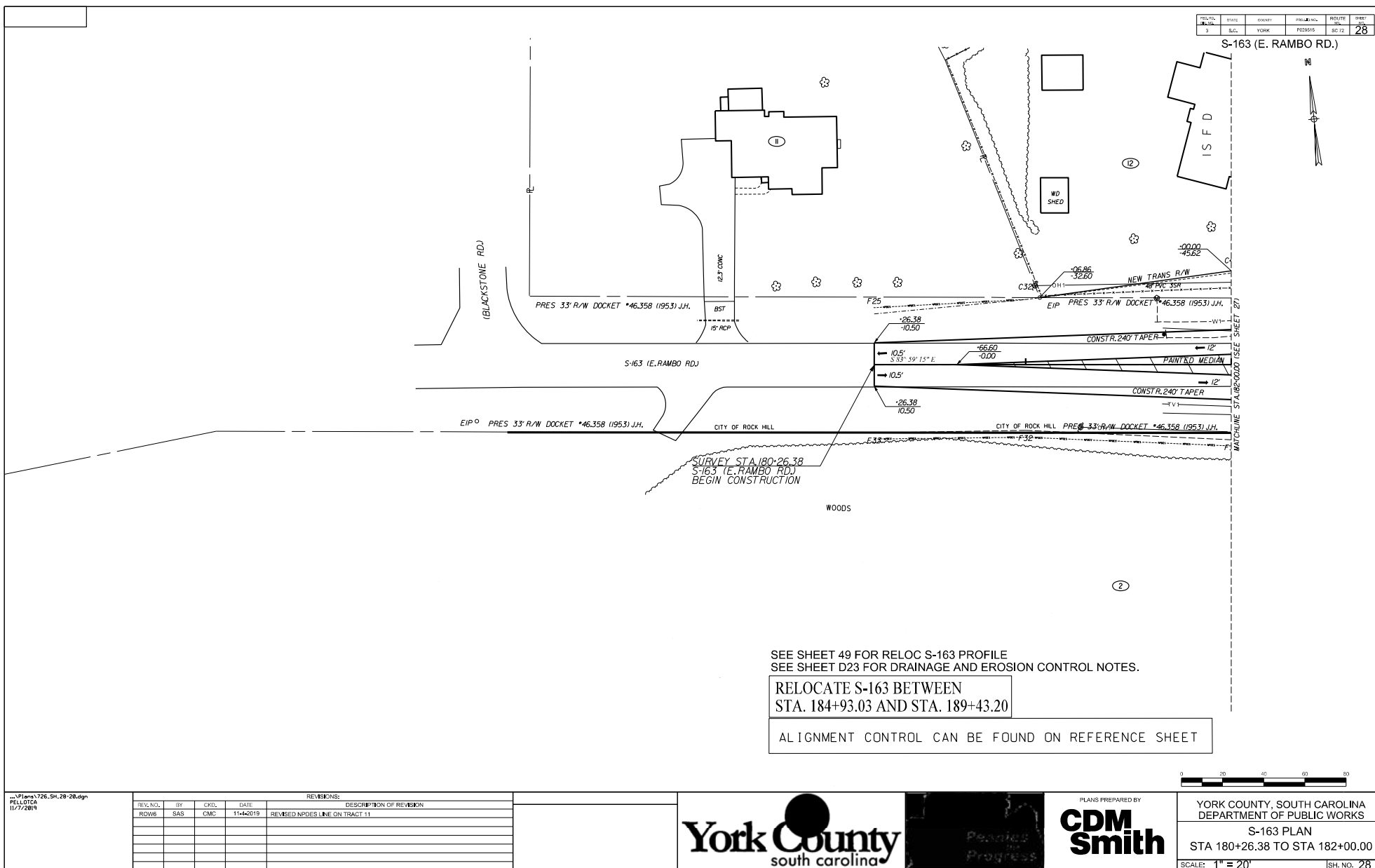
REV. NO.	BY	CHKD.	DATE	DESCRIPTION OF REVISION
ROW 1	SAB	CMC	7-10-2019	REVISED DRAINAGE AND NEW R/W TRACT 18.



PLANS PREPARED BY
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS
S-163 PLAN
STA 182+00 TO STA 187+50
SCALE: _____
SHEET NO. 27

FED. RD. DIST.	STATE	COUNTY	PROJECT NO.	ROUTE	SHEET NO.
3	S.C.	YORK	FD2615	SC 72	28

S-163 (E. RAMBO RD.)



SEE SHEET 49 FOR RELOC S-163 PROFILE
SEE SHEET D23 FOR DRAINAGE AND EROSION CONTROL NOTES.

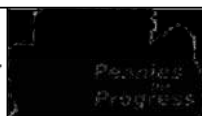
RELOCATE S-163 BETWEEN
STA. 184+93.03 AND STA. 189+43.20

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET



\\Plans\726.54.28-28.dgn
PELLDTCA
11/7/2019

REV. NO.	BY	CHKD.	DATE	REVISIONS
ROW6	SAS	CMC	11-4-2019	REVISED NPDES LINE ON TRACT 11



PLANS PREPARED BY
CDM Smith

YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS
S-163 PLAN
STA 180+26.38 TO STA 182+00.00
SCALE: 1" = 20'
SHEET NO. 28

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

PLAT NO.	SHEET	COUNTY	PROJECT NO.	ROUTE	SHEET
3	S.C.	YORK	FD2615	SC 12	29

S-244 (DUNLAP RODDEY RD.)

RELOCATE S-244 BETWEEN
STA. 13+08.36 AND STA. 17+90.55

SEE SHEET 51 FOR RELOC S-244 PROFILE
SEE SHEET 52 FOR CUL-DE-SAC PROFILE
SEE SHEET D24 FOR DRAINAGE AND EROSION CONTROL NOTES.

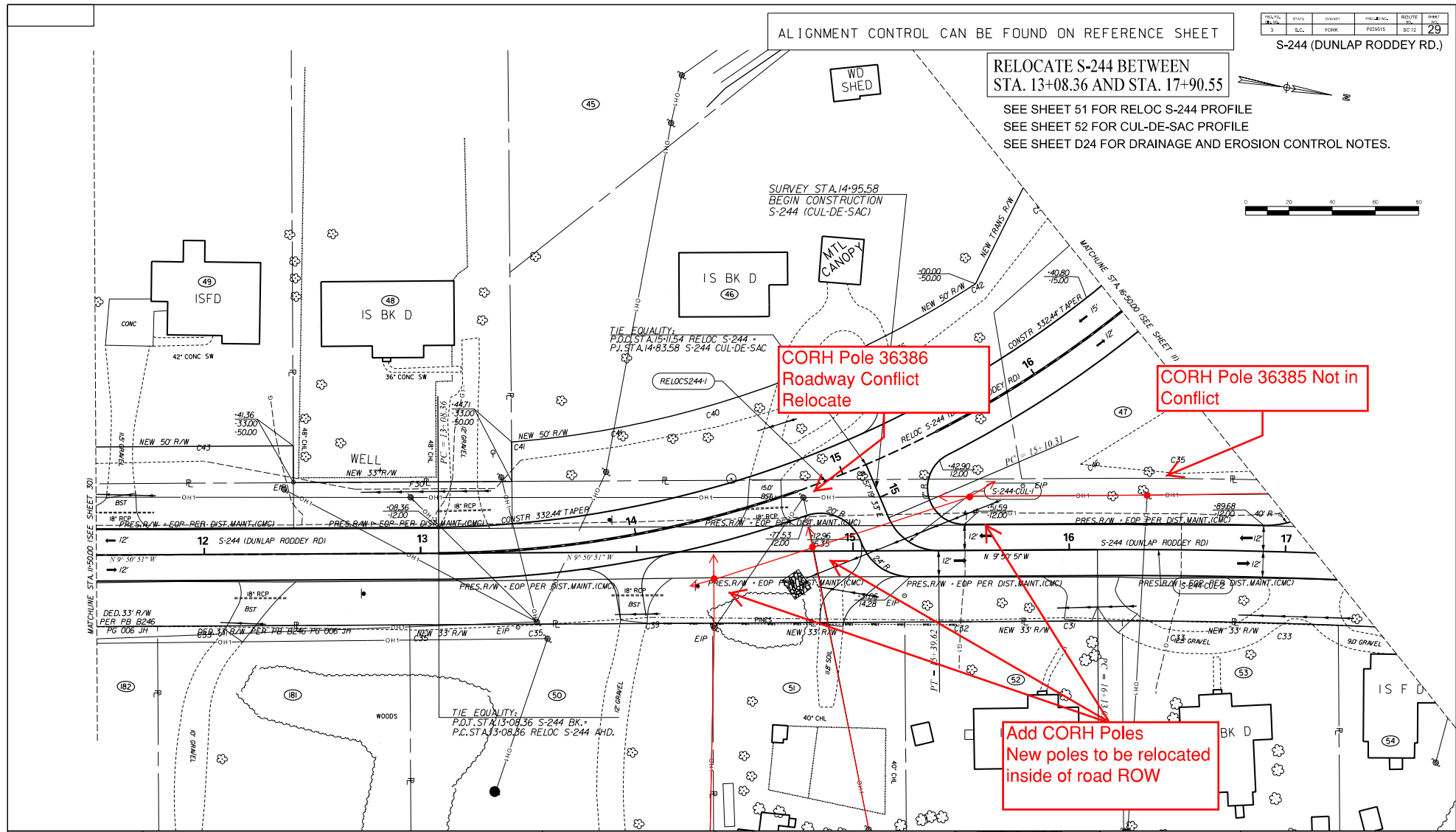


SURVEY STA. 14+95.58
BEGIN CONSTRUCTION
S-244 (CUL-DE-SAC)

**CORH Pole 36386
Roadway Conflict
Relocate**

**CORH Pole 36385 Not in
Conflict**

**Add CORH Poles
New poles to be relocated
inside of road ROW**



Plans 1726.S4.21-28.dgn
PLOT DATE
1/24/2020

REV. NO.	BY	CHKD.	DATE	DESCRIPTION OF REVISION
ROW 7	CAP	CMC	1/15/2020	TRACT 48 - REVISED NEW ROW



PLANS PREPARED BY
**YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS**

S-244 PLAN
STA 11+50 TO STA 16+50

SCALE: 1"=20'
SH. NO. 29

TITLE	SHEET	COUNTY	WATERWAY	ROUTE	SHEET
S-244	3	YORK	PG2615	SC 72	30

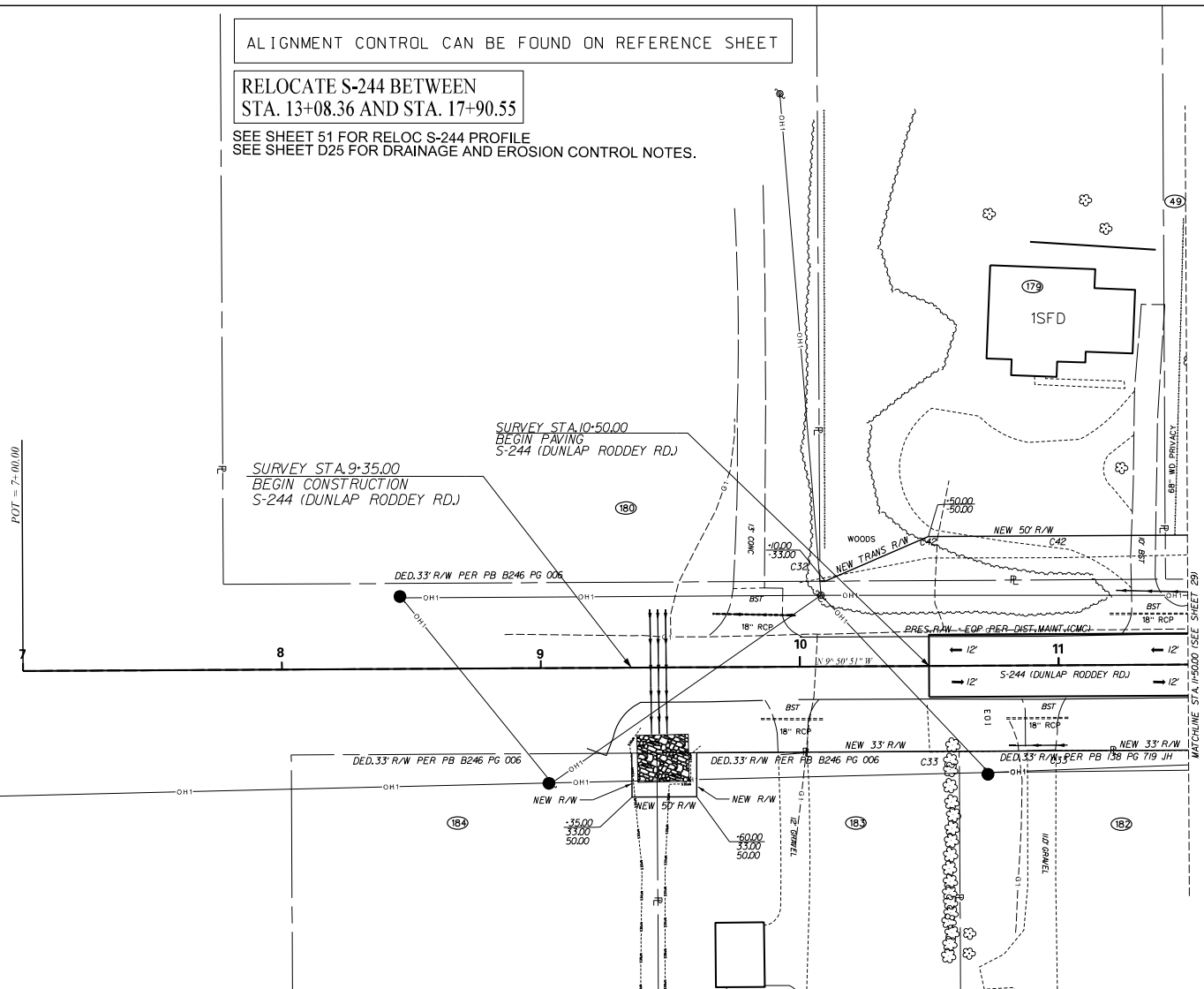
S-244 (DUNLAP-RODDEY RD.)



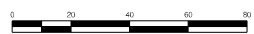
ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

RELOCATE S-244 BETWEEN
STA. 13+08.36 AND STA. 17+90.55

SEE SHEET 51 FOR RELOC S-244 PROFILE
SEE SHEET D25 FOR DRAINAGE AND EROSION CONTROL NOTES.



PROT = 7'-00.00



\\P\plans\1726_S4_30-28.dwg
SWANSONA
1/11/2014

REV. NO.	BY	CHKD.	DATE	DESCRIPTION OF REVISION



PLANS PREPARED BY
CDM Smith


YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS

S-244 PLAN
STA 10+50 TO STA 11+50

SCALE: 1"=20' SH. NO. 30

RELOCATE S-721 BETWEEN STA. 10+25.74 AND STA. 15+90.50

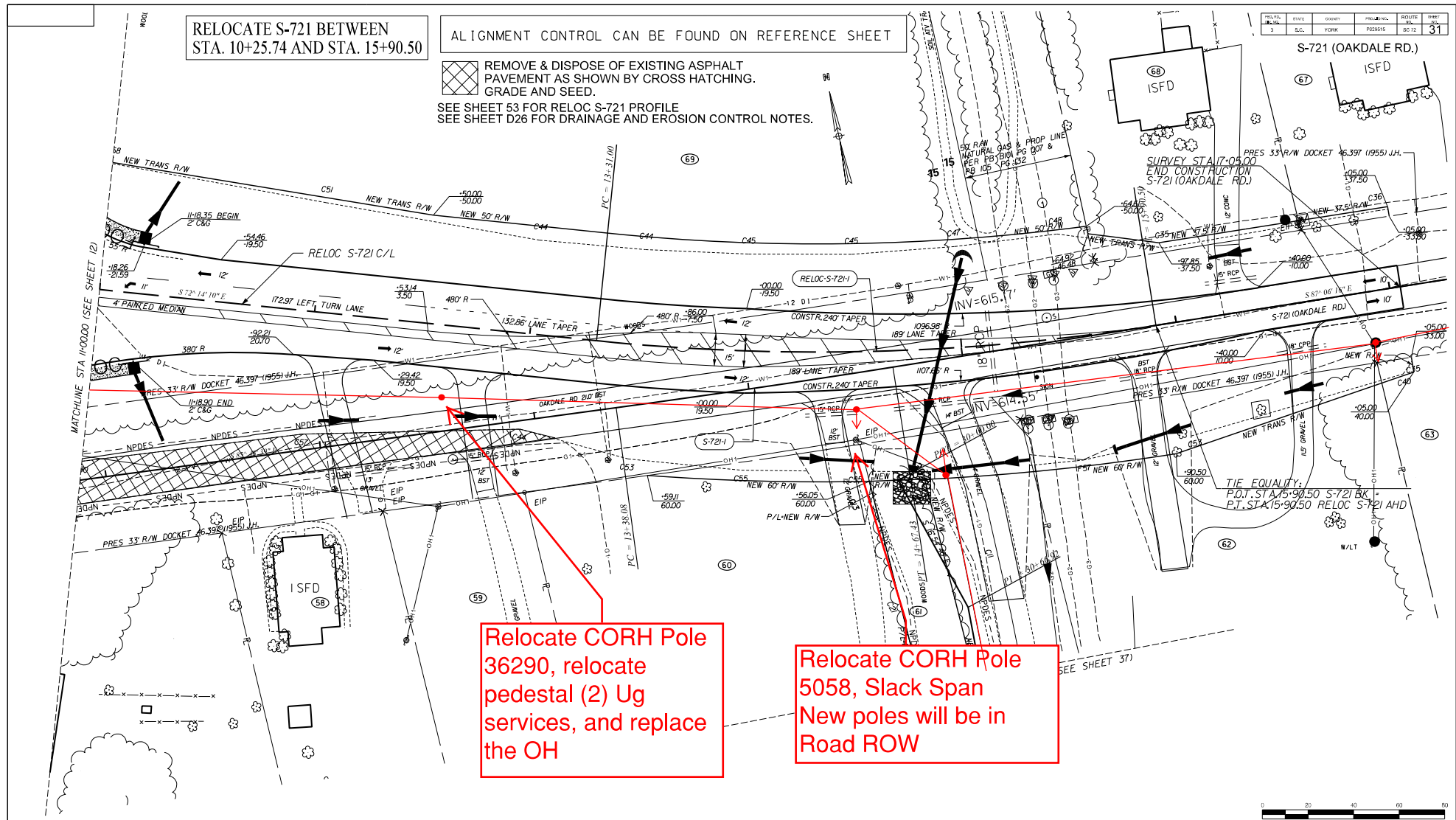
ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

 REMOVE & DISPOSE OF EXISTING ASPHALT PAVEMENT AS SHOWN BY CROSS HATCHING. GRADE AND SEED.

SEE SHEET 53 FOR RELOC S-721 PROFILE
SEE SHEET D26 FOR DRAINAGE AND EROSION CONTROL NOTES.

PLN. NO.	SHEET	COUNTY	PROJECT NO.	ROUTE	SHEET
3	S.C.	YORK	FD2915	SC 72	31

S-721 (OAKDALE RD.)



Relocate CORH Pole 36290, relocate pedestal (2) Ug services, and replace the OH

Relocate CORH Pole 5058, Slack Span New poles will be in Road ROW

\\P\plans\726_SH_31-28.dgn
User: J.CASSIDY\JCM
5/21/2020

REV. NO.	BY	CHKD.	DATE	REVISIONS	DESCRIPTION OF REVISION
ROW 1	SAS	CMC	7-10-2019	RELOCATED OUTRILL DITCH DUE TO GAS LINES, REV NEW ROW TRACTS 60,61,62	
ROW 2	CAP	CMC	8-9-2019	REVISED ROW AND PERMANENT EASEMENT CALLOUTS ON TRACT 61	
ROW 7	SMS	CMC	1-15-2020	REVISED ROW TRACT 68	
ROW 8	SMS	CMC	1-28-2020	TRACT 61 • REVISED PERM. EASEMENT CALLOUT TO READ "NEW ROW"	
ROW 10	SAS	CMC	04-27-2020	TRACT 61 • REV. OF FITCH ALIGN. REV. PERM. CONSTR. EASMT. ADD TEMP. CONSTR. EASMT.	



YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS

S-721 PLAN
STA 11+00 TO STA 17+05.00


SCALE: 1"=20' SH. NO. 31

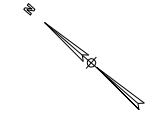
ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

FED. RD. DIST.	STATE	COUNTY	PROJECT NO.	ROUTE	SHEET NO.
3	S.C.	YORK	P029515	SC 172	32

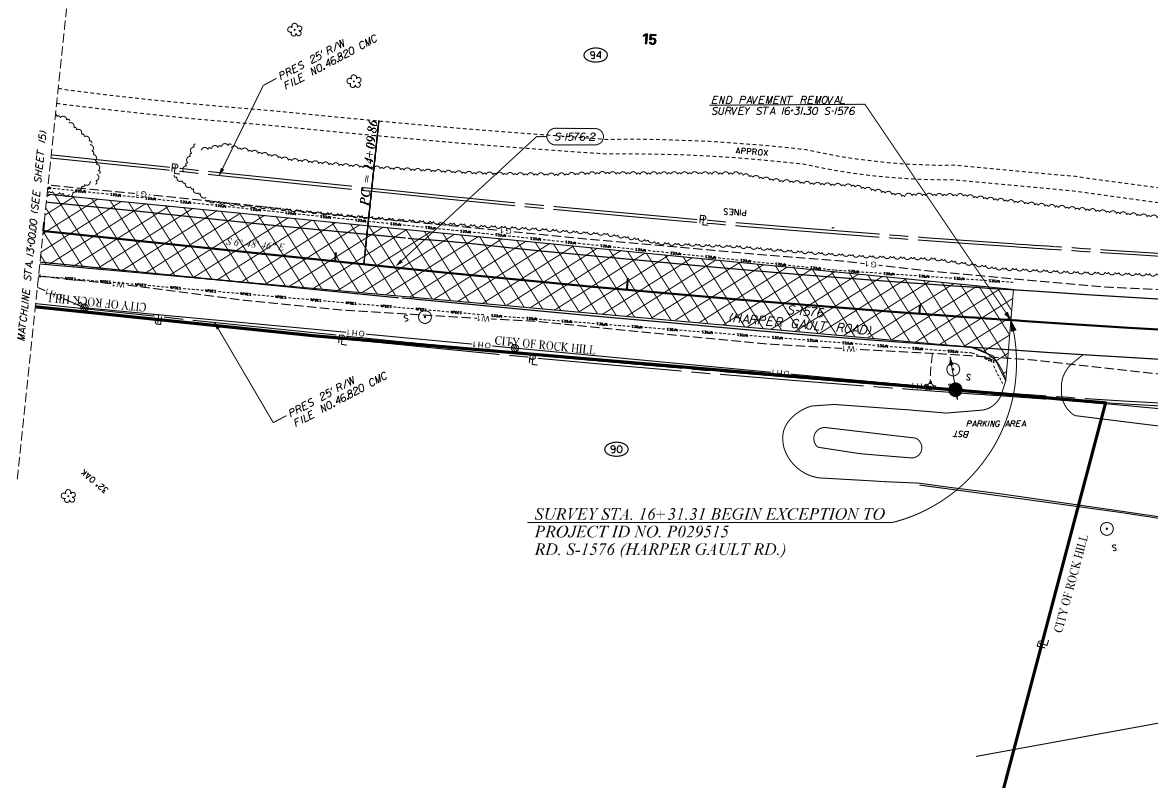
S-1576 (HARPER GAULT RD.)

SEE SHEET D27 FOR DRAINAGE AND EROSION CONTROL NOTES

 REMOVE & DISPOSE OF EXISTING ASPHALT PAVEMENT AS SHOWN BY CROSS HATCHING. GRADE AND SEED.



Comporium poles
no impact



\\Plans\1726_S-1576.dwg
PELLDTEA
1/24/2020

REVISIONS:				
REV. NO.	BY	CHKD.	DATE	DESCRIPTION OF REVISION
ROW 7	SAS	CMC	1-15-2020	REMOVED RELOC S-1576 (HARPER GAULT RD) ALIGNMENT



PLANS PREPARED BY
CDM Smith

YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS

S-1576 PLAN
STA 13+00 TO STA 16+31.31
SCALE: 1" = 20'

SHT. NO. 32

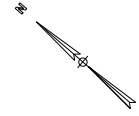


06/07/20

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

SHEET NO.	SHEET	COUNTY	PROJECT NO.	ROUTE	SHEET
3	S.C.	YORK	P029515	SC 72	33

S-1576 (HARPER GAULT RD.)
S-147 (COUNTRY CLUB DR.)
INTERSECTION PLAN



DRAWN BY GIS

SURVEY STA. 21+16.06 END EXCEPTION TO
PROJECT ID NO. P029515 BEGIN CONSTRUCTION
RD. S-1576 (HARPER GAULT RD.)

SURVEY STA. 22+18.78 END
PROJECT ID NO. P029515
RD. S-1576 (HARPER GAULT RD.)

S-1576 (HARPER GAULT RD)
CUL-DE-SAC R/W CURVE
 $\Delta = 99^\circ 17' 50''$
 $D = 121^\circ 54' 21''$
 $T = 55.32'$
 $L = 81.45'$
 $E = 25.59'$
 $R = 47'$
 $LC = 71.64'$
 $M = 16.57'$



Comporium Pole 2176
Not Impacted
However there is an electrical box near pole and an underground primary line that continues down Harper Gault that maybe in conflict and shall be located and drawn in on plans.



PLANS PREPARED BY
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS
S-1576 / S-147 INTERSECTION
PLAN

SCALE: 1"=20' SH. NO. 33

\\Plans\1726_S4_33-28.dwg
MELLOTTA
1/24/2020

REV. NO.	BY
ROW-7	SA

PLAT	SHEET	COUNTY	TOWNSHIP	ROUTE	SHEET
3	S-250	YORK	P02615	S-250	34

S-250 (RAWLSVILLE RD.)

CORH Pole 35809
No Impact

CORH Pole 35808
Impacted by road.
Relocate

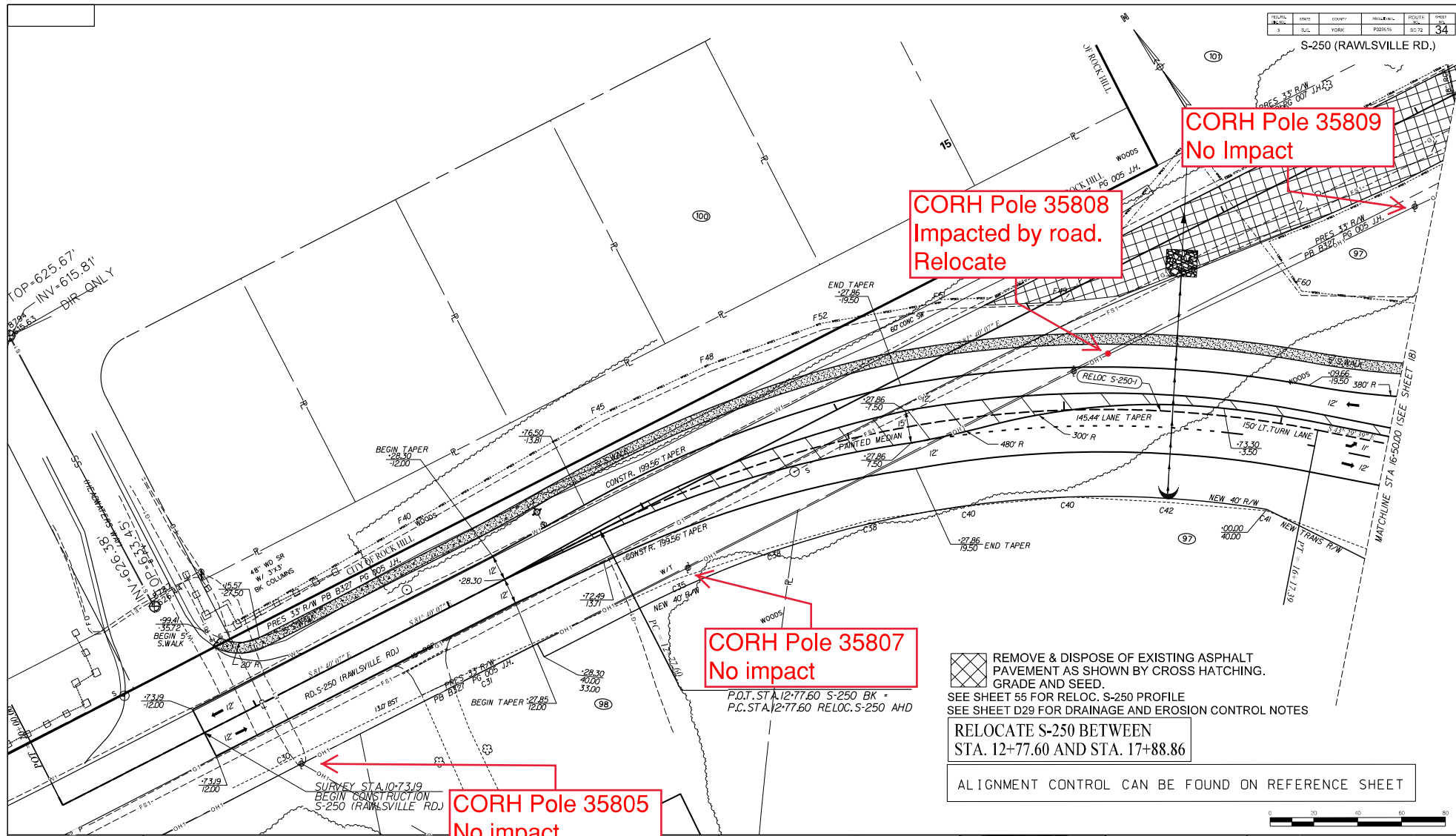
CORH Pole 35807
No impact

CORH Pole 35805
No impact

REMOVE & DISPOSE OF EXISTING ASPHALT PAVEMENT AS SHOWN BY CROSS HATCHING. GRADE AND SEED.
SEE SHEET 55 FOR RELOC. S-250 PROFILE
SEE SHEET D29 FOR DRAINAGE AND EROSION CONTROL NOTES

RELOCATE S-250 BETWEEN STA. 12+77.60 AND STA. 17+88.86

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET



Plans 1726.S4.34-28.dwg
SWANSONA
1/11/2014

REV. NO.	BY	CHKD.	DATE	REVISIONS	DESCRIPTION OF REVISION



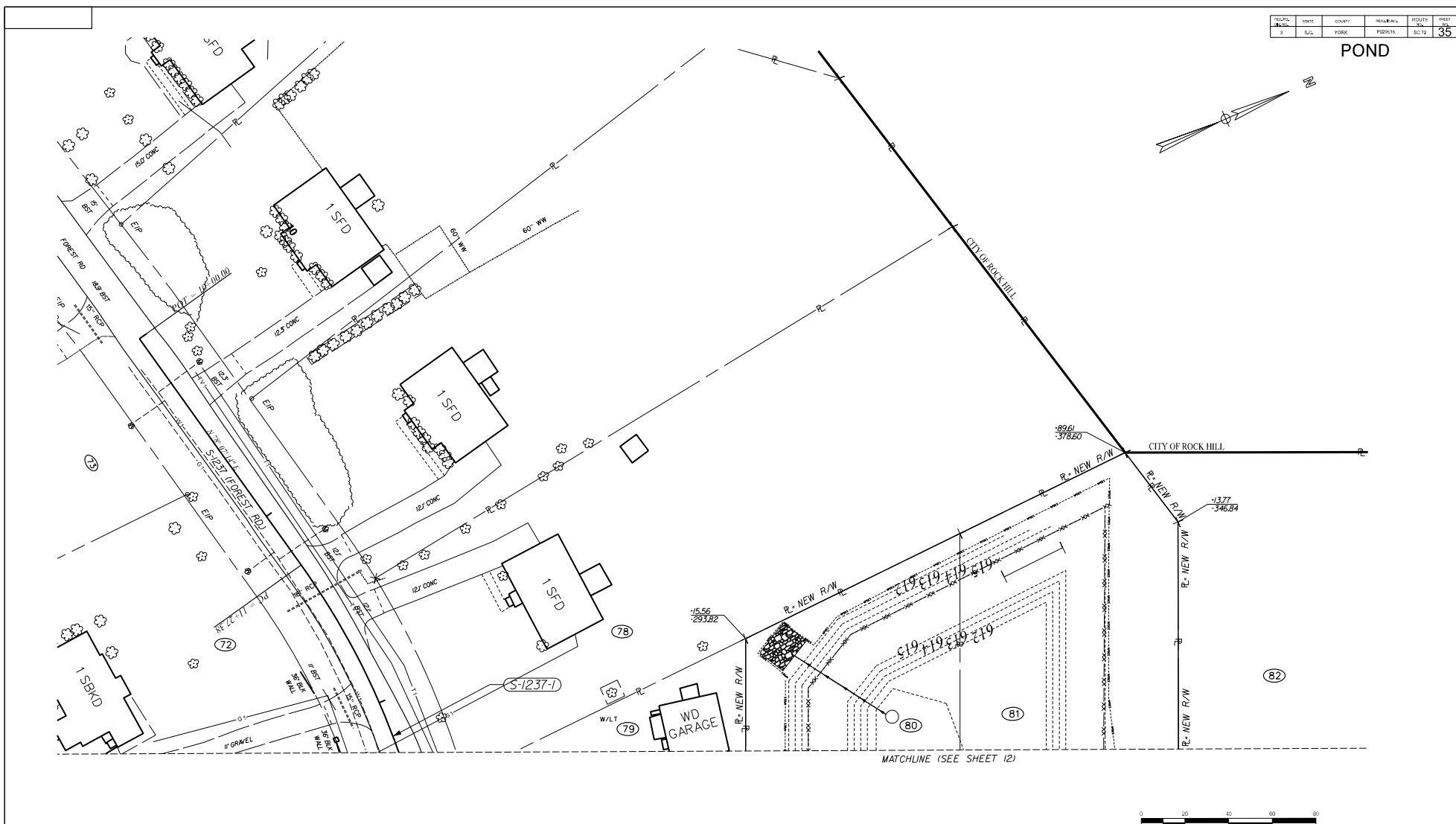
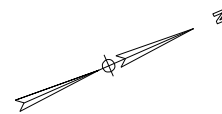
PLANS PREPARED BY
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS

S-250 PLAN
STA 10+73.19 TO STA 16+55.00

SCALE: 1"=20' SH. NO. 34

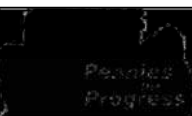
SCALE	SHEET	COUNTY	WELL/REEL	ROUTE	SHEET
3	S.L.	YORK	PG2615	SC 72	35

POND



\\Plans\726_S4_35-28.dwg
SWANSONA
1/11/2014

REV. NO.	BY	CHKD.	DATE	REVISIONS:	DESCRIPTION OF REVISION



PLANS PREPARED BY
CDM Smith

YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS

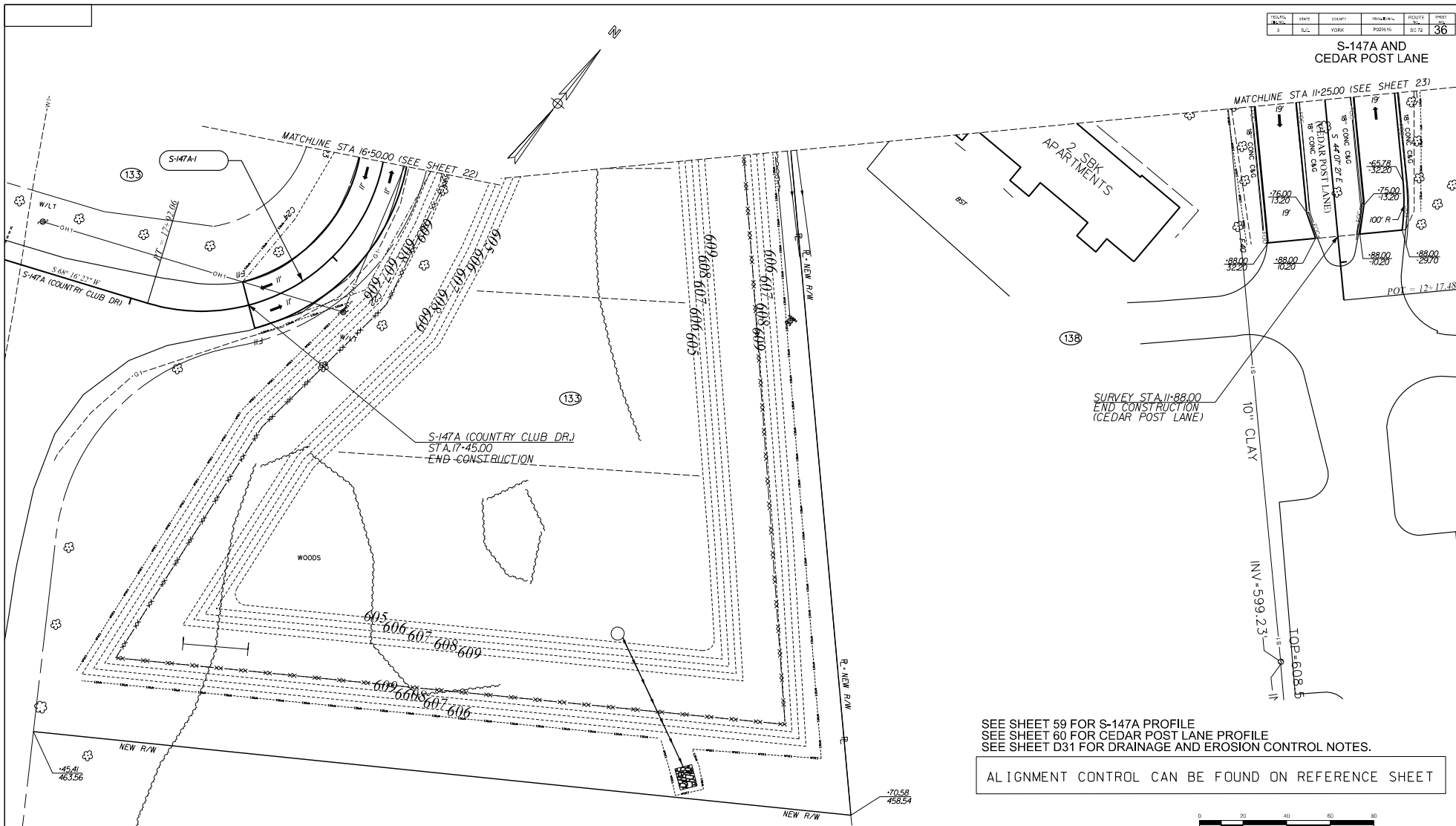
SC 72 PLAN
POND

SCALE: 1" = 20'

SH. NO. 35

TITLE	SHEET	COUNTY	WELLER	ROUTE	SHEET
S-147A AND CEDAR POST LANE	3	YORK	PS2615	SC72	36

S-147A AND CEDAR POST LANE



SURVEY STA 11+88.00
END CONSTRUCTION
(CEDAR POST LANE)

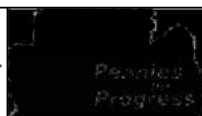
SEE SHEET 59 FOR S-147A PROFILE
SEE SHEET 60 FOR CEDAR POST LANE PROFILE
SEE SHEET D31 FOR DRAINAGE AND EROSION CONTROL NOTES.

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET



\\P11001\726_S4_36-28.dwg
SWANSONA
1/11/2014

REV. NO.	BY	CHKD.	DATE	REVISIONS	DESCRIPTION OF REVISION



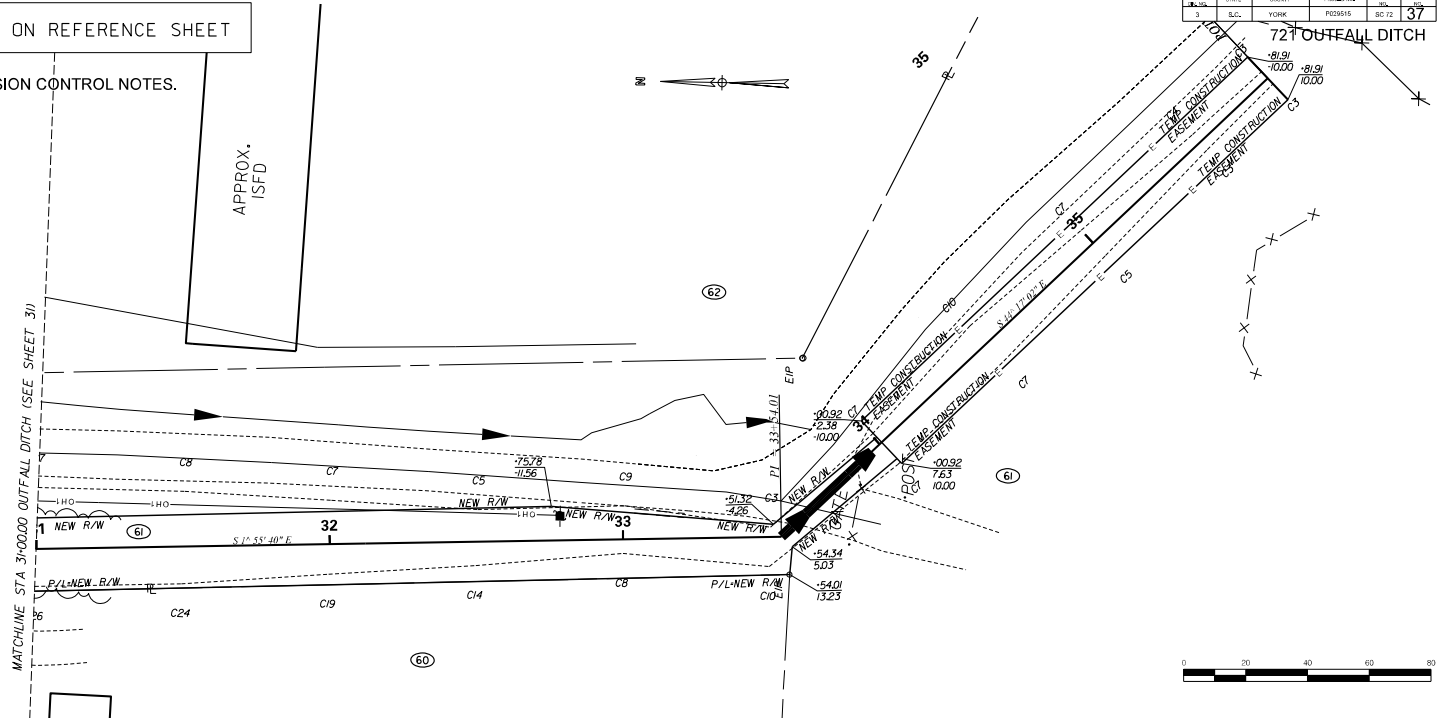
PLANS PREPARED BY
CDM Smith
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS
S-147A AND CEDAR POST LANE
SCALE: 1" = 20' SH. NO. 36

FILE NO.	SHEET	COUNTY	PROJECT NO.	ROUTE	SHEET
3	S.C.	YORK	FD29515	SC 72	37

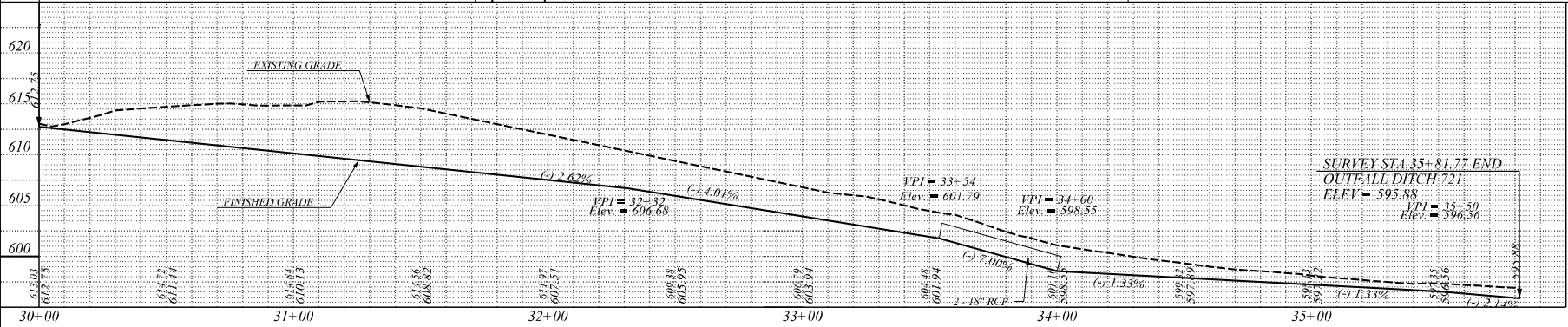
ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

SEE SHEET 53 FOR RELOC S-721 PROFILE
SEE SHEET D32 FOR DRAINAGE AND EROSION CONTROL NOTES.

APPROX.
ISFD



SURVEY STA. 30+00.00 BEGIN
OUTFALL DITCH 721
ELEV = 612.75



\\plains\726_S1_37-28.dwg
User: J.CASSIDY\JCM
9/21/2020

REV. NO.	BY	CHKD.	DATE	DESCRIPTION OF REVISION
ROW 1	SAS	CMC	7/10/2019	RELOCATED OUTFALL DITCH DUE TO GAS LINES, REV NEW R/W TRACTS 60 & 61.62
ROW 2	CAP	CMC	8/6/2019	REVISED R/W AND PERMANENT EASEMENT CALLOUTS ON TRACT 61
ROW 8	CAP	CMC	10/29/2020	TRACT 61 - REVISED PERM. EASEMENT CALLOUTS TO READ 'NEW R/W'
ROW 10	SAS	CMC	04-27-2020	TRACT 61 - REV. OF DITCH ALIGN, REV. PERM. CONSTR. EASMT, ADDED TEMP. CONSTR. EASMT



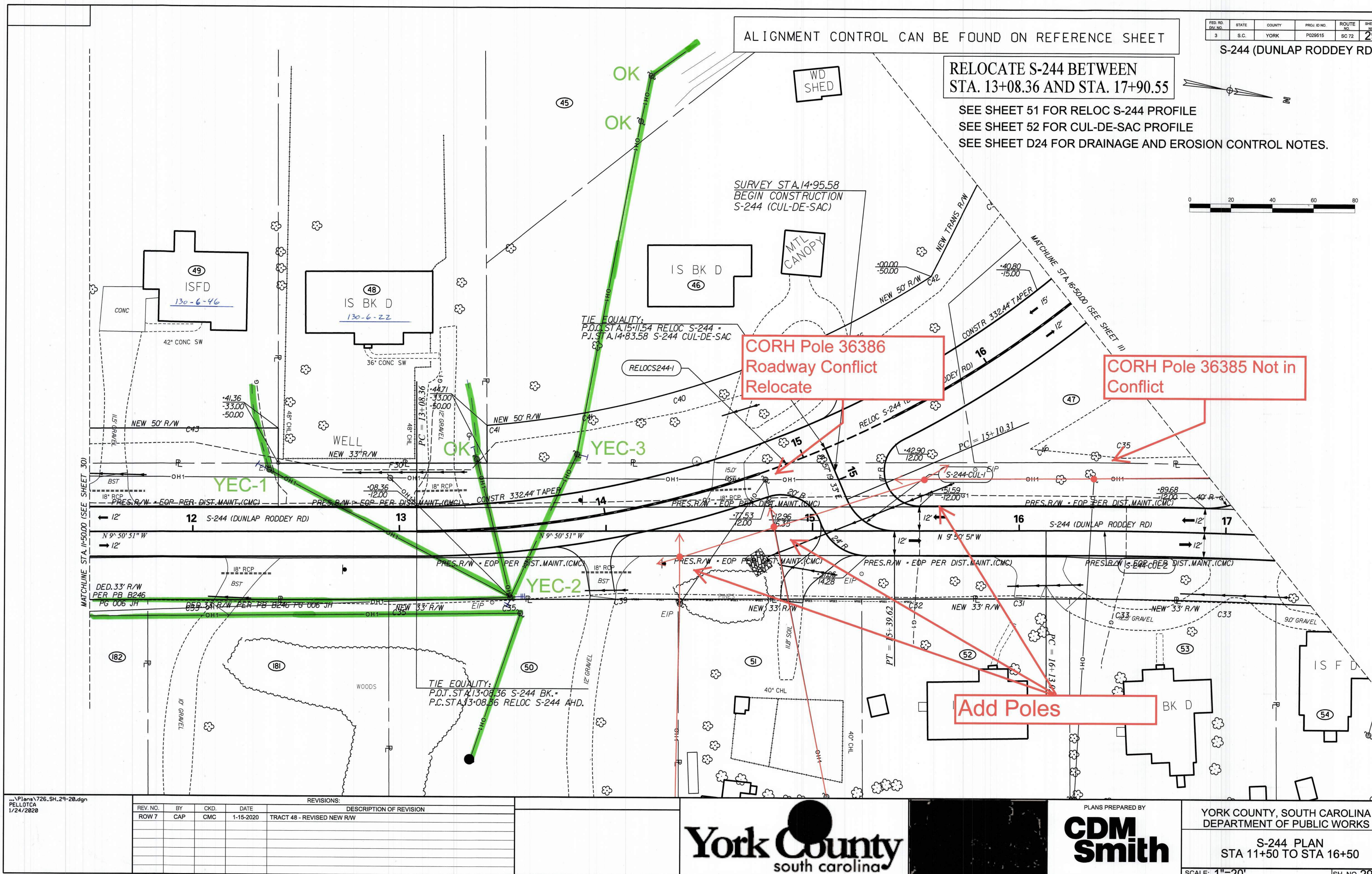
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS

721 OUTFALL DITCH

SCALE: 1"=20' SH. NO. 37

YORK ELECTRIC COOPERATIVE
RELOCATION SKETCHES

York Electric Co-op



ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

RELOCATE S-244 BETWEEN STA. 13+08.36 AND STA. 17+90.55

SEE SHEET 51 FOR RELOC S-244 PROFILE
SEE SHEET 52 FOR CUL-DE-SAC PROFILE
SEE SHEET D24 FOR DRAINAGE AND EROSION CONTROL NOTES.

FED. NO.	STATE	COUNTY	PROJ. NO.	ROUTE	SHEET NO.
3	S.C.	YORK	P029615	SC 72	2

S-244 (DUNLAP RODDEY RD)

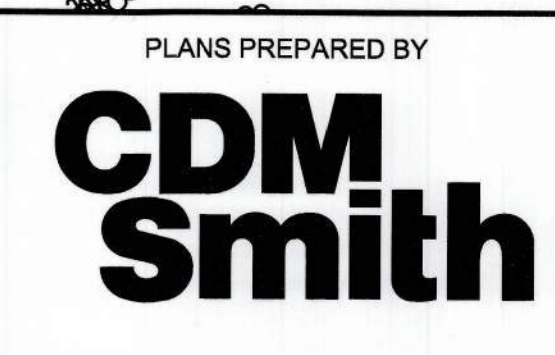
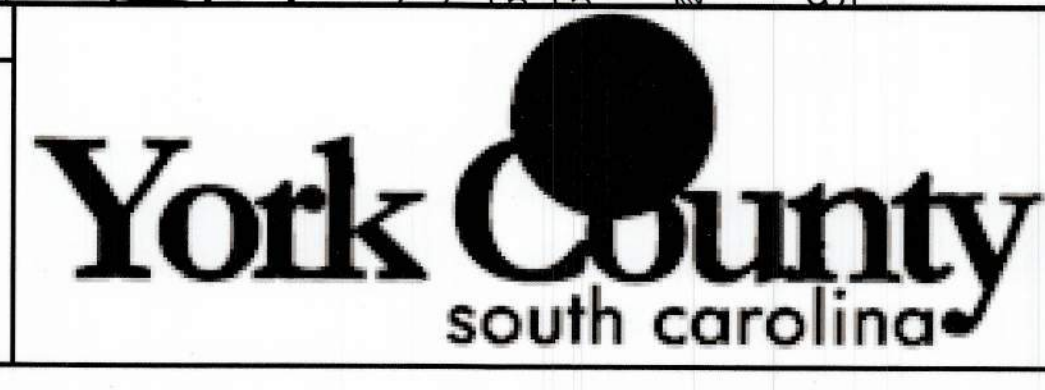
CORH Pole 36386
Roadway Conflict
Relocate

CORH Pole 36385 Not in
Conflict

Add Poles

...:\Plans\1726.SH.29-28.dgn
PELLOTEA
1/24/2020

REV. NO.	BY	CHKD.	DATE	DESCRIPTION OF REVISION
ROW 7	CAP	CMC	1-15-2020	TRACT 48 - REVISED NEW RW



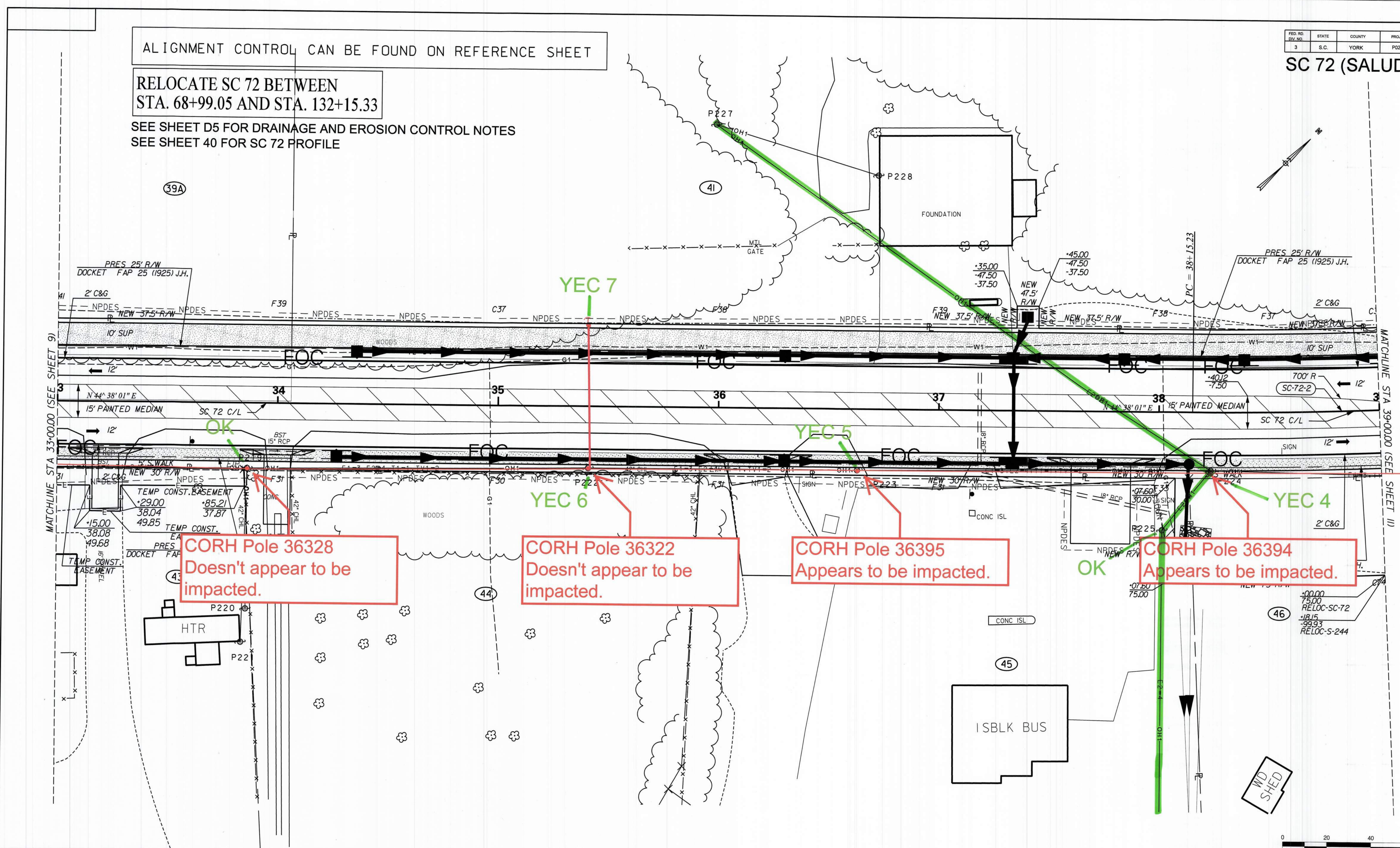
PLANS PREPARED BY
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS

S-244 PLAN
STA 11+50 TO STA 16+50
SCALE: 1"=20' SH. NO. 29

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

RELOCATE SC 72 BETWEEN STA. 68+99.05 AND STA. 132+15.33

SEE SHEET D5 FOR DRAINAGE AND EROSION CONTROL NOTES
SEE SHEET 40 FOR SC 72 PROFILE



CORH Pole 36328
Doesn't appear to be impacted.

CORH Pole 36322
Doesn't appear to be impacted.

CORH Pole 36395
Appears to be impacted.

CORH Pole 36394
Appears to be impacted.

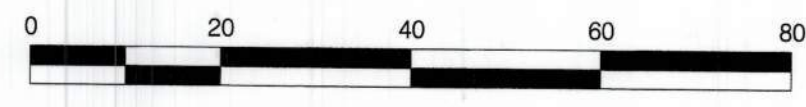
...Plans\726_SH_18-28.dgn
User: I.CASSIDYCH
5/21/2020

REV. NO.	BY	CHKD.	DATE	DESCRIPTION OF REVISION
ROW 1	SAS	CMC	7-10-2019	REVISED TRACT 39, ADDED TRACT 39A REVISED TRACT 41
ROW 7	SAS	CMC	1-15-2020	TRACT 43 - CONVERT PERMISSIONS TO TEMPORARY CONSTRUCTION EASEMENT
ROW 10	CAP	CMC	05-12-2020	TRACT 45 - REVISE NEW RW

DOCUMENT REVIEW		
RESPONSIBILITY	NAME	DATE
ORIGINATOR		
CHECKED		
REVISED		
VERIFIED		



PLANS PREPARED BY
CDM Smith
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS
SC 72 PLAN
STA 33+00 TO STA 39+00
SCALE: 1" = 20' SH. NO. 10



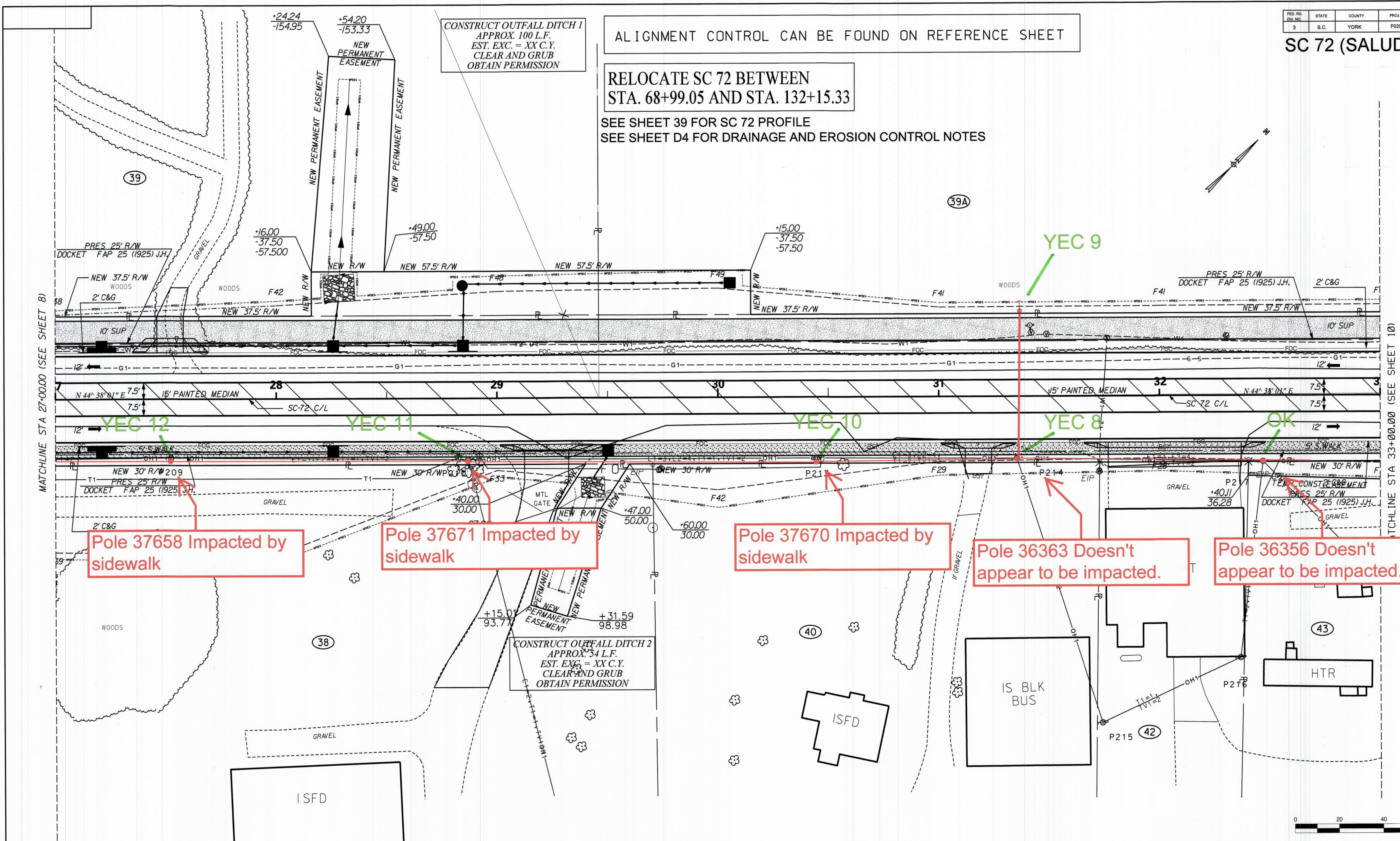
ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

RELOCATE SC 72 BETWEEN STA. 68+99.05 AND STA. 132+15.33

SEE SHEET 39 FOR SC 72 PROFILE
SEE SHEET D4 FOR DRAINAGE AND EROSION CONTROL NOTES

CONSTRUCT OUTFALL DITCH 1
APPROX. 100 L.F.
EST. EXC. = XX C.Y.
CLEAR AND GRUB
OBTAIN PERMISSION

CONSTRUCT OUTFALL DITCH 2
APPROX. 34 L.F.
EST. EXC. = XX C.Y.
CLEAR AND GRUB
OBTAIN PERMISSION



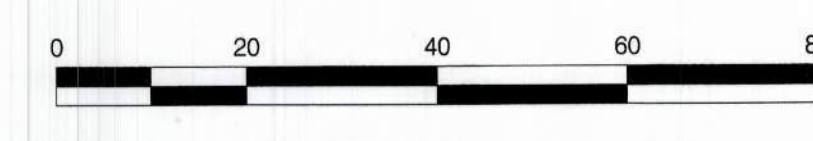
Pole 37658 Impacted by sidewalk

Pole 37671 Impacted by sidewalk

Pole 37670 Impacted by sidewalk

Pole 36363 Doesn't appear to be impacted.

Pole 36356 Doesn't appear to be impacted.



...:\Plans\726.S1.09-28.dgn
PELLOTCA
1/24/2020

REV. NO.	BY	CHKD.	DATE	DESCRIPTION OF REVISION
ROW 1	SAS	CMC	7-10-2019	REVISED TRACT 39, ADDED TRACT 39A REVISED TRACT 41
ROW 2	CAP	CMC	8-9-2019	REVISED R/W AND PERMANENT EASEMENT CALLOUTS ON TRACTS 38 & 39
ROW 7	CAP	CMC	1-15-2020	TRACT 43 - CONVERT PERMISSIONS TO TEMPORARY CONSTRUCTION EASEMENT



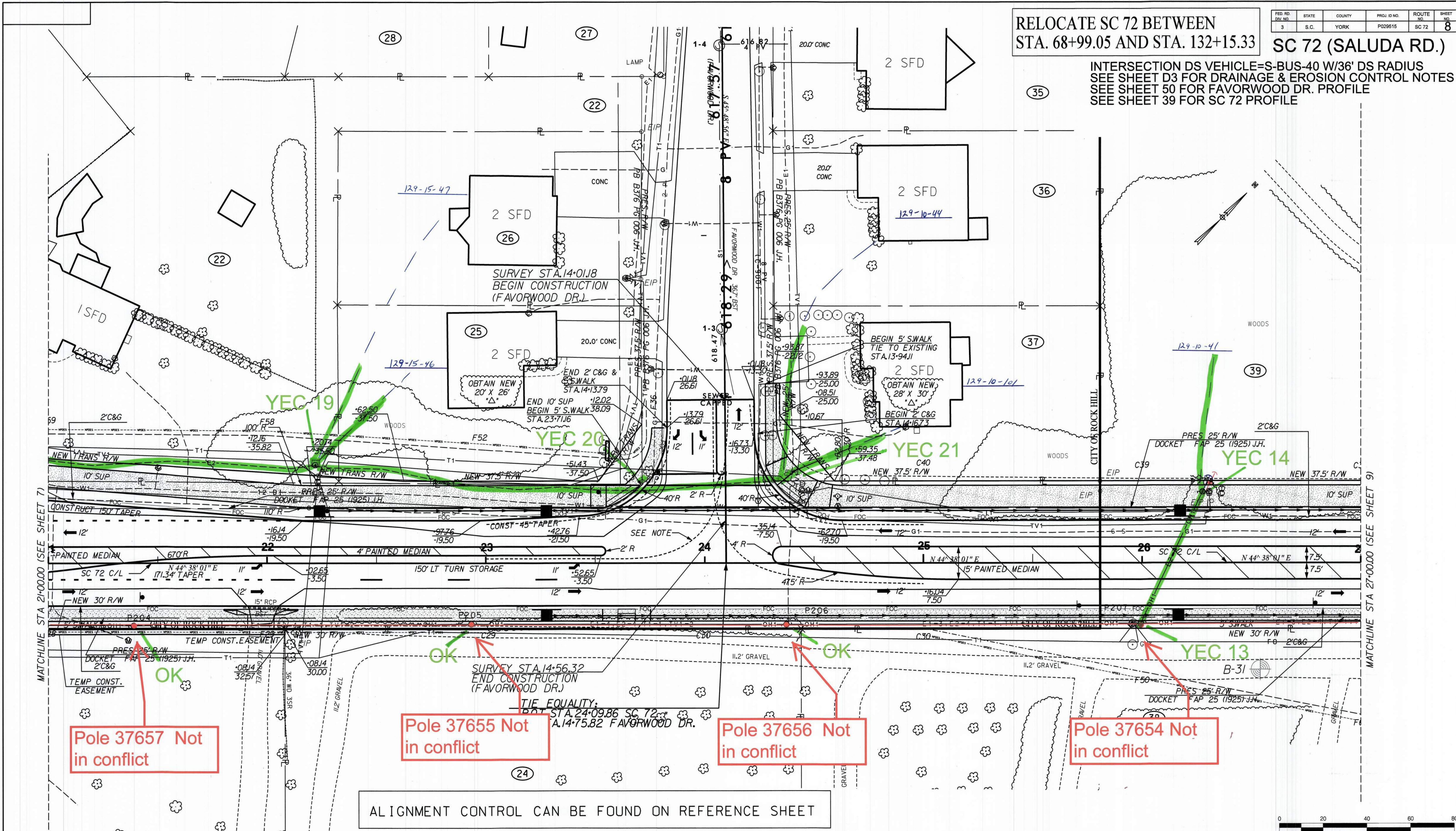
PLANS PREPARED BY
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS
SC 72 PLAN
STA 27+00 TO STA 33+00
SCALE: 1" = 20'
SH. NO. 9

RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33

FED. RD. DIST. NO.	STATE	COUNTY	PROJ. ID NO.	ROUTE NO.	SHEET NO.
3	S.C.	YORK	P022615	SC 72	8

SC 72 (SALUDA RD.)

INTERSECTION DS VEHICLE=S-BUS-40 W/36' DS RADIUS
SEE SHEET D3 FOR DRAINAGE & EROSION CONTROL NOTES
SEE SHEET 50 FOR FAVORWOOD DR. PROFILE
SEE SHEET 39 FOR SC 72 PROFILE



Pole 37657 Not in conflict

Pole 37655 Not in conflict

Pole 37656 Not in conflict

Pole 37654 Not in conflict

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

Plans 726, SH. 08-28.dgn
PELLOTTCA
3/12/2020

REV. NO.	BY	CHKD.	DATE	DESCRIPTION OF REVISION
ROW 9	CAP	CMC	3/12/2020	TRACT 23 - CONVERT PERMISSIONS TO TEMPORARY CONSTRUCTION EASEMENT



PLANS PREPARED BY
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS

SC 72 PLAN
STA 21+00 TO STA 27+00

SCALE: 1" = 20' SH. NO. 8

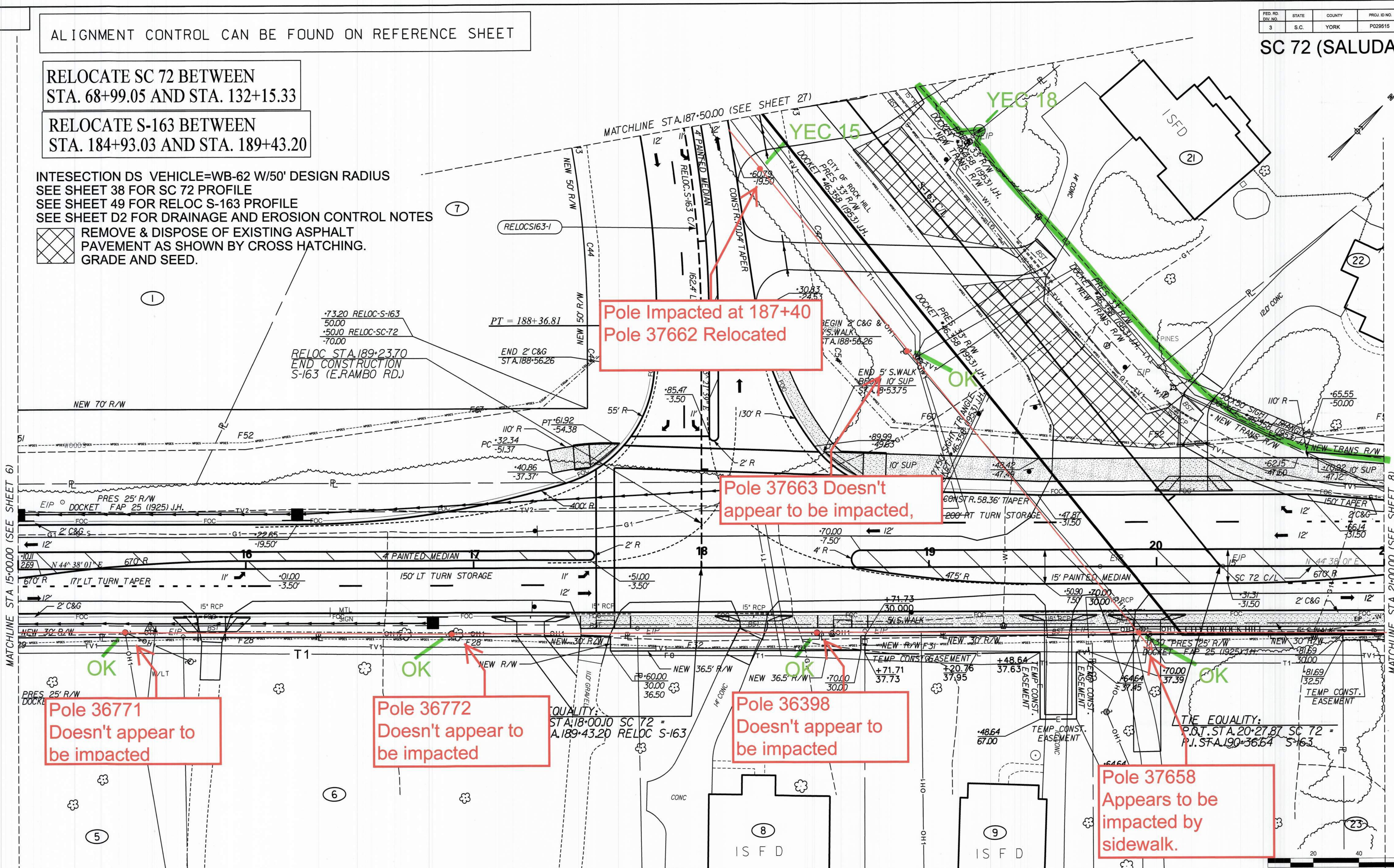
SC 72 (SALUDA RD.)

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33

RELOCATE S-163 BETWEEN
STA. 184+93.03 AND STA. 189+43.20

INTERSECTION DS VEHICLE=WB-62 W/50' DESIGN RADIUS
SEE SHEET 38 FOR SC 72 PROFILE
SEE SHEET 49 FOR RELOC S-163 PROFILE
SEE SHEET D2 FOR DRAINAGE AND EROSION CONTROL NOTES
REMOVE & DISPOSE OF EXISTING ASPHALT
PAVEMENT AS SHOWN BY CROSS HATCHING.
GRADE AND SEED.



Pole 36771
Doesn't appear to
be impacted

Pole 36772
Doesn't appear to
be impacted

Pole 36398
Doesn't appear to
be impacted

Pole 37658
Appears to be
impacted by
sidewalk.

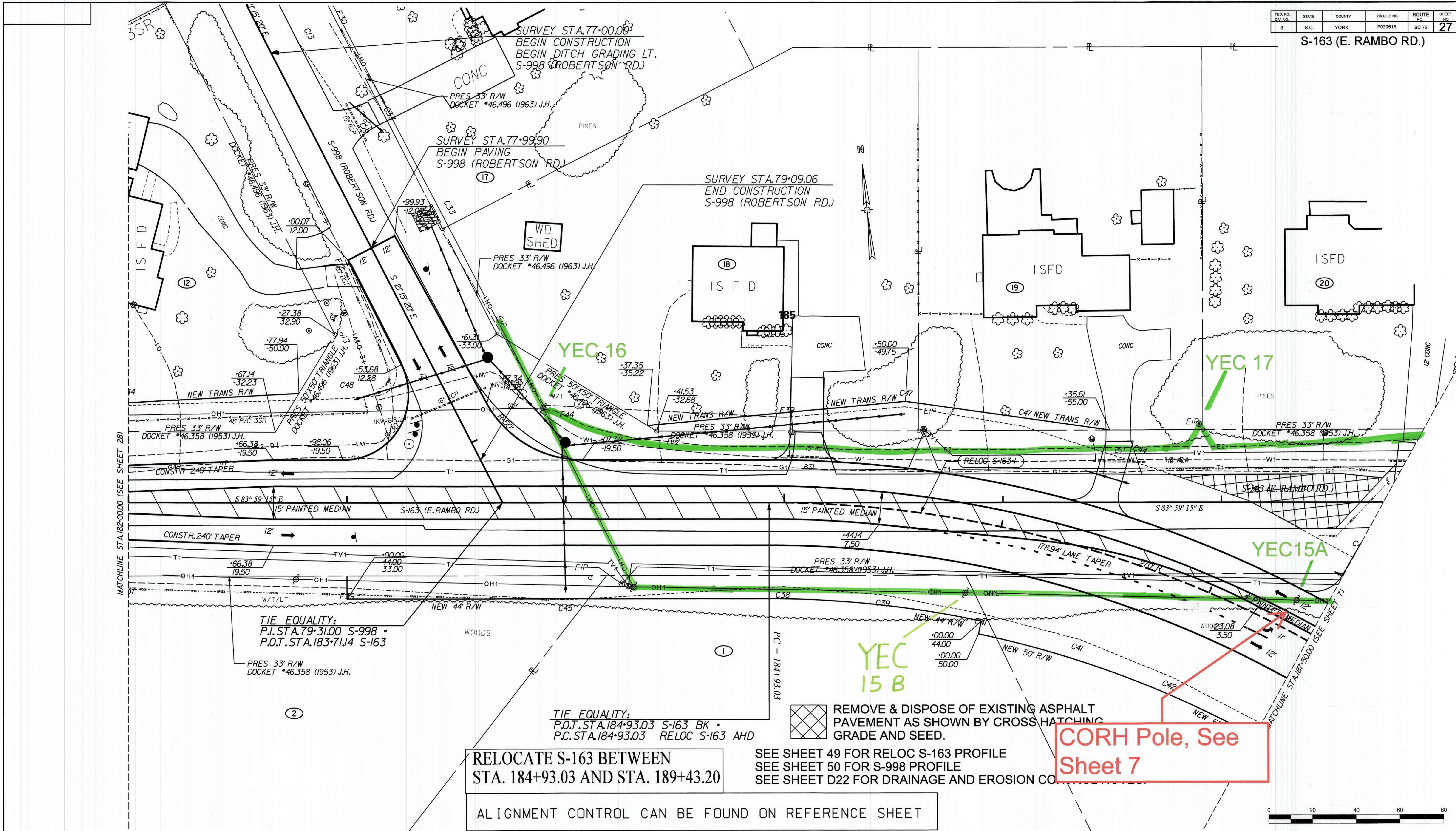
Pole 37663 Doesn't
appear to be impacted,

Pole 37662 Relocated

REV. NO.	BY	CHKD.	DATE	DESCRIPTION OF REVISION
ROW6	CMC	SAS	11/22/2019	TRACT 9 - CONVERT PERMISSIONS TO TEMPORARY CONSTRUCTION EASEMENT
ROW9	CAP	CMC	3/12/2020	TRACT 23 - CONVERT PERMISSIONS TO TEMPORARY CONSTRUCTION EASEMENT



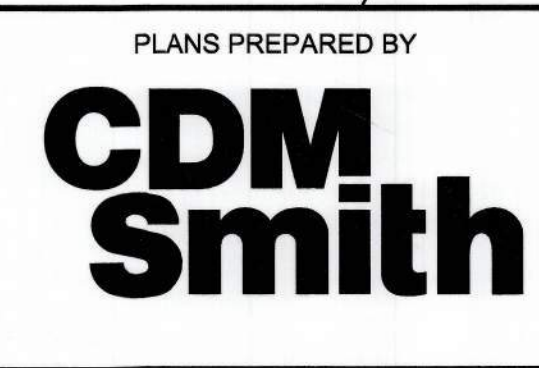
PLANS PREPARED BY
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS
SC 72 PLAN
STA 15+00 TO STA 21+00
SCALE: 1" = 20' SH. NO. 7



...:\Plans\726.SH.27-28.dgn
SWANSONSA
7/12/2019

REV. NO.	BY	CKD.	DATE	DESCRIPTION OF REVISION
ROW 1	SAS	CMC	7-10-2019	REVISED DRAINAGE AND NEW R/W TRACT 18.

REV. NO.	BY	CKD.	DATE	DESCRIPTION OF REVISION
ROW 1	SAS	CMC	7-10-2019	REVISED DRAINAGE AND NEW R/W TRACT 18.



PLANS PREPARED BY
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS
S-163 PLAN
STA 182+00 TO STA 187+50
SCALE: _____ SH. NO. 27

COMPORIUM
RELOCATION SKETCHES

UTILITY CONTACT INFORMATION

Type	Utility	Contact	Phone	E-mail
Power transmission	Duke Energy	Stephen Lord	704-812-2316	Stephen.Lord@duke-energy.com
Power distribution	City of Rock Hill - Power	David Hope	803-329-5525	David.Hope@cityofrockhill.com
Power distribution	York Electric Cooperative	Tim Scism	803-984-2020	tim.scism@yorkelectric.net
Water	City of Rock Hill - Water	Rick Carter	803-325-2694	rick.carter@cityofrockhill.com
Sanitary Sewer	City of Rock Hill - Sewer	Rick Carter	803-325-2694	rick.carter@cityofrockhill.com
Gas Transmission	Dominion Carolina Gas Transmission	Nate Hendrix	803-726-3746	Nathaniel.E.Hendrix@dom.com
Gas Transmission	Flains All American Pipeline, LP	Daniel So	918-223-0205	dys@paalo.com
Gas Distribution	York County Natural Gas Authority	Amanda Gallagher	803-323-5363	amanda.gallagher@cncga.com
Telecom	Comporium (Telephone)	George Stewart II	803-326-6082	george.stewart@comporium.com
Telecom	Comporium (Cable TV)	George Stewart II	803-326-6082	george.stewart@comporium.com
Telecom	TTime Warner Cable	Jason Paysour	704-671-6139	jason.paysour@twcable.com

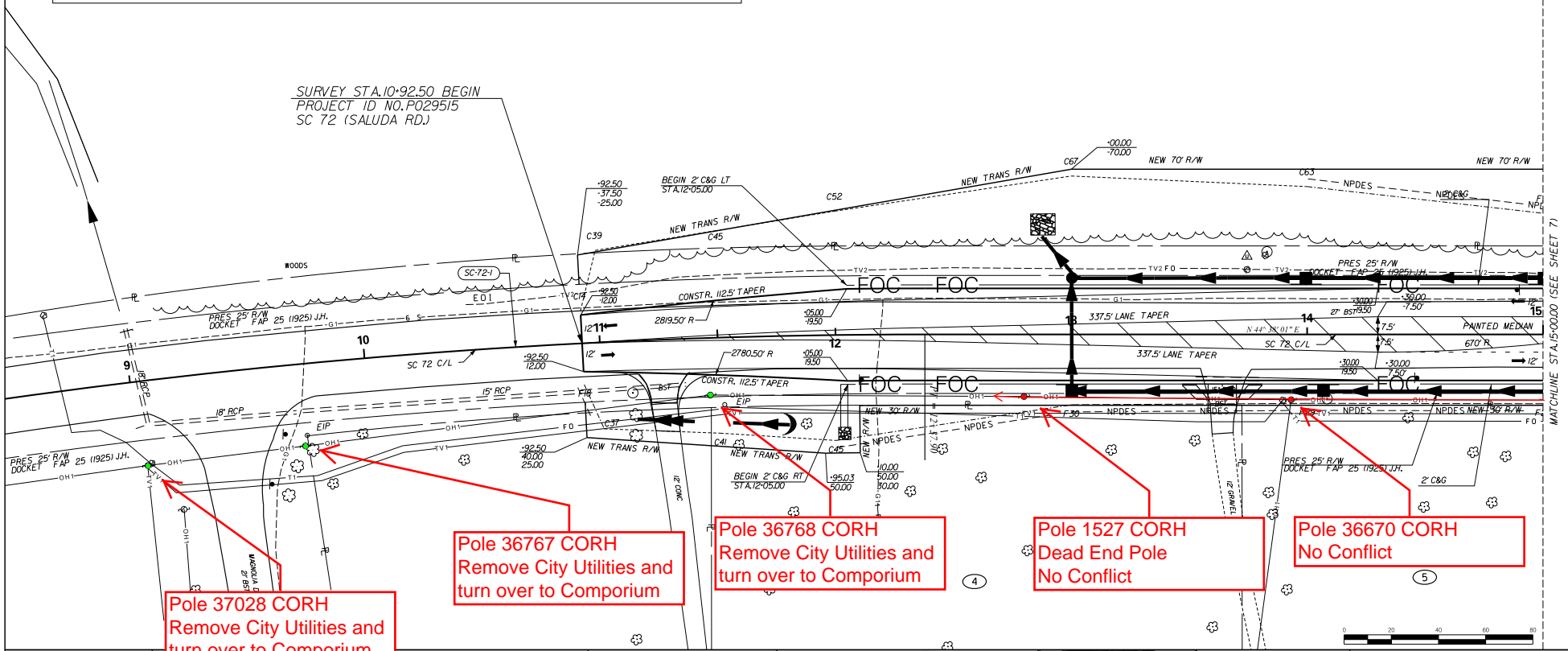
ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33

SEE SHEET 38 FOR SC 72 PROFILE
SEE SHEET D1 FOR DRAINAGE AND EROSION CONTROL NOTES

FILE NO.	SHEET	COUNTY	PROJECT NO.	ROUTE	SHEET
3	S.C.	YORK	P029515	SC 72	6

SC 72 (SALUDA RD.)



Pole 37028 CORH
Remove City Utilities and
turn over to Comporium

Pole 36767 CORH
Remove City Utilities and
turn over to Comporium

Pole 36768 CORH
Remove City Utilities and
turn over to Comporium

Pole 1527 CORH
Dead End Pole
No Conflict

Pole 36670 CORH
No Conflict

\\P1era\726_SH_86-28.dgn
User: J.CASSIDY\CM
9/21/2020

REV	DESCRIPTION OF REVISION
ROW10	CAP
CMC	05/12/2020
TRACT 4 + ADD PIPE TO DITCH	



PLANS PREPARED BY
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS
SC 72 PLAN
STA 10+00 TO STA 15+00
SCALE: 1" = 20'
SH. NO. 6

FILE NO.	SHEET	COUNTY	PROJECT NO.	ROUTE	SHEET
18206	3	YORK	PD2615	SC 72	7


SC 72 (SALUDA RD.)

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33

RELOCATE S-163 BETWEEN
STA. 184+93.03 AND STA. 189+43.20

INTERSECTION DS VEHICLE=WB-62 W/50' DESIGN RADIUS
SEE SHEET 38 FOR SC 72 PROFILE
SEE SHEET 49 FOR RELOC S-163 PROFILE
SEE SHEET D2 FOR DRAINAGE AND EROSION CONTROL NOTES

 REMOVE & DISPOSE OF EXISTING ASPHALT PAVEMENT AS SHOWN BY CROSS HATCHING. GRADE AND SEED.

+73.20 RELOC-S-163
50.00
-50.00 RELOC-SC-72
-70.00
RELOC STA 189+23.70
END CONSTRUCTION
S-163 (E.RAMBO RD.)

RELOC S163-I

PT = 188+36.81
END 2' C&G
STA 188+56.26

Pole Impacted at 187+40
Pole 37662 Relocated
Will Need Easement

Pole 37663 Doesn't
appear to be impacted,
will need easement due
to road shift.

Pole 36771
Doesn't appear to
be impacted

Pole 36772
Doesn't appear to
be impacted

Pole 36398
Doesn't appear to
be impacted

Pole 37658
Appears to be
impacted by
sidewalk. Will need
easement

QUALITY
STA 18-00.00 SC 72
A.189+43.20 RELOC S-163

Plans 1726, SH. 87-28.dwg
PELLITCA
3/12/2020

REV. NO.	BY	CHKD.	DATE	DESCRIPTION OF REVISION
ROW8	CMC	SAS	11/20/19	TRACT 9 - CONVERT PERMISSIONS TO TEMPORARY CONSTRUCTION EASEMENT
ROW9	CAP	CMC	3/12/2020	TRACT 23 - CONVERT PERMISSIONS TO TEMPORARY CONSTRUCTION EASEMENT



YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS

SC 72 PLAN
STA 15+00 TO STA 21+00

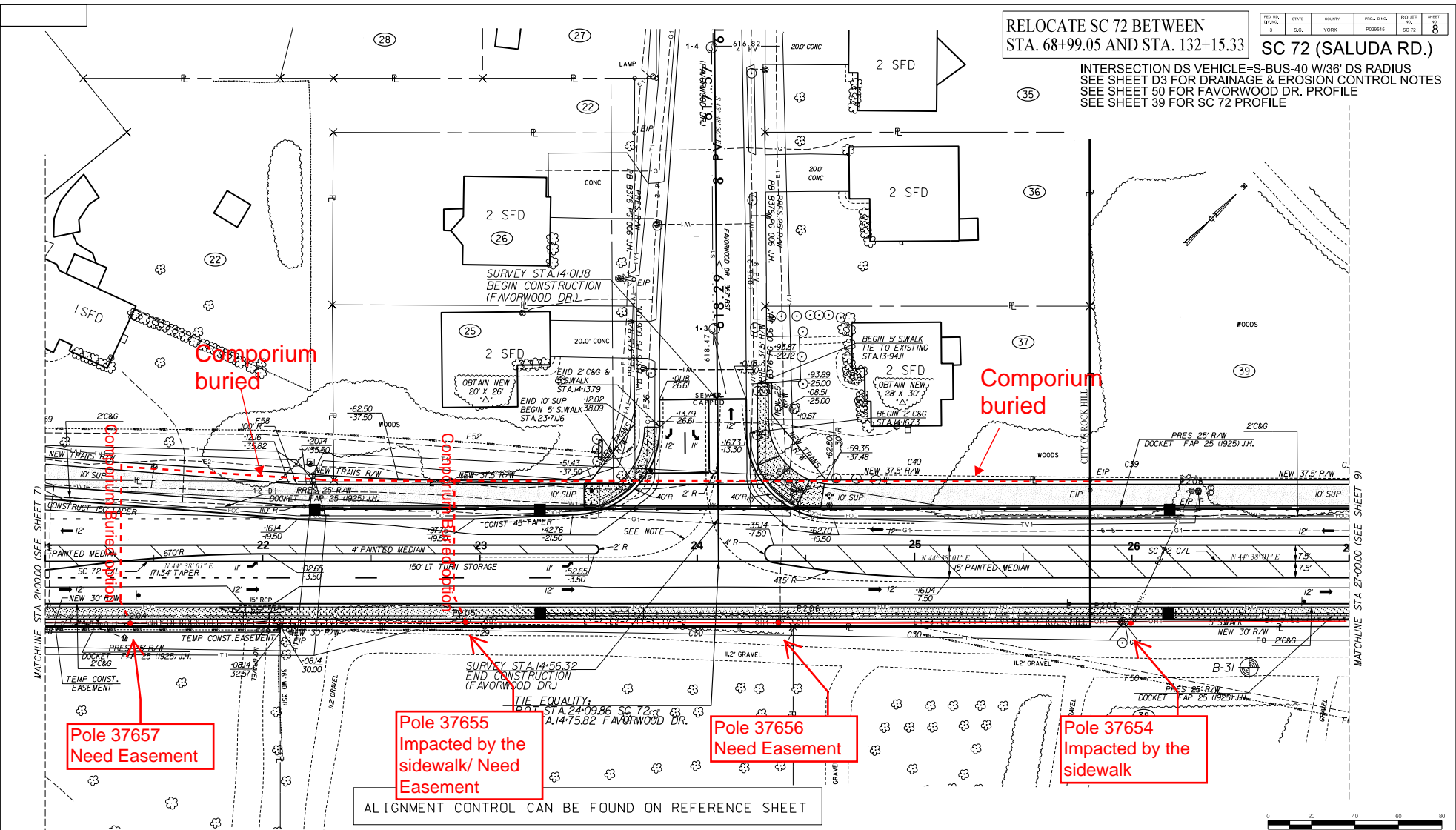
SCALE: 1" = 20' SH. NO. 7

RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33

DIST.	SHEET	COUNTY	PROJECT NO.	ROUTE	SHEET
3	S.C.	YORK	PD2815	SC 72	8

SC 72 (SALUDA RD.)

INTERSECTION DS VEHICLE=S-BUS-40 W/36' DS RADIUS
SEE SHEET D3 FOR DRAINAGE & EROSION CONTROL NOTES
SEE SHEET 50 FOR FAVORWOOD DR. PROFILE
SEE SHEET 39 FOR SC 72 PROFILE



PLANS 726, SH. 88-28.dgn
PELLDTCA
3/12/2020

REV. NO.	BY	CHKD.	DATE	DESCRIPTION OF REVISION
ROW 9	CAP	CMC	3/23/2020	TRACT 23 - CONVERT PERMISSIONS TO TEMPORARY CONSTRUCTION EASEMENT



PLANS PREPARED BY
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS
SC 72 PLAN
STA 21+00 TO STA 27+00
SCALE: 1" = 20'
SH. NO. 8

DIST.	STATE	COUNTY	PROJECT NO.	ROUTE	SHEET
3	S.C.	YORK	PD2615	SC 72	9

SC 72 (SALUDA RD.)

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33

SEE SHEET 39 FOR SC 72 PROFILE
SEE SHEET D4 FOR DRAINAGE AND EROSION CONTROL NOTES

CONSTRUCT OUTFALL DITCH 1
APPROX. 100 L.F.
EST. EXC = XX CY.
CLEAR AND GRUB
OBTAIN PERMISSION

CONSTRUCT OUTFALL DITCH 2
APPROX. 34 L.F.
EST. EXC = XX CY.
CLEAR AND GRUB
OBTAIN PERMISSION

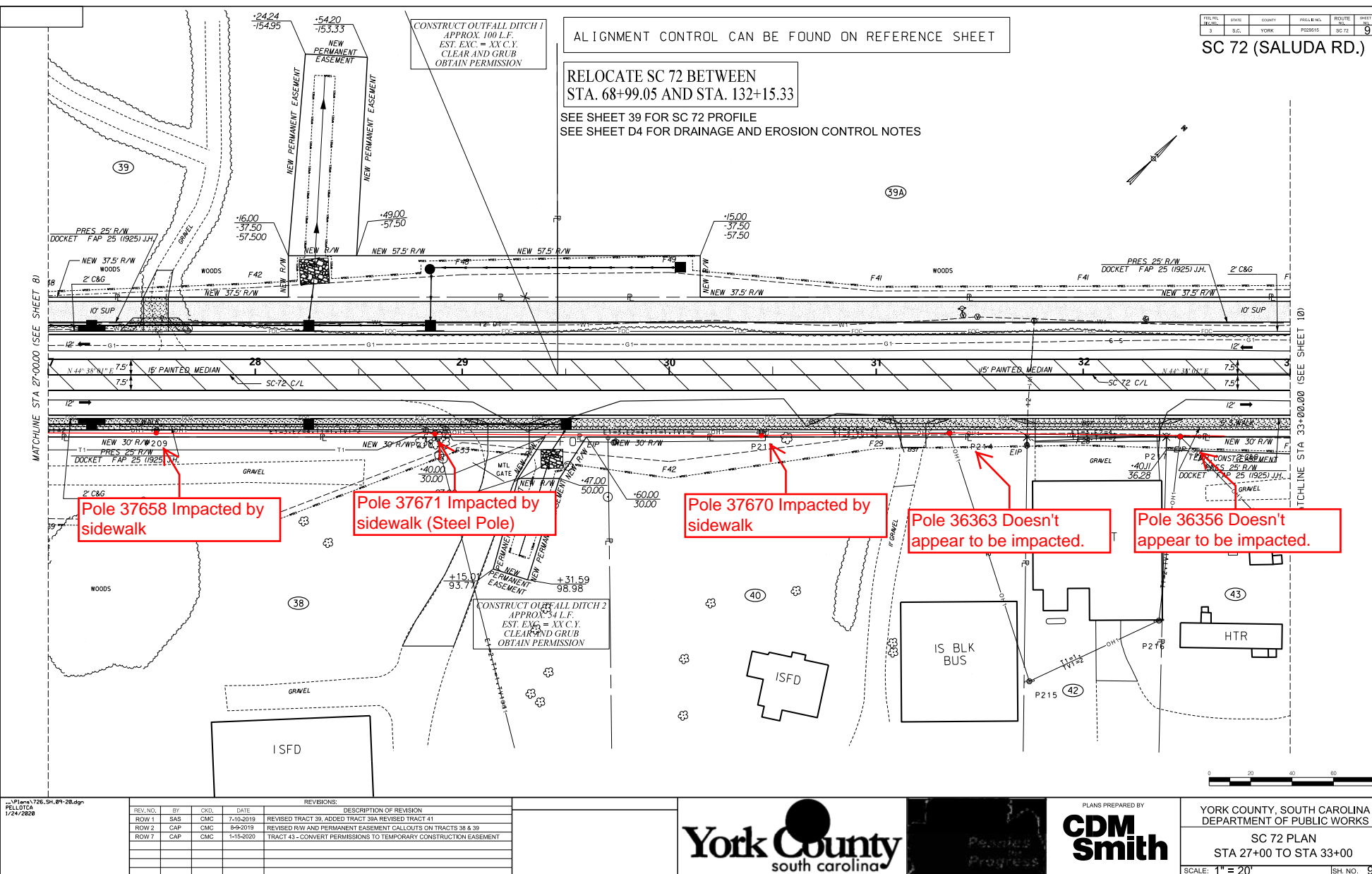
Pole 37658 Impacted by
sidewalk

Pole 37671 Impacted by
sidewalk (Steel Pole)

Pole 37670 Impacted by
sidewalk

Pole 36363 Doesn't
appear to be impacted.

Pole 36356 Doesn't
appear to be impacted.



\\P\plans\1726_S4_81\28.dgn
PELLDTCA
1/24/2020

REV. NO.	BY	CHKD.	DATE	REVISIONS	DESCRIPTION OF REVISION
ROW 1	SAS	CMC	7-10-2019	REVISED TRACT 39, ADDED TRACT 39A	REVISED TRACT 39, ADDED TRACT 39A REVISED TRACT 41
ROW 2	CAP	CMC	8-9-2019	REVISED ROW AND PERMANENT EASEMENT CALLOUTS ON TRACTS 38 & 39	REVISED ROW AND PERMANENT EASEMENT CALLOUTS ON TRACTS 38 & 39
ROW 7	CAP	CMC	1-15-2020	TRACT 43 - CONVERT PERMISSIONS TO TEMPORARY CONSTRUCTION EASEMENT	TRACT 43 - CONVERT PERMISSIONS TO TEMPORARY CONSTRUCTION EASEMENT



PLANS PREPARED BY
CDM Smith

YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS

SC 72 PLAN
STA 27+00 TO STA 33+00

SCALE: 1" = 20'

SH. NO. 9

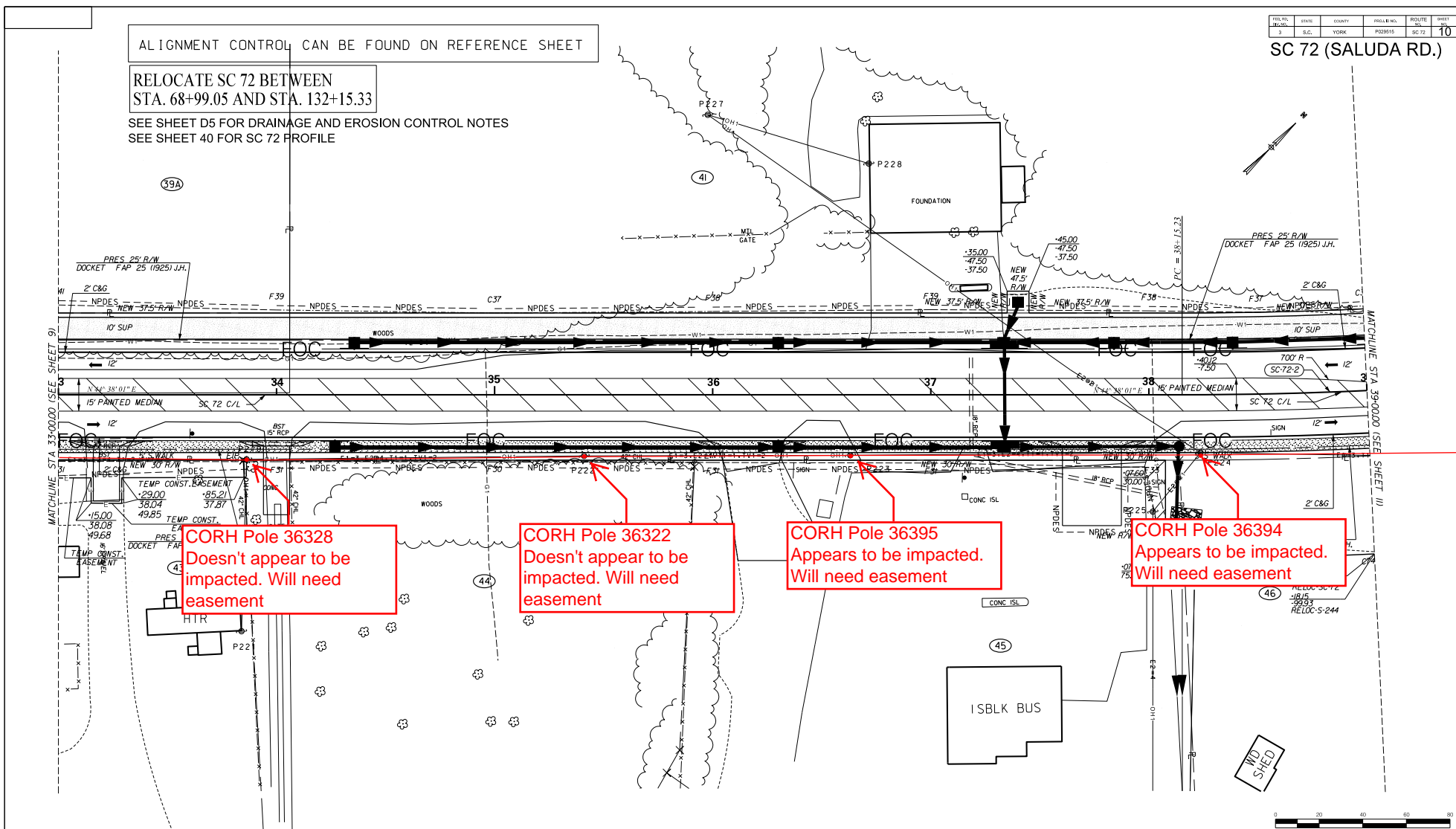
DIST.	STATE	COUNTY	PROJECT NO.	ROUTE	SHEET
3	S.C.	YORK	P02615	SC 72	10

SC 72 (SALUDA RD.)

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33

SEE SHEET D5 FOR DRAINAGE AND EROSION CONTROL NOTES
SEE SHEET 40 FOR SC 72 PROFILE



CORH Pole 36328
Doesn't appear to be impacted. Will need easement

CORH Pole 36322
Doesn't appear to be impacted. Will need easement

CORH Pole 36395
Appears to be impacted. Will need easement

CORH Pole 36394
Appears to be impacted. Will need easement

...\\P1101\726_S110-28.dgn
User: JCADSD\JCM
5/21/2020

REV. NO.	BY	CHKD.	DATE	REVISIONS	DESCRIPTION OF REVISION
ROW 1	SAS	CMC	7-10-2019	REVISED TRACT 39, ADDED TRACT 39A REVISED TRACT 41	
ROW 7	SAS	CMC	1-15-2020	TRACT 43 - CONVERT PERMISSIONS TO TEMPORARY CONSTRUCTION EASEMENT	
ROW 10	CAP	CMC	05-12-2020	TRACT 45 - REVISE NEW R/W	

TRACKING NO.		DOCUMENT REVIEW	
RESPONSIBILITY	NAME	DATE	
ORIGINATOR			
CHECKED			
REVISED			
VERIFIED			



PLANS PREPARED BY
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS
SC 72 PLAN
STA 33+00 TO STA 39+00
SCALE: 1" = 20' SH. NO. 10

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33

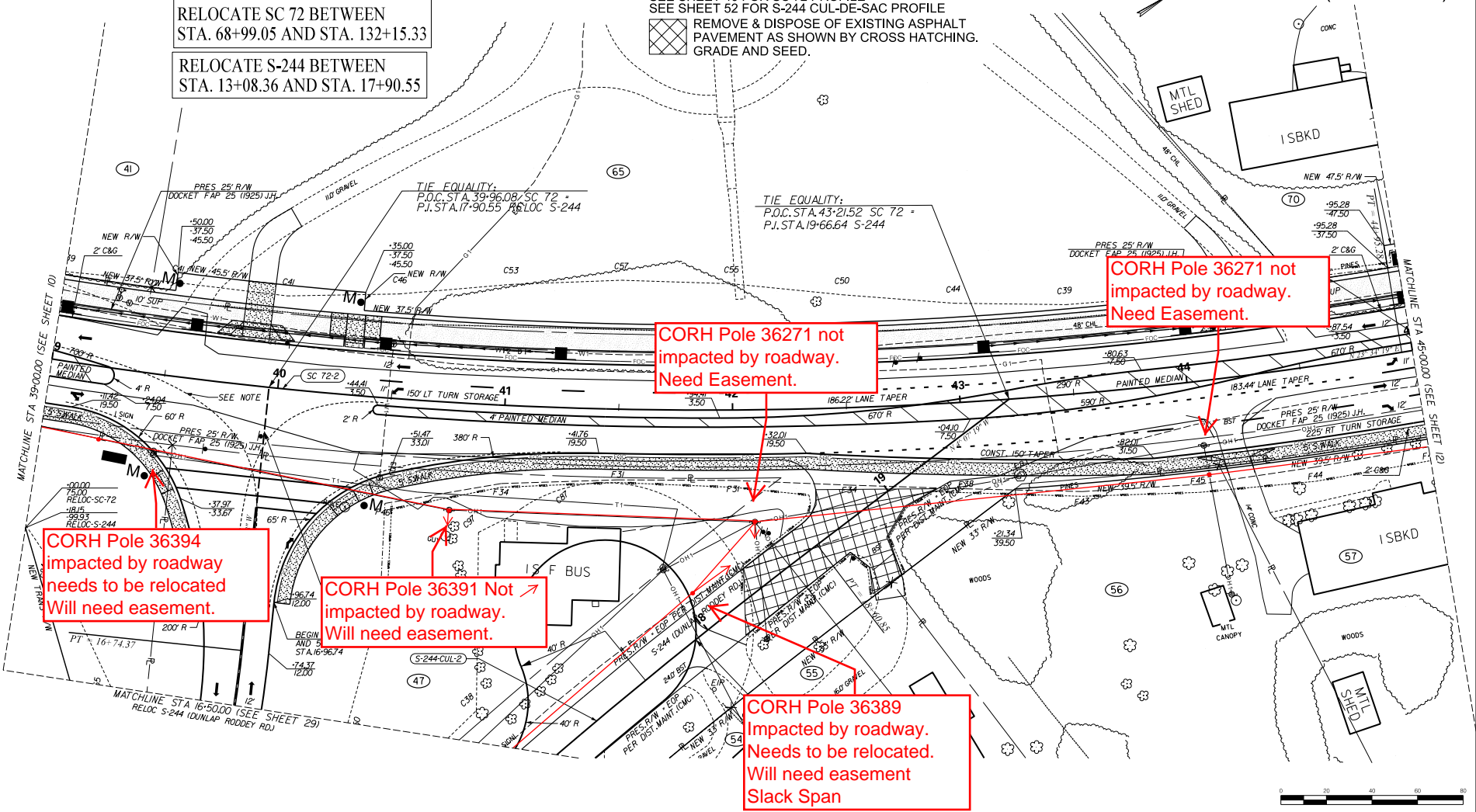
RELOCATE S-244 BETWEEN
STA. 13+08.36 AND STA. 17+90.55

INTERSECTION DS VEHICLE = WB-62 W/ 50' DS RADIUS
SEE SHEET D6 FOR DRAINAGE AND EROSION CONTROL NOTES
SEE SHEET 51 FOR RELOC S-244 PROFILE
SEE SHEET 40 FOR SC 72 PROFILE
SEE SHEET 52 FOR S-244 CUL-DE-SAC PROFILE

REMOVE & DISPOSE OF EXISTING ASPHALT
PAVEMENT AS SHOWN BY CROSS HATCHING.
GRADE AND SEED.

FILE NO.	SHEET	COUNTY	PROJECT NO.	ROUTE	SHEET
16206	3	S.C.	YORK	POB015	SC 72
					11

SC 72 (SALUDA RD.)



CORH Pole 36271 not impacted by roadway. Need Easement.

CORH Pole 36271 not impacted by roadway. Need Easement.

CORH Pole 36394 impacted by roadway needs to be relocated Will need easement.

CORH Pole 36391 Not impacted by roadway. Will need easement.

CORH Pole 36389 Impacted by roadway. Needs to be relocated. Will need easement Slack Span

Plans 1726_S4.11-28.dgn
PELLDTCA
1/24/2020

REV. NO.	BY	CHKD.	DATE	DESCRIPTION OF REVISION
ROW 7	CAP	CMC	1-15-2020	TRACT 66 - REV PROPERTY LINE TO 33' R/W PER PB A242




YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS

SC 72 PLAN
STA 39+00 TO STA 45+00

SCALE: 1" = 20' SH. NO. 11

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

 REMOVE & DISPOSE OF EXISTING ASPHALT PAVEMENT AS SHOWN BY CROSS HATCHING. GRADE AND SEED.

RELOCATE SC 72 BETWEEN STA. 68+99.05 AND STA. 132+15.33

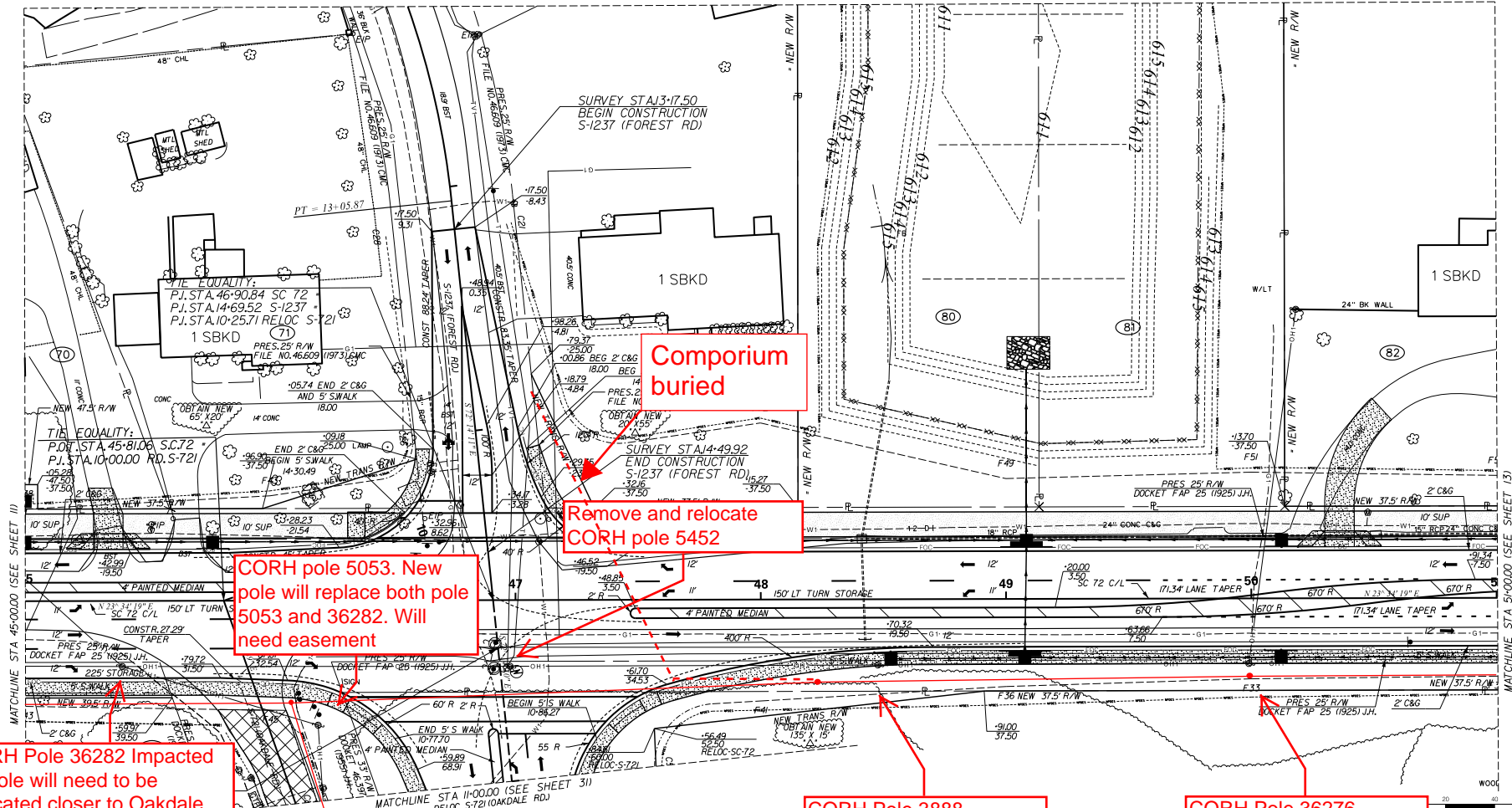
RELOCATE S-721 BETWEEN STA. 10+25.74 AND STA. 15+90.50

FOREST RD. INTERSECTION DS VEHICLE = S-BUS-40 W/36' DS RADIUS
 RELOC S-721 INTERSECTION DS VEHICLE = WB-62 W/50' DS RADIUS
 SEE SHEET 53 FOR RELOC S-721 PROFILE
 SEE SHEET 41 FOR SC 72 PROFILE
 SEE SHEET 52 FOR S-1237 PROFILE
 SEE SHEET D7 FOR DRAINAGE AND EROSION CONTROL NOTES

FILE NO.	SHEET	COUNTY	PROJECT NO.	ROUTE	SHEET
3	S.C.	YORK	PG0615	SC 72	12

SC 72 (SALUDA RD.)

MATCHLINE STA (SEE SHEET 35)



Comporium buried

Remove and relocate CORH pole 5452

CORH pole 5053. New pole will replace both pole 5053 and 36282. Will need easement

CORH Pole 36282 Impacted by pole will need to be relocated closer to Oakdale Rd

CORH Pole 3888 Impacted by sidewalk. Will need to be relocated

CORH Pole 36276 Impacted by sidewalk. Will need to be relocated

DATE	REVISIONS	DESCRIPTION OF REVISION

YORK County
south carolina

smith

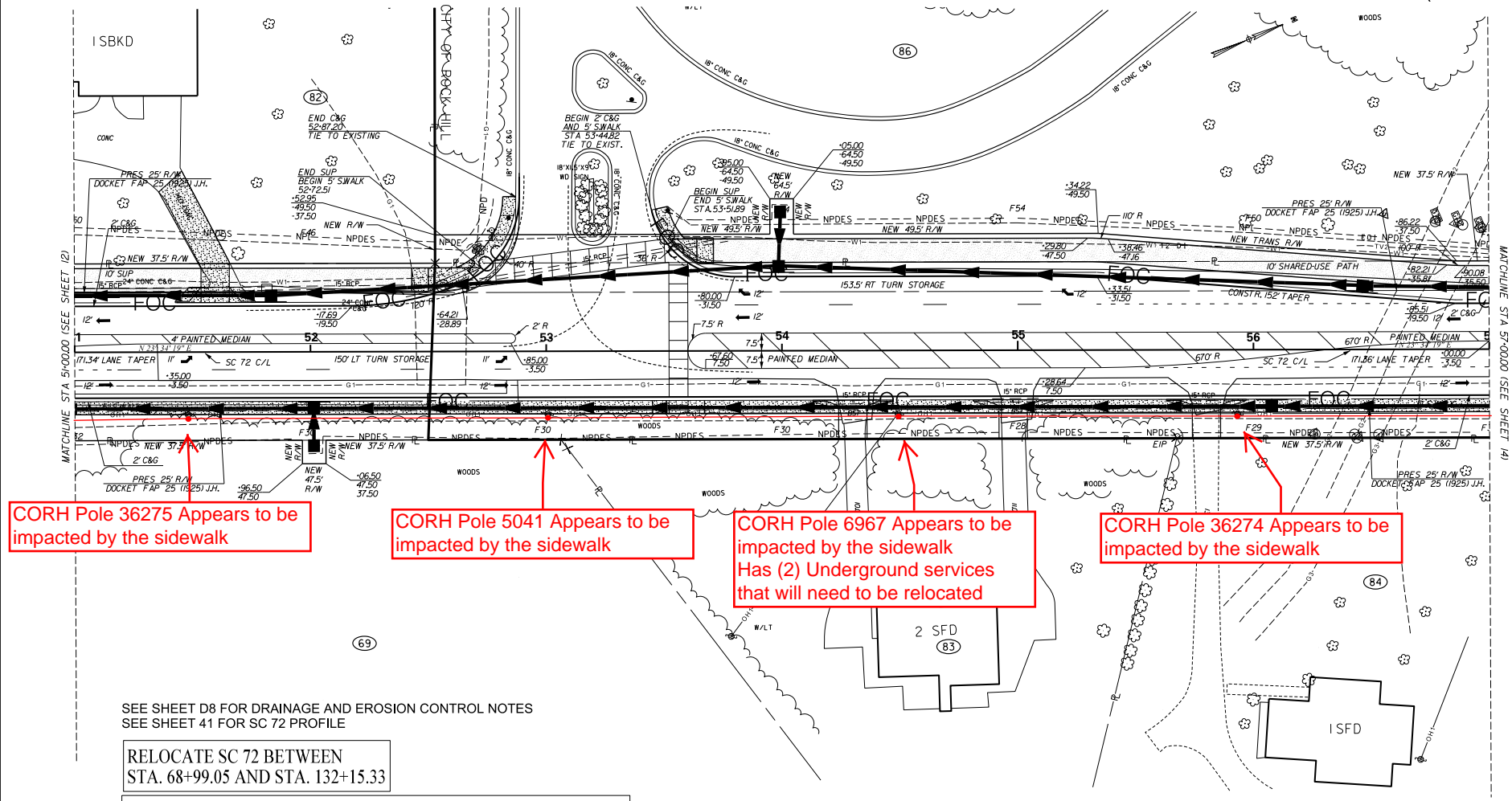
COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS

SC 72 PLAN
STA 45+00 TO STA 51+00

SCALE: 1" = 20' SH. NO. 12

DIST.	SHEET	COUNTY	PROJECT NO.	ROUTE	SHEET
3	S.C.	YORK	P02615	SC 72	13

SC 72 (SALUDA RD.)



CORH Pole 36275 Appears to be impacted by the sidewalk

CORH Pole 5041 Appears to be impacted by the sidewalk

CORH Pole 6967 Appears to be impacted by the sidewalk
Has (2) Underground services that will need to be relocated

CORH Pole 36274 Appears to be impacted by the sidewalk

SEE SHEET D8 FOR DRAINAGE AND EROSION CONTROL NOTES
SEE SHEET 41 FOR SC 72 PROFILE

RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

...Plans\1726_SH.13-28.dgn
User: J.CASIDY\JCM
5/21/2020

REV. NO.	BY	CHKD.	DATE	REVISIONS:	DESCRIPTION OF REVISION
ROW10	SAS	CMC	4-24-2020	TRACT 82 - REVISED SHARED USE PATH & NEW R/W	



PLANS PREPARED BY
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS
SC 72 PLAN
STA 51+00 TO STA 57+00
SCALE: 1" = 20' SH. NO. 13

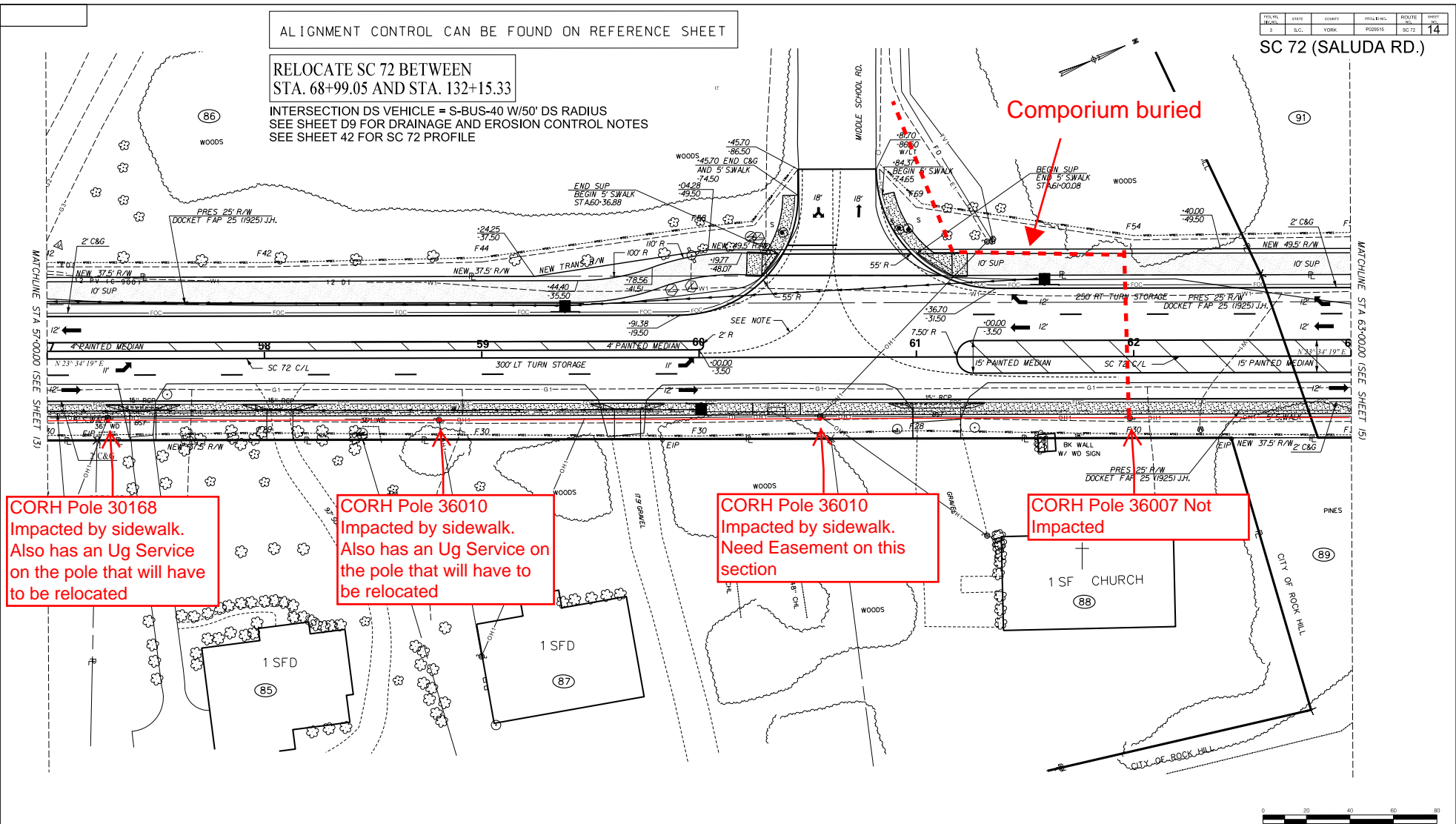
ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33

INTERSECTION DS VEHICLE = S-BUS-40 W/50' DS RADIUS
SEE SHEET D9 FOR DRAINAGE AND EROSION CONTROL NOTES
SEE SHEET 42 FOR SC 72 PROFILE

FILE NO.	SHEET	COUNTY	PROJECT NO.	ROUTE	SHEET
13026	3	YORK	P02615	SC 72	14

SC 72 (SALUDA RD.)



CORH Pole 30168
Impacted by sidewalk.
Also has an Ug Service
on the pole that will have
to be relocated

CORH Pole 36010
Impacted by sidewalk.
Also has an Ug Service on
the pole that will have to
be relocated

CORH Pole 36010
Impacted by sidewalk.
Need Easement on this
section

CORH Pole 36007 Not
Impacted

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SWANSONA
1/11/2014

REV. NO.	BY	CHKD.	DATE	REVISIONS:	DESCRIPTION OF REVISION



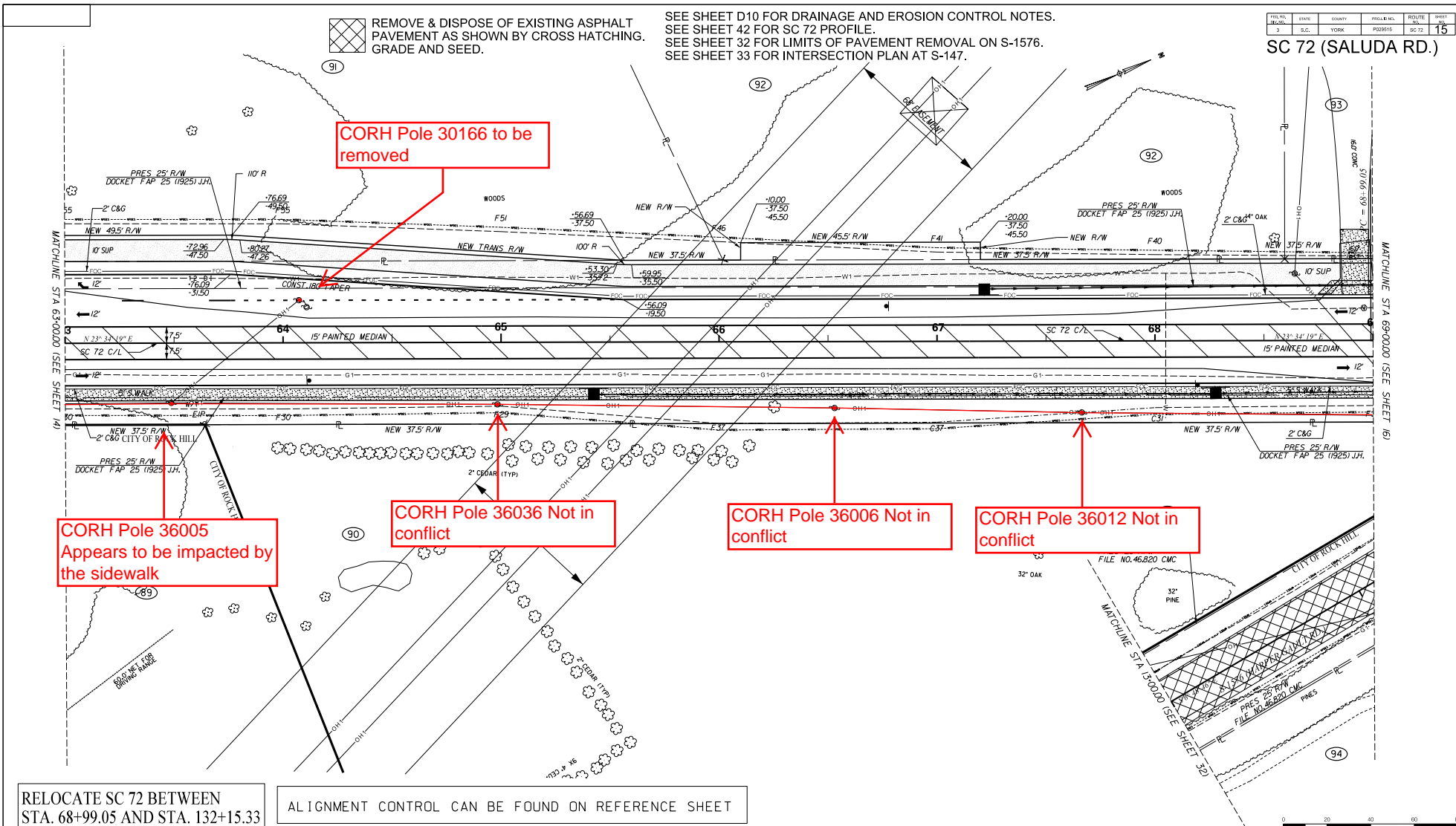
PLANS PREPARED BY
CDM Smith
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS
SC 72 PLAN
STA 57+00 TO STA 63+00
SCALE: 1" = 20' SH. NO. 14

REMOVE & DISPOSE OF EXISTING ASPHALT PAVEMENT AS SHOWN BY CROSS HATCHING. GRADE AND SEED.

SEE SHEET D10 FOR DRAINAGE AND EROSION CONTROL NOTES.
SEE SHEET 42 FOR SC 72 PROFILE.
SEE SHEET 32 FOR LIMITS OF PAVEMENT REMOVAL ON S-1576.
SEE SHEET 33 FOR INTERSECTION PLAN AT S-147.

DIST.	SHEET	COUNTY	PROJECT NO.	ROUTE	SHEET
3	S.C.	YORK	PD2615	SC 72	15

SC 72 (SALUDA RD.)



RELOCATE SC 72 BETWEEN STA. 68+99.05 AND STA. 132+15.33

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

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PELLDTCA
1/24/2020

REV. NO.	BY	CHKD.	DATE	REVISIONS:	DESCRIPTION OF REVISION
ROW.7	SAS	CMC	1-15-2020	REMOVED RELOC S-1576 (HARPER GAULT RD.)	



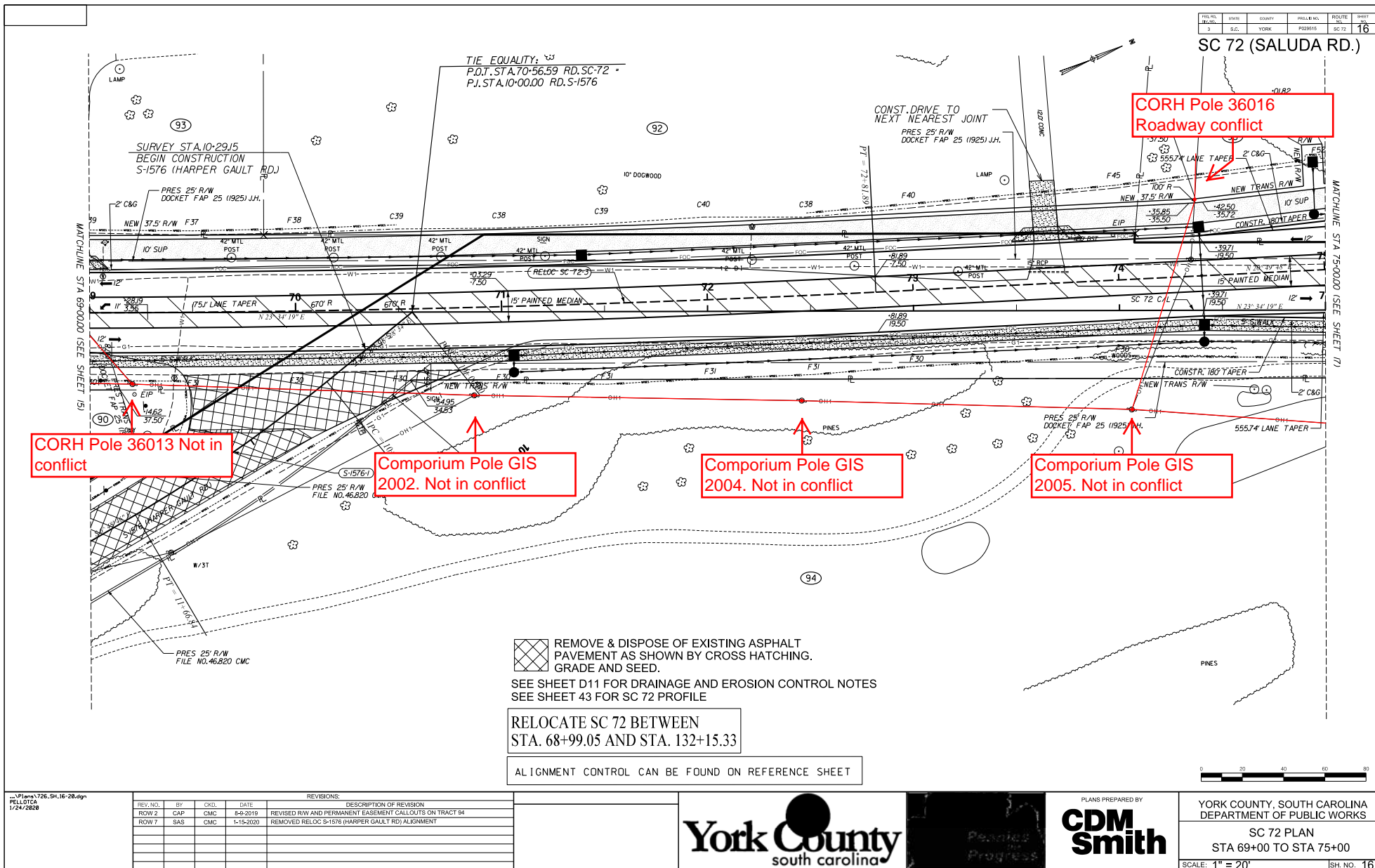
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS

SC 72 PLAN
STA 63+00 TO STA 69+00

SCALE: 1" = 20' SH. NO. 15

DIST.	SHEET	COUNTY	PROJECT NO.	ROUTE	SHEET
3	S.C.	YORK	POB15	SC 72	16

SC 72 (SALUDA RD.)



CORH Pole 36013 Not in conflict

Comporium Pole GIS 2002. Not in conflict

Comporium Pole GIS 2004. Not in conflict

Comporium Pole GIS 2005. Not in conflict



REMOVE & DISPOSE OF EXISTING ASPHALT PAVEMENT AS SHOWN BY CROSS HATCHING. GRADE AND SEED.

SEE SHEET D11 FOR DRAINAGE AND EROSION CONTROL NOTES
SEE SHEET 43 FOR SC 72 PROFILE

RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

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PELLDTCA
1/24/2020

REV. NO.	BY	CHKD.	DATE	DESCRIPTION OF REVISION
ROW 2	CAP	CMC	8-9-2019	REVISED RW AND PERMANENT EASEMENT CALLOUTS ON TRACT 94
ROW 7	SAS	CMC	1-15-2020	REMOVED RELOC S-1576 (HARPER GAULT RD) ALIGNMENT



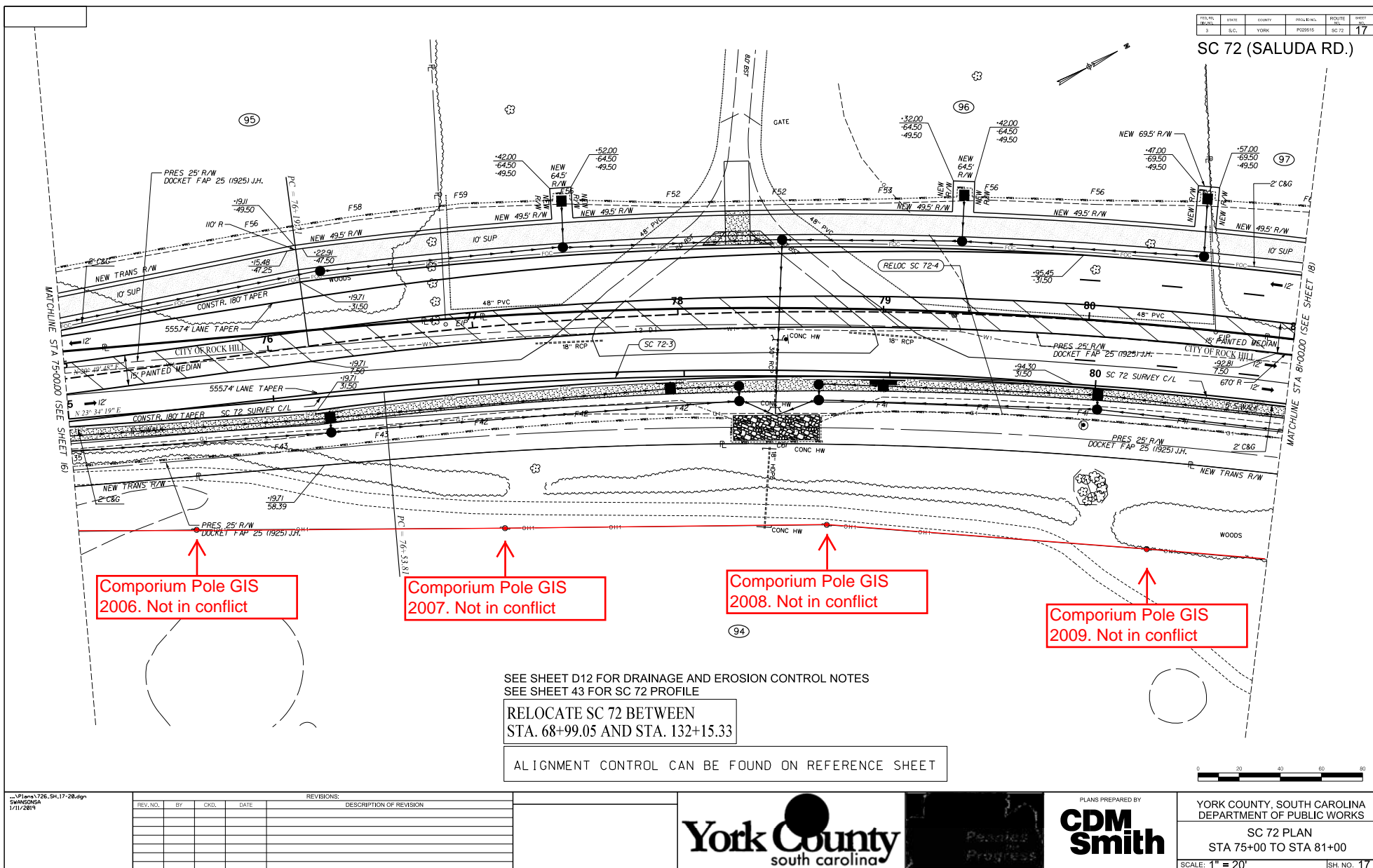
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS

SC 72 PLAN
STA 69+00 TO STA 75+00

SCALE: 1" = 20' SHEET NO. 16

FED. RD. DIST. NO.	STATE	COUNTY	PROJECT NO.	ROUTE	SHEET NO.
3	S.C.	YORK	P02615	SC 72	17

SC 72 (SALUDA RD.)



Comporium Pole GIS 2006. Not in conflict

Comporium Pole GIS 2007. Not in conflict

Comporium Pole GIS 2008. Not in conflict

Comporium Pole GIS 2009. Not in conflict

SEE SHEET D12 FOR DRAINAGE AND EROSION CONTROL NOTES
SEE SHEET 43 FOR SC 72 PROFILE

RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

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SWANSONA
1/11/2014

REV. NO.	BY	CHKD.	DATE	REVISIONS:	DESCRIPTION OF REVISION



PLANS PREPARED BY
CDM Smith
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS
SC 72 PLAN
STA 75+00 TO STA 81+00
SCALE: 1" = 20'
SH. NO. 17

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33

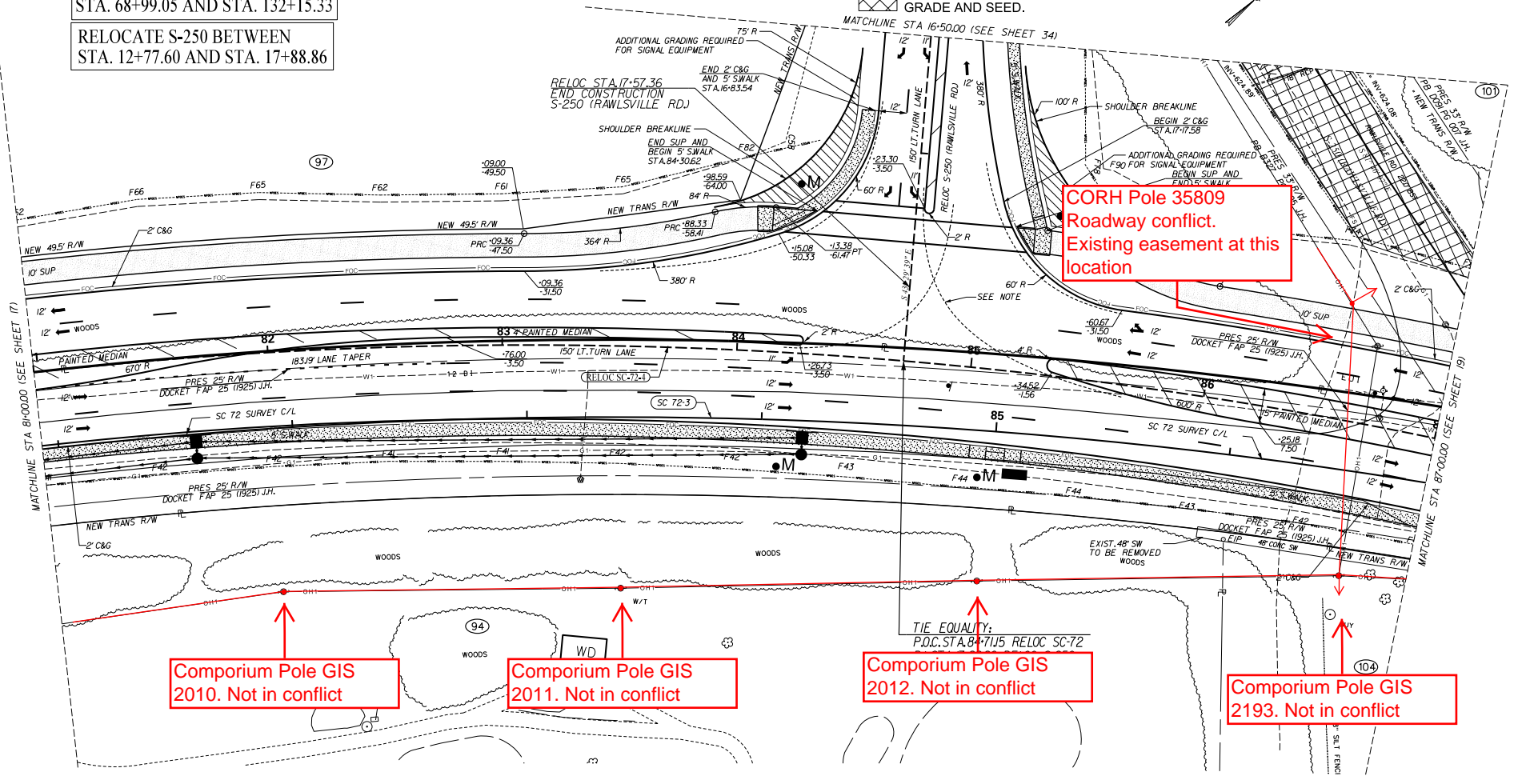
RELOCATE S-250 BETWEEN
STA. 12+77.60 AND STA. 17+88.86

INTERSECTION DS VEHICLE = WB-62 W/50' DS RADIUS
SEE SHEET D13 FOR DRAINAGE AND EROSION CONTROL WORKS
SEE SHEET 44 FOR SC 72 PROFILE
SEE SHEET 55 FOR RELOC S-250 PROFILE

REMOVE & DISPOSE OF EXISTING ASPHALT
PAVEMENT AS SHOWN BY CROSS HATCHING.
GRADE AND SEED.

FILE NO.	SHEET	COUNTY	PROJECT NO.	ROUTE	SHEET
1822	3	S.C.	YORK	PG0615	SC 72 18

SC 72 (SALUDA RD.)



Comporium Pole GIS
2010. Not in conflict

Comporium Pole GIS
2011. Not in conflict

Comporium Pole GIS
2012. Not in conflict

Comporium Pole GIS
2193. Not in conflict

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SWANINSA
1/11/2014

REV. NO.	BY	CHKD.	DATE	REVISIONS	DESCRIPTION OF REVISION



YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS

SC 72 PLAN
STA 81+00 TO STA 87+00

SCALE: 1" = 20' SH. NO. 18

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

DIST.	SHEET	COUNTY	PROJECT NO.	ROUTE	SHEET
3	S.C.	YORK	PD2815	SC 72	19

SC 72 (SALUDA RD.)

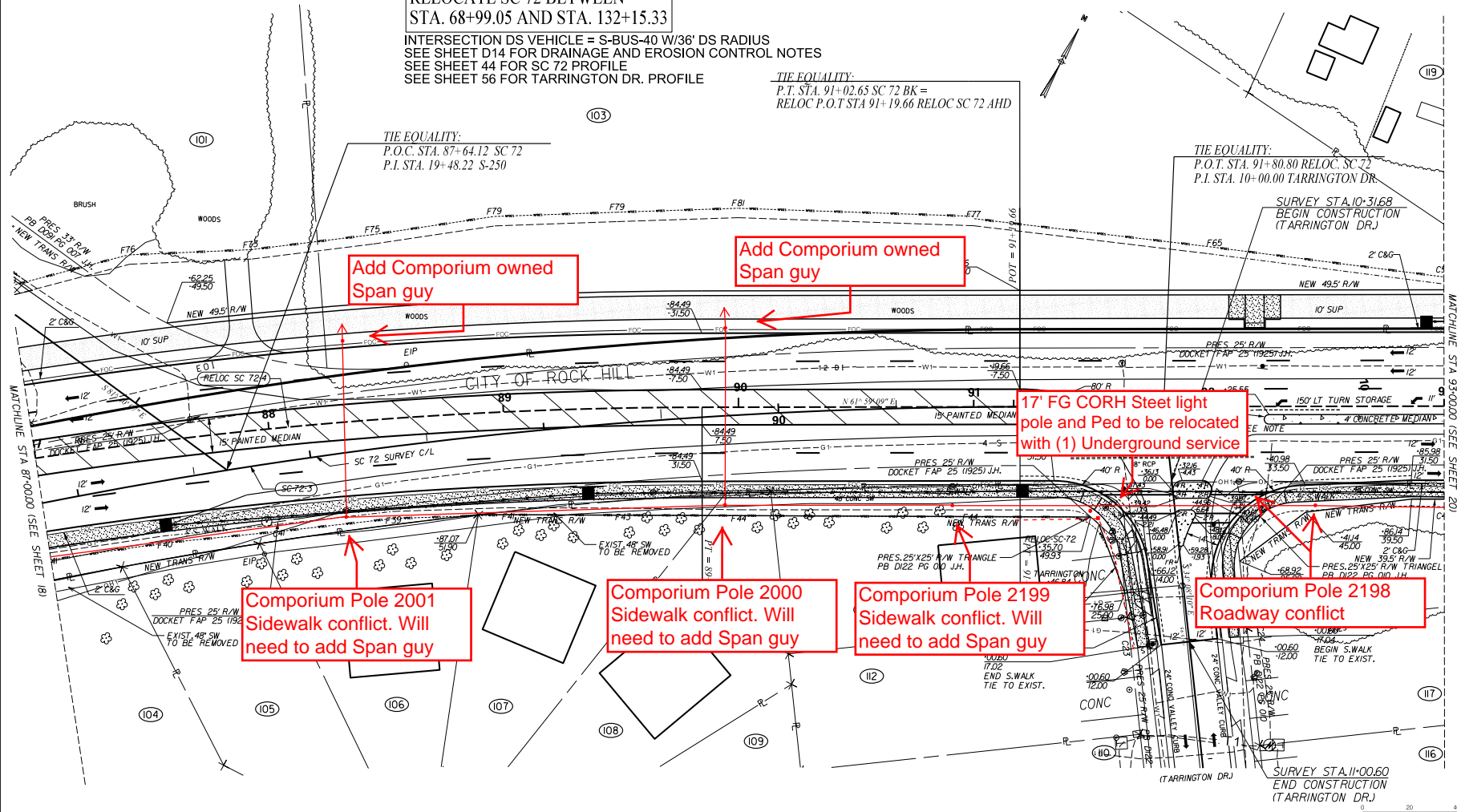
RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33

INTERSECTION DS VEHICLE = S-BUS-40 W/36' DS RADIUS
SEE SHEET D14 FOR DRAINAGE AND EROSION CONTROL NOTES
SEE SHEET 44 FOR SC 72 PROFILE
SEE SHEET 56 FOR TARRINGTON DR. PROFILE

TIE EQUALITY:
P.T. STA. 91+02.65 SC 72 BK =
RELOC P.O.T. STA 91+19.66 RELOC SC 72 AHD

TIE EQUALITY:
P.O.C. STA. 87+64.12 SC 72
P.I. STA. 19+48.22 S-250

TIE EQUALITY:
P.O.T. STA. 91+80.80 RELOC. SC 72
P.I. STA. 10+00.00 TARRINGTON DR.



Plans 1726.S4.19-28.dgn
PELLI/TC
1/24/2020

REV. NO.	BY	CHKD.	DATE	REVISIONS	DESCRIPTION OF REVISION
ROW.7	CAP	CMC	12/3/19	UPDATED RAW ON TRACTS 106, 107, 108 AND 113	



PLANS PREPARED BY
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS
SC 72 PLAN
STA 87+00 TO STA 93+00
SCALE: 1" = 20'
SHEET NO. 19

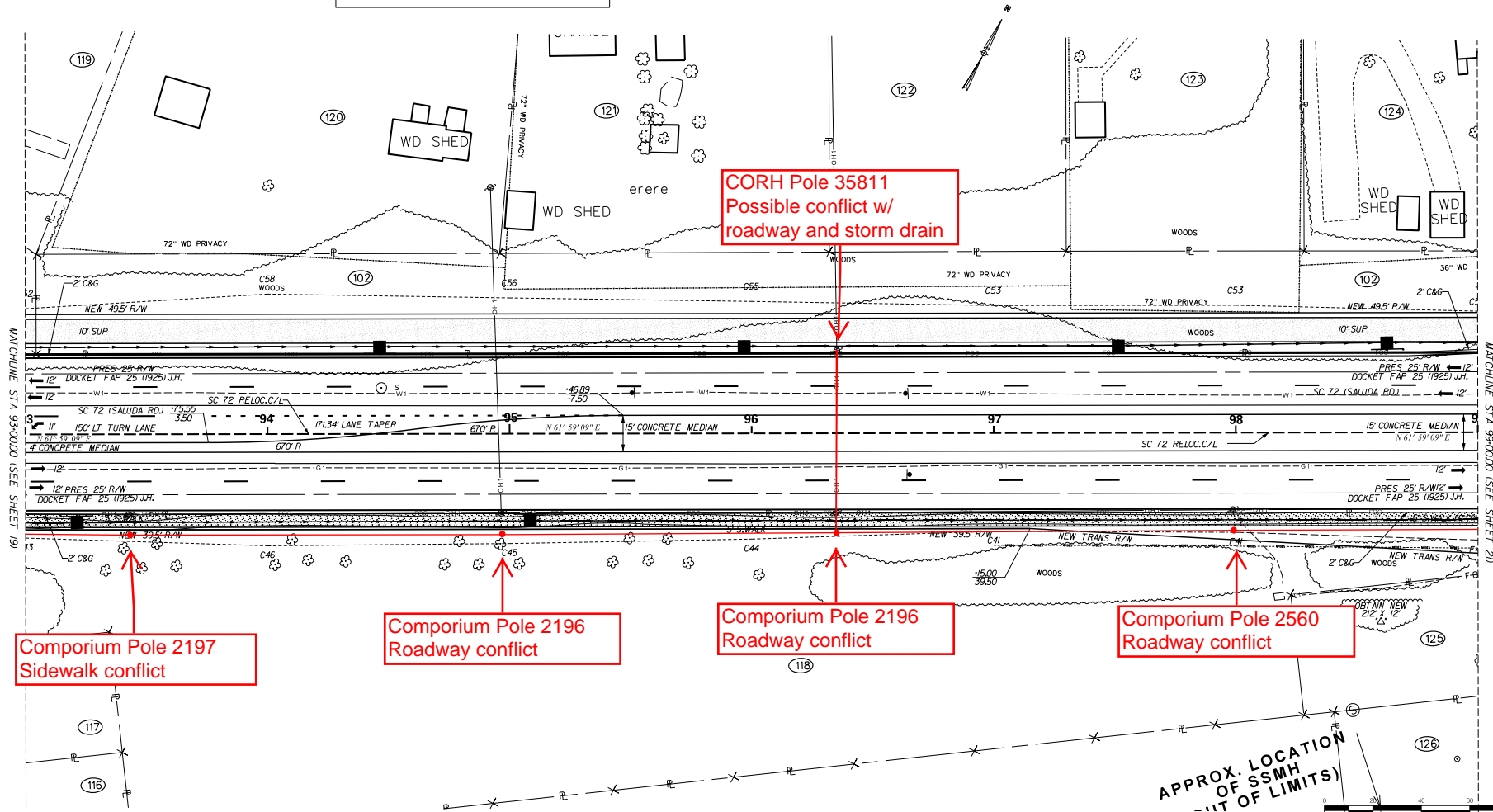
ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

SEE SHEET D15 FOR DRAINAGE AND EROSION CONTROL NOTES
SEE SHEET 45 FOR SC 72 PROFILE

FILE NO.	SHEET	COUNTY	PROJECT NO.	ROUTE	SHEET
D15	3	YORK	P09615	SC 72	20

RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33

SC 72 (SALUDA RD.)



CORH Pole 35811
Possible conflict w/
roadway and storm drain

Comporium Pole 2197
Sidewalk conflict

Comporium Pole 2196
Roadway conflict

Comporium Pole 2196
Roadway conflict

Comporium Pole 2560
Roadway conflict

APPROX. LOCATION
OF SSMH
(OUT OF LIMITS)

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SWANSONA
1/11/2014

REV. NO.	BY	CHKD.	DATE	REVISIONS:	DESCRIPTION OF REVISION



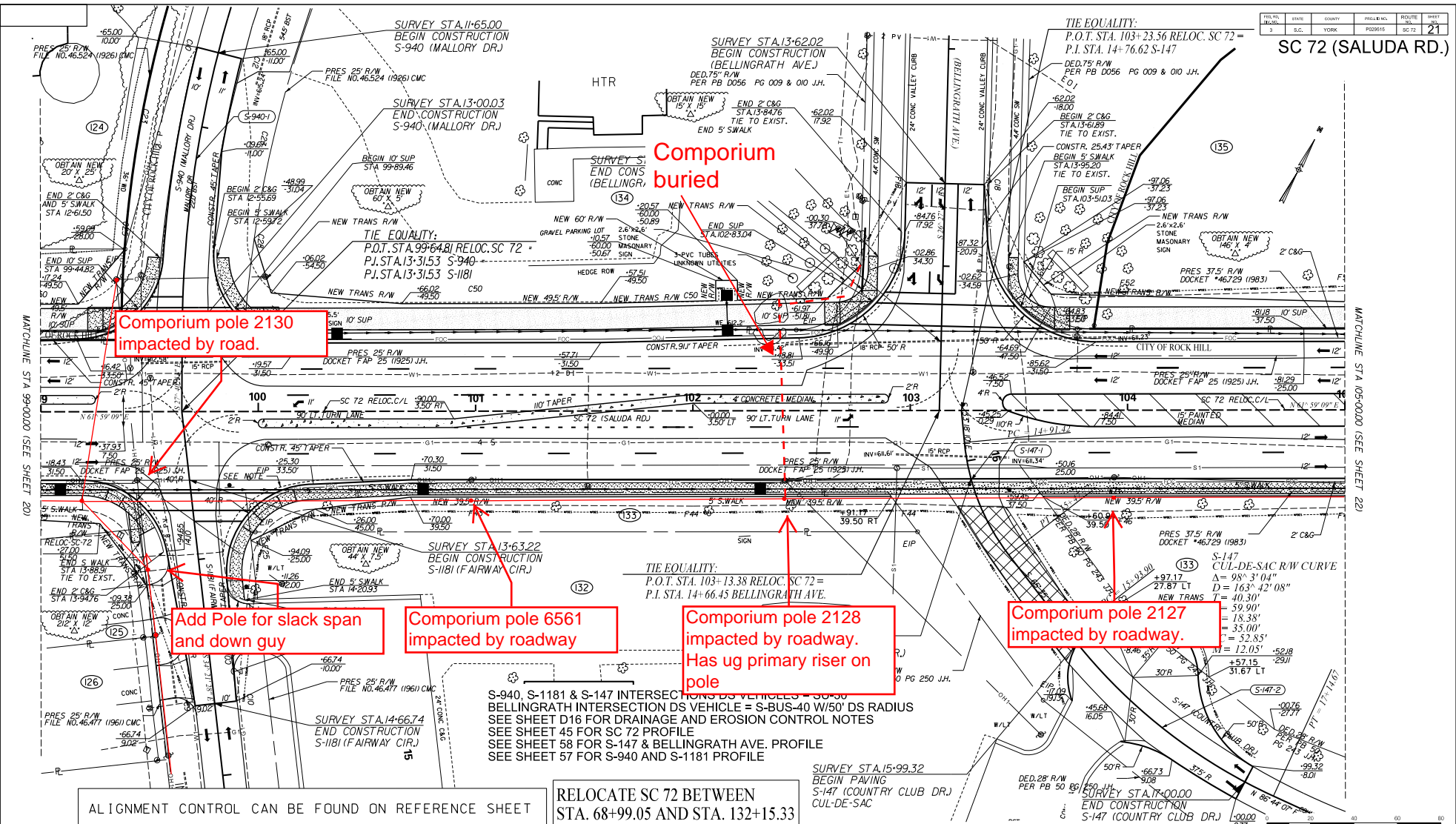
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS

SC 72 PLAN
STA 93+00 TO STA 99+00

SCALE: 1" = 20' SH. NO. 20

FILE NO.	SHEET	COUNTY	PROJECT NO.	ROUTE	SHEET
103	3	YORK	PG0615	SC 72	21

SC 72 (SALUDA RD.)



ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

RELOCATE SC 72 BETWEEN STA. 68+99.05 AND STA. 132+15.33

S-940, S-1181 & S-147 INTERSECTIONS DS VEHICLES - SEE SHEET D16 FOR DRAINAGE AND EROSION CONTROL NOTES
 BELLINGRATH INTERSECTION DS VEHICLE = S-BUS-40 W/50' DS RADIUS
 SEE SHEET 45 FOR SC 72 PROFILE
 SEE SHEET 58 FOR S-147 & BELLINGRATH AVE. PROFILE
 SEE SHEET 57 FOR S-940 AND S-1181 PROFILE

Plans 1726, SH. 21-28.dgn
 BELLOTTA
 1/24/2020

REV. NO.	BY	CHKD.	DATE	REVISIONS	DESCRIPTION OF REVISION
ROW 7	SAS	CMC	1-15-2020	REPLACED S-147 INTERSECTION WITH SC 72 WITH CUL-DE-SAC.	
ROW 7	SAS	CMC	1-15-2020	REVISED SC 72 MEDIAN FROM TARRINGTON TO BELLINGRATH	



PLANS PREPARED BY YORK COUNTY, SOUTH CAROLINA DEPARTMENT OF PUBLIC WORKS

SC 72 PLAN STA 99+00 TO STA 105+00

SCALE: 1" = 20'

SH. NO. 21

CEDAR POST LN INTERSECTION DS VEHICLE = S-BUS-40 W/36' DS RADIUS
 SEE SHEET D18 FOR DRAINAGE AND EROSION CONTROL NOTES
 SEE SHEET 46 FOR SC 72 PROFILE
 SEE SHEET 60 FOR CEDAR POST LN PROFILE

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

FILE NO.	SHEET	COUNTY	PROJECT NO.	ROUTE	SHEET
111+00	3	YORK	PG0615	SC 72	23

SC 72 (SALUDA RD.)

RELOCATE SC 72 BETWEEN
 STA. 68+99.05 AND STA. 132+15.33

Comporium buried

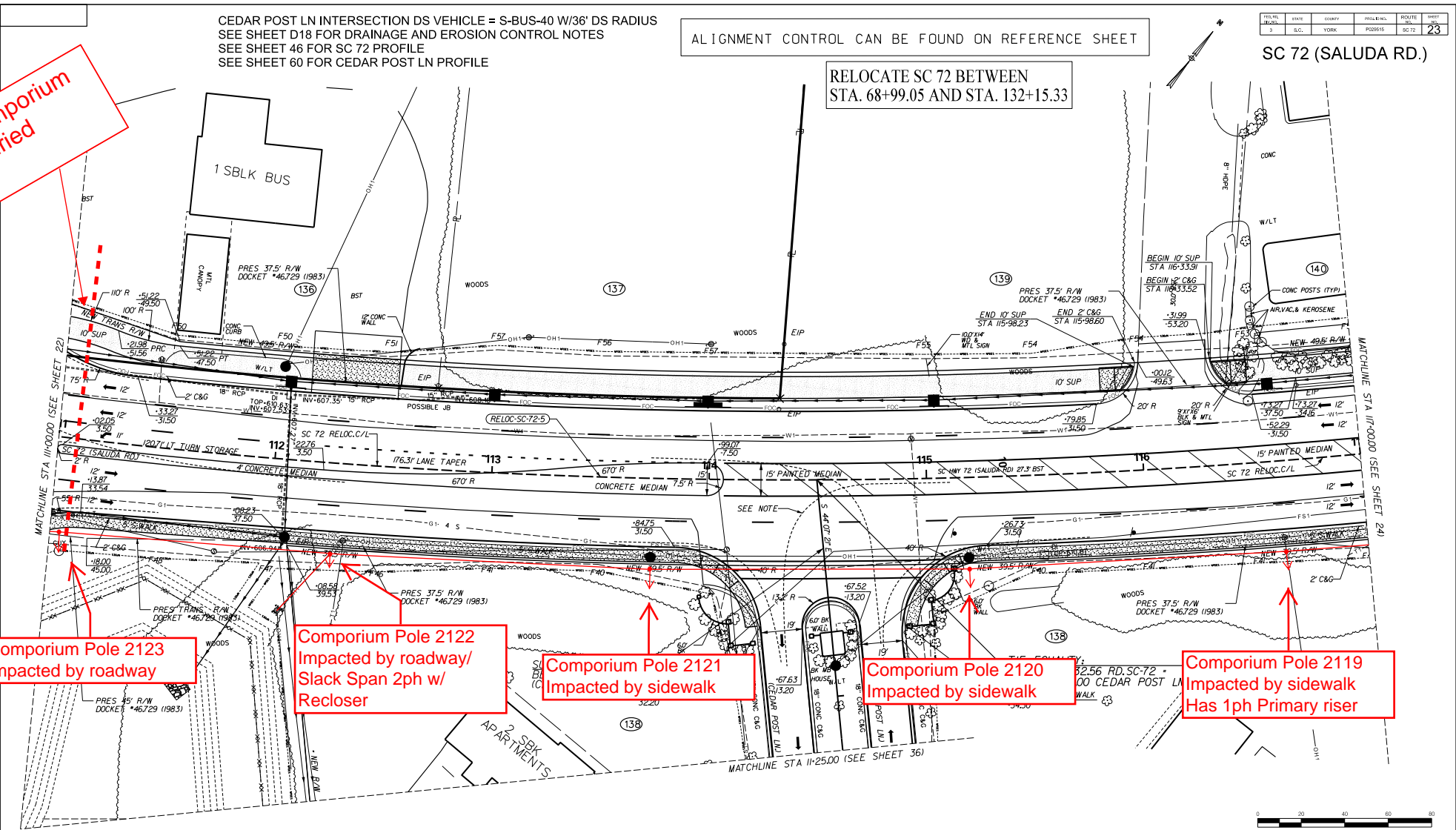
Comporium Pole 2123
 Impacted by roadway

Comporium Pole 2122
 Impacted by roadway/
 Slack Span 2ph w/
 Recloser

Comporium Pole 2121
 Impacted by sidewalk

Comporium Pole 2120
 Impacted by sidewalk

Comporium Pole 2119
 Impacted by sidewalk
 Has 1ph Primary riser



11-Plans 1726_S4_23-28.dgn
 SWANSONA
 1/11/2014

REV. NO.	BY	CHKD.	DATE	REVISIONS	DESCRIPTION OF REVISION



PLANS PREPARED BY
CDM Smith
 YORK COUNTY, SOUTH CAROLINA
 DEPARTMENT OF PUBLIC WORKS
 SC 72 PLAN
 STA 111+00 TO STA 117+00
 SCALE: 1" = 20' SH. NO. 23

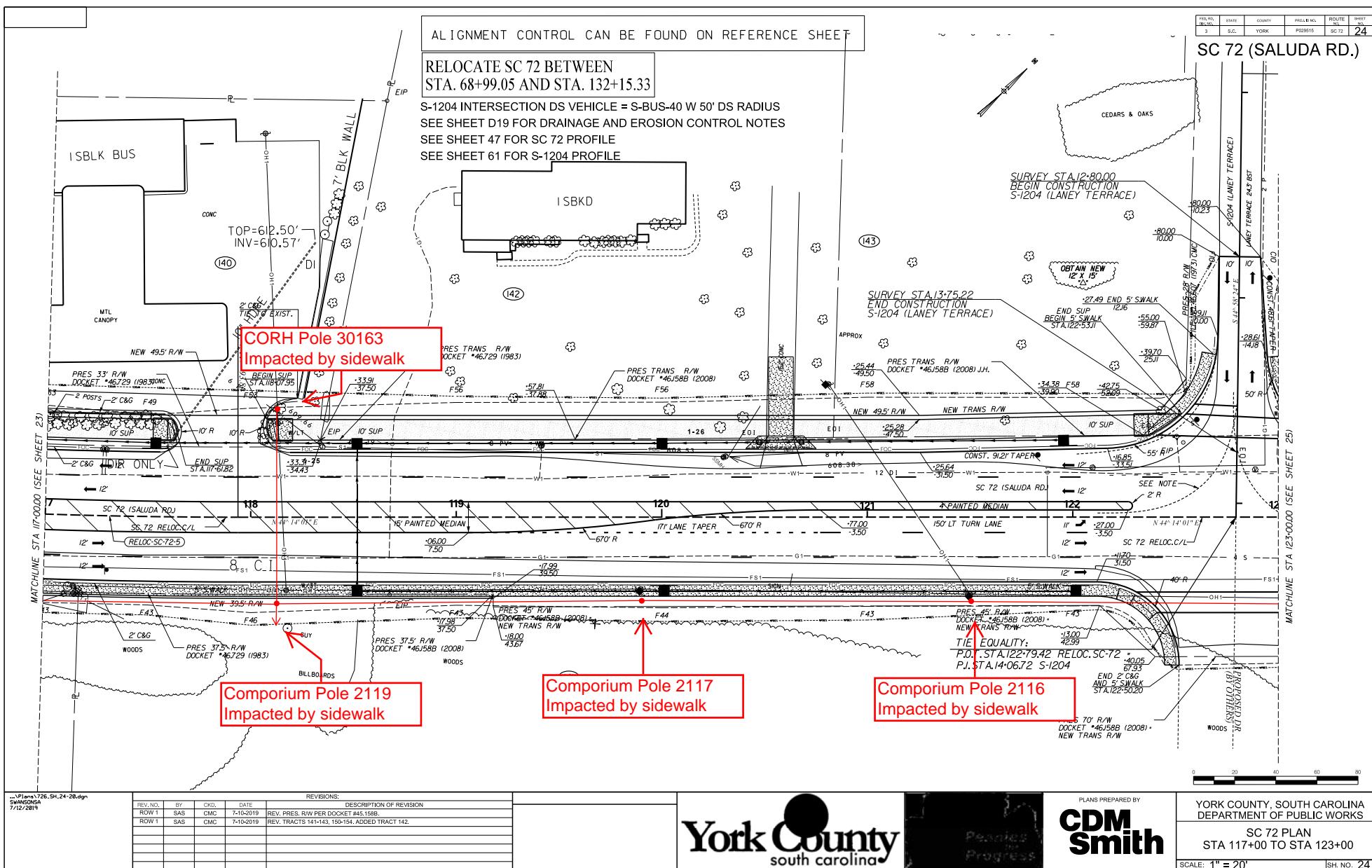
FILE NO.	SHEET	COUNTY	PROJECT NO.	ROUTE	SHEET
112-000	3	YORK	PD0915	SC 72	24

SC 72 (SALUDA RD.)

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33

S-1204 INTERSECTION DS VEHICLE = S-BUS-40 W 50' DS RADIUS
SEE SHEET D19 FOR DRAINAGE AND EROSION CONTROL NOTES
SEE SHEET 47 FOR SC 72 PROFILE
SEE SHEET 61 FOR S-1204 PROFILE



CORH Pole 30163
Impacted by sidewalk

Comporium Pole 2119
Impacted by sidewalk

Comporium Pole 2117
Impacted by sidewalk

Comporium Pole 2116
Impacted by sidewalk

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SWANSONSA
7/12/2014

REV. NO.	BY	CHKD.	DATE	DESCRIPTION OF REVISION
ROW 1	SAS	CMC	7-10-2019	REV. PRES. R/W PER DOCKET #43, 158B.
ROW 1	SAS	CMC	7-10-2019	REV. TRACTS 141-143, 150-154, ADDED TRACT 142.



YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS

SC 72 PLAN
STA 117+00 TO STA 123+00

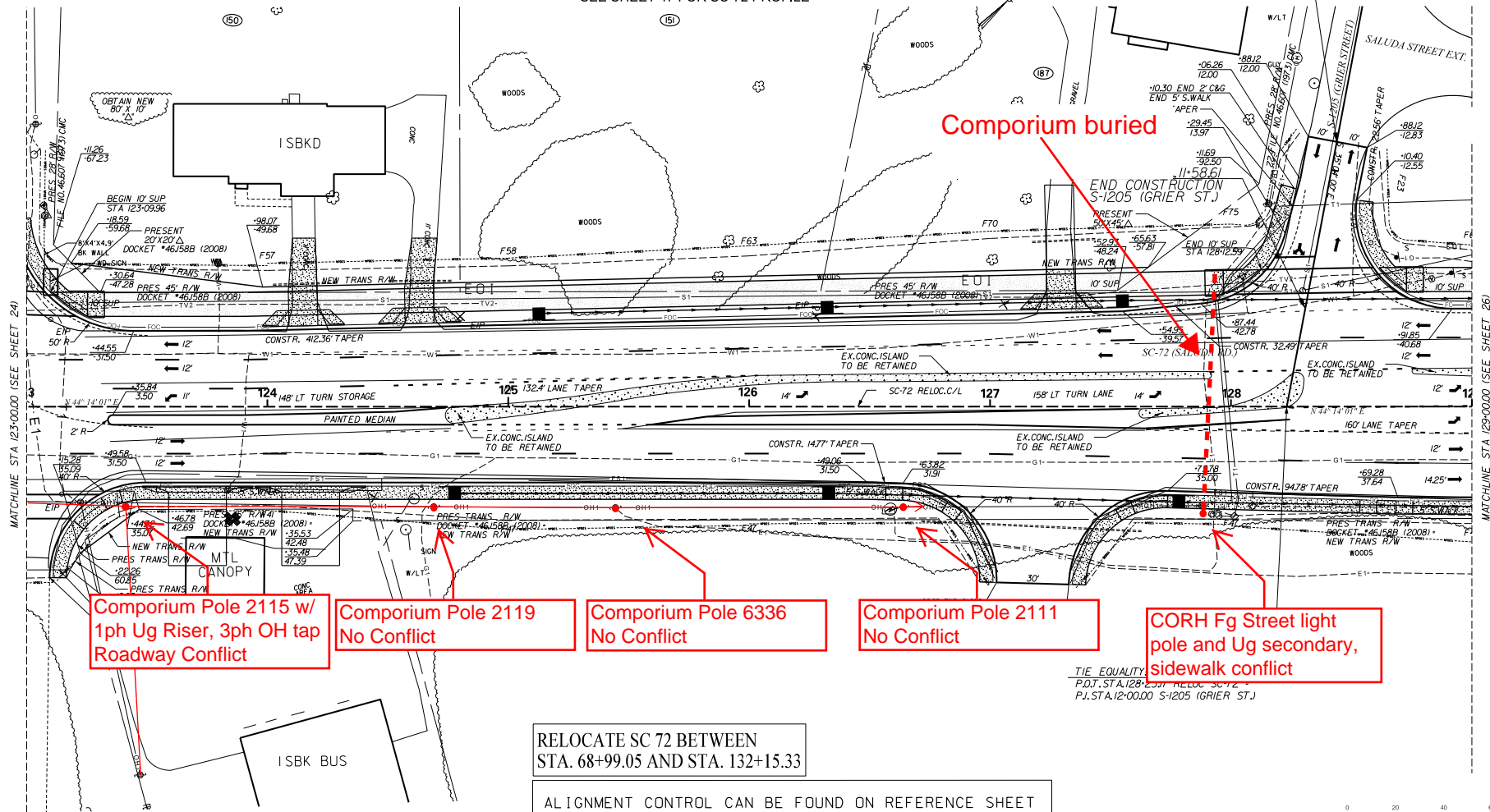
SCALE: 1" = 20' SH. NO. 24

FILE NO.	SHEET	COUNTY	PROJECT NO.	ROUTE	SHEET
124	3	S.C.	YORK	PG0815	SC-72
					25

SC-72 (SALUDA RD.)

S-1205 INTERSECTION DS VEHICLE = S-BUS-40 W/50' DS RADIUS
 SEE SHEET D20 FOR DRAINAGE AND EROSION CONTROL NOTES
 SEE SHEET 61 FOR S-1205 PROFILE
 SEE SHEET 47 FOR SC-72 PROFILE

SURVEY STA. 10+88.12
 BEGIN CONSTRUCTION
 S-1205 (GRIER ST.)



Comporium Pole 2115 w/
 1ph Ug Riser, 3ph OH tap
 Roadway Conflict

Comporium Pole 2119
 No Conflict

Comporium Pole 6336
 No Conflict

Comporium Pole 2111
 No Conflict

CORH Fg Street light
 pole and Ug secondary,
 sidewalk conflict

RELOCATE SC 72 BETWEEN
 STA. 68+99.05 AND STA. 132+15.33

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

Plans 124, 25-28.dgn
 PELLDTCA
 1/24/2020

REV. NO.	BY	CHKD.	DATE	REVISIONS	DESCRIPTION OF REVISION
ROW 1	SAS	CMC	7-10-2019	REV. PRES R/W PER DOCKET #45,158B, TRACTS 141-143, 150-154 AND 159.	
ROW 1	SAS	CMC	7-10-2019	REV. GRIER ST. INTERSECTION	
ROW 5	CAP	CMC	9-20-2019	TRACTS 153, 154 AND 155 COMBINED INTO TRACT 157	
ROW 7	CAP	CMC	1-15-2020	TRACT 152 REVISED DRIVEWAYS	



YORK COUNTY, SOUTH CAROLINA
 DEPARTMENT OF PUBLIC WORKS

SC 72 PLAN
 STA 123+00 TO STA 129+00

SCALE: 1" = 20'

SH. NO. 25

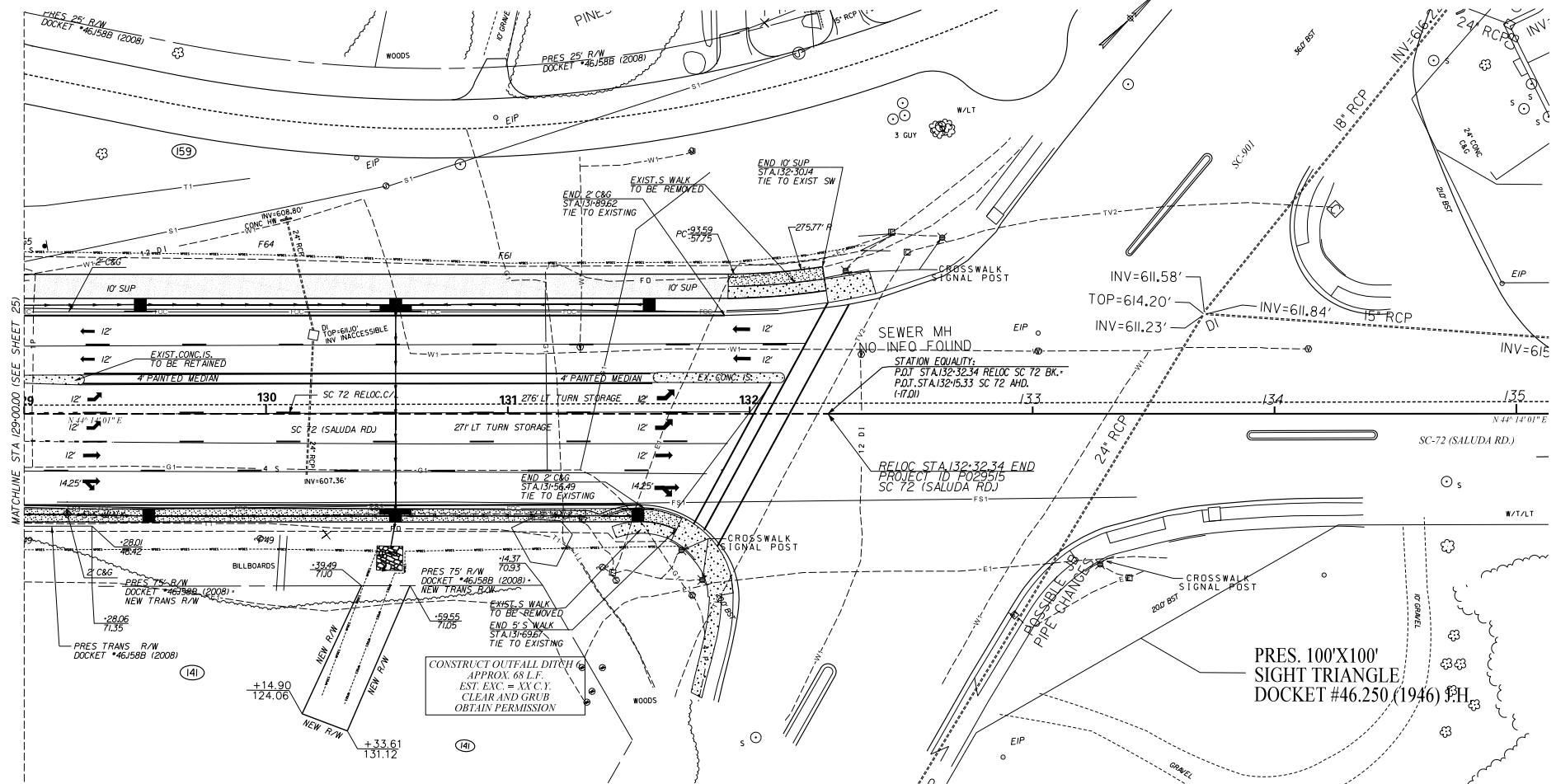
ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

SEE SHEET D21 FOR DRAINAGE AND EROSION CONTROL NOTES
SEE SHEET 48 FOR SC 72 PROFILE

RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33

FILE NO.	SHEET	COUNTY	PROJECT NO.	ROUTE	SHEET
18-000	3	S.C.	YORK	PO29515	SC 72
					26

SC 72 (SALUDA RD.)



MATCHLINE STA 129+00.00 (SEE SHEET 25)

CONSTRUCT OUTFALL DITCH
APPROX. 68 L.F.
EST. EXC. = 30 C.Y.
CLEAR AND GRUB
OBTAIN PERMISSION

PRES. 100'X100'
SIGHT TRIANGLE
DOCKET #46.250 (1946)



Plans 1726, SH. 26-28.dwg
PELLDTCA
1/28/2020

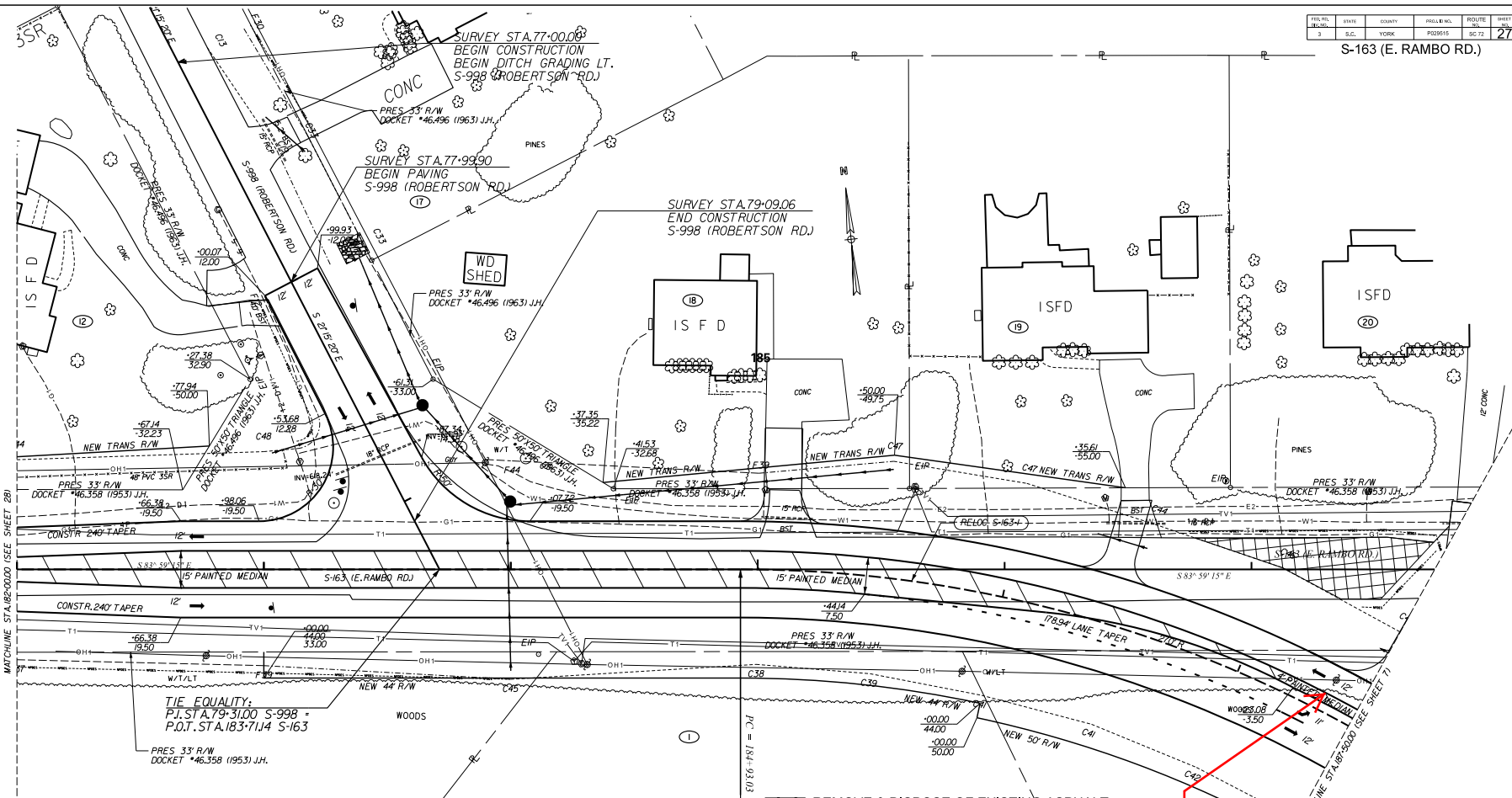
REVISIONS:				
REV. NO.	BY	CHKD.	DATE	DESCRIPTION OF REVISION
ROW 1	SAS	CMC	7-10-2019	REV. PRES R/W PER DOCKET #45, 158B, TRACTS 141-143, 150-154 AND 159.
ROW 2	CAP	CMC	8-3-2019	REVISED R/W AND PERMANENT EASEMENT CALLOUTS ON TRACT 141
ROW 3	CAP	CMC	1-28-2020	TRACT 141 - REVISED PERM. EASEMENT CALLOUT TO READ 'NEW R/W'



PLANS PREPARED BY
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS
SC 72 PLAN
STA 129+00 TO 132+32.34
SCALE: 1" = 20'
SH. NO. 26

FILE NO.	SHEET	COUNTY	PROJECT NO.	ROUTE	SHEET
18228	3	S.C.	YORK	P02615	SC 72

S-163 (E. RAMBO RD.)



RELOCATE S-163 BETWEEN
STA. 184+93.03 AND STA. 189+43.20

SEE SHEET 49 FOR RELOC S-163 PROFILE
SEE SHEET 50 FOR S-998 PROFILE
SEE SHEET D22 FOR DRAINAGE AND EROSION CONTROL

CORH Pole, See Sheet 7

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

\\P\plans\726_S1.27-28.dgn
SWANSONSA
7/12/2014

REV. NO.	BY	CHKD.	DATE	REVISIONS	DESCRIPTION OF REVISION
ROW 1	SAS	CMC	7-10-2019	REVISED DRAINAGE AND NEW R/W TRACT 18.	



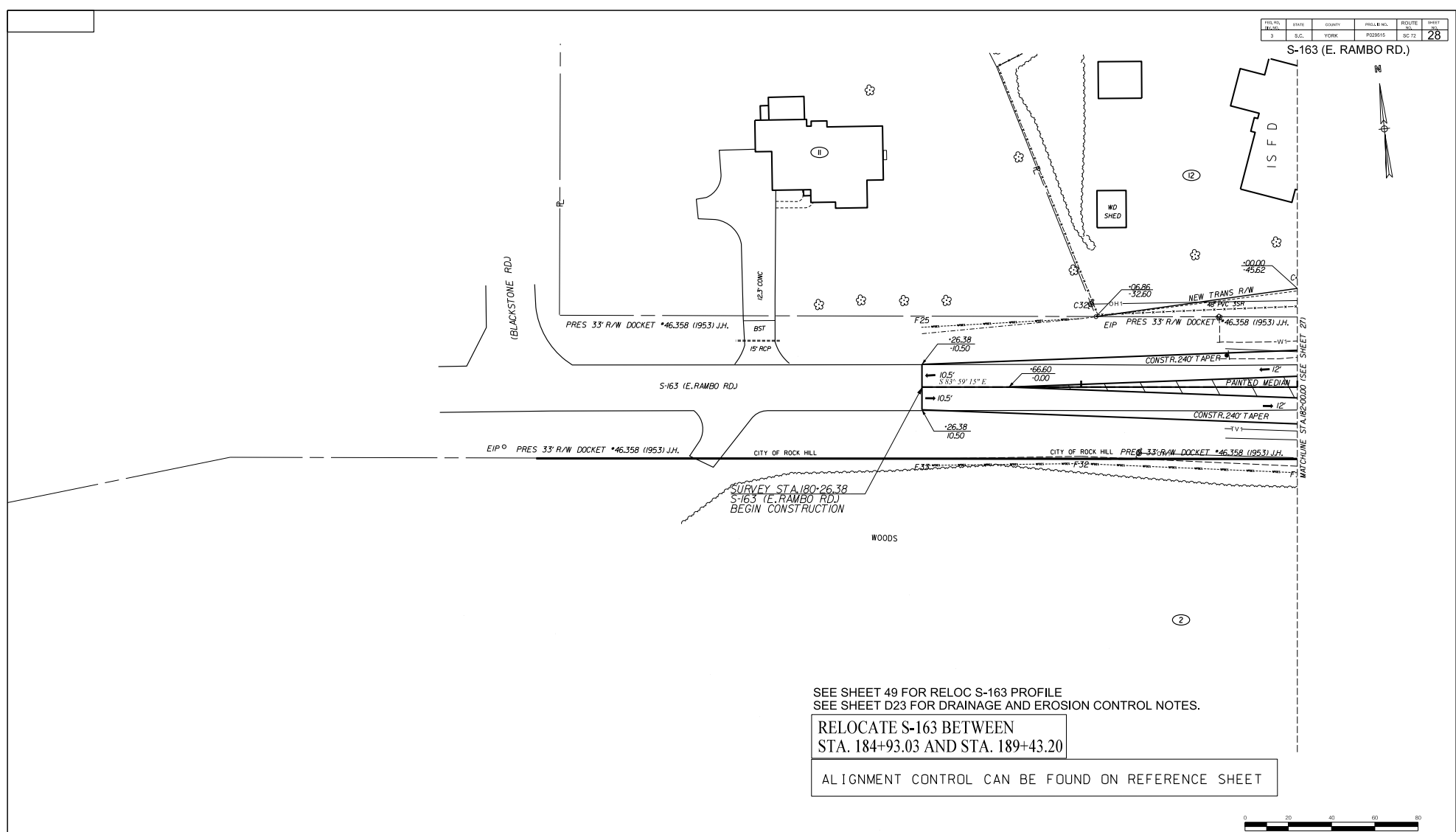
PLANS PREPARED BY
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS

S-163 PLAN
STA 182+00 TO STA 187+50

SCALE: _____ SH. NO. 27

FED. RD. DIST. NO.	STATE	COUNTY	PROJECT NO.	ROUTE	SHEET NO.
3	S.C.	YORK	P09515	SC 72	28

S-163 (E. RAMBO RD.)



SEE SHEET 49 FOR RELOC S-163 PROFILE
SEE SHEET D23 FOR DRAINAGE AND EROSION CONTROL NOTES.

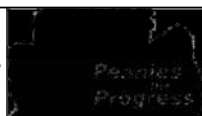
RELOCATE S-163 BETWEEN
STA. 184+93.03 AND STA. 189+43.20

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET



\\P\plans\1726_S-163-28.dwg
PELLDTCA
11/7/2019

REV. NO.	BY	CHKD.	DATE	REVISIONS:	DESCRIPTION OF REVISION
ROW6	SAS	CMC	11-4-2019	REVISED NPDES LINE ON TRACT 11	



PLANS PREPARED BY
CDM Smith

YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS
S-163 PLAN
STA 180+26.38 TO STA 182+00.00
SCALE: 1" = 20'
SH. NO. 28

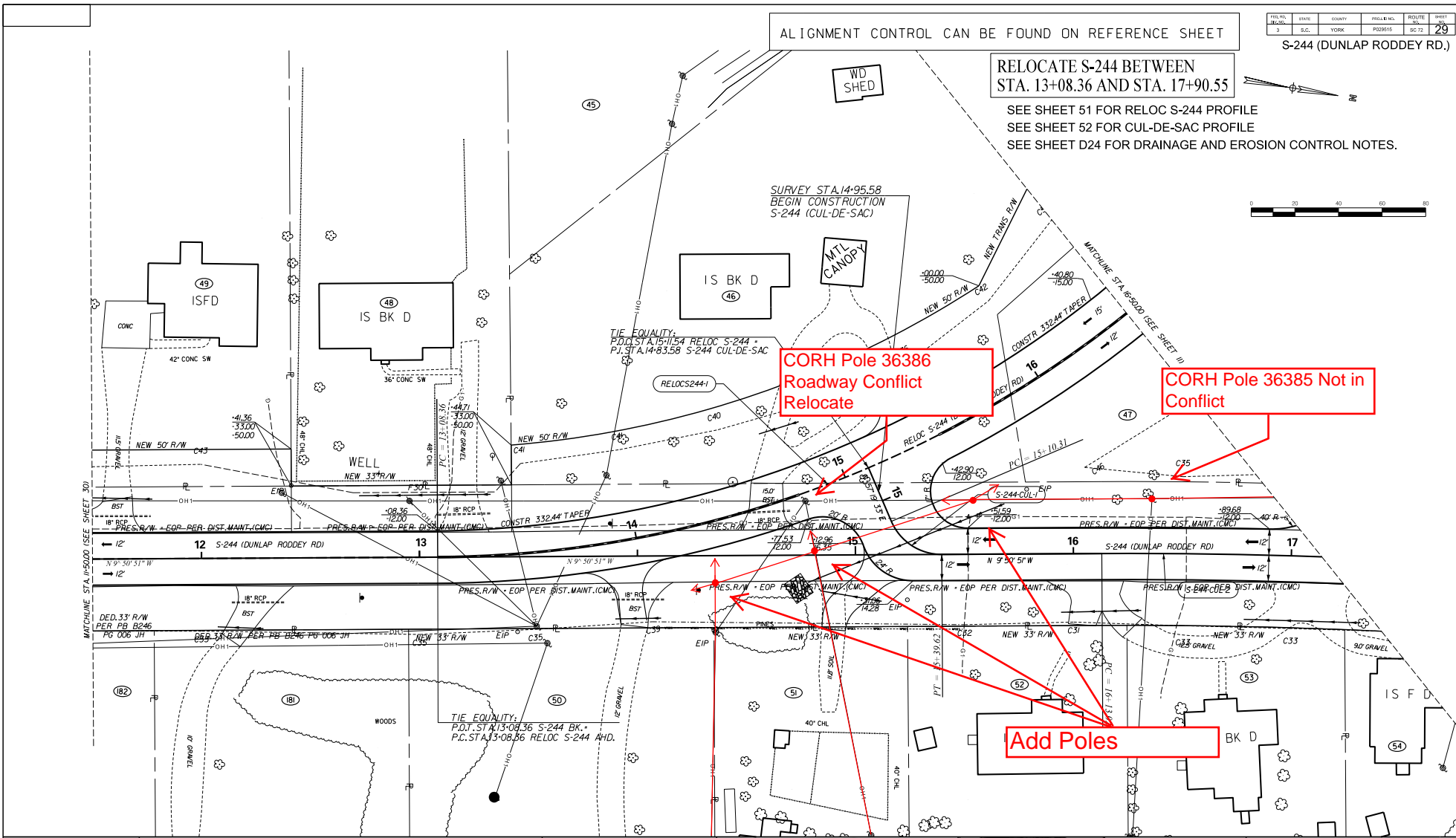
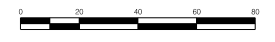
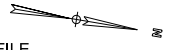
FIL. NO.	SHEET	COUNTY	PROJECT NO.	ROUTE	SHEET
11-2024	3	S.C.	YORK	FD2815	SC 72
					29

S-244 (DUNLAP RODDEY RD.)

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

RELOCATE S-244 BETWEEN
STA. 13+08.36 AND STA. 17+90.55

SEE SHEET 51 FOR RELOC S-244 PROFILE
SEE SHEET 52 FOR CUL-DE-SAC PROFILE
SEE SHEET D24 FOR DRAINAGE AND EROSION CONTROL NOTES.



**CORH Pole 36386
Roadway Conflict
Relocate**

**CORH Pole 36385 Not in
Conflict**

Add Poles

\\Plans\726_S4_24-28.dwg
PELLDTCA
1/24/2020

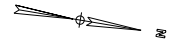
REV. NO.	BY	CHKD.	DATE	DESCRIPTION OF REVISION
ROW.7	CAP	CMC	1-15-2020	TRACT 48 - REVISED NEW RAW



PLANS PREPARED BY
**YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS**
S-244 PLAN
STA 11+50 TO STA 16+50
SCALE: 1"=20'
SH. NO. 29

FED. RD. DIST. NO.	STATE	COUNTY	PROJ. NO.	ROUTE	SHEET NO.
3	S.C.	YORK	P02615	SC 72	30

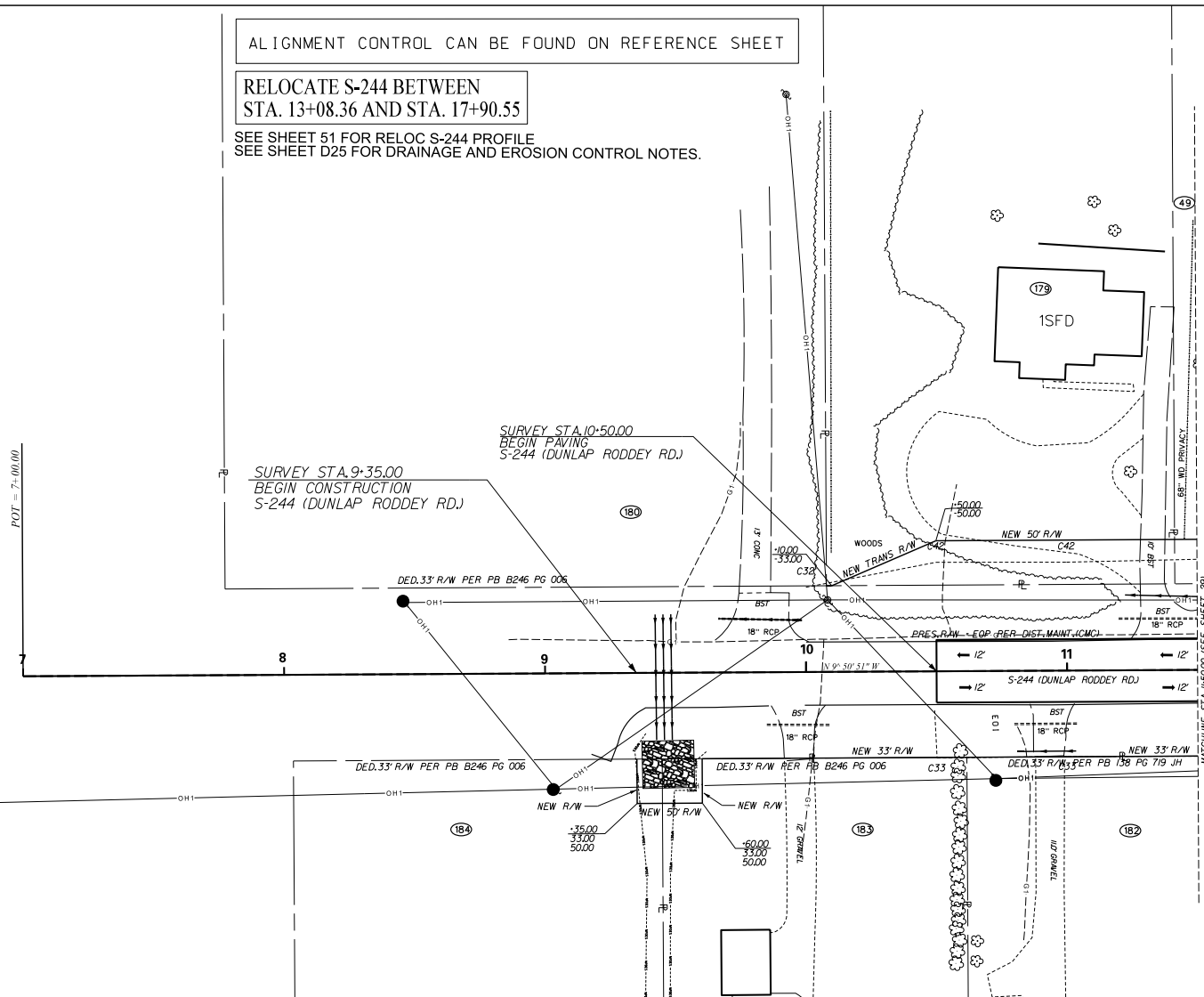
S-244 (DUNLAP-RODDEY RD.)



ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

RELOCATE S-244 BETWEEN
STA. 13+08.36 AND STA. 17+90.55

SEE SHEET 51 FOR RELOC S-244 PROFILE
SEE SHEET D25 FOR DRAINAGE AND EROSION CONTROL NOTES.



TOTAL = 71,000.00

MATCHLINE STA. 11+50.00 (SEE SHEET 29)



\\P1plan\726_S4_30-28.dwg
SWANSONA
1/11/2014

REV. NO.	BY	CHKD.	DATE	REVISIONS:	DESCRIPTION OF REVISION



PLANS PREPARED BY
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS


S-244 PLAN
STA 10+50 TO STA 11+50

SCALE: 1"=20'

SH. NO. 30

RELOCATE S-721 BETWEEN
STA. 10+25.74 AND STA. 15+90.50

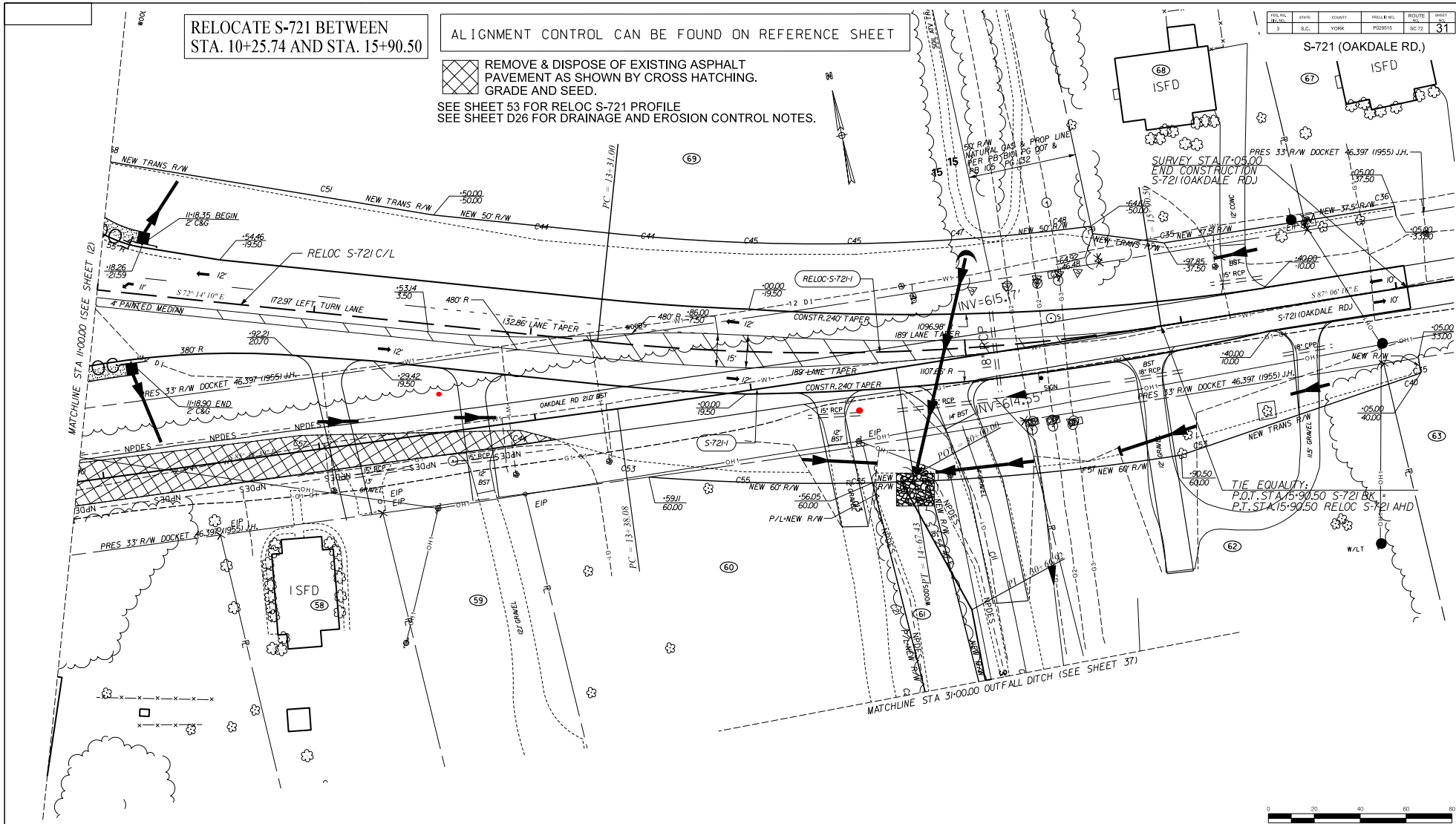
ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

 REMOVE & DISPOSE OF EXISTING ASPHALT
PAVEMENT AS SHOWN BY CROSS HATCHING.
GRADE AND SEED.

SEE SHEET 53 FOR RELOC S-721 PROFILE
SEE SHEET D26 FOR DRAINAGE AND EROSION CONTROL NOTES.

DIST.	TOWN	COUNTY	PROJECT NO.	ROUTE	SHEET
3	S.C.	YORK	P02615	SC 72	31

S-721 (OAKDALE RD.)



\\P1\apps\1726_S\11-31-20.dgn
User: J.CASIDY\JCM
5/21/2020

REV. NO.	BY	CHKD.	DATE	REVISIONS	DESCRIPTION OF REVISION
ROW 1	SAS	CMC	7-10-2019		RELOCATED OUTFALL DITCH DUE TO GAS LINES. REV NEW R/W TRACTS 60,61,62
ROW 2	CAP	CMC	8-4-2019		REVISED R/W AND PERMANENT EASEMENT CALLOUTS ON TRACT 61
ROW 7	SMS	CMC	1-15-2020		REVISED R/W TRACT 68
ROW 8	SMS	CMC	1-28-2020		TRACT 61 - REVISED PERM. EASEMENT CALLOUT TO READ "NEW R/W"
ROW 10	SAS	CMC	04-27-2020		TRACT 61 - REV. OF DITCH ALIGN. REV. PERM. CONSTR. EASMT. ADD TEMP. CONSTR. EASMT.



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DEPARTMENT OF PUBLIC WORKS

S-721 PLAN
STA 11+00 TO STA 17+05.00


SCALE: 1"=20' SH. NO. 31

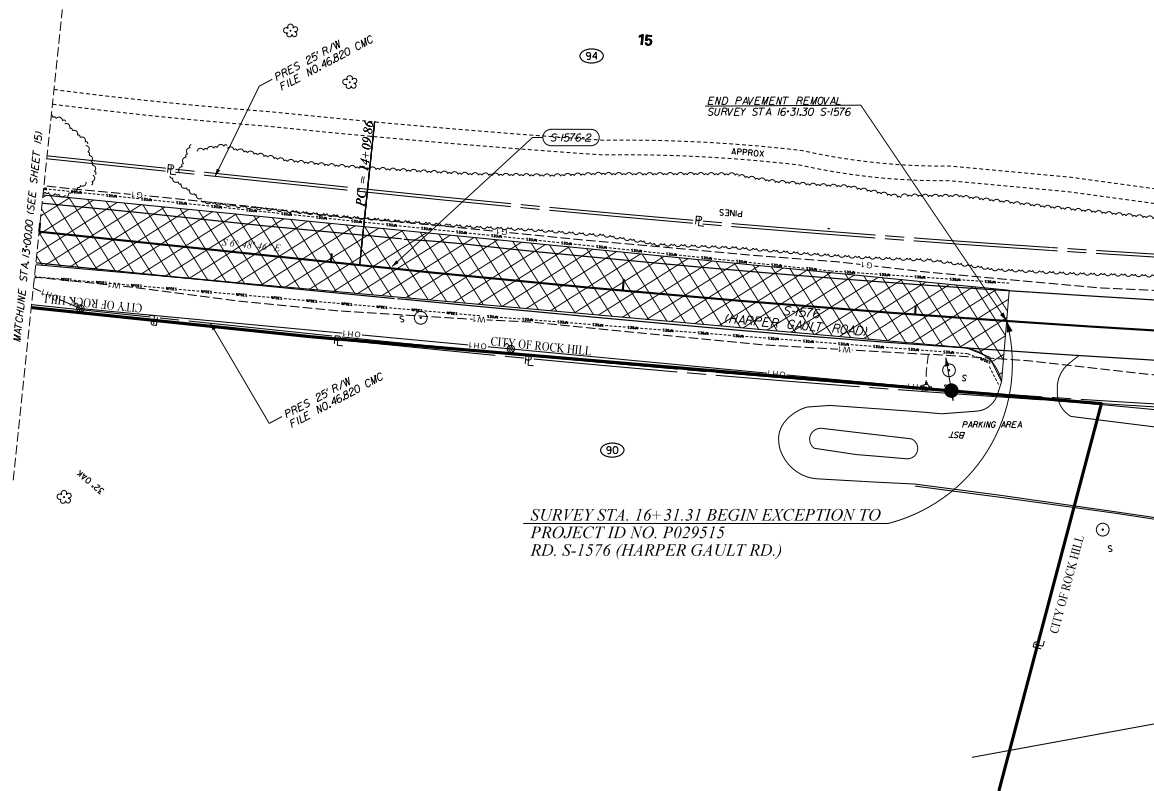
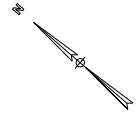
ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

FILE NO.	STATE	COUNTY	PROJECT NO.	ROUTE	SHEET NO.
3	S.C.	YORK	P029515	SC 72	32

S-1576 (HARPER GAULT RD.)

SEE SHEET D27 FOR DRAINAGE AND EROSION CONTROL NOTES

 REMOVE & DISPOSE OF EXISTING ASPHALT PAVEMENT AS SHOWN BY CROSS HATCHING. GRADE AND SEED.



\\Plans\1726_S-1576.dgn
PELLDTCA
1/24/2020

REVISIONS:				
REV. NO.	BY	CHKD.	DATE	DESCRIPTION OF REVISION
ROW 7	SAS	CMC	1-15-2020	REMOVED RELOC S-1576 (HARPER GAULT RD.) ALIGNMENT

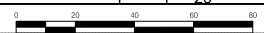


PLANS PREPARED BY
CDM Smith

YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS

S-1576 PLAN
STA 13+00 TO STA 16+31.31

SCALE: 1" = 20' SH. NO. 32

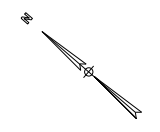


09-09-2019

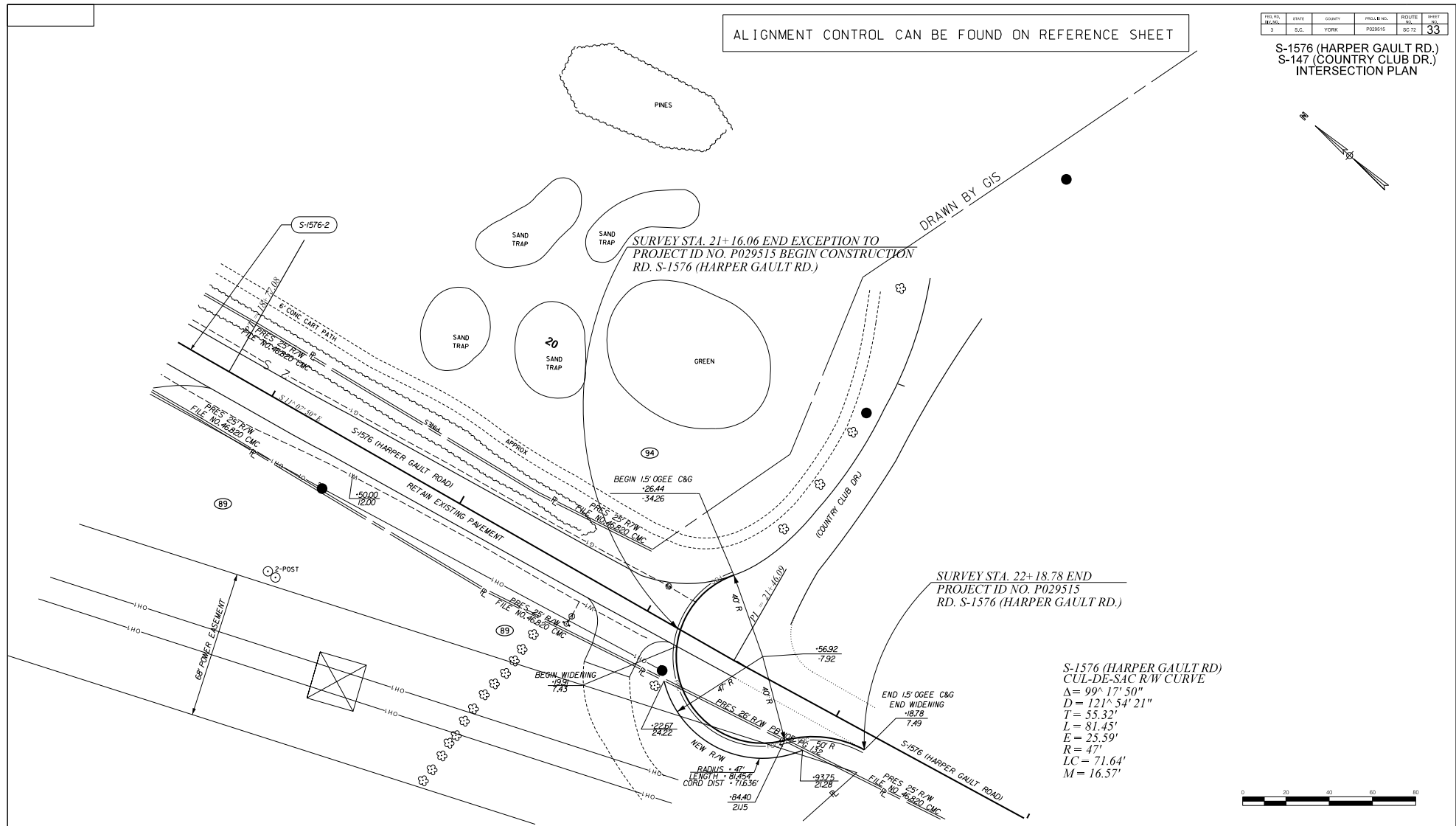
ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

FILE NO.	SHEET	COUNTY	PROJECT NO.	ROUTE	SHEET NO.
3	S.C.	YORK	P029515	SC 72	33

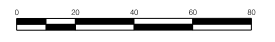
S-1576 (HARPER GAULT RD.)
S-147 (COUNTRY CLUB DR.)
INTERSECTION PLAN



DRAWN BY GIS



S-1576 (HARPER GAULT RD.)
CUL-DE-SAC R/W CURVE
 $\Delta = 99^\circ 17' 50''$
 $D = 121^\circ 54' 21''$
 $T = 55.32'$
 $L = 81.45'$
 $E = 25.59'$
 $R = 47'$
 $LC = 71.64'$
 $M = 16.57'$



\\P\plans\1726_S4_33-28.dgn
PELLDTCA
1/24/2020

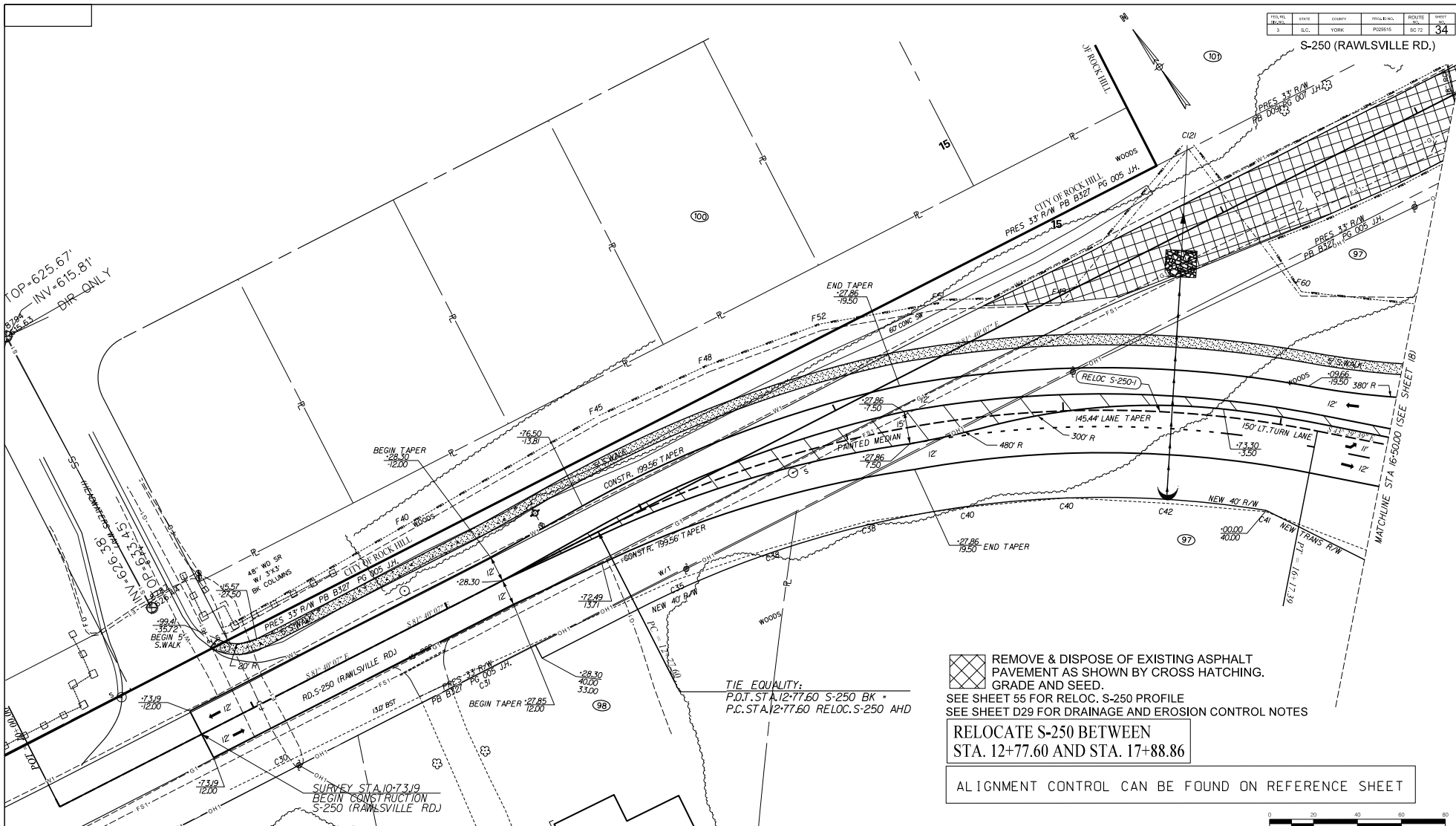
REV. NO.	BY	CHKD.	DATE	REVISIONS:	DESCRIPTION OF REVISION
ROW 7	SAS	CMC	5-15-2020	REMOVED RELOC. S-1576 & ADDED CUL-DE-SAC AT S-1576 AND COUNTRY CLUB DR.	




PLANS PREPARED BY
YORK COUNTY, SOUTH CAROLINA
 DEPARTMENT OF PUBLIC WORKS
 S-1576 / S-147 INTERSECTION PLAN
 SCALE: 1"=20'
 SH. NO. 33

FED. RD. DIST.	STATE	COUNTY	PROJECT NO.	ROUTE	SHEET NO.
3	S.C.	YORK	P02615	SC 72	34

S-250 (RAWLSVILLE RD.)



 REMOVE & DISPOSE OF EXISTING ASPHALT PAVEMENT AS SHOWN BY CROSS HATCHING. GRADE AND SEED.
 SEE SHEET 55 FOR RELOC. S-250 PROFILE
 SEE SHEET D29 FOR DRAINAGE AND EROSION CONTROL NOTES

**RELOCATE S-250 BETWEEN
 STA. 12+77.60 AND STA. 17+88.86**

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

TIE EQUALITY:
 P.O.T. STA. 12+77.60 S-250 BK *
 P.C. STA. 12+77.60 RELOC. S-250 AHD



\p\Plans\1726_SPL34-28.dwg
 SWANSONA
 1/11/2014

REV. NO.	BY	CHKD.	DATE	REVISIONS	DESCRIPTION OF REVISION



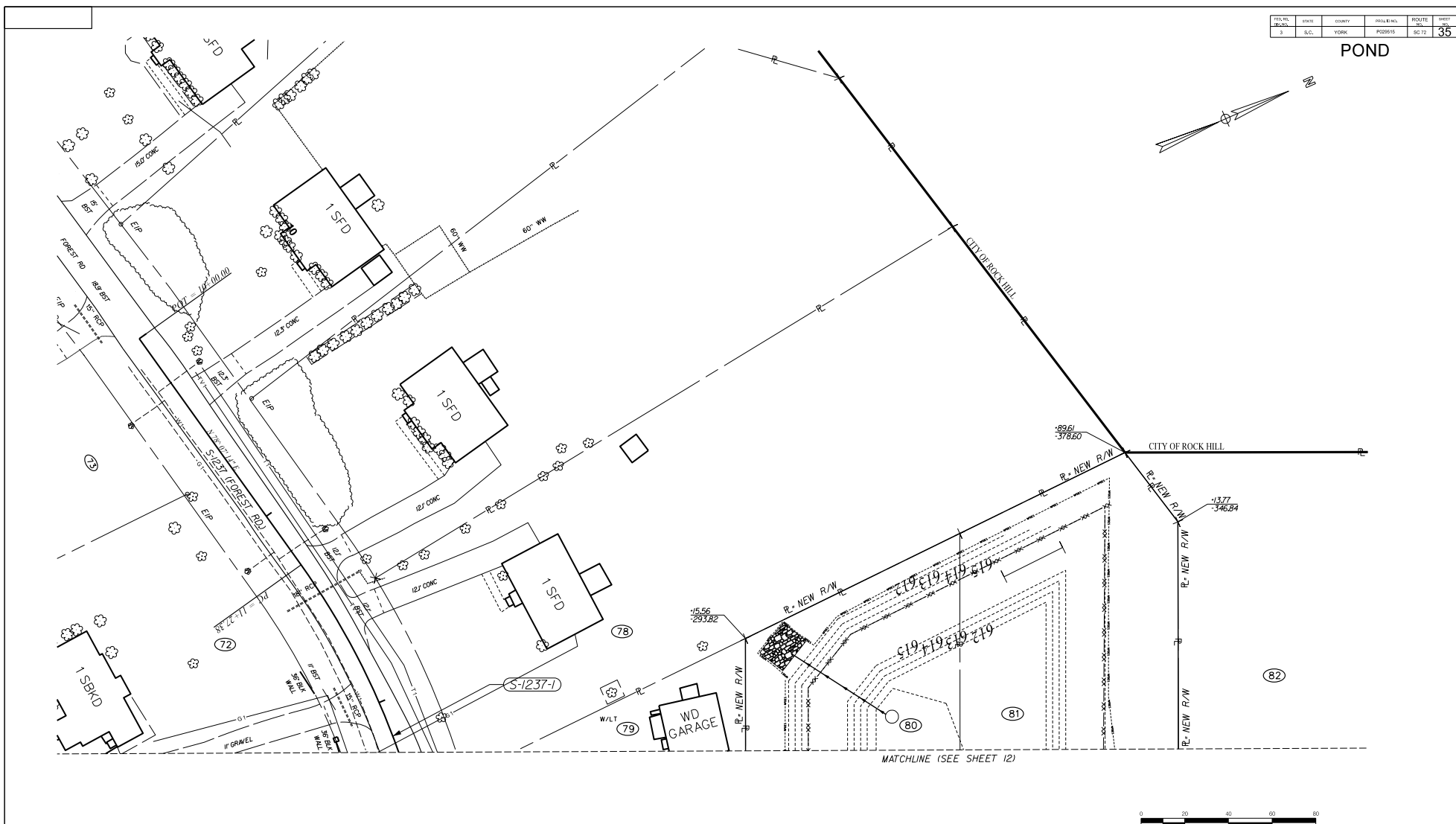
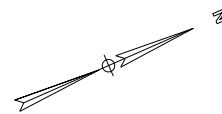
PLANS PREPARED BY
 YORK COUNTY, SOUTH CAROLINA
 DEPARTMENT OF PUBLIC WORKS

S-250 PLAN
 STA 10+73.19 TO STA 16+55.00

SCALE: 1"=20' SH. NO. 34

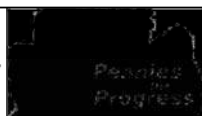
FILE NO.	SHEET	COUNTY	PROJECT NO.	ROUTE	SHEET
18-026	3	YORK	P02615	SC 72	35

POND



\\plans\726_S4_35-28.dgn
SWANSONA
1/11/2014

REVISIONS:				
REV. NO.	BY	CHKD.	DATE	DESCRIPTION OF REVISION

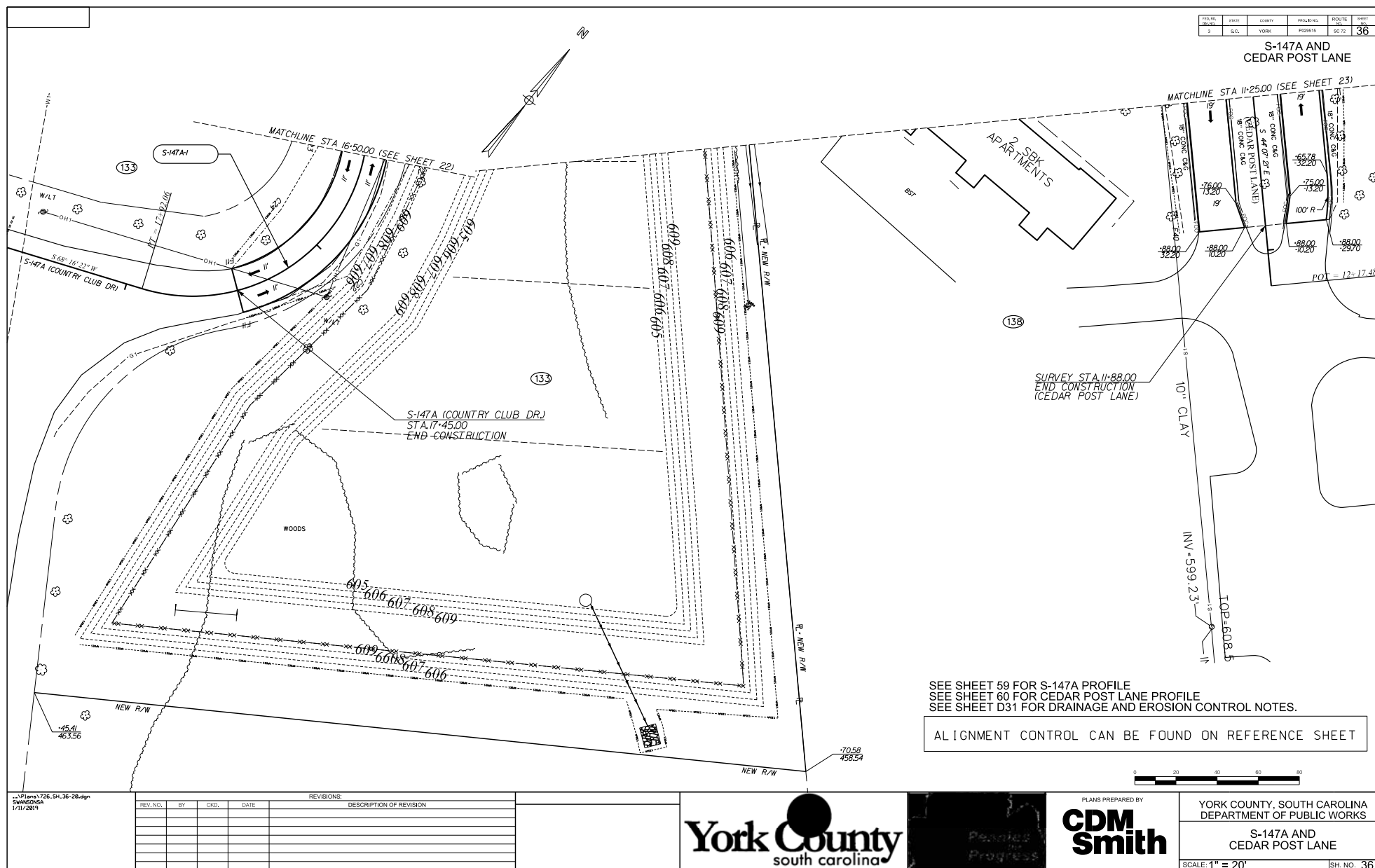


PLANS PREPARED BY
CDM Smith

YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS
SC 72 PLAN
POND
SCALE: 1" = 20'
SH. NO. 35

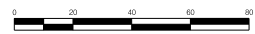
TITLE	SHEET	COUNTY	PROJECT NO.	ROUTE	SHEET
S-147A AND CEDAR POST LANE	3	S.C.	P02615	SC 72	36

S-147A AND CEDAR POST LANE



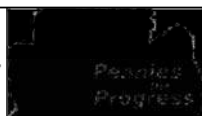
SEE SHEET 59 FOR S-147A PROFILE
 SEE SHEET 60 FOR CEDAR POST LANE PROFILE
 SEE SHEET D31 FOR DRAINAGE AND EROSION CONTROL NOTES.

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET



\\P11001\726_S4_36-28.dwg
 SWANSONA
 1/11/2014

REV. NO.	BY	CHKD.	DATE	REVISIONS	DESCRIPTION OF REVISION



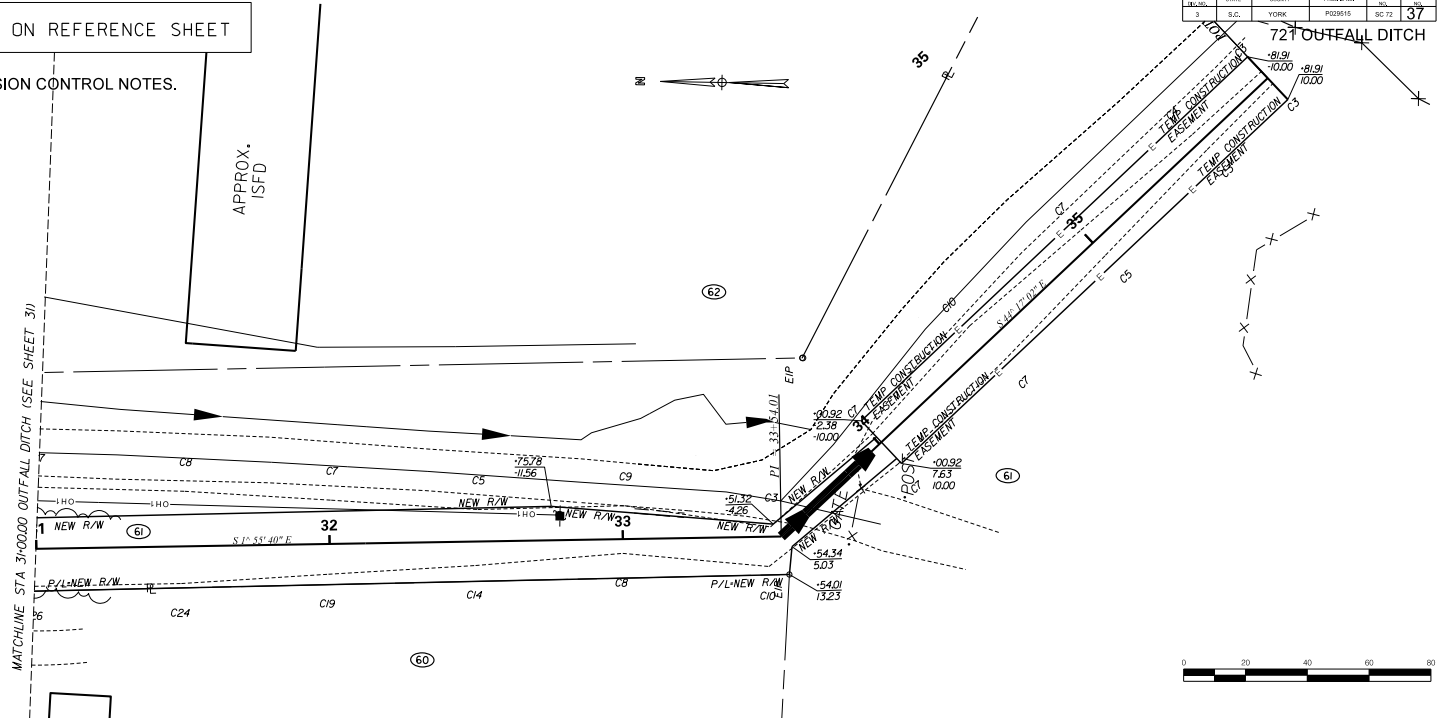
PLANS PREPARED BY
 YORK COUNTY, SOUTH CAROLINA
 DEPARTMENT OF PUBLIC WORKS
 S-147A AND CEDAR POST LANE
 SCALE: 1" = 20' SH. NO. 36

FED. RD. DIST. NO.	STATE	COUNTY	PROJECT NO.	ROUTE	SHEET NO.
3	S.C.	YORK	P2815	SC 72	37

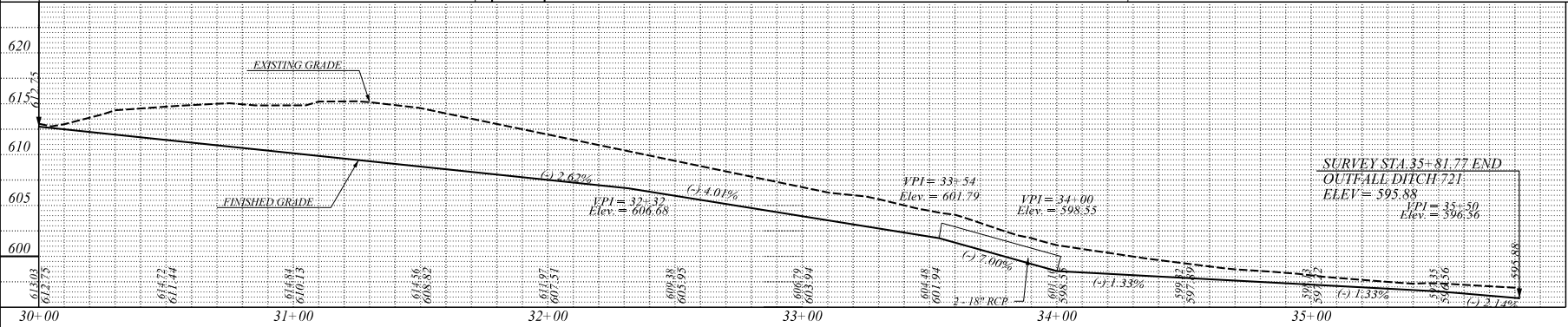
ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

SEE SHEET 53 FOR RELOC S-721 PROFILE
SEE SHEET D32 FOR DRAINAGE AND EROSION CONTROL NOTES.

APPROX.
ISFD



SURVEY STA. 30+00.00 BEGIN
OUTFALL DITCH 721
ELEV = 612.75



SURVEY STA. 35+81.77 END
OUTFALL DITCH 721
ELEV = 595.88

\\P1\p1\1726_SH_37-28.dgn
User: J.CASIDY\JCM
9/21/2020

REV. NO.	BY	CHKD.	DATE	DESCRIPTION OF REVISION
ROW 1	SAS	CMC	7-10-2019	RELOCATED OUTFALL DITCH DUE TO GAS LINES, REV NEW R/W TRACTS 60,61,62
ROW 2	CAP	CMC	8-9-2019	REVISED R/W AND PERMANENT EASEMENT CALLOUTS ON TRACT 61
ROW 8	CAP	CMC	1-28-2020	TRACT 61 - REVISED PERM. EASEMENT CALLOUTS TO READ 'NEW R/W'
ROW 10	SAS	CMC	04-27-2020	TRACT 61 - REV. OF DITCH ALIGN, REV. PERM. CONSTR. EASMT, ADDED TEMP. CONSTR. EASMT



YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS

721 OUTFALL DITCH

SCALE: 1"=20' SH. NO. 37

YORK COUNTY NATURAL GAS AUTHORITY
RELOCATION SKETCHES

LEGEND

- G1 = YORK COUNTY NATURAL GAS AUTHORITY
- G2 = DOMINION CAROLINA GAS
- G3 = PLAINS ALL AMERICA
- TV1 = COMPORIUM
- TV2 = TIME WARNER CABLE
- T1 = COMPORIUM
- E1 = CITY OF ROCK HILL
- E2 = YORK ELECTRIC COOPERATIVE
- E3 = DUKE ENERGY
- E4 = YORK COUNTY SCHOOL DISTRICT 03
- W1 = CITY OF ROCK HILL

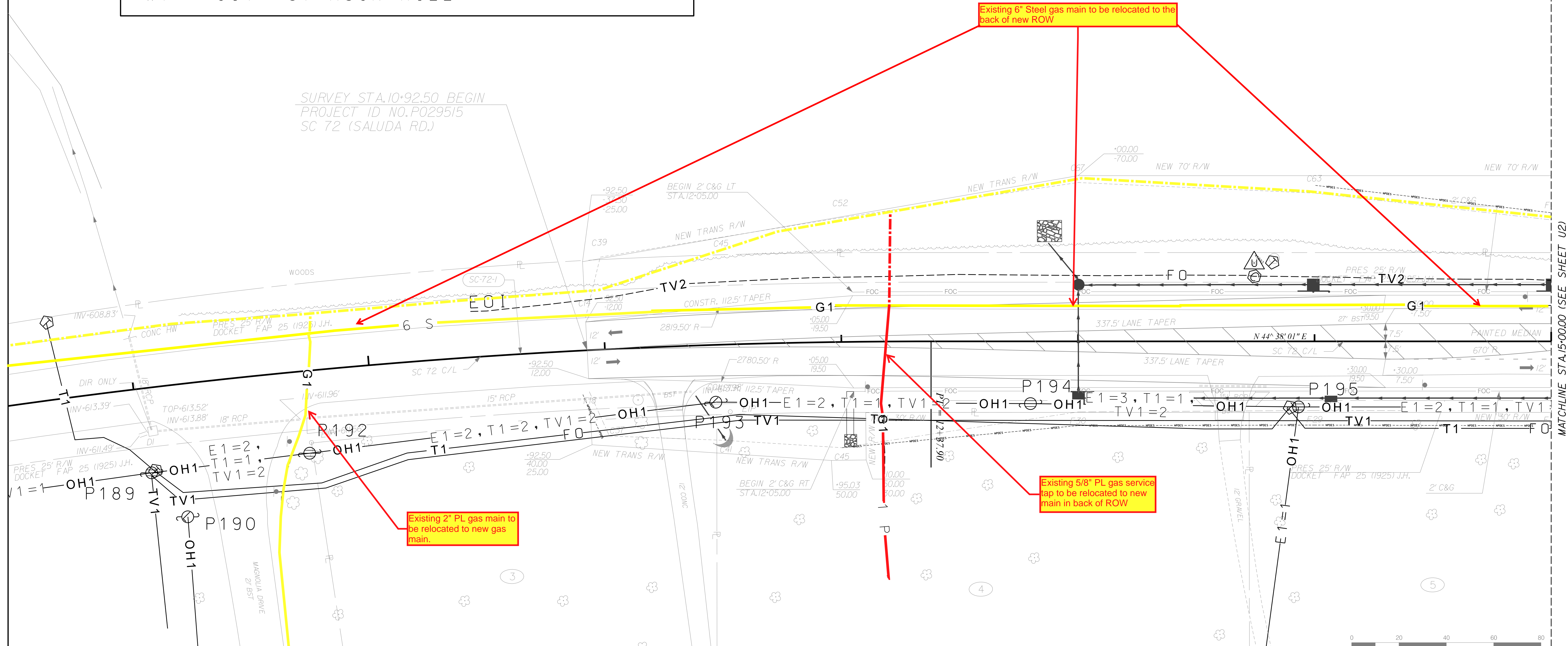
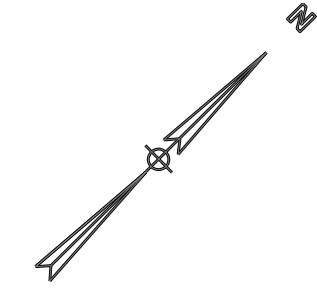
ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33

YCNGA

FED. RD. DIST. NO.	STATE	COUNTY	PROJ. ID NO.	ROUTE NO.	SHEET NO.
3	S.C.	YORK	P029515	SC 72	U1

SC-72 (SALUDA RD.)



SURVEY STA. 10+92.50 BEGIN
PROJECT ID NO. P029515
SC 72 (SALUDA RD.)

Existing 6" Steel gas main to be relocated to the back of new ROW

Existing 2" PL gas main to be relocated to new gas main.

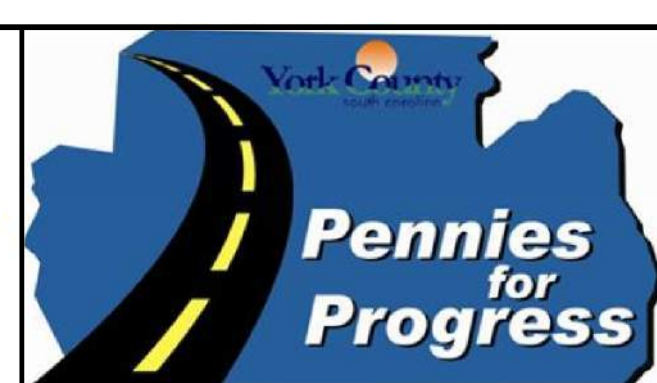
Existing 5/8" PL gas service tap to be relocated to new main in back of ROW

MATCHLINE STA 15+00.00 (SEE SHEET U2)

...\\Plans\726.SH.U01.dgn
SWANSONSA
3/7/2019

REV. NO.	BY	CKD.	DATE	DESCRIPTION OF REVISION

DOCUMENT REVIEW		
RESPONSIBILITY	NAME	DATE
ORIGINATOR		
CHECKED		
REVISED		
VERIFIED		



PLANS PREPARED BY
**YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS**
SC 72 PLAN
STA 10+00 TO STA 15+00
SCALE: 1" = 20'
SH. NO. U1

SC-72 (SALUDA RD.)

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33

RELOCATE S-163 BETWEEN
STA. 184+93.03 AND STA. 189+43.20

YCNGA disagrees with the Utility Report and cannot safely install and maintain a 6" Steel Gas Main from Station 15+00 to Station 21+00 due to the presence of multiple utilities. YCNGA will therefore install their 6" Steel Gas Main, as proposed, along the north side of Hwy 72 and will provide adequate separation from the City of Rock Hill Water Main, as we have on numerous other projects.

New 6" STL gas main to be installed in back of ROW

Existing 6" Steel gas main to be retired.

Existing 6" STL gas main to remain in place.

Existing 5/8" PL gas service tap to remain in place.

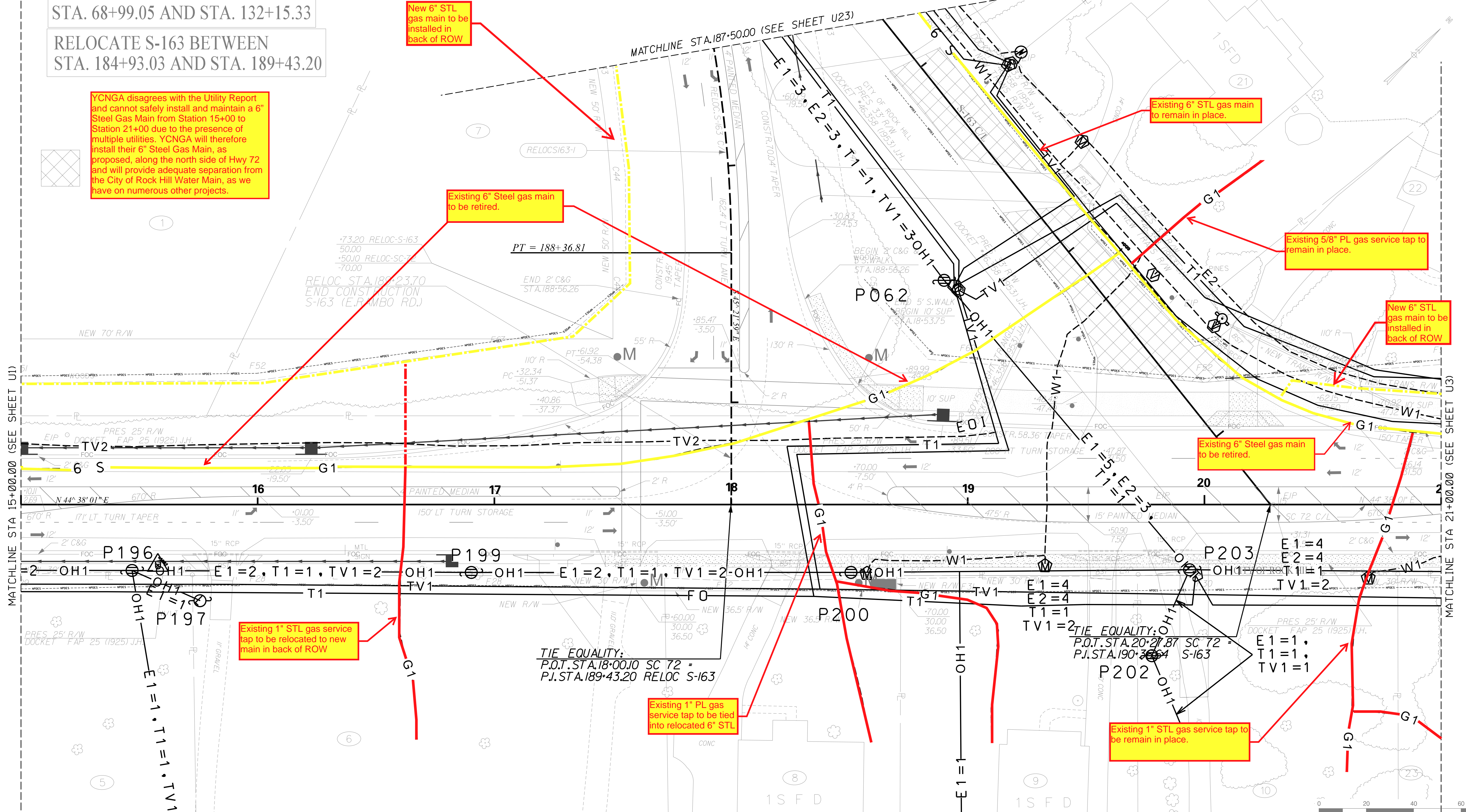
New 6" STL gas main to be installed in back of ROW

Existing 6" Steel gas main to be retired.

Existing 1" STL gas service tap to be relocated to new main in back of ROW

Existing 1" PL gas service tap to be tied into relocated 6" STL

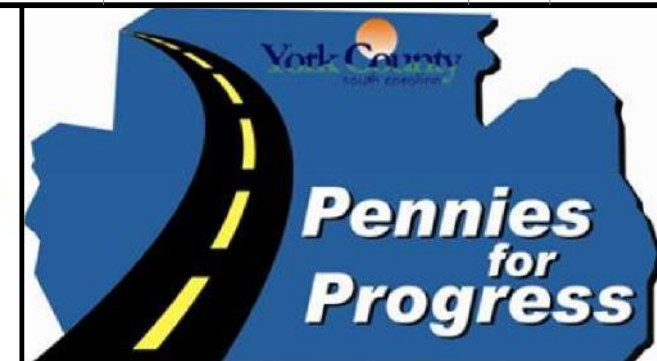
Existing 1" STL gas service tap to be remain in place.



...\\P1eng\726.SH.U02.dgn
SWANSONSA
3/7/2019

REVISIONS:				
REV. NO.	BY	CKD.	DATE	DESCRIPTION OF REVISION

DOCUMENT REVIEW		
RESPONSIBILITY	NAME	DATE
ORIGINATOR		
CHECKED		
REVISED		
VERIFIED		

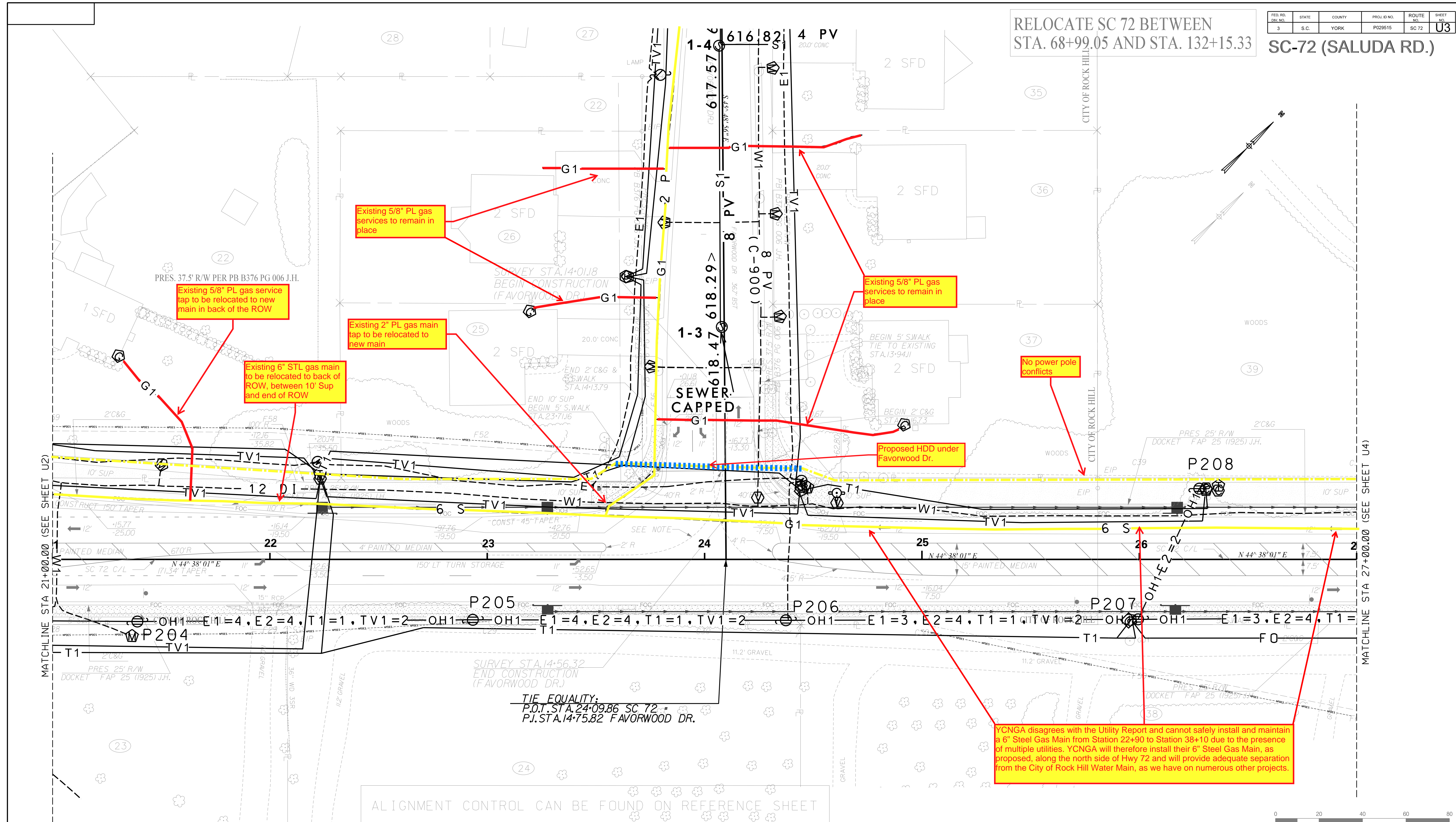


PLANS PREPARED BY
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS
SC 72 PLAN
STA 15+00 TO STA 21+00
SCALE: 1" = 20'
SH. NO. U2

RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33

FED. RD. DIST. NO.	STATE	COUNTY	PROJ. ID NO.	ROUTE NO.	SHEET NO.
3	S.C.	YORK	P029515	SC 72	U3

SC-72 (SALUDA RD.)



Existing 5/8" PL gas service tap to be relocated to new main in back of the ROW

Existing 6" STL gas main to be relocated to back of ROW, between 10' Sup and end of ROW

Existing 2" PL gas main tap to be relocated to new main

Existing 5/8" PL gas services to remain in place

Existing 5/8" PL gas services to remain in place

No power pole conflicts

Proposed HDD under Favorwood Dr.

YCNGA disagrees with the Utility Report and cannot safely install and maintain a 6" Steel Gas Main from Station 22+90 to Station 38+10 due to the presence of multiple utilities. YCNGA will therefore install their 6" Steel Gas Main, as proposed, along the north side of Hwy 72 and will provide adequate separation from the City of Rock Hill Water Main, as we have on numerous other projects.

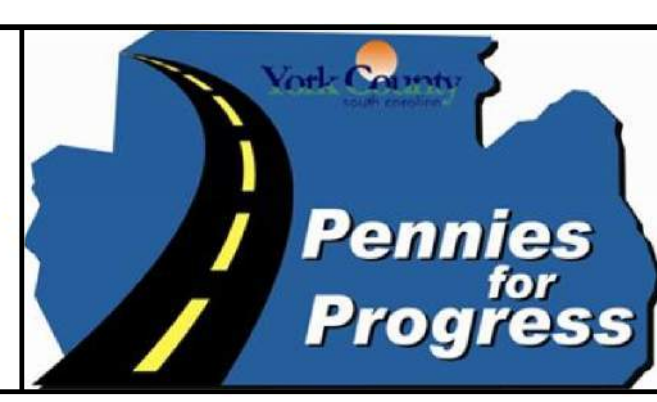
TIE EQUALITY:
P.O.T. STA. 24+09.86 SC 72
P.J. STA. 14+75.82 FAVORWOOD DR.

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

...Plans\726_Sc72_U03.dgn
SWANSONSA
3/7/2019

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PLANS PREPARED BY
**YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS**
SC 72 PLAN
STA 21+00 TO STA 27+00
SCALE: 1" = 20'
SH. NO. U3

FED. RD. DIST. NO.	STATE	COUNTY	PROJ. ID NO.	ROUTE NO.	SHEET NO.
3	S.C.	YORK	P029515	SC 72	U4

SC-72 (SALUDA RD.)

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

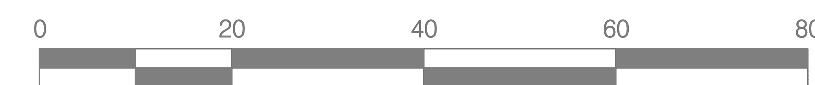
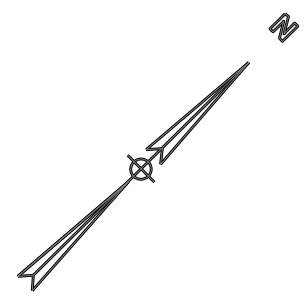
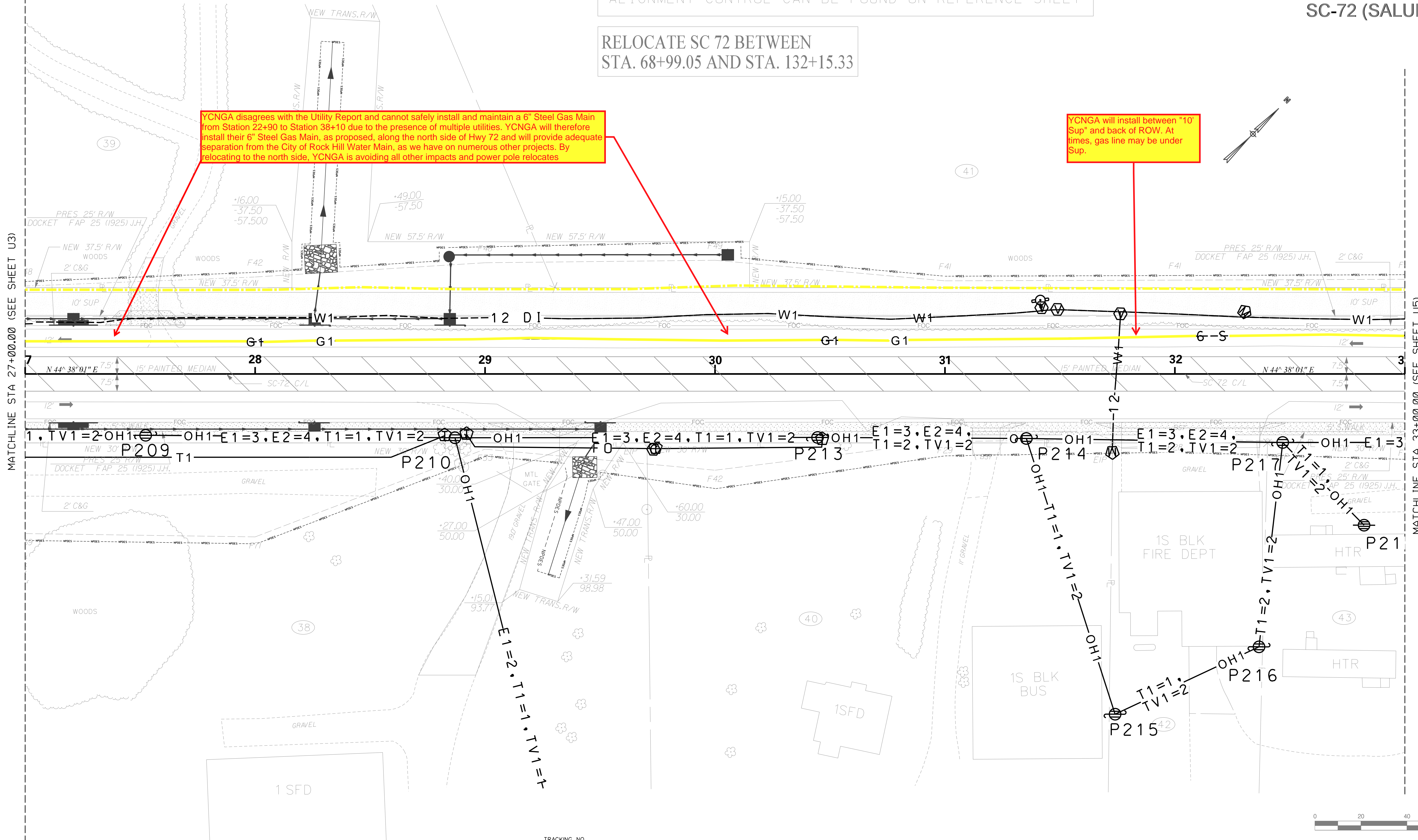
RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33

YCNGA disagrees with the Utility Report and cannot safely install and maintain a 6" Steel Gas Main from Station 22+90 to Station 38+10 due to the presence of multiple utilities. YCNGA will therefore install their 6" Steel Gas Main, as proposed, along the north side of Hwy 72 and will provide adequate separation from the City of Rock Hill Water Main, as we have on numerous other projects. By relocating to the north side, YCNGA is avoiding all other impacts and power pole relocates

YCNGA will install between "10' Sup" and back of ROW. At times, gas line may be under Sup.

MATCHLINE STA 27+00.00 (SEE SHEET U3)

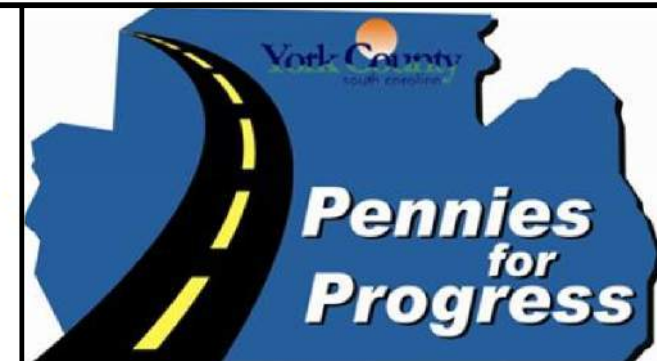
MATCHLINE STA 33+00.00 (SEE SHEET U5)



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SWANSONSA
3/7/2019

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PLANS PREPARED BY
CDM Smith
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS
SC 72 PLAN
STA 27+00 TO STA 33+00
SCALE: 1" = 20'
SH. NO. U4

SC-72 (SALUDA RD.)

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

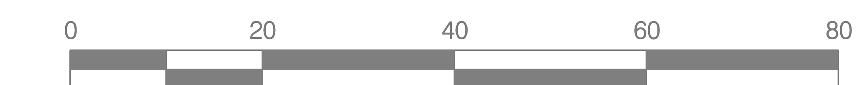
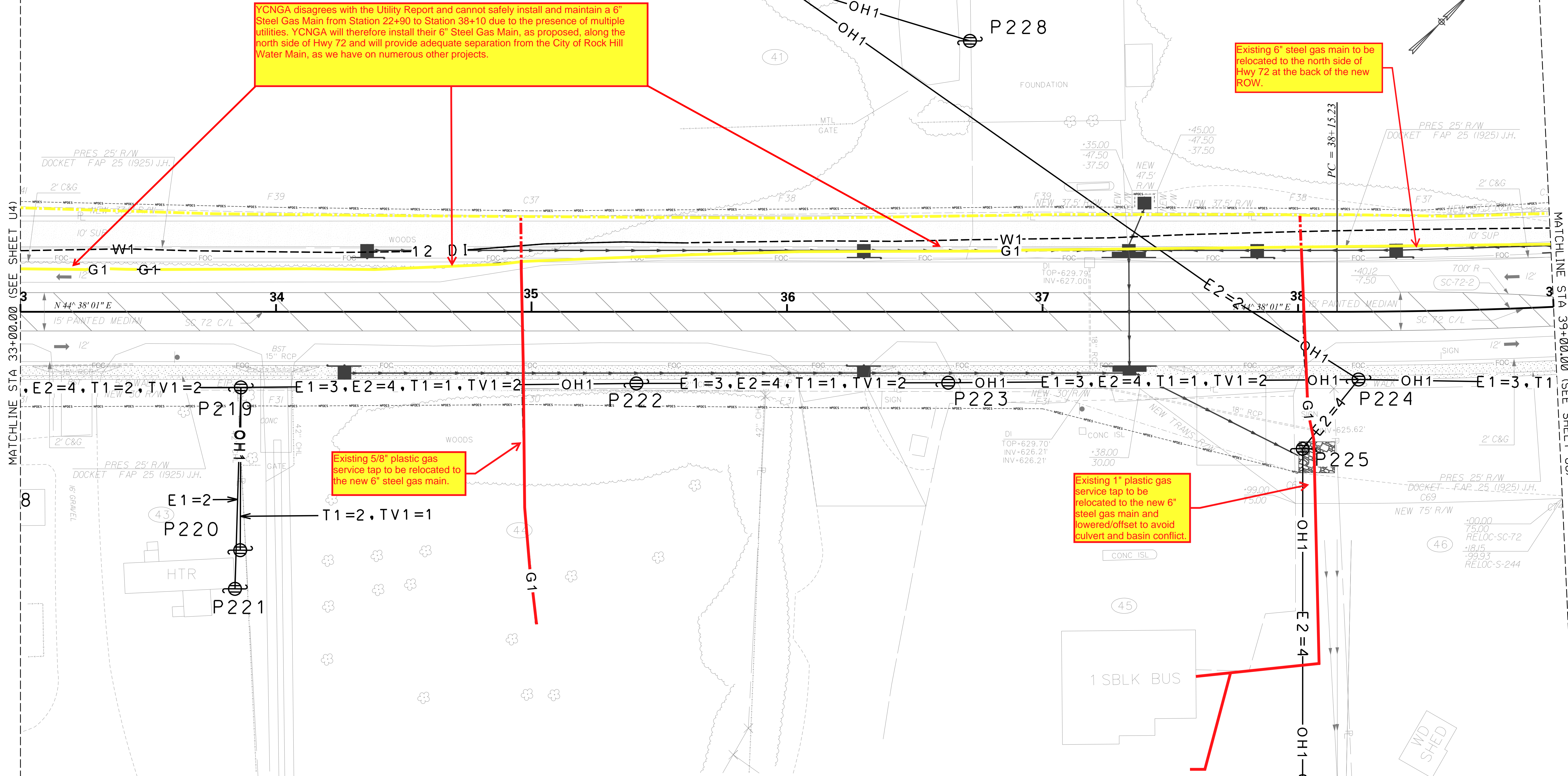
RELOCATE SC 72 BETWEEN STA. 68+99.05 AND STA. 132+15.33

YCNCA disagrees with the Utility Report and cannot safely install and maintain a 6" Steel Gas Main from Station 22+90 to Station 38+10 due to the presence of multiple utilities. YCNCA will therefore install their 6" Steel Gas Main, as proposed, along the north side of Hwy 72 and will provide adequate separation from the City of Rock Hill Water Main, as we have on numerous other projects.

Existing 6" steel gas main to be relocated to the north side of Hwy 72 at the back of the new ROW.

Existing 5/8" plastic gas service tap to be relocated to the new 6" steel gas main.

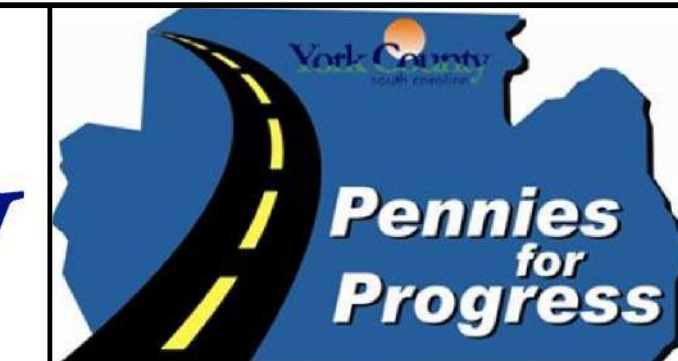
Existing 1" plastic gas service tap to be relocated to the new 6" steel gas main and lowered/offset to avoid culvert and basin conflict.



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PLANS PREPARED BY
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS
SC 72 PLAN
STA 33+00 TO STA 39+00
SCALE: 1" = 20'
SH. NO. U5

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

FED. RD. DIST. NO.	STATE	COUNTY	PROJ. ID NO.	ROUTE NO.	SHEET NO.
3	S.C.	YORK	P029515	SC 72	U6

SC-72 (SALUDA RD.)

RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33

RELOCATE S-244 BETWEEN
STA. 13+08.36 AND STA. 17+90.55

Existing 1" plastic gas service tap to be relocated to new main

Existing 6" steel gas main to be relocated to the north side of Hwy 72 at the back of the new ROW.

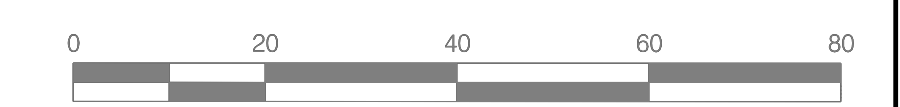
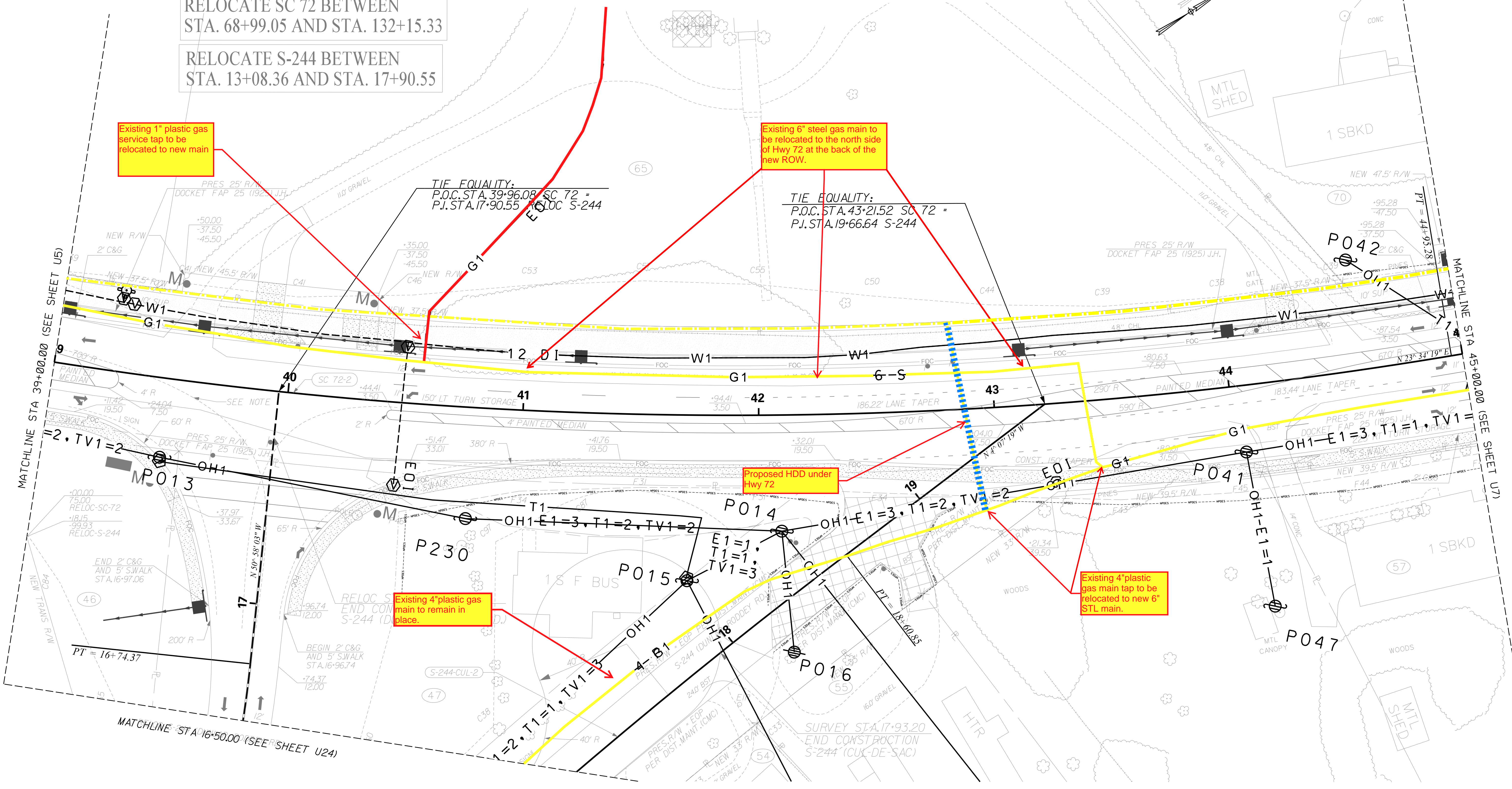
TIE EQUALITY:
P.O.C. STA. 39+96.08 SC 72 =
P.I. STA. 17+90.55 S-244

TIE EQUALITY:
P.O.C. STA. 43+21.52 SC 72 =
P.I. STA. 19+66.64 S-244

Proposed HDD under Hwy 72

Existing 4" plastic gas main to remain in place.

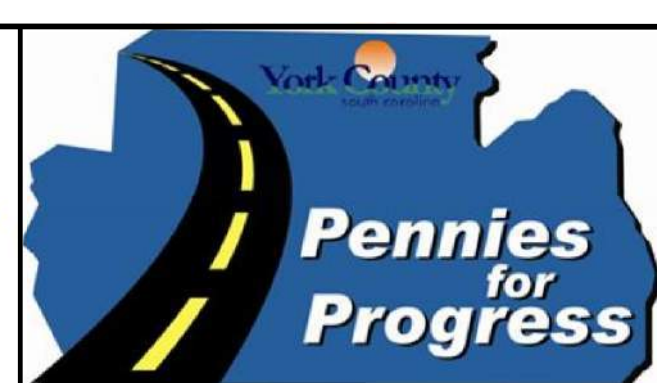
Existing 4" plastic gas main tap to be relocated to new 6" STL main.



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DEPARTMENT OF PUBLIC WORKS**

SC 72 PLAN
STA 39+00 TO STA 45+00

SCALE: 1" = 20'

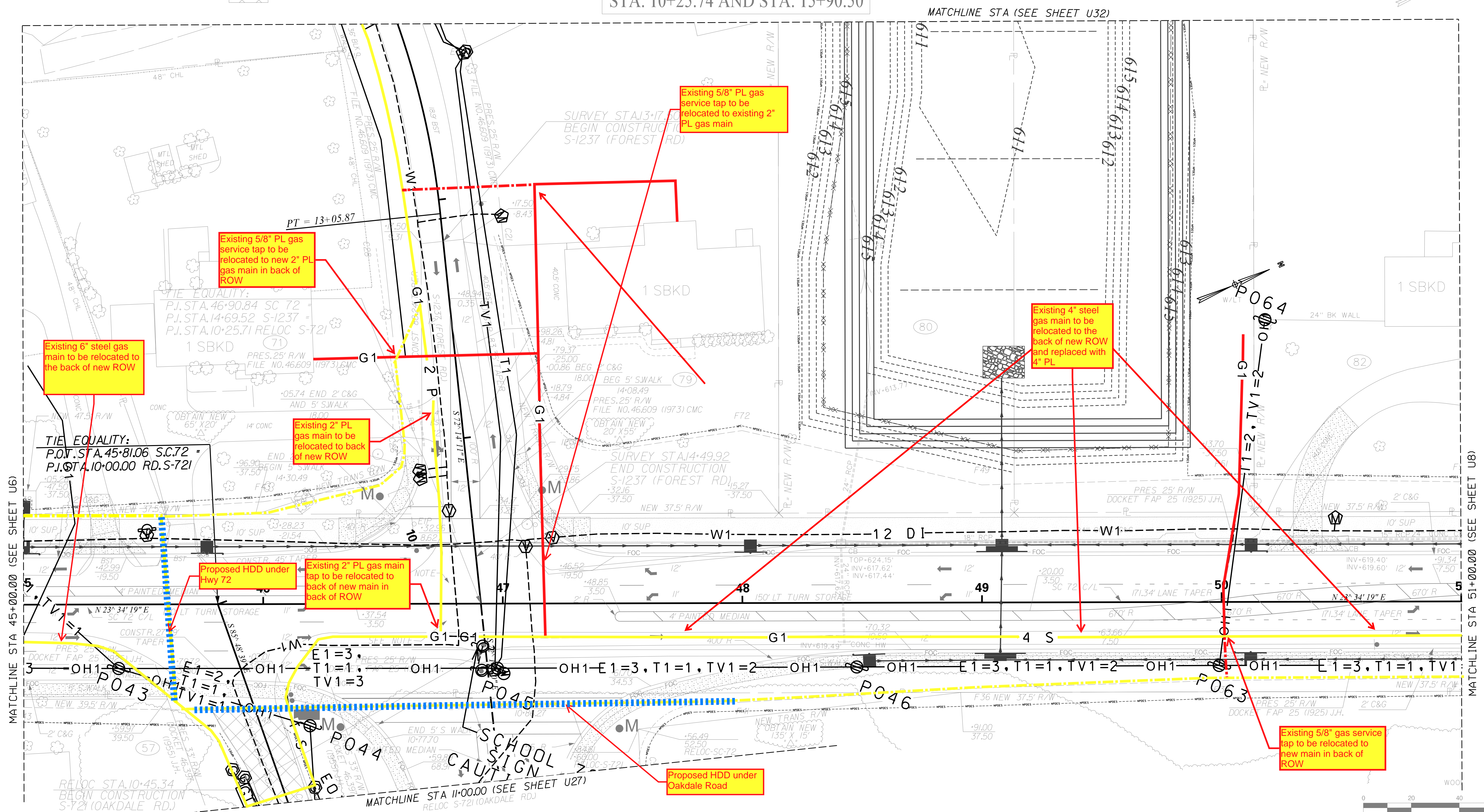
ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

RELOCATE SC 72 BETWEEN STA. 68+99.05 AND STA. 132+15.33

RELOCATE S-721 BETWEEN STA. 10+25.74 AND STA. 15+90.50

FED. RD. DIST. NO.	STATE	COUNTY	PROJ. ID NO.	ROUTE NO.	SHEET NO.
3	S.C.	YORK	P029515	SC 72	U7

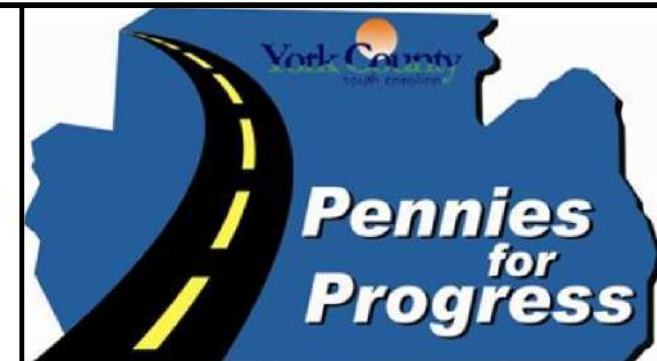
SC 72 (SALUDA RD.)



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SWANSONSA
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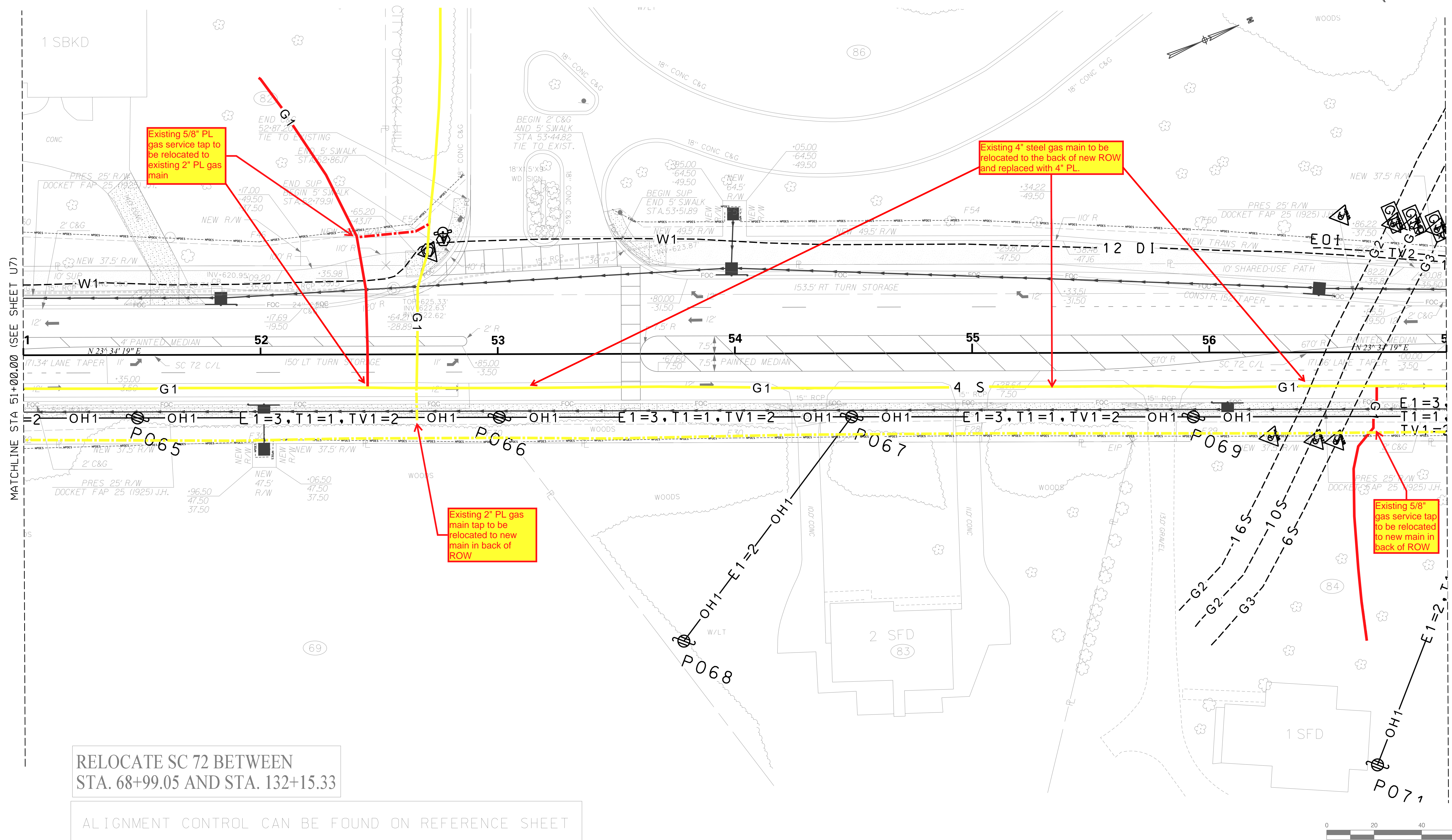
PLANS PREPARED BY
**YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS**

SC 72 PLAN
STA 45+00 TO STA 51+00

SCALE: 1" = 20'

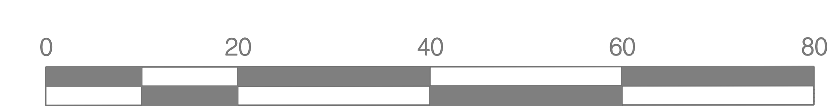
SH. NO. U7

SC-72 (SALUDA RD.)



RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33

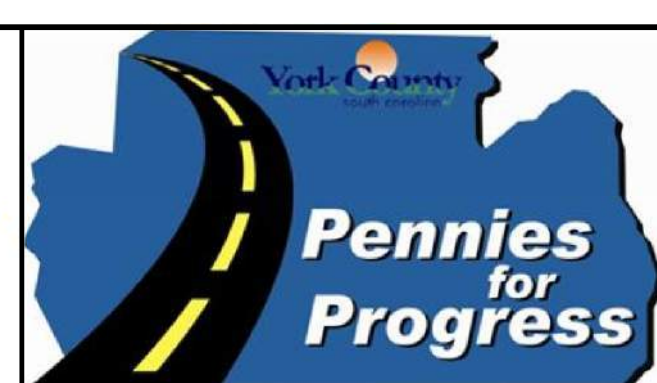
ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET



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PLANS PREPARED BY
CDM Smith
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS
SC 72 PLAN
STA 51+00 TO STA 57+00
SCALE: 1" = 20'
SH. NO. U8

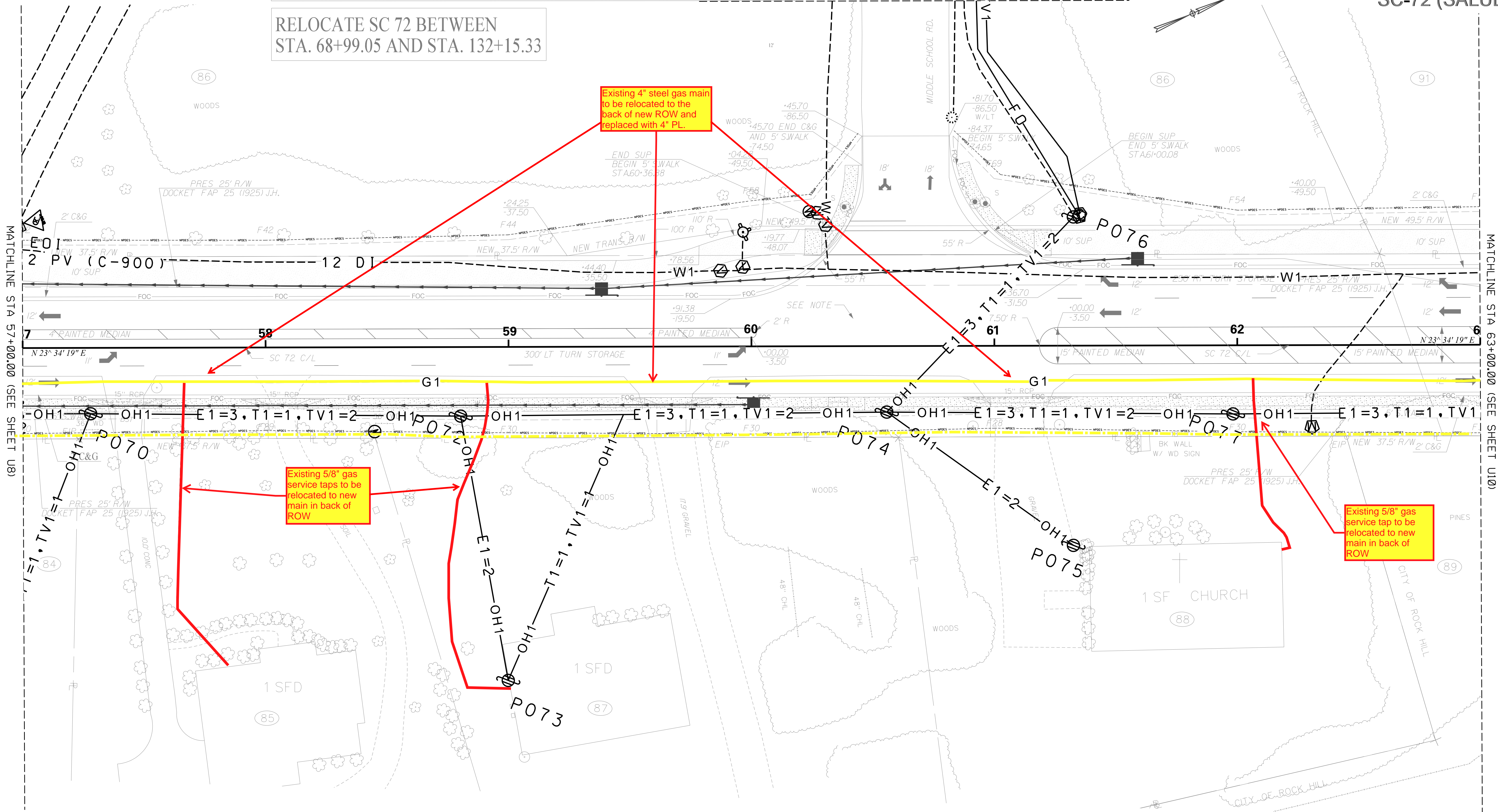
FED. RD. DIST. NO.	STATE	COUNTY	PROJ. ID NO.	ROUTE NO.	SHEET NO.
3	S.C.	YORK	P029515	SC 72	U9

SC-72 (SALUDA RD.)

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

RELOCATE SC 72 BETWEEN STA. 68+99.05 AND STA. 132+15.33

MATCHLINE STA 14+50.00 (SEE SHEET U26)



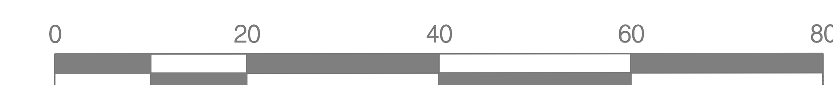
Existing 4" steel gas main to be relocated to the back of new ROW and replaced with 4" PL.

Existing 5/8" gas service taps to be relocated to new main in back of ROW

Existing 5/8" gas service tap to be relocated to new main in back of ROW

MATCHLINE STA 57+00.00 (SEE SHEET U8)

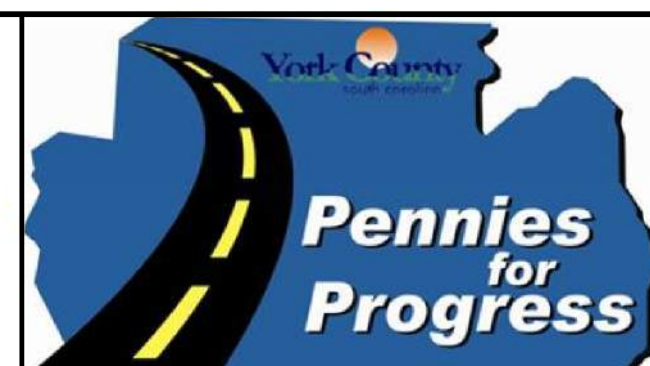
MATCHLINE STA 63+00.00 (SEE SHEET U10)



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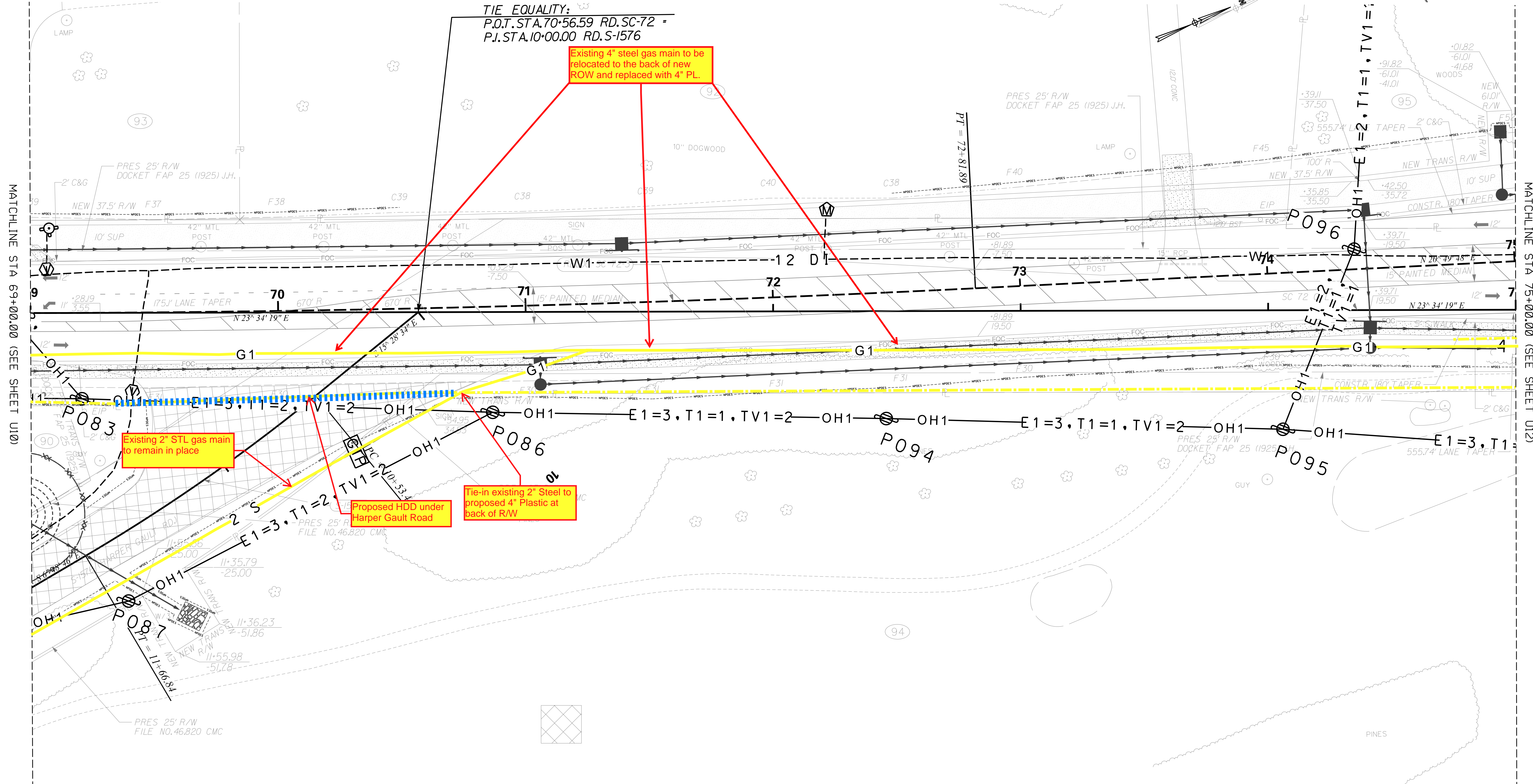
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PLANS PREPARED BY
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DEPARTMENT OF PUBLIC WORKS
SC 72 PLAN
STA 57+00 TO STA 63+00
SCALE: 1" = 20'
SH. NO. U9

SC-72 (SALUDA RD.)



TIE EQUALITY:
P.O.T. STA. 70+56.59 RD. SC-72 =
P.I. STA. 10+00.00 RD. S-1576

Existing 2" STL gas main to remain in place

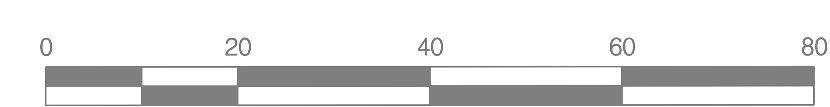
Proposed HDD under Harper Gault Road

Tie-in existing 2" Steel to proposed 4" Plastic at back of R/W

Existing 4" steel gas main to be relocated to the back of new ROW and replaced with 4" PL.

**RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33**

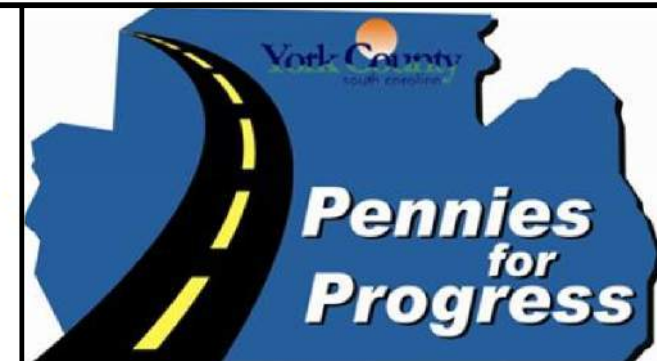
ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET



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SWANSONSA
3/7/2019

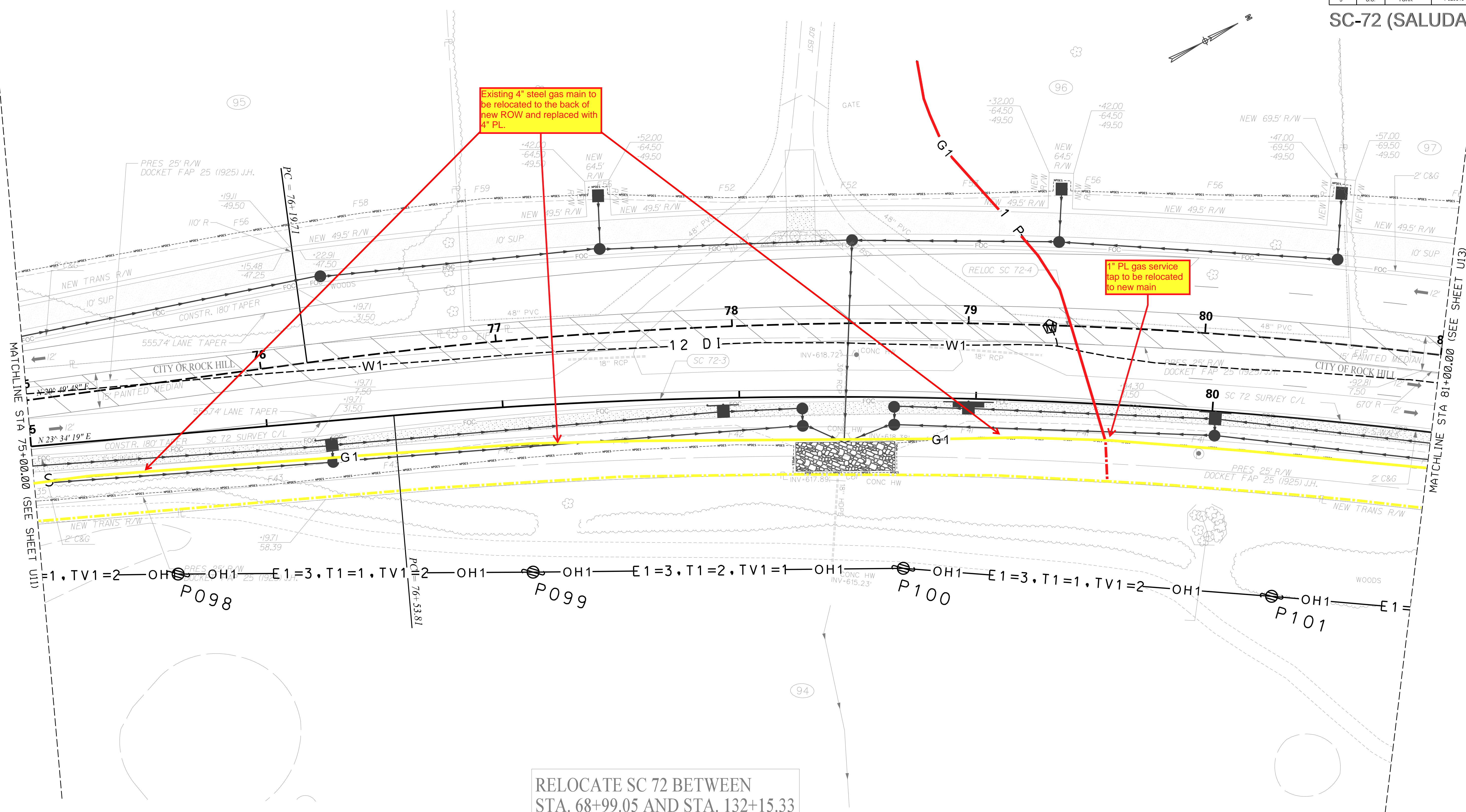
REVISIONS:				
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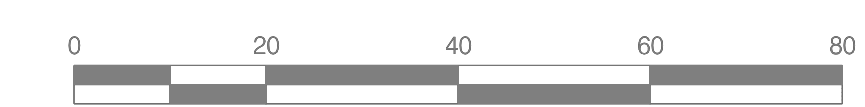
PLANS PREPARED BY
**YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS**
**SC 72 PLAN
STA 69+00 TO STA 75+00**
SCALE: 1" = 20'
SH. NO. U11

SC-72 (SALUDA RD.)



RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33

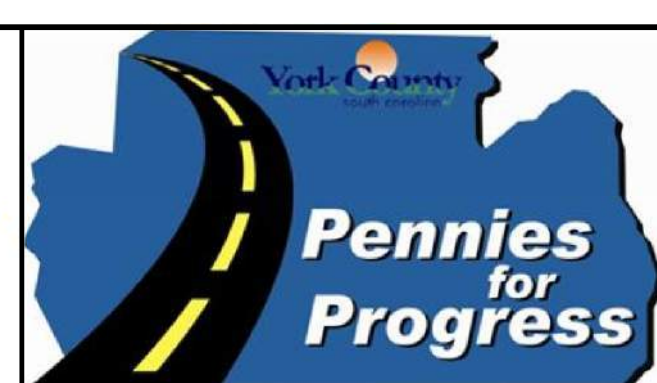
ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET



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SWANSONSA
3/7/2019

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REVISED	_____	_____
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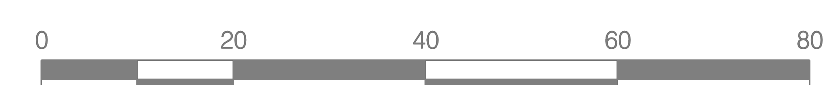
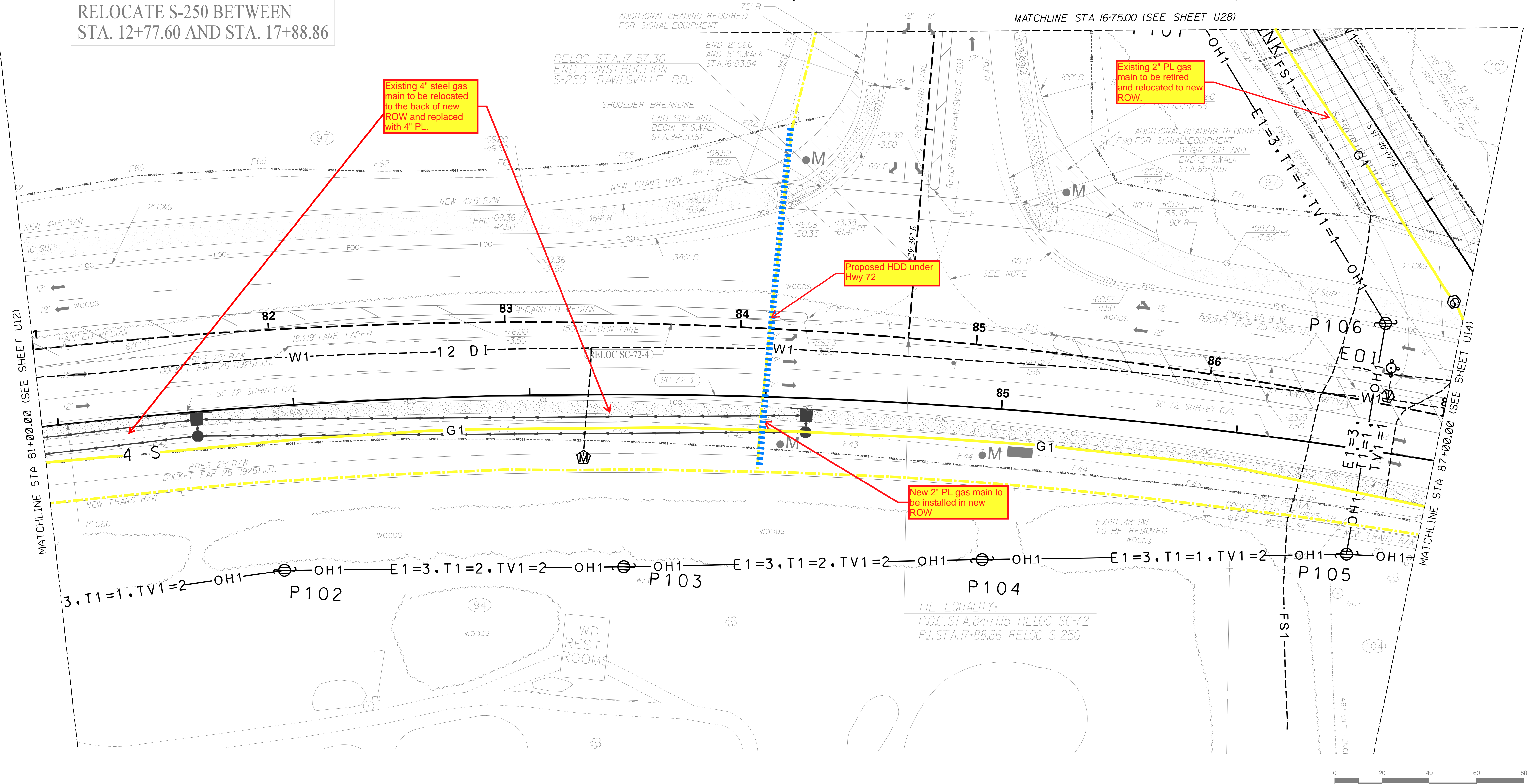


PLANS PREPARED BY
CDM Smith
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS
SC 72 PLAN
STA 75+00 TO STA 81+00
SCALE: 1" = 20'
SH. NO. U12

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

RELOCATE SC 72 BETWEEN STA. 68+99.05 AND STA. 132+15.33

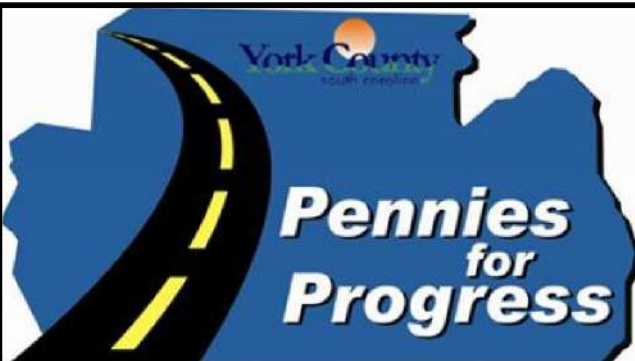
RELOCATE S-250 BETWEEN STA. 12+77.60 AND STA. 17+88.86



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PLANS PREPARED BY
CDM Smith

YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS

SC 72 PLAN
STA 81+00 TO STA 87+00

SCALE: 1" = 20' SH. NO. U13

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

FED. RD. DIST. NO.	STATE	COUNTY	PROJ. ID NO.	ROUTE NO.	SHEET NO.
3	S.C.	YORK	P029515	SC 72	U14

SC-72 (SALUDA RD.)

**RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33**

TIE EQUALITY:
P.T. STA. 91+02.65 SC 72 BK =
RELOC P.O.T STA 91+19.66 RELOC SC 72 AHD

TIE EQUALITY:
P.O.C. STA. 87+64.12 SC 72
P.I. STA. 19+48.22 S-250

TIE EQUALITY:
P.O.T. STA. 91+80.80 RELOC. SC 72
P.I. STA. 10+00.00 TARRINGTON DR.

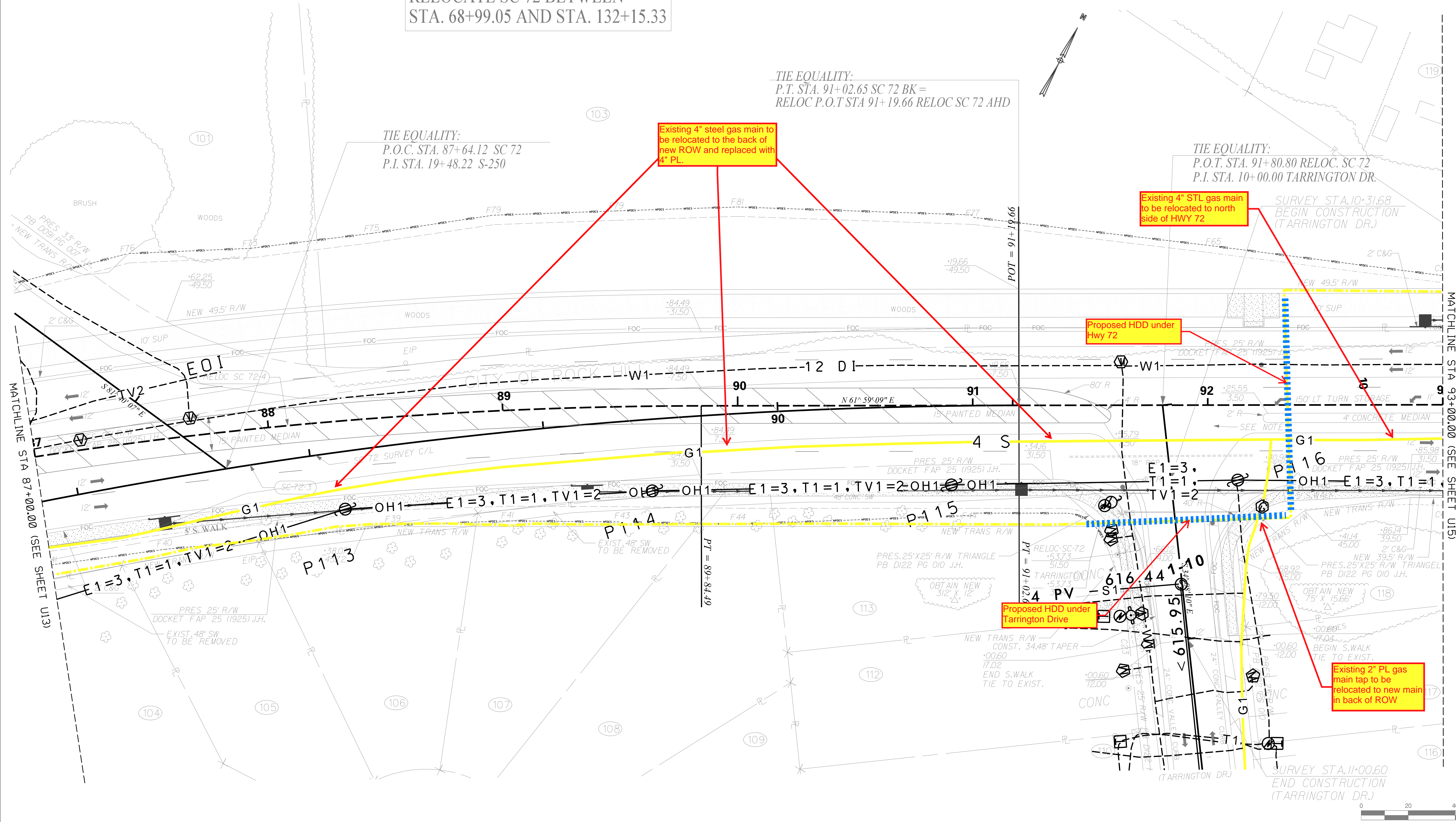
Existing 4" steel gas main to be relocated to the back of new ROW and replaced with 4" PL.

Existing 4" STL gas main to be relocated to north side of HWY 72

Proposed HDD under Hwy 72

Proposed HDD under Tarrington Drive

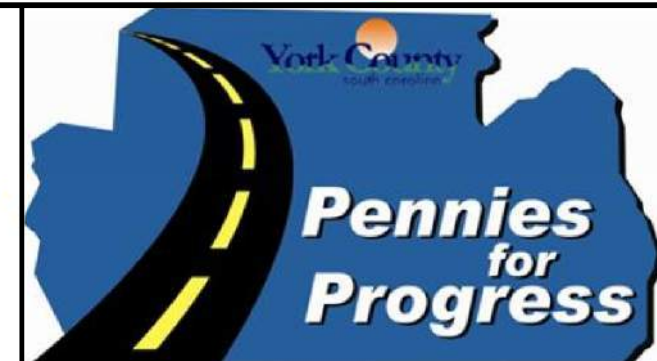
Existing 2" PL gas main tap to be relocated to new main in back of ROW



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3/7/2019

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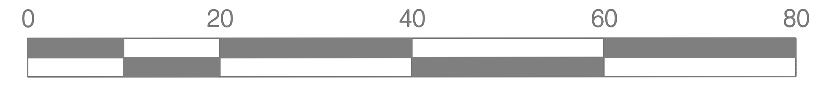
PLANS PREPARED BY
CDM Smith

YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS

SC 72 PLAN
STA 87+00 TO STA 93+00

SCALE: 1" = 20'

SH. NO. U14



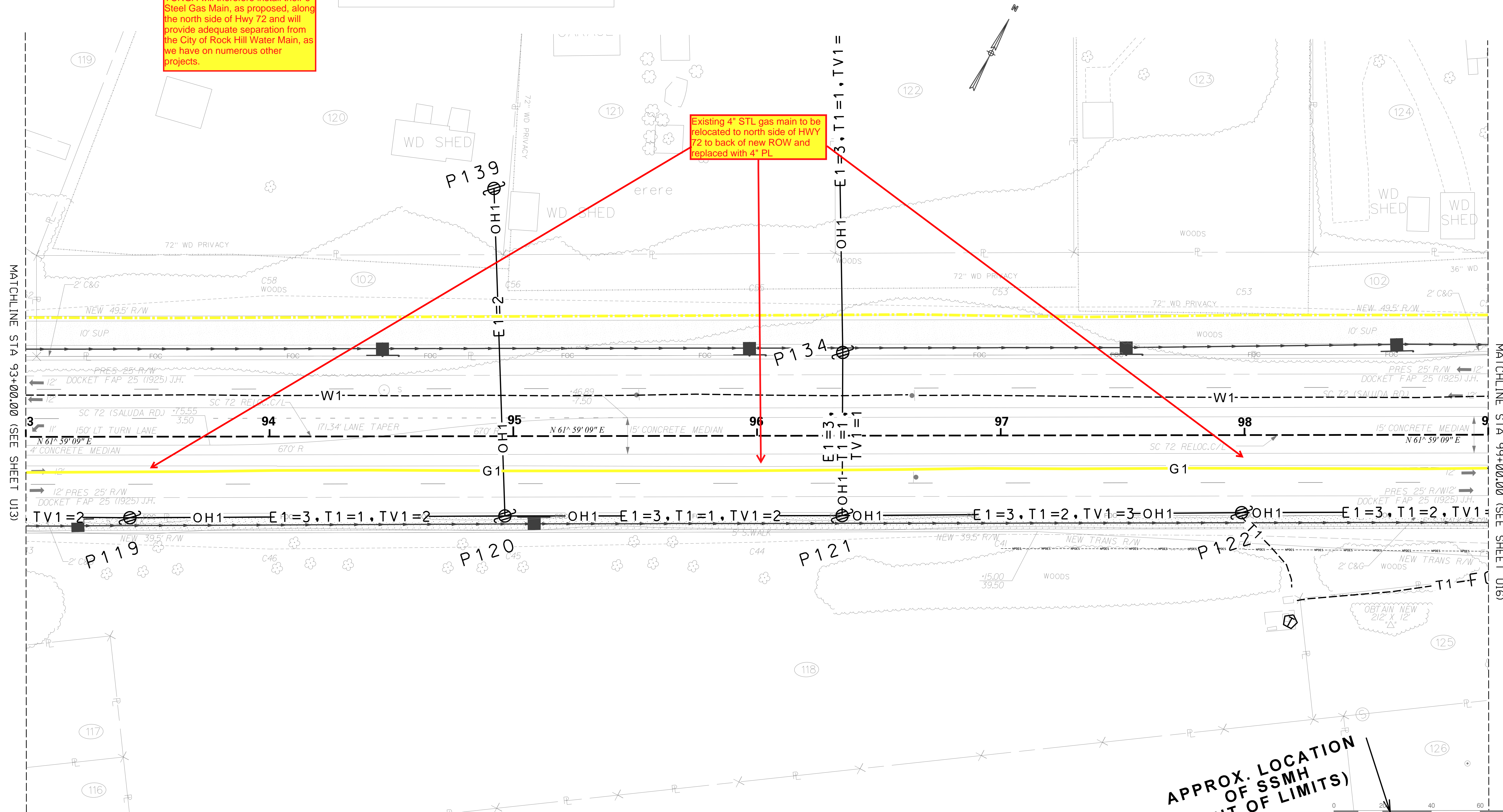
SC-72 (SALUDA RD.)

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

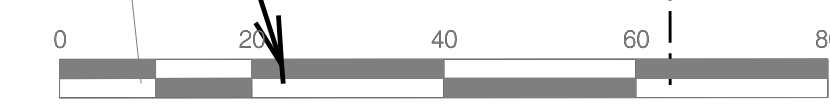
RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33

YCNGA disagrees with the Utility Report and cannot safely install and maintain a 6" Steel Gas Main from Station 93+00 to Station 99+00 due to the presence of multiple utilities. YCNGA will therefore install their 6" Steel Gas Main, as proposed, along the north side of Hwy 72 and will provide adequate separation from the City of Rock Hill Water Main, as we have on numerous other projects.

Existing 4" STL gas main to be relocated to north side of HWY 72 to back of new ROW and replaced with 4" PL



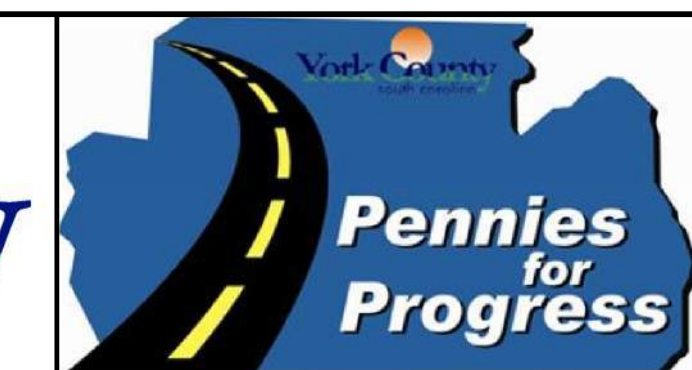
APPROX. LOCATION OF SSMH LIMIT OF LIMITS



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SWANSONSA
3/7/2019

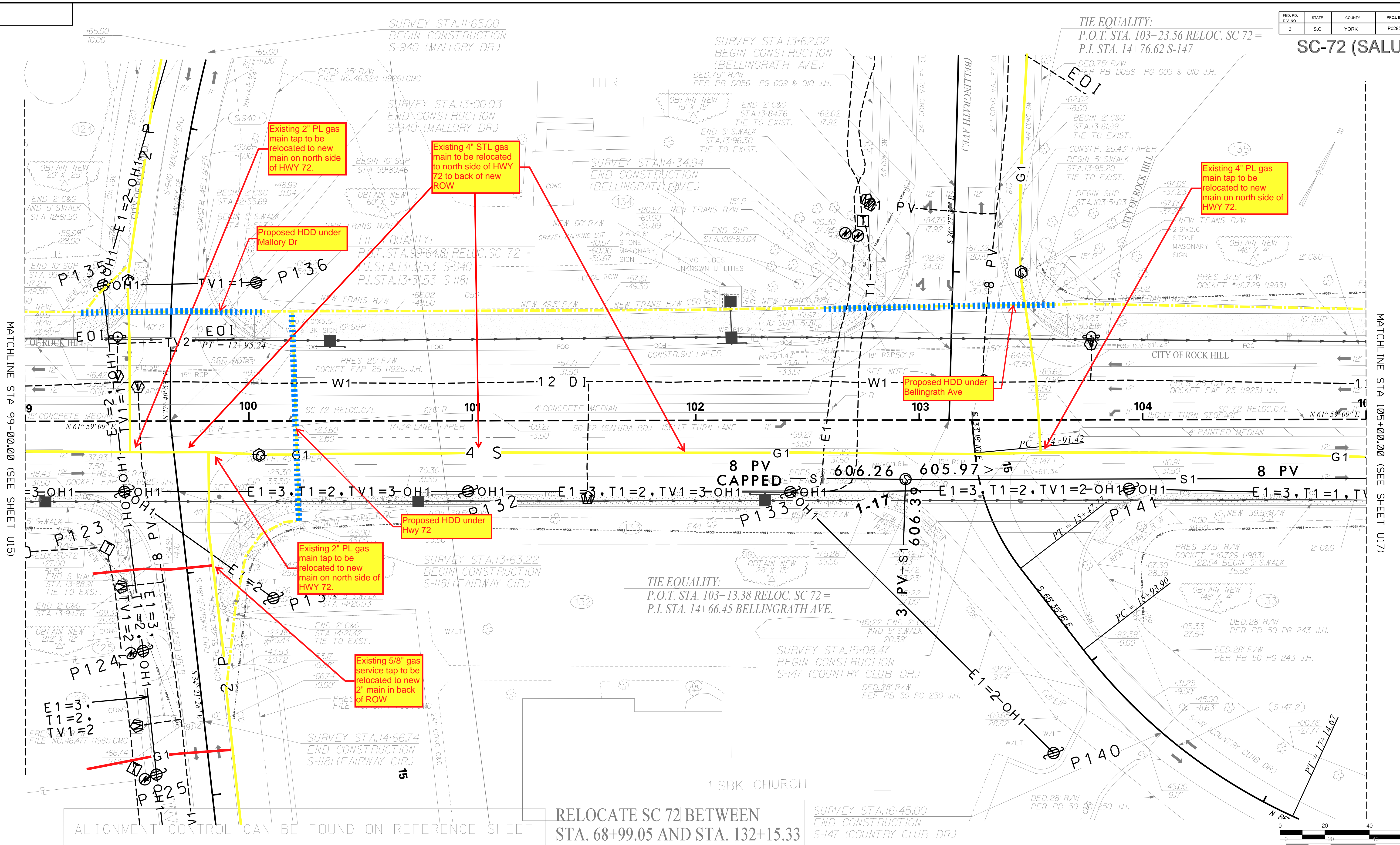
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REV. NO.	BY	CKD.	DATE	DESCRIPTION OF REVISION

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PLANS PREPARED BY
CDM Smith
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS
SC 72 PLAN
STA 93+00 TO STA 99+00
SCALE: 1" = 20'

SC-72 (SALUDA RD.)

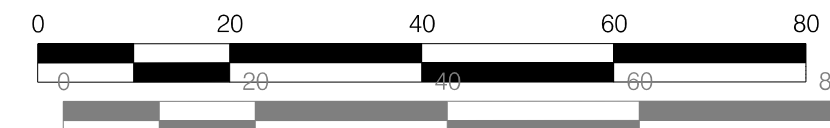


MATCHLINE STA 99+00.00 (SEE SHEET U15)

MATCHLINE STA 105+00.00 (SEE SHEET U17)

**RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33**

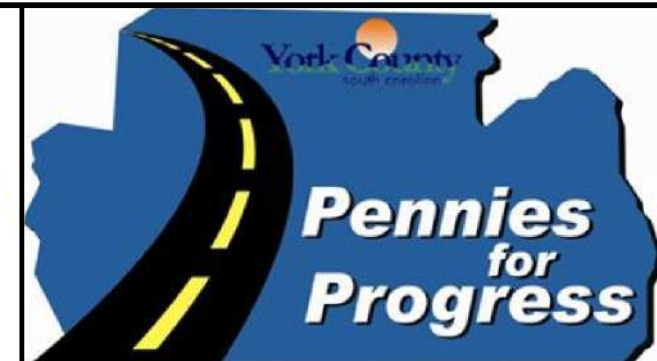
ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET



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SWANSONSA
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PLANS PREPARED BY
CDM Smith

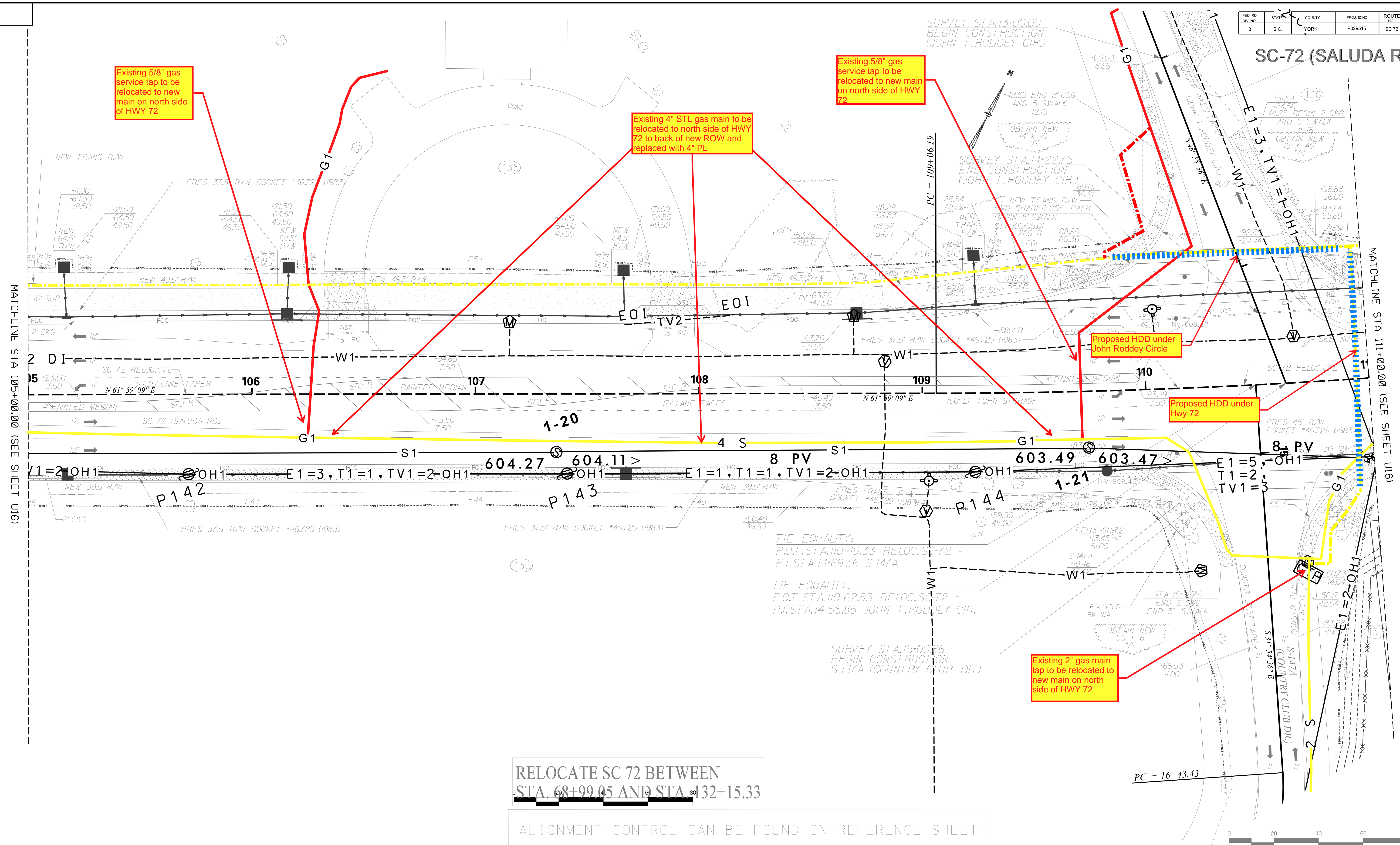
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS

SC 72 PLAN
STA 99+00 TO STA 105+00

SCALE: 1" = 20'

SH. NO. U16

SC-72 (SALUDA RD.)



Existing 5/8" gas service tap to be relocated to new main on north side of HWY 72

Existing 4" STL gas main to be relocated to north side of HWY 72 to back of new ROW and replaced with 4" PL

Existing 5/8" gas service tap to be relocated to new main on north side of HWY 72

Proposed HDD under John Roddey Circle

Proposed HDD under Hwy 72

Existing 2" gas main tap to be relocated to new main on north side of HWY 72

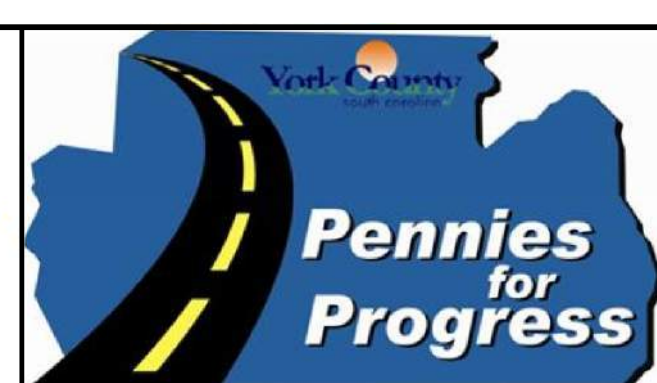
RELOCATE SC 72 BETWEEN STA. 68+99.05 AND STA. 80+132+15.33

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

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SWANSONSA
3/7/2019

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PLANS PREPARED BY
CDM Smith

YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS

SC 72 PLAN
STA 105+00 TO STA 111+00

SCALE: 1" = 20'

SH. NO. U17

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

FED. RD. DIST. NO.	STATE	COUNTY	PROJ. ID NO.	ROUTE NO.	SHEET NO.
3	S.C.	YORK	P029515	SC 72	U18

SC-72 (SALUDA RD.)

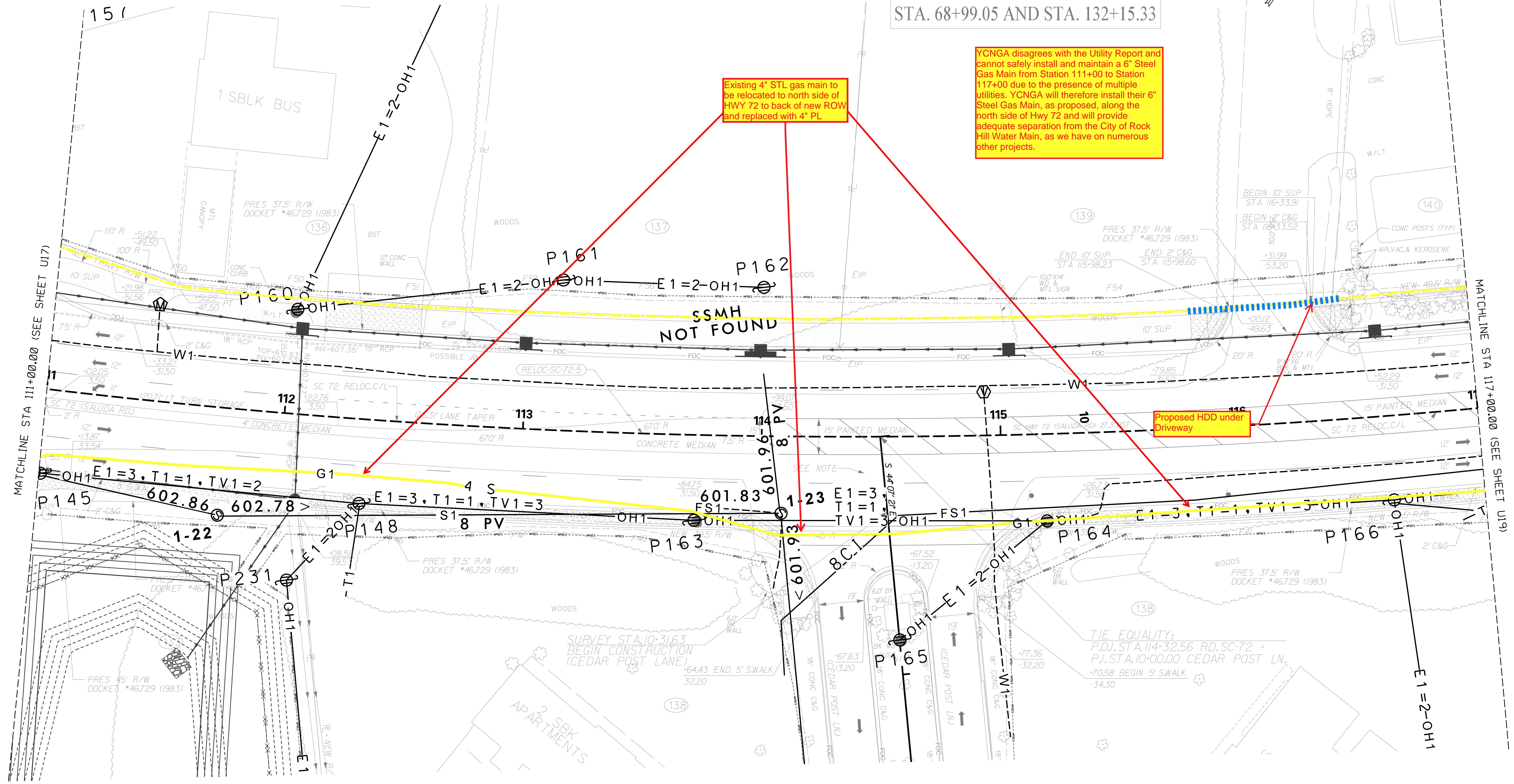
RELOCATE SC 72 BETWEEN STA. 68+99.05 AND STA. 132+15.33

YCNGA disagrees with the Utility Report and cannot safely install and maintain a 6" Steel Gas Main from Station 111+00 to Station 117+00 due to the presence of multiple utilities. YCNGA will therefore install their 6" Steel Gas Main, as proposed, along the north side of Hwy 72 and will provide adequate separation from the City of Rock Hill Water Main, as we have on numerous other projects.

Existing 4" STL gas main to be relocated to north side of HWY 72 to back of new ROW and replaced with 4" PL

Proposed HDD under Driveway

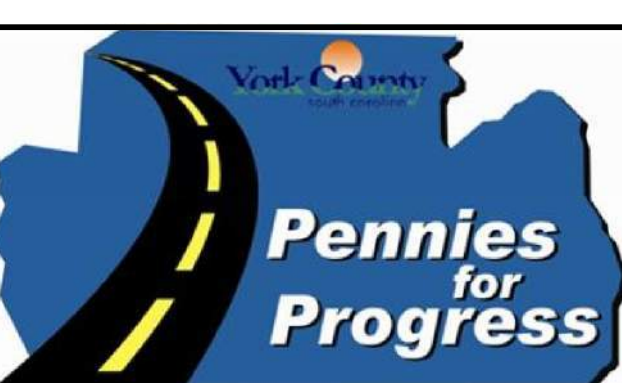
SSMH NOT FOUND



...P:\eng\726.SH.U18.dgn
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3/7/2015

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YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS

SC 72 PLAN
STA 111+00 TO STA 117+00

SCALE: 1" = 20' SH. NO. U18

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET U18

RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33

YCNGA disagrees with the Utility Report and cannot safely install and maintain a 6" Steel Gas Main from Station 117+00 to Station 123+00 due to the presence of multiple utilities. YCNGA will therefore install their 6" Steel Gas Main, as proposed, along the north side of Hwy 72 and will provide adequate separation from the City of Rock Hill Water Main, as we have on numerous other projects.

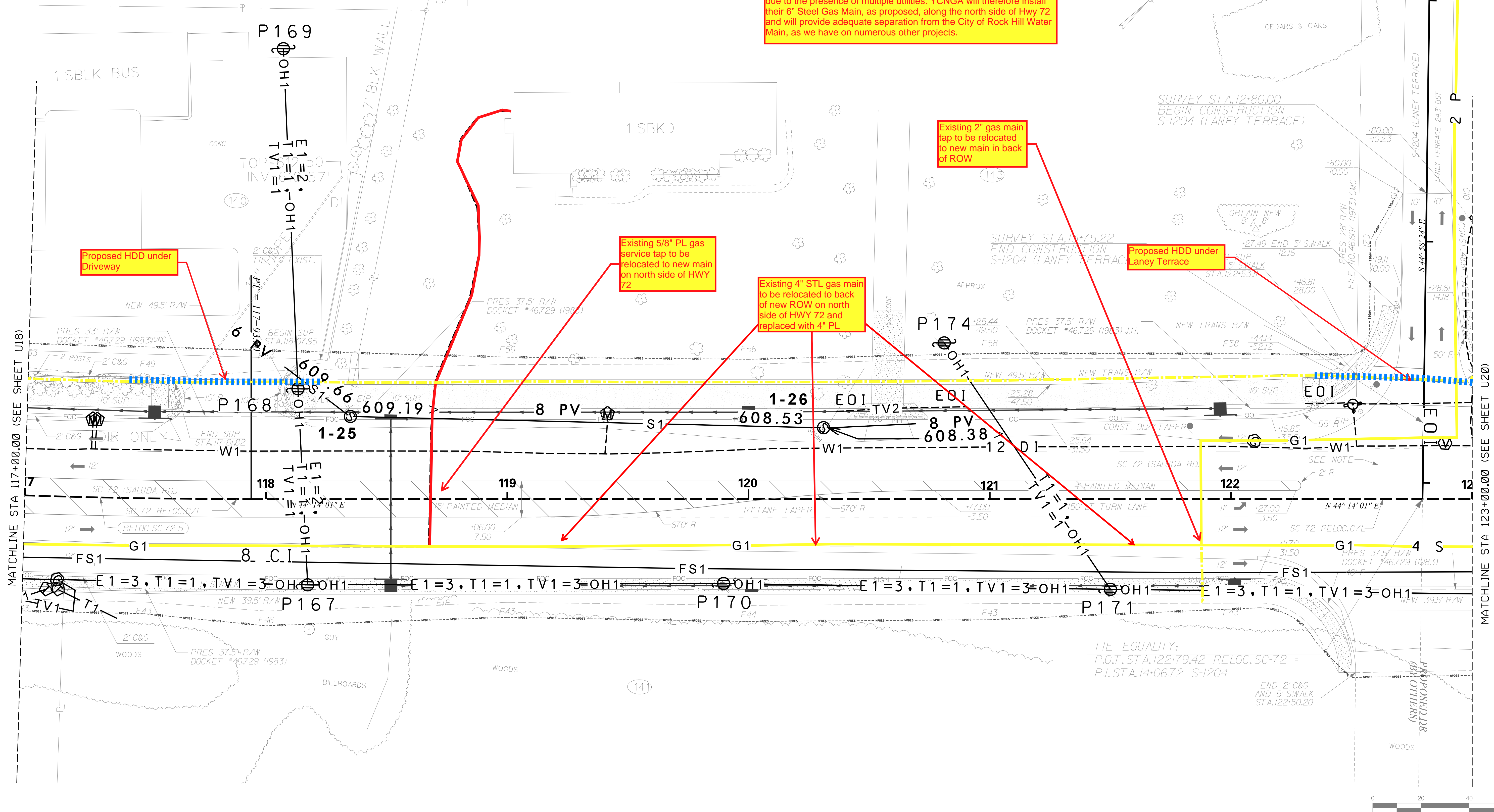
Existing 2" gas main tap to be relocated to new main in back of ROW

Existing 5/8" PL gas service tap to be relocated to new main on north side of HWY 72

Existing 4" STL gas main to be relocated to back of new ROW on north side of HWY 72 and replaced with 4" PL

Proposed HDD under Laney Terrace

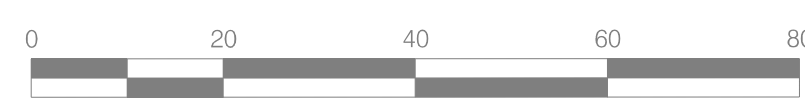
Proposed HDD under Driveway



MATCHLINE STA 117+00.00 (SEE SHEET U18)

MATCHLINE STA 123+00.00 (SEE SHEET U20)

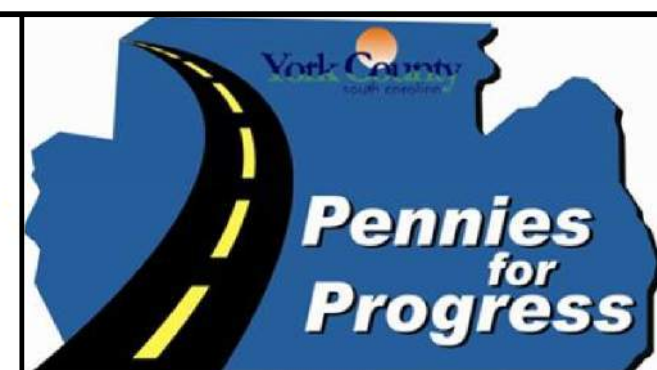
TIE EQUALITY:
P.O.T. STA. 122+79.42 RELOC. SC-72 -
P.I. STA. 14+06.72 S-1204



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3/7/2019

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PLANS PREPARED BY
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS
SC 72 PLAN
STA 117+00 TO STA 123+00
SCALE: 1" = 20'
SH. NO. U19

FED. RD. DIST. NO.	STATE	COUNTY	PROJ. ID NO.	ROUTE NO.	SHEET NO.
3	S.C.	YORK	P029515	SC 72	120

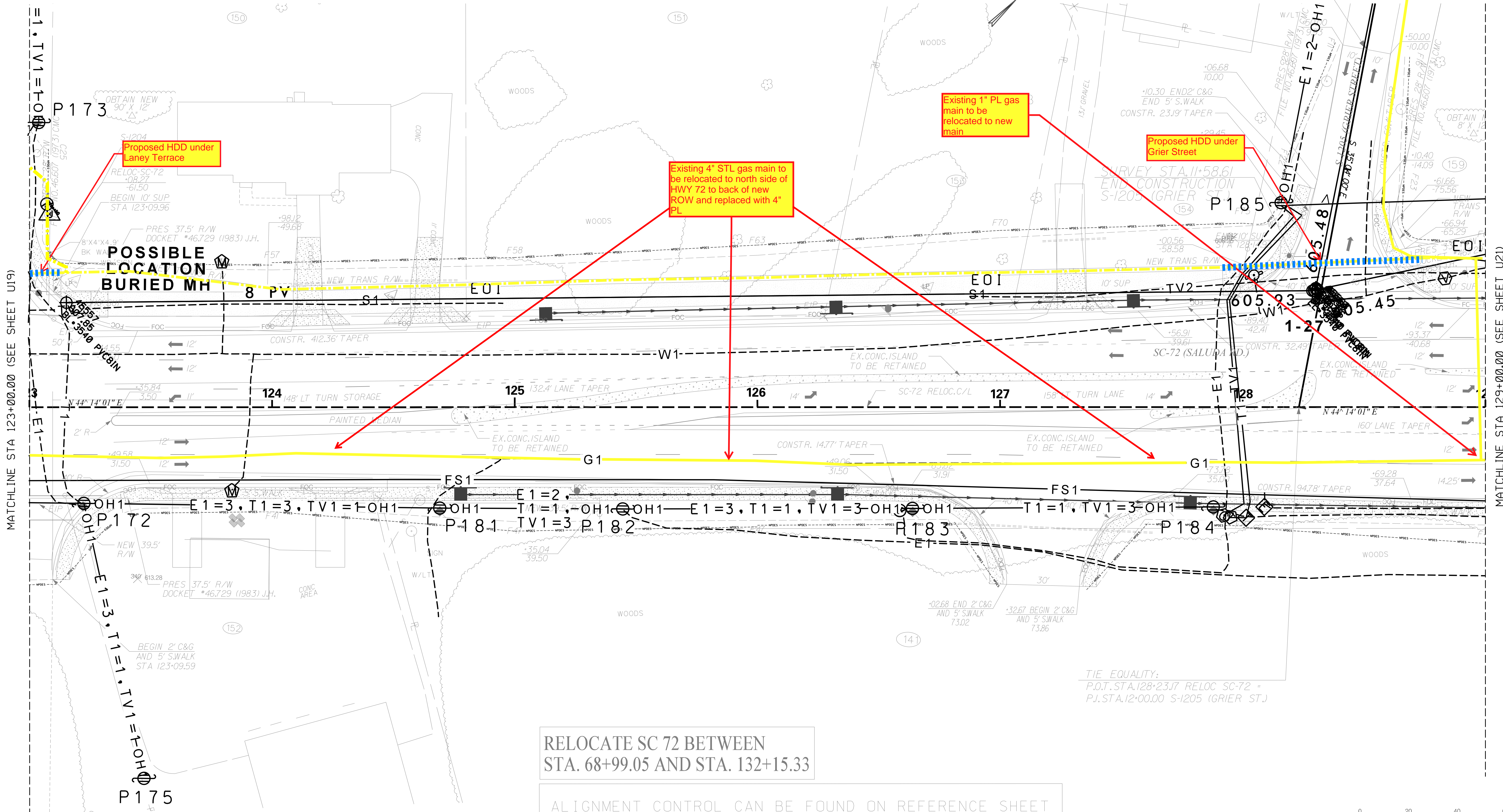
SC-72 (SALUDA RD.)

S-1205 INTERSECTION DS VEHICLE = S-BUS-40 W/50' DS RADIUS
 SEE SHEET D20 FOR DRAINAGE AND EROSION CONTROL NOTES
 SEE SHEET 61 FOR S-1205 PROFILE
 SEE SHEET 47 FOR SC-72 PROFILE

SURVEY STA. 10+50.00
 BEGIN CONSTRUCTION
 S-1205 (GRIER ST.)

SURVEY STA. 11+58.61
 END CONSTRUCTION
 S-1205 (GRIER ST.)

TIE EQUALITY:
 P.O.T. STA. 128+23.17 RELOC SC-72 +
 P.I. STA. 12+00.00 S-1205 (GRIER ST.)



Proposed HDD under Laney Terrace

Existing 1" PL gas main to be relocated to new main

Proposed HDD under Grier Street

Existing 4" STL gas main to be relocated to north side of HWY 72 to back of new ROW and replaced with 4" PL

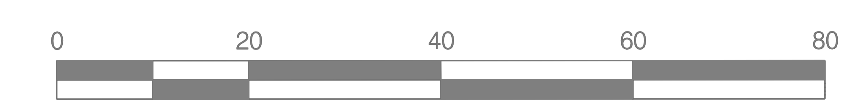
POSSIBLE LOCATION BURIED MH

RELOCATE SC 72 BETWEEN
 STA. 68+99.05 AND STA. 132+15.33

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

MATCHLINE STA 123+00.00 (SEE SHEET U19)

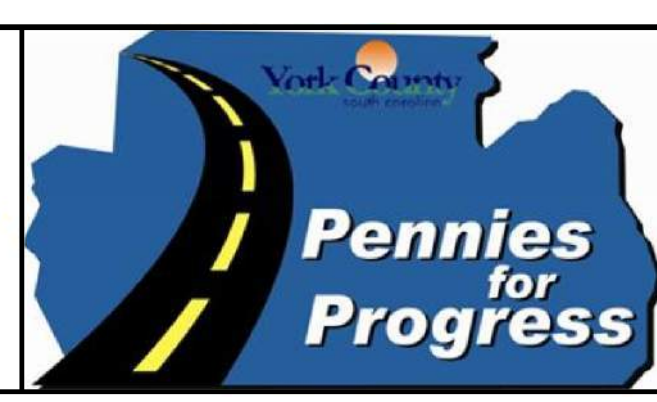
MATCHLINE STA 129+00.00 (SEE SHEET U21)



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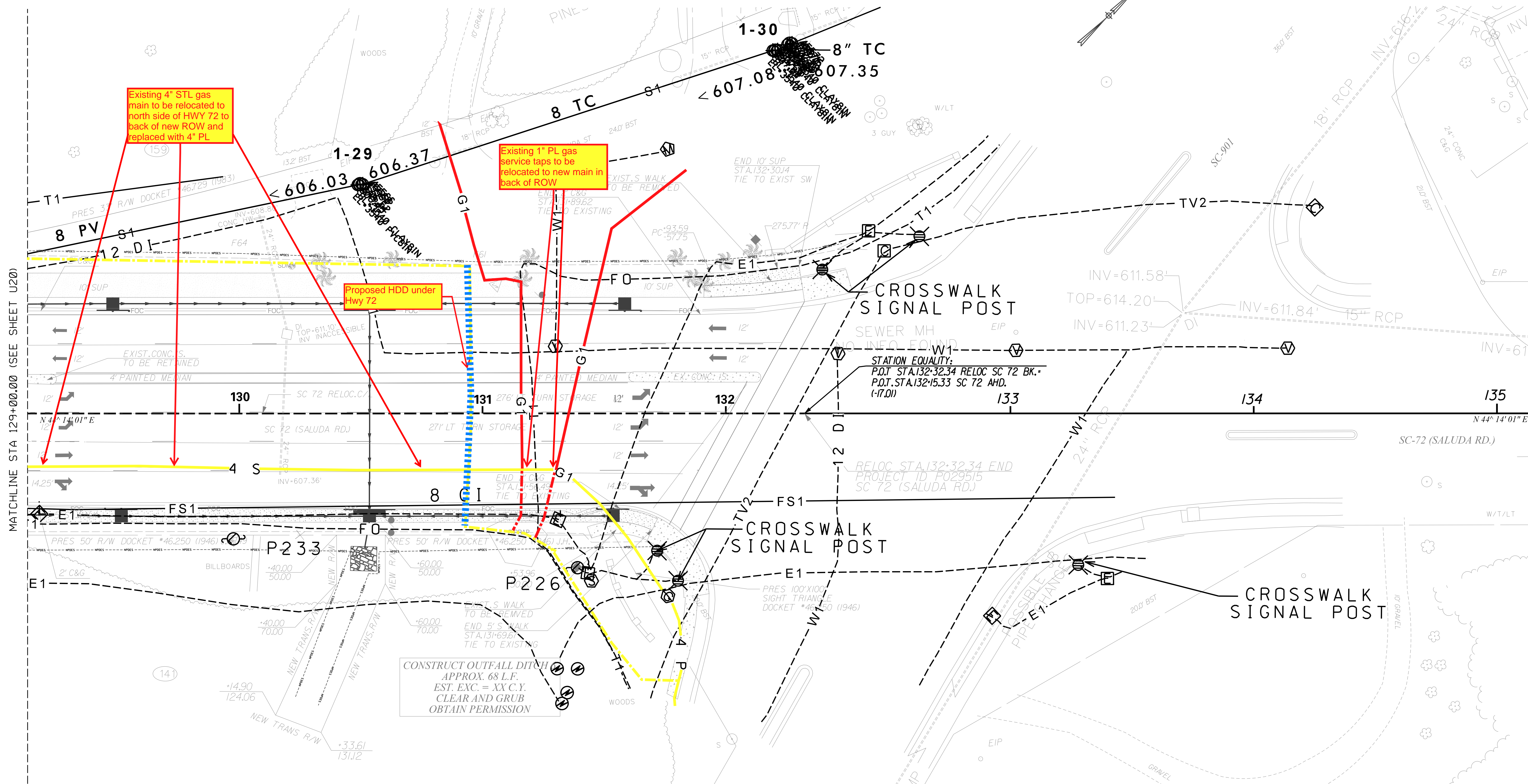
PLANS PREPARED BY
CDM Smith
 YORK COUNTY, SOUTH CAROLINA
 DEPARTMENT OF PUBLIC WORKS
 SC 72 PLAN
 STA 123+00 TO STA 129+00
 SCALE: 1" = 20'
 SH. NO. U20

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

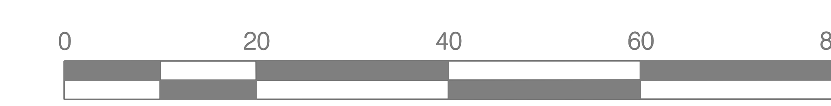
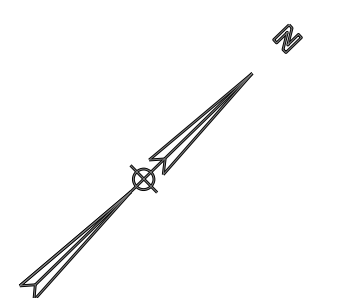
RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33

FED. RD. DIST. NO.	STATE	COUNTY	PROJ. ID NO.	ROUTE NO.	SHEET NO.
3	S.C.	YORK	P029515	SC 72	U21

SC-72 (SALUDA RD.)



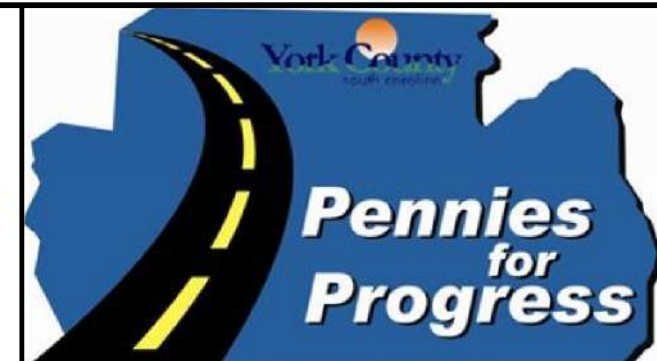
MATCHLINE STA 129+00.00 (SEE SHEET U20)



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PLANS PREPARED BY
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS
SC 72 PLAN
STA 129+00 TO 132+32.34
SCALE: 1" = 20' SH. NO. U21

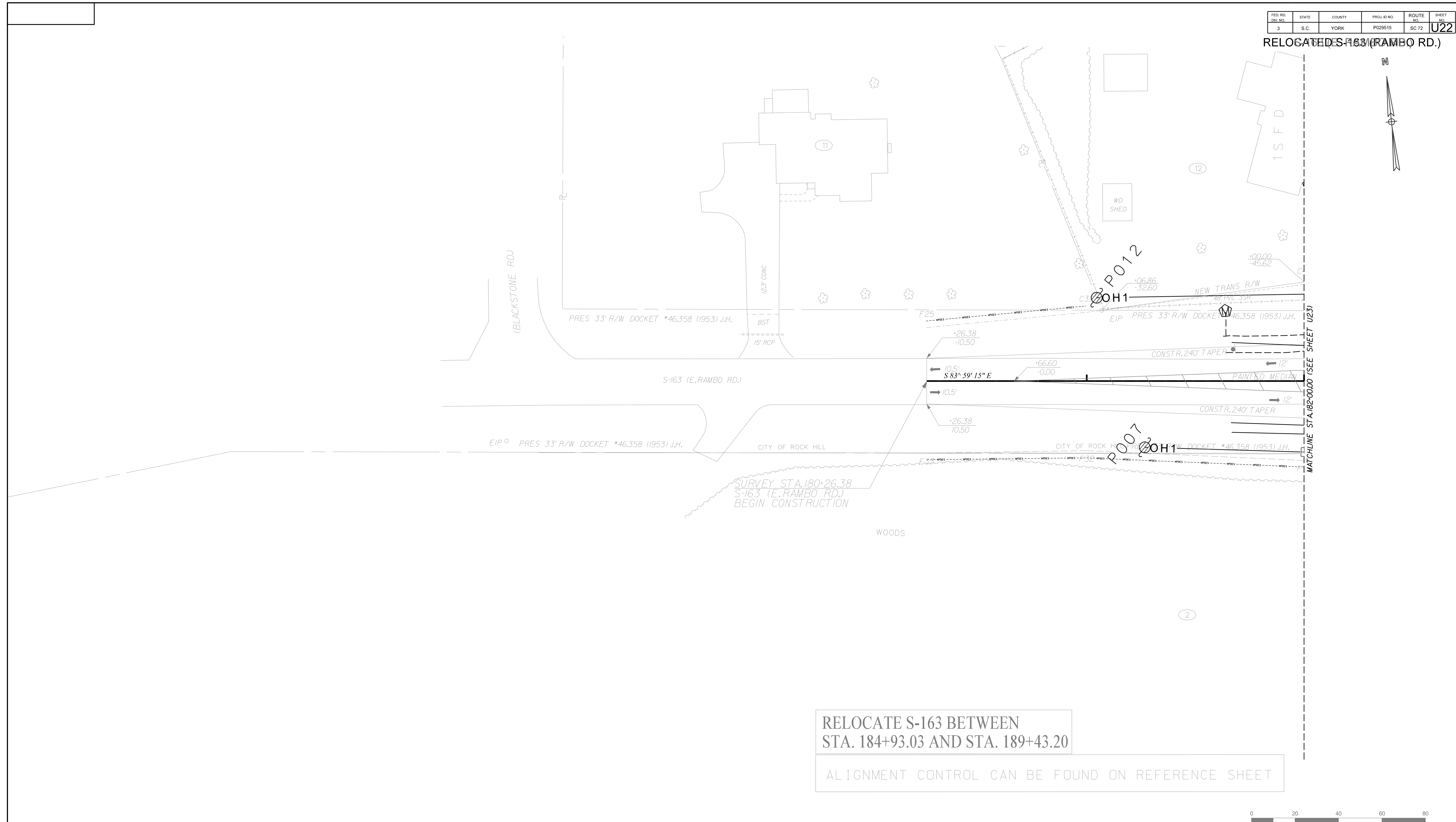
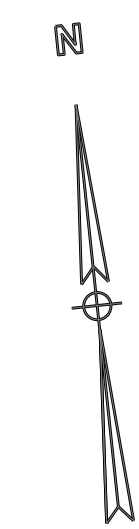
CONSTRUCT OUTFALL DITCH
APPROX. 68 L.F.
EST. EXC. = XX C.Y.
CLEAR AND GRUB
OBTAIN PERMISSION

STATION EQUALITY:
P.O.T. STA. 132+32.34 RELOC SC 72 BK.
P.O.T. STA. 132+15.33 SC 72 AHD.
(-17.01)

RELOC STA. 132+32.34 END
PROJECT ID P029515
SC 72 (SALUDA RD.)

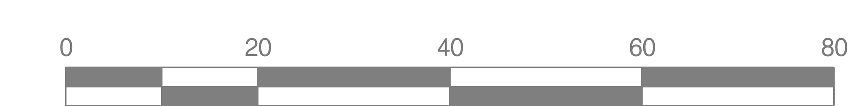
FED. RD. DIST. NO.	STATE	COUNTY	PROJ. ID NO.	ROUTE NO.	SHEET NO.
3	S.C.	YORK	P029515	SC 72	U22

RELOCATED S-163 (RAMBO RD.)



RELOCATE S-163 BETWEEN
STA. 184+93.03 AND STA. 189+43.20

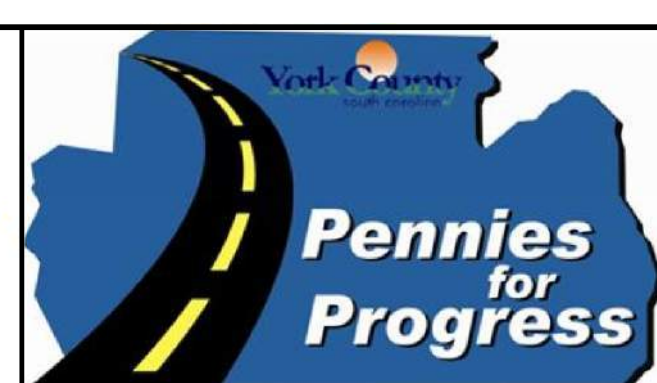
ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET



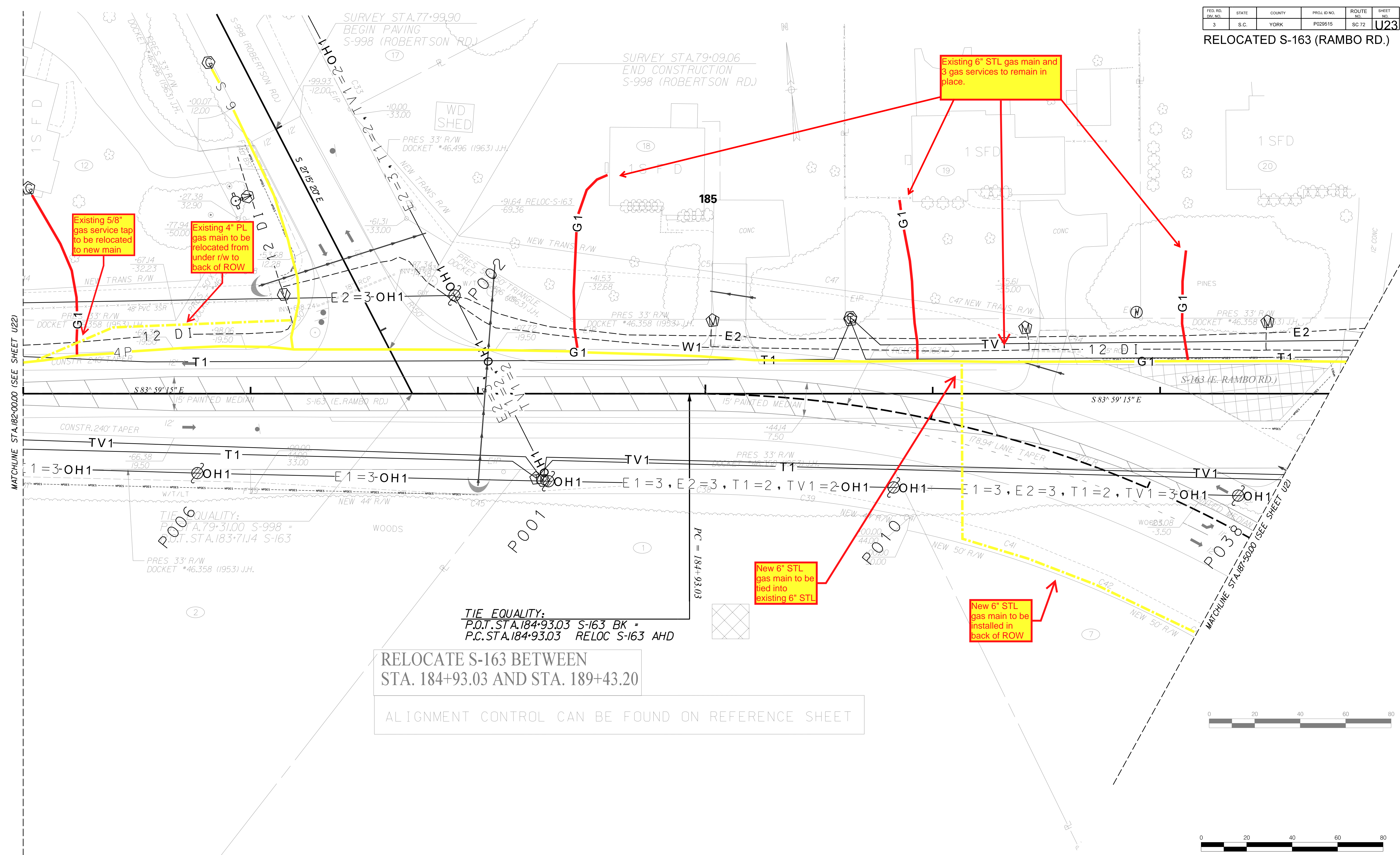
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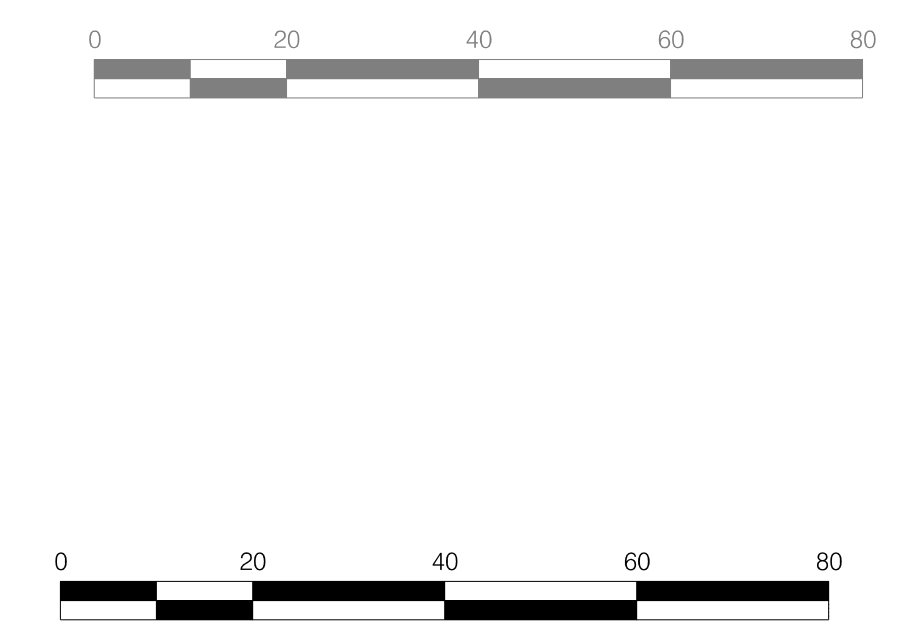


PLANS PREPARED BY
CDM Smith
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS
RELOC. S-163 PLAN
STA 180+26.38 TO STA 182+00.00
SCALE: 1" = 20' SH. NO. U23



RELOCATE S-163 BETWEEN
STA. 184+93.03 AND STA. 189+43.20

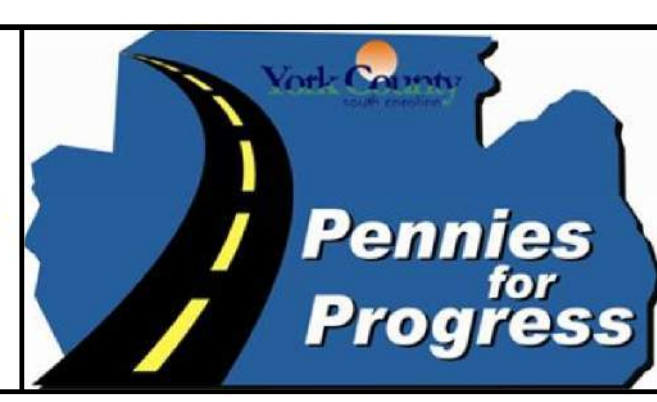
ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET



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PLANS PREPARED BY
CDM Smith

YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS

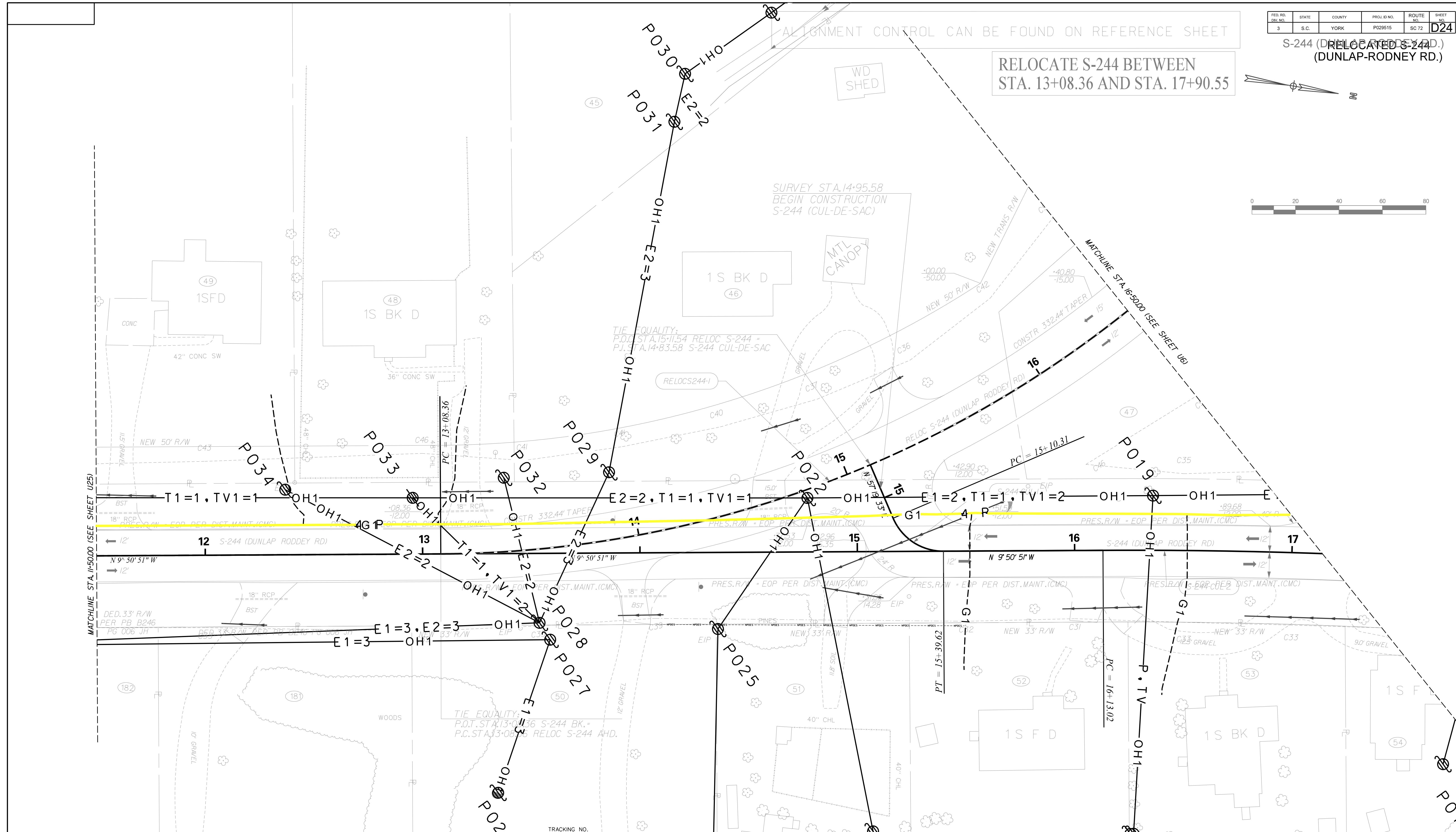
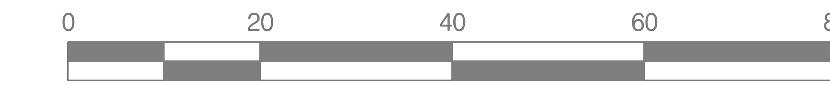
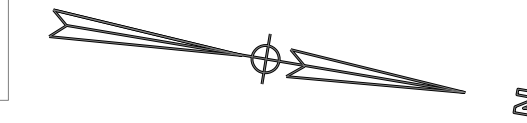
RELOC. S-163 PLAN
STA 182+00 TO STA 187+50

SCALE: _____ SH. NO. U23

FED. RD. DIST. NO.	STATE	COUNTY	PROJ. ID NO.	ROUTE NO.	SHEET NO.
3	S.C.	YORK	P029515	SC 72	D24

S-244 (DUNLAP RODDEY RD.)
 (RELOCATED S-244)
 (DUNLAP-RODNEY RD.)

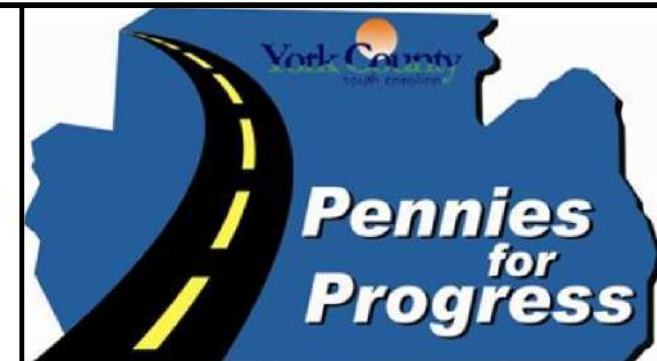
RELOCATE S-244 BETWEEN
 STA. 13+08.36 AND STA. 17+90.55



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 3/7/2019

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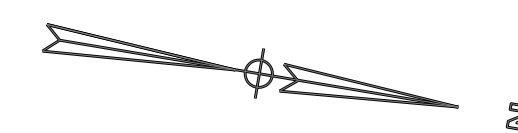
DOCUMENT REVIEW		
RESPONSIBILITY	NAME	DATE
ORIGINATOR		
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PLANS PREPARED BY
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS
 RELOC. S-244 PLAN
 STA 11+50 TO STA 16+50
 SCALE: 1"=20' SH. NO. D24

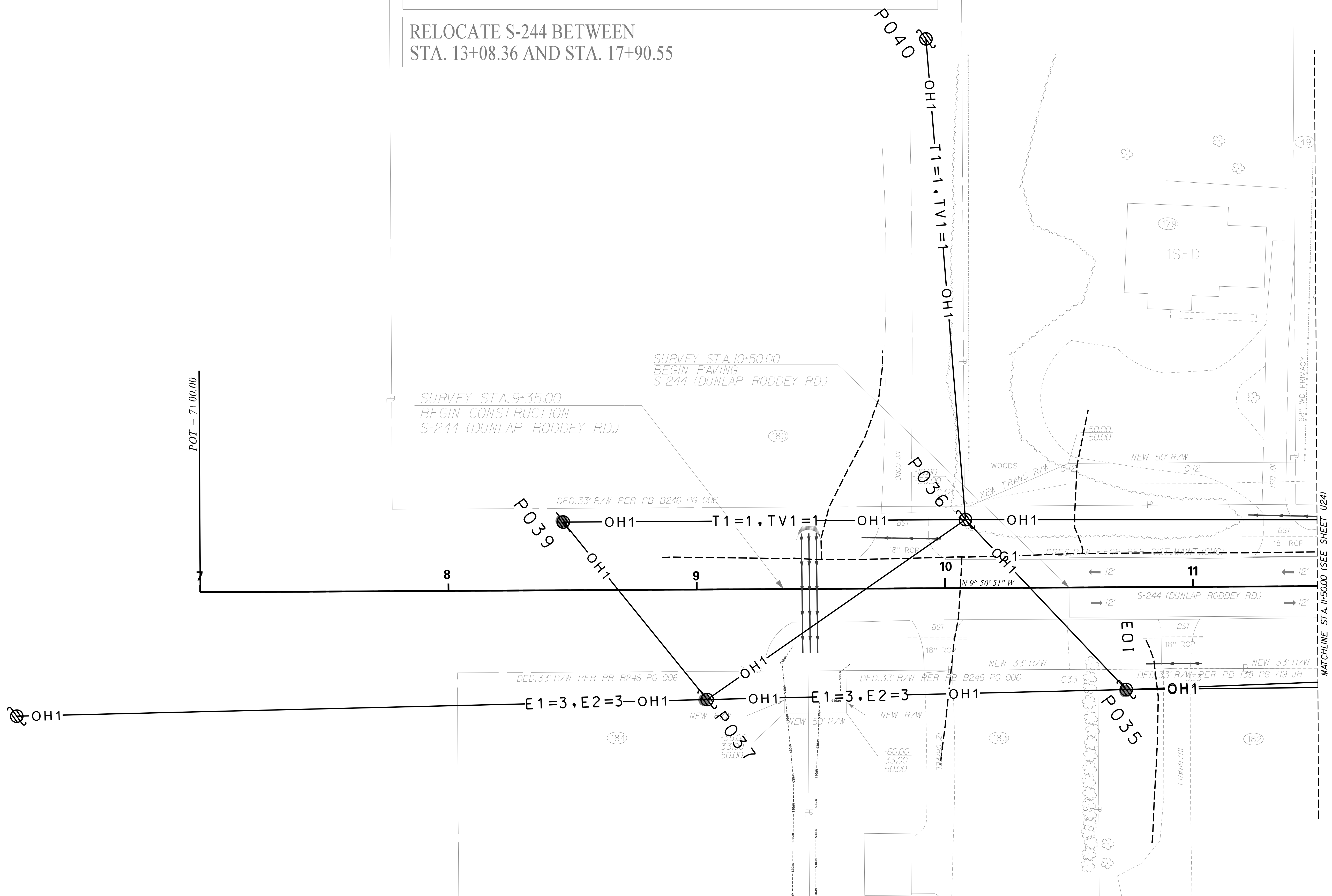
FED. RD. DIST. NO.	STATE	COUNTY	PROJ. ID NO.	ROUTE NO.	SHEET NO.
3	S.C.	YORK	P029515	SC 72	U25

RELOCATED S-244
S-244 (DUNLAP RODNEY RD.)
(DUNLAP-RODNEY RD.)

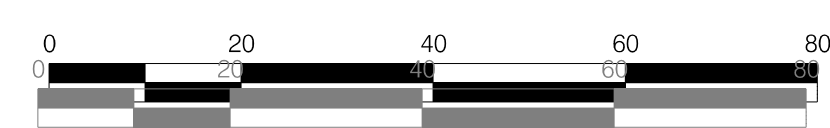


ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

RELOCATE S-244 BETWEEN
STA. 13+08.36 AND STA. 17+90.55



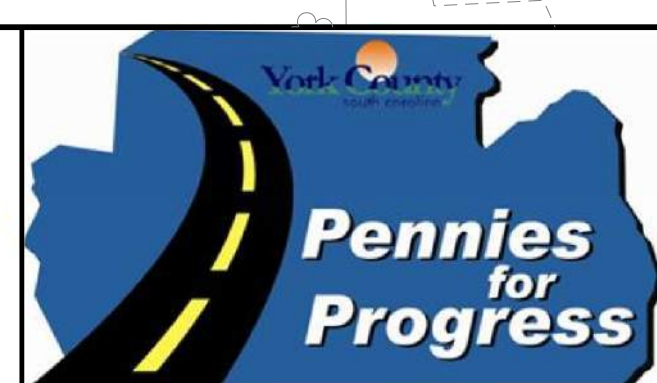
RELOCATE S-244 BETWEEN
STA. 13+08.36 AND STA. 17+90.55



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PLANS PREPARED BY
CDM Smith
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS
RELOC. S-244 PLAN
STA 11+50 TO STA 11+50
SCALE: 1"=20' SH. NO. U25

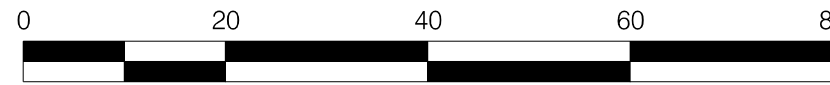
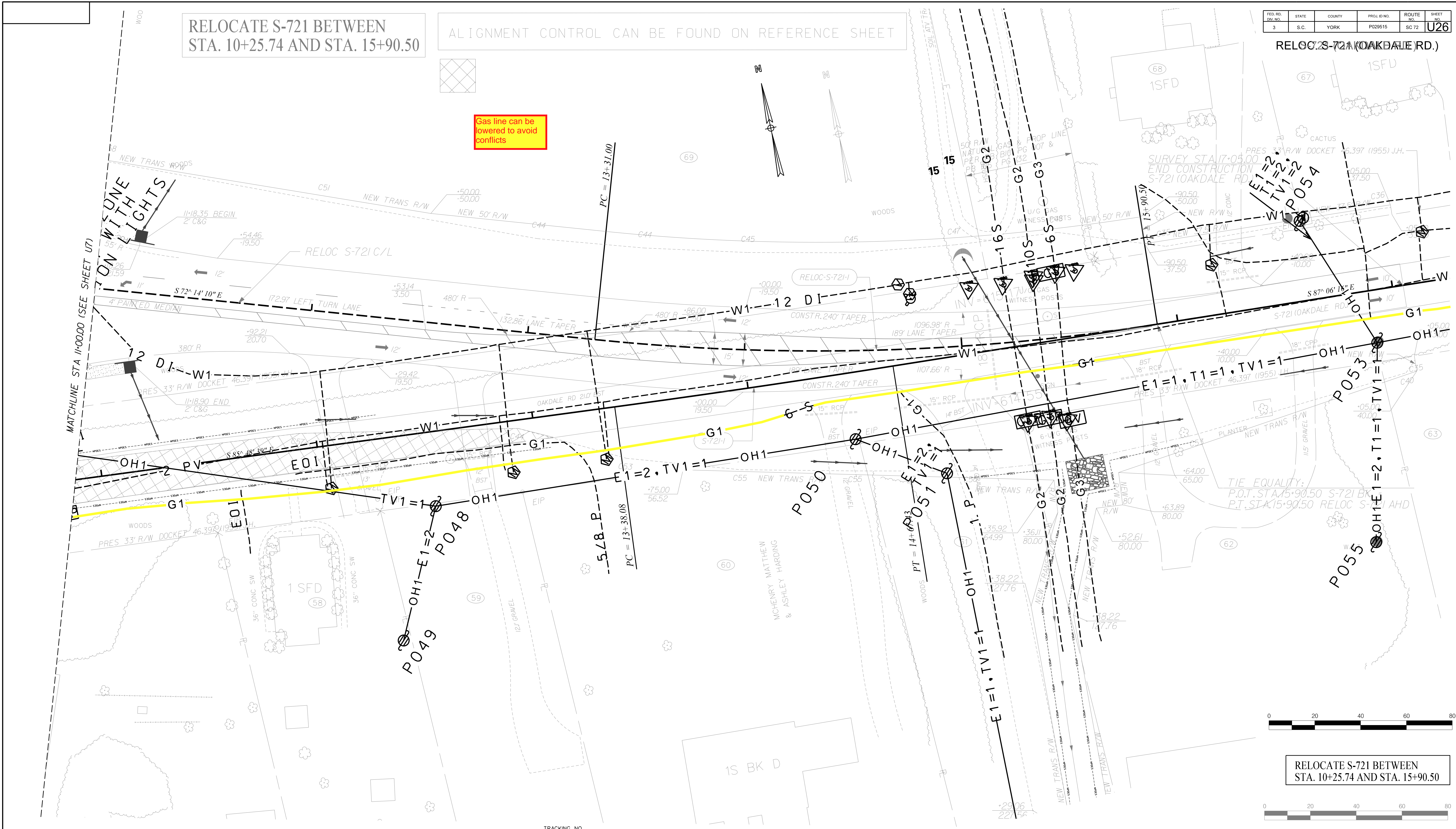
RELOCATE S-721 BETWEEN
STA. 10+25.74 AND STA. 15+90.50

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

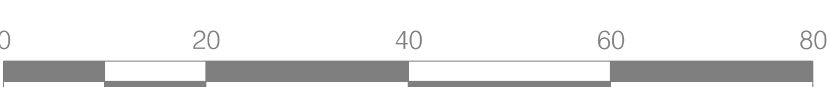
FED. RD. DIST. NO.	STATE	COUNTY	PROJ. ID NO.	ROUTE NO.	SHEET NO.
3	S.C.	YORK	P029515	SC 72	U26

RELOC. S-721 (OAKDALE RD.)

Gas line can be lowered to avoid conflicts



RELOCATE S-721 BETWEEN
STA. 10+25.74 AND STA. 15+90.50



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VERIFIED		



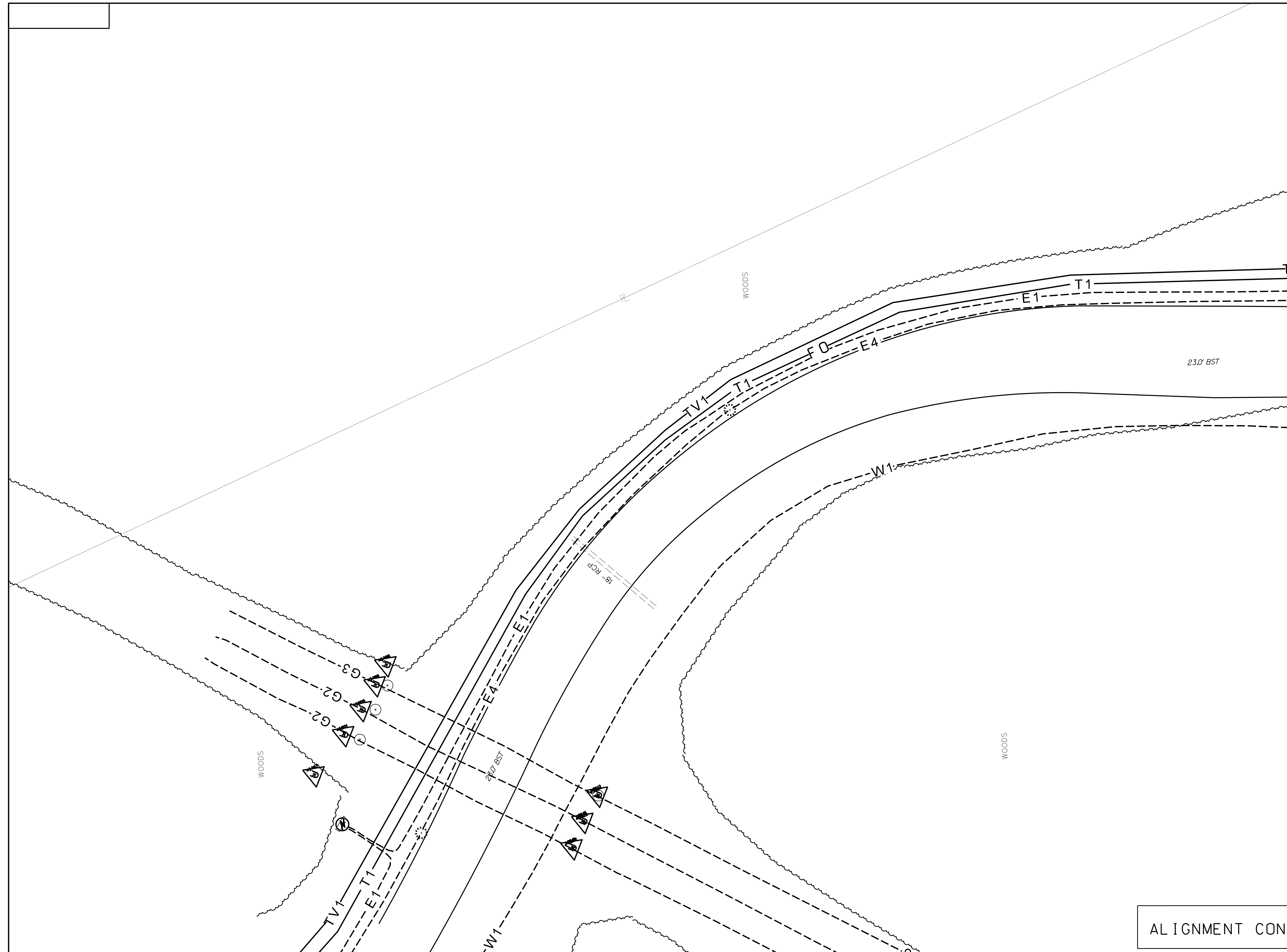
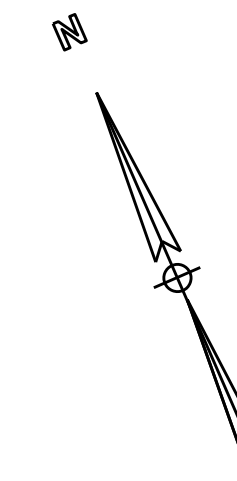
PLANS PREPARED BY
**YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS**

RELOC. S-721 PLAN
STA 12+00 TO STA 17+05

SCALE: 1"=20' SH. NO. U26

FED. RD. DIST. NO.	STATE	COUNTY	PROJ. ID NO.	ROUTE NO.	SHEET NO.
3	S.C.	YORK	P029515	SC 72	U27

MIDDLE SCHOOL RD.



MATCHLINE STA 14+50.00 (SEE SHEET U9)

23.0' BST

24.0' BST

18" RCP

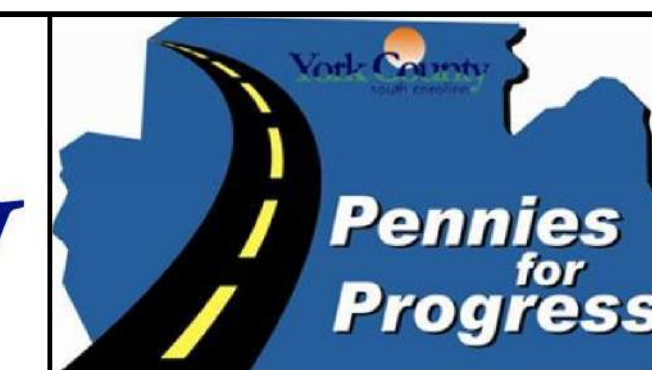
ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET



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SWANSONSA
3/7/2019

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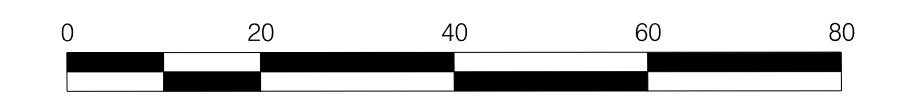
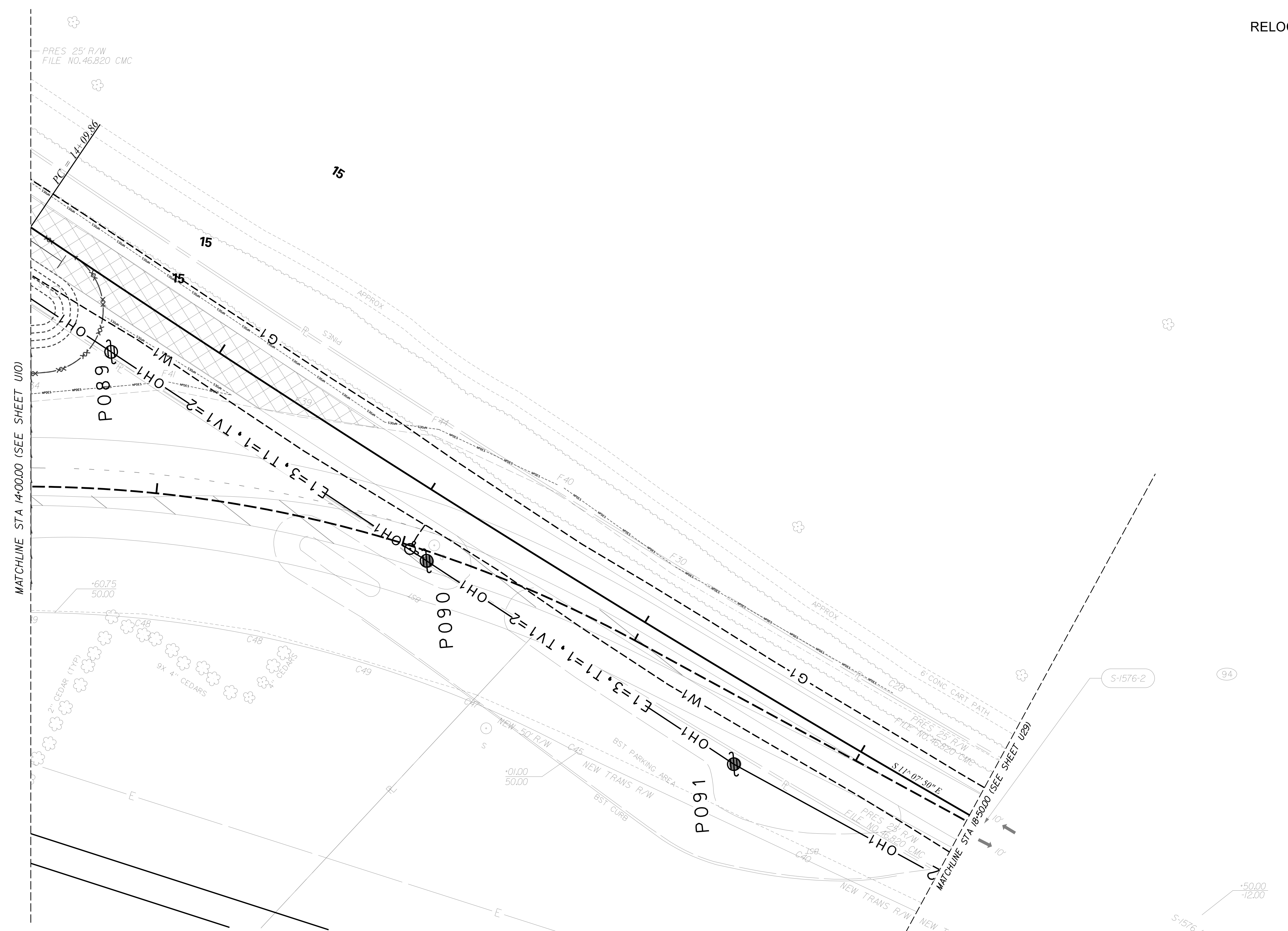
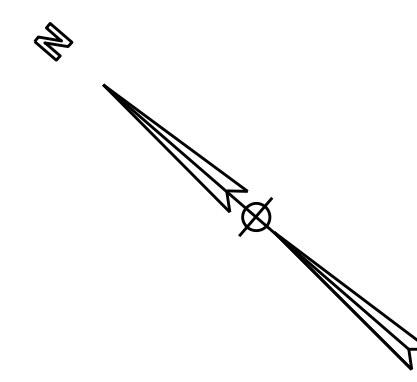
DOCUMENT REVIEW		
RESPONSIBILITY	NAME	DATE
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PLANS PREPARED BY
**YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS**
MIDDLE SCHOOL RD.
STA 10+33.91 TO STA 14+50
SCALE: 1"=20' SH. NO. U27

FED. RD. DIST. NO.	STATE	COUNTY	PROJ. ID NO.	ROUTE NO.	SHEET NO.
3	S.C.	YORK	P029515	SC 72	U28

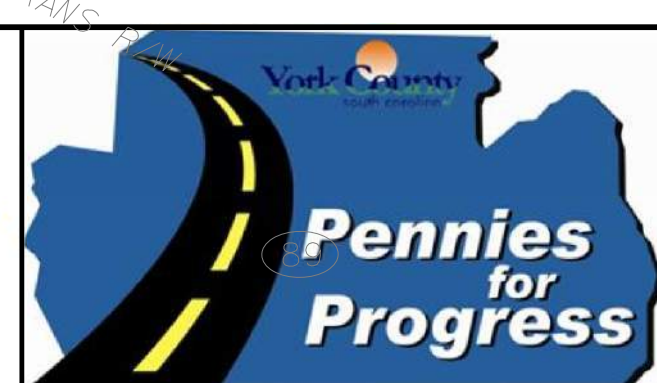
RELOCATED S-1576 (HARPER GAULT RD.)



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 SWANSONSA
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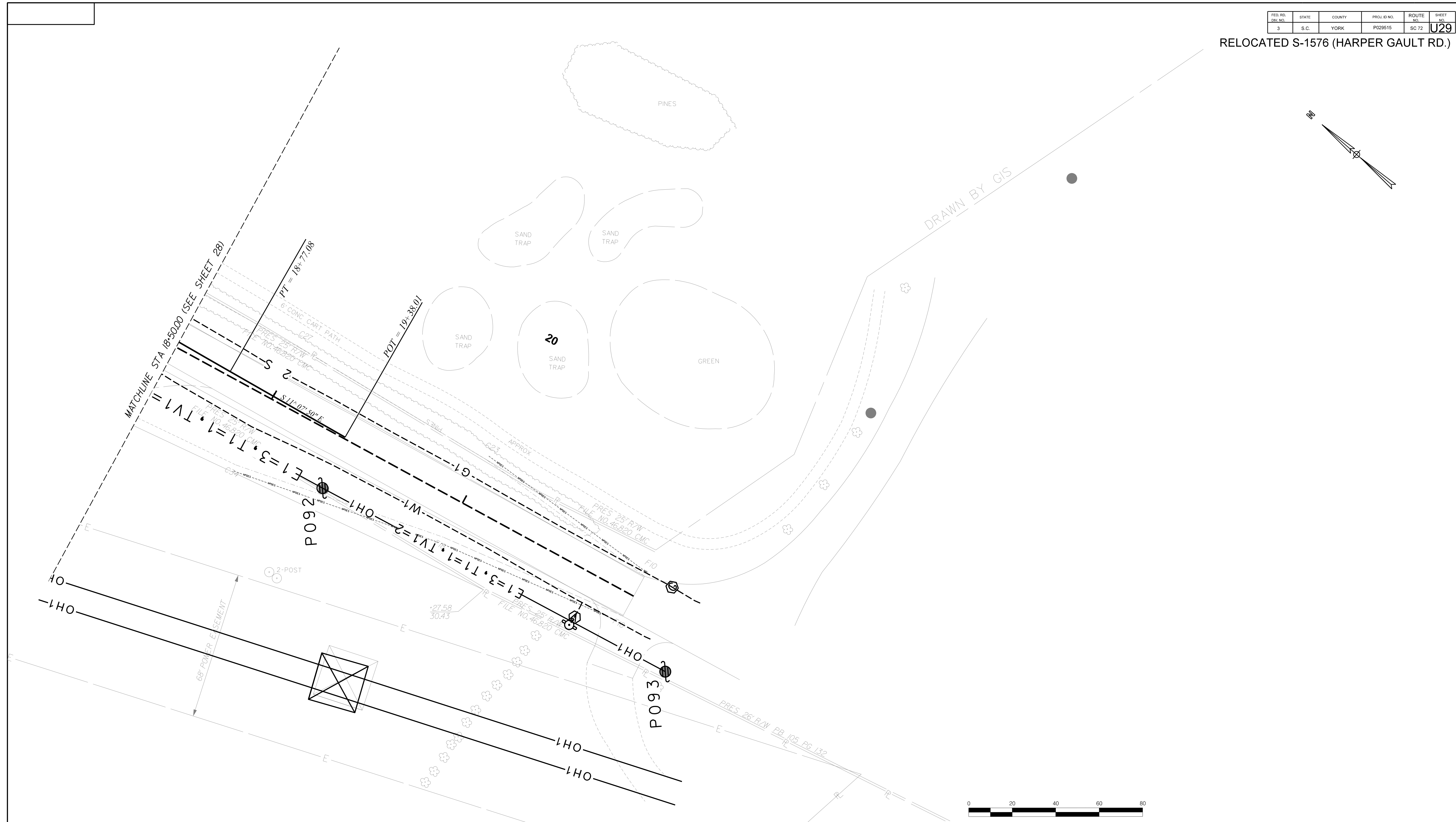
DOCUMENT REVIEW		
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PLANS PREPARED BY
 YORK COUNTY, SOUTH CAROLINA
 DEPARTMENT OF PUBLIC WORKS
 RELOC S-1576 PLAN
 STA 14+00 TO STA 18+50
 SCALE: 1" = 20' SH. NO. U28

FED. RD. DIST. NO.	STATE	COUNTY	PROJ. ID NO.	ROUTE NO.	SHEET NO.
3	S.C.	YORK	P029515	SC 72	U29

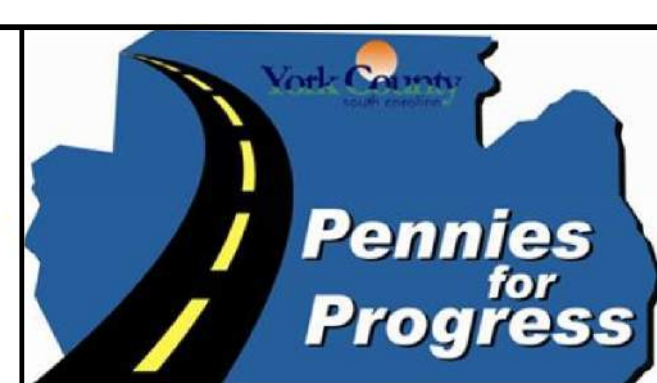
RELOCATED S-1576 (HARPER GAULT RD.)



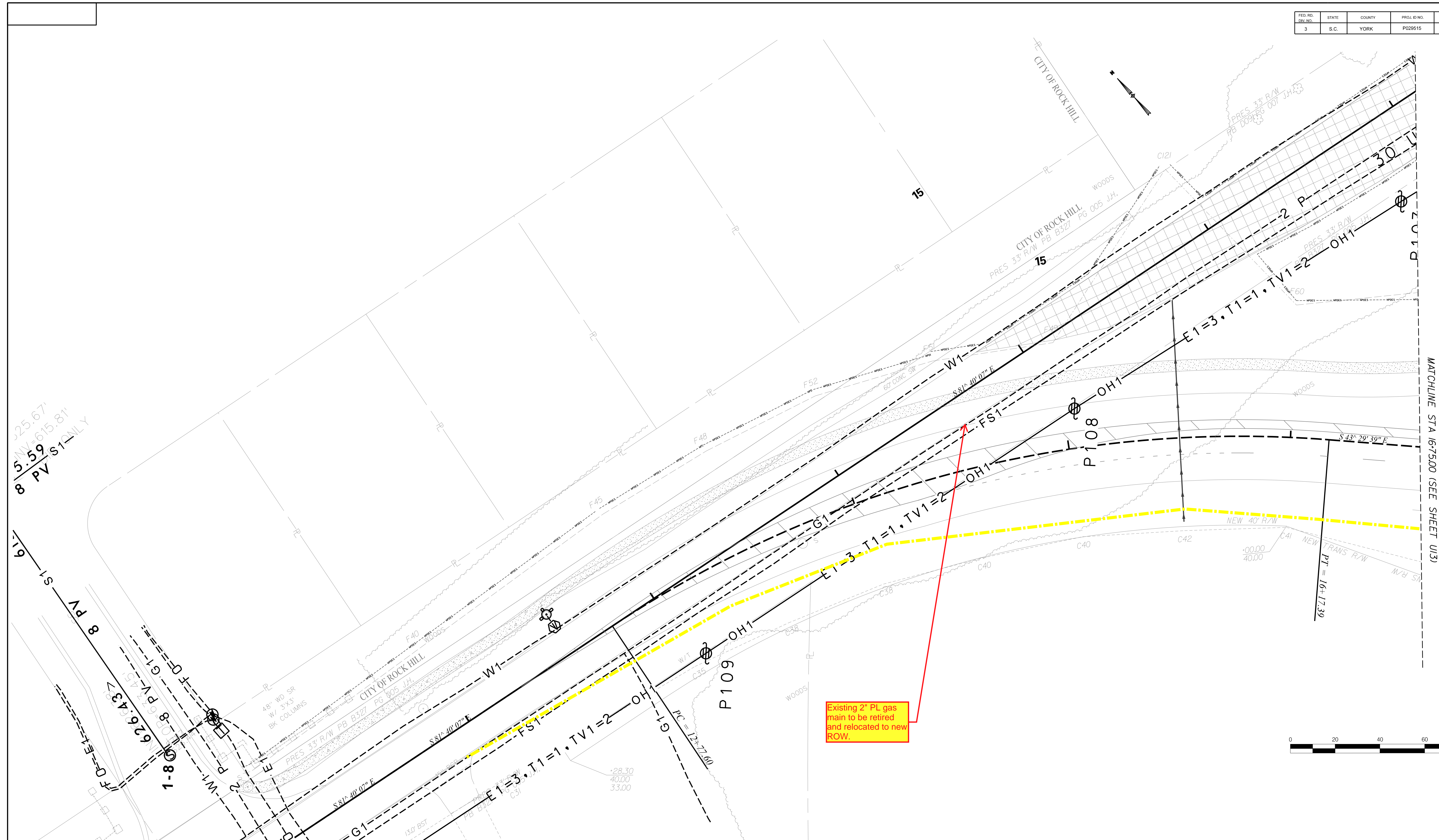
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3/7/2019

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REV. NO.	BY	CKD.	DATE	DESCRIPTION OF REVISION

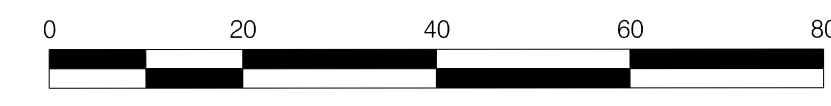
DOCUMENT REVIEW		
RESPONSIBILITY	NAME	DATE
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PLANS PREPARED BY
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS
RELOC S-1576 PLAN
STA 18+50 TO STA 20+89.68
SCALE: 1"=20' SH. NO. U29



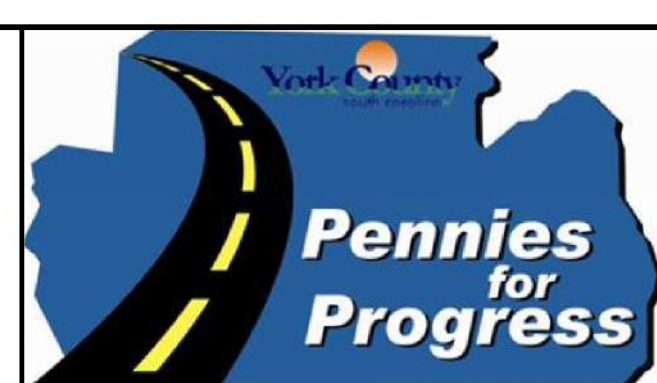
Existing 2" PL gas main to be retired and relocated to new ROW.



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3/7/2019

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VERIFIED	_____	_____



PLANS PREPARED BY
YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS
RELOC S-250 PLAN
STA 12+00.00 TO STA 16+75.00
SCALE: 1"=20' SH. NO. U30

SPECTURM (CHARTER COMMUNICATIONS)

NO CONFLICT LETTER



June 29, 2020

Mr. Richard E Culler, PE, PMP
CDM Smith
1441 Main Street, Suite 1000
Columbia, SC 29201

Re: SC-72 Road Widening
York County, SC

Dear Richard:

We have reviewed the plans you provided for the above referenced project that includes SUE data obtained within the area of the project. We can confirm that we do have utility facilities in the project area. We have further determined that none of our existing facilities are in the locations to be disturbed by construction of this project. Therefore we do not find any conflicts with the proposed construction as shown on the plans you provided and therefore no relocations are being planned.

If there are any changes to the scope of the proposed construction please contact me as quickly as possible with those changes so that we can ensure our facilities are protected.

If you have any further questions, please contact me.

Sincerely,

A handwritten signature in black ink that reads "Jason Paysour". The signature is written in a cursive, flowing style.

Jason Paysour
Construction Supervisor
704-671-6139

DUKE ENERGY

**USE GUIDELINES FOR ENCROACHMENTS
INVOLVING TRANSMISSION EASEMENTS**



Duke Energy Corporation
1900 North Main Street
Mount Holly, NC 28201
704-812-2316
stephen.lord@duke-energy.com

July 27, 2020

Richard Culler, PE, PMP
CDM Smith
1441 Main St, Ste 1000
Columbia, SC 29201
cullerre@cdmsmith.com

Re: Duke Energy Transmission Line Easement Plan Review Conditional Approval
Project: York County SC-72 Saluda Road and S-1576 - Pennies for Progress Relocate
Line: 1N2723 64.0-65.0

Dear Richard,

This office has reviewed the proposed York County SC-72 Saluda Road and S-1576 - Pennies for Progress Relocate in York County SC (as attached) and referred to herein as Attachment "A". We find the plans as shown on the referenced drawings to be acceptable and in compliance with the attached Use Guidelines for Encroachments involving Transmission Easements. Therefore, Duke Energy Transmission ("DET") approves the referenced plans, insofar as its transmission easement rights are concerned, subject to the conditions detailed below. If this project construction has not commenced by a period of 12 months from the date of this letter, this approval by DET shall expire, and an additional plan review will be required by DET at that time.

In summary, the following details Duke Energy comments:

- Notwithstanding our review of your development plans, we are not providing a comment on present or future vegetation plantings. However, please be apprised that to ensure safe and reliable service and to maintain the ability to safely access its easement, Duke Energy relies on clear easement areas to provide open spaces for the staging of large equipment. Therefore, Duke Energy has and continues to manage vegetation within or outside of the easement and retains the rights afforded to it in its underlying easement documents, including to remove vegetation that has the potential to or does cause an interference with its easement rights.
- No stockpiling or storage of materials, dirt, or equipment of any kind is permitted within the DET easement area, nor may any combustible materials be placed within the easement area.
- Contractors operating any and all equipment should be instructed not to operate within 25' of the poles, towers, or other electrical structures including guy anchors. All slopes shall be 4:1 or less. No spoil dirt is to be placed within the easement limits unless previously approved by DET.
- Any proposed easements must not cross closer than 25' to DET's electrical structures including, but not limited to poles, towers, and guy anchors.
- All underground facilities, such as, but not limited to, storm water pipes and domestic water line pipes, must be capable of a heavy equipment load bearing weight of 80,000 lbs. DET will not be responsible for damages to these installed facilities. Additionally, Irrigation systems and signs are not permitted in the easement area.
- All plats, plans, renderings and representations of lots, parcels, designated spaces and/or designated areas having and including area within a DET easement cannot represent, with setbacks or other means, buildable areas(s) within a DET easement.

- Underground Utilities with cathodic protection will require a study of anodic interference on existing DET structures. The developer / owner is responsible for any required remediation as determined by DET. This study shall be provided at no cost to DET for their review and acceptance before a Final Approval shall be issued by DET. This study must be submitted to DET prior to the commissioning of the Underground Utilities.
- Any damage to the transmission line or its associated structures, related to this project, and/or claims due to the damage, is the responsibility of the developer/owner.
- This approval by DET is subject to the paramount right of DET at all times to make use of its entire easement area for the construction, maintenance, reconstruction, and operation of electric lines.
- This letter only addresses issues related to the DET's transmission line easement. Additional easements, approvals, or permits from the underlying property owner(s) or other applicable agencies may be required for you to proceed with this project.

DET also offers these additional comments to ensure that other potential conflicts are not created during or after construction: We have not reviewed, and therefore have not approved, any plans other than Attachment "A".

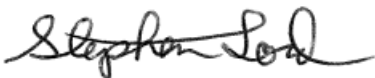
- If there are design changes to any drawings that involve the transmission easements, DET must review the changes for compliance with the Use Guidelines for Encroachments involving Transmission Easements.
- Proper clearances must be maintained at all times. If any transmission line modification by DET is required to maintain proper clearances, the cost will be the responsibility of the developer/owner. Any such line modifications must be approved and scheduled, through DET well in advance of the project start date.
- To avoid obstructions and interferences all current and future property owners should adhere to the most current version of the DET Use Guidelines for Encroachments involving Transmission Easements.
- DET heavy equipment access must not be restricted during this project due to grading or other activity.
- Please contact me prior to the start of this project to attend any pre-construction meetings.

In not objecting to the use of the transmission easement for use as shown on the drawings, DET is not relinquishing the right to control and maintain the transmission easement as specified in the recorded agreements. Any damages to the transmission lines or its associated structures, and claims caused by the damage, is the responsibility of the developer/contractor. It is the responsibility of the contractors/owners to ensure that all work performed in the proximity of the transmission lines complies with all applicable laws and regulations, including but not limited to the National Electric Safety Code ("**NESC**"), the Overhead High-Voltage Line Safety Act ("**OHVLSA**"), and the Occupational Safety and Health Act ("**OSHA**"), and that all persons working near the electric power lines are made aware of the inherent safety hazards associated with these lines.

Please note that this approval is based in part on the accuracy of the information you have supplied on the plans (Attachment "A"). You are responsible for indicating the correct location of the DET easement and its associated electrical structures along with the correct width of the DET easement limits.

Thank you for your cooperation. If you have any questions, please feel free to contact me at 704.821.2316.

Sincerely,



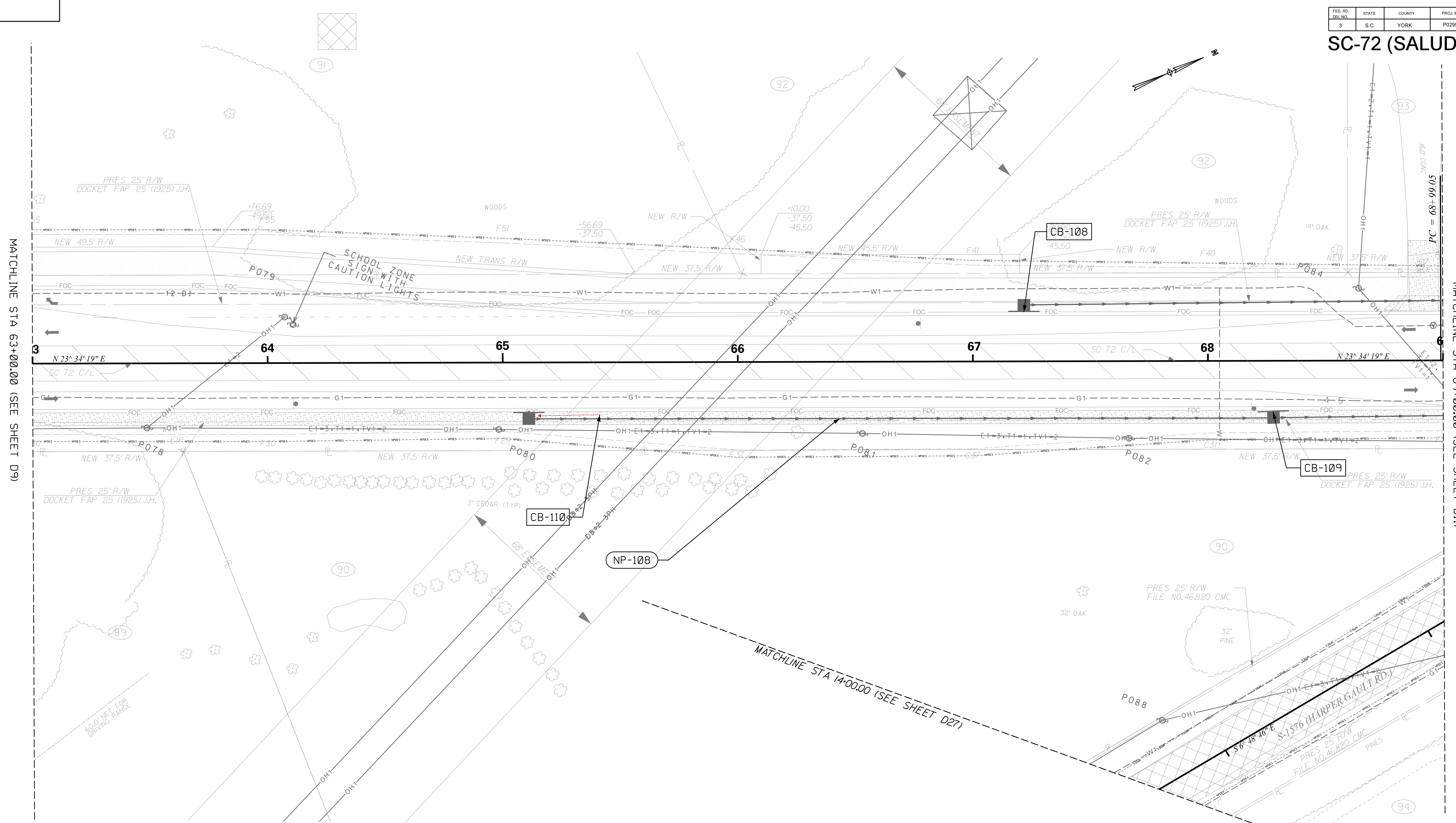
Stephen Lord
 Asset Protection Specialist
 Transmission Right of Way

Attachments: Attachment "A" - Site Plans
 Duke Energy Transmission Easement Use Guidelines
 Duke Energy "Look Up & Live" Brochure

Attachment "A"

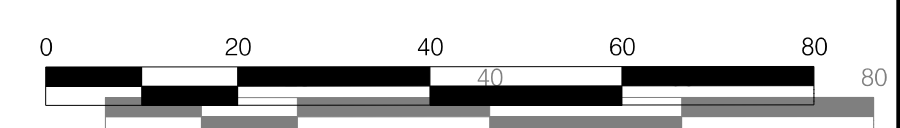
FED. RD. DIST. NO.	STATE	COUNTY	PROJ. ID NO.	ROUTE NO.	SHEET NO.
3	S.C.	YORK	P029515	SC 72	D10

SC-72 (SALUDA RD.)



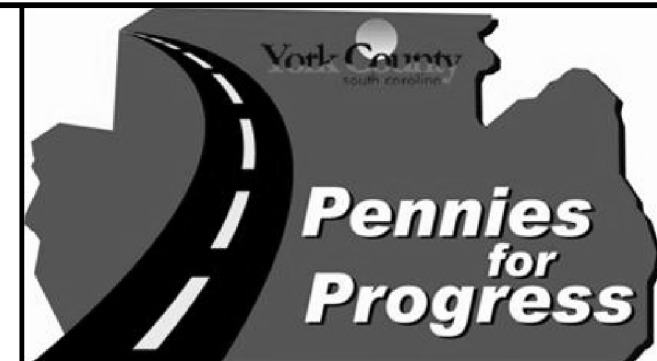
RELOCATE SC 72 BETWEEN
STA. 68+99.05 AND STA. 132+15.33

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET



...:\Plans\726.SH.D10.dgn
SWANSONSA
6/30/2020

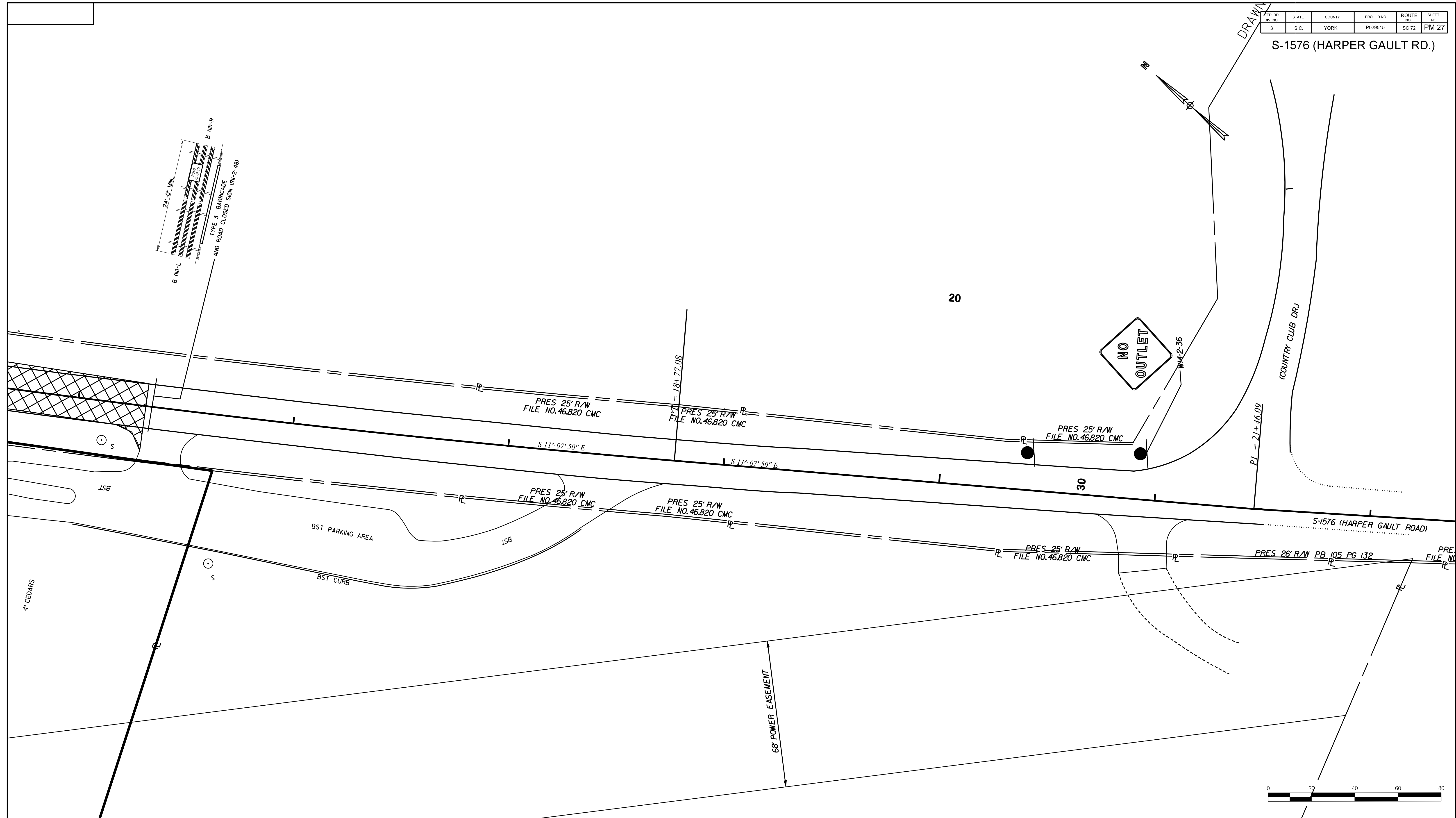
REVISIONS:				
REV. NO.	BY	CKD.	DATE	DESCRIPTION OF REVISION
ROW 7	SAS	CMC	1-15-2020	REMOVED RELOC S-1576 (HARPER GAULT RD)



PLANS PREPARED BY
**YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS**
SC 72 DRAINAGE PLAN
STA 63+00 TO STA 69+00
SCALE: 1" = 20'
SH. NO. D10

REV. NO.	STATE	COUNTY	PROJ. ID NO.	ROUTE	SHEET
3	S.C.	YORK	P029515	SC 72	PM 27

S-1576 (HARPER GAULT RD.)



REVISIONS:				
REV. NO.	BY	CKD.	DATE	DESCRIPTION OF REVISION

DOCUMENT REVIEW		
RESPONSIBILITY	NAME	DATE
ORIGINATOR	_____	_____
CHECKED	_____	_____
REVISED	_____	_____
VERIFIED	_____	_____



PLANS PREPARED BY
YORK COUNTY, SOUTH CAROLINA
 DEPARTMENT OF PUBLIC WORKS
 S-1576
 PAVEMENT MARKING & SIGNING
 PLAN STA 18+50 TO STA 20+89.68
 SCALE: 1"=20' SH. NO. PM 27

USE GUIDELINES FOR ENCROACHMENTS INVOLVING TRANSMISSION EASEMENTS

Duke Energy has a property interest called an easement (or sometimes a right-of-way) in land that you own or are considering purchasing. This easement grants Duke Energy the right to use the easement area for purposes described in the easement document that is filed and recorded in the county's recorder office. This property interest stays with the land when it is bought and sold and generally is perpetual in duration. A series of easements often form a corridor in which the transmission facilities are located and access up and down the corridor is part of the reason Duke Energy obtains these rights.

Broadly stated, easements allow Duke Energy to use another person's property to construct, operate, maintain, repair, and replace electrical facilities for the transmission of high voltage power. The landowner may continue to use the easement area so long as the use is not inconsistent with the easement document or Duke Energy's use of the easement. Any incompatible use by the landowner is called an encroachment. Where an encroachment is under construction, Duke Energy will request that it be stopped and removed; where an encroachment is already installed, Duke Energy will request that it be removed. Where a landowner fails to cooperate, Duke Energy will seek legal recourse to remove the encroachment.

Electricity is a public service and subject to state and federal regulations with which Duke Energy must comply. Any use by the landowner that does or could create regulatory issues is an encroachment. Power lines in the transmission easement are uninsulated and electricity is a dangerous instrumentality. Any landowner use that increases the danger to the landowner, the public or Duke Energy in its use of the easement is also an encroachment.

Over years of designing, constructing, operating, repairing, upgrading and maintaining electric facilities in transmission easements, Duke Energy has developed an understanding of the types of uses by landowners that do, or potentially can, interfere with the easement's purposes and Duke Energy's ability to provide safe and reliable service. This guidance, which supersedes all prior versions, provides a brief overview of types of things that do, or can, interfere with Duke Energy's easement rights and thereby create encroachments.

This overview cannot address all possible situations and is intended to provide general guidance. Please contact the Asset Protection Specialist if you have additional questions or concerns about the use of the easements. Please discuss any proposed activity in the transmission easements with Duke Energy to avoid creating an encroachment or interference. The Asset Protection Specialist can assist and help avoid a subsequent need by the landowner to revise plans or remove obstructions from the easements. Engineering plans may be required by Duke Energy to fully understand any proposed use by the landowner.

By providing these guidelines, Duke Energy does not waive any rights it has in its easements or under the law. Duke Energy's concurrence that a proposed use does not constitute an interference with its easement rights does not mean that requirements of local, county, state or federal governments or other agencies with governing authority have been met.

The following are not permitted in Duke Energy's transmission easements as they interfere with Duke Energy's use of the easements for transmission of electricity by, among other things, interfering with full use the easement, interfering with existing facilities, interfering with access to the facilities, interfering with future expansion in the easement, increasing the danger to the public or those who may be required to work in the easement, creating regulatory violations and generally, making the transmission of electricity more dangerous, costly and/or unreliable: Examples include but are not limited to:

- Permanent or temporary structures and buildings, including for example, permanent or manufactured/mobile homes (and home additions and extensions), garages, sheds, satellite systems, intersections, cul-de-sacs, entrances, streets, swimming pools (any associated equipment and decking), playground equipment, graves, billboards, dumpsters, signs, wells, deer stands, retaining walls, septic systems or tanks (whether above or below ground).
- Mounding or stockpiling any material, such as spoils, dirt, logs, construction or building material, wrecked or disabled vehicles, (e.g. may create clearance and access issues and/or increases dangers in using the easement).
- Transformers, telephone/cable pedestals and associated equipment (unless specifically addressed in a joint use agreement), fire hydrants, manholes, water valves, water meters, backflow preventers & irrigation heads, (e.g. may increase the likelihood of safety hazards & access issues).

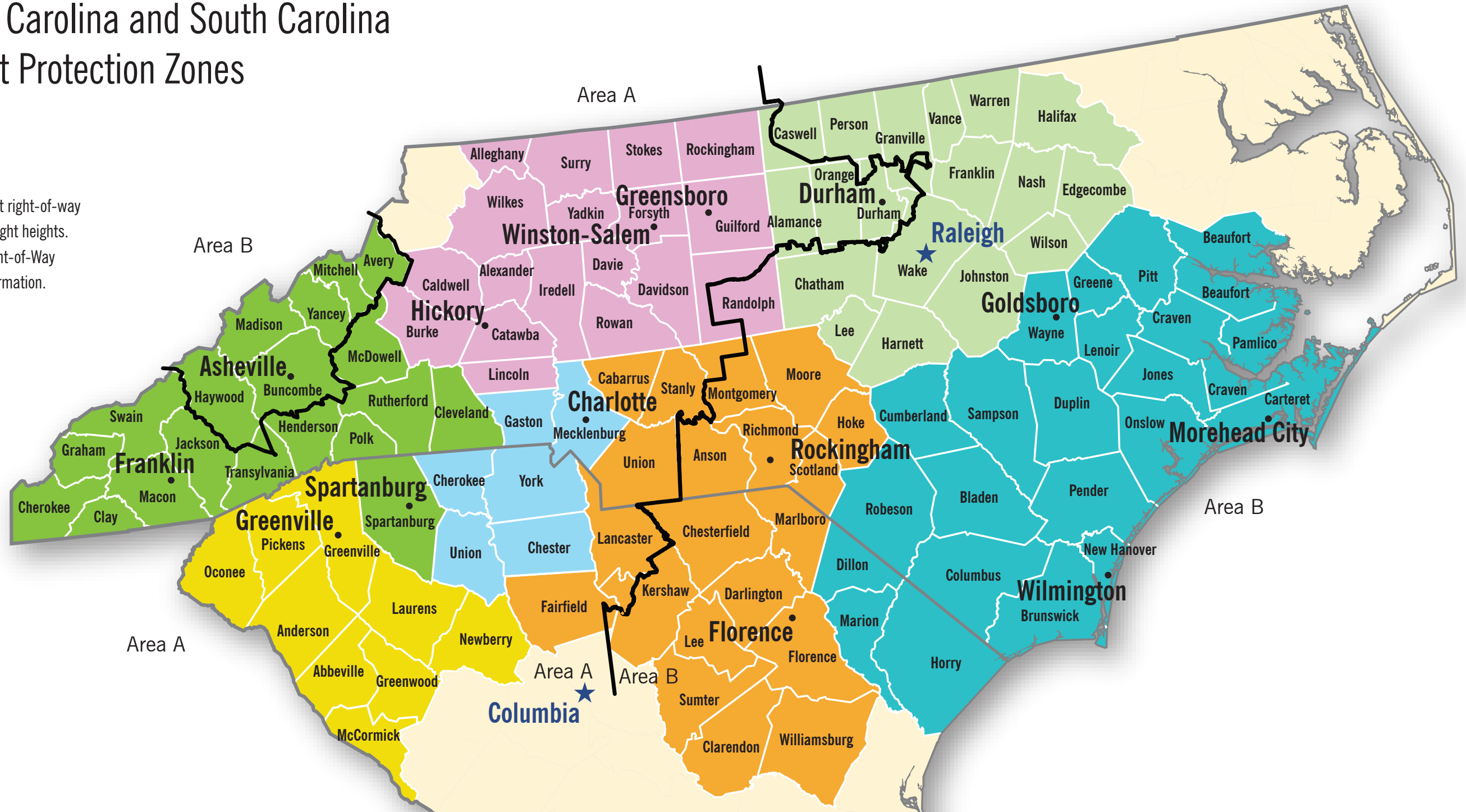
- Attachments to Duke Energy structures in the easement; (unless specifically addressed in a joint use agreement).
- Streets, roads, driveways, sewer/water lines, other utility lines or any underground facilities that run in parallel to the centerline in the easement or cross in one contiguous segment from outside edge of easement to opposing outside edge of easement, at any angle that is less than 30 degrees or greater than 90 degrees as measured from the centerline. No portion of such facility shall be located within 25 feet of Duke Energy's facilities (unless specifically addressed in a joint use agreement.)
- Fences or utilities that cross the easement in multiple segments in a non-continuous alignment from outside edge of easement to opposing outside edge of easement at any angle of less than 30 degrees or greater than 90 degrees as measured from the centerline. This generally creates an interference as the ability to access and utilize the full easement and reach facilities in the easement is substantially impaired. If a fence crosses the easement at an angle greater than or equal to 30 degrees and less than or equal to 90 degrees with the centerline, a gate (16 feet wide at each crossing) shall be installed by the landowner, per Duke Energy's specifications. Duke Energy will supply a lock. The landowner is required to install the Duke Energy lock on the gate to ensure access. The lock can be interlocked with the landowner's lock. Fences and gates that exceed 10 feet in height are prohibited because they create a clearance issue and are an interference. Fences that inhibit Duke Energy's access because they lack a gate that is at least 16 feet wide, interfere with Duke Energy's easement use.
- Grading (cuts or fill) in the easement that is closer than 25 feet to transmission facilities i.e. poles, towers, guys and anchors and/or slopes greater than 4:1 no matter where located or that otherwise change clearances or topography.
- Parking or lighting facilities which affect clearances, access or Duke Energy's ability to make full use of its easement.
- Placement of combustible materials and/or the purposeful burning of anything within the easement are inconsistent with electric facilities, the transmission of power and create safety hazards and system reliability issues.
- Any water feature in the easement, such as a detention and retention pond, stream or lake. Where a structure outside the easement causes erosion or directs storm water toward the easement or the electric facilities or access to or around the electric facilities, such structure will interfere with Duke Energy's use and must be altered to eliminate that effect.
- Incompatible vegetation above ground transmission lines - Vegetation within or outside of the transmission easement that will mature to a height or size that will pose a grow-in, fall-in, or blowing-together threat to the transmission conductor (typical maximum mature height greater than 15 feet within the transmission easement depending on location and voltage).
- Incompatible vegetation underground transmission lines - Vegetation within or outside of the transmission easement that is capable of posing a threat (e.g., root systems, etc.) to the underground transmission conductor by a) causing damage to the underground pipes / cables or b) reducing the moisture in the soil, thus altering the thermal properties of the surrounding soil / backfill and thereby negatively impacting the cable ampacity rating (typical maximum mature height within the easement - greater than 3 feet depending on location and voltage).
- Incompatible vegetation for safe and reliable operation and access on all transmission lines - Vegetation that will limit or block access, limit the safe and reliable operation, emergency restoration, or maintenance of the transmission facilities, limit the full use of the transmission easement for its intended purposes or vegetation which is typically within a horizontal distance of 25 feet of any Duke Energy facilities (towers, poles, guy wires, guy anchors, manholes, dip-poles, substation equipment, etc.).

As discussed, these guidelines are not exhaustive and there may be other interferences on a case-by-case basis depending on individual circumstances. Certain conditions such as line voltage, line criticality, frequency of required access and structure type may require heightened restrictions in the easements to provide safe and reliable service.

If you have additional questions or plan any activity not mentioned above, please contact customer service and ask for your local Transmission Asset Protection Specialist.

Duke Energy North Carolina and South Carolina Transmission Asset Protection Zones

Area A and Area B have different right-of-way restrictions related to tree and light heights. Please refer to the attached Right-of-Way Restrictions Guide for more information.



— Area divider

Asset Protection Right-of-Way Specialist Zones

- | | | | |
|---|---|---|---|
| <p> Zone 1 – Craig Garrett 828.258.5018
craig.garrett@duke-energy.com</p> <p> Zone 2 – Johnny Wagner 864.234.4382
jonathan.wagner@duke-energy.com</p> | <p> Zone 3 – Stephen Lord 704.812.2316
stephen.lord@duke-energy.com</p> <p> Zone 4 – Ethan Pardue 336.526.2524
ethan.pardue@duke-energy.com</p> | <p> Zone 5 – Lorick Fanning 910.944.5249
lorick.fanning@duke-energy.com</p> <p> Zone 6 – Bill Wilder 910.772.4903
bill.wilder@duke-energy.com</p> | <p> Zone 7 – Bruce Pait 919.431.4831
bruce.pait@duke-energy.com</p> |
|---|---|---|---|

Legend – updated 12/17/19





Your safety is our priority

We have a goal at Duke Energy – to eliminate injury and death from needless power line contacts. We want to provide you with the information you need to stay safe at work.

Important OSHA minimum approach regulation

The following table is from OSHA 1910.333 and applies to nonqualified persons working in proximity to energized power lines. The minimum approach distance is to be maintained for nonqualified workers. When using equipment classified as a crane or derrick, OSHA 29 CFR 1926.1407-1411 must be followed.

OSHA - 1910.333 Applies to NonQualified Persons Minimum Approach Distance	
Up to 50 kV	10 Feet
50 kV up to 200 kV	15 Feet
200 kV up to 350	20 Feet
350 to 500 kV	25 Feet
500 kV to 750 kV	35 Feet

Important OSHA crane regulation

Cranes and derricks near transmission power lines – OSHA 29 CFR 1926.1407-1411

This regulation applies to power-operated equipment used in construction that can hoist, lower and horizontally move a suspended load. Such equipment includes, but is not limited to:

If any part of equipment, load line or load could get closer than 20 feet to less than 350 kV power lines or 50 feet for greater than 350 kV power lines, you must speak with a Duke Energy representative before beginning work.

Such equipment includes, but is not limited to:

- Articulating cranes (such as knuckle boom cranes)
- Floating cranes
- Locomotive cranes
- Multipurpose machines when configured to hoist and lower (by means of a winch or hook) and horizontally move a suspended load
- Industrial cranes (such as carry deck cranes)
- Pedestal cranes
- Straddle cranes
- Derricks
- Overhead bridge and gantry cranes NOT permanently installed
- Crawler cranes
- Cranes on barges
- Side boom tractors
- Base-mounted drum hoists only when used with derricks
- Tower cranes
- Portal cranes
- Service/mechanic trucks with a hoisting device
- Dedicated pile drivers
- Mobile cranes (such as wheel-mounted, rough-terrain, all-terrain, commercial truck-mounted and boom truck cranes)
- Variations of these types of equipment



Look up and live.

Working around high-voltage transmission lines



Know how to protect yourself, your crew and the public when working around transmission lines.

Contact us

For more information, please visit duke-energy.com/safety or call:

Duke Energy Carolinas
800.777.9898 or 800.POWERON

Duke Energy Indiana
800.521.2232

Duke Energy Kentucky or Ohio
800.544.6900

Duke Energy Progress
800.452.2777

Duke Energy Florida
800.700.8744

Duke Energy cares about your safety. This brochure contains important information for:

- Anyone working around power lines
- Grading contractors
- Forklift operators
- Crane operators
- Developers (residential, commercial, industrial)
- Architects and engineers
- Dump truck operators

550 South Tryon Street
Charlotte, NC 28202



www.duke-energy.com

Printed on 10% post-consumer recycled stock.
©2014 Duke Energy Corporation 130695 8/14

Know your voltage, know your clearance

A planned project is a safe project

Federal law requires that all contractors maintain at least a 10-foot clearance from overhead power lines up to 50 kV. Greater clearance is required for higher-voltage power lines and cranes and derricks in construction.

Contact Duke Energy at least three working days before you start working near overhead power lines and equipment so that safety recommendations can be made.

Treat all transmission lines, regardless of their operating voltage, with caution:

- 44 kV and 100 kV lines look similar.
- Never assume a voltage based on the illustration.
- Minimum clearance includes maximum sag, which must be calculated for each instance.
- Injury or death can occur without touching power lines.
- Assume all overhead power lines are energized.
- Contact Duke Energy if you are in doubt about safe operating distances.

Fact 1.

Power lines that serve your homes and businesses are not insulated like home appliance cords.

Fact 2.

Power lines carry 4,000 to 500,000 volts of electricity that can seriously injure or kill on contact.

Fact 3.

The simplest way to stay safe is to know where your power lines are located and stay away.

Check the job site for hazards and know the location of all overhead power lines and electric equipment, including poles and guy wires.

Consider all overhead lines as energized. Mark the work site boundaries to keep workers, vehicles, tools and equipment a safe distance from electric lines and equipment.

Hold a pre-work safety meeting, pointing out areas where overhead lines and electric equipment are located.

We can help you:

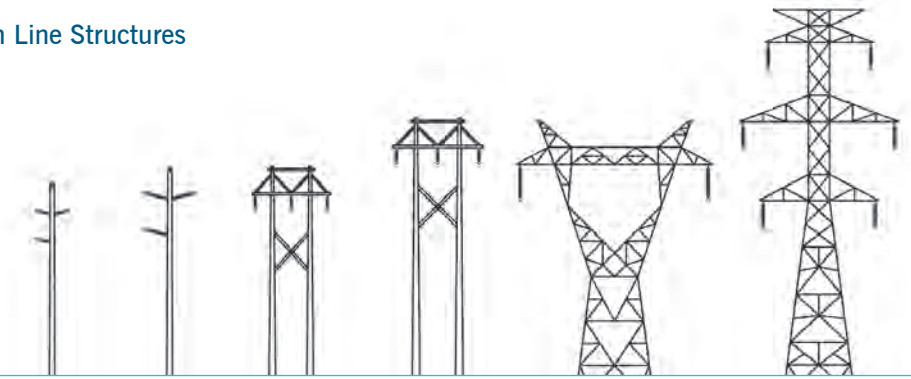
- Confirm voltage
- Confirm clearance
- Confirm wire height under peak conditions
- Provide safety guidance around power lines
- Review and approve drawings for:
 - Compliance with right-of-way restrictions
 - Compliance to National Electric Safety Code
- Identify the best, safe solution

Emergency situations

If your equipment makes contact with an overhead power line, notify Duke Energy immediately and take these precautions:

- Have someone call 911.
- Do not attempt to turn off engines or generators.
- Move equipment away from the line only if it is safe to do so.
- Remain on equipment until utility workers arrive and de-energize the line.
- Warn others to stay away. Those on the ground can be injured or killed if they make contact with the equipment.
- If you must leave the equipment because of fire or other dangers, jump off with your feet together. Never touch the ground and equipment at the same time. Keeping your feet together, shuffle or hop away until you are clear of the area.

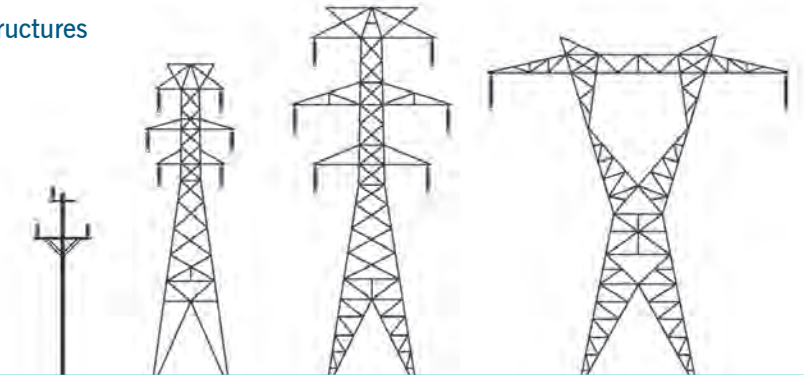
Duke Energy Midwest Transmission Line Structures



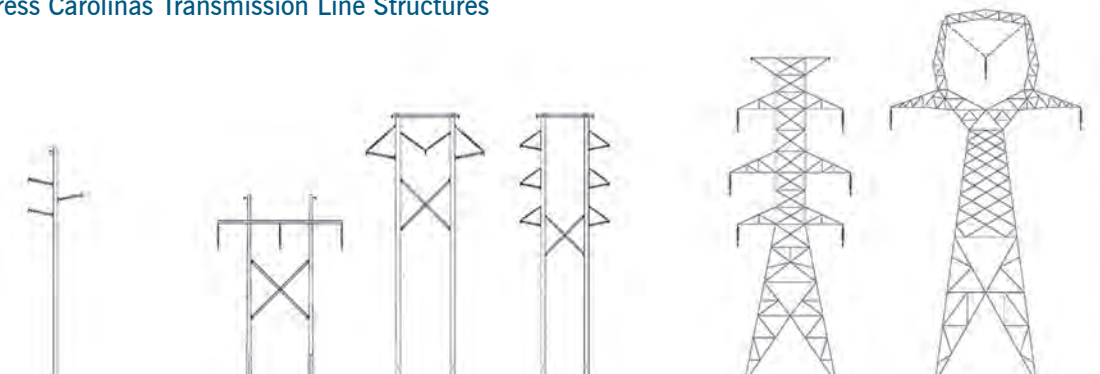
Duke Energy Florida Transmission Line Structures



Duke Energy Carolinas Transmission Line Structures



Duke Energy Progress Carolinas Transmission Line Structures



For more information, visit duke-energy.com/safety.

BERKSHIRE HATHAWAY ENERGY

NO CONFLICT LETTER

PENDING

CRESTWOOD EQUITY PARTNERS LP
SALUDA RD AND OAKDALE ROAD CROSSINGS
AND TEST HOLE DATA

**PROJECT REPORT
CATHODIC PROTECTION SYSTEM
RELOCATE TEST STATIONS
CRESTWOOD LP
TIRZAH LPG PIPELINE
YORK, SOUTH CAROLINA**

PREPARED FOR:

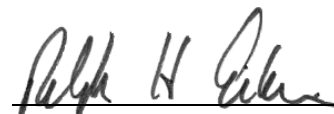
CRESTWOOD LP
2470 OLD YORK ROAD
YORK, SOUTH CAROLINA 29745
MR. SHAWN MARION, Area Supervisor

PREPARED BY:



CORROSION CONTROL INCORPORATED
494 FAIRPLAY STREET
RUTLEDGE, GEORGIA 30663
(706) 557-9624

SEPTEMBER 2023



Ralph Eichlin
NACE CP Specialist #7509

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SECTION VIII	POST INSTALLATION DATA
SECTION IX	SHOP DRAWINGS

SECTION I
PROJECT SUMMARY

PROJECT SUMMARY

CORROSION CONTROL INCORPORATED (CCI) has been retained by Crestwood LP to supply cathodic protection to relocate two test stations on the Tirzah liquid propane pipeline. The subject pipeline conveys liquefied petroleum gas (LP) in a nominal 6-inch diameter pipeline from the Bethune valve station to the Tirzah Terminal. The tasks completed, and a brief description of each, are listed in Section II of this submittal.

The SCDOT and York County recently started a project to widen Oakdale Road and Saluda Road. The widening required existing test stations be repositioned so there would be no conflict with land grading or the new paved surfaces.

Crestwood LP retained CCI to complete the test station relocation. During a planning meeting on August 25, 2023, it was agreed the test stations would be positioned 50 feet from the new road right-of-way (R.O.W.), which was approximately 31 feet from the existing test station location.

The utility “One Call” was submitted on August 22, 2023. Work commenced and was completed on August 31, 2023. The new test station locations are summarized below.

Street Name	Mile Marker	Latitude	Longitude
Oakdale Road	51.147	34.880707	-81.048940
Saluda Road	51.352	34.883942	-81.049550

The cathodic protection components were installed by CCI personnel under the direction of CCI’s NACE certified Cathodic Protection (CP) Specialist. The CP Specialist prepared this report and provided technical support throughout this project.

The pipeline at each location was determined to be 5 to 6 feet deep. Excavation locations were marked with white paint to facilitate utility one call notifications. CCI provided new test station components which were installed at new locations specified by Crestwood personnel. The test stations included two wires which were connected to the pipeline by exothermic welding. Two polarization coupons were attached to a PVC pipe which will fit inside the above grade test station at the Oakdale Road location. One coupon will be utilized to record native potential measurements. The second coupon has been connected to the

cathodically protected pipeline and will allow for the measurement of polarized potential without interrupting multiple rectifiers. Pipeline and coupon wires have been housed in an above grade, non-metallic test station housing, color-coded yellow to represent petroleum product.

A description of the steps to install the cathodic protection components is presented in Section II, Installation Procedures. Photographs of the work in progress are in Section III. All work on the project was performed under the direction of a NACE certified Cathodic Protection Specialist. The resume and certification for the specialist are provided in Sections IV and V, respectively. Materials provided by CCI, and the corresponding product data sheets are attached in Section VI and Section VII, respectively.

After the new test station components were installed, and excavated area was graded, tests were conducted to verify the components were functional. The data indicates the test wires are functioning properly.

The green coupon wire was connected to one pipeline wire in the Oakdale Road test station. The coupon displayed good polarization after being connected less than 30 minutes, but will require more time to meet the NACE polarized potential criteria.

SECTION II
INSTALLATION PROCEDURES

INSTALLATION PROCEDURES

1. CCI provided all items listed in the Material List.
2. CCI submitted the required utility One Call ticket and coordinated the excavation date with Crestwood LP to have utility owner representatives present, if required.
3. Excavated and exposed the top of the LP pipeline at the location requested by Crestwood personnel. Benched or sloped the excavation to allow for safe entry by personnel.
4. Removed coating from the pipeline in two locations large enough to fit an exothermic weld mold.
5. Prepared wire long enough to reach from the pipe to the test station head, allowing some slack for wire movement during backfill.
6. Monitored the work area with an LEL meter to verify there are no flammable vapors in the excavated area.
7. Attached two wires to the pipeline using the exothermic weld process. Repaired the pipe coating with epoxy mastic after the exothermic weld cooled.
8. Attached polarization coupons to a 2-inch diameter PVC pipe with nylon wire ties and vinyl tape. Positioned the 2-inch pipe and coupons approximately 24 inches above the pipeline. Terminated the top of the PVC pipe inside the test station.
9. Positioned the new test station directly above the pipeline and with the top of the test station 42 inches above grade. Installed and secured anchor rods to the bottom of the test station.
10. Connected the test station wires to the terminal board with ring terminals.
11. After the mastic coating has cured, covered the top of the pipe with 12 inches of sand.
12. Backfilled the remainder of the excavated area with spoils. Tamped thoroughly every 12 to 18 inches. Raked and seeded the area and covered with straw.
13. Installed a magnetically activated switch between one pipe wire and one coupon wire. Provided switch operation magnet within the test station.

14. Affixed a printed heat shrink label to each wire with the following text:

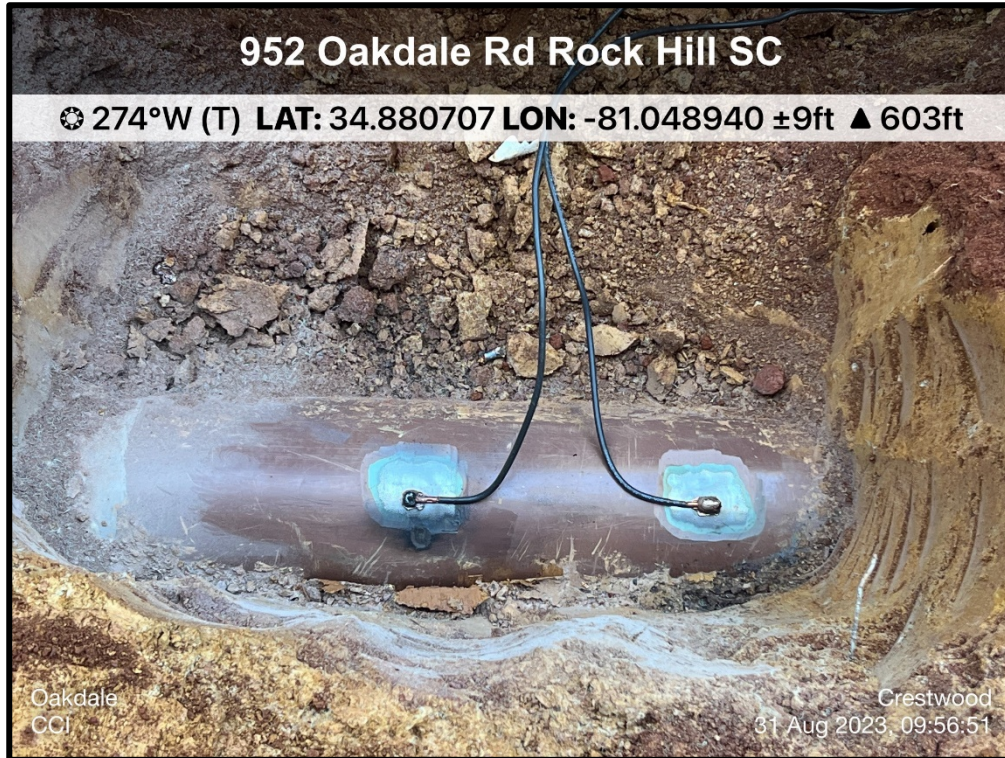
LP PIPE
LP PIPE
NATIVE COUPON
ENERGIZED COUPON

15. Recorded initial potential measurements on each pipeline wire and on each coupon wire with the reference electrode inside the 2-inch PVC pipe.

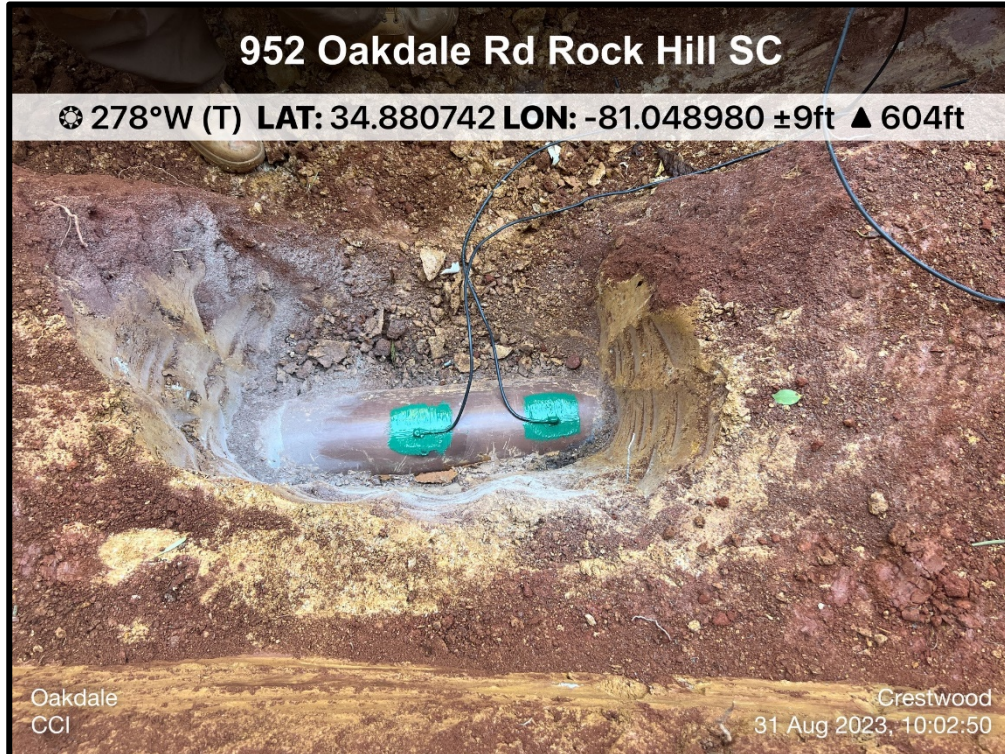
16. Provided a project close-out report.

SECTION III
PROJECT PHOTOGRAPHS

Oakdale



O-1: No. 10 wires attached to pipe.



O-2: Epoxy mastic coating applied to weld area.



O-3: Pipeline wires (left) connected to one of two coupon wires (right), with a magnetically activated switch.



O-4: Magnet on a lanyard suspended inside the test station.



O-5: Finished grade.

Saluda



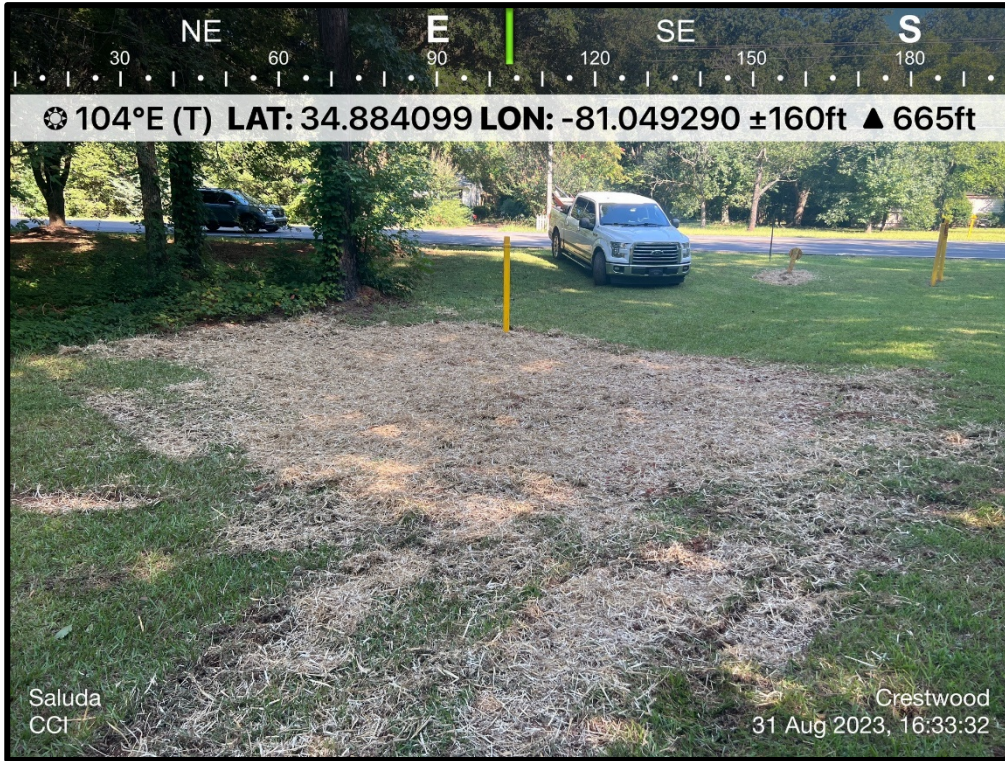
S-1: No. 10 wires attached to pipe.



S-2: Epoxy mastic coating applied to weld area.



S-3: Pipeline test leads.



S-4: Finished grade.

SECTION IV
PROJECT PERSONNEL

CATHODIC PROTECTION PERSONNEL

Project Manager – NACE CP Specialist, QA/QC

Ralph Eichlin

Corrosion Control Incorporated

NACE Cathodic Protection Specialist #7509

Veriforce OQ #re-022064-01

Installation Technician

Adriane Cheely

Corrosion Control Incorporated

NACE Cathodic Protection Tester

Veriforce OQ #ac-111776-01

Alternate QA/QC

Craig Meier

Corrosion Control Incorporated

NACE Cathodic Protection Specialist #6552

SECTION V
CP PROJECT MANAGER RESUME

RALPH EICHLIN
CATHODIC PROTECTION PROJECT MANAGER

RALPH H. EICHLIN

**SENIOR CORROSION ENGINEER
CORROSION CONTROL INCORPORATED**

EDUCATION

Bachelor of Science, Petroleum Engineering
Marietta College, Marietta, Ohio

REGISTRATIONS

National Association of Corrosion Engineers Cathodic Protection Specialist #7509
American Petroleum Institute, Authorized Inspector (Piping) #51924

PROFESSIONAL EXPERIENCE

1999 to Present – Corrosion Control Incorporated, Rutledge, GA

Senior corrosion engineer with responsibilities including cathodic protection designs, mechanical integrity program management, training classes, corrosion failure analysis, trouble shooting of cathodic protection systems, audits of environmental and DOT/PSC compliance programs, direction of API-570 and API-653 inspection programs.

1997 to 1999 – RCS/Corrpro Companies, Conyers, GA

Director of inspection services for RCS division of Corrpro Companies for Southeast Region and specialty pulp and paper applications. Managed inspection services for piping under API-570, storage tanks under API-653 and vessels under API-510 and ASME code. Included enacting API-570 piping integrity programs for the State of Florida DEP and development of inspection techniques for digesters within the pulp and paper industry.

1992 to 1997 - Corrpro Companies Inc., Conyers, GA

Senior engineer responsible for project management, corrosion failure analysis, corrosion control evaluations, cathodic protection design, specification preparation, cathodic protection system evaluations and inspections.

1989 to 1992 – Corpro Companies, Inc., Conyers, GA

Field engineer responsible for cathodic protection design surveys, cathodic protection system evaluations and corrosion failure investigations.

1986 to 1989 – Harco Technologies, Hatboro, PA

Associate engineer responsible for cathodic protection system evaluations and design.

SUMMARY OF PROJECTS

Electrical & Nuclear Industry

Project Engineer - Feasibility study and cathodic protection system design for exterior bottoms of low level waste holding tanks on concrete foundations, Y-12 Plant, Oak Ridge, TN.

Project Engineer - Cathodic protection system evaluation and system design for rectifier and anode be repair, various underground piping structures, Alabama Power Plant, Farley Nuclear Facility, Dothan, Alabama.

Project Engineer - Cathodic protection system evaluation for natural gas pipelines, Larson & McIntosh Power Plant, City of Lakeland, FL.

Field Engineer - Cathodic protection system evaluation for fuel and water storage facilities, Debarry Power Plant, Florida Power Corporation.

Field Engineer - Cathodic protection system evaluation, condenser units and intake structures, Crystal River Power Plant, Florida Power Corporation.

Project Engineer - Cathodic protection system design and evaluation, Hunts Bay Power Station, Jamaica Public Service Company.

Field Engineer - Cathodic protection system installation inspection and evaluation, chilled water piping, Oak Ridge National Laboratories, Oak Ridge, TN.

Military

Inspector – Conducted API-570 field inspection and issued mechanical integrity report on above grade fuel piping network serving the Kuwae 2 Tank Farm storage tanks and pump houses. 505th QMBM Okinawa, Japan.

Inspector – Conducted API-570 field inspection and issued mechanical integrity report on over hundred miles of the underground Cross Island Petroleum Pipelines using excavate and inspect technique. 505th QMBM Okinawa, Japan.

Project Engineer – Performed a corrosion activity close interval potential survey on the Cross Island Petroleum Pipelines in Preparation for API-570 inspections. 505th QMBM Okinawa, Japan.

Inspector – Conducted API-570 integrity evaluation of petroleum receipt pipeline between dock and terminal for Texaco. Cayman Brac, West Indies.

Project Engineer – Performed a close interval potential (CIP) profile survey or coating flaw survey combined with CIP survey to identify areas of active corrosion in preparation for API-570 inspection on underground fuel transfer pipelines at:

Barksdale AFB	Nellis AFB
Indian Springs AFB	Tonopah Test Range
Minot AFB	Mountain Home AFB
NB White Beach, Okinawa	3 USFK Facilities, Korea
RAF Lakenheath	RAF Fairford

Inspector – Conducted corrosion investigation and environmental compliance evaluation on above grade fuel storage tanks and associated receipt lines including rectifier inspection. Peterson AFB, Colorado.

Project Engineer – Provided oversight during repairs to cathodic protection systems at over six (6) petroleum storage tank farms and the Cross Island Petroleum Pipelines. 505th QMBM Okinawa, Japan.

Project Engineer - Cathodic protection system design for basewide POL storage and jet fuel distribution system, Eglin AFB, FL.

Project Engineer - Cathodic protection system design for underground piping, Civil Engineering Complex, Dobbins AFB, Marietta, GA.

Project Engineer - Cathodic protection system design, Joint Stars POL system, Robins AFB, Warner Robins, GA.

Project Engineer - Cathodic protection system design, POL system on apron alterations, Michigan Air National Guard, Selfridge, MI.

Field Engineer - Cathodic protection system evaluation for water storage facilities, Naval Support Facility, Antigua.

Project Manager – Designed and installed cathodic protection to upgrade existing POL pipelines. Osan Air Base, Kunsan Air Base, Suwon Air Base, Gwang-ju Air Base, Camp Humphreys, Camp Casey, Republic of Korea. This project included inspection of the existing cathodic protection systems, preparation of design drawings, and supervision of host nation contractors.

Project Manager – Evaluated, designed, and installed cathodic protection, POL pipelines, RAF Fairford, Fairford, UK. This project included a detailed evaluation of the existing fuel pipeline network, preparation of detailed design drawings, and oversight of technicians completing repairs.

Project Engineer/Project Manager – Conducted site inspection and design repairs to replace defective cathodic protection components beneath an existing AST. NY ANG Hancock Field, Syracuse, New York.

Project Engineer – Conducted site inspection to identify contacts between underground fuel pipelines and foreign pipelines, then managed a project to implement the repairs. NY ANG, Suffolk County, Westhampton Beach, New York.

Airport Facilities

Inspector – Conducted integrity inspection of exposed jet fuel lines within valve pits. Cincinnati International Airport.

Project Engineer - Cathodic protection system design and evaluation, bulk fuel storage facilities, Memphis International Airport.

Project Engineer - Cathodic protection system design and evaluation for underground fuel hydrant piping, Luis Munoz Marin International Airport, San Juan, PR.

Project Engineer - Cathodic protection system design for fuel storage facility and fuel hydrant piping, Cincinnati/Northern Kentucky International Airport.

Project Engineer - Cathodic protection system design for underground fuel hydrant piping, Los Angeles International Airport.

Project Engineer - Cathodic protection system design for underground fuel hydrant piping, Tampa International Airport.

Design Engineer – Impressed current cathodic protection design for jet fuel hydrant pipelines, JFK International Airport, Terminals 3 and 4.

Design Engineer – Evaluated existing hydrant pipelines and designed cathodic protection for American Airlines, JFK Terminal 8.

Design Engineer – Galvanic cathodic protection system for jet fuel hydrant pipelines, LaGuardia Airport Central Terminal Building (CTB).

Design Engineer/Project Manager – Design engineer for cathodic protection on steel pipe piles for the runway over-run extensions on R/W 4-24 and 3-13. Supervised the installing contractor and conducted QA inspections. LaGuardia Airport.

Petro-Chemical Industries

Inspector – Developed national integrity assessment program for more than 2000 vessels and tanks at 9 plants, in accordance with API, ASME, OSHA and EPA codes. Masonite Corporation.

Inspector – Managed program to determine structural integrity of high pressure pulp and paper digesters. International Paper, Stone Container and Rayonier.

Project Engineer - Cathodic protection system design and evaluation for bulk fuel storage facility, Appalachian Petroleum Company, Knoxville, TN.

Project Engineer - Cathodic protection system evaluation and design of supplemental systems, Petrojam Refinery, Kingston, Jamaica.

Project Engineer - Cathodic protection system evaluation and consulting engineer, Shell Oil Company, Port Everglades, FL.

Field Engineer - Cathodic protection system evaluation for fuel storage facility, Colonial Oil Industries, Savannah, GA.

Field Engineer - Cathodic protection system evaluation for intake structure and bulkhead, Monsanto, Pensacola, FL.

Project Engineer - Cathodic protection system evaluation for E.I. DuPont at the Chattanooga, TN; New Johnsonville, TN; and Manati, PR plants.

Project Engineer - Cathodic protection system design for deep artisan well casings, E.I. DuPont, Manati, PR.

Utility & Municipal

Field Engineer - Electrical continuity evaluation of ductile iron water mains, City of Philadelphia, PA.

Field Engineer - System wide cathodic protection evaluation for natural gas pipelines, Central Hudson Electric & Gas, Newburgh, NY.

Project Engineer - Corrosion evaluation and cathodic protection system design on U.R.D. electric cable, Central Jersey Power & Light, Morristown, NJ.

Project Engineer - Corrosion evaluation and cathodic protection system design on U.R.D. electrical cable. Snapping Shoals Electric Membership Corporation, Covington, GA.

Marine Facilities

Project Engineer – Provided oversight on project to jacket over 400 bridge support piles in splash zone. San Jose Lagoon, Puerto Rico.

Inspector – Conducted mechanical integrity evaluation of more than 400 bridge support piles. San Jose Lagoon, Puerto Rico.

Project Engineer - Cathodic protection system evaluation and design assistant, offshore bridge piles, San Jose Lagoon, San Juan, PR.

Field Engineer - Cathodic protection system design and evaluation for offshore dock piles, Caja de Muertos, Ponce, PR.

Field Engineer - Cathodic protection system evaluation, Maxwell House Coffee, Jersey City, New Jersey.

Project Engineer – Solar power cathodic protection system, submarine fuel pipeline, Guantanamo Bay, Cuba. US Navy demonstration project.

Project Manager and Engineer – Design and install cathodic protection system, submerged dock piles, Jamalco Rocky Point Pier, Jamaica.

Cathodic Protection System Evaluation – galvanic cathodic protection system on submerged dock piles, Discovery Bay, Jamaica.

Design Engineer and QA/QC – galvanic cathodic protection system and splash zone wraps, fender piles and dock support piles, Motiva Enterprises, Providence, RI.

Design Engineer and QA/QC - Impressed current cathodic protection system, Motiva Enterprises, Brooklyn, NY.

Design Engineer and QA/QC – galvanic cathodic protection system on dock piles, Petrojam, Kingston, Jamaica

Design Engineer and QA/QC – galvanic cathodic protection system and splash zone wraps on runway extension piles, LaGuardia Airport, NY

Railroads

Project Engineer – Conducted site inspections and report findings and/or designed new or repaired cathodic protection systems on diesel fuel AST and underground diesel fuel pipelines at 43 railroad terminals, Union Pacific Railroad.

PROFESSIONAL AFFILIATIONS

National Association of Corrosion Engineers (NACE)

American Petroleum Institute (API)



Certificate of Achievement

The NACE International Institute Recognizes

Ralph Eichlin

As a Certified

CP4 - Cathodic Protection Specialist

Helena Subinger

Executive Director
NACE International Institute



Expires
February 28, 2024

Cert No.7509

SECTION VI
MATERIAL LIST

MATERIAL LIST

<u>Item</u>	<u>Qty</u>	<u>Unit</u>	<u>Description</u>
1	2	Ea.	Test station; 3-inch diameter, above grade, yellow pipe, yellow test head, 5 terminals. Cott Mfg. Big Fink.
2	2	Ea.	Magnet activated switch; EDI model UI- MS-BRD.
3	2	Ea.	Magnet for switch activation; EDI model UI-MS-MAG.
4	1	Ea.	Exothermic weld mold; CAHAA-1G.
5	20	Ea.	Exothermic weld metal; CA-15.
6	2	Ea.	Coating to cover exothermic welds; Denso Protal 7200, 50 mL.
7	100	Ft.	Wire, #10 RHW-USE; Black insulation.
8	2	Ea.	Coupon; with #12 THWN green wire.
9	2	Ea.	Coupon; with #12 THWN purple wire.
10	20	Ea.	Ring terminals.
11	2	Ea.	2" PVC pipe x 10 ft long.
12	50	Ea.	Nylon wire ties; 18" long.
13	12	Ea.	Sand; 50-pound bag.

SECTION VII
PRODUCT DATA SHEETS

Big Fink[®]
Cathodic
Protection
Test Station



Big FINK®

The **Big FINK** cathodic protection test station is a field proven, high strength, maintenance free terminal for monitoring electric currents and potentials. Since 1976 the **Big FINK** CP test station has been utilized worldwide by gas, oil, chemical and water pipeline companies. Manufactured by Cott in Pittsburgh, Pennsylvania and Los Angeles, California; it is available from Cott distributors everywhere.

Features:

CP Test Station

Cap, Terminal Board and Collect Nut made from Makrolon® polycarbonate. One of the toughest plastics in the world.

Support Post

COTTPipe® PE (standard) polyethylene has over 20 years of proven durability. **COTTPipe**® PC (optional polycarbonate is available for the toughest applications.) Standard length 6 feet, available to 40 feet.

Anchor

COTTPipe® PE is easily installed and prevents pullout.

Hardware

Standard nickel plated brass or optional stainless steel for guaranteed long service life. Up to 11 terminals accessible from both sides of the board.

Accessories

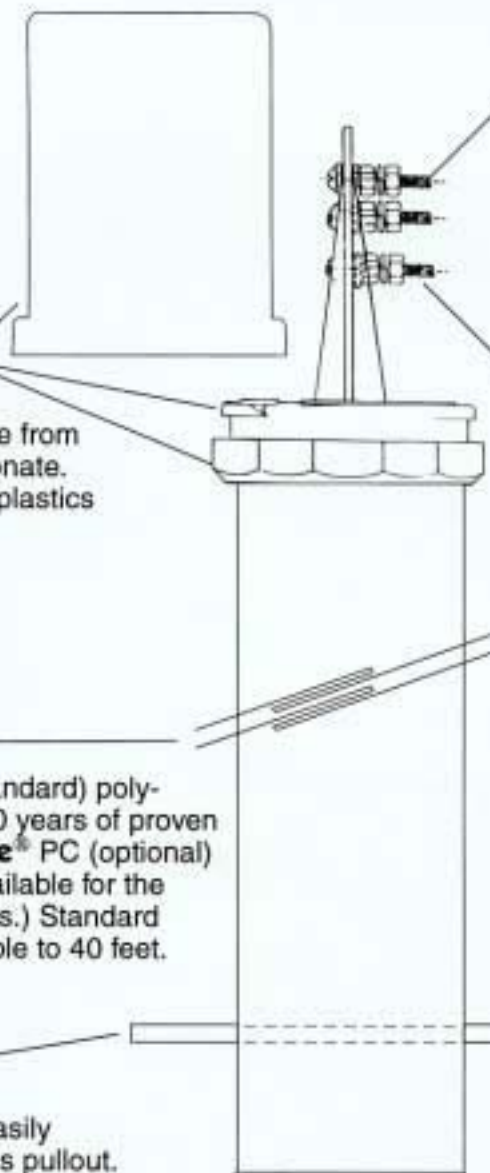
All **Big FINK**® terminal boards can accommodate **COTTShunts**®, Slide Resistors, **COTTMeters**® (Volt or Amp) Burndy connectors, Cott bonding/shorting straps, Banana Jacks, **ZAP Gard**®, locking devices, lightning arrestors and flange mounting brackets.

Colors

Red, Orange, Yellow, Green, Blue, White and Black are standard on **Big FINK**® and **COTTPipe**®. Any color is available as an option.

Sizes

Available in models to fit 1¼", 2" and 3" pipe.



Model UI-MS – Magnetic Switch System

EDI Model UI-MS Magnetic Switch System consists of a sealed reed switch for use in above and below ground test stations. The switch is activated by holding a magnet next to it.

Typical Applications

- Cathodic protection coupons – use a normally-closed switch to simplify making instant-disconnect measurements.
- Reference electrodes – use a normally-open switch to keep the reference electrode isolated from the structure except when measurements are being made.



Electrical Specifications

Switching Current: 0.5 amps

Carry current: 1.0 amp

Switching Voltage: 175 volts

Breakdown voltage: min. 200 VDC

Contact resistance: 150 mohm

Operating temp.: -40°F - 260°F (-40°C - 130°C)

Switch Configurations

Board Mount: switch is mounted on a small circuit board with two 9/32 in. (7 mm) dia holes on a 1 in. (25.4 mm) spacing.

Specify as Model UI-MSx-BRD

Adjustable mount: switch is centered in a length of wire terminating in 9/32 in. (7 mm) ID ring lugs. Ring lugs are spaced at 6-1/4 in. (160 mm).

Specify as Model UI-MSx-ADJ

Note - *x* refers to switch type:

C = normally closed, use magnet to open (green band)

O = normally open, use magnet to close (red band)

Activating Magnet

Specify as EDI Model UI-MS-MAG

Magnetically operated switches are momentary toggle switches which are activated by touching the magnet to the color band on the switch body. Green bands denote normally closed switches which are momentarily opened with the magnet. These are most often used for instant-disconnect cathodic protection coupon measurements. Red bands denote normally open switches which are momentarily closed with the magnet. These can be used to electrically isolate a reference electrode in test stations which may become submerged. For best results, the use of Model UI-MS-MAG magnets are recommended.

electrochemical devices, inc.

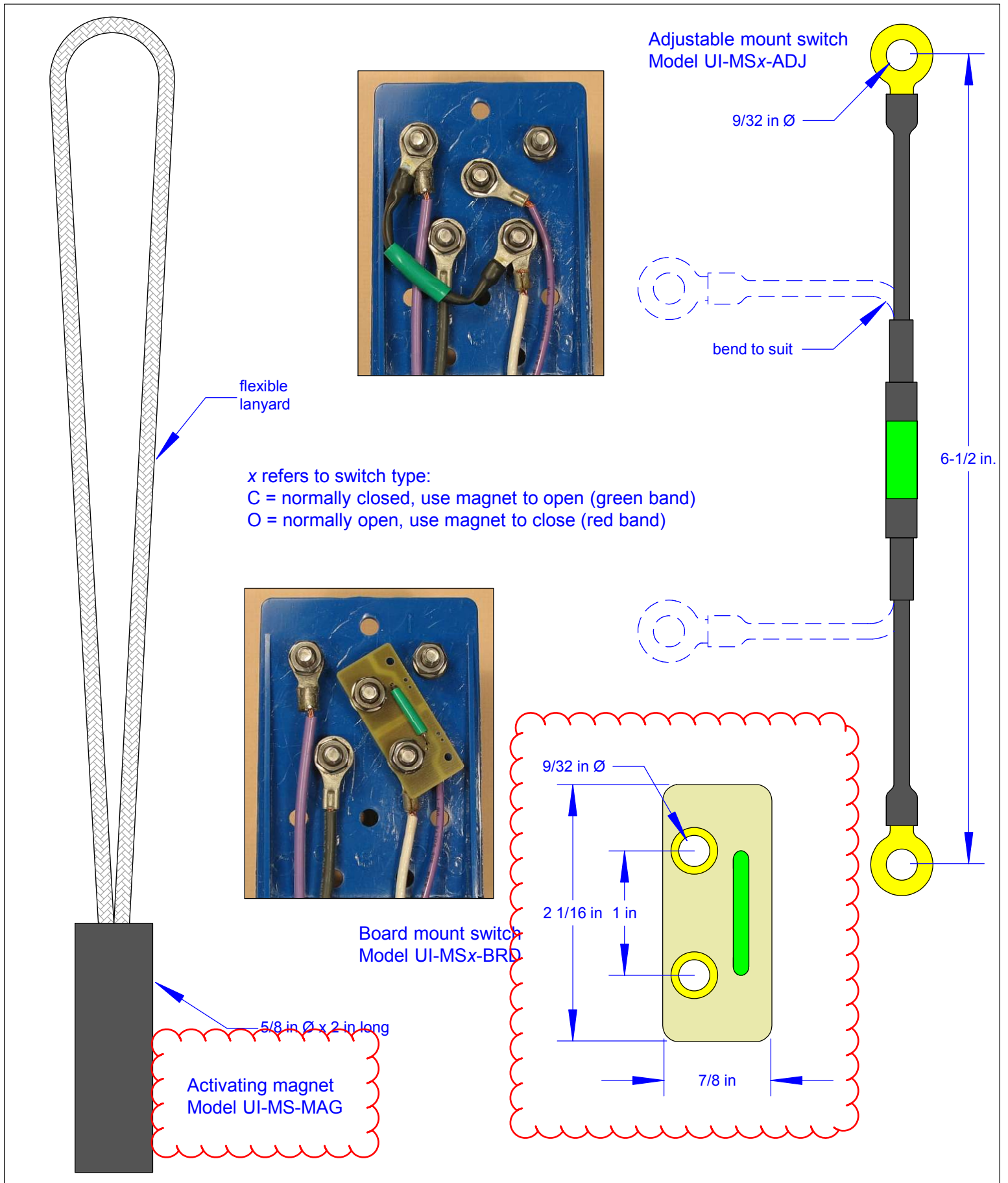
Web: www.edi-cp.com **Email:** info@edi-cp.com

Tel: 617-484-9085 **Fax:** 617-484-3923

Address: P.O. Box 31; Albion, RI 02802-0031

*U Series
Underground
Products*





Magnetic Switch System

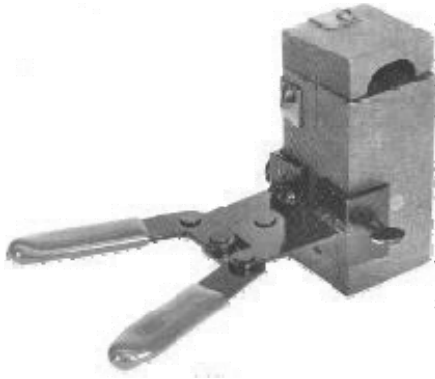
SCALE	FULL
DRAWN BY	FJA
DATE	24 APR 2013
DRAWING NUMBER	UIMS-2

edi electrochemical devices, inc.
PO Box 31, Albion, RI 02802 401-333-6112

www.edi-cp.com
info@edi-cp.com

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2013

CADWELD Welders and Molds



When making a CADWELD connection, an accurate control of the CADWELD process is accomplished by using a semi-permanent graphite mold. Control is exercised over the direction and speed of the molten CADWELD weld metal flow and final shape. The graphite used in a CADWELD mold is a high temperature type that lasts for an average of 50 to 100 CADWELD connections under normal usage.

Welder Price **CAT**, **CAP** and **CAN** (to the left) are split and use the new **Mini E-Z** handle. Welder Part No. includes mold frame. Welder Price **CAA** (to the right) is a solid block with a hold-down handle. If mold only (less frame) is required, order Welder Part No. "M".





CADWELD Weld Metal

CADWELD weld metal is a mixture of copper oxide and aluminum, packaged by size in plastic tubes. Each tube contains the starting powder at the bottom of the plastic tube, with the weld metal on top. These containers are packaged, with metal disks, in polyethylene boxes. The welding metal cannot ignite spontaneously. They can be handled and stored without danger and can be shipped with no special packaging or marking.

Two types of CADWELD weld metal are used for cathodic protection connections:

- **F-33 alloy** is used for all connections of cable to cable and cable to steel or stainless steel pipe. The F-33 weld metal containers have green caps.
- **XF-19 alloy** is used for all connections to cast iron. XF-19 weld metal containers have orange caps.

Size	Packed per	
	Box	Std. Pkg.
CA15	20	100
CA25	20	100
CA32	20	100
CA45	20	100
CA65	20	100

PROTAL 7200

Fast Cure, High Build Pipeline Coating

Description

Protal 7200 is a VOC free, 100% solids, 2 part epoxy coating specially formulated to compliment FBE coated pipe. It is a high build liquid coating that is brush or spray applied (referred to as Protal 7250 in Canada) in one coat in the field or shop. It cures very fast to allow quick handling and backfill times.

Uses

On-site protection of girth welds, tie-ins, welds for boring applications, repairs to FBE, push-rack applications, station piping, fittings and fabrication. Also used for main line pipe coating, sacrificial coating for directional drill (ARO) and road bore pipe, and rehabilitation of existing pipelines.

Features

- Fast touch dry and set times
- High temperature resistance up to 203°F (95°C)
- High build (up to 70 mils / 1778 microns in one coat)
- Excellent adhesion (compliments FBE coated pipe)
- High abrasion resistance for drilling applications
- Can be used as an abrasion resistant coating (ARO)
- Safe and environmentally friendly
- Does not shield cathodic protection
- Can be applied with brush, roller or spray
- Available in a variety of packaging options
- Meets AWWA C-210-92 specifications
- Outstanding self-leveling characteristics
- CSA Z 245.30-14 compliant

Application

Brush: Prepare surfaces by grit blasting to a clean near-white finish, SSPC-SP 10 / NACE No. 2. Appropriate angular grit shall be used to achieve a 2.5 to 5 mil (63 to 127 microns) anchor profile. Initially stir the base and hardener. Add the hardener to base and mix at a slow speed until a constant color is achieved making sure all sides of container are scraped. Apply mixed material onto surface and brush, trowel or roll to required mil thickness. A wet-film thickness gauge shall be used to measure mil thickness. If surface temperature falls below 50°F (10°C), surface should be preheated to achieve faster cure. Preheat may be achieved with a propane torch or induction coil. Resin and hardener component shall be kept warm, at a minimum of 60°F (15°C), to mix easily.

Spray: Prepare surfaces by grit blasting to a clean near-white finish, SSPC-SP 10 / NACE No. 2. Appropriate angular grit shall be used to achieve a 2.5 to 5 mil (63 to 127 microns) anchor profile. The equipment shall be a XP70 Plural Component Sprayer designed to mix and atomize 100% solids epoxies. Please refer to the Protal 7200 Plural Spray Application Specification for equipment details. Part A should be heated to 140°F - 160°F (60°C - 71°C) and Part B heated to 100°F - 110°F (38°C - 43°C). Hose bundle shall be set at 140°F - 150°F (60°C - 65°C). A wet on wet spray technique should be used to achieve a minimum thickness of 20 mils (508 microns). The coating thickness should be measured using a wet-film thickness gauge. The equipment settings are only guidelines and may vary based on equipment.

All application personnel shall be trained by a Denso representative prior to application of Protal 7200. Spray application personnel shall be trained in the proper spray pump operational procedures by the specific spray pump manufacturer's representative.

For complete application instructions please refer to the Protal 7200 Application Specifications.



Protal 7200

TECHNICAL DATA

PROPERTIES	VALUE
Solids Content	100%
Mixed Material - (Mixed) @ 77°F (25°C)	
Specific Gravity	1.63
Viscosity	170,000 cps
Color	Green
Mixing Ratio (A/B) by Volume	3 Parts Base: 1 Part Hardener
Cure Times	
Pot Life @ 77°F (25°C)	14 - 17 Minutes
Pot Life @ 97°F (36°C)	7 - 8 Minutes
Handling Time @ 77°F (25°C) Shore D 70 min.	2.5 - 3 Hours
Handling Time @ 117°F (47°C) Shore D 70 min.	1 Hour
Handling Time @ 157°F (69°C) Shore D 70 min.	20 Minutes
Recoat Window	
@ 57°F (14°C)	5 Hours
@ 77°F (25°C)	2 Hours
@ 97°F (36°C)	1 Hour
Theoretical Coverage	14 ft ² (1.3 m ²)/30 mils/liter
Thickness - Weld Joints / FBE Repairs	
Minimum/Maximum	20/70 mils (508/1778 microns)
Recommended	25 - 30 mils (635 - 762 microns)
Thickness - Bore Pipe	
Minimum/Maximum	40/70 mils (1016/1778 microns)
Recommended	45 - 60 mils (1143 - 1524 microns)
Holiday Detection	Refer to NACE SPO188
Cathodic Disbondment Test (ASTM G95)	
28 Days @ 77°F (25°C)	3 mm
28 Days @ 150°F (65°C)	4 mm
28 Days @ 185°F (85°C)	6 mm
28 Days @ 203°F (95°C)	6 mm
Hardness (ASTM D-2240-02)	Shore D 85 +/-2
Impact Resistance (ASTM G14-04) @ 32°F (0°C)	70.6 in-lbs.
Tabor Abrasion (ASTM 4060-07)	
-1000 cycles, CS-17 wheels, 1000 g. load	1,270 cycles per mil (93 mg)
-5000 cycles, CS-17 wheels, 1000 g. load	1,612 cycles per mil (338 mg)
Gouge Resistance (Partech Test - 40 kg load)	15.4 mils (391 microns)
Dielectric Strength (ASTM D-149)	450 V/mil (17,716 V/mm)
Adhesion to Steel (ASTM D-4541-02)	3,956 psi (27.3 MPa)
Adhesion to FBE (ASTM D-4541-02)	2,579 psi (17.8 MPa)
Service Temperature	-40°F to 203°F (-40°C to 95°C)
Application Temperature	-30°F to 212°F (-34°C to 100°C)

Note: If temperature falls below 50°F (10°C), surface must be preheated and maintained throughout the cure process.

STORAGE: Minimum 24 months when stored in original containers @ 40°F (4°C) to 105°F (41°C). On job site where temperatures are below 50°F (10°C) product should be kept warm to mix properly (65°F to 85°F optimal). Do not allow material to freeze.

CLEANING: Clean equipment with Xylene, MEK, Acetone or equivalent solvent cleaner.

HEALTH AND SAFETY: Wear protective clothing and ensure adequate ventilation. Avoid contact with skin and eyes. See material safety data sheet for further information.

PACKAGING: 1, 1.5, 1.75 and 2 liter kits and 75 liter & 800 liter kits standard. Dual cartridge repair tubes (50 ml, 400 ml & 1000 ml) and dispensing guns available for small repair areas.



DENSO NORTH AMERICA

HOUSTON:
9747 Whithorn Drive,
Houston, Texas,
U.S.A. 77095
Tel: 281-821-3355
Fax: 281-821-0304

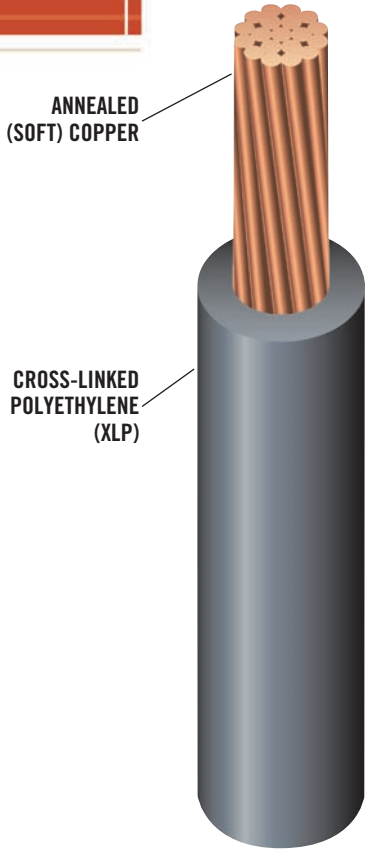
TORONTO:
90 Ironside Crescent,
Unit 12, Toronto,
Ontario, Canada M1X1M3
Tel: 416-291-3435
Fax: 416-291-0898

www.densona.com

A Member of Winn & Coales International

The information given on this sheet is intended as a general guide only and should not be used for specification purposes. We believe the information to be accurate and reliable but do not guarantee it. We assume no responsibility for the use of this information. Users must, by their own tests, determine the suitability of the products and information supplied by us for their own particular purposes. No patent liability can be assumed.

RHH/RHW/USE



Underground Service Entrance Cable

600 Volt

Copper Conductors

Cross-Linked Polyethylene (XLP) Insulation

High-Heat, Moisture, and Sunlight Resistant

Sizes 6 Through 4/0 AWG Also Rated SIS

APPLICATIONS Suitable for use as follows:

- Southwire Type RHH or RHW-2 or USE-2 conductors are used with conduit as specified in the National Electrical Code¹
- When used as Type USE-2, conductor is suitable for use as underground service entrance cable for direct burial at conductor temperatures not to exceed 90°C
- When used as RHH, conductor temperatures shall not exceed 90°C in dry locations
- When used as RHW-2 or USE-2, conductor temperatures shall not exceed 90°C in wet or dry locations
- Voltage rating for RHH or RHW-2 or USE-2 conductors is 600 volts

STANDARDS & REFERENCES

Southwire Type RHH or RHW-2 or USE-2 meets or exceeds UL Standard 44 (for RHH or RHW-2), UL Standard 854 (for USE-2), Federal Specification A-A-59544, and requirements of the National Electrical Code.

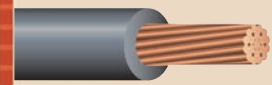
CONSTRUCTION

- Southwire Type RHH or RHW-2 or USE-2 copper conductors are annealed (soft) copper.
- Insulation is an abrasion, moisture, heat, and sunlight resistant black cross-linked polyethylene (XLP).

SPECIFICATIONS

- Conductors shall be UL-listed Type RHH or RHW-2 or USE-2, suitable for operation at 600 volts or less in wet or dry locations, including direct burial in the earth.
- Conductors shall be annealed copper, cross-linked polyethylene (XLP) insulated, as manufactured by Southwire Company or approved equal.

¹ 2005 Edition



COPPER CONDUCTORS

RHH/RHW/USE

WEIGHTS, MEASUREMENTS AND PACKAGING

CONDUCTOR		INSULATION THICKNESS (mils)	NOMINAL O.D. (mils)	ALLOWABLE AMPACITIES†			APPROX. NET WEIGHT PER 1000 FT. (lbs)	STANDARD PACKAGE
SIZE (AWG or kcmil)	NUMBER OF STRANDS			60°C	75°C	90°C		
14	7	45	160	15	15	15	21	A
12	7	45	177	20	20	20	30	A
10	7	45	201	30	30	30	44	A
8	7	60	262	40	50	55	72	B
6	7	60	297	55	65	75	106	B
4	7	60	344	70	85	95	156	B
2	7	60	400	95	115	130	238	B
1	19	80	484	110	130	150	309	B
1/0	19	80	523	125	150	170	381	B
2/0	19	80	567	145	175	195	472	B
3/0	19	80	617	165	200	225	586	B
4/0	19	80	673	195	230	260	729	B
250	37	95	751	215	255	290	867	B
300	37	95	804	240	285	320	1029	B
350	37	95	854	260	310	350	1191	B
400	37	95	899	280	335	380	1352	B
500	37	95	983	320	380	430	1674	B
600	61	110	1089	355	420	475	2012	C
700	61	110	1158	385	460	520	2332	C
750	61	110	1191	400	475	535	2492	C
800	61	110	1223	410	490	555	2652	C
900	61	110	1283	435	520	585	2970	C
1000	61	110	1340	455	545	615	3288	C

†Allowable Ampacities:
 Allowable ampacities shown are for general use as specified by the National Electrical Code, 2005 Edition, section 310.15.
 60°C - When terminated to equipment for circuits rated 100 amperes or less or marked for 14 through 1 AWG conductors.
 75°C - When terminated to equipment for circuits rated over 100 amperes or marked for conductors larger than 1 AWG.
 90°C - RHH dry locations. RHW-2 and USE-2 wet or dry locations. For ampacity derating purposes.

STANDARD PACKAGE CODES

A – 2500 ft. reel
 B – 1000 ft. reel
 C – 500 ft. reel

Accurate.

P R E C I S E .

Reliable.

Our IR-Free Coupon Was Built to *Your* Exacting Specifications.

We listened to you to find out what corrosion and cathodic protection engineers want in a corrosion coupon. You said *accuracy, precision* and *reliability*. You also said you wanted a corrosion coupon that was cost-effective to use.

In development for 10 years, M.C. Miller's IR-Free corrosion coupon accurately measures the integrity of pipeline cathodic protection systems without the need to interrupt all current sources. This revolutionary device is designed for easy installation next to existing test stations. It also withstands harsh field environments and eliminates the effects of stray earth currents, producing accurate measurements every time.

Product Features

Easy installation at existing test stations

No new test stations required

No need to interrupt all current sources for IR-free readings

Built for Accuracy...and Precision

Unlike other corrosion coupons, M.C. Miller's IR-free coupon is designed to evaluate cathodic protection systems without interrupting rectifiers, foreign bonds, or sacrificial anodes. The coupon consists of a bare, cold-rolled steel cylinder head and No. 12 stranded wires, which are inserted along side a 2-inch PVC tube. The PVC tube shields the reference electrode from potential gradients, resulting in accurate, precise cathodic protection measurements. These measurements also meet anticipated federal regulations and industry standards for considering IR drop in structure-to-soil potential readings.

Built to Last

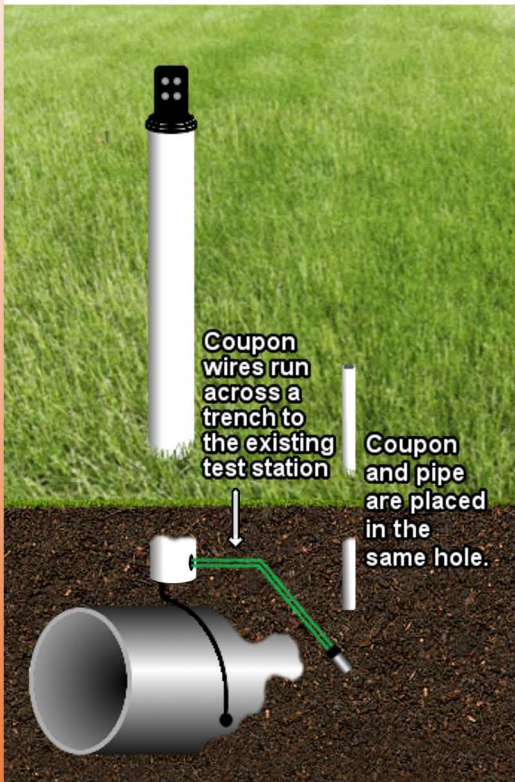
Like all M.C. Miller products, our IR-free corrosion coupon is built to last. The wire-coupon interface is environmentally sealed to keep the steel, copper, and solder components corrosion-free, making the coupon virtually indestructible.



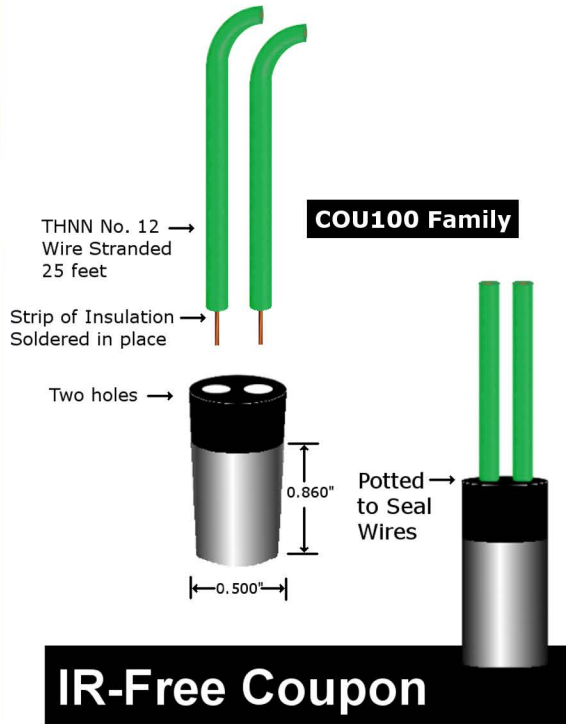
11640 US Highway 1
Sebastian, FL 32958
772-794-9448
Fax 772-794-9908
www.mcmiller.com

Instruments and Equipment for the Corrosion Engineer

M.C. Miller's IR-Free Coupon is Simple to Install and Use.



Our IR-free corrosion coupon is designed for easy installation next to existing test stations, as shown here.



IR-Free Coupon

Coupon Specifications*

- THHN No. 12 stranded wire
- 3M potting compound

*Coupons can be customized to your specifications. Optional alloy and surface area designs are encouraged.

Easy Installation

Using an auger, bore a hole to the horizontal center line of the pipeline, about 4 to 12 inches away from the pipeline. Then, lower the coupon into the hole by its wires. Drop native soil in the hole until about 1-1/2" to 2" (inches) of soil is packed over the coupon, so that it will remain outside of the PVC tube.

Install the PVC tube 1-1/2" to 2" (inches) above the coupon, with the wires outside the tube. Then fill the tube with native soil, which should be saturated with water and thoroughly packed to remove excess air. Install the No. 12 color coded wires along the outside of the PVC tube and insert through a hole at the base of the adjacent test station. Drill a hole in the test station just below grade level to accommodate the wire. Then, connect one of the color coded coupon wires to the structure test wire by direct connection or through a jumper bar at the test station box.

Easy Measurement

After the coupon has been polarized, insert a half-cell into the top of the PVC tube, contacting the compacted soil above the coupon. Connect a LC-4 selectable voltmeter to the color coded coupon wire and the half-cell.

An IR-free potential reading is obtained by breaking the connection between the coupon wire and the structure test wire, usually through the jumper bar, interrupting cathodic protection to the coupon. Take a potential measurement one to two seconds after breaking the coupon connection.

Carbon Steel	
Part #	Surface Area
COU075	0.155 sq in (1cm ²)
COU100	1.55 sq in (10cm ²)
COU170	1.353 sq in (8.73cm ²)
COU220	1.55 sq in (10cm ²)
COU425	15.5 sq in (100cm ²)

Ductile Iron	
Part #	Surface Area
COU200	1.55 sq in (10cm ²)

Aluminum	
Part #	Surface Area
COU300	1.55 sq in (10cm ²)

Stainless Steel	
Part #	Surface Area
COU350	1.55 sq in (10cm ²)

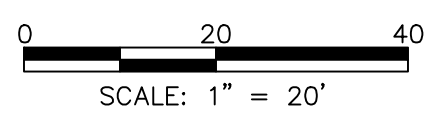
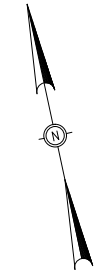
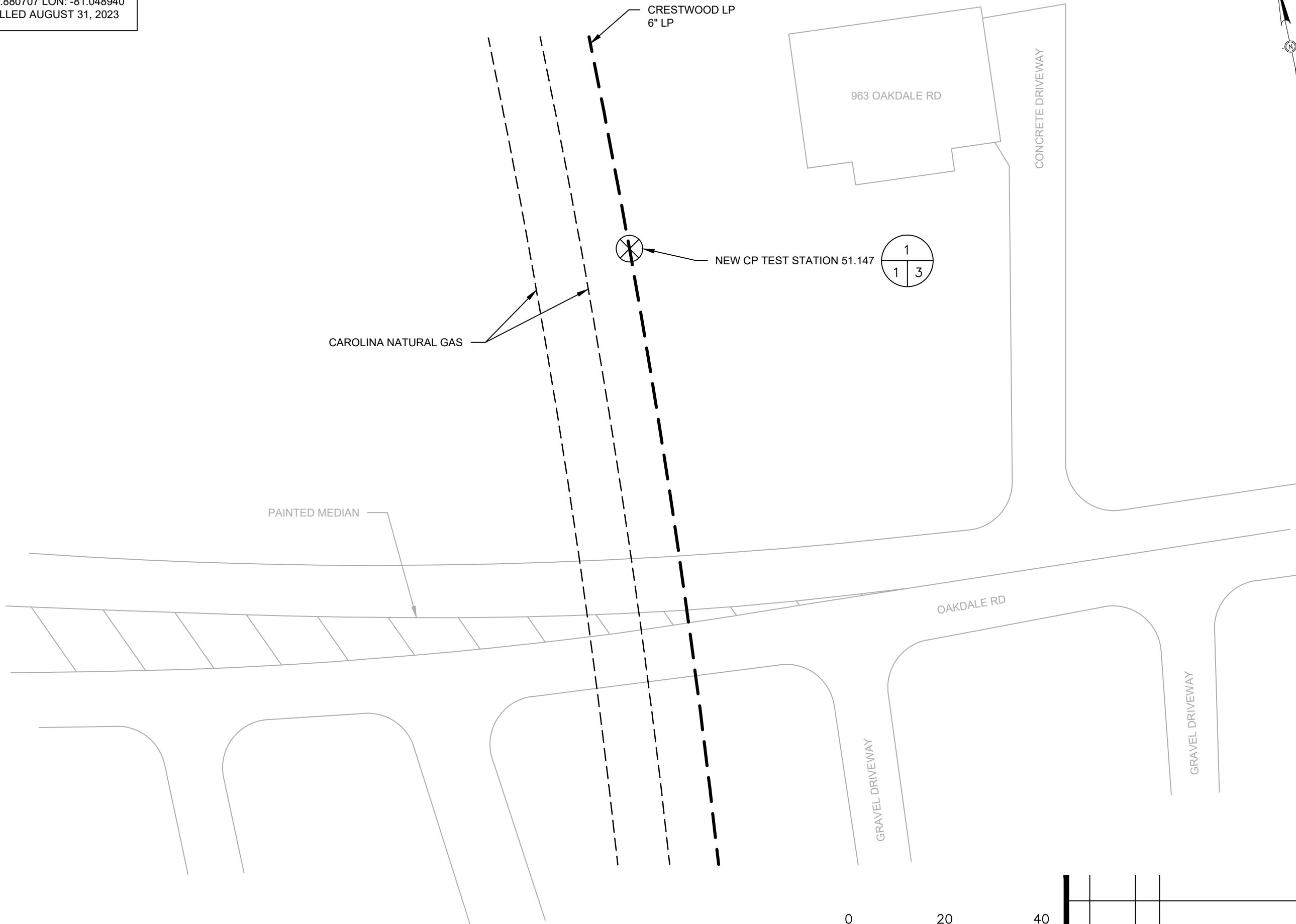


11640 US Highway 1
 Sebastian, FL 32958
 772-794-9448
 Fax 772-794-9908
 www.mcmiller.com

SECTION VIII
POST INSTALLATION DATA

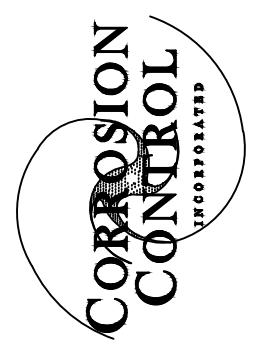
SECTION IX
SHOP DRAWINGS

TEST STATION LOCATION
 LAT: 34.880707 LON: -81.048940
 INSTALLED AUGUST 31, 2023



No.	DATE	BY	REVISION

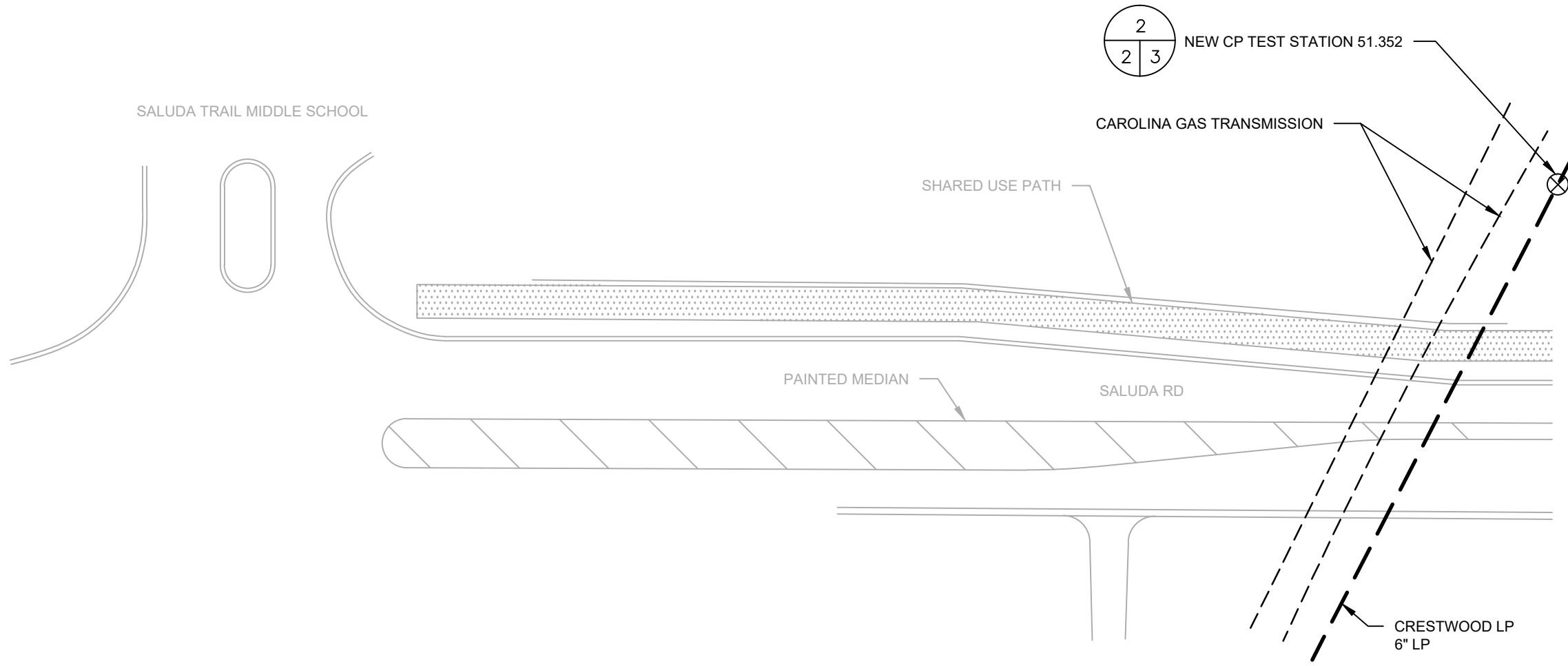
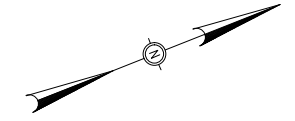
CORROSION CONTROL INCORPORATED
 494 FAIRPLAY STREET
 RUTLEDGE, GEORGIA 30663
 PHONE 706-557-9624 FAX 706-557-7923
 ENGINEERING @ CORROSIONCONTROLLINC.COM



RELOCATE CP TEST STATION 51.147
 OAKDALE RD
 CRESTWOOD LP
 2470 OLD YORK RD
 YORK, SC 29745

DATE: 09-02-23
 DSN BY: RHE
 DWN BY: JG
 CH BY: RHE
 SCALE: AS-NOTED
 SHEET
 A-5141-1
 1 OF 3

TEST STATION LOCATION
 LAT: 34.883942 LON: -81.049550
 INSTALLED AUGUST 31, 2023

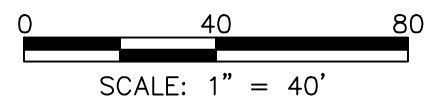


**CORROSION CONTROL
 INCORPORATED**
 494 FAIRPLAY STREET
 RUTLEDGE, GEORGIA 30663
 PHONE 706-557-9624 FAX 706-557-7923
 ENGINEERING @ CORROSIONCONTROLINC.COM



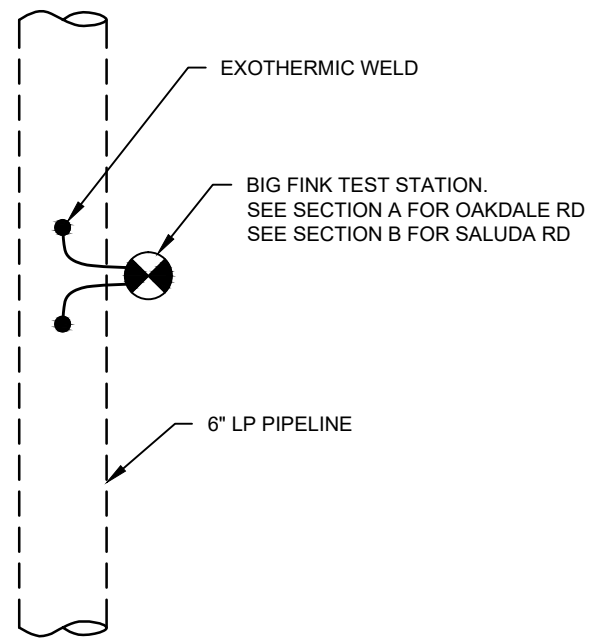
RELOCATE CP TEST STATION 51.352
 SALUDA RD
 CRESTWOOD LP
 2470 OLD YORK RD
 YORK, SC 29745

DATE:	09-02-23
DSN BY:	RHE
DWN BY:	JG
CH BY:	RHE
SCALE:	AS-NOTED



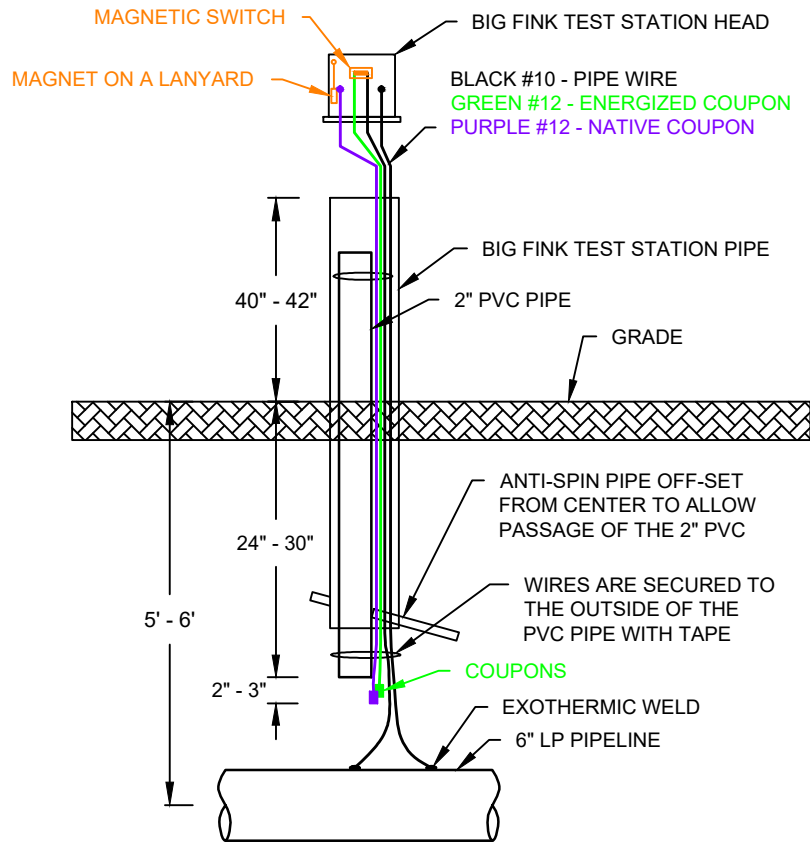
No.	DATE	BY	REVISION

SHEET
 A-5141-2
 2 OF 3

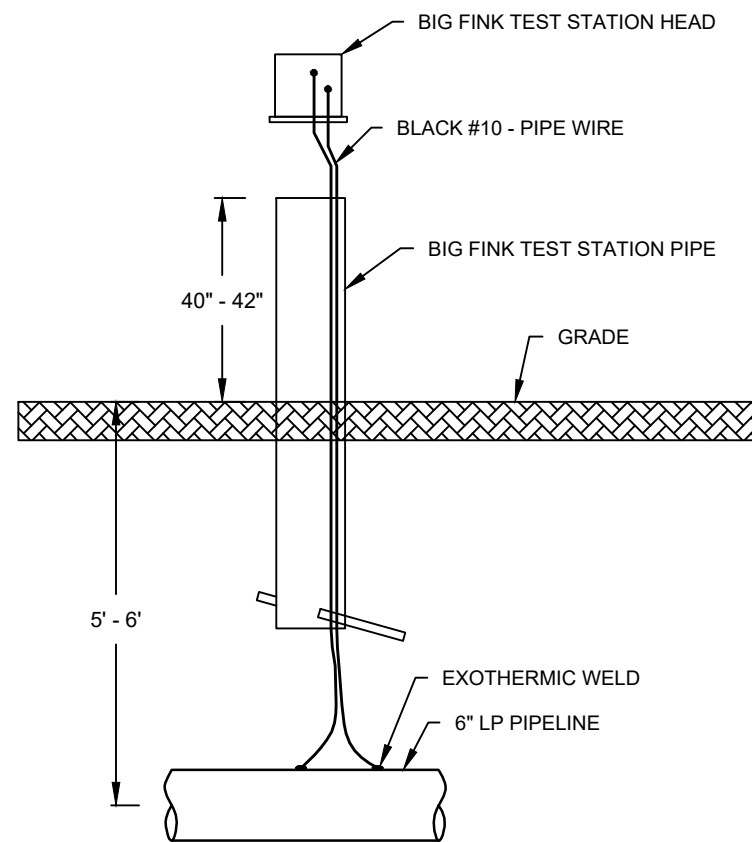


1
1/3 **DETAIL - TS 51.147 OAKDALE RD**

2
2/3 **DETAIL - TS 51.352 SALUDA RD**

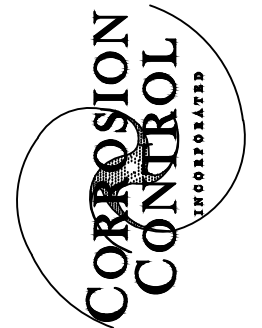


A
SECTION - TS 51.147 OAKDALE RD



B
SECTION - TS 51.352 SALUDA RD

CORROSION CONTROL INCORPORATED
 494 FAIRPLAY STREET
 RUTLEDGE, GEORGIA 30663
 PHONE 706-557-9624 FAX 706-557-7923
 ENGINEERING @ CORROSIONCONTROLLINC.COM



RELOCATE CP TEST STATIONS
 DETAILS
 CRESTWOOD LP
 2470 OLD YORK RD
 YORK, SC 29745

DATE:	09-01-23
DSN BY:	RHE
DWN BY:	JG
CH BY:	RHE
SCALE:	NTS

SHEET
 A-5141-3
 3 OF 3

No.	DATE	BY	REVISION

TEST HOLE DATA - SC HWY. 72 DESIGN SURVEYS

DATE	TIME	COUNTY	DATE	TIME

TEST HOLE NO	TYPE OF UTILITY	UTILITY OWNER	UTILITY MATERIAL	USE OR CAPACITY	SILTY CONDITION	RECORD MATCH	SURFACE TYPE	PAVEMENT THICKNESS	SOIL TYPE	SURVEY MARKER	SURVEY B.M.	HUB GRADE	TOP OF UTILITY ELEV	BOTTOM OF UTILITY ELEV	ALIGNMENT	STATION	PROJECT LOCATION DATA			EASTING
																	OFFSET	NORTHING	EASTING	
1	SS SERV.	CORH	METAL	4"	N/A	N	N	N/A	C	HUB A	BL-10	613.25	607.07	N/A	N/A	1112292.8	108890.2	108890.2	108890.2	
2	GAS	PPL	METAL	6"	N/A	Y	N	N/A	C	HUB A	BL-22	617.96	605.02	N/A	N/A	108891.1	108892.9	108892.9	108892.9	
3	GAS	DE	METAL	12"	N/A	Y	N	N/A	C	HUB A	BL-22	618.06	610.62	N/A	N/A	108891.1	108892.9	108892.9	108892.9	
4	GAS	DE	METAL	16"	N/A	Y	N	N/A	C	HUB A	BL-22	617.66	608.12	N/A	N/A	108891.1	108892.9	108892.9	108892.9	
5	WATER	CORH	PLAST.	12"	N/A	Y	N	N/A	C	HUB A	BL-22	615.99	612.70	N/A	N/A	108891.1	108892.9	108892.9	108892.9	
6	WATER	CORH	METAL	12"	N/A	Y	N	N/A	C	HUB A	BL-22	615.88	612.31	N/A	N/A	108891.1	108892.9	108892.9	108892.9	
7	GAS	PPL	METAL	6"	N/A	Y	N	N/A	C	HUB A	BL-5	628.90	623.02	N/A	N/A	108894.4	108894.4	108894.4	108894.4	
8	GAS	DE	METAL	12"	N/A	Y	N	N/A	C	HUB A	BL-5	628.54	623.24	N/A	N/A	108894.4	108894.4	108894.4	108894.4	
9	GAS	DE	METAL	16"	N/A	Y	N	N/A	C	HUB A	BL-5	628.78	621.07	N/A	N/A	108894.4	108894.4	108894.4	108894.4	
10	WATER	CORH	METAL	12"	N/A	Y	N	N/A	C	HUB A	BL-7	627.85	623.35	N/A	N/A	108894.4	108894.4	108894.4	108894.4	
11	SSFM	CORH	METAL	30"	N/A	Y	N	N/A	C	HUB A	BL-7	628.47	623.08	N/A	N/A	108894.4	108894.4	108894.4	108894.4	
12	SSFM	CORH	METAL	30"	N/A	Y	N	N/A	C	HUB A	BL-7	628.34	622.49	N/A	N/A	108894.4	108894.4	108894.4	108894.4	
13	SSFM	CORH	METAL	30"	N/A	Y	N	N/A	C	HUB A	BL-7	630.24	623.53	N/A	N/A	108894.4	108894.4	108894.4	108894.4	
14	GAS	DE	METAL	16"	N/A	Y	N	N/A	C	HUB A	BL-5	629.07	621.91	N/A	N/A	108894.4	108894.4	108894.4	108894.4	
15	GAS	DE	METAL	12"	N/A	Y	N	N/A	C	HUB A	BL-5	629.18	622.42	N/A	N/A	108894.4	108894.4	108894.4	108894.4	
16	GAS	PPL	METAL	6"	N/A	Y	N	N/A	C	HUB A	BL-5	629.38	622.59	N/A	N/A	108894.4	108894.4	108894.4	108894.4	
17	GAS	DE	METAL	16"	N/A	Y	N	N/A	C	HUB A	BL-22	613.97	609.48	N/A	N/A	108894.4	108894.4	108894.4	108894.4	
18	GAS	DE	METAL	12"	N/A	Y	N	N/A	C	HUB A	BL-22	613.68	608.87	N/A	N/A	108894.4	108894.4	108894.4	108894.4	
19	GAS	PPL	METAL	6"	N/A	Y	N	N/A	C	HUB A	BL-22	614.01	605.94	N/A	N/A	108894.4	108894.4	108894.4	108894.4	
20	WATER	CORH	METAL	12"	N/A	Y	N	N/A	C	HUB A	BL-15	619.88	616.47	N/A	N/A	108894.4	108894.4	108894.4	108894.4	
21	WATER	CORH	METAL	12"	N/A	Y	N	N/A	C	HUB A	BL-15	619.18	616.08	N/A	N/A	108894.4	108894.4	108894.4	108894.4	

PROJECT: BASIS: GPS 15-3
 EASTING: 108890.2
 CGF: 1.00003892 (GROUND TO GRID)
 HORIZONTAL DATUM: NAD 83 (SCSPCS)
 VERTICAL DATUM: NAVD 88
 UNITS: INTERNATIONAL FEET
 ESTABLISHED BY: ESP ASSOCIATES, INC.

I, KEVIN D. MEDEIROS PLS. CERTIFY THAT THE DATA SHOWN HEREON WAS COLLECTED AND COMPILED UNDER MY SUPERVISION, IS CORRECT AND BELIEVE BEYOND REASONABLE DOUBT TO BE TRUE AND ACCURATE IN ACCORDANCE WITH THE REQUIREMENTS OF THE STANDARDS OF PRACTICE MANUAL FOR SURVEYING IN SOUTH CAROLINA, AND MEETS OR EXCEEDS THE REQUIREMENTS AS SPECIFIED THEREIN.

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

SC HWY. 72 ROAD WIDENING DESIGN SURVEYS LEVEL A SUE DATA SHEET

ESP Associates, Inc.

2000 GATEWAY CENTER BLVD. SUITE 206, ROBERTSVILLE, N.C. 27860
 PH: 610-100 COMPUTER LICENSE # 004 - 8809
 SCALE N/A

REFERENCE THE .DGN ENTITLED "HAL SC 72 ROAD WIDENING LEVEL A SUE 04-06-2020" FOR THE FINAL CAD VERSION OF THE ABOVE CERTIFIED DATA

PROJECT DESCRIPTION: SC HWY. 72 ROAD WIDENING LEVEL A SUE

**SOIL DESCRIPTION LEGEND KEY		**SOIL COMBINATION CHART				**SURFACE DESCRIPTION LEGEND KEY			
COMPACTION	WATER LEVEL	SANDY LOAM	SILTY LOAM	CLAY LOAM	CLAY	SAND	ASPHALT	LOCKING BRICK	CONC. RETE
L	D	SL	ZL	CL	CL	Z	A	I	C
LOOSE	DRY	CLAY LOAM	SILTY CLAY	CLAY	CLAY	NATURAL GROUND	N		
	MOIST	SANDY CLAY	SILTY CLAY	CLAY	CLAY	CLAY	C		
	HARD								
	STANDING WATER								

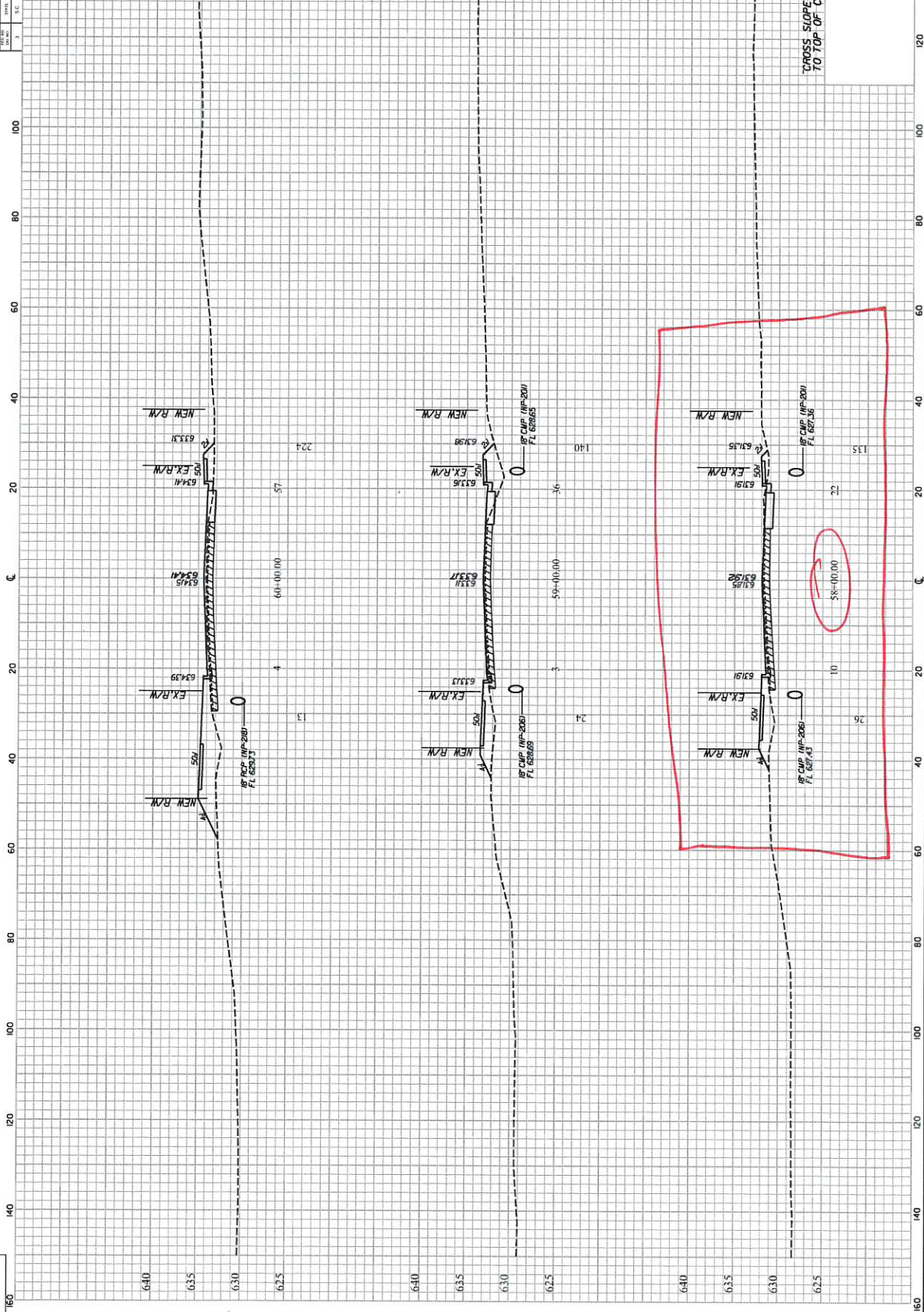
DE - DOMINION ENERGY
 CORH - CITY OF ROCK HILL
 PPL - PLAINS ALL AMERICAN PIPELINE

SS - SANITARY SEWER
 SSFM - SANITARY SEWER FORCE MAIN

KEVIN D. MEDEIROS, PLS NO. 28152

DATE	BY	CHECK	APPROVED	SCALE	SHEET NO.	TOTAL SHEETS
12/20/20	J.S.			1"=40'	22	22

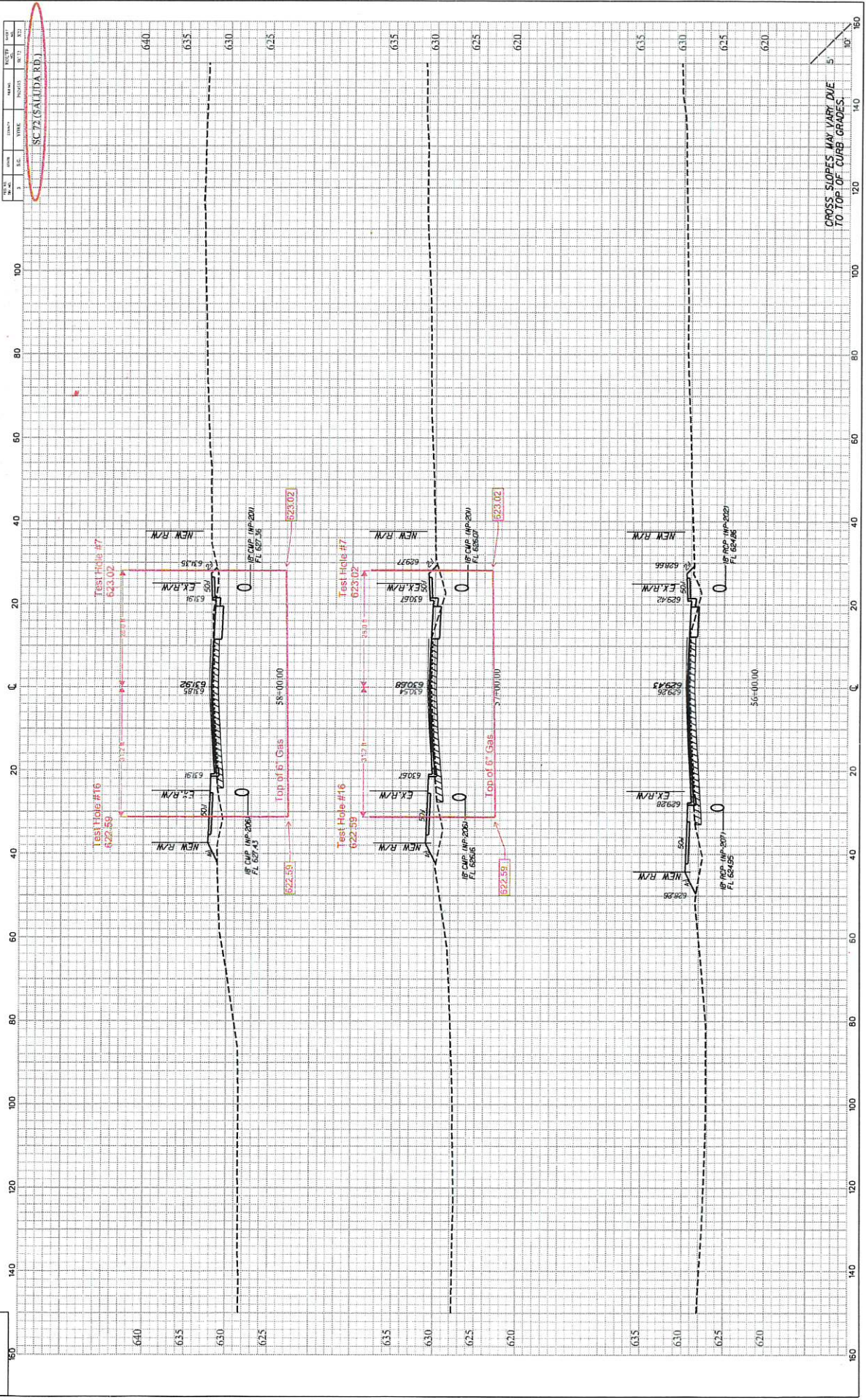
SC 72 (SALUDAR D.)



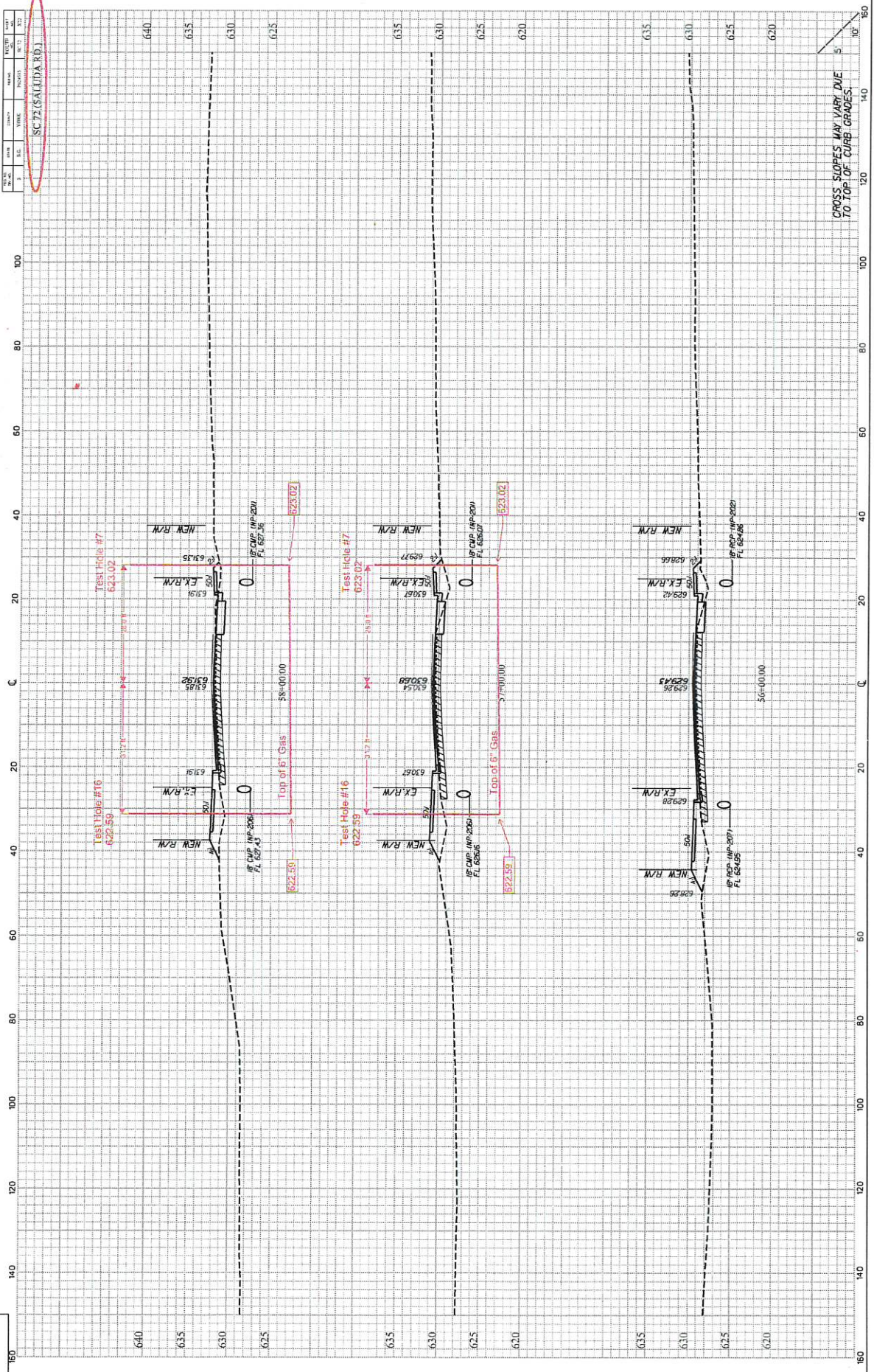
CROSS SLOPES MAY VARY DUE TO TOP OF CURB GRADES.



\$\$\$date\$\$\$
 \$\$\$path\$\$\$
 \$\$\$user\$\$\$

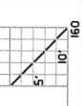
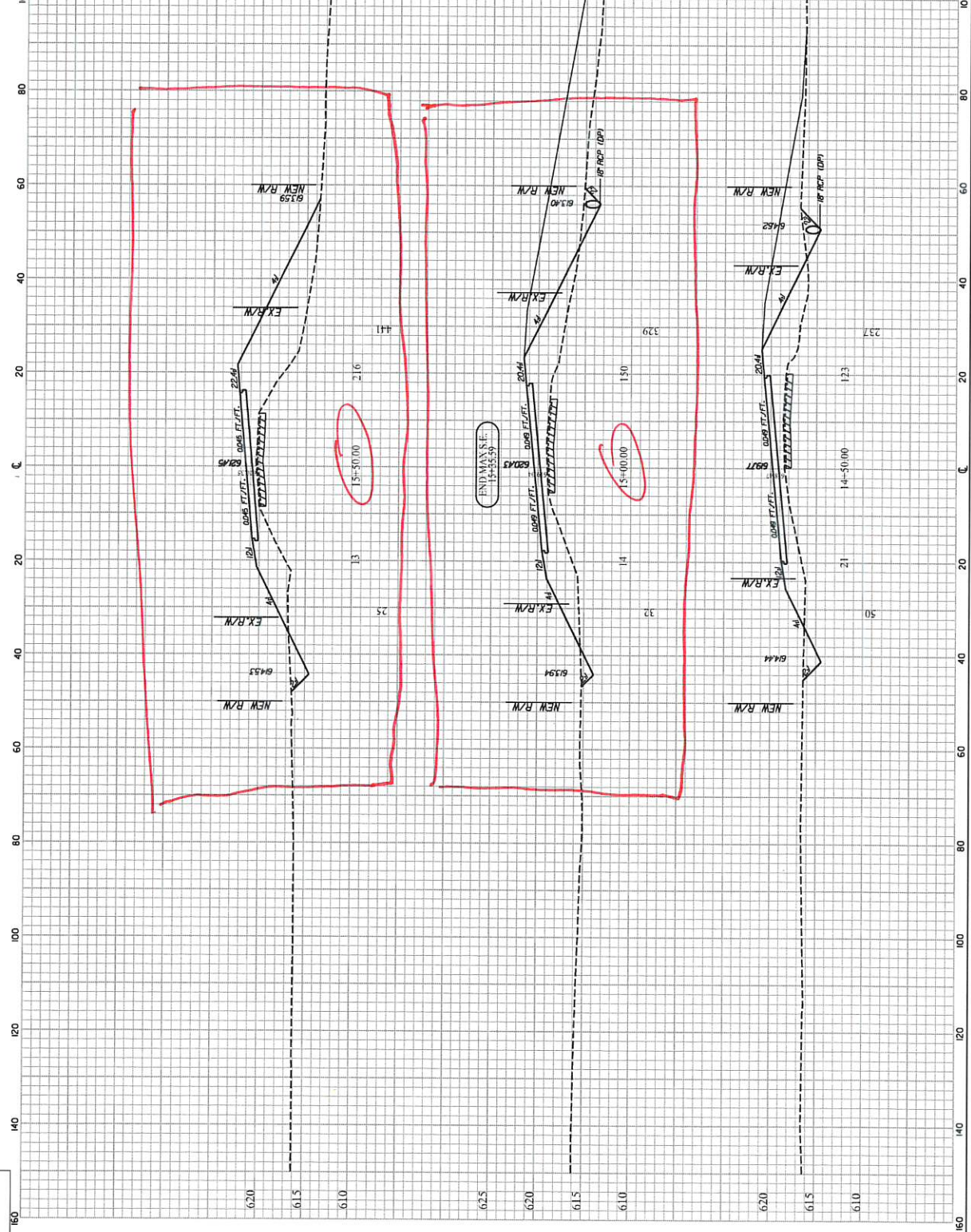


CROSS SLOPES MAY VARY DUE TO TOP OF CURB GRADES.

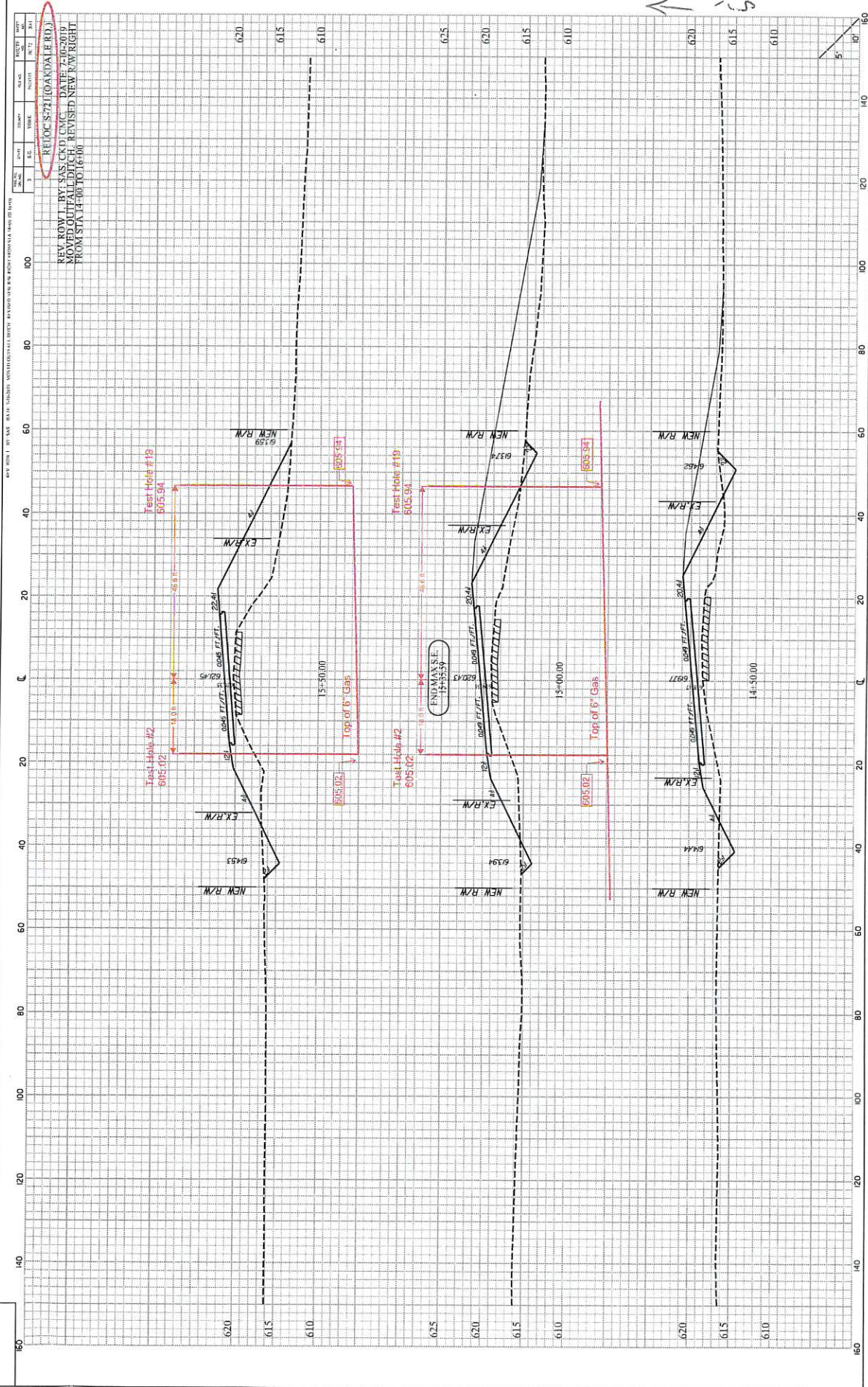


DATE	BY	REVISION	PROJECT	DATE
10/15/10	SA	1	RELOC S-721 (OAKDALE RD)	10/15/10

RELOC S-721 (OAKDALE RD)
 REV. ROW L BY: SAS, CKD, CMC DATE: 7/10/09
 MOVED OUTFALL DITCH, REVISED NEW R/W RIGHT
 FROM STA 14+00 TO 16+00



\$\$\$User\$\$\$
 \$\$\$Dot\$\$\$
 \$\$\$Dot\$\$\$
 \$\$\$Dot\$\$\$



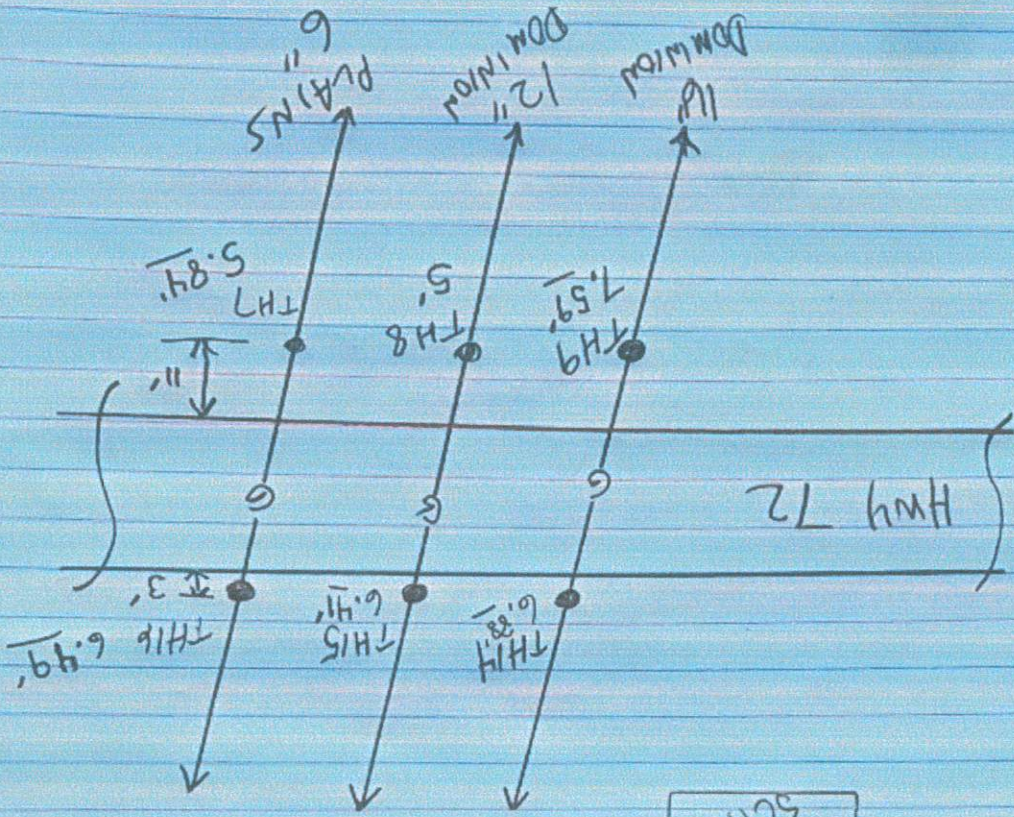
DATE	BY	CHKD	DATE	REVISION
7/12/2019	SAS	CKD	7/12/2019	REVISED NEW R/W RIGHT

RELOC S-71 (OAKDALE RD.)
 REV. ROW L BY SAS, CKD CMC, DATE 7/12/2019
 MOVED OUTFALL DITCH, REVISED NEW R/W RIGHT
 FROM STA 14+00 TO 16+00

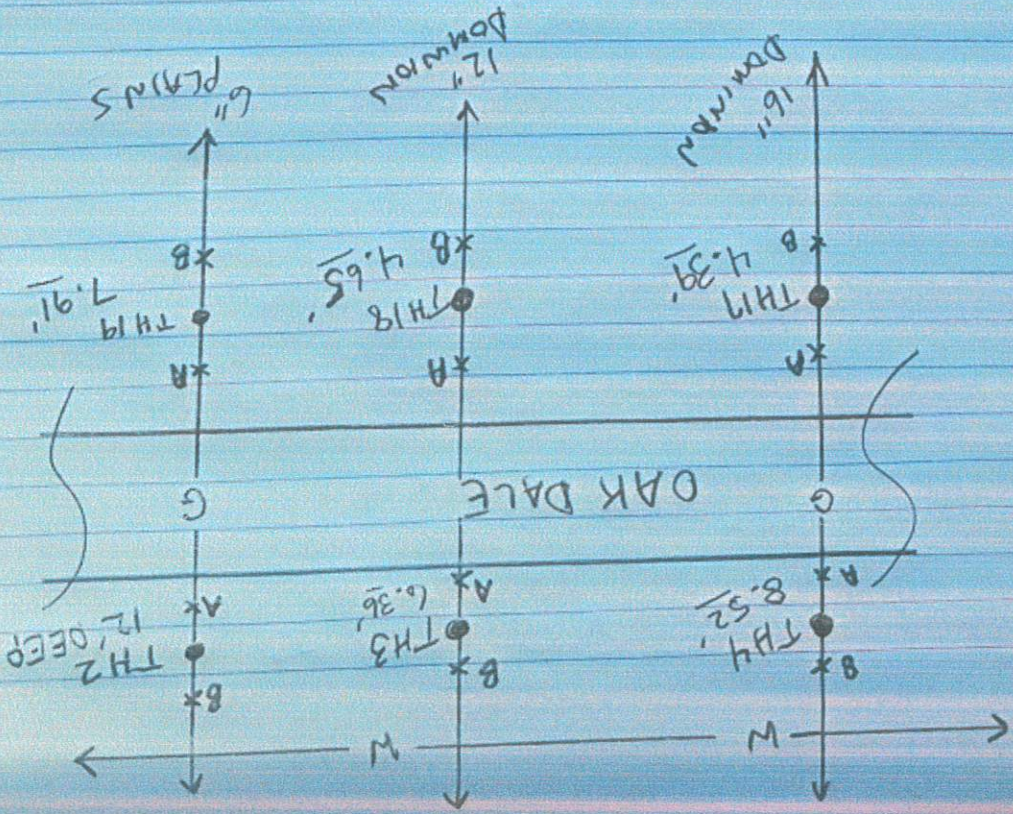
2.518
 110013

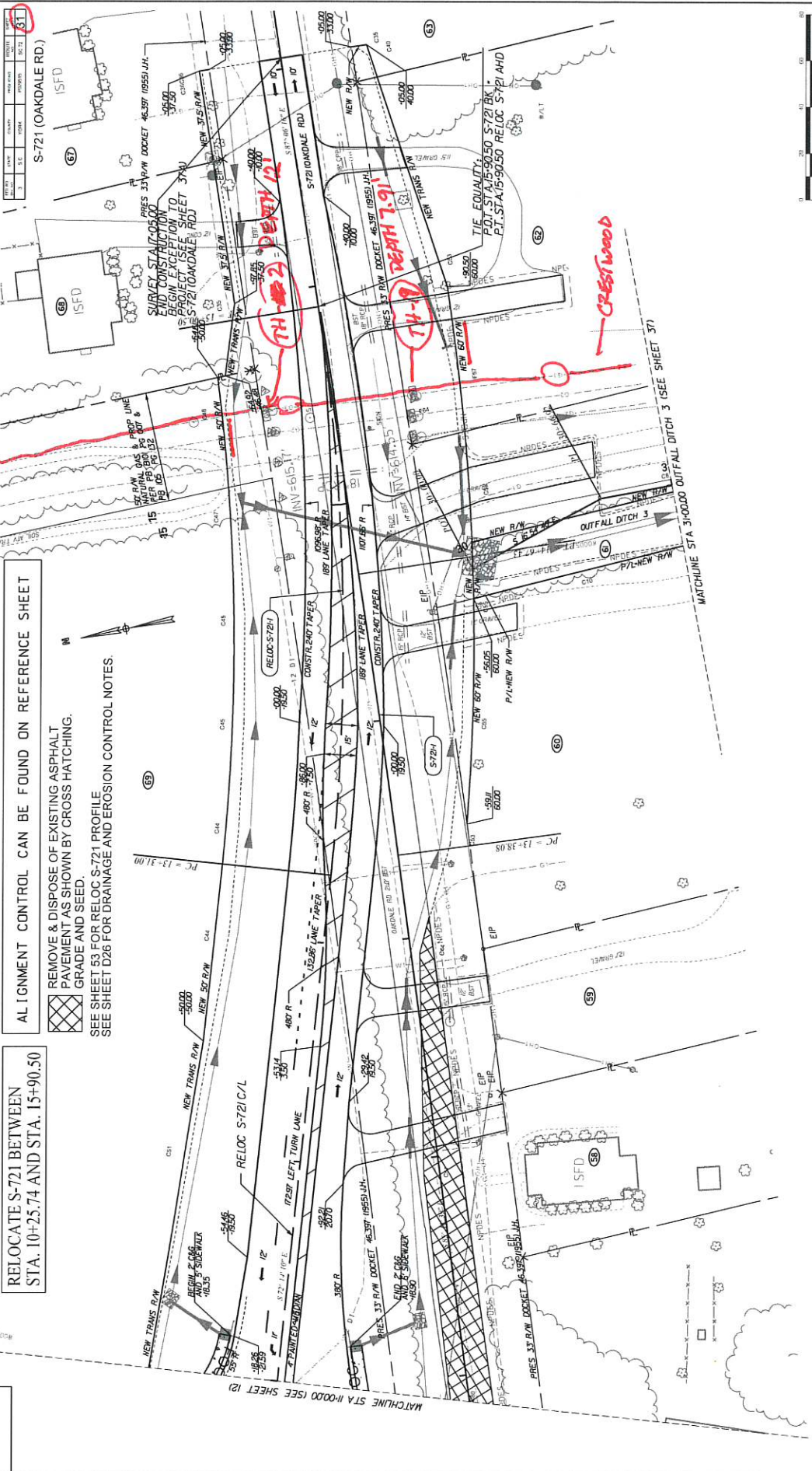
← Station 15

2400



SALUDA
TRAIL
MIDDLE
SCHOOL





ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

REMOVE & DISPOSE OF EXISTING ASPHALT PAVEMENT AS SHOWN BY CROSS HATCHING. GRADE AND SEED.

SEE SHEET 53 FOR RELOC S-721 PROFILE. SEE SHEET D26 FOR DRAINAGE AND EROSION CONTROL NOTES.

RELOCATE S-721 BETWEEN STA. 10+25.74 AND STA. 15+90.50

YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS
S-721 PLAN
STA 11+00 TO STA 17+05.00
SCALE: 1"=20'

PLANS PREPARED BY
CDM Smith

Pennix
INCORPORATED
Progress

York County
south carolina

REVISIONS

NO.	DATE	BY	DESCRIPTION
REV 1	11/11/2019	CMC	RELOCATED OUTFALL DITCH LINE TO MATCH NEW R/W TRACTS 08A & 02
REV 2	11/11/2019	CMC	REVISED ROAD AND PERMANENT EASEMENT CALLOUTS ON TRACT 01
REV 3	11/11/2019	CMC	REVISED FROM TRACT 09
REV 4	11/11/2019	CMC	REVISED FROM EASEMENT CALLOUT TO ROAD "NEW R/W"
REV 5	11/11/2019	CMC	TRACT 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100

DATE: 11/11/2019
DRAWN BY: CMC
CHECKED BY: CMC
SCALE: 1"=20'
SHEET NO.: 31
TOTAL SHEETS: 31

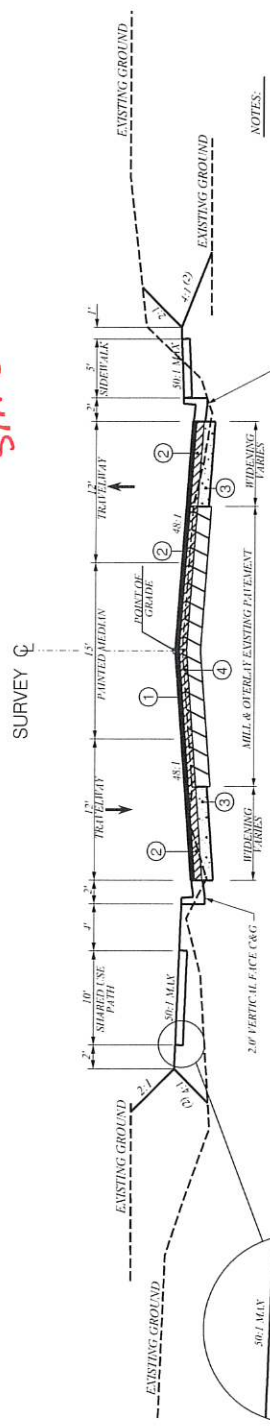
*END OF CASING LOCATION ?
AND TEST STATION/VENT PIPE*

DATE	BY	CHECKED	SCALE	NO.
3/1/21	J.S.C.	POSSE	AS NOTED	3A

SC-72 (SALUDA RD.)

STA 57+00 TO STA 57+00

TYPICAL SECTION ③



USE THIS SECTION FOR
SC 72 (SALUDA RD.)

FROM STA. 17+40.42 TO RELOC. STA. 68+99.05
NTS

DETAIL
10' SHARED-USE-PATH

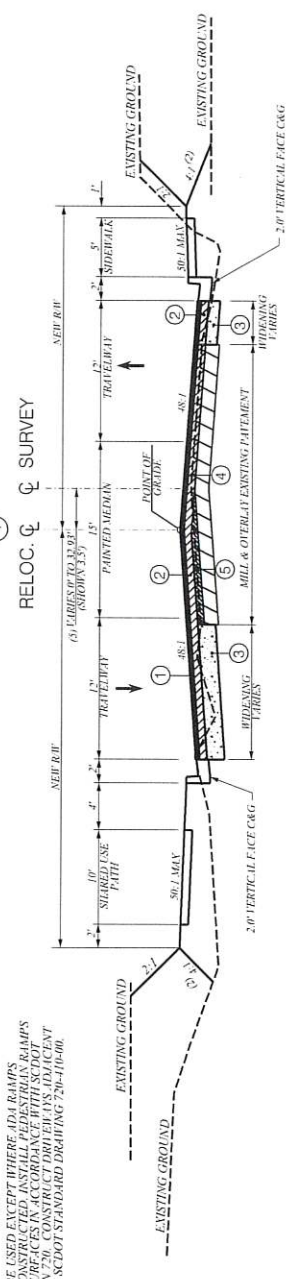
FROM STA. 18+53.75 TO RELOC. STA. 132+30.14
NTS

THIS PAVEMENT SECTION TO BE USED EXCEPT WHERE ADA RAMPS AND DRIBLEYS ARE BEING CONSTRUCTED. INSTALL PEDESTRIAN RAMPS AND DRIBLEYS IN ACCORDANCE WITH STANDARD DRAWING 720-110-00. CONSTRUCT DRIBLEYS TO ADJACENT TO S.U.P. IN ACCORDANCE WITH SCOTD STANDARD DRAWING 720-110-00.

NOTES:

- 1) ADD 3.75' WHERE GUARDRAIL IS REQUIRED. SEE PLAN SHEETS & CROSS SECTIONS FOR SPECIFIC LOCATIONS.
- 2) 2.1' = 0' TO 10' FILL
2.1' = > 10' FILL
- 3) SEE PLANS FOR LOCATIONS OF TURN LANES, LANE WIDENING AND VARIABLE WIDTH MEDIANS.
- 4) INSTALL PEDESTRIAN RAMPS AND DETECTABLE WARNING SURFACES IN ACCORDANCE WITH SCOTD STANDARD DRAWINGS SECTION 720.
- 5) VARIES FROM RELOC. STA. 68+99.05 TO RELOC. STA. 91+19.66
- 6) SEE CROSS SECTIONS FOR SUPER ELEVATED SECTIONS.

TYPICAL SECTION ④

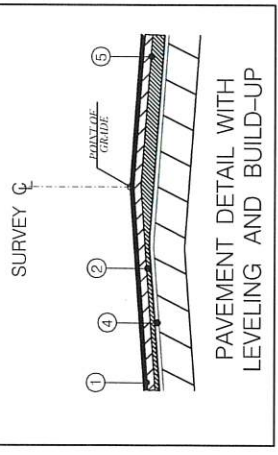


USE THIS SECTION FOR
SC 72 (SALUDA RD.)

FROM RELOC. STA. 68+99.05 TO RELOC. STA. 74+39.71
NTS

PAVEMENT DESIGN

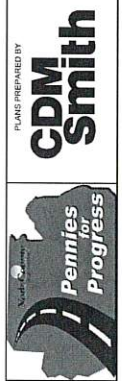
①	HM ASPHALT SURFACE CR. - TYPE B	(200 PSY)
②	HM ASPHALT INTERMEDIATE CR. - TYPE B	(400 PSY)
③	HM ASPHALT BASE CR. - TYPE A	(800 PSY)
④	MILLING EXISTING	(2" MIN.)
⑤	LEVELING & BUILD-UP WITH HM ASPHALT INTERMEDIATE CR. - TYPE B (1.5')	VARIABLE
	HM ASPHALT SURFACE CR. - TYPE F (1.15')	



URBAN PRINCIPAL ARTERIAL

STIP	ST 72 (SALUDA RD.)	PROPOSED TO STA
	45	101+92.50 / 132+32.34
	30	17+48.83 / 132+32.34
		EXCEPTIONS TO DESIGN SPEED

YORK COUNTY, SOUTH CAROLINA
DEPARTMENT OF PUBLIC WORKS
SC 72
TYPICAL SECTIONS
SCALE: AS NOTED
PWT NO. 3A



York County
south carolina

95% PLANS SUBMISSION

REV. NO.	BY	CHK.	DATE	DESCRIPTION OF REVISION

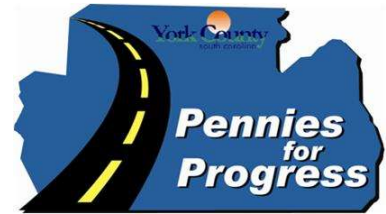
DATE	BY	CHECKED	SCALE	NO.
3/1/21	J.S.C.	POSSE	AS NOTED	3A

DATE	BY	CHECKED	SCALE	NO.
3/1/21	J.S.C.	POSSE	AS NOTED	3A

DIVISION III
FINAL GEOTECHNICAL REPORT



SC ROUTE 72 WIDENING FROM RAMBO ROAD TO SOUTH OF SC 901



FINAL ROADWAY GEOTECHNICAL ENGINEERING REPORT

Prepared for:



Prepared by:



August 2020



FINAL
ROADWAY GEOTECHNICAL ENGINEERING REPORT

SC72 Widening from Rambo Road to South of SC901

York County, South Carolina
York County Project Number: 11149-014
CDM Smith Project Number: 111726

Prepared for
York County of South Carolina

August 10, 2020

Prepared By:
CDM Smith



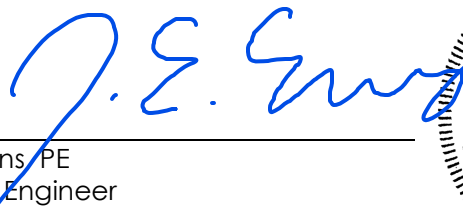
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Reviewed By:
CDM Smith



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Geotechnical Engineer

Prepared By:
CDM Smith

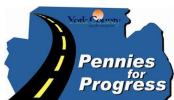


Thomas E. Evans, PE
Geotechnical Engineer



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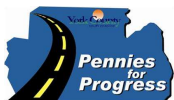
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Appendix A	Field Testing Location Plan
Appendix B	Field Exploration Records
Appendix C	Laboratory Test Results
Appendix D	Slope Stability and Settlement Analyses
Appendix E	Site Photographs



1 INTRODUCTION

1.1 PROJECT DESCRIPTION AND LOCATION

York County of South Carolina plans to widen about 2.1 miles of SC72 (Saluda Road) near the southern limits of Rock Hill, South Carolina. The project limits along SC72 will extend northeast from about S-163 (East Rambo Road) to about SC901 (Mount Holly Road). The project locus is shown on Figure 1-1.

The SC72 widening will consist of a new center turn lane along the entire project as well as a curb and gutter. Widening to accommodate the new turn lane will begin at station 10+00. The planned three-lane section continues to station 11+12.50 where a sidewalk and multiuse pathway will be built to the right and left of the roadway. Further widening takes place near station 74+38.45 where the roadway will transition to a five-lane roadway and continue as such to the end of the project. In addition to the SC72 widening, many of the cross roads will be realigned at their intersections with SC72. Those roads with several hundred feet of proposed realignment include: East Rambo Road, Dunlap Roddey Road, Oakdale Road, Harper Gault Road and Rawlsville Road.

New roadway fills will typically be 1 to 4 feet thick. Localized fills may be on the order of 10 feet. Cuts will be about 1 to 6 feet deep.

The project is not anticipated to have any bridges or retaining walls. However, eleven drainage pipe crossings are planned along the SC72 alignment.

1.2 PURPOSE AND SCOPE

The objective of this work was to conduct a roadway geotechnical engineering exploration related to the improvements proposed for SC72, in general accordance with the requirements of the South Carolina Department of Transportation (SCDOT) *Geotechnical Design Manual (GDM)*, Version 1.1, 2010, as well as applicable SCDOT *Bridge Design Memoranda*. This report presents our understanding of the project and site conditions, a discussion of subsurface conditions encountered within a limited number of soil borings performed at the project site, and recommendations related to the design of roadway embankments.



Figure 1-1 Site Locus



(Image Created using Google Earth, 2016)



1.3 REPORT LIMITATIONS

This report has been prepared in accordance with generally accepted engineering practices and the SCDOT *GDM*. The discussions and recommendations in this report are not intended for use in the preparation of construction plan documents. No other warranty, express or implied, is made. In the event that changes in the design or location of the earthworks occur, the conclusions and recommendations contained herein should not be considered valid unless verified in writing by CDM Smith.



2 SITE AND SUBSURFACE CONDITIONS

2.1 GENERAL

The project site is located along the southwestern side of Rock Hill, South Carolina. Residential properties are along both sides of Saluda Road within the project limits, but they are most prevalent near the ends of the project (between East Rambo Road and Oakdale Road and between Rawlsville Road and Mount Holly Road). Saluda Trail Middle School and Rock Hill Country Club are sizable properties near the middle of the project. A few commercial properties and undeveloped, wooded tracts are also present along both sides of Saluda Road.

Just North of Saluda Trail Middle School, multiple utility easements cross Saluda Road. Three parallel gas transmission lines pass under Saluda Road immediately north of the main entrance to the school. Overhead transmission lines cross over Saluda Road about 500 feet south of Harper Gault Road.

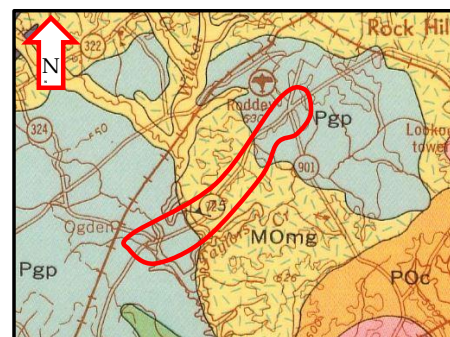
The gently rolling hills along the project are typical of those in the piedmont of South Carolina. The ground elevations along Saluda Road vary between approximately +611 and +638 feet. Slopes along the project limits are typically inclined at 2.5H:1V or flatter, and appear stable with only surface erosion noted in some areas.

2.2 SITE GEOLOGY AND SOIL SURVEY

The site is located in the Central Piedmont physiographic province of South Carolina. The Piedmont is characterized by crystalline igneous and metamorphic bedrock overlain by partially weathered rock and residual soil.

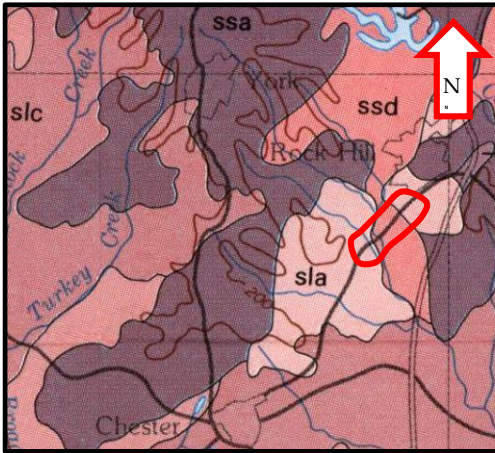
According to the *Geologic Map of the Crystalline Rocks of South Carolina, 1965* (see **Figure 2-1**), the site is located within the Charlotte Belt and underlain by two geologic units: **Pgp** (Gabbro, Pyroxenite and Norite) and **MOmg** (Mica Gneiss). The partially weathered rock encountered in CDM Smith's subsurface exploration is more consistent with the nearby unit of **POc**, or coarse-grained granite which is described in Southwestern York County as light gray to gray, coarse-grained, locally biotite-

Figure 2-1: Crystalline Rocks of South Carolina



quartz monzonite. Mica gneiss is noted to have granitic layers. The observed weathered rock samples encountered as a part of our preliminary investigation were interpreted as granitic-diorite or “granodiorite.”

Figure 2-2: Quaternary Geologic Map of the Savannah Quadrangle



According to the *Quaternary Geologic Map of the Savannah 4x6 Quadrangle, United States, 1987* (see **Figure 2-2**), the site extends over two geologic units: **ssd** (sandy clay saprolite developed on metamorphic or igneous rocks, thickness less than 5 meters) and **sla** (clayey saprolite). The first soil unit (**ssd**) consists of red, yellowish-red, “strong-brown” and light to greenish gray, slightly clayey sand to sandy clay saprolite. The second soil unit (**sla**) consists of greenish-gray and yellow, slightly micaceous clayey sand to sandy clay or clayey silt.

According to the *Soil Survey of York County*, the predominant surficial soils at the site are sandy and clayey residuum derived from granite, gabbro and micaceous gneiss. Near surface soils are reported to include loam, sandy loam, silt and clay loam, and clay from the Brewback, Cecil, Mecklenburg, Wynott and Pacolet series. Soils are noted to range from clayey sand and clay (SC, CL, CH, A-6, A-7-6) in the higher elevations to silty and clayey sand and clay (SC-SM, CL, CH, A-4, A-6, A-7-6) in the lower elevations. The depth to weakly cemented Fragipan or paralithic bedrock is typically estimated to be between 1.5 and 5 feet. Soils reportedly vary between a moderate and very slow infiltration rate, and they have a relative risk of corrosion for uncoated steel and concrete of moderate to high and low to moderate, respectively. The pH values of the soil series in the lower and higher elevations range from about 4.5 to 8.5 and 4.5 to 6, respectively. Groundwater is estimated at a depth between 0.5 and 3.3 feet below existing grades in the lower elevation soil series, which is generally anticipated near the Northeastern end of the project alignment.

2.3 SUBSURFACE EXPLORATION AND TESTING PROGRAM

The subsurface exploration was performed in two phases by CDM Smith and subcontractor, Terracon, Inc. As part of the preliminary phase, Terracon drilled 29 test borings in February of 2016. The preliminary phase borings were designated as B01 through B29. In addition to the soil borings, dynamic cone penetrometer (DCP) tests were performed at ten pavement core locations within existing travel lanes, designated as C01 through C10. As part of the final phase, Terracon drilled seven test borings in March of 2020. The final phase borings were also designated as B33 through B42. In addition to the soil borings, Terracon, Inc. performed a hand auger boring designated as HA37. The location and depth of the field tests conducted

for the preliminary and final subsurface explorations are summarized in **Table 2-1** and **Table 2-2**, respectively.

All of the test locations are shown on the field testing location plan sheets provided in **Appendix A**. Logs of the test borings, DCP tests, and the hand auger boring are provided in **Appendix B**.

The test borings were drilled using either a truck-mounted CME-45C drill rig or a track-mounted CME-55 drill rig. The borings were advanced using 4¼ -inch (outside diameter) continuous flight augers. The pavement cores were conducted using a portable coring rig with a 6-inch core barrel, and the soundings were performed with a dynamic cone penetrometer (ASTM D 6951). The soundings were advanced up to three feet below the pavement surface.

Soil sampling in the test borings was typically accomplished by the standard penetration test (SPT) using a split-spoon sampler (ASTM D 1586). The CME-45C and CME-55 used automatic hammers with measured hammer efficiencies of 76.3% and 80%, respectively. SPT sampling was typically performed on 2- to 5-foot intervals in accordance with SCDOT *GDM* requirements. Borings were advanced to target depths or until auger refusal was encountered. Bulk soil samples of auger cuttings were collected from borings B02, B05, B12, B17, B20, B25, and B28.

Terracon performed a laboratory test program that included determinations of natural moisture content, grain-size distribution, and Atterberg limits. Terracon also performed Standard Proctor compaction, consolidated-undrained (CU) triaxial compression, and direct shear testing on the bulk samples. Shear strength properties determined from this testing was used in the slope stability analyses. A summary of the lab results can be found in **Tables 2-3** through **2-6**. Test data sheets are attached in **Appendix C**.



Table 2-1: Soil Testing Location Table – Preliminary Subsurface Investigation

Number	Alignment	Station	Offset	Elevation (feet) ¹	Depth (feet)
B01	SC72	11+48	7.6' LT	617.2	10
B02	SC72	16+57	28.9' LT	627.3	10
B03	SC72	21+54	19.3' LT	634.5	10
B04	SC72	26+54	7.2' LT	631.2	15
B05	SC72	31+61	32.7' LT	637.1	10
B06	SC72	36+62	22.4' LT	630.8	15
B07	SC72	42+32	20.2' LT	635.3	2.5
B08	SC72	47+45	20.1' LT	625.4	15
B09	SC72	52+50	17.2' LT	625.0	10
B10	SC72	57+46	35.5' LT	629.6	10
B11	SC72	62+20	39.7' LT	633.8	10
B12	SC72	67+02	21' LT	632.6	15
B13	SC72	72+36	27.7' LT	626.6	15
B14	SC72	77+56	33' RT	620.8	10
B15	SC72	82+26	29.1' RT	624.2	10
B16	SC72	87+51	50.5' LT	627.8	10
B17	SC72	90+93	20.2' LT	627.1	15
B18	SC72	93+80	44.2' RT	625.8	15
B19	SC72	97+09	29.2' LT	618.4	15
B20	SC72	100+04	30.8' LT	615.9	15
B21	SC72	105+16	43.7' LT	612.8	8.9
B22	SC72	109+47	23.8' LT	611.8	5.5
B23	SC72	114+87	25.4' LT	610.2	5.3
B24	SC72	119+35	31' LT	612.3	9.3
B25	S-163	16+39	8.6' LT	627.0	15
B26	SR 46-244	14+78	36.8' RT	620.1	15
B27	S-721	13+93	3.5' RT	617.5	15
B28	S-1576	16+68	0.4' RT	633.0	15
B29	S-250	15+55	10.6' LT	628.4	15
C01	S-163	16+34	20.7' LT	628.5	3.4
C02	SC72	11+44	7.8' LT	617.2	4.6
C03	SR 46-244	14+78	36.8' RT	619.7	4.1
C04	S721	13+95	11' RT	618.5	3.3
C05	SC72	52+50	17.2' LT	625.0	3.5
C06	S-1576	16+68	0.4' RT	633.7	3.4
C07	SC72	79+77	7' RT	622.8	3.8
C08	S-250	15+54	20.5' LT	628.9	3.6
C09	SC72	97+07	8.0' LT	617.3	4.2
C10	SC72	119+34	24.8' LT	612.9	4.1

Notes:

¹ Based on NAVD'88.

Table 2-2: Soil Testing Location Table – Final Subsurface Investigation

Number	Alignment	Station	Offset	Elevation (feet) ¹	Depth (feet)
B33	SC-72	41+76	71.13' LT	648.4	30
B34	SC-72	49+15	19.5' LT	624.3	10
B35	SC-72	74+16	29.65' LT	623.6	10
B38	SC-72	111+63	13.1' LT	611.6	10
B40	SC-72	130+31	36' LT	612.5	10
B41	SC-72	184+43	17.73' RT	621.6	10
B42	SC-72	9+80	8.00' RT	605.3	10
HA37	SC-72	89+87	38.36 LT	623.7	10

Notes:

¹ Based on NAVD'88.

Table 2-3: Laboratory Testing Table

Test Type	Test Standard	Quantity
Atterberg Limits	ASTM D 4318	39
Full Sieve Analysis	AASHTO T 311-00	45
Natural Moisture Content	ASTM D 2216	57
Standard Proctor Compaction	ASTM D 698	8
Remolded CU Triaxial with Pore Pressure Readings	ASTM D 4767	7
Remolded Direct Shear – 3-point test	ASTM D 3080	1



Table 2-4: Preliminary Laboratory Test Results: Index Testing

Test Boring No.	Sample No. ¹	Sample Depth (ft)	USCS Soil Type(s)	Moisture Content (%) ²	Grain Size Analysis (%) ³			Atterberg Limits (%) ⁴	
					Gravel	Sand	Fines	Liquid Limit	Plasticity Index
B01	SS-2	2-4	SC	19.5	0.6	57.5	41.9	38	21
B02	BULK ⁵ (SS 1-4)	0-10	CL	22.6 ⁽⁵⁾	0.1	42.9	57.1	44	19
B03	SS-3	4-6	SC	25.7	0.8	53.6	45.6	62	37
B04	SS-2	2-4	MH	22.3	0.0	49.5	50.5	55	23
B04	SS-5	8-10	SM	23.6	0.5	59.8	39.6	55	24
B05	BULK ⁵ (SS 1-3)	0-6	MH	32.5 ⁽⁵⁾	0.0	29.0	70.4	66	31
B07	SS-1	0-2	MH	39.9	1.8	24.8	73.4	65	27
B08	SS-2	2-4	CH	22.9	2.8	38.4	58.8	55	31
B08	SS-4	6-8	CH	25.5	0.1	27.9	72.0	71	41
B11	SS-1	0-2	CH	28.5	0.0	38.5	61.5	68	41
B12	BULK ⁵ (SS 1-3)	0-6	ML	25.4 ⁽⁵⁾	0.0	40.9	59.1	47	19
B13	SS-1	0-2	MH	34.4	0.0	12.3	87.7	70	34
B14	SS-1	0-2	SC	24.7	5.5	45.5	49.0	61	33
B15	SS-1	0-2	MH	32.2	0.0	31.2	68.8	55	20
B16	SS-1	0-2	SC	20.4	1.3	55.1	43.5	51	25
B17	BULK ⁵ (SS 1-4)	0-10	MH	23.5 ⁽⁵⁾	0.4	28.3	71.2	52	22
B17	SS-5	8-10	MH	36.0	0.0	34.3	65.7	55	16
B18	SS-1,2	0-4	CH	29.9	0.2	31.9	67.9	50	24
B19	SS-1	0-2	SC	19.2	2.9	60.1	37.0	31	15
B19	SS-2	2-4	CH	28.9	0.0	22.7	77.3	68	42
B20	BULK ⁵ (SS 1-4)	0-10	SC	21.2 ⁽⁵⁾	0.0	59.2	40.8	27	11
B21	SS-1	0-2	CH	30.5	0.5	44.8	54.8	56	35
B24	SS-1	0-2	CH	28.3	0.0	34.1	65.9	61	30
B25	BULK ⁵ (SS 1-3)	0-6	MH	28.3 ⁽⁵⁾	0.0	35.7	64.3	55	21
B28	BULK ⁵ (SS 1-3)	0-8	CH	17.7 ⁽⁵⁾	2.7	36.6	60.6	46	22
B28	SS-2	2-4	CL	31.4	0.5	17.6	82.0	73	40
B29	SS-1	0-2	SC	11.8	10.9	57.1	32.0	30	15

Notes:

¹ "SS" and "BULK" designates split-spoon and bulk samples, respectively.

² Moisture contents, AASHTO T-265 (ASTM D2216)

³ Grain size analyses, AASHTO T 311-00

⁴ Atterberg limits, AASHTO T89/T90 (ASTM D4318)

⁵ Samples with multiple split spoons listed were combined to evaluate the corresponding BULK in-situ moisture level

Table 2-5: Final Laboratory Test Results: Index Testing

Test Boring No.	Sample No. ¹	Sample Depth (ft)	USCS Soil Type(s)	Moisture Content (%) ²	Grain Size Analysis (%) ³			Atterberg Limits (%) ⁴	
					Gravel	Sand	Fines	Liquid Limit	Plasticity Index
B33	SS-1	0-2	-	27	3.0	27.7	69.3	-	-
B33	SS-2	2-4	-	29	0.1	16.5	83.4	-	-
B33	SS-3	4-6	-	30	0.4	16.9	82.7	-	-
B33	SS-4	6-8	MH	32	-	-	71.2	54	12
B33	SS-5	8-10	MH	36	-	-	82.4	53	12
B33	SS-6	13.5-15	MH	35	-	-	75.7	55	15
B33	SS-7	18.5-20	-	38	0.7	26.1	73.2	-	-
B33	SS-8	23.5-25	-	32	0.0	34.8	65.2	-	-
B33	SS-9	28.5-30	-	35	0.0	38.3	61.7	-	-
B34	SS-1	15.-3	-	20	15.9	33.3	50.9	-	-
B34	SS-2	3-4.5	CL	24	-	-	65.3	45	22
B34	SS-3	4.5-6	CL	22	-	-	65.7	42	20
B35	SS-1	0-2	-	21	0.7	34.3	65.0	-	-
B35	SS-2	2-4	CH	33	-	-	92.0	67	36
B35	SS-3	4-6	MH	31	-	-	90.4	65	32
B38	SS-1	1-2.5	CL	23	-	-	66.8	48	30
B40	SS-1	1-2.5	CL	30	-	-	55.9	43	24
B41	SS-1	0-2	-	17	0.5	50.6	48.9	-	-
B41	SS-2	2-4	CH	27	-	-	67.4	57	32
B41	SS-3	4-6	MH	28	-	-	77.7	59	28
B42	SS-1	1-2.5	CH	23	-	-	64.4	55	26
B42	SS-2	2.5-4	-	24	2.2	38.1	59.7	-	-
B42	SS-3	4-6	-	31	0.4	40.4	59.2	-	-
B42	SS-4	6-8	-	36	0.0	40.8	59.2	-	-
HA37	SS-1	0-1	-	24	2.7	32.7	64.6	-	-
HA37	SS-2	1-2	-	22	0.9	39.0	60.0	-	-
HA37	SS-3	2-3	-	21	1.6	39.6	58.8	-	-
HA37	SS-4	3-4	-	27	0.3	36.8	62.9	-	-
HA37	SS-5	4-5	-	28	0.1	36.3	63.6	-	-
HA37	SS-6	5-6	-	27	0.2	37.6	62.2	-	-

Notes:

¹ "SS" and "BULK" designates split-spoon and bulk samples, respectively.

² Moisture contents, AASHTO T-265 (ASTM D2216)

³ Grain size analyses, AASHTO T 311-00

⁴ Atterberg limits, AASHTO T89/T90 (ASTM D4318)



Table 2-6: Summary of Compaction and Strength Testing of Bulk Samples

Test Boring No.	Sample Depth (ft)	USCS Soil Type	Total Stress		Effective Stress ²		Percent Fines	Max. Dry Density (PCF)	Optimum Water Content (%)
			Cohesion (psf)	ϕ (deg)	Cohesion' (psf)	ϕ' (deg)			
B02	0-10	CL	588	25.1	148	28.7	57.1	100.9	17.9
B05	0-6	MH	216	11.8	86.4	29.6	70.4	90.4	26.3
B12	0-6	ML	409	25.4	238	27.2	59.1	102.1	18.0
B17	0-10	MH	36	28.3	7	31.4	71.2	99.5	18.7
B20	0-10	SC	432	22.1	307	26.3	40.8	121.0	11.2
B25	0-6	MH	158.4	15.1	28.8	28.3	64.3	95.1	21.8
B28	0-8	CL	751	13.8	226	24.4	60.6	108.3	17.2
¹ B33	0-10	MH	412	25.4	-	-	-	95.4	24.5

Notes:

¹ Direct Shear testing was used to determine the strength parameters for sample B33. The remaining tests were performed using Consolidated Undrained Triaxial testing.

² Effective stresses reported ϕ' -c' in laboratory report by Terracon, however, drained cohesion was not necessarily used in analysis.

2.4 GENERALIZED SUBSURFACE CONDITIONS

Surface materials encountered in the borings generally included less than 4 inches of topsoil in unpaved areas and asphalt pavement sections along roadways. Within the depths explored beneath these surface materials, the generalized soil stratigraphy includes occasional fills over residuum over partially weathered rock (PWR). PWR is defined as material with SPT N-value of 100 or greater. A stratification summary of conditions along the project corridor is given in **Table 2-7**.

Table 2-7: Generalized Subsurface Stratigraphy

Geologic Formation	Typical Depth to Top of Layer (feet)	USCS Soil Types	Approx. Range of Measured SPT N-values	Comments
Fill	0	SM, SC, CL, ML, CH, MH	2 to 12	Beneath pavements, within roadway embankments, and backfilled utility trenches.
Residuum	0 to 6	SM, CL, ML, CH, MH	1 to 36	-
PWR	5 to 15+	Not Applicable	100+	Only encountered in borings B21, B22, B23, B24, B38, and B40.

Pavement types and thicknesses varied across the project site from 2 to 18 inches of asphalt pavement over varying thicknesses of concrete (PCC), soil/aggregate concrete, and/or aggregate base course (ABC). Pavement description, evaluation, and analysis can be found in separate CDM Smith technical memorandum dated September 2018.



Fill was more prevalent along the southwestern half of the project as identified in borings B03 through B10, B16, B17, B27, B28, B38, B41 and B42. The thickness of the fill was often about 2 to 6 feet. Both coarse-grained (SM, SC / A-2 and A-2-4) and fine-grained (ML, MH, CL, CH / A-4, A-6 and A-7) fill soils were sampled beneath pavements, within roadway embankments and at backfilled utility trenches. Measured SPT N-values in the fill varied from 2 to 35.

Beneath the fill soils, the residuum at the site was primarily fine-grained soils (CL, CH, ML, MH / A-4, A-5, A-6, A-7-5, A-7-6) with a variable fraction of sand. However, a few zones of silty or clayey sand (SM, SP-SM, SC / A-2 and A-2-4) were also identified. At the boring locations, the residual soils extend from about 5 feet to more than 15 feet beneath existing grades. The majority of the borings did not fully penetrate the residuum. The measured SPT N-values varied but were generally between about 10 and 20. Natural moisture contents were typically between 20% and 30%, which is close to the samples' corresponding plastic limits.

PWR was encountered beneath residuum in six of the test borings. The PWR was sampled primarily as silty sand. PWR in the Piedmont region is native bedrock material that has weathered in-place and produces SPT N-values greater than 100. The top of the PWR was encountered between elevations of +606 and +607 feet in Borings B21 through B24. The PWR was typically about 2 to 4 feet thick and was underlain by crystalline bedrock. The parent rock unit of the encountered PWR was identified as granodiorite.

Rock was encountered in borings B22 and B23 by auger or split spoon refusal, between stations 109+00 and 115+00.

2.5 GROUNDWATER CONDITIONS

Groundwater measurements were taken in each of the borings at the time of drilling and often at least 24 hours after drilling. At the time of drilling, all the borings were dry except for B27. Due to safety concerns, borings B01, B03, B04, B07, B09, B25 through B29, B33 through B35, B38, and B40 through B42 were backfilled after drilling. Of the borings which remained open overnight, groundwater was only measured in four of the borings, and these are summarized in **Table 2-8**.

It should be noted that fluctuations in rainfall, evaporation, construction activity, surface runoff, and other site-specific factors could cause groundwater elevations at the time of construction to vary from those observed during this subsurface exploration.



Table 2-8: Measured Groundwater Levels

Boring		B08	B19	B20	B21	B27
Depth (feet)	Time of Drilling	Dry	Dry	Dry	Dry	11.2
	24-Hour	11.0	13	5.0	8.0	N/A ²
Groundwater Elevation (feet) ¹		614.4	605.4	610.9	604.8	606.3

Notes:

¹ Based on NAVD'88.

² Pavement area, boring filled upon completion.



3 GEOTECHNICAL DESIGN RECOMMENDATIONS

3.1 GENERAL

This section of the report describes our geotechnical engineering evaluation, discussion of anticipated geotechnical issues that will impact design and construction, and recommendations for the proposed roadway improvements. Our evaluation was conducted in general accordance with SCDOT *GDM* and applicable SCDOT *Bridge Design Memoranda*. This section provides a discussion of geotechnical issues that may potentially impact design and construction of the proposed roadway sections.

3.2 ROADWAY EMBANKMENTS

3.2.1 Overview

The most significant fills for the project will be placed over existing embankment slopes that are typically 3H:1V or flatter. These in-place embankment slopes appear stable. The proposed fill and cut slopes will be 2H:1V or flatter.

Based on roadway plan and profile information provided for our use, cuts and fills will typically be less than 5 feet. Maximum cut will be about 9 feet and maximum fill will be about 9 feet.

Roadway construction should be conducted in accordance with latest version of the SCDOT *Standard Specifications for Highway Construction*, the recommendations provided in this report, and project specific supplemental specifications.

3.2.2 Stability Analyses

Upon review of the proposed roadway plan and profile drawings, areas of cut and fill slopes were selected for slope stability analyses using the *Slope/W* computer software. The geometry and subsurface model at each of the analyzed sections are summarized in **Table 3-1**. Selected material properties for these analyses are summarized in **Table 3-2**. Additional information regarding the analyses, including output from *Slope/W*, is attached in **Appendix D**.



Table 3-1: Summary of Analyzed Cross Sections

Station	Fill or Cut	Max. Required Resistance Factor ²	Slope	Approx. Slope Height (feet)	Nearest Boring
28+00 (SC72)	Fill	0.75	2H:1V	9	B04
39+50 (SC72)	Fill	0.75	2H:1V	6	B06
41+50(SC72)	Cut	0.75	2H:1V	9	B33
48+00 (SC72)	Fill	0.75	2H:1V	8	B08
90+00 (SC72)	Fill	0.75	2H:1V	7	B17
13+50 (S 244)	Fill	0.75	2H:1V	5	B26
14+00 (S 1576)	Cut	0.75	2H:1V	6	B28, B12

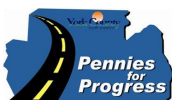
Table 3-2: Summary of Selected Material Properties for Slope Stability Analyses

Station	Material	Long-Term		End-of-Construction		Total Unit Weight (pcf)
		Friction Angle (degrees) ¹	Cohesion (psf) ¹	Friction Angle (degrees) ¹	Cohesion (psf) ¹	
28+00 (SC72)	New Embankment Fill	32	-	32	-	120
	Firm to Stiff MH	28	-	-	300	115
	Loose SM	30	-	30	-	120
39+50 (SC72)	New Embankment Fill	32	-	32	-	120
	Fill – Firm Clay CL	27	-	-	400	115
	Very Stiff Clay CL	28	-	-	600	118
	Medium Dense SM	30	-	30	-	125
41+50 (SC72)	New Embankment Fill	32	-	32	-	120
	V Stiff Silt	32	-	-	600	110
	Soft ML	30	-	-	500	105
48+00 (SC72)	New Embankment Fill	32	-	32	-	120
	Fill – Soft to Stiff CH	27	-	-	400	115
	Very Stiff CH	28	-	-	600	118
90+00 (SC72)	New Embankment Fill	32	-	32	-	120
	Soft to Stiff MH	31	-	-	300	115
13+50 (S-244)	New Embankment Fill	32	-	32	-	120
	Loose SM	33	-	33	-	110
	Stiff ML	28	-	-	400	118
14+00 (S-1576)	New Embankment Fill	32	-	32	-	120
	Firm to Stiff CH/ML	30	-	30	-	118
	Loose to M. Dense SM	33	-	30	-	120

Notes:

¹ Values based on lab testing and SCDOT strength limits.

According to the SCDOT *Design Memorandum 0211*, the roadway structure operational classification for this project is ROC IV. As such, for the service limit state, SCDOT *GDM Table 9-9* recommends maximum resistance factors of 0.75 and 0.70 are for global stability of fill and



cut sections, respectively. However, the SCDOT *GDM Version 2.0* issued in 2019 slightly modified the recommended maximum resistance factors for global stability of cut slopes to 0.75. The updated maximum resistance factor (0.75) for cut slopes was used as the design criteria for the slope stability analyses. Analyses for the extreme event limit state have not been included in our analysis for the ROC IV embankments. Based on the analyses we performed, as summarized below in **Table 3-3**, the maximum resistance factors have been satisfied for each of the slope areas.

Table 3-3: Summary of Slope Stability Resistance Factors

Station	Slope Conditions	Maximum Required Resistance Factor ¹	Calculated Resistance Factors	
			² End-of-Construction, Undrained Condition	² Long Term, Drained Condition
28+00 (SC72)	Fill	0.75	0.74	0.75
39+50 (SC72)	Fill	0.75	0.53	0.69
41+50 (SC72)	Cut	0.75	0.47	0.69
48+00 (SC72)	Fill	0.75	0.56	0.70
90+00 (SC72)	Fill	0.75	0.69	0.66
13+50 (\$ 244)	Fill	0.75	0.66	0.72
14+00 (\$ 1576)	Cut	0.75	0.28	0.74

Notes:

¹ Factors from the SCDOT *GDM V.2.0 (2019)* for representative ROC Service Limit States.

² Largest Resistance Factor of Morgenstern & Price, Bishop and Spencer Methods reported above.

We have considered the following conditions for our analyses in accordance with the requirements of Chapter 17 of the *GDM*:

- End-of-Construction (Short-Term) condition
- Long-Term condition

For both the short- and long-term conditions, we have used a live load of 250 psf to model traffic loading on the roadway embankment based on SCDOT guidelines and a dead load of 20 psf to simulate the replacement of soil with pavement material. An additional dead load of 140 psf was used for the long-term condition to model future pavement overlays. For pedestrian walkways wider than 2 feet, a live load of 75 psf and a dead load of 12.5 psf were used for both the short- and long-term conditions to model the pedestrian traffic load and the pavement material, respectively.



As shown in our analyses, we have limited failure to be defined as deep seated failures and have not included erosion and shallow sloughing. These shallow failures will be considered as maintenance. As shown in the Table 3-3, above, all the sections chosen for analysis meet the design criteria. Detailed analyses can be found in Appendix D.

3.2.3 Settlement

Over most of the project corridor, settlements resulting from placement of new roadway fills are anticipated to be relatively small as the thickness of compressible soils are often no more than 5 to 10 feet.

The maximum settlements of the in-place soils subject to the most significant fills were estimated at up to 2 inches at Stations 39+50 and 90+00. Calculations are attached in Appendix D. We believe that the SCDOT specified embankment widening performance limits for the service limit state (Chapter 10 of the *GDM*) will be satisfied on this project.

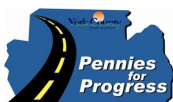
3.3 EXCAVATIONS

Even though excavation is anticipated at several locations, it is not expected to be within PWR or bedrock. The limits of these proposed excavation areas include STA 39+00 to 44+50 SC72; STA 14+50 to 18+50 S-163; STA 16+50 to 17+50 S-721; and STA 12+65 to 18+50 S-1576. Borings in the vicinity of these areas did not encounter PWR or crystalline rock.

Based on coordination with the water services group, excavation in PWR and bedrock should be anticipated for installation of utilities. The degree of difficulty of excavation of PWR and bedrock are anticipated to vary locally. In general, it is anticipated that a track hoe with hydraulic hoe ram can remove several feet of the PWR in local excavations or for trenches. Mass excavation in the PWR may be limited to a couple feet when using large bulldozers with ripper teeth.

3.4 SEISMIC CONSIDERATIONS

According to SCDOT *Bridge Design Memorandum 0211* the entirety of the roadway alignments is classified as ROC IV embankments and therefore shall be designed and evaluated for the strength and service limit states only. No extreme event limit state analysis has been performed.



APPENDIX A.
FIELD TESTING LOCATION PLAN



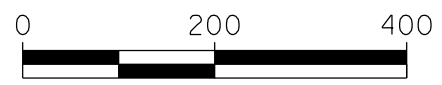
LEGEND

- SPT BORING
- PAVEMENT CORE & DCP

BEGIN SC72 WIDENING
STA. 10+00.00

BORING	LATITUDE	LONGITUDE	STATION	OFFSET	ALIGNMENT
B01	34.8740389	81.0584249	11+48	7.6' LT	SC-72
B02	34.8750772	81.057287	16+57	28.9' LT	SC-72
B03	34.8760319	81.056100	21+54	19.3' LT	SC-72
B04	34.8769857	81.054901	26+54	7.2' LT	SC-72
B05	34.8780272	81.053774	31+61	32.7' LT	SC-72
B06	34.8789868	81.052577	36+62	22.4' LT	SC-72
B25	34.8757977	81.057589	16+39	8.6' LT	RELOC-S-163
B26	34.8790524	81.050937	14+78	36.8' RT	RELOC-S-244
B41	34.8758692	81.0583233	184+42.98	17.7' RT	S-163
B42	34.8776797	81.0506427	9+79.95	8.0' RT	S-244
C01	34.8758334	81.057587	16+34	20.7' LT	RELOC-S-163
C02	34.8740321	81.058433	11+44	7.8' LT	SC-72
C03	34.8790524	81.050937	14+78	36.8' RT	RELOC-S-244

NOTES: ● All locations shown are actual locations per field survey performed 03/01/16 through 03/07/16, and April 2020.
● Station and offset information is referenced to the corresponding centerline alignment.



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SC72 WIDENING FROM RAMBO ROAD TO SOUTH OF SC901

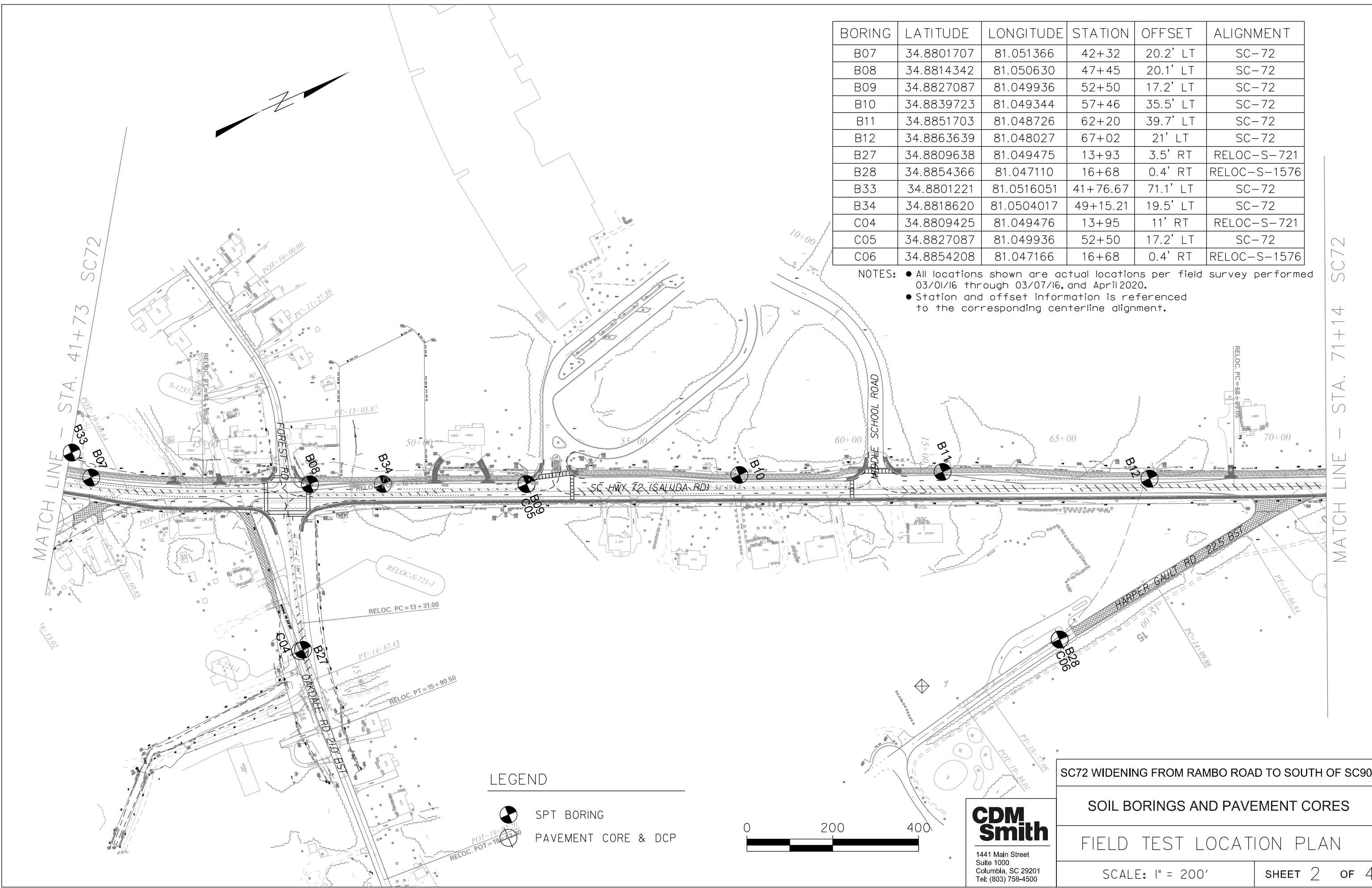
SOIL BORINGS AND PAVEMENT CORES

FIELD TEST LOCATION PLAN

SCALE: 1" = 200' SHEET 1 OF 4

BORING	LATITUDE	LONGITUDE	STATION	OFFSET	ALIGNMENT
B07	34.8801707	81.051366	42+32	20.2' LT	SC-72
B08	34.8814342	81.050630	47+45	20.1' LT	SC-72
B09	34.8827087	81.049936	52+50	17.2' LT	SC-72
B10	34.8839723	81.049344	57+46	35.5' LT	SC-72
B11	34.8851703	81.048726	62+20	39.7' LT	SC-72
B12	34.8863639	81.048027	67+02	21' LT	SC-72
B27	34.8809638	81.049475	13+93	3.5' RT	RELOC-S-721
B28	34.8854366	81.047110	16+68	0.4' RT	RELOC-S-1576
B33	34.8801221	81.0516051	41+76.67	71.1' LT	SC-72
B34	34.8818620	81.0504017	49+15.21	19.5' LT	SC-72
C04	34.8809425	81.049476	13+95	11' RT	RELOC-S-721
C05	34.8827087	81.049936	52+50	17.2' LT	SC-72
C06	34.8854208	81.047166	16+68	0.4' RT	RELOC-S-1576

NOTES: ● All locations shown are actual locations per field survey performed 03/01/16 through 03/07/16, and April 2020.
 ● Station and offset information is referenced to the corresponding centerline alignment.



SC72 WIDENING FROM RAMBO ROAD TO SOUTH OF SC901




SOIL BORINGS AND PAVEMENT CORES

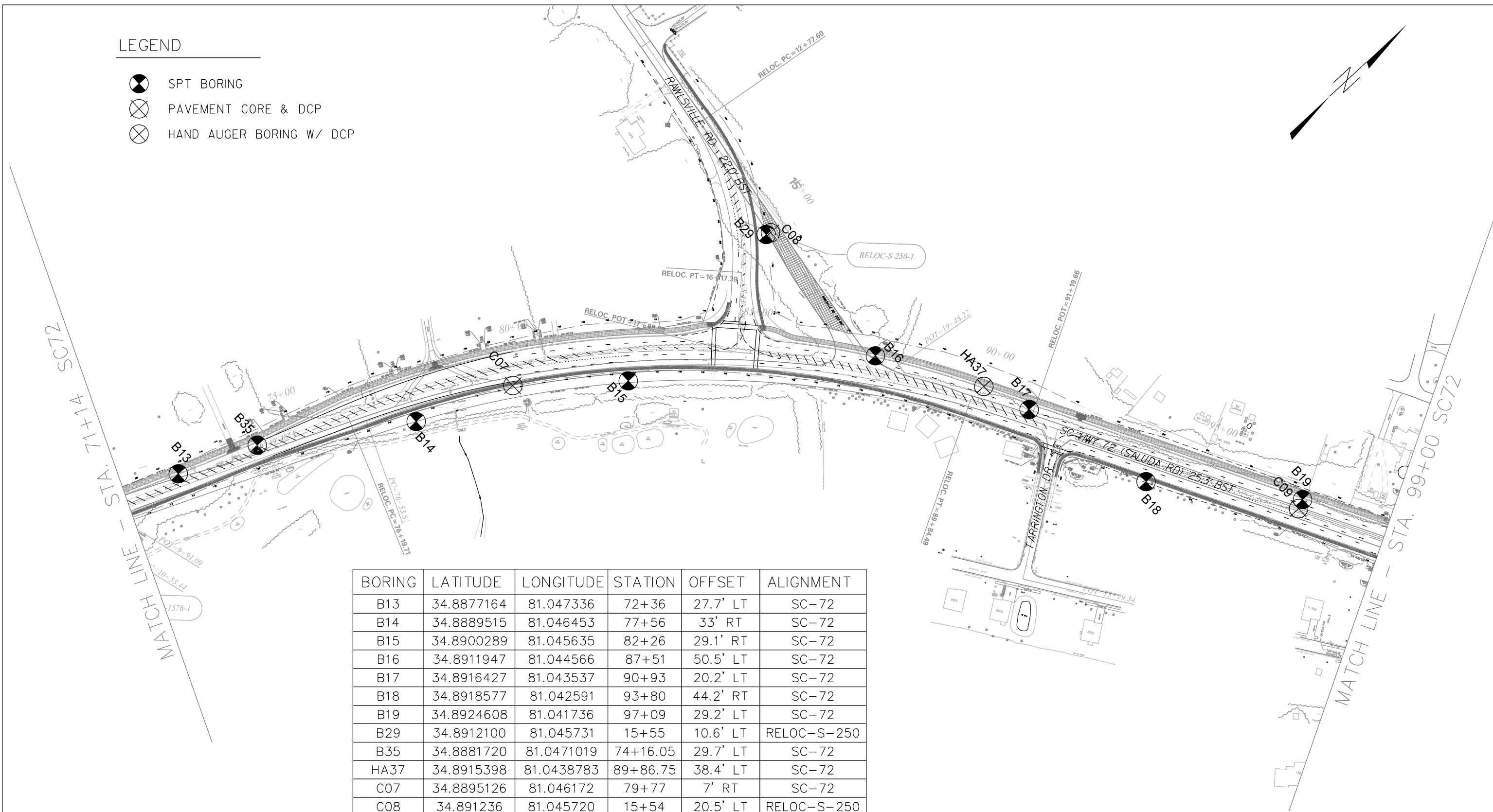
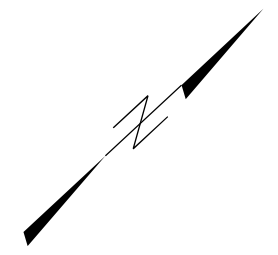
FIELD TEST LOCATION PLAN

SCALE: 1" = 200' SHEET 2 OF 4

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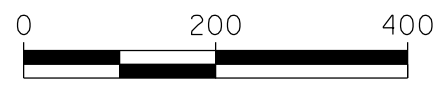
LEGEND

-  SPT BORING
-  PAVEMENT CORE & DCP
-  HAND AUGER BORING W/ DCP



BORING	LATITUDE	LONGITUDE	STATION	OFFSET	ALIGNMENT
B13	34.8877164	81.047336	72+36	27.7' LT	SC-72
B14	34.8889515	81.046453	77+56	33' RT	SC-72
B15	34.8900289	81.045635	82+26	29.1' RT	SC-72
B16	34.8911947	81.044566	87+51	50.5' LT	SC-72
B17	34.8916427	81.043537	90+93	20.2' LT	SC-72
B18	34.8918577	81.042591	93+80	44.2' RT	SC-72
B19	34.8924608	81.041736	97+09	29.2' LT	SC-72
B29	34.8912100	81.045731	15+55	10.6' LT	RELOC-S-250
B35	34.8881720	81.0471019	74+16.05	29.7' LT	SC-72
HA37	34.8915398	81.0438783	89+86.75	38.4' LT	SC-72
C07	34.8895126	81.046172	79+77	7' RT	SC-72
C08	34.891236	81.045720	15+54	20.5' LT	RELOC-S-250
C09	34.8924074	81.041709	97+07	8' LT	SC-72

NOTES: ● All locations shown are actual locations per field survey performed 03/01/16 through 03/07/16, and April 2020.
 ● Station and offset information is referenced to the corresponding centerline alignment.

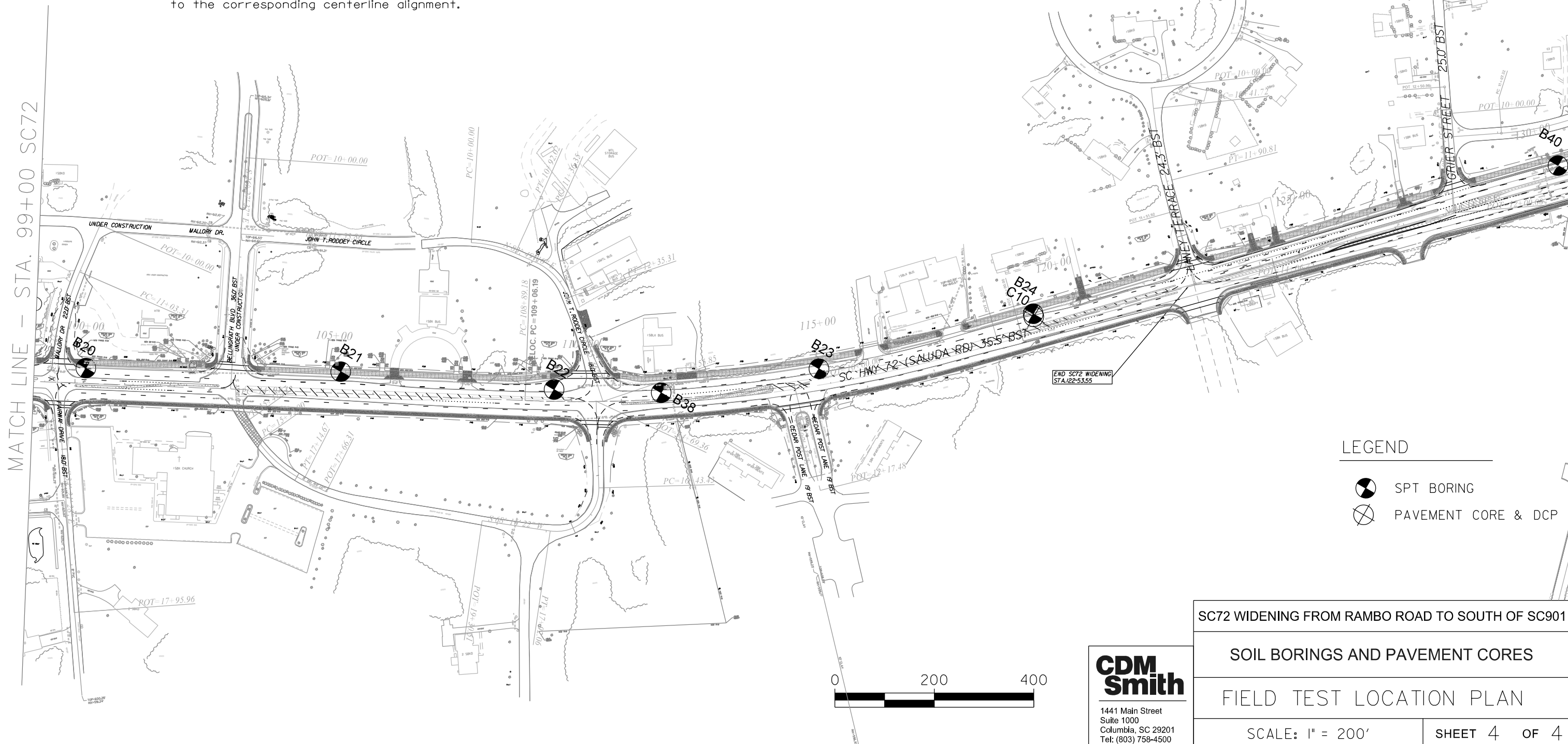


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SC72 WIDENING FROM RAMBO ROAD TO SOUTH OF SC901	
SOIL BORINGS AND PAVEMENT CORES	
FIELD TEST LOCATION PLAN	
SCALE: 1" = 200'	SHEET 3 OF 4

BORING	LATITUDE	LONGITUDE	STATION	OFFSET	ALIGNMENT
B20	34.8928453	81.040872	100+04	30.8' LT	SC-72
B21	34.8935382	81.039384	105+16	43.7' LT	SC-72
B22	34.8940471	81.038087	109+47	23.8' LT	SC-72
B23	34.894884	81.036623	114+87	25.4' LT	SC-72
B24	34.8957434	81.035568	119+35	31' LT	SC-72
B38	34.8943298	81.0374558	111+63.81	13.1' LT	SC-72
B40	34.8979128	81.0330287	130+31.80	36.0' LT	SC-72
C10	34.8957303	81.035554	119+34	24.8' LT	SC-72

NOTES: ● All locations shown are actual locations per field survey performed 03/01/16 through 03/07/16, and April 2020.
 ● Station and offset information is referenced to the corresponding centerline alignment.



LEGEND

- SPT BORING
- ⊗ PAVEMENT CORE & DCP

SC72 WIDENING FROM RAMBO ROAD TO SOUTH OF SC901

SOIL BORINGS AND PAVEMENT CORES

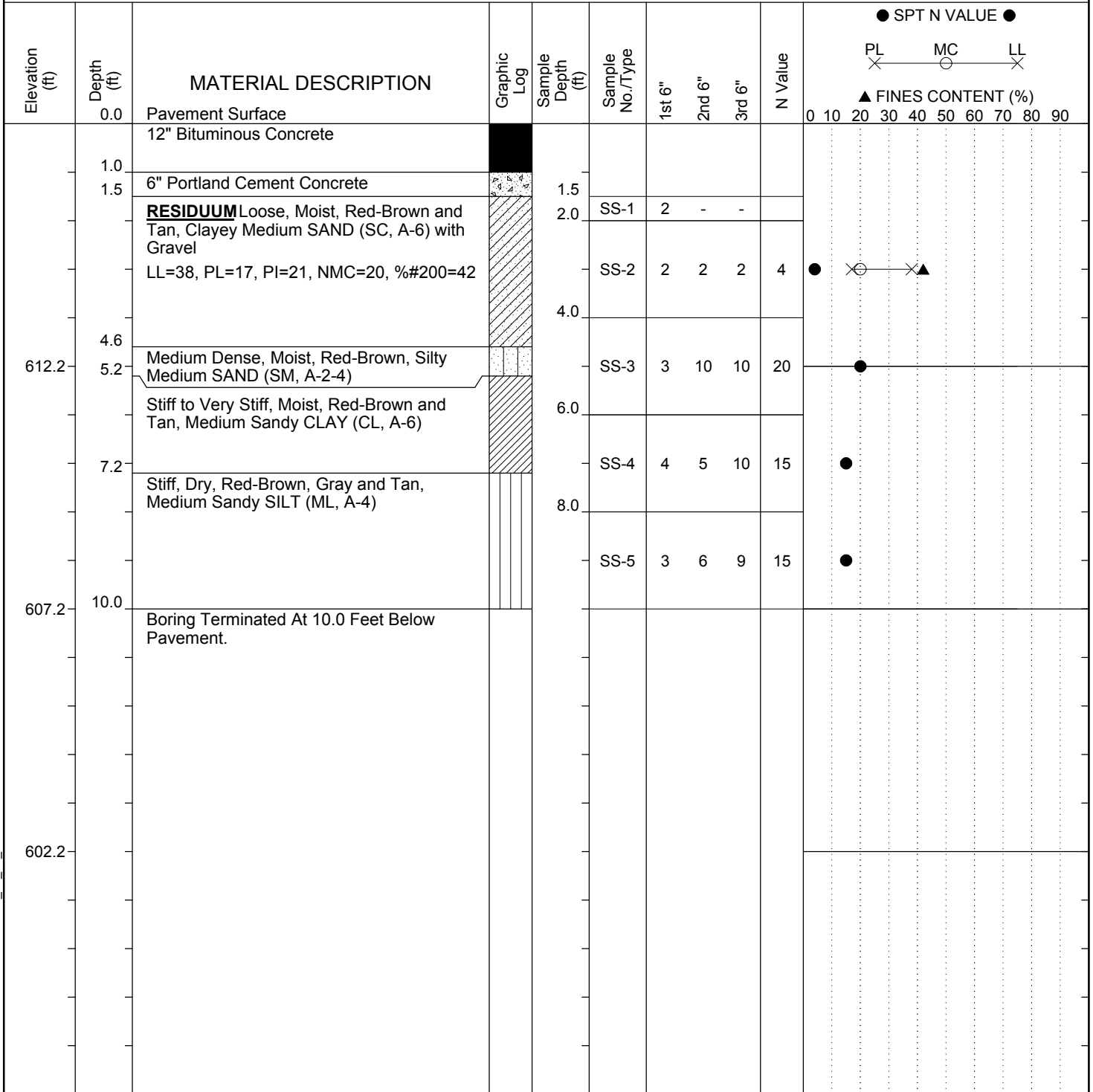
FIELD TEST LOCATION PLAN

SCALE: 1" = 200' SHEET 4 OF 4

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APPENDIX B.
FIELD EXPLORATION RECORDS

Project ID: 111726		County: York		Boring No.: B01	
Site Description: SC72 Widening from Rambo Road to South of SC901				Route: SC72	
Eng./Geo.: Evans, T. E.		Boring Location: 11+48		Offset: -7.6 ft LT	Alignment: SC-72
Elev.: 617.2 ft	Latitude: 34.8740389	Longitude: 81.0584249	Date Started: 2/19/2016		
Total Depth: 10 ft	Soil Depth: 10 ft	Core Depth: N/A ft	Date Completed: 2/19/2016		
Bore Hole Diameter (in): 4.5		Sampler Configuration		Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME-45C	Drill Method: CFA	Hammer Type: Automatic		Energy Ratio: 76.3%	
Core Size: N/A	Driller: Ferdrychowski, C.	Groundwater: TOB	DRY	24HR	Filled

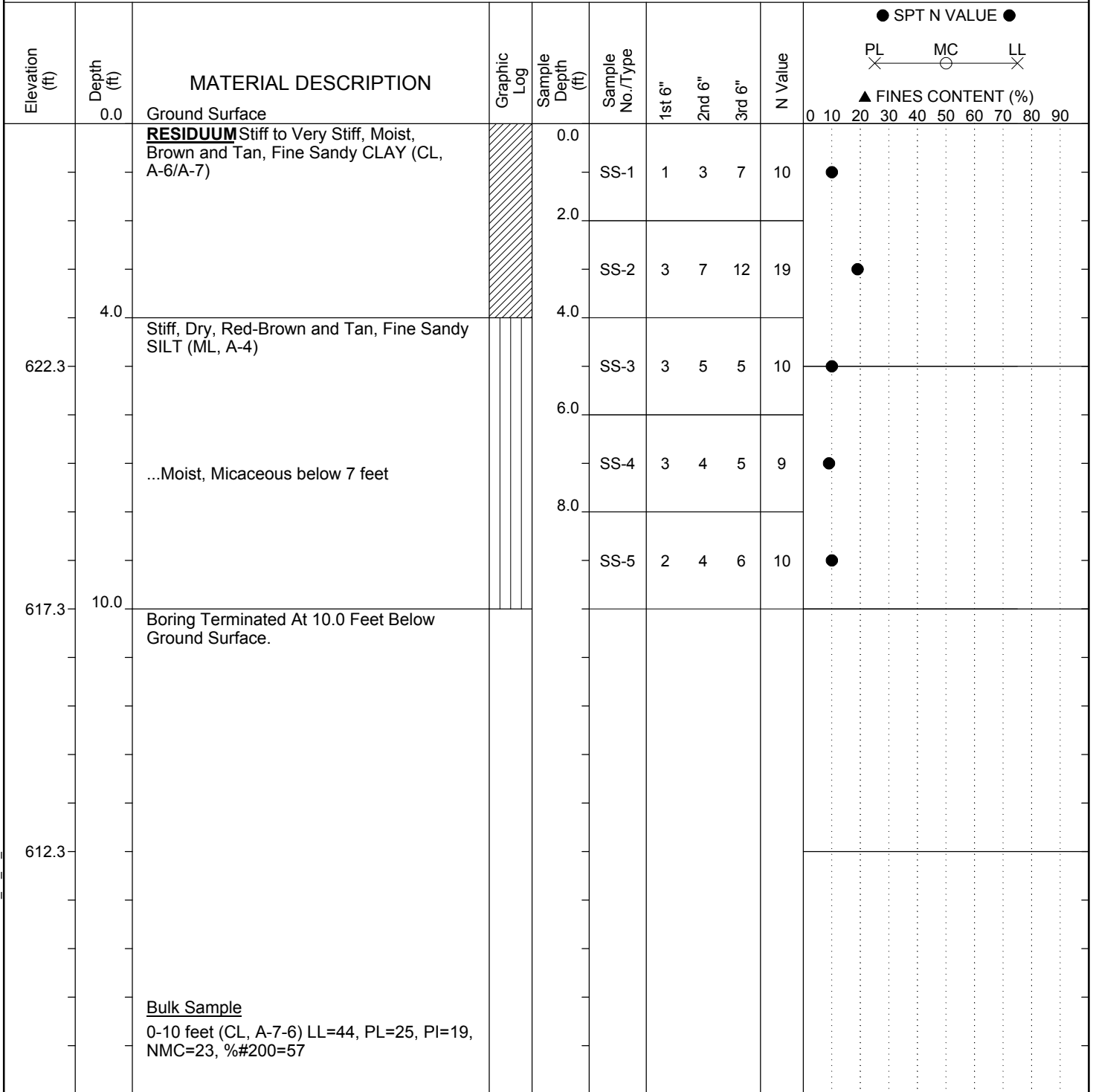


LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_SC72_GINT.GPJ SCDOT DATA TEMPLATE_12_30_2014.GDT 10/19/16

Project ID: 111726		County: York		Boring No.: B02	
Site Description: SC72 Widening from Rambo Road to South of SC901				Route: SC72	
Eng./Geo.: Evans, T. E.		Boring Location: 16+57		Offset: -28.9 ft LT	Alignment: SC-72
Elev.: 627.3 ft	Latitude: 34.8750772	Longitude: 81.0572865	Date Started: 2/17/2016		
Total Depth: 10 ft	Soil Depth: 10 ft	Core Depth: N/A ft	Date Completed: 2/17/2016		
Bore Hole Diameter (in): 4.5		Sampler Configuration		Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME-55	Drill Method: CFA	Hammer Type: Automatic		Energy Ratio: 80%	
Core Size: N/A	Driller: Ferdrychowski, C.	Groundwater: TOB	DRY	24HR	DRY

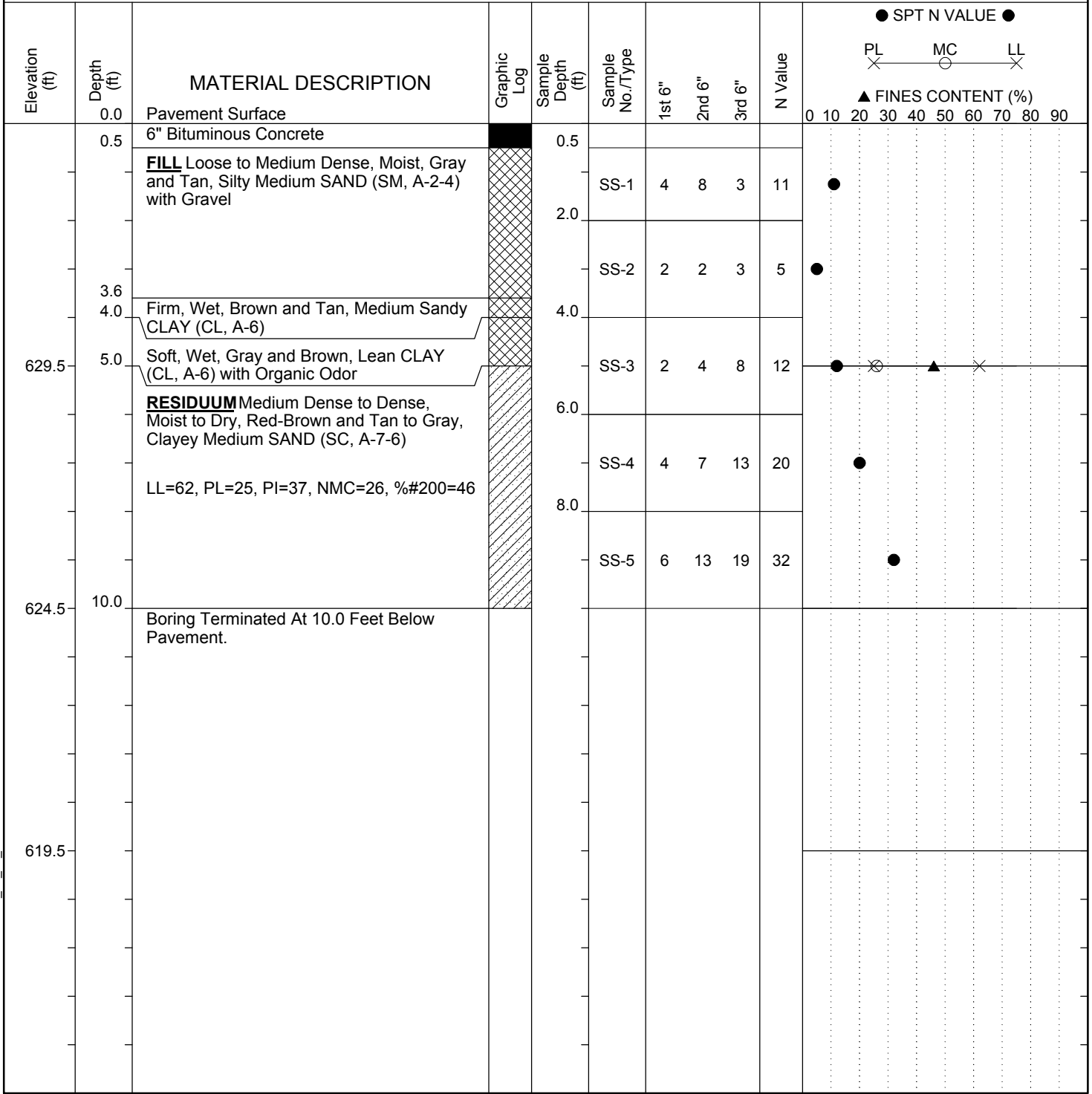


LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT SC72_GINT.GPJ SCDOT DATA TEMPLATE_12_30_2014.GDT 10/19/16

Project ID: 111726			County: York			Boring No.: B03		
Site Description: SC72 Widening from Rambo Road to South of SC901						Route: SC72		
Eng./Geo.: Evans, T. E.		Boring Location: 21+54		Offset: -19.3 ft LT		Alignment: SC-72		
Elev.: 634.5 ft	Latitude: 34.8760319		Longitude: 81.0561004		Date Started: 2/19/2016			
Total Depth: 10 ft		Soil Depth: 10 ft		Core Depth: N/A ft		Date Completed: 2/19/2016		
Bore Hole Diameter (in): 4.5		Sampler Configuration			Liner Required: Y (N)		Liner Used: Y (N)	
Drill Machine: CME-45C		Drill Method: CFA		Hammer Type: Automatic		Energy Ratio: 76.3%		
Core Size: N/A		Driller: Ferdrychowski, C.		Groundwater: TOB DRY		24HR: Filled		

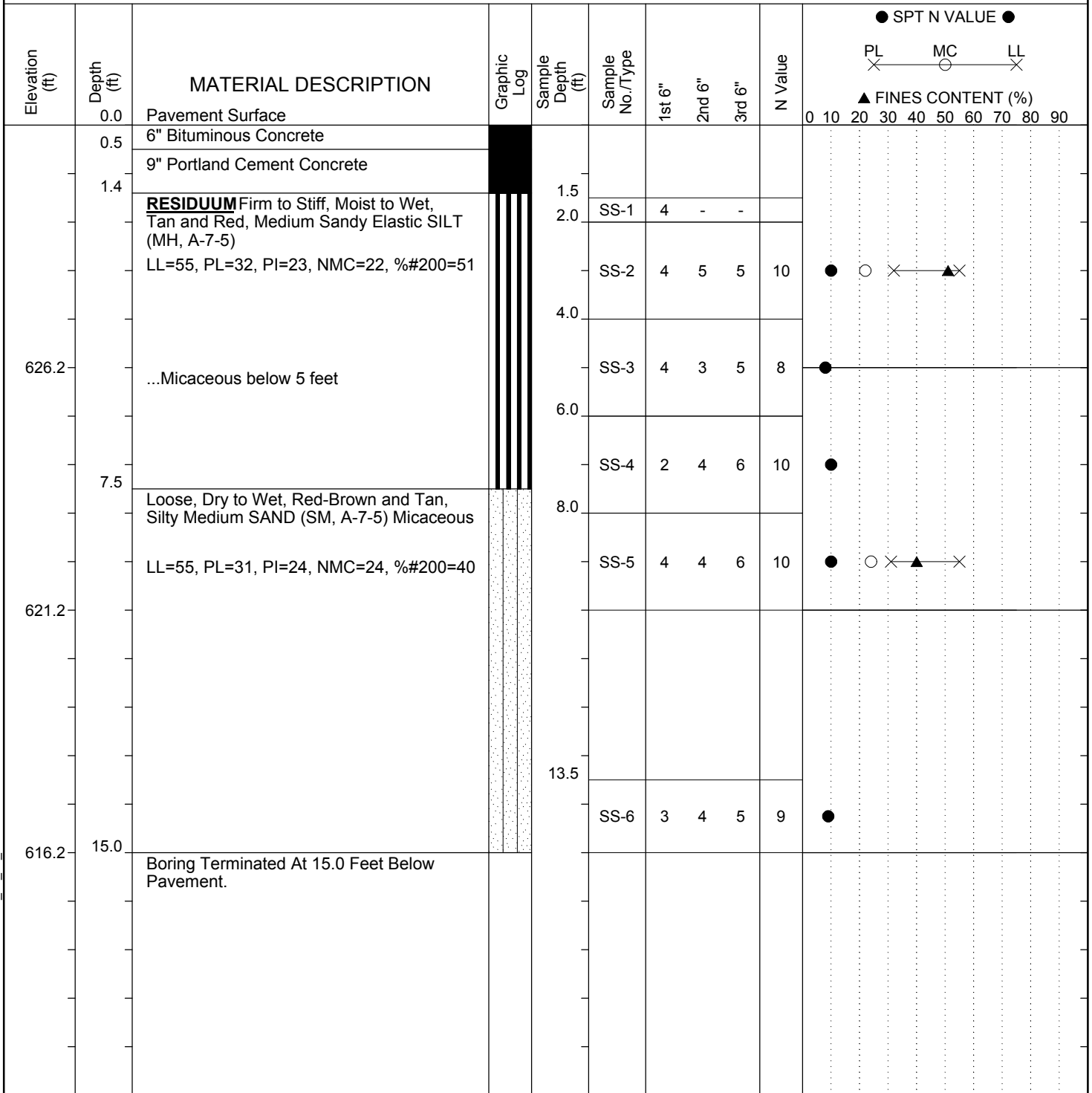


LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_SC72_GINT.GPJ SCDOT DATA TEMPLATE_12_30_2014.GDT 10/19/16

Project ID: 111726			County: York			Boring No.: B04		
Site Description: SC72 Widening from Rambo Road to South of SC901						Route: SC72		
Eng./Geo.: Evans, T. E.		Boring Location: 26+54		Offset: -7.2 ft LT		Alignment: SC-72		
Elev.: 631.2 ft	Latitude: 34.8769857		Longitude: 81.0549012		Date Started: 2/19/2016			
Total Depth: 15 ft		Soil Depth: 15 ft		Core Depth: N/A ft		Date Completed: 2/19/2016		
Bore Hole Diameter (in): 4.5		Sampler Configuration			Liner Required: Y (N)		Liner Used: Y (N)	
Drill Machine: CME-45C		Drill Method: CFA		Hammer Type: Automatic		Energy Ratio: 76.3%		
Core Size: N/A		Driller: Ferdrychowski, C.		Groundwater: TOB DRY		24HR		Filled

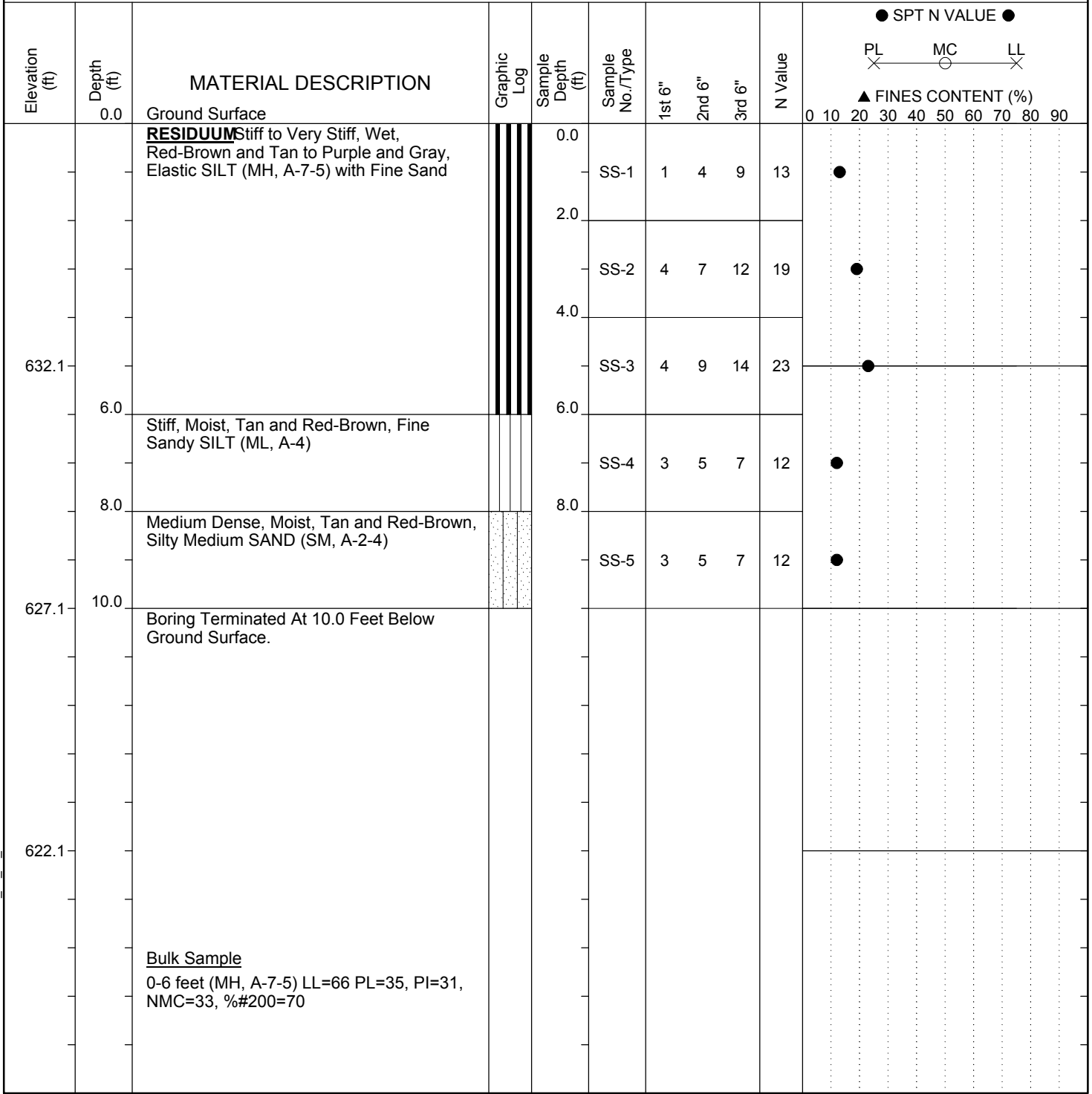


LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_SC72_GINT.GPJ SCDOT DATA TEMPLATE_12_30_2014.GDT 10/19/16

Project ID: 111726			County: York			Boring No.: B05		
Site Description: SC72 Widening from Rambo Road to South of SC901						Route: SC72		
Eng./Geo.: Evans, T. E.		Boring Location: 31+61			Offset: -32.7 ft LT		Alignment: SC-72	
Elev.: 637.1 ft		Latitude: 34.8780272		Longitude: 81.0537738		Date Started: 2/17/2016		
Total Depth: 10 ft		Soil Depth: 10 ft		Core Depth: N/A ft		Date Completed: 2/17/2016		
Bore Hole Diameter (in): 4.5		Sampler Configuration			Liner Required: Y (N)		Liner Used: Y (N)	
Drill Machine: CME-55		Drill Method: CFA		Hammer Type: Automatic		Energy Ratio: 80%		
Core Size: N/A		Driller: Ferdrychowski, C.		Groundwater: TOB DRY		24HR: DRY		

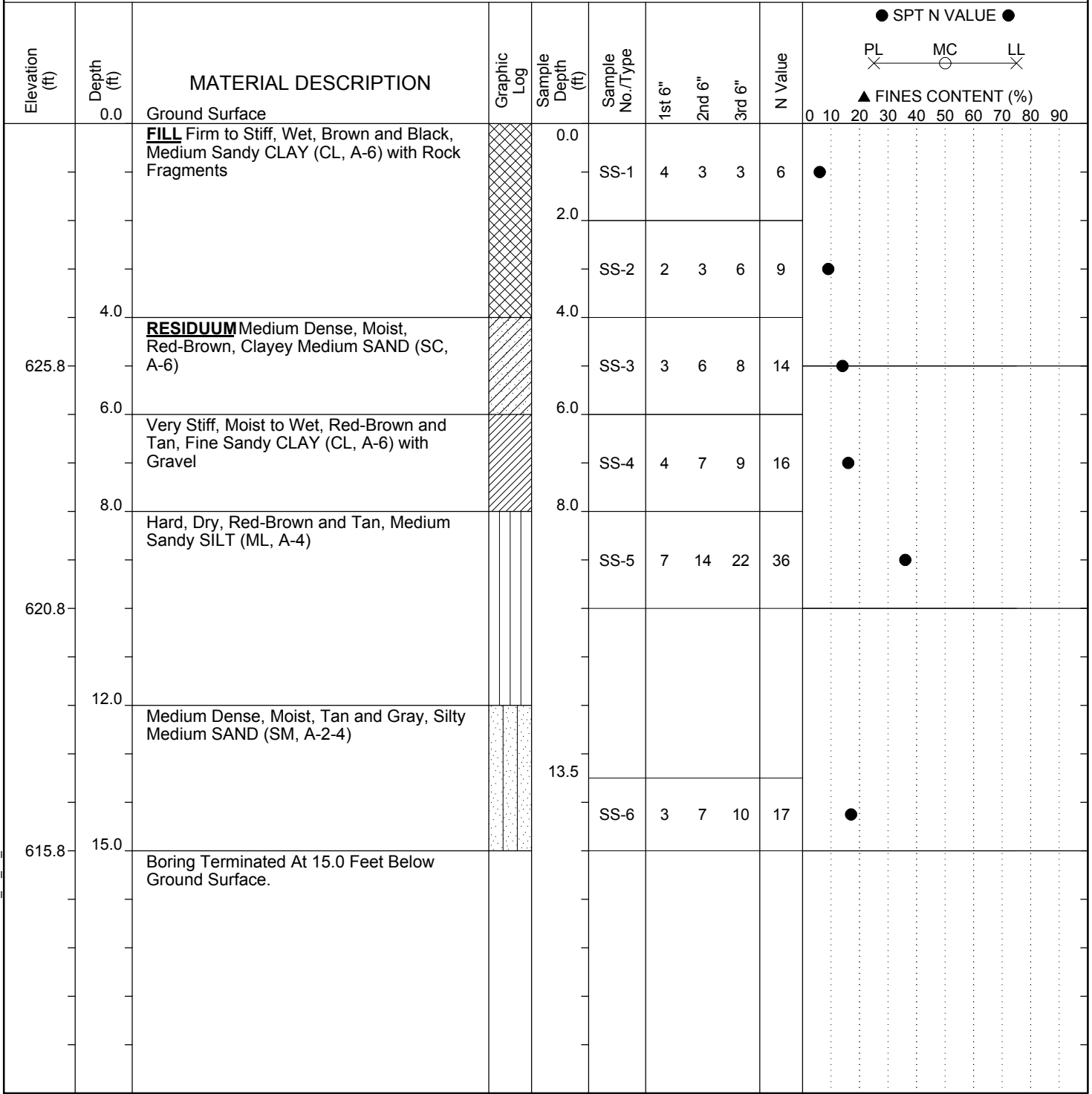


LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_SC72_GINT.GPJ SCDOT DATA TEMPLATE_12_30_2014.GDT 10/19/16

Project ID: 111726		County: York		Boring No.: B06	
Site Description: SC72 Widening from Rambo Road to South of SC901				Route: SC72	
Eng./Geo.: Evans, T. E.		Boring Location: 36+62		Offset: -22.4 ft LT	Alignment: SC-72
Elev.: 630.8 ft	Latitude: 34.8789868	Longitude: 81.0525768	Date Started: 2/17/2016		
Total Depth: 15 ft	Soil Depth: 15 ft	Core Depth: N/A ft	Date Completed: 2/17/2016		
Bore Hole Diameter (in): 4.5		Sampler Configuration		Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME-55	Drill Method: CFA	Hammer Type: Automatic		Energy Ratio: 80%	
Core Size: N/A	Driller: Ferdrychowski, C.	Groundwater: TOB	DRY	24HR	DRY

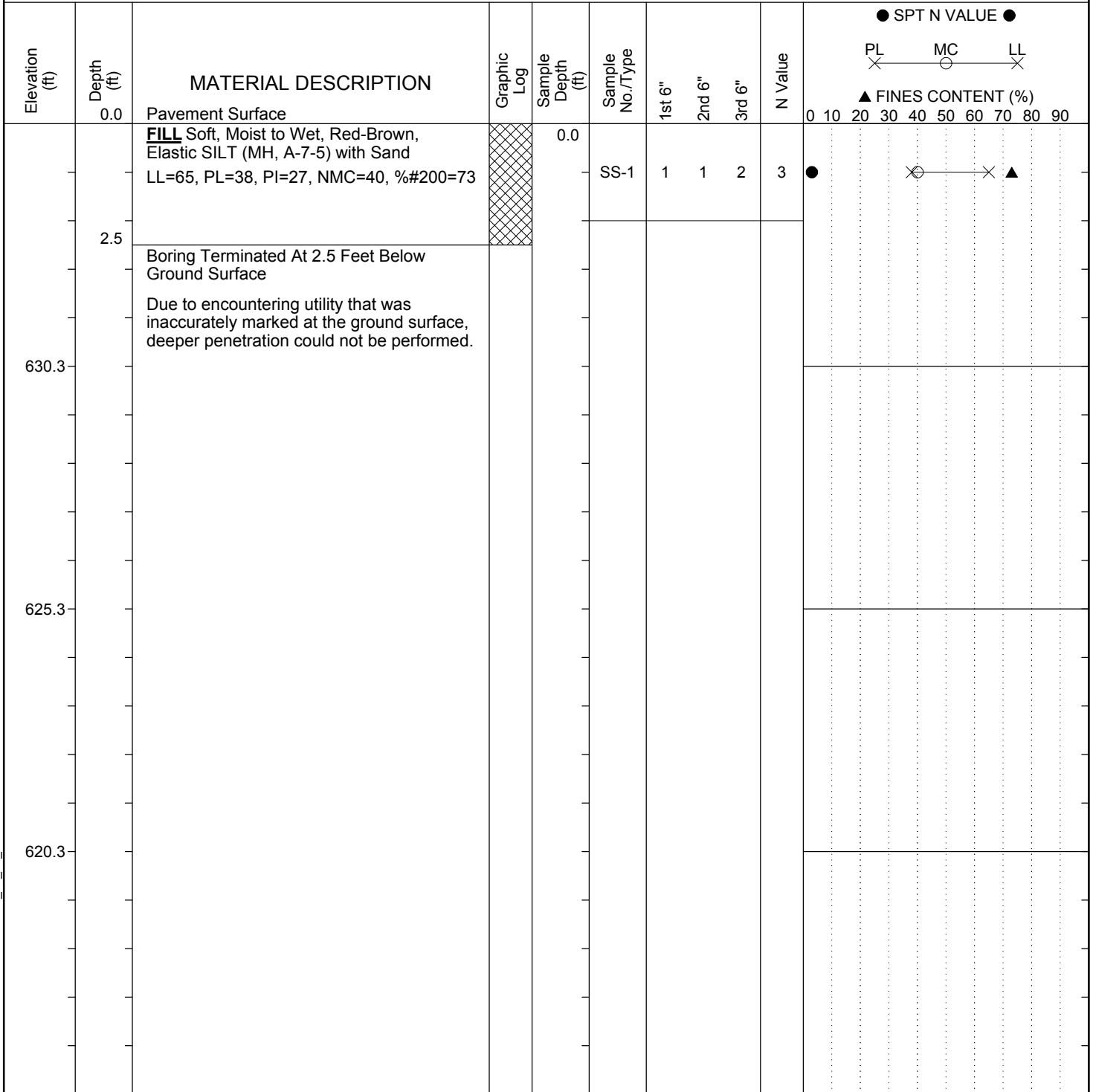


LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_SC72_GINT.GPJ_SCDOT_DATA_TEMPLATE_12_30_2014.GDT 10/19/16

Project ID: 111726		County: York		Boring No.: B07	
Site Description: SC72 Widening from Rambo Road to South of SC901				Route: SC72	
Eng./Geo.: Evans, T. E.		Boring Location: 42+32		Offset: -20.2 ft LT	Alignment: SC-72
Elev.: 635.3 ft	Latitude: 34.8801707	Longitude: 81.0513661	Date Started: 2/17/2016		
Total Depth: 2.5 ft	Soil Depth: 2.5 ft	Core Depth: N/A ft	Date Completed: 2/17/2016		
Bore Hole Diameter (in): 4.5		Sampler Configuration		Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME-45C	Drill Method: CFA	Hammer Type: Automatic		Energy Ratio: 76.3%	
Core Size: N/A	Driller: Ferdrychowski, C.	Groundwater: TOB DRY		24HR	Filled

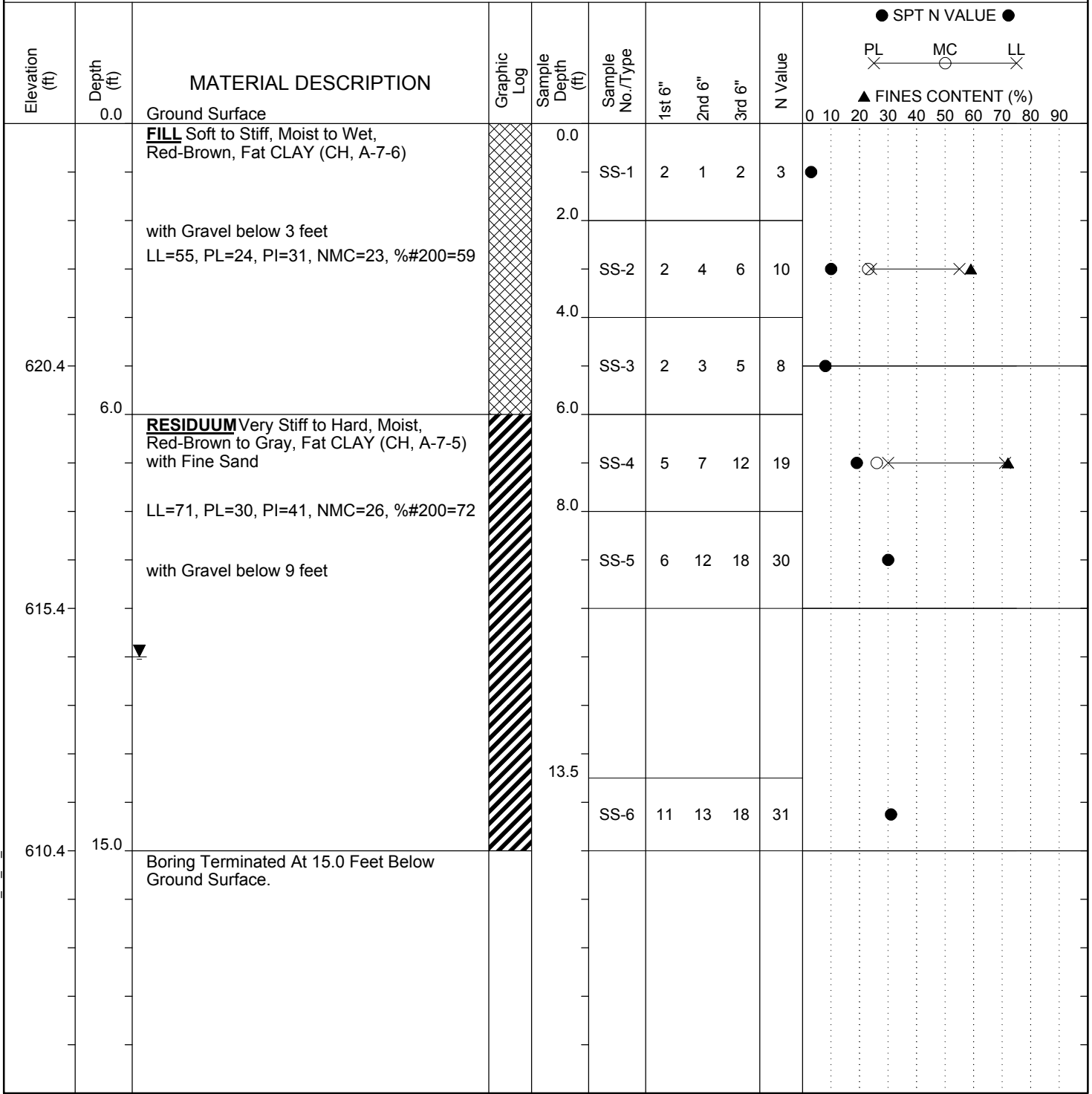


LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_SC72_GINT.GPJ SCDOT DATA TEMPLATE_12_30_2014.GDT 10/19/16

Project ID: 111726			County: York			Boring No.: B08		
Site Description: SC72 Widening from Rambo Road to South of SC901						Route: SC72		
Eng./Geo.: Evans, T. E.		Boring Location: 47+45		Offset: -20.1 ft LT		Alignment: SC-72		
Elev.: 625.4 ft	Latitude: 34.8814342		Longitude: 81.0506301		Date Started: 2/17/2016			
Total Depth: 15 ft		Soil Depth: 15 ft		Core Depth: N/A ft		Date Completed: 2/17/2016		
Bore Hole Diameter (in): 4.5		Sampler Configuration			Liner Required: Y (N)		Liner Used: Y (N)	
Drill Machine: CME-55		Drill Method: CFA		Hammer Type: Automatic		Energy Ratio: 80%		
Core Size: N/A		Driller: Ferdrychowski, C.		Groundwater: TOB DRY		24HR		11 ft



LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_SC72_GINT.GPJ SCDOT DATA TEMPLATE_12_30_2014.GDT 10/19/16

Project ID: 111726		County: York		Boring No.: B09	
Site Description: SC72 Widening from Rambo Road to South of SC901				Route: SC72	
Eng./Geo.: Evans, T. E.		Boring Location: 52+50		Offset: -17.2 ft LT	Alignment: SC-72
Elev.: 625.0 ft	Latitude: 34.8827087	Longitude: 81.0499357	Date Started: 2/19/2016		
Total Depth: 10 ft	Soil Depth: 10 ft	Core Depth: N/A ft	Date Completed: 2/19/2016		
Bore Hole Diameter (in): 4.5		Sampler Configuration		Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME-45C	Drill Method: CFA	Hammer Type: Automatic		Energy Ratio: 76.3%	
Core Size: N/A	Driller: Ferdrychowski, C.	Groundwater: TOB DRY		24HR	Filled

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	N Value	SPT N VALUE									
										PL	MC	LL	FINES CONTENT (%)						
	0.0	Pavement Surface																	
	0.4	4.5" Bituminous Concrete																	
	1.0	7.5" Aggregate Base Course																	
	2.0	FILL Loose, Moist, Silty Medium SAND (SM, A-4) with Gravel		1.5															
		RESIDUUM Stiff, Moist to Wet, Red-Brown and Tan, Medium Sandy SILT (ML, A-4)		2.0	SS-1	4	5	-											
		...Micaceous below 4 feet			SS-2	3	4	6	10	●									
620.0					SS-3	3	5	9	14	●									
					SS-4	5	6	9	15	●									
		with Gravel			SS-5	4	6	9	15	●									
615.0	10.0	Boring Terminated At 10.0 Feet Below Pavement.																	

LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_SC72_GINT.GPJ SCDOT DATA TEMPLATE_12_30_2014.GDT 10/19/16

Project ID: 111726		County: York		Boring No.: B10	
Site Description: SC72 Widening from Rambo Road to South of SC901				Route: SC72	
Eng./Geo.: Evans, T. E.		Boring Location: 57+46		Offset: -35.5 ft LT	Alignment: SC-72
Elev.: 629.6 ft	Latitude: 34.8839723	Longitude: 81.0493442	Date Started: 2/17/2016		
Total Depth: 10 ft	Soil Depth: 10 ft	Core Depth: N/A ft	Date Completed: 2/17/2016		
Bore Hole Diameter (in): 4.5		Sampler Configuration		Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME-55	Drill Method: CFA	Hammer Type: Automatic		Energy Ratio: 80%	
Core Size: N/A	Driller: Ferdrychowski, C.	Groundwater: TOB DRY		24HR: DRY	

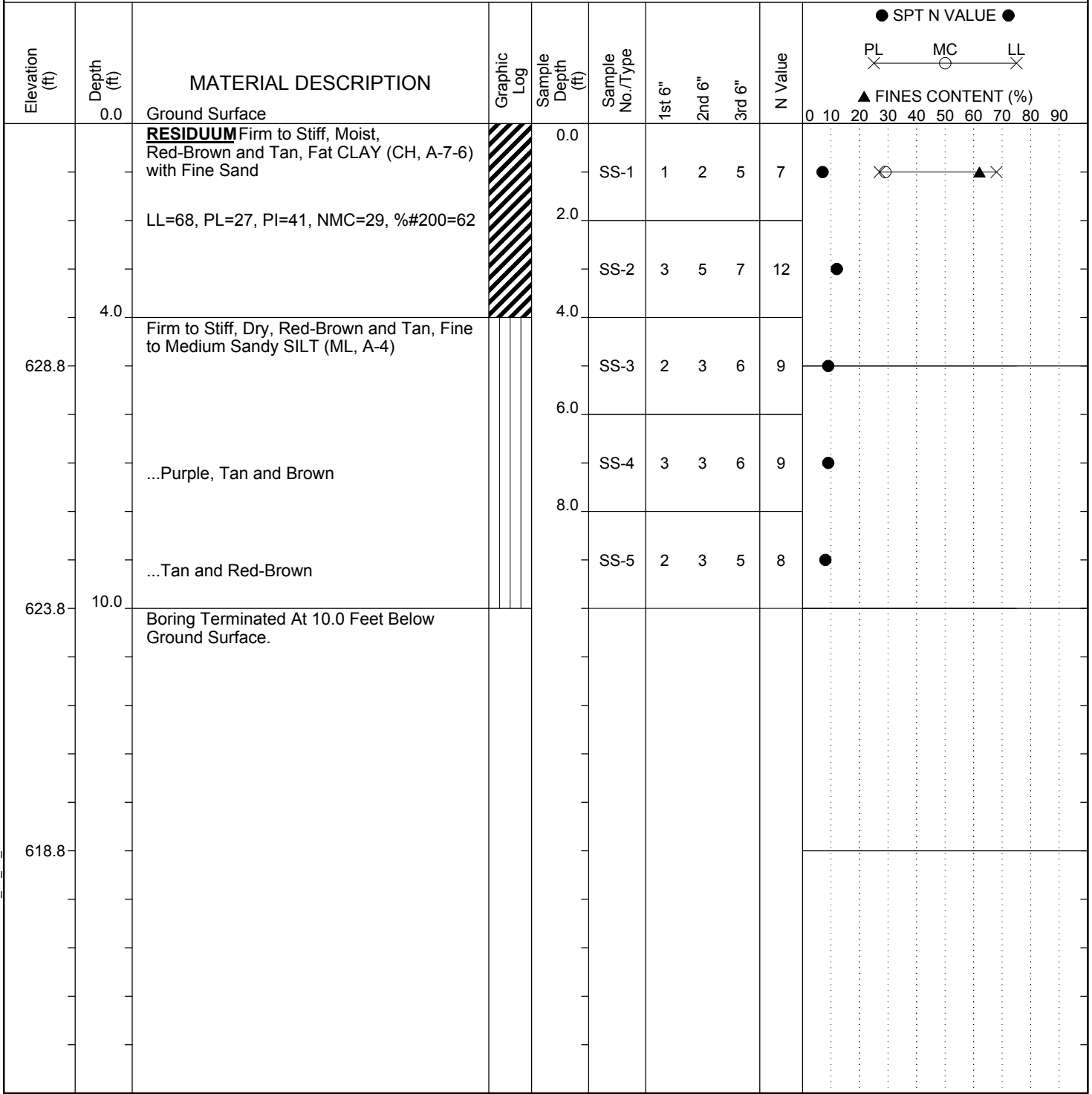
Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	N Value	SPT N VALUE ●									
										PL	MC	LL	▲ FINES CONTENT (%)						
	0.0	Ground Surface								0	10	20	30	40	50	60	70	80	90
		FILL Soft, Moist, Red-Brown, Lean CLAY (CL, A-6)		0.0	SS-1	2	1	2	3	●									
		with Black Rock Fragments		2.0	SS-2	2	1	2	3	●									
624.6	4.0	RESIDUUM Very Soft to Firm, Moist to Wet, Red-Brown and Tan, Lean CLAY (CL, A-6)		4.0	SS-3	2	1	1	2	●									
				6.0	SS-4	2	2	3	5	●									
				8.0	SS-5	2	2	3	5	●									
619.6	10.0	Boring Terminated At 10.0 Feet Below Ground Surface.																	
614.6																			

LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_SC72_GINT.GPJ SCDOT DATA TEMPLATE_12_30_2014.GDT 10/19/16

Project ID: 111726		County: York		Boring No.: B11	
Site Description: SC72 Widening from Rambo Road to South of SC901				Route: SC72	
Eng./Geo.: Evans, T. E.		Boring Location: 62+20		Offset: -39.7 ft LT	
Alignment: SC-72					
Elev.: 633.8 ft		Latitude: 34.8851703		Longitude: 81.0487256	
Date Started: 2/17/2016					
Total Depth: 10 ft		Soil Depth: 10 ft		Core Depth: N/A ft	
Date Completed: 2/17/2016					
Bore Hole Diameter (in): 4.5		Sampler Configuration		Liner Required: Y (N)	
Liner Used: Y (N)					
Drill Machine: CME-55		Drill Method: CFA		Hammer Type: Automatic	
Energy Ratio: 80%					
Core Size: N/A		Driller: Ferdrychowski, C.		Groundwater: TOB DRY	
24HR: DRY					



LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_SC72_GINT.GPJ_SCDOT_DATA_TEMPLATE_12_30_2014.GDT 10/19/16

Project ID: 111726		County: York		Boring No.: B12	
Site Description: SC72 Widening from Rambo Road to South of SC901				Route: SC72	
Eng./Geo.: Evans, T. E.		Boring Location: 67+02		Offset: -21 ft LT	Alignment: SC-72
Elev.: 632.6 ft	Latitude: 34.8863639	Longitude: 81.0480265	Date Started: 2/17/2016		
Total Depth: 15 ft	Soil Depth: 15 ft	Core Depth: N/A ft	Date Completed: 2/17/2016		
Bore Hole Diameter (in): 4.5		Sampler Configuration		Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME-55	Drill Method: CFA	Hammer Type: Automatic		Energy Ratio: 80%	
Core Size: N/A	Driller: Ferdrychowski, C.	Groundwater: TOB DRY		24HR: DRY	

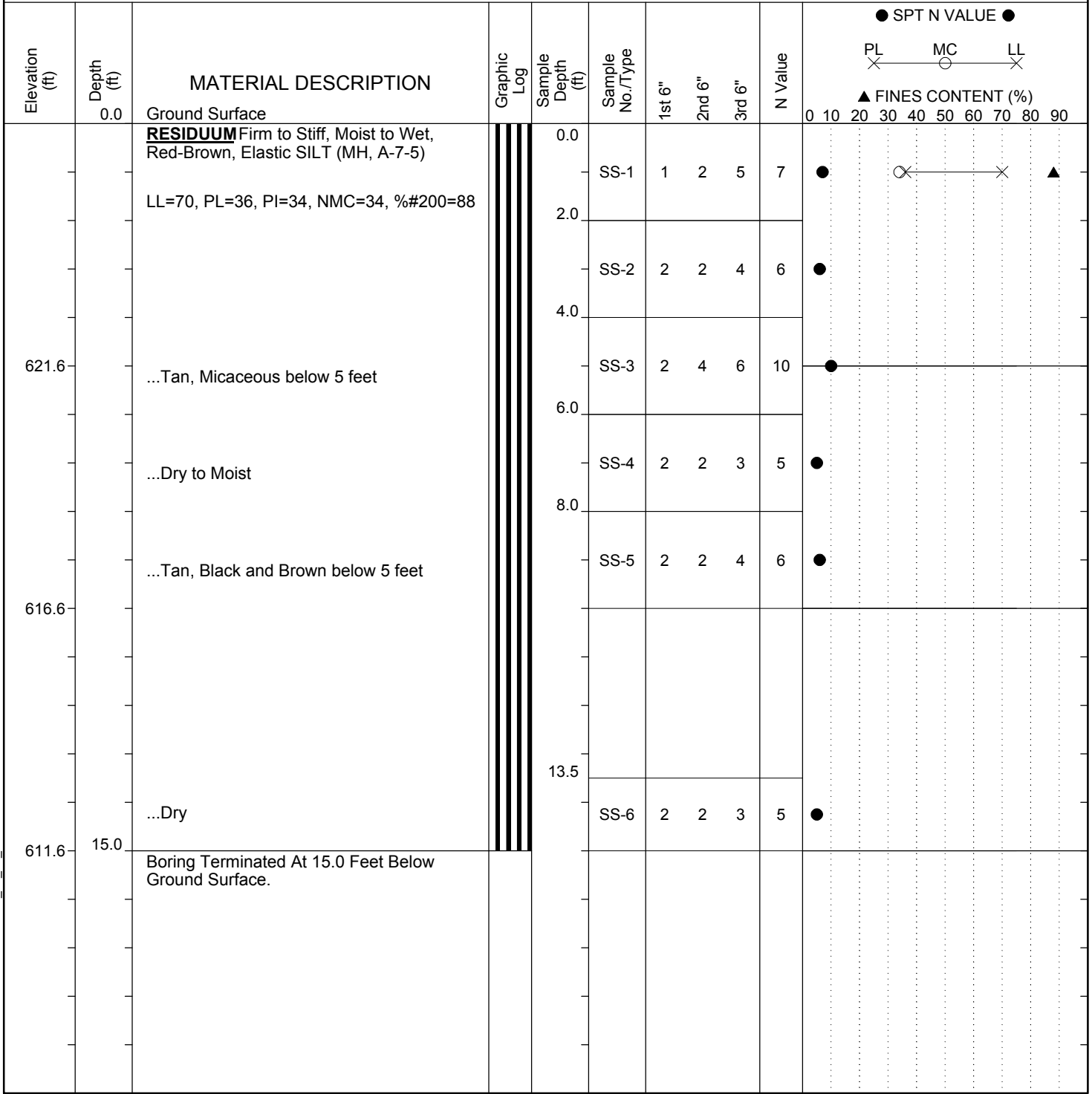
Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	N Value	SPT N VALUE												
										0	10	20	30	40	50	60	70	80	90			
	0.0	Ground Surface								● SPT N VALUE ● PL — MC — LL X — O — X ▲ FINES CONTENT (%)												
		RESIDUUM Firm to Stiff, Moist, Red-Brown, SILT (ML, A-7-6) with Roots		0.0	SS-1	2	4	4	8	●												
				2.0	SS-2	2	2	6	8	●												
627.6				4.0	SS-3	4	5	7	12	●												
	6.0	Loose, Dry, Red-Brown and Tan, Silty Medium SAND (SM, A-4)		6.0	SS-4	3	4	6	10	●												
				8.0	SS-5	2	4	4	8	●												
622.6																						
		...Purple, Brown and Tan		13.5	SS-6	3	4	6	10	●												
617.6	15.0	Boring Terminated At 15.0 Feet Below Ground Surface.																				
		<u>Bulk Sample</u> 0-6 feet (ML, A-7-6) LL=47, PL=28, PI=19, NMC=25, %#200=59																				

LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_SC72_GINT.GPJ SCDOT DATA TEMPLATE_12_30_2014.GDT 10/19/16

Project ID: 111726		County: York		Boring No.: B13	
Site Description: SC72 Widening from Rambo Road to South of SC901				Route: SC72	
Eng./Geo.: Evans, T. E.		Boring Location: 72+36		Offset: -27.7 ft LT	Alignment: SC-72
Elev.: 626.6 ft	Latitude: 34.8877164	Longitude: 81.0473357	Date Started: 2/16/2016		
Total Depth: 15 ft	Soil Depth: 15 ft	Core Depth: N/A ft	Date Completed: 2/16/2016		
Bore Hole Diameter (in): 4.5		Sampler Configuration		Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME-55	Drill Method: CFA	Hammer Type: Automatic		Energy Ratio: 80%	
Core Size: N/A	Driller: Ferdrychowski, C.	Groundwater: TOB DRY		24HR: DRY	

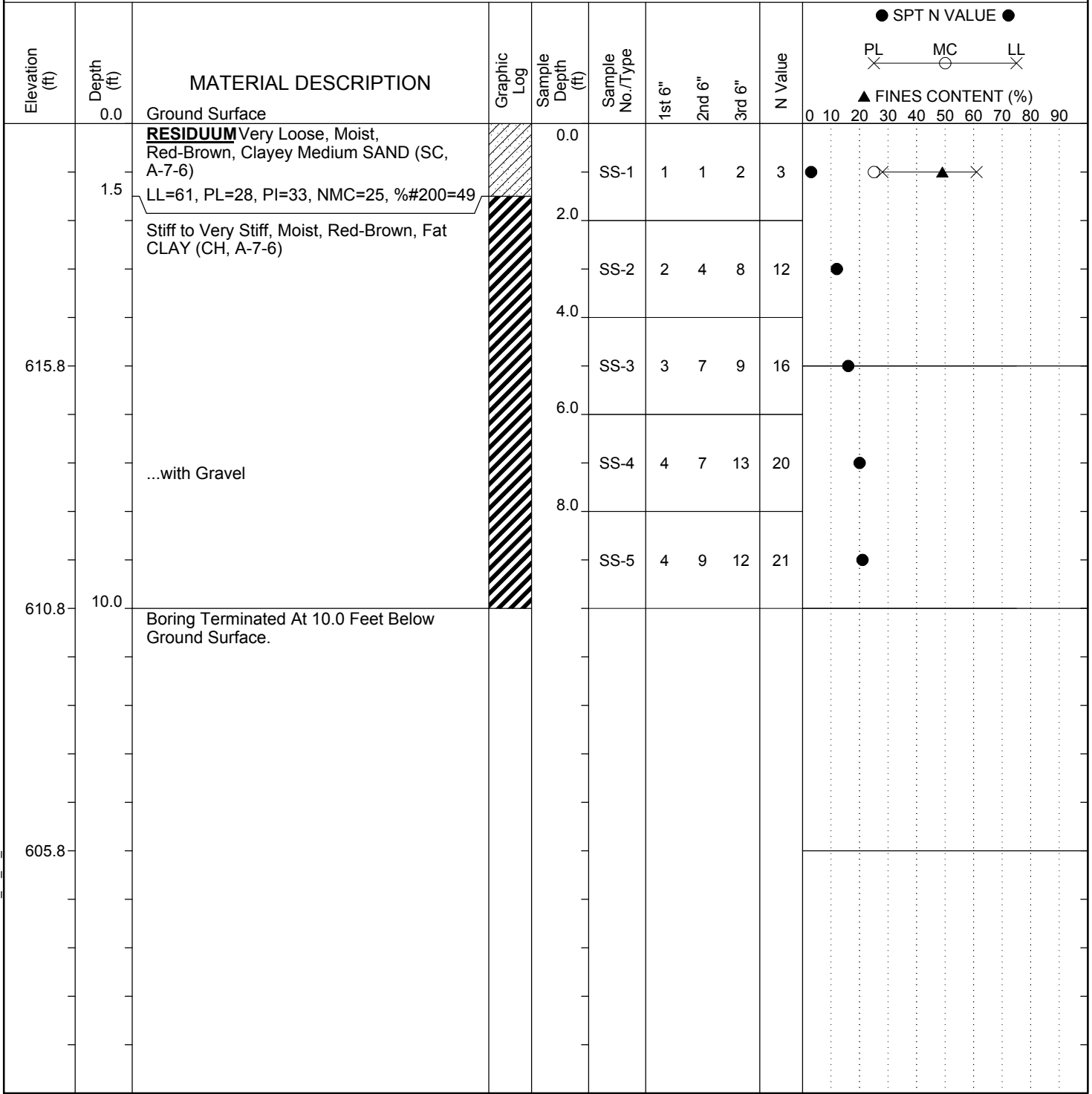


LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_SC72_GINT.GPJ_SCDOT_DATA_TEMPLATE_12_30_2014.GDT 10/19/16

Project ID: 111726		County: York		Boring No.: B14	
Site Description: SC72 Widening from Rambo Road to South of SC901				Route: SC72	
Eng./Geo.: Evans, T. E.		Boring Location: 77+56		Offset: 33.0 ft RT	Alignment: SC-72
Elev.: 620.8 ft	Latitude: 34.8889515	Longitude: 81.0464532	Date Started: 2/16/2016		
Total Depth: 10 ft	Soil Depth: 10 ft	Core Depth: N/A ft	Date Completed: 2/16/2016		
Bore Hole Diameter (in): 4.5		Sampler Configuration		Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME-55	Drill Method: CFA	Hammer Type: Automatic		Energy Ratio: 80%	
Core Size: N/A	Driller: Ferdrychowski, C.	Groundwater: TOB DRY		24HR: DRY	

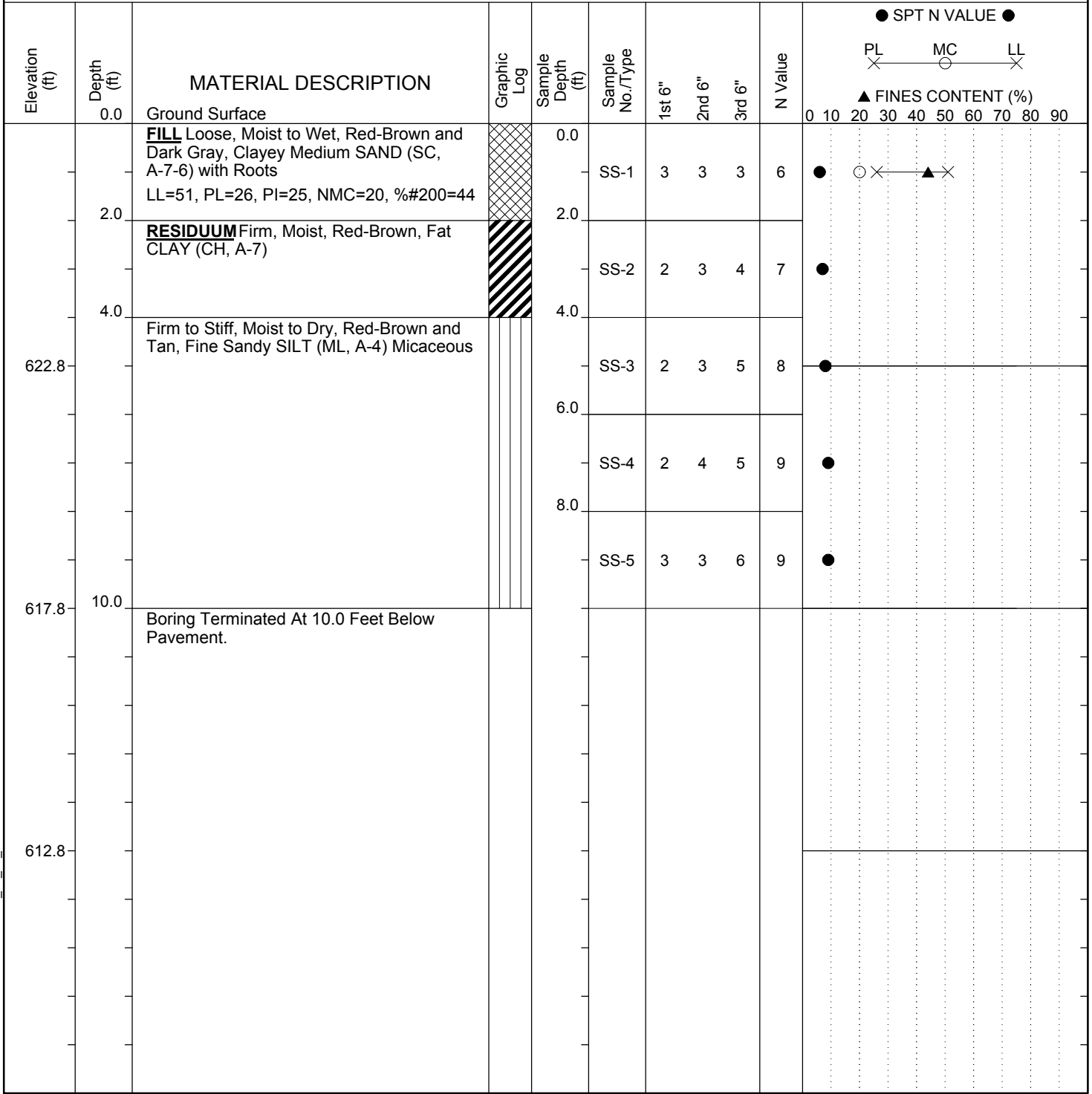


LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_SC72_GINT.GPJ SCDOT DATA TEMPLATE_12_30_2014.GDT 10/19/16

Project ID: 111726		County: York		Boring No.: B16	
Site Description: SC72 Widening from Rambo Road to South of SC901				Route: SC72	
Eng./Geo.: Evans, T. E.		Boring Location: 87+51		Offset: -50.5 ft LT	Alignment: SC-72
Elev.: 627.8 ft	Latitude: 34.8911947	Longitude: 81.0445655	Date Started: 2/16/2016		
Total Depth: 10 ft	Soil Depth: 10 ft	Core Depth: N/A ft	Date Completed: 2/16/2016		
Bore Hole Diameter (in): 4.5		Sampler Configuration		Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME-55	Drill Method: CFA	Hammer Type: Automatic		Energy Ratio: 80%	
Core Size: N/A	Driller: Ferdrychowski, C.	Groundwater: TOB DRY		24HR: DRY	

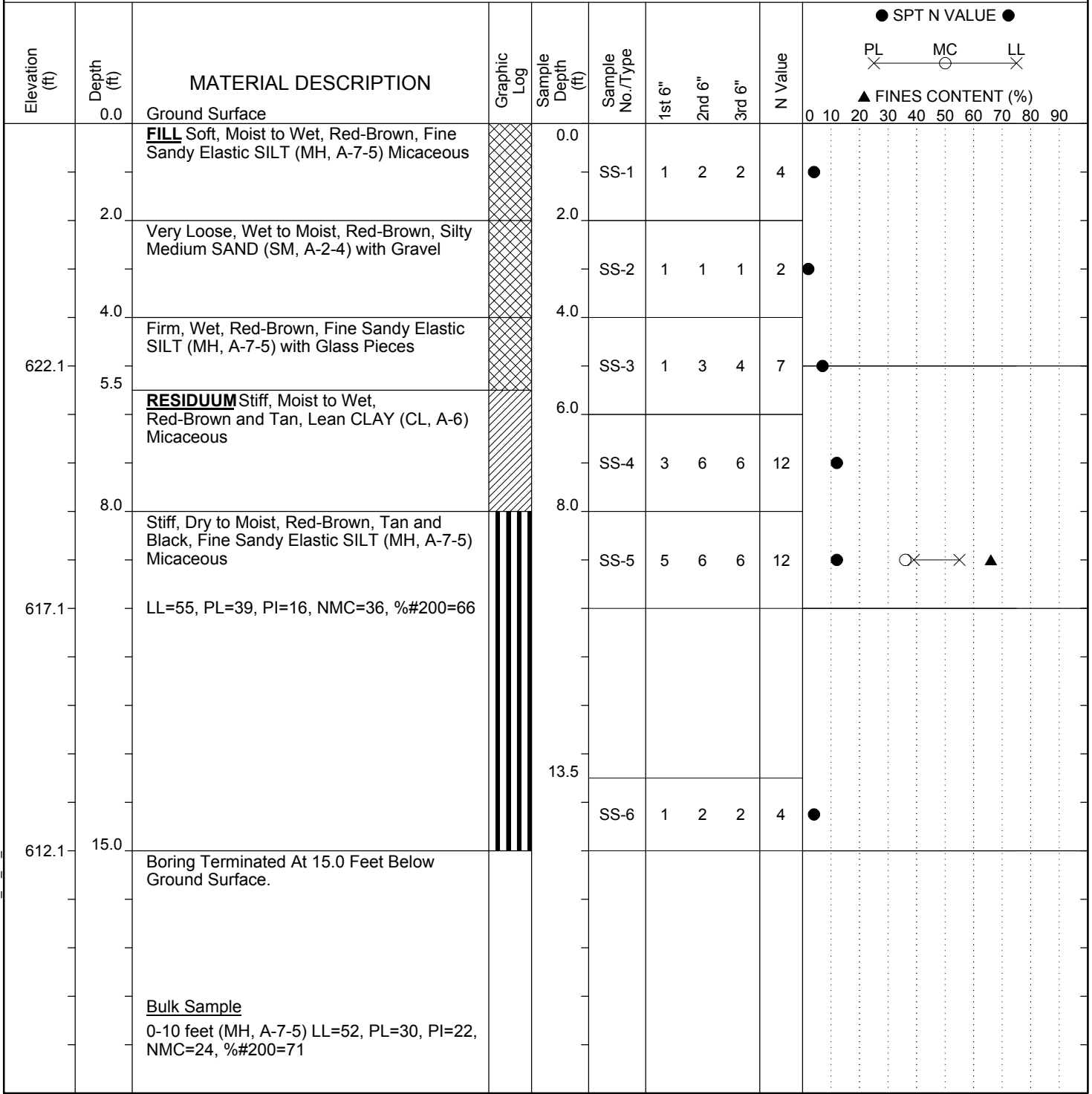


LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_SC72_GINT.GPJ SCDOT DATA TEMPLATE_12_30_2014.GDT 10/19/16

Project ID: 111726		County: York		Boring No.: B17	
Site Description: SC72 Widening from Rambo Road to South of SC901				Route: SC72	
Eng./Geo.: Evans, T. E.		Boring Location: 90+93		Offset: -20.2 ft LT	Alignment: SC-72
Elev.: 627.1 ft	Latitude: 34.8916427	Longitude: 81.0435372	Date Started: 2/16/2016		
Total Depth: 15 ft	Soil Depth: 15 ft	Core Depth: N/A ft	Date Completed: 2/16/2016		
Bore Hole Diameter (in): 4.5		Sampler Configuration		Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME-55	Drill Method: CFA	Hammer Type: Automatic		Energy Ratio: 80%	
Core Size: N/A	Driller: Ferdrychowski, C.	Groundwater: TOB	DRY	24HR	DRY

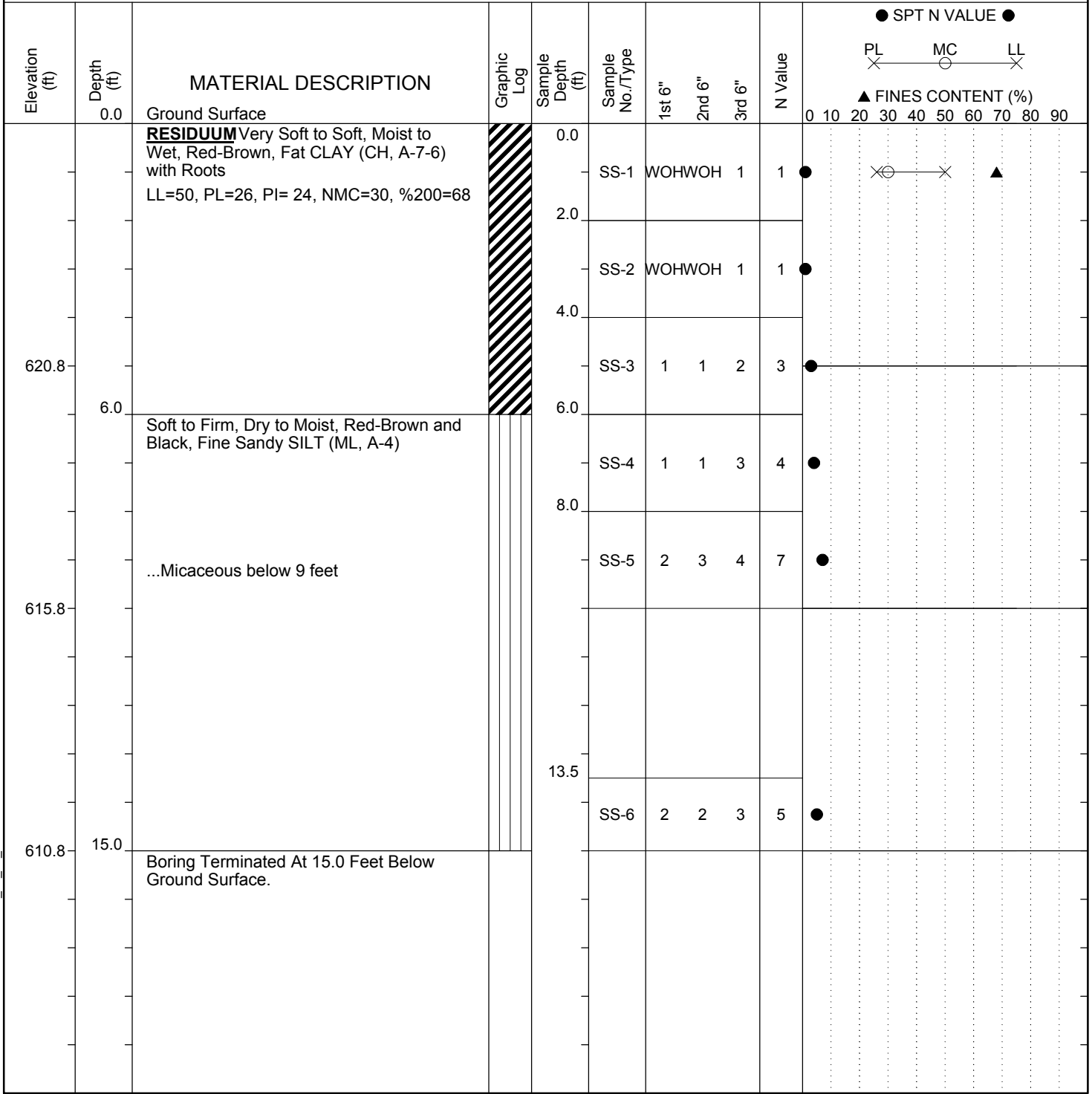


LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_SC72_GINT.GPJ SCDOT DATA TEMPLATE_12_30_2014.GDT 10/19/16

Project ID: 111726			County: York			Boring No.: B18		
Site Description: SC72 Widening from Rambo Road to South of SC901						Route: SC72		
Eng./Geo.: Evans, T. E.		Boring Location: 93+80		Offset: 44.2 ft RT		Alignment: SC-72		
Elev.: 625.8 ft	Latitude: 34.8918577		Longitude: 81.0425912		Date Started: 2/16/2016			
Total Depth: 15 ft		Soil Depth: 15 ft		Core Depth: N/A ft		Date Completed: 2/16/2016		
Bore Hole Diameter (in): 4.5		Sampler Configuration			Liner Required: Y (N)		Liner Used: Y (N)	
Drill Machine: CME-55		Drill Method: CFA		Hammer Type: Automatic		Energy Ratio: 80%		
Core Size: N/A		Driller: Ferdrychowski, C.		Groundwater: TOB DRY		24HR: DRY		

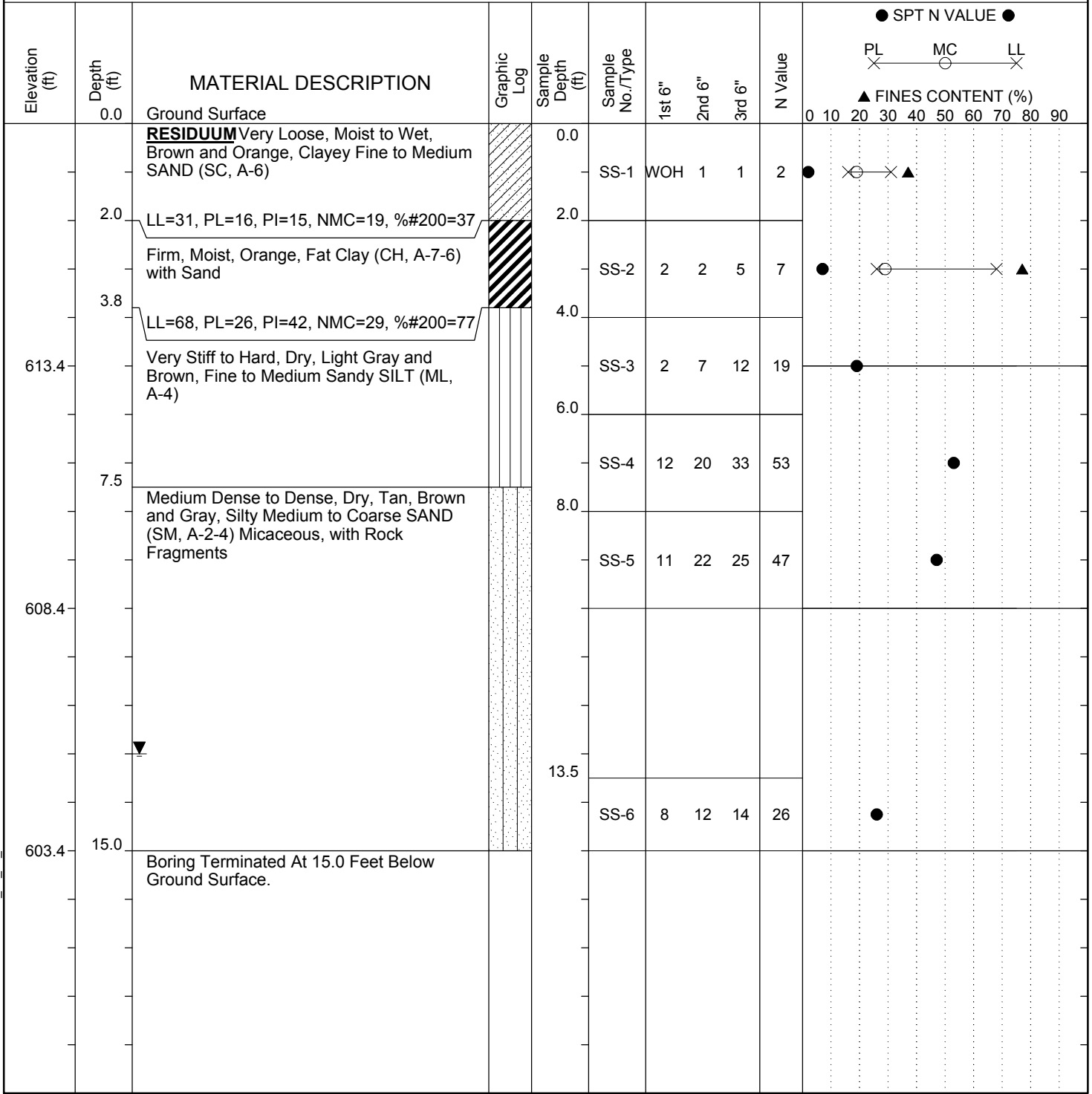


LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_SC72_GINT.GPJ SCDOT DATA TEMPLATE_12_30_2014.GDT 10/19/16

Project ID: 111726	County: York	Boring No.: B19
Site Description: SC72 Widening from Rambo Road to South of SC901		Route: SC72
Eng./Geo.: Evans, T. E.	Boring Location: 97+09	Offset: -29.2 ft LT Alignment: SC-72
Elev.: 618.4 ft	Latitude: 34.8924608	Longitude: 81.0417363 Date Started: 2/16/2016
Total Depth: 15 ft	Soil Depth: 15 ft	Core Depth: N/A ft Date Completed: 2/16/2016
Bore Hole Diameter (in): 4.5	Sampler Configuration	Liner Required: Y (N) Liner Used: Y (N)
Drill Machine: CME-55	Drill Method: CFA	Hammer Type: Automatic Energy Ratio: 80%
Core Size: N/A	Driller: Ferdrychowski, C.	Groundwater: TOB DRY 24HR: 13 ft

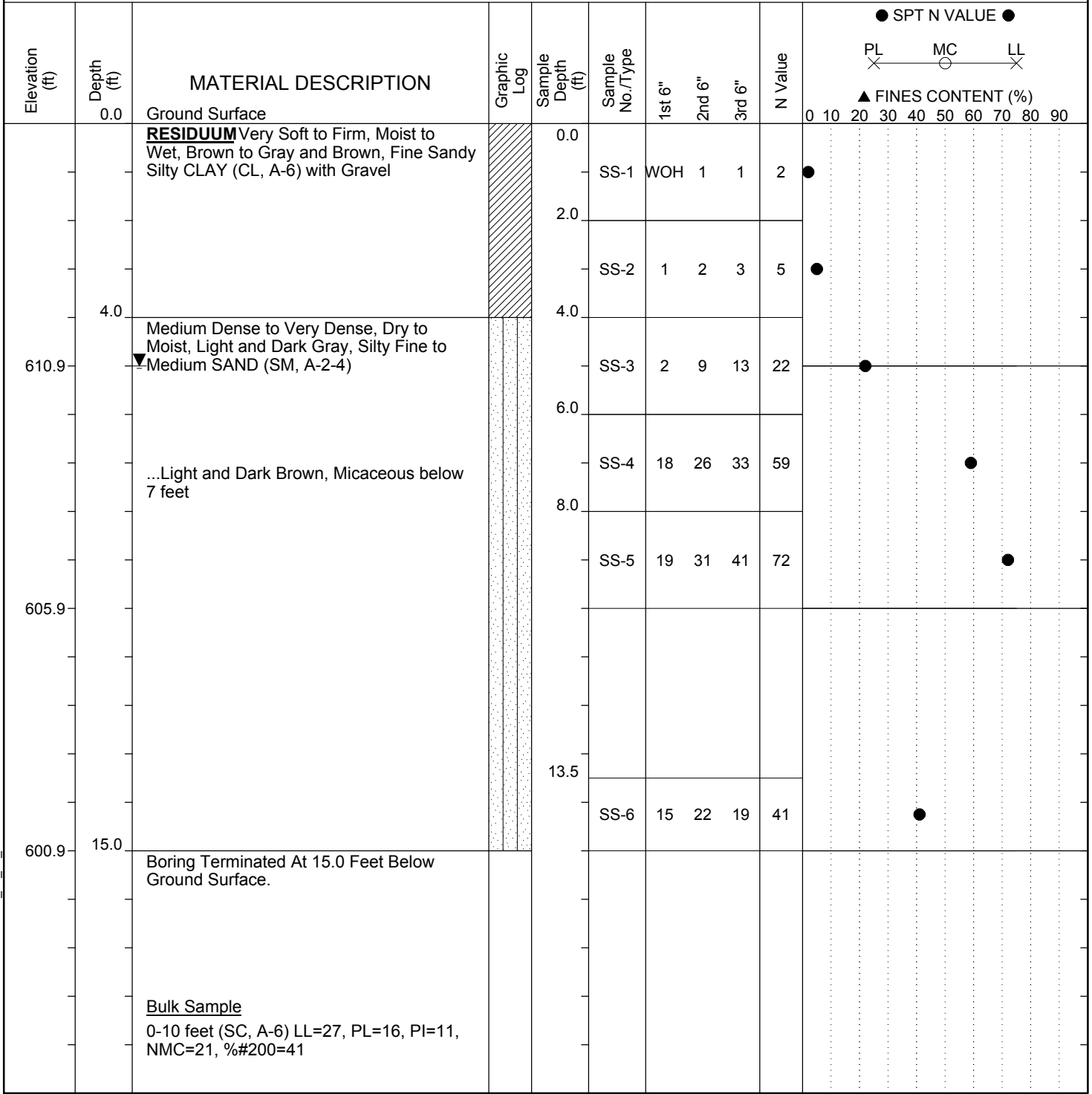


LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_SC72_GINT.GPJ_SCDOT_DATA_TEMPLATE_12_30_2014.GDT 10/19/16

Project ID: 111726			County: York			Boring No.: B20		
Site Description: SC72 Widening from Rambo Road to South of SC901						Route: SC72		
Eng./Geo.: Evans, T. E.		Boring Location: 100+04		Offset: -30.8 ft LT		Alignment: SC-72		
Elev.: 615.9 ft		Latitude: 34.8928453		Longitude: 81.0408722		Date Started: 2/16/2016		
Total Depth: 15 ft		Soil Depth: 15 ft		Core Depth: N/A ft		Date Completed: 2/16/2016		
Bore Hole Diameter (in): 4.5		Sampler Configuration			Liner Required: Y (N)		Liner Used: Y (N)	
Drill Machine: CME-55		Drill Method: CFA		Hammer Type: Automatic		Energy Ratio: 80%		
Core Size: N/A		Driller: Ferdrychowski, C.		Groundwater: TOB DRY		24HR		5 ft

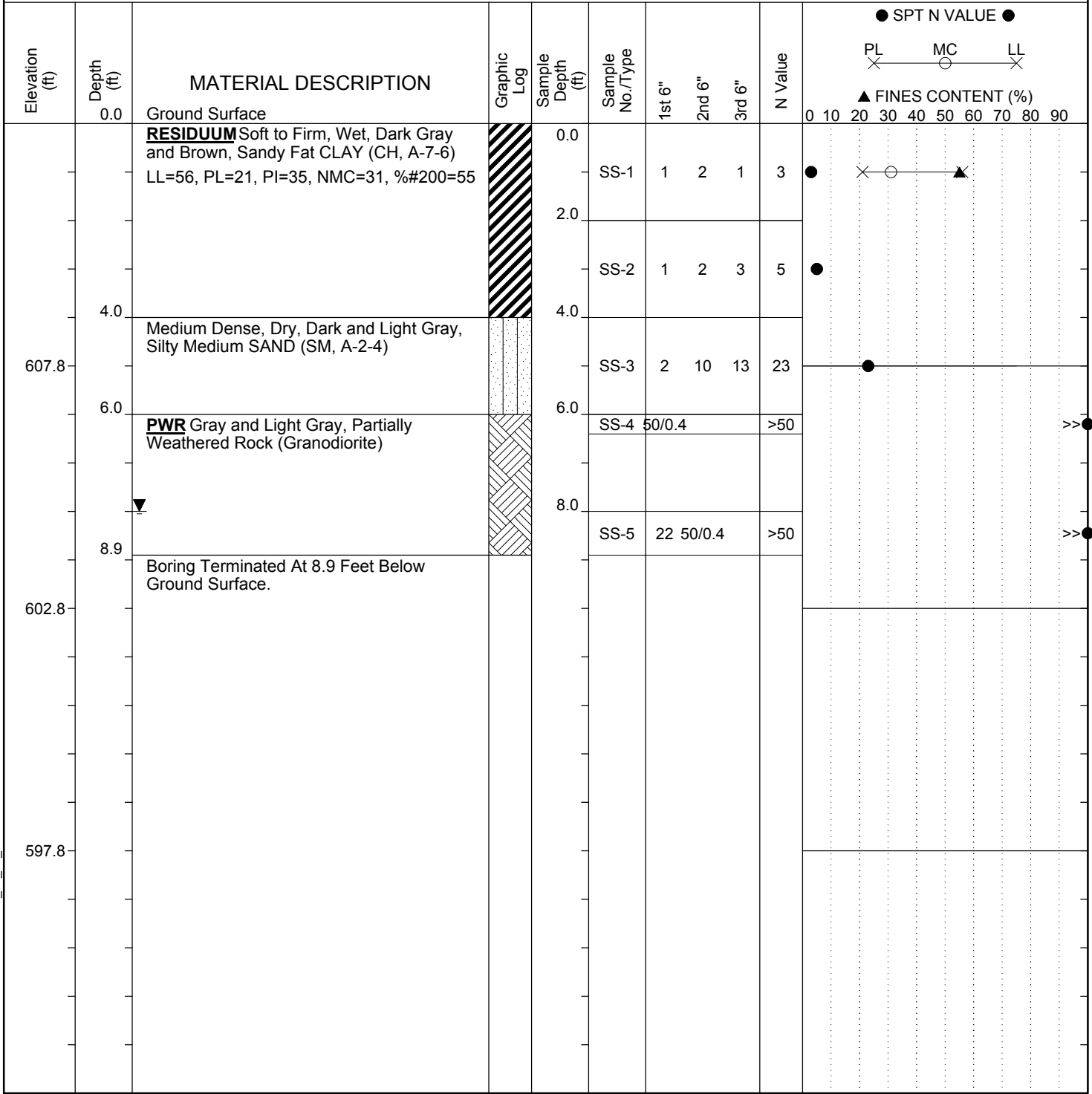


LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT SC72_GINT.GPJ SCDOT DATA TEMPLATE_12_30_2014.GDT 10/19/16

Project ID: 111726			County: York			Boring No.: B21		
Site Description: SC72 Widening from Rambo Road to South of SC901						Route: SC72		
Eng./Geo.: Evans, T. E.		Boring Location: 105+16		Offset: -43.7 ft LT		Alignment: SC-72		
Elev.: 612.8 ft	Latitude: 34.8935382		Longitude: 81.0393835		Date Started: 2/17/2016			
Total Depth: 8.9 ft		Soil Depth: 8.9 ft		Core Depth: N/A ft		Date Completed: 2/17/2016		
Bore Hole Diameter (in): 4.5		Sampler Configuration			Liner Required: Y (N)		Liner Used: Y (N)	
Drill Machine: CME-55		Drill Method: CFA		Hammer Type: Automatic		Energy Ratio: 80%		
Core Size: N/A		Driller: Ferdrychowski, C.		Groundwater: TOB DRY		24HR		8 ft

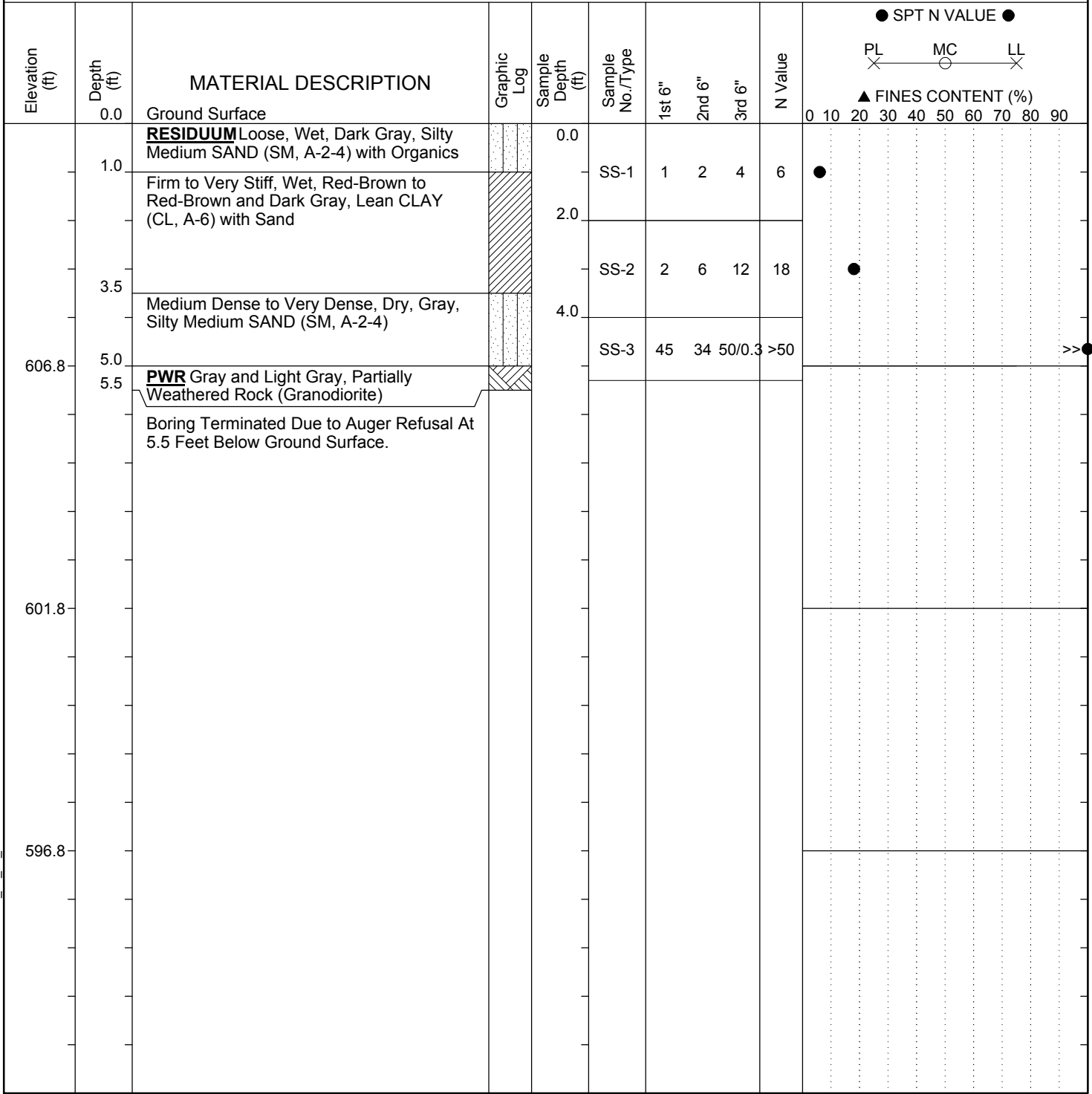


LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT SC72_GINT.GPJ SCDOT DATA TEMPLATE_12_30_2014.GDT 10/19/16

Project ID: 111726		County: York		Boring No.: B22	
Site Description: SC72 Widening from Rambo Road to South of SC901				Route: SC72	
Eng./Geo.: Evans, T. E.		Boring Location: 109+47		Offset: -23.8 ft LT	Alignment: SC-72
Elev.: 611.8 ft	Latitude: 34.8940471	Longitude: 81.0380871	Date Started: 2/17/2016		
Total Depth: 5.5 ft	Soil Depth: 5.5 ft	Core Depth: N/A ft	Date Completed: 2/17/2016		
Bore Hole Diameter (in): 4.5		Sampler Configuration		Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME-55	Drill Method: CFA	Hammer Type: Automatic		Energy Ratio: 80%	
Core Size: N/A	Driller: Ferdrychowski, C.	Groundwater: TOB	DRY	24HR	DRY

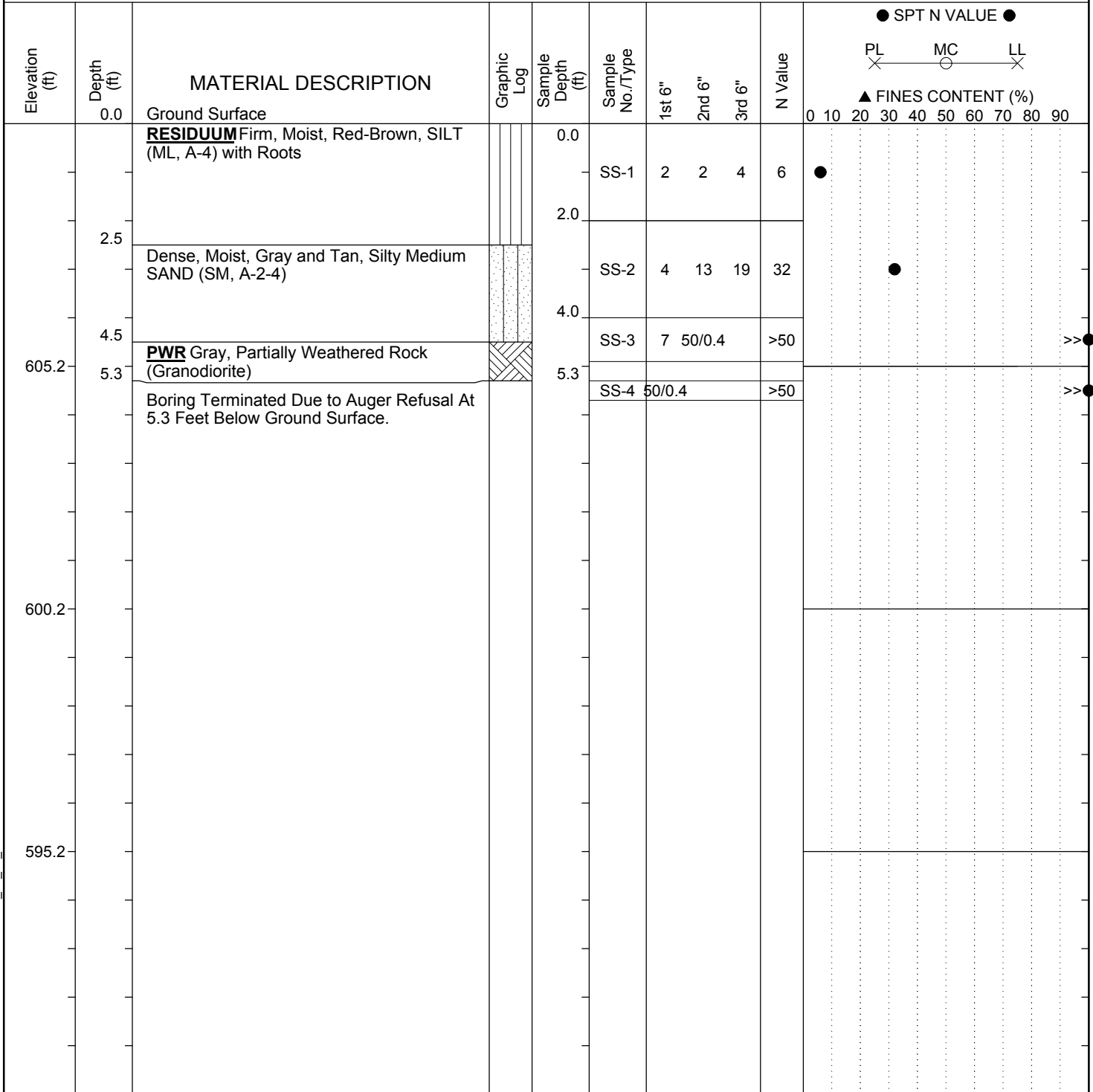


LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_SC72_GINT.GPJ_SCDOT DATA TEMPLATE_12_30_2014.GDT 10/19/16

Project ID: 111726		County: York		Boring No.: B23	
Site Description: SC72 Widening from Rambo Road to South of SC901				Route: SC72	
Eng./Geo.: Evans, T. E.		Boring Location: 114+87		Offset: -25.4 ft LT	Alignment: SC-72
Elev.: 610.2 ft	Latitude: 34.894884	Longitude: 81.0366229	Date Started: 2/17/2016		
Total Depth: 5.3 ft	Soil Depth: 5.3 ft	Core Depth: N/A ft	Date Completed: 2/17/2016		
Bore Hole Diameter (in): 4.5		Sampler Configuration		Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME-55	Drill Method: CFA	Hammer Type: Automatic		Energy Ratio: 80%	
Core Size: N/A	Driller: Ferdrychowski, C.	Groundwater: TOB	DRY	24HR	DRY

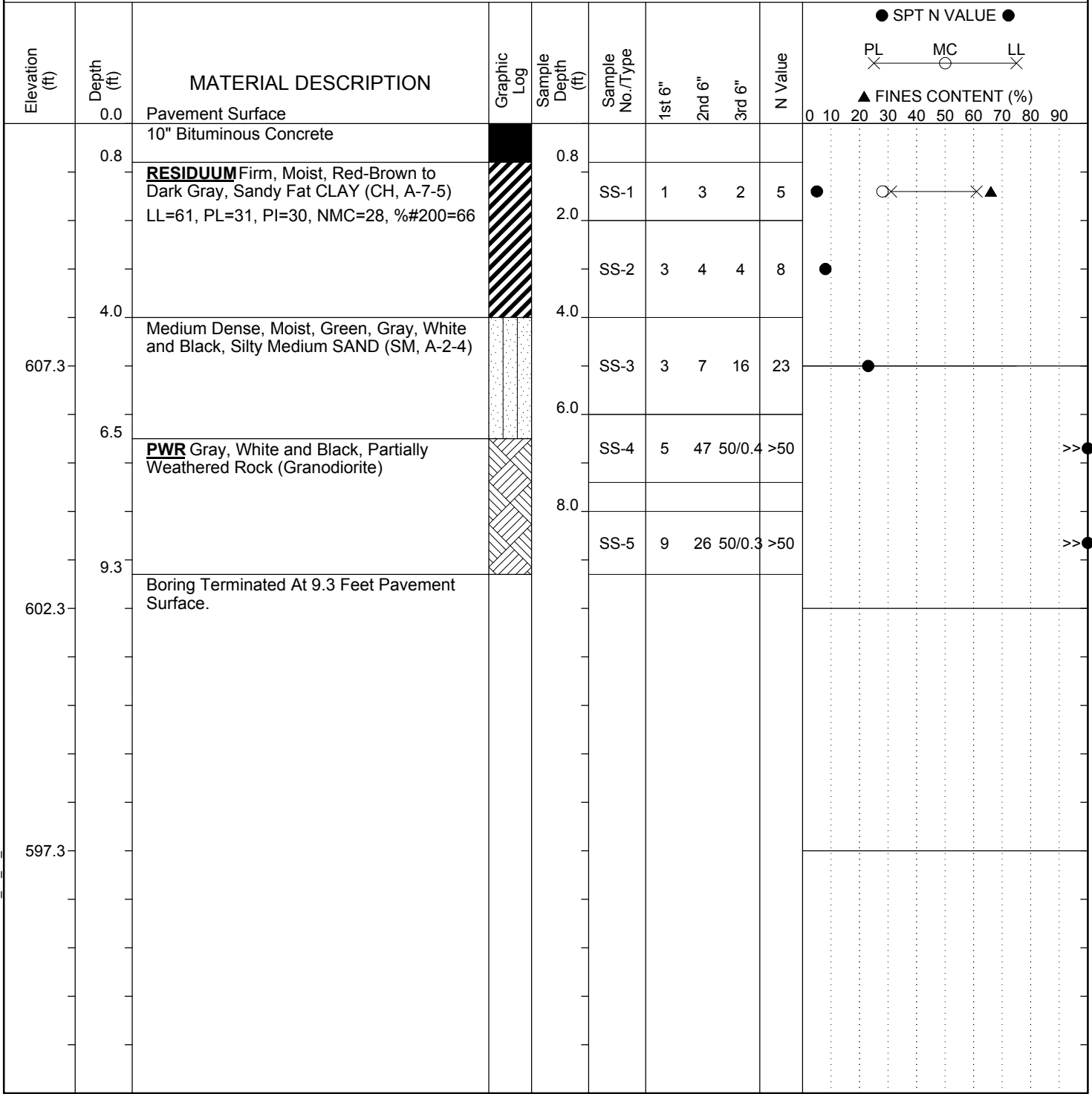


LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT SC72_GINT.GPJ SCDOT DATA TEMPLATE_12_30_2014.GDT 10/19/16

Project ID: 111726		County: York		Boring No.: B24	
Site Description: SC72 Widening from Rambo Road to South of SC901				Route: SC72	
Eng./Geo.: Applegate, K. N.		Boring Location: 119+35		Offset: -31.0 ft LT	Alignment: SC-72
Elev.: 612.3 ft	Latitude: 34.8957434	Longitude: 81.0355677	Date Started: 2/20/2016		
Total Depth: 9.3 ft	Soil Depth: 9.3 ft	Core Depth: N/A ft	Date Completed: 2/20/2016		
Bore Hole Diameter (in): 4.5		Sampler Configuration		Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME-55	Drill Method: CFA	Hammer Type: Automatic		Energy Ratio: 80%	
Core Size: N/A	Driller: Ferdrychowski, C.	Groundwater: TOB	DRY	24HR	DRY



LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_SC72_GINT.GPJ_SCDOT_DATA_TEMPLATE_12_30_2014.GDT 10/19/16

Project ID: 111726			County: York			Boring No.: B25		
Site Description: SC72 Widening from Rambo Road to South of SC901						Route: S-163		
Eng./Geo.: Evans, T. E.		Boring Location: 16+39		Offset: -8.6 ft LT		Alignment: RELOC-S-163		
Elev.: 627.0 ft	Latitude: 34.8757977		Longitude: 81.0575894		Date Started: 2/17/2016			
Total Depth: 15 ft		Soil Depth: 15 ft		Core Depth: N/A ft		Date Completed: 2/17/2016		
Bore Hole Diameter (in): 4.5		Sampler Configuration			Liner Required: Y (N)		Liner Used: Y (N)	
Drill Machine: CME-55		Drill Method: CFA		Hammer Type: Automatic		Energy Ratio: 80%		
Core Size: N/A		Driller: Ferdrychowski, C.		Groundwater: TOB DRY		24HR: DRY		

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	N Value	SPT N VALUE											
										0	10	20	30	40	50	60	70	80	90		
	0.0	Ground Surface																			
		RESIDUUM Firm to Stiff, Moist to Dry, Red-Brown and Tan to Tan, Fine Sandy Elastic SILT (MH, A-7-5) Micaceous		0.0	SS-1	2	3	5	8	●											
				2.0	SS-2	2	3	4	7	●											
622.0				4.0	SS-3	2	4	5	9	●											
	6.0	Loose, Moist to Wet, Purple, Red and Tan, Silty Medium SAND (SM, A-4 / A-2-4) Micaceous		6.0	SS-4	2	3	3	6	●											
				8.0	SS-5	2	2	3	5	●											
617.0																					
				13.5																	
	15.0	Boring Terminated At 15.0 Feet Below Ground Surface.			SS-6	2	2	4	6	●											
612.0																					
		<u>Bulk Sample</u> 0-6 feet (MH, A-7-5) LL=55, PL=34, PI=21, NMC=28, %#200=64																			

LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT SC72_GINT.GPJ SCDOT DATA TEMPLATE_12_30_2014.GDT 10/19/16

Project ID: 111726			County: York			Boring No.: B26		
Site Description: SC72 Widening from Rambo Road to South of SC901						Route: SR-46-244		
Eng./Geo.: Evans, T. E.		Boring Location: 14+78		Offset: 36.8 ft RT		Alignment: RELOC-S-244		
Elev.: 620.1 ft	Latitude: 34.879052		Longitude: 81.0509373		Date Started: 2/19/2016			
Total Depth: 15 ft		Soil Depth: 15 ft		Core Depth: N/A ft		Date Completed: 2/19/2016		
Bore Hole Diameter (in): 4.5		Sampler Configuration			Liner Required: Y (N)		Liner Used: Y (N)	
Drill Machine: CME-45C		Drill Method: CFA		Hammer Type: Automatic		Energy Ratio: 76.3%		
Core Size: N/A		Driller: Ferdrychowski, C.		Groundwater: TOB DRY		24HR		Filled

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	N Value	SPT N VALUE									
										PL	MC	LL	FINES CONTENT (%)						
	0.0	Pavement Surface																	
	0.3	3.25" Bituminous Concrete																	
	1.1	10" Soil / Aggregate Concrete		1.1															
		RESIDUUM Stiff, Moist, Red-Brown and Tan, SILT (ML, A-4) Micaceous, with Sand Layers		2.0	SS-1	2	3	-											
					SS-2	4	5	6	11	●									
615.1				4.0	SS-3	3	4	8	12	●									
				6.0	SS-4	3	5	5	10	●									
	7.5	Loose, Dry, Red-Brown Tan and Gray, Silty Medium SAND (SM, A-2-4)		8.0	SS-5	3	4	6	10	●									
610.1	9.0	Firm to Stiff, Moist, Red-Brown and Black, Fine Sandy SILT (ML, A-4) Micaceous																	
				13.5	SS-6	3	4	4	8	●									
605.1	15.0	Boring Terminated At 15.0 Feet Below Pavement.																	

LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT SC72_GINT.GPJ SCDOT DATA TEMPLATE_12_30_2014.GDT 10/19/16

Project ID: 111726		County: York		Boring No.: B27	
Site Description: SC72 Widening from Rambo Road to South of SC901				Route: S-721	
Eng./Geo.: Applegate, K. N.		Boring Location: 13+93		Offset: 3.5 ft RT	Alignment: RELOC-S-721
Elev.: 617.5 ft	Latitude: 34.8809638	Longitude: 81.0494754	Date Started: 2/20/2016		
Total Depth: 15 ft	Soil Depth: 15 ft	Core Depth: N/A ft	Date Completed: 2/20/2016		
Bore Hole Diameter (in): 4.5		Sampler Configuration		Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME-45C	Drill Method: CFA	Hammer Type: Automatic		Energy Ratio: 76.3%	
Core Size: N/A	Driller: Ferdrychowski, C.	Groundwater: TOB	11.2 ft	24HR: Filled	

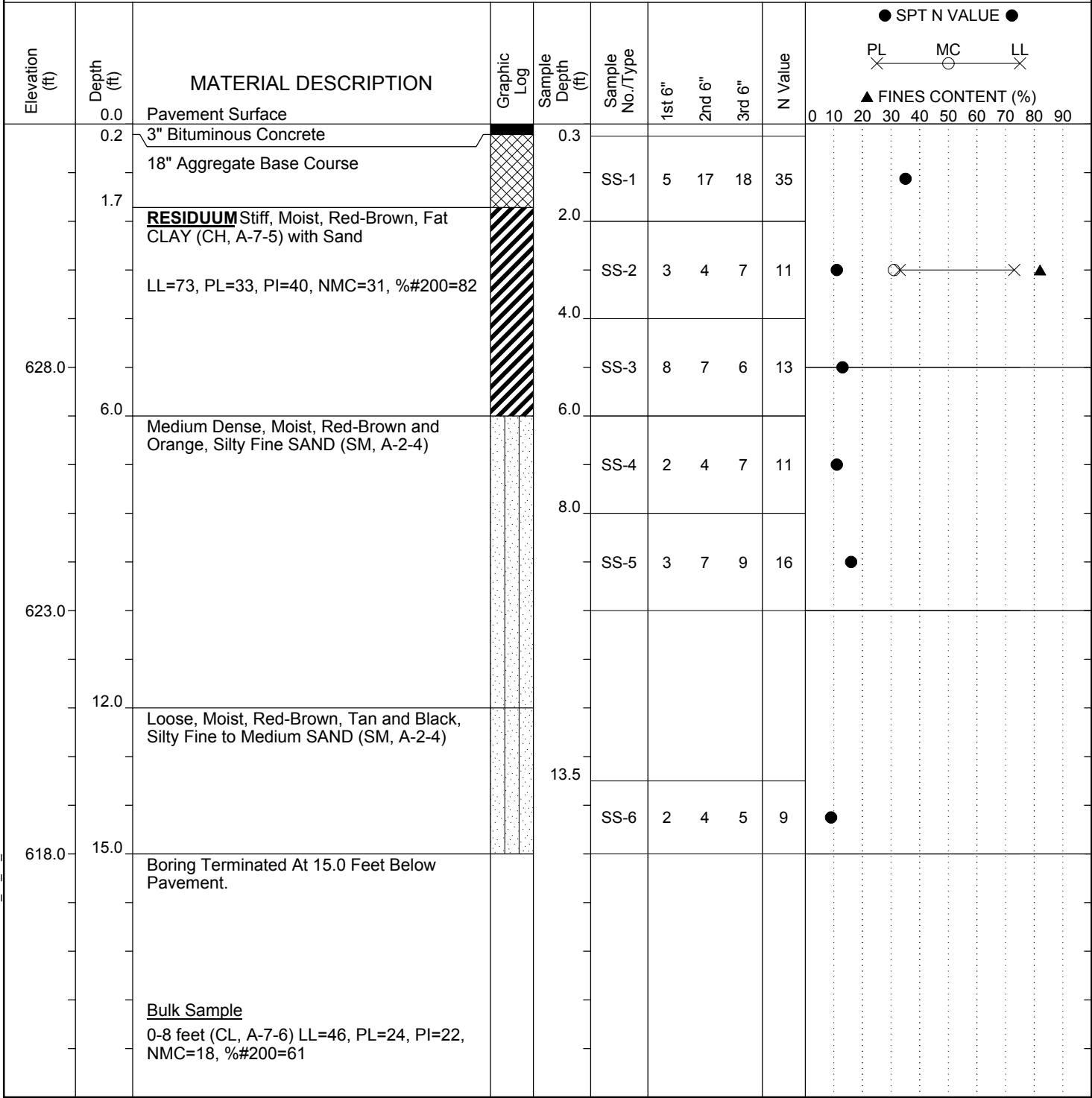
Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	N Value	SPT N VALUE
	0.0	Pavement Surface								
	0.2	2.75" Bituminous Concrete		0.3						
		23.8" Aggregate Base Course								
	2.0	RESIDUUM Loose, Moist, Red-Brown to Red-Brown and Dark Brown, Silty Fine SAND (SM, A-2-4)		2.0	SS-1	3	7	5	12	●
				4.0	SS-2	4	3	3	6	●
612.5				6.0	SS-3	3	3	4	7	●
	6.0	Firm, Moist, Red-Brown, Mottled with Dark Brown and Tan, Medium Sandy SILT (ML, A-4)		6.0	SS-4	3	3	3	6	●
		...with Clay Seams at 9 feet		8.0	SS-5	2	2	3	5	●
607.5										
	12.0	Firm, Wet, Purple, Tan and White, Fine Sandy CLAY (CL, A-6)		13.5	SS-6	2	2	3	5	●
602.5	15.0	Boring Terminated At 15.0 Feet Below Pavement.								

LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_SC72_GINT.GPJ_SCDOT_DATA_TEMPLATE_12_30_2014.GDT 10/19/16

Project ID: 111726		County: York		Boring No.: B28	
Site Description: SC72 Widening from Rambo Road to South of SC901				Route: S-1576	
Eng./Geo.: Applegate, K. N.		Boring Location: 16+68		Offset: 0.4 ft RT	Alignment: RELOC-S-1576
Elev.: 633.0 ft	Latitude: 34.8854208	Longitude: 81.0471662	Date Started: 2/20/2016		
Total Depth: 15 ft	Soil Depth: 15 ft	Core Depth: N/A ft	Date Completed: 2/20/2016		
Bore Hole Diameter (in): 4.5		Sampler Configuration		Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME-45C	Drill Method: CFA	Hammer Type: Automatic		Energy Ratio: 76.3%	
Core Size: N/A	Driller: Ferdrychowski, C.	Groundwater: TOB DRY		24HR: Filled	

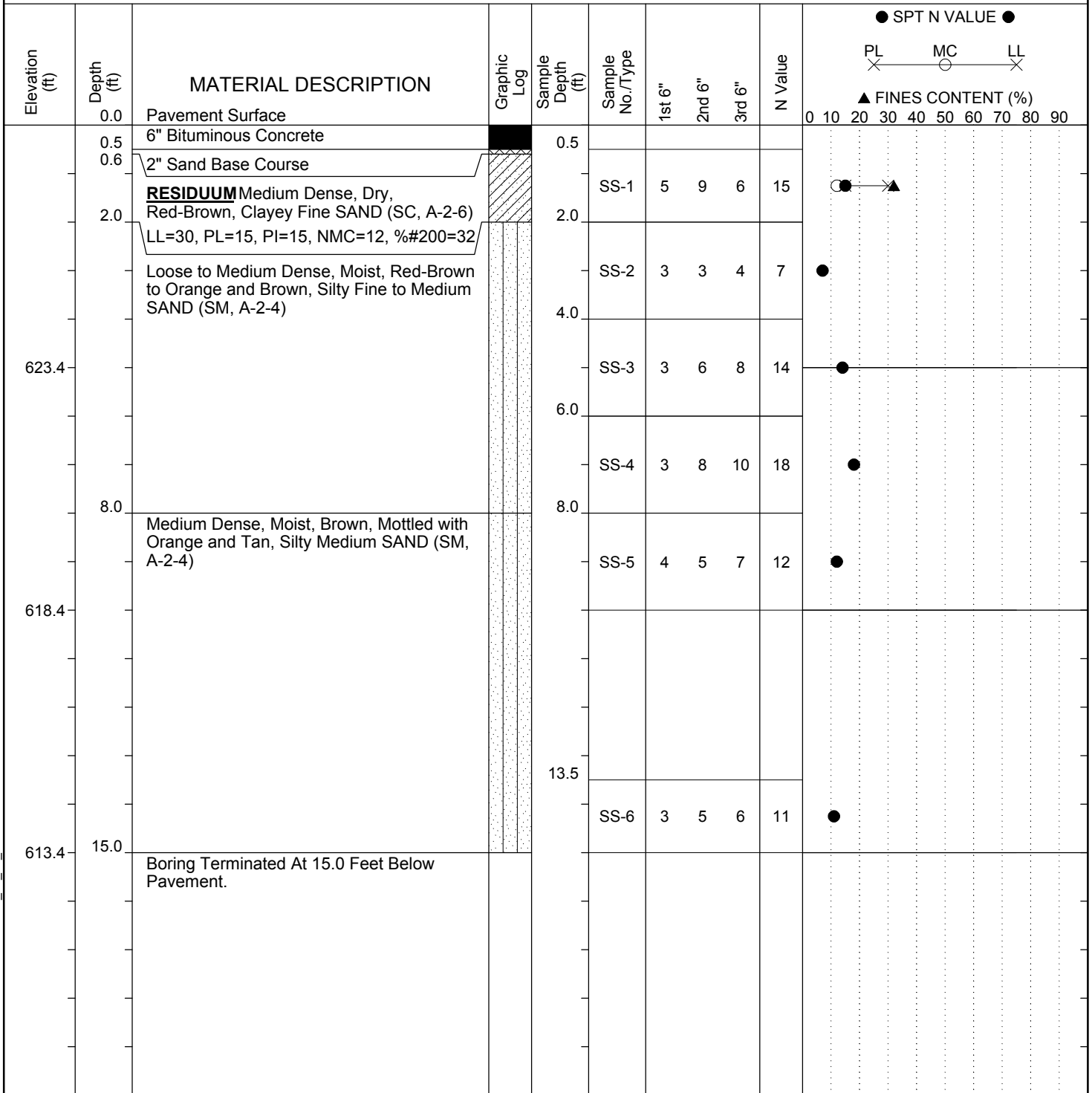


LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT SC72_GINT.GPJ SCDOT DATA TEMPLATE_12_30_2014.GDT 10/19/16

Project ID: 111726		County: York		Boring No.: B29	
Site Description: SC72 Widening from Rambo Road to South of SC901				Route: S-250	
Eng./Geo.: Applegate, K. N.		Boring Location: 15+55		Offset: -10.6 ft LT	Alignment: RELOC-S-250
Elev.: 628.4 ft	Latitude: 34.89121	Longitude: 81.0457311	Date Started: 2/20/2016		
Total Depth: 15 ft	Soil Depth: 15 ft	Core Depth: N/A ft	Date Completed: 2/20/2016		
Bore Hole Diameter (in): 4.5		Sampler Configuration		Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME-45C	Drill Method: CFA	Hammer Type: Automatic		Energy Ratio: 76.3%	
Core Size: N/A	Driller: Ferdrychowski, C.	Groundwater: TOB	DRY	24HR	Filled

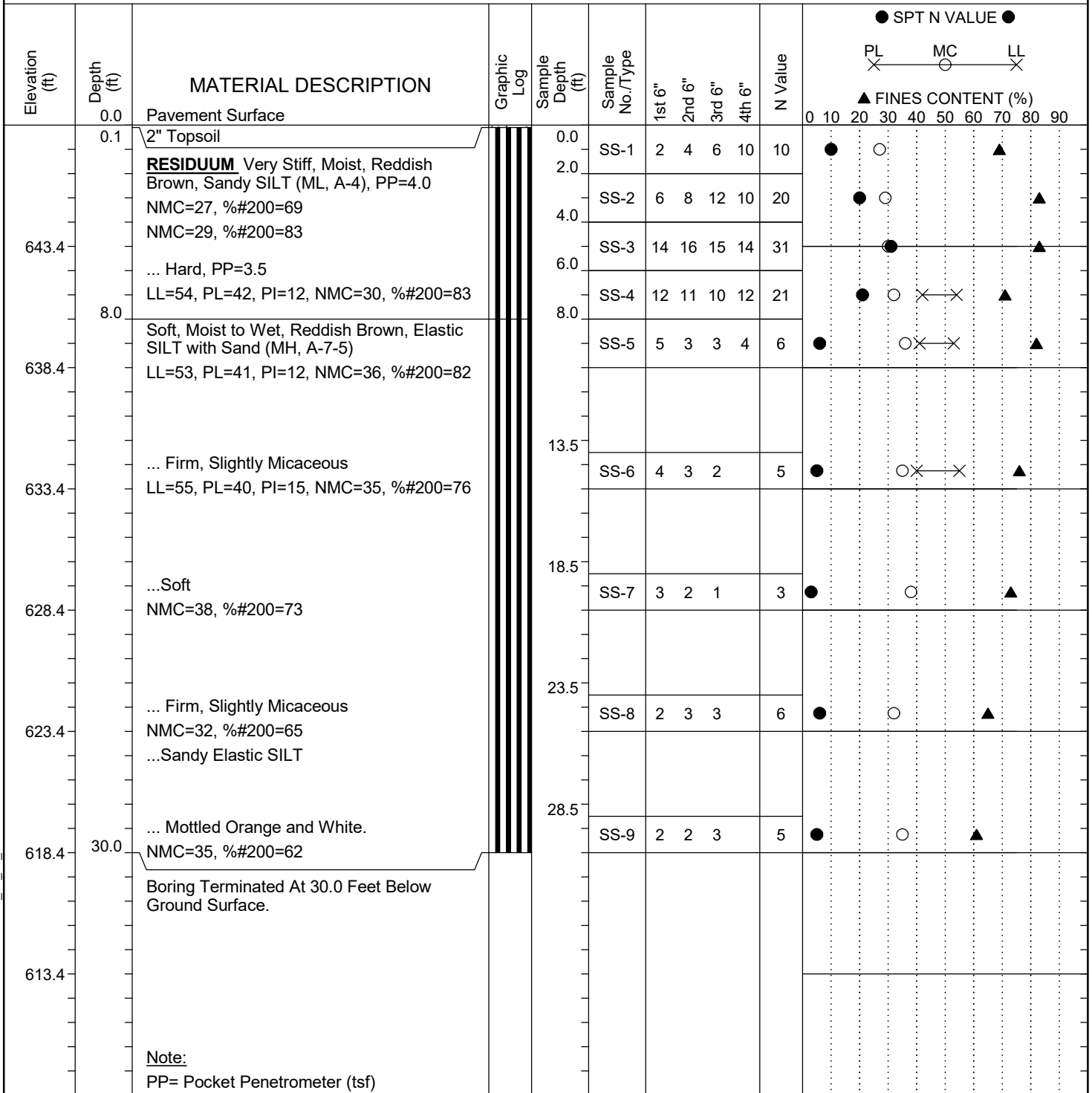


LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_SC72_GINT.GPJ_SCDOT_DATA_TEMPLATE_12_30_2014.GDT 10/19/16

Project ID: P029515	County: York	Boring No.: B33
Site Description: SC72 Widening from Rambo Road to South of SC901		Route: SC-72
Eng./Geo.: Applegate, K. N.	Boring Location: 41+76.67	Offset: -71.13
Alignment: SC-72	Elev.: 648.4 ft	Latitude: 34.8801221
Longitude: 81.0516051	Date Started: 4/2/2020	
Total Depth: 30 ft	Soil Depth: 30 ft	Core Depth: N/A ft
Date Completed: 4/2/2020	Bore Hole Diameter (in): 4.5	Sampler Configuration
Liner Required: Y (N)	Liner Used: Y (N)	
Drill Machine: CME-45C	Drill Method: HSA	Hammer Type: Automatic
Energy Ratio: 81%	Core Size: N/A	Driller: Mike Burnash
Groundwater: TOB	DRY	24HR Filled

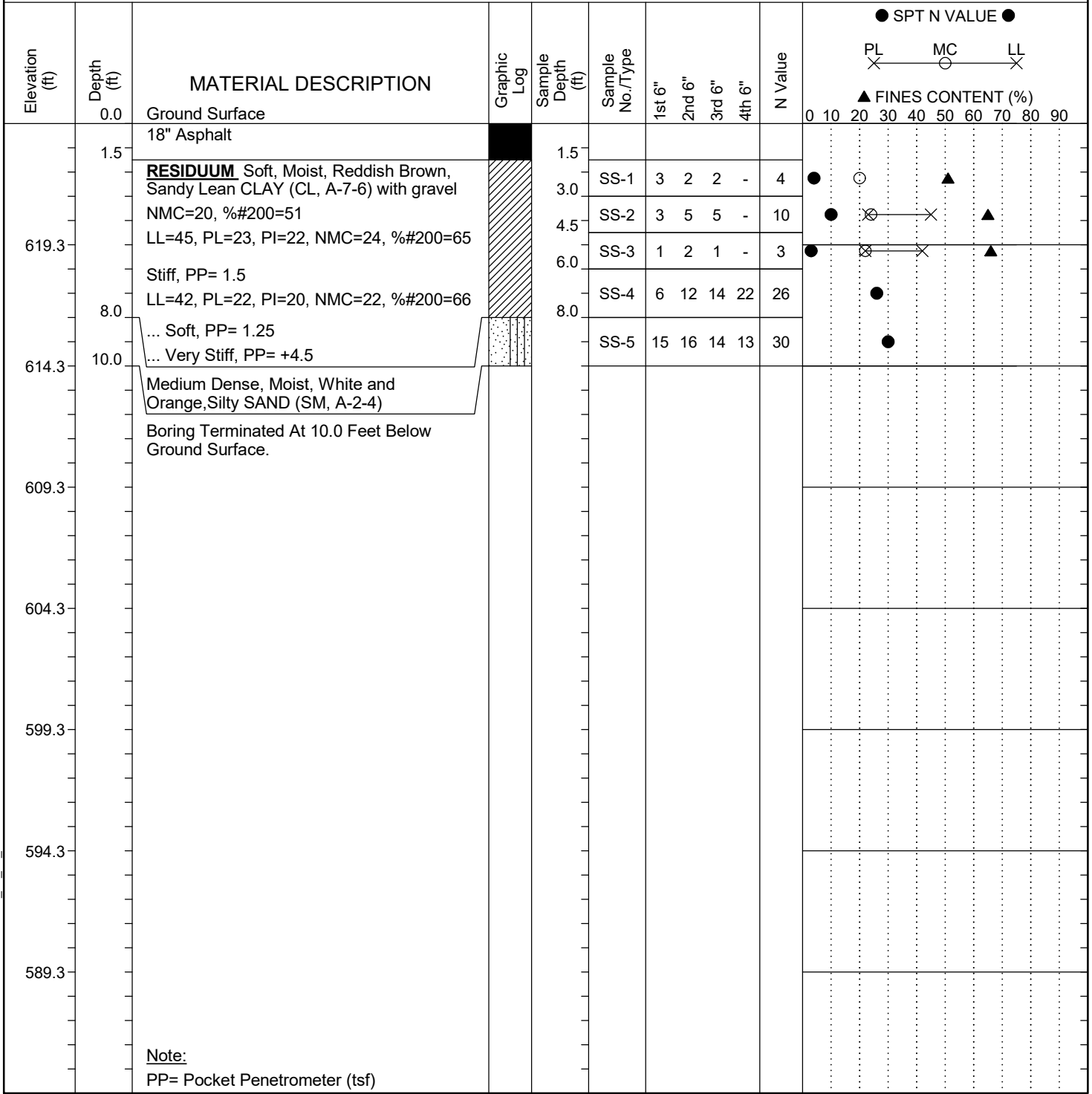


LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_SC72_GINT.GPJ_SCDOT DATA TEMPLATE_01_30_2015.GDT 8/25/20

Project ID: P029515		County: York		Boring No.: B34	
Site Description: SC72 Widening from Rambo Road to South of SC901				Route: SC-72	
Eng./Geo.: Applegate, K. N.		Boring Location: 49+15.21		Offset: -19.50	Alignment: SC-72
Elev.: 624.3 ft	Latitude: 34.881862	Longitude: 81.0504017	Date Started: 4/2/2020		
Total Depth: 10 ft	Soil Depth: 10 ft	Core Depth: N/A ft	Date Completed: 4/2/2020		
Bore Hole Diameter (in): 4.5		Sampler Configuration		Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME-45C	Drill Method: HSA	Hammer Type: Automatic		Energy Ratio: 81%	
Core Size: N/A	Driller: Mike Burnash	Groundwater: TOB	DRY	24HR	Filled

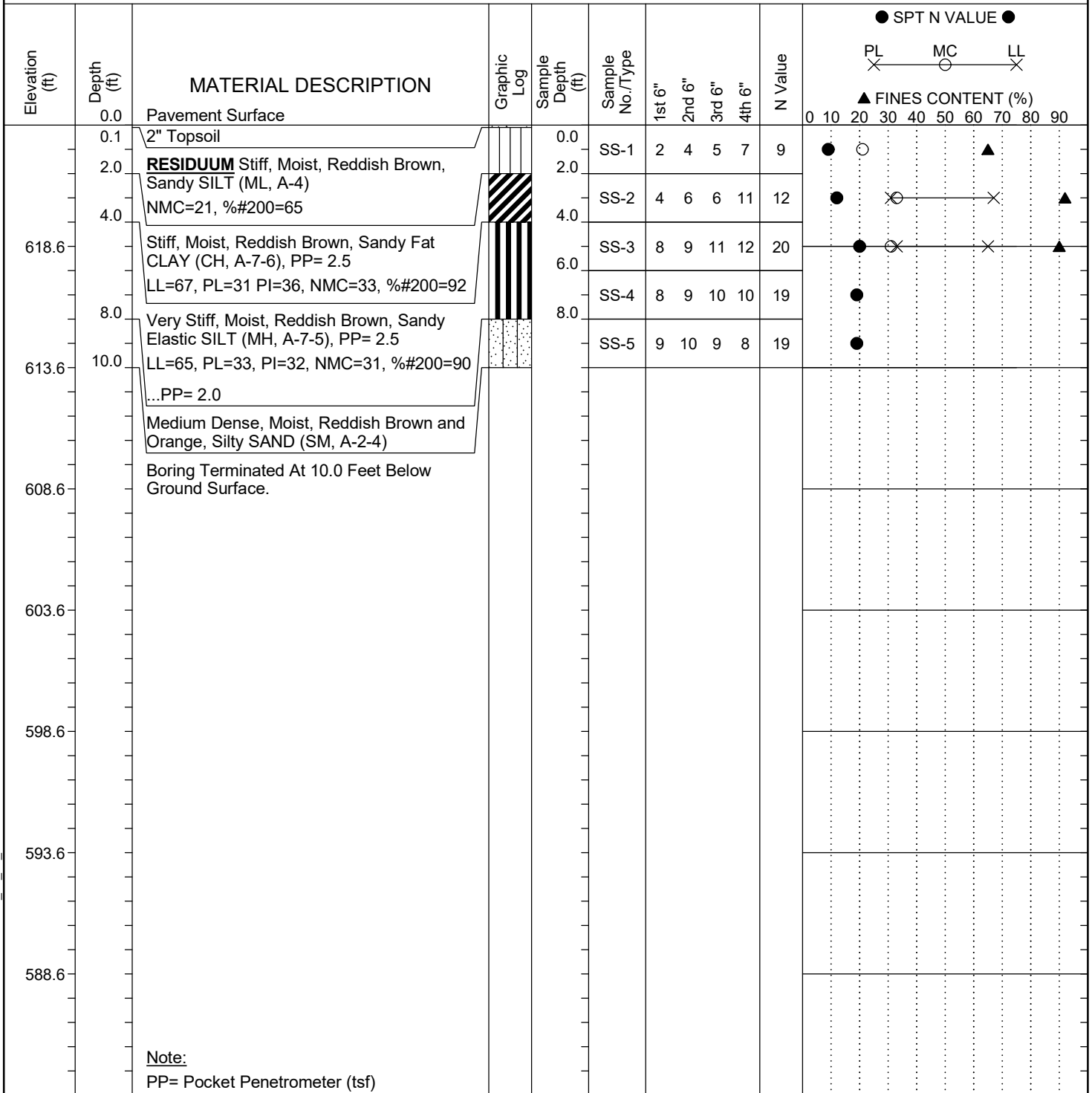


SC_DOT_SC72_GINT.GPJ_SCDOT DATA TEMPLATE_01_30_2015.GDT 8/25/20

LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

Project ID: P029515		County: York		Boring No.: B35	
Site Description: SC72 Widening from Rambo Road to South of SC901				Route: SC-72	
Eng./Geo.: Applegate, K. N.		Boring Location: 74+16.05		Offset: -29.65	Alignment: SC-72
Elev.: 623.6 ft	Latitude: 34.888172	Longitude: 81.0471019	Date Started: 4/2/2020		
Total Depth: 10 ft	Soil Depth: 10 ft	Core Depth: N/A ft	Date Completed: 4/2/2020		
Bore Hole Diameter (in): 4.5		Sampler Configuration		Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME-45C	Drill Method: HSA	Hammer Type: Automatic		Energy Ratio: 81%	
Core Size: N/A	Driller: Mike Burnash	Groundwater: TOB	DRY	24HR	Filled



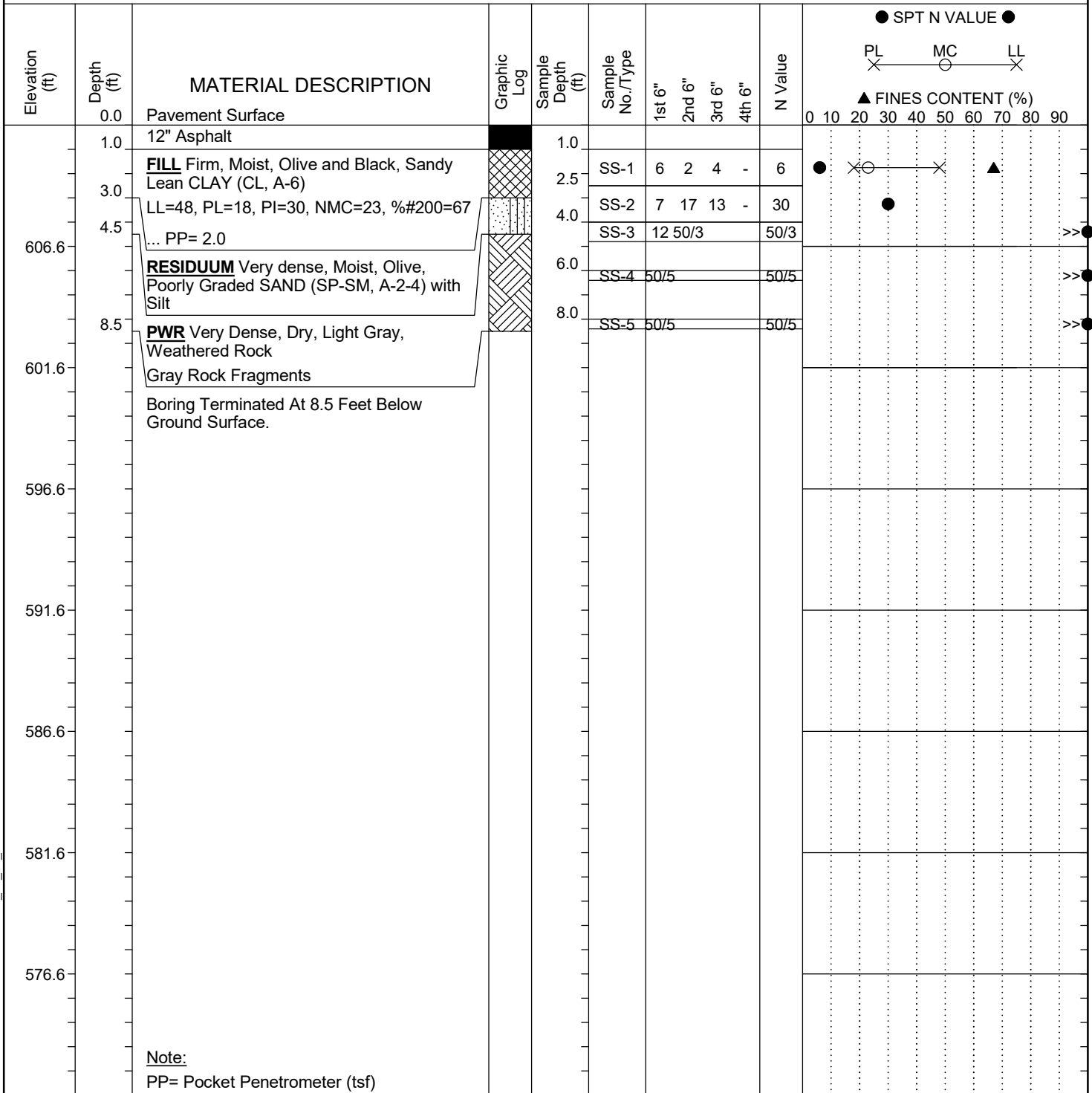
Note:
PP= Pocket Penetrometer (tsf)

LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_SC72_GINT.GPJ_SCDOT DATA TEMPLATE_01_30_2015.GDT 8/25/20

Project ID: P029515		County: York		Boring No.: B38	
Site Description: SC72 Widening from Rambo Road to South of SC901				Route: SC-72	
Eng./Geo.: Applegate, K. N.		Boring Location: 111+63.81		Offset: -13.10	Alignment: SC-72
Elev.: 611.6 ft	Latitude: 34.8943298	Longitude: 81.0374558	Date Started: 4/2/2020		
Total Depth: 10 ft	Soil Depth: 10 ft	Core Depth: N/A ft	Date Completed: 4/2/2020		
Bore Hole Diameter (in): 4.5		Sampler Configuration		Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME-45C	Drill Method: HSA	Hammer Type: Automatic		Energy Ratio: 81%	
Core Size: N/A	Driller: Mike Burnash	Groundwater: TOB	DRY	24HR	Filled



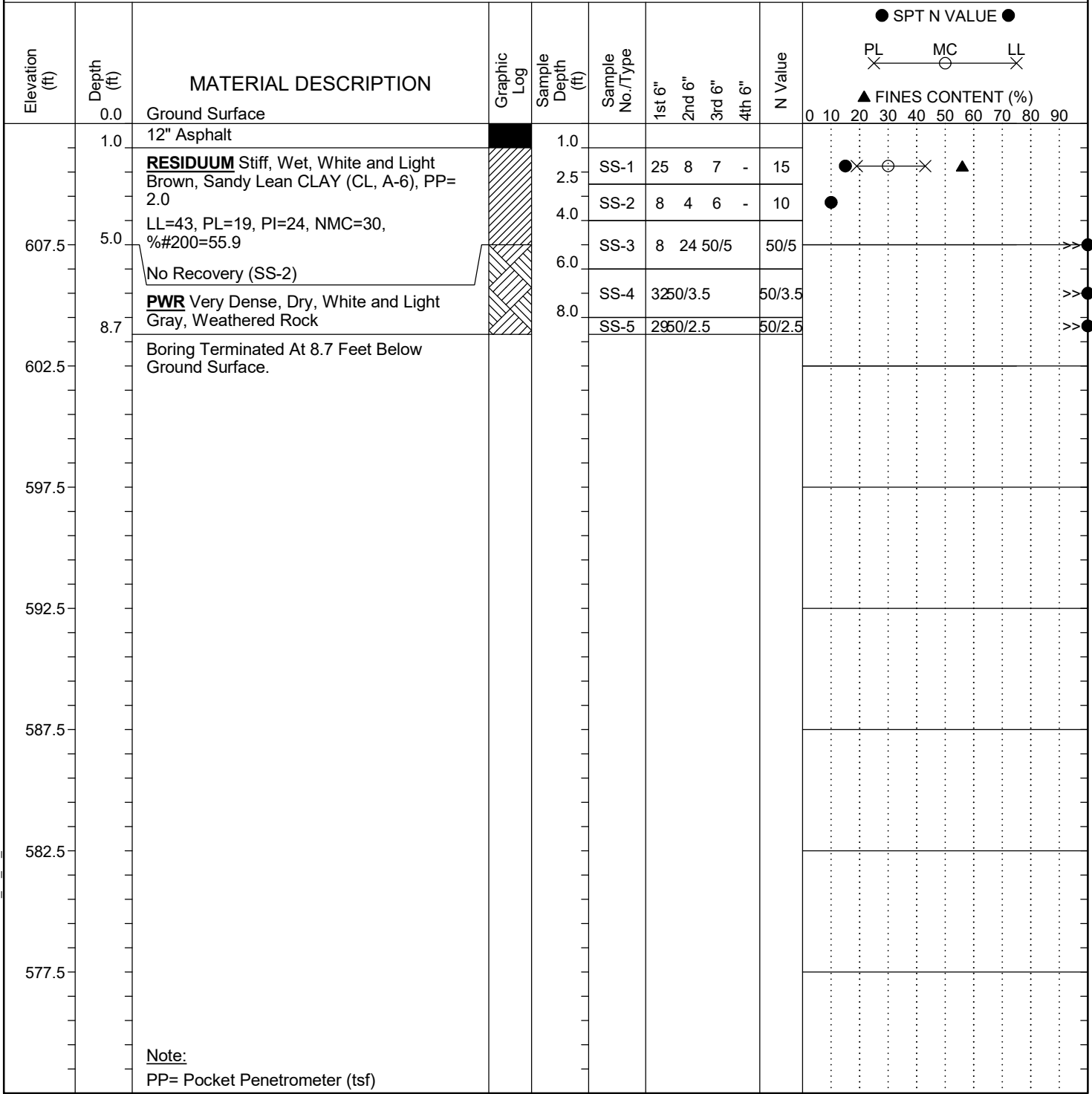
Note:
PP= Pocket Penetrometer (tsf)

LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_SC72_GINT.GPJ_SCDOT DATA TEMPLATE_01_30_2015.GDT 8/25/20

Project ID: P029515		County: York		Boring No.: B40	
Site Description: SC72 Widening from Rambo Road to South of SC901				Route: SC-72	
Eng./Geo.: Applegate, K. N.		Boring Location: 130+31.80		Offset: -36.00	Alignment: SC-72
Elev.: 612.5 ft	Latitude: 34.8979128		Longitude: 81.0330287	Date Started: 4/2/2020	
Total Depth: 10 ft		Soil Depth: 10 ft	Core Depth: N/A ft	Date Completed: 4/2/2020	
Bore Hole Diameter (in): 4.5		Sampler Configuration		Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME-45C		Drill Method: HSA	Hammer Type: Automatic		Energy Ratio: 81%
Core Size: N/A		Driller: Mike Burnash	Groundwater: TOB DRY		24HR: Filled



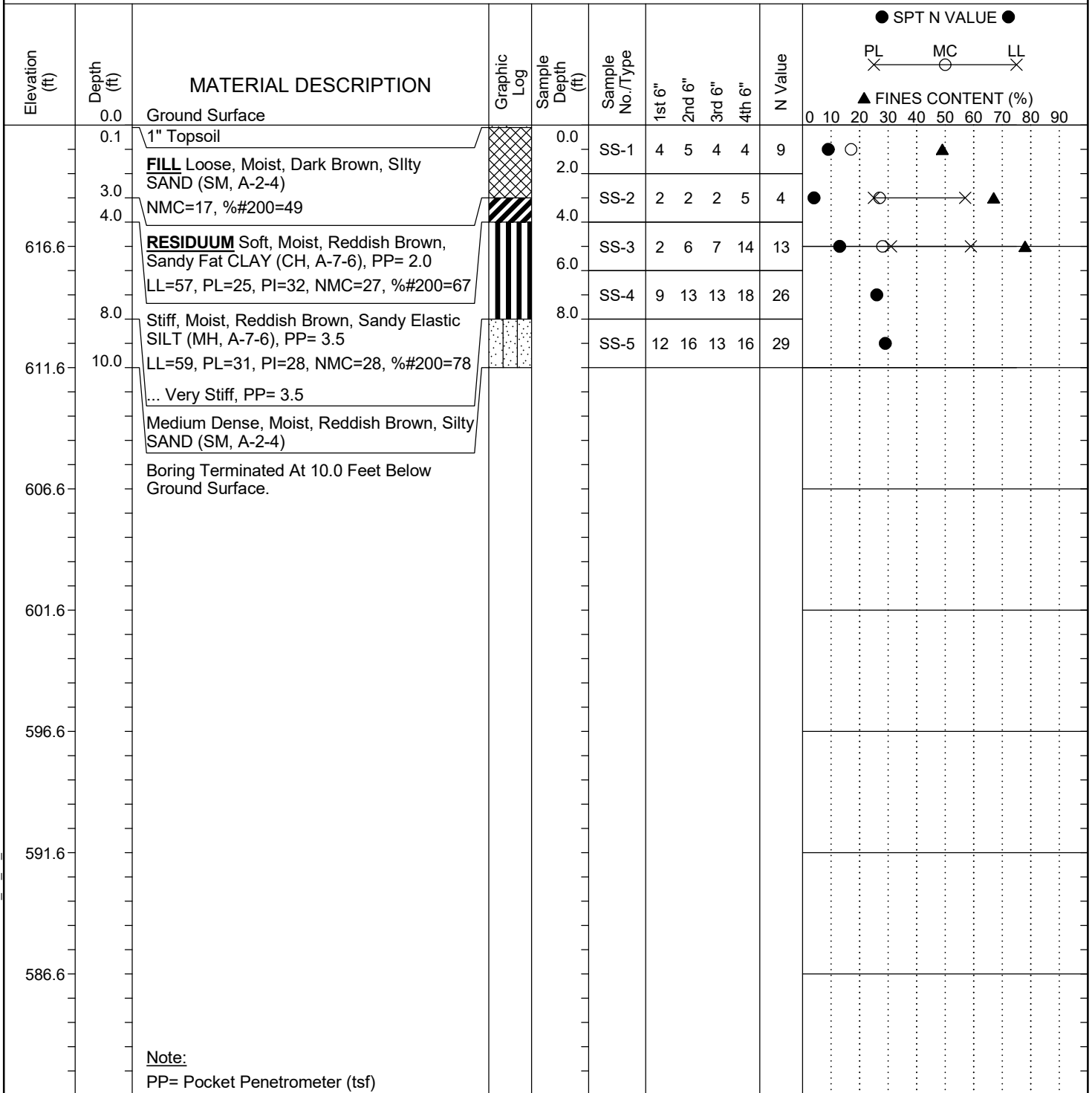
Note:
PP= Pocket Penetrometer (tsf)

LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_SC72_GINT.GPJ_SCDOT DATA TEMPLATE_01_30_2015.GDT 8/25/20

Project ID: P029515		County: York		Boring No.: B41	
Site Description: SC72 Widening from Rambo Road to South of SC901				Route: S-163	
Eng./Geo.: Applegate, K. N.		Boring Location: 184+42.98		Offset: 17.73	Alignment: SC-72
Elev.: 621.6 ft	Latitude: 34.8758692	Longitude: 81.0583233	Date Started: 4/2/2020		
Total Depth: 10 ft	Soil Depth: 10 ft	Core Depth: N/A ft	Date Completed: 4/2/2020		
Bore Hole Diameter (in): 4.5		Sampler Configuration		Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME-45C	Drill Method: HSA	Hammer Type: Automatic		Energy Ratio: 81%	
Core Size: N/A	Driller: Mike Burnash	Groundwater: TOB	DRY	24HR	Filled



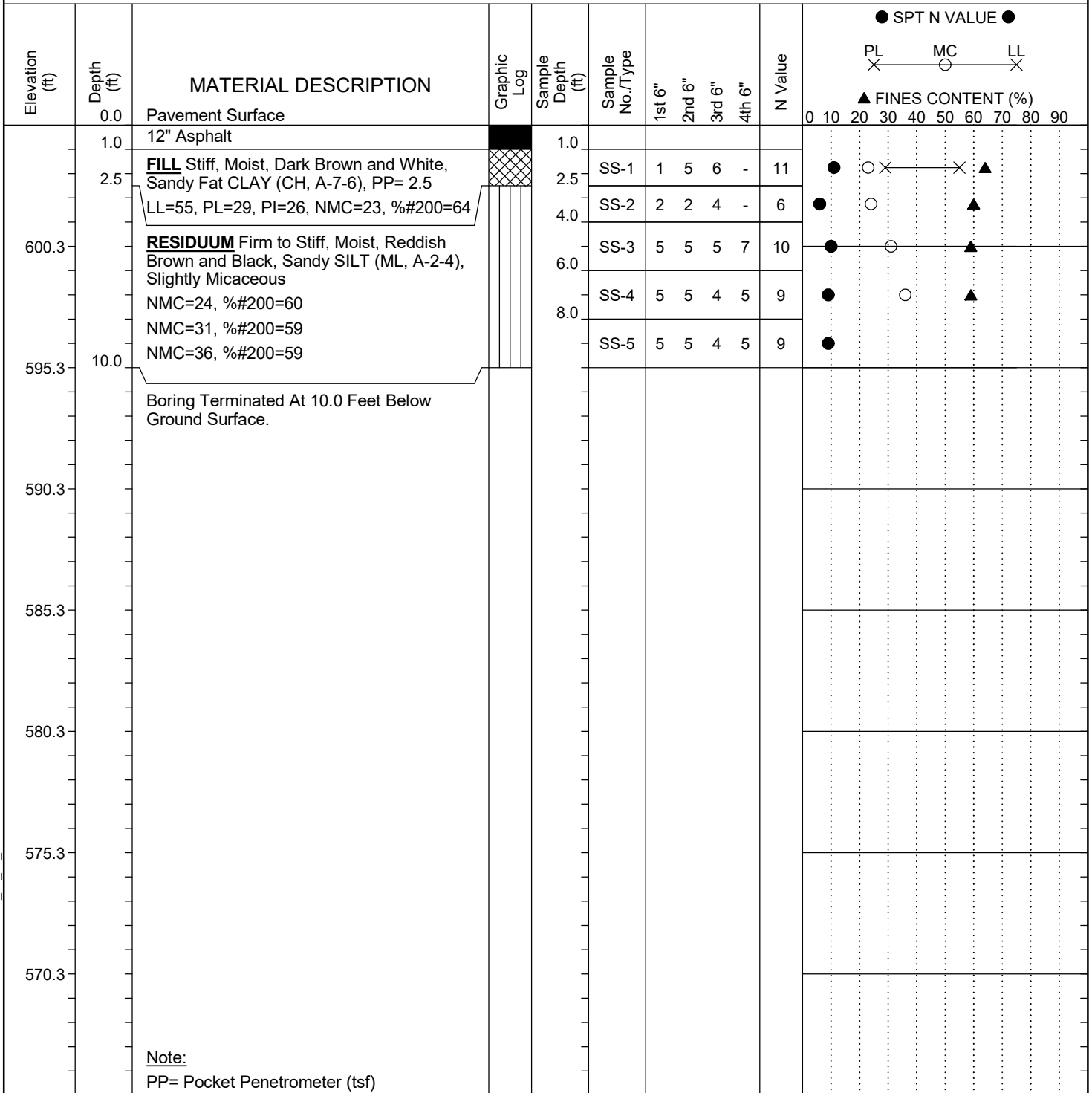
Note:
PP= Pocket Penetrometer (tsf)

LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_SC72_GINT.GPJ_SCDOT DATA TEMPLATE_01_30_2015.GDT 8/25/20

Project ID: P029515		County: York		Boring No.: B42	
Site Description: SC72 Widening from Rambo Road to South of SC901				Route: S-244	
Eng./Geo.: Applegate, K. N.		Boring Location: 9+79.95		Offset: 8.00	Alignment: SC-72
Elev.: 605.3 ft	Latitude: 34.8776797	Longitude: 81.0506427	Date Started: 4/2/2020		
Total Depth: 10 ft	Soil Depth: 10 ft	Core Depth: N/A ft	Date Completed: 4/2/2020		
Bore Hole Diameter (in): 4.5		Sampler Configuration		Liner Required: Y (N)	Liner Used: Y (N)
Drill Machine: CME-45C	Drill Method: HSA	Hammer Type: Automatic		Energy Ratio: 81%	
Core Size: N/A	Driller: Mike Burnash	Groundwater: TOB	DRY	24HR	Filled



Note:
PP= Pocket Penetrometer (tsf)

LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	NQ - Rock Core, 1-7/8"	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

SC_DOT_SC72_GINT.GPJ_SCDOT DATA TEMPLATE_01_30_2015.GDT 8/25/20

Project ID: P029515	County: York	Boring No.: HA37
Site Description: SC72 Widening from Rambo Road to South of SC901		Route: SC72
Driller: Truesdale, S.	Boring Location: 89+86.75	Offset: -38.36
Alignment: SC-72	Elev.: 623.7 ft	Northing: 34.8915398
Easting: 81.0438783	Date Started: 4/5/2020	
Total Depth: 10 ft	Groundwater: TOB	Date Completed: 4/5/2020
24 hr	Filled	

Dynamic Cone Penetrometer Test Procedure:

Elevation (ft)	Depth (ft)	MATERIAL DESCRIPTION	Graphic Log	Sample Depth (ft)	Sample No./Type	1st 6"	2nd 6"	3rd 6"	DCP-Value	PL	MC	LL	FINES CONTENT (%)
	0.0	Ground Surface											
		RESIDUUM Moist, Reddish Tan, Sandy SILT (ML, A-4)		0.0	S-1	11	11	15	26				
				1.0	S-2	6	6	7	13				
				2.0	S-3	5	6	8	14				
				3.0	S-4	8	10	10	20				
				4.0	S-5	7	7	11	18				
618.7				5.0	S-6	8	8	9	17				
				6.0	S-7	13	11	11	22				
				7.0	S-8	10	12	10	22				
				8.0	S-9	9	11	10	21				
613.7	10.0			9.0	S-10	9	9	11	20				
608.7													
603.7													
		NOTE S - Grab Sample Hand auger performed at toe of existing embankment. Boring was performed by hand due to access restrictions. DCP Test Procedure 15-lb hammer, falling 20 inches on E-rod slide drive. 1.5" diameter cone with 45 degree tip. Three successive 1.75" drives											
598.7													
593.7													
588.7													

LEGEND

SAMPLER TYPE		DRILLING METHOD	
SS - Split Spoon	DCP - Dynamic Cone Penetrometer	HSA - Hollow Stem Auger	RW - Rotary Wash
UD - Undisturbed Sample	CU - Cuttings	CFA - Continuous Flight Augers	RC - Rock Core
AWG - Rock Core, 1-1/8"	CT - Continuous Tube	DC - Driving Casing	

MANUAL AUGER LOG SC72_GINT.GPJ SCDOT DATA TEMPLATE_12_30_2014.GDT 6/11/20

DCP TEST DATA

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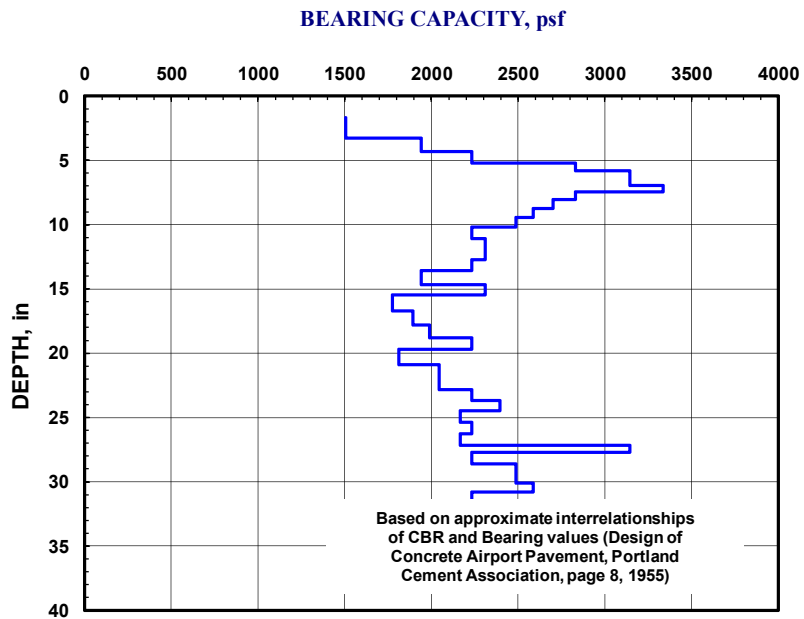
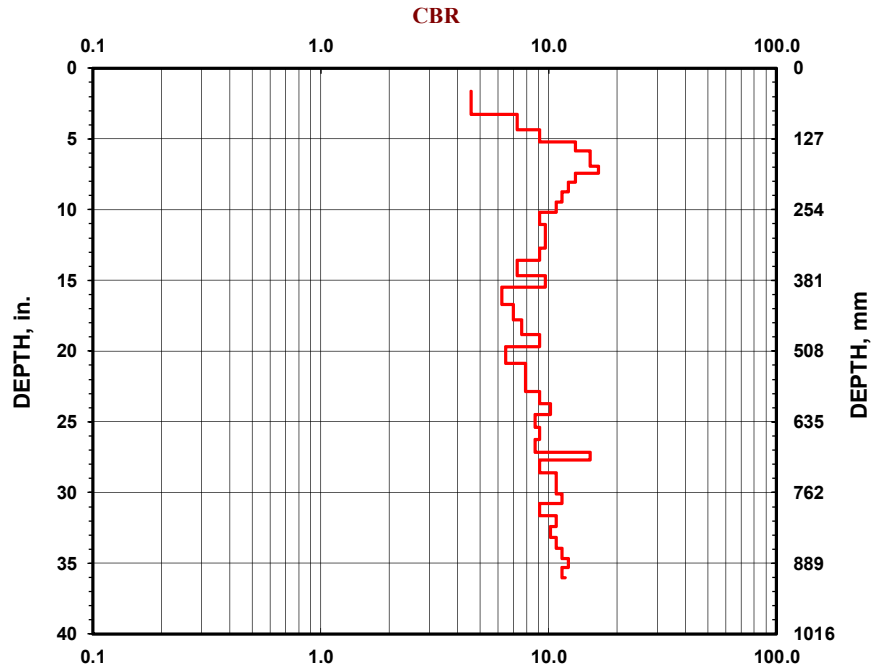
Project: SC72 Widening from Rambo...
Location: Rock Hill, SC

Date: 19-Feb-16
Soil Type(s): Silty SAND (SM)

Hammer
 10.1 lbs.
 17.6 lbs.
 Both hammers used

Soil Type
 CH
 CL
 All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
1	42	1
1	83	1
1	110	1
1	132	1
1	148	1
1	162	1
1	176	1
1	189	1
1	205	1
1	222	1
1	240	1
1	259	1
1	281	1
1	302	1
1	323	1
1	345	1
1	372	1
1	393	1
1	424	1
1	452	1
1	478	1
1	500	1
1	530	1
1	555	1
1	580	1
1	602	1
1	622	1
1	645	1
1	667	1
1	690	1
1	704	1
1	726	1
1	745	1
1	764	1
1	782	1
1	804	1
1	823	1
1	843	1
1	862	1
1	880	1
1	897	1
1	915	1
2	950	1



DCP TEST DATA

File Name: C10

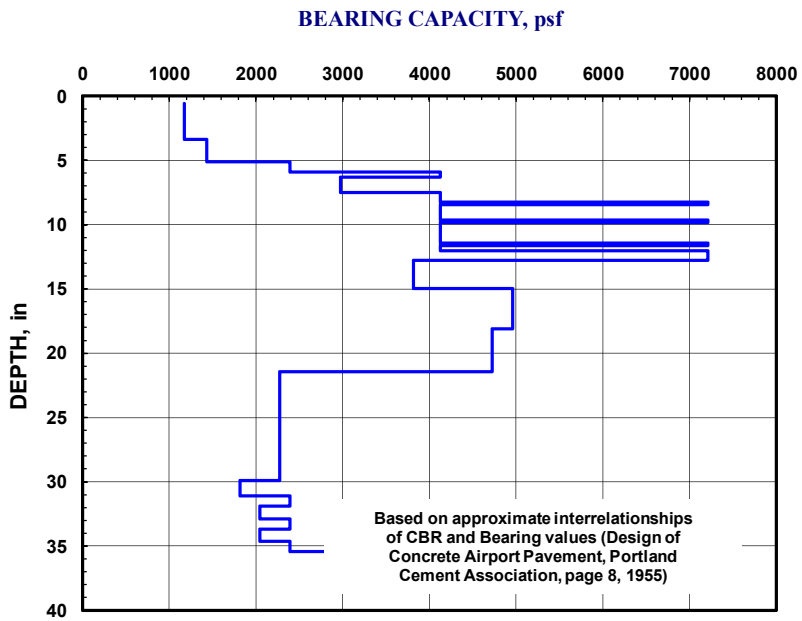
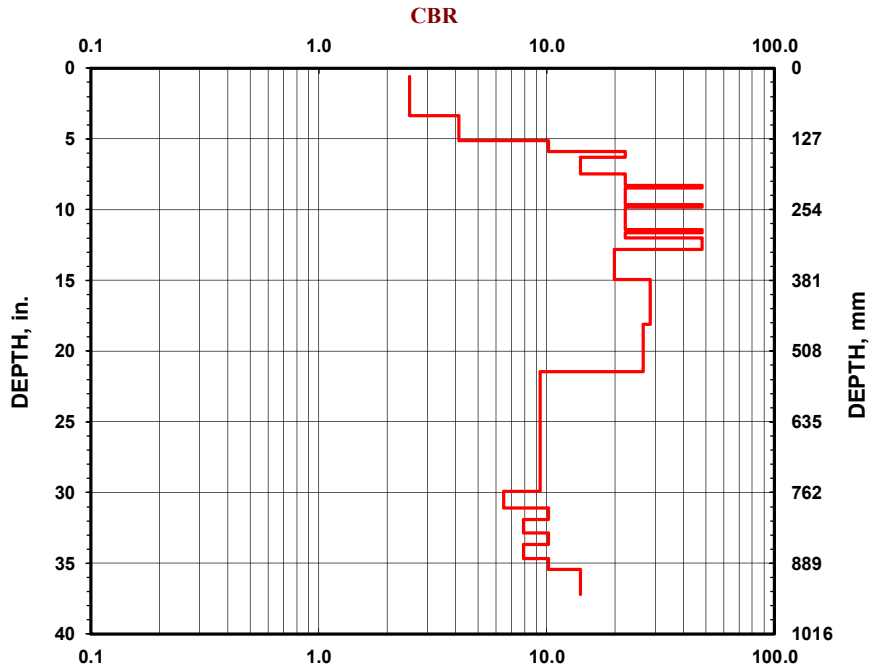
Project: SC72 Widening from Rambo...
Location: Rock Hill, SC

Date: 20-Feb-16
Soil Type(s): Silty SAND (SM)

Hammer
 10.1 lbs.
 17.6 lbs.
 Both hammers used

Soil Type
 CH
 CL
 All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	15	1
1	85	1
1	130	1
1	150	1
1	160	1
1	175	1
1	190	1
1	200	1
1	210	1
1	215	1
1	225	1
1	235	1
1	245	1
1	250	1
1	260	1
1	270	1
1	280	1
1	290	1
1	295	1
1	305	1
1	310	1
1	315	1
1	320	1
1	325	1
5	380	1
10	460	1
10	545	1
10	760	1
1	790	1
1	810	1
1	835	1
1	855	1
1	880	1
1	900	1
1	915	1
1	930	1
1	945	1
		1
		1
		1
		1
		1
		1



From The Automated Kessler Soils Engineering Manual, 2015.

(2) $CBR = 292 / PR^{1.12}$ All Soils and CL above CBR 10

(3) $CBR = 1 / (0.017019 * PR)^2$ CL < CBR 10

(3) $CBR = 1 / (0.002871 * PR)$ CH Soils

Where PR = Penetration Rate (mm/blow)

(2) Kleyn, E.G., (July.1975), The Use of the Dynamic Cone Penetrometer (DCP), Report 2/74, Transvaal Roads Department, Pretoria, South Africa. Page 35.

(3) METHOD ST6: Measurement of the In Situ Strength of soils by the Dynamic Cone Penetrometer (DCP) (1984) Special Methods for Testing Roads, Draft TMH6, Technical Methods for Highways (TMH), ISBN 0 7988 2289 9, Pages 19 to 24, 1984.

(12) $q = 3.794 * CBR^{0.664}$ Bearing Capacity (PSI) Ultimate

(12) PCA, Design of Concrete Airport Pavement, Portland Cement Association, 1955.

APPENDIX C.
LABORATORY TESTING DATA

May 18, 2016



CDM Smith
1441 Main Street, Suite 1000
Columbia, SC 29201

Attn: Mr. Tommy E. Evans, P.E

Re: Laboratory Testing Data
SC 72 Widening from Rambo Road to South of SC 901
York County, SC
Terracon Project No. 73165113 (Rev. 1)

Dear Mr. Evans:

Terracon has performed the requested laboratory testing program indicated by your electronic correspondences of February 24, 2016 and March 10, 2016. The testing included:

27 – Atterberg Limits
27 – Grain Size Distribution
27 – Moisture Content
7 – Standard Proctor Tests
7 – Triaxial Shear Test with Pore Pressure Measurements (Remolded)

The attached data has been updated with the description changed requested in your May 4, 2016 email. If there are any questions regarding the results or if we can be of additional service, please contact us.

Sincerely,
Terracon Consultants, Inc.



Phillip A. Morrison, P.E.
Geotechnical Department Manager

Attachments

Copies:

1xc: Above (PDF via email)
1xc: File



Terracon Consultants, Inc. 521 Clemson Road Columbia, South Carolina 29229
P [803] 741 9000 F [803] 741 9900 terracon.com

Geotechnical



Environmental



Construction Materials



Facilities

Summary of Laboratory Results

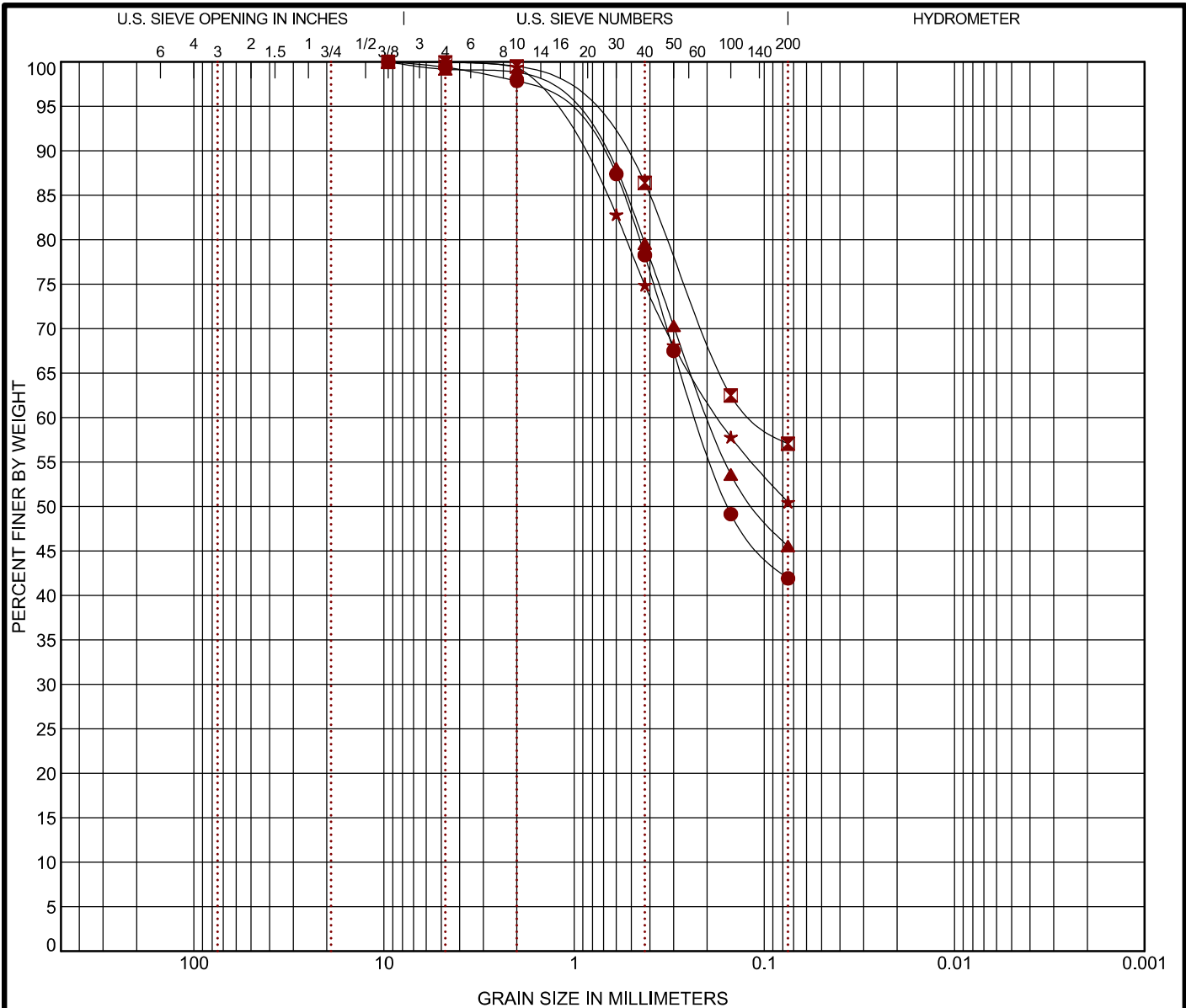
BORING ID	Depth	USCS Classification and Soil Description	Compressive Strength (tsf)	Liquid Limit	Plastic Limit	Plasticity Index	% <#200 Sieve	% Gravel	% Sand	% Silt	% Clay	Water Content (%)	Dry Density (pcf)
B-01	2 - 4	CLAYEY SAND(SC)		38	17	21	41.9	0.6	57.5			19.5	
B-02	0 - 10	SANDY LEAN CLAY(CL)		44	25	19	57.1	0.1	42.9				
B-02**	0 - 8	SANDY LEAN CLAY (CL)										22.6	
B-03	4 - 6	CLAYEY SAND(SC)		62	25	37	45.6	0.8	53.6			25.7	
B-04	2 - 4	SANDY ELASTIC SILT(MH)		55	32	23	50.5	0.0	49.5			22.3	
B-04	8 - 10	SILTY SAND(SM)		55	31	24	39.6	0.5	59.8			23.6	
B-05	0 - 6	ELASTIC SILT with SAND(MH)		66	35	31	70.4	0.0	29.0				
B-05**	0 - 6	ELASTIC SILT with SAND (MH)										32.5	
B-07	0 - 2	ELASTIC SILT with SAND(MH)		65	38	27	73.4	1.8	24.8			39.9	
B-08	2 - 4	SANDY FAT CLAY(CH)		55	24	31	58.8	2.8	38.4			22.9	
B-08	6 - 8	FAT CLAY with SAND(CH)		71	30	41	72.0	0.1	27.9			25.5	
B-11	0 - 2	SANDY FAT CLAY(CH)		68	27	41	61.5	0.0	38.5			28.5	
B-12	0 - 6	SANDY SILT(ML)		47	28	19	59.1	0.0	40.9				
B-12**	0 - 6	SANDY SILT (ML)										25.4	
B-13	0 - 2	ELASTIC SILT(MH)		70	36	34	87.7	0.0	12.3			34.4	
B-14	0 - 2	CLAYEY SAND(SC)		61	28	33	49.0	5.5	45.5			24.7	
B-15	0 - 2	SANDY ELASTIC SILT(MH)		55	35	20	68.8	0.0	31.2			32.2	
B-16	0 - 2	CLAYEY SAND(SC)		51	26	25	43.5	1.3	55.1			20.4	
B-17	0 - 10	ELASTIC SILT with SAND(MH)		52	30	22	71.2	0.4	28.3				
B-17	8 - 10	SANDY ELASTIC SILT(MH)		55	39	16	65.7	0.0	34.3			36.0	
B-17**	0 - 8	ELASTIC SILT with SAND (MH)										23.5	
B-18**	0 - 4	SANDY FAT CLAY(CH)		50	26	24	67.9	0.2	31.9			29.9	
B-19	0 - 2	CLAYEY SAND(SC)		31	16	15	37.0	2.9	60.1			19.2	
B-19	2 - 4	FAT CLAY with SAND(CH)		68	26	42	77.3	0.0	22.7			28.9	
B-20	0 - 10	CLAYEY SAND(SC)		27	16	11	40.8	0.0	59.2				
B-20**	0 - 8	CLAYEY SAND (SC)										21.2	
B-21	0 - 2	SANDY FAT CLAY(CH)		56	21	35	54.8	0.5	44.8			30.5	
B-24	0 - 2	SANDY FAT CLAY(CH)		61	31	30	65.9	0.0	34.1			28.3	
B-25	0 - 6	SANDY ELASTIC SILT(MH)		55	34	21	64.3	0.0	35.7				
B-25**	0 - 6	SANDY ELASTIC SILT (MH)										28.3	
B-28	0 - 8	SANDY LEAN CLAY(CL)		46	24	22	60.6	2.7	36.6				
B-28	2 - 4	FAT CLAY with SAND(CH)		73	33	40	82.0	0.5	17.6			31.4	
B-28**	0 - 8	FAT CLAY with SAND (CH)										17.7	
B-29	0 - 2	CLAYEY SAND(SC)		30	15	15	32.0	10.9	57.1			11.8	

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. OLD-LAB SUMMARY: USCS 73155113.GPJ TERRACON2012.GDT 5/18/16

PROJECT: SC 72 Widening from Rambo Road to South of SC 901	<p style="color: #8B0000; font-weight: bold; margin-top: 10px;">521 Clemson Rd Columbia, SC</p>	PROJECT NUMBER: 73155113
SITE: SC 72 Rock Hill, South Carolina		CLIENT: CDM Smith Columbia, South Carolina
		EXHIBIT: B-1

GRAIN SIZE DISTRIBUTION

ASTM D422



COBBLES	GRAVEL		SAND			SILT OR CLAY			
	coarse	fine	coarse	medium	fine				

	Boring ID	Depth	USCS Classification	AASHTO Classification	LL	PL	PI	Cc	Cu	
●	B-01	2 - 4	CLAYEY SAND (SC)	A-6(4)	38	17	21			
■	B-02	0 - 10	SANDY LEAN CLAY (CL)	A-7-6(9)	44	25	19			
▲	B-03	4 - 6	CLAYEY SAND (SC)	A-7-6(12)	62	25	37			
★	B-04	2 - 4	SANDY ELASTIC SILT (MH)	A-7-5(9)	55	32	23			
	Boring ID	Depth	D ₁₀₀	D ₆₀	D ₃₀	D ₁₀	%Gravel	%Sand	%Silt	%Clay
●	B-01	2 - 4	9.5	0.226			0.6	57.5	41.9	
■	B-02	0 - 10	9.5	0.109			0.1	42.9	57.1	
▲	B-03	4 - 6	9.5	0.196			0.8	53.6	45.6	
★	B-04	2 - 4	4.75	0.174			0.0	49.5	50.5	

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS & AASHTO COMBINED 73155113.GPJ TERRACON2012.GDT 3/23/16

PROJECT: SC 72 Widening from Rambo Road to South of SC 901

SITE: SC 72
Rock Hill, South Carolina

Terracon
521 Clemson Road
Columbia, South Carolina

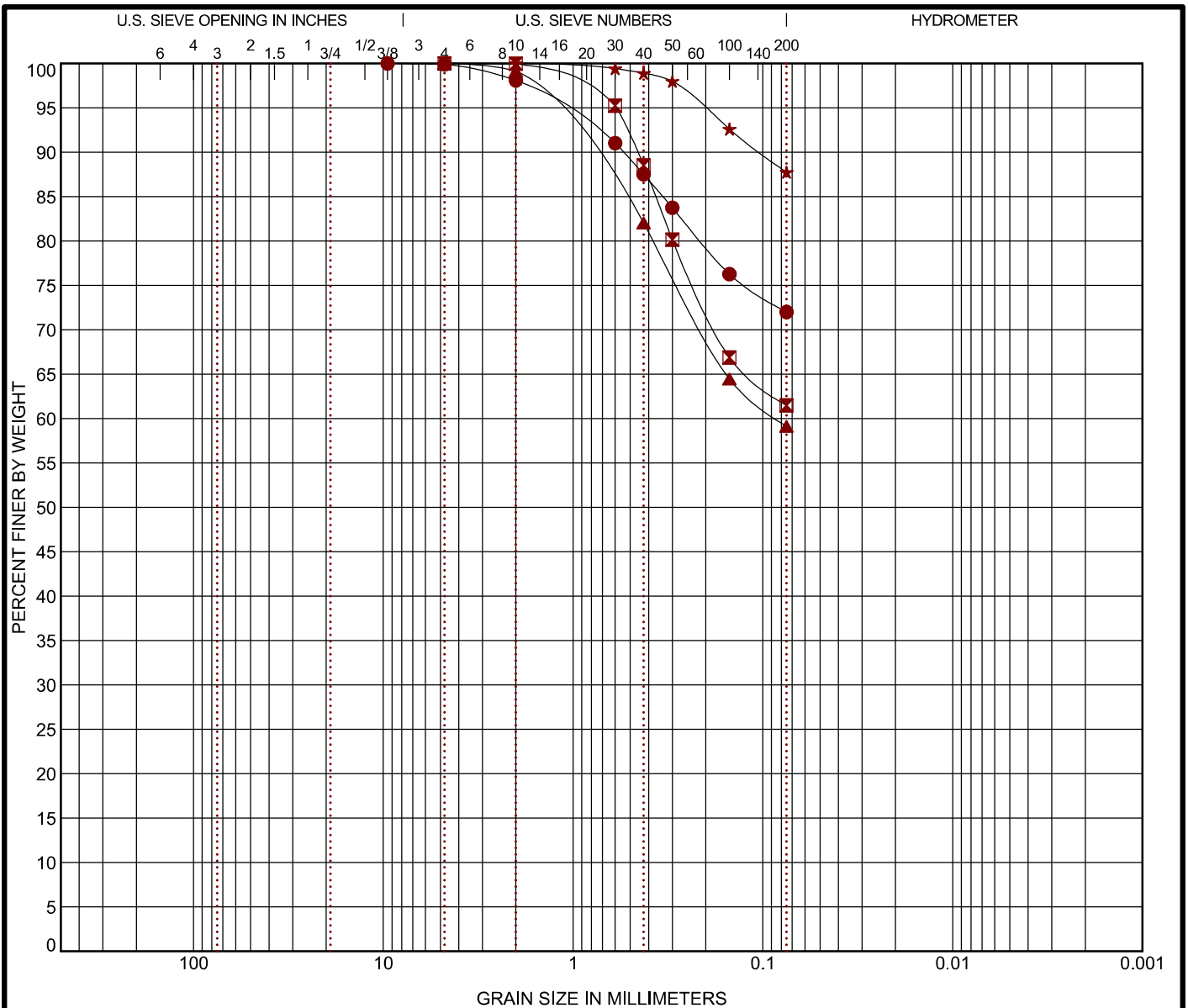
PROJECT NUMBER: 73155113

CLIENT: CDM Smith
Columbia, South Carolina

EXHIBIT: B-2

GRAIN SIZE DISTRIBUTION

ASTM D422



COBBLES	GRAVEL		SAND			SILT OR CLAY		
	coarse	fine	coarse	medium	fine			

	Boring ID	Depth	USCS Classification	AASHTO Classification	LL	PL	PI	Cc	Cu	
●	B-08	6 - 8	FAT CLAY with SAND (CH)	A-7-5(31)	71	30	41			
☒	B-11	0 - 2	SANDY FAT CLAY (CH)	A-7-6(23)	68	27	41			
▲	B-12	0 - 6	SANDY SILT (ML)	A-7-6(10)	47	28	19			
★	B-13	0 - 2	ELASTIC SILT (MH)	A-7-5(36)	70	36	34			
	Boring ID	Depth	D ₁₀₀	D ₆₀	D ₃₀	D ₁₀	%Gravel	%Sand	%Silt	%Clay
●	B-08	6 - 8	9.5				0.1	27.9	72.0	
☒	B-11	0 - 2	4.75				0.0	38.5	61.5	
▲	B-12	0 - 6	4.75	0.084			0.0	40.9	59.1	
★	B-13	0 - 2	4.75				0.0	12.3	87.7	

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS & AASHTO COMBINED 73155113.GPJ TERRACON2012.GDT 3/23/16

PROJECT: SC 72 Widening from Rambo Road to South of SC 901

SITE: SC 72
Rock Hill, South Carolina



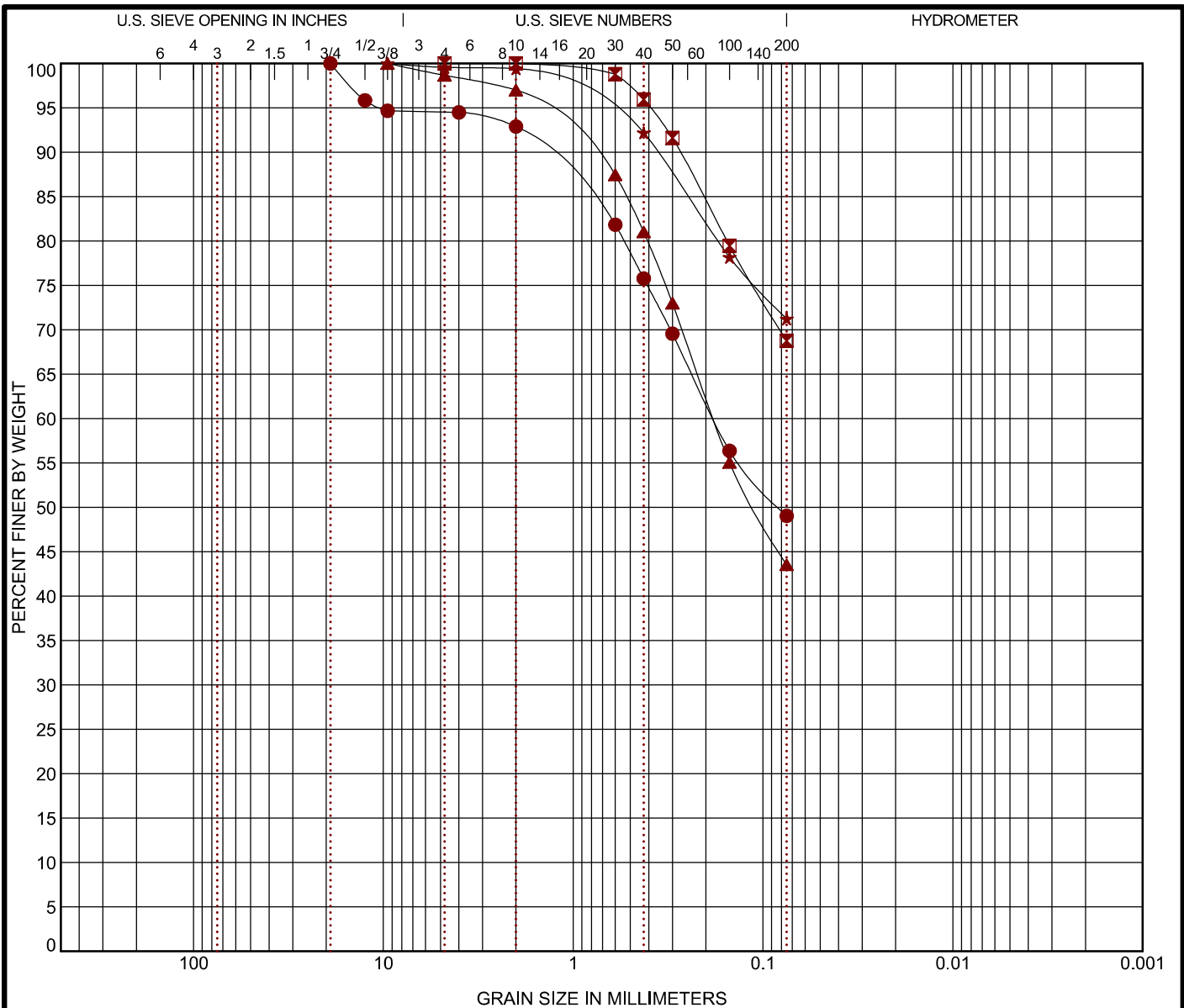
PROJECT NUMBER: 73155113

CLIENT: CDM Smith
Columbia, South Carolina

EXHIBIT: B-4

GRAIN SIZE DISTRIBUTION

ASTM D422



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID	Depth	USCS Classification	AASHTO Classification		LL	PL	PI	Cc	Cu
● B-14	0 - 2	CLAYEY SAND (SC)	A-7-6(12)		61	28	33		
☒ B-15	0 - 2	SANDY ELASTIC SILT (MH)	A-7-5(15)		55	35	20		
▲ B-16	0 - 2	CLAYEY SAND (SC)	A-7-6(7)		51	26	25		
★ B-17	0 - 10	ELASTIC SILT with SAND (MH)	A-7-5(16)		52	30	22		
Boring ID	Depth	D ₁₀₀	D ₆₀	D ₃₀	D ₁₀	%Gravel	%Sand	%Silt	%Clay
● B-14	0 - 2	19	0.182			5.5	45.5	49.0	
☒ B-15	0 - 2	4.75				0.0	31.2	68.8	
▲ B-16	0 - 2	9.5	0.182			1.3	55.1	43.5	
★ B-17	0 - 10	9.5				0.4	28.3	71.2	

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS & AASHTO COMBINED 73155113.GPJ TERRACON2012.GDT 3/23/16

PROJECT: SC 72 Widening from Rambo Road to South of SC 901

SITE: SC 72
Rock Hill, South Carolina



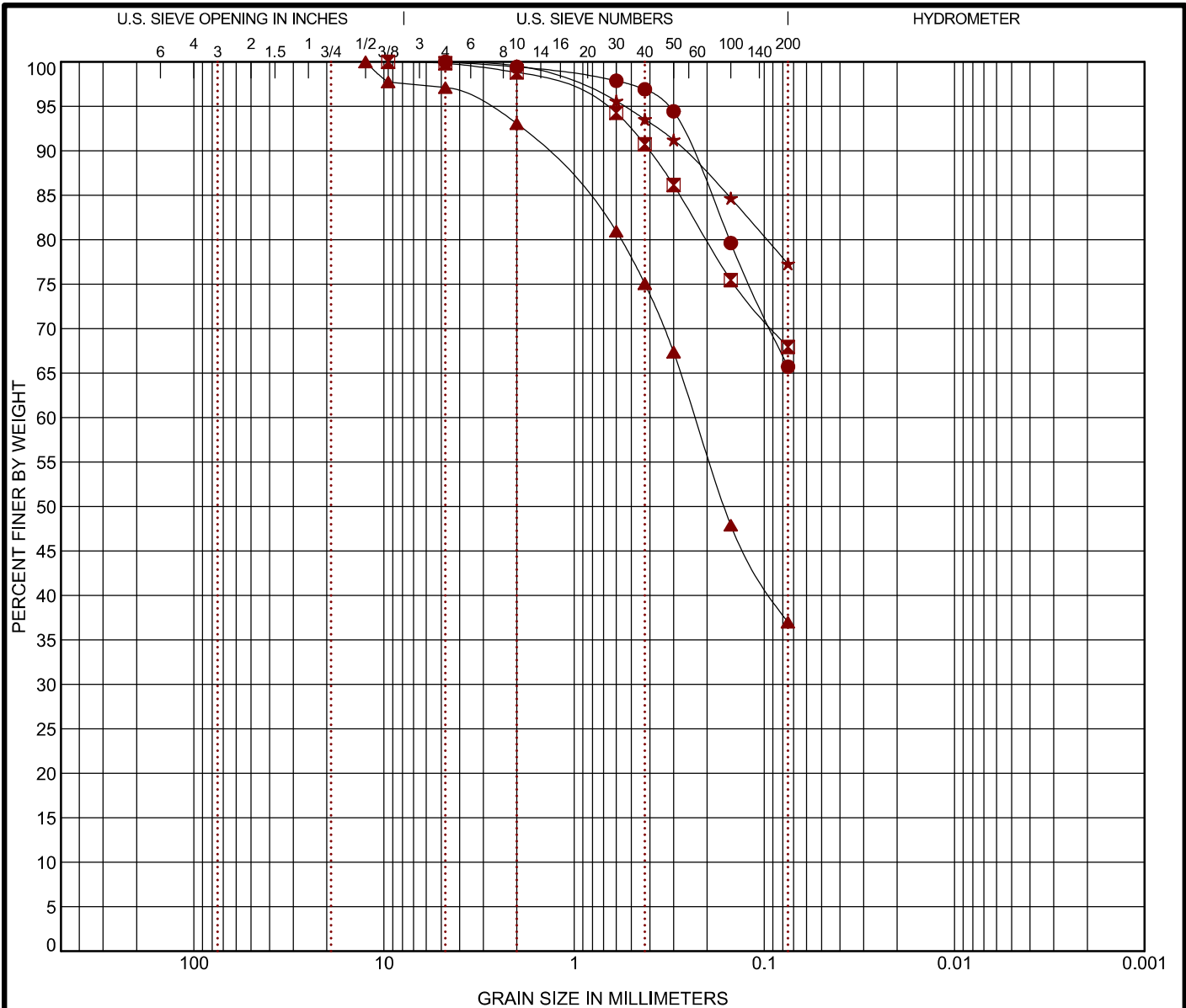
PROJECT NUMBER: 73155113

CLIENT: CDM Smith
Columbia, South Carolina

EXHIBIT: B-5

GRAIN SIZE DISTRIBUTION

ASTM D422



COBBLES	GRAVEL		SAND			SILT OR CLAY			
	coarse	fine	coarse	medium	fine				

	Boring ID	Depth	USCS Classification	AASHTO Classification	LL	PL	PI	Cc	Cu	
●	B-17	8 - 10	SANDY ELASTIC SILT (MH)	A-7-5(12)	55	39	16			
■	B-18**	0 - 4	SANDY FAT CLAY (CH)	A-7-6(16)	50	26	24			
▲	B-19	0 - 2	CLAYEY SAND (SC)	A-6(1)	31	16	15			
★	B-19	2 - 4	FAT CLAY with SAND (CH)	A-7-6(34)	68	26	42			
	Boring ID	Depth	D ₁₀₀	D ₆₀	D ₃₀	D ₁₀	%Gravel	%Sand	%Silt	%Clay
●	B-17	8 - 10	4.75				0.0	34.3	65.7	
■	B-18**	0 - 4	9.5				0.2	31.9	67.9	
▲	B-19	0 - 2	12.5	0.231			2.9	60.1	37.0	
★	B-19	2 - 4	4.75				0.0	22.7	77.3	

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS & AASHTO COMBINED 73155113.GPJ TERRACON2012.GDT 3/23/16

PROJECT: SC 72 Widening from Rambo Road to South of SC 901

SITE: SC 72
Rock Hill, South Carolina



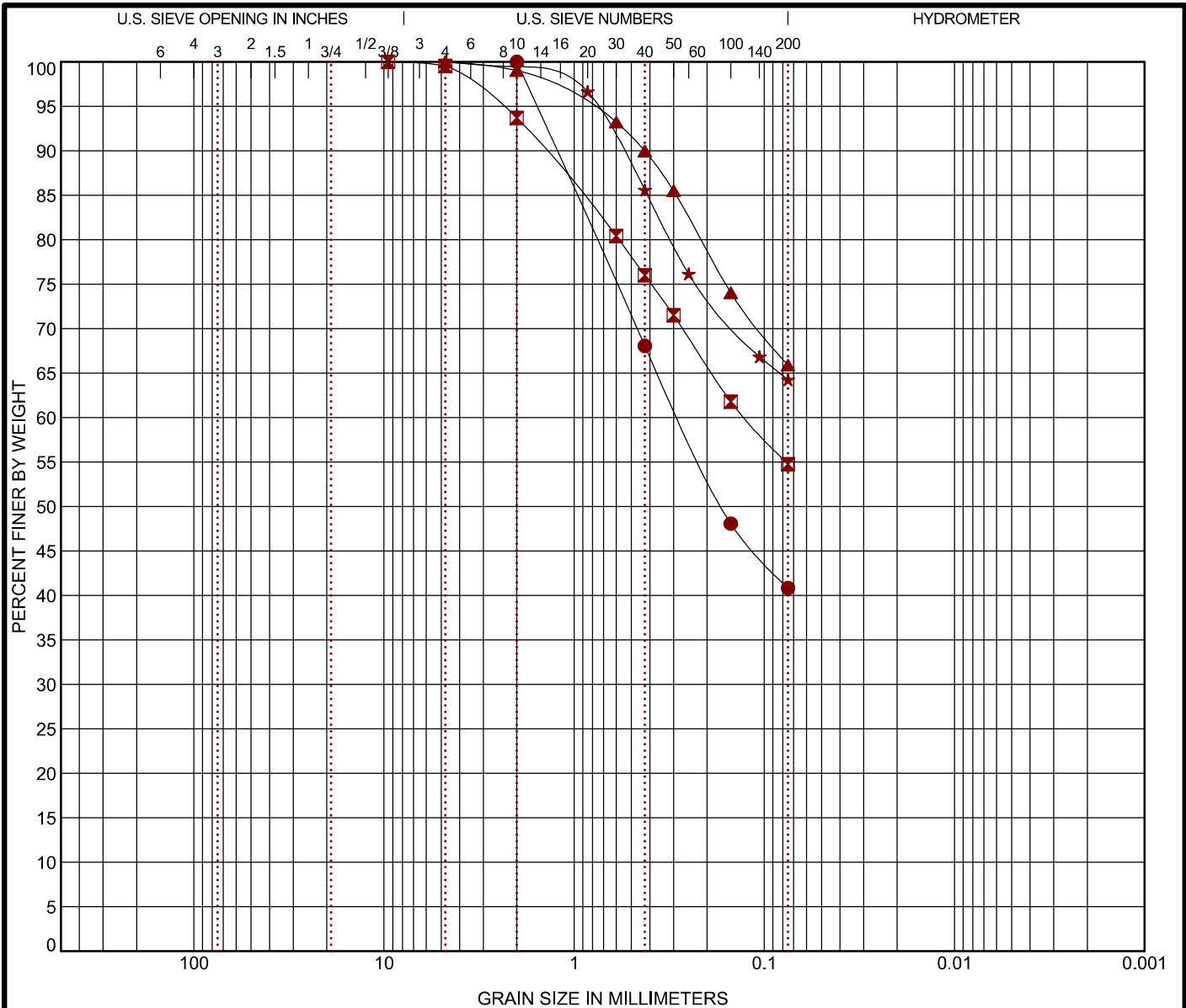
PROJECT NUMBER: 73155113

CLIENT: CDM Smith
Columbia, South Carolina

EXHIBIT: B-6

GRAIN SIZE DISTRIBUTION

ASTM D422



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring ID	Depth	USCS Classification	AASHTO Classification	LL	PL	PI	Cc	Cu	
●	B-20	0 - 10	CLAYEY SAND (SC)	A-6(1)	27	16	11			
☒	B-21	0 - 2	SANDY FAT CLAY (CH)	A-7-6(16)	56	21	35			
▲	B-24	0 - 2	SANDY FAT CLAY (CH)	A-7-5(20)	61	31	30			
★	B-25	0 - 6	SANDY ELASTIC SILT (MH)	A-7-5(13)	55	34	21			
	Boring ID	Depth	D ₁₀₀	D ₆₀	D ₃₀	D ₁₀	%Gravel	%Sand	%Silt	%Clay
●	B-20	0 - 10	2	0.279			0.0	59.2	40.8	
☒	B-21	0 - 2	9.5	0.126			0.5	44.8	54.8	
▲	B-24	0 - 2	4.75				0.0	34.1	65.9	
★	B-25	0 - 6	4.75				0.0	35.7	64.3	

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS & AASHTO COMBINED 73155113.GPJ TERRACON2012.GDT 3/23/16

PROJECT: SC 72 Widening from Rambo Road to South of SC 901

SITE: SC 72
Rock Hill, South Carolina



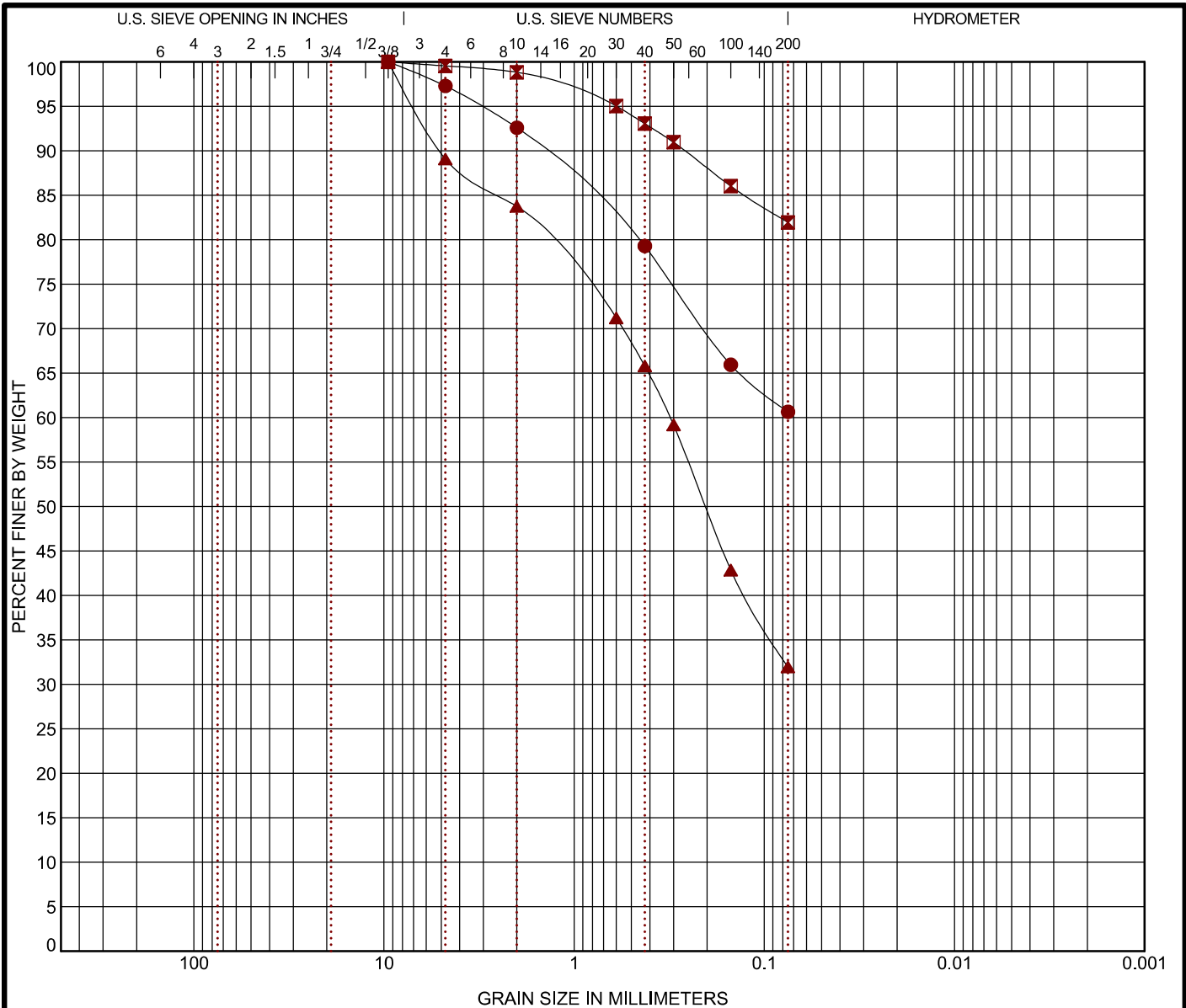
PROJECT NUMBER: 73155113

CLIENT: CDM Smith
Columbia, South Carolina

EXHIBIT: B-7

GRAIN SIZE DISTRIBUTION

ASTM D422



COBBLES	GRAVEL		SAND			SILT OR CLAY			
	coarse	fine	coarse	medium	fine				

	Boring ID	Depth	USCS Classification	AASHTO Classification	LL	PL	PI	Cc	Cu
●	B-28	0 - 8	SANDY LEAN CLAY (CL)	A-7-6(12)	46	24	22		
☒	B-28	2 - 4	FAT CLAY with SAND (CH)	A-7-5(37)	73	33	40		
▲	B-29	0 - 2	CLAYEY SAND (SC)	A-2-6(1)	30	15	15		

	Boring ID	Depth	D ₁₀₀	D ₆₀	D ₃₀	D ₁₀	%Gravel	%Sand	%Silt	%Clay
●	B-28	0 - 8	9.5				2.7	36.6	60.6	
☒	B-28	2 - 4	9.5				0.5	17.6	82.0	
▲	B-29	0 - 2	9.5	0.313			10.9	57.1	32.0	

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS & AASHTO COMBINED 73155113.GPJ TERRACON2012.GDT 3/23/16

PROJECT: SC 72 Widening from Rambo Road to South of SC 901

SITE: SC 72
Rock Hill, South Carolina



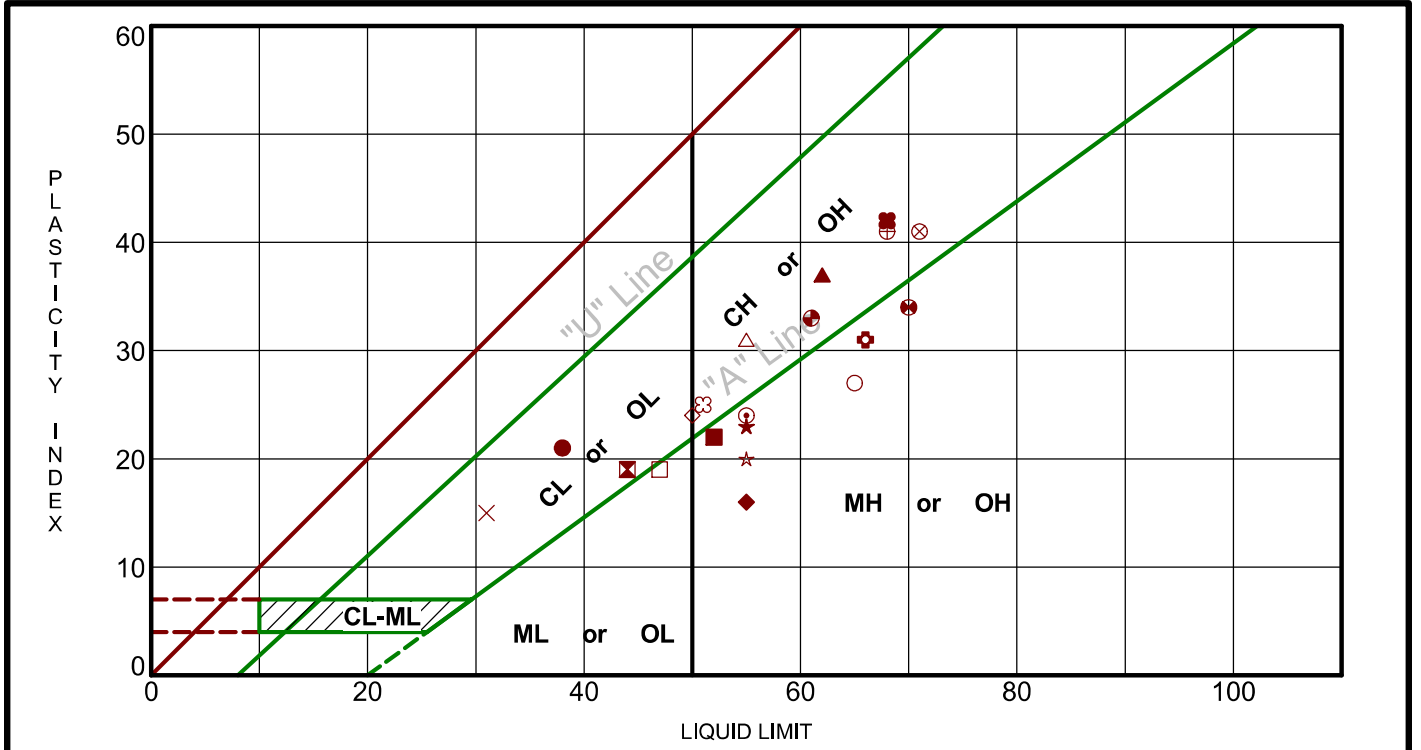
PROJECT NUMBER: 73155113

CLIENT: CDM Smith
Columbia, South Carolina

EXHIBIT: B-8

ATTERBERG LIMITS RESULTS

ASTM D4318



Boring ID	Depth	LL	PL	PI	Fines	USCS	Description
● B-01	2 - 4	38	17	21	42	SC	CLAYEY SAND
⊠ B-02	0 - 10	44	25	19	57	CL	SANDY LEAN CLAY
▲ B-03	4 - 6	62	25	37	46	SC	CLAYEY SAND
★ B-04	2 - 4	55	32	23	50	MH	SANDY ELASTIC SILT
⊕ B-04	8 - 10	55	31	24	40	SM	SILTY SAND
⊕ B-05	0 - 6	66	35	31	70	MH	ELASTIC SILT with SAND
○ B-07	0 - 2	65	38	27	73	MH	ELASTIC SILT with SAND
△ B-08	2 - 4	55	24	31	59	CH	SANDY FAT CLAY
⊗ B-08	6 - 8	71	30	41	72	CH	FAT CLAY with SAND
⊕ B-11	0 - 2	68	27	41	61	CH	SANDY FAT CLAY
□ B-12	0 - 6	47	28	19	59	ML	SANDY SILT
⊕ B-13	0 - 2	70	36	34	88	MH	ELASTIC SILT
⊕ B-14	0 - 2	61	28	33	49	SC	CLAYEY SAND
★ B-15	0 - 2	55	35	20	69	MH	SANDY ELASTIC SILT
⊗ B-16	0 - 2	51	26	25	44	SC	CLAYEY SAND
■ B-17	0 - 10	52	30	22	71	MH	ELASTIC SILT with SAND
◆ B-17	8 - 10	55	39	16	66	MH	SANDY ELASTIC SILT
◇ B-18**	0 - 4	50	26	24	68	CH	SANDY FAT CLAY
⊠ B-19	0 - 2	31	16	15	37	SC	CLAYEY SAND
⊕ B-19	2 - 4	68	26	42	77	CH	FAT CLAY with SAND

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. ATTERBERG LIMITS 73155113.GPJ TERRACON2015.GDT 3/23/16

PROJECT: SC 72 Widening from Rambo Road to South of SC 901

SITE: SC 72
Rock Hill, South Carolina



PROJECT NUMBER: 73155113

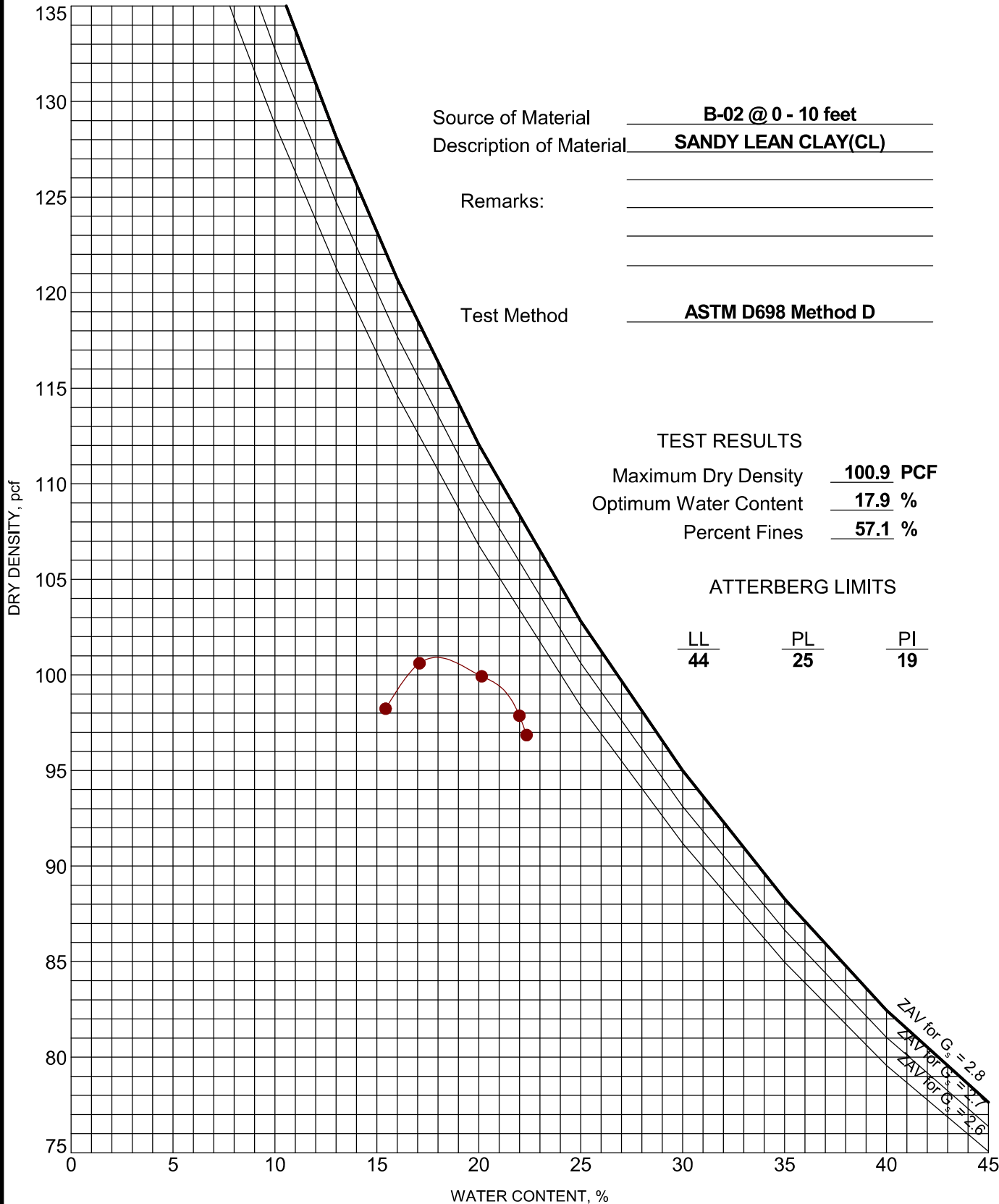
CLIENT: CDM Smith
Columbia, South Carolina

EXHIBIT: B-9

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. COMPACTION - V2 73155113.GPJ TERRACON2012.GDT 3/23/16



Source of Material B-02 @ 0 - 10 feet
 Description of Material SANDY LEAN CLAY(CL)
 Remarks: _____
 Test Method ASTM D698 Method D

PROJECT: SC 72 Widening from Rambo Road to South of SC 901

SITE: SC 72
 Rock Hill, South Carolina



PROJECT NUMBER: 73155113

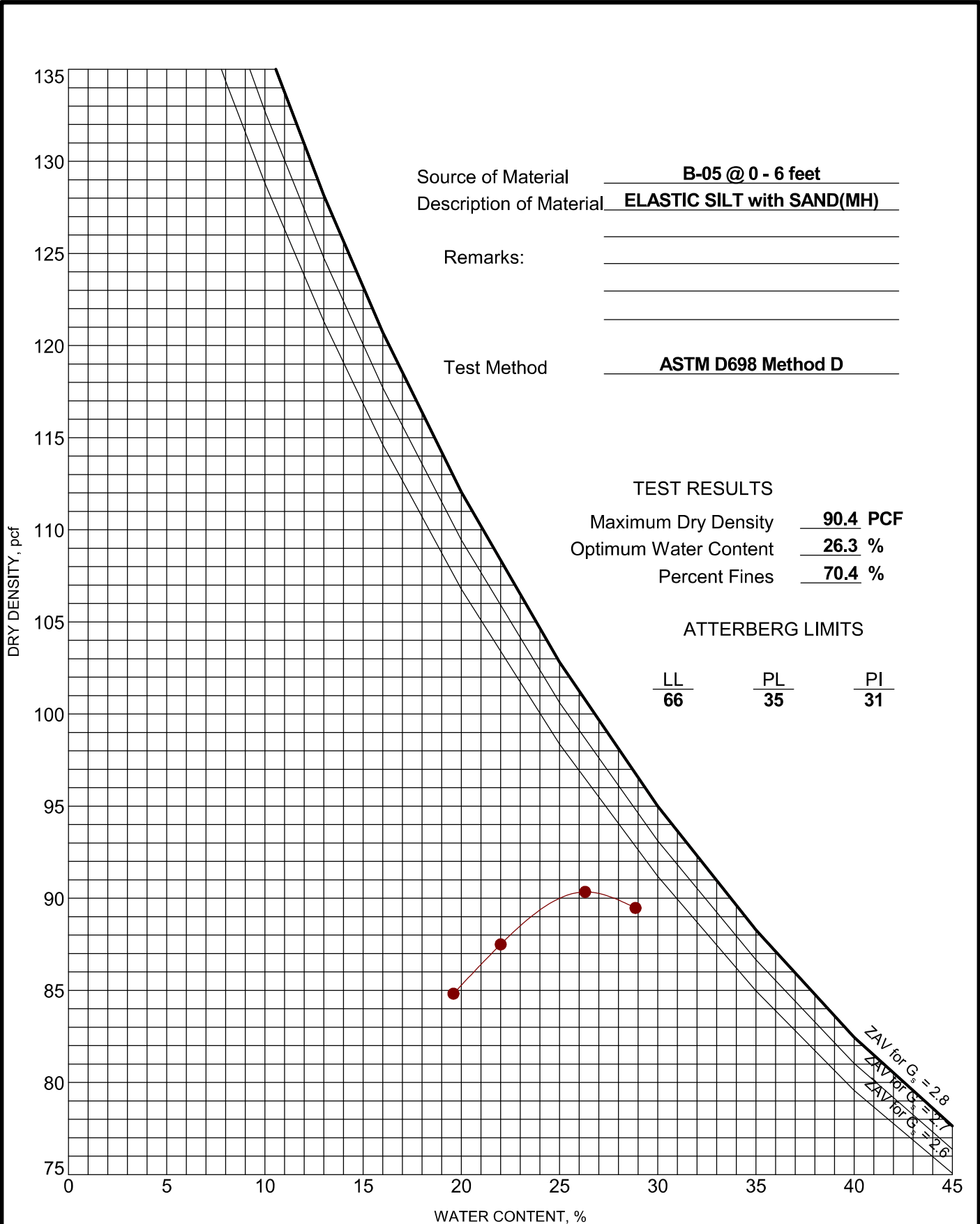
CLIENT: CDM Smith
 Columbia, South Carolina

EXHIBIT: B-11

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. COMPACTION - V2 73155113.GPJ TERRACON2012.GDT 3/23/16



Source of Material B-05 @ 0 - 6 feet
 Description of Material ELASTIC SILT with SAND(MH)
 Remarks: _____
 Test Method ASTM D698 Method D

TEST RESULTS
 Maximum Dry Density 90.4 PCF
 Optimum Water Content 26.3 %
 Percent Fines 70.4 %

ATTERBERG LIMITS

LL	PL	PI
66	35	31

PROJECT: SC 72 Widening from Rambo Road to South of SC 901
 SITE: SC 72
 Rock Hill, South Carolina

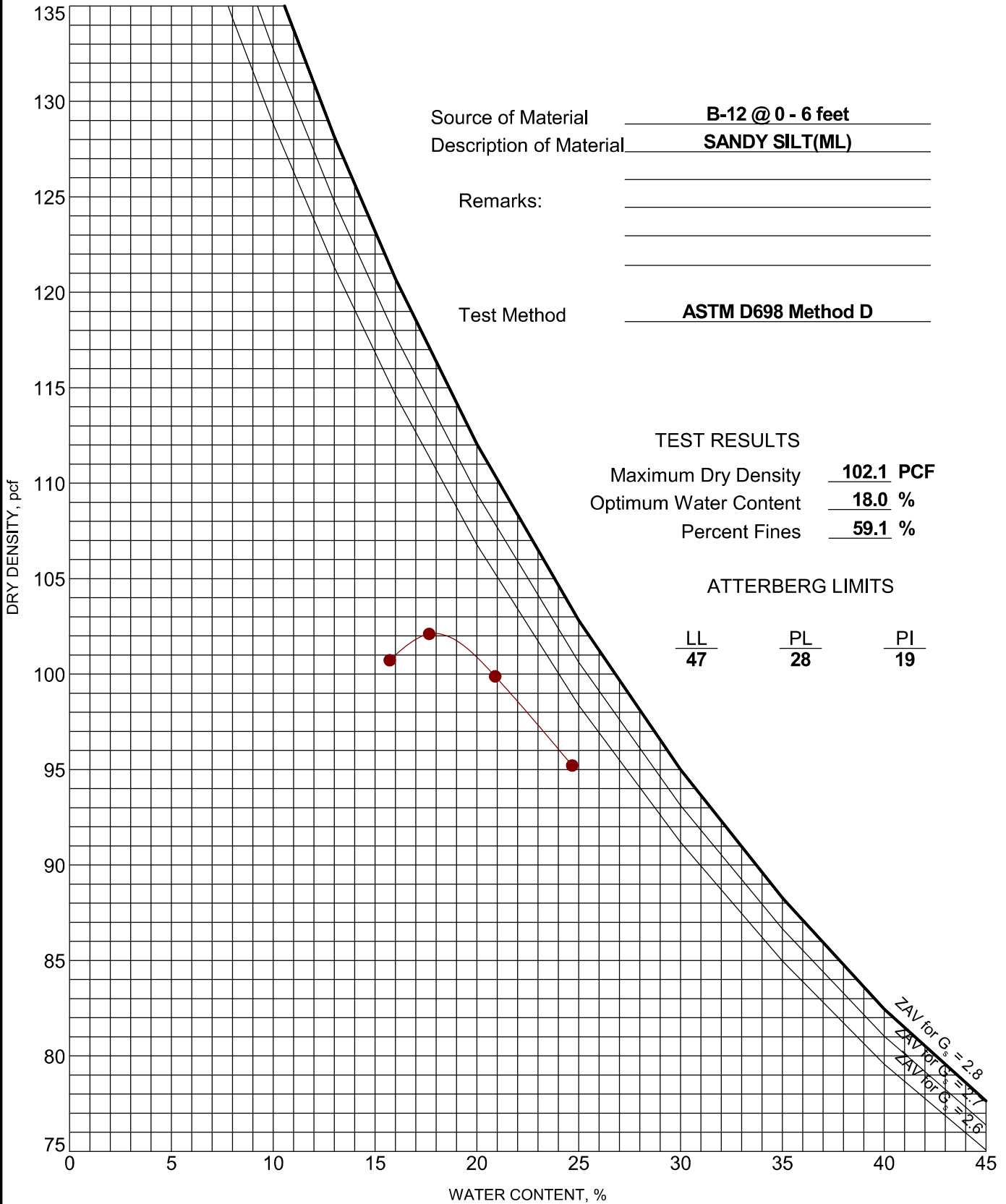


PROJECT NUMBER: 73155113
 CLIENT: CDM Smith
 Columbia, South Carolina
 EXHIBIT: B-12

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. COMPACTION - V2 73155113.GPJ TERRACON2012.GDT 3/23/16



WATER CONTENT, %

PROJECT: SC 72 Widening from Rambo
Road to South of SC 901

SITE: SC 72
Rock Hill, South Carolina

Terracon
521 Clemson Road
Columbia, South Carolina

PROJECT NUMBER: 73155113

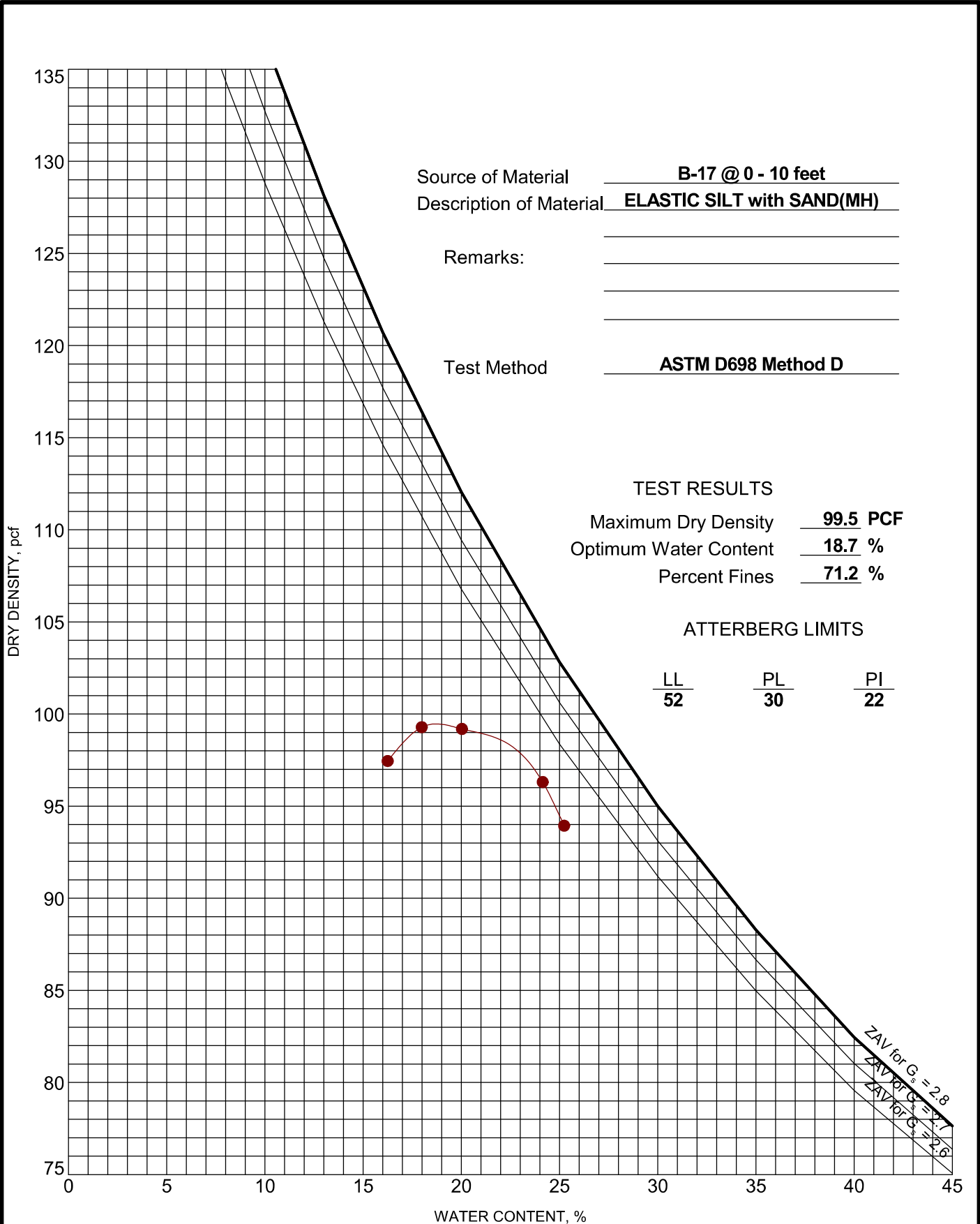
CLIENT: CDM Smith
Columbia, South Carolina

EXHIBIT: B-13

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. COMPACTION - V2 73155113.GPJ TERRACON2012.GDT 3/23/16



Source of Material B-17 @ 0 - 10 feet
 Description of Material ELASTIC SILT with SAND(MH)
 Remarks: _____
 Test Method ASTM D698 Method D

TEST RESULTS
 Maximum Dry Density 99.5 PCF
 Optimum Water Content 18.7 %
 Percent Fines 71.2 %

ATTERBERG LIMITS

LL	PL	PI
52	30	22

PROJECT: SC 72 Widening from Rambo
 Road to South of SC 901

SITE: SC 72
 Rock Hill, South Carolina



PROJECT NUMBER: 73155113

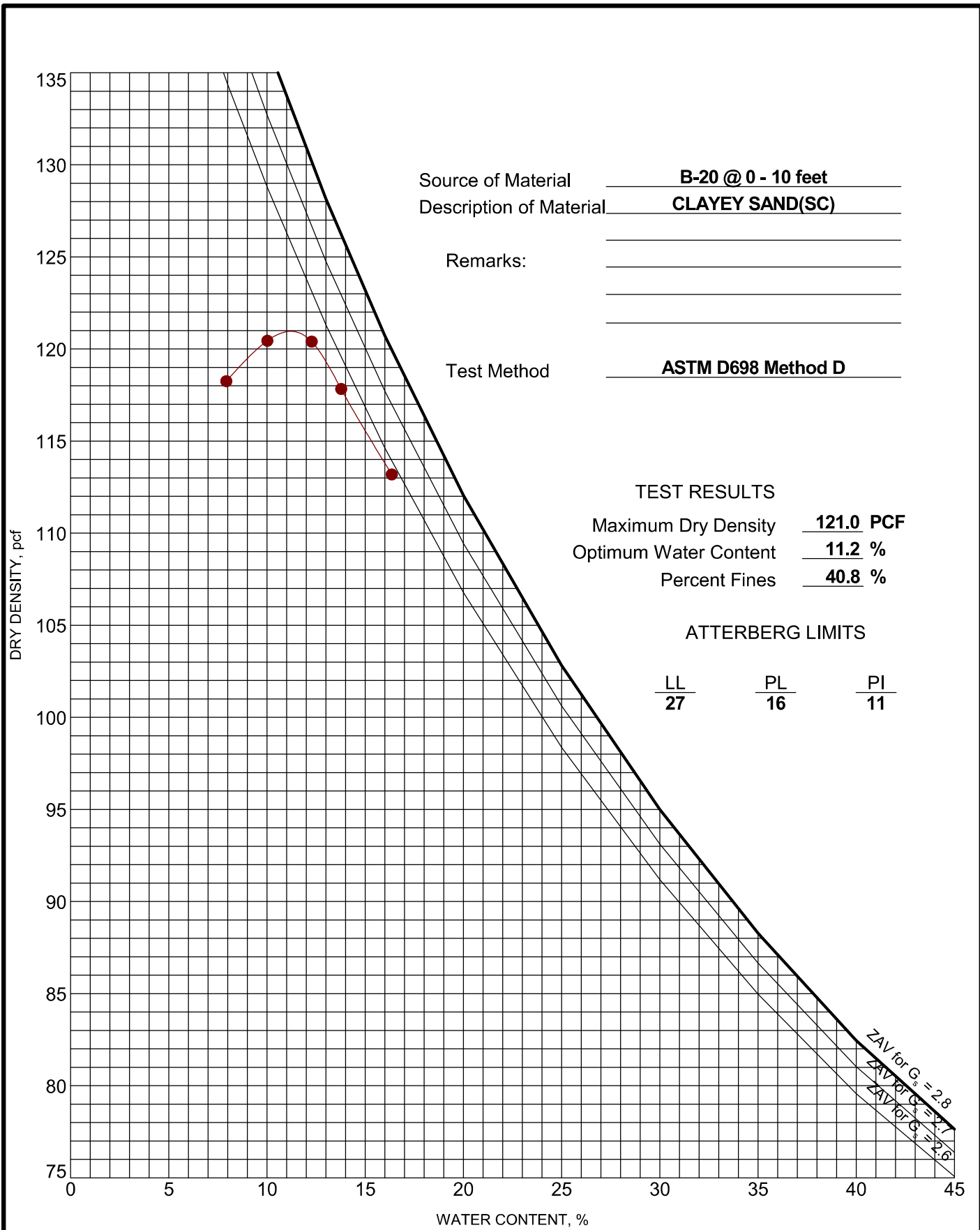
CLIENT: CDM Smith
 Columbia, South Carolina

EXHIBIT: B-14

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. COMPACTION - V2 73155113.GPJ TERRACON2012.GDT 3/23/16



Source of Material B-20 @ 0 - 10 feet
 Description of Material CLAYEY SAND(SC)

Remarks: _____

Test Method ASTM D698 Method D

TEST RESULTS

Maximum Dry Density 121.0 PCF
 Optimum Water Content 11.2 %
 Percent Fines 40.8 %

ATTERBERG LIMITS

LL	PL	PI
<u>27</u>	<u>16</u>	<u>11</u>

ZAV for $G_s = 2.8$
 ZAV for $G_s = 2.65$
 ZAV for $G_s = 2.6$

PROJECT: SC 72 Widening from Rambo
 Road to South of SC 901

SITE: SC 72
 Rock Hill, South Carolina



PROJECT NUMBER: 73155113

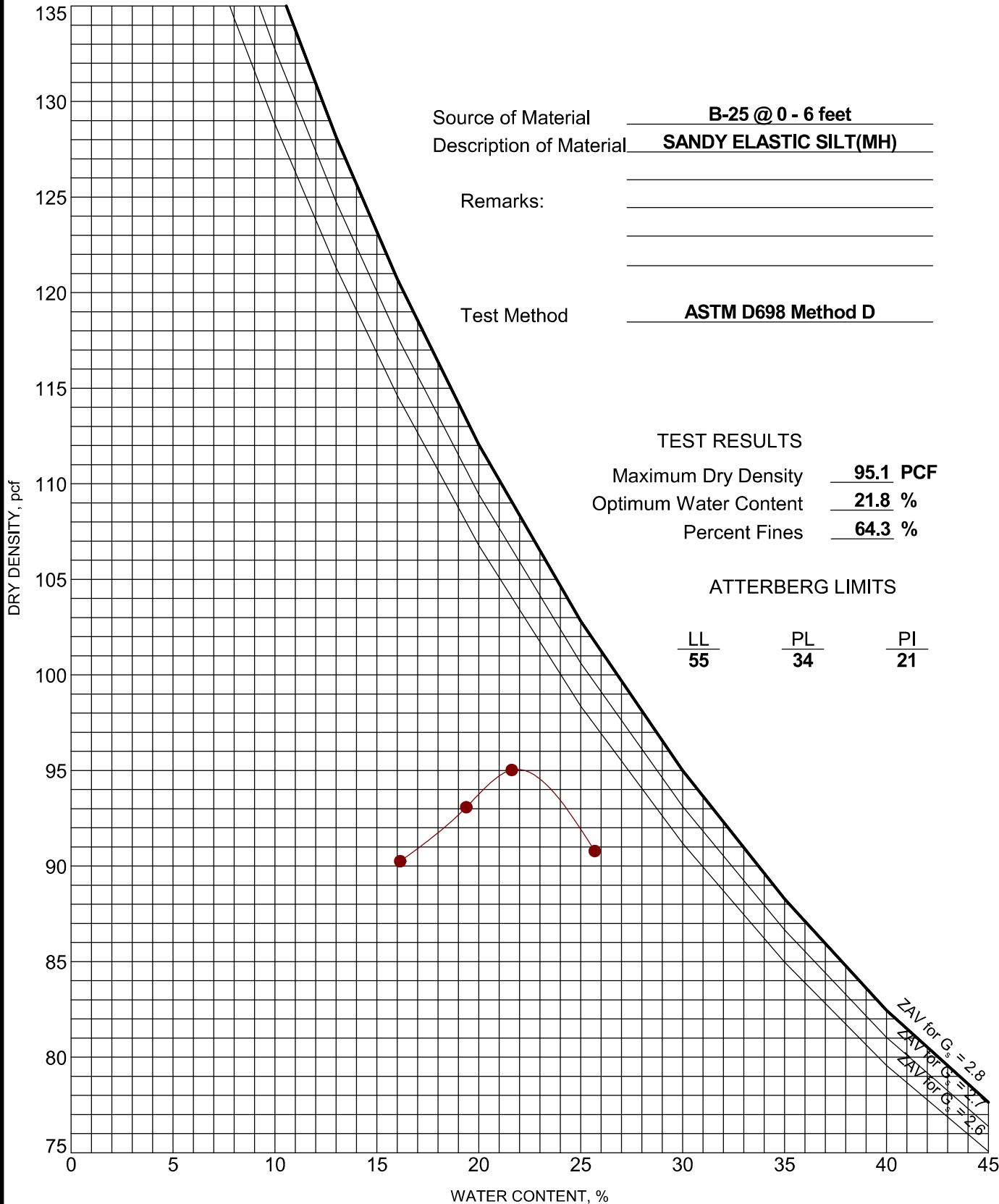
CLIENT: CDM Smith
 Columbia, South Carolina

EXHIBIT: B-15

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. COMPACTION - V2 73155113.GPJ TERRACON2012.GDT 3/23/16



PROJECT: SC 72 Widening from Rambo Road to South of SC 901

SITE: SC 72
Rock Hill, South Carolina



PROJECT NUMBER: 73155113

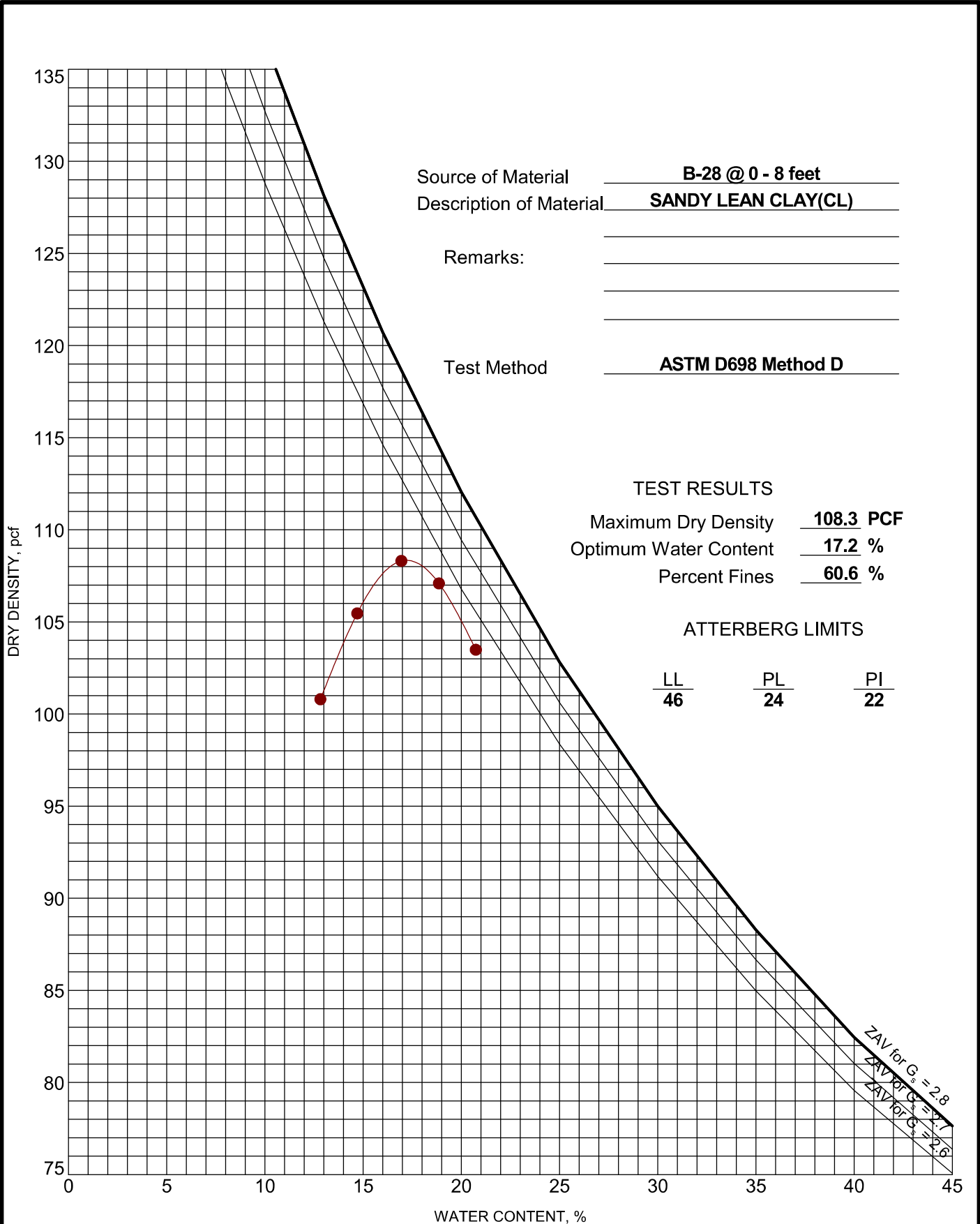
CLIENT: CDM Smith
Columbia, South Carolina

EXHIBIT: B-16

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. COMPACTION - V2 73155113.GPJ TERRACON2012.GDT 3/23/16



Source of Material B-28 @ 0 - 8 feet
 Description of Material SANDY LEAN CLAY (CL)
 Remarks: _____
 Test Method ASTM D698 Method D

TEST RESULTS
 Maximum Dry Density 108.3 PCF
 Optimum Water Content 17.2 %
 Percent Fines 60.6 %

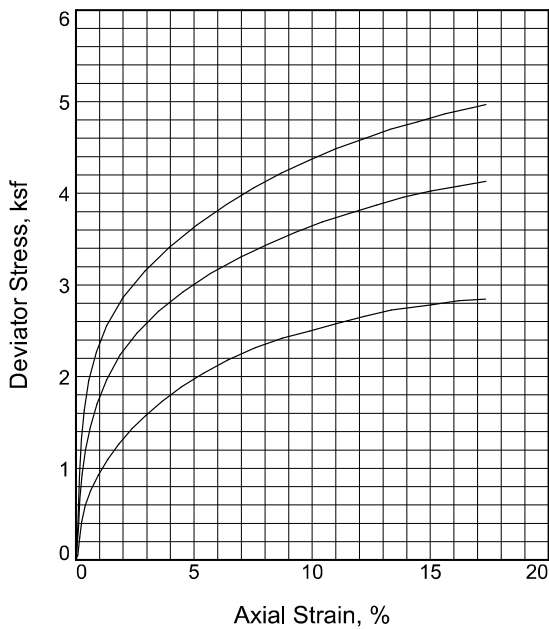
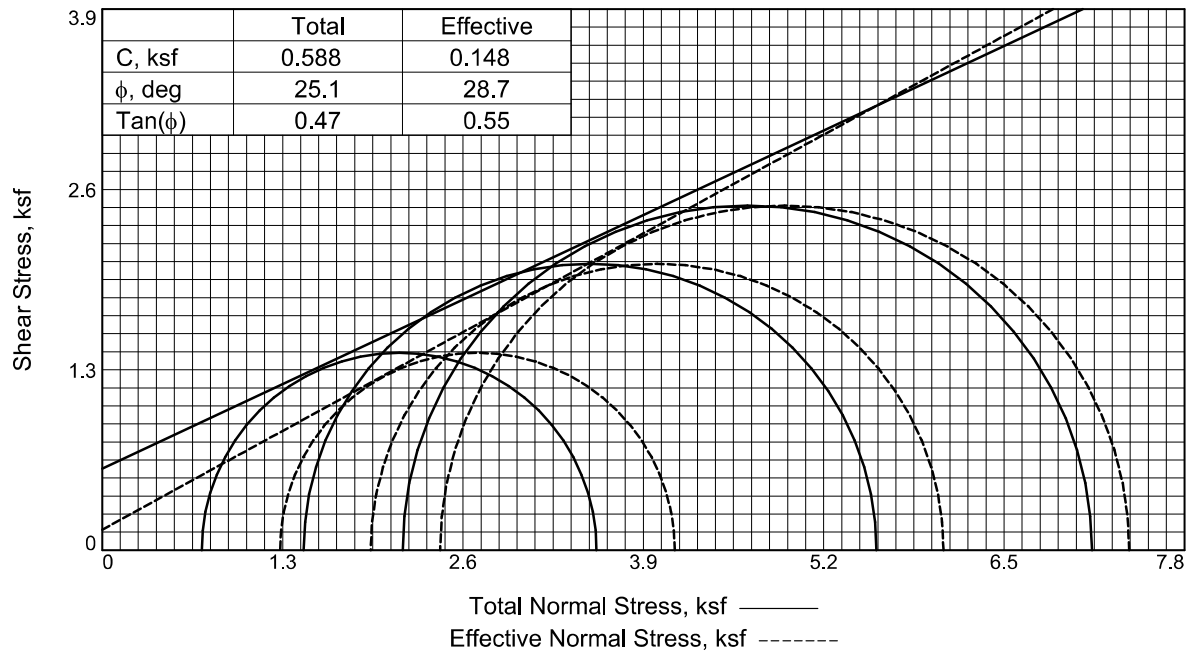
ATTERBERG LIMITS

LL	PL	PI
46	24	22

PROJECT: SC 72 Widening from Rambo
 Road to South of SC 901
 SITE: SC 72
 Rock Hill, South Carolina



PROJECT NUMBER: 73155113
 CLIENT: CDM Smith
 Columbia, South Carolina
 EXHIBIT: B-17



Sample No.	1	2	3	
Initial	Water Content, %	18.5	18.5	18.5
	Dry Density, pcf	97.8	97.7	98.4
	Saturation, %	69.1	68.9	70.1
	Void Ratio	0.7230	0.7253	0.7133
	Diameter, in.	2.850	2.820	2.820
	Height, in.	5.590	5.590	5.590
At Test	Water Content, %	25.4	26.0	24.0
	Dry Density, pcf	97.8	97.7	98.4
	Saturation, %	94.7	97.0	90.8
	Void Ratio	0.7230	0.7253	0.7133
	Diameter, in.	3.087	3.055	3.055
	Height, in.	4.764	4.764	4.764
Strain rate, in./min.	0.000	0.000	0.005	
Back Pressure, psi	60.000	60.000	60.000	
Cell Pressure, psi	64.980	70.080	75.040	
Fail. Stress, ksf	2.846	4.129	4.968	
Excess Pore Pr., ksf	-0.564	-0.483	-0.269	
Ult. Stress, ksf				
Excess Pore Pr., ksf				
$\bar{\sigma}_1$ Failure, ksf	4.127	6.064	7.403	
$\bar{\sigma}_3$ Failure, ksf	1.282	1.935	2.435	

Type of Test:

CU with Pore Pressures

Sample Type: Laboratory molded

Description: Red Sandy Lean Clay

LL= 44 PL= 19 PI= 25

Assumed Specific Gravity= 2.70

Remarks: ASTM D4767

Client: CDM Smith

Project: SC 72 Widening

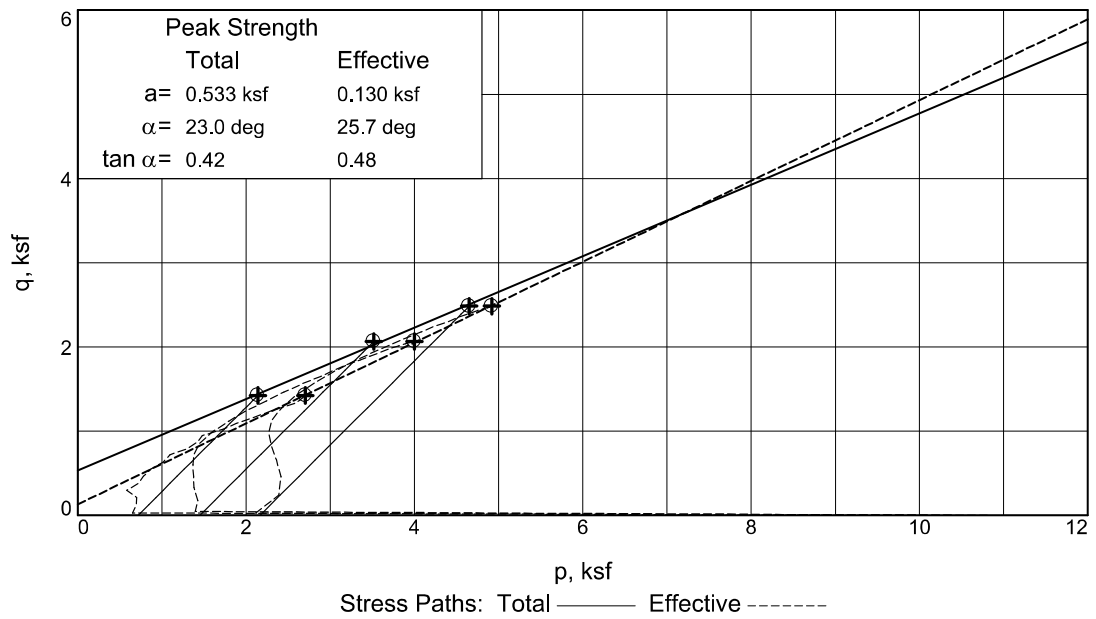
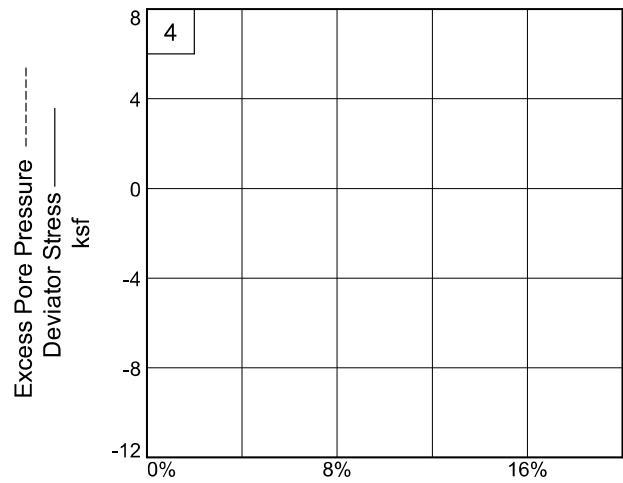
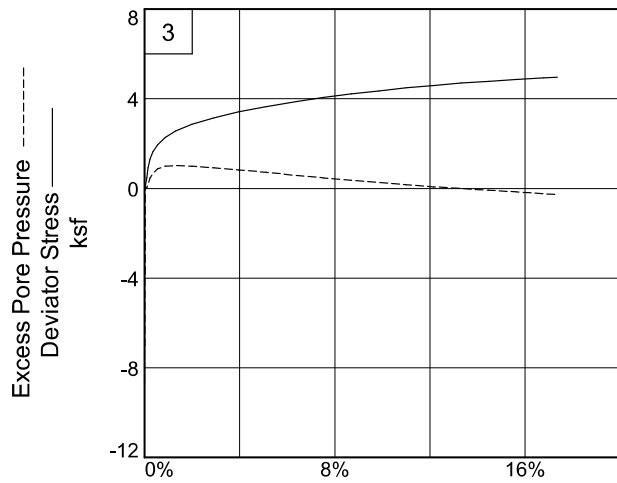
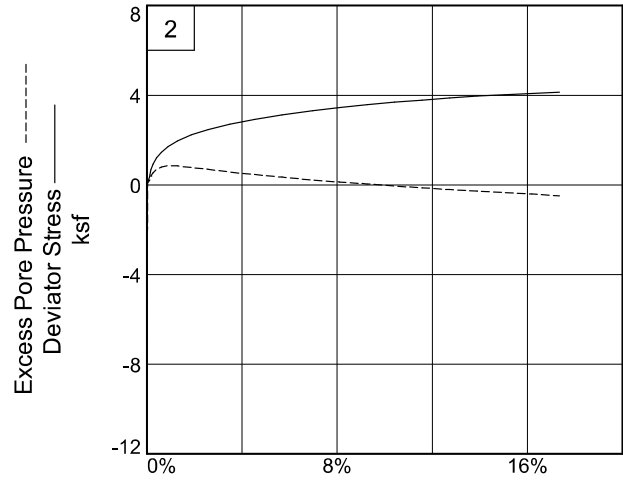
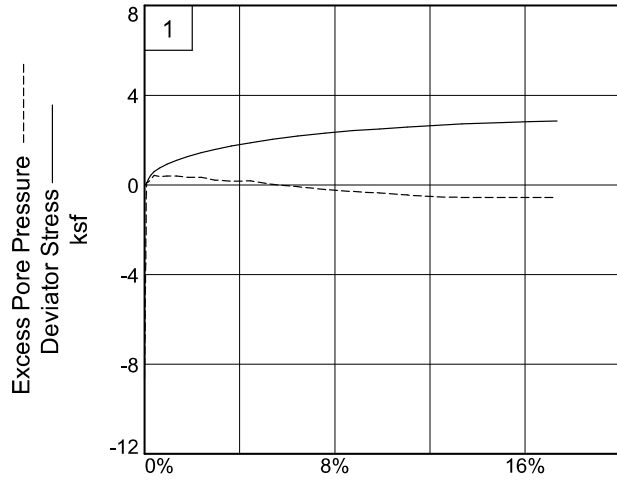
Location: B-2

Depth: 0-10 ft.

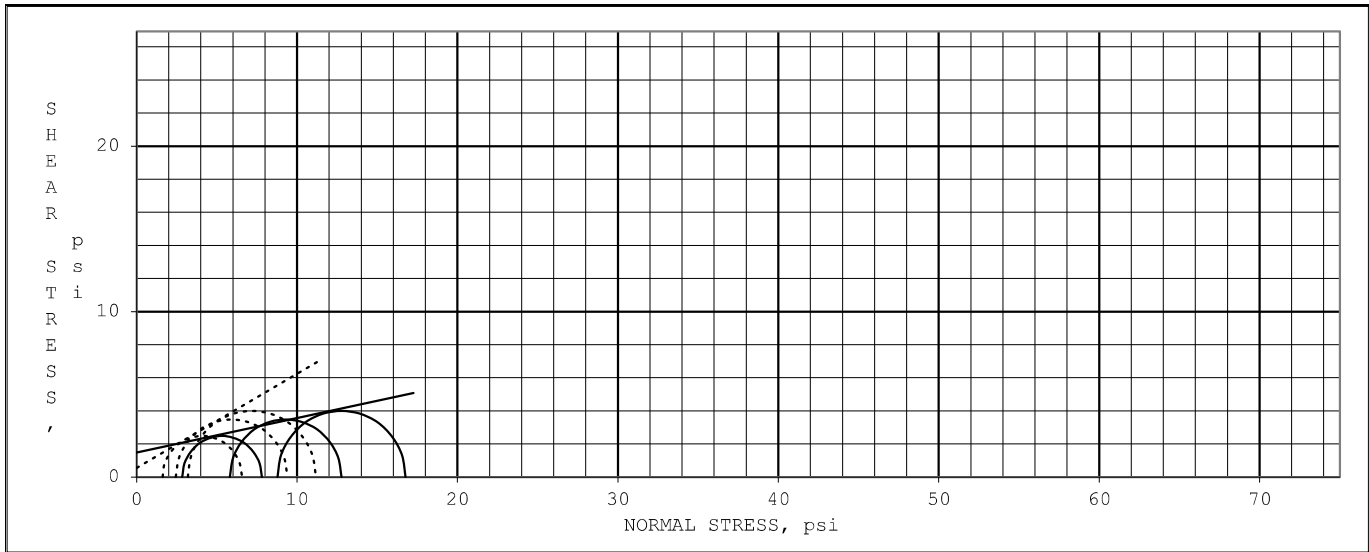
Proj. No.: 73155113

Date Sampled: 2-17-2016

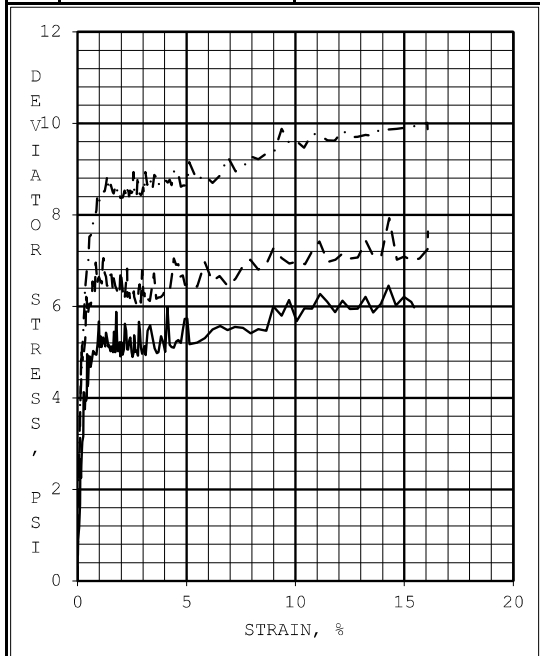
TRIAXIAL SHEAR TEST REPORT
 Terracon Consultants, Inc.
 Houston, TX



Client: CDM Smith
Project: SC 72 Widening
Location: B-2 **Depth:** 0-10 ft.
Project No.: 73155113



EFFECTIVE STRESS ---	ANGLE OF INTERNAL FRICTION, deg	29.6	COHESION, psi	0.6
TOTAL STRESS —	ANGLE OF INTERNAL FRICTION, deg	11.8	COHESION, psi	1.5



SPECIMEN ID:		A	B	C
INITIAL	WATER CONTENT, %	26.9	26.8	27.0
	DRY DENSITY, pcf	85.9	85.8	85.8
	SATURATION, %	76	75	76
	VOID RATIO	0.96	0.96	0.97
BEFORE SHEAR	WATER CONTENT, %	35.3	34.9	34.4
	DRY DENSITY, pcf	86.3	86.8	87.4
	SATURATION (B PARAMETER)	0.99	0.96	0.96
	VOID RATIO	0.95	0.94	0.93
	FINAL BACK PRESSURE, psi	99.3	99.4	100.7
MINOR PRINCIPAL STRESS, psi		2.8	5.8	8.8
EFFECTIVE STRESS PEAK AT % STRAIN		0.85	0.85	0.85
EFF. DEVIATOR STRESS AT PEAK STRAIN, psi		5.0	7.0	8.0
TOTAL STRESS PEAK AT % STRAIN		0.85	0.85	0.85
TOTAL DEVIATOR STRESS AT PEAK STRAIN, psi		5.0	7.0	8.0

CONTROLLED - STRAIN TEST		ULTIMATE DEVIATOR STRESS (15% STR), psi		6.2	7.1	9.9
SAMPLE TYPE: RE-COMPACTED		TIME TO 50% PRIMARY CONSOLIDATION, min		0.45	0.33	0.41
DESCRIPTION OF SPECIMENS: ELASTIC SILT WITH SAND, REDDISH BROWN		STRAIN RATE, % / hour		5.64	5.29	5.64
		INITIAL DIAMETER, inch		2.002	2.004	2.002
		INITIAL HEIGHT, inch		4.011	4.011	4.014
LL 66	PL 35	PI 31	Gs 2.7 EST.	AREA AFTER CONSOLIDATION, inch ²		3.142 3.134 3.103
PROJECT NO. 73155113		PROJECT: SC 72				
		BORING #: B-05				
LABORATORY: TERRACON - LENEXA		SAMPLE #: Bulk				
DATE: 4/4/2016		DEPTH, feet: 0.0 - 6.0				

PROCEDURE: ASTM D4767, CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS



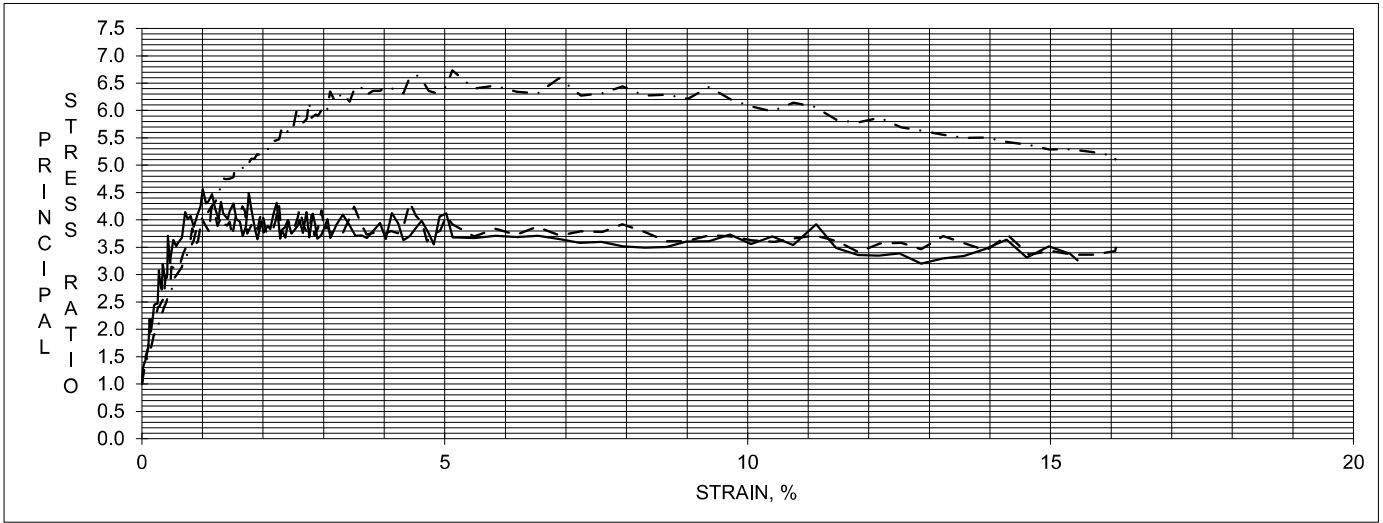
SC 72

73155113

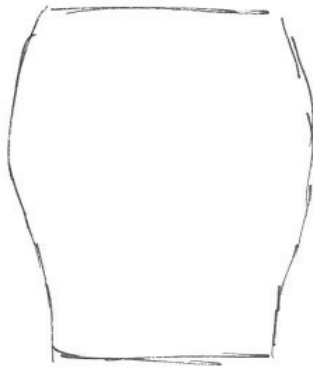
B-05

Bulk

0.0 - 6.0

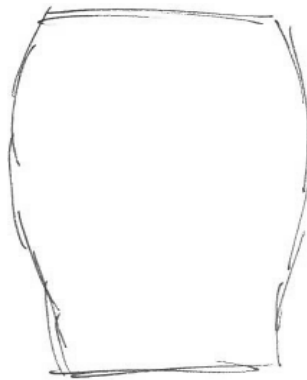


FAILURE SKETCH



SPECIMEN A

FAILURE SKETCH



SPECIMEN B

FAILURE SKETCH



SPECIMEN C

REMARKS:

SPECIMENS SATURATED BY THE WET METHOD.
 EFFECTIVE STRESS FAILURE DATA BASED ON 0.85 % STRAIN.
 EFFECTIVE STRESS MOHR'S CIRCLES DRAWN AT 0.85 % STRAIN.
 TOTAL STRESS FAILURE DATA BASED ON 0.85 % STRAIN.
 TOTAL STRESS MOHR'S CIRCLES DRAWN AT 0.85 % STRAIN.
 DEVIATOR STRESSES CORRECTED FOR MEMBRANE AND FILTER PAPER EFFECTS.
 AREA AFTER CONSOLIDATION CALCULATED AS PER SECTION 10.3.2.1 METHOD A

STANDARD PROCTOR = 90.4pcf @ 26.7% MOISTURE
 REMOLDED TO 85.8 pcf @ 26.9% MOISTURE REMOLDED TO 95% COMPACTION



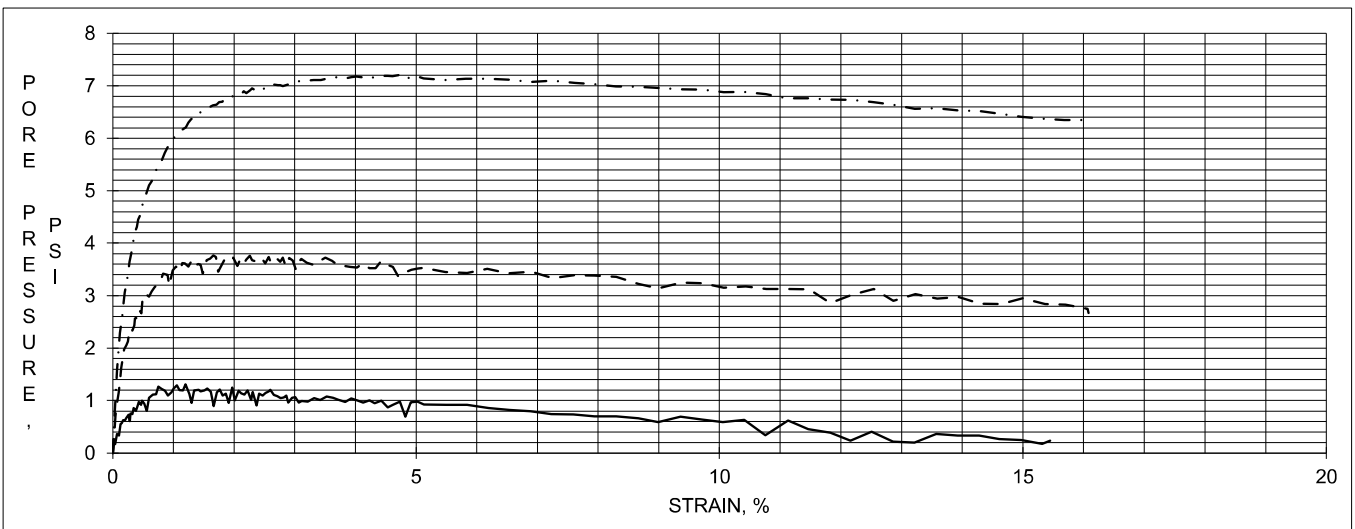
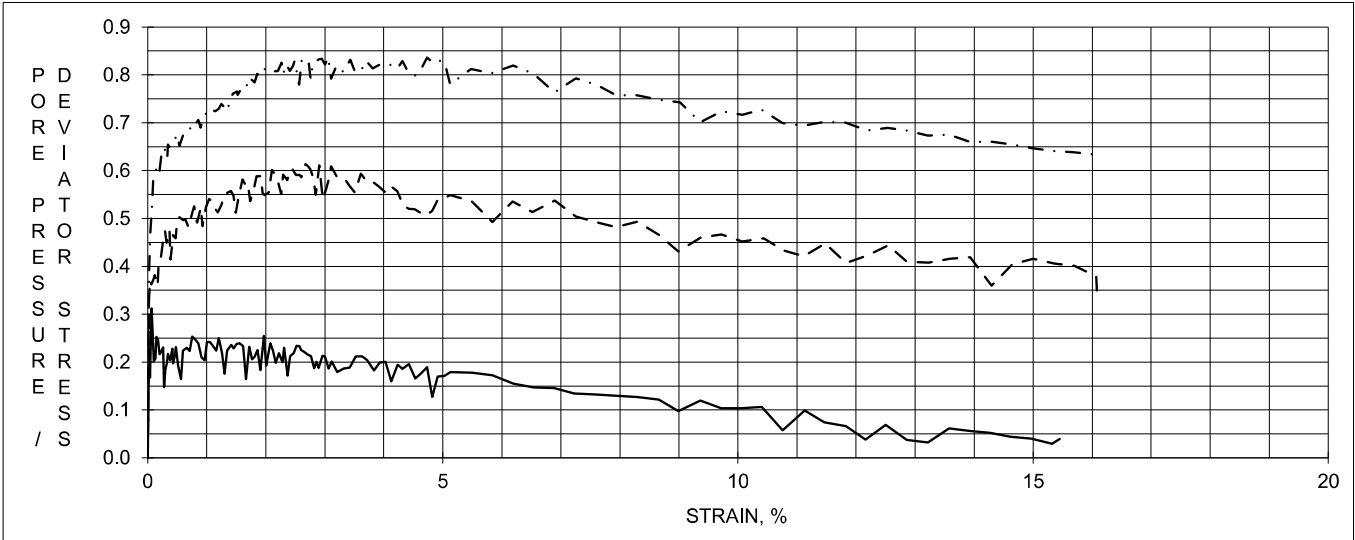
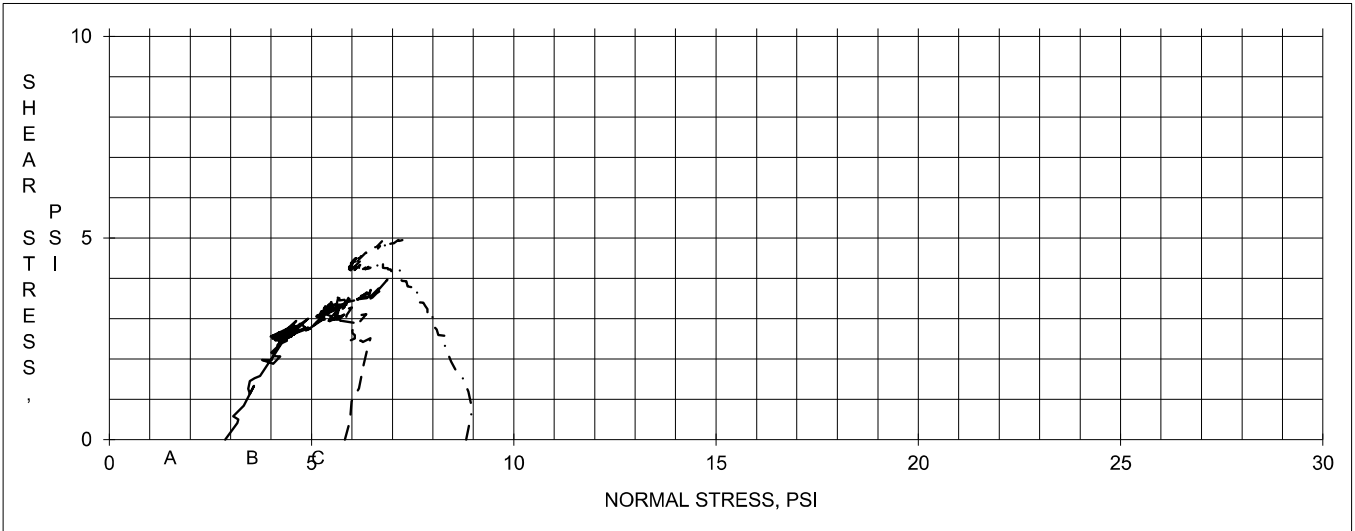
SC 72

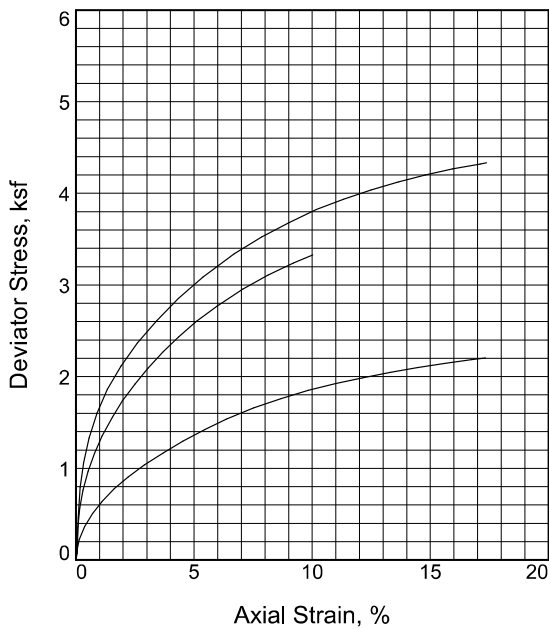
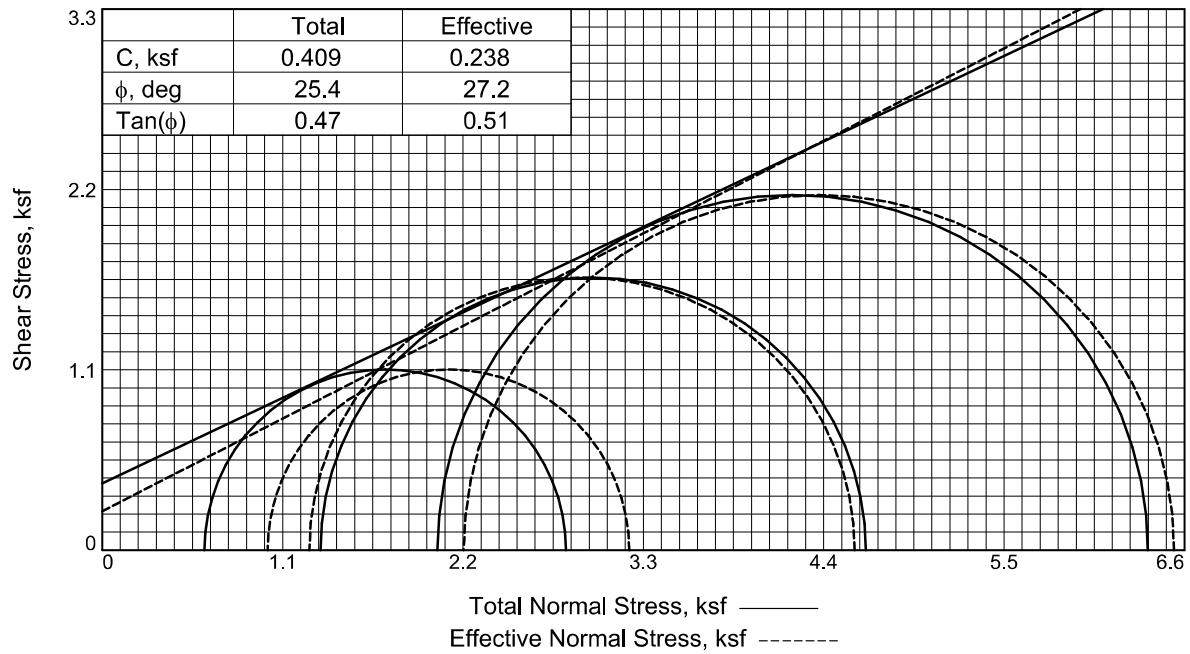
73155113

B-05

Bulk

0.0 - 6.0





Sample No.	1	2	3	
Initial	Water Content, %	19.5	19.5	19.5
	Dry Density, pcf	99.1	99.0	98.9
	Saturation, %	75.1	74.8	74.8
	Void Ratio	0.7011	0.7032	0.7039
	Diameter, in.	2.820	2.820	2.820
At Test	Height, in.	5.590	5.600	5.590
	Water Content, %	24.8	23.5	22.5
	Dry Density, pcf	99.1	99.0	98.9
	Saturation, %	95.5	90.2	86.1
	Void Ratio	0.7011	0.7032	0.7039
Test Parameters	Diameter, in.	3.055	2.958	3.055
	Height, in.	4.764	5.090	4.762
	Strain rate, in./min.	0.000	0.000	0.000
	Back Pressure, psi	60.000	60.000	60.000
	Cell Pressure, psi	64.330	69.240	74.200
	Fail. Stress, ksf	2.205	3.326	4.332
	Excess Pore Pr., ksf	-0.386	0.067	-0.160
	Ult. Stress, ksf			
	Excess Pore Pr., ksf			
	$\bar{\sigma}_1$ Failure, ksf	3.214	4.589	6.537
$\bar{\sigma}_3$ Failure, ksf	1.009	1.263	2.205	

Type of Test:
CU with Pore Pressures

Sample Type: Laboratory molded

Description: Red Sandy Silt

LL= 47 PL= 28 PI= 19

Assumed Specific Gravity= 2.7

Remarks: ASTM D4767

Client: CDM Smith

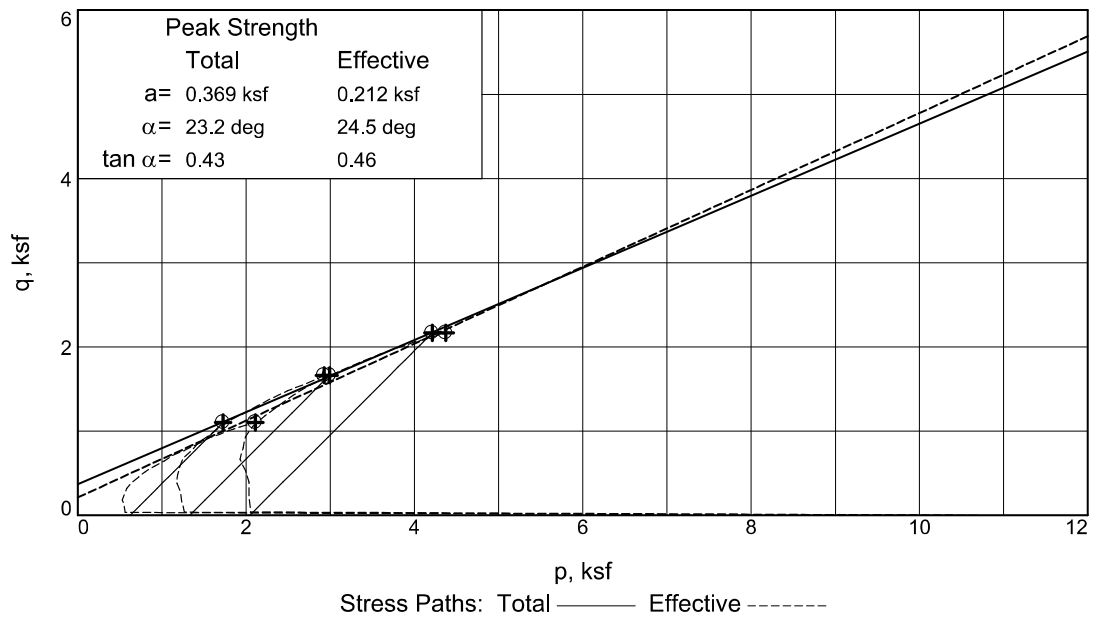
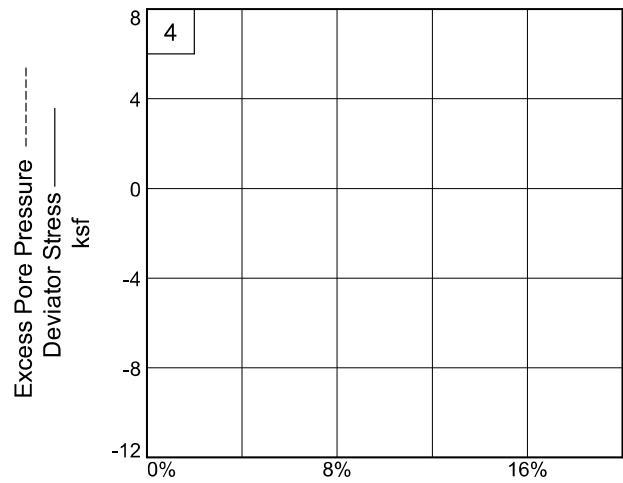
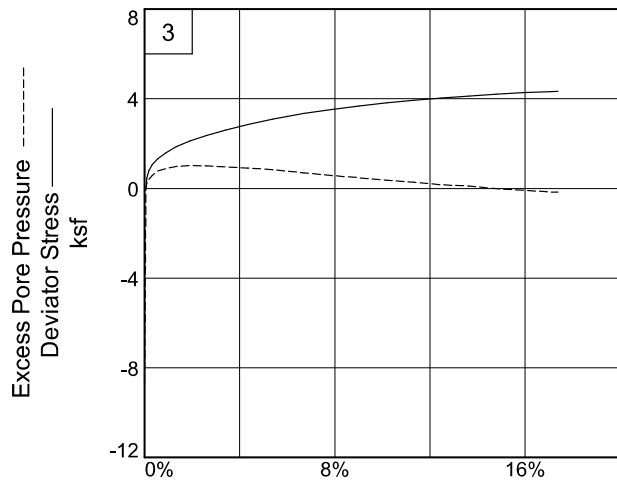
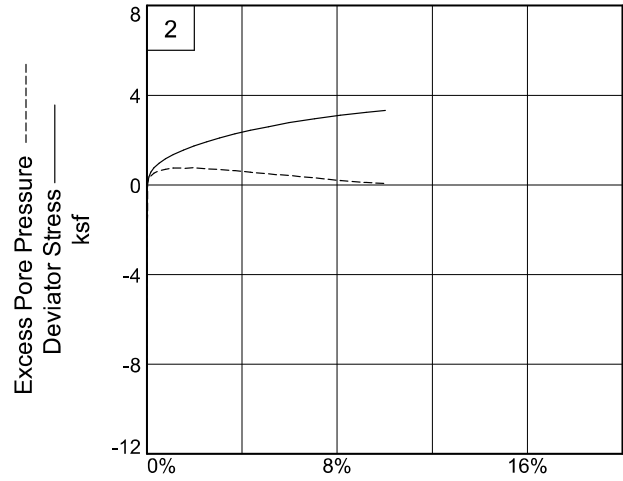
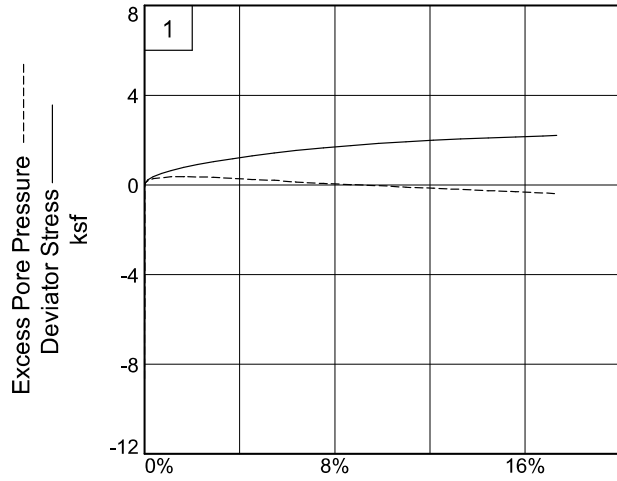
Project: SC 72 Widening

Location: B-12

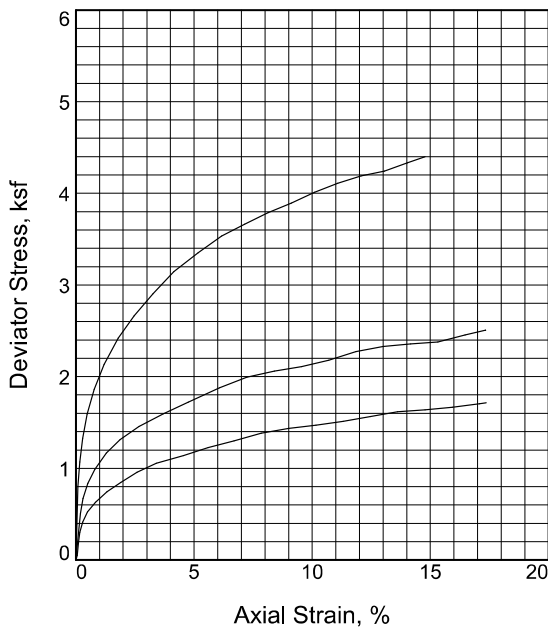
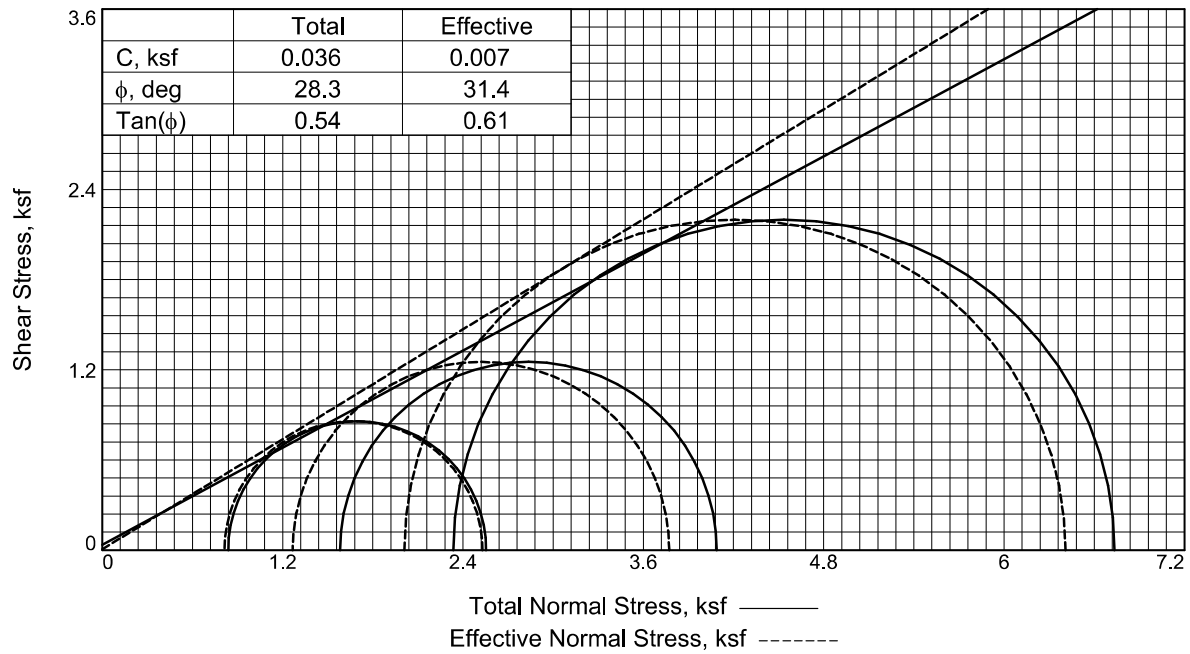
Depth: 0-6 ft

Proj. No.: 73155113 **Date Sampled:** 2-17-2016

TRIAXIAL SHEAR TEST REPORT
Terracon Consultants, Inc.
Houston, TX



Client: CDM Smith
Project: SC 72 Widening
Location: B-12 **Depth:** 0-6 ft
Project No.: 73155113



Sample No.	1	2	3	
Initial	Water Content, %	19.4	19.4	19.4
	Dry Density, pcf	97.1	96.6	96.1
	Saturation, %	71.1	70.2	69.4
	Void Ratio	0.7361	0.7453	0.7535
	Diameter, in.	2.820	2.820	2.820
	Height, in.	5.590	5.590	5.590
At Test	Water Content, %	27.4	25.0	24.3
	Dry Density, pcf	97.1	96.6	96.1
	Saturation, %	100.4	90.6	86.9
	Void Ratio	0.7361	0.7453	0.7535
	Diameter, in.	3.055	3.055	2.820
	Height, in.	4.763	4.764	5.590
Strain rate, in./min.	0.000	0.000	0.000	
Back Pressure, psi	60.000	60.000	60.000	
Cell Pressure, psi	65.820	70.990	76.220	
Fail. Stress, ksf	1.716	2.506	4.398	
Excess Pore Pr., ksf	0.025	0.316	0.326	
Ult. Stress, ksf				
Excess Pore Pr., ksf				
$\bar{\sigma}_1$ Failure, ksf	2.530	3.772	6.408	
$\bar{\sigma}_3$ Failure, ksf	0.813	1.267	2.010	

Type of Test:

CU with Pore Pressures

Sample Type: Laboratory molded

Description: Red Elastic Silt with Sand

LL= 52 PL= 30 PI= 22

Assumed Specific Gravity= 2.7

Remarks: ASTM D4767

Client: CDM Smith

Project: SC 72 Widening

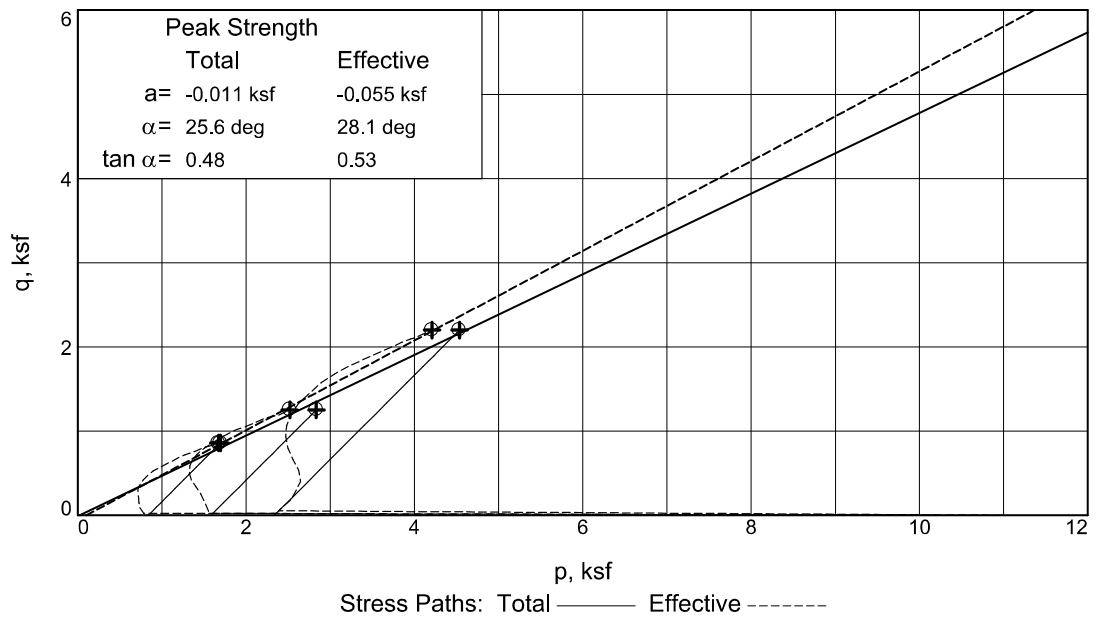
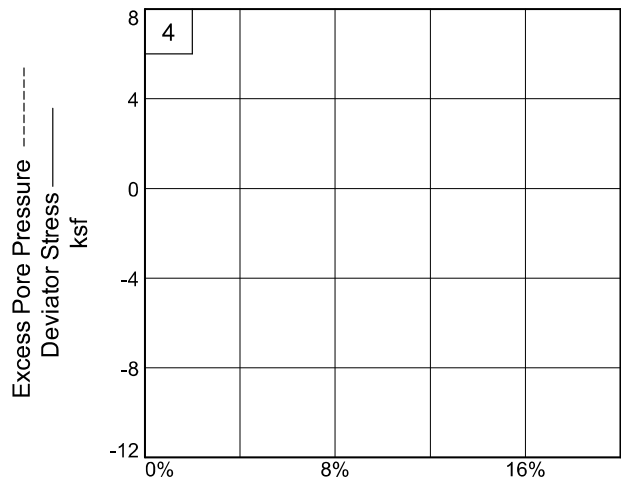
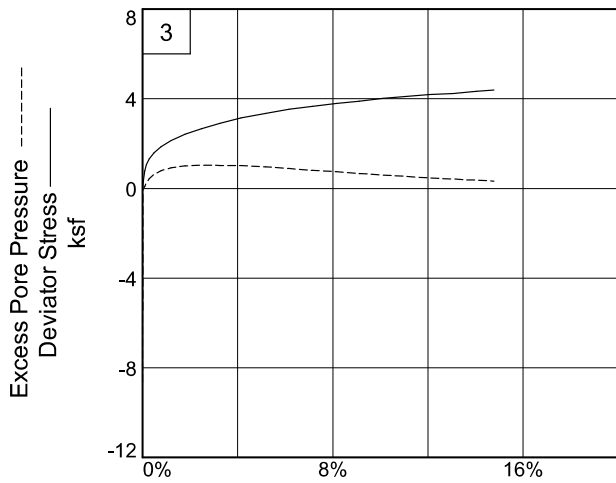
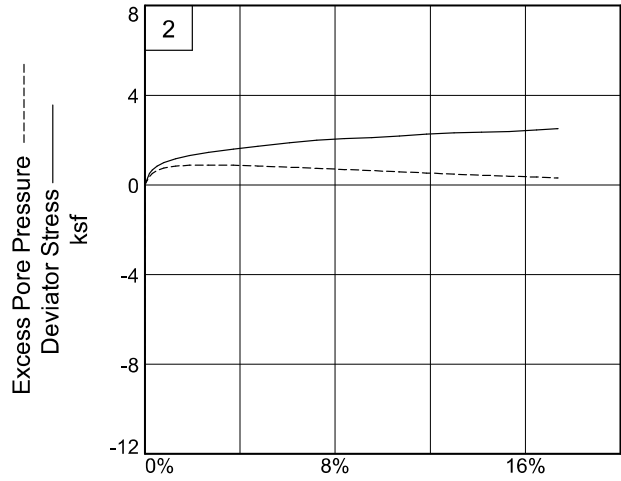
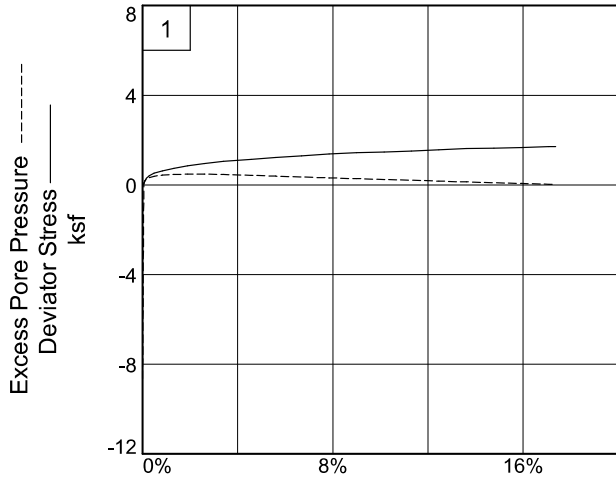
Location: B-17

Depth: 0-10 ft.

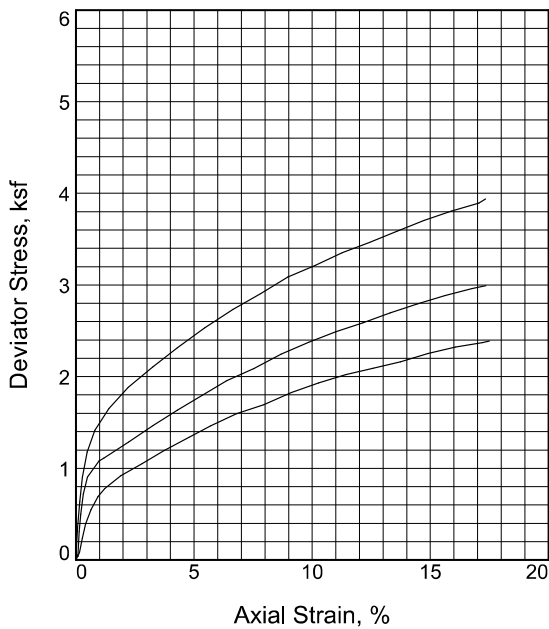
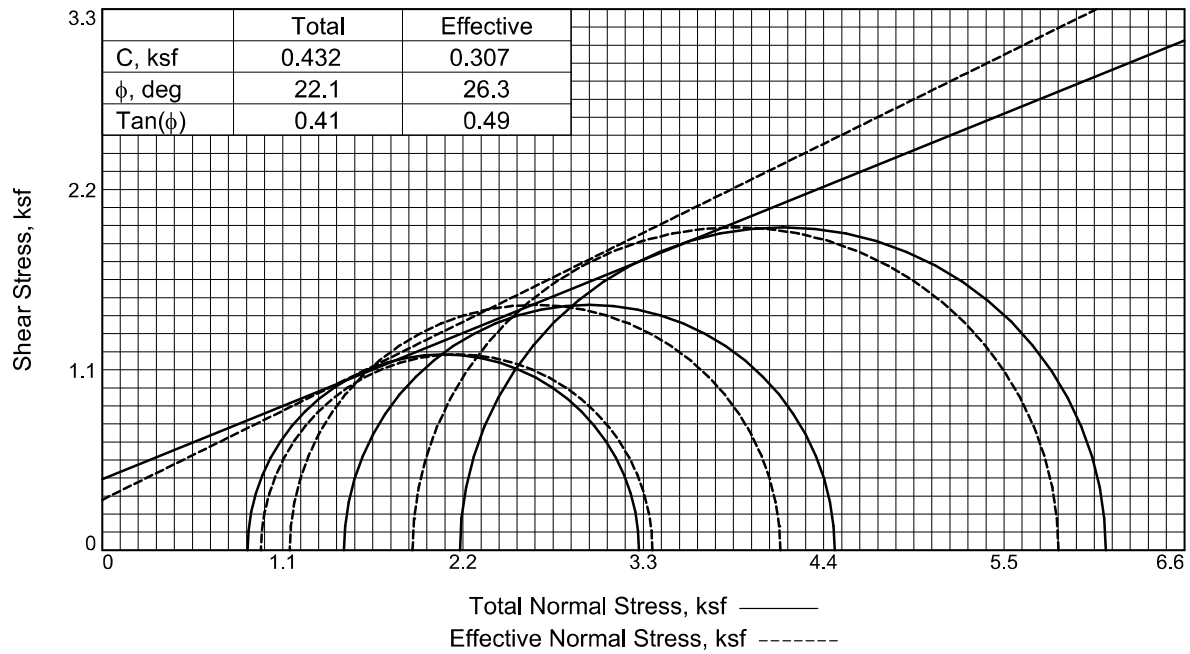
Proj. No.: 73155113

Date Sampled: 2-16-2016

TRIAXIAL SHEAR TEST REPORT
Terracon Consultants, Inc.
Houston, TX



Client: CDM Smith
Project: SC 72 Widening
Location: B-17 **Depth:** 0-10 ft.
Project No.: 73155113



Sample No.	1	2	3	
Initial	Water Content, %	12.5	12.5	12.5
	Dry Density, pcf	116.4	116.2	115.7
	Saturation, %	75.5	75.1	74.2
	Void Ratio	0.4486	0.4509	0.4564
	Diameter, in.	2.820	2.820	2.820
	Height, in.	5.590	5.590	5.590
At Test	Water Content, %	16.1	16.1	16.3
	Dry Density, pcf	116.4	116.2	115.7
	Saturation, %	96.7	96.4	96.7
	Void Ratio	0.4486	0.4509	0.4564
	Diameter, in.	3.057	3.055	3.055
	Height, in.	4.758	4.764	4.764
Strain rate, in./min.	0.000	0.000	0.000	
Back Pressure, psi	60.000	60.000	60.000	
Cell Pressure, psi	66.150	70.240	75.150	
Fail. Stress, ksf	2.388	2.993	3.939	
Excess Pore Pr., ksf	-0.082	0.331	0.289	
Ult. Stress, ksf				
Excess Pore Pr., ksf				
$\bar{\sigma}_1$ Failure, ksf	3.356	4.136	5.832	
$\bar{\sigma}_3$ Failure, ksf	0.968	1.143	1.892	

Type of Test:

CU with Pore Pressures

Sample Type: Laboratory molded

Description: Gray Clayey Sand

LL= 27 PL= 16 PI= 11

Assumed Specific Gravity= 2.7 Re-

marks: ASTM D4767

Client: CDM Smith

Project: SC 72 Widening

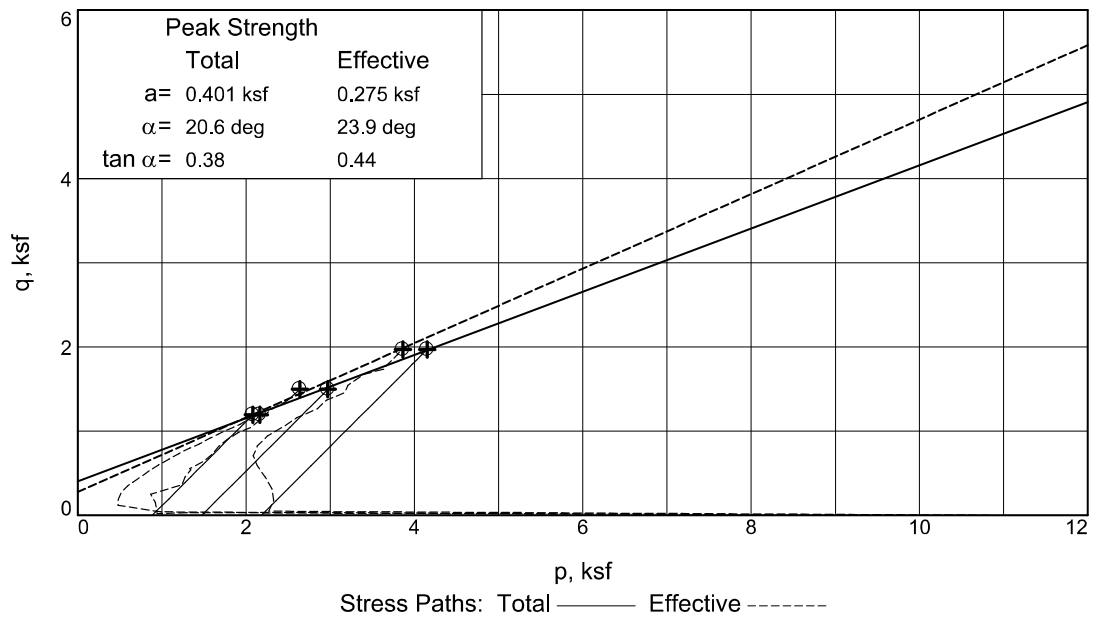
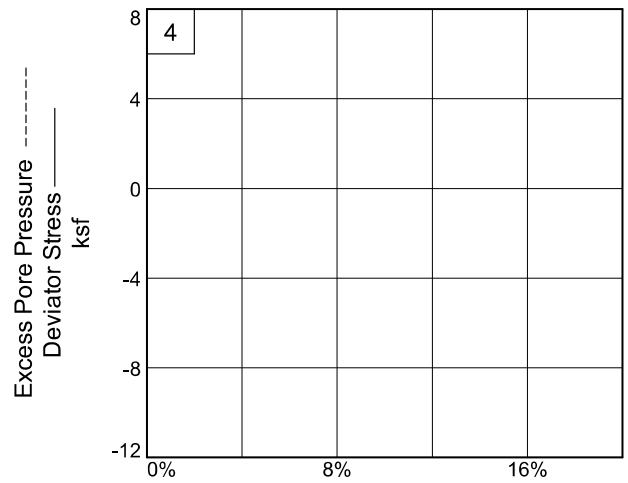
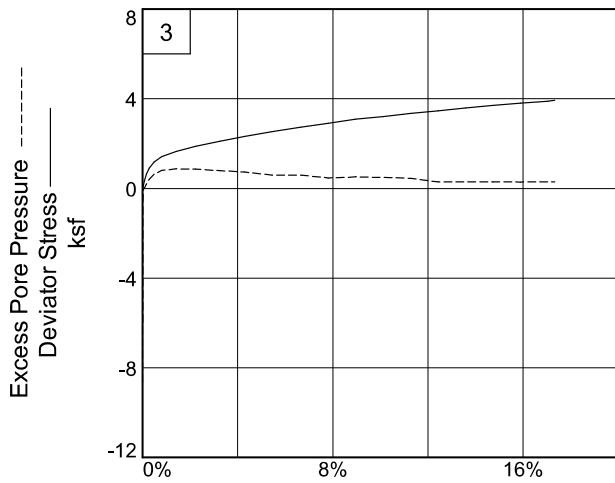
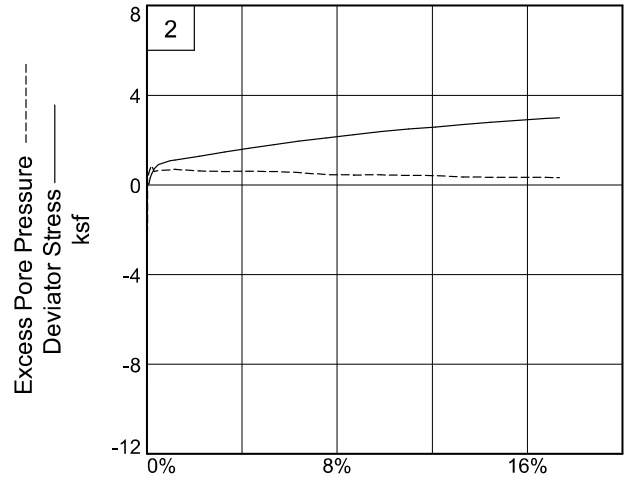
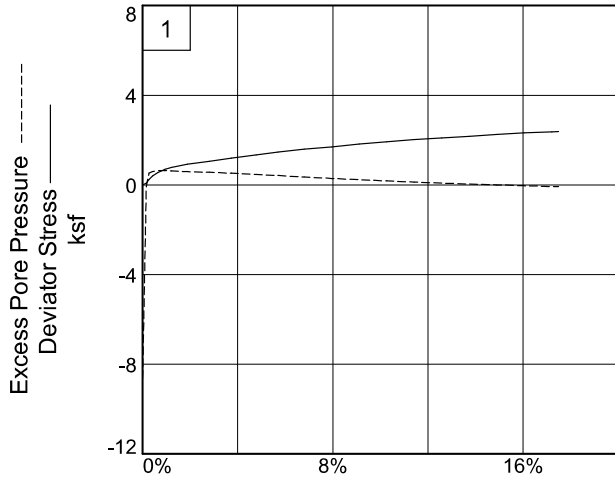
Location: B-20

Depth: 0-10 ft.

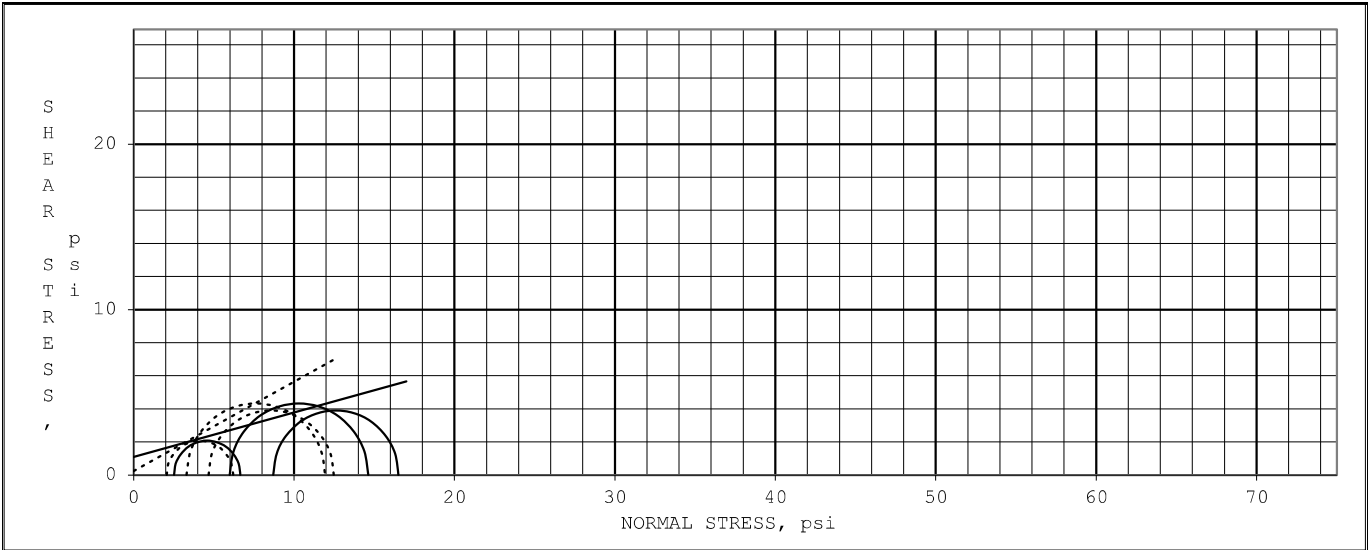
Proj. No.: 73155113

Date Sampled: 2-16-2016

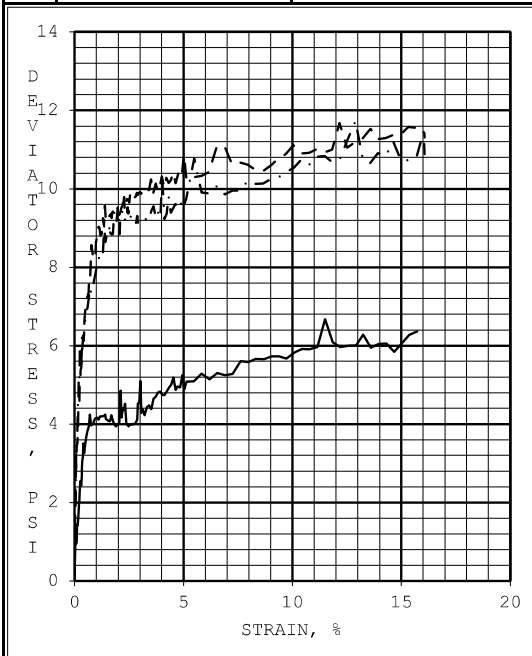
TRIAXIAL SHEAR TEST REPORT
 Terracon Consultants, Inc.
 Houston, TX



Client: CDM Smith
Project: SC 72 Widening
Location: B-20 **Depth:** 0-10 ft.
Project No.: 73155113



EFFECTIVE STRESS ---	ANGLE OF INTERNAL FRICTION, deg	28.3	COHESION, psi	0.2
TOTAL STRESS —	ANGLE OF INTERNAL FRICTION, deg	15.1	COHESION, psi	1.1



SPECIMEN ID:		A	B	C
INITIAL	WATER CONTENT, %	23.0	22.8	22.9
	DRY DENSITY, pcf	90.6	90.2	90.3
	SATURATION, %	72	71	71
	VOID RATIO	0.86	0.87	0.87
BEFORE SHEAR	WATER CONTENT, %	31.8	31.3	29.8
	DRY DENSITY, pcf	90.7	91.4	93.4
	SATURATION (B PARAMETER)	0.95	0.98	0.98
	VOID RATIO	0.86	0.84	0.80
	FINAL BACK PRESSURE, psi	99.7	99.1	99.6
MINOR PRINCIPAL STRESS, psi		2.5	6.0	8.7
EFFECTIVE STRESS PEAK AT % STRAIN		1.0	1.0	1.0
EFF. DEVIATOR STRESS AT PEAK STRAIN, psi		4.1	8.6	7.8
TOTAL STRESS PEAK AT % STRAIN		1.0	1.0	1.0
TOTAL DEVIATOR STRESS AT PEAK STRAIN, psi		4.1	8.6	7.8

CONTROLLED - STRAIN TEST		ULTIMATE DEVIATOR STRESS (15% STR), psi	6.0	11.4	10.7		
SAMPLE TYPE: RE-COMPACTED		TIME TO 50% PRIMARY CONSOLIDATION, min	1.20	0.47	0.34		
DESCRIPTION OF SPECIMENS: SANDY ELASTIC SILT		STRAIN RATE, % / hour	5.57	5.30	5.58		
		INITIAL DIAMETER, inch	2.000	2.005	2.004		
		INITIAL HEIGHT, inch	4.015	4.015	4.014		
LL 55	PL 34	PI 21	Gs 2.7 EST.	AREA AFTER CONSOLIDATION, inch ²	3.149	3.123	3.053
PROJECT NO. 73155113		PROJECT: SC 72					
		BORING #: B-25					
LABORATORY: TERRACON - LENEXA		SAMPLE #: Bulk					
DATE: 4/5/2016		DEPTH, feet: 0.0 - 6.0					

PROCEDURE: ASTM D4767, CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ON COHESIVE SOILS



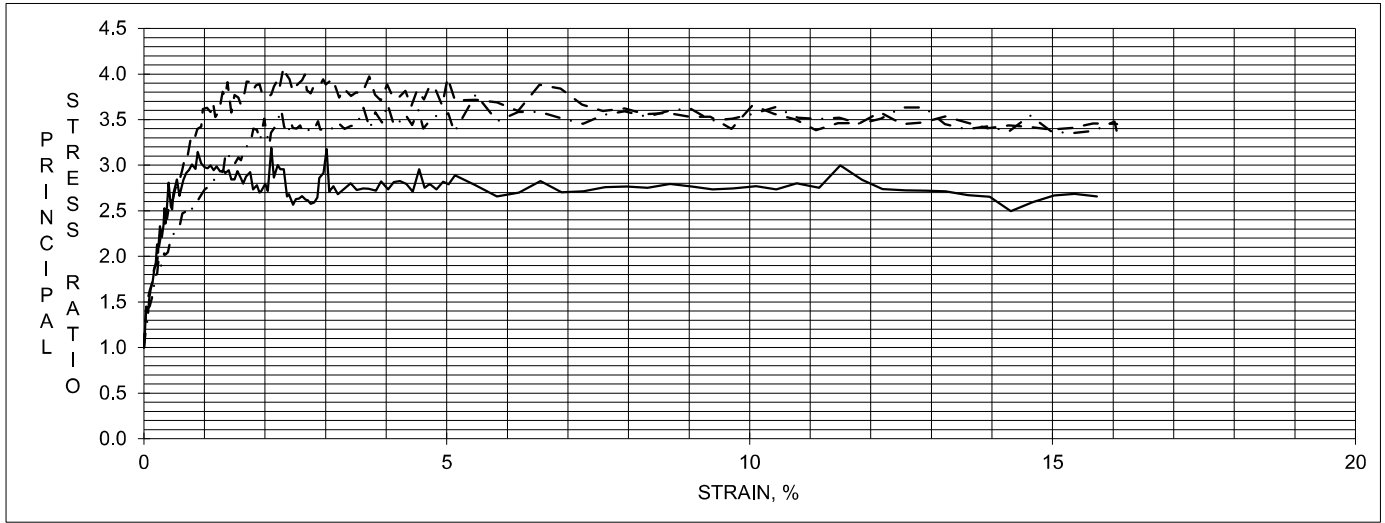
SC 72

73155113

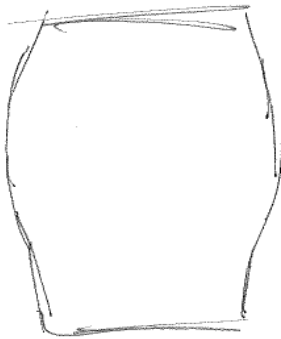
B-25

Bulk

0.0 - 6.0

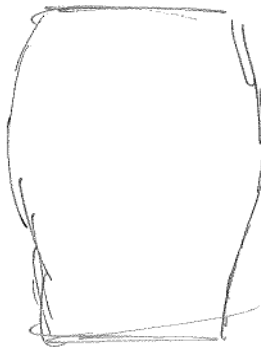


FAILURE SKETCH



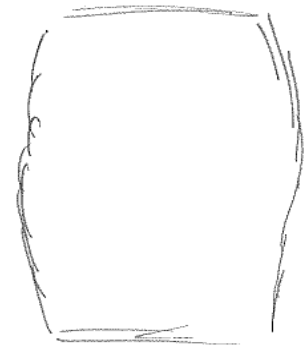
SPECIMEN A

FAILURE SKETCH



SPECIMEN B

FAILURE SKETCH



SPECIMEN C

REMARKS:

SPECIMENS SATURATED BY THE WET METHOD.
 EFFECTIVE STRESS FAILURE DATA BASED ON 1 % STRAIN.
 EFFECTIVE STRESS MOHR'S CIRCLES DRAWN AT 1 % STRAIN.
 TOTAL STRESS FAILURE DATA BASED ON 1 % STRAIN.
 TOTAL STRESS MOHR'S CIRCLES DRAWN AT 1 % STRAIN.
 DEVIATOR STRESSES CORRECTED FOR MEMBRANE AND FILTER PAPER EFFECTS.
 AREA AFTER CONSOLIDATION CALCULATED AS PER SECTION 10.3.2.1 METHOD A

STANDARD PROCTOR = 95.4pcf @ 22.5% MOISTURE

REMOLDED TO 90.4 pcf @ 22.9% MOISTURE

REMOLDED TO 94.7% COMPACTION



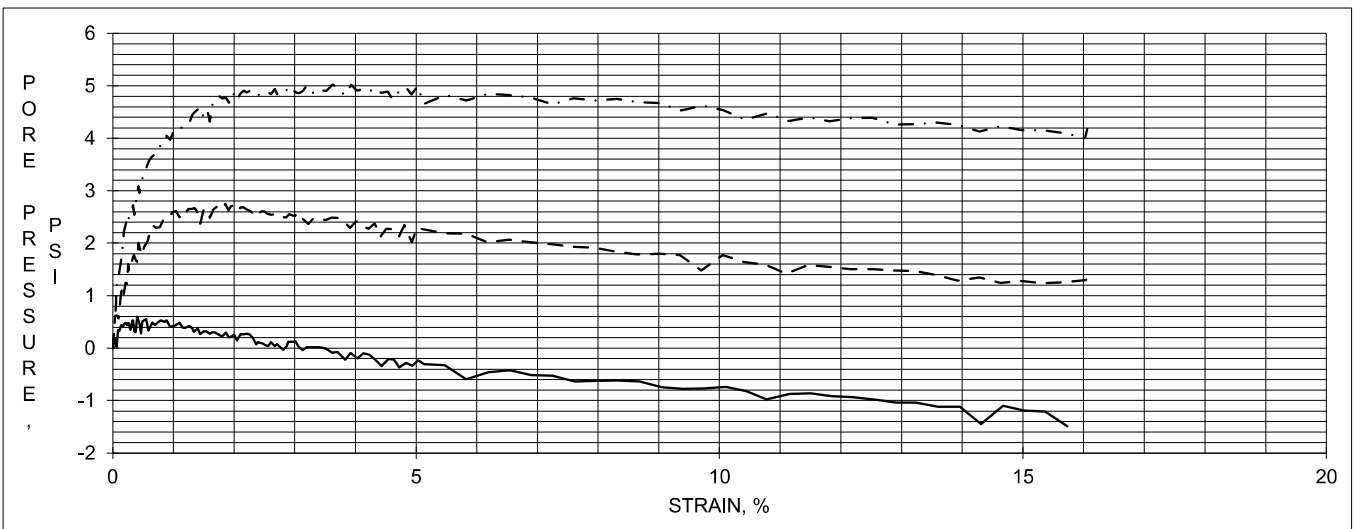
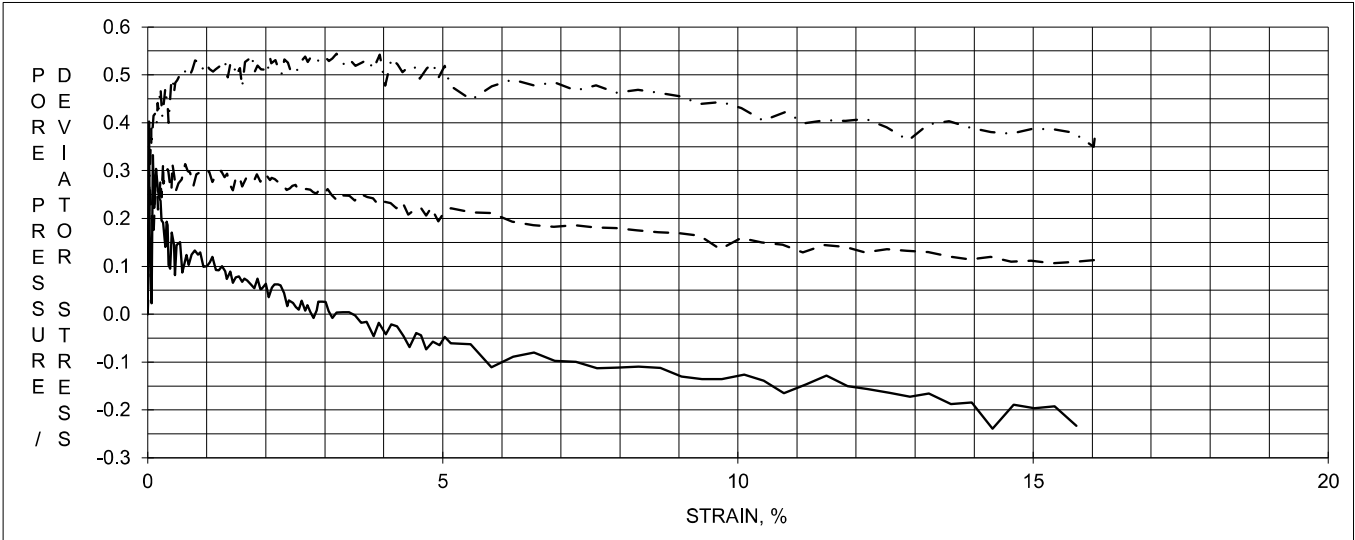
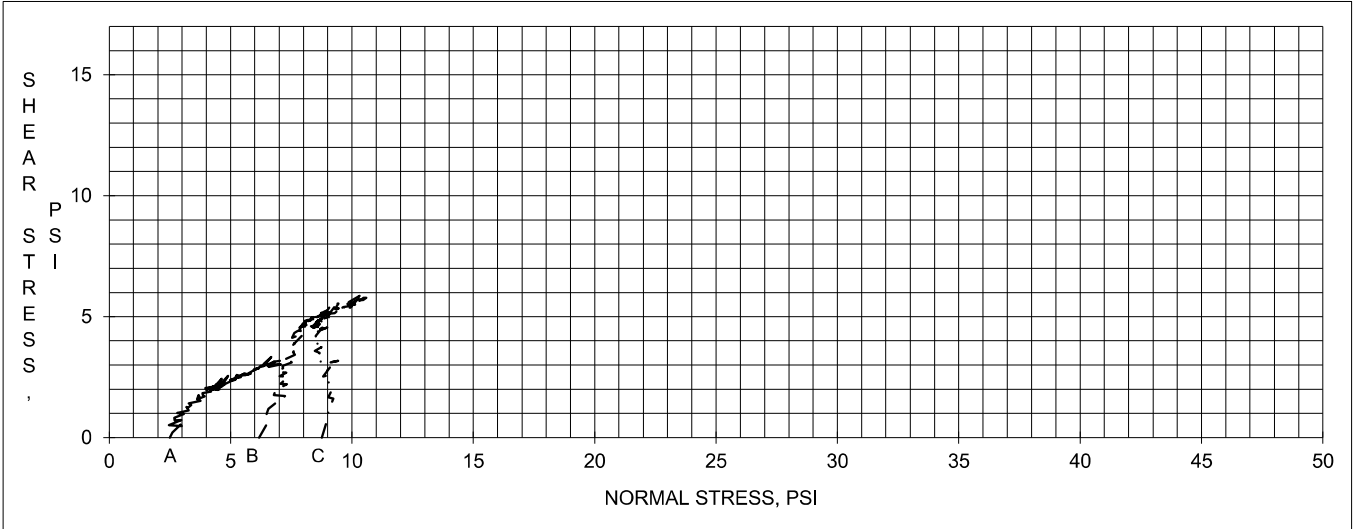
SC 72

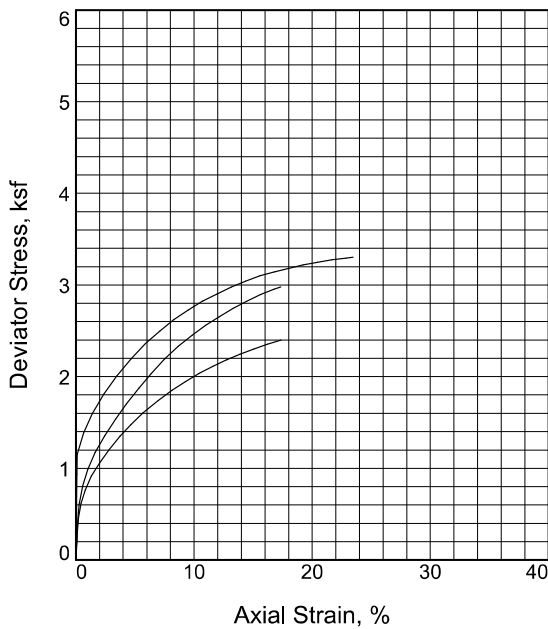
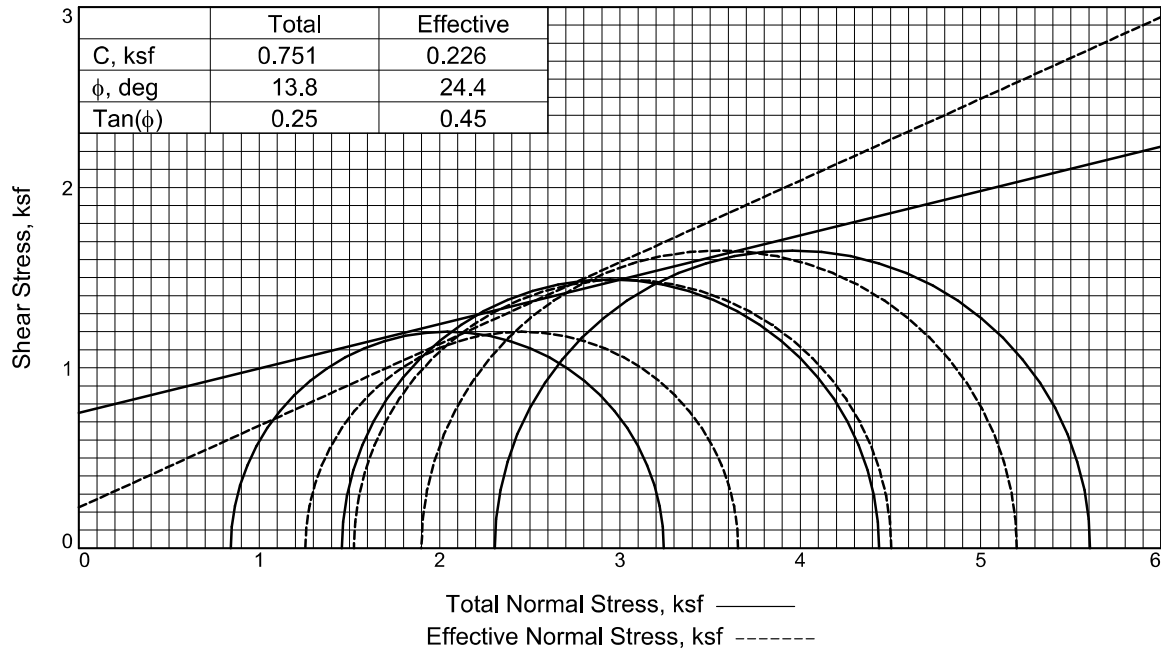
73155113

B-25

Bulk

0.0 - 6.0





Sample No.	1	2	3	
Initial	Water Content, %	17.9	17.9	17.9
	Dry Density, pcf	104.3	104.0	104.1
	Saturation, %	77.0	76.3	76.6
	Void Ratio	0.6333	0.6394	0.6365
	Diameter, in.	2.820	2.820	2.820
	Height, in.	5.590	5.590	5.590
At Test	Water Content, %	22.5	21.8	21.4
	Dry Density, pcf	104.3	104.0	104.1
	Saturation, %	97.1	92.9	92.0
	Void Ratio	0.6333	0.6394	0.6365
	Diameter, in.	3.055	3.055	3.133
	Height, in.	4.763	4.764	4.530
Strain rate, in./min.	0.000	0.000	0.000	
Back Pressure, psi	60.000	60.000	60.000	
Cell Pressure, psi	65.850	70.120	76.010	
Fail. Stress, ksf	2.400	2.979	3.301	
Excess Pore Pr., ksf	-0.413	-0.067	0.407	
Ult. Stress, ksf				
Excess Pore Pr., ksf				
$\bar{\sigma}_1$ Failure, ksf	3.655	4.504	5.200	
$\bar{\sigma}_3$ Failure, ksf	1.255	1.525	1.899	

Type of Test:

CU with Pore Pressures

Sample Type: Undisturbed

Description: Red Sandy Lean Clay

LL= 46

PL= 24

PI= 22

Assumed Specific Gravity= 2.73

Remarks: ASTM D4767

Client: CDM Smith

Project: SC 72 Widening

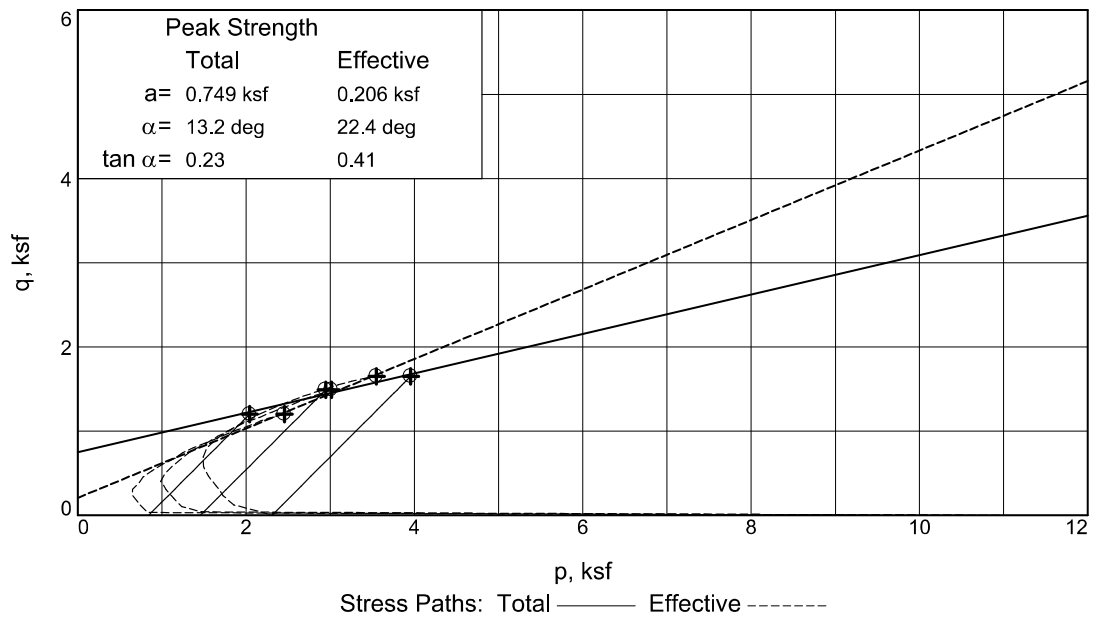
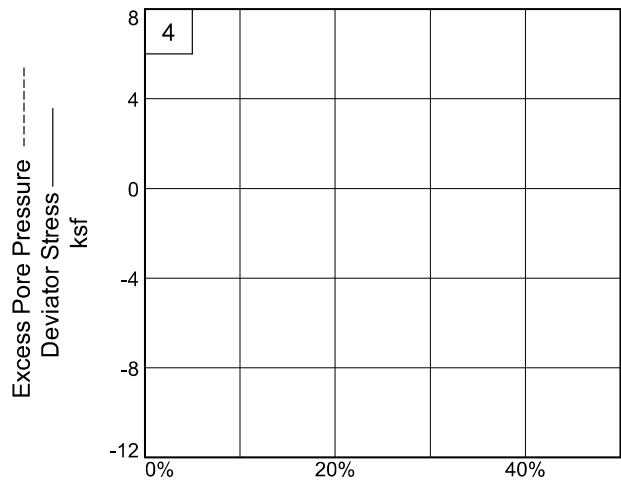
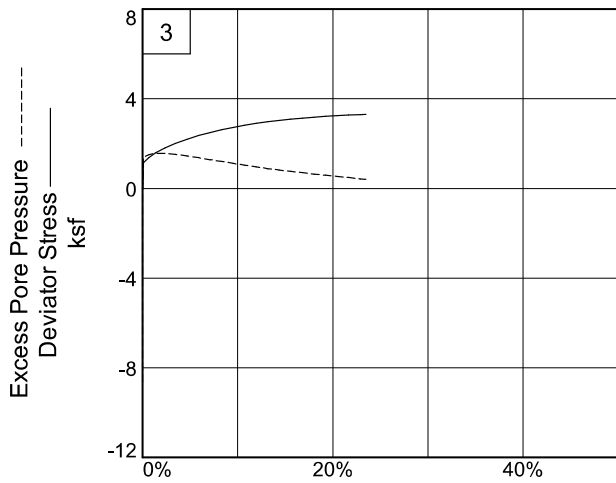
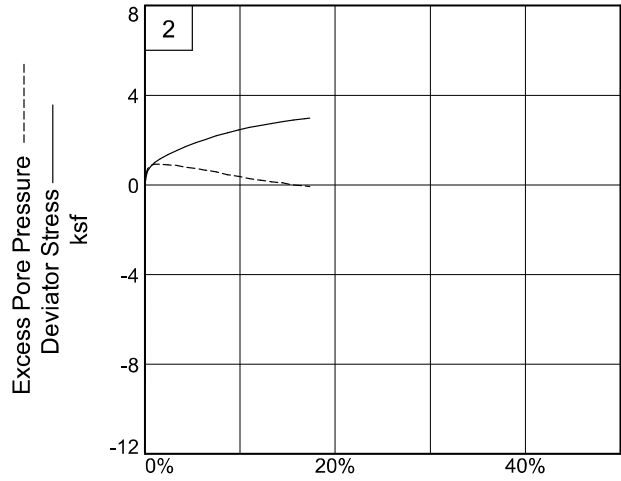
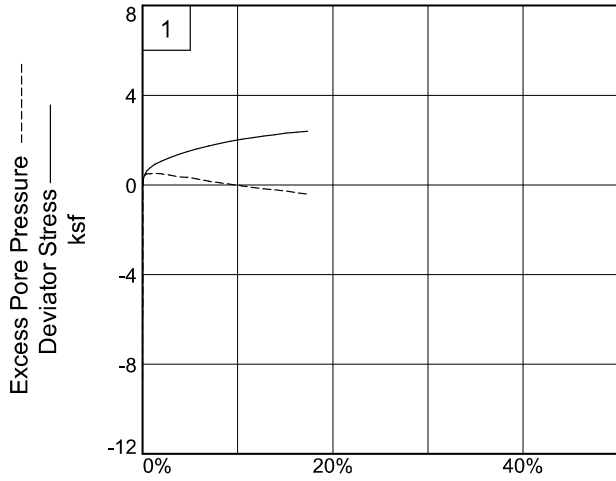
Location: B-28

Depth: 0-8 ft.

Proj. No.: 73155113

Date Sampled: 2-20-2016

TRIAXIAL SHEAR TEST REPORT
 Terracon Consultants, Inc.
 Houston, TX



Client: CDM Smith
Project: SC 72 Widening
Location: B-28 **Depth:** 0-8 ft.
Project No.: 73155113

Terracon Consultants, Inc.

April 28, 2020



CDM Smith
1441 Main Street, Suite 1000
Columbia, SC 29201

Attn: Mr. Tommy E. Evans, P.E

Re: Laboratory Testing Data
SC 72 Widening from Rambo Road to South of SC 901 – Phase 2
York County, SC
Terracon Project No. 73205009

Dear Mr. Evans:

Terracon has performed the requested laboratory testing program indicated by your electronic correspondences of April 10, 2020 and April 14, 2020, and telephone conversations within that timespan. The testing included:

- 12 – Atterberg Limits Tests
- 12 – Hydrometer Tests
- 18 – Grain Size Distribution
- 30 – Moisture Content
- 1 – Standard Proctor Test
- 1 – Direct Shear Test

If there are any questions regarding the results or if we can be of additional service, please contact us.

Sincerely,
Terracon Consultants, Inc.

Phillip A. Morrison, P.E.
Geotechnical Department Manager



Terracon Consultants, Inc. 521 Clemson Road Columbia, South Carolina 29229
P [803] 741 9000 F [803] 741 9900 terracon.com

APPENDIX B
LABORATORY TESTING

Laboratory Testing Description

Laboratory tests were conducted on selected soil samples and the test results are presented in this appendix. Selected bulk samples of the site soils were combined to make composite samples, and these composite samples were tested in the laboratory. Laboratory tests were performed in general accordance with the applicable SCDOT, ASTM, local or other accepted standards. Selected soil samples obtained from the site were tested for the following engineering properties:

■ Particle-Size Distribution (Gradation) of Soils	ASTM D6913
■ Hydrometer Analysis	ASTM D7928
■ Atterberg Limits	ASTM D4318
■ Moisture Content Determination	ASTM D2216
■ Compaction Characteristics of Soil using Standard Effort	ASTM D698
■ Direct Shear	ASTM D3080

SUMMARY OF LABORATORY RESULTS

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. SMART LAB SUMMARY-LANDSCAPE-A. 73205009 SC 72 WIDENING FR.GPJ TERRACON.DATATEMPLATE.GDT 4/24/20

BORING ID	Depth (Ft.)	Soil Classification USCS & AASHTO	Liquid Limit	Plastic Limit	Plasticity Index	% Fines	% Gravel	% Sand	% Silt	% Clay	Water Content (%)
B-33	0 - 2					69.3	3.0	27.7			27
B-33	2 - 4					83.4	0.1	16.5			29
B-33	4 - 6					82.7	0.4	16.9			30
B-33	6 - 8	ELASTIC SILT with SAND(MH) / A-7-5 (11)	54	42	12	71.2			30.7	40.5	32
B-33	8 - 10	ELASTIC SILT with SAND(MH) / A-7-5 (14)	53	41	12	82.4			41.7	40.7	36
B-33	13.5 - 15	ELASTIC SILT with SAND(MH) / A-7-5 (14)	55	40	15	75.7			29.2	46.5	35
B-33	18.5 - 20					73.2	0.7	26.1			38
B-33	23.5 - 25					65.2	0.0	34.8			32
B-33	28.5 - 30					61.7	0.0	38.3			35
B-34	1.5 - 3					50.9	15.9	33.3			20
B-34	3 - 4.5	SANDY LEAN CLAY(CL) / A-7-6 (13)	45	23	22	65.3			18.7	46.6	24
B-34	4.5 - 6	SANDY LEAN CLAY(CL) / A-7-6 (12)	42	22	20	65.7			22.2	43.5	22
B-35	0 - 2					65.0	0.7	34.3			21
B-35	2 - 4	FAT CLAY(CH) / A-7-5 (39)	67	31	36	92.0			24.0	68.0	33
B-35	4 - 6	ELASTIC SILT(MH) / A-7-5 (34)	65	33	32	90.4			32.1	58.3	31
B-38	1 - 2.5	SANDY LEAN CLAY(CL) / A-7-6 (18)	48	18	30	66.8			26.0	40.8	23
B-40	1 - 2.5	SANDY LEAN CLAY(CL) / A-7-6 (10)	43	19	24	55.9			17.1	38.8	30
B-41	0 - 2					48.9	0.5	50.6			17
B-41	2 - 4	SANDY FAT CLAY(CH) / A-7-6 (21)	57	25	32	67.4			13.9	53.6	27
B-41	4 - 6	ELASTIC SILT with SAND(MH) / A-7-5 (24)	59	31	28	77.7			22.5	55.2	28
B-42	1 - 2.5	SANDY FAT CLAY(CH) / A-7-6 (16)	55	29	26	64.4			20.2	44.2	23
B-42	2.5 - 4					59.7	2.2	38.1			24
B-42	4 - 6					59.2	0.4	40.4			31
B-42	6 - 8					59.2	0.0	40.8			36
HA-37	0 - 1					64.6	2.7	32.7			24
HA-37	1 - 2					60.0	0.9	39.0			22
HA-37	2 - 3					58.8	1.6	39.6			21
HA-37	3 - 4					62.9	0.3	36.8			27

PROJECT: SC 72 Widening from Rambo Road to South of SC 901	 521 Clemson Rd Columbia, SC	PROJECT NUMBER: 73205009
SITE: SC 72 York County, SC		CLIENT: CDM Smith Inc. Columbia, SC
PH. 803-741-9000 FAX. 803-741-9900		

SUMMARY OF LABORATORY RESULTS

BORING ID	Depth (Ft.)	Soil Classification USCS & AASHTO	Liquid Limit	Plastic Limit	Plasticity Index	% Fines	% Gravel	% Sand	% Silt	% Clay	Water Content (%)
HA-37	4 - 5					63.6	0.1	36.3			28
HA-37	5 - 6					62.2	0.2	37.6			27

PROJECT: SC 72 Widening from Rambo Road to South of SC 901

SITE: SC 72
York County, SC



PH. 803-741-9000

FAX. 803-741-9900

PROJECT NUMBER: 73205009

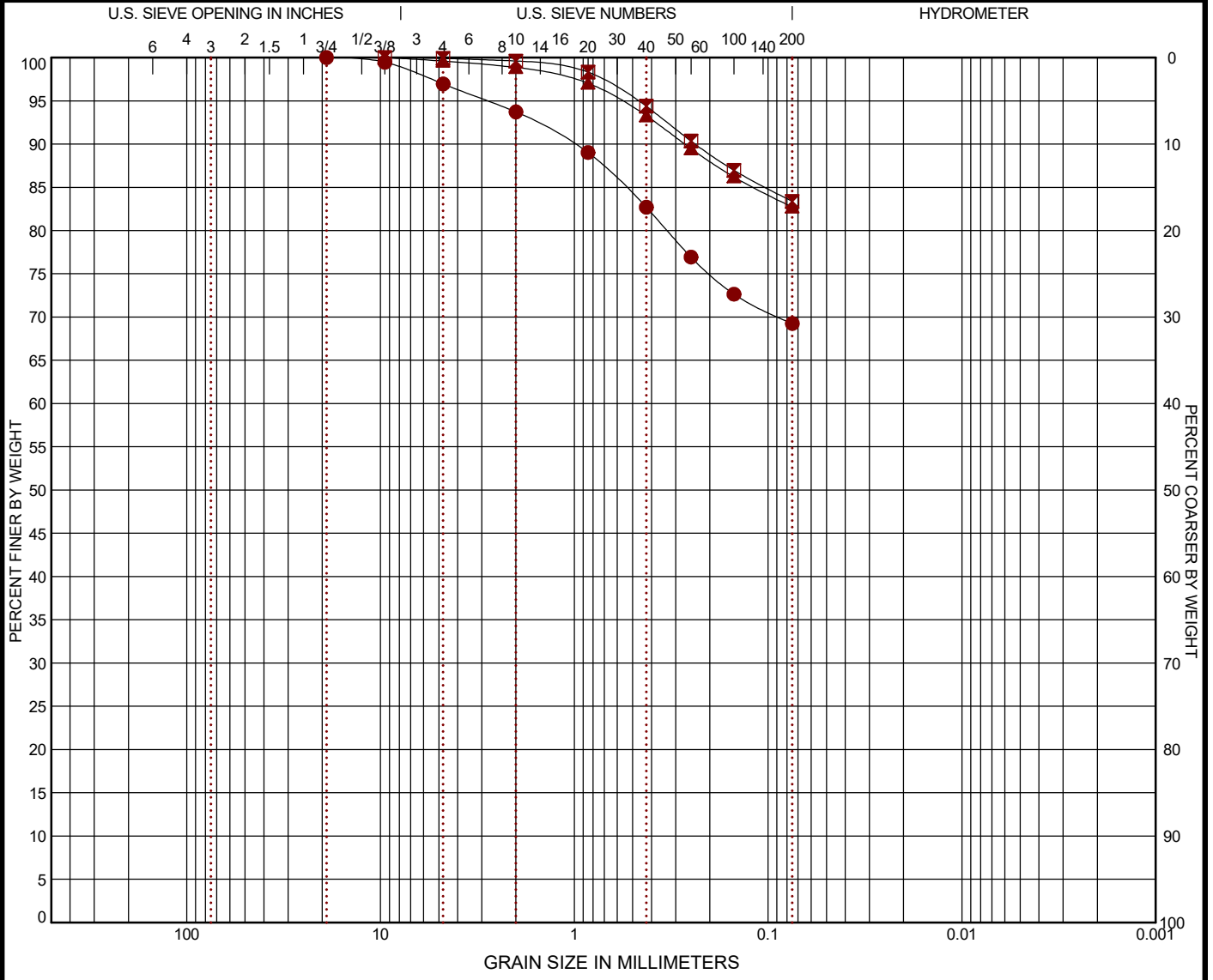
CLIENT: CDM Smith Inc.
Columbia, SC

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. SMART LAB SUMMARY-LANDSCAPE-A. 73205009 SC 72 WIDENING FR.GPJ TERRACON.DATATEMPLATE.GDT 4/24/20

GRAIN SIZE DISTRIBUTION

ASTM D6913 / ASTM D7928

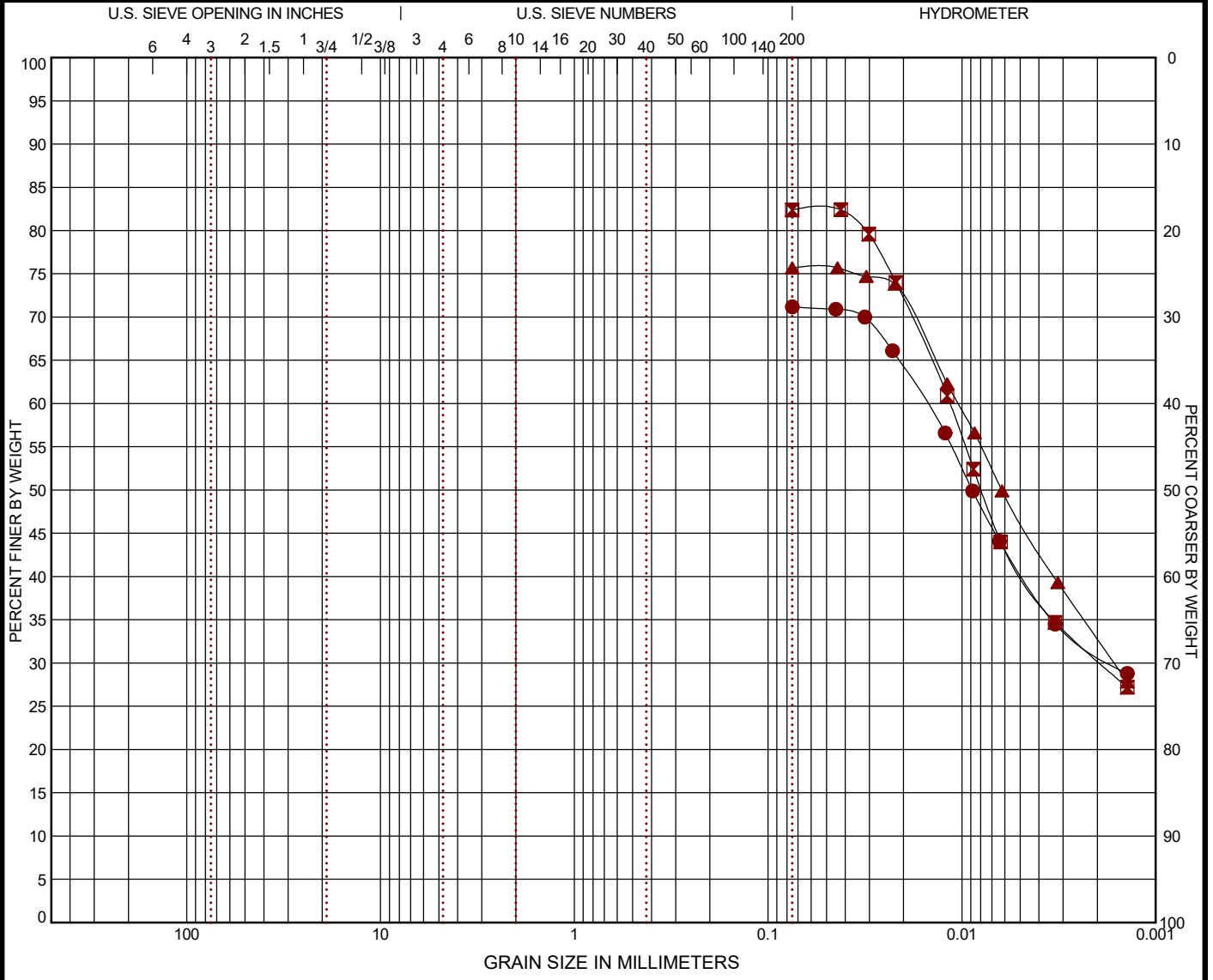
LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: AASHTO DESC-1 73205009 SC 72 WIDENING FR.GPJ TERRACON_DATATEMPLATE.GDT 4/24/20



GRAIN SIZE DISTRIBUTION

ASTM D6913 / ASTM D7928

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: AASHTO DESC-1 73205009 SC 72 WIDENING FR.GPJ TERRACON_DATATEMPLATE.GDT 4/24/20



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BORING ID	DEPTH	% COBBLES	% GRAVEL	% SAND	% SILT	% FINES	% CLAY	USCS
B-33	6 - 8				30.7		40.5	MH
B-33	8 - 10				41.7		40.7	MH
B-33	13.5 - 15				29.2		46.5	MH

GRAIN SIZE	B-33 (6-8 ft)		B-33 (8-10 ft)		B-33 (13.5-15 ft)	
	Sieve	% Finer	Sieve	% Finer	Sieve	% Finer
D ₆₀	0.015	71.18	0.012	82.38	0.01	75.68
D ₃₀	0.002		0.002		0.002	
D ₁₀						
COEFFICIENTS						
C _c						
C _u						

SOIL DESCRIPTION

- A-7-5 (11)
- ☒ A-7-5 (14)
- ▲ A-7-5 (14)

REMARKS

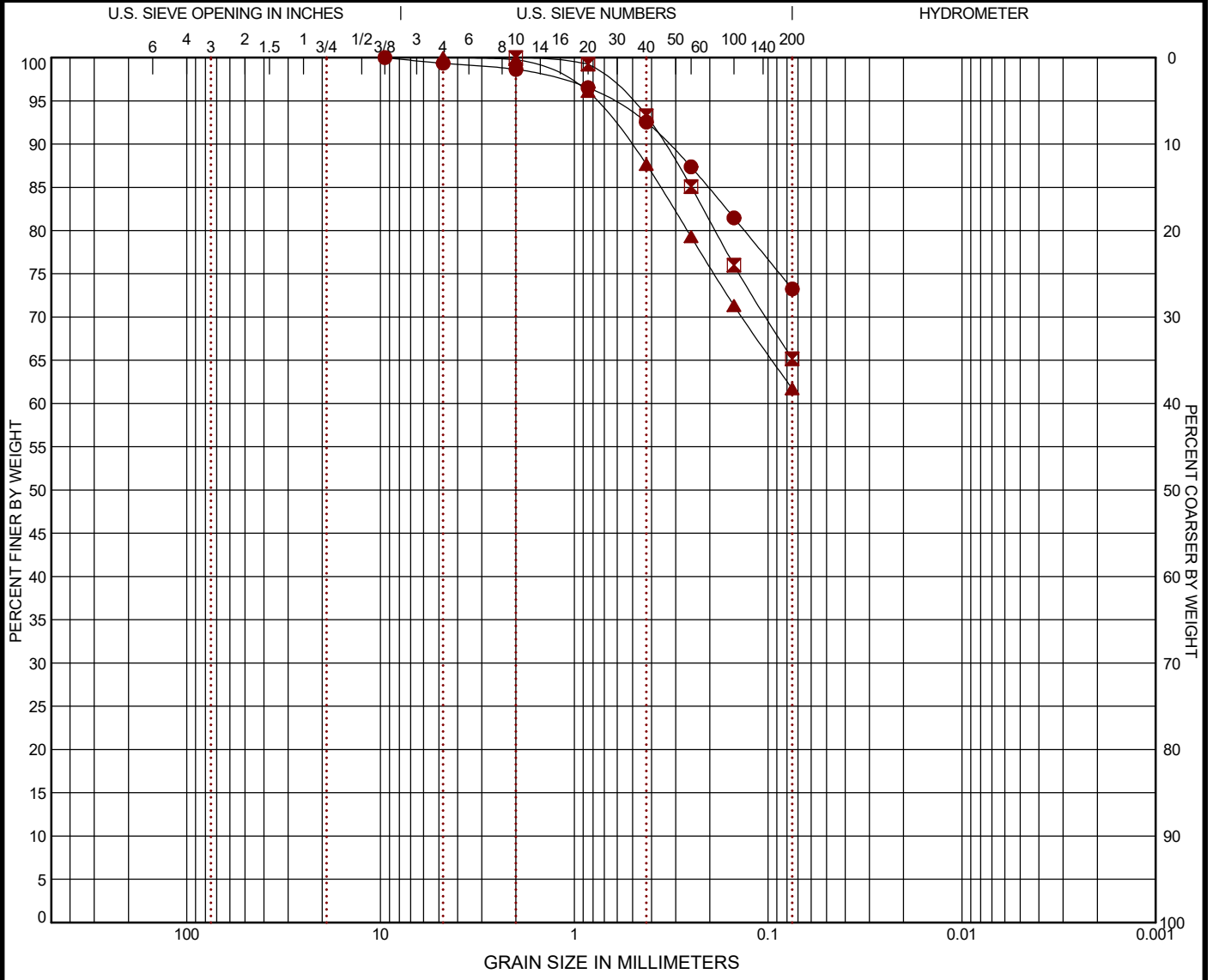
-
- ☒
- ▲

PROJECT: SC 72 Widening from Rambo Road to South of SC 901 SITE: SC 72 York County, SC	521 Clemson Rd Columbia, SC	PROJECT NUMBER: 73205009 CLIENT: CDM Smith Inc. Columbia, SC
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GRAIN SIZE DISTRIBUTION

ASTM D6913 / ASTM D7928

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: AASHTO DESC-1 73205009 SC 72 WIDENING FR.GPJ TERRACON_DATATEMPLATE.GDT 4/24/20



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BORING ID	DEPTH	% COBBLES	% GRAVEL	% SAND	% SILT	% FINES	% CLAY	USCS
●	B-33	18.5 - 20	0.0	0.7	26.1		73.2		
☒	B-33	23.5 - 25	0.0	0.0	34.8		65.2		
▲	B-33	28.5 - 30	0.0	0.0	38.3		61.7		

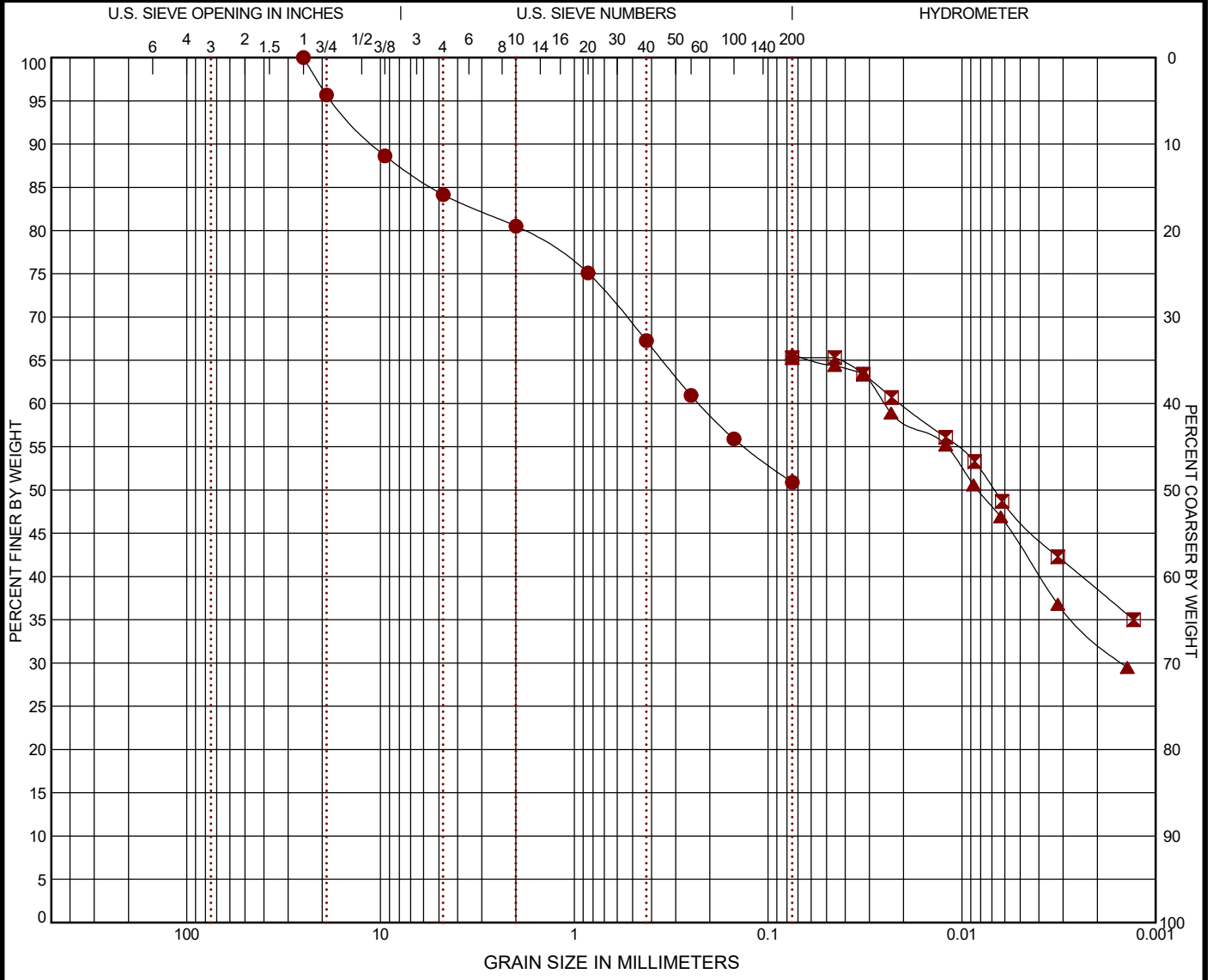
GRAIN SIZE		●		☒		▲		SOIL DESCRIPTION
		Sieve	% Finer	Sieve	% Finer	Sieve	% Finer	
☒		3/8"	100.0	#10	100.0	#4	100.0	● ☒ ▲ REMARKS ● ☒ ▲
●		#4	99.34	#20	99.23	#10	99.75	
●		#10	98.63	#40	93.28	#20	96.08	
☒		#20	96.53	#60	85.09	#40	87.65	
●		#40	92.54	#100	76.01	#60	79.3	
●		#60	87.36	#200	65.17	#100	71.33	
●		#100	81.46			#200	61.71	
●		#200	73.24					
COEFFICIENTS								
☒		C _c						
☒		C _u						

PROJECT: SC 72 Widening from Rambo Road to South of SC 901	<p>521 Clemson Rd Columbia, SC</p>	PROJECT NUMBER: 73205009 CLIENT: CDM Smith Inc. Columbia, SC
SITE: SC 72 York County, SC		

GRAIN SIZE DISTRIBUTION

ASTM D6913 / ASTM D7928

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: AASHTO DESC-1 73205009 SC 72 WIDENING FR.GPJ TERRACON_DATATEMPLATE.GDT 4/24/20



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BORING ID	DEPTH	% COBBLES	% GRAVEL	% SAND	% SILT	% FINES	% CLAY	USCS
● B-34	1.5 - 3	0.0	15.9	33.3		50.9		
☒ B-34	3 - 4.5				18.7		46.6	CL
▲ B-34	4.5 - 6				22.2		43.5	CL

GRAIN SIZE			
	●	☒	▲
D ₆₀	0.227	0.021	0.025
D ₃₀			0.001
D ₁₀			
COEFFICIENTS			
C _c			
C _u			

Sieve	% Finer	Sieve	% Finer	Sieve	% Finer
1"	100.0	#200	65.32	#200	65.7
3/4"	95.67				
3/8"	88.63				
#4	84.14				
#10	80.51				
#20	75.1				
#40	67.27				
#60	60.94				
#100	55.91				
#200	50.89				

SOIL DESCRIPTION

- A-7-6 (13)
- ☒ A-7-6 (13)
- ▲ A-7-6 (12)

REMARKS

-
- ☒
- ▲

PROJECT: SC 72 Widening from Rambo Road to South of SC 901

SITE: SC 72
York County, SC



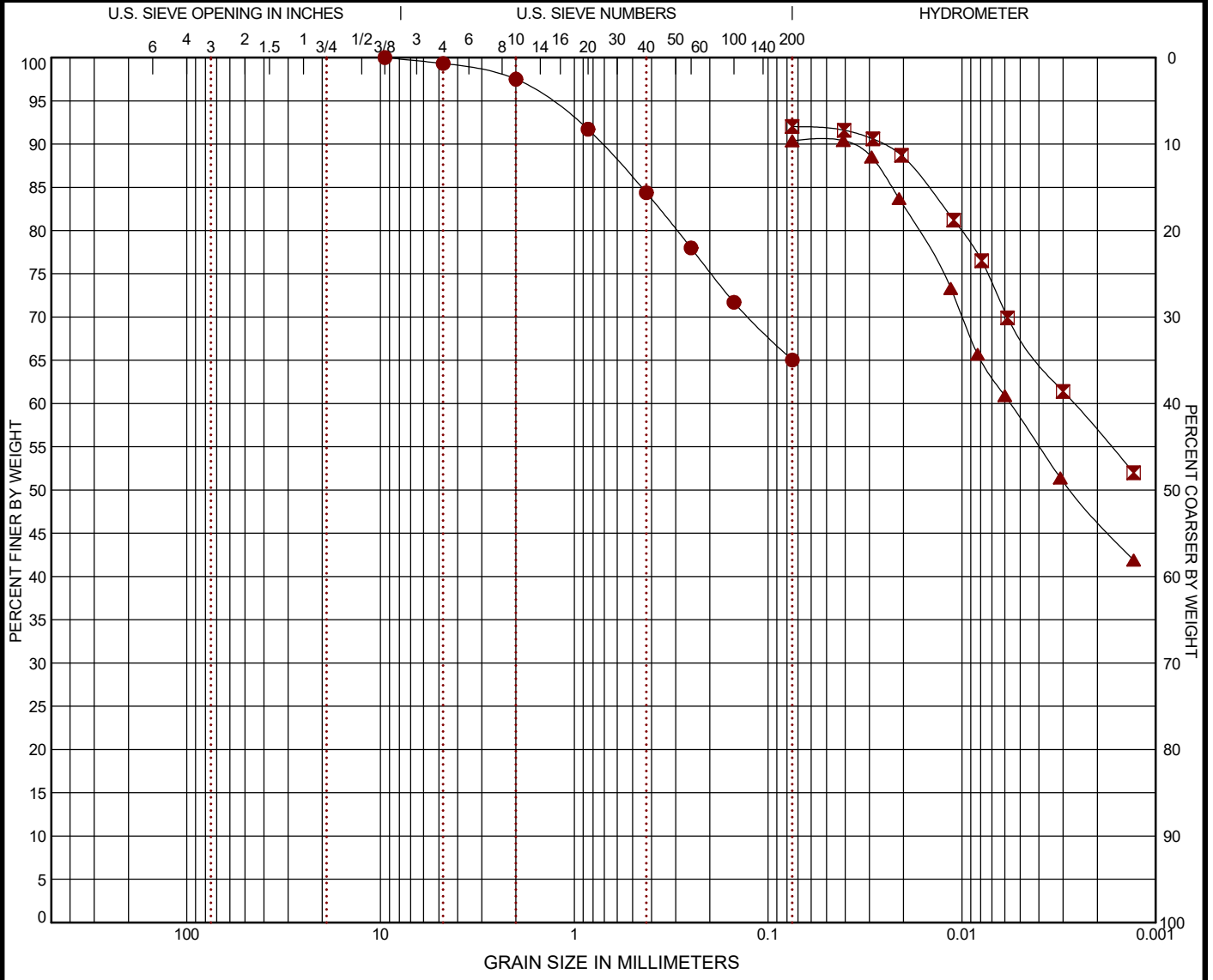
PROJECT NUMBER: 73205009

CLIENT: CDM Smith Inc.
Columbia, SC

GRAIN SIZE DISTRIBUTION

ASTM D6913 / ASTM D7928

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: AASHTO DESC-1 73205009 SC 72 WIDENING FR.GPJ TERRACON_DATATEMPLATE.GDT 4/24/20



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BORING ID	DEPTH	% COBBLES	% GRAVEL	% SAND	% SILT	% FINES	% CLAY	USCS
B-35	0 - 2	0.0	0.7	34.3		65.0		
B-35	2 - 4				24.0		68.0	CH
B-35	4 - 6				32.1		58.3	MH

GRAIN SIZE				SOIL DESCRIPTION	
Sieve	% Finer	Sieve	% Finer	Sieve	% Finer
3/8"	100.0	#200	92.02	#200	90.38
#4	99.32				
#10	97.49				
#20	91.71				
#40	84.38				
#60	77.99				
#100	71.71				
#200	65.03				

GRAIN SIZE			
Symbol	Grain Size (mm)	Grain Size (mm)	Grain Size (mm)
●			
☒	0.003		
▲		0.006	

COEFFICIENTS			
Symbol	C _c	C _u	
●			
☒			
▲			

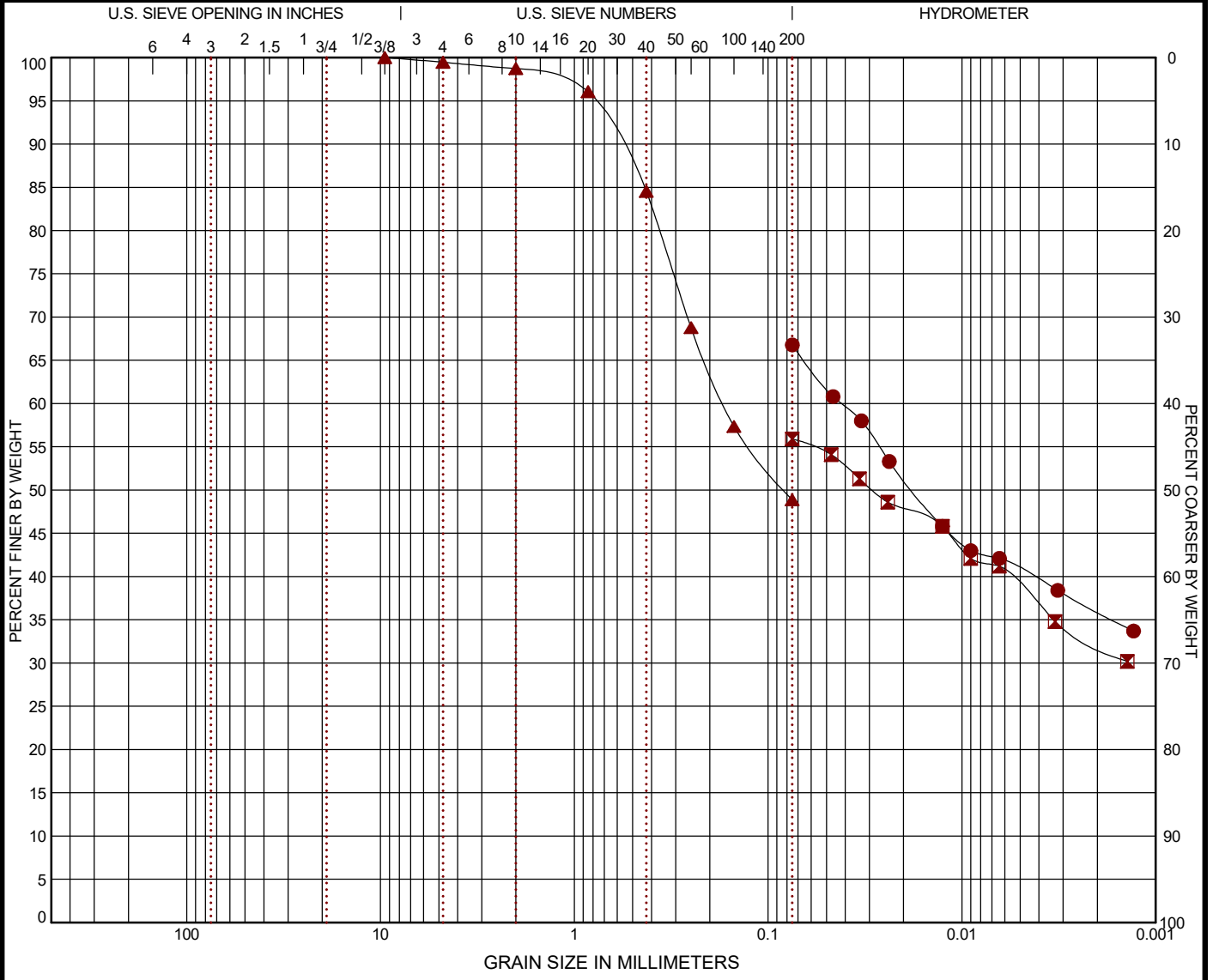
REMARKS
●
☒
▲

PROJECT: SC 72 Widening from Rambo Road to South of SC 901	 <p>521 Clemson Rd Columbia, SC</p>	PROJECT NUMBER: 73205009
SITE: SC 72 York County, SC		CLIENT: CDM Smith Inc. Columbia, SC

GRAIN SIZE DISTRIBUTION

ASTM D6913 / ASTM D7928

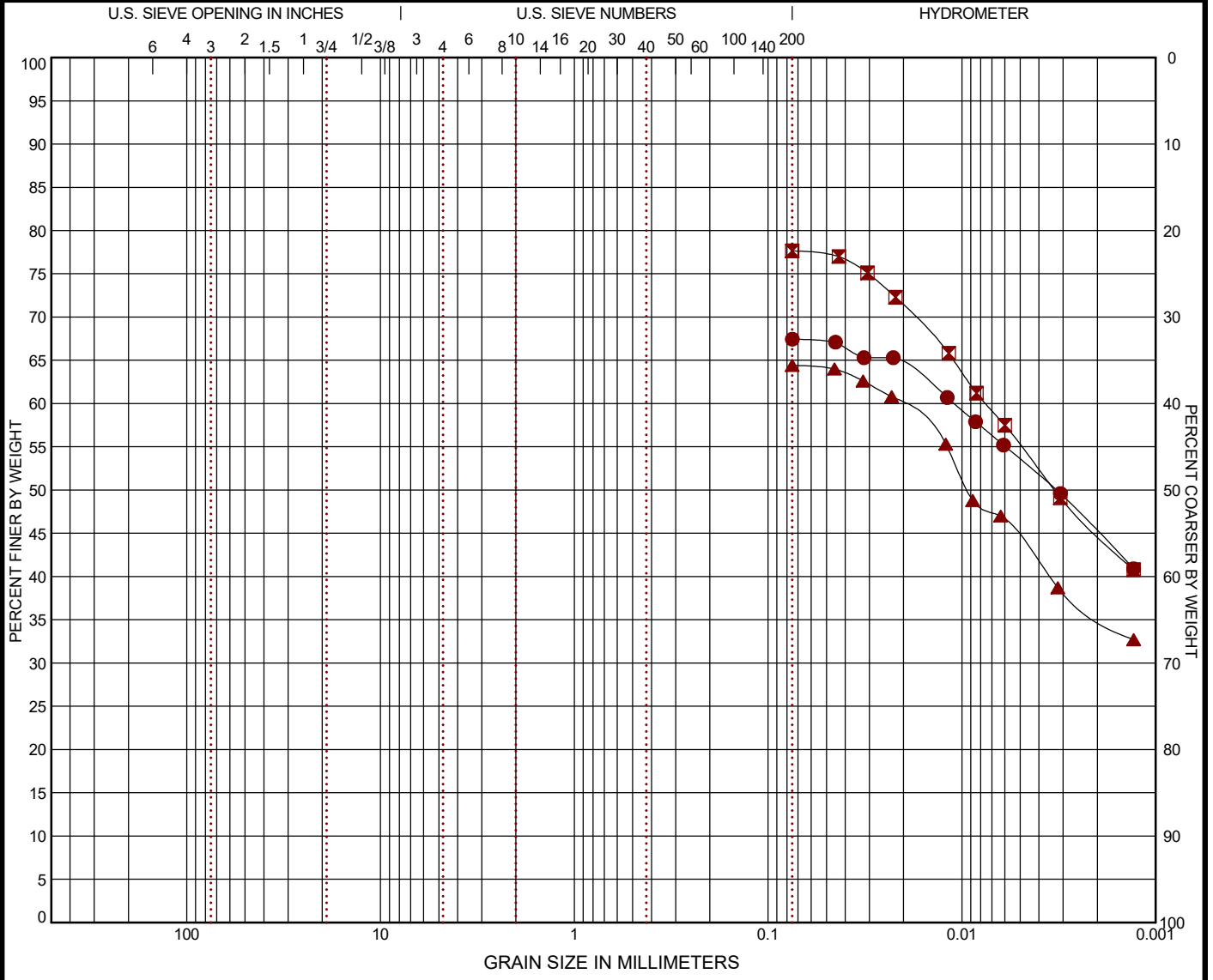
LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: AASHTO DESC-1 73205009 SC 72 WIDENING FR.GPJ TERRACON_DATATEMPLATE.GDT 4/24/20



GRAIN SIZE DISTRIBUTION

ASTM D6913 / ASTM D7928

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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BORING ID	DEPTH	% COBBLES	% GRAVEL	% SAND	% SILT	% FINES	% CLAY	USCS
●	B-41	2 - 4				13.9		53.6	CH
⊠	B-41	4 - 6				22.5		55.2	MH
▲	B-42	1 - 2.5				20.2		44.2	CH

GRAIN SIZE			
	●	⊠	▲
D ₆₀	0.011	0.008	0.021
D ₃₀			
D ₁₀			
COEFFICIENTS			
C _c			
C _u			

●		⊠		▲	
Sieve	% Finer	Sieve	% Finer	Sieve	% Finer
#200	67.44	#200	77.65	#200	64.41

SOIL DESCRIPTION

- A-7-6 (21)
- ⊠ A-7-5 (24)
- ▲ A-7-6 (16)

REMARKS

-
- ⊠
- ▲

PROJECT: SC 72 Widening from Rambo Road to South of SC 901

SITE: SC 72
York County, SC



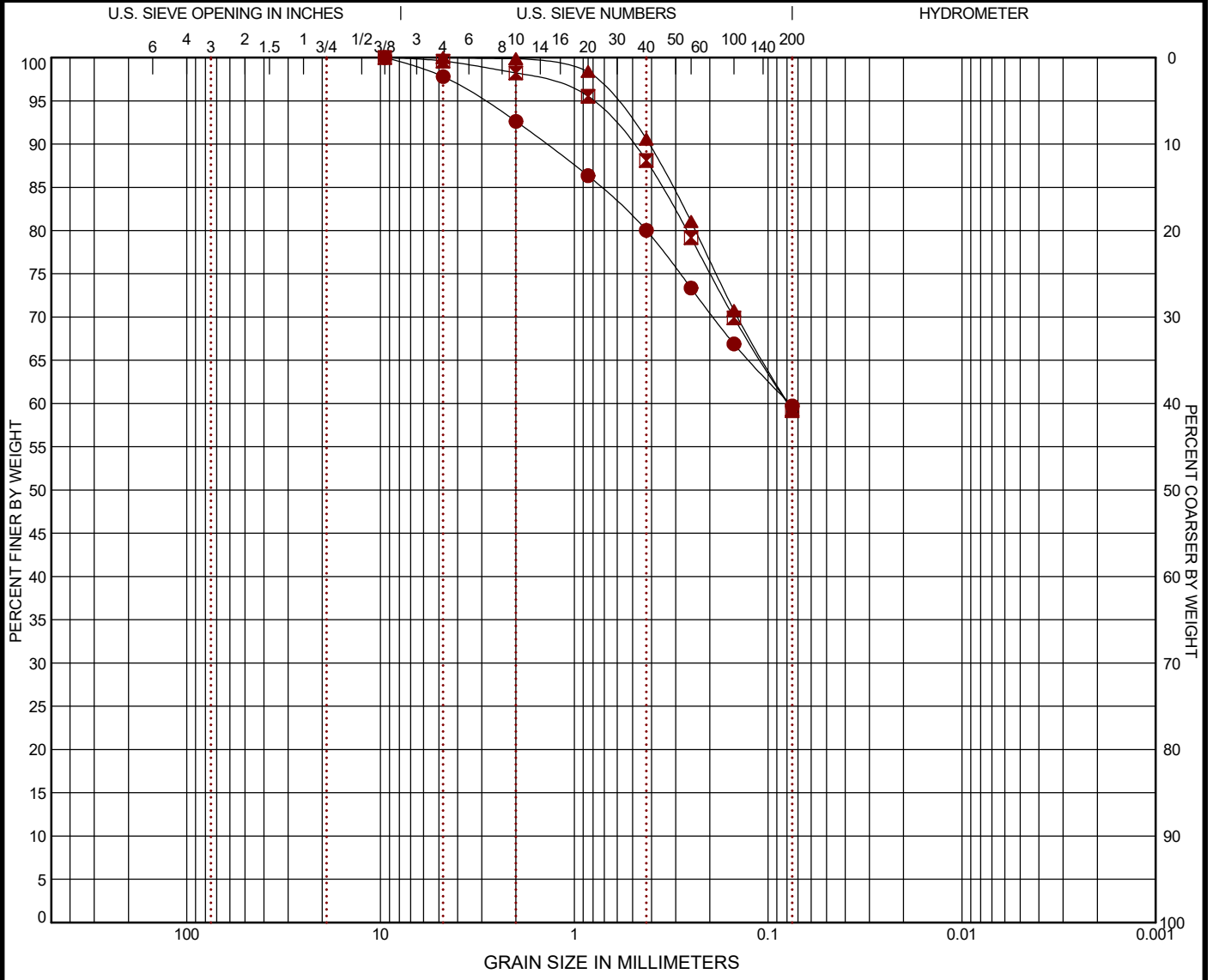
PROJECT NUMBER: 73205009

CLIENT: CDM Smith Inc.
Columbia, SC

GRAIN SIZE DISTRIBUTION

ASTM D6913 / ASTM D7928

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: AASHTO DESC-1 73205009 SC 72 WIDENING FR.GPJ TERRACON_DATATEMPLATE.GDT 4/24/20



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BORING ID	DEPTH	% COBBLES	% GRAVEL	% SAND	% SILT	% FINES	% CLAY	USCS
●	B-42	2.5 - 4	0.0	2.2	38.1		59.7		
⊠	B-42	4 - 6	0.0	0.4	40.4		59.2		
▲	B-42	6 - 8	0.0	0.0	40.8		59.2		

GRAIN SIZE				SOIL DESCRIPTION					
				Sieve	% Finer	Sieve	% Finer	Sieve	% Finer
●	⊠	▲		3/8"	100.0	3/8"	100.0	#4	100.0
				#4	97.79	#4	99.6	#10	99.88
				#10	92.62	#10	98.22	#20	98.4
				#20	86.35	#20	95.54	#40	90.57
				#40	80.02	#40	88.09	#60	81.05
				#60	73.36	#60	79.16	#100	70.76
				#100	66.89	#100	69.92	#200	59.24
				#200	59.72	#200	59.17		

COEFFICIENTS			
D ₆₀	0.077	0.079	0.079
D ₃₀			
D ₁₀			
C _c			
C _u			

SOIL DESCRIPTION

●

⊠

▲

REMARKS

●

⊠

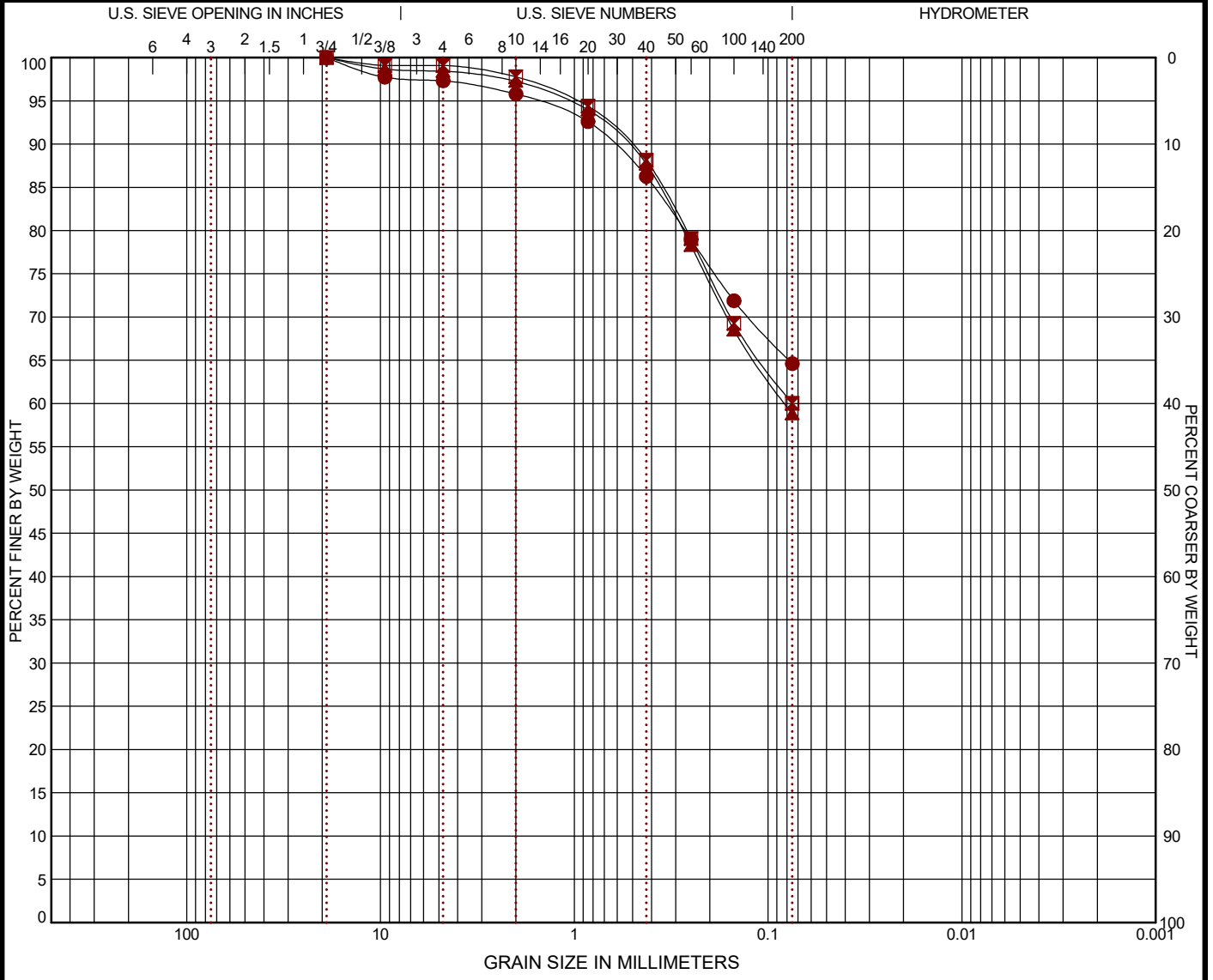
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PROJECT: SC 72 Widening from Rambo Road to South of SC 901	<p>521 Clemson Rd Columbia, SC</p>	PROJECT NUMBER: 73205009
SITE: SC 72 York County, SC		CLIENT: CDM Smith Inc. Columbia, SC

GRAIN SIZE DISTRIBUTION

ASTM D6913 / ASTM D7928

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: AASHTO DESC-1 73205009 SC 72 WIDENING FR.GPJ TERRACON_DATATEMPLATE.GDT 4/24/20



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BORING ID	DEPTH	% COBBLES	% GRAVEL	% SAND	% SILT	% FINES	% CLAY	USCS
● HA-37	0 - 1	0.0	2.7	32.7		64.6		
☒ HA-37	1 - 2	0.0	0.9	39.0		60.0		
▲ HA-37	2 - 3	0.0	1.6	39.6		58.8		

GRAIN SIZE				SOIL DESCRIPTION			
Sieve	% Finer	Sieve	% Finer	Sieve	% Finer		
3/4"	100.0	3/4"	100.0	3/4"	100.0	●	
3/8"	97.72	3/8"	99.08	3/8"	98.66	☒	
#4	97.31	#4	99.08	#4	98.41	▲	
#10	95.78	#10	97.77	#10	97.25		
#20	92.6	#20	94.39	#20	93.95		
#40	86.26	#40	88.14	#40	87.69		
#60	78.99	#60	79.08	#60	78.29		
#100	71.88	#100	69.26	#100	68.5		
#200	64.61	#200	60.03	#200	58.8		

COEFFICIENTS			
C _c			
C _u			

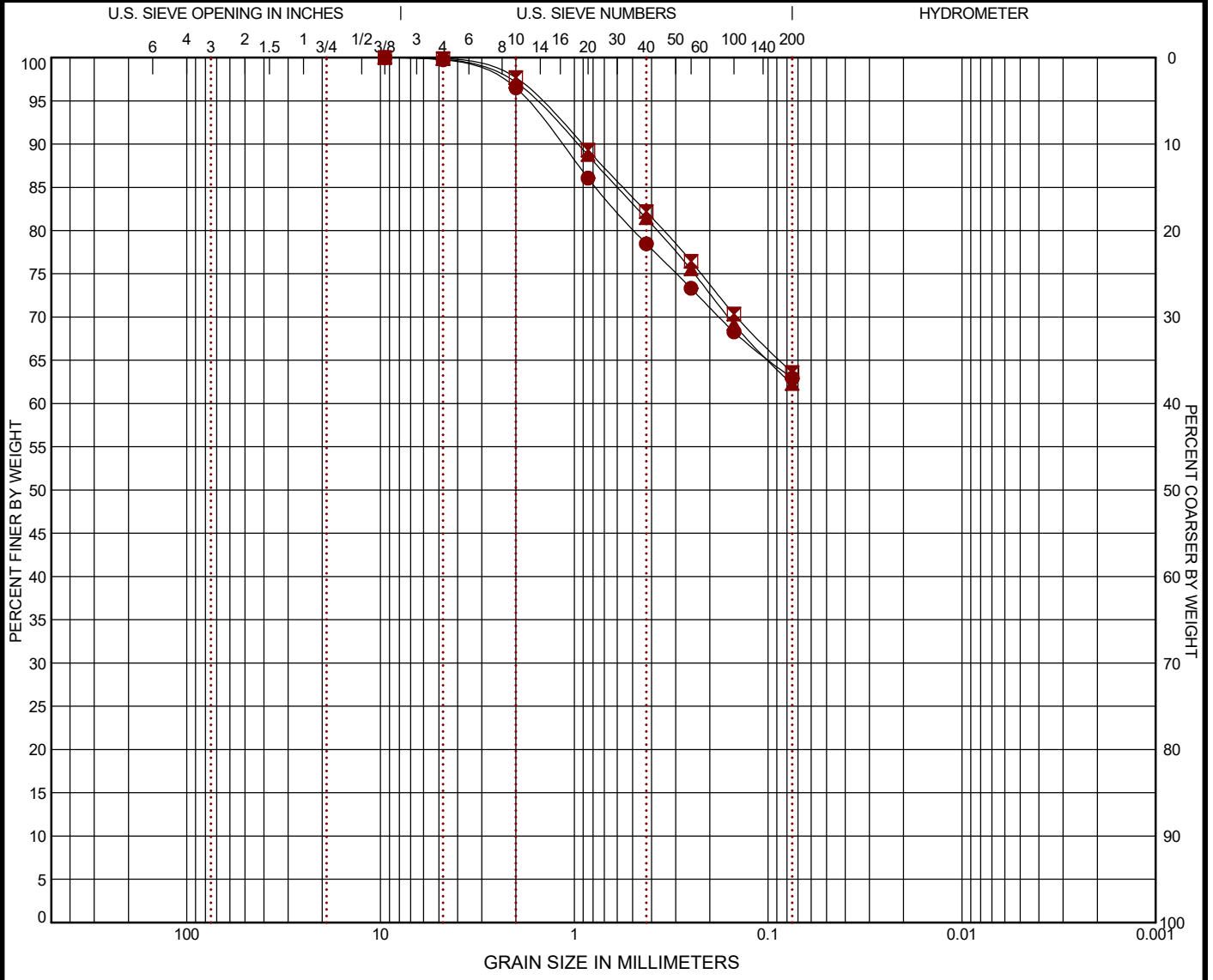
REMARKS	
●	
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▲	

PROJECT: SC 72 Widening from Rambo Road to South of SC 901	 <p>521 Clemson Rd Columbia, SC</p>	PROJECT NUMBER: 73205009
SITE: SC 72 York County, SC		CLIENT: CDM Smith Inc. Columbia, SC

GRAIN SIZE DISTRIBUTION

ASTM D6913 / ASTM D7928

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: AASHTO DESC-1 73205009 SC 72 WIDENING FR.GPJ TERRACON_DATATEMPLATE.GDT 4/24/20



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BORING ID	DEPTH	% COBBLES	% GRAVEL	% SAND	% SILT	% FINES	% CLAY	USCS
● HA-37	3 - 4	0.0	0.3	36.8		62.9		
☒ HA-37	4 - 5	0.0	0.1	36.3		63.6		
▲ HA-37	5 - 6	0.0	0.2	37.6		62.2		

<table border="1" style="width: 100%;"> <tr><th colspan="2">GRAIN SIZE</th></tr> <tr><td style="text-align: center;">●</td><td style="text-align: center;">☒</td></tr> <tr><td style="text-align: center;">▲</td><td></td></tr> <tr><td>D₆₀</td><td></td></tr> <tr><td>D₃₀</td><td></td></tr> <tr><td>D₁₀</td><td></td></tr> <tr><th colspan="2">COEFFICIENTS</th></tr> <tr><td>C_c</td><td></td></tr> <tr><td>C_u</td><td></td></tr> </table>	GRAIN SIZE		●	☒	▲		D ₆₀		D ₃₀		D ₁₀		COEFFICIENTS		C _c		C _u		<table border="1" style="width: 100%;"> <thead> <tr> <th>Sieve</th> <th>% Finer</th> <th>Sieve</th> <th>% Finer</th> <th>Sieve</th> <th>% Finer</th> </tr> </thead> <tbody> <tr><td>3/8"</td><td>100.0</td><td>3/8"</td><td>100.0</td><td>3/8"</td><td>100.0</td></tr> <tr><td>#4</td><td>99.74</td><td>#4</td><td>99.87</td><td>#4</td><td>99.8</td></tr> <tr><td>#10</td><td>96.5</td><td>#10</td><td>97.67</td><td>#10</td><td>97.14</td></tr> <tr><td>#20</td><td>86.06</td><td>#20</td><td>89.31</td><td>#20</td><td>88.7</td></tr> <tr><td>#40</td><td>78.47</td><td>#40</td><td>82.18</td><td>#40</td><td>81.39</td></tr> <tr><td>#60</td><td>73.33</td><td>#60</td><td>76.45</td><td>#60</td><td>75.49</td></tr> <tr><td>#100</td><td>68.28</td><td>#100</td><td>70.35</td><td>#100</td><td>69.16</td></tr> <tr><td>#200</td><td>62.93</td><td>#200</td><td>63.57</td><td>#200</td><td>62.2</td></tr> </tbody> </table>	Sieve	% Finer	Sieve	% Finer	Sieve	% Finer	3/8"	100.0	3/8"	100.0	3/8"	100.0	#4	99.74	#4	99.87	#4	99.8	#10	96.5	#10	97.67	#10	97.14	#20	86.06	#20	89.31	#20	88.7	#40	78.47	#40	82.18	#40	81.39	#60	73.33	#60	76.45	#60	75.49	#100	68.28	#100	70.35	#100	69.16	#200	62.93	#200	63.57	#200	62.2	<p>SOIL DESCRIPTION</p> <p>●</p> <p>☒</p> <p>▲</p> <hr/> <p>REMARKS</p> <p>●</p> <p>☒</p> <p>▲</p>
GRAIN SIZE																																																																										
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#10	96.5	#10	97.67	#10	97.14																																																																					
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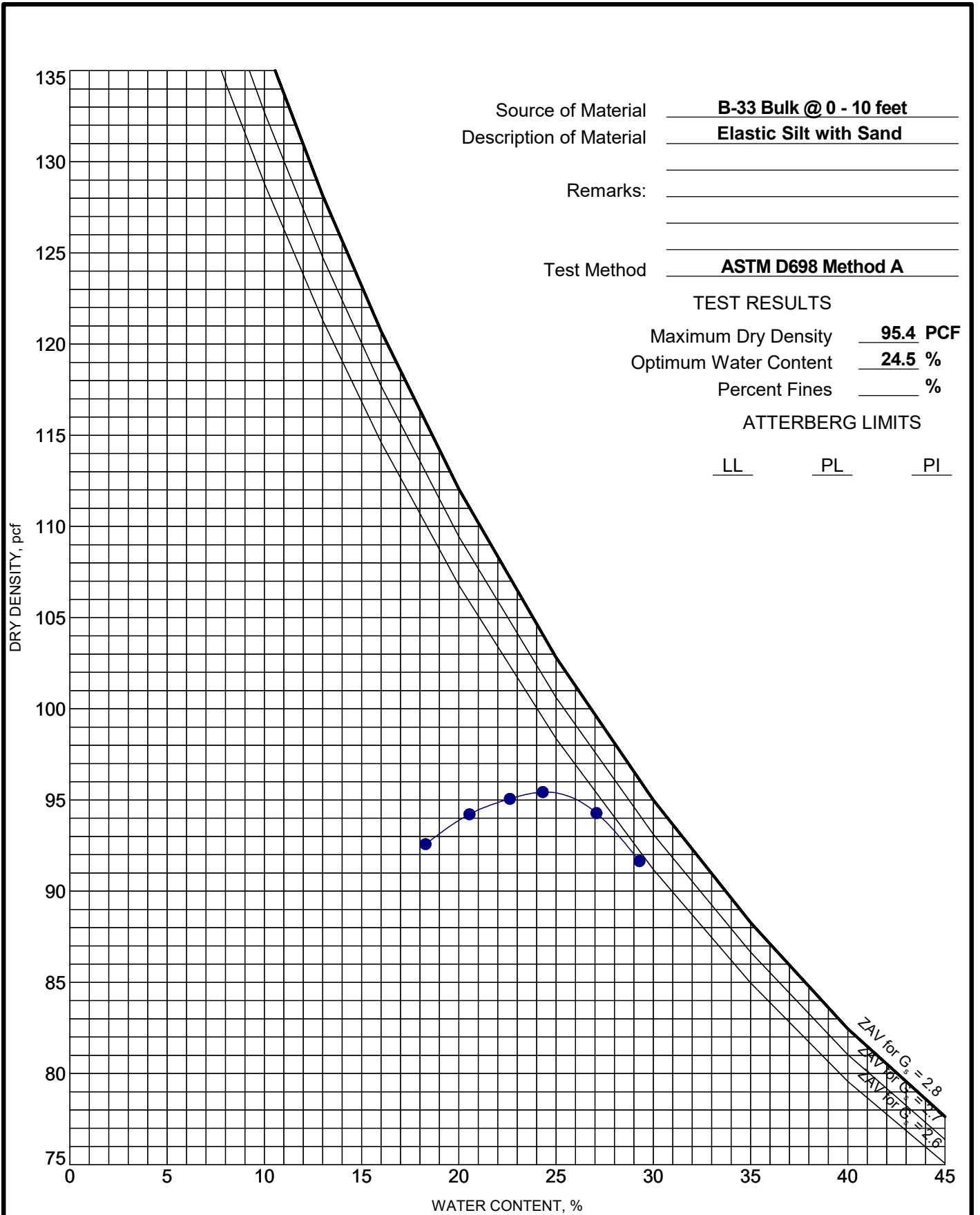
PROJECT: SC 72 Widening from Rambo Road to South of SC 901 SITE: SC 72 York County, SC	<p>521 Clemson Rd Columbia, SC</p>	PROJECT NUMBER: 73205009 CLIENT: CDM Smith Inc. Columbia, SC
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MOISTURE-DENSITY RELATIONSHIP

C-51

ASTM D698/D1557

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. COMPACTION - V2 73205009 SC 72 WIDENING FR.GPJ TERRACON_DATATEMPLATE.GDT 4/24/20



Source of Material B-33 Bulk @ 0 - 10 feet
 Description of Material Elastic Silt with Sand
 Remarks: _____
 Test Method ASTM D698 Method A

PROJECT: SC 72 Widening from Rambo
 Road to South of SC 901
 SITE: SC 72
 York County, SC



PROJECT NUMBER: 73205009
 CLIENT: CDM Smith Inc.
 Columbia, SC

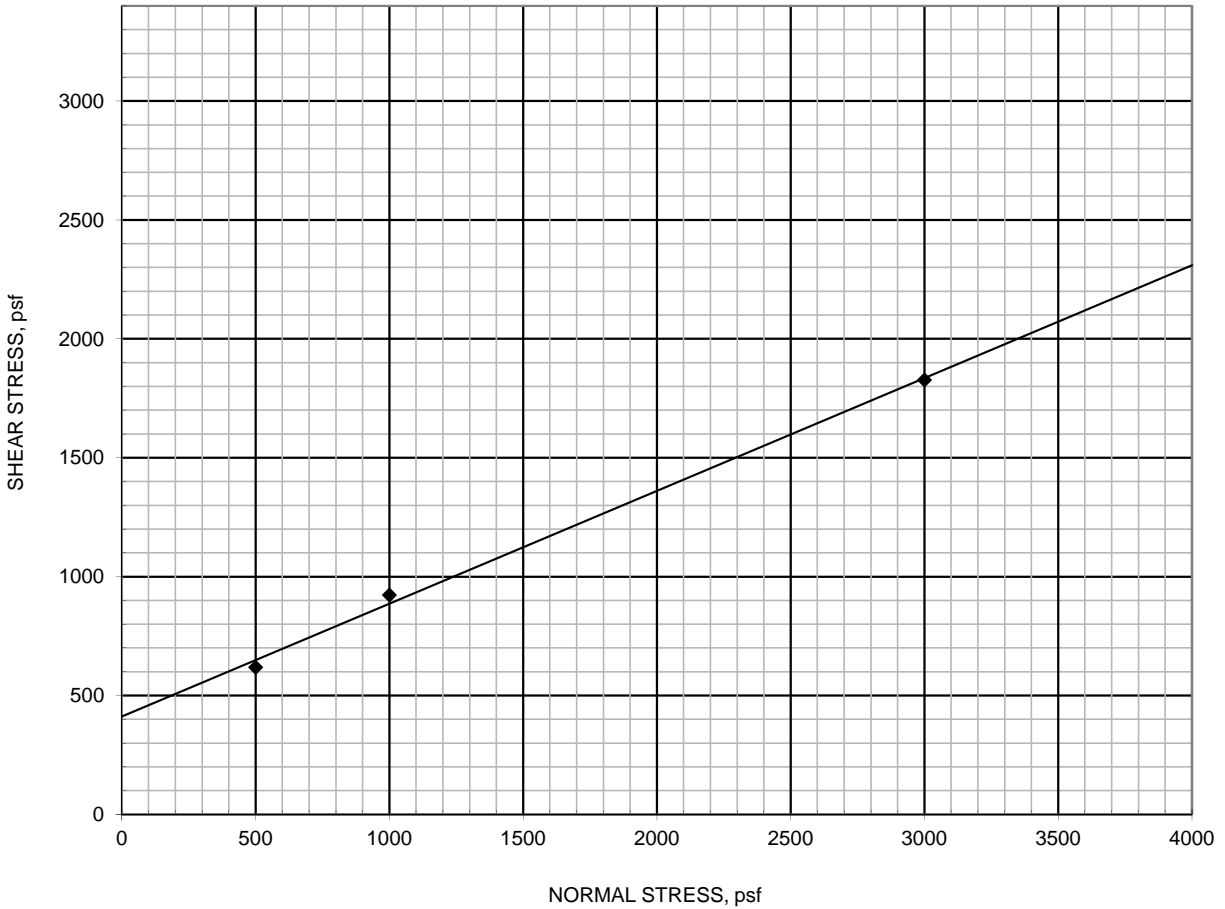
DIRECT SHEAR TEST OF SOILS UNDER CONSOLIDATED DRAINED CONDITIONS


ASTM D3080

Page 1 of 2

SHEAR STRENGTH

◆ MAXIMUM SHEAR STRESS — INTERPRETED FAILURE

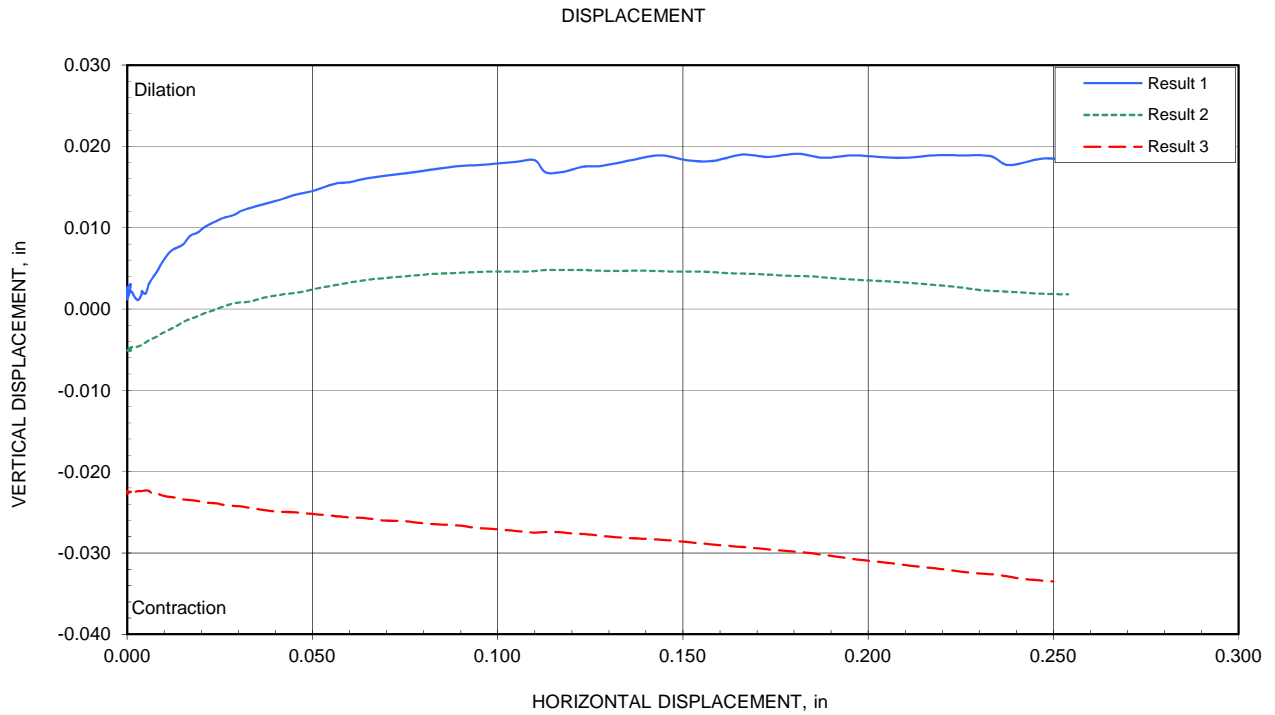
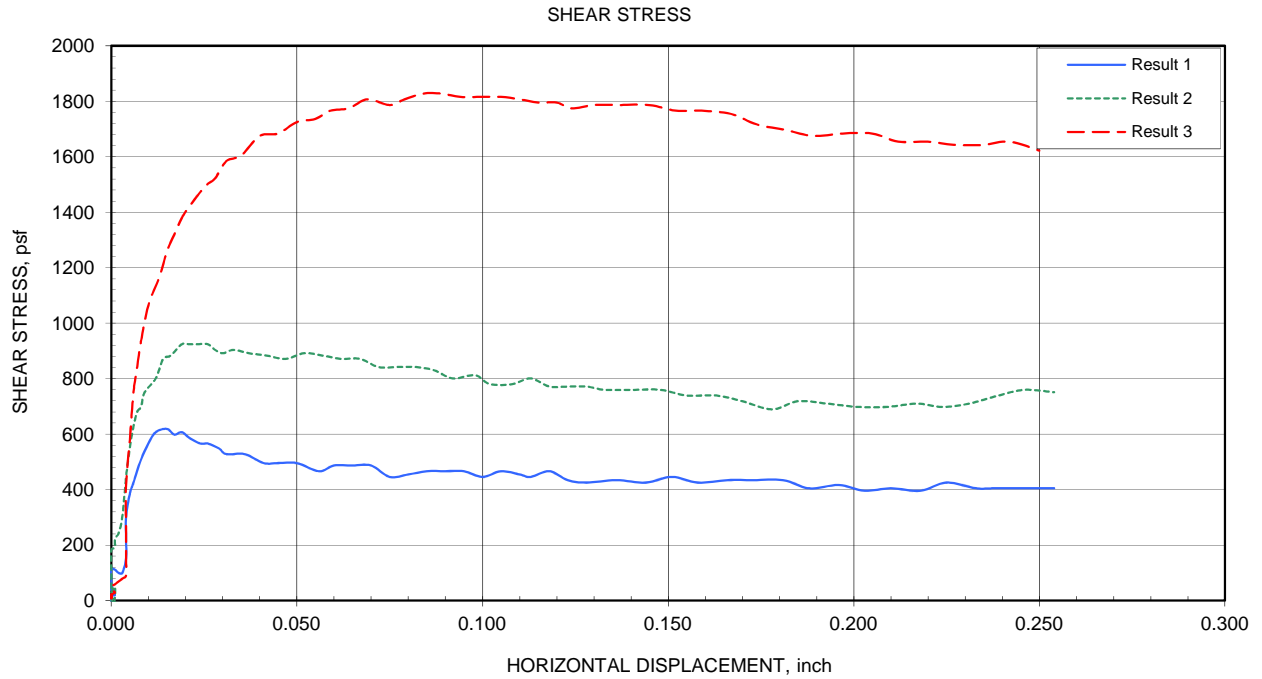


AT MAXIMUM SHEAR STRESS		FRICITION ANGLE	COHESION*	NORMAL STRESS, psf		
		25.4 deg	412 psf	500	1000	3000
INITIAL AREA, in ²	4.909	INITIAL MOISTURE, %		24.3	24.3	24.3
INITIAL LENGTH, in	1.000	INITIAL DRY DENSITY, pcf		91.0	91.1	90.8
SPECIFIC GRAVITY	2.65	INITIAL SATURATION, %		79	79	78
SG ASSUMED	X	INITIAL VOID RATIO		0.82	0.82	0.82
SG TESTED		FINAL MOISTURE, %		32.2	30.6	27.0
LIQUID LIMIT	-	FINAL SATURATION, %		99.7	100.0	99.6
PLASTIC LIMIT	-	FINAL VOID RATIO		0.86	0.81	0.72
PLASTICITY INDEX	-	MAXIMUM SHEAR STRESS, psf		619	924	1828
SAMPLE TYPE	RECOMPACTED	RATE OF LOADING, in/min		0.0023	0.0024	0.0023
DESCRIPTION	Elastic Silty with Sand					
SAMPLE NO.	B-33 Bulk 0-10'	*Apparent Cohesion				
PROJECT: SC 72 Widening		 521 Clemson Road Columbia, SC		PROJECT NUMBER: 73205009		
LOCATION: York County, SC				CLIENT: CDM Smith Inc.		
NOTES: Recompacted to 95% MDD at Optimum Moisture Content				DATE: 04/22/20		

DIRECT SHEAR TEST OF SOILS UNDER CONSOLIDATED DRAINED CONDITIONS

ASTM D3080

Page 2 of 2



DESCRIPTION	Elastic Silt with Sand		
SAMPLE NO.	B-33 Bulk 0-10'		
PROJECT: SC 72 Widening	 521 Clemson Road Columbia, SC	PROJECT NUMBER: 73205009	
LOCATION: York County, SC		CLIENT: CDM Smith Inc.	
NOTES: Recompacted to 95% MDD at Optimum Moisture Content		DATE: 04/22/20	

APPENDIX D.

SLOPE STABILITY AND SETTLEMENT ANALYSES

Client: <u>York County of SC</u>	Job No. <u>118807</u>	Calculations By: <u>TEE and KNA</u>
Project: <u>SC72 Widening</u>	Checked By/Date: <u>KNA – 06/10/20</u>	Date: <u>10/19/2016 – 6/9/2020</u>
Detail: <u>Final Geotechnical Analyses</u>	Reviewed By/Date: <u>EOT – 6/11/20</u>	Calc #: <u>1</u>

Roadway Analyses for Slope Stability and Settlement

1.0 Purpose/Objective:

CDM Smith is providing design services to York County, South Carolina for the widening of SC-72 (Saluda Road) between Rambo Road and Mount Holly Road in York County, South Carolina. Saluda Road will be widened by constructing roadway embankments up to 9 feet high with slopes of 2H:1V to 4H:1V. As a part of the final roadway geotechnical engineering report, settlement and global slope stability analyses were performed in general accordance with the SCDOT *GDM* and AASHTO procedures, as presented below.

2.0 Procedure:

1. Establish representative subsurface profiles and parameters from SPT borings and laboratory data.
2. Develop representative cross sections for critical slope sections based on the roadway plans.
 - a. Station 28+00 (SC 72 Alignment) – 9 feet tall FILL embankment section – 2H:1V
 - b. Station 39+50 (SC 72 Alignment) – 6 feet tall FILL embankment section – 2H:1V
 - c. Station 41+50 (SC 72 Alignment) – 9 feet tall CUT embankment section – 2H:1V
 - d. Station 48+00 (SC 72 Alignment) – 8 feet tall FILL embankment section – 2H:1V
 - e. Station 90+00 (SC 72 Alignment) – 7 feet tall FILL embankment section – 2H:1V
 - f. Station 13+50 (S-244 Alignment) – 5 feet tall FILL embankment section – 2H:1V
 - g. Station 14+00 (S-1576 Alignment) – 6 feet tall CUT embankment section – 2H:1V
3. Run GeoStudio - *SLOPE/W* software to evaluate global slope stability at the proposed cross sections.
4. Perform settlement analyses using ROCscience - *Settle3D* software and empirical methods to estimate anticipated settlement along the roadway widening project due to new embankment construction.

3.0 References/Data Sources:

- A. SCDOT, “Geotechnical Design Manual Version 1.1”, 2010
- B. AASHTO, “AASHTO LRFD Bridge Design Specifications”, with 2015 and 2016 Interim Revisions (7th Edition)
- C. *Slope/W*, GeoStudio 2018 Software, August 2017 Release, Version 9.0.4.15639
- D. *Settle3D*, ROCscience Inc. Software, version 3.016, 2015
- E. SC72 (Saluda Road) roadway plans and investigation including boring (SPT) logs.
- F. Terracon, “Laboratory Testing Data, SC72 Widening from Rambo Road to SC 901, York County, SC”, April 7, 2016.
- G. Terracon, “Laboratory Testing Data, SC72 Widening from Rambo Road to SC 901 – Phase 2, York County, SC”, April 28, 2020.

4.0 Assumptions and Limitations:

- A. In general, the SCDOT *GDM* was used as the design standard for the analyses as well as AASHTO LRFD *Bridge Design Specifications* (7th Edition).
- B. Roadway Embankment Surcharge Loads (based on Table 8-8 and Table 8-9 in the SCDOT *GDM*)
 End-of-Construction Slope Stability Analyses:
- Live Load Surcharge (LL) = 250 psf
 - Dead load Surcharge (DL_{EOC}) = 20 psf (calculated based on replacing 12" of soil with 12" of pavement, i.e. 140 psf – 120 psf)
 - Surcharge Load (SL_{EOC}) = LL + DL_{EOC} = 250 psf + 20 psf = 270 psf
- Long-Term Slope Stability Analyses:
- Live Load Surcharge (LL) = 250 psf
 - Dead Load Surcharge (DL_{LT}) = 20 psf + 140 psf (calculated based on replacing 12" of soil with 12" of pavement and accounting for 12" of additional pavement overlays over the lifetime of the proposed roadway)
 - Surcharge Load (SL_{LT}) = LL + DL_{LT} = 250 psf + 20 psf + 140 psf = 410 psf
- C. Surcharge for Pedestrian Walkways wider than 2 feet (based on the SCDOT *GDM*)
- Live Load Surcharge (LL) = 75 psf
 - Dead Load Surcharge (DL) = 12.5 psf (calculated based on replacing 6" of soil with 6" of concrete, i.e. $0.5 \times [145 \text{ psf} - 120 \text{ psf}]$)
 - Surcharge Load (SL) = 75 psf + 12.5 psf = 87.5 psf
 - Note: the pedestrian walkway surcharge loads for the end-of-construction and long-term design scenarios are identical since there are no anticipated overlays on the walkways.
- D. Subsurface cross sections were developed from field and laboratory data collected during the preliminary and final subsurface investigations.
- E. Three different limit equilibrium methodologies: Bishop, Morgenstern-Price, and Spencer were utilized to perform the slope stability analyses. The potential critical slip surfaces for each method were adjusted using the optimization techniques provided in the Slope/W software to identify the most critical failure surface for each model. The reported values represent optimized Factors of Safety (FOS) for the most critical failure surfaces determined between the three methodologies.
- F. Total settlement estimates include Elastic (immediate settlement), Primary and Secondary Consolidation as well as time-rate of settlement. For our analyses, we have assumed only primary and secondary consolidation for clay soils, and for silts and sands we have assumed only elastic settlement.
- G. Infinite slope and shallow slope failure surfaces (less than 4 feet deep) are not considered a controlling factor in slope inclination design and thus have been ignored.
- H. Proposed embankment fill soil parameters were assumed using SCDOT *GDM* guidelines and prior experience from similar projects.
- I. Groundwater levels assumed from the geotechnical data collected during the subsurface investigation. For all slope stability analyses, a groundwater elevation of 608 ft NAVD was considered, based on the highest recorded groundwater elevation during the SC72 investigations.

4.0 Assumptions and Limitations:

- A. In general, the SCDOT *GDM* was used as the design standard for the analyses as well as AASHTO LRFD *Bridge Design Specifications* (7th Edition).
- B. Roadway Embankment Surcharge Loads (based on Table 8-8 and Table 8-9 in the SCDOT *GDM*)
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- Live Load Surcharge (LL) = 250 psf
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 - Surcharge Load (SL_{EOC}) = LL + DL_{EOC} = 250 psf + 20 psf = 270 psf
- Long-Term Slope Stability Analyses:
- Live Load Surcharge (LL) = 250 psf
 - Dead Load Surcharge (DL_{LT}) = 20 psf + 140 psf (calculated based on replacing 12" of soil with 12" of pavement and accounting for 12" of additional pavement overlays over the lifetime of the proposed roadway)
 - Surcharge Load (SL_{LT}) = LL + DL_{LT} = 250 psf + 20 psf + 140 psf = 410 psf
- C. Surcharge for Pedestrian Walkways wider than 2 feet (based on the SCDOT *GDM*)
- Live Load Surcharge (LL) = 75 psf
 - Dead Load Surcharge (DL) = 12.5 psf (calculated based on replacing 6" of soil with 6" of concrete, i.e. $0.5 \times [145 \text{ psf} - 120 \text{ psf}]$)
 - Surcharge Load (SL) = 75 psf + 12.5 psf = 87.5 psf
 - Note: the pedestrian walkway surcharge loads for the end-of-construction and long-term design scenarios are identical since there are no anticipated overlays on the walkways.
- D. Subsurface cross sections were developed from field and laboratory data collected during the preliminary and final subsurface investigations.
- E. Three different limit equilibrium methodologies: Bishop, Morgenstern-Price, and Spencer were utilized to perform the slope stability analyses. The potential critical slip surfaces for each method were adjusted using the optimization techniques provided in the Slope/W software to identify the most critical failure surface for each model. The reported values represent optimized Factors of Safety (FOS) for the most critical failure surfaces determined between the three methodologies.
- F. Total settlement estimates include Elastic (immediate settlement), Primary and Secondary Consolidation as well as time-rate of settlement. For our analyses, we have assumed only primary and secondary consolidation for clay soils, and for silts and sands we have assumed only elastic settlement.
- G. Infinite slope and shallow slope failure surfaces (less than 4 feet deep) are not considered a controlling factor in slope inclination design and thus have been ignored.
- H. Proposed embankment fill soil parameters were assumed using SCDOT *GDM* guidelines and prior experience from similar projects.
- I. Groundwater levels assumed from the geotechnical data collected during the subsurface investigation. For all slope stability analyses, a groundwater elevation of 608 ft NAVD was considered, based on the highest recorded groundwater elevation during the SC72 investigations.

5.0 Calculations:

A. Define Generalized Soil Profiles and Strength Parameters

1. For our slope stability analyses, we have selected seven (7) critical cross sections based on embankment geometry and subsurface stratigraphy. These are summarized in the **Table D-1**, below:

Table D-1: Generalized Profile-Soil Strength Parameters used in Slope Stability Analyses

Station	Material	Total Unit Weight (pcf)	End-of-Construction (Undrained Parameters)		Long-Term (Drained Parameters)	
			C (psf)	ϕ (deg)	C' (psf)	ϕ' (deg)
28+00 (SC-72)	New Embankment Fill	120	-	32	-	32
	Firm to Stiff MH	115	300	-	-	28
	Loose SM	120	-	30	-	30
39+50 (SC-72)	New Embankment Fill	120	-	32	-	32
	Fill – Firm Clay CL	115	400	-	-	27
	Very Stiff Clay CL	118	600	-	-	28
	Medium Dense SM	125	-	30	-	30
41+50 (SC-72)	New Embankment Fill	120	-	32	-	32
	V Stiff Silt	110	600	-	-	32
	Soft ML	105	500	-	-	30
48+00 (SC-72)	New Embankment Fill	120	-	32	-	32
	Fill – Soft to Stiff CH	115	400	-	-	27
	Very Stiff CH	118	600	-	-	28
90+00 (SC-72)	New Embankment Fill	120	-	32	-	32
	Soft to Stiff MH	115	300	-	-	31
13+50 (S-244)	New Embankment Fill	120	-	32	-	32
	Loose SM	110	-	33	-	33
	Stiff ML	118	400	-	-	28
14+00 (S-1576)	New Embankment Fill	120	-	32	-	32
	Firm to Stiff CH/ML	118	400	-	-	30
	Loose to Med. Dense SM	120	-	33	-	33

2. For our settlement analyses, we have selected the cross sections and subsurface stratigraphy at Station 39+50 and Station 90+00. These sections are the most critical sections for settlement due to the proposed fill heights and the observed subsurface conditions. The properties used for our analyses are summarized in the **Table D-2** and **Table D-3**, below.

Table D-2: Generalized Profile-Soil Parameters used in Settlement Analyses – 39+50

Soil Layer	Top Elevation (ft)	Bottom Elevation (ft)	Unit Weight (pcf)	Cc	Cr	e0	OCR	Cv (ft ² /yr)	Es (ksf)
0 – Embankment Fill (Height=6 ft)	633	627	120	-	-	-	-	-	-
1 – Med. Dense SC	627	625	118	-	-	-	-	-	1000
2 – Very Stiff CL	625	623	115	0.4	0.1	0.72	5	36.5	-
3 – Hard ML	623	619	118	-	-	-	-	-	200
4 – Medium Dense SM	619	616	125	-	-	-	-	-	1000

Table D-3: Generalized Profile-Soil Parameters used in Settlement Analyses – 90+00

Soil Layer	Top Elevation (ft)	Bottom Elevation (ft)	Unit Weight (pcf)	Cc	Cr	e0	OCR	Cv (ft ² /yr)	Es (ksf)
Embankment Fill (Height=6 ft)	628	622	120	-	-	-	-	-	-
1 – Stiff CL	622	619	115	0.14	0.04	0.74	5	36	-
2 – Stiff to Soft ML	625	612	115	0.14	0.04	0.74	2	55	-

3. The two General Profile Tables for 39+50 and 90+00 were generated using subsurface information from borings B06 and B17, respectively. Consolidation parameters as well as Elastic moduli are correlated values based on Table 7-19 (*GDM*), Table 8-2 (Holtz and Kovacs), Figure 7-30 and 31 (*GDM*) and laboratory testing data.

B. GeoStudio - *SLOPE/W* analyses (attached)

The factors of safety were computed using the geometry, soil parameters, and loads described in this calculation package using GeoStudio 2018 *SLOPE/W* software.

The factors of safety (FOS) are converted to resistance factors using the equation below:

$$\text{Resistance Factor} = \frac{1}{\text{FOS}}$$

Article 11.6.2.3 in AASHTO LRFD, for the Service I load combination dictates that where the slope supports or contains a structural element (bridge) the resistance factor should be not more than 0.65 and where no structural element is supported, the resistance factor may be taken as 0.75.

The Summary of the factors of safety and resistance factors are shown in **Table D-4**, below:

Table D-4: Slope Stability Results

Station	Slope Conditions	¹ Maximum Required Resistance Factor	Factors of Safety		Calculated Resistance Factors	
			End-of-Construction	Long-Term	End-of-Construction	Long-Term
28+00	Fill	0.75	1.36	1.33	0.74	0.75
39+50	Fill	0.75	1.90	1.45	0.53	0.69
41+50	Cut	0.75	2.14	1.45	0.47	0.69
48+00	Fill	0.75	1.80	1.42	0.56	0.70
90+00	Fill	0.75	1.44	1.51	0.69	0.66
13+50	Fill	0.75	1.52	1.39	0.66	0.72
14+00	Cut	0.75	3.58	1.35	0.28	0.74

The above FOS were computed using Morgenstern and Price, Spencer, and Bishop methodologies and the lowest result is shown. Extreme Event I analysis was not performed on the above cross sections because ROC III embankments do not require seismic analyses. All the above sections meet the required resistance factors.

C. Settlement Calculations:

1. Settlement calculation results are summarized in **Table D-5** and **Table D-6**, below. Maximum total settlements of 1 to 2 inches are anticipated beneath the embankments along the project alignments.
2. Settlement estimates consider profiles to a depth of up to 15 feet below ground surface based on available boring information.
3. Settlement of the embankment fill is assumed to be elastic (immediate) and not considered in the following estimated values.

Table D-5: Settlement Estimates at Station 39+50 near Boring B06

Location	Elastic Settlement (in)	Primary Consolidation (in)	Total Settlement (in)
Toe of Slope	<0.1	0.1	0.2
Mid Slope	0.1	0.4	0.5
Top of Slope	0.2	0.5	0.7

Table D-6: Settlement Estimates at Station 90+00 near Boring B17

Location	Elastic Settlement (in)	Primary Consolidation (in)	Total Settlement (in)
Toe of Slope	<0.1	N/A	0.1
Mid Slope	1.2	N/A	1.2
Top of Slope	1.6	N/A	1.6

4. We estimate time to reach 90% consolidation at approximately 2-4 weeks. The majority of the consolidation and settlement will occur rapidly, likely during construction. We anticipate post construction settlements being very small. Similar settlement results were found at other sections along the alignment.

6.0 Conclusions/Results:

1. Global slope stability and settlement analyses have been performed for the SC72 Widening project. Based on our analyses, the proposed 4 to 9-foot-high embankments satisfy the service limit state Resistance Factors under end-of-construction and long-term soil conditions for both settlement and stability.
2. The anticipated maximum total settlements of the project's embankments are on the order to 1 to 2 inches. The rate of anticipated settlements will be sufficiently rapid such that delay periods or other mitigation measures will not be necessary.

Slope/W Results:



SC72 Widening from Rambo Road to SC901 York County, South Carolina Slope Stability Analysis

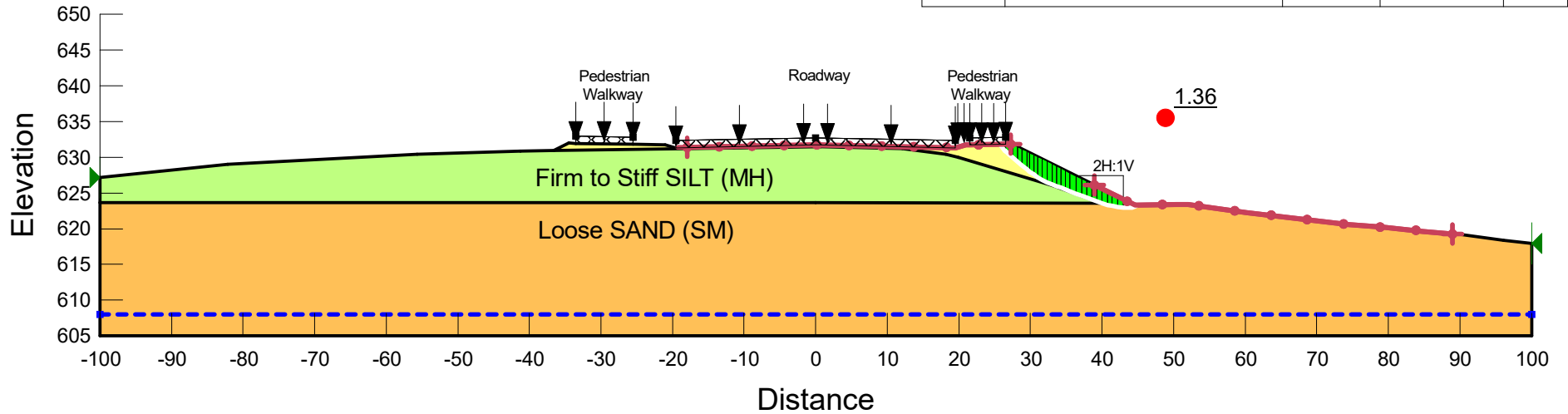
Client: York County of South Carolina
Project: 111726

Transverse Section
Limit Equilibrium Method: Bishop

Pedestrian LL = 87.5 pcf
Roadway LL = 270 pcf

Sta. 28+00 (SC-72 Alignment) End-of-Construction Stability

Color	Name	Unit Weight (pcf)	Cohesion (psf)	Phi (°)
	0 - Proposed Embankment	120	0	32
	1 - MH - Firm to Stiff - EOC	115	300	0
	2 - SM - Loose	120	0	30



Computed by: Evans, Thomas E.
Date & Time: 06/09/2020 03:36:17 PM



SC72 Widening from Rambo Road to SC901 York County, South Carolina Slope Stability Analysis

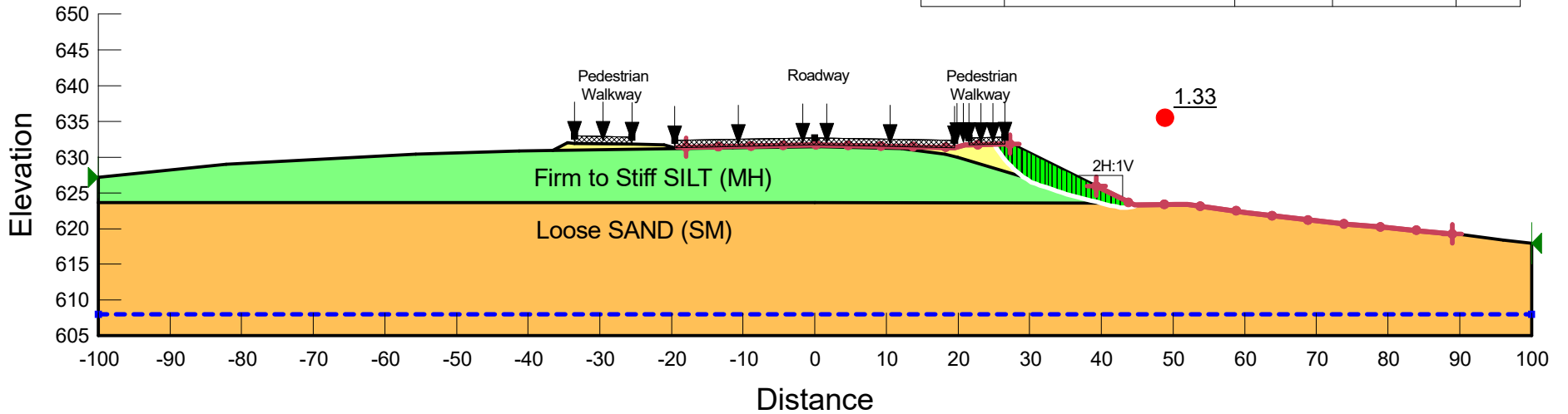
Client: York County of South Carolina
Project: 111726

Sta. 28+00 (SC-72 Alignment) Long-Term Stability

Transverse Section
Limit Equilibrium Method: Morgenstern-Price

Pedestrian LL = 87.5 pcf
Roadway LL = 410 pcf

Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	0 - Proposed Embankment	120	0	32
	1 - MH - Firm to Stiff - Long Term	115	0	28
	2 - SM - Loose	120	0	30





SC72 Widening from Rambo Road to SC901 York County, South Carolina Slope Stability Analysis

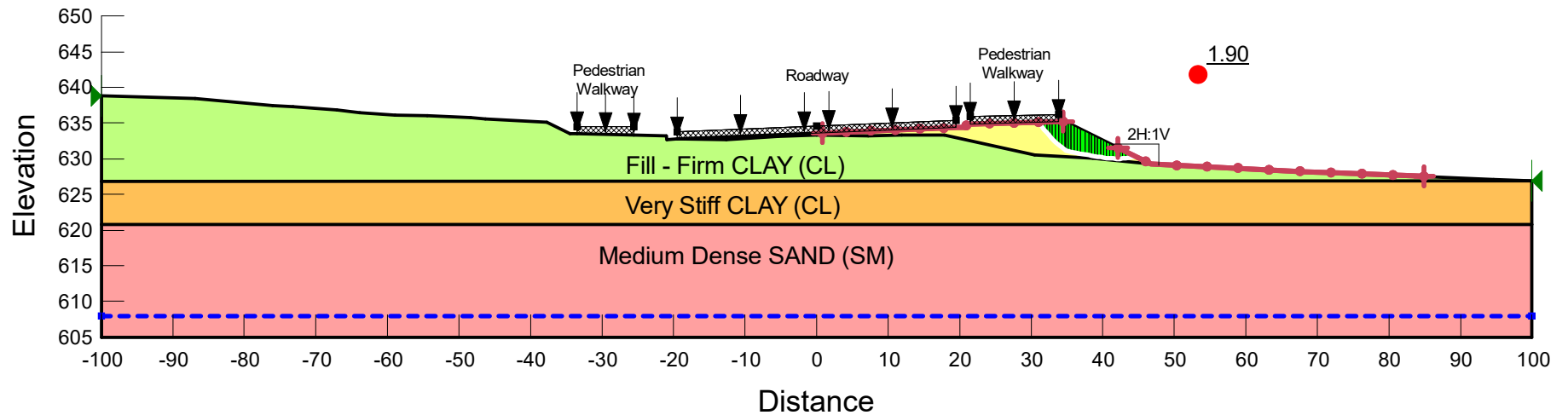
Client: York County of South Carolina
Project: 111726

Sta. 39+50 (SC-72 Alignment) End-of-Construction Stability

Transverse Section
Limit Equilibrium Method: Morgenstern-Price

Pedestrian LL = 87.5 pcf
Roadway LL = 270 pcf

Color	Name	Unit Weight (pcf)	Cohesion (psf)	Phi (°)
Yellow	0 - Proposed Embankment	120	0	32
Light Green	1 - Fill - Firm CL - Short Term	115	400	0
Orange	2 - Very Stiff CL - Short Term	118	600	0
Pink	3 - Medium Dense SM	125	0	30





SC72 Widening from Rambo Road to SC901 York County, South Carolina Slope Stability Analysis

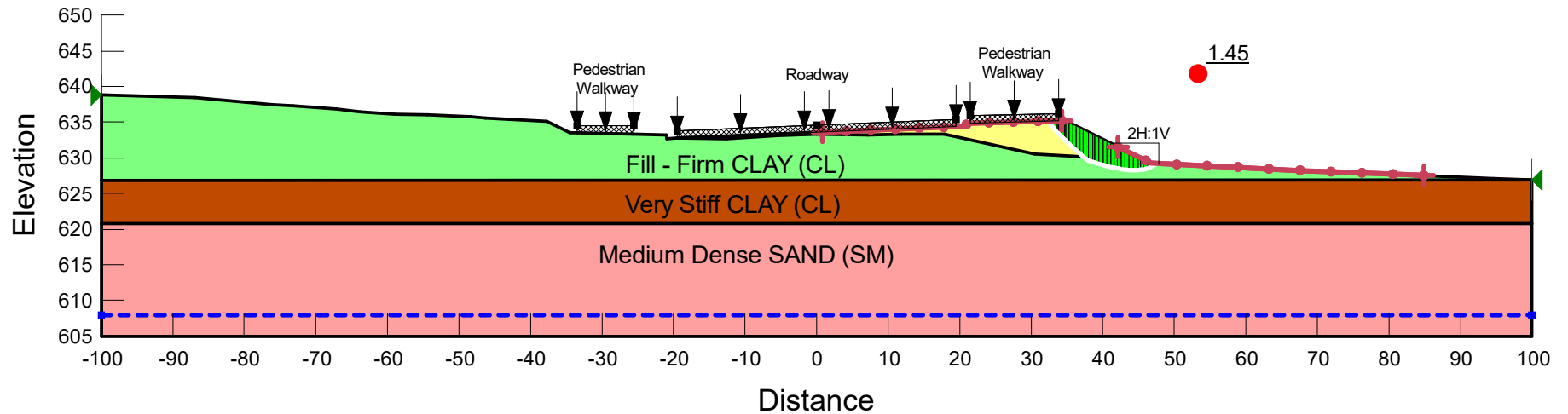
Client: York County of South Carolina
Project: 111726

Transverse Section
Limit Equilibrium Method: Bishop

Pedestrian LL = 87.5 pcf
Roadway LL = 410 pcf

Sta. 39+50 (SC-72 Alignment) Long-Term Stability

Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	0 - Proposed Embankment	120	0	32
	1 - Fill - Firm CL - Long Term	115	0	27
	2 - Very Stiff CL - Long Term	118	0	28
	3 - Medium Dense SM	125	0	30





SC72 Widening from Rambo Road to SC901 York County, South Carolina Slope Stability Analysis

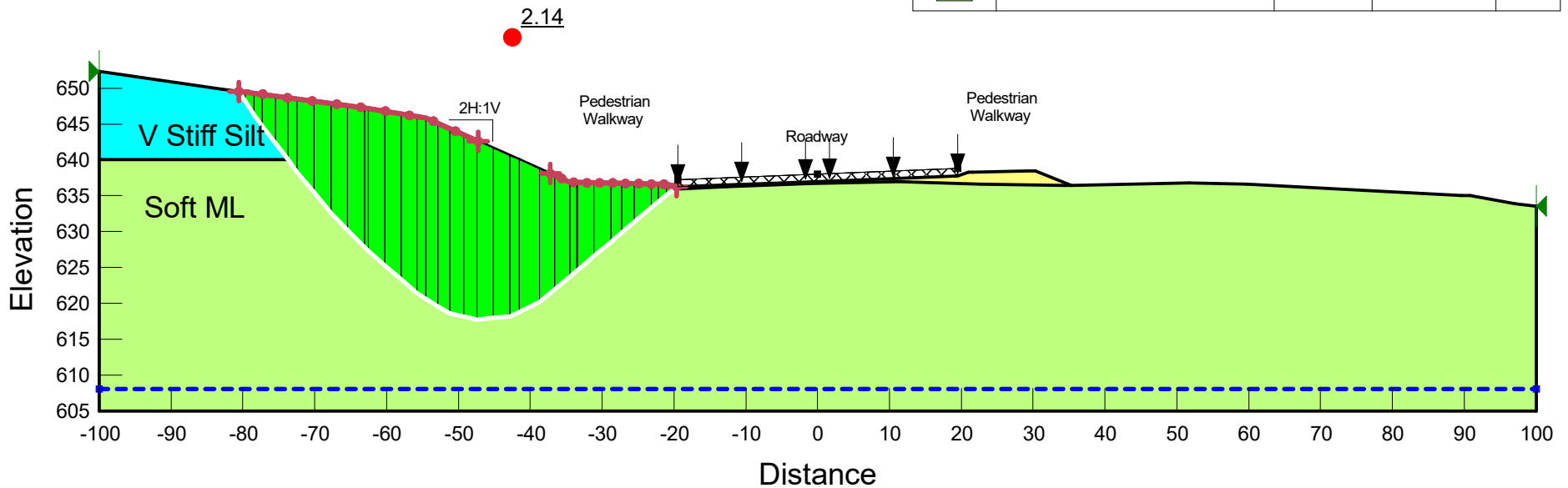
Client: York County of South Carolina
Project: 111726

Sta. 41+50 (SC-72 Alignment) End-of-Construction Stability

Transverse Section
Limit Equilibrium Method: Bishop

Roadway LL = 270 pcf

Color	Name	Unit Weight (pcf)	Cohesion (psf)	Phi (°)
	0 - Proposed Embankment	120	0	32
	1 - V. Stiff Silt - EOC	110	600	0
	2 - Soft ML - EOC	105	500	0



Computed by: Evans, Thomas E.
Date & Time: 08/26/2020 04:34:11 PM



SC72 Widening from Rambo Road to SC901 York County, South Carolina Slope Stability Analysis

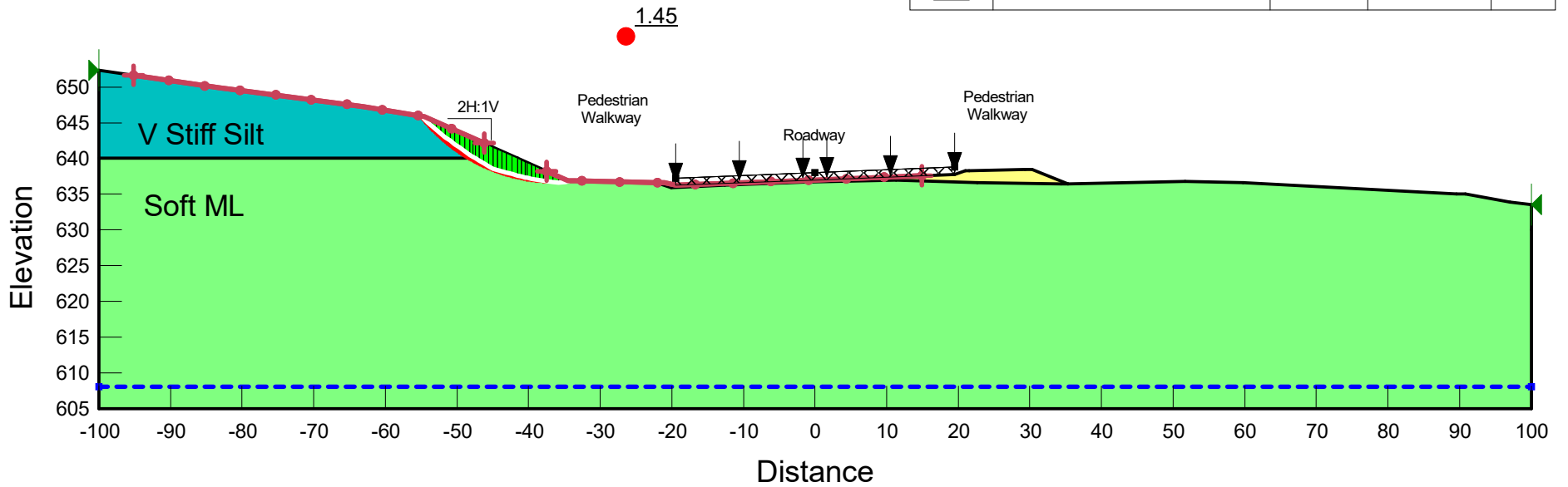
Client: York County of South Carolina
Project: 111726

Sta. 41+50 (SC-72 Alignment) Long-Term Stability

Transverse Section
Limit Equilibrium Method: Bishop

Roadway LL = 410 pcf

Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	0 - Proposed Embankment	120	0	32
	1 - V. Stiff Silt - Long Term	110	0	32
	2 - Soft ML - Long Term	105	0	30





SC72 Widening from Rambo Road to SC901 York County, South Carolina Slope Stability Analysis

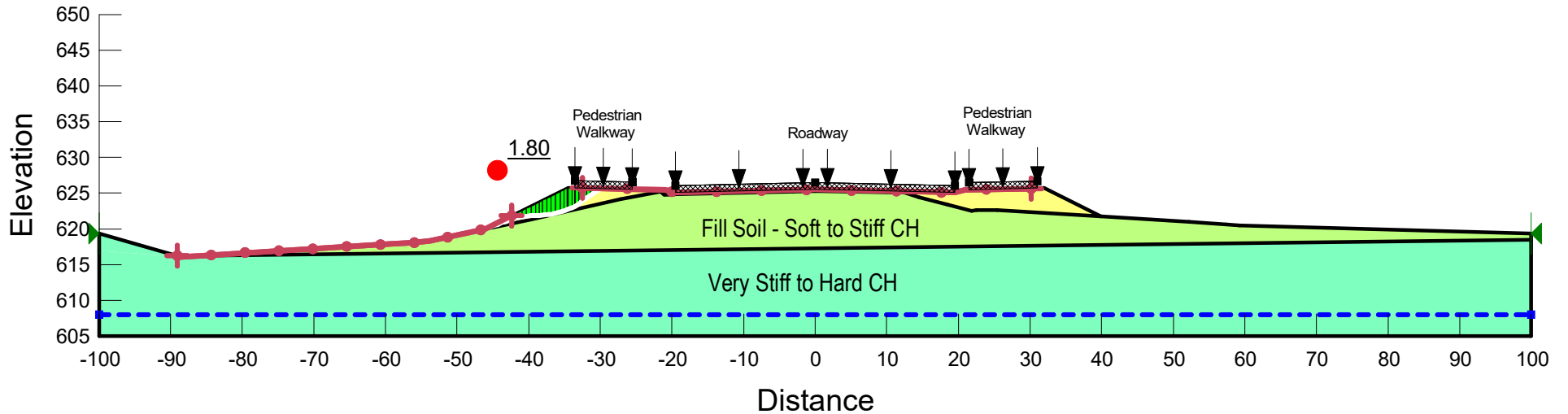
Client: York County of South Carolina
Project: 111726

Transverse Section
Limit Equilibrium Method: Bishop

Pedestrian LL = 87.5 pcf
Roadway LL = 270 pcf

Sta. 48+00 (SC-72 Alignment) End-of-Construction Stability

Color	Name	Unit Weight (pcf)	Cohesion (psf)	Phi (°)
Yellow	0 - Proposed Embankment	120	0	32
Light Green	1 - Fill - Soft to Stiff CH - Short Term	115	400	0
Dark Green	2 - Very Stiff to Hard CH - Short Term	118	600	0





SC72 Widening from Rambo Road to SC901 York County, South Carolina Slope Stability Analysis

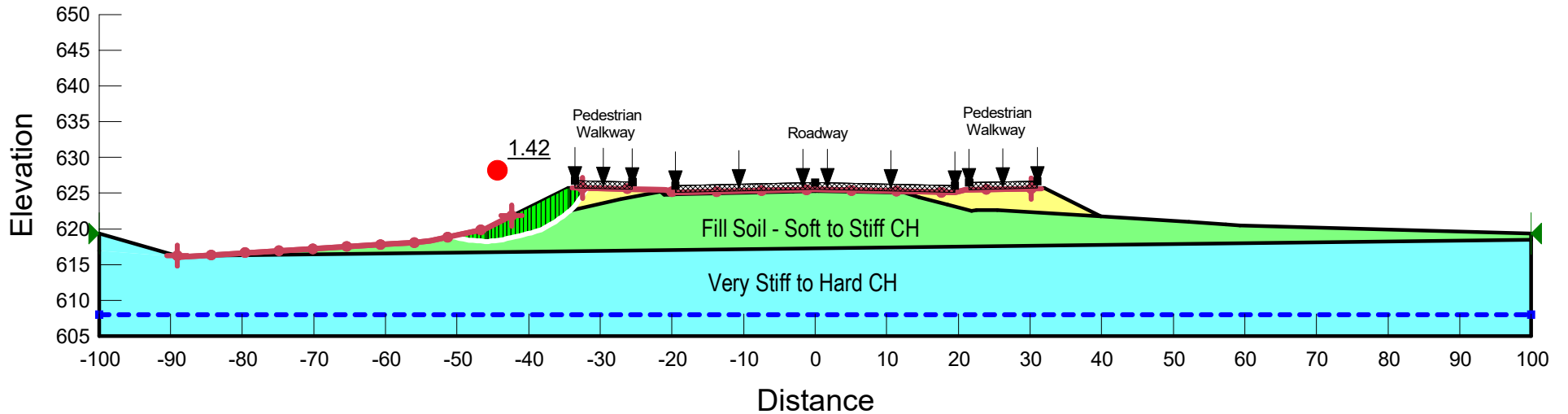
Client: York County of South Carolina
Project: 111726

Sta. 48+00 (SC-72 Alignment) Long-Term Stability

Transverse Section
Limit Equilibrium Method: Morgenstern-Price

Pedestrian LL = 87.5 pcf
Roadway LL = 410 pcf

Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	0 - Proposed Embankment	120	0	32
	1 - Fill - Soft to Stiff CH - Long Term	115	0	27
	2 - Very Stiff to Hard CH - Long Term	118	0	28





SC72 Widening from Rambo Road to SC901 York County, South Carolina Slope Stability Analysis

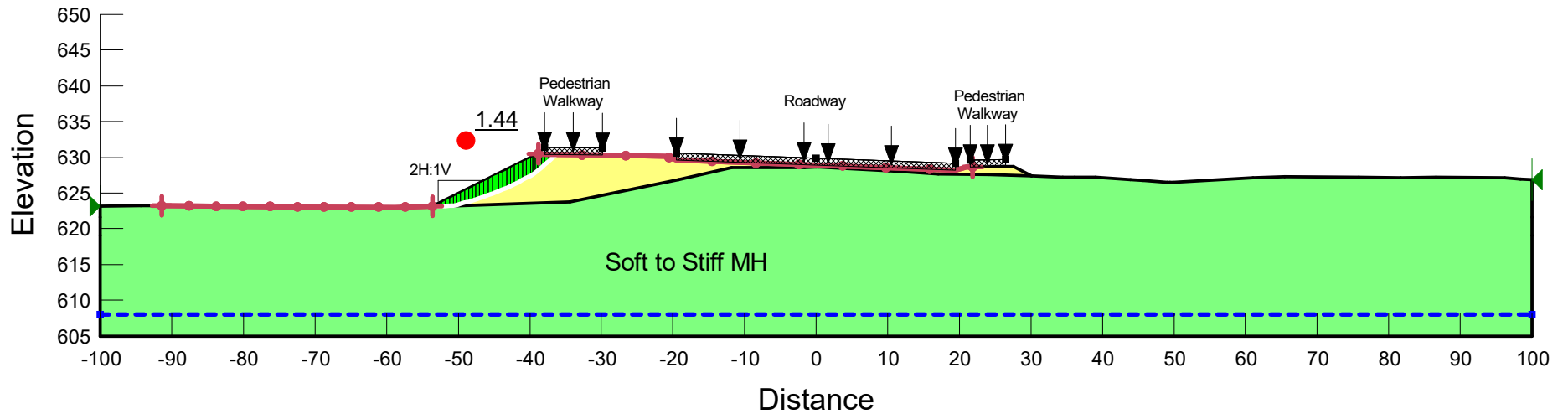
Client: York County of South Carolina
Project: 111726

Sta. 90+00 (SC-72 Alignment) End-of-Construction Stability

Transverse Section
Limit Equilibrium Method: Morgenstern-Price

Pedestrian LL = 87.5 pcf
Roadway LL = 270 pcf

Color	Name	Unit Weight (pcf)	Cohesion (psf)	Phi (°)
	0 - Proposed Embankment	120	0	32
	1 - Soft to Stiff MH - Short Term	115	300	0





SC72 Widening from Rambo Road to SC901 York County, South Carolina Slope Stability Analysis

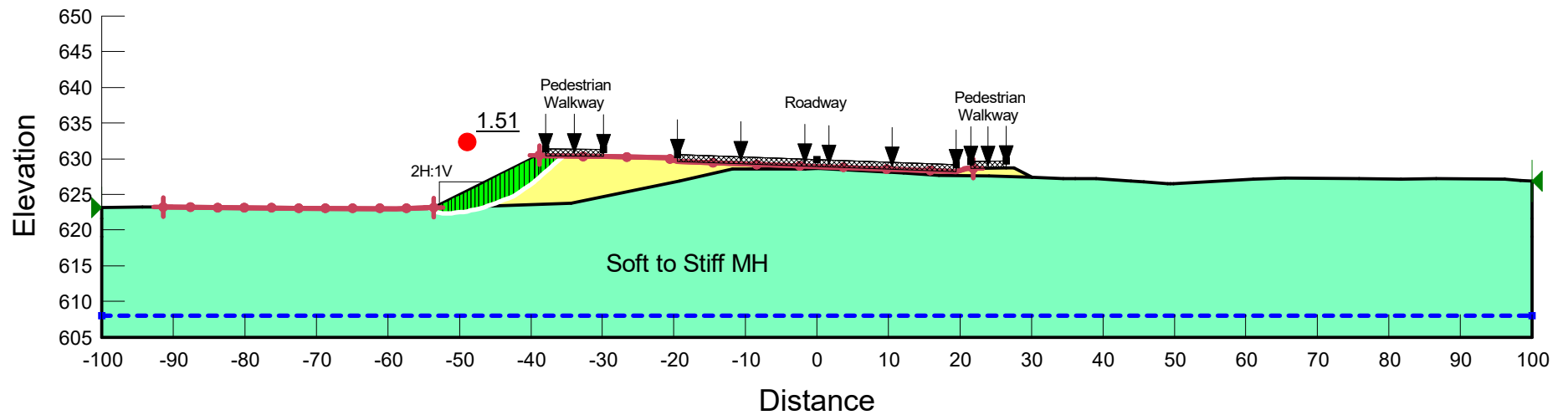
Client: York County of South Carolina
Project: 111726

Sta. 90+00 (SC-72 Alignment) Long-Term Stability

Transverse Section
Limit Equilibrium Method: Bishop

Pedestrian LL = 87.5 pcf
Roadway LL = 270 pcf

Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	0 - Proposed Embankment	120	0	32
	1 - Soft to Stiff MH - Long Term	115	0	31





SC72 Widening from Rambo Road to SC901 York County, South Carolina Slope Stability Analysis

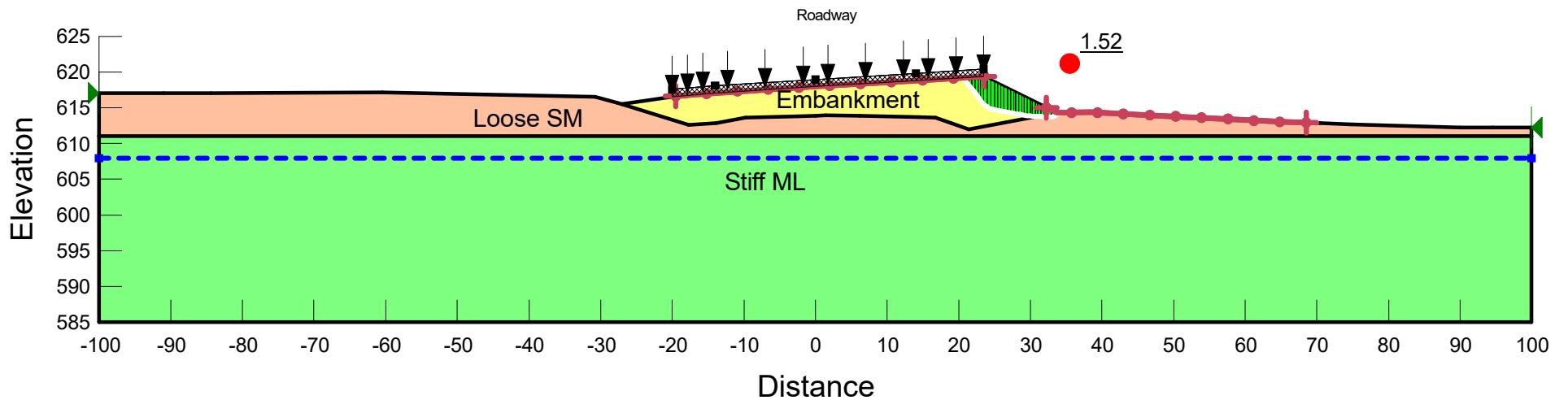
Client: York County of South Carolina
Project: 111726

Sta. 13+50 (S-244 Alignment) End-of-Construction Stability

Transverse Section
Limit Equilibrium Method: Bishop

Roadway LL = 270 pcf

Color	Name	Unit Weight (pcf)	Cohesion (psf)	Phi (°)
Yellow	0 - Proposed Embankment	120	0	32
Orange	1 - Loose SM	110	0	33
Green	2 - Stiff ML - Short Term	118	400	0





SC72 Widening from Rambo Road to SC901 York County, South Carolina Slope Stability Analysis

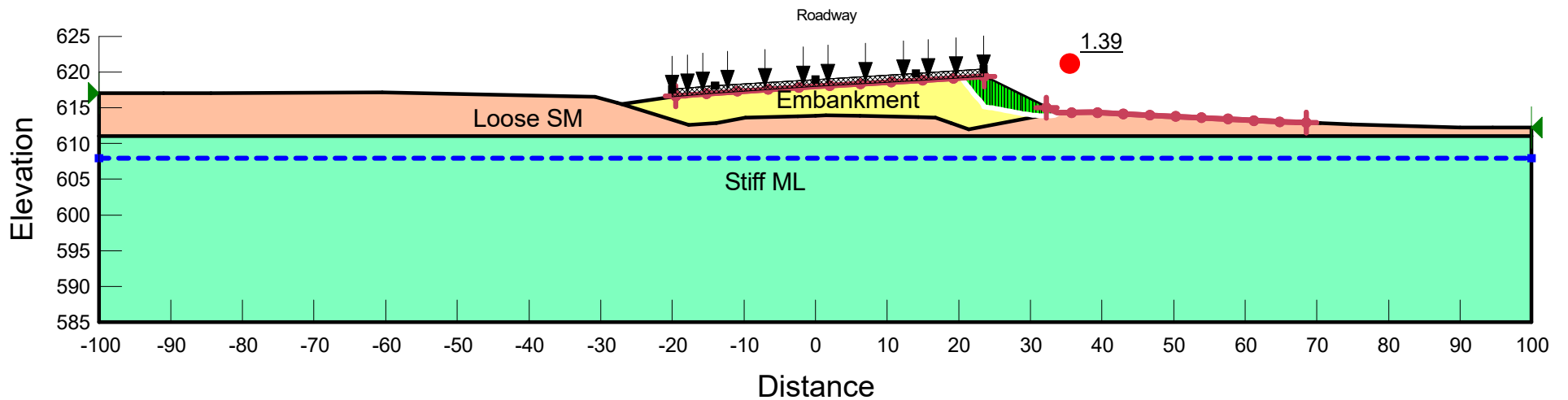
Client: York County of South Carolina
Project: 111726

Sta. 13+50 (S-244 Alignment) Long-Term Stability

Transverse Section
Limit Equilibrium Method: Bishop

Roadway LL = 410 pcf

Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
Yellow	0 - Proposed Embankment	120	0	32
Orange	1 - Loose SM	110	0	33
Green	2 - Stiff ML - Long Term	118	0	28





SC72 Widening from Rambo Road to SC901 York County, South Carolina Slope Stability Analysis

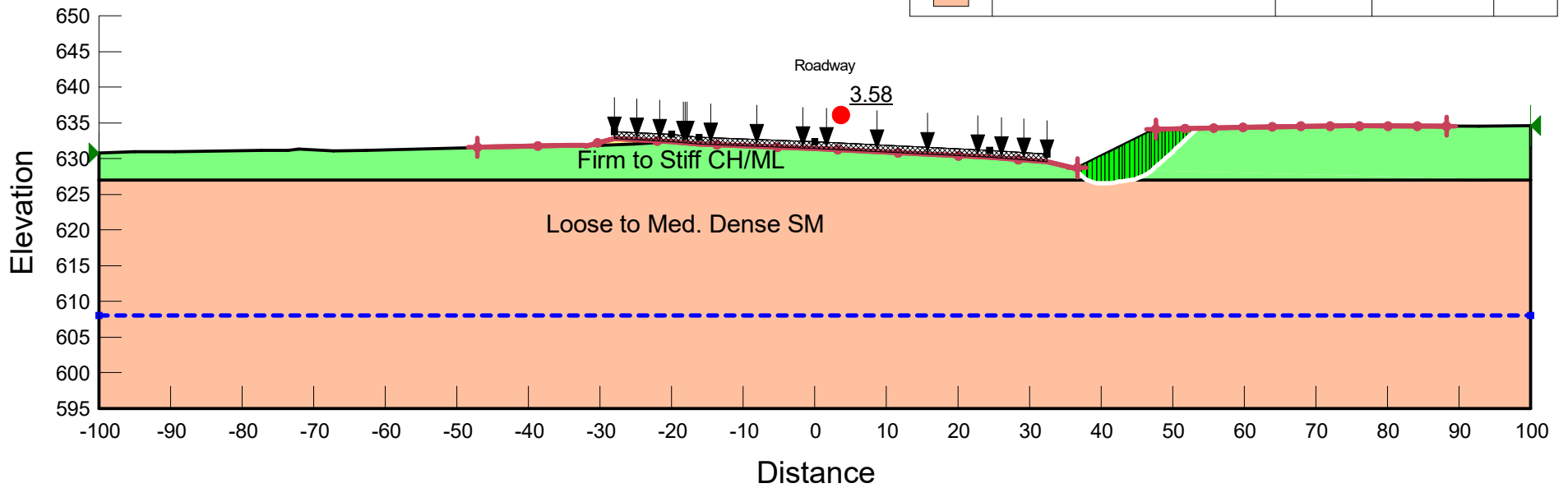
Client: York County of South Carolina
Project: 111726

Sta. 14+00 (S-1576 Alignment) End-of-Construction Stability

Transverse Section
Limit Equilibrium Method: Bishop

Roadway LL= 270 pcf

Color	Name	Unit Weight (pcf)	Cohesion (psf)	Phi (°)
Yellow	0 - Proposed Embankment	120	0	32
Green	1 - Stiff ML - Short Term	118	400	0
Orange	2 - Loose to Med Dense SM	120	0	33





SC72 Widening from Rambo Road to SC901 York County, South Carolina Slope Stability Analysis

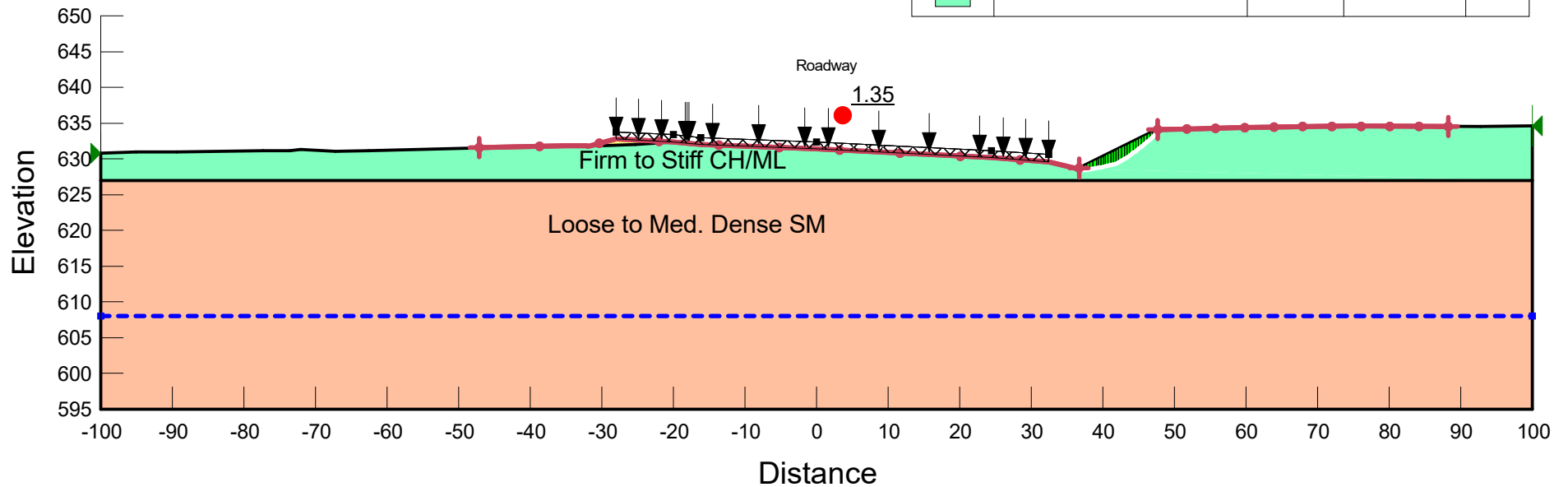
Client: York County of South Carolina
Project: 111726

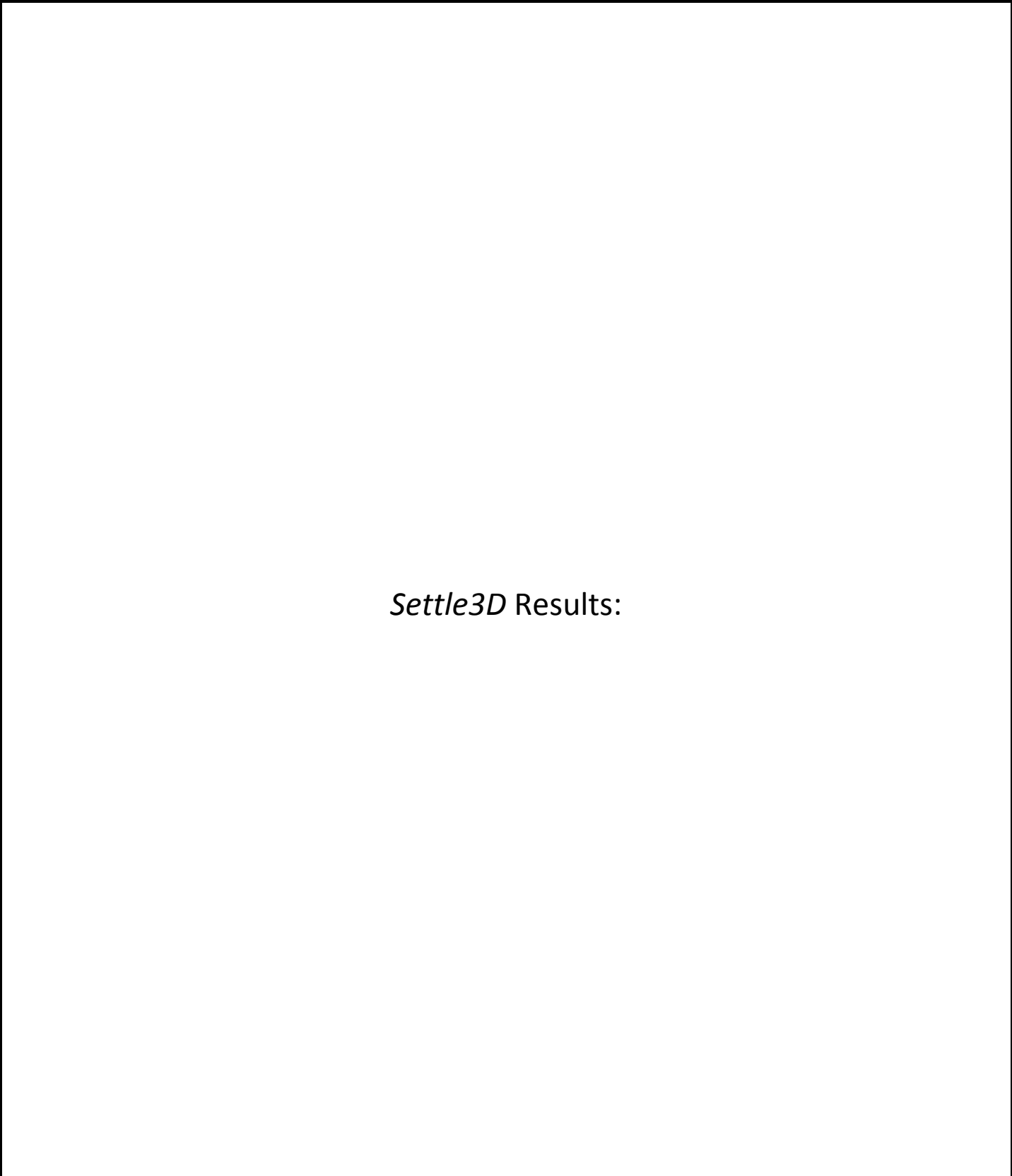
Sta. 14+00 (S-1576 Alignment) Long-Term Stability

Transverse Section
Limit Equilibrium Method: Bishop

Roadway LL= 410 pcf

Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Loose to Med Dense SM	120	0	33
	Proposed Embankment	120	0	32
	Stiff ML - Long Term	118	0	30

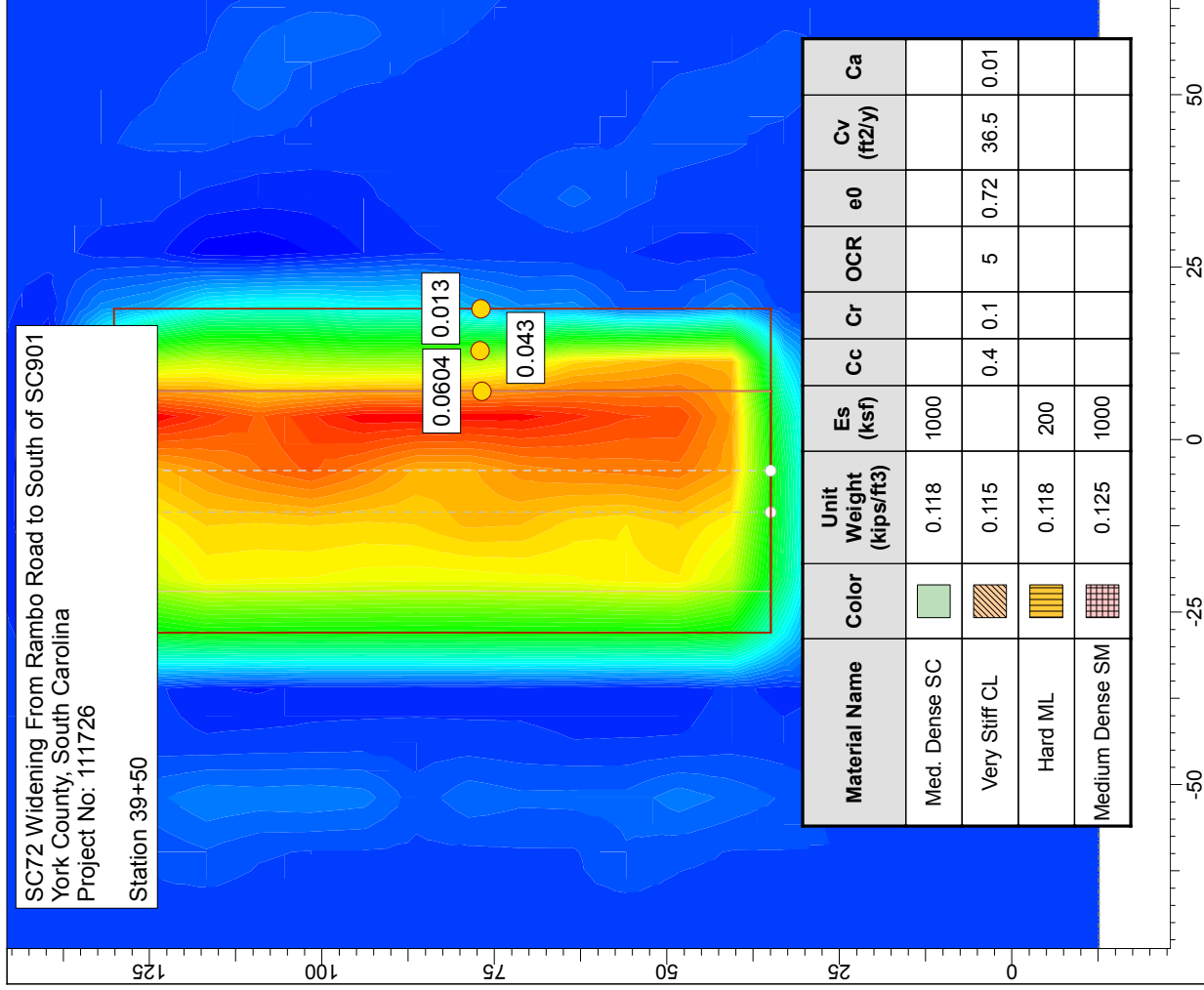




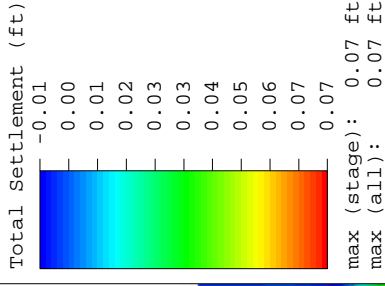
Settle3D Results:

SC72 Widening From Rambo Road to South of SC901
 York County, South Carolina
 Project No: 111726

Station 39+50



Material Name	Color	Unit Weight (kips/ft3)	Es (ksf)	Cc	Cr	OCR	e0	Cv (ft2/y)	Ca
Med. Dense SC		0.118	1000						
Very Stiff CL		0.115		0.4	0.1	5	0.72	36.5	0.01
Hard ML		0.118	200						
Medium Dense SM		0.125	1000						



SETTLE3D 3.019

Project: SC72 Widening from Rambo Road to South of SC901
 Analysis Description: Settlement - 39+50
 Drawn By: Evans, T. E.
 Date: 5/9/2016, 9:02:00 AM

Company: CDM Smith
 File Name: Settle3D_39+50s.s3z

Settle3D Analysis Information

SC72 Widening from Rambo Road to South of SC901

Project Settings

Document Name	Settle3D_39+50s.s3z
Project Title	SC72 Widening from Rambo Road to South of SC901
Analysis	Settlement - 39+50
Author	Evans, T. E.
Company	CDM Smith
Date Created	5/9/2016, 9:02:00 AM
Stress Computation Method	Multiple Soil Layers
Time-dependent Consolidation Analysis	
Time Units	days
Permeability Units	feet/year
Use average properties to calculate layered stresses	
Ignore negative effective stresses in settlement calculations	

Stage Settings

Stage #	Name	Time [days]
1	Previous Embankment	0
2	100 Years	36500
3	+1 day (add Emb.)	36501
4	+1 month	36530
5	+2 months	36560
6	20 Years	43800
7	100 Years	73000

Results (relative to Stage: 100 Years = 36500 d)

Time taken to compute: 112.55 seconds

Stage: Previous Embankment = 0 d

Data Type	Minimum	Maximum
Total Settlement [ft]	0	0
Consolidation Settlement [ft]	0	0
Immediate Settlement [ft]	0	0
Secondary Settlement [ft]	0	0
Loading Stress [ksf]	0	0
Effective Stress [ksf]	0	0
Total Stress [ksf]	0	0
Total Strain	0	0
Pore Water Pressure [ksf]	0	0
Excess Pore Water Pressure [ksf]	0	0
Degree of Consolidation [%]	0	0
Pre-consolidation Stress [ksf]	0	0
Over-consolidation Ratio	0	0
Void Ratio	0	0
Permeability [ft/y]	0	0
Coefficient of Consolidation [ft ² /y]	0	0
Hydroconsolidation Settlement [ft]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	0	0

Stage: 100 Years = 36500 d

Data Type	Minimum	Maximum
Total Settlement [ft]	0	0
Consolidation Settlement [ft]	0	0
Immediate Settlement [ft]	0	0
Secondary Settlement [ft]	0	0
Loading Stress [ksf]	0	0
Effective Stress [ksf]	0	0
Total Stress [ksf]	0	0
Total Strain	0	0
Pore Water Pressure [ksf]	0	0
Excess Pore Water Pressure [ksf]	0	0
Degree of Consolidation [%]	0	0
Pre-consolidation Stress [ksf]	0	0
Over-consolidation Ratio	0	0
Void Ratio	0	0
Permeability [ft/y]	0	0
Coefficient of Consolidation [ft ² /y]	0	0
Hydroconsolidation Settlement [ft]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	0	0

Stage: +1 day (add Emb.) = 36501 d

Data Type	Minimum	Maximum
Total Settlement [ft]	-0.00588428	0.0693902
Consolidation Settlement [ft]	-0.00533127	0.0541827
Immediate Settlement [ft]	-0.000585588	0.0176144
Secondary Settlement [ft]	0	0
Loading Stress [ksf]	-0.0398752	0.714104
Effective Stress [ksf]	-0.0398752	0.714104
Total Stress [ksf]	-0.0398752	0.714104
Total Strain	-0.0045447	0.0350288
Pore Water Pressure [ksf]	0	0
Excess Pore Water Pressure [ksf]	0	0
Degree of Consolidation [%]	-100	100
Pre-consolidation Stress [ksf]	0	0.714018
Over-consolidation Ratio	-4.46567	1.00357
Void Ratio	-0.0607841	0.00796462
Permeability [ft/y]	0	0.716262
Coefficient of Consolidation [ft ² /y]	0	0
Hydroconsolidation Settlement [ft]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	-0.00623173	0.0642916

Stage: +1 month = 36530 d

Data Type	Minimum	Maximum
Total Settlement [ft]	-0.00588428	0.0693943
Consolidation Settlement [ft]	-0.00533127	0.0541827
Immediate Settlement [ft]	-0.000585588	0.0176144
Secondary Settlement [ft]	0	4.16584e-006
Loading Stress [ksf]	-0.0398752	0.714104
Effective Stress [ksf]	-0.0398752	0.714104
Total Stress [ksf]	-0.0398752	0.714104
Total Strain	-0.0045447	0.0350308
Pore Water Pressure [ksf]	0	0
Excess Pore Water Pressure [ksf]	0	0
Degree of Consolidation [%]	-100	100
Pre-consolidation Stress [ksf]	0	0.714018
Over-consolidation Ratio	-4.46567	1.00357
Void Ratio	-0.0607877	0.00796462
Permeability [ft/y]	0	0.716262
Coefficient of Consolidation [ft ² /y]	0	0
Hydroconsolidation Settlement [ft]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	-0.00623173	0.0642916

Stage: +2 months = 36560 d

Data Type	Minimum	Maximum
Total Settlement [ft]	-0.00588428	0.0693986
Consolidation Settlement [ft]	-0.00533127	0.0541827
Immediate Settlement [ft]	-0.000585588	0.0176144
Secondary Settlement [ft]	0	8.47186e-006
Loading Stress [ksf]	-0.0398752	0.714104
Effective Stress [ksf]	-0.0398752	0.714104
Total Stress [ksf]	-0.0398752	0.714104
Total Strain	-0.0045447	0.035033
Pore Water Pressure [ksf]	0	0
Excess Pore Water Pressure [ksf]	0	0
Degree of Consolidation [%]	-100	100
Pre-consolidation Stress [ksf]	0	0.714018
Over-consolidation Ratio	-4.46567	1.00357
Void Ratio	-0.0607913	0.00796462
Permeability [ft/y]	0	0.716262
Coefficient of Consolidation [ft ² /y]	0	0
Hydroconsolidation Settlement [ft]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	-0.00623173	0.0642916

Stage: 20 Years = 43800 d

Data Type	Minimum	Maximum
Total Settlement [ft]	-0.00588428	0.0703351
Consolidation Settlement [ft]	-0.00533127	0.0541827
Immediate Settlement [ft]	-0.000585588	0.0176144
Secondary Settlement [ft]	0	0.000956214
Loading Stress [ksf]	-0.0398752	0.714104
Effective Stress [ksf]	-0.0398752	0.714104
Total Stress [ksf]	-0.0398752	0.714104
Total Strain	-0.0045447	0.0355036
Pore Water Pressure [ksf]	0	0
Excess Pore Water Pressure [ksf]	0	0
Degree of Consolidation [%]	-100	100
Pre-consolidation Stress [ksf]	0	0.714018
Over-consolidation Ratio	-4.46567	1.00357
Void Ratio	-0.061601	0.00796462
Permeability [ft/y]	0	0.716262
Coefficient of Consolidation [ft ² /y]	0	0
Hydroconsolidation Settlement [ft]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	-0.00623173	0.0642916

Stage: 100 Years = 73000 d

Data Type	Minimum	Maximum
Total Settlement [ft]	-0.00588428	0.0729827
Consolidation Settlement [ft]	-0.00533127	0.0541827
Immediate Settlement [ft]	-0.000585588	0.0176144
Secondary Settlement [ft]	0	0.00363572
Loading Stress [ksf]	-0.0398752	0.714104
Effective Stress [ksf]	-0.0398752	0.714104
Total Stress [ksf]	-0.0398752	0.714104
Total Strain	-0.0045447	0.0368342
Pore Water Pressure [ksf]	0	0
Excess Pore Water Pressure [ksf]	0	0
Degree of Consolidation [%]	-100	100
Pre-consolidation Stress [ksf]	0	0.714018
Over-consolidation Ratio	-4.46567	1.00357
Void Ratio	-0.06389	0.00796462
Permeability [ft/y]	0	0.716262
Coefficient of Consolidation [ft ² /y]	0	0
Hydroconsolidation Settlement [ft]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	-0.00623173	0.0642916

Embankments

1. Embankment

Center Line (-10.516, 34.924) to (-10.516, 130.101)
 Number of Layers 1
 Near End Angle 90 degrees
 Far End Angle 90 degrees
 Base Width 35

Layer	Stage	Left Bench Width (ft)	Left Angle (deg)	Height (ft)	Unit Weight (kips/ft ³)	Right Angle (deg)	Right Bench Width (ft)
1	Previous Embankment = 0 d	0	90	4	0.115	7.85	0

2. Embankment

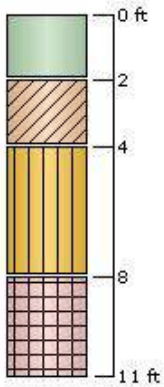
Center Line (-4.516, 34.924) to (-4.516, 130.101)
 Number of Layers 1
 Near End Angle 90 degrees
 Far End Angle 90 degrees
 Base Width 47

Layer	Stage	Left Bench Width (ft)	Left Angle (deg)	Height (ft)	Unit Weight (kips/ft ³)	Right Angle (deg)	Right Bench Width (ft)
1	+1 day (add Emb.) = 36501 d	0	90	6	0.12	26.5	0





Soil Layers

Ground Surface Drained: Yes

Layer #	Type	Thickness [ft]	Depth [ft]	Drained at Bottom
1	Med. Dense SC	2	0	Yes
2	Very Stiff CL	2	2	Yes
3	Hard ML	4	4	Yes
4	Medium Dense SM	3	8	Yes



Soil Properties

Property	Med. Dense SC	Very Stiff CL	Hard ML	Medium Dense SM
Color				
Unit Weight [kips/ft ³]	0.118	0.115	0.118	0.125
Saturated Unit Weight [kips/ft ³]	0.118	0.115	0.118	0.125
Immediate Settlement	Enabled	Disabled	Enabled	Enabled
Es [ksf]	1000		200	1000
Esur [ksf]	1000		200	1000
Primary Consolidation	Disabled	Enabled	Disabled	Disabled
Material Type		Non-Linear		
Cc		0.4		
Cr		0.1		
e0		0.72		
OCR	1	5	1	1
Cv [ft ² /y]		36.5		
B-bar		1		
Secondary Consolidation	Disabled	Standard	Disabled	Disabled
Cae/Ca		0.01		
Car/Care		0.01		
Multiple Stress Option	E from Es = 1000 ksf	E from CC = 13.9012 ksf	E from Es = 200 ksf	E from Es = 1000 ksf
Undrained Su A [kips/ft ²]	0	0	0	0
Undrained Su S	0.2	0.2	0.2	0.2
Undrained Su m	0.8	0.8	0.8	0.8
Piezo Line ID	0	0	0	1

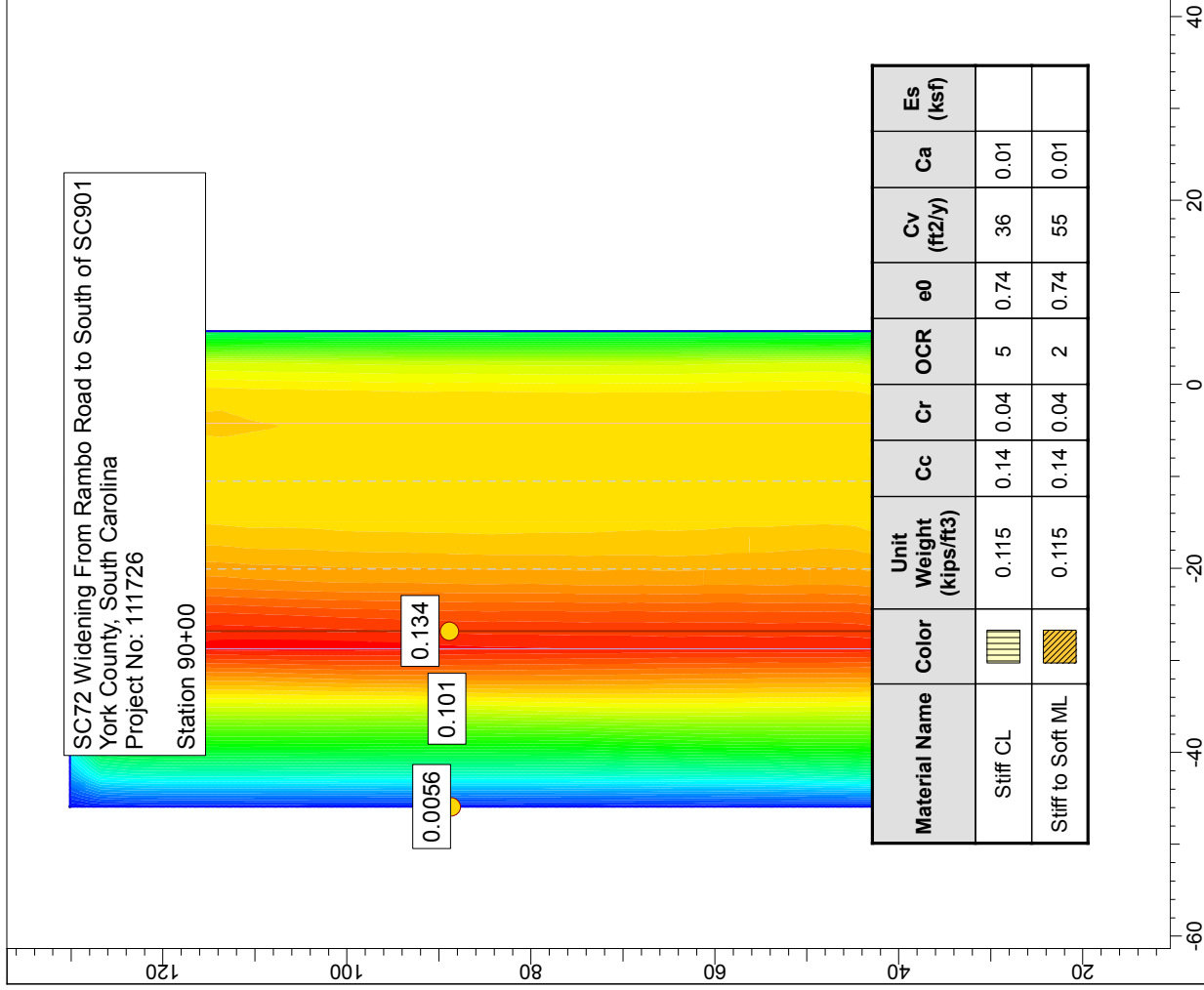
Groundwater

Groundwater method Piezometric Lines

Water Unit Weight 0.0624 kips/ft³

Piezometric Line Entities

ID	Depth (ft)
1	22 ft



SC72 Widening From Rambo Road to South of SC901
 York County, South Carolina
 Project No: 111726
 Station 90+00

0.0056
 0.101
 0.134

Material Name	Color	Unit Weight (kips/ft3)	Cc	Cr	OCR	e0	Cv (ft2/y)	Ca	Es (ksf)
Stiff CL		0.115	0.14	0.04	5	0.74	36	0.01	
Stiff to Soft ML		0.115	0.14	0.04	2	0.74	55	0.01	

SC72 Widening from Rambo Road to South of SC901

Project		Settlement - 90+00	
Analysis Description		Company	
Drawn By		File Name	
Date		Company	
Evans, T. E.		CDM Smith	
10/17/2016		Settle3D_90+00.s3z	



Settle3D Analysis Information

SC72 Widening from Rambo Road to South of SC901

Project Settings

Document Name	Settle3D_90+00.s3z
Project Title	SC72 Widening from Rambo Road to South of SC901
Analysis	Settlement - 90+00
Author	Evans, T. E.
Company	CDM Smith
Date Created	10/17/2016
Stress Computation Method	Multiple Soil Layers
Time-dependent Consolidation Analysis	
Time Units	days
Permeability Units	feet/year
Use average properties to calculate layered stresses	
Ignore negative effective stresses in settlement calculations	

Stage Settings

Stage #	Name	Time [days]
1	Previous Embankment	0
2	Pre Embankment	36500
3	+1 day (add Emb.)	36501
4	+1 month	36530
5	+2 months	36560
6	20 Years	43800
7	100 years	73000

Results (relative to Stage: Pre Embankment = 36500 d)

Time taken to compute: 28.847 seconds

Stage: Previous Embankment = 0 d

Data Type	Minimum	Maximum
Total Settlement [ft]	0	0
Consolidation Settlement [ft]	0	0
Immediate Settlement [ft]	0	0
Secondary Settlement [ft]	0	0
Loading Stress [ksf]	0	0
Effective Stress [ksf]	0	0
Total Stress [ksf]	0	0
Total Strain	0	0
Pore Water Pressure [ksf]	0	0
Excess Pore Water Pressure [ksf]	0	0
Degree of Consolidation [%]	0	0
Pre-consolidation Stress [ksf]	0	0
Over-consolidation Ratio	0	0
Void Ratio	0	0
Permeability [ft/y]	0	0
Coefficient of Consolidation [ft ² /y]	0	0
Hydroconsolidation Settlement [ft]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	0	0

Stage: Pre Embankment = 36500 d

Data Type	Minimum	Maximum
Total Settlement [ft]	0	0
Consolidation Settlement [ft]	0	0
Immediate Settlement [ft]	0	0
Secondary Settlement [ft]	0	0
Loading Stress [ksf]	0	0
Effective Stress [ksf]	0	0
Total Stress [ksf]	0	0
Total Strain	0	0
Pore Water Pressure [ksf]	0	0
Excess Pore Water Pressure [ksf]	0	0
Degree of Consolidation [%]	0	0
Pre-consolidation Stress [ksf]	0	0
Over-consolidation Ratio	0	0
Void Ratio	0	0
Permeability [ft/y]	0	0
Coefficient of Consolidation [ft ² /y]	0	0
Hydroconsolidation Settlement [ft]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	0	0

Stage: +1 day (add Emb.) = 36501 d

Data Type	Minimum	Maximum
Total Settlement [ft]	0	0.139028
Consolidation Settlement [ft]	0	0.139028
Immediate Settlement [ft]	0	0
Secondary Settlement [ft]	0	0
Loading Stress [ksf]	-0.000178961	0.701879
Effective Stress [ksf]	-0.000178961	0.701879
Total Stress [ksf]	-0.000178961	0.701879
Total Strain	-1.36813e-005	0.204751
Pore Water Pressure [ksf]	0	0
Excess Pore Water Pressure [ksf]	0	0
Degree of Consolidation [%]	-1.42109e-014	100
Pre-consolidation Stress [ksf]	0	0.654729
Over-consolidation Ratio	-4.02029	0.00685048
Void Ratio	-0.356268	2.38055e-005
Permeability [ft/y]	0	97.6208
Coefficient of Consolidation [ft ² /y]	0	0
Hydroconsolidation Settlement [ft]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	-2.59376e-005	0.0692757

Stage: +1 month = 36530 d

Data Type	Minimum	Maximum
Total Settlement [ft]	0	0.139052
Consolidation Settlement [ft]	0	0.139028
Immediate Settlement [ft]	0	0
Secondary Settlement [ft]	0	2.42595e-005
Loading Stress [ksf]	-0.000178961	0.701879
Effective Stress [ksf]	-0.000178961	0.701879
Total Stress [ksf]	-0.000178961	0.701879
Total Strain	-1.36813e-005	0.204754
Pore Water Pressure [ksf]	0	0
Excess Pore Water Pressure [ksf]	0	0
Degree of Consolidation [%]	-1.42109e-014	100
Pre-consolidation Stress [ksf]	0	0.654729
Over-consolidation Ratio	-4.02029	0.00685048
Void Ratio	-0.356272	2.38055e-005
Permeability [ft/y]	0	97.6208
Coefficient of Consolidation [ft ² /y]	0	0
Hydroconsolidation Settlement [ft]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	-2.59376e-005	0.0692757

Stage: +2 months = 36560 d

Data Type	Minimum	Maximum
Total Settlement [ft]	0	0.139077
Consolidation Settlement [ft]	0	0.139028
Immediate Settlement [ft]	0	0
Secondary Settlement [ft]	0	4.93353e-005
Loading Stress [ksf]	-0.000178961	0.701879
Effective Stress [ksf]	-0.000178961	0.701879
Total Stress [ksf]	-0.000178961	0.701879
Total Strain	-1.36813e-005	0.204757
Pore Water Pressure [ksf]	0	0
Excess Pore Water Pressure [ksf]	0	0
Degree of Consolidation [%]	-1.42109e-014	100
Pre-consolidation Stress [ksf]	0	0.654729
Over-consolidation Ratio	-4.02029	0.00685048
Void Ratio	-0.356276	2.38055e-005
Permeability [ft/y]	0	97.6208
Coefficient of Consolidation [ft ² /y]	0	0
Hydroconsolidation Settlement [ft]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	-2.59376e-005	0.0692757

Stage: 20 Years = 43800 d

Data Type	Minimum	Maximum
Total Settlement [ft]	0	0.144554
Consolidation Settlement [ft]	0	0.139028
Immediate Settlement [ft]	0	0
Secondary Settlement [ft]	0	0.00556845
Loading Stress [ksf]	-0.000178961	0.701879
Effective Stress [ksf]	-0.000178961	0.701879
Total Stress [ksf]	-0.000178961	0.701879
Total Strain	-1.36813e-005	0.205324
Pore Water Pressure [ksf]	0	0
Excess Pore Water Pressure [ksf]	0	0
Degree of Consolidation [%]	-1.42109e-014	100
Pre-consolidation Stress [ksf]	0	0.654729
Over-consolidation Ratio	-4.02029	0.00685048
Void Ratio	-0.357263	2.38055e-005
Permeability [ft/y]	0	97.6208
Coefficient of Consolidation [ft ² /y]	0	0
Hydroconsolidation Settlement [ft]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	-2.59376e-005	0.0692757

Stage: 100 years = 73000 d

Data Type	Minimum	Maximum
Total Settlement [ft]	0	0.160039
Consolidation Settlement [ft]	0	0.139028
Immediate Settlement [ft]	0	0
Secondary Settlement [ft]	0	0.0211724
Loading Stress [ksf]	-0.000178961	0.701879
Effective Stress [ksf]	-0.000178961	0.701879
Total Stress [ksf]	-0.000178961	0.701879
Total Strain	-1.36813e-005	0.206927
Pore Water Pressure [ksf]	0	0
Excess Pore Water Pressure [ksf]	0	0
Degree of Consolidation [%]	-1.42109e-014	100
Pre-consolidation Stress [ksf]	0	0.654729
Over-consolidation Ratio	-4.02029	0.00685048
Void Ratio	-0.360053	2.38055e-005
Permeability [ft/y]	0	97.6208
Coefficient of Consolidation [ft ² /y]	0	0
Hydroconsolidation Settlement [ft]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	-2.59376e-005	0.0692757

Embankments

1. Embankment

Center Line (-10.516, 34.924) to (-10.516, 130.101)
 Number of Layers 1
 Near End Angle 90 degrees
 Far End Angle 90 degrees
 Base Width 32.6

Layer	Stage	Left Bench Width (ft)	Left Angle (deg)	Height (ft)	Unit Weight (kips/ft ³)	Right Angle (deg)	Right Bench Width (ft)
1	Previous Embankment = 0 d	0	12	4.8	0.115	90	0

2. Embankment: "Proposed Embankment"

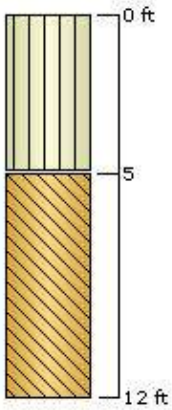
Label Proposed Embankment
 Center Line (-20.066, 34.924) to (-20.066, 130.101)
 Number of Layers 1
 Near End Angle 90 degrees
 Far End Angle 90 degrees
 Base Width 51.7

Layer	Stage	Left Bench Width (ft)	Left Angle (deg)	Height (ft)	Unit Weight (kips/ft ³)	Right Angle (deg)	Right Bench Width (ft)
1	+1 day (add Emb.) = 36501 d	0	19.3	6	0.12	90	0



Soil Layers

Ground Surface Drained: Yes

Layer #	Type	Thickness [ft]	Depth [ft]	Drained at Bottom
1	Stiff CL	5	0	Yes
2	Stiff to Soft ML	7	5	Yes



Soil Properties

Property	Stiff CL	Stiff to Soft ML
Color		
Unit Weight [kips/ft ³]	0.115	0.115
Saturated Unit Weight [kips/ft ³]	0.115	0.115
Primary Consolidation	Enabled	Enabled
Material Type	Non-Linear	Non-Linear
Cc	0.14	0.14
Cr	0.04	0.04
e0	0.74	0.74
OCR	5	2
Cv [ft ² /y]	36	55
B-bar	1	1
Secondary Consolidation	Standard	Standard
Cae/Ca	0.01	0.01
Car/Care	0.01	0.01
Multiple Stress Option	E from CC = 28.7967 ksf	User Defined E = 208.9 ksf
Undrained Su A [kips/ft ²]	0	0
Undrained Su S	0.2	0.2
Undrained Su m	0.8	0.8
Piezo Line ID	0	0

Groundwater

Groundwater method Piezometric Lines
 Water Unit Weight 0.0624 kips/ft³

Piezometric Line Entities

ID	Depth (ft)
1	12 ft

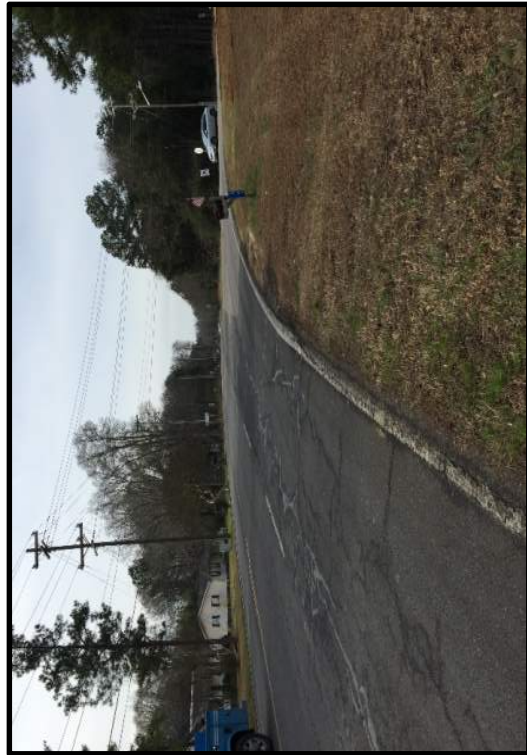
APPENDIX E.
SITE PHOTOGRAPHS



Looking northeast from about station 11+50 SC72



Looking east from station near 14+00 Rambo Road toward intersection with SC72



Looking southwest from about station 21+50 SC72 toward intersection of SC72 and Rambo Road



Looking southwest from about station 31+00

Site Photographs



Looking southeast at businesses near station 36+50 SC72



Looking toward Salluda Trail Middle School from near station 47+50 SC72



Looking north from near station 16+70 Harper Gault Road toward the intersection of SC72 and Harper Gault Road



Looking southeast toward Rock Hill Country Club from near station 74+00 SC72



Looking northeast at soft/wet ditch from about station 105+00



Looking southwest from about station 110+00 SC72. Note Distressed pavement



Looking northeast at business from about station 111+00 SC72



Looking southwest from about station 119+50 SC72