REQUEST FOR PROPOSALS

FOR

BOONE BOULEVARD GREEN INFRASTRUCTURE & CAPACITY RELIEF PROJECT

FC - 8856

ATLANTA, GEORGIA

JoAnn J. Macrina, PE
Commissioner
Department of Watershed Management

Adam L. Smith, Esq., CPPO, CPPB, CPPM, CPP,
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Chief Procurement Officer
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CITY OF ATLANTA

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DEPARTMENT OF PROCUREMENT
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Chief Procurement Officer
asmith@atlantaga.gov

April 25, 2016

ATTENTION INTERESTED PROPONENTS:

Your firm is hereby invited to submit to the City of Atlanta (the "**City**"), Department of Procurement ("**DOP**"), a proposal for **FC-8856 Boone Boulevard Green Infrastructure & Capacity Relief Project.** The City's DOP, on behalf of the Department of Watershed Management ("**DWM**"), is seeking proposals from qualified firms to perform a Design-Build to provide green infrastructure improvements to Boone Boulevard from Mayson Turner Road to Northside Drive (approximately 6300 feet).

A **Pre-Proposal Conference** will be held on **Tuesday, May 10, 2016, at 10:00 a.m. EDT,** at the DOP's Conference Room in Suite 1900. The purpose of the Pre-Proposal Conference is to provide Proponents with detailed information regarding the project and to address questions and concerns. There will be representatives from the DWM, the Ethics Office, the Office of Contract Compliance and Risk Management available at the conference to discuss this project and to answer any questions. Attendance at the Pre-Proposal Conference is **strongly** encouraged for each Proponent desiring to submit a proposal.

Proponents will be allowed to ask questions during the Pre-Proposal Conference. However, please note that oral answers to questions during the Pre-Proposal Conference on May 10, 2016, are **not** authoritative. The last date to submit questions in writing is Friday, **May 13, 2016 by noon, EDT**. Questions may be sent via email to jnwebb@atlantaga.gov, or facsimile at 404-979-7459.

Your response to this Request For Proposal ("**RFP**") will be received by designated staff of the Department of Procurement at City Hall South, 55 Trinity Avenue, S.W., Suite 1900, Atlanta, Georgia 30303, **no later than 2:00 p.m., EDT, Tuesday, June 7, 2016.**

****ABSOLUTELY NO PROPOSALS WILL BE ACCEPTED AFTER 2:00 P.M.****

Proposals will be publicly opened and read at 2:01 p.m., EDT on the respective due date in the Department of Procurement, City Hall South, 55 Trinity Avenue, S.W., Suite 1900, Atlanta, Georgia 30303.

Proposals will be publicly opened and read at 2:01 p.m., EDT on the respective due date in the Department of Procurement, City Hall South, 55 Trinity Avenue, S.W., Suite 1900, Atlanta, Georgia 30303.

This RFP is being made available by electronic means. If accepted by such means, then the Proponent acknowledges and accepts full responsibility to insure that no changes are made to the Proposal. In the event of conflict between a version of the Proposal in the Proponent's possession and the version maintained by DOP, the version maintained by the DOP shall govern.

The Proposal document may also be obtained from the Department of Procurement's Plan Room, City Hall South, 55 Trinity Avenue, S.W., Suite 1900, Atlanta, Georgia 30303, at a cost of **$75.00** per package, beginning on April 25, 2016.

You are required to email and confirm receipt of your business name, contact person, address, phone number, fax number and the project number to the DOP's Plan Room at dop@atlantaga.gov, to be placed on the Plan Holders List. Failure to do so will prevent you from receiving any addenda that are issued and may deem you non-responsive. Any questions regarding the procedures for purchasing a copy of the document or obtaining a copy of the Plan Holder's list should be directed to the Plan Room at (404) 330-6204.

All questions and inquiries concerning this project should be directed in writing to Joyce Webb, Contracting Officer, Department of Procurement, 55 Trinity Avenue, S.W., City Hall South, Suite 1900, Atlanta, Georgia 30303 or questions may be e-mailed to jnwebb@atlantaga.gov .

The City reserves the right to cancel any and all solicitations and to accept or reject, in whole or in part, any and all proposals when it is for good cause and in its best interest.

Thank you for your interest in doing business with the City.

Sincerely,

Adam L. Smith

Adam L. Smith

ALS/jnw

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PART 1

INFORMATION AND INSTRUCTIONS TO PROPONENTS

FC-8856, BOONE BOULEVARD GREEN INFRASTRUCTURE & CAPACITY RELIEF PROJECT

PART 1: INFORMATION AND INSTRUCTIONS TO PROPONENTS

1. **Work Being Procured:** This Request for Proposals ("RFP") from qualified proponents ("Proponent" or "Proponents") by the City of Atlanta ("City"), on behalf of its Department of Watershed Management ("DWM"), seeks to procure work ("Work") for the following project: Contract No. FC-8856, Boone Boulevard Green Infrastructure & Capacity Relief Project. The RFP includes the following parts, including exhibits, attachments and appendices:

   - Part 1 – Information and Instructions to Proponents
   - Part 2 – Contents of Proposals / Required Submittals
   - Part 3 – Evaluation of Proposals
   - Part 4 – Required Procurement Documents
   - Part 5 – Standard Form of Agreement
   - Appendices

2. **Scope of Work:** The Project is designed to provide green infrastructure improvements to Boone Boulevard from Mayson Turner Road to Northside Drive (approximately 6,300 feet). It consists of installing bike lanes, stormwater (bioretention) planters, pervious pavement, new asphalt pavement, and relevant signange and striping. Work to be rendered by the Proponent(s) to complete the project are provided in more detail in Exhibit C - Scope of Work documents included herein. In addition to the above, the City of Atlanta has received separate funding for streetscape improvements to Boone Boulevard. These improvements should include replacement of damaged sidewalks, handicap ramps, and curbing, and the addition of other streetscape elements that can be designed and constructed within the allocated allowance indicated on the Cost Proposal Form.

3. **Method of Source Selection:** This procurement is being conducted in accordance with all applicable provisions of the City of Atlanta's Code of Ordinances, including its Procurement and Real Estate Code and the particular method of source selection for the work sought in this RFP is Code Section 2-1189; Competitive Sealed Proposal. By submitting a Proposal concerning this procurement, a Proponent acknowledges that it is familiar with all laws applicable to this procurement, including, but not limited to, the City's Code of Ordinances and Charter, which laws are incorporated into this RFP by reference.

4. **Minimum Qualifications; Authority to Transact Business in Georgia:**

   4.1 Each Proponent must submit with its Proposal documentation that demonstrates it is duly authorized to conduct business in the State of Georgia.

   4.2 Proponent must meet the Disadvantaged Business Enterprises (DBE) goals specified in Appendix A – Office of Contract Compliance Requirements.

4.3 Proponent shall not have been terminated for cause from any City contract in the preceding ten (10) years nor shall Proponent have any active litigation or claims pending against the City of Atlanta, Georgia.

4.4 Proponent shall have successfully completed at least three (3) projects of similar size and scope of this Project.

4.5 FC-8856 is a Design/Build project. As such, Proponent shall include a written description of streetscape elements and locations included in their proposal as well as cut sheets or concept plans as needed to describe the type and extent of the improvements.

4.6 Proponent shall not award more than forty-nine percent (49%) of the Work to subcontractors.

5. **No Offer by City; Firm Offer by Proponent:** This procurement does not constitute an offer by City to enter into an agreement and cannot be accepted by any Proponent to form an agreement. This procurement is only an invitation for offers from interested Proponents and no offer shall bind City. A Proponent's offer is a firm offer and may not be withdrawn except under the rules specified in City's Code of Ordinances and other applicable law.

6. **Proposal Deadline:** Your response to this RFP must be received by the City's Department of Procurement ("DOP"), 55 Trinity Avenue, S.W., City Hall South, Suite 1900, Atlanta, Georgia 30303-0307 no later than **2:00 p.m., EDT** (as verified by the Bureau of National Standards) on **Tuesday, June 7, 2016**. Any Proposal received after this time will not be considered and will be rejected and returned.

7. **Pre-Proposal Conference:** Each Proponent is strongly encouraged to attend the Pre-Proposal Conference scheduled for **Tuesday, May 10, 2016, at 10:00 a.m.**, at the DOP's Conference Room in Suite 1900. Each Proponent must be fully informed regarding all existing and expected conditions and matters which might affect the cost or performance of the Work. Any failure to fully investigate the Jobsite(s) shall not relieve any Proponent from responsibility from evaluating properly the difficulty or cost of successfully performing the Work.

8. **Proposal Guarantee:**

8.1 Each Proponent is required to furnish a Proposal Guarantee in the amount of five percent (5%) of the Lump Sum Amount (Total Bid Amount). At the option of the Proponent, the Proposal Guarantee may also be cash, a certified check payable to the order of City or a Proposal Bond as provided on Form 8 included in Part 4 herein. A surety executing a Proposal Bond must meet the requirements set forth in Appendix B-Insurance and Bonding Requirements attached to the Agreement included in this RFP.

8.2 No Proposal shall be considered unless it is accompanied by the required guarantee. The Proposal Guarantee shall insure the execution of the Agreement and the furnishing of the performance and payment bonds and insurance by the successful Proponent as required by the Agreement Documents.

8.3 Each Proponent agrees that, if it is awarded the Agreement and fails to execute provide all other documents required to consummate the transaction within fifteen (15) days of the award, City will retain the Proposal Guarantee as liquidated damages and not as a penalty.

8.4 Attorneys-in-fact who sign Proposal Bonds must file with the bond a certified and effectively dated copy of their power of attorney.

9. **Procurement Questions; Prohibited Contacts:** Any questions regarding this RFP should be submitted in writing to, Joyce Webb, Contracting Officer, Department of Procurement, 55 Trinity Avenue, SW, Suite 1900, Atlanta, Georgia 30303-0307, by fax (404) 979-7459 or e-mail **jnwebb@atlantaga.gov**, and must be received by **12:00 p.m., EDT on Friday, May 13, 2016**. Questions received after the designated period may not be considered. Any response made by the City will be provided in writing to all Proponents by Addendum. It is the responsibility of each Proponent to obtain a copy of any Addendum issued for this procurement by monitoring the City' website at www.atlantaga.gov and its Department of Procurement's Plan Room which is open during posted business hours, Suite 1900, 1st Floor, 55 Trinity Avenue, S.W., City Hall South, Atlanta, Georgia 30303. No Proponent may rely on any verbal response to any question submitted concerning this RFP. All Proponents and representatives of any Proponent are **strictly prohibited** from contacting any other City employees or any third-party representatives of the City on any matter having to do with this RFP. All communications by any Proponent concerning this RFP must be made to the City's contact person, or any other City representatives designated by the Chief Procurement Officer in writing.

10. **Ownership of Proposals:** Each Proposal submitted to the City will become the property of the City, without compensation to a Proponent, for the City's use, in its discretion.

11. **Georgia Utility Contractor's License:** The Proponent shall provide its Georgia Utility Contractor's License Number and a copy of the license with the documentation submitted in Part 4 of this RFP. A utility Contractor's license number held by a Subcontractor or issued by another state does **NOT** fulfill this requirement in lieu of the Proponent's Georgia Utility Contractor's License.

12. **Preparation of Proposals:** All Proposals must be submitted on forms supplied by the City and shall be subject to all requirements of the Agreement Documents. All Proposals must be regular in every respect and no interlineations, excisions, or special conditions shall be made or included in the Proposal by the Proponent.

12.1 Lump sum, unit price, and extensions of unit prices must be entered in the appropriate spaces provided on the Proposal Cost Form. Unit prices shall include an appropriate allocation of overhead and other indirect costs so that the summation of unit price extensions and lump sum items represent the Proposal Total amount. In the case of any Proposal item for which a fixed amount predetermined by the City has already been entered on the Proposal Cost Form, the amount so entered shall be conclusive of all Proponents as the price for such item, and shall not be revised unless the City directs a change in the Scope of Work affecting the item to which such amount relates.

12.2 The City may consider as irregular any conditional Proposal or any Proposal on which there is an alteration of, or departure from, the Proposal Cost Form hereto attached and at its option may reject the same.

12.3 Erasure or other changes in the Proposals must be explained or noted over the signature of the Proponent. Failure to do so shall render the Proponent as non-responsive and cause rejection of the Proposal.

12.4 Failure to execute the Proposal Cost Form documents may render the Proponent as non-responsive and cause rejection of the Proposal.

13. Georgia Open Records Act: Each Proponent shall refer to the Georgia Open Records Acts (O.C.G.A. § 50-18-72) for information not subject to public disclosure.

14. How to Submit Proposals: The Proposal must be submitted in sealed envelope(s) or package(s) and the outside of the envelope(s) or package(s) must clearly identify the name of the project: **FC-8856; Boone Boulevard Green Infrastructure & Capacity Relief Project** and, the name and address of the Proponent. All proposals must be submitted to:

Adam L. Smith, Esq., CPPO, CPPB, CPPM, CPP,
CIPC, CISCC, CIGPM, CPPC
Chief Procurement Officer
Department of Procurement
55 Trinity Avenue, S.W.
City Hall South, Suite 1900
Atlanta, GA 30303-0307

14.1 A Proponent is required to submit one (1) original and six (6) copies of its Informational Proposal. Each Informational Proposal must be submitted on 8½" x 11" single-sided, double-spaced, typed pages, using 12–point font size and such pages must be inserted in a standard three-hole ring binder. Each Informational Proposal must contain an index and separate sections for the information requirements set forth in this RFP, as well as for the forms required to be submitted.

14.2 In addition to the hard copy submission, each Proponent must submit two (2) digital versions of its Proposal in Adobe Portable Document Format (PDF) on compact disk (CDs). CD One (1) version should be a duplicate of the hard copy of the Proposal with no deviations in order or layout of the hard copy Proposal. CD Two (2) version should be a redacted version of your hard copy Proposal. Please refer to the Georgia Open Records Acts (O.C.G.A. Section 50-18-72) for those items of documents that can be redacted.

14.3 The City assumes no liability for differences in information contained in the Proponent's printed Proposal and that contained on the CDs. In the event of a discrepancy, the City will rely upon the information contained in the Proponent's printed material (Hard Copy). Each CD should be labeled with the Project Number, Project Name, and the CD Number.

14.4 A Proponent is required to submit, in a separate, sealed envelope, clearly marked "Cost Proposal", one (1) original, marked "Original" and six (6) copies of its Cost Proposal with its Informational Proposal.

15. Execution of Proposal Documents: Proponents shall submit their Proposals, together with the Proposal Guarantee and all forms which the Proponent is required to sign, executed in the appropriate manner as set forth below:

15.1 If the Proponent is a corporation, all documents requiring execution by the Proponent shall be signed by the president or vice-president of the corporation, whose signature shall be attested by the secretary or assistant secretary of the corporation and the corporate seal affixed.

15.2 If the Proponent is an individual, he or she shall sign the documents and his or her signature shall be notarized by a notary public.

15.3 If the Proponent is an individual doing business under a trade name, all documents shall be signed by the Proponent whose signature shall be followed by either, "doing business as," or "trading as," followed by the trade name of the Proponent's business, and notarized by a notary public.

15.4 If the Proponent is a partnership, all forms shall be executed by placing the name of the partnership followed by "By: (the signature of the partner executing)" followed by the word "Partner," and notarized by a notary public.

15.5 If the Proponent is a joint venture, each party to the joint venture shall execute the Proposal Documents in the manner set forth in this article as appropriate for this type of organization.

16. Insurance and/or Bonding Requirements: The Insurance and/or Bonding requirements for any Agreement that may be awarded pursuant to this RFP are set forth in the Insurance and Bonding Requirements included in the appendix of this RFP.

17. Applicable City Office of Contract Compliance ("OCC") Programs: The OCC Programs applicable to this procurement are set forth in Appendix A; Office of Contract Compliance Requirements, included in this RFP. By submitting a Proposal in response to this procurement, each Proponent agrees to comply with such applicable OCC Programs.

18. Evaluation of Financial Information: The City's evaluation of financial information concerning a Proponent and its consideration of such information in determining whether a Proponent is responsive and responsible may involve a review of several items of information required to be included in a Proposal. The City will review the information included in **Form 3**; **Proponent Financial Disclosure** attached to this RFP and any additional information required on that form to be included in a Proposal. Further, if this RFP requires the provision of a Payment Bond and/or Performance Bond if an Agreement is awarded, the City will review the information included in **Form 4.2**; **Certification of Bonding Ability and Form 4.1; Certification of Insurance Ability,** indicating that the financial capacity of the Proponent is such that the insurer(s)/surety(ies) is/are willing to issue insurance and Payment and Performance Bonds for the Proponent if an Agreement is

awarded to it. Further, if this RFP requires a successful Proponent that is awarded an Agreement pursuant to this procurement to post some other type of performance guarantee (e.g. letter of credit, guaranty agreement, etc.), a Proponent must submit with its Proposal a notarized letter from an appropriate financial institution (e.g. bank) indicating that it is willing to issue such performance guarantee for the Proponent if an Agreement is awarded to it.

19. **Special Rules Applicable to Evaluation of Proposals:** A Proponent may be required to submit, in writing, the addresses of any proposed subcontractors or equipment manufacturers listed in the Proposal and to submit other material information relative to proposed subcontractors. City reserves the right to disapprove any proposed subcontractors or equipment manufacturers who's technical or financial ability or resources or whose experience are deemed inadequate.

20. **Examination of Proposal Documents:**

    20.1 Each Proponent is responsible for examining with appropriate care the complete RFP and all Addenda and for informing itself with respect to all conditions which might in any way affect the cost or the performance of any Work. Failure to do so will be at the sole risk of the Proponent, who is deemed to have included all costs for performance of the Work in its Proposal.

    20.2 Each Proponent shall promptly notify City in writing should the Proponent find discrepancies, errors, ambiguities or omissions in the Proposal Documents, or should their intent or meaning appear unclear or ambiguous, or should any other question arise relative to the RFP. Replies to such notices may be made in the form of an Addendum to the RFP, which will be issued simultaneously to all potential Proponents who have obtained the RFP from City.

    20.3 City may in accordance with applicable law, by Addendum, modify any provision or part of the RFP at any time prior to the Proposal due date and time. The Proponent shall not rely on oral clarifications to the RFP unless they are confirmed in writing by City in an issued Addendum.

    20.4 Each Proponent must confirm Addenda have been received and acknowledge receipt by executing the Form 5: Acknowledgment of Addenda attached to this RFP.

21. **Oral Presentations**: Responsive Proponents may be required to participate in an oral presentation to the City Evaluation Committee. The Key Personnel (or some group thereof) identified in the Proponent's Proposal must be active participants in the oral presentation. The Proponent's presentation should demonstrate an understanding of the project and work to be provided. The City will notify responsive Proponent(s) of the date, time and location for the presentation and will provide an agenda or topics for discussion.

22. **Cancellation of Solicitation:** This solicitation may be cancelled in accordance to the City of Atlanta Code of Ordinances.

23. **Award of Agreement; Execution:** If the City awards an Agreement pursuant to this procurement, the City will prepare and forward to the successful Proponent an Agreement for execution substantially in the form included in this RFP. Subsequent to the award and within fifteen (15) days after the prescribed forms are presented for signature, the successful Proponent shall execute and deliver to the City seven (7) copies of the Agreement as included in the Agreement Documents and provide performance and payment bonds and insurance certificates. The failure of the successful Proponent to execute the Agreement and to supply the required bonds within fifteen (15) days after the prescribed forms are presented for signature, or within such extended period as the City may grant, based upon reasons determined sufficient by the City, shall constitute a default, and the Proponent shall forfeit the Proposal Guarantee and the City may either award the Agreement to the next most responsive Proponent or re-advertise for Proposals, and may proceed against the Proposal Bond of the defaulted Proponent. If a more favorable Proposal is received by re-advertising, the defaulting Proponent shall have no claim against the City for a refund.

24. **Surety Bonds:** Regarding submission of surety bonds prior to or subsequent to the Proposal submission, the following requirements pertain:

    24.1 Any surety bond submitted in accordance with the Proposal or Agreement requirements must be issued by a corporate surety company satisfactory to the City and authorized to act as such in the State of Georgia;

    24.2 Such bonds shall conform to the forms provided with the RFP and be completed in accordance with the instructions thereon; and

    24.3 In accordance with Georgia law, and upon award of the Agreement, separate performance and payment bonds shall be required of the successful Proponent, each in an amount not less than the total amount payable under the Agreement.

    24.3.1.1 The performance bond shall remain in effect for two (2) years after final acceptance of the Work or the guaranty period under the Agreement, whichever is the longer.

    24.3.1.2 The payment bond shall remain in effect for the period required under Georgia law for the payment bonds on public construction agreements. Reference is made to the bond forms and the Agreement Documents for additional particulars of the terms required in the bonds. In the case of any inconsistency between the Bond Forms and Georgia law, the law shall control. Finally, alterations, extension of the time allowed for performance, extra and additional Work, and other changes authorized under the Agreement may be made without notice to or consent of the surety or sureties.

25. **Laws and Regulations:** The Proponent's attention is directed to the fact that all applicable state laws, municipal ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the Project shall apply to the Agreement throughout, to the extent that such requirements do not conflict with federal laws or regulations, and they will be deemed to be included in the Agreement the same as though therein written out in full.

    Proponent's attention is directed to the following laws and regulations:

25.1 The Contractor is responsible for all Federal and State government wage requirements;

25.2 Applicable provisions of the Occupational Safety and Health Act must be observed during Work under this Agreement; and

25.3 Appendix A – Requirements of the Office of Contract Compliance.

26. Agreement Terms: The term of the Contract shall be substantial completion of the entire Work, which shall be achieved no later than two hundred seventy (270) calendar days after the date of commencement.

27. Liquidated Damages: The performance of the Work under Agreement within the specified time is essential to the City's economic interests. The attention of potential Proponents is directed to the provisions of the Agreement Documents, which establish the basis for liquidated damages to be paid to the City in the event that the Work is not completed on schedule.

28. Pre-Construction Conference: A pre-construction conference may be held with the successful Proponent and all known Subcontractors at a time and place set by the City.

29. Substitutions: Whenever a Material, article or piece of Equipment is identified on the Plans or in the Specifications by reference to manufacturers' or vendors' names, trade names, catalog numbers, etc., it is intended to establish a standard, and any Material, article or Equipment of other manufacturers and vendors which will perform adequately the duties imposed by the general design will be considered equally acceptable, provided the Material, article or Equipment so proposed is, in the opinion of the City, of equal substance and function. A Material, article or piece of Equipment shall not be purchased or installed by the Proponent without the City's written approval.

29.1 If the term "OR EQUAL" follows the names of approved manufacturers, then other manufacturers desiring approval may submit the product to the City for approval during the bidding phase. The manufacturer should include the following items in this pre-submittal:

29.1.1 Descriptive literature, including information on Materials used, minimum design standards features, manufacturing processes and facilities, and similar information, which will indicate experience and expertise in the manufacture of the product being evaluated;

29.1.2 Performance Specifications applicable to the manufacturer's standard design, which indicate the level of performance to be expected from the product;

29.1.3 A complete set of submittal Drawings of similar Equipment that has been completed and placed into operation;

29.1.4 A list of existing installations of equipment similar in type and size;

29.1.5 Evidence of technical ability of the manufacturer to design and manufacture Equipment and systems meeting project requirements. Evidence submitted

shall include, at a minimum, descriptions of engineering and manufacturing staff capabilities;

29.1.6 Information required to satisfy specified experience requirements or a copy of the bond to be submitted in lieu of experience;

29.1.7 A complete description of field services capabilities, including the location of field service facilities which would serve the proposed facility and the number and qualifications of personnel working from that location;

29.1.8 A complete list of all requirements of the Drawings and Specifications with which the manufacturer cannot conform, including reasons why alternate features are considered equivalent; and

29.1.9 All other information necessary to fully evaluate the product for consideration.

29.2 This pre-submittal shall reach the City no later than three (3) weeks prior to the Proposal due date. Manufacturers will be advised of approval or rejection in writing no later than fourteen (14) days prior to the Proposal due date. Rejected submittals may be supplemented with additional information and resubmitted no later than one (1) week prior to the Proposal due date. Manufacturers making supplementary submittals will be advised of approval or rejection in writing no later than three (3) days prior to the Proposal due date.

29.2.1 NOTE: Proposals based on Equipment, which has not received the approval of the City, will render the Proponent as non-responsive and cause rejection of the Proposal.

29.2.2 If the term "EQUAL TO" precedes the names of approved manufacturers in the Specifications, the Proponent may, after receiving the Notice to Proceed, submit Shop Drawings on the substitute product for the approval of the City.

29.2.3 Any Proponent intending to furnish substitute products is cautioned to verify that the item being furnished will perform the same functions and have the same capabilities as the item specified. The Proponent shall include in his Proposal the cost of accessory items, which may be required by the substitute product and any architectural, structural, mechanical, piping, electrical or other modifications required to accommodate the substitution.

29.2.4 Approval of the City is dependent on his determination that the product offered is essentially equal in function, performance, quality of manufacture, ease of maintenance, reliability, service life and other criteria to that on which the design is based, and will require no major modifications to structures, electrical systems, control systems, or piping systems.

30. Illegal Immigration: Each Proponent must complete and submit a Contractor's Affidavit, attached hereto as Form 1; Illegal Immigration Reform and Enforcement Act Forms with its Proposal. This RFP is subject to the Illegal Immigration Reform and Enforcement Act of 2011 (the "Act"). Pursuant to the Act, the Proponent must provide with its proposal proof of

its registration with and continuing and future participation in the E-Verify Program established by the United States Department of Homeland Security. Under state law, the City cannot consider any Proposal which does not include a completed Contractor's Affidavit. It is not the intent of this notice to provide detailed information or legal advice concerning the Act. All Proponents intending to do business with the City are responsible for independently apprising themselves of and complying with the requirements of the Act and assessing its effect on City procurements and their participation in those procurements. For additional information on the E-Verify program or to enroll in the program, go to https://e-verify.uscis.gov/enroll.

31. **Multiple Awards:** The City reserves, at its sole discretion, the option to award to multiple Proponents. The award(s) will be based on the Scope of Work in its entirety or by components. Multiple awards may be made on the total Scope of Work or to components of the Scope of Work.

32. **Conflict of Interest:** The City has contractual commitments and may have engaged numerous firms providing/or have provided various professional services to the Owner for this Project. These firms and their respective sub-consultant firms may be contractually prohibited from participation in specific work phases of the Project. The Proponent must ensure that all entities with which it contracts have reviewed their contractual obligations and that a conflict of interest would not exist by performing Work on the Project.

PART 2

CONTENTS OF PROPOSALS/REQUIRED SUBMITTALS

Part 2; Contents of Proposals/Required Submittals

1. **General Contents of Proposals:** A Proponent must submit a complete Proposal in response to this RFP in the format specified in this RFP; no other format will be considered. A Proposal will consist of two (2) separate documents:

   1.1. Informational Proposal; and

   1.2. Cost Proposal (Form provided by City at Part IV; Required Procurement Documents). The Cost Proposal will become part of the Agreement attached to this RFP at Part V, if an Agreement is awarded pursuant to this procurement.

2. **Informational Proposal:** An Informational Proposal is comprised of two (2) sources of information:

   2.1. Volume I, information drafted and provided by a Proponent; and

   2.2. Volume II, information provided by a Proponent on forms provided by the City (or required to be created by a Proponent) in this RFP.

   The Informational Proposals must be tabbed as indicated to reflect the sections listed in the Outline below.

3. **Information Required to be Included in Informational Proposal:**

   3.1. **Summary:** The following is a summary of information required to be contained in an Informational Proposal:

   3.1.1. **Information Drafted and Provided by a Proponent:** This information should be included in **Volume I** of the Proposal:

   3.1.1.1. Executive Summary;
   3.1.1.2. Organizational Structure;
   3.1.1.3. Resumes of Key Personnel;
   3.1.1.4. Overall Experience, Qualifications and Performance on Previous Similar Projects; and
   3.1.1.5. Technical Approach
   3.1.1.6. Project Approach

   3.1.2. **Information Provided by a Proponent on Forms Provided by the City ("Required Submittals"):** This information should be included in **Volume II** of the Proposal:

   3.1.2.1. **Form 1;** Illegal Immigration Reform and Enforcement Act (IIREA);
   3.1.2.2. **Form 2;** Contractor Disclosure Affidavit and Questionnaire;
   3.1.2.3. **Form 3;** Proponent Financial Disclosure;

3.1.2.4. **Form 4.1;** Certificate of Insurance Ability;
3.1.2.5. **Form 4.2;** Certification of Bonding Ability;
3.1.2.6. **Form 5;** Acknowledgment of Addenda;
3.1.2.7. **Form 6;** Proponent Contact Directory;
3.1.2.8. **Form 7;** Reference List;
3.1.2.9. **Form 8;** Proposal Bond;
3.1.2.10. **Form 9;** Required Submittal Checklist;
3.1.2.11. Cost Proposal Form
3.1.2.12. Statement of Qualifications;
3.1.2.13. Safety Record Form;
3.1.1.14. Authority to Transact Business in the State of Georgia;
3.1.1.15. Georgia Utility Contractor's License; and
3.1.1.16. Appendix A; City's OCC Programs; Office of Contract Compliance Requirement forms and submittals, including Joint Venture agreement, if applicable.

NOTE: Every space on every form must be completed. If the form requires a Notary, please comply. Failure to complete each form as required may deem you non-responsive. If there are any questions regarding any form, it is strongly recommended that you submit your question(s) to the Contracting Officer listed in the RFP prior to the deadline for submitting questions.

3.2. **Information Requirements Details:** The following is a more detailed summary of the requirements of certain portions of the Informational Proposal. Each Outlined Item should be included in your Proposals and tabbed as indicated:

3.2.1. **Executive Summary (Tab in Volume I)**

3.2.1.1. **Cover Letter:** The executive summary must include a letter with the Proponent's name, address, telephone number and fax number, signed by a person authorized to act on behalf of the Proponent. The letter should also include the name, title, address, e-mail address, telephone number and fax number of the person signing the letter and the name, title, address, e-mail address, telephone number and fax number of one (1) contact person to whom all future correspondence and/or communications may be directed by the City concerning this procurement, if that person is different from the person executing the letter. The letter should also designate the type of business entity that proposes to enter into a Contract with the City and the identity of any other business entities that will comprise the Proponent and include a brief history of the Proponent and statement of the Proponent's approach to providing the services solicited in this RFP.

3.2.1.2. **Detailed Executive Summary:** The purpose of the Detailed Executive Summary is to provide an overview of the Proponent's qualifications to accomplish the project. At a minimum, the Detailed Executive Summary must contain the following information:

3.2.1.2.1. Complete legal name of the Proponent and the name of the legal entities that comprise the Proponent. The Proponent must provide the domicile where each entity comprising it is organized, including entity name, brief history of the entity, contact name, address, phone number, and facsimile number, as well as the legal structure of the entity and a listing of major satellite offices;

3.2.1.2.2. The general and specific capabilities and experience of the Proponent's Team. Each Proponent must identify examples where team members have worked together to complete a project. Discuss how the team was formed and how the team will function as an integrated unit in providing services to the City;

3.2.1.2.3. A description of the Proponent's plan for complying with the City's EBO goals. This section should include detailed information regarding the essential subcontractors/ sub consultants the Proponent intends to use and should indicate the roles and responsibilities these firms will be assigned. Each Proponent must provide a letter from each essential subcontractor/sub consultant indicating that the firm concurs with the role and responsibility Proponent has described; and

3.2.1.2.4. Litigation Disclosure Statement. A declarative statement as to whether the Proponent or any member of the Proponent's team has an open dispute with the City or is involved in any litigation associated with work in progress or completed work in either the private or public sector during the past five (5) years.

3.2.1.2.5 The Executive Summary. The Executive Summary will be evaluated based on completeness of the information requested in a concise, easily understood form.

3.2.2. **Organizational Structure (Tab in Volume I):** The organization will be evaluated based on completeness of the information requested in a concise, easily understood form. The Proponent's Organizational Structure Section of the Proposal should introduce the proposed Proponent's team by:

3.2.2.1. Providing the Proponent's Management Organizational Chart both graphically and in narrative format. The Organizational chart and narrative should provide a description of the Proponent's views on how it will organizationally provide the Services, as well as depict the

relationship of its key personnel roles to that of the Principal-in-Charge and other key members of the management team;

3.2.2.2 Providing a description of how this organizational structure will facilitate managing the Services requested and how an efficient flow of information will be realized from the Organizational structure; and

3.2.2.3. Providing the names of proposed candidates for each function on the chart;

3.2.3. **Key Personnel/Resumes:**

3.2.3.1. Identify and provide an organizational chart and resumes for the individuals that the Proponent will use as Key Personnel. The resumes should detail the minimum qualifications as listed with respect to the position identified. Key Personnel will include but is not limited to the following:

3.2.3.1.1. Project Manager - Must have completed at least three (3) public roadway improvement projects such as surface restoration, streetscapes, street rehabilitation involving full depth restoration and curb repairs, and associated utility work projects within the past five (5) years.

3.2.3.1.2. Construction Manager or Superintendent - Must have constructed at least three (3) public roadway improvement projects such as surface restoration, streetscapes, street rehabilitation involving full depth restoration and curb repairs, and associated utility work projects within the past five (5) years.

3.2.3.1.3 Designer or Design Manager – Must have designed at least three (3) green infrastructure improvement projects that have been successfully implemented within the past five (5) years. Green infrastructure projects incorporated into roadway design is preferred.

3.2.3.1.4. Project QA/QC Manager – Must have five (5) years of onsite construction experience. If experience does not include vegetated green infrastructure, then the Design Manager must provide adequate supervision of the green infrastructure components as they are being installed.

3.2.3.1.5. Project Safety Manager - Must have ten (10) years of related construction industry related experience, or five (5) years' experience if they possess a Certified Safety Professional (CSP) certification or safety and Health degree, and average twenty four (24) hours of formal safety training each year for the past four (4) years.

3.2.3.2 Resumes should be organized as follows:

3.2.3.2.1. Name and Title;

3.2.3.2.2. Professional Background;
3.2.3.2.3. Current and Past Relevant Employment;
3.2.3.2.4. Education;
3.2.3.2.5. Certifications;
3.2.3.2.6. List of three (3) Relevant projects, including:

- Client name:
- Project description;
- Project value;
- Role of the individual;
- The original contract schedule to start and complete the project; and
- The actual start and completion dates of the project.

3.2.3.3. Submission of these names constitutes a commitment to use these individuals if the Proponent is selected, and changes may be made only with the prior written consent of the City. In the event there is a need to replace key team members during the course of the project, Proponent must describe its back-up personnel plan.

3.2.4. **Overall Experience, Qualifications and Performance on Previous Projects (Tab in Volume I):**

3.2.4.1. Proponents should submit examples of previously completed or current projects which are similar in scope and complexity to this project and meet the minimum project experience requirements as shown in 'Statement of Proponent's Qualifications' included herein at Part 4, Required Submittal Forms. If desired, Proponent may also submit a supplemental narrative to clarify the relevant experience of the Proponent and key team members.

3.2.4.2. For construction/renovation Design Projects, please provide all of the following information:

a) Name of Project as bid, name of owner, name of Design Firm, name of Construction Contract Administration Firm;
b) Name, Position or title, address and telephone number of contact person currently employed by each of the above;
c) State the method of Procurement and Construction, i.e., Design-Bid-Build, Design/Build or Construction Manager at Risk;
d) Percent of labor-related items performed by the Proponent's own work force;
e) A complete description including sizes, quantities, structures, and major items of equipment and materials;
f) Names and contact information for major subcontractors, including earthwork, reinforced concrete, landscaping,

electrical, and instrumentation and control. If work was self-performed, please indicate such;

g) Names and contact information for Manufacturer representatives of major equipment items provided on project;

h) The original amount **and** final cost to owner, with an explanation of cost overrun, if any, including change orders; and

i) The original contract time, actual time to complete project and completion date, with an explanation of time overrun, if any.

3.2.5. **Management Plan and Project Approach (Tab in Volume I):** Based on the Proponent's Organizational structure, describe how the Proponent will manage the Work, specifically addressing the following:

3.2.5.1. Proponent's approach to team leadership;

3.2.5.2. How the Proponent will:

3.2.5.2.1. Ensure proper communications among pertinent project team members;

3.2.5.2.2. Assure the City that the Scope of Work will be kept within any established time and budget constraints;

3.2.5.2.3. Establish and maintain the necessary cooperative relationships;

3.2.5.2.4. Coordinate all necessary project activities within that team relationship;

3.2.5.2.5. The tools that are intended to be used to manage these project elements;

3.2.5.2.6. Proponent's proposed method to:

A. Identify and resolve issues during the project duration;

B. Detail how emergencies will be handled; including response times for emergencies (include a map of Proponent's local office in relation to the City's center); and

C. Make critical decisions.

3.2.5.2.7. Describe the management process the Proponent will implement to ensure all work and services performed are to the highest quality. The approach should include a description of the Proponent's process as it pertains to equipment, methods, techniques and procedures used to ensure accurate and comprehensive set of deliverable products. Describe the proponent corrective action plan. Describe how the Proponent's organization structure supports this plan and clearly identify responsible and accountable parties; and

3.2.5.2.8. Proponent must provide a description of the approach to the Scope of Work. All proposals must be comprehensive and include a detailed pilot project timeline and complete project timeline to go along with their narrative.

3.2.6. **Project Technical Approach and Proposal (Tab in Volume I):** Please provide a project approach document that describes the Proponent's understanding and knowledge of the Project Requirements, Project Schedule, the Geotechnical Report, existing site conditions, existing site utilities, proposed technical specifications, and Partial Design Drawings. The Contractor's approach will address the elements of this project including the engineering design, project controls, coordination, and General QA/QC requirements for both design and construction phases of the Work, Permitting requirements for the site, Safety and Security Requirements, and an understanding of the importance of meeting the project schedule. The approach should clearly describe the Proponent's design, permitting and construction activities that will lead to substantial and final completion of the project. This approach shall also clearly describe the proposed pervious pavement manufacturer, installation recommendations, proposed equipment and materials to be used, a description of the mechanical installation equipment and other associated equipment that will provide a successful project. The approach shall describe how the Proponent's team will do the work, describe in detail how: permits will be acquired; the project design will be finalized; work within rights–of–way will be executed; critical traffic and road closures will be planned and coordinated with the City and Community; storage of materials will be handled; and existing utilities will be incorporated into the completed project. The approach shall describe how the Proponent's Team will meet Envision Sustainable Infrastructure Rating System Certification for this project. The approach should identify specific credits and levels of achievement the Proponent's Team will strive to attain. Additionally, please describe the Proponent's approach to public meetings and design input from the community as well as how the Proponent's team will meet the City's First Source Jobs employment requirements.

4. **Cost Proposal.** Each Proponent must submit a Cost Proposal using the form provided by the City at Part 4; Required Procurement Forms. The Cost Proposal must support the Scope of Work contained in the RFP and fully encompass all activities in the Proponent's Proposal. The Cost Proposal shall serve as the baseline for final fee negotiation with the City. **Submit one (1) original, marked "Original" and six (6) copies in a separate envelope.**

5. **Submission of Proposals:** See Part 1, Paragraph 14.0, "How to Submit Proposals" of this RFP.

PART 3

EVALUATION OF PROPOSALS

Part 3; Evaluation of Proposals

All Proposals will be evaluated in accordance with the City's Code of Ordinances and the criteria specified on the Percentage Evaluation Form and considering the information required to be submitted in each Proposal. An Evaluation Committee will review the Proposals in accordance with this RFP.

All Proposals will be evaluated using the following Evaluation Form:

RELATIVE WEIGHT	GRADED ITEM	SCORE
5	**Executive Summary**	
10	**Organizational Structure/Resumes of Key Personnel**	
10	**Overall Experience, Qualifications and Performance on Previous Similar Projects**	
25	**Project Technical Approach**	
10	**Financial Capability**	
25	**Cost Proposal**	
15	**OCC Programs**	
100%	**TOTAL SCORE**	

PART 4

REQUIRED SUBMITAL FORMS

PART 4: REQUIRED SUBMITTAL FORMS

All Respondents, including, but not limited to, corporate entities, limited liability companies, joint ventures, or partnerships, that submit a Proposal or Bid in response to this solicitation must fill out all forms in their entirety, and all forms must be signed, notarized or sealed with the corporate seal (if applicable), as required per each form's instructions.

If Respondent intends to be named as a Prime Contractor(s) with the City, then Respondent must fill out all the forms listed in this solicitation document; otherwise, Respondent may be deemed non-responsive.

Required Submittal (FORM 1)

Illegal Immigration Reform and Enforcement Act Forms (Page 1 of 3)

INSTRUCTIONS TO PROPONENTS:

All Proponents must comply with the Illegal Immigration Reform and Enforcement Act of 2011, O.G.G.A § 13-10-90, et seq. (IIREA). IIREA was formerly known as the Georgia Security and Immigration Compliance Act or GSICA. Proponents must familiarize themselves with IIREA and are solely responsible for ensuring compliance. Proponents must not rely on these instructions for that purpose. They are offered only as a convenience to assist Proponents in complying with the requirements of the City's procurement process and the terms of this RFP.

1. The attached Contractor Affidavit must be filled out COMPLETELY and submitted with the Proposal prior to Proposal due date.

2. The Contractor Affidavit must contain an active Federal Work Authorization Program (E-Verify) User ID Number and Date of Registration.

3. Where the business structure of a Proponent is such that Proponent is required to obtain an Employer Identification Number (EIN) from the Internal Revenue Service, Proponent must complete the Contractor Affidavit on behalf of, and provide a Federal Work Authorization User ID Number issued to, the Proponent itself. Where the business structure of a Proponent does not require it to obtain an EIN, each entity comprising Proponent must submit a separate Contractor Affidavit.

   Example 1, ABC, Inc. and XYZ, Inc. form and submit a Proposal as Happy Day, LLC. Happy Day, LLC must enroll in the E-verify program and submit a single Contractor Affidavit in the name of Happy Day, LLC which includes the Federal Work Authorization User ID Number issued to Happy Day, LLC.

   Example 2, ABC, Inc. and XYZ, Inc. execute a joint venture agreement and submit a Proposal under the name Happy Day, JV. If, based on the nature of the JV agreement, Happy Day, JV. is not required to obtain an Employer Identification Number from the IRS, the Proposal submitted by Happy Day, JV must include both a Contractor Affidavit for ABC, Inc. and a Contractor Affidavit for XYZ, Inc.

4. All Contractor Affidavits must be executed by an authorized representative of the entity named in the Affidavit.

5. All Contractor Affidavits must be duly notarized.

6. All Contractor Affidavits must be submitted with the Proponent's Response to the RFP.

7. Subcontractor and sub-subcontractor affidavits are not required at the time of proposal submission, but will be required at contract execution or in accordance with the timelines set forth in IIREA.

Required Submittal (FORM 1)

Illegal Immigration Reform and Enforcement Act Forms (Page 2 of 3)

Contractor Affidavit under O.C.G.A. § 13-10-91(b)(1)

By executing this affidavit, the undersigned contractor verifies its compliance with O.C.G.A. § 13-10-91, stating affirmatively that the individual, firm or corporation which is engaged in the physical performance of services on behalf of the City of Atlanta has registered with, is authorized to use and uses the federal work authorization program commonly known as E-Verify, or any subsequent replacement program, in accordance with the applicable provisions and deadlines established in O.C.G.A. § 13-10-91. Furthermore, the undersigned contractor will continue to use the federal work authorization program throughout the contract period and the undersigned contractor will contract for physical performance of services in satisfaction of such contract only with subcontractors who present an affidavit to the contractor with the information required by O.C.G.A. § 13-10-91(b). Contractor hereby attests that its federal work authorization user identification number and date of authorization are as follows:

_____ _____

Federal Work Authorization User Identification Number Date of Authorization

Name of Contractor: _____

Name of Project: _____

Name of Public Employer: City of Atlanta

I hereby declare under penalty of perjury that the forgoing is true and correct.

Executed on _____, ____, 20__ in _____(city), _____(state)

_____

Signature of Authorized Officer or Agent

_____

Printed name and Title of Authorized Officer or Agent

SUBSCRIBED AND SWORN BEFORE
ME ON THIS THE ___, DAY OF _____, 20___

_____

NOTARY PUBLIC
My Commission Expires: _____

Required Submittal (FORM 1)

Illegal Immigration Reform and Enforcement Act Forms (Page 3 of 3)

Subcontractor Affidavit under O.C.G.A. § 13-10-91(b)(3)

By executing this affidavit, the undersigned subcontractor verifies its compliance with O.C.G.A. § 13-10-91, stating affirmatively that the individual, firm or corporation which is engaged in the physical performance of services under a contract with (_____ (name of contractor)) on behalf of the City of Atlanta has registered with, is authorized to use and uses the federal work authorization program commonly known as E-Verify, or any subsequent replacement program, in accordance with the applicable provisions and deadlines established in O.C.G.A. § 13-10-91. Furthermore, the undersigned subcontractor will continue to use the federal work authorization program throughout the contract period and the undersigned subcontractor will contract for the physical performance of services in satisfaction of such contract only with sub-subcontractors who present an affidavit to the subcontractor with the information required by O.C.G.A. § 13-10-91(b). Additionally, the undersigned subcontractor will forward notice of the receipt of an affidavit from a sub-subcontractor to the contractor within five business days of receipt. If the undersigned subcontractor receives notice of receipt of an affidavit from any sub-subcontractor that has contracted with a sub-subcontractor to forward, within five business days of receipt, a copy of such notice to the contractor. Subcontractor hereby attests that its federal work authorization user identification number and date of authorization are as follows:

_____ _____

Federal Work Authorization User Identification Number Date of Authorization

Name of Subcontractor: _____

Name of Project: _____

Name of Public Employer: City of Atlanta

I hereby declare under penalty of perjury that the forgoing is true and correct.

Executed on _____, ____, 20__ in _____(city), _____(state)

_____

Signature of Authorized Officer or Agent

_____

Printed name and Title of Authorized Officer or Agent

SUBSCRIBED AND SWORN BEFORE
ME ON THIS THE ___, DAY OF _____, 20____

_____

NOTARY PUBLIC
My Commission Expires: _____

Required Submittal (FORM 2)
Contractor Disclosure Affidavit (Page 1 of 7)

DEFINITIONS FOR THE PURPOSES OF THIS DISCLOSURE AFFIDAVIT

"Affiliate"	Any legal entity that, directly or indirectly through one of more intermediate legal entities, controls, is controlled by or is under common control with the Respondent or a member of Respondent.
"Contractor"	Any person or entity having a contract with the city.
"Control"	The controlling entity: (i) possesses, directly or indirectly, the power to direct or cause the direction of the management and policies of the controlled entity, whether through the ownership of voting securities or by contract or otherwise; or (ii) has direct or indirect ownership in the aggregate of fifty one (51%) or more of any class of voting or equity interests in the controlled entity.
"Respondent"	Any individual or entity that submits a proposal in response to a solicitation. If the Respondent is an individual, then that individual must complete and sign this Disclosure Affidavit where indicated. If the Respondent is an entity, then an authorized representative of that entity must complete and sign this Disclosure Affidavit where indicated. **If the Respondent is a newly formed entity (formed within the last three years), then an authorized representative of that entity must complete and sign this Disclosure Affidavit where indicated, and each of the members or owners of the entity must also complete and sign separate Disclosure Affidavits where indicated.**

Instructions: Provide the following information for the entity or individual completing this Statement (the "Individual/Entity").

A. Basic Information:

1. Name of Individual/Entity responding to this solicitation:

2. Name of the authorized representative for the responding Entity:

B. Individual/Entity Information:

1. Principal Office Address:

2. Telephone and Facsimile Numbers:

3. E-Mail Address:

4. Name and title of Contact Person for the Individual/Entity:

5. Is the individual/Entity authorized to transact business in the state of Georgia?

☐ Yes **(Attach Certificate of Authority to transact business in Georgia from Georgia Secretary of State.)**

☐ No

C. Questionnaire

If you answer "YES" to any of the questions below, please indicate the name(s) of the person(s), the nature, and the status and/or outcome of the information, indictment, conviction, termination, claim or litigation, the name of the court and the file or reference number of the case, as applicable. Any such information should be provided on a separate page, attached to this form and submitted with your Proposal.

1. Please describe the general development of the Respondent's business during the past ten (10) years, or such shorter period of time that the Respondent has been in business.

2. Are there any lawsuits, administrative actions or litigation to which Respondent is currently a party or has been a party (either as a plaintiff or defendant) during the past ten (10) years based upon fraud, theft, breach of contract, misrepresentation, safety, wrongful death or other similar conduct? **YES** ☐ **NO** ☐

3. If "yes" to question number 2, were any of the parties to the suit a bonding company, insurance company, an owner, or otherwise? If so, attach a sheet listing all parties and indicate the type of company involved. **YES** ☐ **NO** ☐ **N/A** ☐

4. Has the Respondent been charged with a criminal offense within the last ten (10) years? **YES** ☐ **NO** ☐

5. Has the Respondent received any citations or notices of violation from any government agency in connection with any of Respondent's work during the past ten (10) years (including OSHA violations)? Describe any citation or notices of violation which Respondent received. **YES** ☐ **NO** ☐

6. Please state whether any of the following events have occurred in the last ten (10) years with respect to the Respondent. If any answer is yes, explain fully the circumstances surrounding the subject matter of the affirmative answer:

(a) Whether Respondent, or Affiliate currently or previously associated with Respondent, has ever filed a petition in bankruptcy, taken any actions with respect to insolvency, reorganization, receivership, moratorium or assignment for the benefit of creditors, or otherwise sought relief from creditors? **YES** ☐ **NO** ☐

(b) Whether Respondent was subject of any order, judgment or decree not subsequently reversed, suspended or vacated by any court permanently enjoining Respondent from engaging in any type of business practice? **YES** ☐ **NO** ☐

(c) Whether Respondent was the subject of any civil or criminal proceeding in which there was a final adjudication adverse to Respondent which directly arose from activities conducted by Respondent. **YES** ☐ **NO** ☐

7. Has any employee, agent or representative of Respondent who is or will be directly involved in the project, in the last ten (10) years:

(a) directly or indirectly, had a business relationship with the City? YES ☐ NO ☐

(b) directly or indirectly, received revenues from the City? YES ☐ NO ☐

(c) directly or indirectly, received revenues from conducting business on City property or pursuant to any contract with the City? YES ☐ NO ☐

8. Whether any employee, agent, or representative of Respondent who is or will be directly involved in the project has or had within the last ten (10) years a direct or indirect business relationship with any elected or appointed City official or with any City employee? YES ☐ NO ☐

9. Whether Respondent has provided employment or compensation to any third party intermediary, agent, or lobbyist to directly or indirectly communicate with any City official or employee, or municipal official or employee in connection with any transaction or investment involving your firm and the City? YES ☐ NO ☐

10. Whether Respondent, or any agent, officer, director, or employee of your organization has solicited or made a contribution to any City official or member, or to the political party or political action committee within the previous five (5) years? YES ☐ NO ☐

11. Has the Respondent or any agent, officer, director, or employee been terminated, suspended, or debarred (for cause or otherwise) from any work being performed for the City or any other Federal, State or Local Government? YES ☐ NO ☐

12. Has the Respondent, member of Respondent's team or officer of any of them (with respect to any matter involving the business practice or activities of his or her employer been notified within the five (5) years preceding the date of this offer that any of them are the target of a criminal investigation, grand jury investigation, or civil enforcement proceeding? YES ☐ NO ☐

13. Please identify any Personal or Financial Relationships that may give rise to a conflict of interest as defined below *[Please be advised that you may be ineligible for award of contract if you have a personal or financial relationship that constitutes a conflict of interest that cannot be avoided]*:

(a) Personal relationships: executives, board members and partners in firms submitting offers must disclose familial relationships with employees, officers and elected officials of the City of Atlanta. Familial relationships shall include spouse, domestic partner registered under section 94-133, mother, father, sister, brother, and natural or adopted children of an official or employee. YES ☐ NO ☐

(b) Financial relationships: Respondent must disclose any interest held with a City employee or official, or family members of a City employee or official, which may yield, directly or indirectly, a monetary or other material benefit to the Respondent or the Respondent's family members. Please describe: YES ☐ NO ☐

_____

_____

_____

D. REPRESENTATIONS

Anti-Lobbying Provision. All respondents, including agents, employees, representatives, lobbyists, attorneys and proposed partner(s), subcontractor(s) or joint venturer(s), will refrain, under penalty of the respondent's disqualification, from direct or indirect contact for the purpose of influencing the selection or creating bias in the selection process with any person who may play a part in the selection process.

Certification of Independent Price Determination/Non-Collusion. Collusion and other anticompetitive practices among Proponents are prohibited by city, state and federal laws. All Respondents shall identify a person having authority to sign for the Respondent who shall certify, in writing, as follows:

> "I certify that this bid proposal is made without prior understanding, agreement, or connection with any corporation, firm, or person submitting an bid or offer for the same supplies, labor, services, construction, materials or equipment to be furnished or professional or consultant services, and is in all respects fair and without collusion or fraud. I understand collusive bidding is a violation of city, state and federal law and can result in fines, prison sentences, and civil damages awards. By signing this document, I agree to abide by all conditions of this solicitation and offer and certify that I am authorized to sign for this Respondent."

Certify Satisfaction of all Underlying Obligations. (If Applicable) If a Contract is awarded through this solicitation, then such Contractor should know that before final payment is made to a Contractor by the City, the Contractor shall certify to the City in writing, in a form satisfactory to the City, that all subcontractors, materialmen suppliers and similar firms or persons involved in the City contract have been paid in full at the time of final payment to the Contractor by the City or will be paid in full utilizing the monies constituting final payment to the Contractor.

Confidentiality . Details of the proposals will not be discussed with other respondents during the selection process. Respondent should be aware, however, that all proposals and information submitted therein may become subject to public inspection following award of the contract. Each respondent should consider this possibility and, where trade secrets or other proprietary information may be involved, may choose to provide in lieu of such proprietary information, an explanation as to why such information is not provided in its proposal. However, the respondent may be required to submit such required information before further consideration.

Equal Employment Opportunity (EEO) Provision. All bidders or Proponents will be required to comply with sections 2-1200 and 2-1414 of the City of Atlanta Code of Ordinances, as follows: During the performance of the agreement, the Contractor agrees as follows:

a. The Contractor shall not discriminate against any employee, or applicant for employment, because of race, color, creed, religion, sex, domestic relationship status, parental status, familial status, sexual orientation, national origin, gender identity, age, disability, or political affiliation. As used here, the words "shall not discriminate" shall mean and include without limitation the following:

Recruited, whether by advertising or other means; compensated, whether in the form of rates of pay, or other forms of compensation; selected for training, including apprenticeship; promoted; upgraded; demoted; downgraded; transferred; laid off; and terminated.

The Contractor agrees to and shall post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officers setting forth the provisions of the EEO clause.

b. The Contractor shall, in all solicitations or advertisements for employees, placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, creed, religion, sex, domestic relationship status, parental status, familial status, sexual orientation, national origin, gender identity, age, disability, or political affiliation.

c. The Contractor shall send to each labor union or representative of workers with which the Contractor may have a collective bargaining agreement or other contract or understanding a notice advising the labor union or workers' representative of the Contractor's commitments under the equal employment opportunity program of the City of Atlanta and under the Code of Ordinances and shall post copies of the notice in conspicuous places available to employees and applicants for employment. The Contractor shall register all workers in the skilled trades who are below the journeyman level with the U.S. Bureau of Apprenticeship and Training.

d. The Contractor shall furnish all information and reports required by the contract compliance officer pursuant to the Code of Ordinances, and shall permit access to the books, records, and accounts of the Contractor during normal business hours by the contract compliance officer for the purpose of investigation so as to ascertain compliance with the program.

e. The Contractor shall take such action with respect to any subcontractor as the city may direct as a means of enforcing the provisions of paragraphs (a) through (h) herein, including penalties and sanctions for noncompliance; provided, however, that in the event the Contractor becomes involved in or is threatened with litigation as a result of such direction by the city, the city will enter into such litigation as is necessary to protect the interest of the city and to effectuate the equal employment opportunity program of the city; and, in the case of contracts receiving federal assistance, the Contractor or the city may request the United States to enter into such litigation to protect the interests of the United States.

f. The Contractor and its subcontractors, if any, shall file compliance reports at reasonable times and intervals with the city in the form and to the extent prescribed by the contract compliance officer. Compliance reports filed at such times directed shall contain information as to employment practices, policies, programs and statistics of the Contractor and its subcontractors.

g. The Contractor shall include the provisions of paragraphs (a) through (h) of this equal employment opportunity clause in every subcontract or purchase order so that such provisions will be binding upon each subcontractor or vendor.

h. A finding, as hereinafter provided, that a refusal by the Contractor or subcontractor to comply with any portion of this program, as herein provided and described, may subject the offending party to any or all of the following penalties:

(1) Withholding from the Contractor in violation all future payments under the involved contract until it is determined that the Contractor or subcontractor is in compliance with the provisions of the contract;

(2) Refusal of all future bids for any contract with the City of Atlanta or any of its departments or divisions until such time as the Contractor or subcontractor demonstrates that there has been established and there shall be carried out all of the provisions of the program as provided in the Code of Ordinances;

(3) Cancellation of the public contract;

(4) In a case in which there is substantial or material violation of the compliance procedure herein set forth or as may be provided for by the contract, appropriate proceedings may be brought to enforce those provisions, including the enjoining, within applicable law, of Contractors, subcontractors or other organizations, individuals or groups who prevent or seek to prevent directly or indirectly compliance with the policy as herein provided.

Prohibition on Kickbacks or Gratuities/Non-Gratuity. The undersigned acknowledges the following prohibitions on kickbacks and gratuities:

a. It is unethical for any person to offer, give or agree to give any employee or former employee a gratuity or an offer of employment in connection with any decision, approval, disapproval, recommendation, preparation or any part of a program requirement or a purchase request, influencing the content of any specification or procurement standard, rendering of advice, investigation, auditing or in any other advisory capacity in any proceeding or application, request for ruling, determination, claim or controversy or other particular matter pertaining to any program requirement or a contract or subcontract or to any solicitation or proposal therefor.

b. It is unethical for any employee or former employee to solicit, demand, accept or agree to accept from another person a gratuity or an offer of employment in connection with any decision, approval, disapproval, recommendation, preparation or any part of a program requirement or a purchase request, influencing the content of any specification or procurement standard, rendering of advice, investigation, auditing or in any other advisory capacity in any proceeding or application, request for ruling, determination, claim or controversy or other particular matter pertaining to any program requirement or a contract or subcontract or to any solicitation or proposal therefor.

c. It is also unethical for any payment, gratuity or offer of employment to be made by or on behalf of a subcontractor under a contract to the prime Contractor or higher tier subcontractor or any person associated therewith as an inducement for the award of a subcontract or order.

Declaration

Under penalty of perjury, I declare that I have examined this Disclosure Affidavit and Questionnaire and all attachments to it, if applicable, and, to the best of my knowledge and belief all statements contained herein and in any attachments, if applicable, are true, correct and complete.

I certify that this offer is made without prior understanding, agreement, or connection with any corporation, firm, or person submitting an offer for the same supplies, services, construction, or professional or consultant services, and is in all respects fair and without collusion or fraud. I understand collusive bidding is a violation of city, state and federal law and can result in fines, prison sentences, and civil damages awards. I agree to abide by all conditions of this solicitation and offer and certify that I am authorized to sign for this Respondent.

Sign here if you are an individual:

Printed Name: _____

Signature: _____

Date: _____, 20___

Subscribed and sworn to or affirmed by _____ **(name) this** ___ **day of** _____, **20**____.

_____

Notary Public of _____ (state)

My commission expires: _____

Sign here if you are an authorized representative of a responding entity or partnership:

Printed Name of Entity or Partnership:_____

Signature of authorized representative:_____

Title: _____

Date: _____, 20__

Subscribed and sworn to or affirmed by _____**(name), as the** _____**(title) of** _____**(entity or partnership name) this**_____**day of** _____, **20**____.

_____

Notary Public of _____(state)

My commission expires: _____

Required Submittal (FORM 3)

Proponent Financial Disclosure (Page 1 of 5)

Instructions: It is necessary for the City to evaluate, verify, and understand the Proponent's financial capability and stability to undertake and perform the Services contemplated in this Solicitation. To accomplish this task, the Proponent must provide accurate and legible financial disclosures to the City as requested below.

A "Proponent" is an individual, entity or partnership submitting a proposal or Proposal in response to a Solicitation.

1. If the Proponent is an individual, financial disclosures for that individual must be provided.

2. If the Proponent is an entity or partnership, financial disclosures for that entity or partnership must be provided.

3. If the Proponent is a newly formed entity or partnership (formed within the last three years), financial disclosures for that entity or partnership must be provided together with full financial disclosure from the entity's or partnership's owners. Financial Disclosure includes a full response to all questions and requests for documentation listed in this Form.

For example, if the Proponent is a newly formed entity (formed within the last three years) made up of two separate entities (e.g., a majority interest owner and a minority interest owner), then financial disclosure is required from the Proponent entity, and financial disclosure is also required from each of the two owners (majority entity owner and minority entity owner) as well.

The Proponent (and its owners, if applicable) must submit hard copies of all financial disclosures in response to this Form.

Required Submittal (FORM 3)

Proponent Financial Disclosure (Page 2 of 5)

Part A - General Information:

Name of the Proponent: _____

Name of individual, entity or partnership completing this Form: _____

Relationship of individual, entity or partnership completing this Form to the Proponent: _____

Contact information of individual, entity or partnership completing this Form: _____

Address _____

Phone Number(s) _____

Email: _____

Required Submittal (FORM 3)

Proponent Financial Disclosure (Page 3 of 5)

Part B: Financial Information:

1. The Proponent, and its owners, if applicable, should demonstrate its financial capability and stability by selecting and providing documentation from one of the following three groups of requests (see below). Please circle which group, (a), (b), or (c), is selected and provide the supporting documentation with the proposal/Proposal.

   (a) Financial statements for the three (3) most recent consecutive fiscal years, audited by a Certified Public Accountant ("CPA"), including:

   (i) Income Statement;
   (ii) Balance Sheet; and
   (iii) Statement of Cash Flows.

   (b) Financial statements for the three (3) most recent consecutive fiscal years, either reviewed or compiled by a Certified Public Accountant ("CPA"), including:

   (i) Income Statement;
   (ii) Balance Sheet; and
   (iii) Satisfactory proof of Proponent's ability to obtain a Performance Bond for the amount described in Appendix B, if applicable.

   (c) Unaudited, self-prepared financial statements for the three (3) most recent consecutive fiscal years, including:

   (i) Income Statement;
   (ii) Balance Sheet;
   (iii) Satisfactory proof of Proponent's ability to obtain a Performance Bond for the amount described in Appendix B, if applicable;
   (iv) Two (2) banks or other institutional lenders' references; and
   (v) Dunn and Bradstreet report for the last two (2) years.

Required Submittal (FORM 3)

Proponent Financial Disclosure (Page 4 of 5)

2. Fill in the blanks below to provide a summary of all of the Proponent's assets and liabilities for the three (3) most recent years (calculated from the date of the end of the fiscal year).

ALL FIGURES BELOW MUST BE REPRESENTED IN U.S. CURRENCY ($).

Standard currency of Proponent's Financial Statements: _____

The exchange rate used: _____ = US $_____

Most recent three (3) years

	Year: 2013 (Thousands)	Year: 2014 (Thousands)	Year: 2015 (Thousands)
Current Assets	$.....	$.....	$.....
Current Liabilities	$.....	$.....	$.....
Property & Equip.	$.....	$.....	$.....
Working Capital	$.....	$.....	$.....
Sales/ Revenue	$.....	$.....	$ .....
Total Assets	$.....	$.....	$.....
Total Liabilities	$.....	$.....	$.....
Interest Charges	$.....	$.....	$.....
Net Income	$.....	$.....	$.....
Net-Worth	$.....	$.....	$.....

3. Do you plan to use or require an open line of credit for the project? Yes or No.

If yes, the Proponent must provide the source of the line of credit on bank letterhead for the bank providing the line of credit. The bank contact information must include: contact name, title, address, telephone, fax and e-mail address.

Required Submittal (FORM 3)

Proponent Financial Disclosure (Page 5 of 5)

Declaration

Under penalty of perjury, I declare that I have examined this Affidavit Disclosure form and all attachments to it, if applicable, and, to the best of my knowledge and belief, and all statements contained in it and all attachments, if applicable, are true, correct and complete.

Whether you are an individual executing this form or you are an authorized representative of an entity executing this form, the person signing below must sign or affirm in the presence of a Notary Public. The Notary Public's signature and seal must be provided, together with the date of the notarial act.

Sign here if you are an individual:

Printed Name: _____

Signature: _____

Date: _____, 20____

Subscribed and sworn to or affirmed by _____ (name) this _____ day of _____, 20___.

_____

Notary Public of_____(state)

My commission expires:_____

Sign here if you are an authorized representative of a responding entity:

Printed Name of Entity: _____

Signature of authorized representative: _____

Title: _____

Date: _____, 20___.

Subscribed and sworn to or affirmed by _____ (name), as the _____ (title) of _____ (entity name) this _____ day of _____, 20___.

_____

Notary Public of_____(state)

My commission expires:_____

Required Submittal (FORM 4.1)

Certification of Insurance Ability Instructions:

Proponents **MUST** submit **a completed copy of this form executed by their insurance company**. Failure to submit completed form will result in the Proponent being deemed non-responsive.

I, _____ [*insert an individual's name*], on behalf of _____ [*insert insurance company full name*], a _____ [*insert type of entity LLC, LLP, corporation, etc.*](**"Insurer"**), hereby represent and certify each of the following to the City of Atlanta, a municipal corporation of the State of Georgia (**"City"**) on this _____ day of _____, 20____ [*insert date*]:

(a) Insurer is licensed by the Insurance and Safety Fire Commissioner of the State of Georgia to transact insurance business in the State of Georgia;

(b) Insurer has reviewed the Agreement attached to the solicitation for Project Number FC-____: _____ (**"Project"**) and its corresponding **Appendix B for Insurance and Bonding Requirements;**

(c) Insurer certifies that if, as of the date written above, _____ (**"Proponent"**) was selected as the successful Proponent for the Project, Insurer would provide insurance to Proponent for this Project in accordance with the terms set forth in the corresponding **Appendix B for Insurance Requirements**; and

PLEASE NOTE: If this Form 4.1 is executed by an Attorney-in-Fact, then Insurer must attach a copy of a duly executed Power-of-Attorney evidencing such authority in addition to correctly completing this Form 4.1. If Proponent is unable to provide City with insurance that comply with the terms of the corresponding Appendix for Insurance Requirements within ten (10) days of receiving notice of intent to award the Project from the City, the City may, in its sole discretion, retain Proponent's security submitted with its offer and/or disqualify Proponent from further consideration for the award of the Agreement.

By executing this certification, Insurer represents that all of the information provided by Insurer herein is true and correct as of the date set forth above.

Insurer: [*insert company name on line provided below*]

Authorized Signatory

_____

By:_____

Print Name:_____

Title:_____

_____

Corporate Secretary/Assistant Secretary

(Seal)

Required Submittal (FORM 4.2)

Certification of Bonding Ability Instructions:

Proponents **MUST** submit **a completed copy of this form executed by their surety.** Failure to submit completed form will result in the Proponent being deemed non-responsive.

I, _____ [*insert an individual's name*], on behalf of _____ [*insert surety company full name*], a _____ [*insert type of entity LLC, LLP, corporation, etc.*](**"Surety"**), hereby represent and certify each of the following to the City of Atlanta, a municipal corporation of the State of Georgia (**"City"**) on this _____ day of _____, 20____ [*insert date*]:

(a) Surety is licensed by the Insurance and Safety Fire Commissioner of the State of Georgia to transact surety business in the State of Georgia;

(b) Surety has reviewed the Agreement attached to the solicitation for Project Number FC-___: _____ ("Project") and its corresponding **Appendix B for Insurance and BondingRequirements;**

(c) Surety certifies that if, as of the date written above, _____ (**"Proponent"**) was selected as the successful Proponent for the Project, Surety would provide bonding to Proponent for this Project in accordance with the corresponding **Appendix B for Insurance and Bonding Requirements**; and

(d) **Surety only**: The Surety states that Proponent's uncommitted bonding capacity (not taking into account this Project) is approximately $ _____(U.S.). Surety's statement set forth in this Section (d) does not represent a limitation of the bonding capacity of Proponent or that Proponent will have the bonding capacity noted above at the time of contract execution for this Project.

PLEASE NOTE: If this Form 4.2 is executed by an Attorney-in-Fact, then Surety must attach a copy of a duly executed Power-of-Attorney evidencing such authority in addition to correctly completing this Form 4.2. If Proponent is unable to provide City with bonds that comply with the terms of the corresponding Appendix for Insurance Requirements within ten (10) days of receiving notice of intent to award the Project from the City, the City may, in its sole discretion, retain Proponent's security submitted with its offer and/or disqualify Proponent from further consideration for the award of the Agreement.

By executing this certification, Surety represents that all of the information provided by Surety herein is true and correct as of the date set forth above.

Surety: [*insert company name on line provided below*]

_____

By:_____

Print Name: _____

Title:_____

_____

Corporate Secretary/Assistant Secretary
(Seal)

Required Submittal (FORM 5)

Acknowledgment of Addenda

Proponents should sign below and return this form with their Proposal(s) to the Department of Procurement, 55 Trinity Avenue, City Hall South, Suite 1900, Atlanta, Georgia 30303, as acknowledgment of receipt of certain Addenda.

This is to acknowledge receipt of the following **Addenda** for **FC-____**; _____:

1. _____;
2. _____;
3. _____; and
4. _____.

Dated the _____day of _____, 20__.

Corporate Proponent: [Insert Corporate Name]	Non-Corporate Proponent: [Insert Proponent Name]
_____	_____
By:_____	By:_____
Print Name:_____	Print Name:_____
Title:_____	Title:_____
_____ Corporate Secretary/Assistant Secretary (Seal)	_____ Notary Public (Seal) My Commission Expires:_____

Required Submittal (FORM 6)

Proponent Contact Directory[1]

NAME	POSITION/TITLE	MAILING ADDRESS	OFFICE PHONE	CELL PHONE	EMAIL ADDRESS AND FAX NUMBER

[1] The purpose of the Proponent Contact Directory is to provide the City with a centralized, easily identified source of important contacts and other information regarding each of the business entities constituting a Proponent. This Proponent Contact Directory should include the names, positions/titles, firms, mailing addresses, phone and fax numbers and e-mail addresses for each of the following as it pertains to each of the firms in a Proponent's team:

1. At least two (2) individuals, one primary the other(s) secondary, authorized to represent the firm for purposes of this RFP; and
2. Proponent Service Provider Key Personnel (as appropriate) listed in the Services Agreement included in this RFP at Part 5.

Required Submittal (FORM 7)

Reference List

Each Proponent must provide a list of at least three (3) references using the below-referenced format. The City is interested in reviewing references that are able to attest to a Proponent's performance ability and credibility in a particular industry or trade.

Reference: Name
Address
City, State, Zip
Phone
Fax

Project Title:

Contact Person: _____
Direct Telephone: _____
Email Address: _____

Date(s) of Project: _____

Description of Services:

Total Amount of Contract Including Change Orders:

Proponent's Role and Responsibilities:

Current Completion Status:

(Use the Same Format to Provide the Additional References)

Required Submittal *"Unless a Proponent Elects to Submit an Alternative Form of Payment"*
(FORM 8)

Proposal Bond (Page 1 of 2)

KNOW ALL MEN BY THESE PRESENTS, THAT WE_____
_____
hereinafter called the PRINCIPAL, and _____
_____
hereinafter called the SURETY, a corporation chartered and existing under the laws of the State of _____, and duly authorized to transact Surety business in the State of Georgia, are held and firmly bound unto the City of Atlanta, Georgia **(OBLIGEE)**, in the penal sum of either: [i] _____ Dollars and Cents ($_____); or [ii] 5% of PRINCIPAL'S Proposal amount for **PROJECT NUMBER FC-___**; _____, good and lawful money of the United States of America, to be paid upon demand of the OBLIGEE, to which payment well and truly to be made we bind ourselves, our heirs, executors, administrators and assigns, jointly and severally and firmly by these presents.

WHEREAS the PRINCIPAL has submitted to the OBLIGEE, for **PROJECT NUMBER FC-__**; _____, a Proposal;

WHEREAS the PRINCIPAL desires to file this Bond in accordance with law, in lieu of a certified Proponent's check otherwise required to accompany this Proposal;

NOW THEREFORE: The conditions of this obligation are such that if the Proposal be accepted, the PRINCIPAL shall within ten (10) calendar days after receipt of written notification from the CITY of the award of the Contract execute a Contract in accordance with the Proposal and upon the terms, conditions and prices set forth therein, in the form and manner required by the City of Atlanta, Georgia, and execute sufficient and satisfactory Performance and Payment Bonds payable to the OBLIGEE, each in the amount of one hundred percent (100%) of the total Contract price in form and with security satisfactory to said OBLIGEE, then this obligation to be void; otherwise, to be and remain in full force and virtue in law; and the SURETY shall upon failure of the PRINCIPAL to comply with any or all of the foregoing requirements within the time specified above immediately pay to the OBLIGEE, upon demand the amount hereof in good and lawful money of the United States of America, not as a penalty but as liquidated damages.

In the event suit is brought upon this Bond by the OBLIGEE and judgment is recovered, the SURETY shall pay all costs incurred by the OBLIGEE in such suit, including attorney's fees to be fixed by the Court.

PLEASE NOTE: If this Form 8 is executed by an Attorney-in-Fact, then Surety must attach a copy of a duly executed Power-of-Attorney evidencing such authority in addition to correctly completing this Form 8.

Required Submittal *"Unless a Proponent Elects to Submit an Alternative Form of Payment"*
(FORM 8)

Proposal Bond (Page 2 of 2)

This Proposal Bond is for the Penal Sum of:

[i] _____ Dollars and Cents ($_____), being in the amount of 5% of the CONTRACT Sum; or [ii] 5% of PRINCIPAL'S Proposal amount for **PROJECT NUMBER FC-____;** _____. The money payable on this Bond shall be paid to the OBLIGEE, for the failure of the Proponent to execute a CONTRACT within ten (10) days after receipt of the Contract form and at the same time furnish a Payment Bond and Performance Bond.

IN TESTIMONY THEREOF, the PRINCIPAL and SURETY have caused these presents to be duly signed and sealed this _____day of _____20__.

Corporate Proponent:
[Insert Corporate Name]

_____
Signature:_____
Print Name:_____
Title:_____

_____
Corporate Secretary/Assistant Secretary
(Seal)

Non-Corporate Proponent:
[Insert Proponent Name]

_____
Signature:_____
Print Name:_____
Title:_____

_____
Notary Public (Seal)

My Commission Expires:_____

SURETY:

Signature:_____

Attorney-in-Fact:_____

Print Name: _____

Required Submittal (FORM 9)

Required Submittal Checklist

The following submittals shall be completed and submitted with each Proposal see table below "Required Proposal Submittal Check Sheet." Please verify that these submittals are in the envelope before it is sealed. *Disclaimer:* **It is each Proponents sole responsibility to ensure that their proposal to the City is inclusive of all required submittal documents outlined on the below-referenced checklist; as well as within other parts of the solicitation document.**

Submit one (1) Original Proposal, signed and dated, and six (6) complete copies of the Original Proposal including all required attachments.

In addition to the hard copy submissions, each Proponent shall submit two (2) digital versions of its Proposal Submission in Adobe Portable Document Format ("PDF") on compact disk (CDs). CD One (1) version should be a duplicate of the hard copy of the Proposal with no deviations in order or layout of the hard copy proposal. CD Two (2) version should be a redacted version of the hard copy Proposal Submission. Please refer to the Georgia Open Records Acts (O.C.G.A. § 50-18-72) for information not subject to public disclosure.

The City assumes no liability for differences in information contained in the Proponent's printed Proposal Submission and that contained on the CDs. In the event of a discrepancy, the City will rely upon the information contained in the Proponent's printed material (Hard Copy). Each CD should be labeled with the Project Number, Project Name, and the CD Number.

Item Number	Required Proposal Submittal Check Sheet	Check ☐
1	**Volume I** – Informational Proposal: ☐ Executive Summary ☐ Organizational Structure ☐ Resumes of Key Personnel ☐ Overall Experience, Qualifications and Performance on Previous Similar Projects ☐ Management Plan ☐ Project Approach ☐ Technical Approach	
2	**Volume II** - Office of Contract Compliance (**Appendix A** Required Submittals Forms 1-5)	
3	**Volume II** – All Required Procurement Documents **(if any of the required submittal documents are not submitted or incomplete within your Proposal submittal package, your firm may be deemed non-responsive).** Required Submittals include but are not limited to: ☐ Form 1; Illegal Immigration Reform and Enforcement Act ☐ Form 2; Contractor Disclosure Form ☐ Form 3; Proponent Financial Disclosure ☐ Form 4.1; Certification of Insurance Ability ☐ Form 4.2; Certification of Bonding Ability ☐ Form 5; Acknowledgement of Addenda ☐ Form 6; Proponent Contact Directory ☐ Form 7; Reference List ☐ Form 8; Proposal Bond ☐ Form 9; Required Submittal Checklist ☐ Statement of Qualifications ☐ Safety Record Form ☐ Authority to Transact Business in the State of Georgia ☐ Georgia Utility Contractor's License	
3A	**Separate Sealed Envelope** ☐ **Cost Proposal**	
4	**Proponent's Official Company Name:** **Company Physical Address:**	
5	**President/Vice President/Owner Name:** **Title:**_____ **Office Telephone Number:**_____ **Direct Cell Telephone Number:**_____ **Email Address:**_____	
6	**Primary Point-of-Contact Concerning RFP:**_____ **Title:**_____ **Office Telephone Number:**_____ **Direct Cell Telephone Number:**_____ **Email Address:**_____	

COST PROPOSAL

Contractor Name: _____

COST PROPOSAL FORM

PROJECT IDENTIFICATION:

OWNER:

1. BASIS OF COST PROPOSAL

1.01 Proponent will complete the Work in accordance with the Agreement Documents for the prices listed on the "Schedule of Lump Sum Prices" (subsection 1.02) and "Alternates" (subsection 1.03) of this Cost Proposal Form. The total cost of the project is indicated as the "Lump Sum".

1.02 Lump Sum Prices

SCHEDULE OF LUMP SUM PRICES

Item Number	Description	Total Price
1	Milling and Paving	$
2	Landscaping	$
3	Traffic Signals	$
4	ADA Sidewalk Ramps	$
5	All Other Work Included in the Scope of the Project	$
6	$1,000,000 Streetscape Allowance (Joseph E Lowery to Northside Drive)	
	Total Bid Amount (Lump Sum Items 1-6)	**$**

LUMP SUM AMOUNT

_____ Dollars

($ _____)

1.03 Alternates

A. The Undersigned Proponent proposes that should any of the following Alternates be accepted and incorporated into the Agreement. The Agreement price will be adjusted if the City determines to include any or all alternates.

B. All Proponents shall submit a valid cost proposal for each of the Alternates listed and described below. Any Proponent's failure or neglect to provide a valid cost proposal for any or each of the Alternates listed and described below, shall deem that Proponent to be

non-responsive, and that Proponent to be non-responsible to perform the Work of the Project; and the Proposal rejected.

C. Owner reserves the right to select any Alternate, in any order, or to select no Alternates. All/any Alternates selected by the Owner shall be made at the time of its review of the submitted proposals. Such selection of any, or no Alternates, shall be added to the submitted Cost Proposal amount. The Project will be awarded to the Proponent with the most responsive proposal, including selected Alternates, if any.

ADD ALTERNATE A – Replace Existing Granite Curb and Extended Curb Tapers: The Design-Builder shall install new or reclaimed granite curbing along extended taper areas and where existing granite curb is to remain in their current locations (as described in Sec. 1.4.1 of Exhibit A-1, "Scope of Work, Project Approach, Project Criteria")

ADD UNIT PRICE FOR _____ DOLLARS PER LINEAR FOOT

ADD ALTERNATE B – Furnish and Install Trees: The Design-Builder shall furnish and install trees in the stormwater planters and associated landscaped strips along the roadway. The work includes all associated temporary erosion & sediment control, excavation, planting, initial watering and care, and other related work for installation of the trees. Tree installation shall be performed on an as-needed and as-requested basis.

ADD _____DOLLARS PER TREE INSTALLATION (estimated quanitity up to 150 trees)

ADD ALTERNATE C – Extend Project Through and East of the Intersection with Northside Drive: The Design-Builder shall extend the bike lanes through and east of the intersection with Northside Drive as shown on the Drawings. The work includes two new sidewalk ramps, one new traffic signal, sidewalk pavement repair, pavement markings, as well as design and other related work for completion of the bike lane extension as indicated on the Drawings.

ADD LUM SUM_____DOLLARS

STATEMENT OF PROPONENT'S QUALIFICATIONS

This Statement is to accompany bids submitted for the following project: **FC: 8856, Boone Boulevard Green Infrastructure and Capacity Relief Project. Proponents must meet the minimum qualification criteria set forth under items 5, 7, 9, and 11 - 15 of this section and must provide the staffing plan and organization chart as set forth under item 6 and 10 respectively of this section to be deemed a "Responsible and Responsive Proponent".**

1. NAME OF BIDDER: _____

2. BUSINESS ADDRESS: _____

_____

3. TELEPHONE NUMBER: _____

4. OFFICIAL REPRESENTATIVE AND TITLE: _____

_____

5. Using the forms provided in this Section, list previously completed or current projects which are similar in scope and complexity to this project which were completed or assigned to your firm or joint venture, including: Name of project, location of project, owner's name, address and phone number, description of work performed, initial contract amount, final contract amount, start date, scheduled completion date and actual completion date. (If a joint venture, list separately for each joint venture partner.) Limit to 5.

    a. The similar project experience shall demonstrate that the Design Builder has successfully designed and constructed three (3) public roadway improvement projects such as surface restoration, streetscapes, street rehabilitation involving full depth restoration and curb repairs, and associated utility work within the past five (5) years;
    b. Within the last five (5) years, the Design Builder must have successfully constructed a minimum of 20,000 square feet of pervious concrete;
    c. Design Builder must meet the National ready Mixed Concrete Association (NRMCA) certification requirements;
    d. Within the last five (5) years the Design Build team must have successfully designed and constructed a minimum of 3,000 square feet of vegetated green infrastructure, such as bioretention and bioswales;
    e. For each project submitted as documentation of similar project experience, provide all the information specified in items 1 through 9 below. Projects should demonstrate the design experience and construction experience of the Design Builder;

1) Name of project as bid, name of Owner, name of Design Firm, name of Construction Contract Administration Firm.
2) Name, position or title, address and telephone number of contact person currently employed by each of the above.
3) State the method of Procurement and Construction, i.e., Design-Bid-Build, Design/Build or Construction Manager at Risk.
4) Percent of labor-related items performed by the Proponent's own work force.
5) A complete description including sizes, quantities, structures, and major items of equipment and materials.
6) Names and contact information for major subcontractors, including earthwork, reinforced concrete, landscaping, electrical, and instrumentation and control. If work was self-performed, please indicate such.
7) Names and contact information for manufacturer representatives of major equipment items provided on project.
8) The original amount and final cost to Owner, with an explanation of cost overrun, if any, including change orders.
9) The original contract time, actual time to complete project and completion date, with an explanation of time overrun, if any.

6. Provide a staffing plan identifying key personnel anticipated to be assigned to the Project. An organizational chart will be included in the proposal that shows the structure of Design Builder, all subcontractors and the associated key personnel required for this project. Provide a brief description and title for each position identified in the staffing plan including the key personnel.

7. Pervious concrete must be placed and finished by a NRMCA-certified Pervious Concrete "Installer" or "Craftsman." The Design Builder must employ at least one certified Craftsman who must be onsite, overseeing each placement crew during all concrete placement, or three certified Installers who must be onsite working as members of each placement crew during all concrete placement.

8. If a firm is the successful Proponent, the key personnel must be actively involved in the day-to day operations of the design and construction of this Project.

9. Proponents shall not award more than forty-nine percent (49%) of the Work to Subcontractors.

10. Provide the following information for the organization proposed for this project:

    a. Organizational chart.

    b. Indicate the participation by the various members in the organization, as shown on the organizational chart; in the management; and in the division of work (If a joint venture, indicate percent of man hours and percent of project cost to be performed by each joint venture member).

11. Using the forms provided in this Section, provide information for key project personnel: Project Manager, Project Superintendent, Design Manager, Project Safety Manager and Project QA/QC Manager. Provide evidence that key personnel have experience on similar projects. Provide resumes (maximum 2 pages each) of the proposed project manager, proposed design manager, proposed project safety manager, proposed QA/QC manager and proposed construction superintendent. For the purposes of Proposal evaluation, key personnel shall include these persons employed by a general contractor, major subcontractors, and design engineering firm. Experience can be from employment prior to being employed by the Proponent. The following key personnel shall meet these requirements:

    a. The Project Manager shall have successfully constructed three (3) public roadway improvement projects such as surface restoration, streetscapes, street rehabilitation involving full depth restoration and curb repairs, and associated utility work projects within the past five (5) years.
    b. The Design Manager – Must have designed at least three (3) green infrastructure improvement projects that have been successfully implemented within the past five (5) years. Green infrastructure projects incorporated into roadway design is preferred.
    c. The Project Superintendent shall have successfully constructed three (3) public roadway improvement projects such as surface restoration, streetscapes, street rehabilitation involving full depth restoration and curb repairs, and associated utility work projects within the past five (5) years.
    d. The Project QA/QC Manager must have five (5) years of onsite construction experience. If experience does not include vegetated green infrastructure, then the Design Manager must provide adequate supervision of the green infrastructure components as they are being installed.
    e. The Project Safety Manager must have ten (10) years of related construction industry related experience, or five (5) years' experience if they possess a Certified Safety Professional (CSP) certification or safety and Health degree, and average twenty four (24) hours of formal safety training each year for the past four (4) years.
    f. The Quality Control Manager or the Site Safety Officer may not serve any other key personnel roles.

12. The Proponent must have an established Safety Program that as a minimum includes those items as listed on the attachment entitled *"SAFETY RECORD FORM"*.

13. The Proponent's Workman's Compensation Ratings (EMR-Experience Modification Rate) must not exceed an average of 1.0 over the last three (3) years.

    Proponent's Workman's Compensation Ratings (EMR-Experience Modification Rate) _____

14. The Proponent's OSHA Incidence Rates must not exceed the Industry Standard published by the U.S. Department of Labor(2002) (i.e.-Recordable Incidence Rates of 6.2 and Loss

Time Incidence Rates of 2.4 per OSHA definition and calculation) for the last three (3) years.

a. Proponent's Recordable Incidence Rates _____

b. Proponent's Lost Time Incidence Rates _____

15. If there have been any fatalities during the last five (5) years on any projects performed by the Pro or on any work performed under the direct supervision of a proposed Project Manager and the Contractor or proposed Project Manager was cited by OSHA for "Willful", in performing the work in which the fatality occurred, the Proponent will be disqualified based on the City's review. The Proponent may also be disqualified in the event that a Recordable Incident occurred due to the same condition that existed when a previous fatality occurred and resulted in an OSHA citation or failure to implement a corrective action plan.

a. Fatalities during the last five (5) years where Contractor was cited by OSHA for "Willful" or "Serious" Violation _____

b. Fatalities during the last five (5) years where the proposed Project Manager was cited by OSHA for "Willful" or "Serious" Violation.

_____

The previous statements and attachments are true, correct, and complete to the best of my knowledge.

Date: _____

Firm Name: _____

By: _____

Title: _____

Sworn to and subscribed before me

this ____ day of _____, 201__

_____

Notary Public of: _____(State)

My Commission Expires:_____

STATEMENT OF PROPONENT'S QUALIFICATIONS

PROPONENT PROJECT EXPERIENCE FORM

NAME: _____

Project No. _____

(Complete Form Only For Projects That Meet Minimum Criteria)

Project Name	
Project Location	
Contractor's Project Manager	
Contractor's Project Superintendent	
Owners Representative & Phone Number	
Design Engineer Representative Name & Phone Number	
Initial Contract Amount	$
Final Contract Amount	$
Project Duration	Date Started: Date Completed: Time Extensions:
Was Project Completed on Time?	
Description of Major Project Components	

*Proponent may provide documentation showing equivalent information substantiating minimum qualifications required for this Project.

STATEMENT OF PROPONENT'S QUALIFICATIONS

KEY PERSONNEL EXPERIENCE

NAME: _____

TITLE: _____

Project No. _____

(Complete Form Only For Projects That Meet Minimum Criteria)

Project Name	
Project Location	
Contractor's Project Manager	
Owners Representative & Phone Number	
Design Engineer Representative Name & Phone Number	
Initial Contract Amount	$
Final Contract Amount	$
Project Duration	Date Started: Date Completed: Time Extensions:
Was Project Completed on Time?	
Description of Major Project Components	

*Proponent may provide documentation showing equivalent information substantiating minimum qualifications required for this Project.

SAFETY RECORD FORM

I. General Information

Name of Firm:	
Business Address:	
Telephone:	Fax:
Prepared by/Title:	Date prepared:

II. Experience Modification Rates

A. List your firm's Workers Compensation Experience Modification Rates (EMR) for the last three years.

Year	Experience Modification Rate (EMR)

III. OSHA Incidence Rates

A. List your firm's Occupational Safety Health Administration (OSHA) total recordable incidence rates for the last three years.

Year	Total Recordable Incidents	Total Hours Worked	OSHA Incidence Rate*

* Use your OSHA Form No. 200 and the formula:

(Total Incidents x 200,000 hours) ÷ (Number of hours worked) = Incidence Rate

III. OSHA Incidence Rates (cont'd)

B. Provide your incidence rates over the last three years for the following categories:

Category	Incidence Rate by Year*		
	Year _____	Year _____	Year _____
Injuries and Illness with Lost Work Days			
Injuries and Illness with Job Transfer or Restricted Work Days			

* Use your OSHA Form No. 200 and the formula:

(Total Incidents x 200,000 hours) ÷ (Number of hours worked) = Incidence Rate

C. Provide your incidences of fatality over the last five years:

Category	Fatalities by Year				
	Year _____	Year _____	Year _____	Year _____	Year _____
Number of Fatalities					

D. Does your firm have any upheld OSHA citations in the past five years?

Yes ❑ No ❑ (If yes, attach explanation)

IV. Safety Program Information

A. Do you have a written safety program?

Yes ❑ No ❑ (If yes, attach outline)

B. Which of the following does your safety program contain:

1. Does your company require health and safety training of its subcontractors?

   Yes ❑ No ❑

2. Is documentation of health and safety training required?

   Yes ❑ No ❑

3. Do you have a Hazard Communication Program (29 CFR 1910.1200, CCR Title 8 Section 5194)?

   Yes ❑ No ❑

4. Do you have a Confined Space Entry and Rescue Program (29 CFR 1910.146, CCR Title 8 Section 5156-5159)?

Yes ❑ No ❑ (If yes, attach explanation)

5. Do you have a "Hot Work" permit program (29 CFR 1910.146, CCR Title 8 5156-5159)?

   Yes ❑ No ❑ (If yes, attach explanation)

6. Do you have a "Lock-Out/Tag-Out" program (29 CFR 1910.417)?

   Yes ❑ No ❑ (If yes, attach explanation)

C. *Do you have an Equipment Maintenance Program for the following:*

1.	Miscellaneous construction tools and equipment?	Yes ❑	No ❑
2.	Ladders?	Yes ❑	No ❑
3.	Scaffolds?	Yes ❑	No ❑
4.	Heavy Equipment?	Yes ❑	No ❑
5.	Vehicles?	Yes ❑	No ❑

D. *Do you have a new employee safety orientation program?*

Yes ❑ No ❑

1. If yes, does it include instruction in the following:

(a)	Company Safety Policy	Yes ❑	No ❑
(b)	Company Safety Rules	Yes ❑	No ❑
(c)	Safety Meeting Attendance	Yes ❑	No ❑
(d)	Company Safety Record	Yes ❑	No ❑
(e)	Hazard Recognition	Yes ❑	No ❑
(f)	Hazard Reporting	Yes ❑	No ❑
(g)	Injury Reporting	Yes ❑	No ❑
(h)	Non-Injury Accident Reporting	Yes ❑	No ❑
(i)	Personal Protective Equipment	Yes ❑	No ❑
(j)	Respiratory Protection	Yes ❑	No ❑
(k)	Fire Protection	Yes ❑	No ❑
(l)	Housekeeping	Yes ❑	No ❑
(m)	Toxic Substance	Yes ❑	No ❑
(n)	Electrical Safety	Yes ❑	No ❑
(o)	Fall Protection	Yes ❑	No ❑
(p)	First-Aid/CPR	Yes ❑	No ❑
(q)	Driving Safety	Yes ❑	No ❑
(r)	Hearing Conservation	Yes ❑	No ❑
(s)	Lock-Out/Tag-Out	Yes ❑	No ❑
(t)	Bloodborne Pathogens	Yes ❑	No ❑
(u)	Asbestos	Yes ❑	No ❑
(v)	Confined Spaces	Yes ❑	No ❑
(w)	Hazard Communication	Yes ❑	No ❑

IV. Safety Program Information (cont'd)

E. Do you conduct safety meetings for your employees? Yes ❑ No ❑

1. If yes, how often:

Daily ❑ Weekly ❑ Bi-weekly ❑ Monthly ❑ As Needed ❑

F. Do you conduct health and safety audits of work in progress?

Yes ❑ No ❑

1. If yes, who conducts the audits?

_____

2. How often are the audits conducted?

_____

G. Do you notify all employees of accidents and precautions related to accidents and near misses?

Yes ❑ No ❑

1. If yes, how is this notification accomplished?

(a) Safety meetings Yes ❑ No ❑
(b) Post notification in office Yes ❑ No ❑
(c) Post notification at the site where the incident occurred Yes ❑ No ❑
(d) Other _____

H. Is safety a criteria in evaluating the performance of:

1. Employees Yes ❑ No ❑
2. Supervisors Yes ❑ No ❑
3. Management Yes ❑ No ❑

I. Does your firm hold "tailgate" safety meetings? Yes ❑ No ❑

1. If yes, how often:

Daily ❑ Weekly ❑ Bi-weekly ❑ Monthly ❑ As Needed ❑

J. Does your company have a drug and alcohol testing policy?

Yes ❑ No ❑

K. Does your company require that subcontractors participate in a drug surveillance/testing program?

Yes ❑ No ❑

L. Does your company have a method of disseminating safety information?

Yes ❑ No ❑

Required Submittal

AUTHORITY TO TRANSACT BUSINESS IN GEORGIA

FC-8856, Design/Build Boone Boulevard Green Infrastructure & Capacity Relief Project

Copy of authorization must be included in Proposal

Required Submittal

GEORGIA UTILITY CONTRACTOR'S LICENSE CERTIFICATION

FC-8856, Design/Build Boone Boulevard Green Infrastructure & Capacity Relief Project

Contractor's Name: _____

Utility Contractor's License Number: _____

Expiration Date of License: _____

FC Number and Project Name: **FC-8856, Design/Build Boone Boulevard Green Infrastructure & Capacity Relief Project**

Copy of License must be included in Proposal

C-3

CONCEPTUAL DESIGN PLANS

CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT

REHABILITATION PLAN AND PROFILE OF PROPOSED

JOSEPH E. BOONE BOULEVARD NW GREEN INFRASTRUCTURE & CAPACITY RELIEF PROJECT
CONCEPTUAL DESIGN PLANS

COA CONTRACT No.: FC-4906D
TASK ORDER #: 14

LOCATION MAP

DEPARTMENT OF WATERSHED MANAGEMENT
JO ANN J. MACRINA, P.E.
COMMISSIONER

DESIGN DATA
TRAFFIC A.D.T.: 194 (308)
SPEED DESIGN: 25 MPH
MIN. K-VALUE:
CREST - 12
SAG - 26
*SPEED DESIGN BASED ON EXISTING PROFILE GRADE.

THE DATA TOGETHER WITH ALL OTHER INFORMATION SHOWN ON THESE PLANS OR IN ANYWAY INDICATED THEREBY, WHETHER BY DRAWINGS OR NOTES, OR IN ANY OTHER MANNER ARE BASED UPON FIELD INVESTIGATIONS AND ARE BELIEVED TO BE INDICATIVE OF ACTUAL CONDITIONS. HOWEVER, THE SAME ARE SHOWN AS INFORMATION ONLY, ARE NOT GUARANTEED AND DO NOT BIND THE CITY OF ATLANTA IN ANY WAY.

LENGTH OF PROJECT	CITY OF ATLANTA CONTRACT No. FC-4906D MILES: 1.3 miles
NET LENGTH OF ROADWAY	1.3 Miles
NET LENGTH OF PROJECT	1.3 Miles
GROSS LENGTH OF PROJECT	1.3 Miles

THIS PROJECT HAS BEEN PREPARED USING THE HORIZONTAL GEORGIA COORDINATE SYSTEM OF 1984 (NAD 1983)/84 WEST ZONE, AND THE NORTH AMERICAN VERTICAL DATUM (NAVD) OF 1988.

GEORGIA811 Utilities Protection Center, Inc.
Know what's **below.** **Call** before you dig

BC/DHA A JOINT VENTURE
[illegible] HAMMOND DRIVE
SUITE [illegible]
ATLANTA, GEORGIA [illegible]

SUBMITTED
DATE
APPROVED
DATE

LINE IS 2 INCHES AT FULL SIZE
IF NOT 2" - SCALE ACCORDINGLY

EXTERNAL REFERENCE FILES

REVISIONS

ZONE	REV	DESCRIPTION	BY	DATE	APP

CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT

BOONE BOULEVARD
GREEN INFRASTRUCTURE &
CAPACITY RELIEF PROJECT

COVER SHEET

SHEET NUMBER
001

PRELIMINARY, NOT FOR PUBLIC USE, GENERAL RELEASE OR CONSTRUCTION

INDEX OF DRAWINGS

No.	DESCRIPTION	DATE
001	COVER SHEET	
002	INDEX OF DRAWINGS AND GENERAL NOTES	
003	SPECIAL PROVISIONS	
004	NOTES	
005	TYPICAL SECTIONS	
006	EXISTING CONDITIONS PLAN AND PROFILE	
007	EXISTING CONDITIONS PLAN AND PROFILE	
008	EXISTING CONDITIONS PLAN AND PROFILE	
009	EXISTING CONDITIONS PLAN AND PROFILE	
010	EXISTING CONDITIONS PLAN AND PROFILE	
011	EXISTING CONDITIONS PLAN AND PROFILE	
012	EXISTING CONDITIONS PLAN AND PROFILE	
013	EXISTING CONDITIONS PLAN AND PROFILE	
014	EXISTING CONDITIONS PLAN AND PROFILE	
015	EXISTING CONDITIONS PLAN AND PROFILE	
016	EXISTING CONDITIONS PLAN AND PROFILE	
017	EXISTING CONDITIONS PLAN AND PROFILE	
018	EXISTING CONDITIONS PLAN AND PROFILE	
019	PROPOSED CONDITIONS PLAN	
020	PROPOSED CONDITIONS PLAN	
021	PROPOSED CONDITIONS PLAN	
022	PROPOSED CONDITIONS PLAN	
023	PROPOSED CONDITIONS PLAN	
024	PROPOSED CONDITIONS PLAN	
025	PROPOSED CONDITIONS PLAN	
026	PROPOSED SIGNING AND MARKING PLAN	
027	PROPOSED SIGNING AND MARKING PLAN	
028	PROPOSED SIGNING AND MARKING PLAN	
029	PROPOSED SIGNING AND MARKING PLAN	
030	PROPOSED SIGNING AND MARKING PLAN	
031	PROPOSED SIGNING AND MARKING PLAN	
032	PROPOSED SIGNING AND MARKING PLAN	
033	COA TYPICAL DETAILS	
034	COA TYPICAL DETAILS	
035	GI TYPICAL DETAILS	

GENERAL NOTES

1. THIS PROJECT IS LOCATED ON BOONE BOULEVARD, NW, ATLANTA, BEGINNING AT MASON TURNER STREET INTERSECTION AND ENDING ON THE EAST SIDE OF NORTHSIDE DRIVE ON IVAN ALLEN JR. BOULEVARD.
2. THE OWNER OF RECORD IS THE CITY OF ATLANTA. THE ENTIRE PROJECT IS WITHIN THE CITY OF ATLANTA RIGHT-OF-WAY AND GDOT NORTHSIDE DRIVE RIGHT-OF-WAY.
3. EXISTING SITE SURVEY FOR THIS PROJECT WAS PROVIDED BY THE DWM DATED AUGUST 8, 2014
4. IT IS THE RESPONSIBILITY OF THE DESIGN BUILD CONTRACTOR TO BECOME FAMILIAR WITH THE CONSTRUCTION DOCUMENTS TO ENSURE THEY HAVE AN ADEQUATE UNDERSTANDING OF THE REQUIREMENTS TO COMPLETE THE DESIGN BUILD CONSTRUCTION PROJECT WITH MINIMAL INTERRUPTIONS DUE TO REQUEST FOR INFORMATION (RFI) OR CHANGE ORDERS (CO).
5. THE CONTRACTOR IS REQUIRED TO FULLY MAINTAIN FULL REGULATORY COMPLIANCE DURING CONSTRUCTION. ANY FINES RESULTING FROM REGULATORY COMPLIANCE ISSUES ASSOCIATED WITH THE CONTRACTOR'S WORK SHALL BE BORNE SOLELY BY THE CONTRACTOR
6. ALL WORK SHALL COMPLY WITH APPLICABLE REQUIREMENTS AND RECOMMENDATIONS OF STANDARDS PUBLISHED BY LISTED AGENCIES AND TRADE ASSOCIATIONS, EXCEPT TO THE EXTENT MORE DETAILED AND STRINGENT REQUIREMENTS ARE INDICATED OR REQUIRED BY LOCAL GOVERNING REGULATIONS.
7. INSTALLATIONS SHALL COMPLY WITH ALL APPLICABLE FEDERAL, STATE, MUNICIPAL AND LOCAL CODES. WORK SHALL BE SUBJECT TO INSPECTION AND APPROVAL REQUIREMENTS OF THE LOCAL AUTHORITY HAVING JURISDICTIONS.
8. THE CONTRACTOR SHALL USE THE LATEST VERSION OF THE CITY OF ATLANTA CONSTRUCTION SPECIFICATIONS AND STANDARD DETAILS. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO CONFORM WITH ALL THE REQUIREMENTS OF THE SPECIFICATIONS, ESPECIALLY AS THEY RELATE TO COOPERATING WITH UTILITY OWNERS AND LOCATION OF UTILITES THAT EXIST ON THE SITE.
9. DURING CONSTRUCTION THE CONTRACTOR IS REQUIRED TO POST EMERGENCY CONTACT SIGNS LISTING THEIR CONTACT INFORMATION.
10. THE LOCATIONS OF THE EXISTING UTILITES SHOWN ARE APPROXIMATE. THE EXACT LOCATIONS AND SIZES SHALL BE DETERMINED IN THE FIELD BY THE CONTRACTOR AND THE UTILITY COMPANIES. THE GENERAL LOCATIONS OF KNOWN UTILITES ARE SHOWN OR IDENTIFIED HEREIN AND REFLECT THE DWM'S BEST RECORDS AND ON-SITE INVESTIGATION. THE DWM MAKES NO EXPRESSED OR IMPLIED GUARANTEE OF ACCURACY OR THAT OTHER UTILITIES ARE NOT LOCATED IN THE CONSTRUCTION VICINITY
11. THE CONTRACTOR SHALL CONFIRM THE UTILITY LOCATIONS AND DEPTHS BY POTHOLING. BACKFILL WITH UNWASHED ASTM #4 STONE
12. BOONE BOULEVARD MAY HAVE STREETCAR TRACKS ABANDONED IN PLACE. DOCUMENTS FOR THE EXISTING FACILITY THAT ARE AVAILABLE FOR REVIEW BY THE CONTRACTOR ARE AS FOLLOWS:
    - HISTORIC STREETCAR SYSTEMS IN GEORGIA
13. DUE TO THE PROXIMITY OF LIVE UNDERGROUND AND OVERHEAD UTILITES, THE DWM IS NOT RESPONSIBLE FOR ANY DAMAGE OR INJURY SUSTAINED DURING CONSTRUCTION BY ANY PERSON, VEHICLES, OR EQUIPMENT USED ON OR ADJACENT TO THE PROJECT SITE.
14. THE CONTRACTOR WILL NOT BE COMPENSATED FOR ANY DELAY OR DAMAGE CAUSED BY UNDERGROUND UTILITES, OBSTRUCTIONS OR ANY OTHER ITEM NOT BEING REMOVED OR RELOCATED IN ADVANCE OF THE WORK
15. ANY AND ALL DAMAGE TO EXISTING UNDERGROUND UTILITES AS A RESULT OF THE CONTRACTOR'S ACTIONS WILL BE REPAIRED IMMEDIATELY AT THE CONTRACTOR'S EXPENSE
16. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROPER AND LAWFUL DISPOSAL OF ALL EXCESS ASPHALT, CONCRETE, DIRT, DEBRIS AND OTHER WASTE MATERIALS, AS DIRECTED BY THE CITY, AT NO ADDITIONAL COST.
17. A GENERAL SEQUENCE OF CONSTRUCTION SHALL BE SUBMITTED 7-DAYS PRIOR TO THE PRE-CONSTRUCTION CONFERENCE AND BE A TOPIC OF DISCUSSION AT THAT CONFERENCE.
18. EROSION CONTROL DEVICES SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBING ACTIVITY AS RECOMMENDED IN THE MANUAL FOR EROSION AND SEDIMENT CONTROL IN GEORGIA, LATEST EDITION.
19. THE CONTRACTOR SHALL NOTIFY THE DEPARTMENT OF WATERSHED MANAGEMENT OF ANY ON-SITE CONFLICTS AND/OR INACCURATE DATA PRIOR TO PROCEEDING WITH THE WORK
20. THE CONTRACTOR SHALL TAKE THE PROPER PRECAUTIONS SO AS NOT TO DAMAGE EXISTING FACILITES, STRUCTURES AND LANDSCAPING THAT ARE TO REMAIN. THE CONTRACTOR SHALL RESTORE DAMAGED AREAS TO THEIR ORIGINAL CONDITION OR BETTER, UNLESS NOTED OTHERWISE.
21. THE CONTRACTOR SHALL PROVIDE TEMPORARY UTILITY CONNECTIONS AND STORM DRAINAGE.
22. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL CONNECTIONS AND CONTINUOUS SERVICE, INCLUDING THE UNITED STATES POSTAL SERVICE.
23. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING PEDESTRIAN AND VEHICLE TRAFFIC IN THE CONSTRUCTION ZONE AT ALL TIMES. ALL TEMPORARY DETOURS AND LANE CLOSURES SHALL BE COORDINATED WITH AND APPROVED BY THE CITY.
24. ALL PERMANENT AND TEMPORARY TRAFFIC CONTROL DEVICES SHALL MEET CURRENT MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) STANDARDS.
25. THE EXISTING ROAD PROFILE AND CROSS SECTION IS THE FINAL PROFILE GRADE LINE AND ROADWAY CROSS SECTION
26. THE ROADWAY SURFACE TO REMAIN AND SHALL BE MILLED AND OVERLAYED WITH 1 1/2 INCH OF ASPHALT.
27. GENERALLY ALL GRASS SWALES UPSTREAM OF THE STORMWATER PLANTERS WILL HAVE A SWALE CROSS SECTION.
28. ALL SIGNING AND MARKING AND TRAFFIC CONTROL ITEMS SHALL CONFORM WITH THAT OF THE CURRENT GDOT STANDARD SPECIFICATIONS FOR MATERIALS AND INSTALLATIONS.
29. ALL SEDIMENT AND DEBRIS REMOVED FROM THE SANITARY AND COMBINED SEWERS SHALL BE HAULED IN APPROVED CONTAINERS THAT PREVENT ODOR AND DRIPPING. THE LEGAL DISPOSAL OF THIS MATERIAL SHALL BE THE CONTRACTOR'S RESPONSIBILITY.
30. PORTIONS OF THE EXISTING STORM SEWER SYSTEM WILL HAVE TO BE MODIFIED WITH RESPECT TO THE INLETS. THIS MAY REQUIRE THE REMOVAL OF EXISTING INLETS, CONVERSION INLETS TO JUNCTION MANHOLES, NEW INLETS, AND NEW INLETS IN COORDINATION WITH THE GREEN INFRASTRUCTURE APPURTENANCES. THESE INLETS WILL REQUIRE A STANDARD TRAP BOTTOM AS SHOWN ON DETAIL NO. SW-G_CB005, AND A TYPE "C" CATCH BASIN TOP, AS SHOWN ON DETAILS NO. SW-G_CB001 CB-1 AND SW-C_CB011.
31. THE EXISTING STORM, SANITARY, AND COMBINED SEWER SYSTEMS THAT ARE TO REMAIN SHALL BE CLEANED
32. THE CONTRACTOR WILL MAINTAIN RECORDS AS WORK PROGRESSES AND SUBMIT DIMENSIONAL SKETCHES FOR ALL COMPLETED WORK AS CONSTRUCTED SHOWING PROGRESS ACCURATELY AS REQUIRED TO SATISFY THIS REQUIREMENT EACH MONTH AS A CONDITION OF PROCESSING THE CONTRACTOR'S PAY REQUEST. INACCURATE OR INCOMPLETE AS-BUILTS WILL PREVENT THE CONTRACTOR FROM RECEIVING PAYMENT. BY EXECUTING THE CONTRACT, THE CONTRACTOR SHALL ACKNOWLEDGE AND ACCEPT THE CONDITION AND AGREES TO MEET AND FULLY SATISFY THIS REQUIREMENT AND CONTRACTUAL OBLIGATIONS EACH MONTH. AN ELECTRONIC AS-BUILT SET (AUTOCAD FORMAT) OF CONSTRUCTION PLANS SHALL BE SUBMITTED WITH THE FINAL PAYMENT REQUEST.
33. CURB ALIGNMENT TRANSITIONS BETWEEN EXISTING AND PROPOSED LOCATIONS SHALL BE MADE WITH STRIPING RATHER THAN CURBING.
34. CHANGES IN THE CURB ALIGNMENT WILL NECESSITATE ADJUSTMENTS TO EXISTING STORM DRAIN INLETS AND PIPING WHICH ARE NOT REFLECTED IN THIS PRELIMINARY DESIGN. D/B CONTRACTOR SHALL DESIGN ALL NECESSARY ADJUSTMENTS IN THE EXISTING STORMWATER DRAINAGE SYSTEM TO ACCOMMODATE THE NEW ROAD AND GREEN INFRASTRUCTURE ELEMENTS.
35. CONTRACTOR SHALL ENSURE ALL DROP-INLET GRATES ARE BIKE-SAFETY GRATES, AND SHALL REPLACE ANY GRATES THAT ARE NOT.
36. THE DRAWINGS GENERALLY REFLECT THE DESIGN/BID BASE SCOPE OF WORK, HOWEVER, THERE ARE SEVERAL ADD-ALTERNATE BID ITEMS INCLUDING
    A. WHERE CURBING IS TO REMAIN IN THE CURRENT LOCATION, THE BASE BID IS TO BE BASED ON THE ASSUMPTION THAT THE CURB CONDITION IS ACCEPTABLE AND DOES NOT INCLUDE REPLACEMENT OF THE CURBING. THE D/B CONTRACTOR'S BID SHALL INCLUDE AN ADD-ALTERNATE FOR REPLACEMENT OF THE CURBING, IN ITS CURRENT LOCATION, IN THE EVENT THAT DWM ELECTS TO REPLACE IT
    B. BASE BID SHALL INCLUDE ALL PLANTINGS IN THE STORMWATER PLANTERS, WITH THE EXCEPTION OF TREES. D/B CONTRACTOR SHALL SUBMIT PRICING FOR THE STORMWATER PLANTER TREES AS AN ADD-ALTERNATE ITEM.
    C. THE CITY MAY ELECT TO EXTEND THE PROJECT THROUGH AND EAST OF THE INTERSECTION WITH NORTHSIDE DRIVE (AS SHOWN ON THE DRAWINGS) AND INCORPORATE STREETSCAPE IMPROVEMENTS INTO THE PROJECT WHICH WILL BE FUNDED SEPARATELY. THE D/B CONTRACTOR'S BID SHALL INCLUDE SEPARATE PRICING FOR THE WORK IN AND EAST OF THE NORTHSIDE DRIVE INTERSECTION AND A DESCRIPTION OF THE PROPOSED STREETSCAPE IMPROVEMENTS TO BE PROVIDED WITH THE BALANCE OF THE STREETSCAPE BUDGET INCLUDED IN THE BID FORM

BC/DHA
A JOINT VENTURE
1555 HAMMOND DRIVE
SUITE 400
ATLANTA, GEORGIA 30328

SUBMITTED:
DATE
APPROVED:
DATE

LINE IS 2 INCHES AT FULL SIZE
DESIGNED
DRAWN
CHECKED
CHECKED
APPROVED

EXTERNAL REFERENCE FILES

REVISIONS

ZONE	REV	DESCRIPTION	BY	DATE	APP

CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT

BOONE BOULEVARD
GREEN INFRASTRUCTURE & CAPACITY RELIEF PROJECT

INDEX OF DRAWINGS AND GENERAL NOTES

DWM PROJECT NUMBER
CLIENT PROJECT NUMBER
SHEET NUMBER 002
SHEET NUMBER 02 OF 35

PRELIMINARY, NOT FOR PUBLIC USE, GENERAL RELEASE OR CONSTRUCTION

GENERAL

1. CONTRACTOR IS RESPONSIBLE FOR PROVIDING THE FINAL DESIGN INCLUDING BUT NOT LIMITED TO CONSTRUCTION DOCUMENTS STAMPED BY AN ENGINEER REGISTERED IN THE STATE OF GEORGIA AND EROSION CONTROL CERTIFICATIONS AS REQUIRED FOR NPDES PERMIT(S).
2. CONTRACTOR TO PROVIDE CALCULATIONS AND ELECTRONIC AUTOCAD FINAL AS-BUILTS FOR THE DEPARTMENT OF WATERSHED MANAGEMENT, OFFICE OF ENGINEERING SERVICES, WITHIN THIRTY DAYS AFTER COMPLETION OF INSTALLATION
3. CONTRACTOR MUST SCHEDULE AND ATTEND MEETINGS TO REVIEW DESIGN/CONSTRUCTION WITH THE DEPARTMENT OF WATERSHED MANAGEMENT, OFFICE OF ENGINEERING SERVICES THROUGHOUT THE DESIGN/BUILD PROJECT.
4. DEPARTMENT OF WATERSHED MANAGEMENT, OFFICE OF ENGINEERING SERVICES TO PROVIDE COPY OF THE GEOTECHNICAL REPORT FOR THE PROJECT.
5. AN OPERATIONS AND MAINTENANCE MANUAL IS REQUIRED UPON COMPLETION OF PROJECT TO PROVIDE GUIDANCE FOR MAINTENANCE ACTIVITIES.
6. ALL EQUIPMENT RECOMMENDED AND REQUIRED FOR OPERATION AND MAINTENANCE OF THE PLANTERS OR PERVIOUS PAVEMENT MUST BE IDENTIFIED BY CONTRACTOR FOR PURCHASE BY DWM FOR USE BY DPW
7. DWM TO PROVIDE TWO DCM INSPECTORS TO SUPPLEMENT TWO DWM A/E INSPECTORS FOR THIS PROJECT. THE INSPECTORS WILL COORDINATE WITH EACH OTHER AND HAVE A REPRESENTED ATTEND EACH WEEKLY MEETING.
8. DWM A/E TO PROVIDE CONSTRUCTION ADMINISTRATIVE SERVICES FOR DWM AND BE REPRESENTED AT WEEKLY MEETINGS. DWM TO PROVIDE A MANAGEMENT TEAM TO ATTEND ALL WEEKLY MEETINGS.
9. WHERE DEEMED APPROPRIATE, ADDITIONAL GREEN INFRASTRUCTURE SUCH AS TREE WELLS, CURB CUTS, RAIN GARDENS, ETC. MAY BE NEGOTIATED AND INCLUDED IN THE PROJECT BY CHANGE ORDER OR WORK AUTHORIZATION.

TRAFFIC CONTROL

1. CONTRACTOR IS RESPONSIBLE FOR DESIGNING, PERMITTING, COORDINATING AND IMPLEMENTING ALL TRAFFIC CONTROL REQUIRED FOR THE PROJECT THROUGH ALL LOCAL, STATE AND FEDERAL AUTHORITIES.
2. PROVIDE UNIFORMED OFFICERS FOR TRAFFIC CONTROL FOR ALL WORK ON ARTERIALS, COLLECTORS AND AT SIGNALIZED INTERSECTIONS.
3. ALL TRAFFIC CONTROL MUST CONFORM TO THE CURRENT EDITION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) AND SHALL BE SUBJECT TO ALL LOCAL CODES, POLICIES AND REGULATIONS OF THE AGENCY HAVING JURISDICTION OVER THE AREA WHERE THE WORK IS PERFORMED.
4. ALL SIGNAGE, CHANNELIZING DEVICES, ARROW DISPLAYS, LIGHTING DEVICES AND OTHER TRAFFIC CONTROL DEVICES SHALL CONFORM TO THE DESIGN REQUIREMENTS CONTAINED IN THE MUTCD WHICH SPECIFICALLY GOVERN SUCH FEATURES AS SIZE, CONTRAST, COLORS, SHAPE, COMPOSITION, USE OF SYMBOLS, ETC. USE OF "HOME MADE" OR CONTRACTOR-FABRICATED DEVICES ARE PROHIBITED.
5. INSTALL AND MAINTAIN TEMPORARY TRAFFIC CONTROL DEVICES ADJACENT TO AND WITHIN THE PROJECT WORKZONE IN ACCORDANCE WITH THE APPROVED TCP AND THE MUTCD. INSTALLATION OF THE TRAFFIC CONTROL DEVICES SHALL PROCEED IN ACCORDANCE WITH MUTCD PHASING AND SHALL BE PERFORMED PRIOR TO THE START OF CONSTRUCTION OPERATIONS.
6. RELOCATE TEMPORARY AND/OR PERMANENT TRAFFIC CONTROL DEVICES AS REQUIRED BY THE PHASING OF THE WORK. REMOVE DEVICES THAT NO LONGER APPLY TO THE WORK IN PROGRESS. TEMPORARILY COVER SIGNS WHEN THEY ARE NOT APPLICABLE TO CURRENT CONDITIONS.
7. IF REQUIRED BY THE WORK IN PROGRESS, MAINTAIN TRAFFIC CONTROL DEVICES 24 HOURS A DAY WITH ADEQUATE BARRICADES, LIGHTS, ARROWS, ETC. TO PROTECT THE PUBLIC FROM TRAFFIC HAZARDS AND ACCIDENTS.
8. REMOVE ALL TEMPORARY TRAFFIC CONTROL DEVICES UPON COMPLETION OF THE WORK AND REPAIR ALL DAMAGE CAUSED BY THEIR INSTALLATION
9. CONTROL PARKING OF CONSTRUCTION PERSONNEL VEHICLES AND CONSTRUCTION EQUIPMENT TO PREVENT INTERFERENCE WITH PUBLIC TRAFFIC AND PUBLIC ACCESS TO PRIVATE DRIVES, PARKING AREAS, SIDEWALKS, RESIDENCES, ETC.
10. PREVENT PARKING ON OR ADJACENT TO SIDE STREETS OR IN NON-DESIGNATED AREAS. THE CONTRACTOR AT HIS EXPENSE WILL REPAIR VEHICLE DAMAGE CAUSED BY THE CONTRACTOR OR HIS PERSONNEL TO RESIDENTIAL OR PRIVATE PROPERTY.
11. SCHEDULE AND COORDINATE DELIVERY AND OFF-LOADING OF MATERIALS SO AS TO NOT INTERFERE WITH TRAFFIC OUTSIDE OF THE CONTRACTOR'S DESIGNATED WORK ZONE OR STAGING AREA
12. WHEN REQUIRED, PROVIDE FLAGMEN OR TRAFFIC CONTROL OFFICERS WHO ARE TRAINED AND EQUIPPED IN ACCORDANCE WITH THE REQUIREMENTS OF PART VI OF THE MUTCD.
13. FLAGGERS SHALL USE TYPE III OR TYPE IV RETRO REFLECTIVE STOP/SLOW PADDLES. USE OF FLAGS IS PROHIBITED UNLESS IT IS AN EMERGENCY SITUATION IN LOW-SPEED, LOW-VOLUME LOCATIONS, WHICH CAN BEST BE CONTROLLED BY A SINGLE FLAGGER.
14. THE FLAGGERS AND OR TRAFFIC CONTROL OFFICERS SHALL WEAR A RETRO REFLECTIVE VEST AT ALL TIMES DURING TRAFFIC CONTROL OPERATIONS.

DEMOLITION/EXCAVATION

1. PROVIDE A SMOOTH SAW CUT TRANSITION BETWEEN PAVEMENT(S) TO REMAIN AND PAVEMENT(S) TO BE REMOVED. CONTRACTOR IS RESPONSIBLE FOR PROTECTING SIDEWALKS, CURBS, DRIVEWAYS, SHOULDERS, DITCHES, ETC. DURING CONSTRUCTION. ANY REPAIRS WARRANTED SHALL BE PERFORMED AT THE CONTRACTOR'S EXPENSE. SEE ALSO DRIVEWAYS, SIDEWALKS AND CURBS NOTES.
2. DO NOT STOCKPILE EXCAVATED SPOIL MATERIAL NEXT TO OPEN EXCAVATIONS, IN DRIVEWAYS AND OR ON SITE. ALL SPOIL MATERIAL MUST BE HAULED OFF AND PROPERLY DISPOSED OF IN ACCORDANCE WITH ALL FEDERAL, STATE AND LOCAL REQUIREMENTS.
3. PROVIDE DRIVEWAY AND BUS STOP ACCESS THROUGHOUT CONSTRUCTION. DO NOT BLOCK OR ENCUMBER DRIVEWAYS AND OR BUS STOPS WITHOUT WRITTEN APPROVAL FROM THE CITY.
4. DO NOT LEAVE EXCAVATIONS OPEN UNLESS APPROVED IN WRITING BY THE CITY.
5. IF UNSUITABLE SUBGRADES ARE ENCOUNTERED, THE MATERIAL SHOULD BE REMOVED AND REPLACED WITH A DENSE GRADED AGGREGATE PER THE GEOTECHNICAL ENGINEERS RECOMMENDATION AND IN ACCORDANCE WITH G.D.O.T. SPECIFICATIONS.
6. DURING EXCAVATION, DO NOT DRIVE HEAVY MACHINERY OVER EXPOSED UNDERLYING SOILS
7. EXCAVATE IN DRY CONDITIONS AS OFTEN AS PRACTICABLE.
8. EXCAVATE FINAL 8 TO 12 INCHES WITH TEETH OF BUCKET (DO NOT SMEAR)
9. SUBSOILS SHALL BE SCARIFIED (NOT COMPACTED) PRIOR TO PLACEMENT OF CLEAN-WASHED AGGREGATE SUBBASE.

UTILITIES

1. ALL FEES ASSOCIATED WITH UTILITY RELOCATIONS AND/OR PERMITS, INCLUDING OUTSIDE UTILITIES SUCH AS ATLANTA GAS AND LIGHT ARE THE RESPONSIBILITY OF THE CONTRACTOR.
2. PRIOR TO COMMENCING WORK, MARK LOCATIONS OF ALL EXISTING UTILITIES AND PROVIDE PROTECTION THROUGHOUT CONSTRUCTION.
3. PROVIDE SUPPORT FOR EXISTING UTILITIES EXPOSED DURING CONSTRUCTION AND REPAIR ANY DAMAGED AT NO ADDITIONAL COST TO THE CITY
4. AT NUMEROUS LOCATIONS, RESIDENCES ARE LOCATED AT LOWER ELEVATIONS THAN ADJACENT ROADWAYS. UTILITIES SUCH AS WATER AND GAS SERVICES ARE ASSUMED TO EXTEND DOWNHILL FROM THE ROADWAY TO SERVE THE RESIDENCE. FINISHED FLOOR ELEVATIONS WERE NOT SURVEYED AND AS SUCH, THE CONTRACTOR IS RESPONSIBLE FOR IDENTIFYING THESE AREAS. ENSURE STORMWATER ASSOCIATED WITH THE PLANTERS OR PERVIOUS PAVEMENT IS CONTAINED WITHIN THE ROADWAYS AND IS PREVENTED FROM MIGRATING ALONG EXISTING UTILITIES TO RESIDENCES.

DRIVEWAYS, SIDEWALKS AND CURBS

1. DO NOT DISTURB EXISTING CURBS AND SIDEWALKS UNLESS SPECIFIED ON THE DRAWINGS OR AS DIRECTED BY THE OWNER. ANY CONTRACTOR CAUSED DAMAGE TO CURBS AND SIDEWALKS SHALL BE REPAIRED AND OR REPLACED AT NO ADDITIONAL COST TO THE OWNER.
2. WHERE EXISTING CURBS REQUIRE REPLACEMENT, CURBS MUST BE REPLACED WITH LIKE MATERIALS. CHANGES IN MATERIALS ARE NOT ALLOWED.
3. FINISHED ELEVATIONS OF BIKE LANE MUST MATCH EXISTING DRIVEWAY AND HANDICAP RAMP ELEVATIONS. ENSURE ADA REQUIREMENTS ARE MET AT TRANSITIONS AND OR CONNECTIONS WITH HANDICAP RAMPS AND LANDINGS.
4. DEPTH OF EXCAVATIONS ADJACENT TO EXISTING CURBS, SIDEWALKS, DRIVEWAY APRONS ETC. WILL VARY BASED UPON LOCATION. CONTRACTOR IS RESPONSIBLE FOR STABILIZING EXCAVATIONS ADJACENT TO THESE FEATURES.

STORMWATER

1. PREVENT STORMWATER FROM ENTERING OPEN EXCAVATIONS. ANY DAMAGE CAUSED FROM STORM WATER ENTERING OPEN EXCAVATIONS SHALL BE REPAIRED AT NO ADDITIONAL COST TO THE OWNER.
2. WATER REMOVED FROM EXCAVATED AREAS SHALL NOT BE PUMPED DIRECTLY INTO STORM DRAINS.
3. MAINTAIN EXISTING DRAINAGE PATTERNS. DO NOT RAISE OR LOWER CURB, DRIVEWAY OR SIDEWALK ELEVATIONS WITHOUT APPROVAL FROM THE OWNER. POST CONSTRUCTION SURFACE DRAINAGE PATTERNS MUST REMAIN THE SAME AS PRE-CONSTRUCTION SURFACE DRAINAGE PATTERNS.

PAVEMENT MARKINGS

1. PERMANENT PAVEMENT MARKINGS FOR THE PROJECT INCLUDE BUT ARE NOT LIMITED TO, ROADWAY STRIPING, STOP BARS, CROSS-WALKS, BIKE LANES, ETC.
2. PLANS DO NOT REFLECT ALL FINAL PERMANENT PAVEMENT MARKINGS REQUIRED FOR THE PROJECT. AT A MINIMUM, REPLACE ALL EXISTING PAVEMENT MARKINGS WITH NEW PAVEMENT MARKINGS.
3. CROSSWALK LINES SHALL BE PARALLEL TO DIRECTION OF TRAVEL LANE.
4. ALL PERMANENT MARKINGS ON CONCRETE PAVEMENT AND/OR POROUS PAVEMENT SHALL BE PREFORMED BY TYPE.
5. EDGE LINES ON ASPHALT ROADWAY PAVEMENT SHALL BE INSET 1 TO 2 INCHES FROM THE NEW BICYCLE LANES.
6. ALL EXISTING SIGNS AND SUPPORTS WITHIN THE PROJECT LIMITS RENDERED OBSOLETE BY THE NEW CONSTRUCTION SHALL BE REMOVED BY THE DESIGN-BUILD CONTRACTOR.
7. ALL PAVEMENT MARKING ARROWS AND LETTERS SHALL BE PREFORMED TYPE.
8. EXISTING PAVEMENT AREAS SHOWN ON THE PLANS THAT ARE TO BE CONVERTED TO BICYCLE LANES SHALL BE PAINTED GREEN TRAFFIC PAINT.

STAGING AREAS AND EQUIPMENT STORAGE

5. DEPARTMENT OF WATERSHED MANAGEMENT, OFFICE OF ENGINEERING SERVICES TO LOCATE PRIME AREAS TO BE CONSIDERED BY DESIGN/BUILD CONTRACTOR FOR INITIAL STAGING AREAS FOR EACH ZONE.
6. CONTRACTOR TO COORDINATE AND PERMIT (IF NECESSARY) ALL STAGING/STOCKPILE/EQUIPMENT STORAGE AREAS WITH THE CITY PRIOR TO BEGINNING WORK.
7. CONTRACTOR TO PROVIDE CITY WITH ANTICIPATED HAUL ROUTES AND APPROXIMATE VOLUMES AS REQUIRED FOR PERMITTING

PAVEMENT

1. PROTECT EXISTING PAVEMENT TO REMAIN AND REPAIR ANY PAVEMENT DAMAGED DURING CONSTRUCTION AT NO ADDITIONAL COST TO THE CITY.
2. REPLACE ANY DAMAGED PAVEMENTS WITH LIKE MATERIALS AND DEPTHS. ALL MATERIALS USED MUST MEET G.D.O.T. AND CITY OF ATLANTA STANDARDS

PRELIMINARY, NOT FOR PUBLIC USE, GENERAL RELEASE OR CONSTRUCTION

SURVEY NOTES

1. D/B CONTRACTOR SHALL FIELD VERIFY THE EXISTING SURVEY AND SUPPLEMENT IT AS NEEDED TO INCLUDE ADDITIONAL INFORMATION, DEPTH TO UTILITIES, ETC. AS NEEDED TO SUPPORT FINAL DESIGN AND CONSTRUCTION.

2. D/B CONTRACTOR IS RESPONSIBLE FOR THE IDENTIFICATION AND RESOLUTION OF ANY CONFLICTS BETWEEN EXISTING CONDITIONS AND DESIGN ELEMENTS.

3. THE LOCATION OF ALL UTILITY LINES SHOWN ON THESE PLANS SHOULD BE CONSIDERED APPROXIMATE. INFORMATION ON EXISTING UTILITIES WAS TAKEN FROM AVAILABLE RECORD INFORMATION AND MAY NOT BE ACCURATE OR RELIABLE. THE CONTRACTOR SHALL FIELD LOCATE ALL UTILITIES WHETHER OR NOT SHOWN ON THESE PLANS PRIOR TO THE START OF ANY WORK.

4. THE D/B CONTRACTOR SHALL BE RESPONSIBLE FOR CONDUCTING A PROPERTY LINE SURVEY TO DETERMINE THE EXACT LOCATION OF THE EXISTING RIGHT-OF-WAY IN THE FIELD. THE D/B CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR DETERMINING THE LINES OF DIVISION BETWEEN ALL INDIVIDUAL LAND PARCELS AFFECTED BY THIS PROJECT.

ADA RELATED NOTES

HANDICAPPED FACILITIES NOTES.

1. THE STANDARD WHEELCHAIR RAMP AND SIDEWALK SHOWN ON THE PROPOSED CONDITIONS PLAN ARE DIAGRAMMATIC IN NATURE AND SHOULD NOT BE CONSIDERED A SPECIFIC DETAILED DESIGN. THE D/B CONTRACTOR IS RESPONSIBLE FOR INSTALLING ALL NEW STANDARD WHEELCHAIR RAMPS AND SIDEWALKS IN ACCORDANCE WITH CITY OF ATLANTA DEPARTMENT OF WATERSHED MANAGEMENT STANDARD DETAILS.

2. WHEN EXISTING RIGHT-OF-WAY AND/OR UTILITY CONSTRAINTS PRECLUDE INSTALLATION OF THE STANDARD WHEELCHAIR RAMP AND SIDEWALK, THE D/B CONTRACTOR SHALL BE RESPONSIBLE FOR DEVELOPING SPECIAL WHEELCHAIR RAMP DETAILS TO DEAL WITH THE CONSTRAINTS. ALL SPECIAL DESIGN WHEELCHAIR RAMPS AND SIDEWALKS SHALL BE SUBMITTED TO BOTH THE DEPARTMENT OF WATERSHED MANAGEMENT AND THE DEPARTMENT OF PUBLIC WORKS FOR REVIEW AND APPROVAL PRIOR TO INSTALLATION.

3. ALL NEW DRIVEWAYS/DRIVEWAY EXTENSIONS SHALL ALSO BE REQUIRED TO MEET ADA REQUIREMENTS.

4. ALL NEW SIDEWALKS SHALL MEET ADA REQUIREMENTS. A MINIMUM SIDEWALK CLEAR WIDTH OF 48 INCHES (EXCLUSIVE OF ANY CURBING) IS REQUIRED. ADDITIONAL SIDEWALK WIDTH IS REQUIRED AT AREAS OF HIGH PEDESTRIAN VOLUMES, OBSTRUCTIONS, TURNS, OR OTHER CHANGES IN DIRECTION.

5. ALL NEW TRAFFIC SIGNALS SHALL BE DESIGNED AS ACCESSIBLE PEDESTRIAN SIGNALS (APS) IN ACCORDANCE WITH CURRENT STANDARDS.

6. CROSSWALK LOCATIONS AND OTHER PAVEMENT MARKINGS SHOWN ON THESE PLANS ARE DIAGRAMMATIC IN NATURE. THE DESIGN BUILD CONTRACTOR SHALL BE RESPONSIBLE FOR DESIGNING THE CROSSWALKS AND OTHER PAVEMENT MARKINGS AS PART OF THE FINAL DESIGN DOCUMENTS.

GENERAL CI NOTES

1. PAVEMENT DYE SHALL BE INCLUDED IN THE PERVIOUS PAVEMENT MIX WHERE LARGE SECTIONS OF PAVEMENT MARKINGS ARE REQUIRED. PAINT WILL ONLY BE ALLOWED IN LIMITED AREAS OF PERVIOUS PAVEMENT.

2. DWM APPROVAL OF ALL PAVEMENT COLORS, PAINT, AND DYE IS REQUIRED.

3. DURING CONSTRUCTION OF THE PERVIOUS PAVEMENT BIKE LANE, CONTRACTOR SHALL SUPPORT THE SUBBASE UNDER THE EXISTING PAVEMENT AND BACKFILL IMMEDIATELY AS THE BIKE LANE IS EXCAVATED.

4. STORAGE VOLUME OF PERVIOUS PAVEMENT AND STORMWATER PLANTERS WITH UNDERDRAINS SHALL BE CALCULATED WITH 100% RRV CREDIT FOR STORAGE VOLUME BELOW THE UNDERDRAIN AND 50% RRV CREDIT FOR STORAGE VOLUME ABOVE THE UNDERDRAIN.

PLANTER SPECIFIC RELATED NOTES

1. THE D/B CONTRACTOR SHALL COORDINATE WITH DWM IN ESTABLISHING THE LOCATION, SPACING, AND SIZING OF STORMWATER PLANTERS. DWM PREFERS THAT THE SIZE AND SPACING OF PLANTERS BE AS CONSISTENT AND UNIFORM AS POSSIBLE.

2. REFER TO TABLE ON CI TYPICAL DETAILS SHEET FOR RUNOFF REDUCTION VOLUME REQUIRED FOR EACH DRAINAGE BASIN.

3. TO THE EXTENT POSSIBLE, UNDERDRAINS SHALL BE LOCATED AT THE FRONT OR BACK EDGE OF PLANTERS AND GRASS STRIPS TO MINIMIZE CONFLICTS WITH TREE PLANTINGS.

4. STORMWATER PLANTERS TO BE SIZED TO MANAGE VOLUME OF RUNOFF FROM THE 1-INCH RAINFALL EVENT FROM CONTRIBUTING DRAINAGE AREAS.

5. DRAINAGE AREAS SHOWN ARE STRICTLY AREAS WITHIN THE RIGHT-OF-WAY AND BASED ON EXISTING CATCH BASIN LOCATIONS.

6. STORMWATER PLANTER ZONE SHOWN FOR REFERENCE ONLY. CLEARANCES TO DRIVEWAYS, ENTRANCES, AND OTHER SURFACE FEATURES TO BE COORDINATED WITH THE CITY OF ATLANTA UNDERGROUND AND SURFACE UTILITY LOCATIONS INCLUDING SERVICE LATERALS TO BE FIELD VERIFIED.

7. THE LOCATION OF THE UNDERDRAIN CAN BE ADJUSTED IN THE FIELD AS REQUIRED DEPENDING UPON EXISTING UTILITY CONSTRAINTS OR THE PRESENCE OF OTHER SUBSURFACE OBSTRUCTIONS.

8. UNDERDRAIN PIPE SHALL BE 4-INCH OR 6-INCH PERFORATED SCHEDULE 40 PVC SURROUNDED BY #57 STONE AND WRAPPED IN NON-WOVEN GEOTEXTILE. UPTURNED PORTIONS OF PIPES AND OUTLET PIPE CONNECTIONS TO THE EXISTING STORM DRAIN SYSTEM SHALL BE SOLID SCHEDULE 40 PVC. PIPE PERFORATIONS SHALL BE 3-HOLE TYPE WITH 5/8 INCH DIAMETER PERFORATIONS SPACED AT 5-INCHES ON-CENTER. PERFORATIONS SHALL BE LOCATED AT THE 4-8-8 O'CLOCK POSITIONS.

9. THE D/B CONTRACTOR SHALL PROVIDE FIELD CONNECTIONS AT EXISTING STORM DRAIN MANHOLES FOR THE CONNECTION OF THE NEW UNDERDRAIN PIPES.

TRAFFIC SIGNAL NOTES

1. NEW TRAFFIC SIGNALS INCLUDING SIGNAL HEADS, POLES, TRAFFIC CONTROLLERS, LOOP DETECTORS, PEDESTRIAN SIGNALS, NEW POWER CONNECTION, AND RELATED EQUIPMENT AND MATERIALS ARE REQUIRED AT THE FOLLOWING LOCATIONS:
   - TAZOR STREET
   - JOSEPH E. LOWERY BOULEVARD
   - JAMES P. BRAMLEY DRIVE
   - SUNSET AVENUE
   - VINE STREET

2. ADJUSTMENT OF EXISTING TRAFFIC SIGNAL POLES AND OTHER EQUIPMENT TO REMAIN MAY BE REQUIRED TO MEET CURRENT DESIGN STANDARDS.

BC/DHA
A JOINT VENTURE
999 HAMMOND DRIVE
SUITE 400
ATLANTA, GEORGIA 30328

SUBMITTED: _____
DATE: _____
APPROVED: _____
DATE: _____

LINE IS 2 INCHES AT FULL SIZE
IF NOT 2" - SCALE ACCORDINGLY

DESIGNED: R.D. SHIPLEY
DRAWN: R.D. SHIPLEY
CHECKED: W.C. DOLTY
CHECKED: W.C. DOLTY
APPROVED: W.C. DOLTY

EXTERNAL REFERENCE FILES

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP

CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT

BOONE BOULEVARD
GREEN INFRASTRUCTURE &
CAPACITY RELIEF PROJECT

NOTES

SHEET NUMBER
004
SHEET NUMBER
04 OF 36

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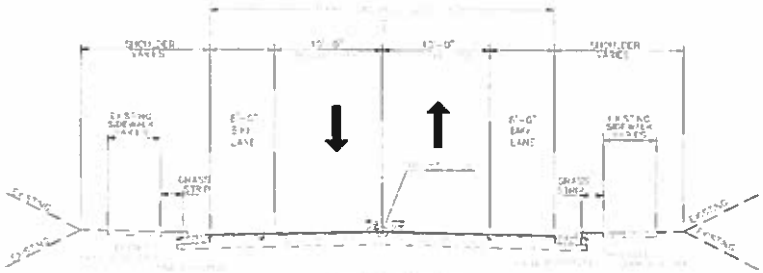
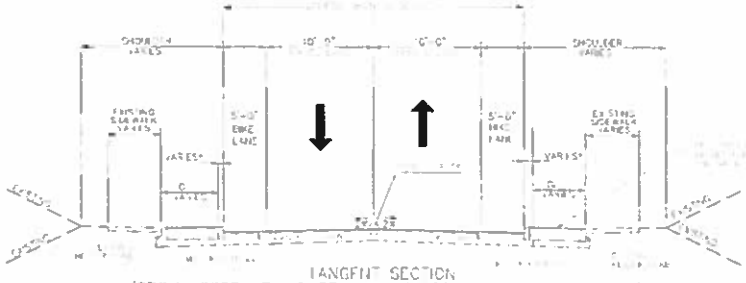
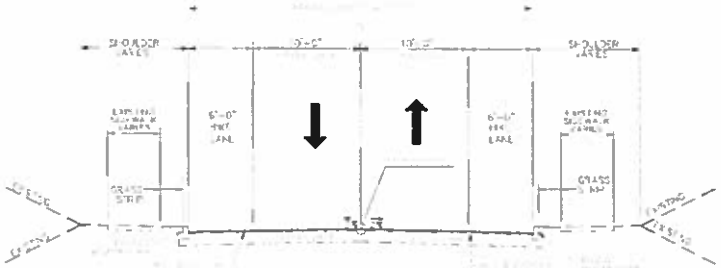
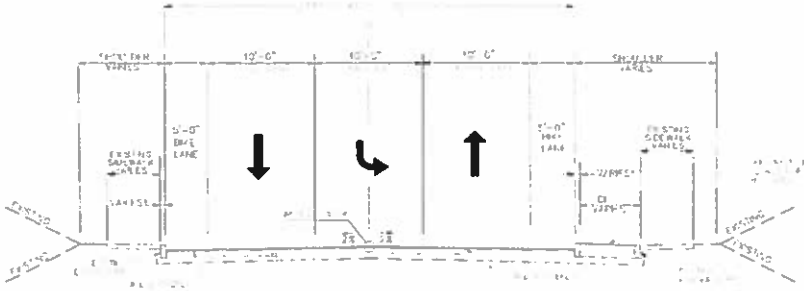


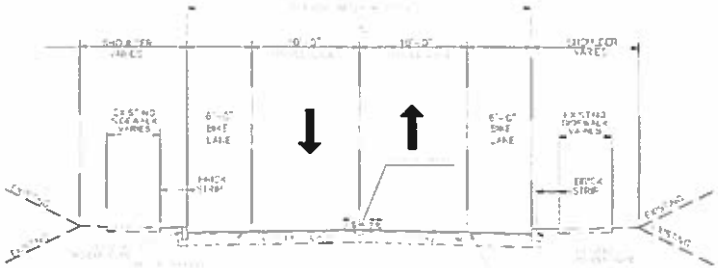


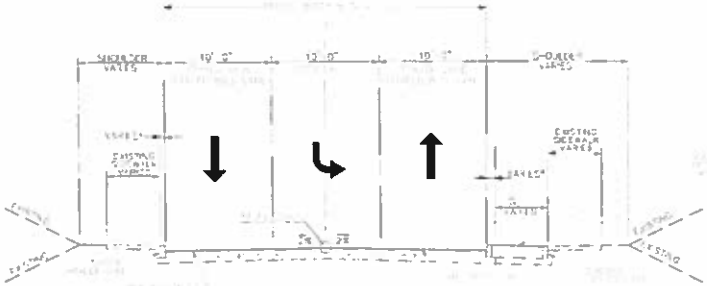
TANGENT SECTION
(FROM JOSEPH E. LOWERY BOULEVARD TO NORTHSIDE DRIVE)





AT INTERSECTIONS WITH LEFT TURN LANES
(JOSEPH E. LOWERY BOULEVARD – WESTBOUND, JAMES P. BRAWLEY DRIVE AND NORTHSIDE DRIVE)





AT INTERSECTION WITH LEFT TURN LANE
(JOSEPH E. LOWERY EASTBOUND)

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A JOINT VENTURE
100 HAMMOND DRIVE
SUITE 400
ATLANTA, GEORGIA 30328

SUBMITTED:
DATE
APPROVED:
DATE

LINE IS 2 INCHES AT FULL SIZE
DESIGNED
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APPROVED

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CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT

BOONE BOULEVARD
GREEN INFRASTRUCTURE & CAPACITY RELIEF PROJECT

TYPICAL SECTIONS

SHEET NUMBER
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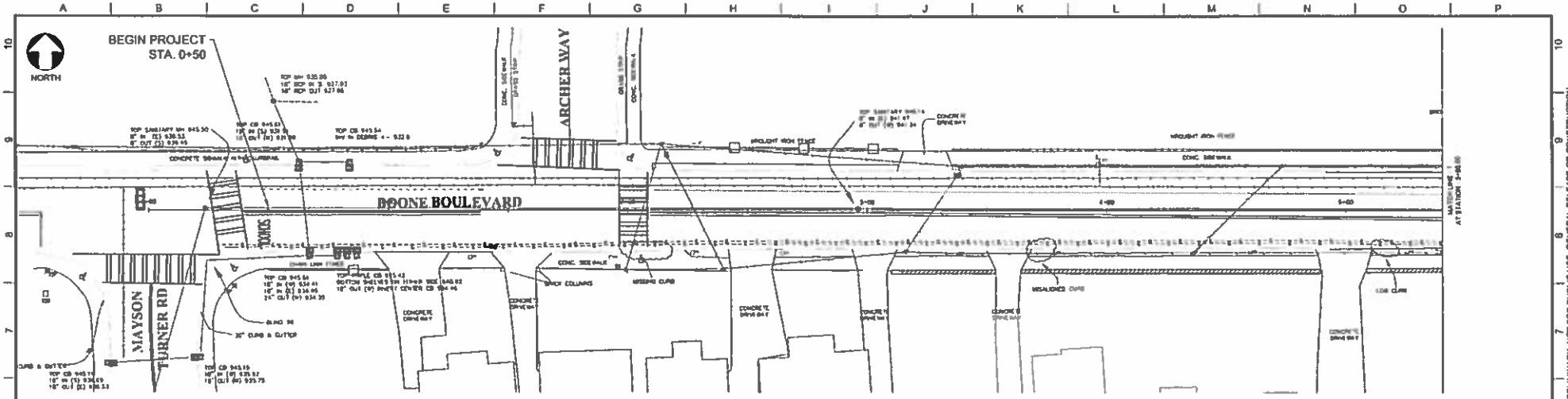

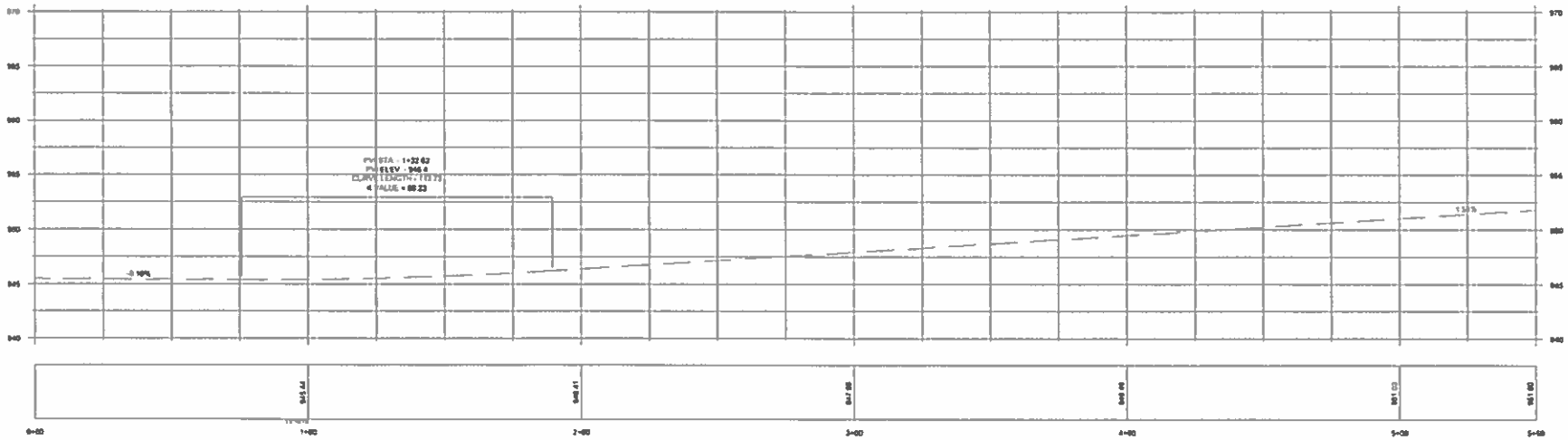

BOONE BOULEVARD

SCALE: HOR 1"=20', VERT 1"=5'

SCALE IN FEET
0 20 40 80

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BC/DHA
A JOINT VENTURE
100 HAMMOND DRIVE
SUITE 600
ATLANTA, GEORGIA 30328

SUBMITTED
DATE
APPROVED
DATE

LINE IS 2 INCHES AT FULL SIZE
IF NOT 2" ADJUST ACCORDINGLY

DESIGNED
DRAWN
CHECKED
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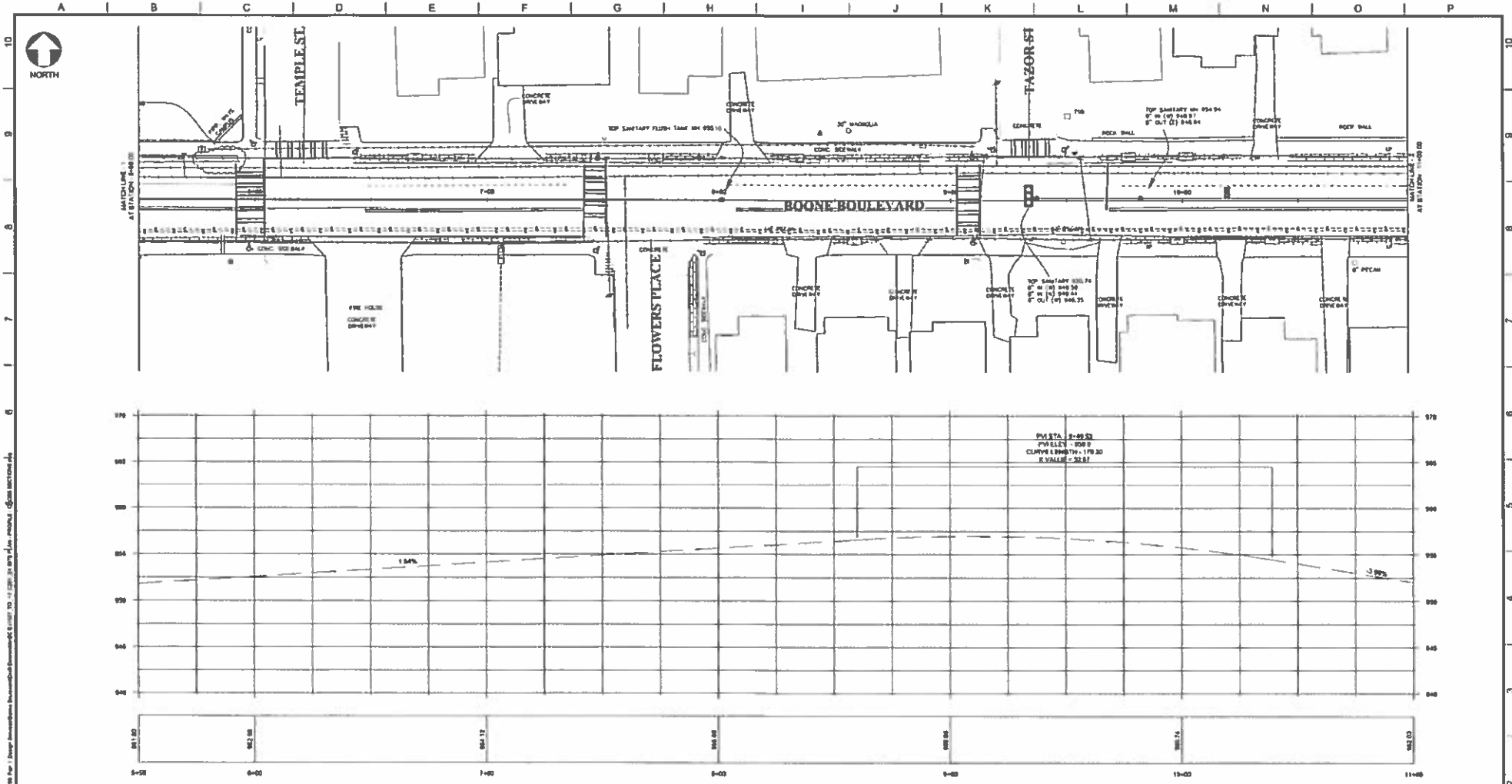
CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT

BOONE BOULEVARD
GREEN INFRASTRUCTURE &
CAPACITY RELIEF PROJECT

EXISTING CONDITIONS PLAN AND PROFILE

FILENAME
CLIENT PROJECT NUMBER
CLIENT PROJECT NAME
SHEET NUMBER
006
SHEET NUMBER
06 OF 35



BOONE BOULEVARD

SCALE: HOR 1"=20', VERT 1"=2'

SCALE IN FEET
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PRELIMINARY, NOT FOR PUBLIC USE, GENERAL RELEASE OR CONSTRUCTION

BC/DHA
A JOINT VENTURE
999 HAMMOND DRIVE
SUITE 400
ATLANTA, GEORGIA 30328

SUBMITTED:
DATE
APPROVED:
DATE

LINE IS 2 INCHES AT FULL SIZE
DESIGNED
DRAWN
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CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT

BOONE BOULEVARD
GREEN INFRASTRUCTURE &
CAPACITY RELIEF PROJECT

EXISTING CONDITIONS PLAN AND PROFILE

FILENAME
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SHEET NUMBER
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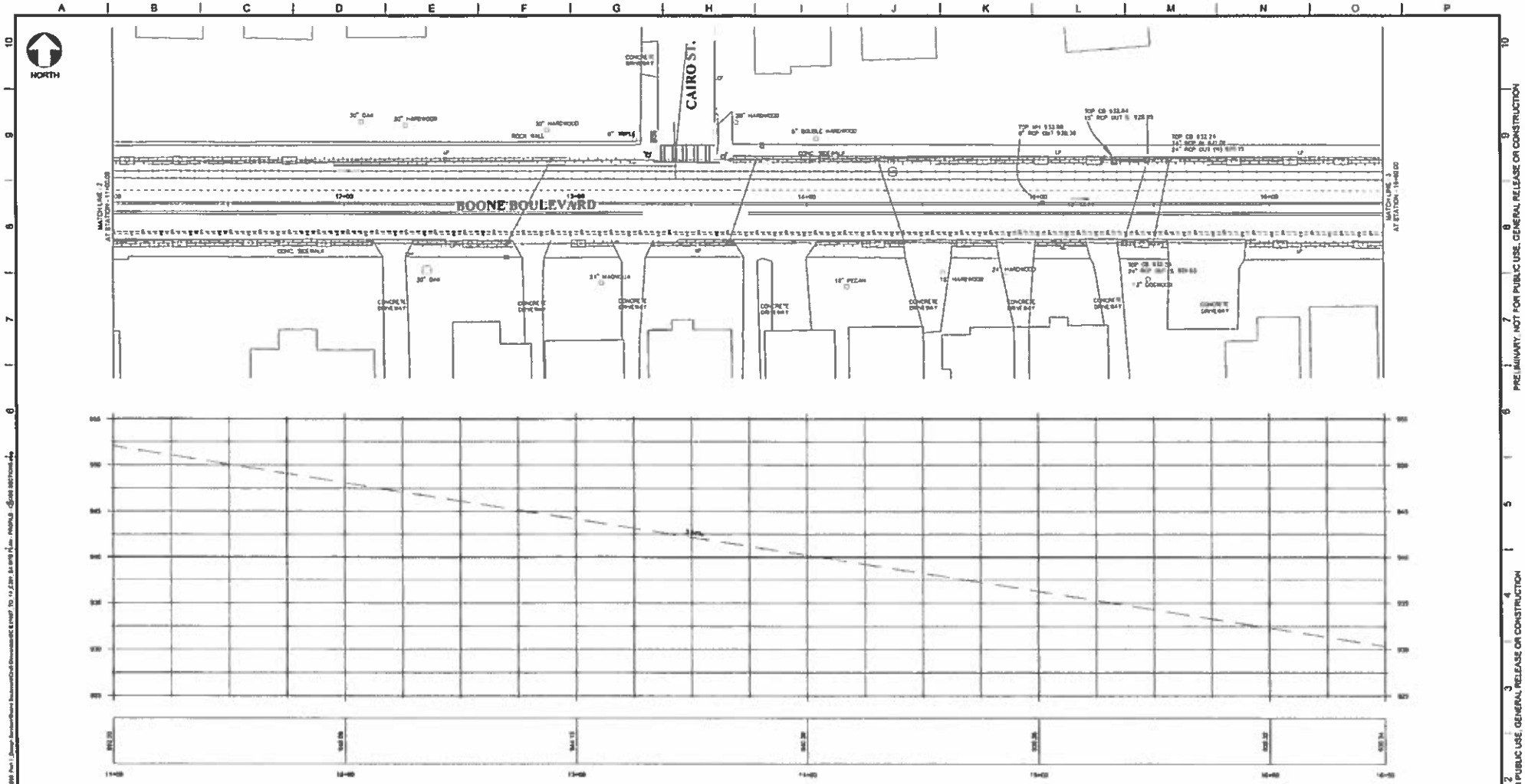
SHEET NUMBER
07 OF 35



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PRELIMINARY, NOT FOR PUBLIC USE, GENERAL RELEASE OR CONSTRUCTION

BC/DHA
A JOINT VENTURE
100 HAWKINS DRIVE
SUITE 400
ATLANTA, GEORGIA 30303

SUBMITTED:
DATE
APPROVED:
DATE

LINE IS 2 INCHES AT FULL SIZE
IF NOT 2" SCALE ACCORDINGLY

DESIGNED
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EXTERNAL REFERENCE FILES

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CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT

BOONE BOULEVARD
GREEN INFRASTRUCTURE &
CAPACITY RELIEF PROJECT

EXISTING CONDITIONS PLAN AND PROFILE

FILENAME

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SHEET NUMBER
008

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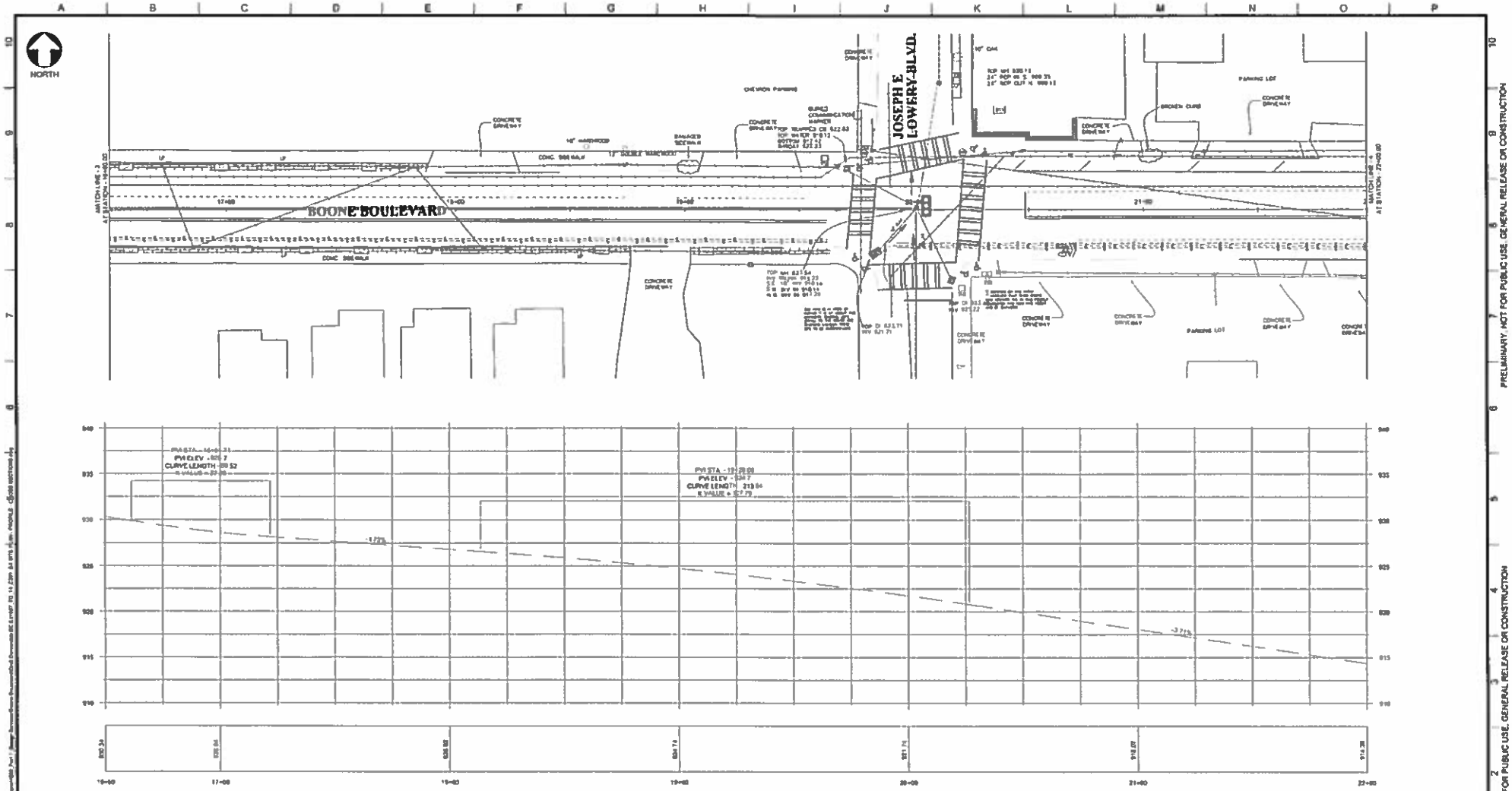
08 OF 26



BC/DHA
A JOINT VENTURE
999 HAMMOND DRIVE
SUITE 400
ATLANTA, GEORGIA 30328

SUBMITTED:
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CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT

BOONE BOULEVARD
GREEN INFRASTRUCTURE &
CAPACITY RELIEF PROJECT

EXISTING CONDITIONS PLAN AND PROFILE

FILENAME

SHEET NUMBER
009

SHEET NUMBER
09 OF 35

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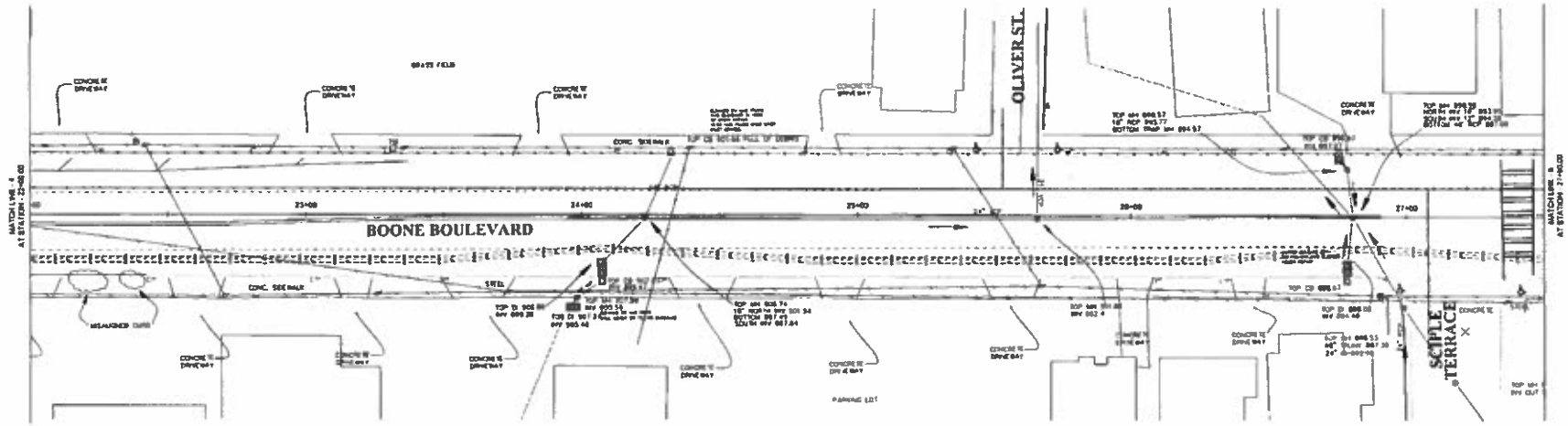
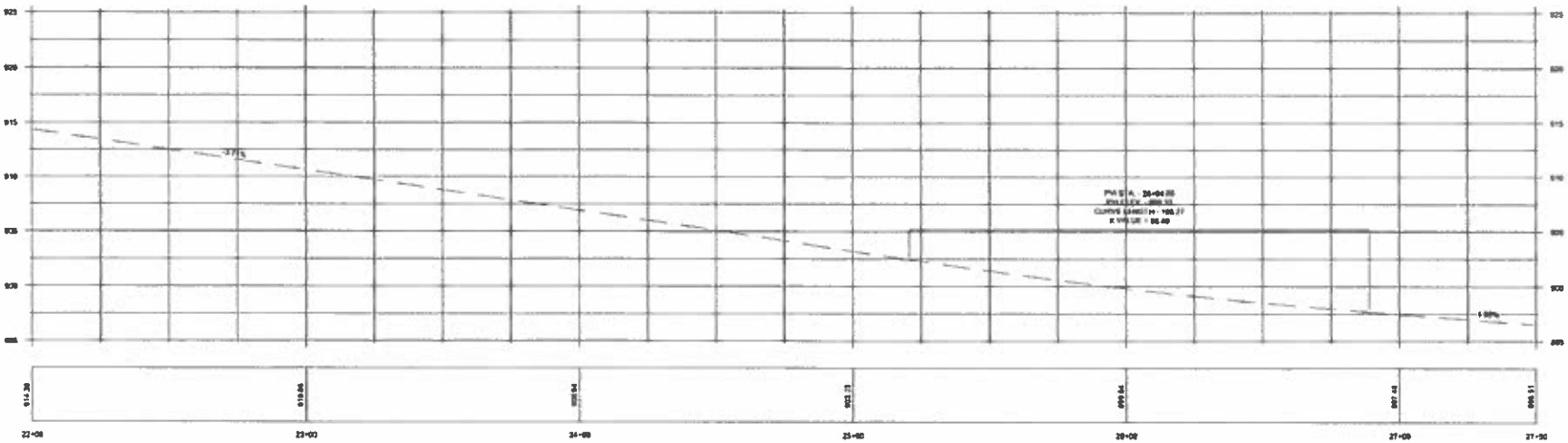
PRELIMINARY, NOT FOR PUBLIC USE, GENERAL RELEASE OR CONSTRUCTION





BOONE BOULEVARD

SCALE: HOR 1"=20', VERT 1"=5'

SCALE IN FEET
0 20 40 80

PRELIMINARY, NOT FOR PUBLIC USE, GENERAL RELEASE OR CONSTRUCTION

BC/DHA
A JOINT VENTURE
100 HAMMOND DRIVE
SUITE 400
ATLANTA, GEORGIA 30328

SUBMITTED
DATE
APPROVED
DATE

LINE IS 2 INCHES AT FULL SIZE
IF NOT 2" ADJUST SCALE ACCORDINGLY

DESIGNED
DRAWN
CHECKED
CHECKED
APPROVED

EXTERNAL REFERENCE FILES

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP

CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT

BOONE BOULEVARD
GREEN INFRASTRUCTURE &
CAPACITY RELIEF PROJECT

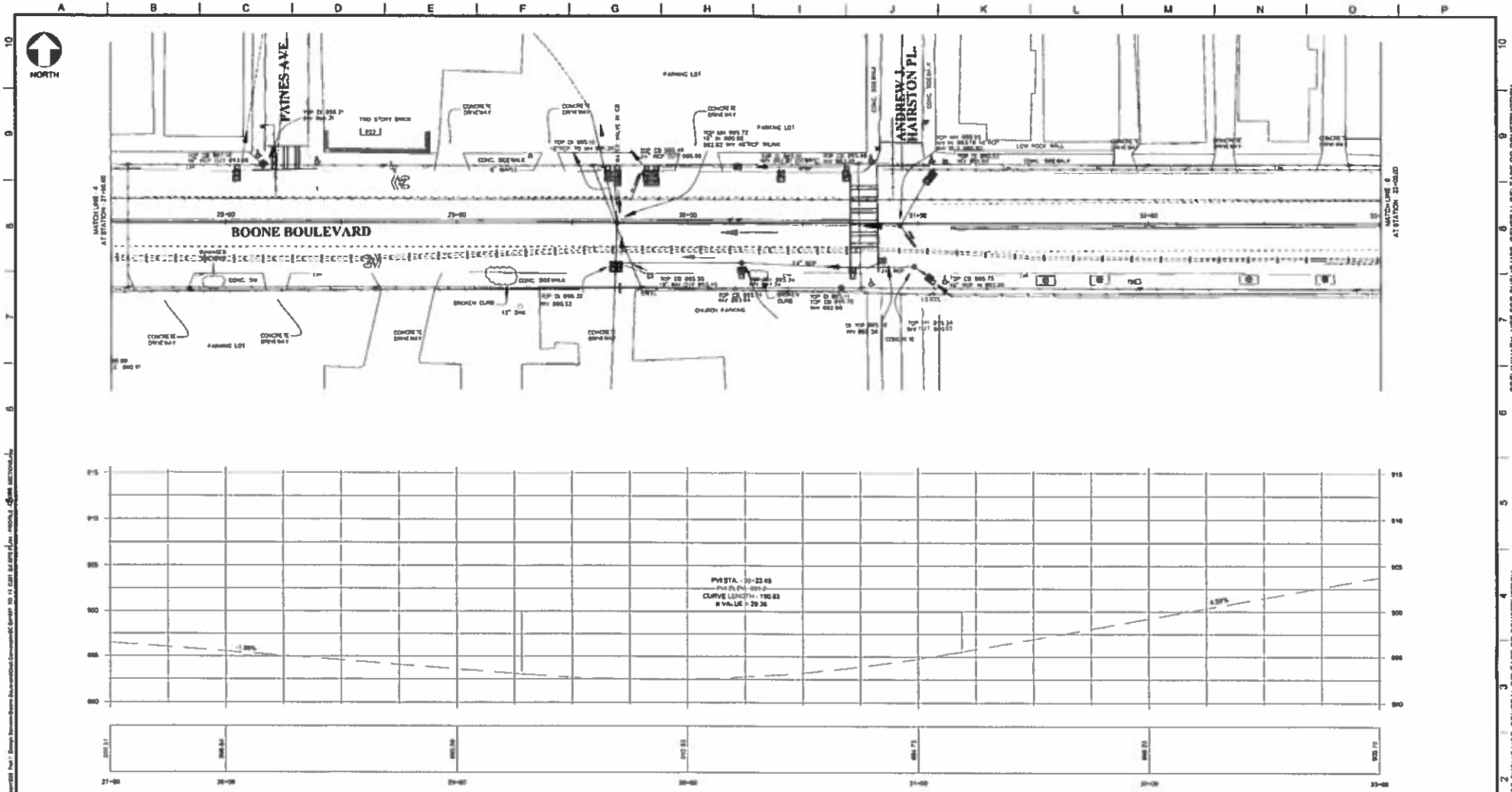
EXISTING CONDITIONS PLAN AND PROFILE

FILENAME

CLIENT PROJECT NUMBER

SHEET NUMBER
010

SHEET NUMBER
12 OF 36



BC/DHA
A JOINT VENTURE
100 HAMMOND DRIVE
SUITE 400
ATLANTA, GEORGIA 30328

SUBMITTED
PROJECT MANAGER
DATE
APPROVED
PROJECT ADMINISTRATOR
DATE

LINE IS 2 INCHES AT FULL SIZE
IF NOT 2" - SCALE ACCORDINGLY
DESIGNED
DRAWN
CHECKED
CHECKED
APPROVED

EXTERNAL REFERENCE FILES

REVISIONS

ZONE	REV	DESCRIPTION	BY	DATE	APP

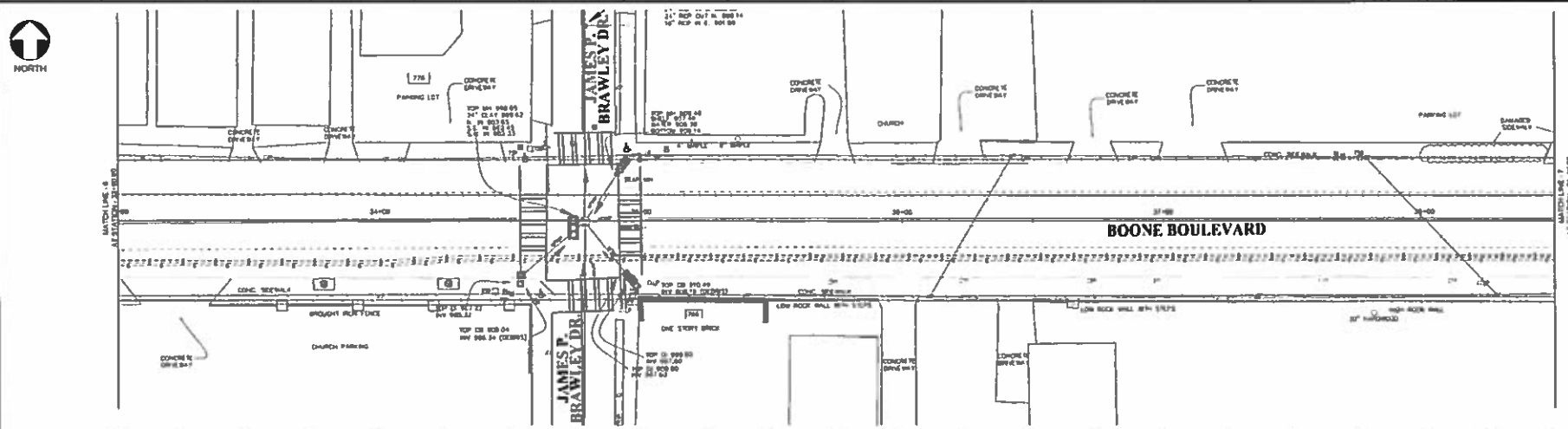
CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT

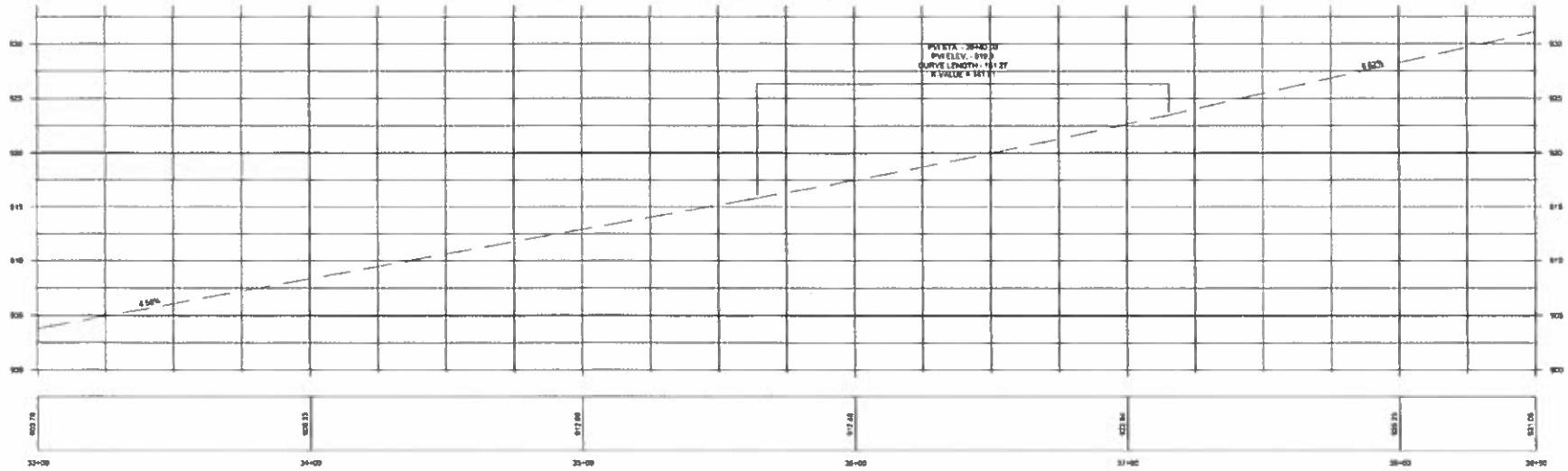
BOONE BOULEVARD
GREEN INFRASTRUCTURE & CAPACITY RELIEF PROJECT

EXISTING CONDITIONS PLAN AND PROFILE

FILENAME
CLIENT PROJECT NUMBER
SHEET NUMBER
011
SHEET NUMBER
11 OF 36

PRELIMINARY, NOT FOR PUBLIC USE, GENERAL RELEASE OR CONSTRUCTION





BOONE BOULEVARD

SCALE HOR 1"=50', VERT 1"=5'

SCALE IN FEET

0 20 40 80

PRELIMINARY, NOT FOR PUBLIC USE, GENERAL RELEASE OR CONSTRUCTION

BC/DHA
A JOINT VENTURE
100 HAMMOND DRIVE
SUITE 400
ATLANTA, GEORGIA 30328

SUBMITTED:
DATE
APPROVED:
DATE

LINE IS 2 INCHES AT FULL SIZE
IF NOT 2" - SCALE ACCORDINGLY

DESIGNED
DRAWN
CHECKED
CHECKED
APPROVED

EXTERNAL REFERENCE FILES

REVISIONS

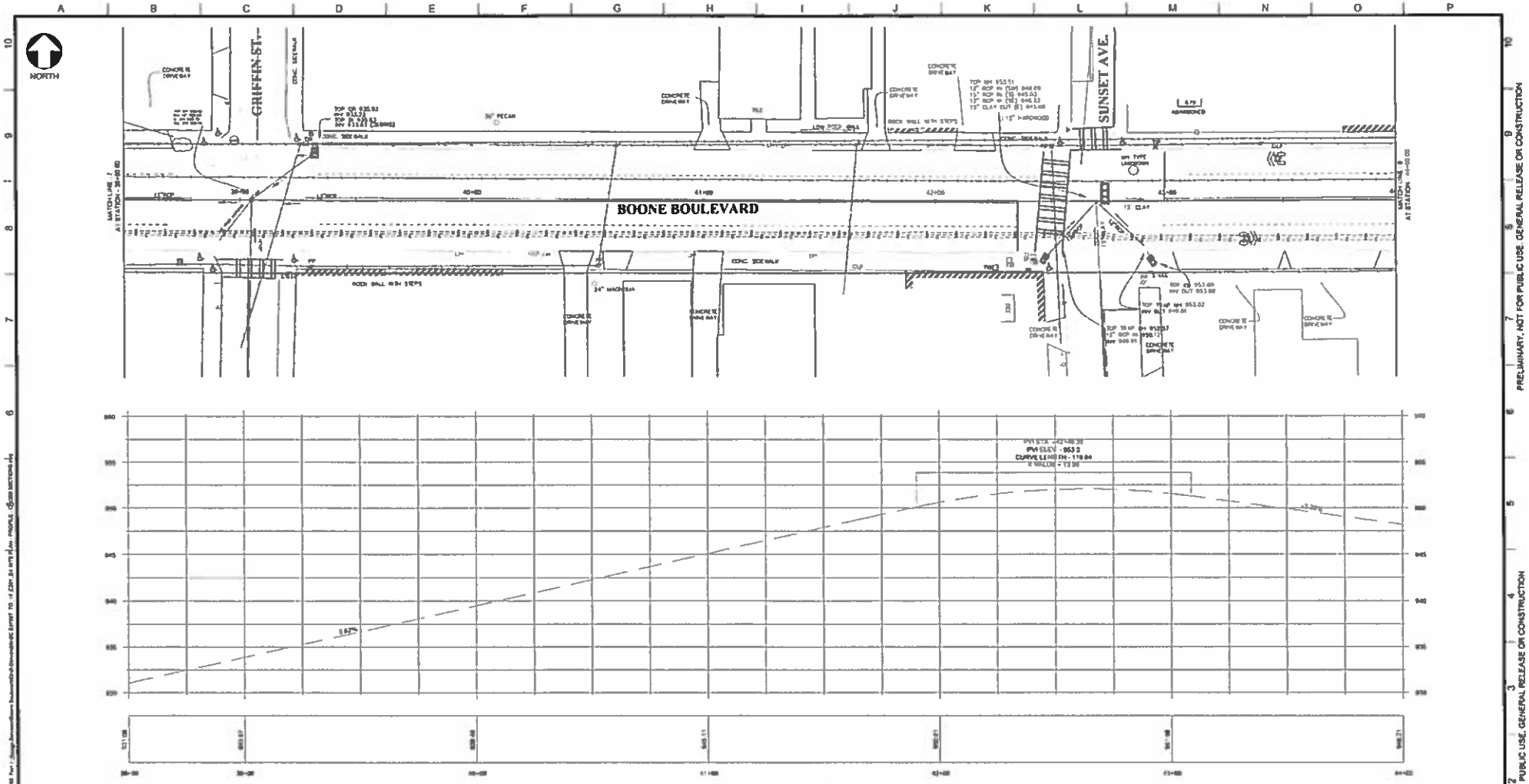
ZONE	REV.	DESCRIPTION	BY	DATE	APP

CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT

BOONE BOULEVARD
GREEN INFRASTRUCTURE & CAPACITY RELIEF PROJECT

EXISTING CONDITIONS PLAN AND PROFILE

SHEET NUMBER
012
SHEET NUMBER
12 OF 35



PRELIMINARY, NOT FOR PUBLIC USE, GENERAL RELEASE OR CONSTRUCTION

BC/DHA
A JOINT VENTURE
600 HAMMOND DRIVE
SUITE 400
ATLANTA, GEORGIA 30328

SUBMITTED:
DATE
APPROVED
DATE

LINE IS 2 INCHES AT FULL SIZE
IF NOT 2" SCALE ACCORDINGLY

DESIGNED
DRAWN
CHECKED
CHECKED
APPROVED

EXTERNAL REFERENCE FILES

REVISIONS

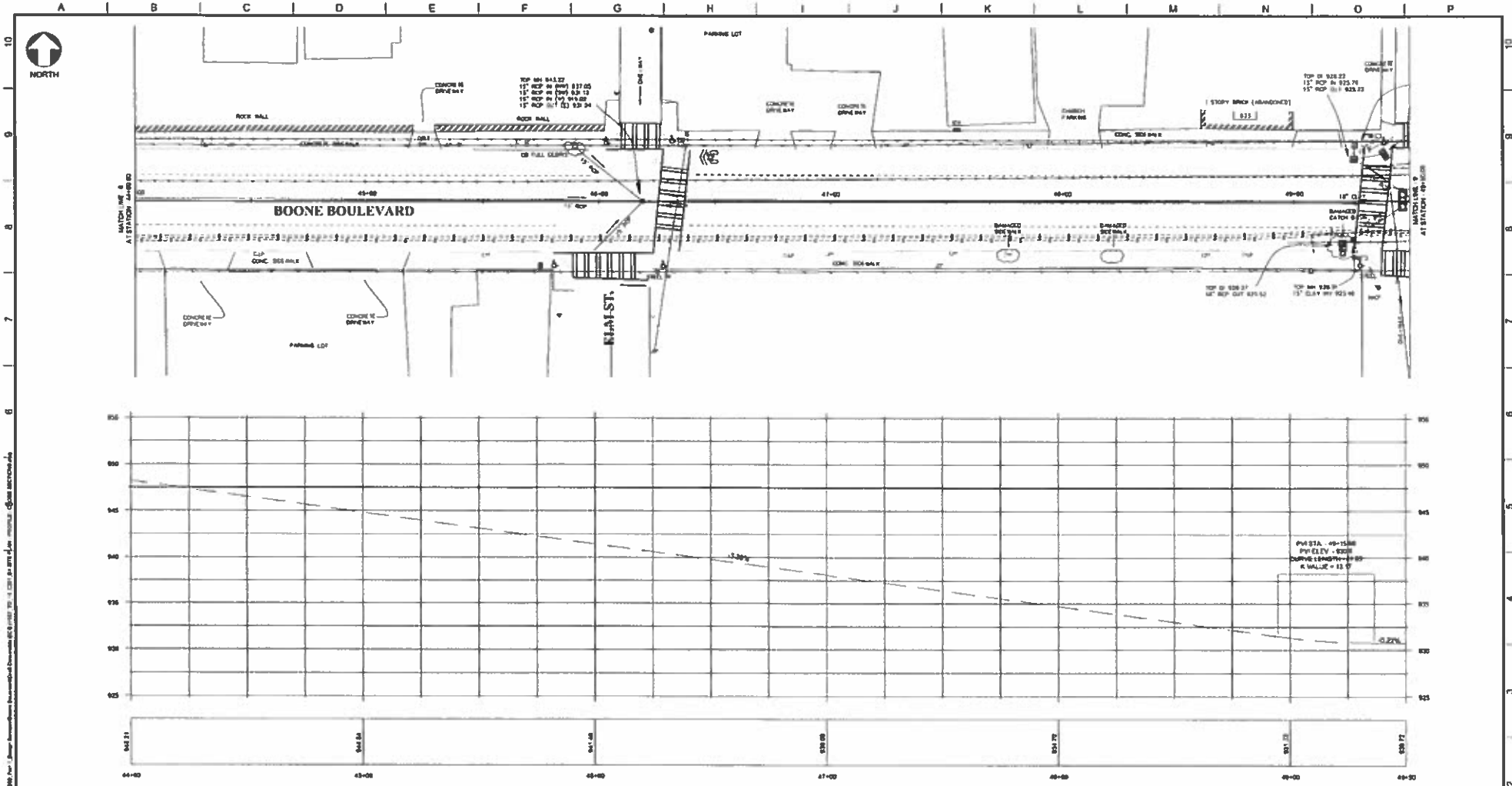
ZONE	REV	DESCRIPTION	BY	DATE	APP

CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT

BOONE BOULEVARD
GREEN INFRASTRUCTURE &
CAPACITY RELIEF PROJECT

EXISTING CONDITIONS PLAN AND PROFILE

SHEET NUMBER
013



BC/DHA
A JOINT VENTURE
900 HAMMOND DRIVE
SUITE 400
ATLANTA, GEORGIA 30328

SUBMITTED
DATE
APPROVED
DATE

LINE IS 2 INCHES AT FULL SIZE
IF NOT 2" - SCALE ACCORDINGLY
DESIGNED
DRAWN
CHECKED
CHECKED
APPROVED

EXTERNAL REFERENCE FILES

REVISIONS

ZONE	REV	DESCRIPTION	BY	DATE	APP

CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT

BOONE BOULEVARD
GREEN INFRASTRUCTURE & CAPACITY RELIEF PROJECT

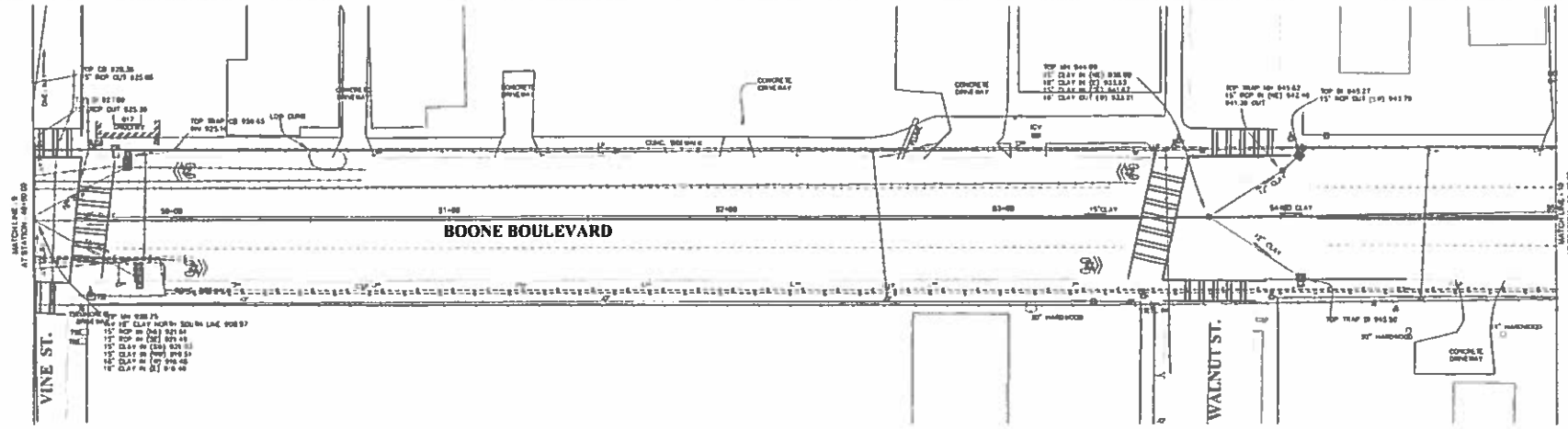
EXISTING CONDITIONS PLAN AND PROFILE

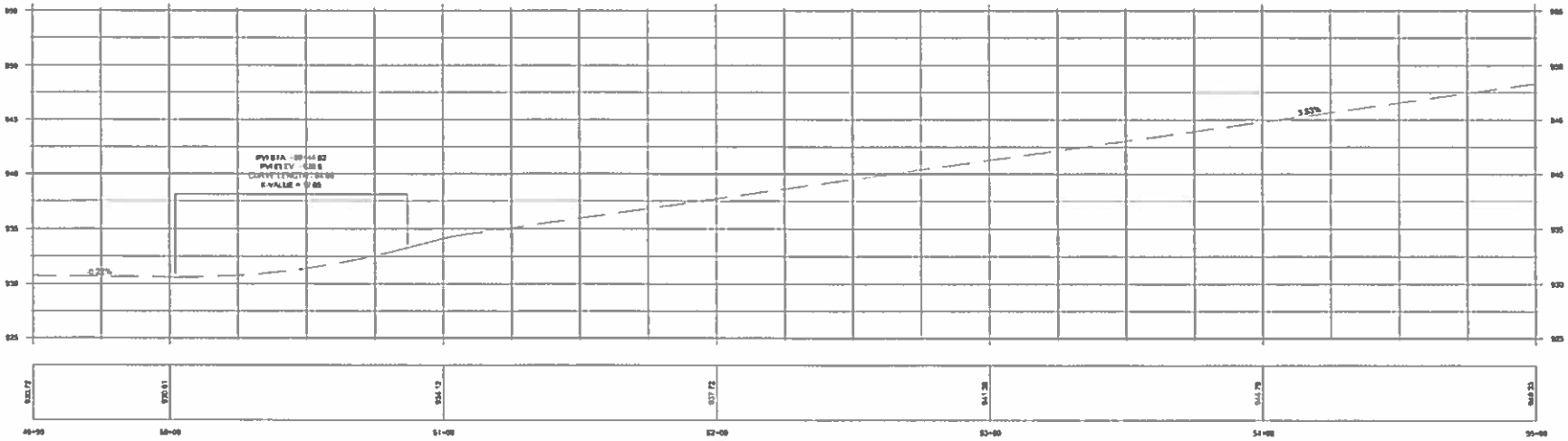
FILENAME

CLIENT PROJECT NUMBER

SHEET NUMBER
014

PRELIMINARY, NOT FOR PUBLIC USE, GENERAL RELEASE OR CONSTRUCTION





BC/DHA
A JOINT VENTURE
100 HAMMOND DRIVE
SUITE 400
ATLANTA, GEORGIA 30328

SUBMITTED
DATE
APPROVED
DATE

LINE IS 2 INCHES AT FULL SIZE

EXTERNAL REFERENCE FILES

REVISIONS

ZONE	REV	DESCRIPTION	BY	DATE	APP

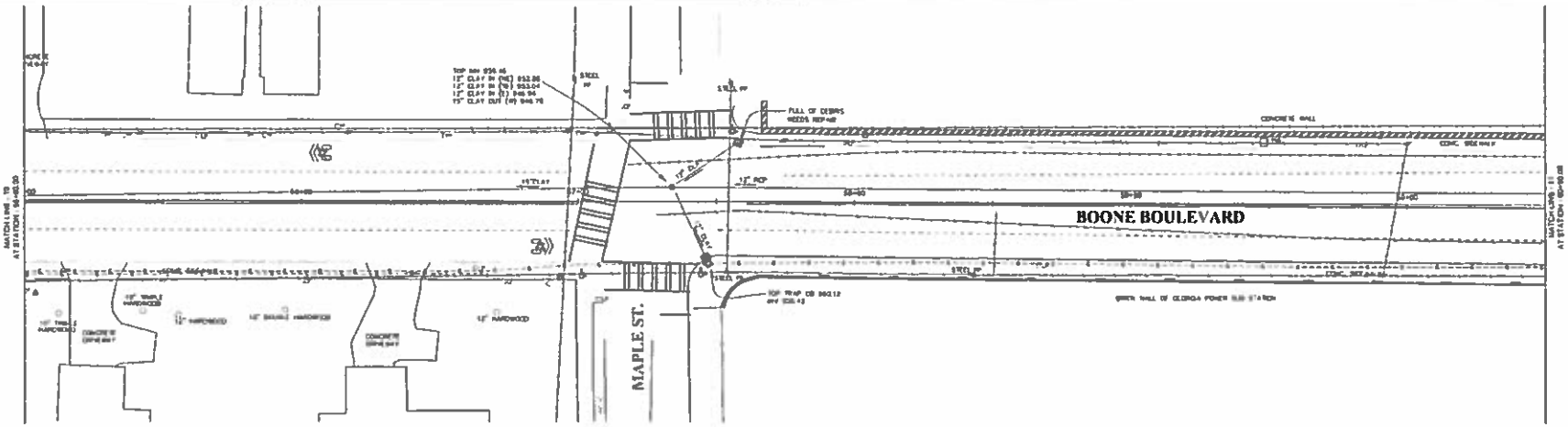
CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT

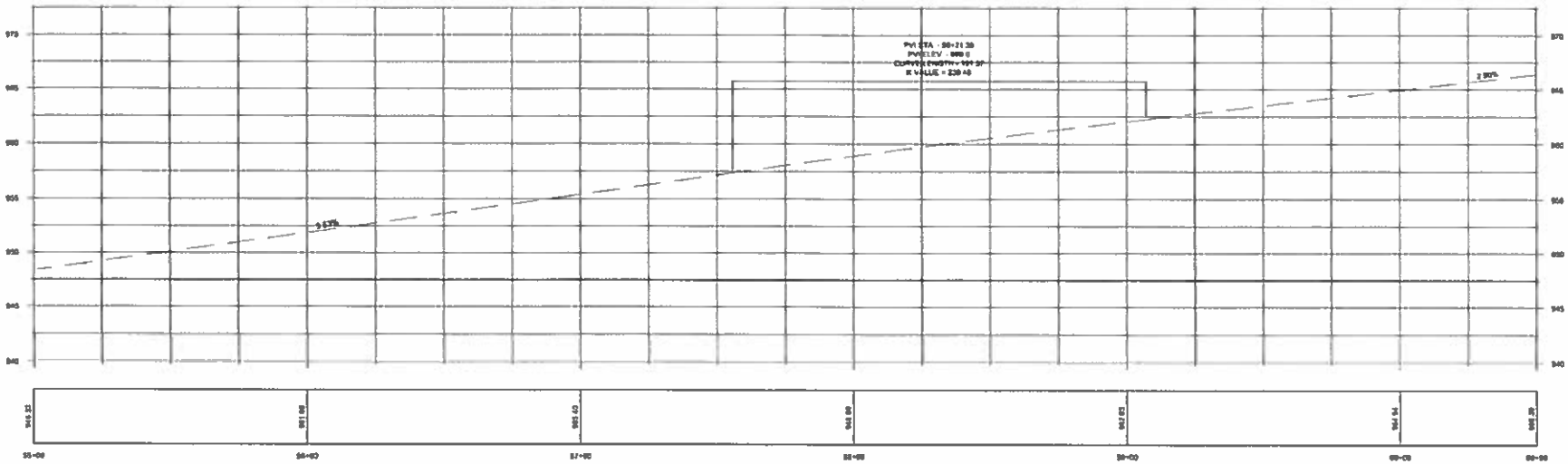
BOONE BOULEVARD
GREEN INFRASTRUCTURE &
CAPACITY RELIEF REPORT

EXISTING CONDITIONS PLAN AND PROFILE

SHEET NUMBER
015

PRELIMINARY, NOT FOR PUBLIC USE, GENERAL RELEASE OR CONSTRUCTION





BOONE BOULEVARD

SCALE: HOR 1"=20', VERT 1"=2'

SCALE IN FEET

0 20 40 80

BC/DHA
A JOINT VENTURE
100 HAMMOND DRIVE
SUITE 400
ATLANTA, GEORGIA 30328

SUBMITTED:
DATE
APPROVED
DATE

LINE IS 2 INCHES ON AT FULL SIZE
DESIGNED
DRAWN
CHECKED
CHECKED
APPROVED

EXTERNAL REFERENCE FILES

REVISIONS

ZONE	REV	DESCRIPTION	BY	DATE	APP

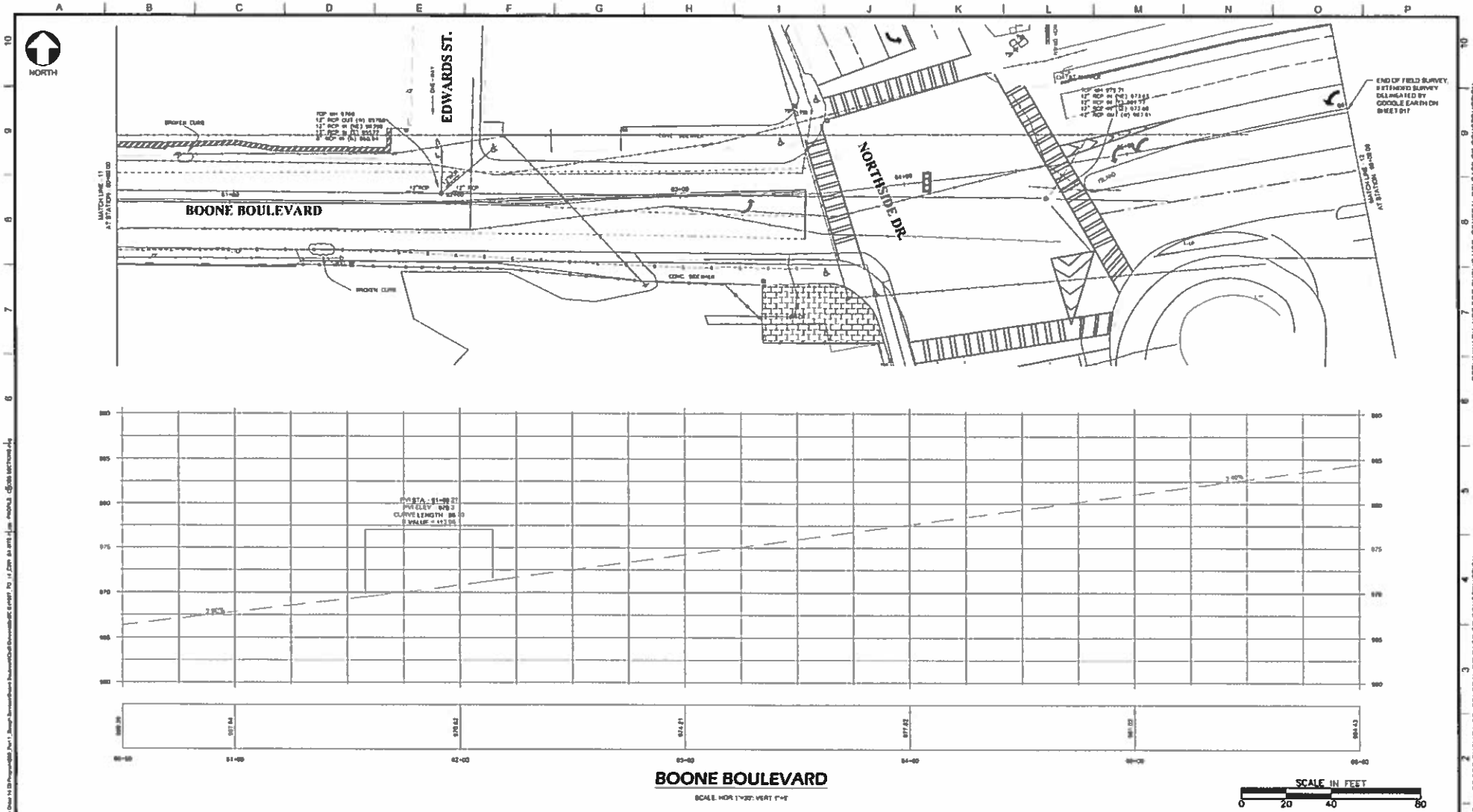
CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT

BOONE BOULEVARD
GREEN INFRASTRUCTURE & CAPACITY RELIEF PROJECT

EXISTING CONDITIONS PLAN AND PROFILE

SHEET NUMBER
016

PRELIMINARY, NOT FOR PUBLIC USE, GENERAL RELEASE OR CONSTRUCTION



BC/DHA
A JOINT VENTURE
100 HAMMOND DRIVE
SUITE 400
ATLANTA, GEORGIA 30328

SUBMITTED:
DATE
APPROVED:
DATE

LINE IS 2 INCHES AT FULL SIZE
DESIGNED
DRAWN
CHECKED
CHECKED
APPROVED

EXTERNAL REFERENCE FILES

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP

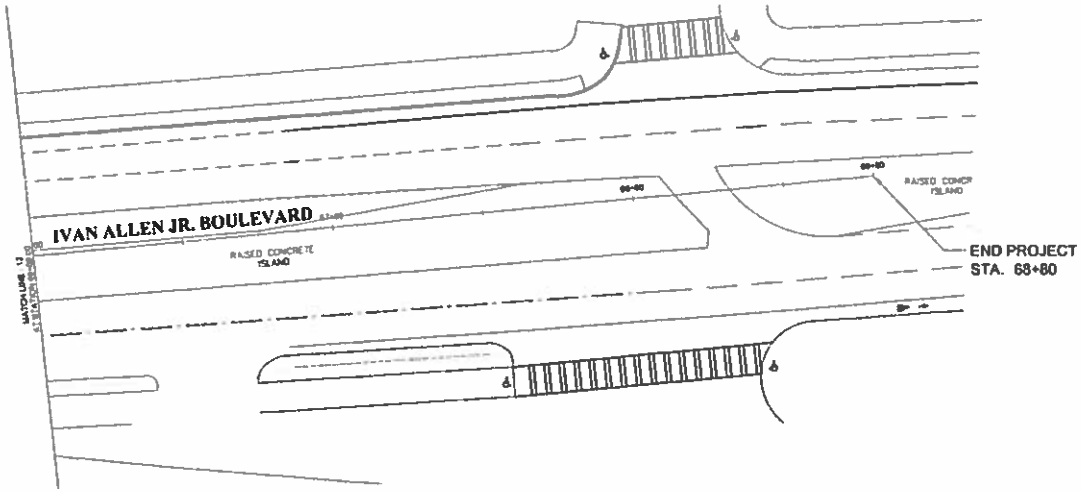
CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT

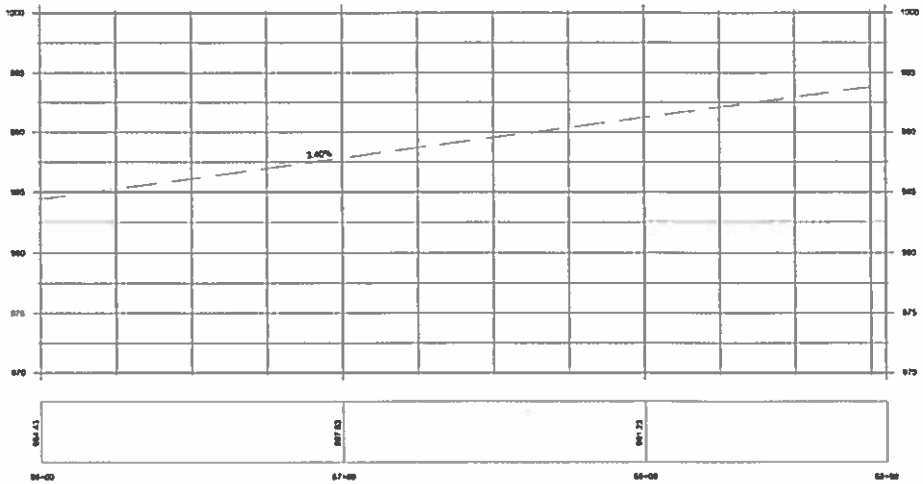
BOONE BOULEVARD
GREEN INFRASTRUCTURE &
CAPACITY RELIEF PROJECT

EXISTING CONDITIONS PLAN AND PROFILE

SHEET NUMBER
017
SHEET NUMBER
17 OF 35

PRELIMINARY, NOT FOR PUBLIC USE, GENERAL RELEASE OR CONSTRUCTION





BOONE BOULEVARD

SCALE: HOR 1"=20' VERT 1"=5'

NOTE:

EXTENDED SURVEY SHOWN ON THIS SHEET HAS BEEN DELINEATED FROM GOOGLE EARTH

SCALE IN FEET

0 20 40 80

PRELIMINARY, NOT FOR PUBLIC USE, GENERAL RELEASE OR CONSTRUCTION

BC/DHA A JOINT VENTURE

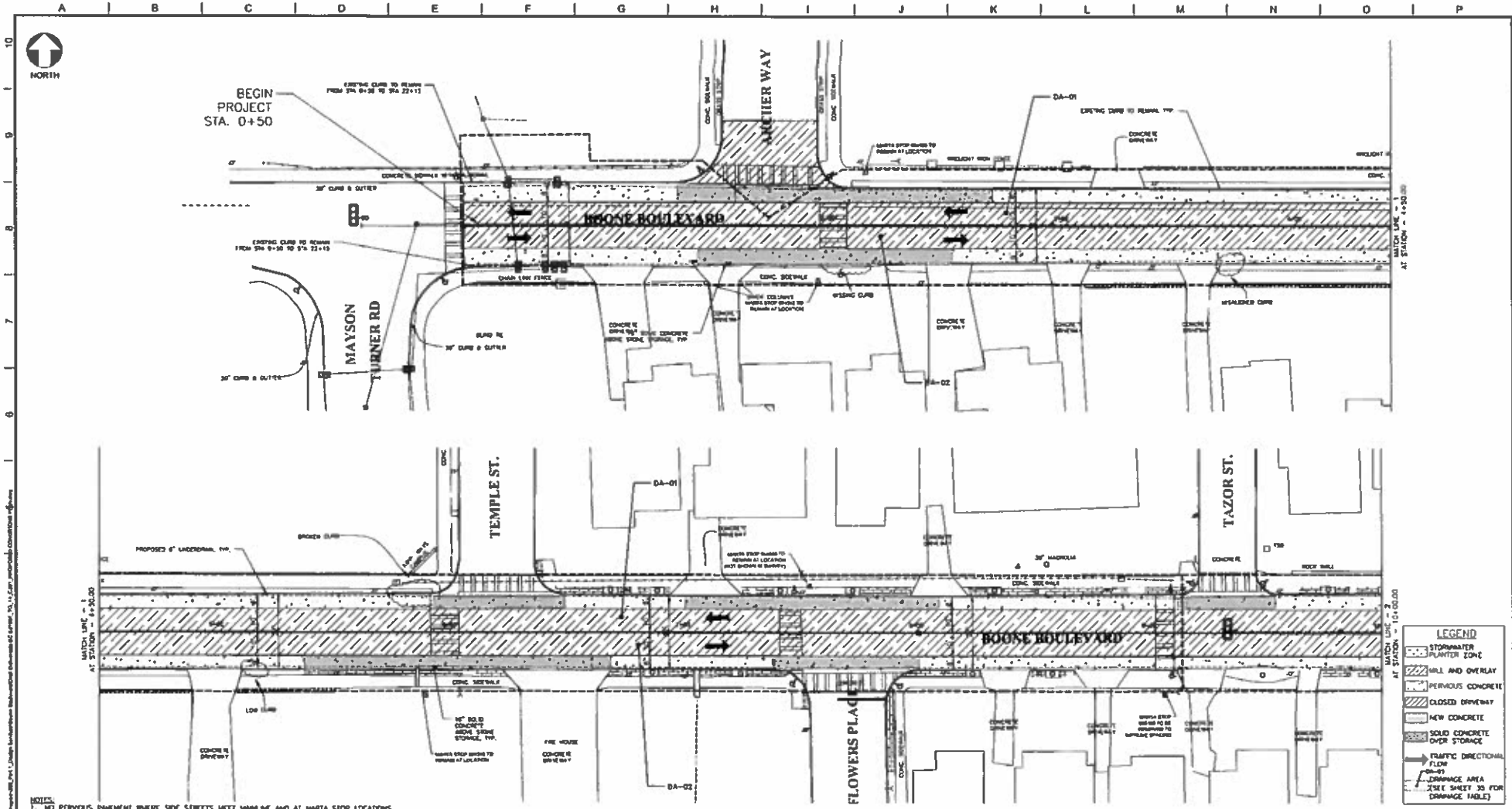
CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT

BOONE BOULEVARD GREEN INFRASTRUCTURE & CAPACITY RELIEF PROJECT

EXISTING CONDITIONS PLAN AND PROFILE

SHEET NUMBER 018

SHEET NUMBER 18 OF 25



NOTES:
1. NO PERVIOUS PAVEMENT WHERE SIDE STREETS MEET MAINLINE AND AT MARTA STOP LOCATIONS.
2. STORMWATER PLANTERS TO BE SIZED AND MANAGE VOLUME OF RUNOFF FROM THE 1-INCH RAINFALL EVENT FROM CONTRIBUTING DRAINAGE AREAS.
3. DRAINAGE AREAS SHOWN ARE STRICTLY WITHIN THE RIGHT-OF-WAY AND BASED ON EXISTING CATCH BASIN LOCATIONS.
4. LOCATION AND SPACING OF STORMWATER PLANTERS TO BE COORDINATED WITH CITY OF ATLANTA DEPARTMENT OF WATERSHED MANAGEMENT.
5. POTENTIAL STORMWATER PLANTER AREAS SHOWN FOR REFERENCE ONLY. CLEARANCES TO DRIVEWAYS, ENTRANCES, AND OTHER SURFACE FEATURES TO BE COORDINATED WITH THE CITY OF ATLANTA UNDERGROUND AND SURFACE UTILITY LOCATIONS, INCLUDING SERVICE LATERALS TO BE FIELD VERIFIED.

BC/DHA
A JOINT VENTURE
999 MARIETTA DRIVE
SUITE 610
ATLANTA, GEORGIA 30328

SUBMITTED:
DATE: 01/08/15
APPROVED:
DATE:

LINE IS 2 INCHES AT FULL SIZE
IF NOT 2" - SCALE ACCORDINGLY

DESIGNED: DHA
DRAWN: Y.D. WORC
CHECKED: Y.D. WORC
CHECKED: M.C. ROFF
APPROVED: M.C. ROFF

EXTERNAL REFERENCE FILES:

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP

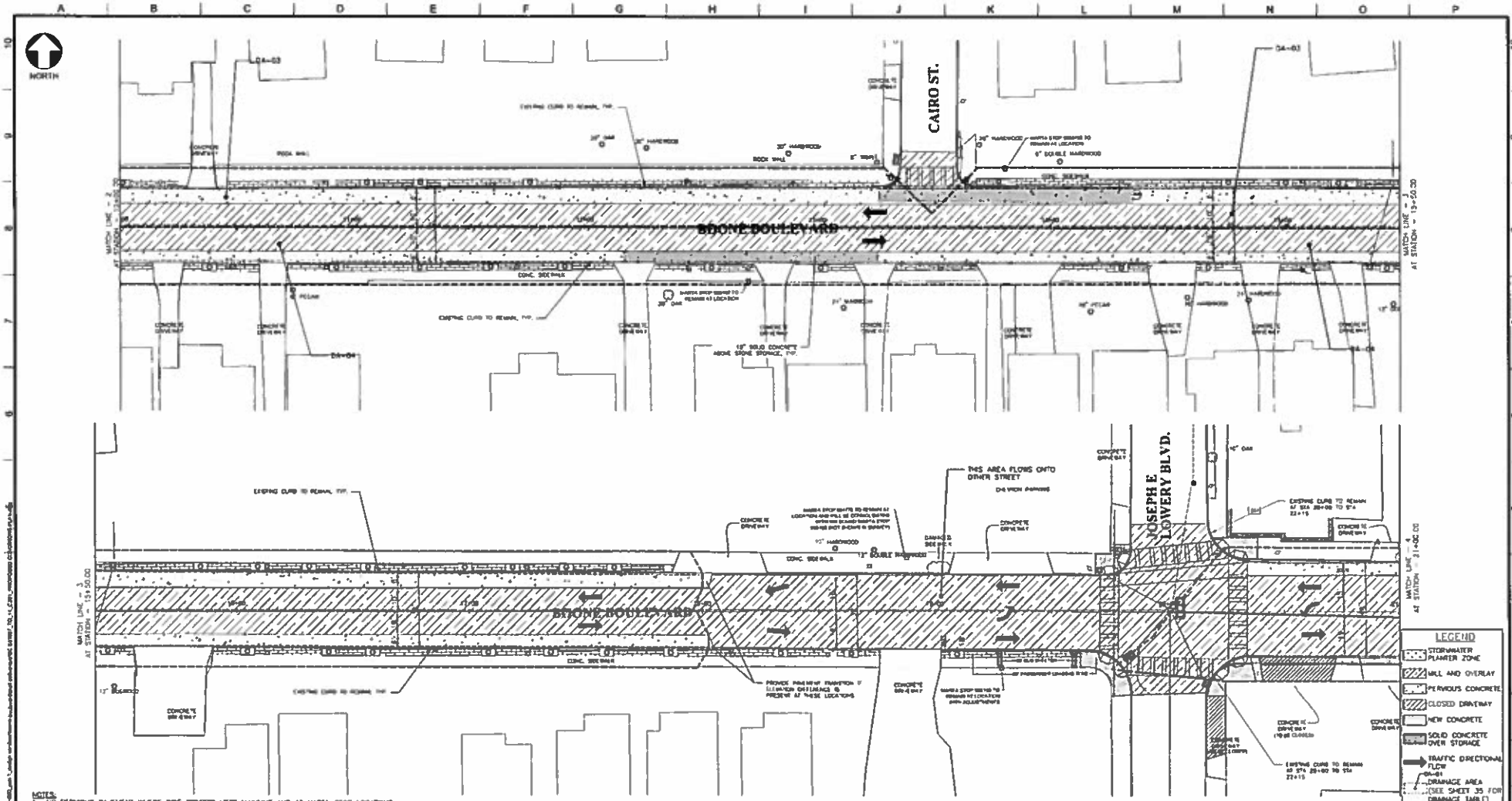
CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT

BOONE BOULEVARD GREEN INFRASTRUCTURE & CAPACITY RELIEF PROJECT

PROPOSED CONDITIONS PLAN

SHEET NUMBER 019
19 OF 35

PRELIMINARY, NOT FOR PUBLIC USE, GENERAL RELEASE OR CONSTRUCTION



NOTES:
1. NO PERVIOUS PAVEMENT WHERE SIDE STREETS MEET MAINLINE AND AT MARTA STOP LOCATIONS.
2. STORMWATER PLANTERS TO BE SIZED AND MANAGE VOLUME OF RUNOFF FROM THE 1-INCH RAINFALL EVENT FROM CONTRIBUTING DRAINAGE AREAS.
3. DRAINAGE AREAS SHOWN ARE STRICTLY WITHIN THE RIGHT-OF-WAY AND BASED ON EXISTING CATCH BASIN LOCATIONS.
4. LOCATION AND SPACING OF STORMWATER PLANTERS TO BE COORDINATED WITH CITY OF ATLANTA DEPARTMENT OF WATERSHED MANAGEMENT.
5. POTENTIAL STORMWATER PLANTER AREAS SHOWN FOR REFERENCE ONLY. CLEARANCES TO DRIVEWAYS, ENTRANCES, AND OTHER SURFACE FEATURES TO BE COORDINATED WITH THE CITY OF ATLANTA UNDERGROUND AND SURFACE UTILITY LOCATIONS INCLUDING SERVICE LATERALS TO BE FIELD VERIFIED.

BC/DHA
A JOINT VENTURE
100 HAMMOND DRIVE
SUITE 400
ATLANTA, GEORGIA 30328

SUBMITTED:
DATE: 01/08/16
APPROVED:
DATE:

1 MM = 2 INCHES
AT FULL SIZE
(IF NOT 2" - SCALE ACCORDINGLY)
DESIGNED: DHA
DRAWN: J.B. HYDE
CHECKED: J.S. BONE
CHECKED: W.J. SOUTT
APPROVED: W.J. SOUTT

EXTERNAL REFERENCE FILES

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

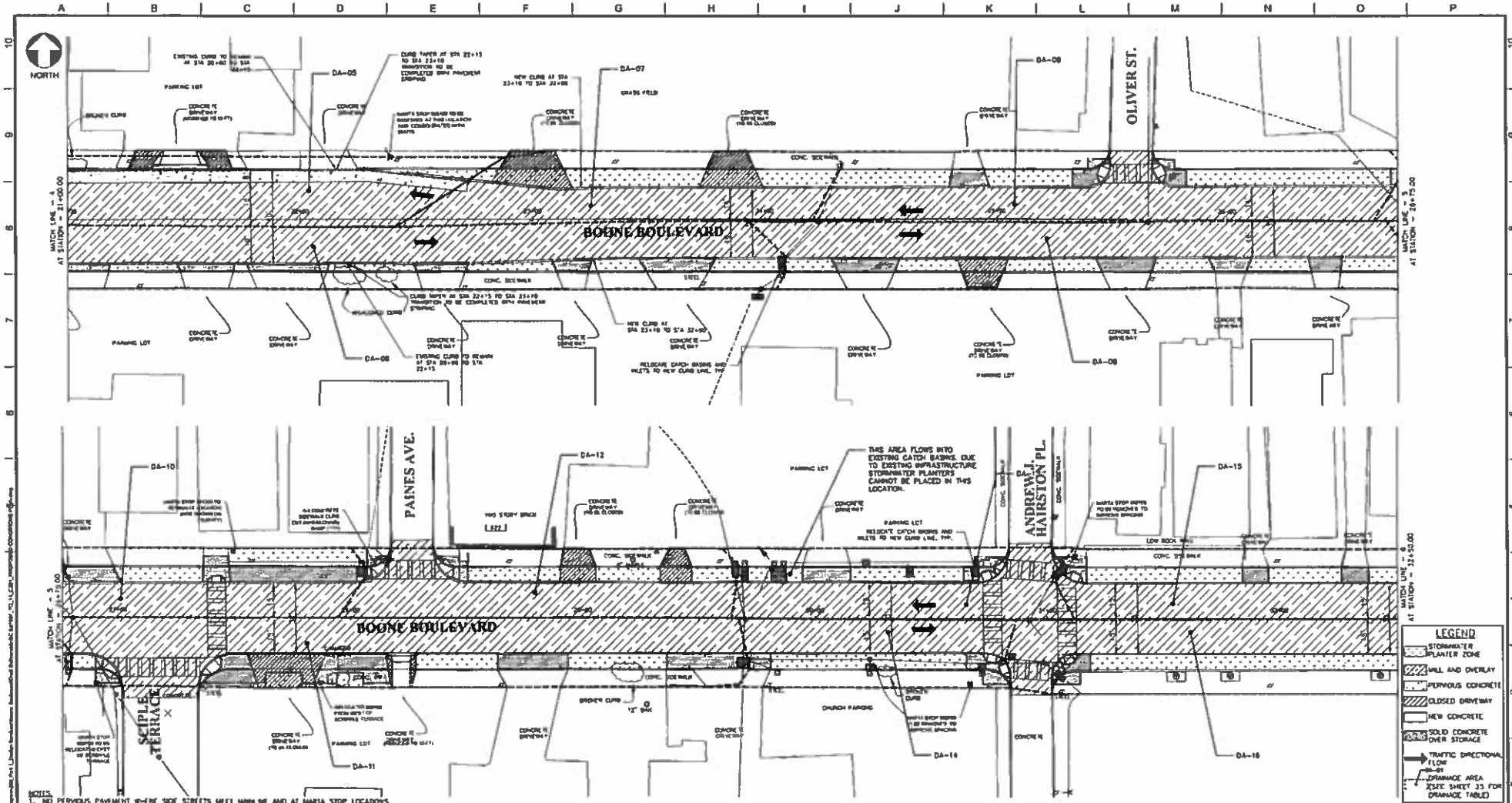
CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT

BOONE BOULEVARD
GREEN INFRASTRUCTURE &
CAPACITY RELIEF PROJECT

PROPOSED CONDITIONS PLAN

SHEET NUMBER
020
SHEET NUMBER OF 35

PRELIMINARY, NOT FOR PUBLIC USE, GENERAL RELEASE OR CONSTRUCTION



NOTES:
1. NO PERVIOUS PAVEMENT WHERE SIDE STREETS MEET MAINLINE AND AT MARTA STOP LOCATIONS.
2. STORMWATER PLANTERS TO BE SIZED AND MANAGE VOLUME OF RUNOFF FROM THE 1-INCH RAINFALL EVENT FROM CONTRIBUTING DRAINAGE AREAS.
3. DRAINAGE AREAS SHOWN ARE STRICTLY WITHIN THE RIGHT-OF-WAY AND BASED ON EXISTING CATCH BASIN LOCATIONS.
4. LOCATION AND SPACING OF STORMWATER PLANTERS TO BE COORDINATED WITH CITY OF ATLANTA DEPARTMENT OF WATERSHED MANAGEMENT.
5. POTENTIAL STORMWATER PLANTER AREAS SHOWN FOR REFERENCE ONLY. CLEARANCES TO DRIVEWAYS, ENTRANCES, AND OTHER SURFACE FEATURES TO BE COORDINATED WITH THE CITY OF ATLANTA UNDERGROUND AND SURFACE UTILITY LOCATIONS INCLUDING SERVICE LATERALS TO BE FIELD VERIFIED.

BC/DHA
A JOINT VENTURE
999 MARIETTA DRIVE
SUITE 400
ATLANTA, GEORGIA 30318

SUBMITTED:
DATE: 7/28/16
APPROVED:
DATE:

LINE IS 2 INCHES AT FULL SIZE
DESIGNED: DHA
DRAWN: T.G. WOOD
CHECKED: T.G. WOOD
CHECKED: D.C. DOUTY
APPROVED: D.C. DOUTY

EXTERNAL REFERENCE FILES

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

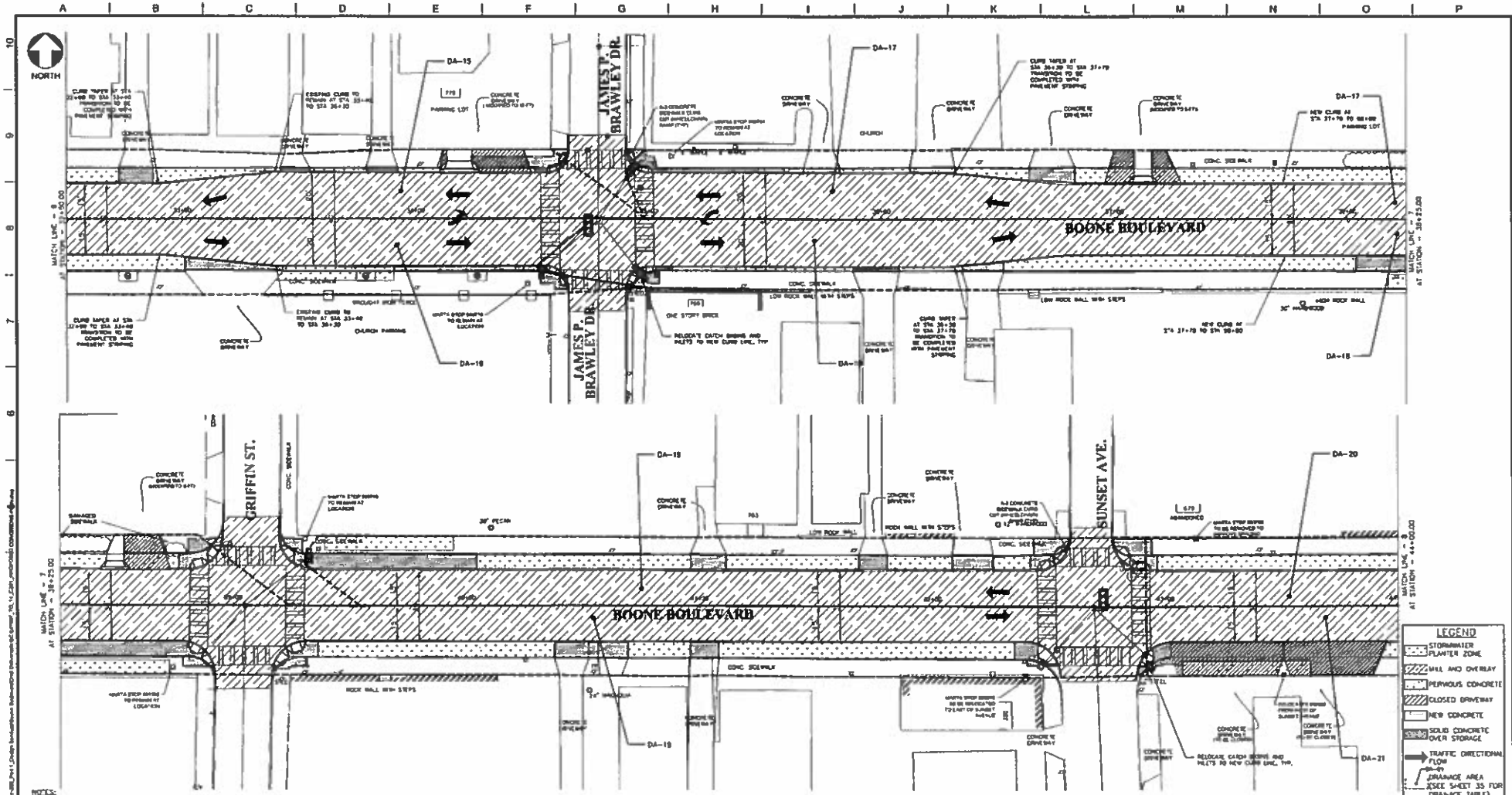
CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT

BOONE BOULEVARD
GREEN INFRASTRUCTURE & CAPACITY RELIEF PROJECT

PROPOSED CONDITIONS PLAN

SHEET NUMBER
021
SHEET NUMBER
21 OF 35

PRELIMINARY, NOT FOR PUBLIC USE, GENERAL RELEASE OR CONSTRUCTION



NOTES:
1. NO PERVIOUS PAVEMENT WHERE SIDE STREETS MEET MAINLINE AND AT MARTA STOP LOCATIONS.
2. STORMWATER PLANTERS TO BE SIZED AND MANAGE VOLUME OF RUNOFF FROM THE 1-INCH RAINFALL EVENT FROM CONTRIBUTING DRAINAGE AREAS.
3. DRAINAGE AREAS SHOWN ARE STRICTLY WITHIN THE RIGHT-OF-WAY AND BASED ON EXISTING CATCH BASIN LOCATIONS.
4. LOCATION AND SPACING OF STORMWATER PLANTERS TO BE COORDINATED WITH CITY OF ATLANTA DEPARTMENT OF WATERSHED MANAGEMENT.
5. POTENTIAL STORMWATER PLANTER AREAS SHOWN FOR REFERENCE ONLY. CLEARANCES TO DRIVEWAYS, ENTRANCES, AND OTHER SURFACE FEATURES TO BE COORDINATED WITH THE CITY OF ATLANTA UNDERGROUND AND SURFACE UTILITY LOCATIONS INCLUDING SERVICE LATERALS TO BE FIELD VERIFIED

BC/DHA
A JOINT VENTURE
100 MAIMONIDES DRIVE
SUITE 400
ATLANTA, GEORGIA 30329

SUBMITTED:
DATE: 01/08/19
APPROVED:
DATE:

LINE IS 2 INCHES AT FULL SIZE
IF NOT 2" SCALE ADJUSTMENT

DESIGNED: DHI
DRAWN: Y.Z. WOW
CHECKED: Y.Z. WOW
CHECKED: M.E. HOUTY
APPROVED: M.E. HOUTY

EXTERNAL REFERENCE FILES

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT

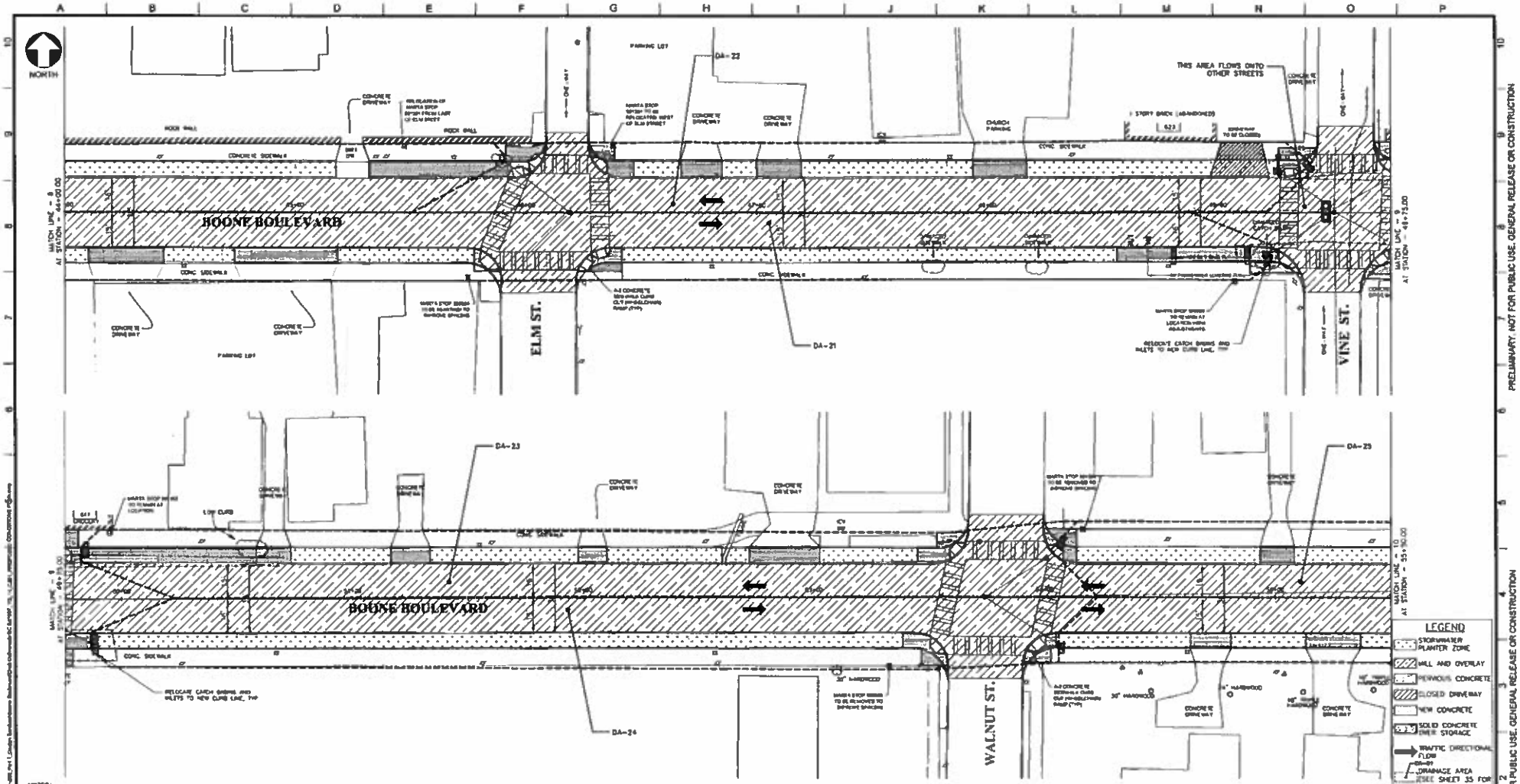
BOONE BOULEVARD
GREEN INFRASTRUCTURE & CAPACITY RELIEF PROJECT

PROPOSED CONDITIONS PLAN

FILENAME: 1967_TO_1A_CDP_PROPOSED CONDITIONS PLAN.DWG
DHI PROJECT NUMBER: 1967B/1B TO 1A
CLIENT PROJECT NUMBER: FC-[illegible]
SHEET NUMBER: 022
SHEET NUMBER 22 OF 35

PRELIMINARY, NOT FOR PUBLIC USE, GENERAL RELEASE OR CONSTRUCTION

PRELIMINARY, NOT FOR PUBLIC USE, GENERAL RELEASE OR CONSTRUCTION



NOTES:
1. NO PERVIOUS PAVEMENT WHERE SIDE STREETS MEET MAINLINE AND AT MARTA STOP LOCATIONS.
2. STORMWATER PLANTERS TO BE SIZED AND MANAGE VOLUME OF RUNOFF FROM THE 1-INCH RAINFALL EVENT FROM CONTRIBUTING DRAINAGE AREAS.
3. DRAINAGE AREAS SHOWN ARE STRICTLY WITHIN THE RIGHT-OF-WAY AND BASED ON EXISTING CATCH BASIN LOCATIONS.
4. LOCATION AND SPACING OF STORMWATER PLANTERS TO BE COORDINATED WITH CITY OF ATLANTA DEPARTMENT OF WATERSHED MANAGEMENT.
5. POTENTIAL STORMWATER PLANTER AREAS SHOWN FOR REFERENCE ONLY. CLEARANCES TO DRIVEWAYS, ENTRANCES, AND OTHER SURFACE FEATURES TO BE COORDINATED WITH THE CITY OF ATLANTA UNDERGROUND AND SURFACE UTILITY LOCATIONS INCLUDING SERVICE LATERALS TO BE FIELD VERIFIED.

BC/DHA
A JOINT VENTURE
100 MARIETTA DRIVE
SUITE 400
ATLANTA, GEORGIA 30303

SUBMITTED:
DATE:
APPROVED:
DATE:

LINE IS 3 INCHES AT FULL SIZE
IF NOT 3" - SCALE ACCORDINGLY

DESIGNED:
DRAWN:
CHECKED:
CHECKED:
APPROVED:

EXTERNAL REFERENCE FILES

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

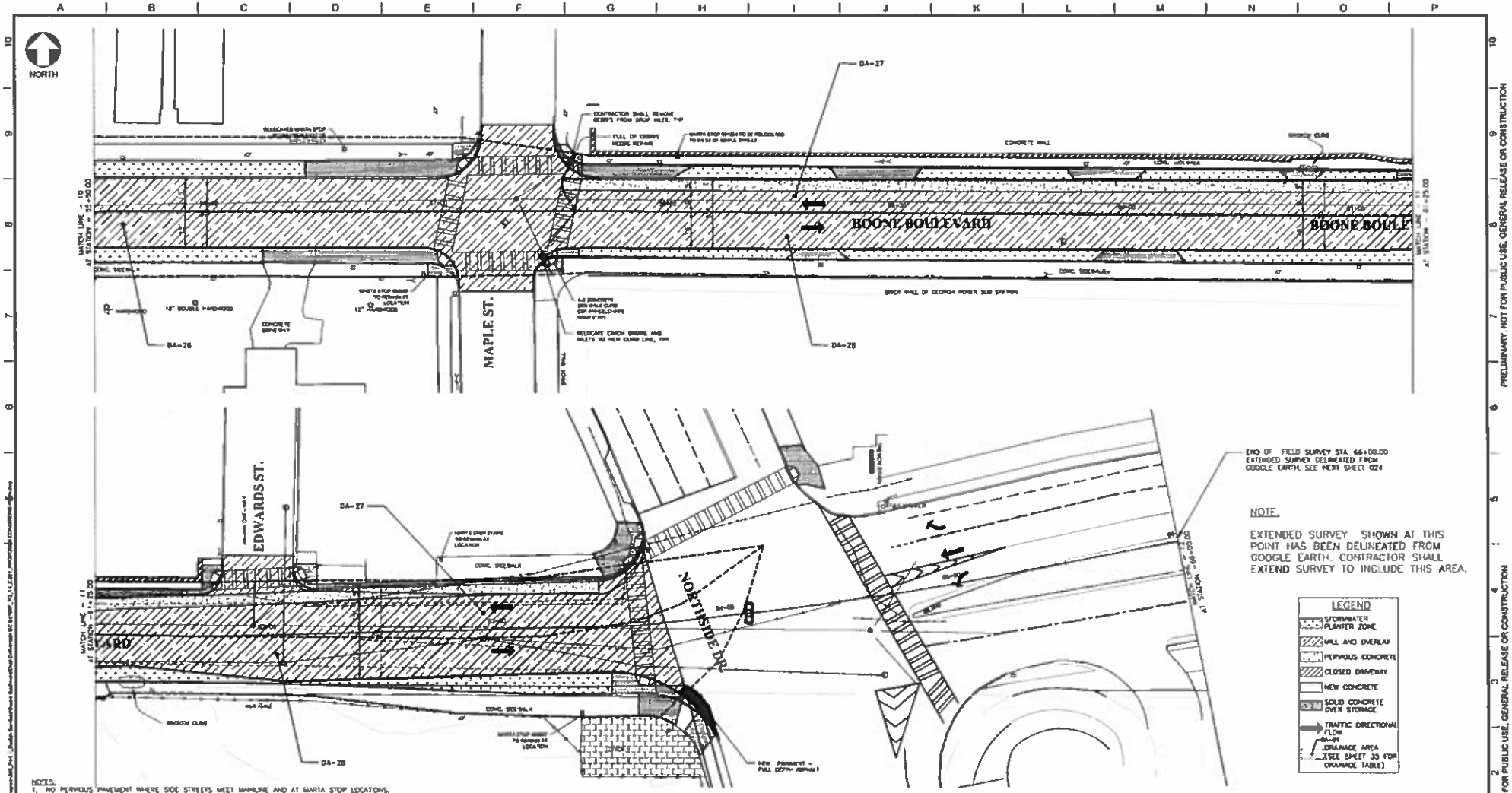
CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT

BOONE BOULEVARD
GREEN INFRASTRUCTURE &
CAPACITY RELIEF PROJECT

PROPOSED CONDITIONS PLAN

SHEET NUMBER
023
SHEET NUMBER
23 OF 35

PRELIMINARY, NOT FOR PUBLIC USE, GENERAL RELEASE OR CONSTRUCTION



NOTES:
1. NO PERVIOUS PAVEMENT WHERE SIDE STREETS MEET MAINLINE AND AT MARTA STOP LOCATIONS.
2. STORMWATER PLANTERS TO BE SIZED AND MANAGE VOLUME OF RUNOFF FROM THE 1-INCH RAINFALL EVENT FROM CONTRIBUTING DRAINAGE AREAS.
3. DRAINAGE AREAS SHOWN ARE STRICTLY WITHIN THE RIGHT-OF-WAY AND BASED ON EXISTING CATCH BASIN LOCATIONS.
4. LOCATION AND SPACING OF STORMWATER PLANTERS TO BE COORDINATED WITH CITY OF ATLANTA DEPARTMENT OF WATERSHED MANAGEMENT.
5. POTENTIAL STORMWATER PLANTER AREAS SHOWN FOR REFERENCE ONLY. CLEARANCES TO DRIVEWAYS, ENTRANCES, AND OTHER SURFACE FEATURES TO BE COORDINATED WITH THE CITY OF ATLANTA UNDERGROUND AND SURFACE UTILITY LOCATIONS INCLUDING SERVICE LATERALS TO BE FIELD VERIFIED.

BC/DHA
A JOINT VENTURE
999 HAMMOND DRIVE
SUITE 400
ATLANTA, GEORGIA 30328

SUBMITTED:
DATE: 01/08/19
APPROVED:
DATE:

LINE TO 2 INCHES AT FULL SIZE IF NOT 2" - SCALE ACCORDINGLY
DESIGNED: DHA
DRAWN: Y.A. WANG
CHECKED: S.D. WOOD
CHECKED: B.E. DOUTY
APPROVED: B.E. DOUTY

EXTERNAL REFERENCE FILES

REVISIONS

FORM	REV.	DESCRIPTION	BY	DATE	APP.

CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT

BOONE BOULEVARD
GREEN INFRASTRUCTURE &
CAPACITY RELIEF PROJECT

PROPOSED CONDITIONS PLAN

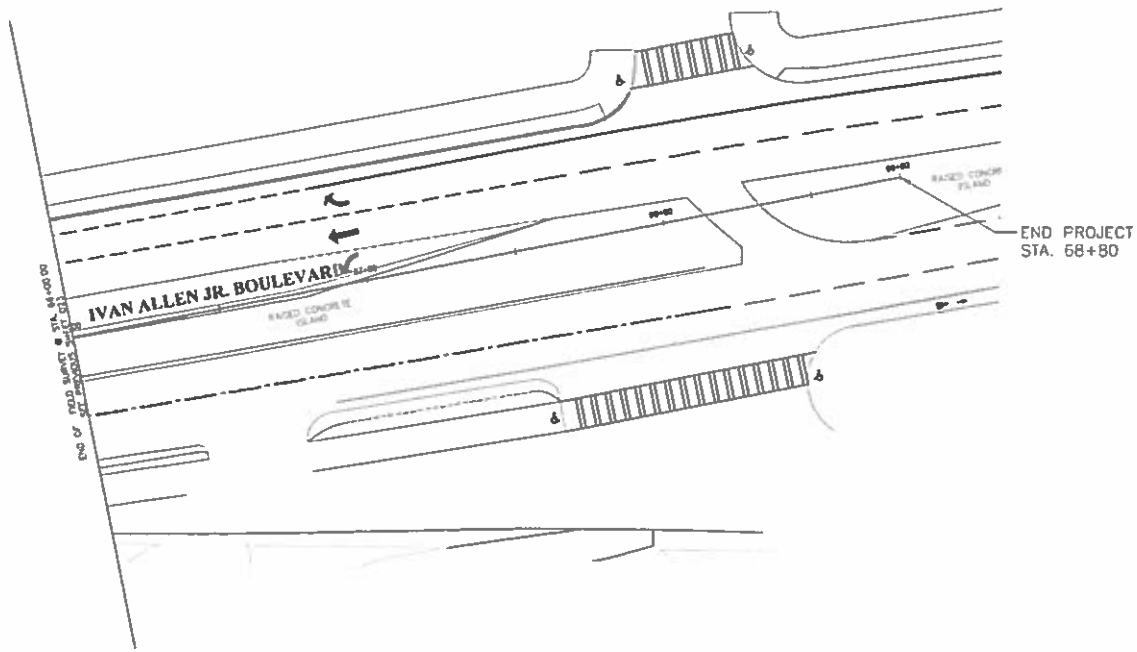
SHEET NUMBER
024
SHEET NUMBER
24 OF 35

PRELIMINARY, NOT FOR PUBLIC USE, GENERAL RELEASE OR CONSTRUCTION

NORTH

NOTE:

EXTENDED SURVEY SHOWN ON THIS SHEET HAS BEEN DELINEATED FROM GOOGLE EARTH. CONTRACTOR SHALL EXTEND SURVEY TO INCLUDE THIS AREA.



LEGEND

- STORMWATER PLANTER ZONE
- MILL AND OVERLAY
- PERVIOUS CONCRETE
- CLOSED DRIVEWAY
- NEW CONCRETE
- SOLID CONCRETE OVER STORAGE
- TRAFFIC DIRECTIONAL FLOW
- DRAINAGE AREA (SEE SHEET J5 FOR DRAINAGE TABLE)

NOTES:
1. NO PERVIOUS PAVEMENT WHERE SIDE STREETS MEET MAINLINE AND AT MARTA STOP LOCATIONS.
2. STORMWATER PLANTERS TO BE SIZED AND MANAGE VOLUME OF RUNOFF FROM THE 1-INCH RAINFALL EVENT FROM CONTRIBUTING DRAINAGE AREAS.
3. DRAINAGE AREAS SHOWN ARE STRICTLY WITHIN THE RIGHT-OF-WAY AND BASED ON EXISTING CATCH BASIN LOCATIONS.
4. LOCATION AND SPACING OF STORMWATER PLANTERS TO BE COORDINATED WITH CITY OF ATLANTA DEPARTMENT OF WATERSHED MANAGEMENT.
5. POTENTIAL STORMWATER PLANTER AREAS SHOWN FOR REFERENCE ONLY. CLEARANCES TO DRIVEWAYS, ENTRANCES, AND OTHER SURFACE FEATURES TO BE COORDINATED WITH THE CITY OF ATLANTA UNDERGROUND AND SURFACE UTILITY LOCATIONS INCLUDING SERVICE LATERALS TO BE FIELD VERIFIED.

SCALE IN FEET
0 20 40 80

BC/DHA
A JOINT VENTURE
990 HAMMOND DRIVE
SUITE 400
ATLANTA, GEORGIA 30328

SUBMITTED:
DATE: 01/08/18
APPROVED:
DATE:

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)
DESIGNED: DHA
DRAWN: Y.D. WWD
CHECKED: Y.D. WWD
CHECKED: S.E. DOUTY
APPROVED: S.E. DOUTY

EXTERNAL REFERENCE FILES

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP

CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT

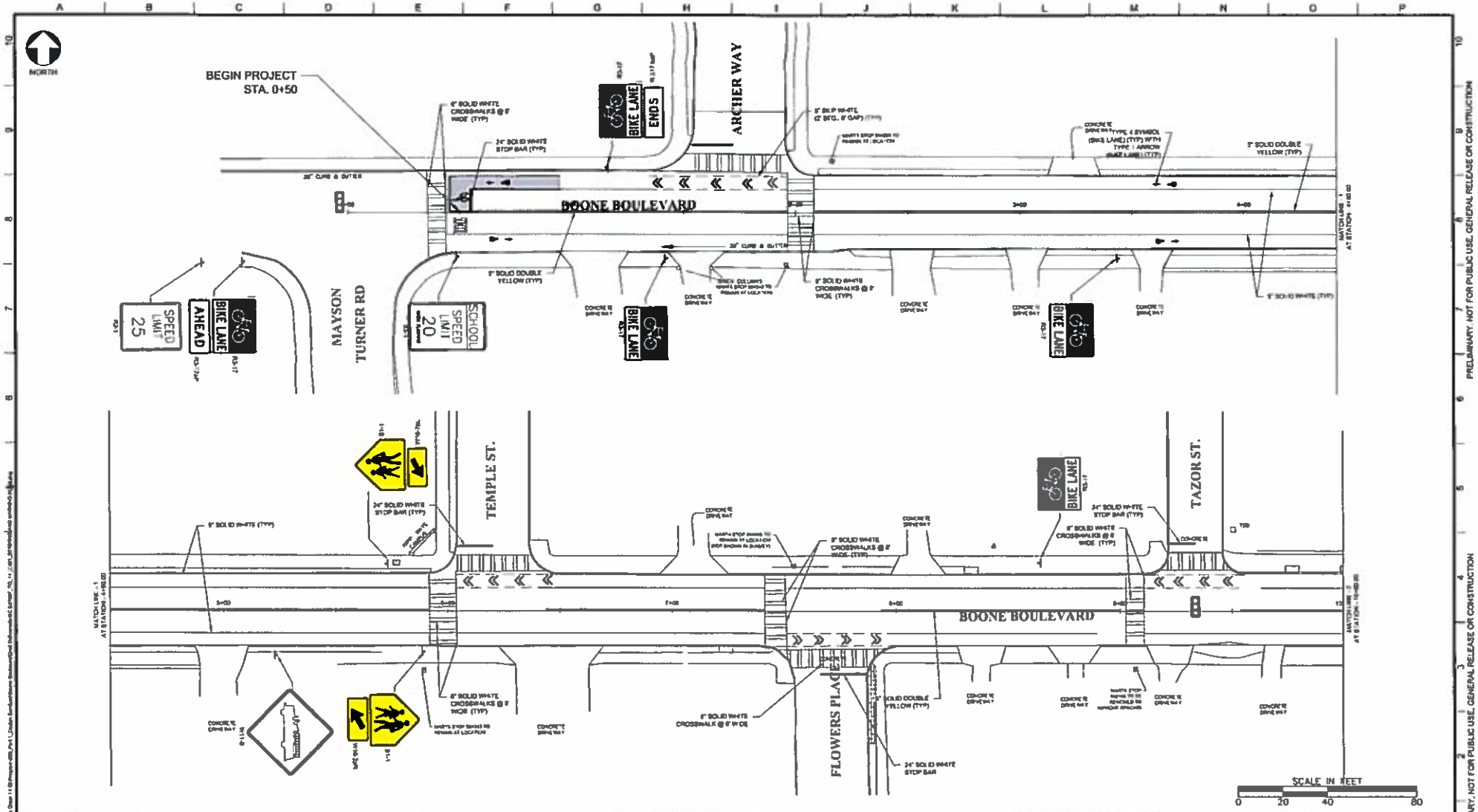
BOONE BOULEVARD
GREEN INFRASTRUCTURE & CAPACITY RELIEF PROJECT

PROPOSED CONDITIONS PLAN

FILENAME: 1957_RD_16_C301_PROPOSED CONDITIONS PLAN.DWG
DHA PROJECT NUMBER: 1957-RD-16
CLIENT PROJECT NUMBER: 16-0000
SHEET NUMBER: 025
SHEET NUMBER: 25 OF 35

PRELIMINARY, NOT FOR PUBLIC USE, GENERAL RELEASE OR CONSTRUCTION

PRELIMINARY, NOT FOR PUBLIC USE, GENERAL RELEASE OR CONSTRUCTION



BC/DHA
A JOINT VENTURE

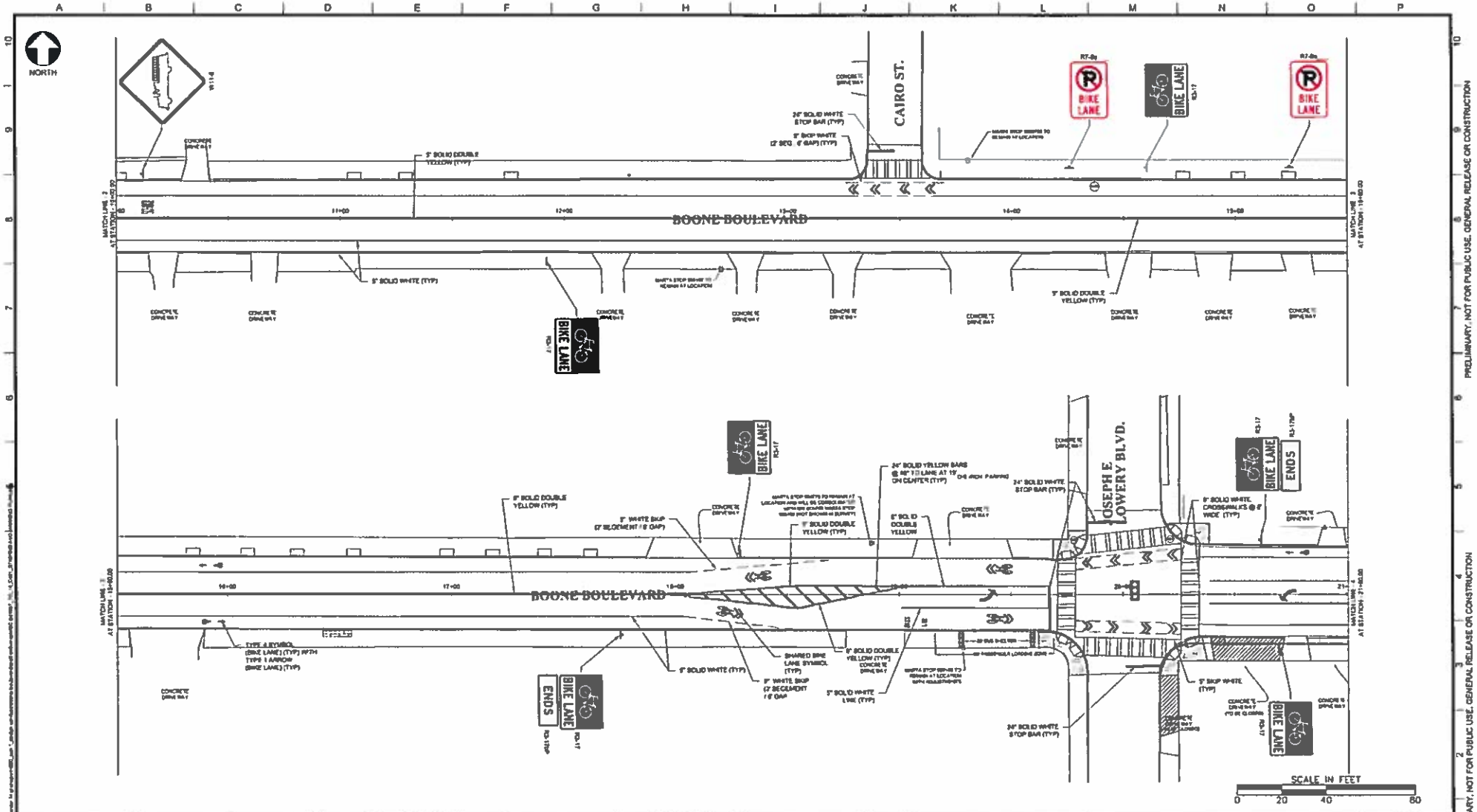
CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT

BOONE BOULEVARD
GREEN INFRASTRUCTURE &
CAPACITY RELIEF PROJECT

PROPOSED SIGNING AND MARKING PLAN

SHEET NUMBER
026

PRELIMINARY, NOT FOR PUBLIC USE, GENERAL RELEASE OR CONSTRUCTION



BC/DHA
A JOINT VENTURE
191 PEACHTREE DRIVE
SUITE 400
ATLANTA, GEORGIA 30328

SUBMITTED:
DATE:
APPROVED:
DATE:

DESIGNED:
DRAWN:
CHECKED:
CHECKED:
APPROVED:

EXTERNAL REFERENCE FILES

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT

BOONE BOULEVARD
GREEN INFRASTRUCTURE &
CAPACITY RELIEF PROJECT

PROPOSED SIGNING AND MARKING PLAN

SHEET NUMBER
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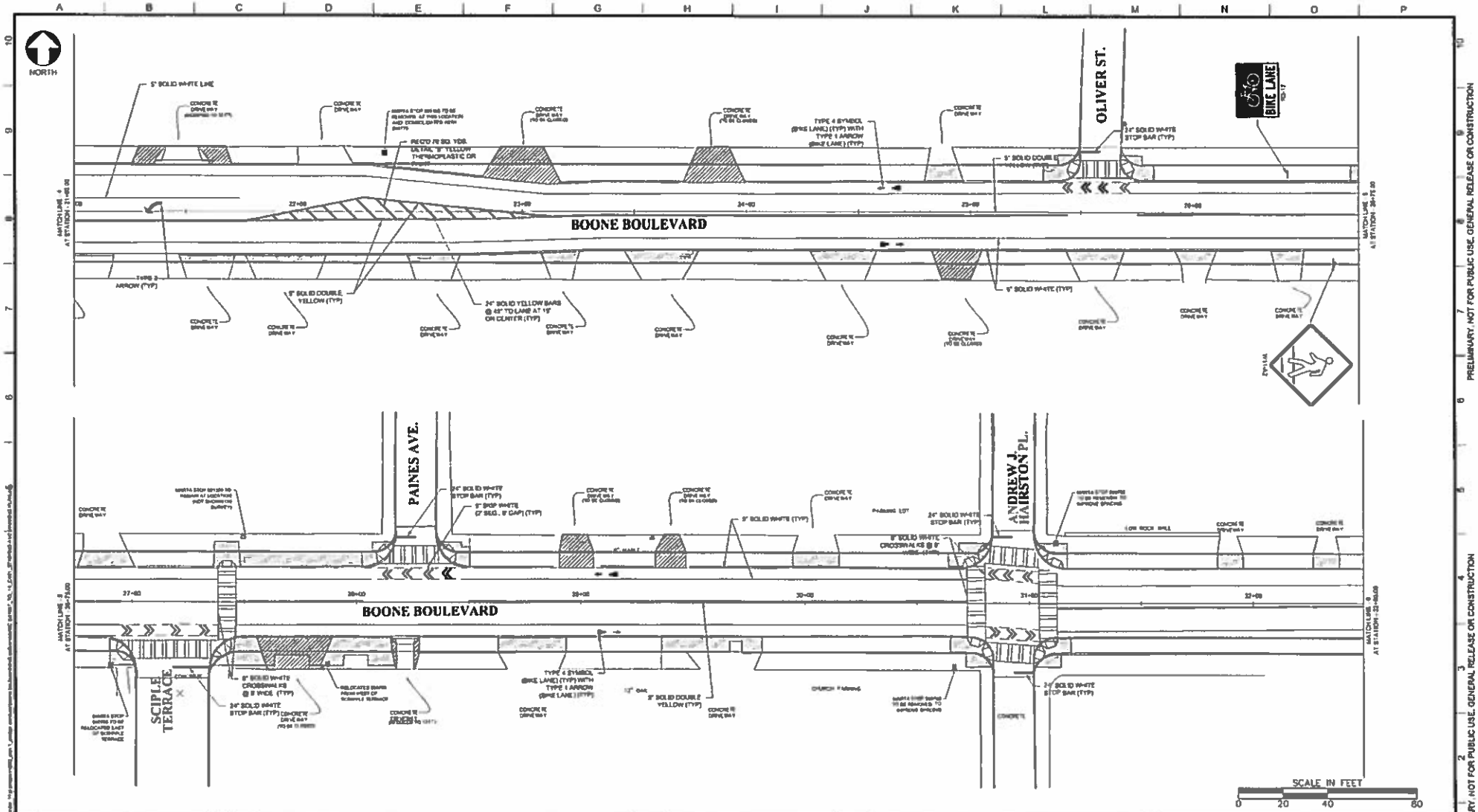


BC/DHA
A JOINT VENTURE

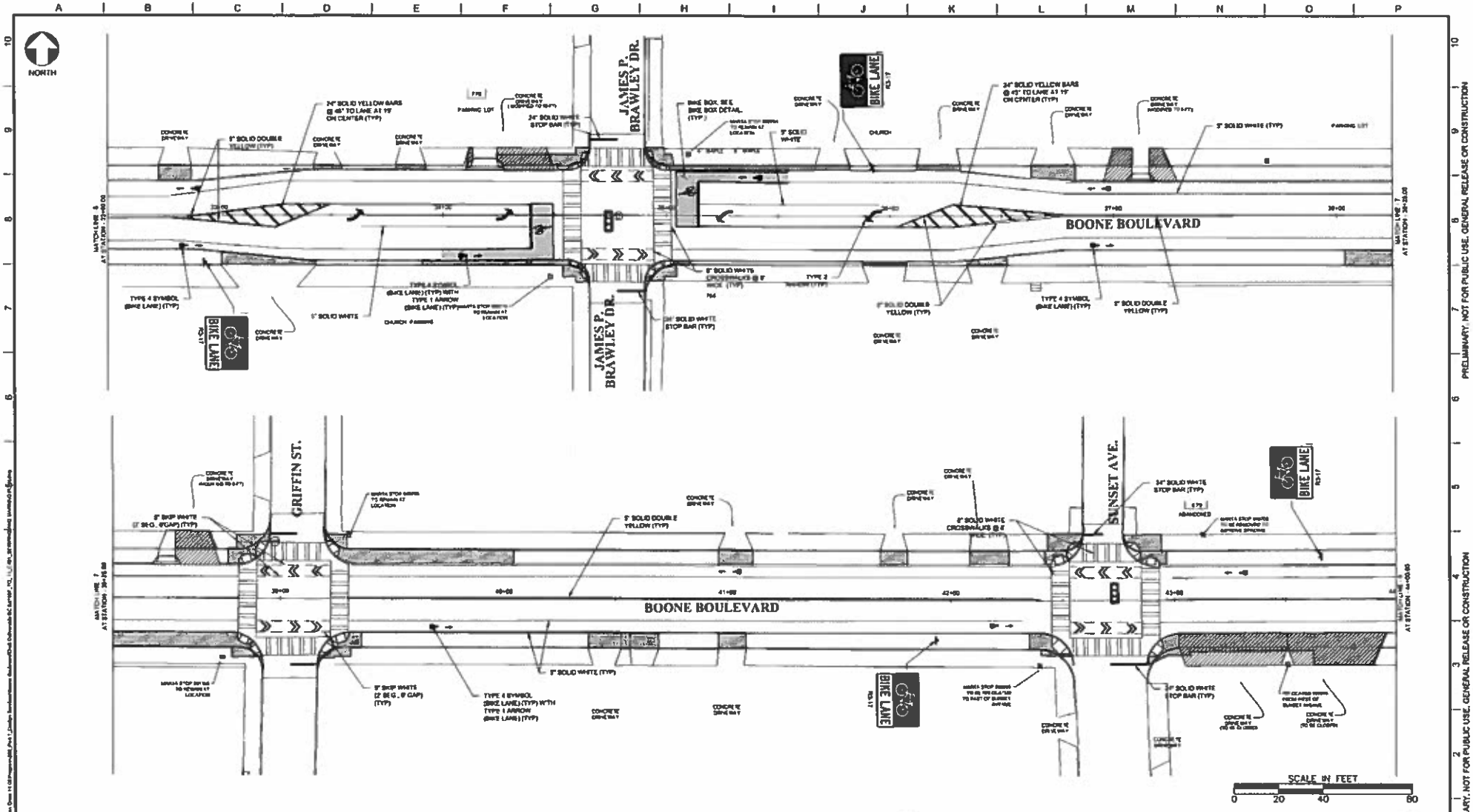
CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT

BOONE BOULEVARD
GREEN INFRASTRUCTURE &
CAPACITY RELIEF PROJECT

PROPOSED SIGNING AND MARKING PLAN

028

PRELIMINARY, NOT FOR PUBLIC USE, GENERAL RELEASE OR CONSTRUCTION



BC/DHA
A JOINT VENTURE

CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT

BOONE BOULEVARD
GREEN INFRASTRUCTURE &
CAPACITY RELIEF PROJECT

PROPOSED SIGNING AND MARKING PLAN

SHEET NUMBER
029

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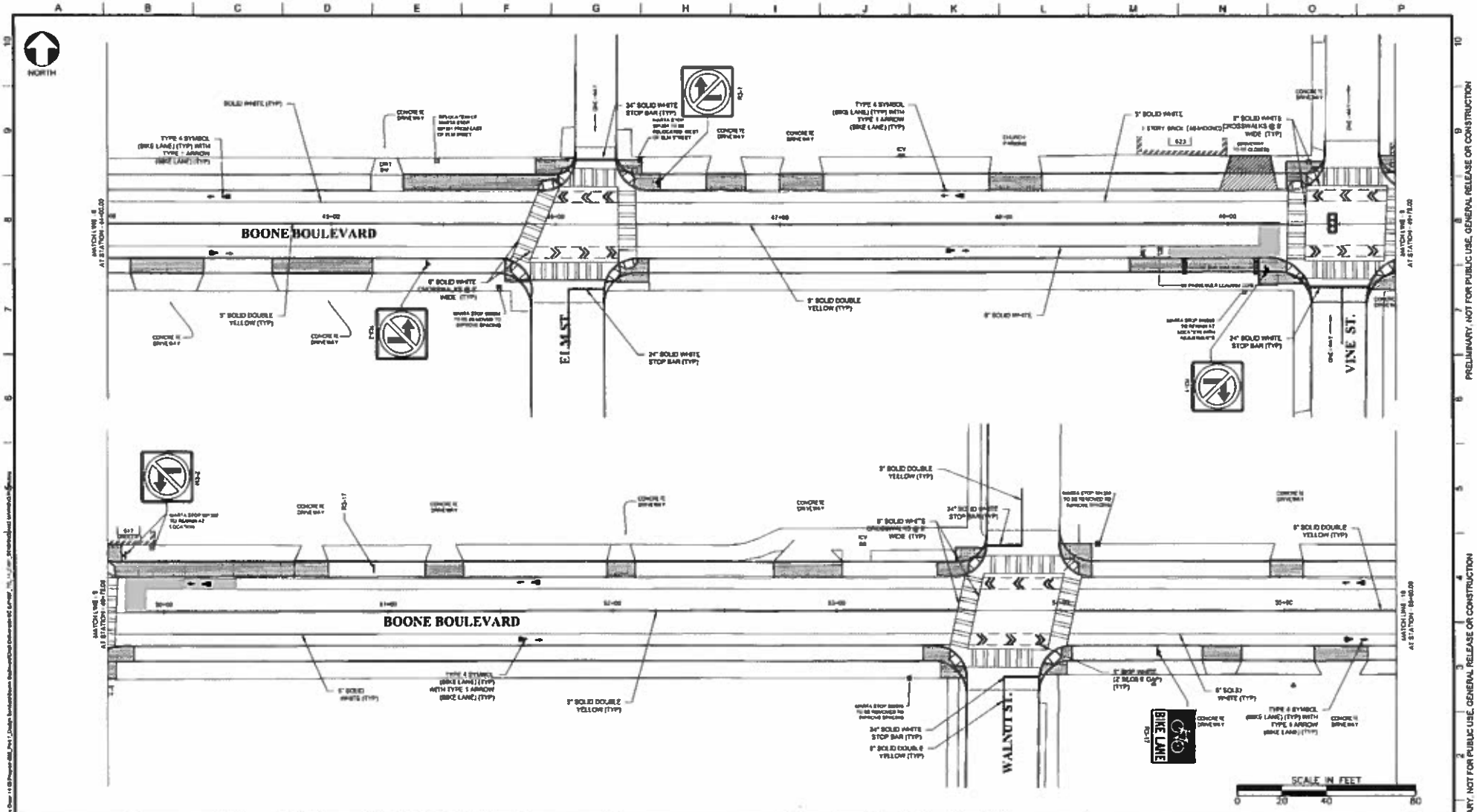


BC/DHA
A JOINT VENTURE
100 MAMMOND DRIVE
SUITE 400
ATLANTA, GEORGIA 30339

SUBMITTED:
DATE:
APPROVED:
DATE:

LINE IS 2 INCHES AT FULL SIZE
IF NOT 2", SCALE ACCORDINGLY

DESIGNED: jma
DRAWN: v.o. [illegible]
CHECKED: v.o. [illegible]
CHECKED: [illegible]
APPROVED: [illegible]

EXTERNAL REFERENCE FILES

REVISIONS

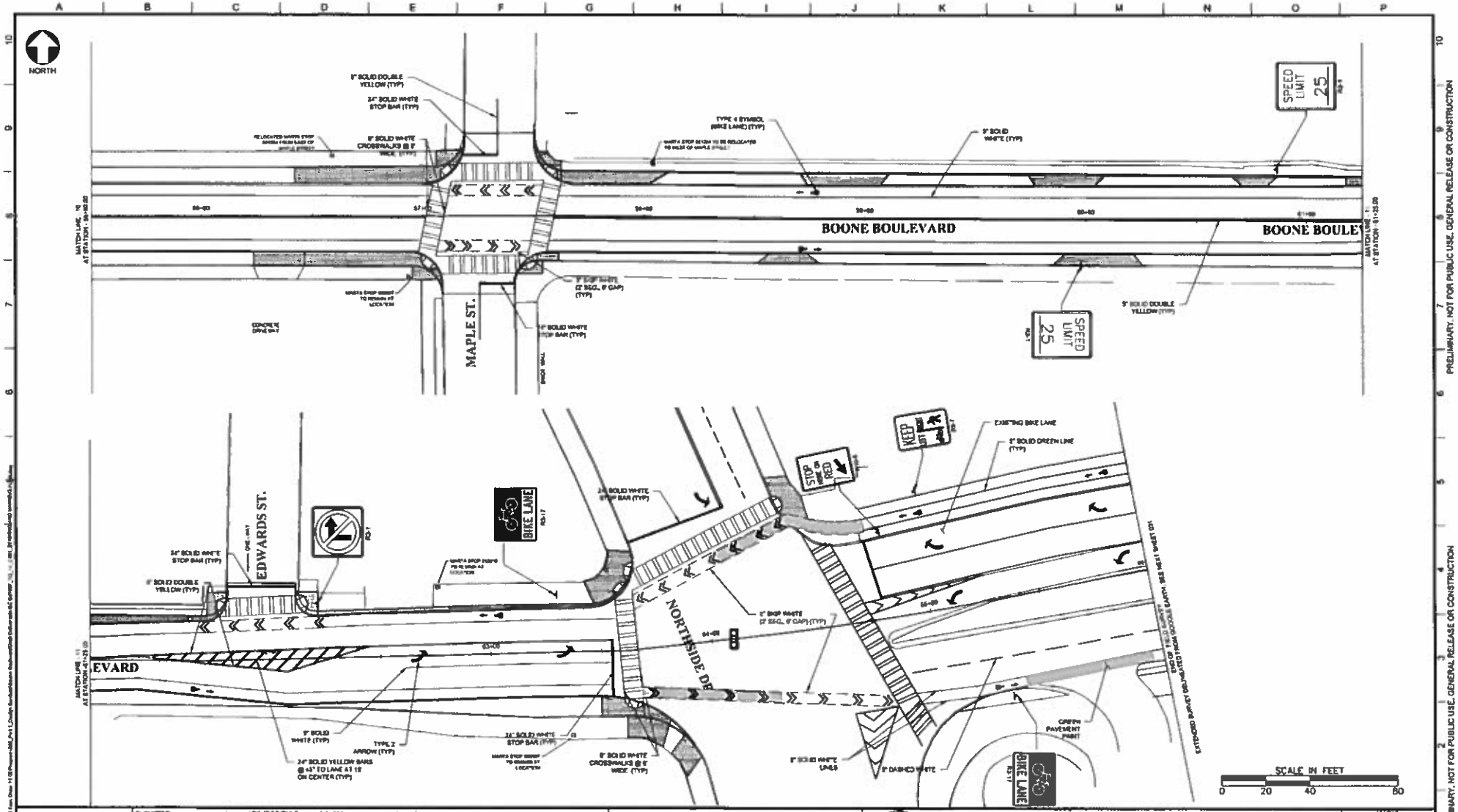
ZONE	REV.	DESCRIPTION	BY	DATE	APPR

CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT

BOONE BOULEVARD
GREEN INFRASTRUCTURE & CAPACITY RELIEF PROJECT

PROPOSED SIGNING AND MARKING PLAN

FEDERAL
NOT TO BE CONSTRUCTED AND SUBMITTED PLANS ONLY
SHEET NUMBER
030
SHEET NUMBER
30 OF 36



BC/DHA
A JOINT VENTURE

CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT

BOONE BOULEVARD
GREEN INFRASTRUCTURE & CAPACITY RELIEF PROJECT

PROPOSED SIGNING AND MARKING PLAN

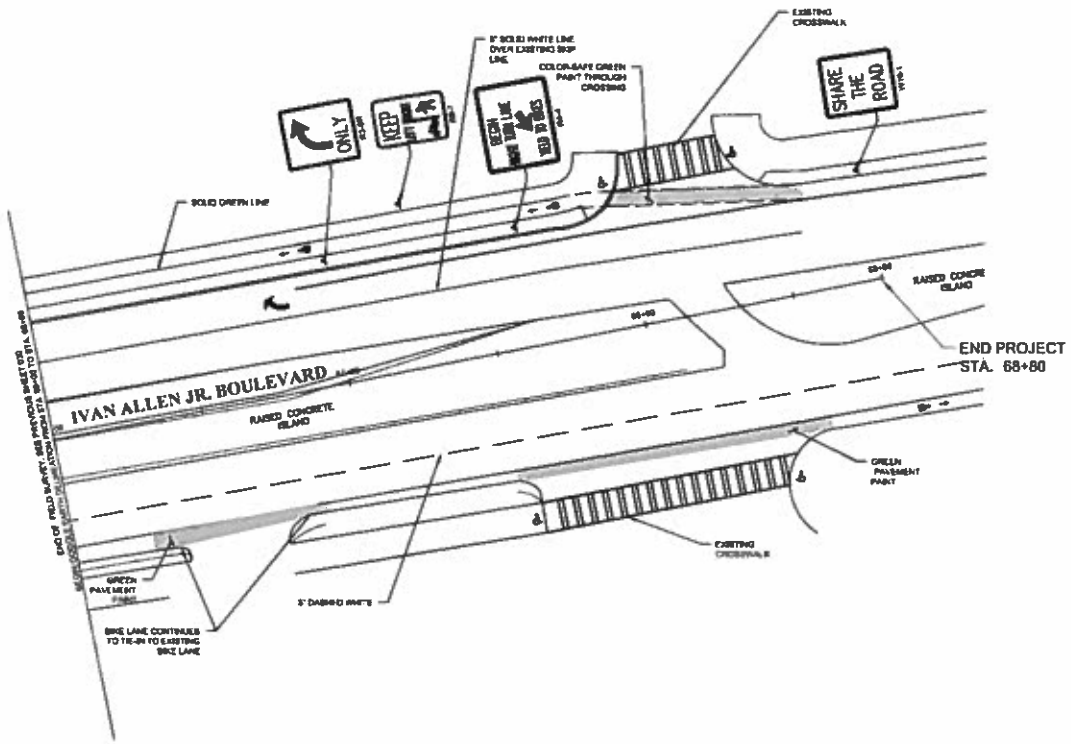
SHEET NUMBER
031

PRELIMINARY, NOT FOR PUBLIC USE, GENERAL RELEASE OR CONSTRUCTION

NORTH

NOTES:

1. EXTENDED SURVEY SHOWN ON THIS SHEET HAS BEEN DELINEATED FROM GOOGLE EARTH.



SCALE IN FEET
0 20 40 80

BC/DHA
A JOINT VENTURE
100 MARIETTA STREET
SUITE 400
ATLANTA, GEORGIA 30303

SUBMITTED:
DATE:
APPROVED:
DATE:

LINE IS 2 INCHES AT FULL SIZE
IF NOT 2" - SCALE ACCORDINGLY

DESIGNED: BH
DRAWN: V.S. WORD
CHECKED: V.S. WORD
CHECKED: R.C. BOLTY
APPROVED: R.C. BOLTY

EXTERNAL REFERENCE FILES

REVISIONS

JOB#	REV.	DESCRIPTION	BY	DATE	APP

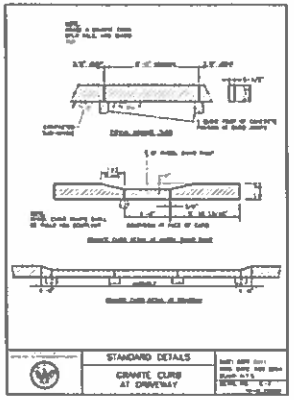
CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT

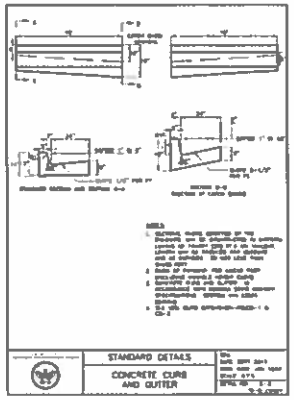
BOONE BOULEVARD
GREEN INFRASTRUCTURE & CAPACITY RELIEF PROJECT

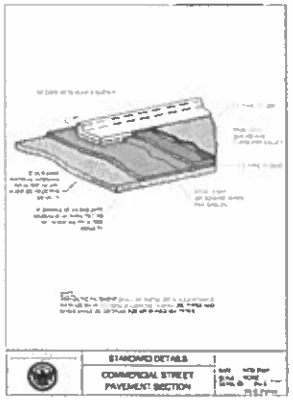
PROPOSED SIGNING AND MARKING PLAN

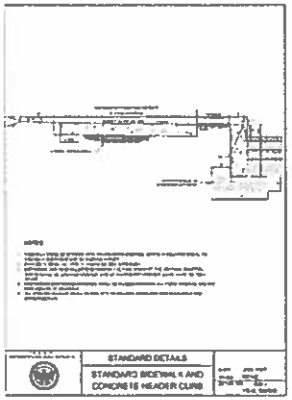
SHEET NUMBER
032

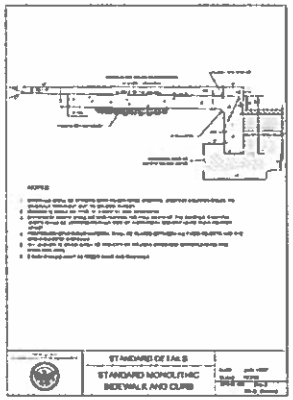
PRELIMINARY, NOT FOR PUBLIC USE, GENERAL RELEASE OR CONSTRUCTION

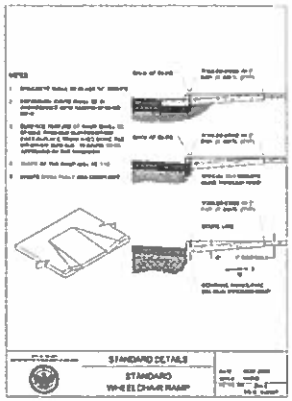


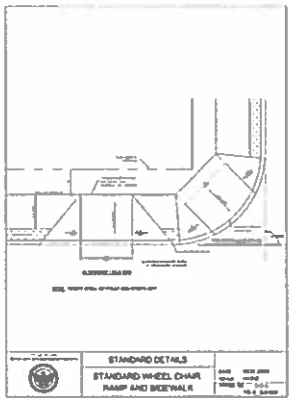


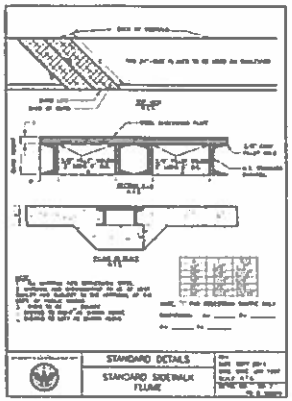


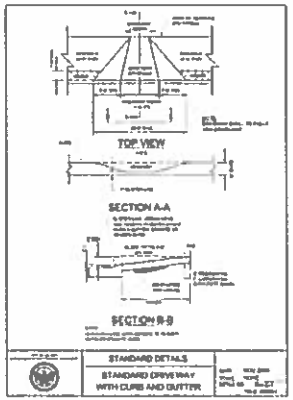


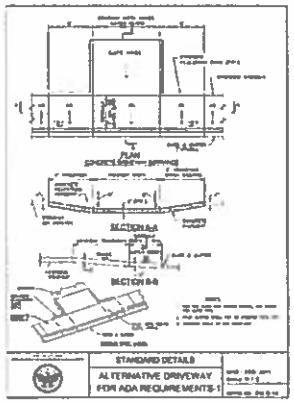












BC/DHA
A JOINT VENTURE
800 RAYMOND DRIVE
SUITE 400
ATLANTA, GEORGIA 30308

SUBMITTED
DATE
APPROVED
DATE

LINE IS 2 INCHES AT FULL SIZE
DESIGNED
DRAWN
CHECKED
CHECKED
APPROVED

EXTERNAL REFERENCE FILES

REVISIONS

ZONE	REV	DESCRIPTION	BY	DATE	APP

CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT

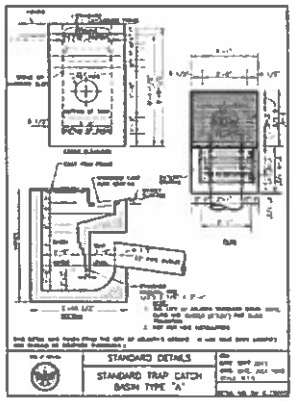
BOONE BOULEVARD
GREEN INFRASTRUCTURE & CAPACITY RELIEF PROJECT

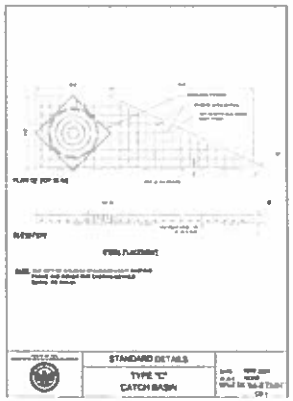
COA TYPICAL DETAILS

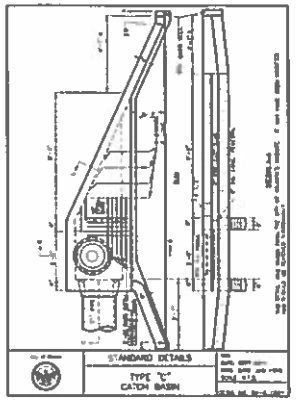
SHEET NUMBER
033
SHEET NUMBER
33 OF 35

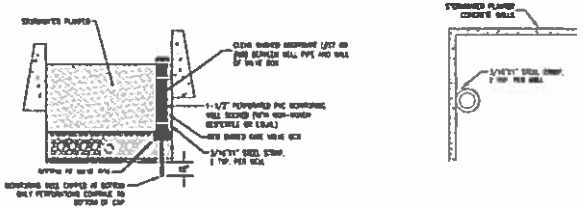
PRELIMINARY, NOT FOR PUBLIC USE, GENERAL RELEASE OR CONSTRUCTION

PRELIMINARY, NOT FOR PUBLIC USE, GENERAL RELEASE OR CONSTRUCTION

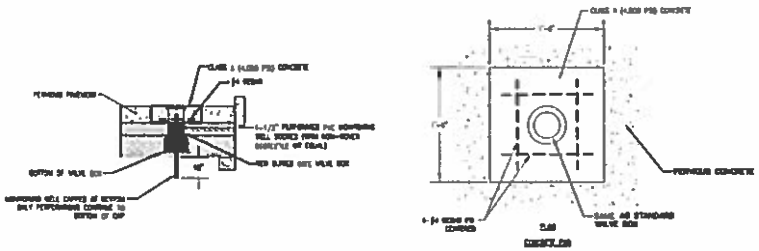






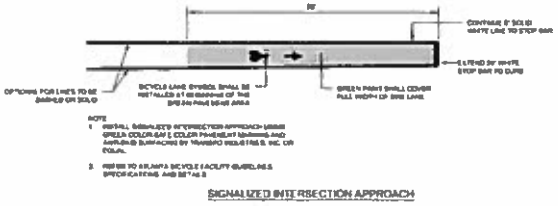


CONCEPTUAL MONITORING WELL DETAIL IN STORMWATER PLANTER
NOT TO SCALE

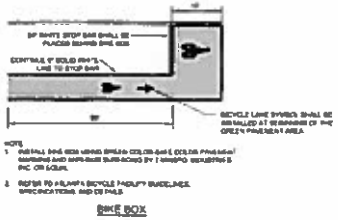


CONCEPTUAL MONITORING WELL DETAIL IN PERVIOUS CONCRETE
NOT TO SCALE

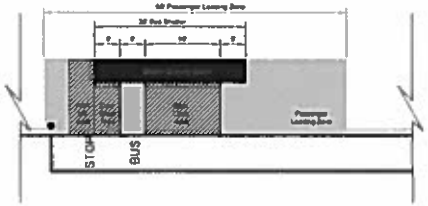
NOTE:
COA DEPARTMENT OF WATERSHED MANAGEMENT TO CONFIRM CONSTRUCTION DETAIL AND PROVIDE LOCATIONS.



SIGNALIZED INTERSECTION APPROACH



BIKE BOX



MARTA 80' PASSENGER LOADING ZONE (40' BUS)

BC/DHA
A JOINT VENTURE
HAMMOND DRIVE
SUITE 400
ATLANTA, GEORGIA 30328

BUSINESS:
DATE
APPROVED
DATE

LINE IS 2 INCHES AT FULL SIZE
DESIGNED
DRAWN
CHECKED
CHECKED
APPROVED

EXTERNAL REFERENCE FILES

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP

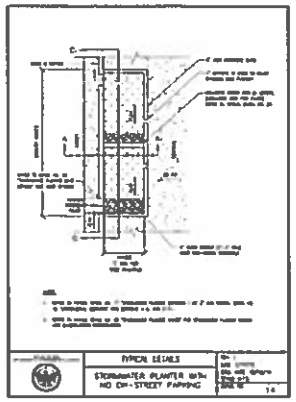
CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT

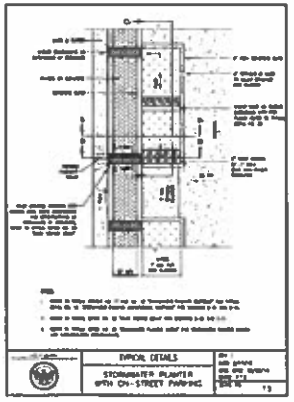
BOONE BOULEVARD GREEN INFRASTRUCTURE & CAPACITY RELIEF PROJECT

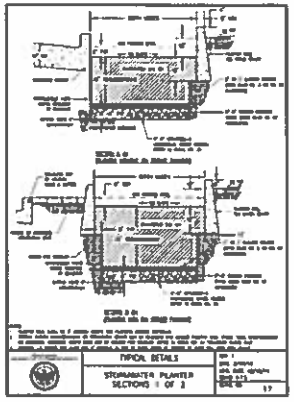
COA TYPICAL DETAILS

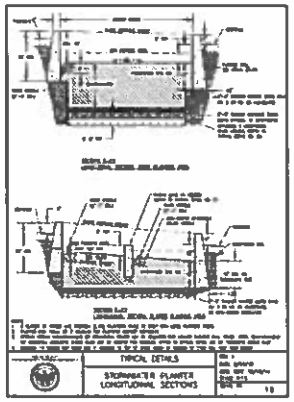
FILENAME
SHEET NUMBER
034
SHEET NUMBER
34 OF 35

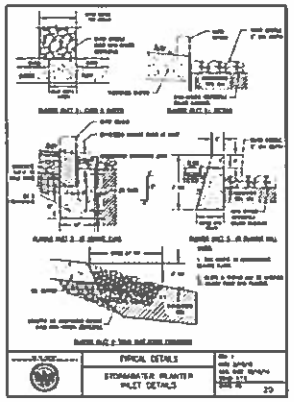
PRELIMINARY: NOT FOR PUBLIC USE, GENERAL RELEASE OR CONSTRUCTION

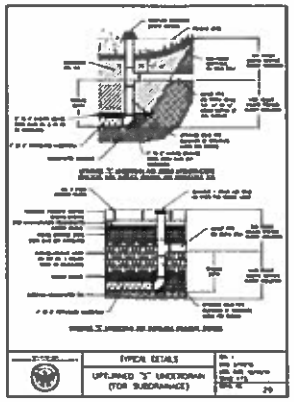


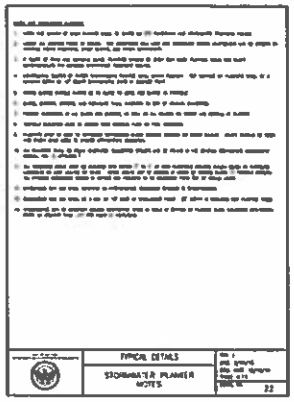


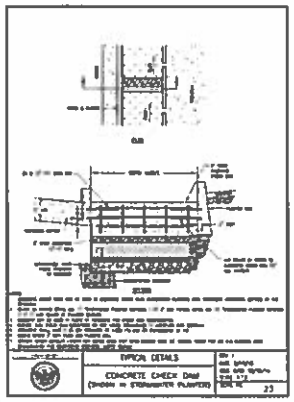


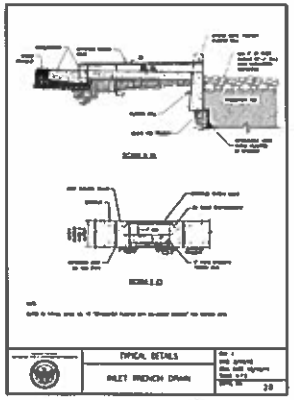


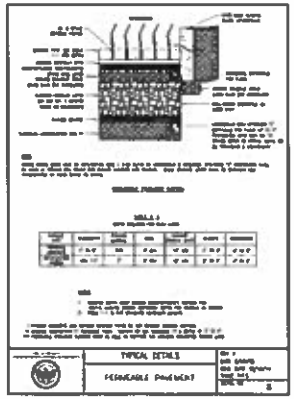


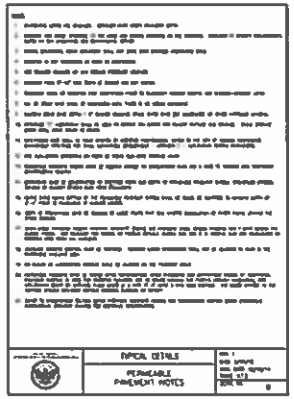










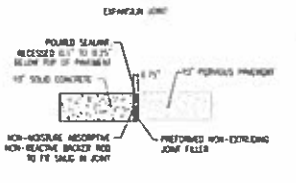


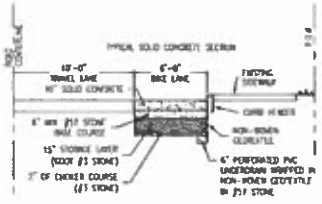
RUNOFF REDUCTION VOLUME

PERVIOUS PAVEMENT	BASIN AREA (sq)	IMPERV. AREA (sq)	PERCENT IMPERV. (%)	Rdv (cu.ft.)
DA-01	0.587	0.487	00.00	1662.70
DA-02	0.642	0.605	07.45	1000.13
DA-03	0.112	0.067	00.00	1740.36
DA-04	0.300	0.003	00.01	1750.00
DA-05	0.171	0.000	00.01	002.01
DA-07	0.300	0.300	00.00	1223.70

RUNOFF REDUCTION VOLUME

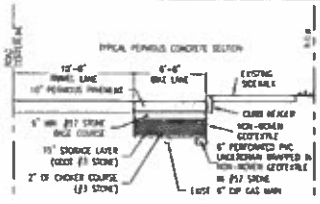
PLANTER No.	BASIN AREA (sq)	IMPERV. AREA (sq)	PERCENT IMPERV. (%)	Rdv (cu.ft.)	REQUIRED SURFACE AREA (sq. ft.)
NORTH LANE					
DA-00	0.347	0.284	00.00	1413.00	304.00
DA-07	0.112	0.111	00.00	384.00	100.00
DA-08	0.100	0.101	00.05	423.07	307.00
DA-09	0.100	0.107	00.00	372.30	102.12
DA-10	0.001	0.000	00.00	310.23	103.41
DA-11	0.208	0.198	00.00	004.00	230.17
DA-12	0.171	0.171	00.00	302.13	127.37
DA-13	0.100	0.000	00.00	340.17	113.39
DA-14	0.007	0.007	00.00	004.00	00.01
DA-15	0.250	0.253	00.00	473.01	201.00
DA-16	0.201	0.279	00.00	001.27	330.00
DA-17	0.202	0.270	00.00	002.00	320.03
DA-18	0.000	0.003	00.00	004.01	047.30
DA-19	0.200	0.237	00.00	017.00	272.00
DA-20	0.103	0.101	00.00	000.01	210.07
DA-21	0.420	0.422	00.00	1400.00	400.10
DA-22	0.340	0.340	00.00	000.00	303.00
DA-23	0.270	0.274	00.07	000.00	314.00
DA-24	0.300	0.307	00.00	1000.07	330.00
DA-25	0.250	0.250	00.00	000.31	203.00
DA-26	0.220	0.210	00.00	701.02	230.00
DA-28	0.440	0.444	00.00	1001.40	000.00

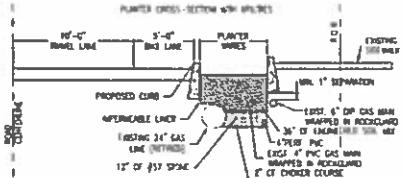




CONCRETE NOTES:

1. CONTRACTOR SHALL VERIFY CORE CAPACITY OF PERVIOUS CONCRETE DURING CORE DESIGN
2. CONTRACTOR SHALL DESIGN A SERIES OF CHECK DAMS OR INFILTRATE IN STORAGE LAYER TO MAXIMIZE STORMWATER VOLUME STORAGE IN THE SYSTEM BASED ON EXISTING ROAD GRADES.
3. CONTRACTOR SHALL INSTALL EXPANSION JOINTS BETWEEN PERVIOUS CONCRETE AND SOLID CONCRETE.
4. CONTRACTOR SHALL INSTALL CONTRACTION JOINTS AT EVERY 10'.





GI TYPICAL DETAILS NOTES:

1. CONTRACTOR SHALL LOCATE CHECK DAMS IN THE STORMWATER PLANTERS BASED ON EXISTING ROAD GRADES IN ORDER TO MAXIMIZE STORMWATER TREATMENT VOLUME.
2. CONTRACTOR SHALL DEVISE EXTRAPOLATION SYSTEM FOR EACH STORMWATER PLANTER BOX. ALL BOXES SHALL BE IMPRINTED WITH ID NUMBER IN A VISIBLE LOCATION. UNDERDRAINS SHALL BE PLACED ALONG THE FRONT OR BACK OF PLANTERS.
3. CONTRACTOR SHALL PROVIDE AS BUILT CHART FOR PLANTER BOXES CONTAINING PLANTER BOX ID NUMBER, LOCATION (SIDE OF ROAD AND ROAD STATION), DEPTH OF PLANTER BOX AND DESCRIPTION OF UTILITIES LOCATED INSIDE PLANTER (UTILITY TYPE, DEPTH, SIZE, MATERIAL)
4. DUE TO PROXIMITY OF GAS LINES, INITIAL COORDINATION WITH ACL HAS BEEN PERFORMED WITH EPIK LOWBIRD AND ICHOLD DEVELOPER. DETAILED COORDINATION SHALL BE REQUIRED BY THE CONTRACTOR FOR ALL UTILITIES.
5. INITIAL GUIDELINES FROM ACL AS FOLLOWS:
   - 5.1. PLANTER WALLS MUST BE A MINIMUM OF 1' AWAY FROM GAS LINES.
   - 5.2. GAS LINES MUST BE WRAPPED IN ROCKGUARD BENEATH THE PLANTER WALLS.
   - 5.3. UNSUPPORTED GAS LINES CANNOT SPAN LONGER THAN 10'-0"

PRELIMINARY, NOT FOR PUBLIC USE, GENERAL RELEASE OR CONSTRUCTION

BC/DHA
A JOINT VENTURE
999 HAMMOND DRIVE
SUITE 400
ATLANTA, GEORGIA 30328

SUBMITTED
DATE
APPROVED
DATE

LINE IS 2 INCHES AT FULL SIZE
DESIGNED
DRAWN
CHECKED
CHECKED
APPROVED

EXTERNAL REFERENCE FILES

REVISIONS

ZONE	REV	DESCRIPTION	BY	DATE	APP

CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT

BOONE BOULEVARD GREEN INFRASTRUCTURE & CAPACITY RELIEF PROJECT

GI TYPICAL DETAILS

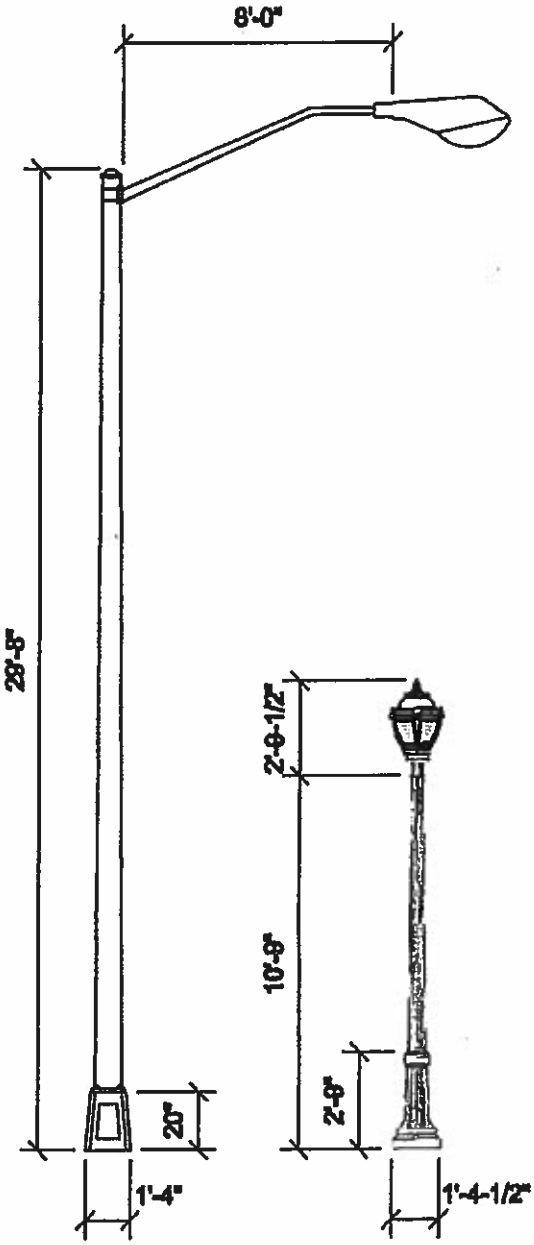
FILENAME
CWA PROJECT NUMBER
CLIENT PROJECT NUMBER
SHEET NUMBER
035
SHEET NUMBER 0
35 OF 35

C-4

CITY OF ATLANTA STREET FURNITURE STANDARDS

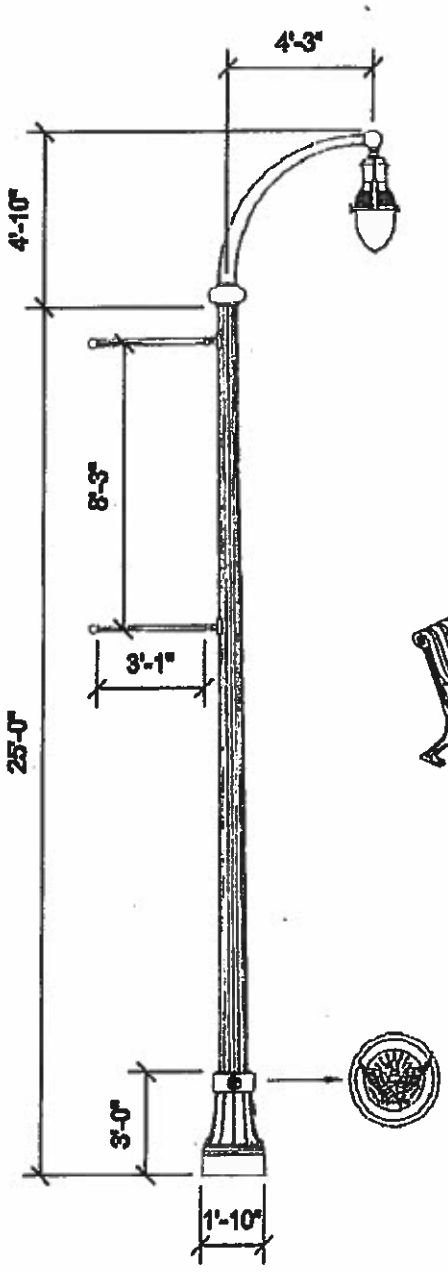
City of Atlanta
Street Furniture Standards

(All elements painted in Tnemec 'CODA Green" color (Pantone 5535))



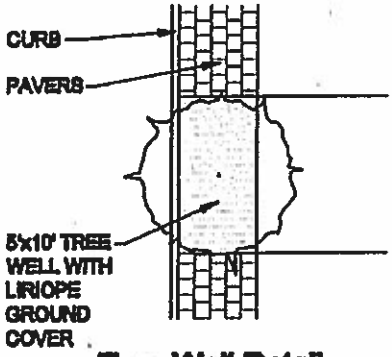
Type "CH"
CobraHead (CH)

Type "C"
Atlanta Light

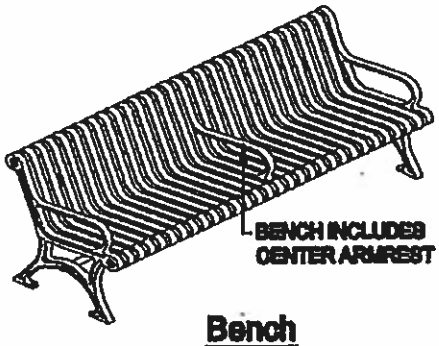


Type "A"
Atlanta Light

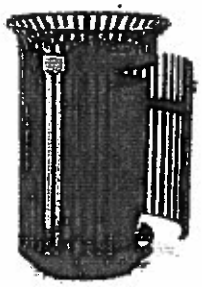
Install street lights 38" O.C. from the face of curb.



Tree Well Detail



Bench
Victor Stanley
Model CR-96 (With Vertical Steel Scrolls)
or equivalent



Trash Receptacle
Victor Stanley
Model SD-42
or equivalent

Contact [redacted] the Public Works Dept. for detailed street light specifications at 404.330.6501.

"THE ATLANTA LIGHT"
ACCEPTABLE MANUFACTURERS

Atlanta Light Type "A" Poles

A. 25 Foot Mounting Height

1. Holophane Drawing No. US-3276r3
2. Union Metal Drawing No. N2515-190-B22
3. Lumec Drawing No. S C.O.A 34112H

B. 29 Foot Mounting Height

1. Holophane Drawing No. US-3376-1r1 Composite
2. Union Metal Drawing No. N2515-190-B11
3. Lumec Drawing No. S C.O.A 34112L

Note: On Streets South of North Avenue Use 25 Foot Mounting Height and On Streets North of North Avenue 29 Foot Mounting Height

Atlanta Light Type "A" Luminaires

A. HolophaneDrawing No. US-3305-C
B. King Luminaire Drawing No. K81-EGD-ST
C. Lumec Drawing No. RN20 34112B

Atlanta Light Type "C" Poles

A. Union Metal Drawing No. N1571-70-B79
B. Main Street AATF1410-9
C. Holophane Drawing No. US-3411r2

Atlanta Light Type "C" Luminaires

A. King Luminaire Drawing No. K134-EAR-K12
B. Main Street L920
C. American Electric Lighting
Cat. No. AEL24 P 150S MOG ARF R5 TB1 AEL-1015r3 CM

All of the aforementioned drawings are attached and made a part of this specification. Any questions concerning these specifications should be addressed to Wahab Alabi, Bureau of Traffic and Transportation, City of Atlanta, 55 Trinty Avenue SW, Atlanta, Georgia 30335, Telephone number 404-330-6501

Wiring Procedures
City of Atlanta

1. **ALL** lighting designs, lighting additions, or lighting deletions, must flow through The City of Atlanta Bureau of Traffic & Transportation for approval.

2. Traffic signal circuits and lighting circuits are to be totally separate from each other. All lights will be served by Georgia Power and will feed directly from an underground vault or an overhead multiple relay. Source and location to be determined by Georgia Power.

3. The first light on each circuit from the Georgia Power vault will be considered the service point for that circuit and must have a "fuse block" installed *inside* the base of the pole. The service point on an overhead service shall have a disconnect on the pole below the relay before the first light. The fuses, or breakers, will be protection for fault current on the circuit and should be sized according to the load of the circuit.

4. Each light must be individually fused using quick-disconnect fuseholders installed inside the base of each pole.

5. Each wiring connection must be made using compression connections (Burndy "C" connector, or equivalent) followed by a heat shrink protective material to protect the connection from weathering elements.

6. All poles will have a 15-inch bolt circle pattern with (4) bolts with accommodations to fit up to a 1-1/4 inch bolt for Type "A", Type "C", and Cobrahead type poles.

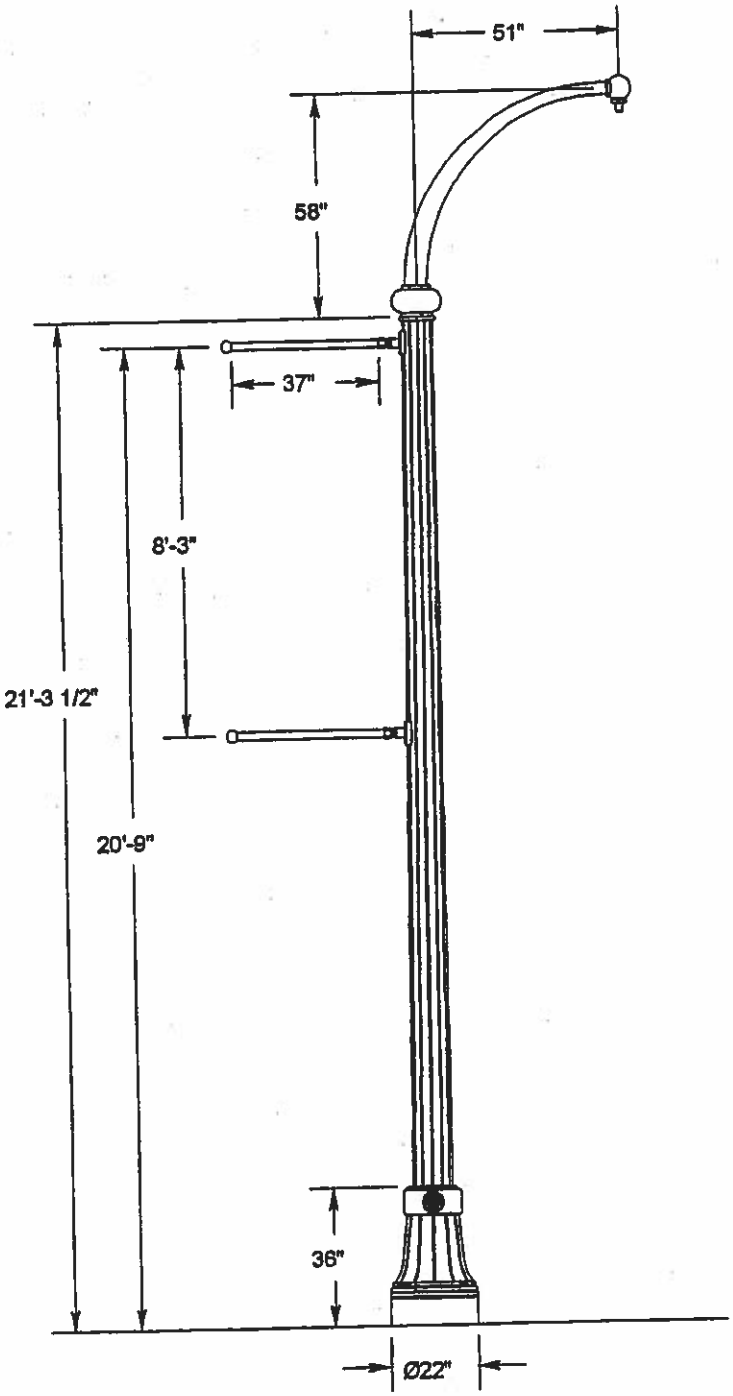
7. All lights will be High Pressure Sodium. Wattage to be determined by The City Bureau of Traffic & Transportation during pre-construction meetings.

12/03/01
LAH

8. Use 2-2" pipe conduits
Use 2" steel pipes under driveways

City of Atlanta

Cast Aluminum & Steel Post
Ø22" Clamshell Base



Specifications

DESCRIPTION
The lighting post shall consist of a decorative, tapered and fluted clamshell base, a 12-flat flute tapered shaft, a smooth, curved and tapered arm with a fitting for luminaire mounting, and 2 bolt-on banner arms with breakaway couplings. Base shall have custom 'Atlanta' medallions at 90° and 270° from access door.

MATERIALS
The base shall be cast aluminum (356.1 ingot alloy). The shaft shall be 11-gauge fluted steel with a steel anchor plate. The luminaire arm shall be 6063-T6 with cast aluminum (356.1 ingot alloy) fittings. Banner arms and brackets shall be aluminum pipe and plate. Banner arms shall have breakaway couplings with safety cables. All hardware shall be tamper resistant, stainless steel. Anchor bolts shall be hot-dip galvanized steel.

DIMENSIONS
The base shall be Ø22" and 36" tall. The shaft shall be 21'-3 1/2" in height, beginning with Ø10.4" at the anchor plate, and tapering at .14 inch per foot. The anchor plate shall be 16" square and 1" thick. Shaft shall have a Ø4 1/2" x 10" tall tenon. Luminaire arm shall rise 58" and measure 51" from post center to luminaire center, with a 1 1/2" NPT male fitting for luminaire mounting. Banner arm shall be 1 1/2" pipe (1 7/8" diameter) and measure 37" in length, with a Ø3" ball finial.

INSTALLATION
Post shall be provided with (4) Ø1" x 42"x 6" hot-dip galvanized anchor bolts to be installed on a Ø15" bolt circle. A nominal 4" x 6 1/2" handhole shall be located in the shaft for wiring access.

FINISH
The post assembly shall be shipped with a 'custom match' powder coat finish. Color to match CODA Olympic Green (Y207D). Atlanta medallions on base shall be furnished with a 'gold' color finish.

Catalog # AT(21.29)FF12/22CSB-CAS/CM-(4x8HH)-T(4.5X10.0)-CLD-2BBA37B3/1.5/BO-CA/CM-ATC51-CA/CM

TYPE: A

DRAWING NO: US-3276r3

THIS DRAWING, WHEN APPROVED, SHALL BECOME THE COMPLETE SPECIFICATION FOR THE MATERIAL TO BE FURNISHED BY HOLOPHANE ON THE ORDER NOTED ABOVE. A UNIT OF SIMILAR DESIGN MAY BE SUPPLIED, BUT ONLY AFTER APPROVAL BY THE CUSTOMER IN WRITING. ON POLE ORDERS AN ANCHOR BOLT TEMPLATE PRINT WILL BE SUPPLIED WITH EACH ANCHOR BOLT ORDER TO MATCH THE POLE PROVIDED.

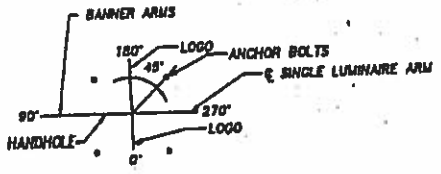
THIS PRINT IS THE PROPERTY OF HOLOPHANE AND IS LOANED SUBJECT TO RETURN UPON DEMAND AND UPON EXPRESS CONDITION THAT IT WILL NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO OUR INTERESTS, AND ONLY IN CONNECTION WITH MATERIAL FURNISHED BY HOLOPHANE.

HOLOPHANE
LEADER IN LIGHTING SOLUTIONS
An AcuityBrandsCompany
214 OAKWOOD AVENUE - NEWARK, OHIO 43055

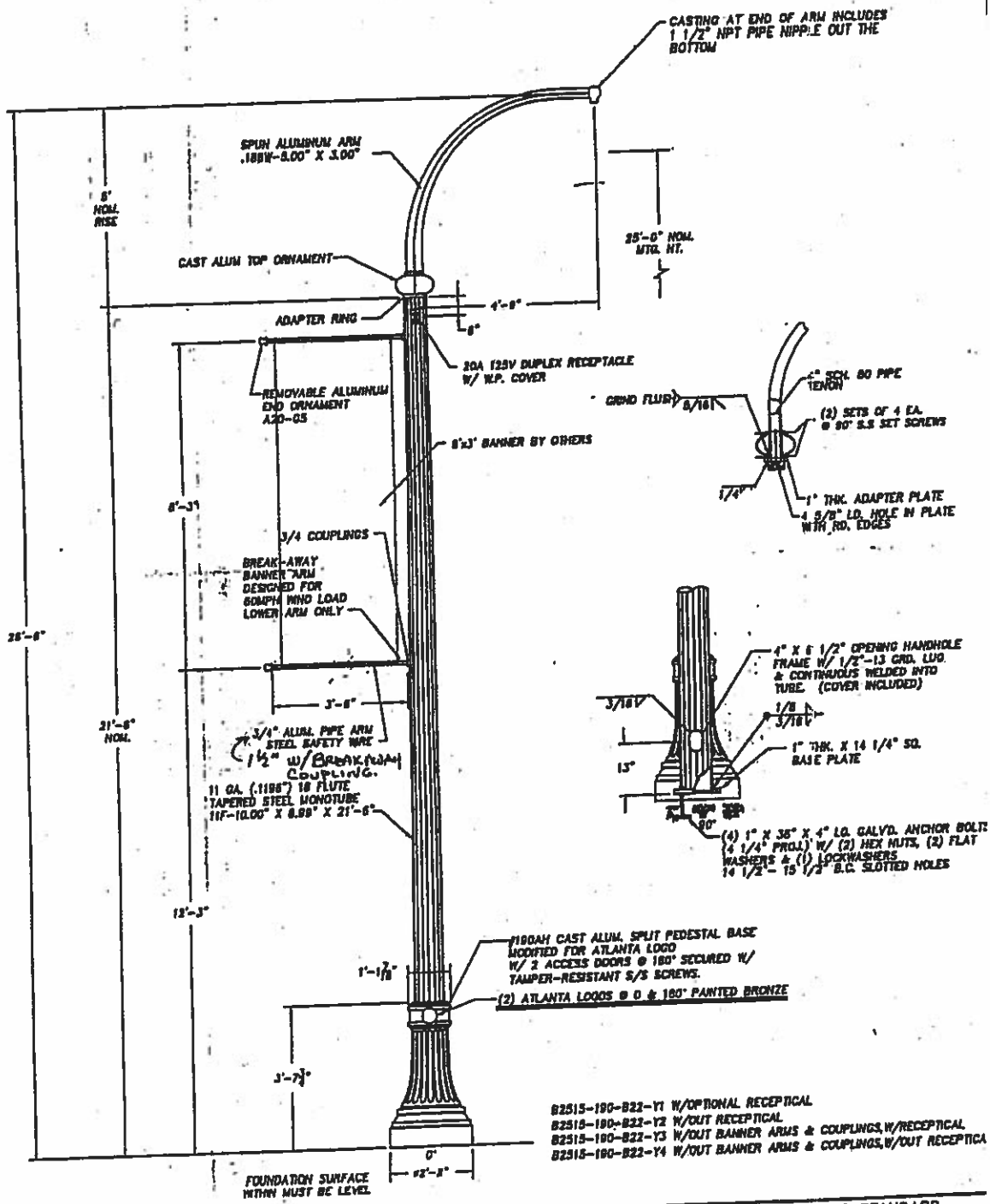
SCALE: NONE
DRAWN: SH
APP'D:
DATE: 02-25-03

MATERIAL SPECIFICATIONS

TUBES: CHEM. & PHYSICAL PROP. OF ASTM A595 GR. A
PLATE,BAR: ASTM A36
ANCHOR BOLTS: AASHTO M314, GR. 55 TOP END GALVD. TO A153
ANCHOR BOLT NUTS: ASTM A563, GR. A GALVD. TO A153
MISC. HDWE: (STAINL. STL.) AISI 300 SERIES (18-8)
ADAPTER RING: CAST ALUMINUM-AA356
ANCO LOCK NUTS: ASTM A563 GR. DH GALVD. TO ASTM A153
FLAT WASHERS: ASTM F436 GALVD. TO A153
MISC. STEEL HDWE: ASTM A307 GALVD. TO ASTM A153
PEDESTAL BASE: CAST ALUMINUM SPLIT BASED-J190
STUDS: ASTM-A36 HD. GALV. TO A153
FINISH: POWDER COATED "CODA GREEN"



TOP VIEW ORIENTATION



ORIGINAL

ORNAMENTAL LIGHTING STANDARD
FOR THE CITY OF ATLANTA
26'-6" A POLE

LOF YES ENG.REF.# ---
REQ.# 0458-18-01 S.O.# --- CAD# ---

Union Metal CORPORATION

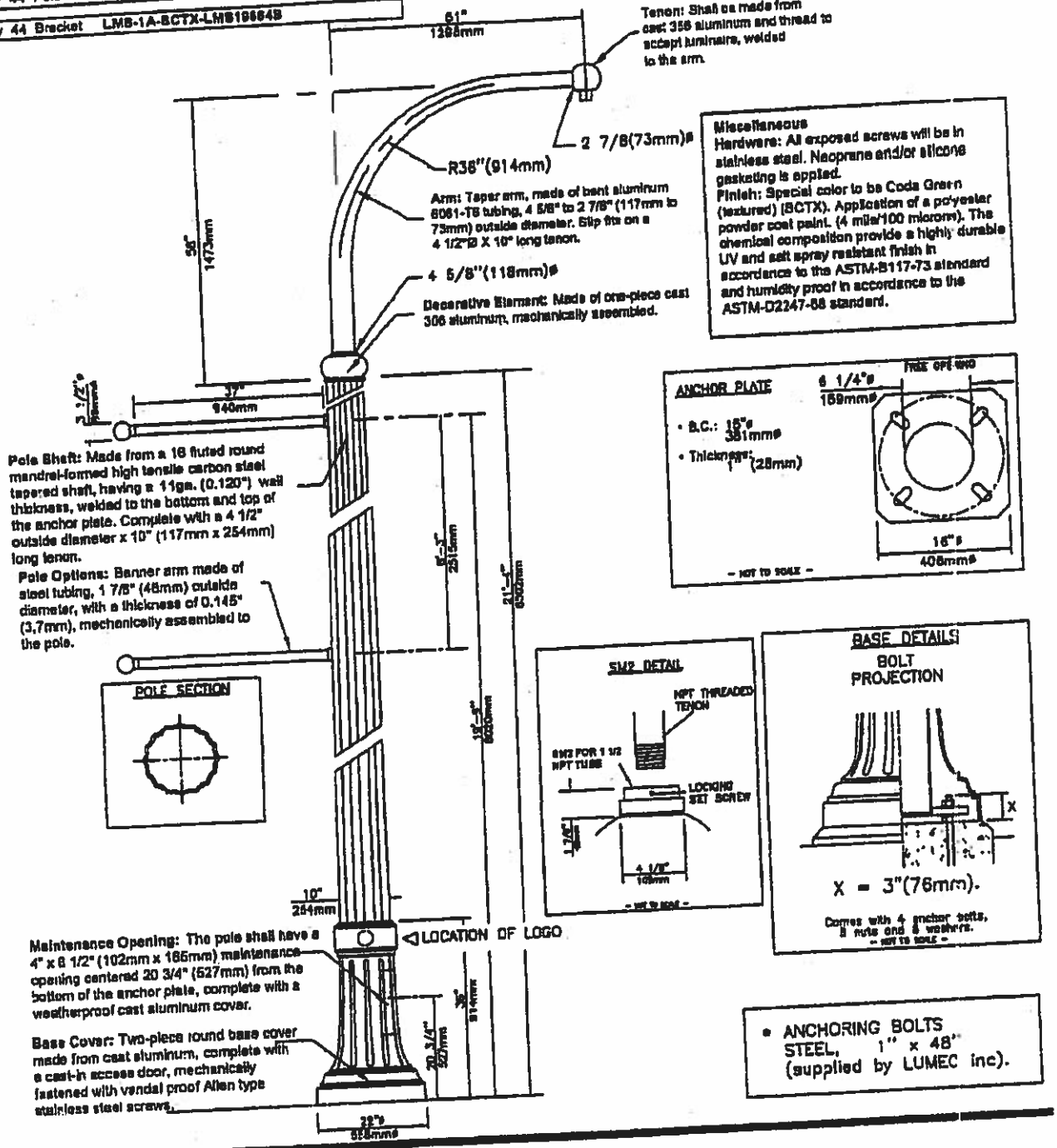
DRAWN W.J.C.
DATE 12-26-01

DRAWING NO. N2515-190-B22

LUMEC
640, Bird Cure Boivin
Boisbriand (Qc), Canada, J7G 2X7
Tel (450)430-7040
Fax (450)430-1483

Qty 44 Pole VSPS-21'-4"-SA537(2)-VPA-BCTX-LMS19664B

Qty 44 Bracket LMS-1A-BCTX-LMS19664B



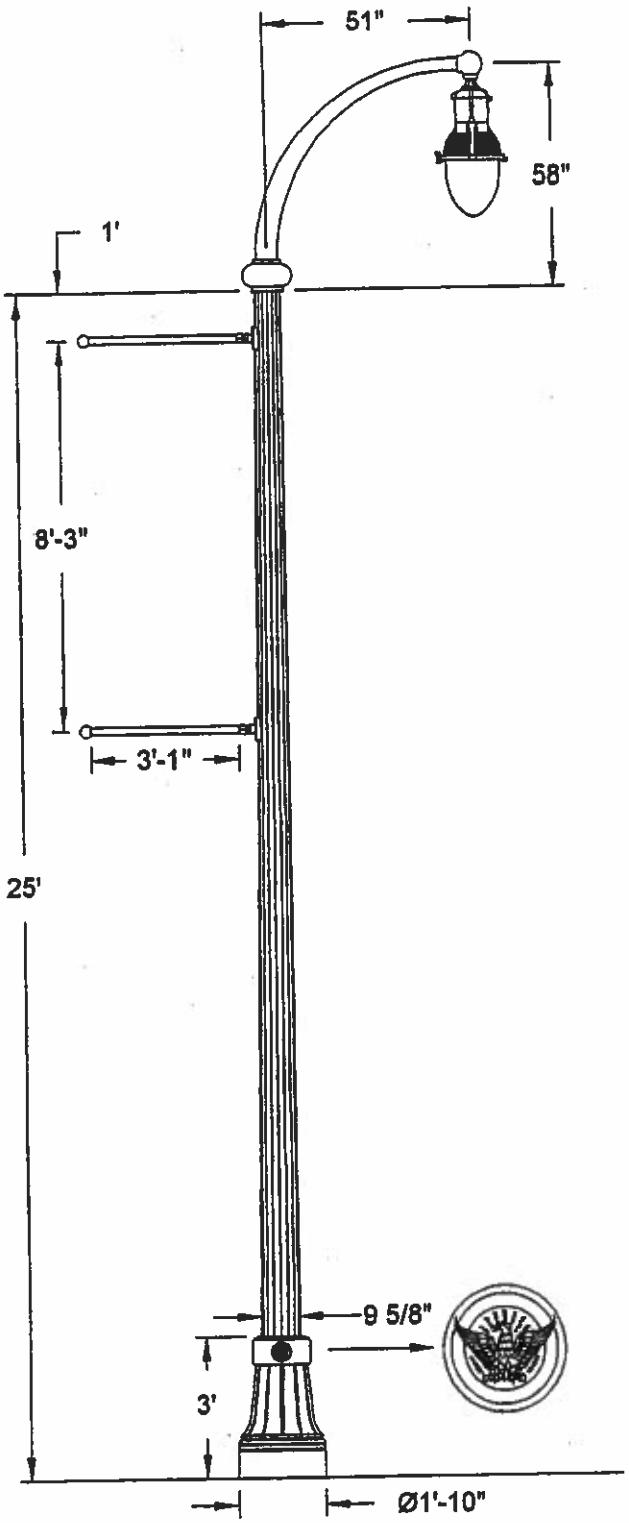
Miscellaneous
Hardware: All exposed screws will be in stainless steel. Neoprene and/or silicone gasketing is applied.
Finish: Special color to be Coda Green (textured) (BCTX). Application of a polyester powder coat paint. (4 mils/100 microns). The chemical composition provide a highly durable UV and salt spray resistant finish in accordance to the ASTM-B117-73 standard and humidity proof in accordance to the ASTM-D2247-68 standard.

• ANCHORING BOLTS STEEL, 1" x 48" (supplied by LUMEC inc).

TITRE: TITLE:	City of Atlanta R90 LMS19664B							34112
ECHELLE/SCALE: 1/2"=1'-0"	N°	REVISION	PAR/BY:	DATE:	VER.:	PAR/BY:	N° DE DESSIN / DRAWING N°	PAGE
	7	Revised as annotated	LL	04-16-02		EM	S C.O.A 34112H	1/1

ENREGISTRÉ ISO 9002 REGISTERED

CITY OF ATLANTA



Specifications

DESCRIPTION
For a complete description of the Atlanta Lumir aire, see US-1413.

DESCRIPTION
The post shall consist of a decorative, tapered and fluted clamshell base, a 16-flute, tapered shaft, a curved and tapered post-top luminaire arm, and 2 bolt-on banner arms with breakaway couplings. Base shall have custom 'Atlanta' medallions at 90° and 270°.

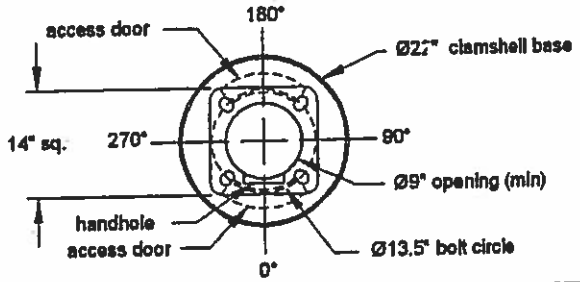
MATERIALS
The clamshell base shall be heavy-wall cast aluminum (A356.1 alloy), formed true to pattern with complete detail. The shaft shall be steel (A595) with a steel anchor plate. Post-top arm shall be 6063-T6 alumimum with cast aluminum (356.1 alloy) post fitter. Bolt-on banner arms shall be 6061-T6 pipe and plate. All hardware shall be tamper resistant, stainless steel. Anchor bolts shall be hot-dip galvanized steel.

DIMENSIONS
The post shall be 25'-0" in height with a 22"Ø x 36" tall base. The 11-gauge shaft (.1196" wall) shall be taper from 10"Ø at the anchor plate (14" square x 1" thick), with a 4 1/2"Ø x 10" tall tenon for luminaire arm mounting. Post-top arm shall have a 58" rise and measure 51" from post center to luminiare center. Arm shall terminate 1 1/2" NPT fitting for luminaire mounting. Banner arms shall be 1 1/2" pipe (1 7/8"Ø) and measure 37" in length, with a 3"Ø ball finial.

INSTALLATION
Post provided with (4) 1"Ø x 40" hot-dip galvanized, L-type anchor bolts to be installed on an 13.5"Ø bolt circle. Two doors shall be located in the base, one coinciding with the shaft handhole for wiring access.

FINISH
The post assembly shall be furnished with a 'custom match' powder cost finish. Customer to provide manufacturer's color number or color sample for matching.

Anchorage Detail



Catalog #:
FL210-T00A250-P9-FP(SPCL)-HH-AB(1.0"x40")-T(4.5X10.0) AT22CSB-CA/CM-CLD-ATC51/1-CA/CM-2BBA37B3/1.5/BO-CA/CM-AL250HPXXA4-Y027D

ARCHITECTURAL OUTDOOR ORDER #:

TYPE: A

DRAWING NO: US-3376-1r1
COMPOSITE

THIS DRAWING, WHEN APPROVED, SHALL BECOME THE COMPLETE SPECIFICATION FOR THE MATERIAL TO BE FURNISHED BY HOLOPHANE ON THE ORDER NOTED ABOVE. A UNIT OF SIMILAR DESIGN MAY BE SUPPLIED, BUT ONLY AFTER APPROVAL BY THE CUSTOMER IN WRITING. ON POLE ORDERS AN ANCHOR BOLT TEMPLATE PRINT WILL BE SUPPLIED WITH EACH ANCHOR BOLT ORDER TO MATCH THE POLE PROVIDED.

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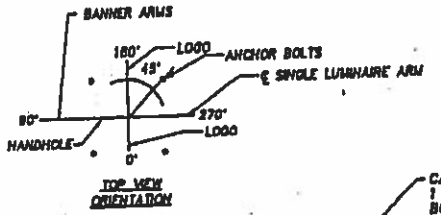
HOLOPHANE
LEADER IN LIGHTING SOLUTIONS
An AcuityBrandsCompany
214 OAKWOOD AVENUE - NEWARK, OHIO 43055

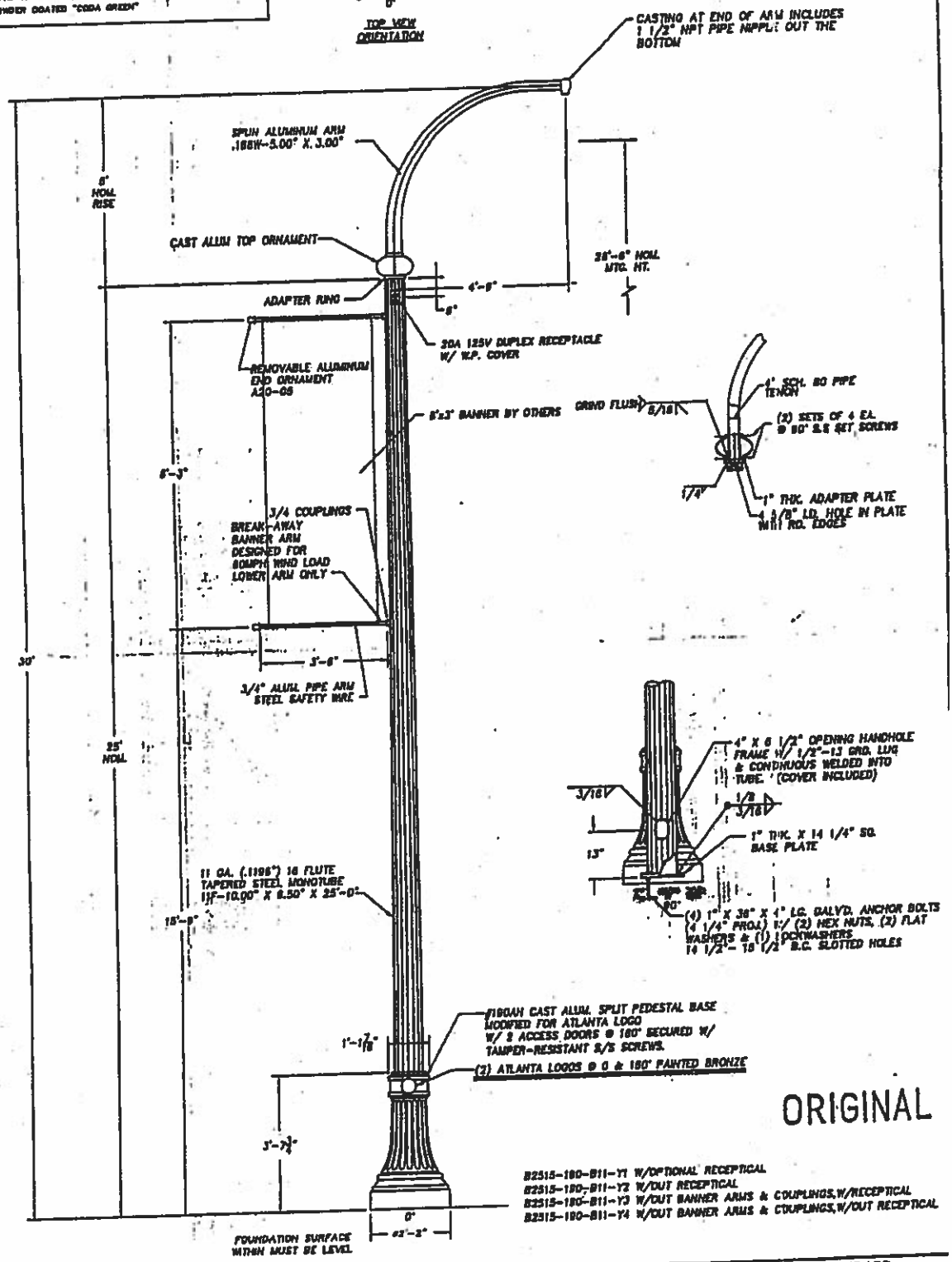
SCALE: N/A
DRAWN: BHH
APP'D:
DATE: 02-25-03

MATERIAL SPECIFICATIONS

TUBES: CHEM. & PHYSICAL PROP. OF ASTM A595, GR. A
PLATE,BAR: ASTM A36
ANCHOR BOLTS: AASHTO M314, GR. 55 TOP END GALVD. TO A153
ANCHOR BOLT NUTS: ASTM A563 GR. A GALVD. TO A153
MISC. HDWE: (STN. STL.) AISI 300 SERIES (18-8)
ADAPTER RING: CAST ALUMINUM-SA319F
ANCO LOCK NUTS: ASTM A563 GR DH GALVD. TO ASTM A153
FLAT WASHERS: ASTM F436 GALVD. TO A153
MISC. STEEL HDWE: ASTM A307 GALVD. TO ASTM A153
PEDESTAL BASE: CAST ALUMINUM SPLIT BASE-319F
STUDS: ASTM-A36 HD. GALV. TO A153
FINISH: POWDER COATED "CODA GREEN"



TOP VIEW ORIENTATION



ORIGINAL

B2515-190-B11-Y1 W/OPTIONAL RECEPTICAL
B2515-190-B11-Y2 W/OUT RECEPTICAL
B2515-190-B11-Y3 W/OUT BANNER ARMS & COUPLINGS,W/RECEPTICAL
B2515-190-B11-Y4 W/OUT BANNER ARMS & COUPLINGS,W/OUT RECEPTICAL

R5	0858 1601	REMOVERD LUM FIXTURE NOW MTG HGT WAS 26'-6" REVISED TITLE BLOCK	12-26-0 W.C.	9.22
R4	0412 3901	REVISED DAVIT ARM CONNECTION WAS THRU-BOLT CONNECTION.	8/13/01 RLR	
R3	0637 3900	REV. TENON CHG. B.C. TO 14 1/2"-15 1/2" SLOTTED ADDED Y3 & Y4 DESIGN #'S	7/3/00 JT	

REVISIONS

ORNAMENTAL LIGHTING STANDARD
FOR THE CITY OF ATLANTA
30' A POLE

LOF YES ENG.REF.# ---
REQ.# 1001-39-98 S.O.# HGA-8502 CAD# 1001A88

Union Metal CORPORATION R5

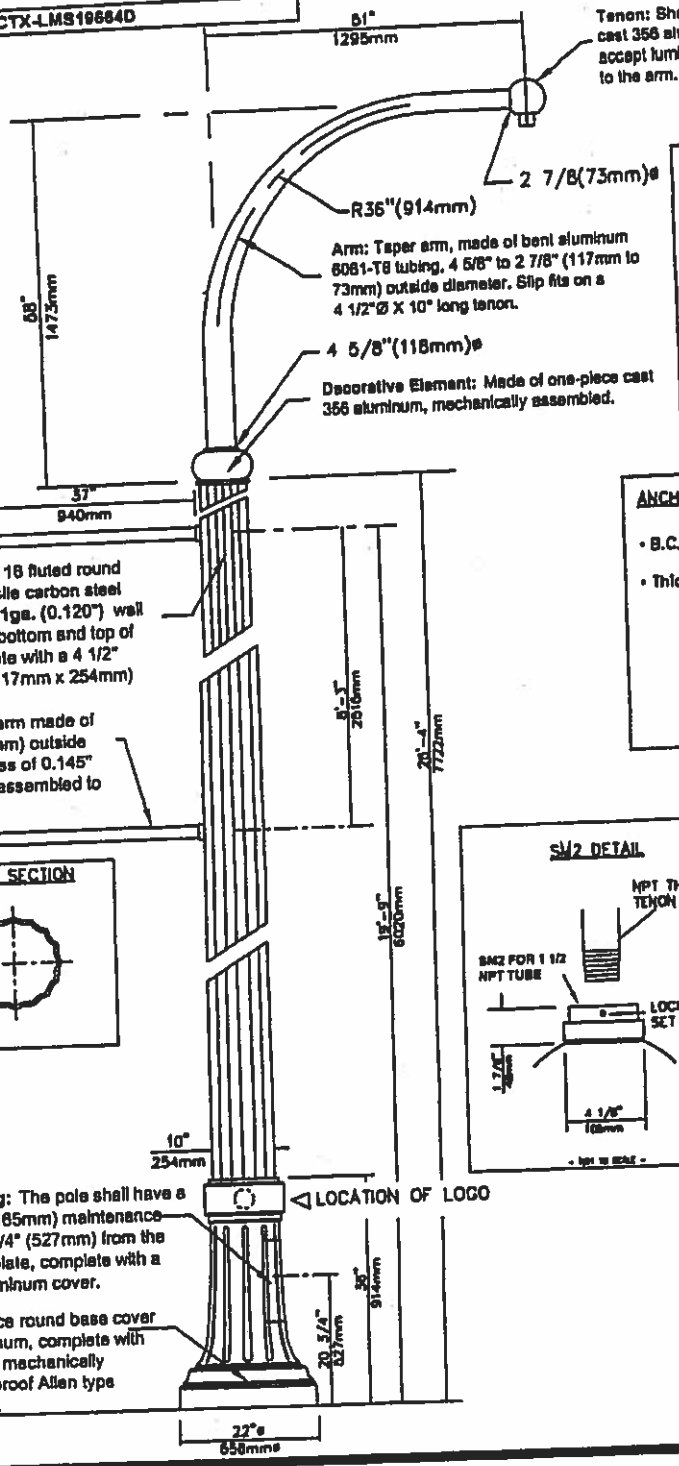
DRAWN RLW
DATE 12/17/98
CHECKED

DRAWING NO.
N2515-190-B11

LUMEC
540, boul Curé Boivin
Boisbriand (Qc), Canada, J7G 2A7
Tel (450)430-7040
Fax (450)430-1483

Qty 1 Pole VSPS-25'-4"-BAS37(2)-VPA-SCTX-LMS19664D

Qty 1 Bracket LMS-1A-SCTX-LMS19664D



Tenon: Shall be made from cast 356 aluminum and thread to accept luminaire, welded to the arm.

Arm: Taper arm, made of bent aluminum 6061-T6 tubing, 4 5/8" to 2 7/8" (117mm to 73mm) outside diameter. Slip fits on a 4 1/2"Ø X 10" long tenon.

Decorative Element: Made of one-piece cast 356 aluminum, mechanically assembled.

Pole Shaft: Made from a 16 fluted round mandrel-formed high tensile carbon steel tapered shaft, having a 11ga. (0.120") wall thickness, welded to the bottom and top of the anchor plate. Complete with a 4 1/2" outside diameter x 10" (117mm x 254mm) long tenon.

Pole Options: Banner arm made of steel tubing, 1 7/8" (48mm) outside diameter, with a thickness of 0.145" (3,7mm), mechanically assembled to the pole.

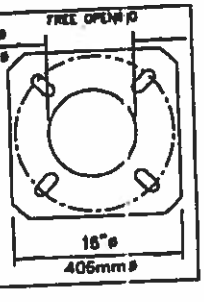
Maintenance Opening: The pole shall have a 4" x 6 1/2" (102mm x 165mm) maintenance opening centered 20 3/4" (527mm) from the bottom of the anchor plate, complete with a weatherproof cast aluminum cover.

Base Cover: Two-piece round base cover made from cast aluminum, complete with a cast-in access door, mechanically fastened with vandal proof Allen type stainless steel screws.

Miscellaneous
Hardware: All exposed screws will be in stainless steel. Neoprene and/or silicone gasketing is applied.
Finish: Special color to be Coda Green (textured) (SCTX). Application of a polyester powder coat paint. (4 mils/100 microns). The chemical composition provide a highly durable UV and salt spray resistant finish in accordance to the ASTM-B117-73 standard and humidity proof in accordance to the ASTM-D2247-68 standard.

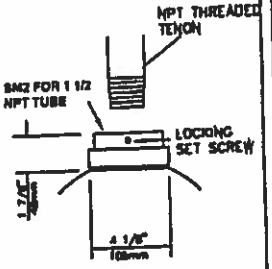
ANCHOR PLATE

- B.C.: 15"ø 381mmø
- Thickness 1" (25mm)

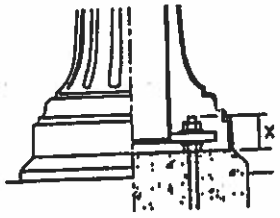


POLE SECTION

SW2 DETAIL



BASE DETAILS
BOLT PROJECTION



X = 3"(76mm).

Comes with 4 anchor bolts, 8 nuts and 8 washers.
- NOT TO SCALE -

- ANCHORING BOLTS STEEL, 1" x 48" (supplied by LUMEC inc).

TITRE:
TITLE: City of Atlanta
R90 LMS19664D

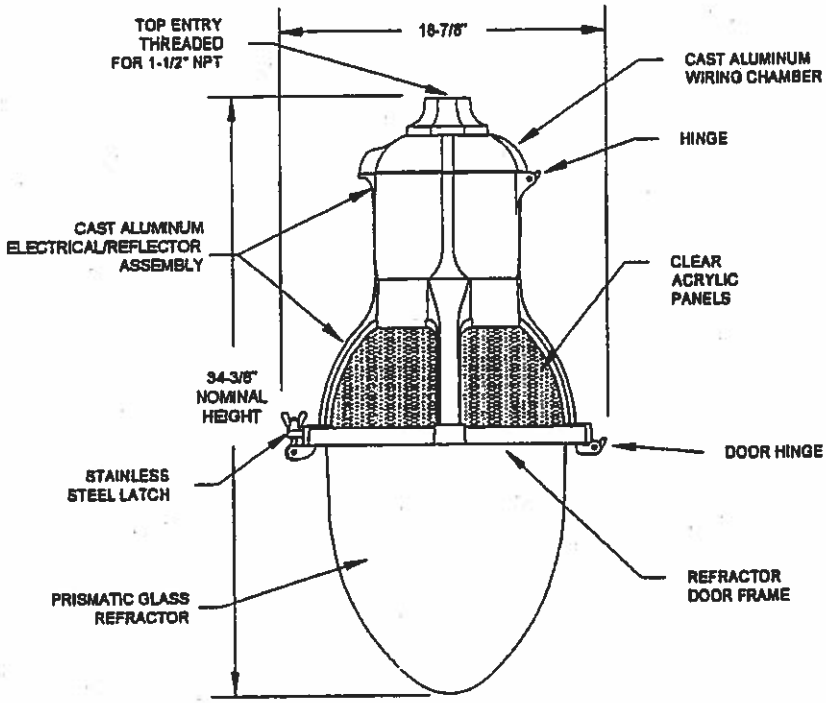
34112

ENREGISTRÉ ISO 9002 REGISTERED

ECHELLE/SCALE:	N°	REVISION	PAR/BY	DATE:	VER.:	PAR/BY	N° DE DESSIN / DRAWING N°	PAGE
1/2"=1'-0"				06-26-02		LL	S C.O.A 34112L	1/1

City of Atlanta

Teardrop Style
Maximum weight - 60 lbs
Maximum effective projected area - 2.0 sq. ft.



ORDERING INFORMATION

TYPE A CAT. # : AL 250HP XX A 4 - SPECIAL Y207D

- BALLAST TYPE (MOGUL BASE): 250HP = 250W HPS
- VOLTAGE: XX = INSERT VOLTAGE; 12 = 120 VOLT; 20 = 208 VOLT; 24 = 240 VOLT; 27 = 277 VOLT; 34 = 347 VOLT; 48 = 480 VOLT
- HOUSING FINISH COLOR: A = AS SPECIFIED (CODA GREEN)
- OPTICS: 4 = ASYMMETRIC REFRACTOR FOR IES TYPE IV DISTRIBUTION

Specifications

DESCRIPTION
The luminaire is styled to replicate the "teardrop" luminaires that lighted boulevards in the first half of this century. Designed for light control and ease of installation and maintenance, the Atlanta has a precision optical system for true street lighting performance.

WIRING CHAMBER
The wiring chamber has a 1-1/2 inch NPT threaded entry for pendant mounting. A stainless steel set screw locks the unit in position. A three station terminal block will accept #14 through #2 wires and is prewired to one half of the plug assembly that connects to the removable electrical module.

ELECTRICAL / REFLECTOR ASSEMBLY
The electrical / reflector assembly hinges down from the wiring chamber for ease in wiring and to facilitate the removal of the electrical module. The assembly is latched in place by a captive stainless steel hex head screw. The unitized electrical module consists of the ballast and socket mounted to a cast aluminum plate that is easily removed by loosening two screws in keyhole slots. The disconnect plug connects the ballast to the terminal block in the wiring chamber. The socket is street lighting grade with nickel plated lamp grip shell, center contact backed by a coiled spring and glazed porcelain body. The prismatic glass reflector is designed to work in conjunction with the refractor to provide the desired distribution of light. The glass reflector allows an uplight component to illuminate clear acrylic panels in the housing, creating a soft upward glow that define the luminaire's classic shape.

REFRACTOR / DOOR ASSEMBLY
The cast aluminum door cradles a teardrop shaped, thermal resistant borosilicate glass refractor that controls the light to provide an I.E.S. type IV cut off distribution. The combination of reflector, refractor and vertical burning lamp maximize efficiency and uniformity of illumination while controlling luminaire brightness. The refractor assembly hinges from the electrical / reflector assembly and is latched by a stainless steel, captive, wing nut assembly.

BALLAST
(Refer to Ballast Data Sheet for specific operating characteristics)
150 watt and below 120 volt High Pressure Sodium (HPS) ballasts are High Power Factor Reactor type. All other 150 watt and below are High Power Factor Autotransformer type. 250 watt HPS ballasts are Lead type.
All Metal Halide (MH) ballasts are Peak Lead Autotransformer type.

FINISH / MATERIAL
The luminaire is finished with polyester powder paint applied after a seven stage pretreatment process to insure maximum durability. Color to match C.O.D.A. Olympic green (Y207D). All castings utilize alloy #356 aluminum for maximum corrosion resistance and all exposed hardware is stainless steel.

U.L. LISTING
U.L. listing suitable for wet locations at 25 degrees C.

TYPE: A

DRAWING NO: US-3305-C

THIS DRAWING, WHEN APPROVED, SHALL BECOME THE COMPLETE SPECIFICATION FOR THE MATERIAL TO BE FURNISHED BY HOLOPHANE ON THE ORDER NOTED ABOVE. A UNIT OF SIMILAR DESIGN MAY BE SUPPLIED, BUT ONLY AFTER APPROVAL BY THE CUSTOMER IN WRITING. ON POLE ORDERS AN ANCHOR BOLT TEMPLATE PRINT WILL BE SUPPLIED WITH EACH ANCHOR BOLT ORDER TO MATCH THE POLE PROVIDED.

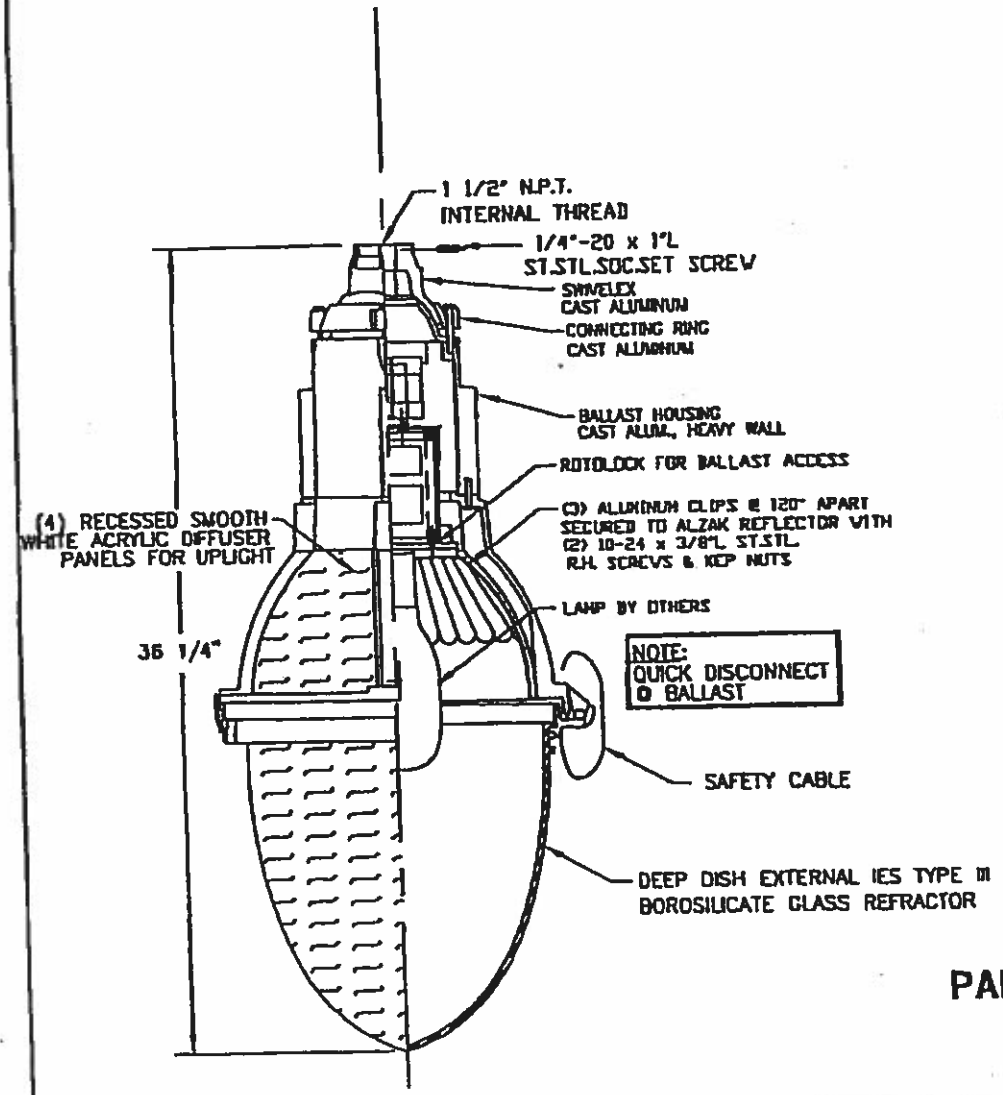
THIS PRINT IS THE PROPERTY OF HOLOPHANE AND IS LOANED SUBJECT TO RETURN UPON DEMAND AND UPON EXPRESS CONDITION THAT IT WILL NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO OUR INTERESTS, AND ONLY IN CONNECTION WITH MATERIAL FURNISHED BY HOLOPHANE.

HOLOPHANE
LEADER IN LIGHTING SOLUTIONS
An AcuityBrandsCompany
214 OAKWOOD AVENUE - NEWARK, OHIO 43055

SCALE: N/A
DRAWN: BHH
APP'D:
DATE: 02-25-03

REV.	ALTERATION	E.C.N.		BY
A	REVISED VOLTAGE INFOR.		041601	TB
A	NEW BALLAST HOUSING ADDED		07/18/01	A.A.

KING U.S. ORDER NO.:	CUSTOMER ORDER NO.:



SPECIFICATIONS

CATALOGUE NO.: KB1-EGD-ST-III-250(MOG)-HPS-120(MT)

QUANTITY:
GLOBE MAT'L: GLASS
IES CLASSIFIC.: TYPE III
WATTAGE: 250W
LIGHT SOURCE: HIGH PRESSURE SODIUM
LINE VOLTAGE: 120V (MULTI-TAP)
PAINT: CODA GREEN MATCH
LAMP BY OTHERS

BALLAST INFORMATION:
BALLAST TYPE: CWA
BALLAST MANUFACTURER: ADVANCE
CATALOG NUMBER: 71A8291

OPTIONS:
QUICK DISCONNECT [X]
TERMINAL BLOCK [ ]
OTHER: 14' 0" OF LEAD UPLIGHT

SEE DRAWING #202C0064 FOR UPLIGHT / REFLECTOR CUT-OUTS

PART No. K81-EDG-ST-III-250(MOG)HPS-120(MT)

NOTE:
CSA APPROVAL - THE LIGHT FIXTURE MEETS ANSI & NEMA STANDARDS, COMPLY WITH NEC REQUIREMENTS & CARRY CSA/NRTL CERTIFIED (OSHA APPROVAL) -UL EQUIVALENT LABEL

PART	PLANT REFERENCE DWG. #'s	REVISION
GLOBE		
CAPITAL		
OPTICS		
BALLAST		
FINIAL		
OTHERS		

CERT. I.D. CS [ ] ET [ ]

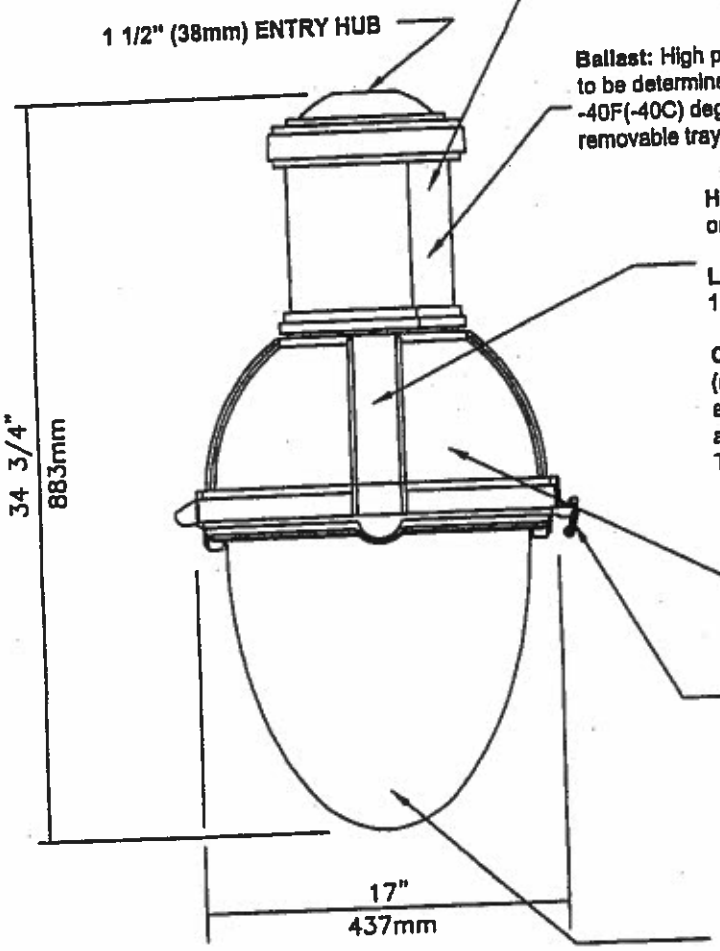
KING LUMINAIRE COMPANY INC.
840 WALKER'S LINE, P.O. BOX 7, BURLINGTON, ONTARIO, CANADA L7R 3Y8
P.O. BOX 286 JEFFERSON, OHIO 1133 STATE ROUTE 45N U.S.A. 44047

DWG NAME	DWG NUMBER	DATE:	DWG BY:	REV.
SPEC. DWG.	KB1-EGD-ST	11/15/00	A.A.	B

PROJECT/CUSTOMER: CITY OF ATLANTA, GEORGIA (TYPE A) (GEORGIA POWER)
\SPEC\GEORGIA_POWER\KB1-EGD-ST

LUMEC
840, boul Curé Boivin
Boisbriand (Qc), Canada, J7G 2A7
Tel: (450)430-7040
Fax: (450)430-1483

Qty 31 Luminaire 250HPS-RN20-THA3-GL-VOLT-GT-SCTX-LMS19664A



Housing: In a round shape, this housing is made of cast aluminum 356, mechanically assembled to the bracket.

Ballast: High power factor of 90%. Primary voltage to be determined _____. Lamp starting capacity -40F(-40C) degrees. Assembled on a unitized removable tray with quick disconnect plug.

Hood: Cast 356 aluminum dome, mechanically assembled on the luminaire.

Lamp: 250 watts high pressure sodium(not included), ED 18 bulb, mogul base.

Optical System: (THA3-GL), I.E.S. type III hyper-extensive (asymetrical). Sealsafe system, composed of brightened anodized aluminum hydroformed reflector, permanently assembled on a refractor globe. Watertightness IP66 rating. This assembly is toolfree removable from the technical ring.

Luminaire Options: Glow Top made of white acrylic, mechanically assembled on the housing.

Access-Mechanism: A cast 356 aluminum frame with latch and hinge. The mechanism shall offer toolfree access to the inside of the luminaire. An embedded memory-retentive gasket shall ensure weatherproofing.

Globe: Made of one-piece seamless injected-molded borosilicate glass having an inner prismatic surface c/w semi prismatic house side shield and a textured exterior surface. The globe is mechanically assembled on the access-mechanism.

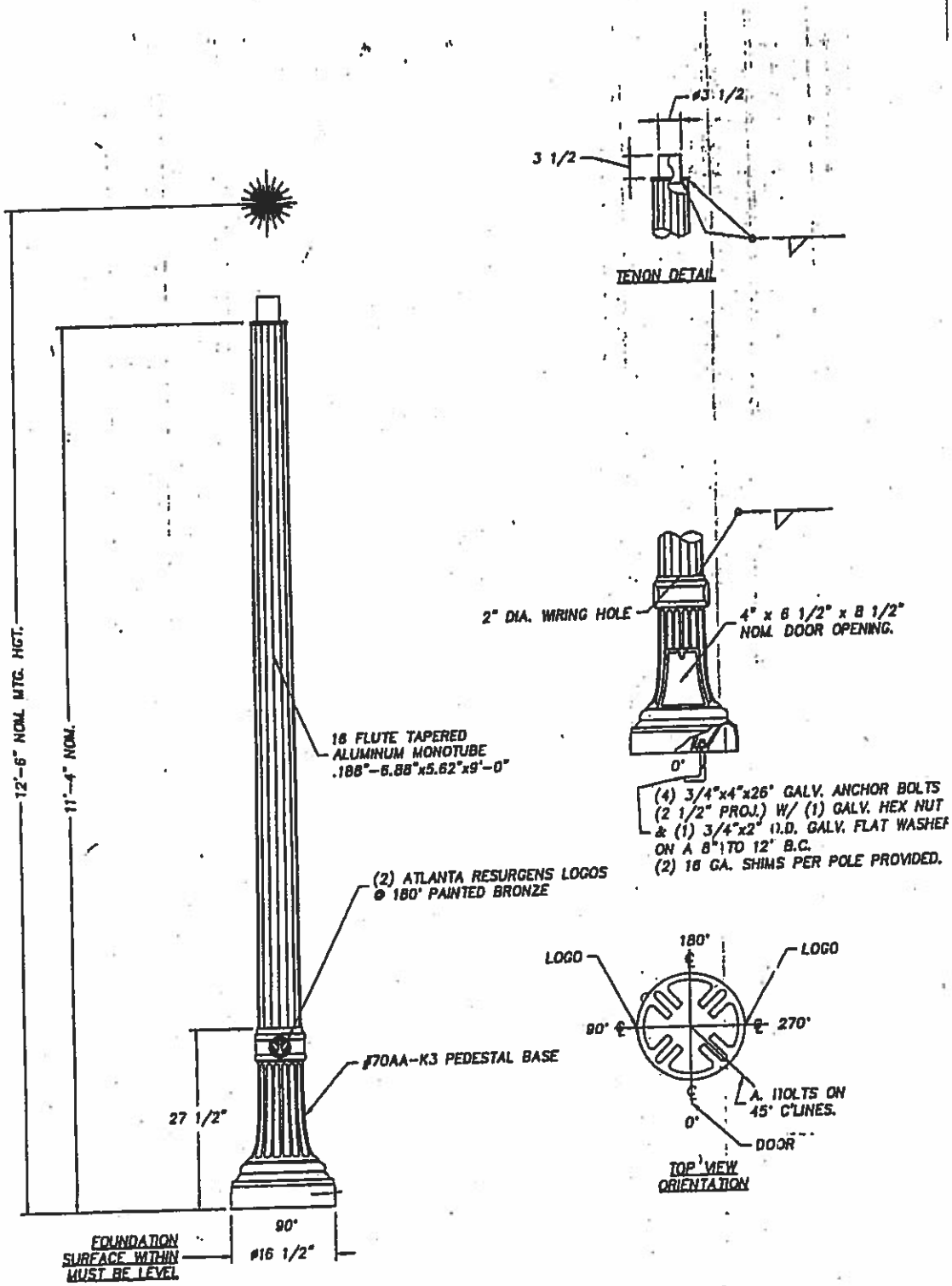
Miscellaneous
Wiring: Type TEW 14 ga. 6" (152mm) minimum exceeding from luminaire.
Hardware: All exposed screws will be in stainless steel. Neoprene and/or silicone gasketing is applied.
Finish: Special color to be Coda Green (textured) (SCTX). Application of a polyester powder coat paint. (4 mils/100 microns). The chemical composition provide a highly durable UV and salt spray resistant finish in accordance to the ASTM-B117-73 standard and humidity proof in accordance to the ASTM-D2247-68 standard.
Note: IMPORTANT: All missing details must be clearly specified on the return of these approval drawings. Thank you for your cooperation. **Voltage of Ballast to be determined _____.**

TITRE: TITLE: City of Atlanta
RN20 LMS19664A

34112

ENREGISTRÉ ISO 9002 REGISTERED

ECHELLE/SCALE:	N°	REVISION	PAR/BY:	DATE:	VER.:	PAR/BY:	N° DE DESSIN / DRAWING N°	PAGE
1/8"=1"	4	REVISION	LL	10-04-02		EM	RN20 34112B	1/1



MATERIAL SPECIFICATIONS

TUBES: AA6063-T4
ANCHOR BOLTS: AASHTO M314 GR. 55 GALV. TO ASTM A153
ANCHOR BOLT NUTS: ASTM A563 GR. A GALV. TO ASTM A153
MISC. HARDWARE: (STN. STL.) AISI 300 SERIES (18-8)
MISC. STL. HARDWARE: ASTM A307 GALV. TO ASTM A153
PEDESTAL BASE: CAST ALUMINUM A319.0
FINISH: PER SALES ORDER

ORIGINAL

DESIGN NUMBER: P1571-70-B79-Y1

R1	0841 3901	REVISED DWG TITLE REMOVED LUMINAIRE RESURGENS WAS SPELLED RESURGENCE	12-4-0 W.J.C.

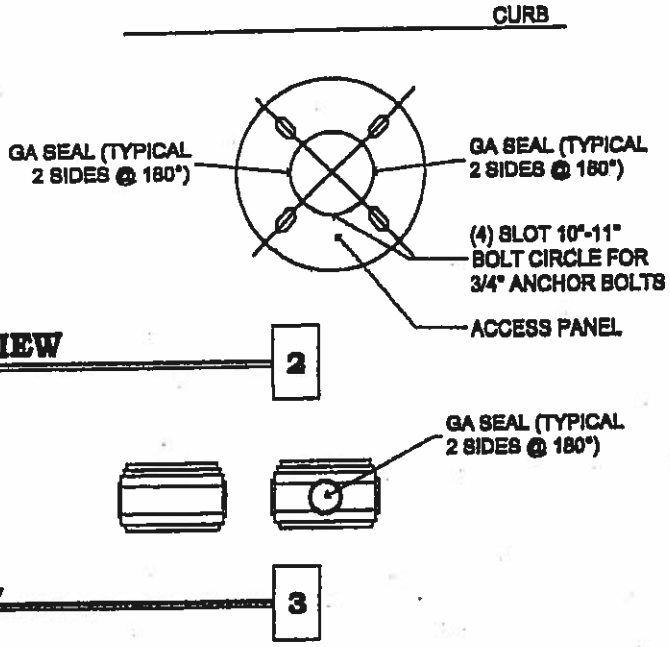
ORNAMENTAL LIGHTING STANDARD
"C" POLE (ONE PIECE ALUMINUM)
ATLANTA, GEORGIA

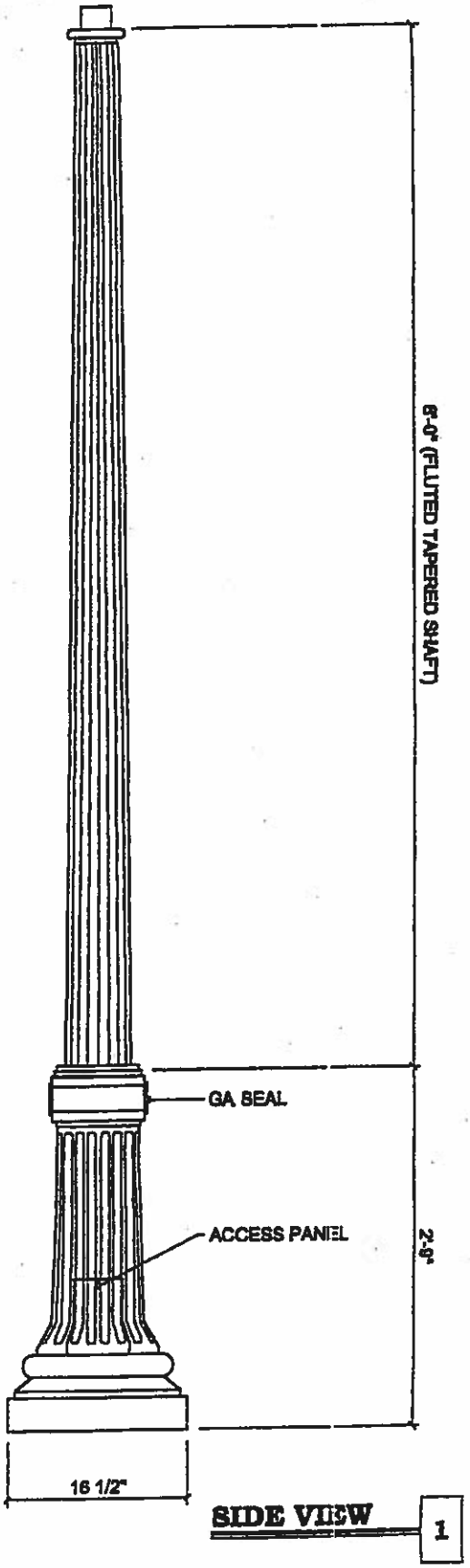
LOF PS
REQ.# 0841-39-01 S.O.# ---
ENG.REF.# N1571-70-B
CAD# ---

Union Metal CORPORATION

DRAWN W.J.C.
DATE 12-6-01

DRAWING NO.
N1571-70-B79





GENERAL DESCRIPTION

CAST ALUMINUM DECORATIVE BASE OF SERIES 319 ALUMINUM ALLOY INCLUDING CAST ALUMINUM MOUNTING PLATE WELDED IN AND IS COMPLETE WITH A HAND HOLE WITH MATCHING DOOR.

THE BASE IS JOINED TO THE SERIES 5052 ALUMINUM ALLOW 11 GAUGE THICK ROLLED AND FORMED TAPERED, FLUTED, ROUND SHAFT UTILIZING 100% PENETRATION TIG WELDING PROCESS. THE SHAFT TAPER IS .14"/FT AND HAS 16 FORMED FLUTES.

TO COMPLETE THIS ASSEMBLY, A CAST SERIES 319 ALUMINUM ALLOY TENON IS TIG WELDED AT THE TOP. THE TENON HAS A 3" DIA. NECK TO HOLD THE LUMINAIRE.

FINISH

THE SURFACE OF THE POLE IS SAND BLASTED TO ASSURE A GOOD PAINT ANCHOR IS ACHIEVED. THE SURFACE IS SOLVENT CLEANED AND A SHERWIN WILLIAMS VINYL WASH PRIMER IS APPLIED. THE FINISH COATING SHALL BE A MIN. DRY FILM THICKNESS OF 1-1/2 MIL. OF SHERWIN WILLIAMS POLANE POLYURETHANE ENAMEL (SPECIAL COLORS MATCHED) TO THOROUGHLY SEAL THE POLE AND GIVE IT THE PROPER UV PROTECTION.

MAIN STREET LIGHTING

(330) 723-4451 FAX: (330) 723-2570
1080 INDUSTRIAL PKWY. MEDINA OH 44256

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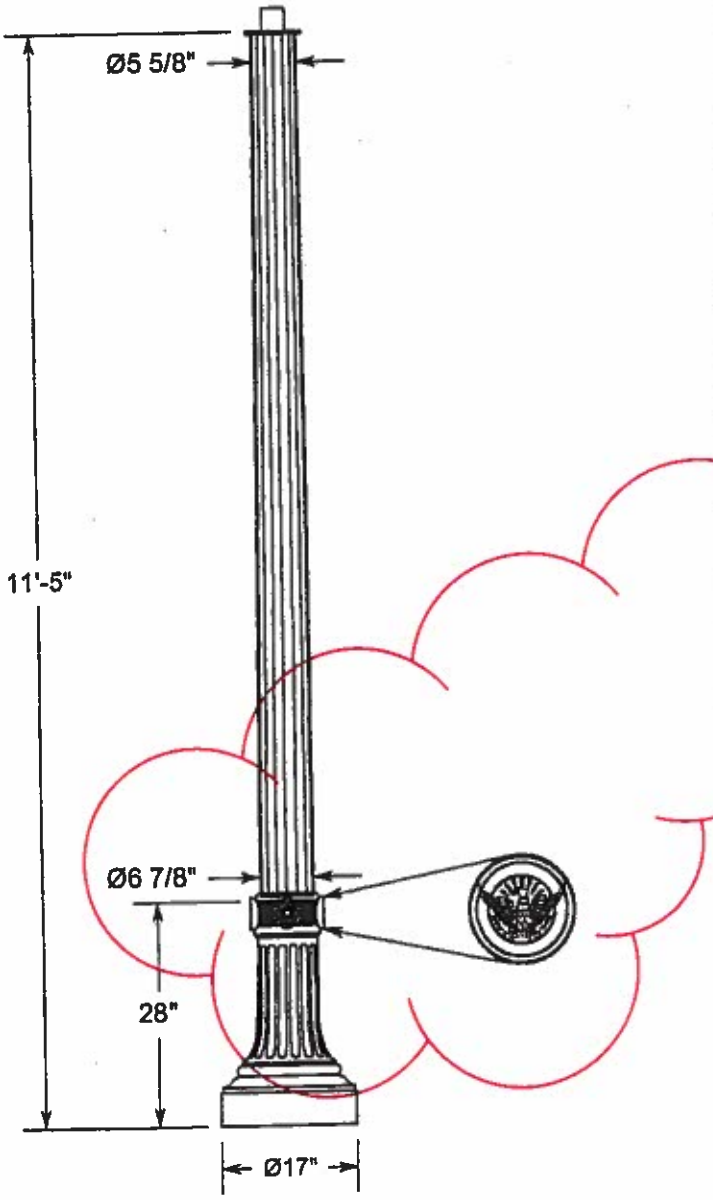
AATF1410-9 (ATL)

SCALE: 3/4"=1'-0"

DATE: 8/13/01

ALUMINUM ASSEMBLY

City of Atlanta
North Yorkshire Series
Cast Aluminum Post
17"Ø Base



Specifications

DESCRIPTION
The lighting post shall be all aluminum construction, with a classic tapered and fluted base, and a 16-flute tapered shaft with a tenon for luminaire mounting. Base shall have custom 'Atlanta Resurgens' logos.

MATERIALS
The base shall be heavy-wall cast aluminum (356.1 ingot alloy) formed true to pattern with complete detail. The shaft shall be tapered and fluted aluminum. All hardware shall be tamper resistant, stainless steel. Anchor bolts shall be hot-dip galvanized steel.

DIMENSIONS
The post height shall be 11'-5" tall, with a 17"Ø x 28" tall base. The fluted shaft shall taper from 6 7/8"Ø at the base to 5 5/8"Ø at the top, with a 3"Ø x 3" tall tenon for luminiare mounting.

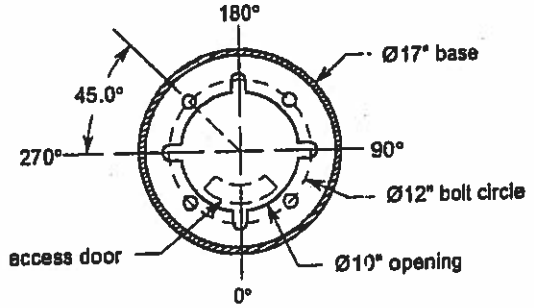
INSTALLATION
Post provided with (4) 3/4"Ø x 24" x 3" hot-dip galvanized, L-type, anchor bolts to be installed on a 12"Ø bolt circle. A door shall be located in the base for anchorage and wiring access. A grounding screw shall be provided inside the base, opposite the door, for easy access.

FINISH
The post assembly shall be shipped with a 'custom match' powder coat finish. Color to match 'CODA Green'.

CUSTOM LOGO
The base shall have 'Atlanta Resurgens' medallions, in lieu of rosettes, located at 90 and 270 degrees. Medallions shall be furnished with a 'gold' color finish.

ALTERNATE BOLT PATTERN
The base shall have an alternate anchor bolt pattern, 45 degrees from access door.

Anchorage Detail



Catalog # NY(11.42)/17CIT-C/I/CM-BC(.75X12.0ALT45)-T(3.0X3.0)-CLD/CS

OUTDOOR ARCHITECTURAL ORDER NO:

TYPE: C

DRAWING NO: US-3411r3

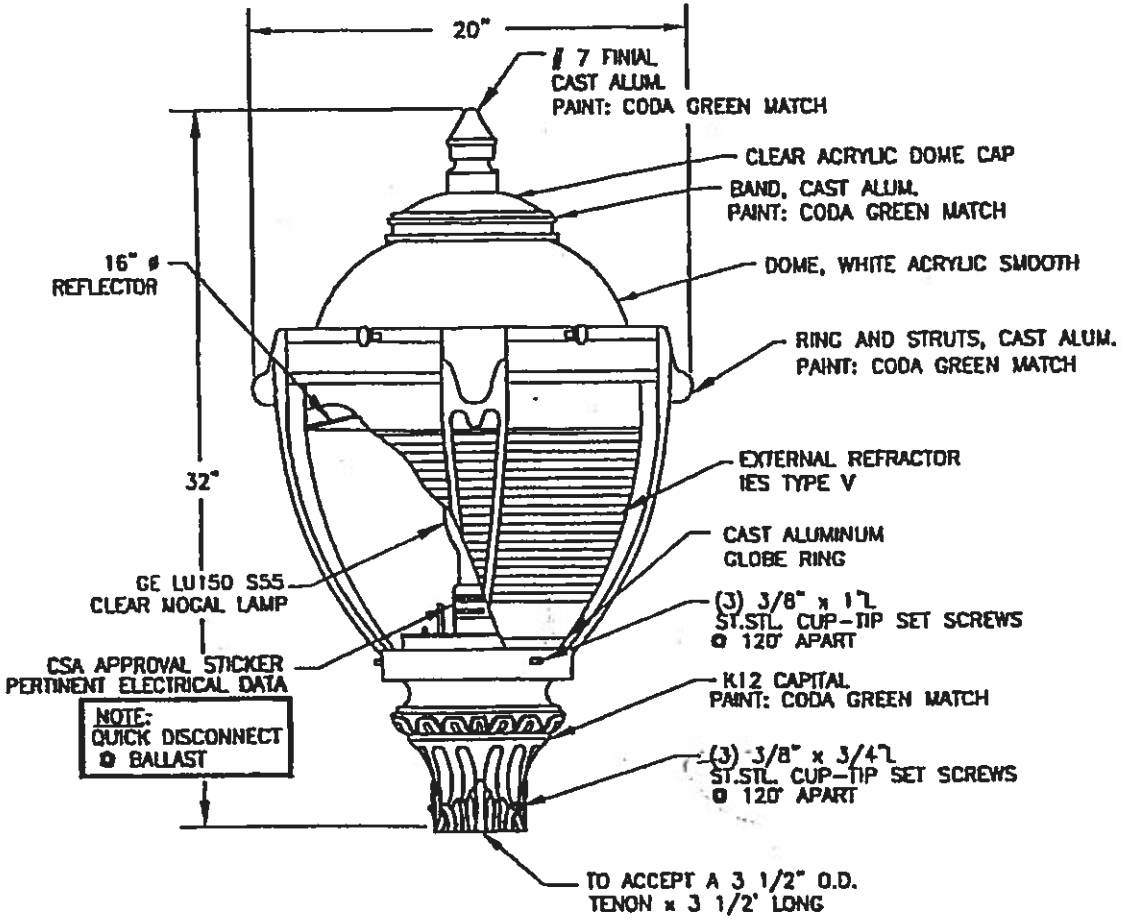
THIS DRAWING WHEN APPROVED SHALL BECOME THE COMPLETE SPECIFICATION FOR THE MATERIAL TO BE FURNISHED BY HOLOPHANE ON THE ORDER NOTED ABOVE. A UNIT OF SIMILAR DESIGN MAY BE SUPPLIED, BUT ONLY AFTER APPROVAL BY THE CUSTOMER IN WRITING. ON POLE ORDERS AN ANCHOR BOLT TEMPLATE PRINT WILL BE SUPPLIED WITH EACH ANCHOR BOLT ORDER TO MATCH THE POLE PROVIDED.

THIS PRINT IS THE PROPERTY OF HOLOPHANE AND IS LOANED SUBJECT TO RETURN UPON DEMAND AND UPON EXPRESS CONDITION THAT IT WILL NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO OUR INTERESTS, AND ONLY IN CONNECTION WITH MATERIAL FURNISHED BY HOLOPHANE.

HOLOPHANE
LEADER IN LIGHTING SOLUTIONS
Holophane
214 OAKWOOD AVENUE - NEWARK, OHIO 43055

SCALE: NONE
DRAWN: SA
APP'D:
DATE: 2/26/03

REV.	ALTERATION	E.C.N.	DATE	BY
A	REVISED VOLTAGE INFOR.		041601	TB



KING U.S. ORDER NO.:	CUSTOMER ORDER NO.:

SPECIFICATIONS
CATALOGUE NO.: K134-EAR-V-150(MOG)-HPS-120(MT)-K12
QUANTITY:
GLOBE MAT'L: ACRYLIC
IES CLASSIFIC.: TYPE V
WATTAGE: 150W
LIGHT SOURCE: HIGH PRESSURE SODIUM
LINE VOLTAGE: 120V (MULTI-TAP)
POLE ADAPTOR: K12
LAMP BY OTHERS

BALLAST INFORMATION:
BALLAST TYPE: HX-HPF
BALLAST MANUFACTURER: ADVANCE
CATALOG NUMBER: 71A8192

OPTIONS:
QUICK DISCONNECT [X]
TERMINAL BLOCK [ ]
OTHER: 14' 0" OF LEAD

PART No. K134-EAR-V-150(MOG)-HPS-120(MT)-K12

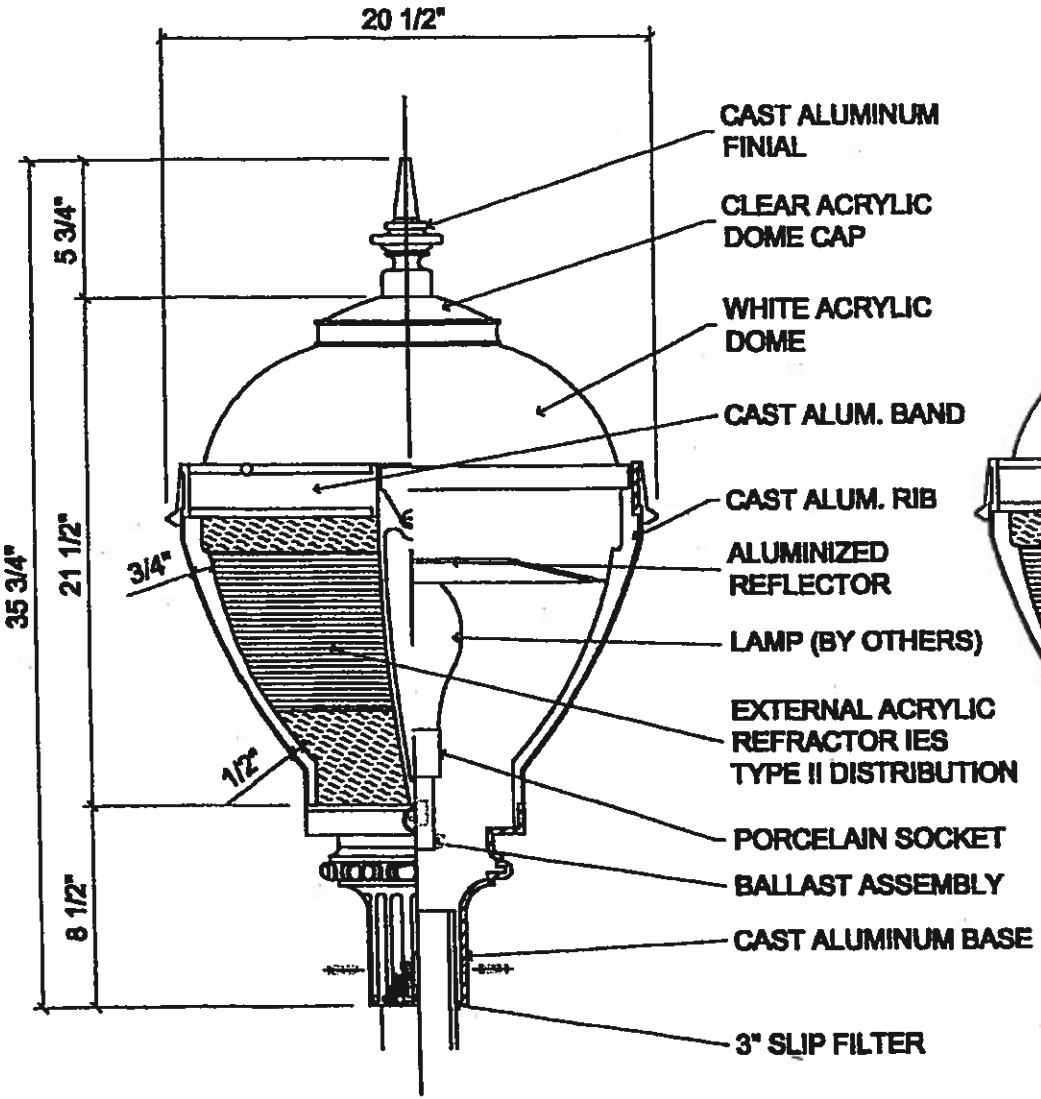
NOTE:
CSA APPROVAL – THE LIGHT FIXTURE MEETS ANSI & NEMA STANDARDS, COMPLY WITH NEC REQUIREMENTS & CARRY CSA/NRTL CERTIFIED (OSHA APPROVAL) –UL EQUIVALENT LABEL

PART	PLANT REFERENCE DWG. #'s	REVISION
GLOBE		
CAPITAL		
OPTICS		
BALLAST		
FINIAL		
OTHERS		
CERT. I.D.	CS [ ] ET [ ]	

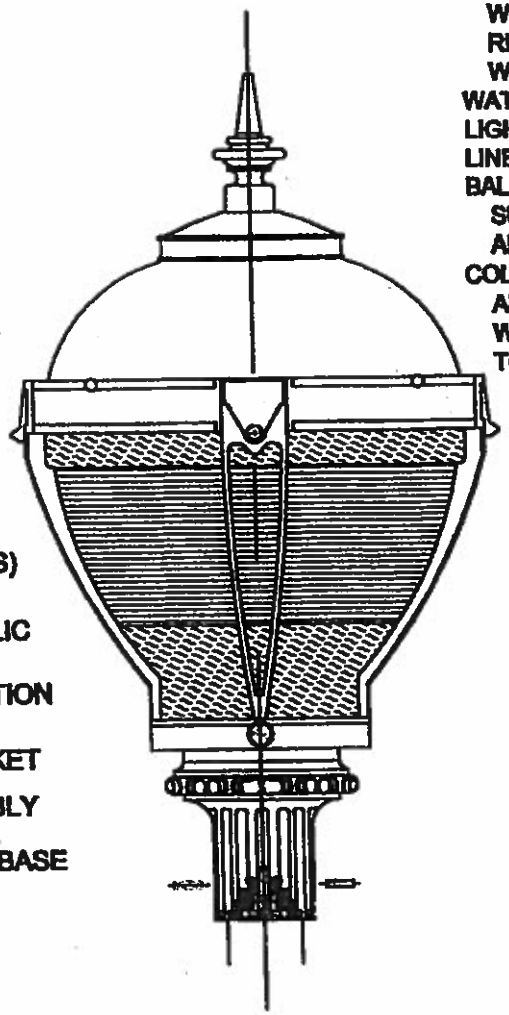
KING LUMINAIRE COMPANY INC.
840 BRUCE'S LINE, P.O. BOX 7, BURLINGTON, ONTARIO, CANADA L7R 3X9
P.O. BOX 306 JEFFERSON, OHIO 1133 STATE ROUTE 45N U.S.A. 44047

DWG NAME	DWG NUMBER	DATE:	DWG BY:	REV.
SPEC. DWG.	K134-EAR-K12	11/15/00	A.A.	A

PROJECT/CUSTOMER:
CITY OF ATLANTA, GEORGIA (TYPE C)
(GEORGIA POWER)
\SPEC\GEORGIA_POWER\K134-EAR-K12



FRONT SECTION 1



FRONT VIEW 1

SPECIFICATIONS

CATALOG # L920 150W. HPS, 120V (MT)
GLOBE MATERIAL: POLYCARBONATE WITH BUILT IN EXTERNAL ACRYLIC REFRACTOR IES TYPE V, INCLUDING WHITE ACRYLIC DOME CAP
WATTAGE: 150W
LIGHT SOURCE: HIGH PRESSURE SODIUM
LINE VOLTAGE: 120V (MULTI-TAP)
BALLAST: ADVANCE #71A8192 SUPPLIED WITH QUICK DISCOUNT AND 14' OF LEAD
COLOR: ALL ALUM. EXTERNAL PARTS ARE WASHED PRIMERED & SHERWIN WILLIAMS POLYURETHANE, APPLIED TO MATCH "CODA GREEN"

MAIN STREET

(800) 772-4431
(503) INDUSTRIAL PKWY.
FAX (503) 772-8770
KEIZER, OR 97303

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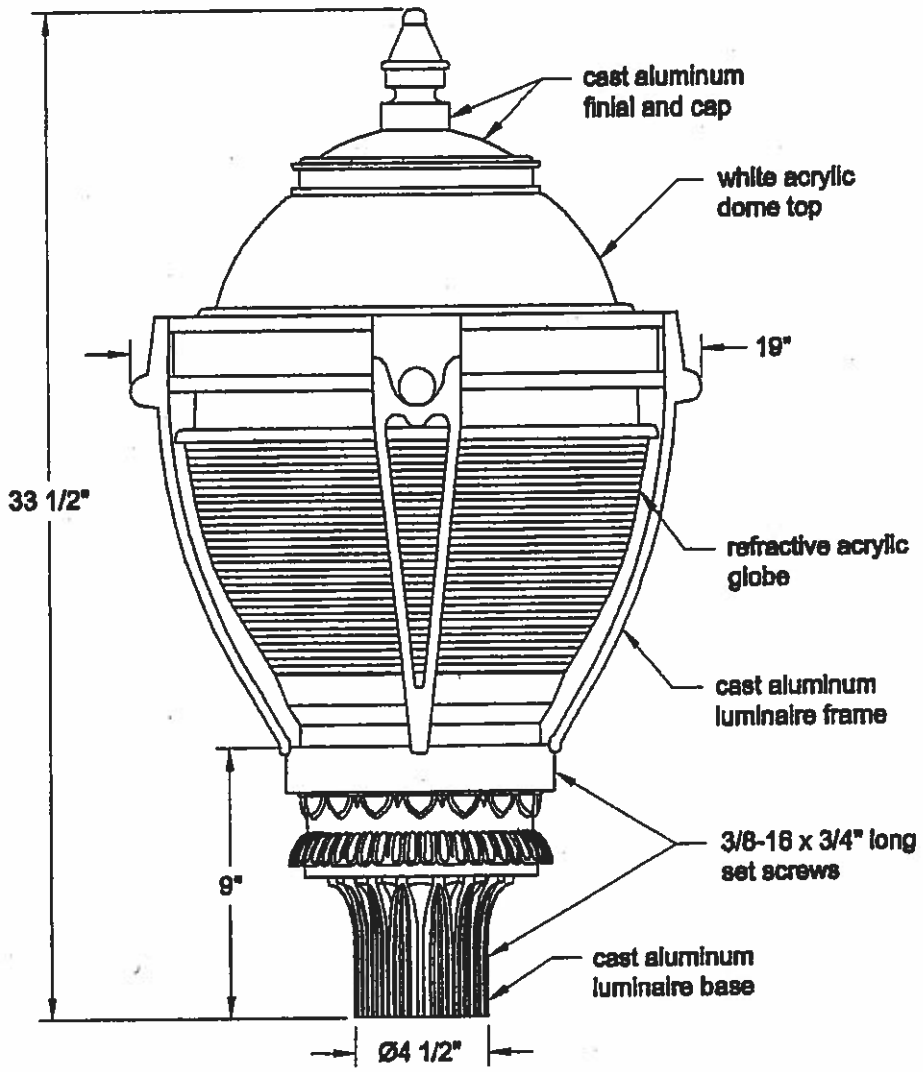
L920

SCALE: 1 1/2"=1'-0"
DATE: 10/24/00

American Electric Lighting

Atlanta Type 'C' Luminaire



Catalog Number: AEL24 P 150S MOG ARF R5 TB1 AEL-1015r3 CM

Luminaire: Luminaire shall be 19" wide x 33-1/2" tall with a cast aluminum base, frame, finial and cap. Globe shall have a clear refractive (IES Type 5 distribution) acrylic lower section and a smooth white acrylic dome top.
Luminaire shall be furnished with a high intensity discharge ballast and a socket assembly for a 150-watt, high-pressure sodium lamp with mogul base. Ballast shall be high power factor, multi-tap, wired for 120-volt operation. 14'-0" leads included. UL listed.

Installation: Luminaire shall slip-fit a nominal 3"Ø x 3" tall tenon, and be secured by 6 socket head set screws.

Finish: The luminaire shall have a custom City of Atlanta CODA green powder coat finish.

American Electric Lighting
An Westinghouse Company

For luminaire information, please contact:
Mark Zureich ph 678-714-1361 fax 678-714-1958

TNEMEC COMPANY Incorporated

COLGIN & ASSOCIATES, INC.
#6 OFFICE PARK CIRCLE, SUITE 209
BIRMINGHAM, AL 35223
TEL: (205) 870-8012
FAX: (205) 870-8013

ANDY

50-330 PANEL
41-39 TIMBER

March 28, 1995

TO: Bill Malay
Senior Project Manager
Corporation for Olympic Development in Atlanta

Fax No. (404) 651-4934

FROM: Tammy Davenport

RE: Custom Color Green (CODA)

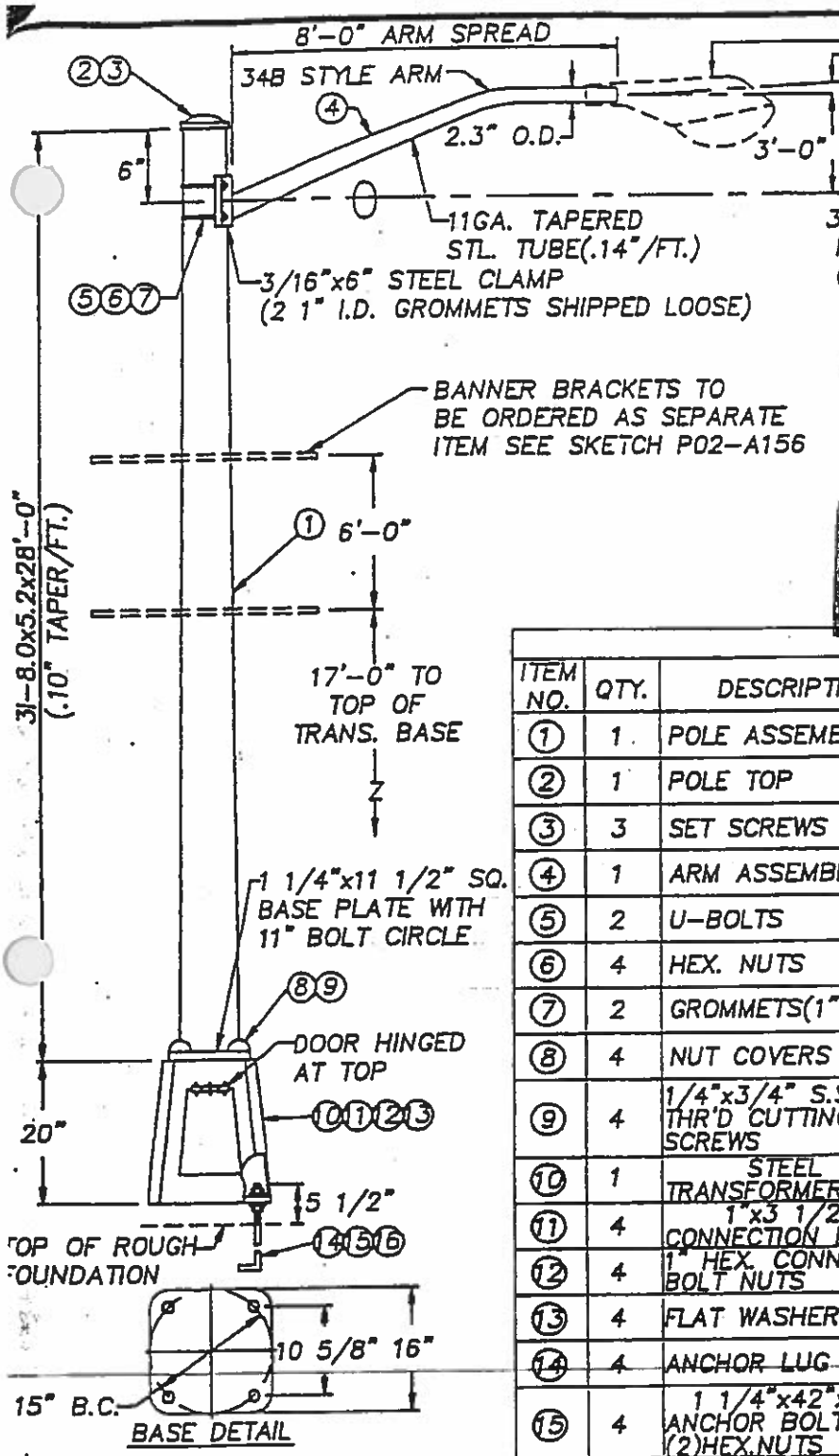
Dear Bill:

Andy Colgin asked that I send you the formula on the Series 175 " CODA Green." The "official" formula number is F175G2490.

Thank you,

Tammy Davenport

Tammy Davenport



DES-905

City of Atlanta
Traffic & Transportation
Lighting Plans Approved
Date: 4/18/05

PACKING LIST

ITEM NO.	QTY.	DESCRIPTION	CONTROL NUMBER	DRAWING NUMBER	MATERIAL SPECIFICATION
1	1	POLE ASSEMBLY			ASTM-A595 GR.B 60 K.S.I.
2	1	POLE TOP			ASTM-B26(43,319 OR 356F ALLOY)
3	3	SET SCREWS			AISI-300 SERIES (STN.STL.)
4	1	ARM ASSEMBLY			40 K.S.I.
5	2	U-BOLTS			ASTM-A36
6	4	HEX. NUTS			ASTM-A563 GR.A
7	2	GROMMETS(1" I.D.)			RUBBER
8	4	NUT COVERS			ASTM-B26
9	4	1/4"x3/4" S.S. THR'D CUTTING SCREWS			AISI-300 SERIES (STN.STL.)
10	1	STEEL TRANSFORMER BASE			ASTM-A36
11	4	1"x3 1/2" CONNECTION BOLTS			ASTM-A325
12	4	1" HEX. CONN. BOLT NUTS			ASTM-A194 GR.2H
13	4	FLAT WASHERS(1")			F436
14	4	ANCHOR LUG			ASTM-A36
15	4	1 1/4"x42"x6" ANCHOR BOLTS W/ (2)HEX.NUTS EACH			AASHTO M314 GR.55
16	8	1 1/4" FLAT WASHERS			F436

FINISH:
H.D. GALV. TO ASTM-A123 E92-072

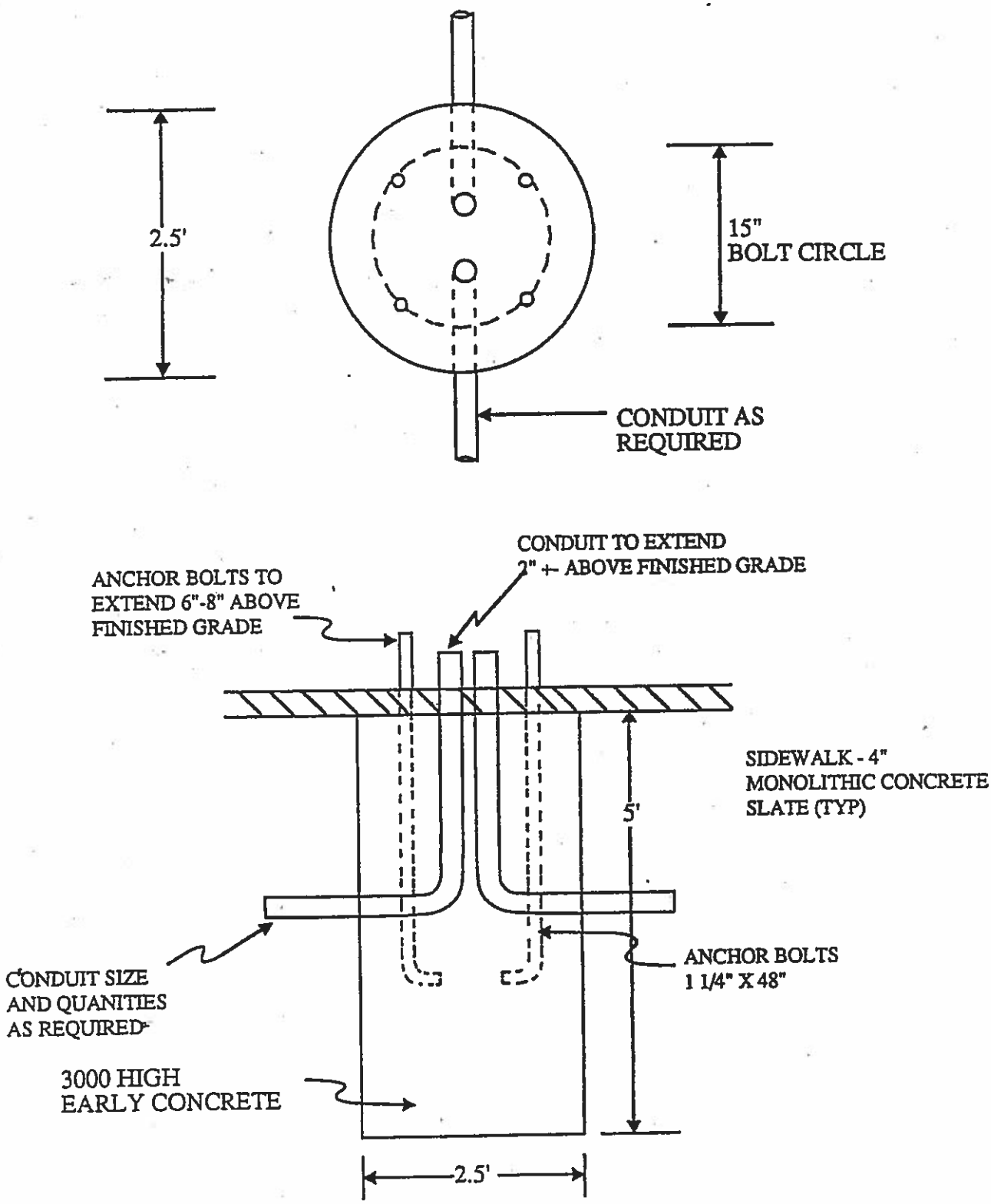
REVISIONS

CITY OF ATLANTA, GEORGIA
STEEL LIGHTING POLE

UNION METAL CORPORATION

DRAWN T.L.BOWE
DATE 3-10-92
CHECKED GMP

DRAWING NO. P06-A255



TYPICAL FOUNDATION - STREET LIGHT/ BANNER POLE

APPENDICES

APPENDIX A

OFFICE OF CONTRACT COMPLIANCE REQUIREMENTS

CITY OF ATLANTA

Kasim Reed
Mayor

SUITE 1700
55 TRINITY AVENUE, SW
ATLANTA, GA 30303
(404) 330-6010 Fax: (404) 658-7359
Internet Home Page: www.atlantaga.gov

OFFICE OF CONTRACT COMPLIANCE
Larry scott
Director
lscott@atlantaga.gov

April 14, 2016

RE: Project No.: FC-8856, Boone Boulevard Green Infrastructure & Capacity Relief Project

Dear Prospective City of Atlanta Bidder:

This packet is substantially different from all previous packets. The Office of Contract Compliance's **Disadvantaged Business Enterprises (DBE)** information is an integral part of every Federally Funded City of Atlanta bid or proposal. Your efforts to assist the City of Atlanta in mitigating the present effects of past discrimination against disadvantaged business enterprises are essential. Please read all of the information very carefully. Pay close attention to the contract goals for this project and the DBE program reminders listed on page DBE 5.

Many businesses that appear in our register as certified M/FBEs or SBEs are not currently certified as **Disadvantaged Business Enterprises.** Certification of DBE firms is being handled by a different agency. Please see page DBE 2 for details of certification of DBEs. Thank you for your extra attention to the DBE program.

If you have any questions about the information included in this section of the solicitation please contact the City of Atlanta Office of Contract Compliance at (404) 330-6010.

The City of Atlanta looks forward to the opportunity to do business with your company.

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CITY OF ATLANTA

DISADVANTAGED BUSINESS ENTERPRISE

POLICY STATEMENT

It is the policy of the City of Atlanta to ensure that DBEs, as defined in 49 CFR Parts 23 and 26, have an equal opportunity to receive and participate in DOT-assisted contracts. It is also the City of Atlanta's policy:

1. To ensure non-discrimination in the award and administration of DOT assisted Opportunities;

2. To create a level playing field on which DBEs can compete fairly for DOT Assisted contracts;

3. To ensure that the DBE program is narrowly tailored in accordance with applicable law;

4. To ensure that only firms that fully meet 49 CFR Parts 23 and 26 eligibility standards are permitted to participate as DBEs;

5. To help remove barriers to the participation of DBEs in DOT assisted contracts; and

6. To assist the development of firms that can compete successfully in the market place outside the DBE program.

IMPLEMENTATION OF DBE POLICY
CONTRACT GOALS

The City of Atlanta establishes contract goals only on those contracts that have subcontracting and/or joint venture possibilities. The size of the contract goal is adopted on a project by project basis, impacted by the circumstances of each such contract (e.g. type and location of work, availability of DBEs to perform the particular type of work), in relation to the City's annual DBE goal.

The City of Atlanta expresses its contract goals as a percentage of the total amount of each particular DOT-assisted contract.

Each solicitation for which a contract goal has been established requires the bidders/offerors to submit the following information as part of their bid or offer:

1. The names, addresses and phone numbers of DBE firms that will participate in the contract;

2. A description of the work that each DBE will perform;

3. The dollar amount of the participation of each DBE firm's participation;

4. Written and signed documentation of commitment to use a DBE subcontractor whose participation is submitted to meet a contract goal;

5. Written and signed confirmation from the DBE that it is participating in the contract as provided in the prime contractor's commitment; and,

6. If the contract goal is not met, evidence of good faith efforts to meet the goal.

The City of Atlanta has designated the Office of Contract Compliance as its DBE Liaison Office. The address of OCC is 55 Trinity Avenue, Ste. 1700, Atlanta, Georgia 30303. The phone number is (404) 330-6010.

Each contracting opportunity at the airport is individually evaluated and the individual contract goal is adjusted as appropriate in relation to the City's Annual DBE goal. The City of Atlanta will express its contract goal as a percentage of the total amount of each individual DOT-assisted contract.

GOOD FAITH EFFORTS

The City of Atlanta treats bidder/offerors' compliance with good faith effort requirements as a matter of responsiveness. Compliance of bidders with the DBE requirements, including good faith efforts, will be evaluated according to the standards of 49 CFR Parts 23 and 26.

DEMONSTRATION OF GOOD FAITH EFFORTS

The obligation of the bidder/offeror is to make good faith efforts to meet the goal. The bidder/offeror can demonstrate that it has done so either by meeting the contract goal or documenting its good faith efforts. Examples of good faith efforts are found at 49 CFR Parts 23 and 26 Appendix A and are attached to this document.

OCC is responsible for determining whether a bidder/offeror who has not met the contract goal has documented sufficient good faith efforts to be regarded as responsive. In determining whether a bidder/offeror is responsive to the DBE goals, OCC will consider whether the information submitted by that bidder/offeror is complete, accurate and adequately documents the bidder's/offeror's good faith efforts. Bidders who are informed that they have not met the "good faith efforts" requirements are entitled to administrative reconsideration of that determination, per 49 CFR 26.53(d).

DISADVANTAGED BUSINESS ENTERPRISE
CONTRACT GOALS

PROJECT # FC- 8856, Boone Boulevard Green Infrastructure & Capacity Relief Project

All proponents must ensure that non-discriminatory practices are utilized to enter into subcontract agreement(s) with Georgia Department of Transportation (G-DOT) certified Disadvantage Business Enterprise (DBE) firms in accordance with federal regulations. The subcontract agreements, at the very least, should reflect details of the subcontractor company's/companies involvement in the **Boone Boulevard Green Infrastructure & Capacity Relief Project** throughout the life of the contract.

The dominant NAICS code and trade to be engaged for the above referenced solicitation is:

541330 Engineering Services

Please be reminded that no Bidder shall be awarded a contract on an Eligible Project unless the Office of Contract Compliance determines that the Bidder has satisfied the non-discrimination requirements of section 2-1448 on such Eligible Project. Details of the O.C.C. review process for determination of non-discrimination are outlined on page 3 of this document.

Note: The DBE program goals are 15% for this project.

OCC will count DBE participation in the form of a certified DBE a prime contractor, DBE certified joint venture partner (Joint ventures are not mandated on this contracting opportunity), or certified DBE sub-contractor arrangement. The above referenced goal will be measured against **total contract value inclusive of any change orders and/or miscellaneous modifications** that may occur throughout the life of the project.

MONITORING OF DBE POLICY

Upon execution of a contract with the City of Atlanta, the successful bidder's Subcontractor Project Plan will become a part of the contract between the bidder and the City of Atlanta. The Subcontractor Project Plan will be monitored by the City of Atlanta's Office of Contract Compliance for adherence with the plan. The successful bidder will be required to provide specific DBE information on a monthly basis that demonstrates the use of subcontractors and suppliers as indicated on the Subcontractor Project Plan. The failure of the successful bidder to provide the specific DBE information by the specified date each month shall be sufficient cause for the City to withhold approval of the successful bidder's invoices for progress payments, increase the amount of the successful bidder's retainage, require joint check issuance, or evoke any other penalties as set forth in the City of Atlanta Code of Ordinances, Sections 2-1452 and 2-1456.

The City of Atlanta will require prime contractors to maintain records, documents, and receipts of gross revenue attributed to DBEs for three years following the performance of the contract. Those records must be made available for inspection upon request by any authorized representative of the City of Atlanta or DOT. This reporting requirement also extends to any certified DBE subcontractor.

The City of Atlanta will keep a running tally of actual gross receipts attributed to the DBE firms from the time of the contract award.

The City of Atlanta's Office of Contract Compliance, or its designee, will perform interim audits of gross receipts and contract payments to DBEs if applicable. The audit will review payments to DBE subcontractors to ensure that the actual amount paid to DBE subcontractors equals or exceeds the dollar amounts stated in the schedule of DBE participation.

DBE PROGRAM REMINDERS

1. DBE Plan. All proposals must contain a DBE Participation plan in accordance with the goals set forth above. The DBE plan must identify each DBE's name, address, and contact name, work description, and contract amount.

2. Subcontractor and Supplier Participation. On projects with subcontractor and supplier opportunities, disadvantaged business enterprise participation may only be met through certified businesses that meet the standards of 49 CFR Parts 23 and 26, Subparts D and E. Each prime contractor must meet the requirements of the DBE program.

3. Failure to Meet DBE Goals. Any bidder unable to meet the DBE goals must document the good faith efforts it made to meet the goals. Documentation must follow the requirements of the DBE plan pursuant to 49 CFR Parts 23 and 26 etc. If the City determines that good faith efforts were not made, the bidder is entitled to administrative reconsideration under 49 CFR 26.53.

4. Certification. As of March 1, 2004, the City no longer does DBE Certification. DBE Certifications are now handled by the GA Department of Transportation (GA DOT). The contact number for GA DOT is (404) 656-5267

5. Reporting. The successful bidder must submit monthly DBE participation reports to OCC in a form as prescribed by the Office of Contract Compliance monitor of record.

6. DBE Concession Program. The DBE Concession Program is governed by the provisions of "49 CFR Parts 23 and 26".

7. Contract Assurance. The Concessionaire shall not discriminate on the basis of race, color, national origin, sex, religion, or sexual orientation in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the City of Atlanta deems appropriate. Anti-discrimination provisions based upon religion and sexual orientation are not included by or enforceable through 49 CFR Parts 23 and 26 but are enforceable through the City of Atlanta regulations.

EQUAL EMPLOYMENT OPPORTUNITY POLICY

PROJECT # FC- 8856, Boone Boulevard Green Infrastructure & Capacity Relief Project

IMPLEMENTATION OF EEO POLICY

The City effectuates its EEO policy by adopting racial and gender workforce goals for every contractor performing work for the City of Atlanta on federally funded projects. These goals are derived from the work force demographics set forth by the United States Department of Labor Federal Office of Contract Compliance. These goals are not included in or enforceable through 49 CFR Part 26.

A FIRM 'S WORK FORCE CONSISTING OF LESS THAN TWENTY-FIVE (25) EMPLOYEES IS EXEMPT FROM THE FOLLOWING EEO REQUIREMENTS

The Office of Federal Contract Compliance Programs (OFCCP) is the office of the United States Department of Labor that has responsibility for administration and enforcement of the Equal Employment Opportunity requirements under the contract compliance program which is authorized by Executive Order 11246 as amended, Section 503 of the Rehabilitation Act of 1973, and the Vietnam Era Veterans Readjustment Act of 1974. The programs mentioned above prohibit Federal contractors and sub-contractors from employment discrimination based on Race, Sex, National Origin, Religion, Sexual Orientation, and against persons with Disabilities or Vietnam Era Veterans, and requires such contractors to take affirmative action to ensure equal employment opportunity.

BUSINESS DEVELOPMENT PROGRAMS

Though the DBE program primarily focuses on DBE participation at the subcontractor level, it is also important to provide DBEs with experience, training and skill development at the prime contractor level. The City of Atlanta encourages joint ventures between a prime contractor and an DBE, or a mentor protégé agreement between a prime contractor and a DBE whenever feasible on applicable contracts. The general description of the joint venture and mentor-protégé agreements is found on **Attachment 1 and Attachment 2** hereto and in the Atlanta Code of Ordinances.

CITY OF ATLANTA CONTRACT COMPLIANCE CERTIFICATE

The undersigned has prepared and submitted all the documents attached hereto. The documents have been prepared with a full understanding of the City's goals and objectives with respect to increased opportunity in the proposed work to be undertaken in performance of this project. It is the company's intent to achieve the airport Concessions Disadvantaged Business Enterprise goals, the Equal Employment Opportunity goals, and the First Source Jobs Employment goals.

All information and representations contained herein and submitted with this bid or proposal are true and correct.

_____
Witness

_____
Signature
Company Authorized Representative

Date: _____

Company Name: _____

FC Number: _____

Project Name: _____

DBE -1

SUBCONTRACTOR CONTACT FORM

List all subcontractors or suppliers (Both DBE and Non-DBE Certified) that were contacted regarding this project.

Name of Sub-contractor/ Supplier	Contact Name, Address and Phone Number	City Of Atlanta Business License? (Yes or No)	Type of Work Solicited for	Business Ownership (see code below)	Certification No. and Expiration Date	Results of Contact

SUBCONTRACTOR CONTACT FORM

List all subcontractors or suppliers (Both DBE and Non-DBE Certified) that were contacted regarding this project.

Name of Sub-contractor/ Supplier	Contact Name, Address and Phone Number	City Of Atlanta Business License? (Yes or No)	Type of Work Solicited for	Business Ownership (see code below)	Certification No. and Expiration Date	Results of Contact

Business Ownership Code: AABE - African American Business Enterprise, HABE – Hispanic Business Enterprise, FBE – Female Business Enterprise, APABE – Asian (Pacific Islander) American Business Enterprise ***Note: COA M/FBE certification does not count for DBE program goals. Firms must be certified by the GA DOT/MARTA.

Company Name: _____ **Project Name:** _____ **FC#:** _____

Signature: _____ **Date:** _____

SUBCONTRACTOR/SUPPLIER UTILIZATION

List all Majority and Disadvantaged Business Enterprises (DBE) subcontractors/suppliers, including lower tiers, to be used on phase two of this project.

Name of Sub-contractor/ Supplier	Contact Name, Address and Phone Number	City of Atlanta Business License? (yes or no)	NIAC Code	Type of Work to be Performed	Ethnicity of DBE Ownership (see code below)	DBE Certification No. and Expiration Date	Dollar ($) Value of Work and Scope of Work	Percentage (%) of Total Bid Amount

Code: AABE - African American Business Enterprise, HABE – Hispanic American Business Enterprise, FBE – Female Business Enterprise,
APABE – Asian (Pacific Islander) American Business Enterprise (*Note… EBO certification does not qualify for DBE projects)**

Proponent's Co. Name: _____ Total DBE%_____

FC#: _____ Project Name: _____ Date:_____

Signature:_____

LETTER OF INTENT

Disadvantage Business Enterprise

Proponent Name:_____

Address:_____

City:_____ State:_____ Zip:_____

DBE Firm: DBE Firm:_____

Address:_____

City:_____ State:_____ Zip:_____

DBE Contact Person: Name:_____ Phone: (___)_____

Expiration Date of DBE Certification:_____

DBE is performing as: ☐Prime Concessionaire ☐Sub concessionaire ☐Joint Venture

Work item(s) to be performed by DBE	Description of Work Item	Dollar ($) Value of Work and Scope of Work	Percentage (%) of Total Bid Amount
TOTAL DBE			

The proponent is committed to utilizing the above-named DBE firm for the work described above. The estimated participation is as follows:

DBE contract amount: $_____ Percent of total contract:_____%

AFFIRMATION:
The above-named DBE firm affirms that it will perform the portion of the contract for the estimated dollar value as stated above.

By: _____
(Print name) *(Title)*

_____
(signature) *(date)*

* In the event the proponent does not receive award of the prime contract, any and all representations in this Letter of Intent and Affirmation shall be null and void.

ATTACHMENT 1

Joint Venture Participation on City of Atlanta DBE Projects

Although Joint Ventures are **not** mandated on federally funded City of Atlanta projects, The City of Atlanta encourages (where feasible) the establishment of joint ventures to ensure prime contracting opportunities for all businesses, including non-discriminatory outreach efforts to utilize certified minority and female business enterprises at the prime level. Should firms choose to voluntarily form a joint venture in pursuit of a DBE contracting opportunity, joint venture member businesses must have different race ownership, different gender ownership, or both. The certified DBE member(s) of the joint venture must be certified as such by the GA. Dept. of Transportation (G-DOT), and the joint venture team shall include in its bid submittal the DBE certification number of each DBE joint venture member.

A joint venture, at its' option, may submit its agreement to the Office of Contract Compliance for *pre-approval* no later than fourteen (14) calendar days prior to the date set for receipt of bids. Otherwise, agreements must be submitted on or before the date set for receipt of bids on a project.

"Components of a Joint Venture Agreement with DBE Participation as Counted under 49 CFR 26.55 (b)"

For credit forward toward the contract goal under Part 26, a joint venture agreement with a certified disadvantaged business enterprise should include at a minimum:

- The name of the Joint Venture
- Contact information of designated primary JV contact person
- Identification of all firms participating in the JV
- The initial capital investment of each venture partner
- Terms and conditions under which future contributions may be necessary
- The proportional allocation of profits and losses to each venture partner
- Description of proportion of work controlled by and management of the joint venture team members
- The method of, and responsibility for, accounting
- Frequency of JV meetings and method for minutes taking and storage
- The methods by which disputes are resolved.
- Provide the specific citation/section of your JV that speaks to the Contract's non-discrimination and assurance requirements
- All other pertinent factors of the joint venture.

ATTACHMENT 2

DISADVANTAGED BUSINESS ENTERPRISE PROGRAM
MENTOR PROTÉGÉ INITIATIVES

The mentor-protégé program is an initiative, in accordance with Appendix D to 49 CFR Part 26, to encourage and develop certified Disadvantaged Business Enterprises in contracting with city government in areas that Disadvantaged Business Enterprises have historically been underrepresented due to various discriminatory barriers. This program, implemented on projects with a projected value of 5 million dollars or more, will enable prime contractors of all ethnic and gender categories to provide technical, administrative, and other assistance to smaller, developing businesses. Companies must successfully complete the Disadvantaged Business Enterprise certification process in order to participate as a protégé in this program. Additionally, participation as a certified Disadvantaged Business Enterprise protégé team member will not preclude the inclusion of the same certified Disadvantaged Business Enterprise team member as a self-performing subcontractor in the DBE plan. The subcontracting by the certified Disadvantaged Business Enterprise protégé team member will be applied toward the satisfaction of the DBE goals in accordance with 49 CFR 26, Subpart C, 26.55.

Examples of good faith efforts are found in 49 CFR Parts 23 and 26, Appendix A that is attached to this package.

"Components of a Mentor-Protégé Agreement with DBE Participation as Counted under 49 CFR 26.55"

The Mentor-Protégé agreement between a prime contractor and the DBE protégé will provide an excellent development opportunity for the disadvantaged business enterprise protégé. Under the guidance of the mentor, the protégé will gain valuable knowledge and experience that will ultimately enhance the capabilities of the protégé. Additionally, the protégé has the opportunity to gain this knowledge and experience without exposing itself to the normal business risks that are associated with projects of this size.

As part of the City's Part 26 DBE program and subject to 49 CFR 26.35 and Appendix D, a mentor may meet up to half of the contract goal for this contract by using a DBE protégé as a self-performing subcontractor through a formal mentor-protégé program. The successful prime for this project remains obligated to meet the entire contract goal for this project, including whatever portion of the goal that cannot be met by the protégé. Only independent DBE forms already certified by the City at this time (see "Certification", page DBE 2) may participate as protégés.

The mentor may not (1) enter into a mentor-protégé agreement as a substitute for compliance with the DBE program, (2) use such an agreement to circumvent the obligations of the DBE program, (3) create a new firm to serve as a protégé (4) require a potential protégé to pay the mentor for the privilege of participating in the agreement, or (5) bar the protégé from performing work on this contract.

To meet the requirements of Part 26, the mentor-protégé team must present a written development plan and formal agreement between the parties to the City of Atlanta prior to executing the final contract.

The agreement should include, but is not limited to the following information:

- The type of collaboration, training and assistance to be provided. The areas of assistance encouraged include, but are not limited to, bonding and insurance support, management and scheduling support.

- The specific rights and responsibilities of the Mentor and the Protégé.

- Names or titles of the individuals from the Mentor responsible for working directly with the Protégé in the areas identified above.

- Names or titles of the individuals from the Protégé responsible for working directly with the Mentor in the areas listed above.

- The term of the agreement.

- A system to monitor and evaluate the effectiveness of the Mentor Protégé agreement.

- A plan detailing how the Mentor plans to include the Protégé on non-governmental projects, governmental projects, and DOT-assisted projects during the term of the agreement.

- Protégé shall not subcontract any of their work to the mentor firm or to other contractors without the approval of the OCC. Subcontracted work will not be counted toward DBE goals except as specified by Part 26.

- Mentor and Protégé representatives may not bid or otherwise participate independently on a contract in which the Mentor Protégé team is bidding or participating as a team.

- Work self-performed by the protégé may be used to fulfill up to one half of the DBE contract goal on this project.

- DBE credit will not be awarded to a non-DBE mentor firm for using its own protégé firm for more than every other contract performed by the protégé.

- Staff members from the Office of Contract Compliance will be available to review draft mentor-protégé agreements for compliance with this section.

DIVERSITY FIRM TERMINATION/SUBSTITUTION ACKNOWLEDGEMENT FORM

As a participant in an eligible City of Atlanta (COA) diversity program contract, certain restrictions and procedures apply to the termination and substitution of a diversity certified entity by a prime concessionaire or prime contractor, as mandated by federal regulations and City ordinances. These requirements are established by 49 C.F.R. § 26.53(f), code sections 2-1356- 2-1380, and 2-1441- 2-1480 of the COA code of ordinances, as may be amended from time to time.

OCC will not allow a prime concessionaire or prime contractor to substitute or terminate a diversity program certified entity without OCC's prior written consent, which will be granted only upon a written finding of good cause. OCC requires completion of a form document to accompany the reason(s) for the request to terminate and/or substitute, which is available at:

http://www.atlantaga.gov/modules/showdocument.aspx?documentid=491

For ease of reference, the federal requirements are quoted below:

49 C.F.R. § 26.53(f)

(1) (i) [OCC] must require that a prime contractor not terminate a DBE[/ACDBE] subcontractor listed in response to paragraph (b)(2) of this section (or an approved substitute DBE[/ACDBE] firm) without [OCC's] prior written consent. This includes, but is not limited to, instances in which a prime contractor seeks to perform work originally designated for a DBE[/ACDBE] subcontractor with its own forces or those of an affiliate, a non-DBE[/ACDBE] firm, or with another DBE[/ACDBE] firm.

(ii) [OCC] must include in each prime contract a provision stating:

(A) That the contractor shall utilize the specific DBEs listed to perform the work and supply the materials for which each is listed unless the contractor obtains your written consent as provided in this paragraph (f); and

(B) That, unless your consent is provided under this paragraph (f), the contractor shall not be entitled to any payment for work or material unless it is performed or supplied by the listed DBE[/ACDBE].

(2) [OCC] may provide such written consent only if [OCC] agree[s], for reasons stated in [OCC's] concurrence document, that the prime contractor has good cause to terminate the DBE[/ACDBE] firm.

(3) For purposes of this paragraph, good cause includes the following circumstances:

(i) The listed DBE[/ACDBE] subcontractor fails or refuses to execute a written contract;

(ii) The listed DBE[/ACDBE] subcontractor fails or refuses to perform the work of its subcontract in a way consistent with normal industry standards. Provided, however, that good cause does not exist if the failure or refusal of the DBE[/ACDBE] subcontractor to perform its work on the subcontract results from the bad faith or discriminatory action of the prime contrac[t]or;

(iii) The listed DBE[/ACDBE] subcontractor fails or refuses to meet the prime contractor's reasonable, nondiscriminatory bond requirements.

(iv) The listed DBE[/ACDBE] subcontractor becomes bankrupt, insolvent, or exhibits credit unworthiness;

(v) The listed DBE[/ACDBE] subcontractor is ineligible to work on public works projects because of suspension and debarment proceedings pursuant 2 CFR Parts 180, 215 and 1,200 or applicable state law;

(vii) [OCC] ha[s] determined that the listed DBE[/ACDBE] subcontractor is not a responsible contractor;

(vi) The listed DBE[/ACDBE] subcontractor voluntarily withdraws from the project and provides to [OCC] written notice of its withdrawal;

(vii) The listed DBE[/ACDBE] is ineligible to receive DBE[/ACDBE] credit for the type of work required;

(viii) A DBE[/ACDBE] owner dies or becomes disabled with the result that the listed DBE[/ACDBE] contractor is unable to complete its work on the contract;

(ix) Other documented good cause that [OCC] determine[s] compels the termination of the DBE[/ACDBE] subcontractor. Provided, that good cause does not exist if the prime contractor seeks to terminate a DBE[/ACDBE] it relied upon to obtain the contract so that the prime contractor can self-perform the work for which the DBE[/ACDBE] contractor was engaged or so that the prime contractor can substitute another DBE[/ACDBE] or non-DBE[/ACDBE] contractor after contract award.

(4) Before transmitting to [OCC] its request to terminate and/or substitute a DBE[/ACDBE] subcontractor, the prime contractor must give notice in writing to the DBE[/ACDBE] subcontractor, with a copy to [OCC], of its intent to request to terminate and/or substitute, and the reason for the request.

(5) The prime contractor must give the DBE[/ACDBE] five days to respond to the prime contractor's notice and advise [OCC] and the contractor of the reasons, if any, why it objects to the proposed termination of its subcontract and why [OCC] should not approve the prime contractor's action. If required in a particular case as a matter of public necessity (e.g., safety), [OCC] may provide a response period shorter than five days.

(6) In addition to post-award terminations, the provisions of this section apply to pre-award deletions of or substitutions for DBE[/ACDBE] firms put forward by offerors in negotiated procurements.

The undersigned acknowledges these requirements on behalf of the below-listed entity.

Prime: _____

Contract No.: _____ Signature: _____

Name: _____

Title: _____ Date: _____

AWDA | ATLANTA WORKFORCE DEVELOPMENT AGENCY

First Source Jobs Program Policy Statement

It is the policy of the City of Atlanta to provide job opportunities to the residents of the City of Atlanta, whenever possible. Whereas every contract with the City of Atlanta creates a potential pool of new employment opportunities, the following program is applicable to **construction projects only** and is subject to review by AWDA on a case by case basis for applicability. Once AWDA has made the determination that the First Source Jobs Program is applicable, the successful prime contractor (and all subcontractors associated with the awarded project) is expected to work with the First Source Jobs Program to fill at least 50% of all new entry-level jobs, which arise from this project, with residents of the City of Atlanta. **AWDA has determined that the first source Jobs program is applicable for this project.** For more specific information about the First Source Jobs Program contact:

Michael Sterling
Executive Director
First Source Jobs Program
Atlanta Workforce Development Agency
818 Pollard Boulevard
Atlanta, GA 30315
(404) 546-3000

AWDA | ATLANTA WORKFORCE DEVELOPMENT AGENCY

AGREEMENT

FC-XXXX

ATLANTA WORKFORCE DEVELOPMENT AGENCY
FIRST SOURCE JOB TRAINING AND EMPLOYMENT PLACEMENT PROGRAM

This Agreement is made on the **XX** day of **Month, Year** and entered into between the Atlanta Workforce Development Agency ("AWDA"), an agency implementing the City of Atlanta's First Source Job Training and Employment Placement Program ("Program"), having its principal office at 818 Pollard Boulevard, S.W. Atlanta, Georgia 30315, and **Name of General Contractor** ("Construction GC"), a Georgia for profit corporation, having its principal office at **Insert Construction GC Address**.

WHEREAS, Ordinance 10-O-0928, which created the City of Atlanta's First Source Job Training and Employment Placement Program, was adopted by the Atlanta City Council on February 4, 2013 and approved by the Mayor of Atlanta on February 13, 2013; and,

WHEREAS, according to the most recent U.S. Census Bureau statistics, some 25 percent of the City of Atlanta's residents live below the federal poverty level; and,

WHEREAS, the City of Atlanta, through implementation of the Program, desires to address the issues of poverty, unemployment, and underemployment by providing meaningful job and career opportunities to the city's residents; and,

WHEREAS, the City of Atlanta enters into numerous public works and improvement contracts that are funded by public tax dollars; and,

WHEREAS, various building and construction workers are required to fulfill and perform the work required under said contracts; and,

WHEREAS, in order to facilitate the successful implementation of the Program, AWDA and the Construction GC desire to enter into this Agreement to set forth the respective responsibilities and obligations of each party for the duration of the Construction Contract as entered into between the City of Atlanta and the Construction GC.

NOW, THEREFORE, in consideration of the mutual covenant herein contained, the AWDA and the Construction GC hereby agree as follows:

Section 1. Definitions. The following italicized terms shall have the following meanings. All definitions include both the singular and plural forms.

Construction Contract shall mean a contract entered into or funded by the City for the performance of work that requires construction or building trades skills and has a face value greater than the Threshold Amount.

Construction General Contractor ("Construction GC") shall mean any entity entering into a Construction Contract that exceeds the Threshold Amount.

Entry-level shall mean any non-managerial position that requires either no education above a high school diploma or certified equivalency, or less than two (2) years of training or specific preparation. This definition includes, but is not limited to apprentices.

First Source Register shall mean the register managed by AWDA providing the Construction GC and its Sub-contractors with Workforce Innovation and Opportunity Act (WIOA) eligible residents of the City of Atlanta from which to fill Entry-level construction positions.

New Construction Position shall mean any non-executive, non-professional engineering, non-office, or non-clerical job, or any job not filled by full-time employees on the Construction GC's payroll for at least three months prior to the Notice to Proceed for the Construction Contract.

Sub-contractor shall mean any contractor performing construction work either directly or indirectly for the Construction GC, pursuant to any Construction Contract and that meets the Threshold Amount.

Threshold Amount shall mean any Construction Contract in which the prime contract is $500,000.00 or greater and the sub-contract(s) is $250,000.00 or greater.

Workforce Innovation and Opportunity Act ("WIOA") shall refer to Public Law 113-128, passed by the U.S. Congress and signed into law by President Barack Obama in July 2014. The Act reauthorized the Workforce Investment Act of 1998. WIOA is a federal grant program designed to help job seekers access employment, education, training, and support services to succeed in the labor market and to match employers with the skilled workers.

Section 2. General.

A. Construction GC shall, and shall cause the Construction GC's Sub-contractors to, use AWDA as its first source for the recruitment, referral, and placement of New Construction Positions through the First Source Register subject to the terms of this Agreement.

B. AWDA will provide recruitment, referral, and placement services through the First Source Register to the Construction GC and its Sub-contractors.

Section 3. Responsibilities of AWDA.

The AWDA shall:

A. Provide recruitment and referral to the Construction GC and Sub-contractor(s), subject to the limitations set out in this Agreement.

B. Screen applicants and provide Construction GC and Sub-contractor(s) with a list of applicants according to the terms of this Agreement.

Section 3. Responsibilities of the Construction GC.

The Construction GC shall, and shall cause its Sub-contractor(s) to:

A. Review and interview job applicants exclusively from the First Source Register – prior to reviewing job applicants from any other source – for all new entry-level Construction Positions.

B. Make good faith efforts to fill 50 percent of entry-level positions with City of Atlanta residents who are listed on the First Source Registry.

C. Provide signed letters of assent ("Exhibit C") indicating agreement to the terms of the First Source Job Training and Employment Placement Program with the submission of the proposal documents."

D. Provide AWDA with Employer Projection of Positions Form ("Exhibit A"), which shall contain a list of all New Construction Positions for which the Construction GC is hiring, as well as the job qualifications for those positions. This notification shall occur after the Construction Contract has been awarded and before the Notice to Proceed ("NTP") is issued.

E. After issuance of the NTP, provide a final Employer Projection of Positions Form ("Exhibit A") to AWDA.

F. Provide names and position titles of all Non-New Construction Positions ("Exhibit B"). Non-New Construction Positions include any executive, professional engineering, office, or clerical jobs, or any jobs filled by full-time salaried employees on the Construction GC's payroll for at least three months prior to the notice to proceed. This list shall be deemed exempted positions.

G. Include provisions in all Construction Contracts entered into with Sub-contractors to represent and warrant adherence to the terms of this Agreement.

H. Evaluate and interview all candidates provided by AWDA from the First Source Register and provide AWDA with the Post-Interview Evaluation Form ("Exhibit D"), within ten (10) days of the evaluation and interview.

I. Provide AWDA with a completed Requisition Progress Report ("Exhibit E") certifying compliance with this Agreement and detailing individuals who were hired, their address, start and end employment dates, and hours worked during that month.

J. Maintain daily sign-in sheet logs and payroll records for all of its employees and make said sign-in sheet logs and payroll records available to AWDA upon request. AWDA shall not use such records for any purpose other than monitoring of compliance with this Agreement.

K. Submit to AWDA with each payment application for the Construction Contract, the following items:

(i) A copy of all completed Employer Projection of Positions Forms ("Exhibit A") which have been completed since the last requisition submitted;

(ii) A copy of all completed Post-Interview Evaluation Forms ("Exhibit D") which have been completed since the last requisition submitted; and

(iii) The completed Requisition Progress Report ("Exhibit E") which have been completed since the last requisition submitted.

Section 4. Nondiscrimination. No party to this Agreement shall discriminate against First Source Register referrals in any terms and conditions of employment, including retention, promotions, job duties, shift assignments, and training opportunities.

Section 5. Events of Default. Subject to construction schedules and safety requirements, AWDA, the Office of Contract of Compliance ("OCC"), and awarding departments shall have the right to
engage in random inspections of job sites and have access to the employees of the Construction Contractor or Sub-contractor(s) and the records required under Ordinance 10-O-0928 (City of Atlanta Code of Ordinances, ARTICLE XI).

If AWDA, OCC, or an awarding department determine the Construction GC and/or Sub-contractor(s) are not in compliance with this Agreement, any or all of the following actions may be taken:

- Withhold progress payments of up to 10% of the Contract Amount;
- Refusal of all future bids on City projects until such time as the Construction GC and/or Sub-contractor come into compliance with this Agreement; or
- Termination of the Agreement.

Section 6. Notices. All notices, consents, approvals and other communications which may be or are required to be given by AWDA or the Construction GC under this Agreement shall be properly given only if made in writing and sent by (a) hand delivery, or (b) certified mail, return receipt requested, or (c) a nationally recognized overnight delivery service (such as Federal Express, UPS Next Day Air or Airborne Express), (d) by email to the email address listed below (provided that a copy of such notice is also delivered within 24 hours to the party by one of the methods listed in this Section 6(a), (b) or (c)), or (e) by facsimile to the facsimile number listed below (provided that a copy of such notice is also delivered within 24 hours to the party by one of the other methods listed in this Section 6(a), (b) or (c)), with all postage and delivery charges paid by the sender and addressed to the other parties as applicable as set forth below. Said notice addresses are as follows:

If notice is to City:

Atlanta Workforce Development Agency
818 Pollard Blvd., SW
Atlanta, GA 30315
ATTN: Business Relations Manager
akhanduri@atlantaga.gov

If notice is to Construction GC:

_____

_____

_____

_____

Each party may change its address by written notice in accordance with this Section (effective five (5) days after the delivery of written notice thereof). Any communication addressed and mailed in accordance with this Section will be deemed to be given when received, unless rejected or returned by the recipient, in which case when mailed, any notice so sent by electronic or facsimile transmission will be deemed to be given when receipt of such transmission is acknowledged, and any communication so delivered in person will be deemed to be given when receipted for, or actually received, by the party identified above.

Section 7. Amendments and Waivers. Any provision of this Agreement may be amended or waived if such amendment or waiver is in writing and is signed by the parties hereto. No course of dealing on the part of any party to this Agreement, nor any failure or delay by any party to this Agreement with respect to exercising any right, power, or privilege hereunder will operate as a waiver thereof.

Section 8. Invalidity. In the event that any provision of this Agreement is held unenforceable in any respect, such unenforceability will not affect any other provision of this Agreement.

Section 9. Successors and Assigns. This Agreement shall be binding upon the parties hereto and their respective successors and assigns and shall inure to the benefit of the parties hereto and their respective permitted successors and assigns. The Construction GC may not assign this Agreement or any of its rights hereunder or any interest herein without the prior written consent of AWDA, which consent may be withheld or conditioned in the sole discretion of AWDA; provided, however, that AWDA will not unreasonably withhold its consent to an assignment by the Construction GC of all or any of its rights under this Agreement.

Section 10. Exhibits; Titles of Articles and Sections. The exhibits attached to this Agreement are incorporated herein and will be considered a part of this Agreement for the purposes stated herein, except that in the event of any conflict between any of the provisions of such exhibits and the provisions of this Agreement, the provisions of this Agreement will prevail. All titles or headings are only for the convenience of the parties and may not be construed to have any effect or meaning as to the Agreement between the parties hereto. Any reference herein to a Section or subsection will be considered a reference to such Section or subsection of this Agreement unless otherwise stated. Any reference herein to an exhibit will be considered a reference to the applicable exhibit attached hereto unless otherwise stated.

Section 11. Applicable Law. This Agreement is made under and will be construed in accordance with and governed by the laws of the State of Georgia.

No provision of this agreement shall be interpreted so as to require the Construction GC and/or Sub-contractor(s) to employ a worker not qualified for a position, or to employ or retain any particular employee, or to hire any worker as a result of such worker's membership in a labor union.

Section 12. Entire Agreement. This Agreement represents the final agreement between the parties and may not be contradicted by evidence of prior, contemporaneous, or subsequent oral agreements of the parties. There are no unwritten oral agreements between the parties.

Section 13. Termination of Agreement. Without cause, AWDA may terminate this agreement at any time upon thirty (30) days' written notice to the Construction GC and AWDA.

IN WITNESS WHEREOF, this Agreement is executed by AWDA and the GC as of the date first written above.

Atlanta Workforce Development Agency
By: _____
Michael T. Sterling
Executive Director

Approved as to form:
By:_____
Susan Garrett, Esq.
Senior Assistant Attorney
City of Atlanta

Construction General Contractor:
By:_____
Name
Title

AWDA ATLANTA WORKFORCE DEVELOPMENT AGENCY

Exhibit A

EMPLOYER PROJECTION OF POSITIONS FORM

	Position Title	Qualifications	Number of Positions
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			

AWDA | ATLANTA WORKFORCE DEVELOPMENT AGENCY

Exhibit B

NON-NEW CONSTRUCTION POSITIONS

Please provide a list of all full-time construction workers (names and position titles) that will work on the project site during the life of the project. Indicate the category of work for which they will be utilized. This list shall be deemed **exempted positions**.

AWDA will not need to be notified ten (10) days prior to their hiring or arrival on the project site as long as their names are reflected on this list.

A **Non-**New Construction Position is any executive, professional engineering, office, or clerical jobs, or any jobs filled by full-time salaried employees on the Construction GC's payroll for **at least three months prior to the notice to proceed** for the project.

	Name	Position Title
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

AWDA ATLANTA WORKFORCE DEVELOPMENT AGENCY

Exhibit C

CONSTRUCTION GC / SUB-CONTRACTOR LETTER OF ASSENT

I have read the First Source Job Training and Employment Placement Agreement and assent to the terms therein.

_____

Construction GC or Sub-Contractor

_____

Date

AWDA | ATLANTA WORKFORCE DEVELOPMENT AGENCY

Exhibit D

POST-INTERVIEW EVALUATION FORM

Instructions

Construction GC and Sub-contractors must complete and submit this form to the Atlanta Workforce Development Agency within ten (10) days of interviewing a job candidate from the First Source Register.

Date of Interview:_____

Name of Candidate:_____

Did the candidate meet the qualifications of the position? Why or why not?

_____
_____
_____
_____

Was the candidate hired? _____

If not, please provide the reasons for your decision:_____
_____
_____
_____

If not, how could the candidate improve his/her employability?_____
_____
_____
_____

AWDA ATLANTA WORKFORCE DEVELOPMENT AGENCY

Exhibit E

REQUISITION PROGRESS REPORT

	Name	Start Date	End Date	Hours Worked
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

Additional Resources Proponents May Contact in an Effort to Identify DBE Participants

Atlanta Minority Business Development Center
Clem Wilmont
Project Director
1599-A Memorial Drive, SE
Suite 134
Atlanta, GA 30317
Phone: 404-329-4567
E-mail: cwilnot@AtlMBDC.com

Atlanta Public Schools
Carolyn Lyons
Outreach Coordinator
Contract Compliance
1631 La France Street
Atlanta, GA 30307
Phone: 404-371-7130
Fax: 404-371-7126
Email: clyons@atlanta.k12.ga.us

Cobb County
Janice Cook
Department of Transportation
463 Commerce Park Drive, Suite 112
Marietta, GA 30060-2737
Phone: 770-528-3690
Fax: 770-528-4360
Email: janice.cook@cobbcounty.org

Dekalb County
Terry Phillips
Contract Compliance Officer
1300 Commerce Drive
Room 202
Decatur, GA 30030
Phone: 404-371-2737
Email: tgphilli@co.dekalb.ga.us

U.S. Small Business Administration
Dinora Gonzalez
Economic Development Specialist
233 Peachtree Street, NE
Suite 1900
Atlanta, GA 30303
Phone: 404-331-0100 ext. 410
Email: dinora.gonalez-cook@sba.com

Georgia Technology Authority
Thomas Hester
Contracting Officer
100 Peachtree Street
Suite 2300
Atlanta, GA 30303
Phone: 404-463-2339
E-mail: tdhester@gta.ga.gov

Governor's Small Business Center
Gail Webb
Governmental and Outreach
Community Administrator
200 Piedmont Avenue
1306 West Tower
Atlanta, GA 30334
Phone: 404-656-6315
Toll-Free: 800-495-0053
Email: gsbc@doas.ga.gov

Minority Business Development Agency
Sunny Guider
Chief Business Development
401 West Peachtree Street, NW
Suite 1715
Atlanta, GA 30308-3516
Phone: 404-730-3300
Email: sguider@mbda.gov

Gwinnett County
Debra Green
Purchasing Director
75 Langley Drive
Lawrenceville, GA 30045
Phone: 770-822-8720
Fax: 770-822-8735 or 770-822-8728
Email: greende@co.gwinnett.ga.us

APPENDIX B

INSURANCE AND BONDING REQUIREMENTS

APPENDIX B

INSURANCE & BONDING REQUIREMENTS
FC-8856 Boone Boulevard

A. Preamble

The following requirements apply to all work under the agreement. Compliance is required by all Contractors/Consultants. **To the extent permitted by applicable law, the City of Atlanta ("City") reserves the right to adjust or waive any insurance or bonding requirements contained in this Appendix B and applicable to the agreement.**

1. Evidence of Insurance Required Before Work Begins

No work under the agreement may be commenced until all insurance and bonding requirements contained in this Appendix B, or required by applicable law, have been complied with and evidence of such compliance satisfactory to City as to form and content has been filed with City. Contractor/Consultant must provide City with a Certificate of Insurance that clearly and unconditionally indicates that Contractor/Consultant has complied with all insurance and bonding requirements set forth in this Appendix B and applicable to the agreement. If the Contractor/Consultant is a joint venture, the insurance certificate should name the joint venture, rather than the joint venture partners individually, as the primary insured. In accordance with the solicitation documents applicable to the agreement at the time Contractor/Consultant submits to City its executed agreement, Contractor/Consultant must satisfy all insurance and bonding requirements required by this Appendix B and applicable by law, and provide the required written documentation to City evidencing such compliance. In the event that Contractor/Consultant does not comply with such submittal requirements within the time period established by the solicitation documents applicable to the agreement, City may, in addition to any other rights City may have under the solicitation documents applicable to the agreement or under applicable law, make a claim against any bid security provided by Contractor/Consultant.

2. Minimum Financial Security Requirements

All companies providing insurance required by this Appendix B must meet certain minimum financial security requirements. These requirements must conform to the ratings published by A.M. Best & Co. in the current Best's Key Rating Guide - Property-Casualty. The ratings for each company must be indicated on the documentation provided by Contractor/Consultant to City certifying that all insurance and bonding requirements set forth in this Appendix B and applicable to the agreement have been unconditionally satisfied.

For all agreements, regardless of size, companies providing insurance or bonds under the agreement must meet the following requirements:

i) Best's rating not less than A-,
ii) Best's Financial Size Category not less than Class VII, and

iii) Companies must be authorized to conduct and transact insurance contracts by the Insurance Commissioner, State of Georgia.

iv) All bid, performance and payment bonds must be underwritten by a U.S. Treasury Circular 570 listed company.

If the issuing company does not meet these minimum requirements, or for any other reason is or becomes unsatisfactory to City, City will notify Contractor/Consultant in writing. Contractor/Consultant must promptly obtain a new policy or bond issued by an insurer acceptable to City and submits to City evidence of its compliance with these conditions.

Contractor/Consultant's failure to comply with all insurance and bonding requirements set forth in this Appendix B and applicable to the agreement will not relieve Contractor/Consultant from any liability under the agreement. Contractor/Consultant's obligations to comply with all insurance and bonding requirements set forth in Appendix B and applicable to the agreement will not be construed to conflict with or limit Contractor/Consultant's/Consultant's indemnification obligations under the agreement.

3. Insurance Required for Duration of Contract

All insurance and bonds required by this Appendix B must be maintained during the entire term of the agreement, including any renewal or extension terms, and until all work has been completed to the satisfaction of City.

4. Notices of Cancellation & Renewal

Contractor/Consultant must, notify the City of Atlanta in writing at the address listed below by mail, hand-delivery or facsimile transmission, within 2 days of any notices received from any insurance carriers providing insurance coverage under this Agreement and Appendix B that concern the proposed cancellation, or termination of coverage.

Enterprise Risk Management
68 Mitchell St. Suite 9100
Atlanta, GA 30303
Facsimile No. (404) 658-7450

Confirmation of any mailed notices must be evidenced by return receipts of registered or certified mail.

Contractor/Consultant shall provide the City with evidence of required insurance prior to the commencement of this agreement, and, thereafter, with a certificate evidencing renewals or changes to required policies of insurance at least fifteen (15) days prior to the expiration of previously provided certificates.

5. Agent Acting as Authorized Representative

Each and every agent acting as Authorized Representative on behalf of a company affording coverage under this contract shall warrant when signing the Accord Certificate of Insurance that specific authorization has been granted by

the Companies for the Agent to bind coverage as required and to execute the Acord Certificates of Insurance as evidence of such coverage. City of Atlanta coverage requirements may be broader than the original policies; these requirements have been conveyed to the Companies for these terms and conditions.

In addition, each and every agent shall warrant when signing the Acord Certificate of Insurance that the Agent is licensed to do business in the State of Georgia and that the Company or Companies are currently in good standing in the State of Georgia.

6. Certificate Holder

The **City of Atlanta** must be named as certificate holder. All notices must be mailed to the attention of **Enterprise Risk Management** at **68 Mitchell Street, Suite, 9100, Atlanta, Georgia 30303.**

7. Project Number & Name

The project number and name must be referenced in the description section of the insurance certificate.

8. Additional Insured Endorsements Form CG 20 26 07 04 or equivalent

The City must be covered as Additional Insured under all insurance (except worker's compensation and professional liability) required by this Appendix B and such insurance must be primary with respect to the Additional Insured. **Contractor/Consultant must submit to City an Additional Insured Endorsement evidencing City's rights as an Additional Insured for each policy of insurance under which it is required to be an additional insured pursuant to this Appendix B. Endorsement must not exclude the Additional Insured from Products - Completed Operations coverage. The City shall not have liability for any premiums charged for such coverage.**

9. Mandatory Sub-Contractor/Consultant Compliance

Contractor/Consultant must require and ensure that all subContractor/Consultants/subconsultants at all tiers to be sufficiently insured/bonded based on the scope of work performed under this agreement.

10. Self Insured Retentions, Deductibles or Similar Obligations

Any self insured retention, deductible or similar obligation will be the sole responsibility of the contractor.

A. Workers' Compensation and Employer's Liability Insurance

Contractor/Consultant must procure and maintain Workers' Compensation and Employer's Liability Insurance in the following limits to cover each employee who is or may be engaged in work under the agreement. :

Workers' Compensation. . . . . **Statutory**
Employer's Liability:
Bodily Injury by Accident/Disease **$1,000,000 each accident**
Bodily Injury by Accident/Disease **$1,000,000 each employee**
Bodily Injury by Accident/Disease **$1,000,000 policy limit**

B. Commercial General Liability Insurance

Contractor/Consultant must procure and maintain Commercial General Liability Insurance on form (CG 00 00 01 or equivalent) in an amount not less than **$1,000,000 per occurrence subject to a $2,000,000 aggregate**. The following indicated extensions of coverage must be provided:

- ☒ Contractual Liability
- ☒ Broad Form Property Damage
- ☒ Premises Operations
- ☒ Personal Injury
- ☒ Advertising Injury
- ☒ Fire Legal Liability
- ☒ Medical Expense
- ☒ Independent Contractor/Consultants/SubContractor/Consultants
- ☒ Products – Completed Operations
- ☒ Additional Insured Endorsement* (primary& non-contributing in favor of the City of Atlanta)
- ☒ Waiver of Subrogation in favor of the City of Atlanta

C. Commercial Automobile Liability Insurance

Contractor/Consultant must procure and maintain Automobile Liability Insurance in an amount not less than **$1,000,000** Bodily Injury and Property Damage combined single limit. The following indicated extensions of coverage must be provided:

- ☒ Owned, Non-owned & Hired Vehicles
- ☒ Waiver of Subrogation in favor of the City of Atlanta

If Contractor/Consultant does not own any automobiles in the corporate name, non-owned vehicle coverage will apply and must be endorsed on either Contractor/Consultant's personal automobile policy or the Commercial General Liability coverage required under this Appendix B.

D. Excess or Umbrella Liability Insurance

Contractor/Consultant shall procure and maintain a policy providing Excess or Umbrella Liability Insurance which is at least as broad as the underlying policy. This insurance, which shall be maintained throughout the life of the contract, shall be in an amount of not less than **$3,000,000 per occurrence**.

☒ Coverage must follow form with primary policy
☒ May be used to achieve minimum liability limits
☒ Coverage must be as broad as primary policy

E. Property Coverage/Inland Marine

Contractor/Consultant shall procure and maintain all risk property coverage in an amount equal to replacement value for all equipment, furniture, fixtures, machinery and/ or personal property.

F. Performance Bond and Payment Bond

Contractor/Consultant shall furnish a Payment Bond and a Performance Bond to the City in an amount equal to **100 percent of the total contract value** and for the duration of the entire term.

The person executing the Bonds on behalf of the surety shall file with the Bonds a general power of attorney unlimited as to amount and type of bonds covered by such power of attorney, and certified by an official of said surety. **Be a U.S. Treasury Circular 570 listed company.**

PART 5

STANDARD FORM OF AGREEMENT

STANDARD FORM OF AGREEMENT BETWEEN OWNER AND DESIGN-BUILDER - LUMP SUM

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Standard Form of Agreement Between Owner and Design-Builder - Lump Sum

This document has important legal consequences. Consultation with an attorney is recommended with respect to its completion or modification.

This **AGREEMENT** is made as of the _____ day of _____in the year of 20__, by and between the following parties, for services in connection with the Project identified below.

OWNER: THE CITY OF ATLANTA
(Name and address)

City of Atlanta Department of Watershed Management
72 Marietta Street
Atlanta, GA. 30303

DESIGN-BUILDER:

PROJECT: FC-XXX Boone Boulevard Green Infrastructure & Capacity Relief Project

In consideration of the mutual covenants and obligations contained herein, Owner and Design-Builder agree as set forth herein.

Article 1

Scope of Work

1.1 Design-Builder shall perform all design and construction services, and provide all material, equipment, tools and labor, necessary to complete the Work described in and reasonably inferable from the Contract Documents.

Article 2

Contract Documents

2.1 The Contract Documents are comprised of the following:

2.1.1 All written modifications, amendments, and Change Orders to this Agreement issued in accordance with the Standard Form General Conditions of Contract ("General Conditions of Contract");

2.1.2 The Basis of Design Documents, including the Owner's Project Criteria, Design-Builder's Proposal and the Deviation List, if any, contained in the Design-Builder's Proposal, which shall specifically identify any and all deviations from Owner's Project Criteria;

2.1.3 This Agreement, including all exhibits, appendices, and attachments, executed by Owner and Design-Builder:

2.1.4 General Conditions of Contract;

2.1.5 Special Conditions of Contract;

2.1.6 Construction Documents prepared and approved in accordance with Section 2.4 of the General Conditions of Contract;

2.1.7 Miscellaneous documents prepared and approved by Owner as required submittals for RFP; and

2.1.8 Legislation authorizing Contract between Owner and Design-Builder.

2.2 **Completeness of Documents.** The Design Builder's signature of the Agreement is a representation to Owner that Design Builder has visited the site where the Work will be performed, become familiar with the local conditions under which the Work is to be performed, and has correlated personal observations with the requirements of the Contract Documents. Except for any error, inconsistencies, conflicts, or omissions reported to Owner by Design-Builder as set forth in Article 3 herein, by signing the Agreement the Design-Builder represents that it has analyzed the Contract Documents and that they are sufficiently complete and detailed for the Work required herein and are consistent with the best practices in the construction and design industries.

Article 3

Interpretation and Intent

3.1 Omitted.

3.2 The Contract Documents are intended to permit the parties to complete the Work and all obligations required by the Contract Documents within the Contract Time(s) for the Contract Price. The Contract Documents are intended to be complementary and interpreted in harmony so as to avoid conflict, with words and phrases interpreted in a manner consistent with construction and design industry standards. In the event of any inconsistency, conflict, or ambiguity between or among the Contract Documents, or between the Contract Documents and applicable standards or Legal Requirements, the Design-Builder shall 1) provide the better quality or greater quantity of Work and 2) comply with the more stringent requirement unless directed otherwise in writing by the City. Design-Builder shall take field measurements and verify existing field conditions prior to ordering materials or performing any Work and shall be responsible for the correctness of such measurements. Design-Builder shall not be entitled to any additional compensation or an extension of the Contract Time(s) arising from its failure to verify existing field conditions.

3.3 Terms, words and phrases used in the Contract Documents, including this Agreement, shall have the meanings given them in the General Conditions of Contract.

3.4 Omitted.

3.5 The Contract Documents form the entire agreement between Owner and Design-Builder and by incorporation herein are as fully binding on the parties as if repeated herein. No oral representations or other agreements have been made by the parties except as specifically stated in the Contract Documents.

Article 4

Ownership of Work Product

4.1 **Work Product.** All drawings, specifications and other documents and electronic data, including such documents identified in the General Conditions of Contract, furnished by Design-Builder to Owner under this Agreement ("Work Product") are deemed to be the property of the City upon payment therefore. The City shall retain the ownership and intellectual property interests of the Work Product, including copyright interests associated with the Work Product.

4.2 **Non-Disclosure Requirements.** Due to the sensitive nature of the Project, Design-Builder acknowledges and agrees that it must implement and maintain adequate safeguards to reduce unnecessary distribution of drawings, specifications, and other documents, as well as electronic data generated or received by Design-Builder under this Agreement or relating to the Project ("Materials"). Design-Builder shall limit the distribution of Materials to those third parties involved in the design, pricing, permitting, or construction of the Project. The Design-Builder shall incorporate the non-disclosure requirements of this Article 4.2 in all of its subcontracts and sub-consultant agreements.

4.3 Omitted.

4.4 Omitted.

4.5 Omitted.

Article 5

Contract Time

5.1 **Date of Commencement.** The Work shall commence within five (5) days of Design-Builder's receipt of Owner's Notice to Proceed ("Date of Commencement") unless a different time is required in the Owner's Notice to Proceed.

5.2 **Substantial Completion and Final Completion.**

5.2.1 Substantial Completion of the entire Work shall be achieved no later than Two Hundred Seventy (270) calendar days after the Date of Commencement ("Scheduled Substantial Completion Date").

5.2.2 Interim milestones and/or Substantial Completion of identified portions of the Work ("Scheduled Interim Milestone Dates"), if any, shall be achieved as set forth in Owner's Project Criteria, the other Contract Documents, or as follows: Design-Builder must meet Substantial Completion no later than June 1, 2017.

5.2.3 Final Completion is the date when all Work is complete pursuant to the definition of Final Completion set forth in Section 1.2.7 of the General Conditions of Contract.

5.2.4 All of the dates set forth in this Article 5 (collectively the "Contract Time(s)") shall be subject to adjustment in accordance with the General Conditions of Contract.

5.3 **Time is of the Essence.** Owner and Design-Builder mutually agree that time is of the essence with respect to the dates and times set forth in the Contract Documents.

5.4 **Liquidated Damages.** Design-Builder understands that if Substantial Completion is not attained by the Scheduled Substantial Completion Date, Owner will suffer damages which are difficult to determine and accurately specify. Design-Builder agrees that if Substantial Completion is not attained by Zero (0) days of Substantial Completion Date, (the "LD Date"), Designer-Builder shall pay Owner One Thousand Dollars ($1,000.00), as liquidated damages for each calendar day that Substantial Completion extends beyond the LD Date.

5.5 Design-Builder understands that if Final Completion is not achieved within Thirty (30) days of the Substantial Completion Date, Owner will suffer damages which are difficult to determine and accurately specify. Design-Builder agrees that if Final Completion is not achieved within Thirty (30) days of Substantial Completion, Design-Builder shall pay to Owner Five Hundred ($500.00), as liquidated damages for each calendar day that Final Completion is delayed beyond the above-referenced number of days.

5.6 The Liquidated Damages set forth in Articles 5.4 and 5.5 are hereby agreed upon as fixed liquidated damages due the City for Design-Builder's failure to complete the Work within the Contract Time(s). Design-Builder and its surety shall be liable for any liquidated damages in excess of the amount due Design-Builder.

5.6.1 If the Design-Builder's schedule projects an untimely completion with unexcused delay and the City in good faith believes that retainage will be insufficient to cover the City's damages, Design-Builder agrees that the City may withhold additional funds to assure the payment of the liquidated damages owed by Design-Builder.

5.6.2 The fixed liquidated damages are not established as a penalty but are calculated and agreed upon in advance by the City and Design-Builder due to the uncertainty and impossibility of making a determination as to the actual direct, incidental and consequential damages which are incurred by the City as a result of the failure on the part of Design-Builder to complete the Work within the Contract Time(s) specified in the Contract Documents. Liquidated Damages as they accrue may be deducted from periodic partial payments to the extent they are sufficient to cover the liquidated damages owing the City; provided that any excess liquidated damages owing over the periodic partial payment amount may be deducted from retainage. Such deduction shall be in addition to the retainage provided for in the Contract Documents. The remaining amount of liquidated damages owing upon completion will be deducted from any amounts owing as Final Payment to Design-Builder or its surety. Any excess amount owing to the City as liquidated damages shall be paid upon demand by Design-Builder or its surety.

5.7 Omitted.

Article 6

Contract Price

6.1 **Contract Price.** Owner shall pay Design-Builder in accordance with Article 6 of the General Conditions of Contract the sum of _____ ($_____)

("Contract Price"), subject to adjustments made in accordance with the General Conditions of Contract. Unless otherwise provided in the Contract Documents, the Contract Price is deemed to include all sales, use, consumer and other taxes mandated by applicable Legal Requirements.

6.2 Markups for Changes. If the Contract Price requires an adjustment due to changes in the Work, and the cost of such changes is determined under Sections 9.4.1.3 or 9.4.1.4 of the General Conditions of Contract, the following markups shall be allowed on such changes:

6.2.1 For additive Change Orders, including additive Change Orders arising from both additive and deductive items, it is agreed that Design-Builder shall receive a Fee of Five percent (5%) of the additional costs incurred for that Change Order.

6.2.2 For deductive Change Orders, including deductive Change Orders arising from both additive and deductive items, the deductive amounts shall include:

An amount equal to the sum of Five percent (5%) applied to the direct costs of the net reduction (which amount will account for a reduction associated with Design-Builder's Fee).

6.3 Allowance Items and Allowance Values.

6.3.1 Any and all Allowance Items, as well as their corresponding Allowance Values, are set forth in the Owner's Project Criteria, other Contract Documents, or attached as an Exhibit or Appendix hereto.

6.3.2 Omitted.

6.3.3 No work shall be performed on any Allowance Item without Design-Builder first obtaining a written Work Authorization or Change Directive to proceed from Owner.

6.3.4 The Allowance Value for an Allowance Item includes the direct cost of labor, materials, equipment, transportation, taxes and insurance associated with the applicable Allowance Item. All other costs, including design fees, Design-Builder's overall project management and general conditions costs, overhead and fee, are deemed to be included in the original Contract Price, and are not subject to adjustment, regardless of the actual amount of the Allowance Item.

6.3.5 Whenever the actual costs for an Allowance Item is more than or less than the stated Allowance Value, the Contract Price shall be adjusted accordingly by Change Order, subject to Section 6.3.4. The amount of the Change Order shall reflect the difference between actual costs incurred by Design-Builder for the particular Allowance Item and the Allowance Value.

6.4 Performance Incentives.

6.4.1 Owner and Design-Builder have agreed to the performance incentive arrangements set forth in Exhibit _____. N/A

Article 7

Procedure for Payment

7.1 Progress Payments.

7.1.1 Design-Builder shall submit to Owner on the Fifteenth (15th) day of each month, beginning with the first month after the Date of Commencement, Design-Builder's Application for Payment in accordance with Article 6 of the General Conditions of Contract.

7.1.2 Owner shall make payment within forty-five days after Owner's receipt and approval of each properly submitted and accurate Application for Payment in accordance with Article 6 of the General

Conditions of Contract, but in each case less the total of payments previously made, and less amounts properly withheld under Section 6.3 of the General Conditions of Contract.

7.1.3 Design-Builder acknowledges and agrees that all payments related to this Agreement are subject to the limitations set forth in Article 6.3 of the General Conditions.

7.2 Retainage on Progress Payments.

7.2.1 Owner will retain ten percent (10%) of each Application for Payment as retainage provided, however, that when fifty percent (50%) of the Work has been satisfactorily completed by Design-Builder and Design-Builder is otherwise in compliance with its contractual obligations, Owner may, in the Owner's sole discretion, reduce retainage to five percent (5%).

7.2.2 Within thirty (30) days after Substantial Completion of the entire Work or, if applicable, any portion of the Work, pursuant to Section 6.6 of the General Conditions of Contract, Owner shall release to Design-Builder all retained amounts relating, as applicable, to the entire Work or completed portion of the Work, less an amount equal to (a) the reasonable value of all remaining or incomplete items of Work as noted in the Certificate of Substantial Completion and (b) all other amounts Owner is entitled to withhold pursuant to Section 6.3 of the General Conditions of Contract.

7.3 Final Payment. Design-Builder shall submit its Final Application for Payment to Owner in accordance with Section 6.7 of the General Conditions of Contract. Owner shall make payment on Design-Builder's properly submitted and accurate Final Application for Payment within sixty (60) days after Owner's receipt and approval of the Final Application for Payment, provided that Design-Builder has satisfied the requirements for final payment set forth in Section 6.7.2 of the General Conditions of Contract.

7.4 The Contract Documents completely supersede the Georgia Prompt Pay Act as it relates to Owner payments and any modifications or successors to the Georgia Prompt Pay Act to the fullest extent allowed by law. Design-Builder acknowledges and agrees that payment shall be in accordance with the provisions of this Agreement and expressly waives its right to assert entitlement under O.C.G.A. § 13-1-11, *et. seq.* to the fullest extent permitted by law. Should the City fail to issue payment for undisputed amounts within ninety (90) days of approval, annual interest on the payment amount may accrue at the Prime Rate, plus one percent (1%). The Prime Rate shall be based on that published in the *Wall Street Journal* on the first business day of January or June, whichever has most recently passed of the current year.

7.5 Record Keeping and Finance Controls. With respect to changes in the Work performed on a cost basis by Design-Builder pursuant to the Contract Documents, Design-Builder shall keep full and detailed accounts and exercise such controls as may be necessary for proper financial management, using accounting and control systems in accordance with generally accepted accounting principles and as may be provided in the Contract Documents. During the performance of the Work and for a period of three (3) years after Final Payment, Owner and Owner's accountants shall be afforded access to, and the right to audit from time-to-time, upon reasonable notice, Design-Builder's records, books, correspondence, receipts, subcontracts, purchase orders, vouchers, memoranda and other data relating to Work performed on a cost basis in accordance with the Contract Documents, all of which Design-Builder shall preserve for a period of three (3) years after Final Payment. Such inspection shall take place at Design-Builder's offices during normal business hours unless another location and time is agreed to by the parties.

Article 8

Termination for Convenience

8.1 The City shall have the right to terminate this Agreement without cause upon seven (7) calendar days' written notice to Design-Builder. In the event of such termination for the City's convenience, Design-Builder's recovery against Owner shall be limited to Work performed through the date of termination, calculated on a

percent complete basis, together with any retainage withheld, as well as Design Builder's reasonable demobilization costs, if applicable. Design-Builder shall not be entitled to any other or further recovery against Owner, including, but not limited to, anticipated profit on work not performed. In no event shall Design-Builder be entitled to a "cost-plus" recovery from Owner.

Article 9

Representatives of the Parties

9.1 Owner's Representatives.

9.1.1 Owner designates the individual(s) listed below as the City's Representative(s) with authority to administer the Agreement as set forth in Section 3.4 of the General Conditions: *(Identify individual's name, title, address and telephone numbers)*

Deputy Commissioner
City of Atlanta, Department of Watershed Management
72 Marietta St NW, Atlanta, GA 30303
w/ a copy to the Project Manager (to be designated prior to the Date of Commencement)
404-546-3261

9.2 Design-Builder's Representatives.

9.2.1 Design-Builder designates the individual(s) listed below as Design-Builder's Representative(s), which have the authority and responsibility set forth in Article 2 of the General Conditions: *(Identify individual's name, title, address and telephone numbers)*

Name:
Title:
Address:
Phone:
Email:

9.2.2 Omitted

Article 10

Bonds and Insurance

10.1 Design-Builder shall procure the insurance and bonding required by Appendix B to this Agreement.

Article 11

Other Provisions

11.1 Ethics and Gratuities.

11.1.1 Gratuities and Kickbacks. In accordance with the City of Atlanta's Code of Ordinances, Section 2-1484, as may be amended, it shall be unethical for any person to offer, give or agree to give any employee or former employee or for any employee or former employee to solicit, demand, accept or agree to

accept from another person a gratuity or an offer of employment in connection with any decision, approval, disapproval, recommendation, preparation or any part of a program requirement or a purchase request, influencing the content of any specification or procurement standard, rendering of advice, investigation, auditing or in any other advisory capacity in any proceeding or application, request for ruling, determination, claim or controversy or other particular matter pertaining to any program requirement or a contract or subcontract or to any solicitation or proposal therefor. Additionally, it shall be unethical for any payment, gratuity or offer of employment to be made by or on behalf of a subcontractor under a contract to the prime Design-Builder or higher tier subcontractor or any person associated therewith as an inducement for the award of a subcontract or order.

11.1.2 Fraud and misrepresentations. Any written or oral information provided by Design-Builder directly or indirectly related to the performance of the Work required by this Agreement constitutes material representations upon which the City relies for the requirements of the Agreement and compliance with local, state and federal rules and regulations. Design-Builder agrees to immediately notify the City of any information provided to the City that it knows and/or believes to be false and/or erroneous and immediately provide correct information to the City and take corrective action. Design-Builder further agrees to immediately notify the City of any actions or information that it believes would constitute fraud or intentional misrepresentations to the City in the performance of this Agreement, whether or not such information actually constitutes fraud and/or intentional misrepresentations, by contacting the **Integrity Line 1-800-884-0911**. Design-Builder agrees to place signage provided by the City regarding the Integrity Line at the location to which Design-Builder's employees report to perform the Work required by this Agreement. Design-Builder acknowledges and agrees that a finding of fraud or other impropriety on the part of the Design-Builder or any of its subcontractors may result in suspension or debarment; and the City may pursue any other actions or remedies that the City may deem appropriate. Design-Builder agrees to include this clause in its subcontracts and contracts with its Design Consultants and take appropriate measures to ensure compliance with this provision.

11.1.3 Contingency Fees. The Design-Builder warrants that it has not employed or retained any company or person, other than a bona fide employee working for the Design-Builder, to solicit or secure this contract or purchase order; and that the Design-Builder has not paid or agreed to pay any person, company, association, corporation, individual or firm, other than a bona fide employee working for the Design-Builder, any fee, commission, percentage, gift or any other consideration contingent upon or resulting from the award or making of this agreement. For the breach or violation of the above warranty, and upon a finding after notice and hearing, the City shall have the right to terminate the Agreement or purchase order without liability, and, at its discretion, to deduct from the Contract Price or purchase order price, or otherwise recover the full amount of such fee, commission, percentage, gift or consideration.

11.2 Equal Employment Opportunity.

During the performance of this agreement, Design-Builder agrees as follows:

(a) The Design-Builder shall not discriminate against any employee, or applicant for employment, because of race, color, creed, religion, sex, domestic relationship status, parental status, familial status, sexual orientation, national origin, gender identity, age, disability, or political affiliation. As used here, the words "shall not discriminate" shall mean and include without limitation the following:

Recruited, whether by advertising or other means; compensated, whether in the form of rates of pay, or other forms of compensation; selected for training, including apprenticeship; promoted; upgraded; demoted; downgraded; transferred; laid off; and terminated.

The Design-Builder agrees to and shall post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officers setting forth the provisions of the EEO clause.

(b) The Design-Builder shall, in all solicitations or advertisements for employees, placed by or on behalf of the Design-Builder, state that all qualified applicants will receive consideration for employment without regard to

race, color, creed, religion, sex, domestic relationship status, parental status, familial status, sexual orientation, national origin, gender identity, age, disability, or political affiliation.

(c) The Design-Builder shall send to each labor union or representative of workers with which the Design-Builder may have a collective bargaining agreement or other contract or understanding a notice advising the labor union or workers' representative of the Design-Builder's commitments under the equal employment opportunity program of the City of Atlanta and under the Code of Ordinances and shall post copies of the notice in conspicuous places available to employees and applicants for employment. The Design-Builder shall register all workers in the skilled trades who are below the journeyman level with the U.S. Bureau of Apprenticeship and Training.

(d) The Design-Builder shall furnish all information and reports required by the contract compliance officer pursuant to the Code of Ordinances, and shall permit access to the books, records, and accounts of the Design-Builder during normal business hours by the contract compliance officer for the purpose of investigation so as to ascertain compliance with the program.

(e) The Design-Builder shall take such action with respect to any subcontractor as the city may direct as a means of enforcing the provisions of paragraphs (a) through (h) herein, including penalties and sanctions for noncompliance; provided, however, that in the event the Design-Builder becomes involved in or is threatened with litigation as a result of such direction by the city, the city will enter into such litigation as is necessary to protect the interest of the city and to effectuate the equal employment opportunity program of the city; and, in the case of contracts receiving federal assistance, the Design-Builder or the city may request the United States to enter into such litigation to protect the interests of the United States.

(f) The Design-Builder and its subcontractors, if any, shall file compliance reports at reasonable times and intervals with the city in the form and to the extent prescribed by the contract compliance officer. Compliance reports filed at such times directed shall contain information as to employment practices, policies, programs and statistics of the Design-Builder and its subcontractors.

(g) The Design-Builder shall include the provisions of paragraphs (a) through (h) of this equal employment opportunity clause in every subcontract or purchase order so that such provisions will be binding upon each subcontractor or vendor.

(h) A finding, as hereinafter provided, that a refusal by the Design-Builder or subcontractor to comply with any portion of this program, as herein provided and described, may subject the offending party to any or all of the following penalties:

(1) Withholding from the Design-Builder in violation all future payments under the involved contract until it is determined that the Design-Builder or subcontractor is in compliance with the provisions of the contract;

(2) Refusal of all future bids for any contract with the City of Atlanta or any of its departments or divisions until such time as the Design-Builder or subcontractor demonstrates that there has been established and there shall be carried out all of the provisions of the program as provided in the Code of Ordinances;

(3) Cancellation of the public contract;

(4) In a case in which there is substantial or material violation of the compliance procedure herein set forth or as may be provided for by the contract, appropriate proceedings may be brought to enforce those provisions, including the enjoining, within applicable law, of Design-Builders, subcontractors or other organizations, individuals or groups who prevent or seek to prevent directly or indirectly compliance with the policy as herein provided.

[Signatures on the following page.]

OWNER:

CITY OF ATLANTA

By:_____
Mayor

ATTEST:

_____
Municipal Clerk (SEAL)

RECOMMENDED:

_____
Commissioner, Department of Watershed Management

APPROVED:

_____
Chief Procurement Officer

APPROVED AS TO FORM:

_____
City Attorney

DESIGN-BUILDER: [IF JOINT VENTURE] [INSERT NAME OF JV]

By: [INSERT NAME OF JV PARTNER]

By:_____

Name (print):_____

Title:_____

Attest:

_____(seal)
Corporate Secretary

By: [INSERT NAME OF JV PARTNER]

By:_____

Name (print):_____

Title:_____

Attest:

_____(seal)
Corporate Secretary

[INSERT ALTERNATIVE SIGNATURE BLOCKS FOR DESIGN-BUILDER FOR APPROPRIATE CORPORATE STRUCTURE]

FOR A SINGLE CORPORATION

CITY OF ATLANTA

By:_____
Mayor

ATTEST:

_____
Municipal Clerk (SEAL)

RECOMMENDED:

_____
Commissioner, Department of
Watershed Management

APPROVED:

_____
Chief Procurement Officer

APPROVED AS TO FORM:

_____
City Attorney

DESIGN-BUILDER

By: [INSERT NAME OF CORPORATION]

By:_____

Name (print):_____

Title:_____

Attest:

_____(seal)
Corporate Secretary

FOR A LIMITED LIABILITY CORPORATION (LLC)

CITY OF ATLANTA

By:_____
Mayor

ATTEST:

_____
Municipal Clerk (SEAL)

RECOMMENDED:

_____
Commissioner, Department of
Watershed Management

APPROVED:

_____
Chief Procurement Officer

APPROVED AS TO FORM:

_____
City Attorney

DESIGN-BUILDER

By: [INSERT NAME OF LLC]
ITS: MANAGING MEMBER

By:_____

Name (print):_____

Title:_____

NOTARY PUBLIC

_____**(SEAL)**

MY COMMISSION EXPIRES:

EXHIBITS

EXHIBIT A

STANDARD FORM OF GENERAL CONDITIONS

STANDARD FORM OF GENERAL CONDITIONS OF CONTRACT BETWEEN OWNER AND DESIGN-BUILDER

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Article 1

General

1.1 Mutual Obligations

1.1.1 *Owner and Design-Builder* commit at all times to cooperate fully with each other, and proceed on the basis of trust and good faith, to permit each party to realize the benefits afforded under the Contract Documents.

1.2 Basic Definitions

1.2.1 *Agreement or Contract* refers to the executed contract between Owner and Design-Builder.

1.2.2 *Basis of Design Documents* are as follows: For these General Conditions, the Basis of Design Documents are the Owner's Project Criteria, Design-Builder's Proposal and the Deviation List, if any.

1.2.2.1 *Change* means any change in the Work authorized by the City in writing, including Field Changes, Change Directives, Work Authorizations, or Change Orders.

1.2.2.2 *Change Directive* means a written order prepared by the City and signed by the City directing a Change in the Work prior to or absent an agreement on adjustment, if any, in the Agreement Price or Agreement Time, or both.

1.2.2.3 *Change Order* means a written agreement signed by the Owner and Design-Builder establishing their written agreement upon all of the following: (1) the change in the Work that includes the addition or reduction of Work; (2) the amount of the adjustment, if any, in the Contract Price; and (3) the extent of adjustment, if any, in the Contract Time(s). A Change Order does not include a Field Change, Work Authorization, or Change Directive.

1.2.2.4 *City* refers to the City of Atlanta, State of Georgia in the United States of America.

1.2.2.5 *City Representative* has the meaning set forth in Section 3.4.

1.2.2.6 *Confidential Information* means information concerning the City which is not generally known to the public and is not subject to public disclosure through the Georgia Open Records Act.

1.2.3 *Construction Documents* are the documents, consisting of Drawings and Specifications, to be prepared or assembled by the Design-Builder consistent with the Basis of Design Documents unless a deviation from the Basis of Design Documents is specifically set forth in a Change Order executed by both the Owner and Design-Builder, as part of the design review process contemplated by Section 2.4 of these General Conditions of Contract.

1.2.4 *Day* or *Days* shall mean calendar days unless otherwise specifically noted in the Contract Documents.

1.2.5 *Design-Build Team* is comprised of the Design-Builder, the Design Consultant, and key Subcontractors identified by the Design-Builder.

1.2.6 *Design Consultant* is a qualified, licensed design professional who is not an employee of Design-Builder, but is retained by Design-Builder, or employed or retained by anyone under contract with Design-Builder, to furnish design services required under the Contract Documents. A Design Sub-Consultant is a qualified, licensed design professional who is not an employee of the Design Consultant, but is retained by the Design Consultant or employed or retained by

anyone under contract to Design Consultant, to furnish design services required under the Contract Documents.

1.2.6.1 *Field Change* means a Change in the Work that that does not require an adjustment in the overall Contract Price, overall Contract Time(s), established budget line items or quantities, or use of allowance items or contingency funds, which is required as a result of field conditions that require such adjustments. A Field Change does not include a Work Authorization, a Change Order or a Change Directive and must be agreed upon in writing and executed by an authorized City representative and the Design-Builder..

1.2.7 *Final Completion* is the date on which the City has beneficial use of the Project, all Work is finally completed to the satisfaction of the City, and the City has confirmed in writing that Design-Builder has achieved Final Completion. The requirements of Final Completion shall also include but not be limited to, any items identified in the punch list prepared under Section 6.6.1 and the submission of all documents set forth in Section 6.7.2.

1.2.8 *Force Majeure Events* are those events that are beyond the control of both Design-Builder and Owner, including the events of war, floods, earthquakes, epidemics, adverse weather conditions not reasonably anticipated, and other acts of God.

1.2.9 *General Conditions of Contract* refer to these General Conditions of Contract between Owner and the Design-Builder.

1.2.10 Omitted.

1.2.11 Omitted.

1.2.12 *Hazardous Conditions* are any materials, wastes, substances and chemicals deemed to be hazardous under applicable Legal Requirements, or the handling, storage, remediation, or disposal of which are regulated by applicable Legal Requirements.

1.2.12.1 *Key Personnel* means the personnel of Design-Builder identified in Article 2.1.

1.2.12.2 *Key Subcontractors* means the Subcontractors identified in Article 2.1.

1.2.13 *Legal Requirements* are all applicable federal, state and local laws, codes, ordinances, rules, regulations, orders and decrees of any government or quasi-government entity having jurisdiction over the Project or Site, the practices involved in the Project or Site, or any Work.

1.2.13.1 *Owner* means the City of Atlanta, a municipal corporation of the State of Georgia in the United States of America.

1.2.14 *Owner's Project Criteria* are developed by or for Owner to describe Owner's program requirements and objectives for the Project, including use, space, price, time, site and expandability requirements, as well as submittal requirements and other requirements governing Design-Builder's performance of the Work. Owner's Project Criteria may include conceptual documents, design criteria, design performance specifications, design specifications, and LEED® or other sustainable design criteria and other Project-specific technical materials and requirements. The Owner's Project Criteria may also include the scope of work and Specifications, the drawings and reports, special conditions, appendices to the Agreement, and the other requirements of the Contract Documents.

1.2.15 *Site* is the land or premises on which the Project is located.

1.2.16 *Subcontractor* is any person or entity retained by Design-Builder as an independent contractor to perform a portion of the Work and shall include materialmen and suppliers.

1.2.17 *Sub-Subcontractor* is any person or entity retained by a Subcontractor as an independent contractor to perform any portion of a Subcontractor's Work and shall include materialmen and suppliers.

1.2.18 *Substantial Completion* or *Substantially Complete* means the date on which the Work is sufficiently complete in accordance with the Contract Documents so that Owner (i) can occupy and has use of the Project for its intended purposes, (ii) the Design Builder has fulfilled all requirements for Substantial Completion set forth in Article 6,, and (iii) the City's authorized representative has confirmed in writing that the Project has achieved Substantial Completion.

1.2.19 *Work* is comprised of all Design-Builder's design, construction and other services required by the Contract Documents, including procuring and furnishing all materials, equipment, services and labor reasonably inferable from the Contract Documents.

1.2.20 *Work Authorization* means a written order executed by the City and Design-Builder, which authorizes utilization of an allowance or contingency item, as may be permitted and defined by the Contract Documents. Work Authorization(s) are used to document a Change in the Work that adds, changes or removes scope of work from the Contract but does not change the Contract Time(s) or the Contract Price. A Work Authorization does not include a Change Order, a Field Change or a Change Directive.

1.2.21 *Work Product* has the meaning set forth in Article 4 of the Agreement.

Article 2

Design-Builder's Services and Responsibilities

2.1 General Services.

2.1.1 Design-Builder's Representative shall be reasonably available to Owner and shall have the necessary expertise and experience required to supervise the Work. Design-Builder's Representative shall communicate regularly with Owner and shall be vested with the authority to act on behalf of Design-Builder. Design-Builder's Representative may be replaced only with the mutual agreement of Owner and Design-Builder. The following persons are identified by the Design-Builder as its key personnel that will provide the Work required by the Contract Documents (Proponents may provide documentation with equivalent information to augment forms.):

2.1.1.1 Key Personnel:
a. Project Manager
b. Superintendent
c. Project Designer Manager
d. Project Safety Manager
e. Project QA/QC Manager

2.1.1.2 Key Subcontractors:
a. Design Consultant
b. Any Subcontractors performing Work for Key Personnel positions
c.

2.1.1.3 Design-Builder shall not transfer, reassign or replace Key Personnel and/or Key

Subcontractors identified in Articles 2.1.1.1 and 2.1.1.2, except as the result of retirement, voluntary resignation, involuntary termination for cause in Design-Builder's sole discretion, illness, disability, or death, during the term of this Agreement without the prior written approval from the Owner.

2.1.2 Design-Builder shall provide Owner with a monthly status report detailing the progress of the Work, including (i) whether the Work is proceeding according to schedule, (ii) whether discrepancies, conflicts, or ambiguities exist in the Contract Documents that require resolution, (iii) whether health and safety issues exist in connection with the Work;; and (iv) other items that require resolution so as not to jeopardize Design-Builder's ability to complete the Work for the Contract Price and within the Contract Time(s).

2.1.3 Unless a schedule for the execution of the Work has been attached to the Agreement as an exhibit at the time the Agreement is executed, Design-Builder shall prepare and submit, at least three (3) days prior to the meeting contemplated by Section 2.1.4 hereof, a schedule for the execution of the Work for Owner's review and response. The schedule shall indicate the dates for the start and completion of the various stages of Work, including the dates when Owner information and approvals are required to enable Design-Builder to achieve the Contract Time(s). The schedule shall be revised as required by conditions and progress of the Work, but such revisions shall not relieve Design-Builder of its obligations to complete the Work within the Contract Time(s), as such dates may be adjusted in accordance with the Contract Documents. Owner's review of, and response to, the schedule shall not be construed as relieving Design-Builder of its complete and exclusive control over the means, methods, sequences and techniques for executing the Work.

2.1.4 The parties will meet within seven (7) days after execution of the Agreement to discuss issues affecting the administration of the Work and to implement the necessary procedures, including those relating to submittals and payment, to facilitate the ability of the parties to perform their obligations under the Contract Documents.

2.2 Design Professional Services.

2.2.1 Design-Builder shall, consistent with applicable state licensing laws, provide through qualified, licensed design professionals employed by Design-Builder, or procured from qualified, independent licensed Design Consultants, the necessary design services, including architectural, engineering and other design professional services, for the preparation of the required drawings, specifications and other design submittals to permit Design-Builder to complete the Work consistent with the Contract Documents within the Contract Time(s). Nothing in the Contract Documents is intended or deemed to create any legal or contractual relationship between Owner and any Design Consultant.

2.3 Standard of Care for Design Professional Services.

2.3.1 The standard of care for all design professional services performed to execute the Work shall be the highest degree of care and skill used by members of the design profession practicing under similar conditions at the same time and locality of the Project.

2.4 Design Development Services.

2.4.1 Design-Builder and Owner shall, consistent with any applicable provision of the Contract Documents, agree upon any interim design submissions that Owner may wish to review, which interim design submissions may include design criteria, drawings, diagrams and specifications setting forth the Project requirements. Interim design submissions shall be consistent with the Basis of Design Documents, as the Basis of Design Documents may have been changed through the design process set forth in this Section 2.4.1. On or about the time of the scheduled submissions, Design-Builder and Owner shall meet and confer about the submissions, with Design-Builder identifying during such meetings, among other things, the evolution of the design

and any changes to the Basis of Design Documents, or, if applicable, previously submitted design submissions. Changes to the Basis of Design Documents shall be processed in accordance with Article 9. Minutes of the meetings, including a full listing of all Changes, will be maintained by Design-Builder and provided to all attendees for review. Following the design review meeting, Owner shall review and approve the interim design submissions and meeting minutes.

2.4.2 Design-Builder shall submit to Owner Construction Documents setting forth in detail drawings and specifications describing the requirements for construction of the Work. The Construction Documents shall be consistent with the latest set of interim design submissions, as such submissions may have been modified in a design review meeting and recorded in the meetings minutes. The parties shall have a design review meeting to discuss, and Owner shall review and approve, the Construction Documents in accordance with the procedures set forth in Section 2.4.1 above. Design-Builder shall proceed with construction in accordance with the approved Construction Documents and shall submit approved Construction Documents to Owner prior to commencement of construction and provide copies of such approved Construction Documents to Owner.

2.4.3 Owner's review and approval of interim design submissions, meeting minutes, and the Construction Documents is for the purpose of mutually establishing a conformed set of Contract Documents compatible with the requirements of the Work. Neither Owner's review nor approval of any interim design submissions, meeting minutes, and Construction Documents shall be deemed to transfer any design liability from Design-Builder to Owner.

2.4.4 To the extent not prohibited by the Contract Documents or Legal Requirements, Owner may direct Design-Builder to prepare interim design submissions and Construction Documents for a portion of the Work to permit construction to proceed on that portion of the Work prior to completion of the Construction Documents for the entire Work.

2.5 Legal Requirements.

2.5.1 Design-Builder shall perform the Work in accordance with all Legal Requirements and shall provide all notices applicable to the Work as required by the Legal Requirements.

2.5.2 The Contract Price and/or Contract Time(s) shall be adjusted to compensate Design-Builder for the effects of any changes in the Legal Requirements enacted after the date of the Agreement affecting the performance of the Work. Such effects may include, without limitation, revisions Design-Builder is required to make to the Construction Documents because of changes in Legal Requirements.

2.6 Government Approvals and Permits.

2.6.1 Unless otherwise directed by the Contract Documents, Design-Builder shall obtain and pay for all necessary permits, approvals, licenses, government charges and inspection fees required for the prosecution of the Work by any government or quasi-government entity having jurisdiction over the Project.

2.6.2 In the event Owner elects to obtain certain permits directly, Design-Builder shall provide reasonable assistance to Owner in obtaining those permits.

2.7 Design-Builder's Construction Phase Services.

2.7.1 Unless otherwise provided in the Contract Documents to be the responsibility of Owner or a separate contractor, Design-Builder shall provide through itself or Subcontractors the necessary supervision, labor, inspection, testing, start-up, material, equipment, machinery, temporary utilities and other temporary facilities to permit Design-Builder to complete construction of the Project consistent with the Contract Documents.

2.7.2 Design-Builder shall perform all construction activities efficiently and with the requisite expertise, skill and competence to satisfy the requirements of the Contract Documents. Design-Builder shall at all times exercise complete and exclusive control over the means, methods, sequences and techniques of construction.

2.7.3 Design-Builder shall employ only Subcontractors who are duly licensed and qualified to perform the Work consistent with the Contract Documents. Owner may reasonably object to Design-Builder's selection of any Subcontractor.

2.7.4 Design-Builder assumes responsibility to Owner for the proper performance of the Work of Subcontractors and any acts and omissions in connection with such performance. Nothing in the Contract Documents is intended or deemed to create any legal or contractual relationship between Owner and any Subcontractor or Sub-Subcontractor, including but not limited to any third-party beneficiary rights.

2.7.5 Design-Builder shall coordinate the activities of all Subcontractors. If Owner performs other work on the Project or at the Site with separate contractors under Owner's control, Design-Builder agrees to reasonably cooperate and coordinate its activities with those of such separate contractors so that the Project can be completed in an orderly and coordinated manner without unreasonable disruption.

2.7.6 Design-Builder shall keep the Site reasonably free from debris, trash and construction wastes to permit Design-Builder to perform its construction services efficiently, safely and without interfering with the use of adjacent land areas. Upon Substantial Completion of the Work, or a portion of the Work, Design-Builder shall remove all debris, trash, construction wastes, materials, equipment, machinery and tools arising from the Work or applicable portions thereof to permit Owner to occupy the Project or a portion of the Project for its intended use.

2.8 Design-Builder's Responsibility for Project Safety.

2.8.1 Design-Builder recognizes the importance of performing the Work in a safe manner so as to prevent damage, injury or loss to (i) all individuals at the Site, whether working or visiting, (ii) the Work, including materials and equipment incorporated into the Work or stored on-Site or off-Site, and (iii) all other property at the Site or adjacent thereto. Design-Builder assumes responsibility for implementing and monitoring all safety precautions and programs related to the performance of the Work. Design-Builder shall, prior to commencing construction, designate a Safety Representative with the necessary qualifications and experience to supervise the implementation and monitoring of all safety precautions and programs related to the Work. Unless otherwise required by the Contract Documents, Design-Builder's Safety Representative shall be an individual stationed at the Site who may have responsibilities on the Project in addition to safety. The Safety Representative shall make routine daily inspections of the Site and shall hold weekly safety meetings with Design-Builder's personnel, Subcontractors and others as applicable.

2.8.2 Design-Builder and Subcontractors shall comply with all Legal Requirements relating to safety, as well as any Owner-specific safety requirements set forth in the Contract Documents, provided that such Owner-specific requirements do not violate any applicable Legal Requirement. Design-Builder will immediately report in writing any safety-related injury, loss, damage or accident arising from the Work to Owner's Representative and, to the extent mandated by Legal Requirements, to all government or quasi-government authorities having jurisdiction over safety-related matters involving the Project or the Work.

2.8.3 Design-Builder's responsibility for safety under this Section 2.8 is not intended in any way to relieve Subcontractors and Sub-Subcontractors of their own contractual and legal obligations and responsibility for (i) complying with all Legal Requirements, including those related to health and safety matters, and (ii) taking all necessary measures to implement and monitor all safety precautions and programs to guard against injuries, losses, damages or accidents resulting from

their performance of the Work.

2.9 Design-Builder's Warranty.

2.9.1 Design-Builder warrants to Owner that the construction, including all materials and equipment furnished as part of the construction, shall be new unless otherwise specified in the Contract Documents, of good quality, in conformance with the Contract Documents and free of defects in materials and workmanship. Design-Builder's warranty obligation excludes defects caused by abuse, alterations, or failure to maintain the Work in a commercially reasonable manner. Nothing in this warranty is intended to limit any manufacturer's warranty which provides Owner with greater warranty rights than set forth in this Section 2.9 or the Contract Documents. Design-Builder agrees to assign to the Owner at the time of Substantial Completion of the Work all manufacturer's warranties relating to the Work, and further agrees to perform the Work in such manner so as to preserve any and all such manufacturer's warranties.

2.10 Correction of Defective Work.

2.10.1 Design-Builder agrees to correct any Work that is found to not be in conformance with the Contract Documents, including that part of the Work subject to Section 2.9 hereof, within a period of one year from the date of Substantial Completion of the Work, or within such longer period to the extent required by any specific warranty included in the Contract Documents.

2.10.2 Design-Builder shall, within three (3) days of receipt of written notice from Owner that the Work is not in conformance with the Contract Documents, take meaningful steps to commence correction of such nonconforming Work, including the correction, removal or replacement of the nonconforming Work and any damage caused to other parts of the Work affected by the nonconforming Work. If Design-Builder fails to commence the necessary steps within such three (3) day period, Owner, in addition to any other remedies provided under the Contract Documents, may commence correction of such nonconforming Work with its own forces. If Owner does perform such corrective Work, Design-Builder and its surety shall be responsible for all reasonable costs incurred by Owner in performing such correction. If the nonconforming Work creates an emergency requiring an immediate response, the three (3) day period identified herein shall be deemed inapplicable.

2.10.3 The one-year period referenced in Section 2.10.1 above applies only to Design-Builder's obligation to correct nonconforming Work and is not intended to constitute a period of limitations for any other rights or remedies Owner may have regarding Design-Builder's other obligations under the Contract Documents. Additionally, the warranties set forth in this Article 2 and elsewhere in the Contract Documents shall survive Final Completion of the Work. All warranties identified in the Contract Documents are in addition to the rights, remedies, and redress that the City has at law or in equity, and none of Design-Builder's warranties shall be deemed a sole or exclusive remedy to the City.

Article 3

Owner's Services and Responsibilities

3.1 Duty to Cooperate.

3.1.1 Owner shall, throughout the performance of the Work, cooperate with Design-Builder and perform its responsibilities, obligations and services in a timely manner to facilitate Design-Builder's timely and efficient performance of the Work and so as not to delay or interfere with Design-Builder's performance of its obligations under the Contract Documents.

3.1.2 Owner shall provide timely reviews and approvals of interim design submissions and Construction Documents. Design-Builder shall provide Owner with at least fourteen (14) days for Owner's review of any such submissions and documents, unless a shorter review period is

otherwise agreed to by Owner.

3.1.3 Omitted.

3.2 Furnishing of Services and Information.

3.2.1 Omitted.

3.2.2 Omitted.

3.3 Financial Information.

3.3.1 Design-Builder acknowledges that this Agreement and any changes to it by amendment, modification, Change Order or other similar document may have required or may require the legislative authorization of the City's Council and approval of the Mayor. Under Georgia law, Design-Builder is deemed to possess knowledge concerning the City's ability to assume contractual obligations and the consequences of Design-Builder's provision of goods or services to the City under an unauthorized contract, amendment, modification, Change Order or other similar document, including the possibility that the Design-Builder may be precluded from recovering payment for such unauthorized goods or services. Accordingly, Design-Builder agrees that if it provides goods or services to the City under an agreement that has not received proper legislative authorization or if Design-Builder provides goods or services to the City in excess of the any contractually authorized goods or services, as required by the City's Charter and Code, the City may withhold payment for any unauthorized goods or services provided by Design-Builder. Design-Builder assumes all risk of non-payment for the provision of any unauthorized goods or services to the City, and it waives and releases all claims to payment or to other remedies for the provision of any unauthorized goods or services to the City, however characterized, including, without limitation, all remedies at law or equity.

3.3.2 Omitted.

3.4 Owner's Representative.

3.4.1 The City will have the authority to designate a representative (the "City Representative" or "City Engineer") who may: serve as primary interface and the single-point of communication for the provision of the Work; have day-to-day interaction with Design-Builder to address issues relating to this Agreement; and to the extent provided under the Code, have the authority to execute any additional documents or Change Orders on behalf of City. Any Work, document, or item to be submitted or prepared by Design-Builder hereunder shall be subject to the review of the City Representative. The City Representative may disapprove of any submission, if in the City Representative's reasonable opinion, the Work, document or item is not in accordance with the requirements of the Contract Documents or sound professional principles, or is impractical, uneconomical or unsuited for the purposes for which the Work, document or item is intended. If any of the said items or any portion thereof are so disapproved, Design-Builder shall revise and/or correct the Work such that it meets the approval of the City Representative at no additional cost to the City.

3.5 Government Approvals and Permits.

3.5.1 Omitted.

3.5.2 Owner may provide reasonable assistance to Design-Builder in obtaining those permits, approvals and licenses that are Design-Builder's responsibility. No action or refusal to act by the City in connection with the provision of permits, approvals, or licenses related to the Work will relieve Design-Builder from any of its obligations under the Contract Documents. The Design-

Builder acknowledges and agrees that any action or refusal to act by the City in connection with the provision of permits, approvals, or licenses related to the Work cannot serve as the basis of a claim for adjustment of the Contract Price and/or the Contract Time(s) and Design-Builder waives and releases any such claims.

3.6 Owner's Separate Contractors.

3.6.1 Owner is responsible for all work performed on the Project or at the Site by separate contractors under Owner's control. Owner shall contractually require its separate contractors to cooperate with, and coordinate their activities so as not to interfere with, Design-Builder in order to enable Design-Builder to timely complete the Work consistent with the Contract Documents.

Article 4

Hazardous Conditions and Investigation of Site Conditions

4.1 Hazardous Conditions.

4.1.1 Upon encountering any Hazardous Conditions, Design-Builder will stop Work immediately in the affected area and duly notify Owner immediately and, if required by Legal Requirements, all government or quasi-government entities with jurisdiction over the Project or Site. Design-Builder agrees to take necessary measures to ensure that the Hazardous Conditions are remediated or rendered harmless and will also take necessary measures to mitigate the Hazardous Conditions as directed by an Owner directed containment and remediation plan.

4.1.2 Omitted.

4.1.3 Omitted.

4.1.4 Subject to the limitations set forth in Article 8 of these General Conditions, Design Builder shall have the right to request an extension of the Contract Time(s) and an adjustment in the Contract Price in accordance with the requirements of Articles 9 and 10 of the General Conditions in the event that a Hazardous Condition, which was not caused by Design-Builder or anyone for whom it is responsible, impacts the critical path of Design Builder's schedule.

4.1.5 Omitted.

4.1.6 Owner is not responsible for Hazardous Conditions introduced to the Site by Design-Builder, Subcontractors or anyone for whose acts they may be liable. To the fullest extent permitted by law, Design-Builder shall indemnify, defend and hold harmless Owner and Owner's officers, directors, employees and agents from and against all claims, losses, damages, liabilities and expenses, including attorneys' fees and expenses, arising out of or resulting from those Hazardous Conditions introduced to the Site by Design-Builder, Subcontractors or anyone for whose acts they may be liable.

4.1.7 Design-Builder shall give all notices and comply with all Legal Requirements bearing on the safety of persons or property or their protection from damage, injury, or loss.

4.1.8 Design-Builder shall erect and maintain, as required by existing conditions and the progress of the Work, all reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent utilities.

4.1.9 When the use or storage of explosives or other hazardous materials or equipment is

necessary for the execution of the Work, Design-Builder shall exercise the utmost care and shall carry on such activities under the supervision of properly qualified personnel.

4.1.10 Design-Builder shall promptly remedy all damage or loss to any property caused in whole or in part by Design-Builder, any Subcontractor, any sub-tier contractor or anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable, except damage or loss attributable solely to the acts or omissions of the City or anyone directly or indirectly employed by any of them in any way, or by anyone for whose acts any of them may be liable, and not attributable to the fault or negligence of Design-Builder.

4.1.11 Design-Builder shall not load or permit any part of the Work to be loaded so as to endanger its safety.

4.1.12 In any emergency affecting the safety of persons or property, Design-Builder shall act, at Design-Builder's discretion, to prevent threatened damage, injury or loss.

4.2 Design-Builder's Investigation of Site Conditions

Design-Builder acknowledges that it has taken steps necessary to ascertain the nature and location of the Work and that it has investigated and satisfied itself as to the general and local conditions which can affect the Work and its costs. The Design-Builder also acknowledges that it has satisfied itself as to the character, quality, and quantity of surface and subsurface materials or obstacles to be encountered or difficulties or access insofar as this information is ascertainable from an inspection of the Site, and available documents, including all information from exploratory or geotechnical work done by the Owner (if any) and its design consultants (if any) as well as from the Contract Documents. The Design-Builder has the right to request permission from the City to make any additional tests necessary to assure itself that the site conditions are satisfactory for the Work contemplated by the Contract Documents. The City agrees not to unreasonably withhold permission for any additional testing requested by Design-Builder.

4.3 Design-Builder's Analysis of Owner's Project Criteria and the Contract Documents

Before presenting its proposal to the City, and continuously after the execution of the Agreement, Design-Builder shall carefully study and compare the Owner's Project Criteria and other Contract Documents and shall at once report any error, ambiguity, inconsistency or omission that may be discovered, including any requirement which may be contrary to Legal Requirements. By submitting its proposal for the Agreement and the Work under it, Design-Builder agrees that the Contract Documents, along with any supplementary written instructions issued by or through the City that have become a part of the Contract Documents, appear accurate, consistent, and complete. No claims shall be made by Design-Builder based on claims of defects, errors, omissions, ambiguities or inconsistencies in the Owner's Project Criteria or other Contract Documents which were reasonably discoverable by a review of the Contract Documents and correlation thereof with the actual conditions at the Site. No observation of the City or its representatives, and no inspections, tests or approvals shall relieve Design-Builder from its obligation to perform its obligations in accordance with the Contract Documents. The Design-Builder acknowledges that the City is relying upon the Design-Builder's expertise as a qualified design professional and contractor. Accordingly, Design-Builder represents and warrants that it has determined, by its own investigation, research, and professional judgment that all the conditions affecting the Work and materials to be furnished and by signature of this Agreement represents and warrants that it shall perform the Work in accordance with the Contract Documents within the Contract Time(s) for the Contract Price.

THE CITY, ITS AGENTS AND EMPLOYEES MAKE NO REPRESENTATION OR WARRANTY OF ANY NATURE WHATSOEVER TO DESIGN-BUILDER CONCERNING THE CONTRACT DOCUMENTS. By the execution hereof, Design-Builder further acknowledges and represents that it has received, reviewed and carefully examined the Contract Documents, has found them to be accurate, adequate, consistent, coordinated and sufficient for design and construction, and

that Design-Builder has not, does not, and will not rely upon any representations or warranties by the City concerning such documents as no such representations or warranties have been or are hereby made. Design-Builder acknowledges and agrees that its obligation to design and construct the Work in accordance with the Contract Documents is not in any way altered or affected by the observations or inspections of the City. Further, Design-Builder acknowledges and agrees that any warranty periods included herein merely set forth the time period during which Design-Builder is contractually required to specifically perform corrective work and that these warranty periods are not and shall not be construed to be exclusive remedies of the City. Instead, Design-Builder acknowledges and agrees that it shall be liable to the City for the cost of correcting Work not performed in accordance with the Contract Documents for the full period of the applicable statute of limitations.

Article 5

Insurance and Bonds

5.1 Design-Builder's Insurance Requirements.

5.1.1 Design-Builder is responsible for procuring and maintaining the insurance for the coverage amounts all as set forth in Appendix B Insurance and Bonding Requirements.

5.1.2 Design-Builder's insurance shall specifically delete any design-build or similar exclusions that could compromise coverages because of the design-build delivery of the Project.

5.1.3 Omitted.

5.1.4 Professional liability insurance required by Appendix B shall specifically delete any design-build or similar exclusions that could compromise coverages because of the design-build delivery of the Project. Such policies shall be provided prior to the commencement of any design services hereunder.

5.2 Omitted

5.3 Omitted

5.4 Bonds and Other Performance Security.

5.4.1 Design-Builder shall furnish a Performance Bond and a Labor and Material Payment Bond each in the penal amount of at least the Contract Price. The bonds must meet all applicable statutory requirements, be provided substantially in the form required by Appendix B, and must be issued by a surety that is reasonably acceptable to Owner and licensed in the State of Georgia. Design-Builder shall provide the bonds to Owner prior to commencement of Work and as a condition precedent to any payment that would otherwise be due to Design-Builder.

5.4.2 Omitted.

5.5 Insurance and Bonding Requirements are not a Limit of Design-Builder's Liability.

Design-Builder acknowledges and agrees that the insurance and bonding required by this Article 5 and other applicable Contract Documents shall not serve as a limitation of Design-Builder's liability to the City.

Article 6

Payment

6.1 Schedule of Values.

6.1.1 Unless required by the Owner upon execution of this Agreement, within ten (10) days of execution of the Agreement, Design-Builder shall submit for Owner's review and approval a schedule of values for all of the Work. The Schedule of Values will (i) subdivide the Work into its respective parts, (ii) include values for all items comprising the Work and (iii) serve as the basis for monthly progress payments made to Design-Builder throughout the Work.

6.1.2 Omitted.

6.2 Monthly Progress Payments.

6.2.1 On or before the date established in the Agreement, Design-Builder shall submit for Owner's review and approval its Application for Payment requesting payment for all Work performed as of the date of the Application for Payment. The Application for Payment shall be accompanied by all supporting documentation required by the Contract Documents and/or established at the meeting required by Section 2.1.4 hereof. The Application for Payment will be substantially in the form attached to this Agreement as Appendix C.

6.2.2 Omitted.

6.2.3 Omitted.

6.2.4 The Application for Payment shall constitute Design-Builder's representation that the Work described herein has been performed consistent with the Contract Documents, has progressed to the point indicated in the Application for Payment, and that title to all Work will pass to Owner free and clear of all claims, liens, encumbrances, and security interests upon the incorporation of the Work into the Project, or upon Design-Builder's receipt of payment, whichever occurs earlier.

6.3 Withholding of Payments.

6.3.1 The City may decline to approve payment and may withhold any payment, in whole or in part because of: (a) defective work not remedied; (b) third party claims filed or reasonable evidence indicating probable filing of such claims; (c) failure of the Design-Builder to promptly make payments to Subcontractors or its Design Consultants; (d) reasonable evidence that the Work cannot be completed for the Contract Price; (e) reasonable evidence that the Work will not be completed within the Contract Time(s); (f) failure to carry out the Work in accordance with the requirements of the Contract Documents; (g) failure to comply with the insurance and bonding requirements of the Contract Documents; (h) Design-Builder's insolvency or reasonable evidence that Design-Builder fails to pay its debts as they come due; (i) Liquidated Damages owed the City; or (j) a material failure of the Design-Builder to comply with any of the requirements of the Contract Documents.

6.3.2 Notwithstanding anything to the contrary in the Contract Documents, Owner shall pay Design-Builder all undisputed amounts in an Application for Payment within the times required by the Agreement.

6.4 Interest.

6.4.1 As set forth in Article 7 of the Agreement, this Article 6 and the other Contract Documents

completely supersede the Georgia Prompt Pay Act as it relates to Owner payments and any modifications or successors to the Georgia Prompt Pay Act to the fullest extent allowed by law. Design-Builder acknowledges and agrees that payment shall be in accordance with the provisions of the Agreement and expressly waives its right to assert entitlement under O.C.G.A. § 13-1-11, *et. seq.* to the fullest extent permitted by law. Should the City fail to issue payment for undisputed amounts within ninety (90) days of approval, annual interest on the payment amount may accrue at the Prime Rate, plus one percent (1%). The Prime Rate shall be based on that published in the *Wall Street Journal* on the first business day of January or June, whichever has most recently passed, of the current year.

6.5 Design-Builder's Payment Obligations.

6.5.1 Design-Builder will pay Design Consultants and Subcontractors, in accordance with its contractual obligations to such parties, all the amounts Design-Builder has received from Owner on account of their work. Design-Builder will impose similar requirements on Design Consultants and Subcontractors to pay those parties with whom they have contracted. Design-Builder will indemnify and defend Owner against any claims for payment and mechanic's liens as set forth in Section 7.3 hereof.

6.6 Substantial Completion.

6.6.1 Design-Builder shall notify Owner when it believes the Work, or to the extent permitted in the Contract Documents, a portion of the Work, is Substantially Complete. Within ten (10) days of Owner's receipt of Design-Builder's notice, Owner and Design-Builder will jointly inspect such Work to verify that it is Substantially Complete in accordance with the requirements of the Contract Documents. If such Work is Substantially Complete, Owner shall prepare and issue a Certificate of Substantial Completion that will set forth (i) the date of Substantial Completion of the Work or portion thereof, (ii) the remaining items of Work that have to be completed before final payment, (iii) provisions (to the extent not already provided in the Contract Documents) establishing Design-Builder's responsibility for the Project's security, maintenance, utilities and insurance pending final payment, and (iv) an acknowledgment that warranties commence to run on the date of Substantial Completion, except as may otherwise be noted in the Certificate of Substantial Completion.

6.6.2 Upon Substantial Completion of the entire Work or, if applicable, any portion of the Work, Owner shall release to Design-Builder all retained amounts relating, as applicable, to the entire Work or completed portion of the Work, less an amount equal to the reasonable value of all remaining or incomplete items of Work as noted in the Certificate of Substantial Completion.

6.6.3 Owner, at its option, may use a portion of the Work which has been determined to be Substantially Complete.

6.7 Final Payment.

6.7.1 After receipt of a Final Application for Payment from Design-Builder, Owner shall make final payment by the time required in the Agreement, provided that Design-Builder has achieved Final Completion.

6.7.2 At the time of submission of its Final Application for Payment, Design-Builder shall provide the following information to the City:

6.7.2.1 An affidavit that there are no claims, obligations or liens outstanding or unsatisfied for labor, services, material, equipment, taxes or other items performed, furnished or incurred for or in connection with the Work which will in any way affect Owner's interests;

6.7.2.2 A general release executed by Design-Builder waiving, upon receipt of final

payment by Design-Builder, all claims, except those claims previously made in writing to Owner and remaining unsettled at the time of final payment;

6.7.2.3 Consent of Design-Builder's surety, if any, to final payment;

6.7.2.4 All operating manuals, shop drawings, daily reports, warranties and other deliverables and Construction Documents required by the Contract Documents;

6.7.2.5 Certificates of insurance confirming that required coverages will remain in effect consistent with the requirements of the Contract Documents;

6.7.2.6 as-built drawings and CAD drawings of the completed Work; and

6.7.2.7 all training manuals, test reports, pre-construction and post-construction CCTVs, payroll reports, process control sheets, documentation substantiating that all defective and/or non-conforming Work has been remedied including correction of all Work identified as "MCNR" or "make corrections noted and re-submit," as well as submissions for systems and equipment, and Design-Builder has provided all required training to the Owner for competent operation and maintenance of the Work.

6.7.3 No payment(s) made, payment application(s) approved, partial use of the Work, or complete use of the Work by the City shall be deemed an acceptance of Work that does not conform to the requirements of the Contract Documents.

6.7.4 No money shall be paid by the City upon any claim, debt, demand or account whatsoever, to any person, firm, or corporation who is in arrears to the City for taxes, or any other debt or claim, and the City shall be entitled to counterclaim and/or offset any such debt, claim, demand or account in the amount of taxes so in arrears or other debts or claims of the City, and no assignment or transfer of such debt, claim, demand, or account after the said taxes are due or after any such debt or claim is asserted by the City, shall affect the right of the City to so offset the said taxes, debts, or other obligations against the same. Design-Builder agrees that the City shall be allowed to setoff and recoup any claim or demand that it may have against Design-Builder (or any of its constituent members if Design-Builder is a joint venture) whether such claim or demand is liquidated or unliquidated. Design-Builder further agrees that in the event it assigns or sells any amounts due or to become due under this Agreement, notice to the City of such assignment or sale shall not affect the City's rights of setoff or recoupment against Design-Builder for claims subsequently arising from this Agreement or any other contract with the City. Any assignee or purchaser of any amounts due Design-Builder under this Agreement shall be bound to these provisions and shall assume the risk of subsequently arising claims of setoff or recoupment.

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Article 7

Indemnification

7.1 Patent and Copyright Infringement.

7.1.1 Design-Builder shall defend any action or proceeding brought against Owner based on any claim that the Work, or any part thereof, or the operation or use of the Work or any part thereof, constitutes infringement of any United States patent or copyright, now or hereafter issued. Owner shall give prompt written notice to Design-Builder of any such action or proceeding and will reasonably provide authority, information and assistance in the defense of same. Design-Builder shall indemnify and hold harmless Owner from and against all damages and costs, including but not limited to attorneys' fees and expenses awarded against Owner or Design-Builder in any such action or proceeding. Design-Builder agrees to keep Owner informed of all developments in the defense of such actions.

7.1.2 If Owner is enjoined from the operation or use of the Work, or any part thereof, as the result of any patent or copyright suit, claim, or proceeding, Design-Builder shall at its sole expense take reasonable steps to procure the right to operate or use the Work. If Design-Builder cannot so procure such right within a reasonable time, Design-Builder shall promptly, at Design-Builder's option and at Design-Builder's expense, (i) modify the Work so as to avoid infringement of any such patent or copyright or (ii) replace said Work with Work that does not infringe or violate any such patent or copyright.

7.1.3 Sections 7.1.1 and 7.1.2 above shall not be applicable to any suit, claim or proceeding based on infringement or violation of a patent or copyright (i) relating solely to a particular process or product of a particular manufacturer specified by Owner and not offered or recommended by Design-Builder to Owner or (ii) arising from modifications to the Work by Owner or its agents after acceptance of the Work. If the suit, claim or proceeding is based upon events set forth in the preceding sentence, Owner shall defend, indemnify and hold harmless Design-Builder to the same extent Design-Builder is obligated to defend, indemnify and hold harmless Owner in Section 7.1.1 above.

7.1.4 The obligations set forth in this Section 7.1 shall constitute the sole agreement between the parties relating to liability for infringement of violation of any patent or copyright.

7.2 Omitted.

7.2.1 Omitted.

7.3 Payment Claim Indemnification.

7.3.1 Design-Builder acknowledges that neither it nor any of its Subcontractors or Design Consultants have lien rights on public property. Design-Builder shall indemnify, defend and hold harmless Owner from any claims or mechanic's liens brought against Owner or against the Project as a result of the failure of Design-Builder, or those for whose acts it is responsible, to pay for any services, materials, labor, equipment, taxes or other items or obligations furnished or incurred for or in connection with the Work. Within three (3) days of receiving written notice from Owner that such a claim or mechanic's lien has been filed, Design-Builder shall commence to take the steps necessary to discharge said claim or lien, including, if necessary, the furnishing of a mechanic's lien bond. If Design-Builder fails to do so, Owner will have the right to discharge the claim or lien and hold Design-Builder and its surety liable for costs and expenses incurred, including attorneys' fees.

7.4 Design-Builder's General Indemnification.

7.4.1 Design-Builder, to the fullest extent permitted by law, shall indemnify, hold harmless and defend Owner, its officers, directors, and employees from and against claims, losses, damages, liabilities, including attorneys' fees and expenses, for bodily injury, sickness or death, and property damage or destruction (other than to the Work itself) to the extent resulting from the negligent acts or omissions of Design-Builder, Design Consultants, Subcontractors, anyone employed directly or indirectly by any of them or anyone for whose acts any of them may be liable.

7.4.2 If an employee of Design-Builder, Design Consultants, Subcontractors, anyone employed directly or indirectly by any of them or anyone for whose acts any of them may be liable has a claim against Owner, its officers, directors, employees, or agents, Design-Builder's indemnity obligation set forth in Section 7.4.1 above shall not be limited by any limitation on the amount of damages, compensation or benefits payable by or for Design-Builder, Design Consultants, Subcontractors, or other entity under any employee benefit acts, including workers' compensation or disability acts.

7.5 Omitted.

Article 8

Time

8.1 Obligation to Achieve the Contract Times.

8.1.1 Design-Builder agrees that it will commence performance of the Work and achieve the Contract Time(s) in accordance with Article 5 of the Agreement.

8.2 Delays to the Work.

8.2.1 If Design-Builder is delayed in the performance of the Work due to acts, omissions, conditions, events, or circumstances beyond its control and due to no fault of its own or those for whom Design-Builder is responsible, the Design-Builder shall be entitled to an extension of the time for completion only, and shall not be entitled to any additional payment on account of such delay. Without limiting the foregoing, the Design-Builder shall not be entitled to payment or compensation of any kind from Owner for direct, consequential, indirect or impact damages, including but not limited to costs of acceleration arising because of hindrance or delay from any cause whatsoever, whether such hindrances or delays be reasonable or unreasonable, foreseeable or unforeseeable, or avoidable or unavoidable; provided, however, that this provision shall not preclude recovery by the Design-Builder of damages for hindrances or delays due solely to fraud or bad faith on part of the Owner or its agents.

8.2.2 Omitted.

8.2.3 Damages For Delay, Acceleration, and Time Impacts. The extension of Contract Time specifically provided for in Article 8.2.1 shall be the Design-Builder's sole and exclusive remedy for delay, except to the extent specifically allowed herein. In the event the Design-Builder is delayed in the performance of the Work due solely to the fraud or bad faith of the Owner, then Design-Builder shall be entitled to an adjustment to the Contract Price for the direct job-site related costs (including General Conditions costs) incurred in performing the delayed Work if such delay (i) is not due to the fault, error, omission, or negligence of Design-Builder, its Design Consultant, Subcontractors, Design Consultants, or any others for whom Design-Builder is responsible, (ii) directly affects the performance of Work that is on the critical path of the construction schedule, (iii) was not reasonably foreseeable, (iv) would otherwise cause the Design-Builder to achieve Substantial Completion of the entire Work beyond the Scheduled Substantial Completion Date, and (v) cannot otherwise be reduced or eliminated by a work around plan or resequencing of the schedule at no extra cost to Design-Builder. In no instance shall Owner be liable for the following time-related costs or damages: (1) profit on any delay, acceleration, or impact costs, (2) loss of anticipated profit, (3) indirect expenses, (4) home office overhead, (5) consequential damages, including without limitation, loss of bonding capacity, loss of bidding opportunities, lost use of personnel, and insolvency, and (6) any claims preparation costs, expenses or consultant fees.

Article 9

Changes to the Contract Price and Time

Changes in the Work may be accomplished after execution of the Agreement, and without invalidating the Agreement, by Change Order, Field Change, Work Authorization, or Change Directive.

9.1 Change Orders.

9.1.1 A Change Order is a written instrument issued after execution of the Agreement signed

by Owner and Design-Builder, stating their agreement upon all of the following:

9.1.1.1 The scope of the change in the Work;

9.1.1.2 The amount of the adjustment to the Contract Price; and

9.1.1.3 The extent of the adjustment to the Contract Time(s).

9.1.2 All changes in the Work authorized by applicable Change Order shall be performed under the applicable conditions of the Contract Documents. Owner and Design-Builder shall negotiate in good faith and as expeditiously as possible the appropriate adjustments for such changes. All Change Orders shall be inclusive of all sales, use, consumer, and other taxes mandated by applicable Legal Requirements.

9.1.3 Omitted.

9.2 Change Directives.

9.2.1 A Change Directive is a written order prepared and signed by the City directing a Change in the Work prior to agreement on an adjustment in the Contract Price and/or the Contract Time(s). Upon receipt of a Change Directive from the City, Design-Builder shall promptly proceed with the performance of the Change in the Work.

9.2.2 Owner and Design-Builder shall negotiate in good faith and as expeditiously as possible the appropriate adjustments for the Change Directive. Upon reaching an agreement, the parties shall prepare and execute an appropriate Change Order reflecting the terms of the agreement.

9.3 Work Authorizations

When directed by the City through a Work Authorization, the Design-Builder will perform Work that is expressly or generally contemplated under any allowance or contingency items designated by the Contract Documents, which may include a Change for the addition of Work that does not result in an increase in the overall Contract Price. Work Authorizations may include Work items that are not necessarily shown in the Contract Documents, but may be necessary for the successful completion of the Project. The performance of the Work Authorization items must conform to the standards of the Contract Documents. The funding for Work Authorizations is an allowance or contingency item only and not a compensable pay item. The City will retain ownership of any such funds not used after the completion of the Work and the Design-Builder will have no claim to such funds. The Work shall be assigned and directed by the City in writing. Measurement, payment, invoicing and pricing of adjustments for Work Authorizations will be in accordance with the Contract Documents.

9.3.1 Field Changes Design-Builder and the City may mutually agree in writing to a Field Change that modifies or adjusts the location of Work established by the Contract Documents provided that such modification or adjustment does not require an adjustment in the overall Contract Price, overall Contract Time(s), budget line items or quantities, or use of allowance items or contingency funds, which are required as a result of field conditions that require such adjustments. Design-Builder and the City shall promptly update all applicable Contract Documents to reflect the implementation of a Field Change upon written agreement to a Field Change by the City and Design-Builder.

9.4 Contract Price Adjustments.

9.4.1 The increase or decrease in Contract Price resulting from a Change in the Work shall be determined by one or more of the following methods:

9.4.1.1 Unit prices set forth in the Contract Documents or as subsequently agreed to between the parties;

9.4.1.2 A mutually accepted lump sum, properly itemized and supported by sufficient substantiating data to permit evaluation by Owner;

9.4.1.3 Costs, fees and any other markups set forth in the Agreement; or

9.4.1.4 If an increase or decrease cannot be agreed to as set forth in items 9.4.1.1 through 9.4.1.3 above and Owner issues a Change Directive, the cost of the change of the Work shall be determined by the reasonable expense and savings in the performance of the Work resulting from the change, including a reasonable overhead and profit, as may be set forth in the Agreement. If the net result of both additions and deletions to the Work is an increase in the Contract Price, overhead and profit shall be calculated on the basis of the net increase to the Contract Price. If the net result of both additions and deletions to the Work is a decrease in the Contract Price, overhead and profit shall be reduced in accordance with Article 6 of the Agreement. . Design-Builder shall maintain a documented, itemized accounting evidencing the expenses and savings associated with such changes.

9.4.2 If the quantities originally contemplated under the Contract Documents are materially changed so that application of such unit prices to quantities of the Work performed will cause substantial inequity to the Owner, the applicable unit prices shall be equitably adjusted. For purposes of this Section 9.4.2, a change in quantities may be considered material if such change is greater than or equal to forty percent (40%) more than the quantities set forth in the Contract Documents.

9.4.3 If Owner and Design-Builder disagree upon whether Design-Builder is entitled to be paid for any services required by Owner, or if there are any other disagreements over the scope of Work or proposed changes to the Work, Owner and Design-Builder shall resolve the disagreement pursuant to Article 10 hereof. As part of the negotiation process, Design-Builder shall furnish Owner with a good faith estimate of the costs to perform the disputed services in accordance with Owner's interpretations. If the parties are unable to agree and Owner expects Design-Builder to perform the services in accordance with Owner's interpretations, Design-Builder shall proceed to perform the disputed services, conditioned upon Owner issuing a written order to Design-Builder (i) directing Design-Builder to proceed and (ii) specifying Owner's interpretation of the services that are to be performed.

9.5 Emergencies.

9.5.1 In any emergency affecting the safety of persons and/or property, Design-Builder shall act, at its discretion, to prevent threatened damage, injury or loss. Any change in the Contract Price and/or Contract Time(s) on account of emergency work shall be determined as provided in this Article 9.

9.6 Written Change Order Requirement

9.6.1 Except as permitted in Article 9.2 regarding Change Directives, and notwithstanding the provisions of Article 10, an increase in the Contract Price or the Contract Time(s) shall be allowed only by a Change Order signed by Owner and either (1) requested by Design-Builder in writing in advance of performing the Work involved or affected or (2) otherwise agreed to in writing by Owner. The failure of Design-Builder to request in writing a Change Order in advance of performing the work affected or involved, whenever reasonably practicable to do so, prevents the Owner from considering cost and time saving measures and alternatives, and therefore shall be a waiver and release of any claim by Design-Builder for an increase in the Contract Price or the Contract Time(s). No eliminations, additions, or alterations shall be made in the Work except upon written order of the City. No course of conduct or dealings between the parties, nor express

or implied acceptance of alterations or additions to the Work, and no claim that the City has been unjustly enriched by any alteration or addition to the Work, shall be the basis of any claim for an increase in any amounts due under the Contract Documents or an increase in any time period provided for in the Contract Documents. No action, conduct, omission, prior failure, or course of dealing by the City shall waive, modify, change, or alter the requirement that Change Orders, Field Changes, Work Authorizations and Change Directives must be in writing signed by the City, and that written Change Orders are the exclusive methods for effecting any adjustment to the Contract Price or Contract Time(s). Design-Builder understands and agrees that the Contract Price and Contract Time(s) cannot be changed by implication, oral contracts, verbal directives, actions, inactions, course of conduct, or constructive change order. Design-Builder shall be under no obligation to perform pursuant to an oral directive to perform work in addition to the Project scope excepting the case of an emergency threatening personal injury or property damage. Design-Builder acknowledges and agrees that no one in the City's organization has the authority to order Changes without a signed writing.

9.7 Accord and Satisfaction

9.7.1 Agreement on any Change Order, Field Change, or Work Authorization shall constitute a final settlement and an accord and satisfaction of all costs and changes to the Contract Price and Contract Time(s) relating to or arising out of the Change in the Work that is the subject of the Change, including but not limited to all claims for direct and indirect costs, impacts, overtime, accelerations, inefficiencies, compression, trade stacking, delays, interference, lost productivity, additional work, and the effect or accumulation of the changed work on any other Work or activities.

Article 10

Contract Adjustments and Disputes

10.1 Requests for Contract Adjustments and Relief.

10.1.1 Subject to the limitations set forth in Articles 8 and 9, Design-Builder shall provide written notice to the City of any claim for extension of the Contract Time(s) or modification of the Contract Price within seven (7) calendar days of the occurrence of the event giving rise to the claim, as well as (a) a narrative statement describing the amount and factual bases of the claim; (b) the precise number of days, if any, claimed as a result of any delay or impact to the Work; and (c) a detailed calculation of the precise amount of additional compensation claimed, if any, with any documentation supporting the claim. The failure of the Design-Builder to file any claim within the time limits prescribed herein or in the form or manner as required hereby shall be deemed a material prejudice to the interests of the City and shall constitute a waiver and release of the claim and the right to file or thereafter prosecute the same.

10.2 Mediation.

10.2.1 In the event of any controversy, claim, dispute or other matter in question arising out of or relating to this Agreement of the breach thereof or otherwise in connection with the Project to which this Agreement pertains, at the City's sole and exclusive option the parties shall, if the City so elects and as an express condition precedent to any party to this Agreement commencing legal action against the other relating to or arising out of the dispute, mediate the dispute utilizing a mutually agreeable mediator. Prior to commencing any legal action against the City, Design-Builder must either mediate the dispute, at the City's election, or obtain a written waiver from the City of its right to mediate.

10.2.2 Omitted.

10.2.3 Omitted.

10.2.4 Omitted.

10.3 Arbitration at the City's Election.

10.3.1 At the Owner's sole election, any claim arising out of or related to the Agreement shall be subject either to binding arbitration or litigation at the City's option. Prior to arbitration or litigation, the parties shall endeavor to resolve claims or disputes in accordance with the terms of this Agreement.

10.3.2 If claims are not resolved by negotiation, mediation, or otherwise, and the Owner elects arbitration, the arbitration shall be held in Atlanta, Georgia and shall be in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association currently then in effect. The demand for arbitration shall be in writing and filed with the appropriate organization selected by the Owner and shall be served on the Design-Builder. This agreement to arbitrate shall be specifically enforceable under applicable law in any court having jurisdiction thereof. In any arbitration or litigation, the arbitrators or the Court shall have the jurisdiction to award the City costs, arbitrator fees, expert fees, and attorneys' fees, and the arbitrators or the Court shall award all such fees to the City if it is the prevailing party. For purposes of this Section 10.3.2, the City shall be the "prevailing party" if it is successful on the material issues of the dispute, even if the City was not successful on all issues.

10.3.3 Except at Owner's sole discretion and with its consent, no arbitration or litigation arising out of or relating to the Agreement shall include, by consolidation or joinder or in any other manner, any other person or entity, including but not limited to the Design Consultant and its employees and consultants, any Subcontractors , and any other separate contractors or suppliers. The Owner's consent or election to allow consolidation or joinder or shall not constitute consent to arbitration of any claim not subject to arbitration pursuant to this Agreement.

10.3.4 Any award rendered by an arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

10.4 Litigation if Arbitration Not Elected.

10.4.1 If the Owner does not elect arbitration, any claims shall be resolved in Fulton County, Georgia Superior Court. Design-Builder hereby submits to the jurisdiction and venue of Fulton County, Georgia, and waives all defenses based on a lack of jurisdiction and/or venue. Design-Builder acknowledges that this Agreement was negotiated, at least in part, in Fulton County, Georgia. In any arbitration or litigation, the arbitrators or the court shall have the jurisdiction to award the City costs, arbitrator fees, expert fees, and attorneys' fees, and the arbitrators or the court shall award all such fees to the City if it is the prevailing party. For purposes of this Section 10.4.1, the City shall be the "prevailing party" if it is successful on the material issues of the dispute, even if the City was not successful on all issues.

10.5 Duty to Continue Performance.

10.5.1 Unless provided to the contrary in the Contract Documents, Design-Builder shall continue to perform the Work pending the final resolution of any dispute or disagreement between Design-Builder and Owner. Design-Builder's failure or refusal to work through disputes in accordance with this Article 10.5 shall be deemed a material default under this Agreement, which will entitle the City immediately rely upon Design-Builder's sureties to cure said default.

10.6 CONSEQUENTIAL DAMAGES.

10.6.1 NOTWITHSTANDING ANYTHING HEREIN TO THE CONTRARY (EXCEPT AS SET FORTH IN SECTION 10.6.2 AND ARTICLE 11 BELOW), NEITHER DESIGN-BUILDER NOR

OWNER SHALL BE LIABLE TO THE OTHER FOR ANY CONSEQUENTIAL LOSSES OR DAMAGES, WHETHER ARISING IN CONTRACT, WARRANTY, TORT (INCLUDING NEGLIGENCE), STRICT LIABILITY OR OTHERWISE, INCLUDING BUT NOT LIMITED TO LOSSES OF USE, LOST PROFITS, BUSINESS, REPUTATION OR FINANCING.

10.6.2 The consequential damages limitation set forth in Section 10.6.1 above is not intended to affect the payment of liquidated damages set forth in Article 5 of the Agreement, which both parties recognize has been established, in part, to reimburse Owner for some damages that might otherwise be deemed to be consequential.

Article 11

Stop Work and Termination for Cause

11.1 Owner's Right to Stop Work.

11.1.1 Owner may, without cause and for its convenience, order Design-Builder in writing to stop and suspend the Work.

11.1.2 Subject to the limitations of Articles 8 and 9, Design-Builder is entitled to seek an adjustment of the Contract Time(s) if it has been adversely impacted by any suspension of stoppage of the Work by Owner.

11.2 Owner's Right to Perform and Terminate for Cause.

11.2.1 If Design-Builder fails to (i) provide a sufficient number of skilled workers, (ii) supply the materials required by the Contract Documents, (iii) comply with applicable Legal Requirements, (iv) timely pay Design Consultants or Subcontractors, (v) prosecute the Work with promptness and diligence to ensure that the Work is completed by the Contract Time(s), as such times may be adjusted, or (vi) perform material obligations under the Contract Documents, then Owner, in addition to any other rights and remedies provided in the Contract Documents or by law, shall have the rights set forth in Sections 11.2.2 and 11.2.3 below.

11.2.2 Upon the occurrence of an event set forth in Section 11.2.1 above, Owner may provide written notice to Design-Builder that it intends to terminate the Agreement unless the problem cited is cured within seven (7) days of Design-Builder's receipt of such notice. If Design-Builder fails to cure such problem within seven (7) days, then Owner may declare the Agreement terminated for default by providing written notice to Design-Builder of such declaration.

11.2.3 Upon declaring the Agreement terminated pursuant to Section 11.2.2 above, Owner may enter upon the premises and take possession, for the purpose of completing the Work, of all materials, equipment, scaffolds, tools, appliances and other items thereon, which have been purchased or provided for the performance of the Work, all of which Design-Builder hereby transfers, assigns and sets over to Owner for such purpose, and to employ any person or persons to complete the Work and provide all of the required labor, services, materials, equipment and other items. In the event of such termination, Design-Builder shall not be entitled to receive any further payments under the Contract Documents until the Work shall be finally completed in accordance with the Contract Documents. At such time, if the unpaid balance of the Contract Price exceeds the cost and expense incurred by Owner in completing the Work, such excess shall be paid by Owner to Design-Builder. If Owner's cost and expense of completing the Work exceeds the unpaid balance of the Contract Price, then Design-Builder and its sureties shall be obligated to pay the difference to Owner. Such costs and expense shall include not only the cost of completing the Work, but also losses, damages, costs and expense, including attorneys' fees and expenses, incurred by Owner in connection with the reprocurement and defense of claims arising from Design-Builder's default, which costs and expenses are not subject to the waiver of consequential damages set forth in Section 10.6 hereof.

11.2.4 If Owner improperly terminates the Agreement for cause, the termination for cause will be converted to a termination for convenience in accordance with the provisions of Article 8 of the Agreement.

11.3 Omitted.

11.4 Omitted.

11.5 Bankruptcy of Design-Builder.

11.5.1 If Design-Builder institutes or has instituted against it a case under the United States Bankruptcy Code, such event may impair or frustrate the Design-Builder's ability to perform its obligations under the Contract Documents. Accordingly, should such event occur:

11.5.1.1 The Design-Builder, its trustee or other successor, shall furnish, upon request of the Owner, adequate assurance of the ability of the Design-Builder to perform all future material obligations under the Contract Documents, which assurances shall be provided within ten (10) days after receiving notice of the request; and

11.5.1.2 The Design-Builder shall file an appropriate action within the bankruptcy court to seek assumption or rejection of the Agreement within sixty (60) days of the institution of the bankruptcy filing and shall diligently prosecute such action. If the Design-Builder fails to comply with its foregoing obligations, the Owner shall be entitled to request the bankruptcy court to reject the Agreement, declare the Agreement terminated and pursue any other recourse available to the Owner under this Article 11.

11.5.2 The rights and remedies under Section 11.5.1 above shall not be deemed to limit the ability of the Owner to seek any other rights and remedies provided by the Contract Documents or by law, including its ability to seek relief from any automatic stays under the United States Bankruptcy Code.

Article 12

Electronic Data

12.1 Electronic Data.

12.1.1 The parties recognize that Contract Documents, including drawings, specifications and three-dimensional modeling (such as Building Information Models) and other Work Product may be transmitted among Owner, Design-Builder and others in electronic media as an alternative to paper hard copies (collectively "Electronic Data").

12.2 Transmission of Electronic Data.

12.2.1 Owner and Design-Builder shall agree upon the software and the format for the transmission of Electronic Data. Each party shall be responsible for securing the legal rights to access the agreed-upon format, including, if necessary, obtaining appropriately licensed copies of the applicable software or electronic program to display, interpret and/or generate the Electronic Data.

12.2.2 Neither party makes any representations or warranties to the other with respect to the functionality of the software or computer program associated with the electronic transmission of Work Product. Unless specifically set forth in the Agreement, ownership of the Electronic Data does not include ownership of the software or computer program with which it is associated, transmitted, generated or interpreted.

12.2.3 By transmitting Work Product in electronic form, the transmitting party does not transfer or assign its rights in the Work Product. The rights in the Electronic Data shall be as set forth in Article 4 of the Agreement. Under no circumstances shall the transfer of ownership of Electronic Data be deemed to be a sale by the transmitting party of tangible goods.

12.3 Electronic Data Protocol.

12.3.1 The parties acknowledge that Electronic Data may be altered or corrupted, intentionally or otherwise, due to occurrences beyond their reasonable control or knowledge, including but not limited to compatibility issues with user software, manipulation by the recipient, errors in transcription or transmission, machine error, environmental factors, and operator error. Consequently, the parties understand that there is some level of increased risk in the use of Electronic Data for the communication of design and construction information and, in consideration of this, agree, and shall require their independent contractors, Subcontractors and Design Consultants to agree, to the following protocols, terms and conditions set forth in this Section 12.3.

12.3.2 Electronic Data will be transmitted in the format agreed upon in Section 12.2.1 above, including file conventions and document properties, unless prior arrangements are made in advance in writing.

12.3.3 The Electronic Data represents the information at a particular point in time and is subject to change. Therefore, the parties shall agree upon protocols for notification by the author to the recipient of any changes which may thereafter be made to the Electronic Data, which protocol shall also address the duty, if any, to update such information, data or other information contained in the electronic media if such information changes prior to Final Completion of the Project.

12.3.4 The transmitting party specifically disclaims all warranties, expressed or implied, including, but not limited to, implied warranties of merchantability and fitness for a particular purpose, with respect to the media transmitting the Electronic Data. However, transmission of the Electronic Data via electronic means shall not invalidate or negate any duties pursuant to the applicable standard of care with respect to the creation of the Electronic Data, unless such data is materially changed or altered after it is transmitted to the receiving party, and the transmitting party did not participate in such change or alteration.

Article 13

Miscellaneous

13.1 Confidential Information.

13.1.1 Design-Builder agrees to preserve as strictly confidential all Confidential Information for two (2) years following the expiration or termination of this Agreement; provided, however, that Design Builder's obligation for Confidential Information that constitutes trade secrets pursuant to applicable law will continue for so long as such Confidential Information continues to constitute a trade secret under applicable law. Any Confidential Information that may be deemed Sensitive Security Information by the Department of Homeland Security or any other similar Confidential Information related to security will be considered trade secrets. Upon request by City, Design Builder will return any trade secrets to City. Design Builder agrees to hold the Confidential Information of the City in trust and confidence and will not disclose it to any person, or use it (directly or indirectly) for its own benefit or the benefit of any other person other than in the performance of its obligations under this Agreement. Design Builder will be entitled to disclose any Confidential Information if compelled to do so pursuant to: (i) a subpoena; (ii) judicial or administrative order; or (iii) any other requirement imposed upon it by applicable law. Prior to making such a disclosure, to the extent allowed pursuant to applicable law, the Design Builder shall provide the City with thirty six (36) hours prior notice by facsimile of its intent to disclose,

describing the content of the information to be disclosed and providing a copy of the pleading, instrument, document, communication or other written item compelling disclosure or, if not in writing, a detailed description of the nature of the communication compelling disclosure with the name, address, phone number and facsimile number of the person requesting disclosure.

13.2 Assignment.

13.2.1 Design-Builder shall not, without the written consent of Owner assign, transfer or sublet any portion or part of the Work or the obligations required by the Contract Documents. Any such purported assignment shall be null and void absent Owner's written consent.

13.3 Successorship.

13.3.1 Design-Builder and Owner intend that the provisions of the Contract Documents are binding upon the parties, their employees, agents, heirs, successors and assigns.

13.4 Governing Law.

13.4.1 The Agreement and all Contract Documents shall be governed by the laws of the State of Georgia, without giving effect to its conflict of law principles.

13.5 Severability.

13.5.1 If any provision or any part of a provision of the Contract Documents shall be finally determined to be superseded, invalid, illegal, or otherwise unenforceable pursuant to any applicable Legal Requirements, such determination shall not impair or otherwise affect the validity, legality, or enforceability of the remaining provision or parts of the provision of the Contract Documents, which shall remain in full force and effect as if the unenforceable provision or part were deleted.

13.6 No Waiver.

13.6.1 The failure of Owner to insist, in any one or more instances, on the performance of any of the obligations required by Design-Builder under the Contract Documents shall not be construed as a waiver or relinquishment of such obligation or right with respect to future performance.

13.7 Headings.

13.7.1 The headings used in these General Conditions of Contract, or any other Contract Document, are for ease of reference only and shall not in any way be construed to limit or alter the meaning of any provision.

13.8 Notice.

13.8.1 Whenever the Contract Documents require that notice be provided to the other party, notice will be deemed to have been validly given (i) if delivered in person to the individual intended to receive such notice, (ii) four (4) days after being sent by registered or certified mail, postage prepaid to the address indicated in the Agreement, or (iii) if transmitted by facsimile, by the time stated in a machine generated confirmation that notice was received at the facsimile number of the intended recipient.

13.9 Amendments.

13.9.1 The Contract Documents may not be changed, altered, or amended in any way except in writing signed by a duly authorized representative of each party.

13.10 Release of Quasi-Contractual Claims.

13.10.1 Design-Builder acknowledges and agrees that it may be adequately compensated in money damages for any claims arising from performance of the Contract Documents. Accordingly, Design-Builder waives and releases any right to assert a claim for *quantum meruit*, unjust enrichment, and any other equitable or quasi-contractual claim for relief that may be available under applicable law.

13.11 Equal Business Opportunity Compliance.

13.11.1 During the performance of this Agreement, Design-Builder agrees to comply with all provisions of Part 2, Chapter 2, Article X, Division 11, including Section 2-1441 through 2-1460 of the Code of Ordinances of the City of Atlanta, the Equal Business Opportunity ("EBO") Program as may be hereafter amended.

13.12 No Construction Against the Drafter.

13.12.1 No presumption of any applicable law relating to the interpretation of contracts against the drafter shall apply to this Agreement.

13.13 Design-Builder not an Agent of the City.

13.13.1 Design-Builder is an independent contractor of the City and nothing in this Agreement shall be deemed to constitute Design-Builder and the City as partners, joint venturers, or be construed as requiring or permitting the sharing of profits or losses. Nothing in this Agreement shall be deemed to constitute Design-Builder and the City as principal and agent and neither party has the authority to represent or bind or create any legal obligations for or on behalf of the other party.

EXHIBIT B

TECHNICAL SPECIFICATIONS

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02650	Testing for Acceptance of Sanitary and Storm Sewers	
02681	Subdrainage for Stormwater Quality Facilities	
02705	Removing and Replacing Pavement	
02798	Concrete Paving	
02900	Trees, Plants and Ground Covers	
02920	Site Restoration	
02922	Amended Soil and Mulch	
02933	Seeding and Sodding	
02934	Native Plug Planting	
02949	Stormwater Planters	
Division 3 – Concrete		
03301	Concrete and Reinforcing Steel	

SECTION 01040
COORDINATION

PART 1 GENERAL

1.01 SUMMARY

A. Coordinate execution of the Work with subcontractors and the Owner's representative as required to maintain operation of the existing facilities and satisfactory progress of the Work.

B. Requirements of this Section will be in addition to those stated in the General Conditions.

C. The Owner's representative may require a written explanation of the Contractor's plan for accomplishing separate phases of the Work.

PART 2 PRODUCTS

(NOT USED)

PART 3 EXECUTION

3.01 CUTTING AND PATCHING

A. Carefully fit around, close up, repair, patch, and point around the work specified herein to the satisfaction of the Owner's representative.

B. Do not cut or alter the work of any subcontractor, except with the written consent of the subcontractor whose work is to be cut or altered, or with the written consent of the Owner's representative. All cutting and patching or repairing made necessary by the negligence, carelessness or incompetence of the Contractor or any of its subcontractors, shall be done by, or at the expense of, the Contractor and shall be the responsibility of the Contractor.

3.02 COORDINATION

A. The Contractor shall consult with the Owner's representative on a daily basis while performing demolition, excavation, or any other alteration activity. No water or sewer function, utility or structure shall be altered, shut off or removed unless approved in advance, and in writing, by the Owner's representative. The Contractor shall give the Owner's representative at least 48 hours advanced notice, in writing, of the need to alter, shut off or remove such function.

B. Coordinate the Work with the Owner's representative and revise daily activities if

needed so as to not adversely affect system operations. Such revisions in the proposed work schedule will be accomplished with no additional compensation to the Contractor.

3.03 PROTECTION AND RESTORATION OF WORK AREA

A. General: Return all items and all areas disturbed, directly or indirectly by work under these Specifications, to their original condition or better, as quickly as possible after work is completed.

1. The Contractor shall plan, coordinate, and prosecute the work such that disruption to personal property and business is held to a practical minimum.

2. All construction areas abutting lawns and yards of residential or commercial property shall be restored promptly. Backfilling of underground facilities, ditches, and disturbed areas shall be accomplished on a daily basis as work is completed. Finishing, dressing, and grassing shall be accomplished immediately thereafter, as a continuous operation within each area being constructed and with emphasis placed on completing each individual yard or business frontage. Care shall be taken to provide positive drainage to avoid ponding or concentration of runoff.

3. Handwork, including raking and smoothing, shall be required to ensure that the removal of roots, sticks, rocks, and other debris is removed in order to provide a neat and pleasing appearance.

4. The Owner's representative will be authorized to stop all work by the Contractor when restoration and cleanup are unsatisfactory and to require appropriate remedial measures.

B. Man-made Improvements: Protect, or remove and replace with the approval of the Owner's representative, all fences, walkways, mail boxes, pipe lines, drain culverts, power and telephone lines and cables, property pins and other improvements that may be encountered in the Work.

C. Cultivated Growth: Do not disturb cultivated trees or shrubbery unless approved by the Owner's representative. Any such trees or shrubbery which must be removed shall be heeled in and replanted under the direction of an experienced nurseryman.

D. Cutting of Trees: Do not cut trees for the performance of the work except as absolutely necessary. Protect trees that remain in the vicinity of the work from damage from equipment. Do not store spoil from excavation against the trunks. Remove excavated material stored over the root system of trees within 30 days to allow proper natural watering of the root system. Repair any damaged tree over 3-inch diameter, not to be removed, under the direction of an experienced nurseryman. All trees and brush that require removal shall be promptly and completely removed from the work area and disposed of by the Contractor. No stumps, wood piles, or trash piles will be permitted on the work site.

E. Disposal of Rubbish: Dispose of all materials cleared and grubbed during the construction of the Project in accordance with the applicable codes and rules of the appropriate county, state and federal regulatory agencies.

F. Refer to Section 02920, Site Restoration

3.04 WATER FOR CONSTRUCTION PURPOSES

A. All water required for construction will be furnished by the Owner. It will be available by connecting to the Owner's water system at a point approved by the Owner's representative. There shall be installed in every connection to the Owner's water supply, a water meter with backflow preventer meeting the requirements of the City. The Contractor shall meter all water usage. The Contractor shall notify the City one week in advance prior to connecting to the water system.

B. A total of the metered water used shall be submitted to the Owner's representative with each monthly application for payment

3.05 EXISTING UTILITIES AND OBSTRUCTIONS

A. The Drawings indicate utilities or obstructions that are known to exist according to the best information available. The Contractor shall call the Utilities Protection Center (UPC) (800-282-7411) as required by Georgia Law (O.C.G.A. Sections 25-9-1 through 25-9-13) and shall call all utilities, agencies or departments that own and/or operate utilities in the vicinity of the construction work site at least 72 hours (three business days) prior to construction to verify the location of the existing utilities.

B. Existing Utility Locations: The following steps shall be exercised to avoid interruption of existing utility service.

1. Provide the required notice to the utility owners and allow them to locate their facilities according to Georgia law. Field utility locations are valid for only 10 days after original notice. The Contractor shall ensure, at the time of any excavation, that a valid utility location exists at the point of excavation.

2. Expose the facility, for a distance of at least 200 feet in advance of pipeline construction, to verify its true location and grade. Repair, or have repaired, any damage to utilities resulting from locating or exposing their true location.

3. Avoid utility damage and interruption by protection with means or methods recommended by the utility owner.

4. Maintain a log identifying when phone calls were made, who was called, area for which utility relocation was requested and work order number issued, if any. The

Contractor shall provide the Owner's representative an updated copy of the log bi-weekly, or more frequently if required.

C. Conflict with Existing Utilities

1. Horizontal Conflict: Horizontal conflict shall be defined as when the actual horizontal separation between a utility, main, or service and the proposed water main does not permit safe installation of the proposed water main or other utility by the use of sheeting, shoring, tying-back, supporting, or temporarily suspending service of the parallel or crossing facility. The Contractor may change the proposed alignment of the water main or other utility to avoid horizontal conflicts if the new alignment remains within the available right-of-way or easement, complies with regulatory agency requirements and after a written request to and subsequent approval by the Owner's representative. Where such relocation of the water main or other utility is denied by the Owner's representative, the Contractor shall arrange to have the utility, main, or service relocated as approved by the Owner.

2. Vertical Conflict: Vertical conflict shall be defined as when the actual vertical separation between a utility, main, or service and the proposed water main or other utility does not permit the crossing without immediate or potential future damage to the utility, main, service, or the water main. The Contractor may change the proposed grade of the water main to avoid vertical conflicts if the changed grade maintains adequate cover and complies with regulatory agencies requirements after written request to and subsequent approval by the Owner's representative. Where such relocation of the water main or other utility is denied by the Owner's representative, the Contractor shall arrange to have the utility, main, or service relocated as approved by the Owner.

D. Electronic Locator: The Contractor shall have available, at all times, an electronic pipe locator and a magnetic locator, in good working order, to aid in locating existing pipe lines or other obstructions.

E. Water and Sewer Separation

1. Water mains should maintain a minimum 10 foot edge-to-edge separation from sewer lines, whether gravity or pressure. If the main cannot be installed in the prescribed easement or right-of-way and provide the 10 foot separation, the separation may be reduced, provided the bottom of the water main is a minimum of 18 inches above the top of the sewer. Should neither of these two separation criteria be possible, the water main shall be installed below the sewer with a minimum vertical separation of 18 inches.

2. The water main, when installed below the sewer, shall be encased in concrete with a minimum 6-inch concrete thickness to the first joint in each direction. Where water mains cross the sewer, the pipe joint adjacent to the pipe crossing the sewer shall be cut to provide maximum separation of the pipe joints from the sewer.

3. No water main shall pass through, or come in contact with, any part of a sanitary sewer manhole.

F. Work shall be located substantially as indicated on the Drawings, but the Owner's representative reserves the right to make such modifications in locations as may be found desirable to avoid interference with existing structures, utilities or for other reasons. Where fittings are noted on the Drawings, such notation is for the Contractor's convenience and does not relieve the Contractor for laying and joining different or additional items where required or when directed by the Owner's representative.

3.06 PIPE DISTRIBUTION

A. Pipe (if part of the scope of work) shall be distributed and placed in such a manner that will not interfere with traffic.

B. Distribution and stringing of pipe along the route will be limited to the total length which will be installed in one work day/work shift. The Owner reserves the right to reduce the distance in residential and commercial areas based on the effects of the pipe distribution on the adjacent property owners.

C. No street or roadway may be closed for unloading of pipe without first obtaining permission from the proper authorities. The Contractor shall furnish and maintain proper warning signs and obstruction lights for the protection of traffic along highways, streets and roadways upon which pipe is distributed.

D. No distributed pipe shall be placed inside drainage ditches.

E. Distributed pipe shall be placed as far as possible from the roadway pavement, but no closer than five feet from the roadway pavement, as measured edge-to-edge.

3.07 CONSTRUCTION OPERATIONS

A. The Contractor shall insure that all work areas and roadways are free from excess excavated material, debris, mud, soil, rocks etc. at the end of each work day. Contractor shall be responsible for sweeping all areas at the end of each work day.

+++ END OF SECTION 01040 +++

SECTION 01055
CONSTRUCTION STAKING

PART 1 GENERAL

1.01 SCOPE

A. Construction staking shall include all of the surveying work required to layout the Work and control the location of the finished Project. The Contractor shall have the full responsibility for constructing the Project to the correct horizontal and vertical alignment, as shown on the Drawings, as specified, or as ordered by the Owner's representative.

B. The Contractor shall assume all costs associated with rectifying work constructed in the wrong location.

C. Work under this Section also includes the preparation of "as-builts" (Record Drawings) as specified herein.

1.02 QUALITY ASSURANCE

A. The Contractor shall hire, at the Contractor's own expense, a Registered Land Surveyor (RLS) with current registration in the State of Georgia, acceptable to the Owner, to provide project construction staking and confirmation of the vertical and horizontal alignment, and to prepare Record Drawings.

B. Any deviations from the Drawings shall be confirmed by the Owner's representative prior to construction of that portion of the Project.

1.03 SUBMITTALS

A. Submit name and address of the Registered Land Surveyor (RLS) to Owner's representative.

B. On request of Owner's representative, submit documentation to verify accuracy of construction staking.

C. Submit record drawings in accordance with PART 3 of this Section.

PART 2 PRODUCTS

(NOT USED)

PART 3 EXECUTION

3.01 PROJECT CONDITIONS

A. The Drawings provide the location of principal components of the Project. The Owner's representative may order changes to the location of some of the components of the Project or provide clarification to questions regarding the correct alignment.

B. The Owner's representative will provide the following:

1. One vertical control point on the Project site with its elevation shown on the Drawings.

2. A minimum of two horizontal control points on the Project site with their coordinates shown on the Drawings.

3.02 GENERAL

A. From the information shown on the Drawings and the information to be provided as indicated in subsection 3.01 above, the Contractor shall:

1. Be responsible for establishing GPS coordinate control system, setting reference points and/or offsets, establishment of baselines, and all other layout, staking, and all other surveying required for the construction of the Project.

   a. The horizontal position of all points shall be referenced to the North American datum of 1983 (1986 adjustment) in the Georgia State Plane West 1002 Coordinate System.
   b. The vertical position of all points shall be referenced to the North American Vertical datum of 1988.
   c. All coordinate values shall be delivered as grid coordinates in US Survey Feet.
   d. The minimum data accuracy required for all record drawings shall be +/- 0.10 USFT (one tenth of one foot).

2. Safeguard all reference points, stakes, grade marks, horizontal and vertical control points, and shall bear the cost of re-establishing same if disturbed.

3. Stake out the limits of construction to ensure that the Work does not deviate from the indicated limits.

4. Stake out the alignment and limits of all new construction.

5. Be responsible for all damage done to reference points, baselines, center lines and temporary bench marks, and shall be responsible for the cost of re-establishment of reference points, baselines, center lines and temporary bench marks as a result of the operations.

6. Maintain a complete, accurate log of all control and survey work as it progresses.

B. Baselines shall be defined as the line to which the location of the Work is referenced, i.e., edge of pavement, road centerline, property line, right-of-way or survey line.

3.03 STAKING PRECISION

A. The precision of construction staking shall match the precision of components location indicated on the Drawings. Staking of utilities, structures, and other site improvements shall be done in accordance with standard accepted practice for the type of utility.

B. The precision of construction staking required shall be such that the location and limits of water mains, sewer pipelines, storm drains, and other site improvements can be established for construction and verified by the Owner's representative. Where the location of components of water mains, sewers or storm drains (e.g. fittings, valves, manholes, road crossings) are not dimensioned, the establishment of the location of these components shall be based upon scaling these locations from the Drawings with relation to readily identifiable land marks (e.g. survey reference points, power poles, manholes).

C. Paved Surfaces: The Contractor shall establish a reference point for establishing and verifying the paving subgrade and finished grade elevations. Any variance with grades shown on the Drawings shall be identified by the Contractor and confirmed by the Owner's representative prior to constructing the base.

D. The Contractor's attention is directed to Section 01040, Coordination.

3.04 RECORD DRAWINGS

A. Water Mains (if part of the scope of work)

1. The Contractor shall submit record drawings which show the final installed location of water mains and survey data for all installed pipe, valves and fittings, tunnel and casing limits and service connections 3-inch diameter and greater. Survey data shall consist of final coordinates for all valves, fittings, tunnel and casing limits and main tap locations for service connections 3-inch diameter and greater and center line of pipe at points every 500 feet along the length of pipe installed.

2. In addition, the location of all valves and fittings and main tap location for service connections 3-inch diameter and greater shall be indicated by at least two ties

(measured distances) from permanent fixed objects within the public right of way, as accepted by the Owner's representative, to allow the Owner to locate the water main and components in the future without the use of GPS instruments.

B. Sewers and Storm Drains (if part of the scope of work)

1. The Contractor shall submit record drawings which show the final installed location of sanitary sewers and storm drains, and survey data for all installed sewer and storm drain pipe, and service connections. Survey data shall consist of final coordinates for all manholes, catch basins, tunnel and casing limits and service connections and invert elevations for all manholes, catch basins and other structures.

2. In addition, the location or station of all sewer service connection tie-in points to the main line sewer shall be indicated on the Drawings, as accepted by the Owner's representative, to allow the Owner to locate the service connections in the future without the use of GPS instruments.

C. The record drawings shall also indicate the horizontal and vertical location, dimensions and materials of all utilities encountered during excavation.

D. In addition to the above requirements for utility record drawings, perform surveying and record actual construction for all portions of the Project as required by the City. At a minimum for this project, the Contractor's RLS shall perform surveys and prepare record drawings to document construction for the following:

1. Horizontal limits of completed pervious concrete paving, including the limits of each paving section for each change in section depth.

2. Thickness of pervious concrete pavement layer and total thickness of the full-depth constructed section (including all aggregate subbase and base layers) for each change in section depth.

3. Horizontal limits and alignment of all new and replaced curbing, for each type of construction (including granite curbing and cast-in-place concrete curb and gutter). Include identification of each type.

4. Horizontal locations of all stormwater planters. Survey and record all four corners of each planter at the inside edge of perimeter concrete walls or curbs, or as otherwise approved by the Owner's representative. The unique identifier assigned by the designer shall be included with each planter location.

5. Full section of all stormwater planters showing thickness of soil media, stone drainage/ base layer, all underdrain components, wall depths, elevation of all curb cuts and flumes, and depth of any monitoring components.

6. Other construction as required by the Owner.

E. Two full-size hard copies of record drawings shall be furnished to the Owner's representative for review. Each record drawing shall be stamped with the name of the Contractor, signed and dated by the Contractor's Project Manager and signed, sealed and dated by the RLS. Also provide two compact disks containing signed and sealed PDFs of the final record drawings.

+++ END OF SECTION 01055 +++

SECTION 01060
REGULATORY REQUIREMENTS

PART 1 GENERAL

1.01 SCOPE

A. Permits and Responsibilities: The Contractor shall be responsible for complying with all applicable federal, state, county and municipal laws, codes and regulations, in connection with the prosecution of the Work and for obtaining all permits including but not limited to NPDES permits for storm water discharges from the Work site.

B. Permits and applications for this project are identified in PART 3 of this Section.

C. The Contractor shall comply with all requirements of the permitting authority, whether permits were obtained by the Contractor or not.

PART 2 PRODUCTS

(NOT USED)

PART 3 EXECUTION

3.01 NPDES PERMITS FOR STORM WATER DISCHARGES

A. The Contractor shall comply with the provisions of the Authorization to Discharge under the National Pollutant Discharge Elimination System, Storm Water Discharges Associated with Construction Activity for Infrastructure Construction Projects, Georgia Environmental Protection Division General Permit No. GAR 100002, including but not limited to filing permit applications, filing Notice of Intent (NOI), filing Notice of Termination (NOT), performing inspections and monitoring and performing record keeping as required.

3.02 GDOT ENCROACHMENT PERMITS

A. Several portions of this project will be constructed within right of ways under the jurisdiction of GDOT as indicated in the following table:

Site/Drawing No.	Street Name	GDOT Right of Way

B. Unless otherwise determined by the Owner, the Owner's representative, in conjunction with the Contractor, will submit permit applications to GDOT for Right of Way Encroachment for installation of pipelines and appurtenances and connections to existing pipelines within the GDOT right of ways..

3.03 CITY LANE CLOSURE PERMITS

A. Unless otherwise determined by the Owner, the Owner's representative, in conjunction with the Contractor, will submit permit applications to the City's Department of Public Works, Office of Transportation for all lane closures required for completion of the project. Refer to Section 01550, Traffic Regulation.

3.04 OTHER PERMITS

A. The Contractor shall submit applications for and obtain all other permits required in conjunction with completion of the Work of the Contact.

3.05 GENERAL

A. The Contractor shall pay for all remaining permits, fees and licenses required for construction of the Project.

B. The Contractor shall examine all permits and conform to the requirements contained therein, including the purchase of additional bonds or insurance as specified therein, and such requirements are hereby made a part of these Contract Documents as though the same were set forth herein. Failure to examine the permit and agreement applications will not relieve the Contractor from compliance with the requirements stated therein.

C. Payment for all permits, fees and licenses required for construction of the Project shall be reimbursed to the Contractor under Allowance Item XX, Special Permit Requirements.

+++ END OF SECTION 01060 +++

SECTION 01351
PUBLIC RELATIONS AND COMMUNICATIONS

PART 1 GENERAL

1.01 SCOPE

A. The Contractor shall provide all labor, materials, equipment and incidentals required to meet the requirements and responsibilities related to public relations and communications as specified herein during performance of the Work.

1.02 STAFFING

A. The Contractor shall employ one (1) full time Public Information Officer (PIO) whose specific duties and job shall be to perform customer service related functions and to continuously coordinate and provide information and services as required by the City's Office of Public Relations and Communications and other City staff as necessary.

1. PIO must have been employed on at least one (1) satisfactorily completed water line construction project and/or at least one (1) satisfactorily completed sanitary sewer construction project.

2. PIO must have had the responsibilities of receiving, logging, tracking, responding and resolving customer/citizen complaints and claims, providing notices to and personal interaction with affected customers/citizens regarding project impact and projected work schedules of the Contractor, reviewing project schedules and "look-ahead" to determine projected areas of impact from the Work.

3. PIO must have a minimum of one (1) year of experience in performing this type of work on similar projects.

B. The City shall provide a Public Information Manager (PIM) whose specific duties and job shall be to perform customer service related functions and to continuously coordinate and provide information and services as required by the City's Office of Public Relations and Communications and other City staff as necessary.

PART 2 PRODUCTS

(NOT USED)

PART 3 EXECUTION

3.01 PUBLIC INFORMATION KICK-OFF MEETING

A. Prior to commencement of Work and following the preconstruction conference, the Contractor, PIO and the Owner's representative shall attend a public information meeting hosted by City Council members whose districts will be impacted by construction and the Office of Public Relations and Communications. At this meeting the following items will be discussed:

1. Contractor's responsibilities

2. Contractor's relationship with the City's Office of Public Relations and Communications and the Owner's representative

3. Functions and responsibilities of the Public Information Officer (PIO) employed by the Contractor as required under paragraph 1.02 above. The Contractor's PIO and backup individual shall be identified to the Customer Care Call Center with 24/7 PIO contact telephone numbers provided.

3.02 RESPONSIBILITIES OF THE PUBLIC INFORMATION OFFICER

A. Responsibilities of the Public Information Officer (PIO) shall include, but not be limited to, the following elements:

1. Receiving, logging, tracking and resolving customer/citizen complaints and claims; either received directly, by the City or the Owner's representative and providing periodic updates and reports as specified.

2. Providing notice to affected customers/citizens in the event there are scheduled service outages or other work elements required for the performance of Work that are scheduled which will have an impact on the neighborhood or property owners.

3. Attendance and participation in scheduled project progress meetings for discussion, updates and resolution to customer/citizen complaints, claims, review of schedules and other matters as required.

4. In the event Work is required on private property where an easement has been acquired, the PIO shall notify the property owner at least fourteen (14) days in advance of commencement of the Work in writing.

5. Prior to commencement of work in any neighborhood, the PIO shall provide notice to the customers/citizens thirty (30) days in advance. In addition, twenty-four (24) hours prior to actual commencement of the work, the PIO shall notify the customers/citizens via door or mailbox hanger as hereinafter provided for in this Section.

6. The PIO shall be on twenty-four (24) hour call, seven (7) days a week and be equipped with a mobile phone. In the event of the PIO being unavailable, the Contractor shall designate a second individual to handle the responsibilities and functions who shall be fully familiar and aware of the duties and prosecution of the work

7. The Contractor/PIO must report all complaints to the Customer Care Call Center (404-658-6500) and to the City's PIO within six (6) hours of receipt. Conversely, all calls received by the Customer Care Call center will be transmitted to the City's PIO within forty-eight (48) hours of receipt and the PIO must perform follow-up within twenty-four (24) hours with resolution after receipt of the notice. Upon receipt of the information the Customer Care Call Center will create a file to document the incident.

8. The PIO shall assist the Contractor's Traffic Control Officer in coordination of all street closures, detours and traffic pattern changes with the Public Involvement Officer and the Department of Public Works and the GDOT. As required above, the PIO must provide notice to the affected areas in advance of the scheduled closures, detours and traffic pattern changes.

9. In the event there is an emergency involving the public or a situation where media inquiries and responses are possible, the PIO shall be notified immediately. The PIM will then coordinate with the City's Media Relations Manager for appropriate action. **Under no circumstance shall any employee, Subcontractor or vendor of the Contractor make any comments to the media regarding the project at any time.**

3.03 CUSTOMER SERVICE TRACKING SOFTWARE

A. The Contractor shall use the City's Document Tracking and Control System (DTCS), as specified in Section 01350, to track and enter information from customers/citizens regarding complaints, claims and inquiries. All related information shall be updated on a daily basis by the PIO. Tracking information and responses shall be coordinated with the PIM.

B. Reports shall be provided as weekly updates on all activities and on specific cases within twenty-four (24) hours when requested.

C. Information recorded shall include but not be limited to the following:

1. Date complaint/claim/inquiry received.

2. Name, address and telephone number of individual filing complaint/claim/inquiry.

3. Nature of complaint/claim/inquiry.

4. Address where problem is located if different than above.

5. Action required, date, action taken, date action completed.

6. Follow-up with person who filed under 2 above to verify satisfaction or status.

7. Documents associated with actions taken.

8. Any information regarding resolution with the Contractor's, Subcontractor's or vendor's insurance company shall be fully documented.

3.04 IDENTIFICATION BADGES AND SECURITY

A. All members of the Contractor's staff and his subcontractor's permanent staff at or above the level of foreman who will be working on-site will be issued an ID badge by the City. The ID badge will list the worker's name and company affiliation and will include a picture. All members will go to the Office of Safety & Security to have their ID's made.

B. It shall be the Contractor's responsibility to collect the ID badges from any employee who is discharged or resigns prior to completion of the project as well as at completion of the project so that all ID badges are returned to the Office of Security and Safety. The Contractor will be charged a fee of $25.00 per badge for any badge not returned at completion of the project. For any ID badges lost during the term of the project that must be reissued, there will be a charge of $15.00 per ID badge. The Contractor shall deduct these charges from his periodic or closeout payment request or the City will deduct.

C. Since lower level personnel of the Contractor, Subcontractor or vendor will not be issued ID badges, the Contractor must maintain a daily sign-in sheet for daily workers under his supervision. The Contractor must be able to identify any employee on the site as a bona fide worker if asked and if not able to identify, the Owner's representative will direct the Contractor to remove the individual from the site

D. The Contractor shall develop a security plan for use on the job site during construction. The plan shall include, as a minimum, the use of pre-employment background checks and drug tests, crime prevention and anti-theft procedures, workplace violence and care of project documents. All staff working on the site shall be familiar with the requirements of the Security Plan.

E. City ordinances prohibit the carrying of weapons on City streets. Any person bringing weapons to the jobsite shall be removed immediately.

F. All of the Contractor's staff at or above the level of foreman shall attend a 4-hour mandatory Security Training session conducted by the Office of Security and Safety. Multiple training sessions will be offered and staff must complete the training at least within 1 month of commencing work on the jobsite. All costs associated with the training will be considered as incidental to the Contract.

G. Persons on the jobsite shall report any suspicious activity by workers or by others at the jobsite area first to the Atlanta Police Department by calling 911 and then immediately to the Director of Security and Safety.

3.05 DOORHANGERS

A. The Contractor shall produce door hangers required for notice to customers/citizens and residents from the template provided by the PIM (SEE EXAMPLE AT END OF THIS SECTION) as specified hereinabove in paragraph 3.02. Door hangers shall be utilized for notification in the event of, but not limited to, the following events:

1. Planned service disruption/outages
2. Road closures/detours/traffic pattern changes
3. Access/entrance to property
4. Work start-up
5. Blasting

3.06 IMPACTED AREA ADDRESS DATABASE

A. The Contractor shall provide the Office of Communications and Public Outreach with a database of addresses and phone numbers (and names if available) of all project impacted residences, businesses and facilities at least three (3) weeks prior to project start-up. The database will be used by the PIM for regular citizen communications and notifications.

B. The Contractor and Owner's representative shall copy the PIM on all correspondence and Right of Entry Agreements with citizens and property owners.

3.07 SCHEDULE

A. The PIO and PIM shall be provided a copy of the detailed CPM project construction schedule following approval by the Owner's representative. The PIO will provide notification to the impacted area at least two (2) weeks prior to project start-up.

B. The Contractor shall inform the PIM through the weekly progress meetings of any project schedule changes or changes in "disruptive work" such as blasting, road closures, etc., that would have significant impact on citizens or require prior citizen notification.

3.08 MEDIA RELATIONS AND JOB SITE INQUIRIES

A. As specified above in paragraph 3.02, only authorized persons shall release any information to media inquiries. The Contractor's field personnel shall at all times have project information cards available that will be provided to media and citizens if inquiries are made on-site. All inquiries shall be directed to the person referred to on the card and citizens shall be referred to the PIO and/or PIM.

B. Project information cards shall be produced by the Contractor from the template provided by the PIM. (SEE EXAMPLE AT END OF THIS SECTION)

3.09 TRAINING

A. All of the Contractor's staff at or below the level of superintendent shall attend a mandatory Public Relations Training and Protocol Procedures Training. The purpose of this training is to teach construction crews on how to deal with citizens, the media, etc. and how to conduct themselves on the jobsite. This training is approximately one (1) hour in length and will be facilitated by City staff at a designated City facility. Training will be provided at no cost to the Contractor.

3.10 VEHICLE SIGNS AND PROJECT SITE SIGNAGE

A. The Contractor shall place pre-approved magnetic signs on all job-site project vehicles. The signage template will be provided by the PIM with the signs to be produced by the Contractor.

B. All project sites shall have pre-approved project signs in accordance with the template provided by the PIM and signs produced by the Contractor. Some of the signs shall be mounted on moveable skids so they can be relocated as the project progresses on various streets in project area.

3.11 NOTIFICATIONS

A. The Contractor shall provide the following notifications as required by the PIM:

1. Anticipated work start date must be three (3) weeks prior so PIM may send out two (2) week notice mailer.

2. Service disruptions - notify PIM and Call Center at least 72 hours in advance so that 48 hour notice may be issued; notice to citizens via door hangers and/or automated phone message 24 hours prior to disruption.

3. Street Closure or Partial Closure - notify PIM and Call Center at least 72 hours in advance to permit 48 hour automated phone message; notify fire, police other emergency services and other authorities 24 hours prior to street closure.

4. Significant work in neighborhood- blasting, directional drilling, trenchless installation, open cut, etc.-door hangers or automated phone messages are required-notify the PIM and Call Center at least 72 hours in advance to permit 48 hour automated phone message; notification to citizens via door hangers and/or automated phone messages 24 hours in advance.

B. The Contractor shall be fully responsible for notification to all emergency related services for detours, closures (partial or full) or traffic pattern changes and as such they must be detailed in their traffic control plan and implemented through the Contractor's Traffic Control Manager and per all permitting requirements. Refer to Section 01550, Traffic Regulation.

C. The Contractor shall be fully responsible for distributing all notifications a minimum of 48 hours in advance of service outages for schools, nursing homes hospitals, medical clinics, assisted living facilities or other types of facilities and shall also make personal contact with facility representatives no later than 60 minutes prior to the outage.

D. The Contractor shall at all times coordinate with the PIM and Call Center to provide detailed schedules and street locations for service disruptions or street closures to ensure that Call Center is well equipped to provide adequate response to citizen inquiries.

+++ END OF SECTION 01351 +++

Sample Door Hanger

NOTICE OF SEWER SYSTEM IMPROVEMENT WORK

City of Atlanta
Department of Watershed Management

The City is pleased to announce that we are moving forward with plans to fix our sewer system to meet state and federal requirements.

We are now at the point where construction activities are about to begin on your street for the South River Capacity Relief Projects. These planned improvements will reduce the incidents of sewage backups, leaks and sanitary sewer overflows.

The particular work planned for your street is checked below.

- o OPEN-CUT CONSTRUCTION
- o TUNNELING
- o SMOKE TESTING
- o ROAD CLOSURES AND/OR DETOURS
- o OTHER _____

We will do our best to minimize any inconvenience to you. All personnel are required to wear Clean Water Atlanta identification badges. If you have any questions or concerns, please contact William Horton, the Public Information Manager for this project at: 770-294-3240 or call the Clean Water Atlanta Help Line at 404-529-9211.

If you have any questions, please call the Department of Watershed Management Helpline at 404-529-9211.

Sample Project Information Card (Tri-Fold)

City will enter into an easement agreement with the owner. The City's real estate agents are currently negotiating access agreements with the affected property owners.

Sewer separation contractors may use different technologies to construct the new sewers, including open-cut and tunnel construction. Neighborhoods in the separation area will experience some disruption, such as partial or complete street closures, traffic rerouting, storage of materials and equipment near construction sites, brief interruptions in sewer service, dust and noise. The City will take every practical measure to reduce disruption during the sewer separation projects.

If you have any concerns about work in your area or would like additional information, you contact the Project Help Line at 404-529-8211 or visit the City's Public Information Office located at 290 M.L.K. Blvd., Suite 103. The office is open from 8:00 am to 5:00 pm, Monday through Friday.

City of Atlanta

Shirley Franklin
Mayor

City Council
Lisa Borders
President

Carla Smith
Kwanza Hall
Mary Young
Cleta Winslow
Natalyn Archibong
Anne Fauver
Howard Shook
Clair Muller
Felicia Moore
C.T. Martin
Jim Maddox
Joyce Sheperd
Cecilia Mitchell
Mary Norwood
H. Lamar Willis

CLEAN WATER ATLANTA

Stockade Project Information Card

COMBINED SEWER OVERFLOW REMEDIATION PROGRAM

The federal Environmental Protection Agency and state Environmental Protection Division have approved the City's plan to eliminate water quality violations from combined sewer overflows (CSOs). This plan includes a combination of deep-rock storage tunnels, new treatment facilities and the separation of combined sewers in selected basins- Greensferry, McDaniel and the Stockade sub-basin portion of the Intrenchment Creek basin.

You live in the Stockade Basin. Work in this basin extends roughly as far south as Lester Avenue, as far east as Stoval Street (north of I-20) or Ormewood Terrace (South of I-20), as far north as Decatur Street and as far west as Boulevard. Sewer separation construction activities commenced on May 1, 2005 and are slated for completion by December 2007.

WHAT HOMEOWNERS MIGHT EXPERIENCE DURING SEWER SEPARATION

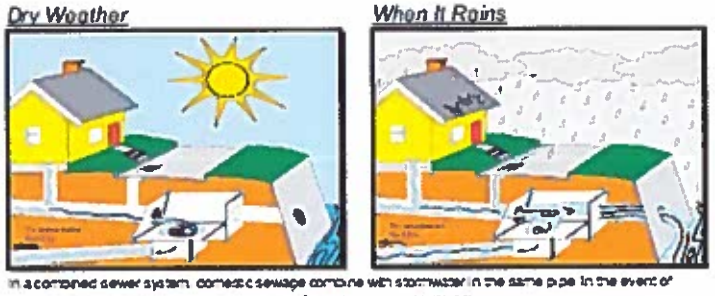
Most of the homes and businesses in the Greensferry, McDaniel and Stockade areas are connected to a combined sewer system. The combined system will be converted to a separated sewer system under the federal consent decree program. Sewer separation involves constructing new sanitary or storm sewers within a combined sewer service area. This allows wastewater and stormwater, currently collected in the same pipe, to be collected in separate pipes. The wastewater would be carried to an existing treatment plant where pollutants are removed before discharge to the South River. Separately treated stormwater would be collected and discharged to a local stream.

The Department of Watershed Management has been working with elected officials and community leaders to keep affected residents and business owners update about this project and to address specific neighborhood concerns.

Most of the existing combined sewers run beneath city streets but some were constructed in areas that are now private property. If a sewer is on private property and there is no existing easement, the

EXISTING COMBINED SEWER SYSTEM

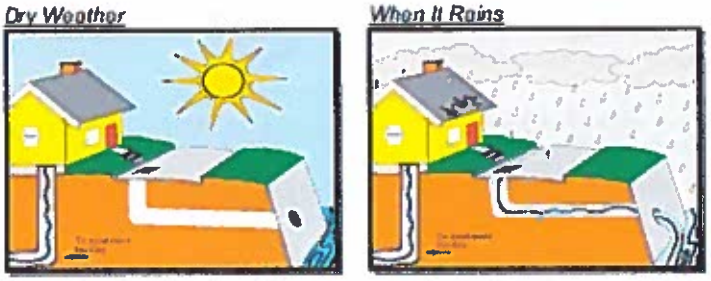
Dry Weather *When It Rains*



In a combined sewer system, domestic sewage combine with stormwater in the same pipe. In the event of heavy rains, the stormwater can cause an overflow into a receiving stream.

AFTER SEPARATION

Dry Weather *When It Rains*



In a separate sewer system, domestic sewage and stormwater flow into separate pipes. The sewage is diverted to a wastewater treatment plant and stormwater is released untreated to a receiving stream.

Sample Door Hanger
(Two-Sided)

Date: _____

Dear Water Customer:

Because of maintenance/repairs to the water system in your community, your service will be briefly interrupted on:

Date: _____

Time: _____

Your service will be restored at approximately:

_____

We apologize for the inconvenience and assure you that our efforts will help ensure clean, safe water for Atlantans and our downstream neighbors for generations to come.

Thank you for your understanding.

Please call 404-658-7220 if you have concerns or questions regarding this work.

_____
Watershed Management Representative

City of Atlanta
Department of Watershed Management
55 Trinity Avenue, S.W., Suite 5400
Atlanta, GA 30303

Date: _____

Dear Water Customer:

Because of maintenance/repairs to the water system in your community, your service will be briefly interrupted on:

Date: _____

Time: _____

Your service will be restored at approximately:

_____

We apologize for the inconvenience and assure you that our efforts will help ensure clean, safe water for Atlantans and our downstream neighbors for generations to come.

Thank you for your understanding.

Please call 404-658-7220 if you have concerns or questions regarding this work.

_____
Watershed Management Representative

City of Atlanta
Department of Watershed Management
55 Trinity Avenue, S.W., Suite 5400
Atlanta, GA 30303

Sample Project Information Card
(Tri-Fold Outside)

Here are some suggestions for dealing with discoloration at your taps:

- Allow the water to run for a few minutes.
- Do not use hot water during this time to prevent sediment from entering and settling in your hot water heater.
- If the discoloration persists for longer than an hour, call 404.658.7220 to report the condition.

Questions or Concerns?

Project Helpline - 404.589.3070
www.atlantawatershed.org
www.facebook.com/atlwatershed
www.twitter.com/atlwatershed

City of Atlanta
Kasim Reed
Mayor

City Council
Ceasar C. Mitchell
President

Carla Smith
Kwanza Hall
Ivory Young
Cleta Winslow
Natalyn Archibong
Alex Wan
Howard Shook
Yolanda Adrean
Felicia Moore
C.T. Martin
Keisha Lance Bottoms
Joyce Sheperd
Michael Julian Bond
Aaron Watson
H. Lamar Willis

CLEAN WATER ATLANTA

Water Distribution System Improvements

The City of Atlanta's Department of Watershed Management is embarking on a program to improve its existing water distribution system. The water distribution system covers approximately 640-square-miles and provides service to residents and businesses in Atlanta, Sandy Springs and South Fulton County. The system is comprised of over 2,500 miles of distribution mains and approximately 25,000 hydrants.

The purpose of the system improvements is to increase water flow & pressures, eliminate water quality issues and increase pipe capacity to satisfy minimum pipe diameter standards.

Upgrades to the water system will take place in approximately 50 selected areas of the system within Atlanta city limits. Improvements will consist of the installation of 100,000 feet of new eight-inch to 16-inch water mains. New hydrants within the existing right-of-way will also take place while existing undersized water mains and hydrants will be abandoned. New service connections will also be provided to water customers after the new mains have been installed, tested and disinfected. These enhancements

Sample Project Information Card
(Tri-Fold Inside)

will be completed under four separate construction contracts. Each contract will cover a separate quadrant of the City (Southeast, Southwest, Northwest and Northeast).

Construction is slated to begin April 2011 for the Southeast area and expected to last one year. Construction for the three remaining contracts will begin in 90-day intervals, with an expected completion date of January 2013.

What to Expect?

Construction – The installation of the new water pipes will require open-cut construction. You will notice crews drilling to break the asphalt and using heavy machinery to install the new pipes. Some dust accumulation on plants, patio furniture and parked cars, can result.

Obstruction of Traffic – There will be temporary lane closures and blocked intersections to allow crews to work safely in the roadway. Detour signs will be posted when necessary. Please exercise caution as you travel through project areas.

Water Main Breaks /Water Service Disruptions – The probability of a water main break is greater where construction is in progress simply because of the use of heavy machinery near buried utility pipes. When a water main breaks, water service to the area is suspended temporarily to allow repair of the pipe. Customers will also experience a scheduled service disruption when water service is transferred from the old mains to the new mains.

Water Discoloration – Distribution mains and connection pipes that supply water service to homes and businesses are made of iron. As they age, these pipes accumulate iron sediment. Under normal conditions, water flows in one direction in the pipes and sediment is never noticed. However, any interruption of water flow in your pipes; i.e., water shut-off, opening of a hydrant or valve can lead to some water discoloration. When the water is turned off and back on again, the water in the mains reverses flow as a result of pressure changes, causing sediment to dislodge and mix with the water. The discolored water is not harmful to your health, and usually the water will return to normal within one hour of the disturbance.

Low Water Pressure – This is another effect of sediment mixing with water when the water is turned off during an interruption and turned back on again. As the sediment flows with the water through your tap, it clogs the filter screen located at the mouth of the tap. This blockage will reduce the water flow. Removing the screen and rinsing out the sediment usually addresses this issue.

Water Pressure Surge – When water service is transferred to the new mains, water pressure is significantly enhanced, causing water to enter service pipes at an increased rate. This pressure surge can cause your service pipes to break. Ensure that your service pipes are in good condition and talk to your plumber about installing a pressure reducing valve to safeguard your pipes and fixtures.

SECTION 01410
TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.01 SCOPE

A. From time to time during progress of the Work, the Owner's representative may require that testing be performed to determine that materials provided for the Work meet the specified requirements, in accordance with the requirements of the Specifications. Such testing includes, but is not necessarily limited to:

1. Cement
2. Aggregate
3. Concrete
4. Concrete block
5. Pipe
6. Steel and metals
7. Welding
8. Soil compaction
9. Bituminous pavement

B. Requirements for testing may be described in various sections of these Specifications; where no testing requirements are described but the Owner's representative decides that testing is required to demonstrate compliance with specified material or performance standards, the Owner's representative may require testing to be performed under current pertinent standards for testing.

C. Employment of a testing laboratory shall in no way relieve the Contractor of Contractor's obligation to perform work meeting the requirements of the Contract.

D. The independent testing laboratory shall be selected and paid by the Contractor and approved in writing by the Owner's representative before any testing services are performed.

E. The Contractor shall pay directly for the services of the independent testing laboratory, approved by the Owner's representative, for all testing required under this Contract.

1.02 LABORATORY DUTIES

A. Cooperate with Owner's representative and Contractor.

B. Provide qualified personnel promptly on notice.

C. Perform specified inspections, sampling and testing of materials and methods of construction.

1. Comply with specified standards, ASTM, other recognized authorities and as specified.

2. Ascertain compliance with requirements of Contract Documents.

D. Promptly notify Owner's representative and Contractor of irregularity or deficiency of work which are observed during performance of services.

E. Promptly submit three (3) copies (two (2) copies to Owner's representative and one (1) copy to Contractor) of report of inspections and tests in addition to those additional copies required by the Contractor including:

1. Date issued
2. Project title and number
3. Testing laboratory name and address
4. Name and signature of inspector
5. Date of inspection or sampling
6. Record of temperature and weather
7. Date of test
8. Identification of product and Specification section
9. Location of Project
10. Type of inspection or test
11. Results of test
12. Observations regarding compliance with Contract Documents

F. Perform additional services as required.

G. Laboratory is not authorized to:

1. Release, revoke, alter or enlarge on requirements of Contract Documents.
2. Approve or accept any portion of Work.

1.03 CONTRACTOR RESPONSIBILITIES

A. Cooperate with laboratory personnel, provide access to Work and/or manufacturer's requirements.

B. Provide to laboratory, preliminary representative samples, in required quantities, of materials to be tested.

C. Furnish copies of mill test reports.

D. Furnish required labor and facilities.

1. To provide access to Work to be tested

2. To obtain and handle samples at the site

3. To facilitate inspections and tests

4. Build or furnish a holding box for concrete cylinders or other samples as

required by the laboratory.

E. Notify laboratory sufficiently in advance of operation to allow for the assignment of personnel and schedules of tests.

F. Laboratory Tests: Where such inspection and testing are to be conducted by an independent laboratory agency, the sample or samples shall be selected by such laboratory or agency or the Owner's representative and shipped to the laboratory by the Contractor at Contractor's expense.

G. Copies of all correspondence between the Contractor and testing agencies shall be provided to the Owner's representative.

1.04 QUALITY ASSURANCE

Testing, when required, will be in accordance with all pertinent codes and regulations and with procedures and requirements of the American Society for Testing and Materials (ASTM).

1.05 PRODUCT HANDLING

Promptly process and distribute all required copies of test reports and related instructions to insure all necessary retesting or replacement of materials with the least possible delay in progress of the Work.

1.06 FURNISHING MATERIALS

The Contractor shall be responsible for furnishing all materials necessary for testing.

1.07 CODE COMPLIANCE TESTING

Inspections and tests required by codes or ordinances or by a plan approval authority, and made by a legally constituted authority, shall be the responsibility of and shall be paid for by the Contractor, unless otherwise provided in the Contract Documents.

1.08 CONTRACTOR'S CONVENIENCE TESTING

Inspection or testing performed exclusively for the Contractor's convenience shall be the sole responsibility of the Contractor.

1.09 SCHEDULES FOR TESTING

A. Establishing Schedule

1. The Contractor shall, by advance discussion with the testing laboratory determine the time required for the laboratory to perform its tests and to issue each of its findings, and make all arrangements for the testing laboratory to be on site to provide the required testing.

2. Provide all required time within the construction schedule.

B. When changes of construction schedule are necessary during construction, coordinate all such changes of schedule with the testing laboratory as required.

1.10 TEST AND CERTIFICATIONS

A. General: As a minimum, the following tests shall be performed and the following certifications provided:

1. Cement: Certified test results by cement manufacturer or by independent laboratory shall be furnished as required by the Owner's representative.

2. Aggregate and Mortar Sand: Certified test results by aggregate producer or by independent laboratory shall be furnished as required by the Owner's representative.

3. Concrete

   a. At least five (5) standard 6-inch cylinders shall be taken each day for each 100 cubic yard or fraction thereof for each class of concrete used.
   b. The number of cylinders, the point of sampling, and the method of securing the samples shall be determined by the Owner's representative.
   c. The five (5) samples shall be taken to the testing laboratory for laboratory curing.
   d. Two (2) of the laboratory cured samples shall be tested at 7 days, two (2) samples tested at 28 days; one (1) sample in reserve.
   e. Test all concrete in accordance with ASTM C31-69, C39-71 and C-172.
   f. Slump Tests
      (1) Perform slump tests on the job in accordance with ASTM standards.
      (2) One (1) slump test shall be performed for each 25 cubic yards of concrete.
      (3) More slump tests shall be performed if deemed necessary by the

Owner's representative.

g. Perform air entrainment tests in accordance with the following standards:
   (1) Field tests - ASTM C 173
   (2) Laboratory tests - ASTM C 231

B. Precast and Concrete Block for Buildings

1. Block and precast may be visually inspected on the site by the Owner's representative.

2. The Owner's representative reserves the right to have the concrete block tested by an independent laboratory.

C. Steel and Miscellaneous Metal: Reinforcing steel, structural steel and miscellaneous metal may be inspected visually on the site by the Owner's representative.

D. Welding: 1 percent of all structural welds during construction shall be inspected either visually or by an independent laboratory as required by the Owner's representative.

E. Compaction of Earthwork

1. The compaction shall be tested by the Owner's representative or by an independent laboratory.

2. The testing shall be performed in a manner in accordance with these Specifications.

F. Bituminous Concrete: The material testing for the bituminous concrete shall be performed by an independent laboratory as deemed necessary by the Owner's representative.

1.11 TAKING SPECIMENS

Unless otherwise provided in the Contract Documents, all specimens and samples for tests will be taken by the testing laboratory or the Owner's representative.

1.12 TRANSPORTING SAMPLES

The Contractor shall be responsible for transporting all samples, except those taken by testing laboratory personnel, to the testing laboratory.

+++ END OF SECTION 01410 +++

SECTION 01550
TRAFFIC REGULATION

PART 1 GENERAL

1.01 SCOPE

A. The work specified in this section includes the provision of products, permits, services, procedures and personnel by the Contractor to effect traffic control during the Work.

1.02 TRAFFIC CONTROL MANAGER

A. The Contractor shall designate a qualified individual as the Traffic Control Manager (TCM) who shall be responsible for selecting, installing and maintaining all traffic control devices in accordance with the Drawings and Specifications and the Manual of Uniform Traffic Control Devices (MUTCD).

B. A written resume documenting the experience and credentials of the TCM shall be submitted and accepted by the Owner's representative prior to beginning any work that involves traffic control.

C. The TCM shall be available on a twenty-four (24) hour basis to perform his duties. If the work requires traffic control activities to be performed during the daylight and nighttime hours it may be necessary for the Contractor to designate alternate TCMs. An alternate TCM must meet the same requirements and qualifications as the primary TCM and be accepted by the Owner's representative prior to beginning any traffic control duties.

D. The Traffic Control Manager's traffic control responsibilities shall have priority over all other assigned duties.

E. As the representative of the Contractor, the TCM shall have full authority to act on behalf of the Contractor in administering the Traffic Control Plan prepared by the Contractor. The TCM shall have appropriate training in safe traffic control practices in accordance with Part VI of the MUTCD. In addition to the TCM all other individuals making decisions regarding traffic control shall meet the training requirements of the Part VI of the MUTCD.

F. The TCMs shall supervise the initial installation of traffic control devices. The Owner's representative, prior to the beginning of construction, will review the initial installation. Modifications to traffic control devices as required by sequence of operations or staged construction shall be reviewed by the TCMs.

PART 2 PRODUCTS

2.01 SIGNS, SIGNALS, AND DEVICES

A. The Contractor shall provide post-mounted and wall-mounted traffic control and informational signs as specified and required by local jurisdictions.

B. The Contractor shall provide automatic traffic control signals as approved by local jurisdictions.

C. The Contractor shall provide traffic cones, drums and flashing lights as approved by local jurisdictions.

D. The Contractor shall provide City of Atlanta police officers and certified flaggers and flagger's equipment as required by GDOT.

PART 3 EXECUTION

3.01 PERMITS

A. The Contractor shall obtain permits from authorities having jurisdiction over road closures before closing any road. The Contractor shall use forms provided by authorities having jurisdiction (City of Atlanta Division of Traffic and Transportation, GDOT, etc). Refer to Section 01060, Regulatory Requirements.

B. Permit applications shall indicate the time (in days), length (in feet), the number of lanes, and the purpose of the closure.

C. All permits are approved for operations during off-peak hours 9:00 a.m. to 4:00 p.m. unless special approval is received.

D. Operations between the hours of 6:00 p.m. and 10:00 p.m. and Saturdays and Sundays must be approved by the City

E. Full street closure permits require ninety-six (96) hours advance notice prior to street closure. The following additional information is required prior to approval:

1. The recommended detour route with signage shown on the Traffic Control Plan in accordance with the Manual of Uniform Traffic Control Devices (MUTCD).

2. A copy of the resident and/or business notification letters about the closure. The residents/businesses located between the detour route must be notified about the closure at least five (5) business days prior to the proposed closure.

F. The City of Atlanta Division of Traffic and Transportation will return full street closure permit applications to the Contractor with a cover letter to the Fire Chief, Chief of Police, Grady Memorial Hospital, MARTA and the Atlanta Board of Education. The Contractor shall have received the permit application and cover letter at least seventy-two (72) hours before commencing street closure activities.

G. Lane closure permits require a minimum of forty-eight (48) hour notice prior to lane closure. The Contractor shall continuously maintain the safety of the traveling public during lane closures in accordance with the requirements of the MUTCD and as stipulated by public officers.

H. The City of Atlanta Division of Traffic and Transportation will return the lane closure applications to the Contractor with a cover letter with copies to the Fire Chief, Chief of Police, Grady Memorial Hospital, MARTA and the Atlanta Board of Education. The Contractor shall have received the permit application and cover letter at least seventy-two (72) hours before commencing lane closure activities.

3.02 PREPARATION OF TRAFFIC CONTROL PLAN

A. The Contractor shall develop a detailed Traffic Control Plan for performing the Work, which shall include but shall not be limited to all requirements for certified flaggers, additional traffic control devices, traffic shifts, detours, paces, lane closures and other measures for all activities that disrupt traffic flow. The Contractor shall submit the Traffic Control Plan in accordance with all applicable regulations to receive final approvals from permitting agencies and provide any and all required traffic control devices as required by permitting agencies at no additional cost to the City.

3.03 CONSTRUCTION PARKING CONTROL

A. The Contractor shall control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles and City's operations.

B. The Contractor shall monitor parking of construction personnel's vehicles in existing facilities and maintain vehicular access to and through parking areas.

C. The Contractor shall prevent parking on or adjacent to access roads or in non designated areas.

3.04 MAINTENANCE OF TRAFFIC

A. Whenever and wherever, in the opinion of the Owner's representative, traffic is sufficiently congested or public safety is endangered, the Contractor shall furnish uniformed officers to direct traffic and to keep traffic off the highway area affected by construction operations.

B. When the Contract requires the maintenance of vehicular traffic on an existing road,

street, or highway during the Contractor's performance of Work that is otherwise provided for on the Drawings and these Specifications, the Contractor shall keep such road, street, or highway open to all traffic and shall provide such maintenance as may be required to safely accommodate traffic. The Contractor shall furnish, erect and maintain barricades, warning signs, flaggers, and other traffic control devices in conformity with the requirements of the Georgia Department of Transportation and other local jurisdictions.

C. The Contractor shall also construct and maintain in a safe condition any temporary connections necessary to ingress into and egress from abutting property or intersecting roads, streets, or highways. The Contractor shall maintain traffic in accordance with the approved Traffic Control Plan.

D. The Contractor shall make his own estimate of all labor, materials, equipment, and incidentals necessary for providing the maintenance of traffic as specified in this section.

E. Unless specified on the Drawings or in these Specifications and subject to the approval of the City, the cost of maintaining traffic specified in this section shall be included under Bid Item, Traffic Regulation.

3.05 UNIFORMED POLICE OFFICER FOR TRAFFIC CONTROL

A. The Contractor shall provide uniformed City of Atlanta police officers to regulate traffic when construction operations are ongoing:

1. In all signalized intersections

2. In streets designated as "collector" streets

3. In all full street closings

4. In GDOT right of ways

B. Officers will be currently employed by the City of Atlanta, be in full uniform and have full arrest power while working.

C. Officers will be employed and paid by the Contractor.

D. It is the officers' responsibility to assist in the direction of traffic within the construction site.

3.06 FLAGGERS FOR TRAFFIC CONTROL

A. The Contractor shall provide Georgia Department of Transportation (GDOT) certified trained and equipped flaggers to regulate traffic when construction operations or traffic encroach on public traffic lanes.

3.07 FLASHING LIGHTS

A. The Contractor shall use flashing lights during hours of low visibility to delineate traffic lanes and to guide traffic.

3.08 HAUL ROUTES

A. The Contractor shall consult with authorities and establish public thoroughfares to be used for haul routes and site access and obtain a haul route permit as specified in Section 01060, Regulatory Requirements.

B. The Contractor shall confine construction traffic to designated haul routes.

C. The Contractor shall provide traffic control at critical areas of haul routes to regulate traffic and minimize interference with public traffic.

3.09 ROAD CLOSURES ON CITY STREETS AND ROADS

A. No street or road shall be closed without the permission of the Owner of any street or road and the fire department having jurisdiction. Prior to closing a street, road or highway, signs shall be posted for a minimum of seven (7) days prior to actual closing, forewarning of the imminent closing. The City shall determine the information to be placed upon the signs by the Contractor. Where traffic is diverted from the Work, the Contractor shall provide all materials and perform all work for the construction and maintenance of all required temporary roadways, structures, barricades, signs and signalization.

B. To obtain approval to close a road or street maintained by the City, the Contractor shall proceed as follows:

1. The Contractor shall obtain approval of the Traffic Control Plan from the Owner's representative. The Traffic Control Plan shall be in accordance with the requirements of the Georgia Department of Transportation and the City of Atlanta.

2. The Contractor shall obtain a utility permit.

3. The Contractor shall apply in writing to the City and obtain a permit to close the road on a specific date. Routine permit approval by the City requires from one (1) to two (2) weeks depending on when the application is received.

4. The Contractor shall obtain a permit from the City before posting closure signs. Signs must be posted for seven (7) days prior to the first day of closure. Signs shall be acceptable to the Owner's representative.

5. Emergency road closures will be handled by the Owner's representative.

3.10 PROCEDURES FOR TRAFFIC DETOUR ROUTE PLAN

A. The Contractor shall provide a sketch map as part of the Traffic Control Plan showing proposed traffic detour route plan. The sketch map does not need to be drawn to scale but should resemble, as closely as possible, the actual location. The sketch map shall be drawn in a manner so as to provide emergency agencies a better understanding of the detour for quick response. The sketch map shall include directional arrows showing the flow of traffic.

B. "Road Closed Ahead" signs shall be erected before the start point of the detour indicating the name of the street closed.

C. Detour signs with appropriate directional arrows shall be erected at every intersection along the detour route until the end of the detour, when the traffic is back to the original street.

D. The Contractor shall erect an "End Detour" sign at the end of the detour.

E. Each detour and "End Detour" sign shall be accompanied by an accessory plate indicating the name of the street being detoured.

F. The Contractor shall apply appropriate traffic control measures in accordance with the requirements of the MUTCD and the City of Atlanta Department of Public Works.

3.11 BARRICADES AND WARNING SIGNS

A. The Contractor shall furnish, erect, and maintain all barricades and warning signs for hazards necessary to protect the public and the Work. When used during periods of darkness, such barricades, warning signs and hazard markings shall be suitably illuminated or reflectorized.

B. For vehicular and pedestrian traffic, the Contractor shall furnish, erect, and maintain barricades, warning signs, lights, and other traffic control devices in conformity with the requirements of the Georgia Department of Transportation and the City of Atlanta Department of Public Works.

C. The Contractor shall furnish and erect all barricades and warning signs for hazards prior to commencing Work which requires such erection and shall maintain the barricades and warning signs for hazards until their dismantling is directed by the Owner's representative.

3.12 REMOVAL

A. The Contractor shall remove equipment and devices when no longer required and repair damage caused by installation.

3.13 RIGHT OF WAY MANUAL

A. Included at the end of this Section are copies of the title page and pages 42 through and including page 52 from the City's Public Right-of Way Manual. These pages include Appendices A, B and C which indicate street designations and Appendix D which covers restrictions for working within the City's right of way. These restrictions shall also apply to GDOT right of ways.

+++ END OF SECTION 01550 +++

SECTION 02000
SITE WORK

PART 1 - GENERAL

1.01 DESCRIPTION

A. These general site work requirements apply to all site work operations. Refer to specification sections for specific product and execution requirements.

1.02 QUALITY ASSURANCE

A. Comply with all applicable local, state, and federal requirements regarding materials, methods of work, and disposal of excess and waste materials.

B. Obtain and pay for all required inspections, permits, and fees. Provide notices required by governmental authorities.

1.03 PROJECT CONDITIONS

A. Locate and identify existing underground and overhead services and utilities within contract limit work areas. Provide adequate means of protection of utilities and services designated to remain. Repair utilities damaged during site work operations at Contractor's expense.

B. Arrange for disconnection and seal or cap all utilities and services designated to be removed before start of site work operations. Perform all work in accordance with the requirements of the applicable utility company or agency involved.

C. When uncharted or incorrectly charted underground piping or other utilities and services are encountered during site work operations, notify the Owner's representative and the applicable utility company immediately to obtain procedure directions. Cooperate with the applicable utility company in maintaining active services in operation.

D. Locate, protect, and maintain bench marks, monuments, control points and project engineering reference points. Reestablish disturbed or destroyed items at Contractor's expense.

E. Perform site work operations and the removal of debris and waste materials to assure minimum interference with streets, walks, and other adjacent facilities.

F. Obtain governing authorities' written permission when required to close or obstruct street, walks and adjacent facilities. Provide alternate routes around closed or obstructed traffic ways when required by governing authorities.

G. Control dust caused by work. Dampen surfaces as required. Comply with pollution control regulations of governing authorities.

H. Protect existing buildings, paving, and other services or facilities on site and adjacent to the site from damage caused by site work operations. Cost of repair and restoration of damaged items at Contractor's expense.

I. Protect and maintain street lights, utility poles and services, traffic signal control boxes, curb boxes, valves and other services, except items designated for removal. Remove or coordinate the removal of traffic signs, parking meters and postal mail boxes with the applicable governmental agency. Provide for temporary relocation when required to maintain facilities and services in operation during construction work.

J. Preserve from injury or defacement all vegetation and objects designated to remain.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Materials and equipment: As selected by Contractor, except as indicated in contract documents.

PART 3 - EXECUTION

3.01 PREPARATION

A. Examine the areas and conditions under which site work is performed. Do not proceed with the work until unsatisfactory conditions are corrected.

B. Consult the records and drawings of adjacent work and of existing services and utilities which may affect site work operations.

+++ END OF SECTION 02000 +++

SECTION 02060
CRUSHED STONE AGGREGATE

PART 1 - GENERAL

1.01 SCOPE

A. This section includes installation of crushed stone aggregate not used in stormwater quality facilities; and any other similar, incidental or appurtenant operation which may be necessary to properly complete the Work.

B. The Contractor shall provide all services, labor, materials, and equipment required for all installation of crushed stone aggregate and related operations necessary or convenient to the Contractor for furnishing complete Work as shown on the Plans or specified in these Contract Documents.

C. Related Work Specified Elsewhere:

1. Section 02200 - Earthwork

1.02 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents.

1.03 QUALITY ASSURANCE

A. Reference Standards: The Contractor shall comply with the applicable provisions and recommendations of the latest editions of the following standards, except as otherwise shown on the Plans or specified in these specifications.

1. AASHTO M147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base, and Surface Courses.

2. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Hammer and a 457-mm (18-in) Drop.

3. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

4. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3)).

5. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soils Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3)).

6. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).

7. ASTM D4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Coarse aggregate shall be crushed stone per GDOT Standards, of solid composition, free from dirt and adherent coatings, and suited for the class of its intended usage.

B. Unless otherwise specified elsewhere in these Specifications or directed by the Owner's representative, gradation of coarse aggregate shall conform with size Number 3, Number 57, or Number 89 as described in ASTM C33.

C. The nominal maximum size of coarse aggregate used in concrete shall not be larger than one-fifth 1/5 of the narrowest dimension between sides of the forms, one-third 1/3 of the depth of slabs, or three-fourths ¾ of the minimum clear spacing between reinforcing bars in conformance with applicable codes and regulations.

D. Sand shall be clean and sharp, free from all deleterious substances, and shall conform to the requirements of ASTM C33.

PART 3 - EXECUTION

3.01 EXAMINATION

A. The Contractor shall verify that subgrade has been inspected and that gradients and elevations are correct and dry.

3.02 AGGREGATE PLACEMENT

A. The Contractor shall place coarse aggregates in areas shown on the Plans or directed by the Owner's representative.

B. The Contractor shall place and compact coarse aggregate in accordance with the requirements of Section 02200.

C. The Contractor shall level and contour surfaces to elevations and gradients indicated on the Plans.

D. The Contractor shall add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.

E. The Contractor shall add water to assist compaction. If excess water is apparent, the Contractor shall remove aggregate and aerate to reduce moisture content.

F. The Contractor shall use mechanical vibrating tamping in areas inaccessible to compaction equipment.

3.03 TOLERANCES

A. Flatness: Maximum variation of 0.2 feet measured with a ten (10) foot straight edge.

B. Variation from True Elevation: Within 0.2 feet.

C. Base: Compacted to ninety-eight percent (98%) standard proctor density as determined by ASTM D-698.

+++END OF SECTION 02060+++

SECTION 02125
TEMPORARY AND PERMANENT EROSION AND SEDIMENTATION CONTROL

PART 1 GENERAL

1.01 SCOPE

A. Work under this section includes furnishing all labor, materials, equipment and incidentals required to install and maintain temporary and permanent erosion and sedimentation controls as shown on the Drawings and as specified herein. Work under this Section also includes the subsequent removal of temporary erosion and sedimentation controls at completion of the project.

B. Temporary and permanent erosion and sedimentation controls include mulching and grassing of disturbed areas and structural barriers at those locations which will ensure that erosion during construction will be maintained within acceptable limits. Acceptable limits are as established by the Georgia Environmental Protection Division (EPD) and applicable codes, ordinances, rules, regulations and laws of local and municipal authorities having jurisdiction.

C. The temporary and permanent erosion and sedimentation control measures shown on the Drawings are minimum requirements. The Contractor shall notify the Owner's representative of any changes and/or additions to the erosion and sedimentation control measures necessary to accommodate the Contractor's means and methods of operation. Any additional erosion and sedimentation control measures required by the Contractor's means and methods of operation will be installed by the Contractor at no additional cost to the City.

D. The Contractor shall be solely responsible for the control of erosion and sediment production within the Project area. The Contractor shall install controls that will ensure that storm water and drainage from the disturbed area of the Project site will be filtered or otherwise managed to minimize impacts on receiving waters and/or existing storm drains. Discharged waters shall be free of soil particles and shall meet all applicable permit turbidity requirements.

1.02 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents.

1.03 QUALITY ASSURANCE

A. The Contractor shall designate a worksite erosion control supervisor. The supervisor shall have the responsibility and authority to coordinate all equipment, personnel and materials needed to maintain project site erosion and sediment control in accordance with the management practices and standards established in the Manual for Erosion

and Sediment Control in Georgia and the Drawings and Specifications.

B. Within 15 days after receipt of the Notice to Proceed, the Contractor shall submit the name and contact data for the designated erosion control supervisor. The supervisor shall be an individual with an active minimum Level 1 certification as issued by the Georgia Soil and Water Conservation Commission.

PART 2 PRODUCTS

2.01 MATERIALS

A. Silt fence: Silt fence shall be as detailed on the Drawings and shall meet the requirements of Section 171 – Silt Fence of the GDOT Department of Transportation Standard Specifications.

1. Silt fence fabric shall conform to GDOT Standard Specification Section 881.2.07.

2. Silt fencing shall conform to GDOT Standard Specification Section 894.

3. Silt fence posts and bracing shall conform to GDOT Standard Specification Section 862.

B. Hay bales shall be clean, seed-free cereal hay type, rectangular in shape.

C. Woven wire fence backing shall be ½-inch, galvanized steel, chicken-wire mesh.

D. Filter stone shall be crushed rock conforming to Georgia Department of Transportation Table 800.01, Size Number 57.

E. Concrete block shall be hollow, non-loadbearing type.

F. Concrete shall be 3000 psi in accordance with Section 03300, Cast-in-Place Concrete.

G. Plywood shall be ¾-inch thick exterior type.

2.02 RIP RAP

A. Use only one method throughout the Project.

B. Stone Rip Rap shall consist of sound, tough, durable stones resistant to the action of air and water. Slabby or shaley pieces will not be acceptable. Specific gravity shall be 2.0 or greater. Rip rap shall have less than 66 percent wear when tested in accordance with AASHT0 T-96. Unless shown on the Drawings or specified otherwise, stone rip-rap shall be type 3.

1. Type 1 Rip Rap: The largest pieces shall have a maximum approximate volume of two cubic feet. At least 35 percent of the mass shall be comprised of pieces which weigh 125 pounds or more. The remainder shall be well graded down to

the finest sizes. Rock fines shall comprise a maximum of 10 percent of the total mass. Rock fines are defined as material passing a No. 4 sieve. Rip rap size shall conform to Georgia Department of Transportation Standard Specification Section 805 - Stone Dumped Rip Rap, Type 1.

2. Type 3 Rip Rap: The largest pieces shall have a maximum approximate volume of one cubic foot. At least 35 percent of the mass shall be comprised of pieces which weigh 15 pounds or more. The remainder shall be well graded down to the finest sizes. Rock fines shall comprise a maximum of 10 percent of the total mass. Rock fines are defined as material passing a No. 4 sieve. Rip rap size shall conform to Georgia Department of Transportation Standard Specification Section 805 - Stone Dumped Rip Rap, Type 3.

2.03 FILTER FABRIC

A. Filter fabric for use under rip-rap shall meet the requirements of GDOT Standard Specification Section 881.2.05.

2.04 CONSTRUCTION EXIT STONE

A. Stone shall be sound, tough, durable stone resistant to the action of air and water. Slabby or shaley pieces will not be acceptable. Aggregate size shall be in accordance with the National Stone Association Size R-2 (1.5 to 3.5-inch stone) or Type 3 Riprap as specified in paragraph 2.02 of this Section.

2.05 GRASS

A. Permanent grass shall be of the same type that existed prior to construction.

2.06 WATER

A. Water shall be free of excess and harmful chemicals, organisms and substances which may be harmful to plant growth or obnoxious to traffic. Salt or brackish water shall not be used.

B. Water shall be furnished by the Contractor.

2.07 EROSION CONTROL FABRIC

A. Erosion control fabric shall be organic or synthetic material filter blankets or jute mesh erosion control matting meeting the requirements of Section 713 or Section 714 (as applicable) of the GDOT Standard Specifications and as indicated on the Drawings.

PART 3 EXECUTION

3.01 GENERAL

A. Basic Principles

1. Conduct the earthwork and excavation activities in such a manner to fit the topography, soil type and condition.

2. Minimize the disturbed area and the duration of exposure to erosion elements.

3. Stabilize disturbed areas immediately.

4. Safely convey run-off from the site to a stable outlet.

5. Retain sediment on site that is generated on site.

6. Minimize encroachment upon watercourses.

B. Temporary Erosion and Sedimentation Control: Temporary erosion and sedimentation control procedures shall be directed toward:

1. Preventing soil erosion at the source.

2. Preventing silt and sediment from entering any waterway if soil erosion cannot be prevented.

3. Preventing silt and sediment from migrating downstream in the event it cannot be prevented from entering the waterway.

C. Permanent Erosion Control: Permanent erosion control measures shall be implemented to prevent sedimentation of waterways and to prevent erosion of the Project site.

3.02 SEDIMENTATION AND EROSION CONTROL MEASURES

A. Temporary and permanent erosion and sedimentation control measures shall prevent erosion and prevent sediment from exiting the site. If, in the opinion of the Owner's representative, the Contractor's temporary erosion and sedimentation control measures are inadequate, the Contractor shall provide additional maintenance for existing measures or additional devices to control erosion and sedimentation on the site at no additional cost to the Owner.

B. All erosion and sedimentation control devices and structures shall be inspected by the Contractor at least once a week and immediately prior to and after each rainfall occurrence. Any device or structure found to be damaged shall be repaired or replaced by the end of the day. Sediment ponds shall be cleaned out prior to the silt reaching the height or elevation shown on the Drawings.

C. All erosion and sedimentation control measures and devices shall be constructed and

installed as shown on the Drawings or specified herein and maintained until adequate permanent disturbed area stabilization has been provided or permanent pavement has been installed and accepted by the Owner's representative. After adequate permanent stabilization has been provided or permanent pavement has been installed and accepted by the Owner's representative, all temporary erosion and sedimentation control structures and devices shall be removed.

3.03 SEDIMENT CONTROL

A. Construction Exit

1. Construction exit(s) shall be placed as shown on the Drawings and as directed by the Owner's representative. A construction exit shall be located at any point traffic will be leaving a disturbed area to a public right-of-way, street, alley, sidewalk or parking area.

2. Placement of Construction Exit Material: The ground surface upon which the construction exit material is to be placed shall be prepared to a smooth condition free from obstructions, depressions or debris. The filter fabric shall be placed to provide a minimum number of overlaps and a minimum width of one foot of overlap at each joint. The stone shall be placed with its top elevation conforming to the surrounding roadway elevations. The stone shall be dropped no more than three feet during construction.

3. Construction Exit Maintenance: The Contractor shall regularly maintain the exit with the top dressing of stone to prevent tracking or flow of soil onto public rights-of-way and paved surfaces as directed by the Owner's representative.

4. Construction Exit Removal: Construction exit(s) shall be removed and properly disposed of when the disturbed area has been properly stabilized, the tracking or flow of soil onto public right-of-way or paved surfaces has ceased and as directed by the Owner's representative.

B. Sediment Barriers

1. Sediment barriers shall include, but are not necessarily limited to, silt fences, hay bales, rock check dams and inlet sediment traps and any device which prevents sediment from exiting the disturbed area.

2. Silt fences, hay bales and rock check dams shall not be used in any flowing stream, creek or river.

3. Sediment barriers shall be installed as shown on the Drawings and as directed by the Owner's representative.

4. Sediment barriers shall be maintained to ensure the depth of impounded sediment is no more than one half of the original height of the barrier or as directed by the Owner's representative. Torn, damaged, destroyed or washed

out barriers shall be repaired, reinforced or replaced with new material and installed as shown on the Drawings and as directed by the Owner's representative.

5. Sediment Barrier Removal

   a. Sediment barrier shall be removed once the disturbed area has been stabilized with a permanent vegetative cover or permanent pavement has been installed and the sediment barrier is no longer required as directed by the Owner's representative.

   b. Accumulated sediment shall be removed from the barrier and removed from the site.

   c. All non biodegradable parts of the barrier shall be disposed of properly. The hay bales may be spread evenly across disturbed areas as a mulching material.

   d. The disturbed area created by barrier removal shall be permanently stabilized.

3.04 EROSION CONTROL

A. Grassing

1. Grassing shall be as specified in paragraph 3.05 of this Section

2. Temporary Stabilization: Temporary stabilization shall be provided as shown on the Drawings and conforming to these Specifications to control erosion on the site. Temporary stabilization shall be provided to any area which will not receive permanent stabilization within the next 14 calendar days. Partial payment requests may be withheld for those portions of the Project not complying with this requirement.

3. Permanent Stabilization

   a. Permanent stabilization shall be provided as shown on the Drawings and conforming to these Specifications to control erosion on the site. Permanent stabilization shall be provided to all areas of land disturbance within seven calendar days of the completion of land disturbance for any area greater than 0.25 acre. Partial payment requests may be withheld for those portions of the Project not complying with this requirement.

   b. Grass or sod removed or damaged in residential areas shall be replanted with the same variety within seven calendar days of the completion of work in any area.

   c. Where permanent stabilization cannot be immediately established because of an inappropriate season, the Contractor shall provide temporary stabilization. The Contractor shall return to the site at the appropriate season to provide permanent stabilization in areas that received only temporary stabilization.

B. Erosion Control Blanket

1. Erosion control blankets shall be applied to sloped areas as indicated on the Drawings and where in excess of 2 to 1 slope. Blankets shall be laid on finished grades that have been seeded, insuring good contact with the soil. Soil surface shall be smooth and free of rocks, roots, debris and other obstructions.

2. Secure blankets with biodegradable staples or stakes at the top of slopes in a 6-inch deep x 6-inch wide anchoring trench. Secure blankets with staples or stakes per the manufacturer's recommendations, increasing the spacing at overlapping edges. Blankets shall be overlapped by a minimum of 8-inches. Provide a 6-inch deep x 6-inch wide anchoring trench at the toe of the slope or shoreline.

3.05 GRASSING

A. General

1. Refer to Section 02933, Seeding for detailed specifications on permanent seeding.

2. When final grade has been established, all bare soil, unless otherwise required by the Contract Documents, shall be seeded, fertilized and mulched in an effort to restore to a protected condition.

3. Specified permanent grassing shall be performed at the first appropriate season following establishment of final grading in each section of the site.

4. All references to grassing, unless noted otherwise, shall relate to establishing permanent vegetative cover as specified herein for seeding, fertilizing, mulching, etc.

5. Permanent grassing shall be of a perennial species.

B. Grassing activities shall comply with Section 02933, Seeding and the Manual for Erosion and Sediment Control in Georgia, specifically for the selection of species, planting dates and application rates for seeding, fertilizer and mulching. Where permanent vegetative cover (grassing) cannot be immediately established (due to season or other circumstances) the Contractor shall provide temporary vegetative or mulch cover.

3.06 RIP-RAP

A. Unless shown otherwise on the Drawings, rip-rap shall be placed at all points where banks of streams or drainage ditches are disturbed by excavation, or at all points where their natural vegetation is removed. Carefully compact backfill and place rip rap to prevent subsequent settlement and erosion. This requirement applies equally to

construction alongside a stream or drainage ditch as well as crossing a stream or drainage ditch.

B. When trenching across a creek, place rip-rap a distance of 10 feet upstream and 10 feet downstream from the top of the trench excavation. Place rip rap across creek bottom, across creek banks and extend rip-rap placement five feet beyond the top of each creek bank.

C. Preparation of Foundations

1. The ground surface upon which the rip rap is to be placed shall be brought in close conformity to the correct lines and grades before placement is commenced. Where filling of depressions is required, the new material shall be compacted with hand or mechanical tampers.

2. Unless at creek banks or otherwise shown or specified, rip-rap shall begin in a toe ditch constructed in original ground around the toe of the fill or the cut slope. The toe ditch shall be two feet deep in original ground, and the side next to the fill or cut shall have that same slope. After the rip-rap is placed, the toe ditch shall be backfilled.

D. Placement of Filter Fabric

1. The surface to receive fabric shall be prepared to a relatively smooth condition free from obstructions, depressions and debris. The fabric shall be placed with the long dimension running up the slope and shall be placed to provide a minimum number of overlaps. The strips shall be placed to provide a minimum width of one foot of overlap for each joint. The filter fabric shall be anchored in place with securing pins of the type recommended by the fabric manufacturer. Pins shall be placed on or within 3-inches of the centerline of the overlap. The fabric shall be placed so that the upstream strip overlaps the downstream strip. The fabric shall be placed loosely so as to give and therefore avoid stretching and tearing during placement of the stones.

2. The fabric shall be protected at all times during construction from clogging due to clay, silts, chemicals or other contaminants. Any contaminated fabric or any fabric damaged during its installation or during placement of rip-rap shall be removed and replaced with uncontaminated and undamaged fabric at no expense to the City.

E. Placement of Rip-Rap

1. The rip-rap shall be placed on a 6-inch layer of soil, crushed stone or sand overlaying the filter fabric. This 6-inch layer shall be placed to maximize the contact between the soil beneath the filter fabric and the filter fabric. Rip-rap shall be placed with its top elevation conforming to the finished grades or the

natural slope of the stream bank and stream bottom.

2. The stones shall be dropped no more than 3 feet during construction.

3. Stone rip-rap shall be dumped into place to form a uniform surface and to the thickness specified on the Drawings. The thickness tolerance for the course shall be -6-inches and +12-inches. If the Drawings do not specify a thickness, the course shall be placed to a thickness of not less than 18-inches.

3.07 CLEAN-UP

A. Remove and dispose of all excess erosion and sedimentation control devices and materials when no longer needed or at the completion of construction as directed by the Owner's representative.

+ + + END OF SECTION 02125 + + +

SECTION 02200
EARTHWORK

PART 1 – GENERAL

1.01 SCOPE

A. The work under this Section includes earthwork and related operations, including, but not limited to: excavating all classes of material encountered; trenching; handling; storage; transportation; and disposal of all excavated and unsuitable material; construction of fills and embankments; backfilling around structures; backfilling all pits; compacting; all sheeting; shoring and bracing; preparation of subgrades; surfacing and grading; and any other similar, incidental, or appurtenant earthwork operation which may be necessary to properly complete the Work.

B. The Contractor shall provide all services, labor, materials, and equipment required for all earthwork and related operations necessary or convenient to the Contractor for furnishing complete Work as shown on the Drawings or specified in these Contract Documents.

C. Related Work specified elsewhere:

1. Section 01410 – Testing Laboratory Services
2. Section 02705 - Removing and Replacing Pavement
3. Section 02225 – Trench Excavation and Backfill
4. Section 03301 – Concrete and Reinforcing Steel

1.02 GENERAL

A. Safety: Comply with local regulations and with provisions of the "Manual of Accident Prevention in Construction" of the Associated General Contractors of America, Inc. Occupational Safety and Health Act (OSHA) and all other applicable safety regulations.

B. The elevations shown on the Drawings as existing are taken from the best available data and are intended to give reasonable information about the existing elevations. The Contractor shall verify conditions to determine the exact quantities of excavation and fill required.

C. Earthwork operations shall be performed in a safe and proper manner with appropriate precautions being taken against all hazards.

D. All excavated and filled areas for structures, trenches, fills, topsoil areas, embankments and channels shall be maintained by the Contractor in good condition at all times until final

acceptance by the City. All damage caused by erosion or other construction operations shall be repaired by the Contractor using material of the same type as the damaged material at no cost to the City.

E. The Contractor shall control grading in a manner to prevent water running into excavations. Obstruction of surface drainage shall be avoided and means shall be provided whereby storm water can flow uninterrupted in existing open ditches or channels; other surface drains; or temporary drains.

F. No classification of excavated materials will be made, except for rock excavation. Excavation work shall include the removal and subsequent handling of all materials excavated or otherwise removed in performance of the Work, regardless of the type, character, composition or condition thereof.

G. The soil testing will be performed by the Contractor's testing laboratory. As a minimum at least one density test shall be performed for every 5,000 square feet of fill area and every two feet of fill lift.

H. Should the Owner choose to conduct its own testing, the Contractor shall make all necessary excavations and shall supply any samples of materials necessary for conducting compaction and density tests. The cost of all retests made necessary by the failure of materials supplied by the Contractor, his agents or subcontractors, to conform to the requirements of these Contract Documents shall be paid by the Contractor. Contractor shall provide at least 24 hours advance notice of earthwork operations to the Testing Laboratory. Testing Laboratory shall provide reports to the Owner's representative with copies to the Contractor certifying (and sealed by a Registered Georgia Engineer) that the earthwork is in conformance with the plans and specifications. The Testing laboratory shall witness the placement of all fill, unless otherwise directed by the Owner's representative.

I. All earthwork operations shall comply with the requirements of OSHA Construction Standards, Part 1926, Subpart P, Excavations, Trenching, and Shoring, and Subpart O, Motor Vehicles, Mechanized Equipment, and Marine Operations, and shall be conducted in a manner acceptable to the Owner's representative.

J. Stockpile Areas: Provided there is space available, stockpiling material may be on site.

1.03 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:

B. Copies of permits obtained by the Contractor for the work.

C. Test results, certification of compliance, source and samples of all imported materials.

D. Samples of fill materials to be used. Samples shall be submitted 2 weeks in advance of use and shall consist of 0.5 cubic feet of each type of material.

E. Test reports for compaction.

1.04 QUALITY ASSURANCE

Reference Standards. Comply with all Federal, State and local laws or ordinances, as well as all applicable codes, standards, regulations and/or regulatory agency requirements including the partial listing below:

A. ASTM C136, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.

B. ASTM D1556, Test Method for Density of Soils in Place by the Sand Cone Method.

C. ASTM D1557, Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb (4.5-kg) Rammer and 18-in. (457-mm Drop).

D. ASTM D3107, Test Method for Moisture Content of Soil and Soil Aggregate in Place by Nuclear Methods (Shallow Depth).

PART 2 – PRODUCTS

2.01 MATERIALS

A. Earthwork Materials

1. Controlled Fill:

   a. Proposed fill soils shall be laboratory tested prior to construction use to determine their suitability. All fill material shall be subject to the approval of the Owner's representative.

   b. Notification: For approval of imported fill material, notify the Owner's representative and Testing Laboratory at least three (3) weeks in advance of intention to import material, designate the proposed borrow area, and permit the Testing Laboratory to sample as necessary from the borrow area for the purpose of making acceptance tests to prove the quality of the material. Test results shall be submitted to the Owner's representative for approval. All fill shall be free of organic matter or debris, have a low to moderate plasticity, ($PI \leq 15$) uniform composition, and be free of rock fragments greater than three inches in dimension. Soils selected for use as fill material shall also have a standard Proctor (ASTM D 698) maximum dry density of at least 90 pounds per cubic foot.

c. All on-site fill material shall be soil exclusive of organic matter, frozen lumps or other deleterious substances.

d. It shall contain no rocks or earth clumps over 3-inches maximum in dimension.

2. Structural Fill and Structural Backfill:

a. Select on site materials may be suitable. Testing and recommendation of suitability shall be made by the Testing Laboratory and submitted by the Contractor to the Owner's representative for approval.

b. Imported material shall be sand, uniformly graded crushed rock or other select material recommended by the Testing Laboratory and submitted by the Contractor to the Owner's representative for approval. Graded aggregate base material as specified in Section 02705 is acceptable for structural fill and backfill.

c. Crushed Rock: Crushed rock used for bedding and drainage stone shall conform to the Georgia Department of Transportation Standard Specifications, Construction of Transportation Systems (GDOT Standard Specifications), Section 800 for No. 57 Stone.

3. Coarse Aggregate: Coarse aggregate shall conform to the (GDOT Standard Specifications) , Section 800 for No. 57 Stone, Group II, and shall have the following gradation:

Sieve size	Percent Passing	
1-½ inch	100	-
1 inch	95	100
¾ inch	-	-
½ inch	25	60
3/8 inch	-	-
#4	0	10
#8	0	5

4. Top Soil: Dark organic weed free loam.

B. Sheeting, Bracing and Timbering: The Contractor shall furnish, place and maintain all sheeting, bracing and timbering required to properly support trenches and other excavations in open cut and to prevent all movement of the soil, pavement, structures, or utilities outside of the trench or pit.

1. General:

a. All cofferdams, sheeting, bracing and timbering shall be designed, sealed and signed by a registered Professional Engineer in the State of Georgia at the Contractor's expense. A copy of the drawings and design computations shall be submitted to the Owner's representative for the project files.

b. Sheeting, bracing and timbering shall be so placed as to allow the Work to be constructed to the lines and grades shown on the Drawings.

c. If at any time the method being used by the Contractor for supporting any material or structure in or adjacent to any excavation is not reasonably safe the Owner's representative may require and the Contractor shall provide additional bracing and support necessary to furnish the added degree of safety. The Contractor shall provide such added bracing and support by such method as Contractor may elect to use, but the taking of such added precautions shall in no way relieve the Contractor of sole and final responsibility for the safety of lives, work and structures.

d. All sheeting and shoring in contact with the concrete or masonry shall remain in place. The sheeting or shoring above the structure may remain in place or be cut off. No sheeting shall be left in place within three feet below the ground surface.

e. There shall be no payment for sheeting, bracing, and timbering left in place.

2. Timber:

a. Timber may be substituted for steel sheet piling when approved by the Owner's representative. Timber for shoring, sheeting or bracing shall be sound and free of large or loose knots and in good condition. Size and spacing shall be in accordance with OSHA regulations.

b. Remove bracing and sheeting in units when backfill reaches the point necessary to protect the work and adjacent property. Leave sheeting in place when it cannot be safely removed. Cut off sheeting left in place below the finished ground surface by three feet.

3. Steel Sheet Piling:

Steel sheet piling shall be the continuous interlock type. The weight, depth and section modulus of the sheet piling shall be sufficient to restrain the loads of earth pressure and surcharge from existing foundations. Procedure for installation and bracing shall be so scheduled and coordinated with the removal of the earth that the ground under existing structures shall be protected against lateral or vertical

movement at all times. In addition to the drawings and computations, the Contractor shall provide closure and sealing details between sheet piling and existing facilities, as well as method of excavation within sheet piling to the Owner's representative for review before commencing with construction operations. The contractor shall be responsible for all damage to existing utilities and structures resulting from installation of sheet piling. Damage to existing utilities and/or structures resulting from installation of sheet piling shall be repaired at the Contractor's expense.

C. Other Materials: All other materials not specifically described, but required for proper completion of the work of this Section, shall be as selected by the Contractor subject to the prior approval of the Owner's representative.

D. Stockpile area: The stockpile area shown on the drawings, or as directed by the Owner's representative, shall be used to stockpile soil material for backfilling around structures and to stockpile needed topsoil.

PART 3 – EXECUTION

3.01 GENERAL

A. Benching of Slopes: When the embankment is to be placed and compacted on hillsides, or when new embankment is to be compacted against existing embankments, or when the embankment is to be built ½ width at a time, the slopes that are steeper than 4:1 as measured at right angles to the embankment shall be continuously benched over those areas as the work is brought up in layers. Benching shall be of sufficient width to permit the operation of placing and compacting equipment. Each successive cut shall begin at the intersection of the original ground and the vertical side of the previous cut. Material thus cut shall be recompacted along with the new embankment material. Proof roll subgrade prior to placement of fill material.

B. Topsoil:

1. Remove all topsoil to a depth at which subsoil is encountered, from all areas, which are to be cut to lower grades or filled.

2. Topsoil to be used for finish grading may be stored on the site. It shall be piled properly, sloped to drain and covered.

C. Bracing and Sheeting:

1. Furnish, install, and maintain all sheeting, bracing, and shoring as may be required to properly support the sides of all excavations and to prevent all movement of earth, which could in any way injure the work, adjacent property, or workmen.

2. Properly support all trenches for duct bank installation so as to conform to all pertinent rules and regulations and these Specifications. All trenches deeper than 5 feet shall be shored unless cut to the angle of repose of the excavated soils.

3. Exercise care in the removal of sheeting, shoring, bracing and timbering to prevent collapse or caving of the excavation faces being supported and damage to the work and adjacent property.

4. Do not leave any sheeting or bracing in the trench or excavation after completion of the work, unless approved or instructed by the Owner's representative. The cost of removing sheeting or bracing shall be at the Contractor's expense.

5. All sheeting and shoring in contact with concrete or masonry shall remain in place. The sheeting and shoring above the structure may remain or be cut off. No sheeting or shoring left in place shall be within three feet below the ground surface.

D. Obstructions:

1. Remove and dispose of all trees, stumps, roots, boulders, pavement, pipes andother materials encountered as required for the performance of the work. Abandoned streetcar tracks, including rails and associated materials, shall be removed to the full limits of construction and shall become the property of the City of Atlanta. Remove, handle and transport the materials as required by the City.

2. Exercise care in excavating around catch basins, inlets, manholes, piping, duct banks, underground vaults, etc.

3. Avoid removing or loosening castings or pushing dirt into structures.

4. Damaged or displaced castings shall be repaired and replaced, and dirt entering the structures during the performance of the work shall be removed at no additional cost to the City.

E. Utilities to be Abandoned:

1. When pipes, conduits, sewers or other structures are removed from the trench leaving dead ends in the ground, such ends shall be fully plugged and sealed as indicated on the Drawings.

2. Abandoned structures such as manholes, catch basins or chambers shall be entirely removed unless otherwise specified or indicated on the Drawings.

3. All materials from abandoned utilities which can be readily salvaged shall be removed from the excavation and stored on the site at a location as directed by the Owner's representative.

4. All salvageable materials will remain the property of the City unless otherwise indicated by the Owner's representative.

F. Extra Earth Excavation:

In case soft material, which, in the opinion of the Owner's representative is not suitable, is encountered in the bottom of a trench or underneath a structure, the soft material shall be removed and replaced with structural fill or coarse aggregate.

G. Cutting Paved Surfaces and Similar Improvements:

1. Remove existing pavement as necessary for installing utilities and appurtenances or as otherwise shown on the Drawings.

2. Before removing any pavement, mark the pavement neatly, paralleling pipe lines and existing street lines. Space the marks to match the width of the trench.

3. Sawcut the asphalt pavement along the marks before breaking away from the part of pavement that should remain.

4. Do not pull pavement with machines until completely broken and separated from pavement to remain.

5. Do not disturb or damage the adjacent pavement. If the adjacent pavement is disturbed or damaged, remove and replace the damaged pavement. Refer to 02705 for removal and replacement of pavement.

   NOTE: No additional payment will be made for removing and replacing damaged adjacent pavement.

6. Remove and replace sidewalks disturbed by construction for their full width and to the nearest undisturbed joint.

7. The Contractor may tunnel under curbs that are encountered. Remove and replace any curb disturbed by construction to the nearest undisturbed joint.

H. Dewatering:

1. The proposed dewatering plan shall be submitted by the Contractor to the Owner's representative for approval at least ten (10) working days prior to the beginning of any excavation.

2. Furnish, install, maintain and operate necessary pumping and other equipment for dewatering the various parts of the Work and for maintaining the foundation and other parts free from water as required for constructing each part of the Work.

3. By the use of well points, pumps, tile drains or other approved methods, the Contractor shall prevent the accumulation of water in excavated areas. Should water accumulate, it shall be promptly removed.

4. Excavations shall be continuously dewatered to maintain a ground water level no higher than 3 feet below the lowest point in the excavation.

5. Piezometric observation wells shall be required, to monitor the ground water level, to insure proper dewatering prior to excavation below the static water table. The number of wells required will vary depending on the size and depth of structures and shall be included in the plan.

6. The cost for all dewatering and discharge shall be at the Contractor's expense and shall be considered incidental.

3.02 EXCAVATION

A. Method:

1. All excavation shall be by open cut from the surface except as indicated on the Drawings.

2. All excavations for appurtenances and structures shall be made in such manner and to such depth and width as will give ample room for building the structures and for bracing, sheeting, and supporting the sides of the excavation, for pumping and draining groundwater and wastewater which may be encountered, and for the removal from the trench of all materials excavated.

3. Water shall not be allowed to accumulate in excavations. Contractor shall provide sufficient temporary pumping to assure that surface and ground waters do not saturate foundation soils.

4. Take special care so that soil below the bottom of the structure to be built is left undisturbed.

B. Grades:

1. Excavate to lines and grades indicated on the Drawings.

2. Where excavation grades are not indicated on the Drawings, excavate as required to accommodate installation.

C. Disposal of Excavated Material:

1. Remove and legally dispose of all excavated material not needed to complete filling, backfilling, and grading.

2. Dispose of excess excavated material at locations secured by the Contractor and in accordance with all requirements of federal, state, county and municipal regulations. No debris of any kind shall be deposited in any stream or body of water, or on any street or alley. No debris shall be deposited on any private property except by written consent of the property owner. In no case shall any material be left on the Project site, or be buried in embankments or trenches on the Project site. With recommendation of the Testing Laboratory and approval by the Owner's representative, demolished, crushed concrete may be acceptable for use in fill areas.

3. Excavated materials shall be placed adjacent to the work to be used for backfilling as required.

4. Excavated materials shall be placed sufficiently back from the edge of the excavation to prevent caving of the trench wall, to permit safe access along the trench and to not cause any drainage problem. Excavated material shall be placed so as to not damage existing landscape or man-made improvements. Surcharging of any bank is not allowed.

D. Rock Excavation:

1. Rock excavation shall mean rock requiring drilling and blasting that occupies an original volume of at least one (1) cubic yard. Rock shall be considered as material which cannot be removed with a crawler tractor equal to a D-8 Caterpillar, equipped with a single-tooth ripper or by an excavator trackhoe equal to a Caterpillar 225 rated with a ¾ cubic yard capacity with a bucket curling pullout capacity of 25,000 pounds.

2. Where rock is encountered within the excavation for structures, it shall be excavated to the lines and grades indicated on the Drawings or as otherwise directed by the Owner's representative. The Contractor shall be responsible for obtaining any blasting permits required.

3. If excess excavation is made or the material becomes disturbed so as to require removal below final subgrade elevations or beyond the prescribed limits, the resulting space shall be refilled with Class B concrete in accordance with Section 03301.

3.03 EXCAVATING FOR STRUCTURES

A. Excavation:

1. All excavation is unclassified and shall be included in the Contractor's Base Bid.

2. Excavation shall include all substances to be excavated. Excavation for structures shall be to limits not less than 2 feet outside wall lines, to allow for formwork and inspection.

3. Where rock excavation is carried below grade the Contractor shall backfill to grade using concrete or structural fill.

4. Where unsuitable material is encountered excavate material to a depth acceptable to the Owner's representative and fill with compacted structural fill as required.

B. Excavation for Foundations: Footings and slabs on grades shall rest on undisturbed earth, rock or compacted materials to insure proper bearing.

1. Unsuitable Foundation Material

a. Any material in the opinion of the Owner's representative which is unsuitable for the foundation shall be removed and replaced with coarse aggregate or structural fill material as directed by the Owner's representative.

b. No determination of unsuitability will be made until all requirements for dewatering are satisfactorily met.

2. Foundation in Rock: Foundations for a structure shall be on similar materials. Should excavation for a foundation be partially in rock, the Contractor shall undercut that portion of the rock 12-inches and bring the excavation to grade with compacted crushed stone.

C. Construction Observations:

All excavations should be examined by the Owner's representative prior to reinforcing steel placement to verify that the design bearing pressure is available. All excavations should be clean, level and free of ponded water, mud and loose, frozen or water-softened soils. If it is necessary for an excavation to remain open overnight, or if rain is imminent, a 3-to 4-inch thick "mud mat" of Class B concrete may be placed in the bottom of the excavation to protect the bearing soils until reinforcing steel and concrete can be placed.

D. Unsuitable Bearing:

If unsuitable bearing for foundations is encountered at the elevations indicated on the Drawings, the Owner's representative shall be notified immediately.

3.04 EXCAVATION BELOW GRADE AND REFILL

If the bottom of any excavation is taken out below the limits shown on the Drawings or specified, it shall be refilled to the bottom grade, at the Contractor's expense, except where rock or unsuitable soil is encountered. The refill shall be 6-inch layers of structural fill or other material satisfactory to the Owner's representative. The type of material to be used shall be the Owner's representative's option.

3.05 BACKFILL AND FILL PLACEMENT

A. Compaction of fill shall be accomplished by placing the fill material in horizontal lifts of eight-inches (8") maximum loose thickness and mechanically compacting each lift to at least the specified dry density.

B. All fill placement shall be witnessed by an experienced soils technician of the Testing Laboratory and fill density and moisture tests for each lift shall be performed to verify that the specified degree of compaction is being achieved.

C. Prior to placement of any material in embankments, the area within embankment limits shall be stripped of topsoil and all unsuitable materials removed as described under Excavation. Area to receive fill shall then be scarified to a depth of at least 6-inches.

D. The fill shall be brought to the proposed elevation by placing and compacting only approved fill materials upon a subgrade approved by the Owner's representative.

E. Fill materials shall be placed in continuous approximately horizontal layers extending the full width of the embankment cross-section and the full dimension of the excavation where practicable.

F. The fill shall be placed at a moisture content that corresponds to a +/- 3% of the optimum moisture content, as determined by the standard Proctor moisture-density relationship test.

G. Compaction:

1. The fill shall be uniformly compacted to a dry density that corresponds to at least 95% of the standard Proctor maximum dry density (ASTM D 698) of the fill soil.

2. The upper twelve-inches (12") of fill beneath the structures and pavement areas shall be compacted to 98% of the standard Proctor maximum dry density.

3. Scarification and recompacting of the upper fill soils immediately prior to the slab-on-grade and/or pavement construction shall be required.

4. Compaction of embankments shall be by sheepsfoot rollers with staggered uniformly spaced knobs and suitable cleaning devices. The projected area of each knob and the

number and spacing of the knobs shall be such that the total weight of the roller and ballast when distributed over the area of one (1) row of knobs shall be 250 psi. Placement and compaction of materials shall extend beyond the final contours sufficiently to insure compaction of the material at the resulting final surface. Final contours shall then be achieved by a tracked bulldozer or grader shaping the face of the embankment.

5. The backfill placement in trenches and behind structures shall be uniformly compacted to a dry density that corresponds to at least 95% of the standard Proctor maximum dry density (ASTM D 698) of the fill soil. In confined areas requiring portable compaction equipment the fill material shall be placed in horizontal lifts of four-inches (4") maximum loose thickness.

6. If tests indicate that density of backfill fill is less than that specified, the area shall be either be recompacted or undercut, filled, and compacted until specified density is achieved.

H. Final Grading: Upon completion of construction operations, the area shall be graded to finish contour elevations and grades shown on the Drawings. Graded areas shall be made to blend with remaining ground surfaces. All surfaces shall be left smooth and free to drain.

I. Moisture:

1. If fill material is too wet, provide and operate approved means to assist the drying of the fill until suitable for compaction.

2. If fill material is too dry, provide and operate approved means to add moisture to the fill layers.

J. Proofrolling:

1. All areas where pavement or structures are to be built on compacted fill and other areas where indicated on the Drawing, shall be proofrolled to detect soft spots prior to the placement of fill material or construction of foundations.

2. Proofrolling shall consist of the moving a 20-30 ton loaded dump truck or pneumatic tire roller over the subgrade after the subgrade is shaped. Proofrolling shall be witnessed by the Owner's representative.

3. Pneumatic-tired rollers shall have not fewer than four pneumatic tired wheels which shall be of such size and ply that tire pressures can be maintained between 80 and 100 pounds per square inch for 25,000 pound wheel load during rolling operations. Unless otherwise required, rolling shall be done with tires inflated to 90 psi. The roller wheels shall be located abreast in a rigid steel frame. Each wheel shall be

loaded with an individual weight box so that each wheel will bear an equal load when traversing uneven ground. The weight boxes shall be suitable for ballast loading such that the load per wheel shall be 25,000 pounds. The spacing of the wheels shall insure that the distance between the nearest edges of adjacent tires shall be not greater than one-half of the tire width of a single tire at the operating pressure for a 25,000 pound wheel load. The roller shall be operated not faster than 5 feet/second.

4. Subgrade shall be proofrolled with 6 passes. Depressions that develop during the proofrolling operation shall be filled with suitable material and those filled areas shall be proofrolled with 6 passes. If, after having been filled and proofrolled, the subgrade still contains depressions, the soil shall be undercut to the full depth of the soft material or 5 feet whichever is less, backfilled, and rolled to achieve a compacted subgrade.

5. After the proofrolled subgrade has been accepted by the Owner's representative, the surface of the subgrade shall be finish rolled with a smooth steel wheel roller weighing not less than 10 tons. Finished surface of the subgrade shall be within a tolerance of 0.04 feet at every point.

6. Conduits, pipes, culverts and underdrains shall be neither disturbed nor damaged by proofrolling operations. Rollers shall neither pass over, nor approach closer than 5 feet to conduits, pipes, culverts and underdrains unless the tops of those facilities are deeper than 3 feet.

K. During wet or rainy periods, aeration (drying) shall be required to reduce the fill materials to the required moisture condition. During dry periods, water shall be added to achieve the proper moisture content for compaction. Silty soils, which are wet, shall require aeration prior to compaction even during dry periods.

3.06 BACKFILLING AROUND STRUCTURES

A. General:

1. Remove debris from excavations before backfilling.

2. Do not backfill against foundation walls and other concrete structures until at least 21 days after concrete construction has been completed and when concrete testing indicates that the concrete has reached the specified compressive strength, unless otherwise directed by the Owner's representative.

3. Wherever possible, backfilling shall be simultaneous on both sides of walls to equalize lateral pressures.

4. Do not backfill on only one (1) side of vertically spanning walls unless walls are adequately shored or permanent construction is in place to furnish lateral support on both top and bottom of the wall.

3.07 GRADING

A. General:

1. Perform all rough and finish grading required to attain the elevations indicated on the Drawings.

2. Perform rough grading to an accuracy of plus or minus 0.10 feet.

B. Grading Around Buildings: Control the grading around buildings so the ground is pitched to prevent water from running into the excavated areas of a building or damaging other site features.

C. Treatment After Completion of Grading:

1. After grading is completed, permit no further excavation, filling or grading, except with the approval of the Owner's representative.

2. Use all means necessary to prevent the erosion of freshly graded areas during construction and until such time as permanent drainage and erosion control measures have been installed.

3.08 EXCESS WATER CONTROL

A. Unfavorable Weather:

1. Do not place, spread or roll any fill material during unfavorable weather conditions.

2. Do not resume operations until moisture content and fill density are satisfactory to the Owner's representative.

3. Any inundated area that freezes shall be removed and refilled at the Contractor's expense.

B. Provide berms or channels to prevent flooding of the subgrade. Promptly remove all water collected in depressions.

C. Pumping, Drainage and Dewatering:

1. Provide, maintain and use at all times during construction adequate means and devices to promptly remove and dispose of all water from every source entering the excavations or other parts of the Work.

2. Dewater by means, which will insure dry excavations, preserve final lines and grades, and do not disturb or displace adjacent soil.

3. All pumping and drainage shall be done with no damage to property or structures and without interference with the rights of the public, owners of private property, pedestrians, vehicular traffic or the work of other contractors, and in accordance with all pertinent laws, ordinances, and regulations.

4. Do not overload or obstruct existing drainage facilities.

3.09 SETTLEMENT

A. The Contractor shall be responsible for all settlements of backfill, fills, and embankments, which may occur within one (1) year after final acceptance of the Work by the City.

B. The Contractor shall make, or cause to be made, all repairs or replacements made necessary by settlement within thirty (30) days after receipt of written notice from the Owner's representative.

3.10 CLEANING

Upon completion of the work of this Section, remove all rubbish, trash and debris resulting from construction operations. Remove surplus equipment and tools. Leave the site in a neat and orderly condition acceptable to the Owner's representative, and in conformance with the General Conditions of the Contract Documents.

+++END OF SECTION 02200+++

SECTION 02201
SITE PREPARATION

PART 1 - GENERAL

1.01 SCOPE

A. This section covers the work necessary to remove all interfering or objectionable material from the areas shown on the Plans, designated in these Specifications, as directed by the Engineer, or as necessary to complete the Work. Site preparation required in temporary easement areas shall be approved by the Engineer before commencing Work, unless specified otherwise in these Specifications.

B. Site preparation includes, but is not limited to, removing from the site of the Work, trees, stumps, roots, brush, structures, abandoned utilities, trash, debris, and all other materials found on or near the surface of the ground in the site of the Work and understood by generally accepted engineering practice not to be suitable for construction of the type contemplated. Precautionary measures that prevent damage to existing features to remain are part of the Work.

C. Site preparation activities shall be coordinated with temporary and permanent erosion and sediment control procedures.

D. Related Work Specified Elsewhere:

1. Section 02125 - Temporary and Permanent Erosion and Sedimentation Control

2. Section 02200 – Earthwork

3. Section 02920 – Site Restoration

1.02 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:

1. The Contractor shall submit the disposal agreement and release to the Engineer.

1.03 REGULATORY REQUIREMENTS

A. The Contractor shall comply with applicable codes, ordinances, rules, and regulations and laws of local, municipal, state, or federal authorities having jurisdiction over the Work. All required permits of a temporary nature shall be obtained for construction operations by the Contractor.

B. Open burning will not be allowed.

PART 2 - PRODUCTS

2.01 EQUIPMENT

A. The Contractor shall furnish equipment of the type normally used in site preparation activities including, but not limited to, tractors, trucks, loaders, and root rakes.

PART 3 - EXECUTION

3.01 SITE INVESTIGATION

A. The Contractor shall verify that existing plant life designated to remain is tagged or identified.

B. The Contractor shall identify an area for placing removed material and inform the Engineer for his approval.

C. The Contractor shall make test holes when necessary for locating underground obstructions. The Contractor shall notify the Georgia Utilities Protection Center in accordance with applicable Georgia law.

3.02 PROTECTION

A. The Contractor shall identify the locations of all utilities in the project area.

B. Where utilities are to be crossed, they shall be uncovered by hand excavation methods before other excavation near them is started. The Contractor shall coordinate all utility locations with the utility owner and the Georgia Utilities Protection Center. Every pipe for water, gas, drainage, or other use, and every conduit, foundation, or other underground structure encountered shall be carefully protected from damage or displacement.

C. The Contractor shall not remove vegetation which has been marked or identified to be saved by the Engineer. If any vegetation so marked appears to be in conflict with areas to be cleared, the Contractor shall inform the Engineer for his decision.

D. The Contractor shall protect benchmarks and survey control points around the site of the Work.

E. As shown on the Drawings or when directed by the Engineer, the Contractor shall provide fences to protect trees to remain at the site of the Work.

F. The Contractor shall protect slopes and control erosion in accordance with the requirements of Section 02125. The Contractor shall be responsible for the prevention and control of soil erosion and gullying as a result of the construction. The Contractor shall prevent excessive erosion within the project area. Ground where the soil has been exposed shall be revegetated with grass. Slopes in channel relocations shall be seeded and fertilized above the water line. Fill slopes shall be provided with adequate slope protection as detailed on the Plans or as directed by the Engineer. All soil left within the easement areas and right-of-way shall be leveled off, dressed out, and seeded in a manner that will permit the ground surface to return to a natural state where approved by the Engineer.

G. Construction operations shall be planned and conducted in such a manner so as to prevent adverse impact on streams, lakes, and reservoirs with sediment or other harmful material used in the construction of the project. The Contractor shall comply with all regulations of the

Environmental Protection Agency and the Georgia Department of Natural Resources, Environmental Protection Division (EPD).

H. The discharge ends of all channel relocations shall be aligned to provide direct flow into existing stream beds without an abrupt direction change.

3.03 DUST CONTROL

A. The Contractor shall control dust in accordance with the requirements of the General Conditions of the Contract Document.

3.05 SITE CLEARING AND GRUBBING

A. Prior to starting construction operations, the Contractor shall remove all vegetative growth, debris, and other objectionable matter standing or lying on the surface within the limits of the areas to be excavated or filled; and shall demolish and remove such buildings and other structures as are specifically designated on the Plans for removal.

B. Clearing shall be performed to provide access and to ensure the safety of employees working at the site of the Work.

C. The Contractor shall remove trees and plants in a manner so as to prevent injury to remaining trees, plants, and structures, which are to be preserved. All stumps shall be completely removed and disposed of in accordance with the requirements of this section.

D. The Contractor shall remove undergrowth and deadwood without disturbing subsoil. The Contractor shall not bury any vegetation or debris.

E. The Contractor shall saw cut along neat lines for removal of paving, curbs and gutters as required to perform the Work.

F. Materials to be cleared, grubbed, and removed from the site of the Work include, but are not limited to, all trees, stumps, roots, brush, trash, organic matter, paving, miscellaneous structures, debris, and abandoned utilities.

G. Grubbing shall consist of completely removing roots, stumps, trash, and other debris from all graded areas so that topsoil is free of roots and debris. Topsoil is to be left sufficiently clean so that further picking and raking will not be required.

H. All stumps, roots, foundations, and planking embedded in the ground shall be removed and disposed of. Piling and butts of utility poles shall be removed to a minimum depth of two (2) feet below the limits of excavation for structures, trenches, and roadways or two (2) feet below finish grade, whichever is lower.

I. Landscaping features shall include, but are not necessarily limited to, fences, cultivated trees, cultivated shrubbery, property corners, man-made improvements, and subdivision and other signs within the right-of-way and easement. The Contractor shall take extreme care in moving landscape features and promptly re-establishing these features.

J. Surface rocks and boulders shall be grubbed from the soil and removed from the site of the

Work if not suitable or required as riprap.

K. Where tree limbs interfere with utility wires, or where the trees to be felled are in close proximity to utility wires, the tree shall be taken down in sections to eliminate the possibility of damage to the utility.

L. Any work pertaining to utility poles shall comply with the requirements of the appropriate utility.

M. All fences adjoining any excavation or embankment that, in the Contractor's opinion, may be damaged or buried, shall be carefully removed, stored, and replaced. Any fencing that, in the Engineer's opinion, is significantly damaged shall be replaced with new fence material to match the existing fence.

N. The Contractor shall exercise special precautions for the protection and preservation of trees, cultivated shrubs, sod, fences, etc. situated within the limits of the construction area but not directly within excavation and/or fill limits. The Contractor shall be held liable for any damage caused by the Contractor's operations.

O. The Contractor shall be responsible for all damages to existing improvements resulting from the Contractor's operations.

3.06 REMOVAL OF EXISTING STRUCTURES AND MATERIALS

A. All existing structures encountered within the established lines, grades, or trenching sections shall be removed by the Contractor, unless such existing structures are otherwise specified to be relocated, adjusted up or down, salvaged, abandoned in place, reused in the Work, or to remain in place.

B. Should the Contractor encounter an existing structure (above or below ground) in the site of the Work for which the disposition is not indicated on the Plans, the Engineer shall be notified prior to disturbing such structure. The disposition of existing structures so encountered will be determined by the Engineer in accordance with the provisions of the Contract.

C. It is intended that all existing materials or structures that may be encountered (within the lines, grades, or trenching sections established for completion of the Work) be utilized in the Work if they are suitable and acceptable to the Engineer. Such existing materials or structures which are not suitable or acceptable for use in the Work shall be disposed of as specified in this section.

3.07 TOPSOIL STRIPPING

A. The Contractor shall remove topsoil from areas to be further excavated or graded.

B. Excavated soil shall be stockpiled at an area approved by the Engineer. Stockpiled soil shall be protected from erosion.

C. The Contractor shall not excavate wet soil.

3.08 BURNING OF MATERIAL ON THE SITE OF THE WORK

A. Burning of material on the site of the Work, is not permitted.

3.09 MATERIAL STORAGE AND DISPOSAL

A. The Contractor shall stockpile excavated material off site within five (5) days of its removal from the excavation, to the satisfaction of the Engineer, until required for backfill or fill. The Contractor shall place, grade, and shape stockpiles for proper drainage and erosion control.

B. All materials removed during site preparation and by excavation which are suitable for the purpose shall be used whenever practical for backfilling and for such other purposes as may be shown on the Plans or directed by the Engineer. All materials not used for such purposes shall be considered as waste materials and disposed of by the Contractor in an approved manner.

E. The Contractor shall locate and retain soil materials away from the edge of excavations. The Contractor shall not store soil materials within drip line of trees indicated to remain.

G Fuels, oils, bitumen, or other greasy or chemical substances originating from construction operations shall not be allowed to enter or be placed where it may contaminate soil, groundwater, or surface water.

H. On completion of any part of the Work, proper disposal shall be made of all surplus or unused materials left within the construction limits of such work and the surface of the Work shall be left in a neat and workmanlike condition.

I. Where materials are to be disposed of on private property, the Contractor shall furnish to the Engineer a copy of a written release (Chain of Custody) signed and approved by the private property owner, allowing the Contractor to dispose of the waste material on that private property, prior to beginning disposal operations.

J. All waste material resulting from site preparation and excavation activities shall be disposed of in accordance with the regulations established by the United States Environmental Protection Agency (EPA), the Georgia Department of Natural Resources, Environmental Protection Division (EPD), and in a manner approved by the Engineer.

K. Spoil areas shall be seeded in accordance with the requirements of Section 02920 - Site Restoration.

3.10 REMOVAL AND MANAGEMENT OF CONTAMINATED AND HAZARDOUS MATERIALS

A. If contaminated material is encountered during site preparation, abandonment, excavation, trenching, or any other activities at the site of the Work, the Contractor shall immediately notify the Engineer. Contaminated material shall be removed and managed in accordance with applicable Federal, State, and local laws and regulations.

3.11 DISPOSAL OF DEBRIS

A. The debris resulting from site preparation operations shall be hauled to a disposal site secured by the Contractor and shall be disposed of in accordance with all requirements of Federal, State, and local laws and regulations. No debris of any kind shall be deposited in any stream or body of water, or in any street or alley. No debris shall be deposited upon any private

property except with written consent of the property owner. In no case shall any material or debris be left on the site of the Work, shoved onto abutting private properties, or buried on the site of the Work.

+++END OF SECTION 02201+++

SECTION 02223
EXCAVATION BELOW NORMAL GRADE AND CRUSHED STONE REFILL

PART 1 GENERAL

1.01 SCOPE

A. If in the opinion of the Owner's representative, the material at or below the normal grade of the bottom of the trench is unsuitable for the foundation, it shall be removed to the depth directed by the Owner's representative and replaced with crushed stone. Normal grade of trench bottom is defined as follows:

Pipe Diameter (Inches)	Normal Grade below Pipe (Inches)
8 - 21	8
24 or greater	12

B. Normal grade below manholes, vaults and other structures shall be 12-inches.

C. The pipe bedding material is not included in the Scope of this Section.

PART 2 PRODUCTS

2.01 MATERIALS

A. Crushed Stone shall be as specified in Section 02225.

PART 3 EXECUTION

3.01 EXCAVATION AND DRAINAGE

A. Whatever the nature of unstable material encountered or the ground water conditions, drainage in excavations shall be complete and effective.

B. If the Contractor excavates below grade through error or for his own convenience, or fails to properly dewater the excavation, or disturbs the sub grade before dewatering is sufficiently complete, he may be directed by the Owner's representative to excavate below grade as set forth in the preceding paragraph, in which case the work excavating below grade and finishing and placing the refill shall be performed at the Contractor's own expense.

3.02 REFILL

A. If the material at the level of trench bottom is unsuitable for foundations, the Owner's representative may require compaction of the unsuitable soil. The Owner's representative may also require the removal of the unsuitable material to such depth and width as he may direct and be replaced with crushed stone.

+++ END OF SECTION 02223 +++

SECTION 02225
TRENCH EXCAVATION AND BACKFILL

PART I GENERAL

1.01 SCOPE

A. The Contractor shall furnish all labor, materials, equipment, and incidentals required to perform all excavation and backfill required to complete the work as shown on the Drawings and as specified herein. The work shall include, but not be necessarily limited to, excavation and backfill for pipe and appurtenances, manholes and vaults, backfill and compaction, disposal of surplus and unsuitable material and all related work such as sheeting and bracing and dewatering.

B. Work shall also include the removal of trees, stumps, brush, debris or other obstacles which remain after clearing and grubbing operations, which may obstruct the work, and the removal of all other materials, including rock, to the extent necessary to install the pipe and appurtenances in conformance with the lines and grades shown on the Drawings and as specified herein.

C. Backfill shall include the refilling and compaction of the fill in the trenches and excavations up to the surrounding ground surface.

D. The trench is divided into five specific areas:

1. Foundation: The area beneath the bedding, sometimes also referenced to as trench stabilization.

2. Bedding: The area above the trench bottom (or foundation) and below the bottom of the barrel of the pipe.

3. Haunching: The area above the bottom of the barrel of the pipe up to a specified height above the bottom of the barrel of the pipe.

4. Initial Backfill: The area above the haunching material and below a plane 12-inches above the top of the barrel of the pipe.

5. Final Backfill: The area above a plane 12-inches above the top of the barrel of the pipe.

E. The choice of method, means, techniques, and equipment rests with the Contractor. The Contractor shall select the method and equipment for trench excavation and backfill depending upon the: type of material to be excavated and backfilled, the depth of excavation, the amount of space available for operation of equipment, storage of

excavated material, proximity of man-made improvements to be protected and available easement or right of way.

1.02 QUALITY ASSURANCE

A. Reference Standards: The Contractor shall comply with the applicable provisions and recommendations of the latest editions of the following standards, except as otherwise shown on the Drawings or specified herein.

1. ASTM C33 – Standard Specification for Concrete Aggregates
2. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
3. ASTM D698 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3)
4. ASTM D4253 – Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using A Vibratory Table
5. ASTM D6938 – Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
6. ASTM D1556 – Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
7. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil using Modified Effort (56,000 ft-lbf/ft^3)
8. ASTM D2937 – Standard Method for Density of Soil in Place by the Drive-Cylinder Method

B. Density: All references to "maximum dry density" shall mean the maximum dry density defined by ASTM D698, except that for cohesionless, free draining soils "maximum dry density" shall mean the maximum index density as determined by ASTM D4253. Determination of the density of foundation, bedding, haunching, or backfill materials in place shall meet with the requirements of ASTM D1556, ASTM D6938 or ASTM D2937.

C. Sources and Evaluation Testing: Testing of materials to certify conformance with the Specifications shall be performed by an independent testing laboratory.

1.03 SUBMITTALS

A. The Contractor shall submit record documents in accordance with the requirements of the General Conditions. The Contractor shall record locations of all pipelines installed referenced to survey benchmarks. The Contractor shall also include the locations of all underground utilities encountered and/or rerouted. The Contractor shall provide dimensions, materials, elevations, inverts and direction of flow. The Contractor shall use GPS technology or conventional survey methods to locate utilities.

1.04 SAFETY

A. Perform all trench excavation and backfilling activities in accordance with the Occupational Safety and Health Act of 1970 (PL 91-596), as amended. The Contractor shall pay particular attention to the Safety and Health Regulations Part 1926, Subpart P "Excavations" as described in OSHA publication 2226.

1.05 TESTING

A. Testing shall be performed by an approved independent laboratory.

B. Compaction testing shall be performed in accordance with the requirements of ASTM D1556 or ASTM D6938.

PART 2 PRODUCTS

2.01 TRENCH FOUNDATION MATERIALS

A. Crushed Stone: Crushed stone shall be utilized for trench foundation (trench stabilization) and shall meet the requirements of the GDOT Standard Specifications, Section 800.01, Group I (limestone, marble, or dolomite) or Group II (quartzite, granite, or gneiss). Stone size shall be between No. 57 and No. 4, inclusive.

2.02 BEDDING AND HAUNCHING MATERIALS

A. Water Mains

1. Unless specified otherwise, bedding and haunching materials shall be suitable materials that have been excavated from the trench and have been approved by the Owner's representative for use as pipe bedding and haunching. Materials. shall be clean and free of rock larger than 2-inches at its largest dimension, organics, cinders, stumps, limbs, frozen earth or mud, man-made wastes and other unsuitable materials.

2. Crushed stone, if utilized for bedding and haunching, shall meet the requirements of the GDOT Standard Specifications Section 800.01, Group I (limestone, marble, or dolomite) or Group II (quartzite, granite, or gneiss). Stone size shall be between No. 57 and No. 4, inclusive.

B. Sewers and Storm Drains: Crushed stone utilized for bedding and haunching shall meet the requirements of the GDOT Standard Specifications Section 800.01, Group I (limestone, marble, or dolomite) or Group II (quartzite, granite, or gneiss). Stone size shall be between No. 57 and No. 4, inclusive.

C. Filter Fabric - Non-Woven Type

1. Filter fabric associated with bedding shall be a UV stabilized, spunbonded, continuous filament, needle-punched, polypropylene, non-woven geotextile.

2. The fabric shall have an equivalent open size (EOS or AOS) of 120 - 70. The fabric shall also conform to the minimum property values listed in the following table:

Fabric Property	Unit	Test Procedure	Average Value	
			Typical	Minimum
Weight	oz/yd^2	ASTM D 3776	8.3	
Thickness	mils	ASTM D 1777	105	
Grab Strength	lbs.	ASTM D 4632	240	210
Grab Elongation	%	ASTM D 4632	>50	50
Tear Strength	lbs.	ASTM D 4533	100	85
Mullen Burst	psi	ASTM D 3786	350	320
Puncture Resistance	lbs.	ASTM D 4833	115	100
Permittivity	sec^{-1}	ASTM D 4491	1.7	
Water Permeability	cm/sec	ASTM D 4491	0.4	
Water Flow Rate	gpm/ft^2	ASTM D 4491	120	
UV Resistance (500 hrs)	%	ASTM D 4355	>85	
pH			2 - 13	

3. If ordered by the Owner's representative, the filter fabric manufacturer shall furnish the services of a competent factory representative to supervise and/or inspect the installation of pipe. This service will be furnished for a minimum of 10 days during initial pipe installation.

4. Filter fabric shall be equal to Polyfelt TS 700, Trevira 1125 or SuPac 7-MP.

2.03 INITIAL BACKFILL

A. Initial backfill material shall be crushed stone or earth materials as specified for bedding and haunching materials.

B. Earth materials utilized for initial backfill shall be suitable materials selected from materials excavated from the trench. Suitable materials shall be clean and free of rock larger than 2-inches at its largest dimension, organics, cinders, stumps, limbs, frozen earth or mud, man-made wastes and other unsuitable materials. Should the material excavated from the trench be saturated, the saturated material may be used as earth material, provided it is allowed to dry properly and it is capable of meeting the specified

compaction requirements. When necessary, initial backfill materials shall be moistened to facilitate compaction by tamping.

C. If materials excavated from the trench are not suitable for use as initial backfill material, provide select material conforming to the requirements of this Section.

2.04 FINAL BACKFILL

A. Final backfill material shall be general excavated earth materials, shall not contain rock larger than 2-inches at its greatest diameter, cinders, stumps, limbs, man-made wastes and other unsuitable materials.

B. If materials excavated from the trench are not suitable for use as final backfill material, provide select material conforming to the requirements of this Section.

2.05 SELECT BACKFILL

A. Select backfill shall be materials that meet the requirements as specified for bedding, haunching, initial backfill or final backfill materials, including compaction requirements.

2.06 CONCRETE

A. Concrete for bedding, haunching, initial backfill, or encasement shall have a compressive strength of not less than 3,000 psi, with not less than 5.5 bags of cement per cubic yard and a slump between 3 and 5-inches. Ready-mixed concrete shall be mixed and transported in accordance with ASTM C94. Reinforcing steel shall conform to the requirements of ASTM A615, Grade 60.

2.07 FLOWABLE FILL

A. Controlled strength flowable fill shall be used as trench backfill only when authorized, in writing, by the Owner's representative.

B. Controlled low strength flowable fill shall conform to Section 600 of the GDOT Standard Specifications .

C. Flowable fill design mix shall be for "excavatable" fill. Design mix shall be submitted to the Owner's representative for approval in accordance with Section 600.3.03 of the GDOT Standard Specifications.

2.08 GRANULAR MATERIAL

A. Granular material, where required for trench backfill, shall be sand, river sand, crushed stone or aggregate, pond screenings, crusher run, recycled concrete, or other angular material. Granular material shall meet gradation requirements for Size No. 57 or finer.

2.09 GRADED AGGREGATE BASE

A. Graded aggregate base shall be Class "A" meeting the requirements of the GDOT Standard Specifications, Section 815.01.

PART 3 EXECUTION

3.01 TRENCH EXCAVATION

A. Topsoil and grass shall be stripped a minimum of 6-inches over the trench excavation site and stockpiled separately for replacement over finished graded areas.

B. Trenches shall be excavated to the lines and grades shown on the Drawings with the centerlines of the trenches on the centerlines of the pipes and to the dimensions which provide the proper support and protection of the pipe and other structures and accessories.

C. Trench Width:

1. The sides of all trenches shall be vertical to a minimum of one foot above the top of the pipe. Unless otherwise indicated on the Drawings, the maximum trench width shall be equal to the sum of the outside diameter of the pipe plus two feet. The minimum trench width shall be that which allows the proper consolidation of the haunching and initial backfill material.

2. Excavate the top portion of the trench to any width within the construction easement or right-of-way which will not cause unnecessary damage to adjoining structures, roadways, pavement, utilities, trees or private property. Where necessary to accomplish this, provide sheeting and shoring.

3. Where rock is encountered in trenches, excavate to remove boulders and stones to provide a minimum of 12-inches clearance between the rock and any part of the pipe, manhole, vault or other structure.

D. Trench Depth:

1. The trenches shall be excavated to the required depth or elevation which allow for the placement of the pipe and bedding to the dimensions and elevations shown on the Drawings.

2. Where rock is encountered in trenches for pipelines, excavate to the minimum depth which will provide a clearance below the pipe barrel of 8-inches for pipe 21-inches in diameter and smaller and 12-inches clearance for larger pipe, manholes and other structures. Remove boulders and stones to provide above minimum clearances between the rock and any part of the pipe, manhole, vault or other structure.

E. Excavated Materials:

1. Excavated materials shall be placed adjacent to the work to be used for backfilling as required. Top soil shall be carefully separated and lastly placed in its original location.

2. Excavated material shall be placed sufficiently back from the edge of the excavation to prevent caving of the trench wall, to permit safe access along the trench and not cause any drainage problems.

3. Excavated material shall be placed so as not to damage existing landscape features or man-made improvements and also allow access to valves and hydrants.

3.02 SHEETING, SHORING AND BRACING

A. Sheeting, shoring and bracing is specified in Section 02150.

B. Protection of the excavation against caving or settling of the banks shall be the sole responsibility of the Contractor. The Contractor shall protect the sides of his excavation by sheeting and bracing as may be necessary. No actions or instructions by the Owner's representative shall be regarded as the responsibility for security of the trench or the surrounding areas. The full responsibility remains with the Contractor.

C. The Contractor shall furnish, put in place and maintain sheeting and bracing required to support the side of the excavation and prevent loss of ground which could damage or delay the work or endanger adjacent structures or vehicular traffic. If the Owner's representative is of the opinion that at any point sufficient or proper supports have not been provided, he may order additional supports placed at the expense of the Contractor. Compliance with such order shall not relieve the Contractor from his responsibility for the sufficiency of such supports. Care shall be taken to prevent

voids outside of the sheeting, but if voids are formed, they shall be immediately filled and rammed.

D. The Contractor shall leave in place to be imbedded in the backfill of the trench, all wood sheeting, bracing and other related items as shown on the Drawings, or which the Owner's representative may direct him in writing to leave in place at any time during the progress of the work for the purpose of preventing injury to structures, utilities, or property, whether public or private. The Owner's representative may direct that timber used for sheeting and bracing in the trench be cut off at any specified elevation, after backfilling and tamping has reached this level.

E. All sheeting and bracing not left in place shall be carefully removed in such manner as not to endanger the construction of other structures, utilities or property, whether public or private.

F. The right of the Owner's representative to order sheeting and bracing left in place shall not be construed as creating any obligation on his part to issue such orders, and his failure to exercise his right to do so shall not relieve the Contractor from liability for damages to persons or property occurring from or upon the work occasioned by negligence or otherwise, growing out of a failure on the part of the Contractor to leave in place in the trench sufficient sheeting and bracing to prevent any caving or moving of the ground adjacent to the sides of the trench.

G. The Contractor shall receive no payment, other than that included in the price to be paid for pipe, for any extra timber used for sheeting, bracing and other related items. The Contractor shall receive no payment for such timber which was used for the convenience of the Contractor.

3.03 TEST PITS

A. Test pits for the purpose of locating underground utilities or structures as an aid in establishing the precise location of new work may be excavated by the Contractor. Test pits shall be backfilled as soon as the desired information has been obtained. The backfilled surface shall be maintained in a satisfactory condition for travel until resurfaced as hereinafter specified.

B. Excavation and backfill of test pits shall be considered work incidental to the project and the cost shall be included in the appropriate bid item.

C. If, for any reason, a test pit is left open for any period of time, it shall be properly barricaded and lighted by the Contractor.

3.04 ROCK EXCAVATION

A. Definition of Rock: Any material which, in the opinion of the Owner's representative, cannot be excavated with conventional excavating equipment, and must be removed by drilling and blasting.

B. Blasting:

1. Exhaust other practical means of excavating prior to utilizing blasting as a means of excavation. Provide licensed, experienced workmen to perform blasting. Conduct blasting operations in accordance with all existing ordinances and regulations. Protect all buildings and structures from the effects of the blast. Repair any resulting damage. If the Contractor repeatedly uses excessive blasting charges or blasts in an unsafe or improper manner, the Owner's representative may direct the Contractor to employ an independent blasting consultant to supervise the preparation for each blast and approve the quantity of each charge.

2. Refer to Section 02020, Use of Explosives

C. Removal of Rock: Dispose of rock off site that is surplus or not suitable for use as rip rap or backfill.

D. The Contractor shall notify the Owner's representative prior to any blasting. Additionally, the Contractor shall notify the City and local fire department before any charge is set.

E. Following review by the Owner's representative regarding the proximity of permanent buildings and structures to the blasting site, the Owner's representative may direct the Contractor to employ an independent, qualified specialty sub-contractor, approved by the Owner's representative, to: monitor the blasting by use of a seismograph; identify the areas where light charges must be used, conduct pre-blast and post-blast inspections of structures, including photographs or videos; and maintain a detailed written log.

3.05 DEWATERING EXCAVATIONS

A. Dewater excavation continuously to maintain a water level two feet below the bottom of the trench.

B. Control drainage in the vicinity of excavation so the ground surface is properly pitched to prevent water running into the excavation.

C. There shall be sufficient pumping equipment, in good working order, available at all times, to remove any water that accumulates in excavations. Where the utility crosses natural drainage channels, the work shall be conducted in such a manner that

unnecessary damage or delays in the prosecution of the Work will be prevented. Provision shall be made for the satisfactory disposal of surface water to prevent damage to public or private property.

D. In all cases, accumulated water in the trench shall be removed before placing bedding or haunching, laying pipe, placing concrete or backfilling.

E. Where dewatering is performed by pumping the water from a sump, crushed stone shall be used as the medium for conducting the water to the sump. Sump depth shall be at least two feet below the bottom of the trench. Pumping equipment shall be of sufficient quantity and/or capacity to maintain the water level in the sump two feet below the bottom of the trench. Pumps shall be a type such that intermittent flows can be discharged. A standby pump shall be required in the event the operating pump or pumps clog or otherwise stop operation.

F. Dewater by use of a well point system when pumping from sumps does not lower the water level two feet below the trench bottom. Where soil conditions dictate, the Contractor shall construct well points cased in sand wicks. The casing shall be jetted into the ground, followed by the installation of the well point, filling casing with sand and withdrawing the casing.

3.06 TRENCH FOUNDATION AND STABILIZATION

A. The bottom of the trench shall provide a foundation to support the pipe and its specified bedding. The trench bottom shall be graded to support the pipe and bedding uniformly throughout its length and width.

B. If, after dewatering as specified above, the trench bottom is spongy, or if the trench bottom does not provide firm, stable footing and the material at the bottom of the trench will still not adequately support the pipe, the Owner's representative may determine that the trench bottom is unsuitable and the Owner's representative may then order trench stabilization by directing the Contractor to over excavate trench bottom and fill with crushed stone.

C. Where the replacement of unsuitable material with crushed stone does not provide an adequate trench foundation, the trench bottom shall be excavated to a depth of at least two feet below the specified trench bottom. Place filter fabric in the bottom of the trench and support the fabric along the trench walls until the trench stabilization, bedding, haunching and pipe have been placed at the proper grade. The ends of the filter fabric shall be overlapped above the pipe.

D. Where trench stabilization is provided, the trench stabilization material shall be compacted to at least 95 percent of the maximum dry density, unless shown or specified otherwise.

3.07 BEDDING AND HAUNCHING

A. Prior to placement of bedding material, the trench bottom shall be free of any water, loose rocks, boulders, or large dirt clods.

B. Bedding material shall be placed to provide uniform support along the bottom of the pipe and to place and maintain the pipe at the proper elevation. The initial layer of bedding placed to receive the pipe shall be brought to the grade and dimensions indicated on the Drawings. All bedding shall extend the full width of the trench bottom. The pipe shall be placed and brought to grade by tamping the bedding material or by removal of the excess amount of the bedding material under the pipe. Adjustment to grade line shall be made by scraping away or filling with bedding material. Wedging or blocking up of pipe shall not be permitted. Applying pressure to the top of the pipe, such as with a backhoe bucket, to lower the pipe to the proper elevation or grade shall not be permitted. Each pipe section shall have a uniform bearing on the bedding for the length of the pipe, except immediately at the joint.

C. At each joint, excavate bell holes of ample depth and width to permit the joint to be assembled properly and to relieve the pipe bell of any load.

D. After the pipe section is properly placed, add the haunching material to the specified depth. The haunching material shall be shovel sliced, tamped, chinked or otherwise consolidated to provide uniform support for the pipe barrel and to fill completely the voids under the pipe, including the bell hole. Prior to placement of the haunching material, the bedding shall be clean and free of any water, loose rocks, boulders, or dirt clods.

E. Pipe Bedding:

1. The Contractor shall furnish and install pipe on the type and thickness of bedding as shown on the Drawings or as specified by the Owner's representative.

2. Pipe bedding requirements for large water transmission mains shall be as specified in Section 02667.

F. Manholes, Vaults and Other Structures: Excavate to a minimum of 12-inches below the planned elevation of the base of the manhole, vault or structure. Place and compact crushed stone bedding material to the required grade before constructing the manhole, vault or structure.

G. Compaction:

1. Bedding and haunching materials under pipe, manholes, vaults, structures and accessories shall be compacted to a minimum of 95 percent of the maximum dry density, unless shown or specified otherwise.

2. Bedding and haunching materials within the limits of restrained joint pipe shall be compacted to a minimum of 95 percent of the maximum dry density, unless shown or specified otherwise.

3.08 INITIAL BACKFILL

A. Initial backfill shall be placed to anchor the pipe, protect the pipe from damage by subsequent backfill and ensure the uniform distribution of the loads over the top of the pipe.

B. Place initial backfill material carefully around the pipe in uniform layers to a depth of at least 12-inches above the pipe barrel. Layer depths shall be a maximum of 6-inches for pipe 18-inches in diameter and smaller and a maximum of 12-inches for pipe larger than 18-inches in diameter.

C. Backfill on both sides of the pipe simultaneously to prevent side pressures.

D. Compact each layer thoroughly with suitable hand tools or tamping equipment.

E. Initial backfill shall be compacted to a minimum 95 percent of the maximum dry density, unless shown or specified otherwise. Initial backfill within the limits of restrained joint pipe shall be compacted to a minimum 95 percent of the maximum dry density, unless shown or specified otherwise.

F. If materials excavated from the trench are not suitable for use as backfill materials, provide select backfill material conforming to the requirements of this Section for initial backfill.

3.09 CONCRETE ENCASEMENT FOR PIPELINES

A Where concrete encasement is shown on the Drawings for pipelines, excavate the trench to provide a minimum of 12-inches clearance from the barrel of the pipe. Lay the pipe to line and grade on solid concrete blocks or solid bricks. In lieu of bedding, haunching and initial backfill, place concrete to the full width of the trench and to a height of not less than 12-inches above the pipe bell. Do not backfill the trench for a period of at least 24 hours after concrete is placed.

3.10 FINAL BACKFILL

A. Backfill carefully to restore the ground surface to its original condition.

B. The top 6-inches of backfill shall be topsoil or graded aggregate base material, depending upon the trench location.

C. Excavated material which is unsuitable for backfilling, and excess material, shall be disposed of in a manner approved by the Owner's representative. Surplus soil may be

neatly distributed and spread over the site, if approved by the Owner's representative, except that surplus soil shall not be distributed and spread over the site in areas under Corps of Engineers jurisdiction. If such spreading is allowed, the site shall be left in a clean condition and shall not affect pre-construction drainage patterns. Surplus rock from the trenching operations shall be removed from the site.

D. If materials excavated from the trench are not suitable for use as backfill materials, provide select backfill material conforming to the requirements of this Section.

E. Pipelines: After initial backfill material has been placed and compacted, backfill with final backfill material. Place backfill material in uniform layers, compacting each layer thoroughly as follows:

1. In 6-inch layers, if using light power tamping equipment, such as a "jumping jack"

2. In 12-inch layers, if using heavy tamping equipment, such as hammer with tamping feet

F. Manholes, Vaults and other Structures:

1. Backfilling shall be carried up evenly on all walls of an individual structure simultaneously. A variation of 2-feet in elevation will be the maximum allowable. Backfill shall not be allowed against walls until they and their supporting slabs, if applicable, have attained sufficient strength. Backfill shall be subject to the approval of the Owner's representative.

2. In locations where pipes pass through walls, the Contractor shall take the following precautions to consolidate the backfill up to an elevation of at least 2-feet above the bottom of the pipe:

   a. Place fill in such areas for a distance of not less than 3-feet either side of the centerline of the pipe in level layers not exceeding 6-inches in depth.
   b. Thoroughly compact each layer with a power tamper to the satisfaction of the Owner's representative.

3. Temporary bracing shall be provided as required during construction of all structures to protect partially completed structures against construction loads, hydraulic pressure and earth pressure. The bracing shall be capable of resisting all loads applied to the walls as a result of backfilling.

G. Final backfill shall be compacted to a minimum 95 percent of the maximum dry density, unless specified otherwise. Final backfill underlying pavement and backfill under dirt and gravel roads and within the limits of restrained joint pipe shall be compacted to a minimum 95 percent of the maximum dry density, unless specified otherwise.

H. Concrete or bituminous asphalt removed during construction shall not be placed in backfill.

I. The surface of filled areas shall be graded to smooth true lines in conformance with the grades or elevations shown on the Drawings.

3.11 ADDITIONAL MATERIAL

A. Where final grades above the pre-construction grades are required to maintain minimum cover, additional fill material will be as shown on the Drawings. Utilize excess material excavated from the trench, if the material is suitable. If excess excavated materials are not suitable, or if the quantity available is not sufficient, provide additional suitable fill material.

3.12 BACKFILL WITHIN RIGHT-OF-WAYS

A. Compact backfill within the limits of the any right-of-way including the backfill underlying pavement and sidewalks, and backfill under dirt and gravel roads to a minimum 95 percent of the maximum dry density.

3.13 BACKFILL WITHIN GEORGIA DOT RIGHT-OF-WAY

A. Backfill within the Georgia DOT right-of-way shall meet the requirements stipulated in the "Utility Accommodation Policy and Standards", published by the Georgia Department of Transportation.

3.14 FLOWABLE FILL

A. Where flowable fill is utilized, excavate the trench to provide a minimum of 6-inches clearance on either side of the pipe barrel. Lay the pipe to line and grade on solid concrete blocks or bricks. In lieu of bedding, haunching and initial backfill, place flowable fill to the full width and depth of the trench.

B. Flowable fill shall be protected from freezing for a period of 36 hours after placement. Minimum temperature of flowable fill at point of delivery shall be 50 degrees F.

3.15 COMPACTED GRANULAR MATERIAL

A. Where compacted granular material is required as initial and final backfill material, it shall be placed after bedding and haunching material specified elsewhere has been placed. Compacted granular material shall be compacted to a minimum 95 percent of the maximum dry density.

3.16 TESTING AND INSPECTION

A. The soils testing laboratory is responsible for compaction tests in accordance with

paragraph 1.02 of this Section.

B. Compaction tests:

1. Compaction tests will be required in existing or proposed streets, sidewalks, driveways and other existing or proposed paved areas at varying depths and at intervals as determined by the Owner's representative.

2. Minimum requirements for compaction testing shall be a minimum of one (1) test for each 400 feet or less of pipeline and one (1) test at each manhole, vault and other structure unless soil conditions or construction practices, in the opinion of the Owner's representative, warrant the need for additional tests. One (1) complete compaction test shall consist of individual tests in the same vertical plane over the installed pipe, beginning at a depth of 2-feet above the top of the pipe and at successive two feet vertical increments up to the top of the backfill.

3. The Owner's representative shall direct where additional compaction tests will be performed along the Project route.

C. The soils testing laboratory shall be responsible for inspecting and testing stripped site, sub grades and proposed fill materials.

D. The Contractor's duties relative to testing include:

1. Notifying laboratory of conditions requiring testing.
2 Coordinating with laboratory for field testing.
3. Providing excavation as necessary for laboratory personnel to conduct tests.
4. Paying costs for additional testing performed beyond the required scope.
5. Paying costs for re-testing where initial tests reveal non-conformance with specified requirements.

E. Inspection

1. Earthwork operations, acceptability of excavated materials for bedding or backfill, and placing and compaction of bedding and backfill shall be subject to inspection by the Owner's representative.

2. Foundations and shallow spread footing foundations shall be inspected by a geotechnical engineer, who shall verify suitable bearing conditions.

F. Contractor shall comply with applicable codes, ordinances, rules, regulations and laws of local, municipal, state and federal authorities having jurisdiction.

+++ END OF SECTION 02225 +++

SECTION 02302
GRANITE CURB

PART 1 GENERAL

1.01 SCOPE

A. Work under this Section furnishing all labor, materials, equipment and incidentals required to install prefabricated granite curb, curb corners, transition curb and curb inlets as specified herein and as shown on the Drawings.

B. The Contractor shall also be responsible for removing and replacing the existing granite curb as specified herein and as directed by the Owner's representative.

1.02 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:

1. 2 samples of finished product granite curb. Samples shall show anticipated color variations of grain structure, inclusions and other visual characteristics.

2. No final cutting or finishing shall be made until the sample is approved by the Owner's representative.

1.03 QUALITY ASSURANCE

A. Reference Standards: The Contractor shall comply with the applicable provisions and recommendations of the latest editions of the following standards, except as otherwise shown on the Drawings or specified herein.

1. ASTM C170 – Test Method for Compressive Strength Of Dimension Stone

2. ASTM C615 – Standard Specification for Granite Dimension Stone

3. ASTM C880 – Test Method for Flexural Strength of Dimensional Stone

1.04 DEFECTIVE WORK

A. Any piece of granite showing manufacturing flaws or imperfections upon receipt on the job site shall be referred to the Owner's representative for a determination on its suitability for installation. If rejected by the Owner's representative, it shall be immediately removed from the job site.

PART 2 PRODUCTS

2.01 MATERIALS

A. Granite Curb

1. Stone curb shall be granite and shall comply with ASTM C615.

2. The granite shall be sound, durable and free from cracks or seams which impair its structural integrity and of a smooth splitting and machining character. The granite curb shall be approved granite curb and shall match exactly the existing curbs in color, texture and size.

3. Granite curb shall be not less than 3-feet or more than 8-feet in length, 16-inches in depth and matched width at the top or 6-inches wide.

4. Granite curb shall have a saw finish on the top with no projections or depressions greater than 1/8-inch.

5. The front of curb shall be split face and have a batter finished surface. The granite shall have no projections or depressions greater than 1/4-inch to grade line. The remainder of the face shall be free from projections greater than 1-inch.

6. The back of the curb shall be parallel to the face and shall have no projections or depressions which exceed a batter of 1-inch in 3-inches from the top.

7. The ends for the full width of the stone curb shall be close jointed, square to the top and face. The remainder of the end shall be cut so that there will be a close joint.

8. The bottom of the stones shall be square.

B. Concrete: Concrete shall be 3000 psi as specified in Section 03301, Concrete and Reinforcing Steel.

PART 3 EXECUTION

3.01 SETTING GRANITE CURB

A. Curb trenches shall be opened to their full width and depth well in advance of the setting of the curb. The foundation for the curb shall be concrete. The bottom layer of concrete shall be 6-inches thick. The concrete in front and back of the curb shall be deposited simultaneously to the required height.

B. Curb shall be set with close joints. The top front edge of the curb shall present an unbroken line and the face a plane surface with a batter of 1 to 12.

C. The curb at the corners of intersecting joints shall be of the same quality as the curb hereinbefore specified and shall be set in the same manner. On curbs, where drainage inlets are located, special shaped stones as may be required shall be furnished and set. At wheelchair ramps and wherever required, transition curb shall be furnished and set.

3.02 REMOVING AND REINSTALLING EXISTING GRANITE CURB

A. In locations where existing granite curb conflicts with pipe installation and hydrant removal and replacement, the Contractor shall remove the existing curb.

B. The Owner's representative will determine whether any granite curb that removed is acceptable for reinstallation.

C. Removed curb approved for reinstallation shall be cleaned and stored by the Contractor until reinstallation.

D. Reinstallation of curb shall include saw cutting the existing pavement a minimum of 1-inch, removing pavement to subgrade, excavation of base and subgrade as necessary to install the curb, installing the curb and backfilling and compacting the completed installation.

E. Any curb that is damaged by the Contractor, which renders it unsuitable for reinstallation, as determined by the Owner's representative, shall be removed from the site and be replaced with new curb by the Contractor at no additional cost to the Owner.

+++ END OF SECTION 02302 +++

SECTION 02371

GREEN INFRASTRUCTURE GEOTEXTILES

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. Section includes furnishing and installation of geotextile for layer separation and filtration in stormwater quality facilities including subsurface drainage and infiltration features as indicated on the Drawings. This section does not include geotextiles for subgrade stabilization.

1.02 REFERENCES

A. American Association of State Highway and Transportation Officials (AASHTO):

1. AASHTO M288, Geotextile Specification for Highway Applications

B. ASTM International:

1. ASTM D 4354, Standard Practice for Sampling of Geosynthetics for Testing
2. ASTM D 4355, Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus
3. ASTM D 4491, Standard Test Methods for Water Permeability of Geotextiles by Permittivity
4. ASTM D 4533, Standard Test Method for Trapezoid Tearing Strength of Geotextiles
5. ASTM D 4632, Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
6. ASTM D 4751, Standard Test Method for Determining Apparent Opening Size of a Geotextile
7. ASTM D 4873, Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples
8. ASTM D 6241, Standard Test Method for the Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe

1.03 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the Contract Documents.

B. Submit the following for review and approval prior to shipment of geotextile products to the Site:

1. Manufacturers' descriptive documentation (including material properties sheets) for each product.

2. Sample of each geotextile product.

C. Submit the following for review and approval at time of shipment of each product:

1. The manufacturers' quality control certifications (including results of source quality control testing of the products as specified in subsection 2.01) to verify that the materials supplied for the project are in compliance with all product specifications in this Section. The certifications shall be signed by a responsible party employed by the manufacturer, such as the QA/QC Manager, Production Manager, or Technical Services Manager. Certifications shall include lot and roll numbers, and corresponding shipping information.

1.04 QUALITY ASSURANCE

A. Installer's Qualifications: The geotextile installer shall have successfully installed at least 5,000 square feet of geotextile in a similar application on at least two separate projects.

B. Manufacturer's Qualifications: The manufacturer(s) shall have at least five years experience in the manufacture of geotextiles of the type specified.

1.05 DELIVERY, STORAGE AND HANDLING

A. Product rolls shall be marked or tagged with manufacturer's name, product identification, lot number, roll number, and roll dimensions.

B. Procedures for storage and handling of geotextile shall conform to ASTM D 4873 and the manufacturer recommendations, including the following:

1. Continuously and uniformly support rolls on a prepared surface elevated above grade away from traffic areas. Cover rolls with tarp for protection from sun, dirt and other deleterious conditions if the protective wrap around the geotextile is damaged.

2. No hooks, tongs, or other sharp instruments shall be used for handling the geotextile. Geotextile rolls shall not be lifted by use of cables or chains in contact with the products.

C. Geotextile shall be inspected upon delivery and during installation. Geotextile that is damaged by the Contractor to the extent that it is no longer usable shall be removed from the Site and replaced with new material.

PART 2 PRODUCTS

2.01 SOURCE QUALITY CONTROL

A. Quality control testing of each geotextile product shall be performed by the manufacturer prior to shipment in accordance with ASTM D 4354.

B. For manufacturer's quality control testing of each geotextile product, the sample average test results (weaker principle direction for mechanical tests) for a particular property for any individual roll tested within a lot designated as first quality shall meet or exceed the Minimum Average Roll Value indicated in the manufacturer's certification.

2.02 GEOTEXTILE PRODUCTS

A. All geotextile products shall be resistant to ultraviolet degradation and biological and chemical environments normally found in soils.

B. Geotextile to be installed as separation geotextile shall be a continuous filament polypropylene nonwoven needle-punched fabric, Survivability Class 1 (as defined in AASHTO M 288), meeting or exceeding the following specifications:

Property	**Test Method**	**Test Value[1]**
Grab Tensile Strength	ASTM D 4632	202 lb
Grab Tensile Elongation	ASTM D 4632	50 %
Trapezoid Tear Strength	ASTM D 4533	79 lb
Puncture (CBR) Strength	ASTM D 6241	433 lb
Permittivity	ASTM D 4491	1.3 sec^{-1}
AOS	ASTM D 4751	0.18 mm (max.)
Ultraviolet Resistance (% strength retained at 500 hours)	ASTM D 4355	50 %

Notes:

[1] Minimum Average Roll Value (unless otherwise noted) in weakest principal direction

PART 3 EXECUTION

3.01 PREPARATION

A. Prepare subgrade for geotextile as specified in applicable sections and as shown on the Drawings.

B. Surfaces to receive geotextile shall be free of litter, sharp protrusions, and large stones.

3.02 GEOTEXTILE INSTALLATION

A. Geotextile shall not be deployed until the required submittals specified in subsection 1.03 are submitted to and approved by the Owner's representative. If the material does not meet project specifications, it shall be removed at no additional cost to the Project.

B. Geotextile shall be placed where shown on the Drawings, and installed in such a manner that placement of overlying material will not excessively stretch or tear the geotextile. Anchor geotextile as necessary to prevent wind uplift and displacement by other causes.

C. Place nonwoven geotextile on the prepared sides of trenches and other indicated areas for separation and filtration at the required locations and to the limits indicated on the Drawings.

D. Overlapping of adjacent panels without seaming will be allowed for installation of geotextile unless otherwise specified. Overlaps of adjacent rolls of geotextile and at the top of aggregate backfill shall be approximately one foot.

E. On curves, the geotextile may be folded or cut to conform to the curves. Folds and overlaps shall be shingled in the direction of construction or downslope, as applicable.

F. Where indicated, geotextile shall be joined by seaming as specified in the following paragraphs. All seams shall be subject to approval by the Owner's representative.

1. Geotextile required to be seamed shall be overlapped and sewn along the entire length of joints in accordance with manufacturer's recommendations, and sufficient to prevent opening of seams by wind action or soil deployment.

2. Seams shall be continuously sewn, unless otherwise recommended by the manufacturer and approved by the Owner's representative.

3. The minimum distance from the geotextile edge to the stitch line nearest the edge shall be three inches, unless otherwise recommended by the manufacturer.

4. The thread at the end of each seam run shall be tied off to prevent unraveling. Seams shall be on the top side of the geotextile to allow inspection.

5. Discontinuities over six inches in length shall be sewn with an extra line of stitching, with 18 inches of stitch overlap.

G. Bury the upper edges of geotextile a minimum of six inches below grade at outer edges of installed material.

3.03 PLACEMENT OF COVER MATERIALS

A. Cover geotextile as soon as possible after installation and approval. Installed geotextile shall not be left exposed for more than seven days.

B. At no time, shall construction equipment come into direct contact with the installed geotextile. Damage to geotextile shall be repaired as specified in subsection 3.04 prior to placement of cover material.

C. Place the required cover material specified in other sections and to the thickness and limits indicated on the Drawings.

D. At least a 12-inch thick layer of cover material shall be maintained between placement equipment and installed geotextile when spreading the material. Unless otherwise specified, place the material using lightweight tracked equipment which will produce maximum loads not greater than eight pounds per square inch.

E. Use care in placing the cover material to avoid damaging or displacing geotextile. Any damage to the geotextile caused by the Contractor's activity shall be repaired.

3.04 GEOTEXTILE REPAIR

A. Holes or tears in the geotextile shall be repaired with a patch of the same material, unless otherwise recommended by the manufacturer and approved by the Owner's representative.

B. Geotextile patches shall be sized to cover a minimum of two feet beyond the limits of the damaged area in all directions.

END OF SECTION

SECTION 02510
ASPHALT PAVING

PART 1 - GENERAL

1.01 SCOPE:

A. The work under this Section includes, but it is not necessarily limited to, the furnishing and installation of all asphalt paving materials and pavement base materials as indicated on the Drawings and as necessary for the proper performance of this work.

B. Related Work Specified Elsewhere:

1. Section 02200, Earthwork.

1.02 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:

1. Batch design.
2. Density and viscosity tests on each run.
3. Weight slips for pavement base and asphalt paving materials.

1.03 QUALITY ASSURANCE:

A. Unless otherwise indicated on the Drawings or herein specified, all work under this Section shall be performed in accordance with the current edition of the Georgia Department of Transportation "Standard Specifications, Construction of Transportation Systems" (GDOT Standard Specifications).

B. Furnish weight slips for all material incorporated in the Project to verify chat the required tonnage has been applied.

1.04 PRODUCT HANDLING:

A. Protection: Use all means necessary to protect the materials of this Section before, during and after installation and to protect the installed work and materials of all other trades.

B. Replacement: In the event of damage, immediately make all repairs and replacements necessary to gain the approval of the Owner's representative at no additional cost to the City.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. General: All materials and products for the work under this Section shall conform to the current GDOT Standard Specifications except as otherwise specified herein.

B. Graded Aggregate Base: The sub-base shall be a minimum of 6-inches thick and a width equal to the width of the finished paving. Aggregate base shall be Class A meeting the requirements of the GDOT Standard Specifications, Section 815.01. Compact to at least 95% Standard Proctor Density. (ASTM D-698)

C. Base: The base for all paved roadways shall conform to the requirements of the GDOT Standard Specifications for the Hot Mix asphalt, Section 828 Type "B".

D. Surface Course: The surface course for all pavement, including paint or tack coat when required by the Owner's representative, shall conform to the requirements of the GDOT Standard Specifications for Asphaltic Concrete, Section 828, Type "E".

E. Prime coat shall be in accordance with Section 412 of the GDOT Standard Specifications.

F. Tack coat shall conform to Section 413 of the GDOT Standard Specifications.

PART 3 - EXECUTION

3.01 EXCAVATING. FILLING AND GRADING:

Perform excavating and filling in accordance with Section 02200 entitled "Earthwork" of these Specifications.

3.02 INSTALLATION:

A. Asphaltic construction shall be performed in accordance with Section 400 of the GDOT Standard Specifications.

B. Place each course in the required quantities so that when compacted, they will conform to the indicated grade, cross section and minimum thickness as specified or as indicated on the Drawings.

3.03 CLEANING:

A. Prior to acceptance of the work of this Section, clean the pavement and related areas in accordance with the requirement s of the General Conditions of the Contract

Documents.

+++ END OF SECTION 02510 +++

SECTION 02521
CONCRETE SIDEWALKS, CURBS AND GUTTERS

PART 1 - GENERAL

1.01 SCOPE

A. Work described in this Section includes furnishing all labor, materials, equipment, tools and incidentals required for construction of concrete sidewalks, concrete monolithic sidewalk and curb, concrete header curb, concrete curb, concrete gutter and concrete combined curb and gutter, which shall consist of monolithic curb and gutter respectively, all constructed of Portland cement concrete, at the locations, and to the lines, grades, cross section, form and dimensions indicated on the Drawings.

B. Cement concrete sidewalks, concrete monolithic sidewalk and gutter, concrete header curb, concrete curb, concrete curb, gutter and combined curb and gutter shall include all necessary excavation, unless otherwise indicated, and subgrade preparation; backfilling, and final clearing up; and completion of all incidentals thereto, as indicated on the Drawings or as directed by the Owner's representative.

C. Related Work Specified Elsewhere:

1. Section 02200, Earthwork.
2. Section 02510, Asphalt Paving.
3. Sectiion 02933, Seeding and Sodding.
3. Section 03301, Concrete and Reinforcing Steel.

1.02 PRODUCT HANDLING

A. Protection: Use all means necessary to protect concrete materials before, during and after installation and to protect the installed work and materials of all other trades.

B. Replacement: In the event of damage, immediately make all repairs and replacements necessary for the approval of the Owner's representative at no additional cost to the City.

1.03 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents.

PART 2 - PRODUCTS

2.01 CONCRETE REINFORCEMENT

A. Concrete reinforcement shall conform to Section 03301.

2.02 CONCRETE AND RELATED MATERIALS

A. General: Concrete and related materials including, but not necessarily limited to, joint materials, membranes and curing compounds shall conform to Section 03301.

B. Class: All concrete shall be Class B 3,000 psi and conform to requirements of Section 03301.

C. Water used in mixing concrete shall be fresh, clean, potable water free from injurious amounts of oil, acid, alkali, vegetable, wastewater and/or organic matter.

D. Admixtures shall meet the following requirements:

1. Except as herein specified, no curative or hardening admixtures shall be used.
2. An air entrainment agent capable of providing 3 to 6 percent air shall be used. Air entraining admixtures which are added to concrete mixtures shall conform to ASTM C 260 for Air Entraining Admixtures for Concrete.

F. Sub-base shall be constructed of durable material such as bank-run gravel. Minimum depth of sub-base shall be 3-inches.

G. Joint filler shall be a non-extruding joint material conforming to AASHTO M21 3 for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (non-extruding and resilient bituminous types). The filler for each joint shall be furnished in a single piece for the full depth and width required for the joint unless otherwise specified by the Owner's representative.

PART 3 - EXECUTION

3.01 EARTHWORK

A. General: All earthwork shall be performed in accordance with Section 02200, Earthwork, and as specified in this Section.

B. Backfilling

1. After the subgrade for sidewalks is compacted and at the proper grade, spread 3 inches or more of sub-base material. Sprinkle with water and compact by rolling or other approved method. Top of the compacted gravel shall be at the proper level to receive the concrete.

2. After the concrete has set sufficiently, the spaces on both sides of the curb, gutter, and combined curb and gutter shall be backfilled, and the materials compacted and left in a neat and workmanlike condition.

3. Curbs to be used in the construction of asphalt pavements shall be backfilled prior to placement of base material for asphalt pavement.

3.02 SUBGRADE PREPARATION

A. The subgrade shall be formed by excavating to the required depth below the finished surface of the respective types, in accordance with the dimensions and designs indicated on the Drawings or as directed by the Owner's representative, and shall be of such width as to permit the proper installation and bracing of forms. The subgrade shall be compacted by hand tamping and all soft, yielding or unsuitable material shall be removed and backfilled with satisfactory material and again compacted thoroughly to 98% of dry density per ASTM 698 and finished to a smooth and unyielding surface. The finished grade shall be to the dimensions and design indicated on the Drawings or as directed by the Owner's representative for the bottom of the proposed construction.

3.03 CONCRETE CURB AND GUTTER CONSTRUCTION

A. Construct curbs to lines and grade shown or established by the Owner's representative. Curbs shall conform to the details shown on the Drawings.

B. Forming:

1. Forms shall be metal and of an approved section. They shall be straight, free from distortions, and shall show no vertical variation greater than □-inch in 10 feet, and shall show no lateral variation greater than ¼-inch in 10 feet from the true plane surface on the vertical face of the form.

2. Forms shall be of the full depth of the structure and be so constructed as to permit the inside forms to be securely fastened to the outside forms.

3. Securely holdsthe formsorms in place true to the lines and grades indicated on the Drawings.

4. Wood forms may be used on sharp turns and for special sections as approved by the Owner's representative.

5. Where wooden forms are used, they shall be free from warp and the nominal depth of the structure.

6. All mortar and dirt shall be removed from the forms and all forms shall be thoroughly oiled or wetted before any concrete is deposited.

7. The supply of the forms shall be sufficient to permit their remaining in place at least 12 hours after the concrete has been placed.

C. Joints:

1. Joints shall be constructed as indicated on the Drawings and as specified.

2. Construct joints true to line with their faces perpendicular to the surface of the structure and within ¼-inch of their designated position.

3. Thoroughly spade and compact the concrete at the faces of all joints to fill all voids.

4. Install expansion joint materials at the point of curve at all street returns.

5. Install expansion joint material behind the curb at abutment to sidewalks and adjacent structures.

6. Place contraction joints every 10 feet along the length of the curbs and gutters.

7. Form contraction joints using steel templates or division plates which conform to the cross section of the structure. Leave the templates in place until the concrete has set sufficiently to hold its shape, but remove them while the forms are still in place.

8. Contraction joint templates or plates shall not extend below the top of the steel reinforcement or shall be notched to permit the reinforcement to be continuous through the joint.

9. Contraction joints shall be a minimum of 1-1/2-inches deep.

D. Finishing:

1. Strike off the surface with a template, and finish the surface with a wood float using heavy pressure, after which, contraction joints shall be made and the surface finished with a wood float or steel trowel.

2. Finish the face of the curbs at the top and bottom with an approved finishing tool of the radius indicated on the Drawings.

3. Finish edges with an approved finishing tool having a 1/4-inch radius.

4. Provide a final broom finish by lightly combing with a stiff broom after troweling is complete.

5. The finished surface shall not vary more than 1/8-inch in 10 feet from the established grade.

E. Concrete Curing:

1. After finishing operations have been completed and immediately after the free water has left the surface, the surface of the structure shall be completely coated

and sealed with a uniform layer of curing compound specified in Section 03301.

2. The compound shall be applied in one or two applications as directed by the Owner's representative. When the compound is applied in two (2) increments, the second application shall follow the first application within 30 minutes.

3. The compound shall be applied continuously by means of an automatic self-propelled, pressure sprayer as approved by the Owner's representative at the rate directed by the Owner's representative, but not less than 1 gallon per 200 square feet of surface.

4. The equipment shall provide adequate stirring of the compound during application.

5. Should the method of applying the compound not produce uniform coverage, its use shall be discontinued, and the curing shall be by another method approved by the Owner's representative.

F. Protection:

1. Provide and use sufficient coverings for the protection of the concrete in case of rain or breakdown of curing equipment.

2. Provide necessary barricades and lights to protect the work and rebuild or repair to the approval of the Owner's representative. All damage caused by people, vehicles, animals, rain, the Contractor's operations and the like shall be repaired by the Contractor at no additional expense to the City.

3.04 SIDEWALK CONSTRUCTION

A. Sidewalks shall be a minimum of 4 inches thick, unless otherwise noted.

B. At locations where the new sidewalk is to abut existing concrete, sawcut concrete for a depth of 2 inches and chip the old concrete back to sound material on a straight line, clean the surface, and apply a neat cement paste just prior to pouring the new sidewalk.

C. Joint:

1. Place preformed asphalt expansion joints as in the adjacent curb, where the sidewalk ends at the curb, and around posts, poles, or other objects protruding through the sidewalk.

2. Provide contraction joints transversely to the walks at locations opposite the construction joints in the curb. These joints shall be straight and at right angles to the surface of the walk.

D. Finishing:

1. Broom the surface with a fine-hair broom at right angles to the length of the walk and tool all edges, joints, and markings. Mark the walks transversely with a jointing tool.

E. Concrete Curing

1. After the finishing operations have been completed and immediately after the free water has left the surface, the surface of the structure shall be completely coated and sealed with a uniform layer of curing compound specified in Section 03301.

2. The compound shall be applied in one or two applications as directed by the Owner's representative. When the compound is applied in two (2) increments, the second application shall follow the first application within 30 minutes.

2. The compound shall be applied continuously by means of an automatic self-propelled, pressure sprayer as approved by the Owner's representative at the rate directed by the Owner's representative, but not less than 1 gallon per 200 square feet of surface.

3.

4. The equipment shall provide adequate stirring of the compound during application.

5. Should the method of applying the compound not produce uniform coverage, its use shall be discontinued, and the curing shall be by another method approved by the Owner's representative.

F. Protection:

1. Protect the sidewalks from damage for a period of seven days.

2. All damage caused by people, vehicles, rain, animals and the Contractor, shall be repaired by the Contractor at no additional expense to the City.

3.05 REPLACEMENT CONCRETE CURB AND SIDEWALK

A. When a section is removed, the existing sidewalk or curb shall be cut to a neat line, perpendicular to both the centerline and the surface of the concrete slab. Existing concrete shall be cut along the nearest existing construction joints; if such joints do not exist, the cut shall be made at minimum distances shown on the Drawings.

B. Existing concrete sidewalks and curbs that have been cut and removed for construction purposes shall be replaced with the same width and surface as the portion removed. sidewalks shall have a minimum uniform thickness of 4-inches. The new work shall be neatly jointed to the existing concrete so that the surfaces of the new work shall form an even, unbroken plane with the existing surfaces.

C. All work shall conform to the requirements for new sidewalks and curbs as detailed in

this Section.

3.06 CLEANING

A. All excess or unsuitable material shall be disposed of as specified in Section 02200.

B. All surfaces of the Work and adjacent surfaces shall be broom clean. The contractor shall use pressure washing and other means approved by the Owner's representative to remove splashed and spilled concrete from the Work and adjacent surfaces.

C. Disturbed seeded areas shall be reseeded per the requirements of Section 02933, Seeding.

+++ END OF SECTION 02521 +++

SECTION 02535
REINFORCED CONCRETE STORM DRAIN PIPE

PART 1 GENERAL

1.01 SCOPE

A. The Contractor shall furnish all labor, materials, equipment and incidentals required to install all reinforced concrete storm drain pipe as shown on the Drawings and as specified herein.

1.02 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:

1. Product Data: The Contractor shall submit, for the approval of the Owner's representative approval, descriptive details and shop drawings covering full details of pipe, fittings, specials, joints and the assembly thereof, joint materials and details thereof, and full details and cuts of all castings to be incorporated into the Work.

2. Manufacturer's Installation Instructions: The Contractor shall submit special procedures required to install products specified.

3. Manufacturer's Certificate: The Contractor shall submit a manufacturer's certificate certifying that products meet or exceed specified requirements.

B. Submit shop drawings to the Owner's representative for review showing a complete laying plan of all pipe, including all fittings, adapters, and specials along with the manufacturer's drawings and specifications indicating complete details of all items. The pipe details shall include stationing, pipe class or design and supporting computations; and laying schedule which specifies pipe class, class coding, pipe stationing for all changes in grade or horizontal alignment, transition stations for various pipe classes and the limits of each. The above shall be submitted to the Owner's representative for review before fabrication and shipment of these items.

1.03 QUALITY ASSURANCE

A. Reference Standards: The Contractor shall comply with the applicable provisions and recommendations of the latest editions of the following standards, except as otherwise shown on the Drawings or specified herein.

1. ASTM C33 – Specification for Concrete Aggregate

2. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe

3. ASTM C150 – Standard Specifications for Portland Cement

4. ASTM C443 - Standard Specification for Joints for Concrete Pipe and Manholes using Rubber gaskets.

5. ASTM C655 – Standard Specifications for Reinforced Concrete D-Load Culvert, Storm Drain and Sewer Pipe

6. ASTM C1479 - Standard Practice for Installation of Precast Concrete Sewer, Storm Drain, and Culvert Pipe Using Standard Installations.

7. ASTM C1619 – Standard Specification for Elastomeric Seals for Joining Concrete Structures

1.04 TRANSPORTATION AND HANDLING

A. Furnish equipment and facilities for unloading, handling, distributing and storing pipe, fittings, valves and accessories. Make equipment available at all times for use in unloading. Do not drop or dump materials. Any materials dropped or dumped will be subject to rejection without additional justification.

B. Handle pipe, fittings and accessories carefully to prevent shock or damage. Handle pipe by rolling on skids, forklift or front loader. Do not use material damaged in handling.

1.05 STORAGE AND PROTECTION

A. Store all pipe which cannot be distributed along the route. Make arrangements for the use of suitable storage areas.

B. Stored materials shall be kept safe from damage. The interior of all pipes, fittings and other appurtenances shall be kept free from dirt or foreign matter at all times.

C. The pipe shall be stored per the manufacturer's recommendations.

D. Store joint gaskets in a cool location, out of direct sunlight. Gaskets shall not come in contact with petroleum products. Gaskets shall be used on a first-in, first-out basis.

1.06 ACCEPTANCE

A. Acceptance of pipe shall be on the basis of plant load-bearing tests of the pipe, material tests and inspection of manufactured pipe for visual defects and imperfections as described in paragraph 5.1.1 of ASTM C76.

B. All pipe shall be manufactured in accordance with the American Concrete Pipe Association QCast Storm Sewer quality assurance program. If pipe producer is not QCast certified, each length of pipe shall be stamped by a regular employee of an approved testing agency.

C. If producer is not QCast certified, provide results of tests on pipe, pipe materials, joint material and made-up joints by an independent testing laboratory approved by the Owner's representative. Include materials, absorption, crushing and hydrostatic leakage tests on pipe of each size in accordance with applicable specifications.

D. Inspect pipe after delivery for QCast or laboratory stamp, shape, cracks, uniformity, blisters and imperfect surfaces, hammer test, damaged ends and gasket grooves. Any pipe repaired or patched is subject to rejection if such repairs or patches, in the opinion of the Owner's representative, are not sound and properly finished.

E. The pipe shall not be shipped until it has attained full specified 28 day compressive strength.

PART 2 PRODUCTS

2.01 GENERAL

A. All reinforced concrete storm drain pipe shall conform to the requirements ASTM C76, except as specifically extended, modified or amended in this section.

B. All reinforced concrete storm drain pipe shall meet the standards for ASTM C76 Class III or as otherwise designated on the Drawings. All reinforced concrete storm drain pipe shall have a minimum of a B wall thickness unless shown otherwise on the Drawings or specified herein.

2.02 CONCRETE PIPE

A. Reinforced concrete storm drain pipe shall be manufactured in accordance with ASTM C76 and shall be furnished in not less than eight (8) foot lengths. Special pieces and closure pieces may be of shorter lengths than specified in this section. Pipe shall be manufactured wet cast, dry cast, or centrifugally cast.

B. No lifting holes shall be provided in the wall of the pipe. Care shall be exercised in handling and transporting the pipe so as to protect the full interior wall of the pipe. No inward projecting hooks or lift bars shall be used in lifting pipe. Extreme care shall be applied to handling pipe immediately after manufacture to prevent development of "cure" cracks and stress cracks due to transporting pipe before full length of curing time.

C. All reinforced concrete storm drain pipe shall be made with concrete with a twenty

eight (28) day minimum compressive strength of 4000 psi and the absorption shall not exceed nine (9) percent. All cement and aggregate shall conform to the requirements of ASTM C76. Coarse aggregate shall meet the requirements of ASTM C33 of a size that provides a workable homogeneous, high quality concrete mixture, considering the particular wall thickness. Cement, for reinforced concrete pipe, shall be Type I/II portland cement. All admixtures shall be approved by the Owner's representative prior to use. Prior to manufacturing any pipe, including test pipe, the manufacturer shall submit the proposed concrete design mix to the Owner's representative for approval. The requirements of this article shall apply to all reinforced concrete pipe manufactured under the requirements of ASTM C76 and ASTM C443.

D. Reinforcement shall consist of either wire conforming to the standard specification for deformed steel wire for concrete reinforcement (ASTM A496), welded deformed steel wire fabric for concrete reinforcement (ASTM A497), bars of intermediate grade steel conforming to standard specifications for billet steel bars for concrete reinforcement (ASTM A615, Grade 60) or from fabricated deformed steel mats for concrete reinforcing (ASTM A184). Steel areas shall be in accordance with ASTM C76. Pipe with a diameter of 42-inches and larger shall be reinforced with two (2) full circular steel cages. Elliptical steel cages or quadrant steel cages shall not be allowed. Reinforcing steel shall be positioned in accordance with the clearances specified in ASTM C76. Clearance shall be provided for the full length of the pipe from bell end to spigot end of the pipe. Steel positioning shall not vary within the forms more than +/-10% of the wall thickness or +/-one-half (1/2)-inch, whichever is greater.

E. Variations of the internal diameter of the pipe shall comply with paragraph 12.1 of ASTM C76. The planes of the ends of the pipe shall be perpendicular to the longitudinal axis of the pipe except as specified for beveled end pipe (special pieces below). The ends of the pipe shall be of such a design that the pipe, when laid, shall form a continuous conduit with smooth and uniform interior surface. Minor repairs to the pipe are allowed as outlined in accordance with ASTM C76. Minor repairs made at the point of manufacture or in the field shall be filled with a permanent non-shrinking patching compound. Mortar patching compound shall be similar and equal to Embeco 167 Mortar as manufactured by Master Builders, Thoropatch as manufactured by Thoroseal Products, or approved equal. The Owner's representative or QCast Inspector shall inspect the lengths of pipe before they are shipped to the project site and shall require the manufacturer to apply the mortar as directed. No mortar shall be applied without prior approval of the Owner's representative or QCast Inspector.

F. A record of pipe supplied for the project shall be furnished to the Owner's representative by the manufacturer. All pipe shipped to the site of the Work shall be clearly marked as to type, date of manufacture, and name or trademark of manufacturer. The historical record of pipe supplied shall be in a form approved by the Owner's representative and shall contain: class, date of manufacture, dates of inspection, date of shipment, and dates and results of compressive tests on cylinders

and cores.

G. The Contractor shall not unload the pipe from trucks at the site of the Work in a manner that might damage the pipe. The method used to unload the pipe shall be subject to the approval of the Owner's representative. It shall be the responsibility of the Contractor to assure that the pipe is manufactured, loaded, transported, unloaded, stored, and installed in a manner which does not result in damage to the pipe.

H. The Owner's representative, in accepting the pipe, does not imply that the pipe is acceptable for its intended use. The Owner's representative reserves the right to reject any and all pipe until it meets all the requirements of these specifications.

2.03 SPECIAL PIECES

A. Special pieces of pipe such as bends shall be manufactured from cut lengths of straight pipe, and shall have carry-over reinforcement across adjoining planes of a design approved by the Owner's representative.

B. Manhole pieces shall be manufactured in accordance with the details shown the Drawings or as specified on the Detail Drawings.

2.04 JOINTS

A. All joints and gaskets shall meet the requirements of ASTM C443.

2.05 SPECIAL DESIGN PIPE

A. Special designs of reinforced concrete pipe shall be in accordance with the requirements of ASTM C76 Section 7.2 - modified or special designs.

B. The pipe manufacturer shall not manufacture reinforced concrete pipe, test pipe, or produce pipe until approval has been obtained from the Owner's representative in writing. The manufacture of pipe shall have concrete cover over the inside steel cage and cover over the outside steel cage, in accordance to ASTM C76 standards, shall provide two complete circular mats of steel, and shall provide the strengths of steel as specified in this section. Pipe shall be designed per applicable sections of ASTM C76.

C. The pipe manufacturer shall be required upon receiving the order from the Contractor to submit to the Owner's representative for the Owner's representative's review and approval, the design for the classes of pipe to be manufactured. The design shall include drawings to be submitted for stamped approval. The stamped approval drawings shall be furnished to the Owner's representative for use during the manufacturing of the pipe. Manufacturing drawings shall be required for each pipe size and pipe class. The drawings shall be working drawings to reflect sizes of steel (circumferential, longitudinal, spacer, and stirrups steel) as well as steel placement.

D. Submission of certified three-edge-bearing tests already made, which are acceptable

to the Owner's representative, may be considered as verification of Special Design in lieu of D-Load tests.

E. The Owner's representative may select at random two full length joints of each class or size of pipe to be tested to D-loads that would produce applicable (ASTM C76) cracking. Tests shall be in accordance with applicable sections of ASTM C76 or as amended in this section. The test shall be performed in the presence of the Owner's representative or QCast inspector.

PART 3 EXECUTION

3.01 LAYING CONCRETE PIPE

A. Excavation for the pipe and preparation of the trench bottom, including bedding to receive the pipe, shall be done in accordance with the requirements of Section 02225, Trench Excavation and Backfill. In the preparation of the pipe bedding, the Contractor shall take into consideration any variation in thickness of the pipe wall, and the bed must be prepared to suit the particular piece of pipe to be lowered into place. Preparation of the compacted bed shall be such that when the pipe is lowered in place and pulled to secure full compressive pack of the rubber joint ring, a smooth and uniform flow line on the specified grades will be secured. An interior inspection of the sewer will be made after sufficient time has elapsed for the backfill to attain its settlement in the trench.

B. The pipe interior and joints shall be clean when lowered into the trench and shall be kept clean thereafter. The exposed ends of pipe in the trench shall be closed by suitable bulkheads at all times when pipe laying is not in progress. Each section of pipe shall be securely anchored in place before the next adjoining pipe is laid and the joint between the sections is made.

C. No tools or equipment shall be used in the laying of the pipe that will damage the pipe. The trenching equipment shall not be used to force a joint of pipe into its proper position on grade by application of pressure on top of the pipe along its partial or full length. All pipe joints shall be brought home by use of properly designed equipment for the specific purpose as approved by the Owner's representative. Pipe lengths that have received damage to wall, spigot, or socket shall be replaced or repaired to the satisfaction of the Owner's representative. Such replacement or repair shall be at the Contractor's expense.

D. The Contractor shall secure the following results with the pipe and joint used:

1. A tight joint with gasket fully compressed and joint openings completely filled.

2. Pipeline shall have a smooth and uniform interior section free from cracks, pits, voids, or crazing as defined in Sections 13 and 15 of ASTM C76.

Longitudinal and transverse cracks with a width less than 0.01-inch shall be considered hairline and minor. Seal longitudinal and transverse cracks having a width equal to or greater than 0.01-inch and less than 0.10-inch if there is displacement across the crack and the soil pH is less than 5.5. Replace pipes having longitudinal and transverse cracks greater than 0.10-inch.

E. Backfilling shall be in accordance with the requirements of Section 02225, Trench Excavation and Backfill.

3.02 CLEANING

A. At the conclusion of the work, the Contractor shall clean all pipe by flushing with water or other means to remove all dirt, stone, wood or other materials which may have entered the pipe during construction.

3.03 TESTING

A. Additional testing and inspection required for acceptability of installed storm sewers is specified in Section 02650, Testing for Acceptance of Sanitary and Storm Sewers.

3.04 CLEANUP

A. After completing each section of storm drain, the Contractor shall remove all debris and construction materials and equipment from the site of the Work; grade and smooth over the surface on both sides of the line; and leave the entire construction area in a clean and neat condition. The Contractor shall restore the site of the Work to its original or better condition.

+ + + END OF SECTION 02535 + + +

SECTION 02607
MANHOLES, JUNCTION BOXES, CATCH BASINS AND INLETS

PART 1 - GENERAL

1.01 SCOPE

A. Work described in this Section includes furnishing all labor, materials, equipment, tools and incidentals required to install cast-in-place, and precast concrete manholes, junction boxes, catch basins and inlets. The term manholes, as used, herein and shown on the Drawings includes manholes, junction boxes, catch basins and inlets. All work shall be installed, adjusted, tested and placed in operation in accordance with these Specifications, the manufacturer's recommendations and as shown on the Drawings.

B. Related Work Specified Elsewhere:
   1. Section 02200, Earthwork.
   2. Section 03301, Concrete and Reinforcing Steel.

1.02 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:

   1. Complete shop drawings and engineering data on frames, covers, steps and precast manhole sections and flotation calculations shall be submitted to the Owner's representative in accordance with the requirements of the General Conditions of the Contract Documents.

1.03 QUALITY ASSURANCE

A. Prior to delivery, all basic materials specified herein shall be tested and inspected by an approved independent commercial testing laboratory or, if approved by the Owner's representative, certified copies of test reports prepared by the manufacturer's testing laboratory will be acceptable. All materials which fail to conform to these Specifications shall be rejected.

B. After delivery to the site, any materials which have been damaged in transit or are otherwise unsuitable for use in the Work shall be rejected and removed from the site.

1.04 QUALITY STANDARDS

A. Manufacturers offering products that comply with these specifications include:
   1. Standard manhole frame and cover.
      a. Vulcan Foundry, VM-26.

b. Neenah Foundry, Series R-1700.
c. Or equal.

2. Manhole adjusting rings.
   a. Neenah Foundry, R1979-H.
   b. Higgins Foundry,.
   c. Or equal.

3. Manhole rungs.
   a. M.A. Industries.
   b. Or equal.

1.05 WARRANTY

A. Provide a warranty against defective materials and workmanship in accordance with the requirements of the General Conditions of the Contract Documents.

PART 2 - PRODUCTS

2.01 GENERAL

A. Manholes shall be constructed of specified materials to the sizes, shapes and dimensions and at the locations shown on the Drawings or as otherwise directed by the Owner's representative. The height or depth of the manhole will vary with the location, but unless shown otherwise on the Drawings, shall be such that the top of the manhole frame will be at the finished grade of the pavement or ground surface and the invert will be at the designated elevations.

2.02 MATERIALS AND CONSTRUCTION

A. Concrete and Reinforcement:

1. The concrete used in manhole and junction chamber construction shall be Class "A" concrete conforming to the requirements of Section 03301.

2. Steel reinforcement shall conform to the requirements of Section 03301.

3. Brick. The brick shall conform to the requirements of AASHTO M 91.

4. Mortar. The mortar for brick masonry and similar work shall be composed of 1 part of portland cement and 2 parts of mortar sand, by volume. The portland cement shall conform to the requirements of AASHTO M 45. Hydrated lime may be added to the mixture of sand and cement in an amount not to exceed 15 percent of the weight of cement used. The hydrated lime shall meet the requirements of ASTM C 6. The water shall be clean and free of deleterious amounts of acids, alkalies, or organic

material. If the water is of questionable quality, it shall be tested in accordance with AASHTO T 26.

B. Precast Concrete Manholes:

1. Precast concrete manholes shall consist of precast reinforced concrete sections, a conical or flat slab top section, and a base section conforming with the typical manhole details as shown on the Drawings.

2. The precast manhole section shall be manufactured, tested and marked in accordance with the latest provisions of ASTM C 478.

3. The minimum compressive strength of the concrete for all sections shall be 4,000 psi.

4. The maximum allowable absorption of the concrete shall not exceed 8 percent of the dry weight.

5. The circumferential reinforcement in the riser sections, conical top sections and base wall sections shall consist of one (1) line of steel and shall be not less than 0.17 square inches per lineal foot.

6. The ends of each reinforced concrete manhole riser section and the bottom of the manhole top section shall be so formed that when the manhole risers and the top are assembled, they will make a continuous and uniform manhole.

7. Joints of the manhole sections shall be of the tongue and groove type. Sections shall be joined using 0-ring rubber gaskets conforming to the applicable provisions of ASTM C443, latest revision, or filled with an approved preformed plastic gasket meeting the requirements of Federal Specifications 55-5-00210, "Sealing Compound, Preformed Plastic for Pipe Joints", Type 1, Rope Form.

8. Each section of the precast manhole shall have not more than two (2) holes for the purpose of handling and laying. These holes shall be tapered and shall be plugged with rubber stoppers or mortar after installation.

9. Polypropylene plastic manhole steps shall be installed in each section of the manhole in accordance with the City of Atlanta standard details, No. MH-22. (PP-2 manhole Step).

C. Brick Structures:

1. Foundations. A prepared foundation shall be placed for all brick structures after the foundation excavation is completed and accepted. Unless otherwise specified, the base shall consist of reinforced concrete mixed, prepared, and placed in accordance

with the requirements of Section 03301. The foundation shall be built to the correct elevation and shall be finished to cause the least possible resistance to flowing water.

2. Laying Brick. All brick shall be clean and thoroughly wet before laying so that they will not absorb any appreciable amount of additional water at the time they are laid. All brick shall be laid in freshly made mortar. Mortar that is not used within 45 minutes after water has been added shall be discarded. Retempering of mortar shall not be permitted. An ample layer of mortar shall be spread on the beds and a shallow furrow shall be made in it which can be readily closed by the laying of the brick. All bed and head joints shall be filled solid with mortar. End joints of stretchers and side or cross joints of headers shall be fully buttered with mortar and a shoved joint made to squeeze out mortar at the top of the joint. Any bricks that may be loosened after the mortar has taken its set shall be removed, cleaned, and relaid with fresh mortar. No broken or chipped brick shall be used in the face, and no spalls or bats shall be used except where necessary to shape around irregular openings or edges; in which case, full bricks shall be placed at ends or corners where possible, and the bats shall be used in the interior of the course. In making closures, no piece of brick shorter than the width of a whole brick shall be used; and wherever practicable, whole brick shall be used and laid as headers.

3. Joints. All joints shall be slushed with mortar at every course, but slushing alone will not be considered adequate for making an acceptable joint. Exterior faces shall be laid up in advance of backing. Exterior faces shall be back plastered or pargeted with a coat of mortar not less than _-inch thick before the backing is laid up. Prior to pargeting, all joints on the back of face courses shall be cut flush. Unless otherwise noted, joints shall be not less than ¼-inch nor more than ½-inch wide and whatever width is adopted shall be maintained uniform throughout the work.

4. Pointing. Face joints shall be neatly struck, using the weather joint. All joints shall be finished properly as the laying of the brick progresses. When nails or line pins are used, the holes shall be immediately plugged with mortar and pointed when the nail or pin is removed.

5. Cleaning. Upon completion of the work, all exterior surfaces shall be thoroughly cleaned by scrubbing and washing down with water and, if necessary to produce satisfactory results, cleaning shall be done with a 5 percent solution of muriatic acid which shall then be rinsed off with liberal quantities of clean fresh water.

6. Curing and cold weather protection. In hot or dry weather the brick masonry shall be protected and kept moist for at least 48 hours after laying the brick. Brick masonry work or pointing shall not be done when there is frost in the brick or when the air temperature is below 50 degrees F unless the Contractor has on the project, ready to use, suitable covering and artificial heating devices necessary to keep the atmosphere surrounding the masonry at a temperature of not less than 60 degrees F for the duration of the curing period.

D. Frames and Covers:

1. Frames and covers shall be cast iron conforming to the minimum requirements of Federal Specifications WWOI-652 or to ASTM A 48 for Class 30 Gray Iron Castings. All castings shall be made accurately to the required dimensions, fully interchangeable, sound, smooth, clean, and free from blisters and/or other defects. Defective castings which have been plugged or otherwise treated shall not be used. All castings shall be thoroughly cleaned and painted or coated with a bituminous paint. Each casting shall have its actual weight in pounds stenciled or painted on it in white paint.

2. Standard manhole frames and covers shall have a minimum of 22-inches clear inside diameter and shall be a minimum of 5-inches high, with guide ring, and shall weigh not less than 446 pounds, total. Manhole covers shall be as detailed on the Drawings.

3. The contact surfaces of all manhole covers and the corresponding supporting rings in the frames shall be machined to provide full perimeter contact.

4. All sanitary and storm sewer manhole covers shall have the word "PROPERTY OF THE CITY OF ATLANTA" cast on the top in letters 1-inch high.

5. An adjusting ring shall be provided for each manhole in a street.

6. Provide solid manhole and handhole covers and frames for electrical underground systems. Covers shall have letters "HIGH VOLTAGE", "LOW VOLTAGE", "SIGNAL", as applicable, embossed on top.

PART 3 - EXECUTION

3.01 CONSTRUCTION OF CAST-IN-PLACE CONCRETE MANHOLES

A. Cast-in-place manholes, excluding curved manhole bases, shall be constructed in place with the base, barrel, and conical section all monolithically cast using removable forms of material and design approved by the Owner's representative.

B. The vertical forms, vertical and horizontal wall spacers, steps and placing cone must be carefully positioned and firmly clamped in place before any placement is made. The wall spacers must be located 90 degrees from each other. The forms shall be firmly supported with bottom of the forms at the proper elevation to permit the base to be deposited through the vertical forms.

C. No pipe penetration shall be formed within 12-inches of a corner, on a square bases, or

within 12-inches of another penetration, in any direction, for circular bases.

D. The manhole base shall be deposited down through the wall forms onto undisturbed earth or shall be rock bearing. It shall be evenly distributed around the walls and vibrated both inside and outside the forms until there is a minimum slope of 60 degrees from the bottom of the forms to the bearing surface both inside and outside of the manhole. When this is complete and before additional concrete is added, the concrete must be carefully vibrated on each side of each sewer pipe.

E. The base shall be concentric with the manhole, except where eccentric alignment with ladder is required, and have a minimum diameter of 4-feet or 16-inches greater than the outside diameter of the manhole whichever is greater, and 10-inch minimum thickness under the lowest pipe. Minimum wall thickness shall be 6-inches.

F. Additional concrete must be deposited in evenly distributed layers of approximately 18-inches with each layer vibrated to bond it to the preceding layer. The wall spacers must be raised as the placements are made. The concrete in the area from which the spacer is withdrawn shall be carefully vibrated. Excessive vibration shall be avoided.

G. Adjustment rings shall be provided between the conical section and the manhole frame. The rings shall be cast-in-place using building felt between pours to create a weakened joint or as directed by the Owner's representative. If adjustment of the lid elevation is called for, concrete adjusting rings shall be used.

H. All manhole bases, including curved manhole bases and inverts shall be constructed of Class "A" concrete in accordance with details on the Drawings. Inverts shall be smooth and accurately shaped and have the same cross section as the invert of the sewers which they connect. The manhole base and invert shall be carefully formed to the required size and grade by gradual and even changes in sections, care being exercised to form the incoming and outgoing sewer pipes into the wall of the manhole at the required elevations. Changing directions of flow through the sewer shall be made to a true curve with as large a radius as the size of the manhole will permit. The invert and flow channel shall be formed during or immediately after the placing of the concrete and brush-finished as soon as the concrete has sufficiently set.

I. Form marks and offsets shall not exceed 1-inch on the outside surface of the manhole. Form marks and offsets shall not exceed 1/2-inch inside of the manhole. All offsets on the inside surface of the manhole shall be smoothed and rubbed so there is no projection or irregularity capable of scratching a worker or catching and holding water or other materials. Honeycombed areas shall be completely removed immediately upon removal of the forms and replaced with a Class "A" concrete as directed by the Owner's representative, or patched with epoxy grout.

J. Should circumstances make a joint necessary, a formed groove or reinforcing dowels shall

be required in the top of the first placement for shear protection. Immediately before the second placement is made, the surface of the cold joint shall be thoroughly cleaned and wetted with a layer of mortar being deposited on the surface.

K. Concrete setting time and backfilling shall be in accordance with the applicable requirements of Section 03301. Masonry work shall be allowed to set for a period of not less than 24 hours. Outside forms, if any, then shall be removed and the manhole backfilled and compacted. All loose or waste material shall be removed from the interior of the manhole. The manhole cover then shall be placed and the surface in the vicinity of the work cleaned off and left in a neat and orderly condition.

3.02 CONSTRUCTION OF PRECAST CONCRETE MANHOLES

A. After placing manhole base, inverts shall be constructed using Class "A" concrete and 3 to 5 inches slump range in accordance with details on the Drawings and inverts shall have the same cross section as the invert of the sewers which they connect. The manhole invert shall be carefully formed to the required size and grade by gradual and even changes in sections. Changes in directions of flow through the sewer shall be made to a true curve with as large a radius as the size of the manhole will permit.

B. After the base section has been set, and inverts formed, the precast manhole sections shall be placed thereon, care being exercised to form the incoming and outgoing sewer pipes into the wall of the manhole at the required elevations.

C. The cast iron frame for the manhole cover shall be set at the required elevation and properly anchored to the riser section. Where manholes are constructed in paved areas, the top surface of the frame and cover shall be tilted to conform to the exact slope, crown and grade of the existing adjacent pavement.

D. After backfilling has been completed, the excavated area, if located in a street, alley or sidewalk, shall be provided with a temporary surface.

3.03 MANHOLES OVER EXISTING SEWERS

A. Construct manholes over existing operating sewer lines at the locations shown. Perform necessary excavation as specified hereinbefore, break into existing line, and construct manhole.

B. Maintain flow through existing sewer lines at all times, and protect new concrete and mortar work for a period of 7 days after the concrete has been placed. Advise Owner's representative on plans for diverting sewage flow and obtain approval of the Owner's representative before starting. Approval of the Owner's representative will not relieve the Contractor of responsibility for maintaining adequate capacity for flow at all times and adequately protecting new and existing work.

C. Construct the new base under the existing sewer and the precast sections as specified herein.

D. Break out the existing pipe within the new manhole, cover the edges with mortar, and trowel smooth.

3.04 INSPECTION AND TESTING

A. After completion, all manholes will be inspected. The Contractor shall make, at Contractor's expense, all necessary changes, modifications, and/or adjustments required to assure satisfactory operation.

+++ END OF SECTION 02607 +++

SECTION 02642
MANHOLE HEIGHT ADJUSTMENT

PART 1 - GENERAL

1.01 SCOPE

A. This section includes manhole entry and procedures for manhole height adjustment; and any other similar, incidental, or appurtenant operation which may be necessary to properly complete the Work.

B. The Contractor shall provide all services, labor, materials, and equipment required for all manhole height adjustments and related operations necessary or convenient to the Contractor for furnishing a complete Work as shown on the Plans or specified in these Specifications.

C. Related Work Specified Elsewhere:

1. Section 02920 - Site Restoration

1.02 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents.

1.03 QUALITY ASSURANCE

A. Reference Standards: The Contractor shall comply with the applicable provisions and recommendations of the latest editions of the following standards, except as otherwise shown on the Plans or specified in these Specifications.

1. ASTM C32 - Standard Specification for Sewer and Manhole Brick (Made From Clay or Shale).

2. ASTM A48/A48M - Standard Specification for gray iron castings.

PART 2 - PRODUCTS

2.01 BRICK

A. Brick shall conform to the requirements of ASTM C32 for grade SM. Bricks shall conform to the following dimensions, unless otherwise approved by the Owner's representative:

	Depth (inches)	Width (inches)	Length (inches)
Standard Size	2¼	$3^3/_4$	8
Allowable Variation	$\pm^1/_4$	$\pm^1/_4$	$\pm^1/_2$

B. All brick shall be new and whole, of uniform standard size and with substantially straight and parallel edges and square corners. Bricks shall be of compact textures, burned hard entirely through, tough and strong, free from injurious cracks and flaws, and shall have a clear ring when struck together. No soft or salmon brick shall be used. Brick shall be culled after delivery, if required, and no culls shall be used except at such places, to such extent, and under such conditions as may be approved by the Owner's representative.

2.02 MORTAR

A. The Contractor shall use mortar meeting the requirements of ASTM C270 Type S unless directed otherwise by the Owner's representative.

B. The Contractor shall prepare mortar only in quantities needed for immediate use. Mortar which has been mixed for more than thirty (30) minutes, which has set, or which has been retempered shall not be used.

PART 3 - EXECUTION

3.01 MANHOLE ENTRY

A. The Contractor shall exercise extreme caution during any manhole entry operations. Particular attention shall be paid while working on larger diameter sewers. The Contractor shall implement all necessary safety precautions, in accordance with OSHA regulations, to give maximum protection at all times to persons or property at or near the site of the Work.

3.02 PROCEDURES FOR MANHOLE HEIGHT ADJUSTMENT

A. The Contractor shall utilize maps, surveys, sounding instruments, or information from local residents to determine approximate locations of buried manholes. Manholes shall be exposed utilizing hand techniques or by carefully probing with mechanical equipment. Manhole exposure in paved areas shall be accomplished by making a square cut in the surface with sufficient width to allow for the excavation of the material around the manhole to expose it to a depth necessary for adequate adjustment.

B. The Contractor shall adjust the top elevation of the manhole frame to grade where indicated on the Plans or directed by the Owner's representative using brick and mortar conforming to the requirements of this section. A maximum adjustment of twelve (12) inches will be allowed using brick and mortar. Mortar shall be applied to create a smooth finish on the interior and exterior prior to backfill. Adjustments greater than twelve (12) inches shall be made by removing the cone section and adding the appropriate precast riser section.

C. When a manhole height adjustment is performed in a paved area and the manhole is not to be rehabilitated by any other method, then the Contractor shall install a manhole frame seal in accordance with the Owner's requirements.

+++END OF SECTION 02642 +++

SECTION 02643
MANHOLE FRAME AND COVER INSTALLATION

PART 1 - GENERAL

1.01 SCOPE

A. This section includes procedures for manhole frame and cover installation; and any other similar, incidental, or appurtenant operation which may be necessary to properly complete the Work.

B. The Contractor shall provide all services, labor, materials, and equipment required for all manhole frames and cover installations and related operations necessary or convenient to the Contractor for furnishing a complete Work as shown on the Plans or specified in these Specifications.

C. Related Work Specified Elsewhere:
1. Section 02920 - Site Restoration

1.02 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:

1. The Contractor shall submit shop drawings of manhole frames and covers to the Owner's representative for approval before installation.

1.03 QUALITY ASSURANCE

A. Reference Standards: The Contractor shall comply with the applicable provisions and recommendations of the latest editions of the following standards, except as otherwise shown on the Plans or specified in these Specifications.

1. American Society for Testing and Materials (ASTM).

PART 2 - PRODUCTS

2.01 GENERAL

A. The Contractor shall provide and install complete manhole covers and frames at each new sanitary sewer manhole, and in all other locations shown on the Plans or specified.

B. Manhole covers and frames shall conform to these specifications, the Plans, all referenced standards, the requirements of the manhole manufacturer, and appropriate industry standards.

C. Manhole covers shall be of either Standard Type (non-bolted) or Bolt-Down Type, as indicated on the Plans or as otherwise specified. If not otherwise indicated, manhole covers shall be Standard Type.

D. The Contractor shall provide manhole covers and frames approved by the City.

2.02 MATERIALS

A. Manhole covers and frames shall be constructed of cast iron conforming to the requirements of ASTM A48Class 30, as a minimum. Tensile strength of the cast iron shall be a minimum of 30,000 psi.

B. Covers and frames shall be "Heavy Duty" type, rated for a minimum of H-20 loading.

C. All castings shall be sound, smooth and clean, and free of blisters, pits, cracks, and other defects. Castings judged to be defective by the Owner's representative will be rejected, and shall be replaced by the Contractor at no additional cost to the City.

D. Casting tolerances shall be $\pm$ $^{1}/_{16}$ -inch, with an additional one-sixteenth ($^{1}/_{16}$) inch per foot of dimension.

E. Manhole covers shall be cast with two (2) non-penetrating type pick-holes, located as indicated in the Detail Drawings. Pick-holes shall conform to the dimensions indicated in the Detail Drawings. Manhole covers shall be vented except those located within the one-hundred (100) year flood plain, within three (3) feet of curb for a two (2) lane road, or within the outside lane of a multi-lane road.

F. Frames shall have integrally cast, full perimeter mud rings. Frames shall be cast with four (4), one (1) inch diameter holes in the flange for anchor bolts. Anchor bolt holes shall be located as shown in the Detail Drawings.

G. The seating surfaces of frames and covers shall be machined flat to ensure contact between the cover and frame along the full perimeter, in accordance with Federal Specifications RR-F-621.

H. Gaskets shall be provided and installed on all manhole frames. Gaskets shall be secured to the seating surface of the frame with a non-degrading glue by the manufacturer. Gaskets shall be flat, one-eights ($^{1}/_{8}$) inch thick, black neoprene, with a tensile strength of 2,000 psi.

I. For manhole covers indicated as Bolt-Down Type, frames shall be cast and machined to accept four (4) cover bolts, on the pattern shown in the Detail Drawings. Covers shall be cast with four (4) holes, three-quarter (¾) inch diameter, for the bolts on the pattern shown in the Detail Drawings. Bolts shall be stainless steel, $^{5}/_{8}$" - 1½ x 2" hex-head cap screws, and shall be provided with all bolt-down type covers. Bolts shall include stainless steel washers and rubber sealing gaskets.

J. Covers and frames shall bear the emblem of "City of Atlanta Sewer" or "City of Atlanta Storm" as applicable, as illustrated in the Detail Drawings. No substitute cover designs will be accepted.

K. Covers shall be cast with four (4) stacking lugs, each five-eights ($^{5}/_{8}$) inch wide by two (2) inches long, on the bottom of the lid.

L. Covers and frames shall conform to the following critical dimensions:

	Standard	Bolt-Down
Overall frame height	6 $^{3}/_{4}$ to 8"	6 $^{3}/_{4}$ to 8"
Cover diameter	23 ½"	23 ½"
Cover thickness, min.	1 $^{3}/_{8}$"	1 $^{3}/_{8}$"
Frame opening for cover	23 $^{11}/_{16}$"	23 $^{3}/_{4}$"
Frame opening for entry	22"	20 $^{5}/_{8}$"
Mud ring O.D.	25 $^{7}/_{8}$"	25 $^{3}/_{4}$"
Mud ring height, min.	$^{3}/_{4}$"	1 $^{5}/_{8}$"

PART 3 - EXECUTION

3.01 PROCEDURES FOR MANHOLE FRAME AND COVER INSTALLATION

A. The Contractor shall prepare the manhole top cone for frame installation per manhole and manhole cover manufacturer recommendations.

B. The Contractor shall prepare and install manhole frames and covers per manufacturer recommendations.

C. The Contractor shall check the installation of gaskets and replace all missing gaskets.

D. The Contractor shall install new frames and covers to the required elevations shown on the Plans or to the existing grade as directed by the Owner's representative.

E. The Contractor shall check the manhole covers for fit in the frame. If a manhole cover is either excessively loose or tight in the frame, or rocks, wobbles, or otherwise moves in its frame, the frame and cover shall be removed and replaced by the Contractor at no additional cost to the City.

F. The Contractor shall install and tighten stainless steel bolts on all Bolt-Down Type covers.

+++ END OF SECTION 02643 +++

SECTION 02650
TESTING FOR ACCEPTANCE OF SANITARY AND STORM SEWERS

PART 1 GENERAL

1.01 SCOPE

A. This section includes sanitary and storm sewer inspection and testing methods; joint testing procedures; manhole testing methods; allowable testing limits for sanitary sewers; and any other incidental or appurtenant operations which may be necessary to properly complete the Work.

B. The Contractor shall provide all labor, materials, and equipment required for all sanitary and storm sewer testing and related operations necessary or convenient for completing the Work as shown on the Drawings or specified herein.

1.02 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents.

1.03 QUALITY ASSURANCE

A. Reference Standards: The Contractor shall comply with the applicable provisions and recommendations of the latest editions of the following standards, except as otherwise shown on the Drawings or specified in these Specifications.

1. ASTM C828 – Test Method for Low-pressure Air Test of Vitrified Clay Pipe Lines

2. ASTM C969 – Standard Practice for Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines

3. ASTM C1103 - Standard Practice For Joint Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines

4. ASTM C1244 – Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill

5. ASTM F1417 – Standard Practice for Installation Acceptance of Plastic non-pressure Sewer Lines Using Low Pressure Air

1.04 ACCEPTANCE TESTS

A. Upon completion of all or a part of a sanitary sewer installation, the Contractor shall test and/or inspect the sewer for acceptability. The method(s) of testing and/or inspection shall be as specified in the individual Specifications sections. Testing and inspection shall

be performed in accordance with the requirements of this Section.

B. One or more of the following tests and/or inspections may be required:

1. Infiltration of Water

2. Exfiltration of Water

3. Exfiltration of Air under Pressure

4. Smoke Testing

5. Joint Testing

6. Direct Visual Inspection

7. Deflection Testing

8. Dye Testing

9. Closed Circuit Television Inspection (CCTV).

C. The specified testing method shall be completed by the Contractor when directed by the Owner's representative. The Contractor shall notify the Owner's representative 48 hours in advance prior to the Contractor performing any testing.

D. Prior to any testing, all lines shall be cleaned of debris and flushed clean. Debris shall be caught and removed from the line and shall not be flushed into existing live sanitary sewers.

1.05 TEST SECTIONS

A. Unless otherwise specified or directed by the Owner's representative, each section of sanitary sewer between manholes shall be tested by the air testing method.

B. The Contractor may at his option divide the installed sewer into subsections of more convenient length for testing. If the section or subsection tested does not pass the tests, it shall be repaired and the test repeated until a satisfactory test is obtained.

C. The Owner's representative may allow alternate testing methods at his discretion or require additional testing methods if, in his opinion, they are warranted.

PART 2 PRODUCTS

(NOT USED)

PART 3 EXECUTION

3.01 SANITARY AND STORM SEWER INSPECTION AND TESTING METHODS

A. All Testing Methods: All wyes, tees, and stubs shall be plugged with flexible jointed caps, or acceptable alternate, and securely fastened to withstand the internal test pressure. Plugs or caps shall be readily removable.

B. The Contractor shall clean and test lines before requesting final acceptance. Where any obstruction is met, the Contractor shall clean the sewers by means of rods, swabs, or other instruments. When requested by the Owner's representative, the Contractor shall flush out lines and manholes before final inspection.

C. Pipe lines shall be straight and show a uniform grade between manholes, except for curves specifically shown on the Drawings. The Contractor shall correct any discrepancies discovered during inspection at no cost to the City.

D. Watertightness

1. All sewers constructed shall be tested for watertightness. Infiltration and exfiltration tests shall be performed on all new sewers constructed as specified in this section, except for those new sewers constructed which have active services tied into them as the pipe is being installed. In such cases the watertightness of the sewers less than or equal to thirty-six (36) inches in diameter shall be based on a visual inspection, and for sewers forty-two (42) inches in diameter and larger based on the individual joint test as specified in this section.

2. All visible leaks, regardless of the amount of leakage, shall be repaired at the Contractor's expense.

E. Infiltration Tests

1. The Contractor shall install weirs in manholes selected by the Owner's representative to determine the leakage of ground water into the sewer. The Contractor shall install weirs for a minimum of four hours before measuring flow. If leakage in any section of the sewer line exceeds one hundred (100) gallons per inch of diameter per day per mile, the Contractor shall locate and repair leaks. Repair methods shall be approved by the Owner's representative. After repairs are completed, the Contractor shall re-test for leakage.

2. Infiltration testing shall be performed before sanitary sewer lateral connections or reconnections are made.

3. The Contractor shall furnish, install and remove the weirs, plugs, and bulkheads required to perform the leakage tests.

4. Weirs shall be V-notch type equal to Pollard.

F. Exfiltration Tests

1. Low-Pressure Air Test:

a. Prior to air testing, the section of sewer between manholes shall be thoroughly cleaned and wetted. Immediately after cleaning or while the pipe is water soaked, the sewer shall be tested with low-pressure air. At the Contractor's option, sewers may be tested in lengths between manholes or in short sections using inflatable balls pulled through the line from manhole to manhole.

b. Air shall be slowly supplied to the plugged sewer section until the internal air pressure reaches approximately four (4) psi. After this pressure is reached and the pressure allowed to stabilize (approximately two (2) to five (5) minutes), the pressure shall be reduced to three and one-half (3.5) psi before starting the test.

c. Record the drop in pressure for the test period. If the pressure drop is equal to or less than one (1) psi during the test time, then the line will pass the test. If the pressure drops more than one (1) psi during the test time, the line will fail the test and the Contractor shall locate the failure, make necessary repairs, and retest the line.

d. The minimum test time for various pipe sizes and types is as follows:

Nominal Pipe Size(Inches)	Time (Min/100 feet)	
	VCP, RCP	DIP, PVC
6	0.7	5.7
8	1.2	7.6
10	1.5	9.4
12	1.8	11.3
15	2.1	14.2
18	2.4	17.0
21	3.0	19.8
24	3.6	22.8
30	4.8	35.4
36	6.0	51.2
42	7.3	69.5

e. Required test equipment, including inflatable balls, braces, air hose, air source, time meter, rotameter as applicable, cut-off valves, pressure reducing valve, 0-

15 psi pressure gauge, 0-5 psi pressure gauge with gradations in 0.1 psi and accuracy of ± two (2) percent shall be provided by the Contractor. Testing equipment shall be equal to Cherne Air-Loc Testing Systems.

f. The Contractor shall keep records of all tests made. Copies of records shall be given to the Owner's representative. Records shall show date, line number and stations, operator, and such other pertinent information as required by the Owner's representative.

g. The Contractor shall take safety precautions in the performance of the air testing. Plugs shall be properly secured and care be exercised in their removal. Every precaution shall be taken to avoid the possibility of over-pressurizing the sewer line.

2. Individual Joint Test: Pipe joints for sewers thirty (30) inches in diameter and larger shall be air tested individually. The joint tester assembly shall be placed over the joint and the joint area pressurized to four (4) psi. The pressure shall not drop more than two (2) psi in ten (10) seconds. The joint tester assembly shall be equal to Cherne Industries, Inc.

G. Smoke Testing

1. Smoke testing may be used only to locate leaks and in no case shall be considered conclusive or a substitute for air tests, infiltration tests, or exfiltration tests. In all cases a smoke test shall be accompanied by an air test, infiltration test or exfiltration test. The Owner's representative may order a smoke test if another leakage test fails and the source of the leak cannot be determined by other means. Smoke testing shall only be performed where ground water is low. Smoke shall be blown into a sealed section of sewer under pressure and the Contractor and Owner's representative shall observe for any smoke appearing on top of the ground indicating the presence of leaks.

2. The Owner's representative may require that the Contractor excavate the sewer to determine the source of any smoke appearing during the smoke test. All leaks or breaks discovered by the smoke tests shall be repaired and/or corrected by the Contractor at his own expense in a manner acceptable to the Owner's representative. Equipment and supplies required for smoke tests shall be furnished by the Contractor.

3. The Contractor may perform smoke tests at any time during construction at his option; however, any such tests shall not supplant the final test of the completed work.

H. Deflection Test

1. The Contractor shall test all PVC gravity sewers for excessive deflection by passing a mandrel through the pipe. Deflection of the pipe shall not exceed five (5) percent.

2. The mandrel size shall be based upon the maximum possible inside diameter for the type of pipe being tested, taking into account the allowable manufacturing tolerances of the pipe. The mandrel shall be configured as shown on the Drawings and shall have an odd number of legs, or vanes, with a quantity equal to or greater than nine (9). The legs of the mandrel shall be permanently attached to the mandrel. A mandrel with variable sizes shall not be allowed. The mandrel shall be constructed of steel, aluminum, or other material approved by the Owner's representative, and shall have sufficient rigidity so the legs of the mandrel will not deform when pulled through the pipe. The Contractor shall provide a proving ring for each size mandrel, with a tolerance of no more than 0.02-inch clearance, and the mandrel dimensions shall be checked by the Owner's representative, using this proving ring, before use by the Contractor.

3. The Contractor shall excavate and properly install any section of pipe not passing this test and re-test until results are satisfactory.

4. This test shall be performed twice:

   a. Once within the first thirty (30) days of installation, and
   b. Once during final inspection, but no sooner than thirty (30) days after pavement backfill is done, at the completion of this Contract.

I. Dye Testing

1. Dye testing shall be used only to confirm service connection or disconnection and in no case shall be considered conclusive or a substitute for air tests, infiltration tests or exfiltration tests. Dye testing shall only be performed where ground water is low. Dye shall be introduced into the service lateral and the Contractor and Owner's representative shall observe for any dye appearing on sanitary or storm sewers. Equipment and supplies required for dye tests shall be furnished by the Contractor.

2. The Contractor may conduct dye tests at any time during construction at his option; however, any such tests shall not supplant the final test of the completed work.

J. Closed Circuit Television Inspection

1. The Owner's representative shall require that the interior of all new gravity sewers be subjected to a televised inspection. Such internal inspection shall be conducted and documented in accordance with the requirements of Section 02655, Sanitary Sewer System Cleaning and Television Inspection.

2. Prior to Final Acceptance the City shall be provided with one copy of the TV inspection report and CD-ROMs showing the entire length of the gravity sewer tested. The report shall contain the condition of pipe, type of pipe, depth, location of services, length, type of joints, roundness and distance between manholes. Any pipe found to be cracked, leaking, misaligned, bellied, or otherwise defective shall be removed and replaced by the Contractor.

3.02 JOINT TESTING PROCEDURES

A. Joint Testing Procedures: Each sanitary sewer joint shall be individually air tested using a packer or other approved testing device at a test pressure of four (4) psi plus one-half (1/2) psi per vertical foot of depth up to a maximum of ten (10) psi. The packer or testing device shall be positioned within the sanitary sewer so as to straddle the joint to be tested. The ends of the packer or testing device shall be expanded to isolate the pipe joint from the remainder of the sewer and create a void space between the packer or testing device and the pipe joint. The sealing elements shall be inflated with air in accordance with the test equipment manufacturer's instructions. Air shall then be introduced into the void space until the required test pressure is recorded on the void pressure meter. If the required test pressure cannot be developed, the joint will fail the test. After the void pressure is observed to be equal to or greater than the required test pressure, the air flow shall be stopped. If the pressure holds or drops less than two (2) psi in fifteen (15) seconds, the joint is acceptable.

1. All test monitoring shall be above ground and in a location to allow for simultaneous and continuous observation by the Owner's representative. The void pressure data shall be transmitted electronically from the void to the monitoring equipment.

2. Prior to starting the sanitary sewer joint testing, a two (2) part control test shall be performed as follows:

   a. A demonstration test shall be performed in a test cylinder constructed in such a manner that a minimum of three (3) known leak sizes (0.062, 0.094, 0.125 inch diameter) can be simulated. During the demonstration test, the Contractor shall use a test cylinder gauge to measure void pressure. The Contractor shall also install the void pressure monitoring equipment in the same manner as will be done to measure the void pressure at a sanitary sewer joint. The Contractor shall then apply pressure to the void space. During the demonstration test, the void pressure reading on the test cylinder gauge shall be the same as that observed on the void pressure monitoring equipment at all times during the test. If the pressure reading on the test cylinder gauge is not the same as the pressure reading observed on the void pressure monitoring equipment at all times, the Contractor shall repair or otherwise modify the packer or testing device and perform the test until the results are satisfactory to the Owner's representative. The demonstration test may be required, by the Owner's representative, at any other time during the joint testing work.
   b. Upon entering each manhole to manhole section with the test equipment, but prior to the commencement of joint testing, the packer or testing device shall be positioned on a section of sound sanitary sewer between pipe joints. The Contractor shall then perform the test at the required pressure. If the test indicates that the sanitary sewer will not meet the joint test requirements, the Contractor shall inform the Owner's representative who will have the discretion of modifying the joint test requirements.

3. During the sanitary sewer joint testing work, the Contractor shall keep the following records:

   a. Manhole to manhole section tested.
   b. Test pressure used.
   c. Location (footage) of each joint tested.
   d. Test results for each joint tested.

B. Lamping Procedures: Lamping will be performed on all sewer pipelines by the Owner's representative.

3.03 MANHOLE TESTING

A. All new manholes, rehabilitated manholes, manhole inserts and replacement manholes shall be tested by the Contractor using the vacuum test method, following the manufacturer's recommendations. Vacuum testing of manholes and structures shall be performed after curing of linings and installation of inserts. Any leakage in the manhole or structure, before, during, or after the test shall be repaired at no cost to the City..

B. Prior to testing manholes for watertightness, all lift holes shall be plugged with a non-shrink grout, all joints between precast sections shall be properly sealed and all pipe openings shall be temporarily plugged and braced.

C. Vacuum Tests:

   1. The manhole, after preparation as noted above, shall be vacuum tested. All testing shall be performed in accordance with the requirements of ASTM C1244. A vacuum shall be drawn and the vacuum drop over a specified time period shall be used to determine the acceptability of the manhole.

   2. The test head shall be placed at the inside of the top of the manhole in accordance with the manufacturer's instructions. A vacuum of ten (10) inches of mercury [five (5) psi] shall be drawn on the manhole, the valve on the vacuum line of the test head closed and the vacuum pump shut off. The time shall be measured for the vacuum to drop from ten (10) inches of mercury [five (5) psi] to nine (9) inches of mercury [four and one-half (4.5) psi]. The manhole shall pass the vacuum test if the time for the vacuum reading to drop from 10-inches of mercury to 9-inches of mercury meets or exceeds the values indicated in the table below.

D. For

MINIMUM TEST TIMES FOR VARIOUS MANHOLE DIAMETERS				
	Manhole Diameter (Inches)			
	48	60	66	72
Depth (Feet)	Time (Seconds)			
8	20	28	29	33
10	25	33	36	41
12	30	39	43	49
14	35	48	51	57
16	40	52	58	67
18	45	59	65	73
20	50	65	72	81
22	55	72	79	89
24	59	78	87	97
26	64	85	94	105
28	69	91	101	113
30	74	96	108	121

manholes less than 8-feet in depth, the minimum value listed shall be used.

E. If the manhole fails the initial test, necessary repairs shall be made with non-shrink grout. Retesting shall proceed until a satisfactory test is obtained.

F. Vacuum testing equipment shall be equal to that as manufactured by P.A. Glazier, Inc.

G. The City reserves the right to have third party consultants perform construction materials testing and assessments to any new manhole.

3.04 ALLOWABLE TESTING LIMITS FOR SANITARY SEWERS

A. No infiltration and exfiltration of ground water or other leakage into or out of the sewer shall be allowed during the twenty-four (24) hour test period.

B. Any visible or audible leaks into the sewer shall be repaired or corrected as directed by the Owner's representative.

+ + + END OF SECTION 02650 + + +

SECTION 02681

SUBDRAINAGE FOR STORMWATER QUALITY FACILITIES

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. Section includes construction of subdrainage (underdrain) systems to collect and discharge filtered stormwater runoff in stormwater quality facilities, including installation of piping, drainage stone and other granular materials.

B. Related Work Specified Elsewhere:
1. Section 02125 - Temporary and Permanent Erosion and Sedimentation Control
2. Section 02225 – Trench Excavation and Backfilling

1.02 REFERENCES

A. ASTM International:

1. ASTM D 448, Standard Classification for Sizes of Aggregate for Road and Bridge Construction

2. ASTM D1785, Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120

3. ASTM D 2321, Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications

4. ASTM D 2466, Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40

5. ASTM D 3034, Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings

6. ASTM D 3212, Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals

7. ASTM F 758, Standard Specification for Smooth-Wall Poly(Vinyl Chloride) (PVC) Plastic Underdrain Systems for Highway, Airport, and Similar Drainage

8. ASTM F 810, Standard Specification for Smoothwall Polyethylene (PE) Pipe for Use in Drainage and Waste Disposal Absorption Fields

B. Georgia Department of Transportation (GDOT):

1. "Standard Specifications, Construction of Transportation Systems", Latest Edition (GDOT Standard Specifications)

1.03 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the Contract Documents.

B. Submit the following for review and approval prior to shipment of materials to the Site:

1. Manufacturers' documentation indicating conformance with the specifications for underdrain pipe and other specified subsurface drainage system components.

2. Certificates and test reports, signed by the material producer of granular materials (for choker course and drainage stone), indicating that the materials meet or exceed the specifications.

1.04 QUALITY ASSURANCE

A. Pipe or drainage system manufacturer shall have manufacturing and quality control facilities capable of producing and assuring the quality of the pipe and fittings specified.

1.05 DELIVERY, STORAGE AND HANDLING

A. Pipe shall be marked with manufacturer's identification symbol, size, date of manufacture, class of pipe and applicable product specification identification number.

B. During loading, transporting and unloading, exercise care to prevent damage to pipe. All materials shall be inspected upon delivery to the Site. Damaged or defective materials shall be rejected and shall be replaced with new materials at no additional cost to the Project.

C. Granular materials of different gradations (including drainage stone and choker course) shall be delivered to the Site using clean equipment, and separately stockpiled in areas approved by the Owner's representative. Adequately protect to preserve the materials' fitness and quality.

PART 2 PRODUCTS

2.01 SOURCE QUALITY CONTROL

A. Proposed materials and sources of supply shall be approved by the Owner's representative as specified, prior to shipment and use of the materials in the construction.

B. Granular materials shall meet specified gradations and quality prior to placement. All processing shall be completed at the source.

2.02 CHOKER COURSE

A. Choker course shall consist of aggregate with gradation conforming to size number 8 (nominal 3/8-inch to No. 8 sieve sizes) or size number 89 (nominal 3/8-inch to No. 16 sieve sizes) as defined in ASTM D 448 or Table 880.1 of the GDOT Standard Specifications.

2.03 DRAINAGE STONE

A. Unless otherwise specified in other sections, washed drainage stone shall conform to the quality and gradation requirements for size number 57 coarse aggregate in ASTM D 448 or Section 800.2.01 of the GDOT Standard Specifications. Gradation shall be as summarized in the following table.

Sieve Size	Percent Passing, by Weight
1 1/2 inch	100
1 inch	95 - 100
1/2 inch	25 – 60
No. 4	0 – 10
No. 8	0 – 5

2.04 PERFORATED UNDERDRAIN PIPE

A. Perforated underdrain pipe shall conform to one of the following specifications:

1. Perforated smoothwall polyethylene pipe conforming to ASTM F 810. Pipe shall have a smooth interior and exterior and the pipe joints shall be bell and spigot with the bell ends integrally formed to provide a soil-tight connection.

2. Perforated Polyvinyl chloride (PVC) pipe conforming to ASTM D 3034, SDR 26.

3. Perforated PVC pipe conforming to ASTM F 758.

B. Furnish required fittings and connectors for a complete system as shown on the Drawings.

2.05 NON-PERFORATED PIPING

A. Non-perforated piping (including upturned "S" piping, cleanouts and outlets) associated with underdrain piping systems shall conform to one of the following specifications:

4. Polyvinyl chloride (PVC) pipe and fittings conforming to ASTM D 3034, SDR 26.

5. Schedule 40 PVC pipe conforming to ASTM D 1785. Fittings shall conform to ASTM D 2466.

B. Furnish required fittings, transition couplings and other accessories as required for a complete installation as indicated on the Drawings.

C. Unless otherwise indicated, a cleanout shall be provided on the upstream end of each underdrain system. Pipe material shall conform to the requirements of paragraph 2.06.A. The cleanout shall include a 12-inch by 12-inch (or larger) by 3-inch thick minimum thickness concrete pad, unless otherwise indicated on the Drawings

PART 3 EXECUTION

3.01 PREPARATION

A. Construction of underdrain system for stormwater quality facilities shall not commence until the area is isolated from all contributing drainage areas. Excavate in dry conditions as much as practicable.

B. Erosion and sediment control measures shall be implemented to protect construction areas. Conform to the requirements indicated on the Drawings and as specified in Section 02125.

C. Locate and mark existing utilities, underground structures, and above ground obstructions before beginning installation and avoid disruption and damage of services.

D. Excavate to the required dimensions, side slopes and depths shown on the Drawings or as otherwise approved by the Owner's representative. Exposed subgrade soils at bottom of excavation shall not be compacted. Low ground pressure equipment shall be used for excavation.

E. Excavate trenches and prepare subgrade for installation of non-perforated underdrain outlet piping to existing storm drainage system as specified in Section 02225 and as indicated on the Drawings.

F. Excavated materials shall be removed from the construction areas and placed in other locations on the Site, if needed, or off-site where approved by the Owner's representative.

G. Prior to placement of granular materials and underdrain piping, the bottom of the excavation shall be dry and scarified (by raking, disking or tilling) to a minimum depth of six inches.

3.02 INSTALLATION OF GRANULAR MATERIALS

A. Place and uniformly grade choker course and drainage stone in sequential layers to the thicknesses and limits indicated on the Drawings. Level and contour surface of each layer to required elevations.

B. Coordinate placement of granular materials with installation of underdrain piping.

3.03 PIPE INSTALLATION

A. Examine pipe and fittings before installation and assure no defective materials are incorporated. Keep inside of pipes and fittings free of dirt and debris.

B. Install piping beginning at low points of the system, true to grades and alignment indicated, with continuous slope.

C. Lay perforated underdrain piping on uniformly graded materials for entire length of alignment at the required locations and lengths. Installation shall be in accordance with ASTM D 2321.

D. Install non-perforated outlet piping at the required locations and orientation as indicated on the Drawings.

E. Pipe and fittings shall be joined in accordance with manufacturers' recommendations and reference standards. Non-perforated pipe connections shall be watertight.

F. Whenever pipe laying is not actively in progress, the open ends of the piping shall be closed by a temporary plug or cap to prevent soil and other foreign matter from entering the piping.

G. Connect to existing storm drainage system as indicated on the Drawings.

3.04 FIELD QUALITY CONTROL

A. Tests and Inspections: After installing drainage course to top of piping, test drain piping with water to ensure free flow before backfilling.

B. Remove obstructions, replace damaged components, and repeat test until free flow of system is achieved.

C. Clear interior of installed piping and structures of dirt and other superfluous material as work progresses.

3.05 BACKFILLING

A. Place drainage stone around and over perforated piping as indicated on the Drawings up to required elevation or depth in each area.

B. Place soil backfill around and over non-perforated pipe in layers not exceeding six inches loose thickness up to finish grade or aggregate base subgrade under pavement (as applicable). Each layer shall be thoroughly compacted using manually guided compaction equipment.

C. Placement and compaction of drainage stone and other backfill materials shall be performed in a manner that will not damage the pipe. Pipe that is damaged shall be replaced at no additional cost to the Project.

3.06 MAINTENANCE AND PROTECTION

A. Prior to the Owner's final acceptance of the Work, Contractor shall perform maintenance and protection of the construction as specified in this Section. In addition, for the one year warranty period, Contractor shall correct or remove and replace defective work as approved by the Owner's representative in accordance with the terms of the Contract.

END OF SECTION

SECTION 02705

Removing and Replacing Pavement

PART 1 – GENERAL

1.01 SCOPE

A. The work to be performed under this Section shall consist of removing and replacing the existing pavement, sidewalks, steps, patios, curbs, and gutters in paved areas where such have been removed for construction of utilities and appurtenances.

B. Existing pavement, sidewalks, curbs, and gutters shall be replaced, to meet the current City of Atlanta standards, or to match existing pavement sidewalk, curb, or gutters; whichever is more stringent.

C. In designated areas, existing pavement shall be removed and replaced with other types of pavement or other construction as indicated on the Drawings and specified in other applicable sections.

D. All materials encountered during removal of pavement shall be handled as specified in this Section.

1.02 SUBMITTALS

A. If required by the City or Owner's representative, provide certificates stating that materials supplied comply with the Specifications. Certificates shall be signed by the asphalt producer and the Contractor.

1.03 CONDITIONS

A. Weather Limitations:

1. Apply bituminous tack coat only when the ambient temperature in the shade has been at least 50 degrees F for 12 hours immediately prior to application.

2. Do not conduct paving operations when surface is wet or contains excess of moisture that would prevent uniform distribution and required penetration.

3. Construct asphaltic courses only when atmospheric temperature in the shade is above 40 degrees F, when the underlying base is dry and when weather is not rainy.

4. Place base course when air temperature is above 35 degrees F and rising.

B. Grade Control: Establish and maintain the required lines and grades for each course during construction operations.

2.01 MATERIALS AND CONSTRUCTION

A. Graded Aggregate Base: The sub-base shall be a minimum of 6-inches thick and a width equal to the width of the finished paving. Aggregate base shall be Class A, meeting the requirements of Section 815.01 of the Georgia Department of Transportation Standard Specifications, Construction Transportation Systems" (GDOT Standard Specifications). Compact to at least 95% Standard Proctor Density. (ASTM D-698)

B. Base: The base for all ashphaltic paved roadways shall conform to the requirements of Section 828 of the GDOT Standard Specifications for the Hot Mix Asphaltic Concrete, 19 mm Superpave mix design.

C. Tack Coat: Tack coat shall conform to Section 413 of the GDOT Standard Specifications.

D. Surface Course: The surface course for all asphaltic pavement, including paint or tack coat when required by the Owner's representative, shall conform to the requirements of the GDOT Standard Specifications for Hot Mix Asphaltic Concrete, Section 828, 9.5mm Superpave, Level C mix design.

E. Concrete: Provide concrete and reinforcing for concrete pavement or base courses in accordance with the requirements of the GDOT Standard Specifications, Section 430. The concrete shall be minimum 3,000 psi compressive strength or as otherwise shown on the Drawings.

F. Special Surfaces: Where pavement, sidewalks, steps, patios, curbs, or gutters are disturbed or damaged which are constructed of specialty type surfaces, e.g., brick or stone, these facilities shall be restored utilizing similar, if not original, materials. Where the nature of these surfaces dictate, a specialty contractor shall be used to restore the surfaces to their previous or better condition. Special surfaces shall be removed and replaced to the limits to which they were disturbed.

2.02 TYPES OF PAVEMENTS

A. General: All existing pavement removed, destroyed or damaged by construction shall be replaced with the same type and thickness of pavement as that existed prior to construction, unless otherwise indicated

on the Drawings or directed by the Owner's representative. Materials, equipment and construction methods used for paving work shall conform to the GDOT Standard Specifications applicable to the particular type required for replacement, repair, or new pavements.

B. Aggregate Base: Aggregate base shall be constructed in accordance with the requirements of the GDOT Standard Specifications. The maximum thickness to be laid in a single course shall be 6-inches compacted. If the design thickness of the base is more than 6-inches, it shall be constructed in two or more courses of approximate equal thickness. After the material placed has been shaped to line, grade, and cross-section, it shall be rolled until the course has been uniformly compacted to at least 100 percent of the maximum dry density when Group 2 aggregate is used, or to at least 98 percent of maximum dry density when Group 1 aggregate is used.

C. Concrete Pavement: Concrete pavement or base courses shall be replaced with concrete. The surface finish, joint pattern and joint sealant of the replaced concrete pavement shall conform to that of the existing pavement. The surface of the replaced concrete base course shall be left rough. The slab depth shall be equivalent to the existing concrete pavement or base course, but in no case less than 6-inches thick. Transverse and longitudinal joints removed from concrete pavement shall be replaced at the same locations and to the same types and dimensions as those removed. Concrete pavements or concrete base courses shall be reinforced.

D. Asphaltic Concrete Base, Bituminous Tack Coat, and Surface Course: Asphaltic concrete base, tack coat, and surface course construction shall conform to GDOT Standard Specifications. The pavement mixture shall not be spread until the designated surface has been previously cleaned and prepared; surface is intact, firm, properly cured, dry and the tack coat has been applied. Apply and compact the base in maximum layer thickness by asphalt spreader equipment of design and operation approved by the Owner's representative. After compaction, the black base shall be smooth and true to established profiles and sections. Apply and compact the surface course in a manner approved by the Owner's representative. Immediately correct any high, low, or defective areas by cutting out the course, replacing with fresh hot mix, and immediately compacting to conform and thoroughly bond to the surrounding area.

E. Surface Treatment Pavement: Bituminous penetration surface treatment pavement shall be replaced with the thickness indicated on the Drawings.

F. Gravel Surfaces: Existing gravel road, drive, and parking area replacement shall meet the requirements of graded aggregate base course. This surfacing may be authorized by the Owner's representative as a temporary surface for paved streets until replacement of hard surfaced pavement is authorized.

G. Temporary Measures: During the period between pavement removal and complete replacement of permanent pavement, maintain highways, streets, and roadways by the use of steel running plates anchored to prevent movement. The backfill above the pipe shall be compacted, as specified in Section 02200 of these Specifications, up to the existing pavement surface to provide support for the steel running plates. All pavements shall be replaced within seven calendar days of their removal.

3.01 LOCATIONS FOR PAVEMENT REPLACEMENT

A. Pavement Replacement (unless otherwise indicated on the Drawings):

1. All trenches for roadway crossings

2. All trench longitudinal installations

3. All locations where pavement must be removed or is damaged in the execution of the Work

B. "Graded Aggregate" pavement repair shall be used only where approved by the Owner's representative.

3.02 REMOVING PAVEMENT

A. General: Remove existing pavement as necessary for installing or replacing pipelines and appurtenances and for other required construction. Existing pavement and sub-base shall be removed.

B. All materials encountered during removal of pavement shall be removed in accordance with the requirements of the City of Atlanta. Abandoned streetcar tracks, including rails and associated materials, shall be removed to the full limits of construction and shall become the property of the City of Atlanta. Remove, handle and transport the materials as required by the City.

C. Remove and replace pavement and base beyond pipeline trench to outer edge of existing pavement or roadway if remaining existing pavement width is 24-inches or less from side of trench to outer edge of pavement or roadway.

D. Marking: Before removing any pavement, mark the pavement neatly paralleling pipelines and existing street lines.

E. Saw Cutting: Under no circumstances shall the Contractor be allowed to remove concrete or asphalt without prior saw cutting. Asphalt pavement

shall be saw cut along the marks using suitable equipment. The saw cutting shall be deep enough to produce an even, straight cut.

F. Machine Pulling: Do not pull pavement with machines until the pavement is completely broken and separated from pavement to remain.

G. Damage to Adjacent Pavement: Do not disturb or damage the adjacent pavement. If the adjacent pavement is disturbed or damaged, remove and replace the damaged pavement.

H. Sidewalks and Patios: Remove and replace any sidewalks or patios disturbed by construction for their full width and to the nearest undisturbed joint.

I. Curbs and Gutters: Tunnel under or remove and replace any curb and/or gutter, which is disturbed by construction to the nearest undisturbed joint.

J. Steps: Completely remove and replace any steps, constructed of concrete or special surfaces, which are disturbed by construction.

3.03 REPLACING PAVEMENT

A. Preparation of Subgrade: Upon completion of backfilling and compaction of the backfill, arrange to have the compaction tested by an independent testing laboratory approved by the Owner's representative. Testing shall be paid for separately by the City directly to the testing laboratory. After compaction testing has been satisfactorily completed, replace all pavements, sidewalks, and curbs removed.

1. The existing street pavement or surface shall be removed or milled along the lines of the work from edge of pavement to edge of pavement. Pavement shall be replaced from edge of existing pavement to edge of existing pavement, unless otherwise indicated on the Drawings.

2. Trench backfill shall be compacted for the full depth of the trench as specified in Section 02200 of these Specifications.

3. Temporary trench backfill along streets and driveways shall include 6-inches of crushed stone or cherty clay as a temporary surfacing of the trenches. This temporary surface shall be maintained carefully at grade, dust-free, by the Contractor until the backfill of the trench has thoroughly compacted in the opinion of the Owner's representative, and permission is granted to replace the street pavement.

4. When temporary crushed stone or chert surface is considered by the Owner's representative to be sufficient surface for gravel pavement, the surface shall be graded smooth and to an elevation that will make the final permanent surfacing level with the adjacent surfacing that was undisturbed.

B. Pavement Replacement:

1. Replace and repave all street and roadway pavement from edge of pavement to edge of pavement as shown on the Exhibit "A", Detail G-7, Type III Pavement Replacement Detail herein. Replace driveways, sidewalks, and curbs with the same material, to nearest existing undisturbed construction joint and to the same dimensions as those existing.

2. If the temporary crushed stone or chert surface is to be replaced, the top 6-inches shall be removed and the crushed stone surfacing for unpaved streets or the base for the bituminous surface shall be placed.

3. Following this preparation, the chert or crushed stone base shall be primed with a suitable bituminous material and surfaced with the proper type of bituminous surface treatment.

4. Where the paved surface is to be replaced with asphaltic concrete pavement, concrete pavement or with a concrete base and a surface course, the temporary chert or crushed stone surface and any necessary backfill material, additional existing paving and new excavation shall be removed to the depth and width shown on the Drawings. All edges of the existing pavement shall be cut to a straight, vertical edge. Care shall be used to get a smooth joint between the old and new pavement and to produce an even surface on the completed street. Concrete base slabs and crushed stone bases, if required, shall be placed and allowed to cure for three days before bituminous concrete surface courses are applied. Expansion joints, where applicable, shall be replaced in a manner equal to the original joint.

5. Where driveways or roadways, constructed of specialty type surfaces, e.g., brick or stone are disturbed or damaged, these driveways and roadways shall be restored utilizing similar materials. Where the nature of these surfaces dictate, a specialty contractor shall be used to restore the surfaces to their previous or better condition. Special surfaces shall be removed and replaced to the limits to which they were disturbed.

C. Pavement Resurfacing:

1. After all pipeline installations are complete and existing pavement has been removed or milled from edge of pavement to edge of pavement, apply tack coat and surface course as specified.

2. Resurfacing limits shall be perpendicular to the road centerline. The limits of resurfacing shall be 10 feet beyond the edge of the pavement replacement on the main road being resurfaced.

3. Where pavement is damaged with potholes, the Contractor shall remove all existing loose pavement material and fill the hole with black base, as specified, to the level of the existing pavement.

D. Pavement Striping: Pavement striping removed or paved over shall be replaced with the same type, dimension, and material as original unless otherwise indicated on the Drawings or directed by the Owner's representative.

E. Installation of Traffic Plates: Following completion of pipeline installations, including backfilling but prior to replacement of pavement, steel plates shall be used to temporarily carry vehicular traffic as follows:

1. All Steel plates shall meet ASTM structural specifications having "A36" designation with minimum yield stress of 36 ksi (ksi = kilopounds per square inch).

2. Asphaltic patching material (cold mix) shall be used to secure the steel plate around its edges. Alternatively, all sides of the plate or plates must be secured to the ground surface with A.R.E.A. standard railroad spikes. No spikes shall be left lying on the highway.

3. Trench must be backfilled to within eight (8) inches from top of existing pavement prior to placing the steel plate.

4. No plate is allowed over a trench having a width greater than 48 inches when adequate soil conditions are present. When the trench is greater than 48 inches, the entire lane containing the trench shall be closed. Before closing a lane, a "Lane Closure Permit" must be obtained from the City of Atlanta, Department of Public Works, Office of Transportation (404-330-6501). At least 24 hours prior notification is required for the "Lane Closure Permit".

5. All necessary warning signs, barricades, and lights shall be adequately provided and placed for the safety of the public and in full conformity with the latest edition of the MUTCD at no additional cost to the City. Before closing a "Lane Closure Permit" must be obtained from the City of Atlanta. The Department of Public Works, Office of Transportation (404-330-6501) must be notified at least 24 hours in advance.

6. The width of a trench is measured normal to the length of the trench. The largest reading of the measurements is the determining factor for width. For a series of steel plates on any continuous trench, all plates must have the same thickness.

7. Trench must be fully covered with a minimum of twelve (12) inches of asphalt taper on all sides of the plate.

8. Upon the completion of the work, the existing surface shall be cleaned and pavement restored to the City of Atlanta standards.

3.04 SIDEWALK, CURB, AND GUTTER REPLACEMENT

A. Construction:

1. All damaged concrete sidewalks, curbs, or gutters shall be replaced.

2. See Section 02521 for concrete walk and concrete curb and gutter construction.

3. When a section is removed, the existing sidewalk, curb, or gutter shall be cut to a neat line, perpendicular to both the centerline and the surface of the concrete slab. Existing concrete shall be cut along the nearest existing construction joints; if such joints do not exist, the cut shall be made at minimum distances shown on the Drawings.

4. Existing concrete sidewalks, curbs, and gutters that have been cut and removed for construction purposes shall be replaced with the same width and surface as the portion removed. Sidewalks shall have a minimum uniform thickness of 4-inches. The new work shall be neatly jointed to the existing concrete so that the surface of the new work shall form an even, unbroken plane with the existing surfaces.

5. The subgrade shall be formed by excavating to a depth equal to the thickness of the concrete, plus 2-inches. Subgrade shall be of such width as to permit the proper installation and bracing of the forms. Subgrades shall be compacted by hand tamping or rolling. Soft, yielding or unstable material shall be removed and backfilled with satisfactory material. Place 2-inches of porous crushed stone under all sidewalks, curbs, and gutters and compact thoroughly, then finish to a smooth, unyielding surface at proper line, grade, and cross-section.

B. Joint for Curbs and Gutters:

1. Joints shall be constructed to match existing and as specified in Section 02521.

2. Expansion joints shall be required to replace any removed expansion joints or in new construction. Expansion joints shall be true and even, shall present a satisfactory appearance, and shall extend to within 1/2-inch of the top of finished concrete surface.

C. Finishing:

1. Strike off the surface with a template and finish the surface with a wood float using heavy pressure, after which, contraction joints shall be made and the surface finished with a wood float or steel trowel.

2. Finish the face of the curbs at the top and bottom with an approved finishing tool of the radius indicated on the Drawings.

3. Finish edges with an approved finishing tool having a 1/4-inch radius.

4. Provide a final broom finish by lightly combing with a stiff broom after troweling is complete.

5. The finished surface shall not vary more than 1/8-inch in 10 feet from the established grade.

D. Driveway and Sidewalk Ramp Openings:

1. Provide driveway openings of the widths and at the locations directed by the Owner's representative.

2. Provide sidewalk ramp openings in conformance with the applicable regulations and as directed by the Owner's representative.

3. Concrete shall be suitably protected from freezing and excessive heat. It shall be kept covered with burlap or other suitable material and kept wet until cured. Provide necessary barricades to protect the work. All damage caused by people, vehicles, animals, rain, the Contractor's operations and the like shall be repaired by the Contractor, at no additional expense to the City.

3.05 MAINTENANCE

A. The Contractor shall maintain the surfaces of roadways built and pavements replaced until the acceptance of the Project. Maintenance shall include replacement, scraping, reshaping, wetting, and re-rolling as necessary to prevent raveling of the road material, the preservation of reasonably smooth surfaces and the repair of damaged or unsatisfactory

surfaces, to the satisfaction of the Owner's representative. Maintenance shall include sprinkling as may be necessary to abate dust from the gravel surfaces.

3.06 SUPERVISION AND APPROVAL

A. Pavement restoration shall meet the requirements of the regulatory agency responsible for the pavement. Obtain agency approval of pavement restorations before requesting final payment.

B. Obtain the Owner's representative's approval of restoration of pavement, such as private roads and drives that are not the responsibility of a regulatory agency.

C. Complete pavement restoration as soon as possible after backfilling.

D. Failure of Pavement: Should any pavement restoration or repairs fail or settle during the life of the Contract, including the bonded period, promptly restore or repair defects.

E. Prior to acceptance and approval of any asphaltic concrete binder and/or topping which is installed for the purpose of City maintenance, a representative of the City of Atlanta's Department of Traffic and Transportation may require one or all of the following tests: 1) coring, 2) extraction, 3) compaction, 4) density. The frequency and location of these tests will be left up to the discretion of the Inspector/Owner's representative. Testing shall be paid for separately by the City directly to the testing laboratory.

3.07 CLEANING

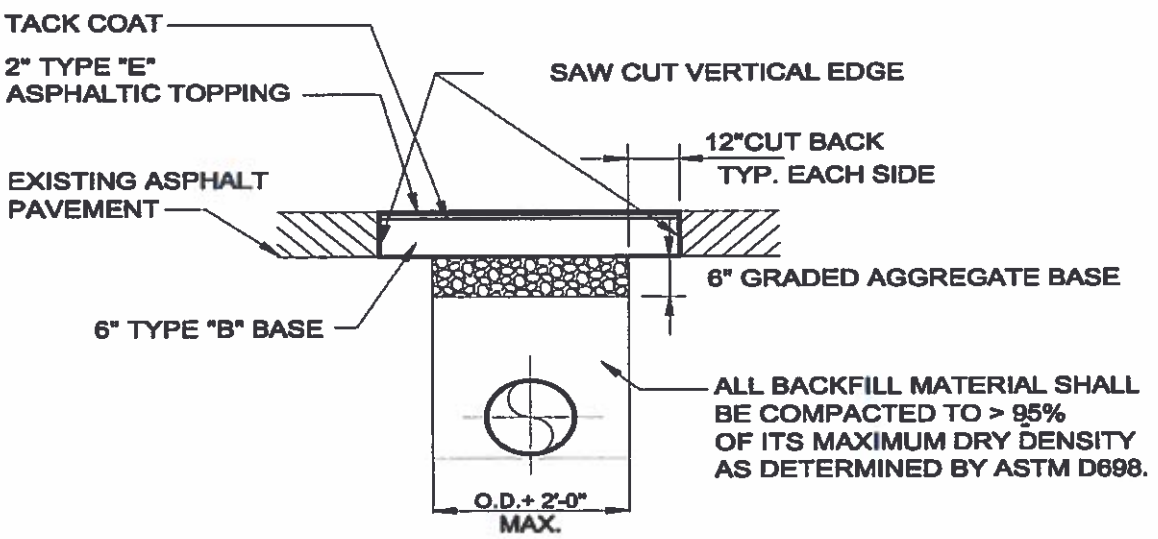
A. The Contractor shall remove all surplus excavation materials and debris from the street surfaces and rights-of-way and shall restore street, roadway, or sidewalk surfacing to its original condition.

3.08 TRAFFIC CONTROL

A. Refer to Specification Section 01550: Traffic Regulation for requirements.

ATTACHMENT A

STANDARD DETAILS



ASPHALT PAVEMENT

NOTE: PAVEMENT REPLACEMENT SHALL BE INSTALLED IN ACCORDANCE WITH GEORGIA DOT STANDARD SPECIFICATIONS

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City of Atlanta Department of Public Works	STANDARD DETAILS	
	TYPE III PAVEMENT REPLACEMENT	DATE : NOV 2004 SCALE : NONE DETAIL NO. G-7

END OF SECTION

SECTION 02798

CONCRETE PAVING

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. Section includes construction of pervious and plain Portland cement (non-pervious) concrete pavement, including subgrade preparation and aggregate base and subbase layers for subgrade support and stormwater storage.

B. Related Work Specified Elsewhere:
   1. Section 02371 – Green Infrastructure Geotextiles
   2. Section 02681 – Subdrainage for Stormwater Quality Facilities

1.02 REFERENCES

A. American Concrete Institute (ACI):

   1. ACI 301, Specifications for Structural Concrete

   2. ACI 305.1, Specification for Hot Weather Concreting

   3. ACI 306.1, Standard Specification for Cold Weather Concreting

   4. ACI 522.1, Specification for Pervious Concrete Pavement

B. American Association of State Highway and Transportation Officials (AASHTO):

   1. AASHTO T119, Standard Method of Test for Slump of Hydraulic Cement Concrete

   2. AASHTO T141, Standard Method of Test for Sampling Freshly Mixed Concrete

   3. AASHTO T152, Standard Method of Test for Air Content of Freshly Mixed Concrete by the Pressure Method

C. ASTM International:

   1. ASTM C 31, Standard Practice for Making and Curing Concrete Test Specimens in the Field

   2. ASTM C 33, Standard Specification for Concrete Aggregates

   3. ASTM C 39, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

   4. ASTM C 42, Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete

5. ASTM C 94, Standard Specification for Ready-Mixed Concrete

6. ASTM C 150, Standard Specification for Portland Cement

7. ASTM C 171, Standard Specification for Sheet Materials for Curing Concrete

8. ASTM C 172, Standard Practice for Sampling Freshly Mixed Concrete

9. ASTM C 174, Standard Test Method for Measuring Thickness of Concrete Elements Using Drilled Concrete Cores

10. ASTM C 260, Standard Specification for Air Entraining Admixtures for Concrete

11. ASTM C 309, Standard Specification for Liquid-Membrane Forming Compounds for Curing Concrete

12. ASTM C 494, Standard Specification for Chemical Admixtures for Concrete

13. ASTM C 595, Standard Specification for Blended Hydraulic Cements

14. ASTM C 618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete

15. ASTM C 979, Standard Specification for Pigments for Integrally Colored Concrete

16. ASTM C 1077, Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation

17. ASTM C 1116, Standard Specification for Fiber-Reinforced Concrete

18. ASTM C 1157, Standard Performance Specification for Hydraulic Cement

19. ASTM C 1602, Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete

20. ASTM C 1688, Standard Test Method for Density and Void Content of Freshly Mixed Pervious Concrete

21. ASTM C 1701, Standard Test Method for Infiltration Rate of In Place Pervious Concrete

22. ASTM C 1754, Standard Test Method for Density and Void Content of Hardened Pervious Concrete

23. ASTM D 994, Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type)

24. ASTM D 1751, Standard Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)

25. ASTM D 1752, Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction

26. ASTM D 5893, Standard Specification for Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements

27. ASTM D 6690, Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements

28. ASTM E 329, Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection

D. Georgia Department of Transportation (GDOT):

1. "Standard Specifications, Construction of Transportation Systems", Latest Edition (GDOT Standard Specifications).

1.03 SYSTEM DESCRIPTION

A. Pervious Concrete Paving Design:

1. Pervious concrete paving system shall be designed to capture and temporarily store runoff and to withstand anticipated traffic loading applications in accordance with the design criteria established for this Project.

2. Pervious concrete paving system shall consist of the following components (as specified in this Section and indicated on the Drawings): pervious concrete surface layer; open-graded base layer; open-graded subbase-storage layer; choker course; prepared subgrade; and underdrain system (if required).

B. Integrally colored concrete shall be furnished for placement in areas designated on the Drawings. Integrally colored concrete shall be achieved using approved color admixtures introduced into the concrete mix during production of concrete prior to delivery and placement, providing consistent color throughout the entire thickness of the concrete section.

1.04 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the Contract Documents.

B. Submit the following for review and approval prior to shipment of materials to the Site.

1. Concrete Materials and Mix Design:

   a. Proposed pervious concrete mixture proportions including all material weights, volumes, design density, and design void content in accordance with ASTM C 1688.

   b. Proposed concrete mix design for non-pervious concrete.

   c. Manufacturer's product data sheets for concrete admixtures, expansion joint fillers, joint sealants, concrete curing aids, and other specified materials.

   d. Manufacturers' product data sheets for concrete color admixtures, and related curing compounds.

2. Samples for Concrete Color Selection: Submit manufacturer's color chart for Owner's selection of color. Color additive number and required dosage rate will be determined based on manufacturer product recommendations for selected color and the results of field construction color test panels.

3. Aggregate Base and Subbase Materials: Washed aggregate type, source, grading and void content (percent porosity).

4. Qualifications of Contractor as specified in subsection 1.05.

5. Qualifications of testing agency showing conformance to the requirements of subsection 1.05.E.

6. Test panel documentation as specified in subsections 1.05.G and 1.05.H.

7. Proposed jointing plan and placing sequence.

8. Proposed procedures for the production, transportation, placement, protection, curing, and temperature monitoring of concrete during cold and hot weather (as applicable).

C. Additional Submittals (In-Progress and at Completion):

   1. Field quality control test results.

   2. Inspection and Maintenance Plan.

1.05 QUALITY ASSURANCE

A. Contractor shall retain the services of an approved independent quality control firm to determine conformance of the materials and the constructed work with the Specifications.

B. Pervious concrete pavement shall conform to the requirements of ACI 522.1 (as modified in this Section) and the recommendations of the National Pervious Concrete Pavement Association (NPCPA).

C. Contractor shall submit evidence of two successful pervious concrete pavement projects completed in the last 24 months, including but not limited to the following:

1. Project name and address, owner name and contact information.

2. Test results, which must include density and void content of freshly mixed pervious concrete, mixture proportions, thickness, density and void content of cores extracted from the pavement (if tested) when required by the Owner's representative. This requirement may be waived by the Owner's representative provided the Contractor demonstrates successful experience in the concrete industry and constructs test panels for inspection and testing in accordance with subsection 1.05.G.

D. Contractor shall employ no less than one National Ready Mixed Concrete Association (NRMCA) certified Pervious Concrete Craftsman who shall be on-site, overseeing each placement crew during all concrete placement, or employ no less than three NRMCA certified Pervious Concrete Installers, who shall be on site working as members of each placement crew during all concrete placement, unless otherwise specified. The minimum number of certified individuals listed above shall be present on each pervious concrete placement including any test panel placements, and a certified individual shall be in charge of the placement crew and procedures.

E. Testing agencies that perform testing services on concrete materials shall meet the requirements of ASTM C 1077. Agencies inspecting the Work shall meet the requirements of ASTM E 329. Testing agencies performing the testing shall be accepted by the Owner's representative before performing any Work.

F. Field testing of concrete required in this Section shall be performed by individuals, each of whom is certified as an NRMCA Certified Pervious Concrete Technician, or equivalent, and an ACI Concrete Field Testing Technician - Grade 1, or equivalent.

G. Test Panels for Pervious Concrete Construction:

1. Test panels shall be constructed in accordance with the Drawings and Specifications. Regardless of qualifications, Contractor shall construct two test panels, each approximately 225 square feet, at the design thickness, consolidated, jointed and cured. Panels shall be constructed using materials, equipment, and personnel proposed for the Project, and on the same aggregate base and subbase layers specified, to demonstrate to the satisfaction of the Owner's representative that in-place unit weights can be achieved and a satisfactory pavement can be installed at the Site. If strength is used in the pavement design, cores from the test panels may be used to confirm that consolidation and infiltration, as well as strength, is consistent with design objectives for the top and bottom of the slab.

2. Quality: Test panels shall have acceptable surface finish, joint details, thickness, porosity and curing procedures and shall comply with the testing and acceptance

standards listed in this Section. Test density and void content of fresh concrete for the test panels in accordance with ASTM C 1688. Obtain hardened concrete cores from the test panels in accordance with ASTM C 42, test core thickness in accordance with h ASTM C 174, and density and void content in accordance with ASTM C 1754.

3. Satisfactory performance of the test panels shall be determined in accordance with the following:

   a. Fresh concrete results:
      i. Density shall be within plus or minus 5 lb/ft^3 of the accepted fresh density from the submitted mixture proportion.
      ii. Void content shall be within plus or minus 2 percent of the submitted fresh void content.

   b. Hardened concrete results:
      i. Compacted thickness shall be within the tolerance specified in Section 3.9 of ACI 522.1 (1-1/2 inch greater than to 3/8 inch less than the specified thickness).
      ii. Hardened density shall be plus or minus 5 percent of the design density.
      iii. Void content shall not be lower than 2 percent below the design void content. Void content shall be calculated as specified in subsection 3.07.G.

4. If test panels are found to be unsatisfactory, they shall be removed at the Contractor's expense and disposed offsite in accordance with applicable regulations. The Contractor shall repeat the test panels until acceptable. If test panels are found to be satisfactory, they may be left in-place and included in the completed work, at no additional cost to the Project. Test core holes, if any, shall be repaired by filling with conventional (non-pervious) concrete or preblended grout and the surface finished to match surrounding concrete surface. The average hardened densities from the two accepted test panels shall be the hardened density used as the basis of acceptance for the remainder of the pavement.

H. Test Panels for Integrally Colored Concrete:

1. After material samples are approved and prior to starting colored concrete construction, at least two test panels shall be constructed for integrally colored concrete areas. Construct test panels under the observation of, and wher approved by, the Owner's representative.

2. Each test panel shall be minimum 2-foot by 2-foot dimension. For accurate color, the quantity of concrete mixed to produce the sample shall be as recommended by the coloring admixture manufacturer.

3. Construct test panels using processes and techniques intended for use on permanent work, including curing procedures. Test panels shall be produced by the workers who will perform the permanent work.

4. Retain samples of color additives used in test panels for comparison with materials used in permanent work.

5. The accepted test panels shall be used as the standard of workmanship for the Project. Test panels shall remain through completion of the Work. If not retained as part of the construction, the test panels shall be demolished and removed from the construction site when directed by the Owner's representative.

I. Preconstruction Conference:

1. A preconstruction conference with the Owner's representative shall be held within one week prior to commencement of the pervious concrete construction. Contractor shall have the pervious concrete supplier, the foreman and the entire concrete crew that will form and place the concrete in attendance at this meeting.

2. As a guide for the meeting, the document "Checklist for the Concrete Preconstruction Conference" (available from the National Ready Mixed Concrete Association) shall be used to review all requirements of the Project during the meeting. Meeting emphasis shall be on how paving with pervious concrete differs from paving with conventional concrete.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Curing compound materials shall be delivered and stored in the manufacturers' original, unopened, sealed container that legibly shows: name of manufacturer; product name; batch number; quantity; date of manufacture; manufacturer's formulation numbers; and manufacturer's directions, including warnings and special precautions. Store and handle in accordance with the manufacturer's instructions.

1.07 PROJECT CONDITIONS

A. Conform to ACI 522.1 and other applicable industry standards for required weather conditions and other restrictions for pervious concrete construction.

B. Conform to the applicable requirements of Section 430 of the GDOT Standard Specifications and ACI 301 for required weather conditions and other restrictions for non-pervious concrete pavement construction.

C. Concrete shall not be placed on subgrade that is frozen or excessively wet. Concrete shall not be placed during periods of precipitation without adequate protection that meets the approval of the Owner's representative.

D. Coordinate concrete construction with other related adjacent site work.

E. Schedule delivery of concrete to provide consistent mix times from batching until discharge. Mix times shall meet manufacturer's written recommendations.

PART 2 PRODUCTS

2.01 SOURCE QUALITY CONTROL

A. Proposed materials shall be approved by the Owner's representative as specified prior to delivery and use in the construction.

2.02 AGGREGATE FOR BASE LAYER

A. Base layer material shall consist of open-graded washed aggregate conforming to the quality requirements of Section 800.2.01 of the GDOT Standard Specifications for "Class A" aggregate. Aggregate shall be washed, with less than 2 percent passing the Number 200 sieve. Gradation shall conform to size number 57 coarse aggregate as defined in Table 800.1 and summarized in the following table.

Sieve Size	Percent Passing, by Weight
1-1/2 inch	100
1 inch	95 - 100
1/2 inch	25 – 60
No. 4	0 – 10
No. 8	0 – 5

2.03 AGGREGATE FOR SUBBASE-STORAGE LAYER

A. Coarse aggregate for the subbase-storage layer shall be an open-graded, clean coarse aggregate. Gradation shall conform to size number 3 coarse aggregate as defined in Table 800.1 and summarized in the following table.

Sieve Size	Percent Passing, by Weight
2-1/2 inches	100
2 inch	90 - 100
1-1/2 inch	35 – 70
1 inch	0 – 15
1/2 inch	0 – 5

2.04 CHOKER COURSE

A. Choker course to be placed on excavated subgrade prior to placement of aggregate subbase layer shall conform to the material requirements specified in Section 02681.

2.05 MISCELLANEOUS MATERIALS

A. Underdrains: Specified in Section 02681.

B. Geotextile: Specified in Section 02371.

2.06 PERVIOUS CONCRETE MATERIALS

A. Comply with ASTM C 94 (except sections identified in ACI 522.1) and the requirements listed in the following paragraphs.

1. Cement: Portland cement Type I, Type II or V conforming to ASTM C 150 and ASTM C 1157 or blended cements conforming to ASTM C 595 and C 1157.

2. Aggregates: Comply with the requirements of ASTM C 33. Aggregate gradation shall meet the requirements for size number 67 (nominal 3/4-inch to No. 4 sieve sizes), size number 7 (nominal 1/2-inch to No. 4 sieve sizes) or size number 8 (nominal 3/8-inch to No. 8 sieve sizes), unless otherwise approved by the Owner's representative.

3. Admixtures: Air-entraining admixtures shall comply with ASTM C 260. Chemical admixtures shall comply with ASTM C 494.

4. Water shall be potable and shall comply with ASTM C 1602.

5. Supplementary Cementitious Materials: Fly ash and natural pozzolans conforming to ASTM C 618.

2.07 PERVIOUS CONCRETE MIXTURE

A. The Contractor shall furnish a proposed mix design with all proportions of materials prior to commencement of work as required in subsection 1.04. Concrete producers may have mixture proportions for pervious concrete optimized for performance with local materials by use of available software programs such as available through NRMCA.

B. General mixture proportions shall be as specified in the following paragraphs, unless otherwise approved by the Owner's representative:

1. Aggregate-cementitious materials ratio: Range of 4:1 to 4.5:1.

2. Concrete Mixture Unit Weight: Range of 100 pounds per cubic foot (lbs/ft^3) to 135 lbs/ft^3.

3. Concrete Mixture Void Content: Range of 15 to 25 percent.

4. Total Cementitious Content: Range of 450 lbs/yd^3 to 700 lb/yd^3.

5. Supplementary Cementitious Content (to reduce the amount of Portland cement used in the mixture): Fly ash shall be 25 percent maximum; slag shall be 25 percent maximum; or a combined supplementary cementitious content of 35 percent maximum.

6. Water-cementitious materials ratio: Range of 0.27 to 0.40.

7. Other materials shall be proportioned as determined by the producer to meet design criteria for the Project as approved by the Owner's representative.

2.08 NON-PERVIOUS CONCRETE MATERIALS AND MIX DESIGN

A. Concrete materials (including Portland cement, aggregate, admixtures and water) shall conform to the applicable requirements of Section 430 of the GDOT Standard Specifications as summarized below:

1. Cement: Portland cement Type I or II, conforming to ASTM C 150

2. Fine Aggregates: Conform to subsection 801.2.02 of the GDOT Standard Specifications, gradation size number 10.

3. Coarse Aggregate: Class A aggregate conforming to subsection 800.2.01 of the GDOT Standard Specifications. Gradation: size number 467 (nominal 1 1/2 to No.4 sieve sizes), size number 57 (nominal 1 inch to No. 4 sieve sizes), or size number 67 (nominal 3/4-inch to No. 4 sieve sizes).

4. Air entrainment admixtures shall conform to ASTM C 260.

5. The use of chemical admixtures shall be approved by the Owner's representative. Chemical admixtures (including any combination of water-reducing, retarding and accelerating admixtures) shall conform to the requirements of ASTM C 494.

B. Concrete mix design for pavement construction shall be Class 1 or 2 as specified in subsection 430.3.06 of the GDOT Standard Specifications.

C. Proportioning and mixing of cement, aggregate, water, and admixtures shall conform to the requirements of Section 430 of the GDOT Standard Specifications.

2.09 COLOR ADMIXTURES

A. Colored admixtures for integrally colored concrete shall consist of concentrated pigments specially processed for mixing into concrete complying with the requirements of ASTM C 494 and ASTM C 979, and shall contain no calcium chloride. Colored admixtures shall be added to concrete mix in accordance with the admixture manufacturer's written instructions.

B. Color for designated areas shall be green as selected by the Owner from manufacturer's standard or custom color cards.

C. Acceptable Products and Manufacturers:

1. CHROMIX® Admixtures for Color-Conditioned® Concrete, manufactured by L.M. Scofield Company (www.scofield.com)

2. Color admixtures manufactured by Davis Colors (www.daviscolors.com)

3. Other product as approved by Owner.

2.10 FORMS

A. Forms shall be constructed of steel, wood, or other materials that are the full depth of the pavement, sufficiently rigid to maintain specified tolerances, and capable of supporting concrete and mechanical concrete placing equipment.

2.11 ISOLATION (EXPANSION) JOINT MATERIAL

A. Isolation joint materials shall comply with ASTM D 994, ASTM D 1751, or ASTM D 1752.

2.12 CURING MATERIALS

A. The primary method of curing pervious concrete shall be the placement of a waterproof covering, consisting of clear polyethylene sheeting conforming to ASTM C 171.

B. Curing compound for integrally colored concrete shall comply with ASTM C 309 and shall be the same color and of the same manufacturer as that of the colored admixture. It shall be suitable for application for use with integrally colored concrete on horizontal exterior construction.

C. Additional curing materials may be used if approved by the Owner's representative.

2.13 JOINT SEALANT

A. Joint sealant for installation in joints in pavement slabs shall conform to ASTM D 5893 or ASTM D 6690. Provide backer rod and other accessories as recommended by the manufacturer.

B. Alternate sealant and accessories may be used if approved by the Owner's representative, providing the materials are compatible with the service environment.

PART 3 EXECUTION

3.01 PREPARATION

A. Provide physical barriers or direct traffic to minimize vehicular traffic on the subgrade during construction.

B. Protect all specified trees, vegetation, and root systems near the area to be paved with pervious concrete. Trees, vegetation, or root systems that are damaged shall be replaced at no additional cost to the Project.

3.02 SUBGRADE PREPARATION

A. Excavate to the required dimensions and elevations shown on the Drawings or as otherwise approved by the Owner's representative.

B. Excavated subgrade shall not be compacted or subject to excessive construction equipment traffic prior to placement of subbase-storage layer. Only low ground pressure equipment shall be used for excavation.

C. Excavated materials shall be removed from the construction areas and placed in other locations on the Site, if needed, or off-site where approved by the Owner's representative.

D. Prior to placement of granular materials and underdrain piping, the bottom of the excavation shall be dry and scarified (by raking, disking or tilling) to a minimum depth of six inches.

3.03 UNDERDRAIN SYSTEM

A. Construct underdrain system if required as indicated on the Drawings and as specified in Section 02681.

3.04 GEOTEXTILE INSTALLATION

A. Place geotextile on exposed excavated side slopes where indicated on the Drawings prior to placement of choker course and subbase and as specified in Section 02371.

3.05 CHOKER COURSE, SUBBASE AND BASE INSTALLATION

A. Upon completion of subgrade preparation, notify Owner's representative. Subgrade must be approved by the Owner's representative before the Contractor may proceed with placement of choker course.

B. Construct curbs and gutters adjacent to pervious concrete pavement as specified in applicable specification sections and indicated on the Drawings.

C. Choker course and subbbase/stormwater storage layer shall be placed immediately after approval of subgrade preparation to the thicknesses and limits indicated on the Drawings. Any accumulation of debris or sediment which has taken place after approval of subgrade shall be removed at the Contractor's expense.

D. Place specified coarse aggregate for subbase/storage layer in 12-inch maximum lifts. Lightly compact each layer by tamping with the bucket of placement equipment or using manually guided compaction equipment such as vibratory plate compactors. Install aggregate to the elevations indicated on the Drawings.

E. Place a minimum 4-inch thick base course evenly over the surface of larger-sized aggregate subbase, sufficient to allow placement of pavement, and lightly compact as specified for subbase/storage layer. Notify the Owner's representative to review installation for approval.

3.06 PERVIOUS CONCRETE PAVEMENT CONSTRUCTION

A. Pervious concrete pavement thickness shall be determined based on required hydrologic and structural criteria and as indicated on the Drawings. Pavements for vehicles heavier

than single axle service/delivery trucks will require special design thicknesses which may require two-course construction.

B. The Contractor will be restricted to pavement placement widths of a maximum of 20 feet, unless the Contractor can demonstrate competence to provide pavement placement widths greater than the maximum specified to the satisfaction of the Owner's representative. Large scale mechanized placement of pervious concrete with slipform concrete paving machines, laser screeds or asphalt paving machines may preclude use of fixed forms.

C. Batching, Mixing and Delivery:

1. Begin mixing immediately after cement has been added to aggregates. Batch and mix in compliance with ASTM C 94, except that discharge shall be completed within 60 minutes of the introduction of mixture water or aggregate to the cement. Increase time to 120 minutes when using a hydration-stabilizing admixture.

2. Drivers shall not add water unless instructed by the testing agency or a NRMCA certified Pervious Concrete Craftsman. If water is added, the fresh density shall still meet specified requirements after water addition.

3. Discharge: Each truckload shall be visually inspected for consistency of concrete mixture. Discharge shall be a continuous operation and shall be completed as quickly as possible.

4. Concrete shall be deposited as close to its final position as practical and such that discharged concrete is incorporated into previously placed plastic concrete. If consolidation occurs during concrete discharge, placement shall be halted and wet concrete removed.

D. Placing and Finishing:

1. Wet the aggregate base with water before concrete placement such that the material is saturated but without any standing water on the prepared aggregate base immediately before concrete placement.

2. Deposit concrete either directly from the transporting equipment or by conveyor onto the aggregate base, unless otherwise specified.

3. Do not place concrete on frozen aggregate base.

4. Deposit concrete between the forms to an approximately uniform height. Spread the concrete using mechanized equipment or hand tools, without segregation.

5. Strike off concrete between forms using a form-riding paving machine, roller screed, or vibrating screed. Other strike-off devices may be used when accepted by the Owner's representative.

6. Finish the pavement to the elevations and thickness indicated on the Drawings within the tolerances specified in Section 3.9 of ACI 522.1.

7. Care shall be taken to prevent closing the void structure of pervious concrete. After mechanical or other approved strike-off and compaction operation, no other finishing operation will be allowed. Internal vibration shall not be permitted.

8. Placed concrete shall not be disturbed while in the plastic state. Low spots after the screeding operation shall be over-filled for surface repair and either tamped to desired elevation with hand tampers or passing the screed a second time to correct the elevation.

9. Hand tampers and an edging tool with ¼ inch radius shall be used to compact the concrete along the slab edges immediately adjacent to the forms. After compaction, inspection and surface repair, no further finishing shall be performed on the concrete. Surface curing shall begin immediately as specified in subsection 3.04.F.

E. Jointing:

1. Construct joints at the locations, depths, and with dimensions indicated on the Drawings. Unless otherwise indicated, contraction (control) joints shall be installed at regular intervals not to exceed 20 feet.

2. Create contraction joints by one of the following methods:

   a. Tool contraction joints to the specified depth and width in fresh concrete immediately after the concrete is compacted. Use a rolling joint tool, drive a steel straightedge or use or approved methods.

   b. Sawcut concrete after concrete has hardened sufficiently to prevent aggregate from being dislodged and soon enough to control pavement cracking. To minimize drying, ensure that curing materials are removed only as needed to make cuts.

3. Transverse contraction joints shall be installed at one-quarter the depth of the thickness of the pavement.

4. Transverse construction joints shall be installed whenever concrete placing is suspended for 30 minutes or whenever concrete is no longer workable.

5. Expansion joints shall be formed full depth of concrete at indicated locations and spacing (including at intersections with curbs and gutters, structures, and other types of concrete paving). Expansion joint width shall be 1/2-inch minimum unless otherwise indicated on the Drawings. Install joint filler in accordance with the manufacturer's recommendations.

F. Curing:

1. Curing procedures shall begin immediately, no later than 10 minutes from the time the pervious concrete is discharged from the truck. Placing, finishing and tooled jointing and edging must be completed within the 10-minute window from discharge.

2. The pavement surface shall be covered with a minimum of 6-mil thick clear polyethylene sheet or other approved covering material. Prior to covering, an evaporative reducer shall be sprayed above the surface when required due to ambient conditions (high temperature, high wind, and low humidity) and if approved by the Owner's representative. The cover shall overlap all exposed edges and shall be secured (without using dirt or stone) to prevent dislocation due to winds or adjacent traffic conditions. The curing cover shall remain securely in place for a minimum of seven days, uninterrupted.

3. Apply approved curing compound for integrally colored concrete in accordance with the manufacturer's written instructions. Apply using tools and methods that will provide close color consistency.

4. During the curing period, protect concrete from damaging mechanical disturbances including load stresses, heavy shock, excessive vibration, and from damage caused by rain or flowing water.

5. No vehicular traffic shall be permitted on the pavement until curing is complete, and no truck traffic shall be permitted for at least 14 days. Pedestrian traffic may be permitted on the curing concrete after 24 hours. The Owner's representative may permit earlier traffic opening times.

3.07 NON-PERVIOUS CONCRETE PLACEMENT AND FINISHING

A. Conform to the applicable requirements of Section 430 of the GDOT Standard Specifications, and as specified in the following paragraphs. Unless otherwise approved by the Owner's representative, concrete pavement shall be constructed using standard methods, which shall include: placement of concrete within fixed forms; and consolidation and finishing of the concrete by equipment operating on forms.

B. Concrete pavement shall be constructed on prepared subgrade aggregate layers at the required locations and to the thickness and horizontal dimensions indicated on the Drawings.

C. Contraction and expansion joints shall be provided as indicated on the Drawings and as specified for pervious concrete.

D. The completed pavement surface shall conform to the lines and grades indicated on the Drawings.

E. Immediately following finishing operations, cure and protect concrete in accordance with the applicable requirements of subsection 430.3.05.L of the GDOT Standard Specifications. During the curing period, protect concrete from damaging mechanical disturbances including load stresses, heavy shock, excessive vibration, and from damage caused by rain or flowing water.

3.08 JOINT SEALING

A. Install joint sealant, including accessories, at top of all joints as soon as possible after proper curing of concrete in accordance with the sealant manufacturer's recommendations.

3.09 FIELD QUALITY CONTROL FOR PERVIOUS CONCRETE

A. Field inspection and testing shall be performed by an approved independent quality control firm in accordance with the following requirements, or as otherwise indicated on the Drawings.

B. Concrete tests shall be performed for each 50 cubic yards, or fraction thereof, with a minimum of one set of tests for each day's placement.

C. Sample freshly mixed concrete in accordance with ASTM C 172.

D. Density: Density of the plastic concrete shall be measured in accordance with ASTM C 1688. Density shall be within plus or minus 5 lb/ft^3 of the accepted fresh density from the submitted mixture proportion.

E. Void Content: Void content of the plastic concrete shall be calculated in accordance with ASTM C 1688 and compared to the submitted fresh void content. Unless otherwise specified, void content shall be between 15 and 25 percent. After a minimum of seven days, hardened concrete shall be tested at a rate of one set of three cores per 100 cubic yards of concrete placed on one day, or fraction thereof. Cores shall be drilled in accordance with ASTM C 42. The cores shall be measured for thickness, void structure and unit weight. Cores shall be taken a minimum two feet away from the edge of placement to ensure a representative sample. Test core holes shall be repaired by filling with conventional (non-pervious) concrete or preblended grout and the surface finished to match surrounding concrete surface.

F. Thickness: Untrimmed hardened core samples shall be used to determine placement thickness. All production cores, when measured for length, shall be within the tolerance specified in Section 3.9 of ACI 522.1 (1-1/2 inch greater than to 3/8 inch less than the specified thickness).

G. Core Density and Void Content:

1. The cores shall be tested for average density and void content using ASTM C 1754. Density of cores trimmed and tested in the saturated condition in accordance with ASTM C 1754 shall be within plus or minus five percent of the design unit weight or approved hardened density from the test panels. Hardened void content shall be not be lower than two percent below the specified design void content or approved hardened void content from the test panels.

3.10 FIELD QUALITY CONTROL FOR NON-PERVIOUS CONCRETE

A. If determined necessary by the Owner's representative, sampling and testing shall be performed during placement of concrete in conformance with ACI 301, and as specified below.

1. Sampling Fresh Concrete: Comply with AASHTO T141.

2. Slump Testing (AASHTO T119): One test for each concrete load at point of discharge; and one for each set of compressive strength test specimens.

3. Concrete Temperature: Tested hourly when air temperature is 40 degrees F. and below, and when 80 degrees F. and above, and each time a set of compression test specimens is made.

4. Compression Test Specimens (ASTM C 31): One set of four standard cylinders for each compressive strength test.

5. Air Entrainment (AASHTO T152): One test for each set of compression test specimens.

6. Compressive Strength Test (ASTM C 39): One set for every 100 cubic yards or fraction thereof, of each concrete mixture placed in any one day, and at least one set per pour. One specimen of each set tested at seven days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.

3.11 MAINTENANCE AND PROTECTION

A. Prior to the Owner's final acceptance of the Work, Contractor shall perform maintenance and protection of the construction as specified in this Section. In addition, for the one year warranty period, Contractor shall correct or remove and replace defective work as approved by the Owner's representative in accordance with the terms of the Contract.

B. Excessive Raveling: Through the end of the warranty period, any areas of excessive surface raveling of pervious concrete, as determined by the Owner's representative, shall be removed and replaced or repaired by the Contractor, at no additional cost to the Project.

C. Surface Drainage for Pervious Concrete: At or before 28 days after placement, either the average infiltration rate of multiple locations or the infiltration rate of a determined localized area of the in-place pervious concrete shall be determined in accordance with ASTM C 1701. Verify the infiltration rate immediately after installation is a minimum of 200 inches per hour (or 2 gallons per square foot per minute) as determined using ASTM C 1701. Any areas of insufficient surface infiltration rate, as determined by the Owner's representative, shall be removed and replaced by the Contractor, at no additional cost to the Project.

D. Inspection and Maintenance Plan for Pervious Concrete: At or before 28 days after placement, the Contractor shall submit to the Owner's representative a written Inspection and Maintenance Plan for implementation by the Owner (or authorized representative) to

prevent the clogging of the pervious concrete pavement. The plan shall include periodic testing of the infiltration rate in accordance with ASTM C 1701, and proposed methods to restore porosity if the rate drops below 75 percent of the original determined rate. Acceptable methods to restore levels of porosity shall be described and shall include vacuuming with or without simultaneous power washing of the pervious concrete sections. Fee for preparation of the Inspection and Maintenance Plan shall be at no additional cost to the Project.

END OF SECTION

SECTION 02900
TREES, PLANTS AND GROUND COVERS

PART 1 GENERAL

1.01 SCOPE

A. The Contractor shall furnish and plant trees, plants and ground covers as shown on the Drawings and as specified herein.

B. Under this section, the Contractor shall also replace trees, plants and ground covers damaged by his operations. Existing trees, plants and ground covers damaged by the Contractor's operations shall be replaced as directed by the Owner's representative, to the satisfaction of the Owner's representative and at no additional cost to the Owner.

C. Work under this Section shall include, but not be limited to:

1. Soil preparation.
2. Planting mixes.
3. Mulch and planting accessories.
4. Furnishing and installing trees, plants and ground covers.
5. Existing tree care.
6. Filling around trees to remain.
7. Maintenance.

1.02 QUALITY ASSURANCE

A. Comply with requirements of Section 02000, Site Work

B. Plant names shall comply with "Standardized Plant Names" as adopted by the latest edition of the American Joint Committee of Horticultural Nomenclature. Names of varieties shall conform generally with names accepted by the nursery trade. Provide stock true to botanical name and legibly tagged.

C. Comply with sizing and grading standards of the latest edition of "American Standard for Nursery Stock". A plant shall be dimensioned as it stands in its natural position.

D. All plants shall be nursery grown under climatic conditions similar to those in the locality of the project.

E. Stock furnished shall be at least the minimum size as stock to be replaced. Larger stock is acceptable, at no additional cost, and providing that the larger plants will not be cut back to the existing plant size.

F. Provide "specimen" plants with height, shape and character of growth. Tag specimen trees or shrubs at the source of supply. The Owner's representative will inspect specimen selections at the source of supply for suitability and adaptability to selected location. When specimen plants cannot be purchased locally, provide sufficient photographs of the proposed specimen plants for approval.

G. Plants may be inspected and approved at the place of growth, for compliance with specification requirements for quality, size, and variety. Such approval shall not impair the right of inspection and rejection upon delivery at the site or during the progress of the work.

H. Contractor shall provide and pay for material testing. Testing agency shall be acceptable to the Owner's representative. Provide the following data:

1. Test representative material samples proposed for use.

2. Topsoil:

   a. pH factor.
   b. Mechanical analysis.
   c. Percentage of organic content.
   d. Recommendations on type and quantity of additives required to establish satisfactory pH factor and supply of nutrients to bring nutrients to satisfactory level for planting.

1.03 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:

1. Mulch samples.
2. Topsoil samples
3. Compost Samples
2. Planting accessories samples.
3. Certification for topsoil source and pH value; compost and plant fertilizer.
4. Material test reports.
5. Upon plant material acceptance, submit written instructions recommending procedures for maintenance of plant materials.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver fertilizer materials in original, unopened, and undamaged containers showing weight, analysis, and name of manufacturer. Store materials in a manner to prevent wetting and deterioration.

B. Take all precautions customary in good trade practice in preparing plants for moving. Workmanship that fails to meet the highest standards will be rejected. Spray deciduous plants in foliage with an approved "Anti-Desiccant" immediately after digging to prevent dehydration. Dig, pack, transport, and handle plants with care to ensure protection against injury. Inspection certificates required by law shall accompany each shipment invoice or order to stock and on arrival, the certificate shall be submitted to the Owner's representative.

C. Protect all plants from drying out. If plants cannot be planted immediately upon delivery, properly protect them with soil, wet peat moss, or in a manner acceptable to the Owner's representative. Water heeled-in plantings daily. No plant shall be bound with rope or wire in a manner that could damage or break the branches.

D. Cover plants transported on open vehicles with a protective covering to prevent wind burn.

E. Provide dry, loose topsoil for planting bed mixes. Frozen or muddy topsoil is not acceptable.

1.05 PROJECT CONDITIONS

A. Notify Owner's representative at least 7 working days prior to installation of plant material.

B. Protect existing utilities, paving, and other facilities from damage caused by landscaping operations.

C. Locate and protect existing irrigation system(s) during planting operations. Repair irrigation system components, damaged during planting operations, at Contractor's expense.

1.06 WARRANTY

A. Warrant plant material to remain alive and be in healthy condition for a period of one year after planting and acceptance. Inspection of plants will be made by the Owner's representative at completion of planting.

B. Replace, in accordance with these specifications, all plants that are dead or, as determined by the Owner's representative, are in an unhealthy or unsightly condition, and have lost their natural shape due to dead branches, or other causes due to the

Contractor's negligence. The cost of such replacement is at Contractor's expense. Warrant all replacement plants for 1 year after installation.

C. 3. During the warranty period, damage to plant material resulting from disease, drought, insect infestation, improper maintenance, winter burn, except breakage resulting from freezing rains or winds of 60 mph and greater, shall be the liability of the Contractor.

D. Remove and immediately replace all plants, as determined by the Owner's representative to be unsatisfactory during the initial planting installation.

PART 2 PRODUCTS

2.01 MATERIALS

A. Plants: Provide plants typical of their species or variety; with normal, densely-developed branches and vigorous, fibrous root systems. Provide only sound, healthy, vigorous plants free from defects, disfiguring knots, sunscald injuries, frost cracks, abrasions of the bark, plant diseases, insect eggs, borers, and all forms of infestation. All plants shall have a fully developed form without voids and open spaces. Plants held in storage will be rejected if they show signs of growth during storage.

1. Dig balled and burlapped plants with firm, natural balls of earth of sufficient diameter and depth to encompass the fibrous and feeding root system necessary for full recovery of the plant. Provide ball sizes complying with the latest edition of the "American Standard for Nursery Stock". Cracked or mushroomed balls are not acceptable.

2. Container-grown stock: Grown in a container for sufficient length of time for the root system to have developed to hold its soil together, firm and whole.

   a. No plants shall be loose in the container.
   b. Container stock shall not be pot bound.

3. Provide new tree species to match existing tree species. New species shall be provided with a single main trunk. Trees that have the main trunk forming a "Y" shape are not acceptable.

4. Plants planted in rows shall be matched in form.

5. Plants larger than those existing may be used when acceptable to the Owner's representative. If the use of larger plants is acceptable, increase the spread of roots or root ball in proportion to the size of the plant.

6. No pruning wounds shall be present with a diameter of more than 1-inch and such wounds must show vigorous bark on all edges.

7. Shrubs and small plants shall meet the requirements for spread as follows:

   a. The measurements for height shall be taken from the ground level to the height of the top of the plant and not the longest branch.
   b. Single stemmed or thin plants will not be accepted.
   c. Side branches shall be generous, well-twigged, and the plant as a whole well-bushed to the ground.
   d. Plants shall be in a moist, vigorous condition, free from dead wood, bruises or other root or branch injuries.

2.02 ACCESSORIES

B. Topsoil for Planting Beds and Tree Pits: Topsoil and Engineered Soil Mix shall be as specified in Section 02922 Amended Soil and Mulch. Fertilizer:

1. Plant Fertilizer Type "A": Commercial type approved by the Owner's representative, containing 5% nitrogen, 10% phosphoric acid, and 5% potash by weight, 1/4 of nitrogen in the form of nitrates, 1/4 in form of ammonia salt and 1/2 in form of organic nitrogen.

2. Plant Fertilizer Type "B": Approved acid-base fertilizer.

C. Anti-Desiccant: Protective film emulsion providing a protective film over plant surfaces; permeable to permit transpiration. Mixed and applied in accordance with manufacturer's instructions.

E. Mulch shall be as specified in Section 02922 Amended Soil and Mulch.

F. Water: Free of substances harmful to plant growth. Hoses or other methods of transportation shall be furnished by the Contractor.

G. Stakes for Staking: Hardwood, 2-inch x 2-inch x 8-feet long.

H. Stakes for Guying: Hardwood, 2-inch x 2-inch x 36-inches long.

I. Guying/Staking Material: : Min. ¾" wide nylon webbing

J. Tree Wrap: Standard waterproofed tree wrapping paper, 2-1/2-inches wide, made of 2 layers of crepe kraft paper weighing not less than 30 lbs. per ream, cemented together with asphalt. Tree wrap shall be removed at 12 months after installation of plant material.

K. Twine: Two-ply jute material.

PART 3 EXECUTION

3.01 INSPECTION

A. Examine proposed planting areas and conditions of installation. Do not start planting work until unsatisfactory conditions are corrected.

3.02 PLANTING OF, TREES, SHRUBS, PERENNIALS, AND GROUND COVER PLANTS.

A. Except as otherwise specified, the Contractor's work shall conform to accepted horticultural practices as used in the trade.

B. Trees, shrubs, balled and burlapped, and containerized plants shall be planted during their individual dormant seasons, as directed in the planting schedule, or as advised by a commercial plant supplier. Trees, shrubs, balled and burlapped, containerized plants shall be installed per the recommendations shown on the individual labels and as directed in the planting schedule, or as advised by a commercial plant supplier.

C. The Owner or Owner's Representative shall verify the staked location of all trees, shrubs, bare root plants prior to installation with labeled stakes to be furnished for this purpose by the Contractor.

D. Planting pits shall be dug and soil for planting readied before plants are delivered. Pits shall be at least twice the diameter of the root ball or container. Contractor shall get approval of the planting pit locations from the Owner or Owner's Representative prior to plant installation.

E. Set plant material in the planting pit to proper grade and alignment. If fabric is used in container plants, remove first before setting in pit. Set plants upright, plum, and no lower than the finished grade or 2-3 inches above finished grade. Add excavated pit material to fill approximately half of the pit. Fill rest of pit soil and bring to finished grade. Lightly compact fill around root ball and be sure to fill all voids. No filling will be permitted around trunks or stems.

F. All plants shall be set on prepared soil to such depth that the finished grade level at the plant after settlement will be the same as that at which the plant has grown. They shall be planted upright and plumb. Platforms, wire and burlap for top and sides of the ball as shown on the Details shall be removed. If synthetic fabric is used instead of burlap, all fabric should be removed prior to planting. All broken, frayed , or circling roots shall be cut off cleanly. Soil shall be placed and compacted carefully to avoid injury to roots and to fill voids. When the hole is nearly filled, add water as necessary and allow it to soak away. Fill the hole to finish grade. After the ground settles additional soil shall be filled to the level of the finished grade.

G. All trees, shrubs, and perennial plants shall be installed per the Drawings and Details.

H. Excess excavated soil from planting operations shall be removed from the site and properly disposed of by the Contractor.

I. All containerized plants shall be fertilized per soil test recommendations within 2 days of installation. Balled and burlapped trees and shrubs shall not be fertilized for the first year after planting.

J. If applicable, staking shall be accomplished as shown on Drawings and done only as recommended by Owner or Owner's Representative. Supports shall be removed immediately after the guarantee period.

K. Unless shown otherwise on the Drawings, all plants shall be mulched with a 3-inch minimum layer of approved mulch within 2 days of planting. This mulch shall entirely cover the area of the planting pit, bed, or saucer around each plant.

G. Pruning:

1. Upon completion of the work under the contract, all new trees and shrubs shall have been pruned and any injuries repaired. The amount of pruning shall be limited to the minimum necessary to remove dead or injured twigs. Pruning shall be done in such a manner as not to change the natural habit or shape of the plant. All cuts shall be made flush, leaving no stubs. On all bruises or scars on the bark and cuts over ¾-inch in diameter, the injured cambium shall be traced back to living tissue and removed; wounds shall be smoothed and shaped so as not to retain water.

2. Multiple leader plants: Preserve the leader which will best promote the symmetry of the plant. Cut branches flush with the trunk or main branch, at a point beyond a lateral shoot or bud at a distance of not less than 1/2 the diameter of the supporting branch. Make cut on an angle.

H. Care of Existing Trees:

1. Selectively prune existing trees in designated areas, under Owner's representative's direction. Remove sucker shoots, dead, rubbing, and damaged branching.

2. Fertilize designated existing trees with 2 to 3 lbs. of Type "A" plant fertilizer per inch of trunk diameter, for trees less than 6-inches in diameter and 3 to 5 lbs. for trees greater than 6-inches in diameter.

   a. Fertilize in early spring before growth begins or in late October.
   b. Fertilize at 2-feet to 3-feet on center in a triangular pattern to a depth of 18-inches within the dripline.
   c. Injection or drilling fertilization methods, when used, shall be acceptable subject to Owner's representative's approval.

3. Water existing trees every 2 weeks until acceptance. Water thoroughly with a fine mist sprinkler head soaker hose or hose at a low flow rate over the entire drip line area as required to allow water to penetrate to a depth of 12-inches to

18-inches.

I. Tree Relocation:

1. Transplant trees designated for relocation to locations shown on the drawings. Prune, dig, ball and burlap, move and plant in accordance with specified tree planting requirements.

3.05 MAINTENANCE

A. Maintenance shall begin immediately after each plant is planted and shall continue until final acceptance is established by the Owner or Owner's Representative. Planting shall be protected and maintained by the Contractor as necessary by watering, weeding, fertilizing, and replanting as necessary throughout the guarantee period.

1. Re-set settled plants to proper grade and position. Restore planting saucer and adjacent material and remove dead material.

2. Tighten and repair guy lines and stakes as required. Remove stakes and guys 12 months after installation of plant material.

3. Remove tree wrapping and twine 12 months after installation of plant material.

4. Correct defective work as soon as possible after deficiencies become apparent and weather and season permit.

5. Water trees, plants, and ground cover beds within the first 24 hours of initial planting.

3.06 ACCEPTANCE

A. Inspection to determine acceptance of planted areas will be made by the Owner's representative, upon Contractor's request. Provide notification at least 10 working days before requested inspection date. Planted areas will be accepted provided all requirements, including maintenance, have been complied with and plant materials are alive and in a healthy, vigorous condition.

B.

3.07 CLEANING

A. Perform cleaning during installation of the work and upon completion of the work. Remove from site all excess materials, soils, debris, and equipment. Repair damage resulting from planting operations.

+ + + END OF SECTION 02900 + + +

SECTION 02920
SITE RESTORATION

PART 1 GENERAL

1.01 SCOPE

A. The Contractor shall provide all, labor, materials, equipment and incidentals required for all site restoration and related operations necessary shown on the Drawings or specified in these Specifications.

B. This section includes disposition of materials and structures encountered in the Work, all cleanup and any other similar, incidental, or appurtenant operations which may be necessary to properly complete the Work.

1.02 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:

1. The Contractor shall submit certificates of inspection as required by government authorities. The Contractor shall submit other data substantiating that materials comply with specified requirements.

2. The Contractor shall submit instructions recommending procedures to be established by the City for maintenance of site restoration work for one (1) full year.

1.03 QUALITY ASSURANCE

A. The Contractor shall ship site restoration materials with certificates of inspection required by authorities having jurisdiction. The Contractor shall comply with regulations applicable to site restoration materials.

B. If specified site restoration materials are not obtainable, the Contractor shall submit proof of non-availability to the Owner's representative together with proposal for use of equivalent material.

1.04 SAFETY REQUIREMENTS

A. Hazards Control:

1. The Contractor shall store volatile wastes in covered metal containers, and remove from the site of the Work daily.

2. The Contractor shall prevent accumulation of wastes that create hazardous conditions.

3. The Contractor shall provide adequate ventilation during use of volatile or noxious substances.

B. The Contractor shall conduct cleaning and disposal operations in compliance with local ordinances and environmental laws and regulations.

1. The Contractor shall not burn or bury rubbish and waste materials on the site of the Work without prior written permission from the Owner's representative.

2. The Contractor shall not dispose of volatile wastes such as mineral spirits, oil, or fuel in open drainage ditches or storm or sanitary drains.

1.05 DELIVERY

A. The Contractor shall deliver packaged materials in containers showing weight, analysis, and name of manufacturer. The Contractor shall protect materials from deterioration during delivery and while stored at the site of the Work.

PART 2 PRODUCTS

(NOT USED)

PART 3 EXECUTION

3.01 DISPOSITION OF MATERIALS AND STRUCTURES ENCOUNTERED IN THE WORK

A. Existing materials or structures that may be encountered (within the lines, grades, or trenching sections established for completion of the Work), if unsuitable or unacceptable to the Owner's representative for use in the Work, and for which the disposition is not otherwise specified, shall either be disposed of by the Contractor or shall remain the property of the City as further provided in this section.

B. At the option of the City, any existing materials or structures of "value" encountered in the Work shall remain the property of the City. The term "value" shall be defined by the City.

C. Any existing materials or structures encountered in the Work, and determined not to be of "value" by the City, shall be disposed of by the Contractor, in an approved manner.

3.02 JOB CONDITIONS

A. The Contractor shall determine the locations of underground utilities and perform Work in

a manner which will avoid possible damage. The Contractor shall hand excavate, as required. The Contractor shall maintain grade stakes set by others until removal is mutually agreed upon by parties concerned.

B. All bare earth areas within the limit of work shall be grassed, mulched, or covered with other plant material as shown on the Drawings.

C. On a continuous basis, the Contractor shall maintain the site of the Work free from accumulations of waste, debris, and rubbish caused by his operations.

D. At completion of the Work, the Contractor shall remove waste materials, rubbish, tools, equipment, machinery, and surplus materials, and clean all sight-exposed surfaces. The Contractor shall leave the site of the Work clean and ready for occupancy or use.

E. The Contractor shall proceed with the complete site restoration work as rapidly as portions of the site of the Work become available, working within seasonal limitations for each kind of site restoration work required. The Contractor will not be allowed to postpone site cleanup and stabilization until the end of the Work.

F. When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, the Contractor shall notify the Owner's representative before planting.

G. The Contractor shall install materials during normal planting seasons for each type of site restoration work.

H. The Contractor shall plant or replace trees and shrubs after final grades are established , unless otherwise acceptable to the Owner's representative.

I. The Contractor may, at his option, employ additional measures (other than those specified) to prevent loss of, or damage to the Work resulting from the effects of wind and/or water. No additional compensation will be made for the employment of such additional measures.

3.03 CLEANUP

A. During site restoration work, the Contractor shall keep pavements clean and the site of the Work in an orderly condition.

B. The Contractor shall protect site restoration work and materials from damage due to site restoration operations, operations by other contractors, and trades and trespassers. The Contractor shall maintain protection during installation and maintenance periods. The Contractor shall treat, repair, or replace damaged site restoration work as directed by the Owner's representative.

C. Immediately upon completion of any section of the Work and before payment therefore

has been made, the Contractor shall remove from the site of the Work all construction equipment, temporary structures, and debris, and shall restore the site of the Work to a condition equal to or better than that which existed prior to construction. Waste materials shall be disposed of at locations satisfactory to the City or affected regulatory agencies.

D. The Contractor shall not remove barricades and warning and direction signs until directed by the Owner's representative.

E. After completion of all Work required by the Contract and before final payment has been made, the Contractor shall make a final cleanup of each separate part of the Work; shall restore all surfaces to a neat and orderly condition; and shall remove all construction equipment, tools, and supplies.

3.04 INSPECTION AND ACCEPTANCE

A. When site restoration work is completed, including maintenance, the Owner's representative will, upon request, make an inspection to determine acceptability.

B. Where inspected site restoration work does not comply with the requirements of the Owner's representative, the Contractor shall replace rejected work and continue specified maintenance until reinspected by the Owner's representative and found to be acceptable. The Contractor shall remove rejected plants and materials promptly from the site of the Work.

+ + + END OF SECTION 02920 + + +

SECTION 02922

AMENDED SOIL AND MULCH

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. Section includes furnishing and installation of amended soil (engineered soil mix) and mulch for stormwater quality facilities, including stormwater planters.

B. Related Work Specified Elsewhere:
1. Section 02125 – Temporary and Permanent Erosion and Sedimentation Control
2. Section 02681 – Subdrainage for Stormwater Quality Facilities
3. Section 02949 – Stormwater Planters

1.02 REFERENCES

A. ASTM International:

1. ASTM C 33, Standard Specification for Concrete Aggregates

2. ASTM D 2974, Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils

3. ATM D 3385, Standard Test Method for Infiltration Rate of Soils in Field Using Double-Ring Infiltrometer

4. ASTM D 4542, Standard Test Method for Pore Water Extraction and Determination of the Soluble Salt Content of Soils by Refractometer

5. ASTM D 4972, Standard Test Method for pH of Soils

6. ASTM D 5268, Standard Specification for Topsoil Used for Landscaping Purposes

1.03 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the Contract Documents.

B. Submit the following for review and approval prior to shipment of materials to the Site:

1. Written documentation from manufacturers or suppliers for materials to be furnished under this Section. Include description of origin and composition of the materials.

2. Material test results including infiltration rate. Source quality control test results.

3. Minimum one-gallon sample of each proposed material.

1.04 QUALITY ASSURANCE

A. Contractor shall retain the services of an approved independent soil testing firm to perform testing of engineered soil mix as specified in this Section.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle materials in a manner to prevent damage and deterioration.

B. Engineered soil mix and mulch shall be delivered to the Site using clean equipment, and separately stockpiled in areas approved by the Owner's representative. Adequately protect to preserve the materials' fitness and quality.

1.06 PROJECT CONDITIONS

A. Conform to the specifications in this Section for required environmental conditions for construction work, including site moisture conditions, ambient temperature.

B. Existing site conditions impacting the work are indicated on the Drawings.

1.07 SCHEDULING

A. Coordinate furnishing and placement of specified materials with related construction work specified in other referenced specification sections.

PART 2 PRODUCTS

2.01 SOURCE QUALITY CONTROL

A. Proposed materials and sources of supply shall be approved by the Owner's representative as specified, prior to use of the materials in the construction.

B. The independent testing firm shall sample and analyze proposed engineered soil mix as specified in this Section.

C. Tests on amended soil shall be performed once per location for pH and organic content. Tests for remaining parameters are required for every 500 cubic yards of soil mix, and at a minimum once per location.

2.02 ENGINEERED SOIL MIX

A. Engineered soil mix shall consist of a mixture of sand, clay, silt and organic matter meeting the following specifications:

1. Classified as a sandy loam or loamy sand.
2. Sand Content: 70% to 80% clean washed sand (dry weight basis), conforming to the gradation requirements for fine aggregate in ASTM C 33.
3. Fines (Clay and Silt) Content: Not greater than 10% including topsoil (dry weight basis).
4. Topsoil: 10%-20% (dry weight basis).

5. Compost: 5% to 10% (dry weight basis).
6. Infiltration rate: At least one inch per hour, and preferred rate of 1 to 2 inches per hour (as determined using ASTM D 3385 or other approved test method).
7. pH: 5.5 to 6.5 (as determined using ASTM D 4972.
8. Organic Content: 3 to 10 percent (as determined using ASTM D 2974 or other approved test method).
9. Concentration of Soluble Salts: Not to exceed 500 ppm (as determined using ASTM D 4542).

B. Alternate Soil Mix Materials: Engineered soil mixtures utilizing alternate or synthetic materials are acceptable provided the overall composition is completely equivalent to the infiltration performance specifications in paragraph 2.02.A above. Contractor shall submit a request for substitution of materials along with test results for the proposed alternate mix.

A. Composted Material: Compost shall be a well decomposed, mature, stable, weed-free organic matter source derived from GA DNR defined Category A Feedstock such as yard debris, wood wastes or agricultural residuals, not including biosolids. Compost shall be brown or black in color with no visible free water or dust and no detectable ammonia odor. Compost shall be certified by the US Composting Council (USCC) Seal of Testing Assurance (STA) program and meet the following requirements:
1. pH: 5.0-8.5
2. Soluble Salt Concentration: <5 dS/m (mmhos/cm)
3. Stability (Carbon Dioxide Evolution Rate) : <8 MG CO2-C per g OM per day
4. Inorganic materials: <1% (dry weight)
5. Chemical contaminants: Meet or exceed US EPA Class A standard, 40 CFR § 503.13, Tables 1 and 3 levels
6. Particle size: 98% passing ¾" screen or smaller

C. Existing topsoil on the Site may be used as a component of the engineered soil mix. The existing topsoil shall be treated for weeds, tested for pH, organic content, grain size analysis, and permeability to identify necessary amendments. Topsoil shall conform to the requirements of subsection 2.03.

D. In the event that sufficient topsoil cannot be obtained from on-site excavation, topsoil may be obtained from outside the limits of the Project as approved by the Owner's representative.

E. Engineered soil mix shall not be incorporated into the Work until it is has been approved by the Owner's representative.

2.03 TOPSOIL

A. Topsoil, as a component of engineered soil mix and for other purposes, shall be natural, friable, fertile, loam, sandy loam, silt loam, or sandy clay loam per USDA soil triangle. It shall be a uniform native upland topsoil, free from subsoil, objectionable weeds, litter, stiff clay, stones larger than one-inch in diameter, stumps, roots, trash, toxic substances, or any other material which may be harmful to plant growth or hinder planting operations.

B. Composition of topsoil material shall be in accordance with ASTM D 5268.

2.04 MULCH

A. Mulch shall consist of finely shredded (double or triple shredded) hardwood mulch, or equivalent material, and shall be well mixed and homogenous, uniform in color and free of foreign material and viable plant propagules. Mulch shall meet the following criteria:

1. 90% of material passing the 1/2 inch screen.
2. Maximum length of any individual component shall be two inches (2")
3. pH: 6.0 to 8.0 (as determined using ASTM D 4972).

2.05 DRAINAGE STONE AND UNDERRDRAIN PIPING

A. Specified in Section 02681.

PART 3 EXECUTION

3.01 PREPARATION

A. Erosion and sediment control measures shall be implemented to protect construction areas. Conform to the requirements indicated on the Drawings and as specified in Section 02125.

B. Excavate for stormwater quality facilities and construct subdrainage system as specified in Section 02681 and other applicable specification sections.

C. Construct check dams, planter walls and other construction items for stormwater planters as specified in Section 02949.

3.02 PLACEMENT OF ENGINEERED SOIL MIX

A. Engineered soil shall be thoroughly mixed and tested prior to placement.

B. Place engineered soil mix to the depth and limits indicated on the Drawings. Installation of engineered soil mix shall be completed in a manner that will ensure preservation of the infiltrative capacity of the underlying soils. The moisture content of the soil shall be low enough to prevent clumping and compaction during placement.

C. The engineered soil mix shall be placed in horizontal layers not to exceed six inches loose depth, and lightly hand-tamped, wetted, or compacted with a small water-filled landscape roller, to reduce the potential for excessive settling.

D. Uniformly grade engineered soil mix to achieve a smooth surface, free of irregular surface changes. Do not over-work or excessively compact the soil mix. Grade to cross-sections, thickness and elevations indicated on the Drawings. Settling of soil by walking on surface and working with hand equipment is acceptable.

3.03 PLACEMENT OF MULCH

A. Unless otherwise indicated on the Drawings, place mulch on top of completed engineered soil mix and around vegetation plantings to a uniform depth of two to four inches. Place to the full limits of each stormwater quality facility as indicated.

B. Where possible, do not allow mulch to touch plant foliage or trunk.

3.04 FIELD QUALITY CONTROL

A. Test drainage of engineered soil mix by filling stormwater quality facility with water twice in succession. Notify Owner's representative of water retention exceeding 24 hours.

3.05 MAINTENANCE AND PROTECTION

A. Remove all debris from within the limits of the constructed stormwater quality facilities.

B. Protect the constructed areas from erosion and keep free from accumulation of debris. Divert post-construction stormwater runoff around the areas until vegetative cover has been established.

C. Damage to the constructed areas shall be fully repaired as approved by the Owner's representative.

END OF SECTION

SECTION 02933
SEEDING AND SODDING

PART 1 GENERAL

1.01 SCOPE

A. The work covered by this Section consists of furnishing all labor, equipment and material required to place topsoil, compost, seed, commercial fertilizer, agricultural limestone and mulch material, including seedbed preparation, harrowing, compacting and other placement operations on graded earthen areas as described herein and/or shown on the Drawings.

B. Seeding operations shall be conducted on all newly graded earthen areas not covered by structures, pavement or sidewalks; all cleared or grubbed areas which are to remain as finish grade surfaces; and on all existing turf areas which are disturbed by construction operations and which are to remain as finish grade surfaces. Areas disturbed by borrow activities shall also be seeded according to these Specifications.

C. The Work shall also include temporary seeding operations to stabilize earthen surfaces during construction or inclement weather and to minimize stream siltation and erosion. Temporary seeding shall be performed at the times and locations as directed by the Engineer.

1.02 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following information shall be submitted:

1. Prior to seeding operations, labels or certified laboratory reports from an accredited commercial seed laboratory or a state seed laboratory showing the analysis and germination of the seed to be furnished. Acceptance of the seed test reports shall not relieve the Contractor of any responsibility or liability for furnishing seed meeting the requirements of this Section.

2. Prior to topsoil operations, the Contractor shall obtain representative samples and furnish soil test certificates including textural, pH, and organic ignition analysis from the State University Agricultural Extension Services or other certified testing laboratory.

PART 2 PRODUCTS

A. Topsoil

1. Topsoil shall be stripped from the site and stockpiled prior to grading activities

per Section 02200. If on-site topsoil is insufficient, additional topsoil or compost may be brought in. Topsoil and compost shall meet the specification in Section 02922

B. Permenant Seeding

1. All references to Grassing or Seeding in this specification shall refer to permanent seed unless otherwise stated.

2. Seed shall be delivered in new bags or bags that are sound and labeled in accordance with the U.S. Department of Agriculture Federal Seed Act.

3. All seed shall be from the last crop available at time of purchase and shall not be moldy, wet or otherwise damaged in transit or storage.

4. Seed shall bear the growers analysis testing to 98 percent for purity and 90 percent for germination. At the discretion of the Engineer, samples of seed may be taken for check against the grower's analysis.

5. Species, rate of seeding, fertilization and other requirements are shown in Table 02933-1 at the end of this Section.

C Temporary Seeding

Temporary seed shall be installed if the grass areas become ready for planting at times other than the planting seasons for permanent grass. The Contractor shall establish temporary vegetative cover (Ds2) per the Georgia Manual for Erosion and Sediment Control and Section 02125 of these specifications. Seed species and rate shall be approved by Owner prior to application.

A. Fertilizer and Liming Materials

1. Fertilizer and liming materials shall comply with applicable state, local and federal laws concerned with their production and use.

2. Commercial fertilizer shall be a ready mixed material and shall be equivalent to the grade or grades specified in Table 02933-1. Container bags shall have the name and address of the manufacturer, the brand name, net weight and chemical composition.

3. Agricultural limestone shall be a pulverized limestone having a calcium carbonate content of not less than 85 percent by weight.

4. Fertilizer shall be a complete fertilizer, the content of which shall meet the

following minimum requirements: 10% nitrogen, 10% phosphoric acid, 10% potash, available materials. Fertilizer shall be uniform in composition, dry and free flowing, and shall be delivered to the site in original unopened containers bearing the manufacturer's statement of guarantee.

5. Ammonium Nitrate shall be a standard brand and shall be delivered to the site in original unopened containers. It shall contain not less than 33-1/3% Nitrogen.

D. Mulch Material

1. All mulch materials shall be air dried and reasonably free of noxious weeds and weed seeds or other materials detrimental to plant growth.

2. Mulch shall be composed of wood cellulose fiber, straw or stalks, as specified herein. Mulch shall be suitable for spreading with standard mulch blowing equipment.

3. Straw mulch shall be threshed stalks of wheat, rye, oats or other approved grain crops.

4. Hydromulch shall be cellulose wood fiber, dyed a suitable color to facilitate placement. A soil binder/ tackifer is required

F. Soil tackifier/ Binder shall consist of non-toxic materials approved for hydroseeding,, applied at manufacturer's suggested rate

E. Mulch Binder

1. Mulch on slopes exceeding 3 to 1 ratio shall be held in place by the use of an approved mulch binder. The mulch binder shall be non-toxic to plant life and shall be acceptable to the Engineer.

F. Inoculants for Legumes: All leguminous seed shall be inoculated prior to seeding with a standard culture of nitrogen fixing bacteria that is adapted to the particular seed involved.

G. Water: Water shall be clean, clear water free from any objectionable or harmful chemical qualities or organisms and shall be furnished by the Contractor.

H. Sod

1. Sod shall be living, growing sod of Bermuda hybrids "Tifway 419" or Tifgreen 328", "Empire" Zoysia, or Tall Fescue. This includes sod which is dormant during the cold or dry season and capable of renewing growth after the dormant period. All sod shall be obtained from approved sources. The presence of weeds or other

noxious growth or any other foreign material which may be detrimental to the proposed planting will be cause of rejection. .

2. The Engineer shall be notified of sources before it is harvested. Approval of such sources shall not be construed as an acceptance of the material. The sod will be subject to inspection while it is being planted and any material which has been permitted to dry out excessively or exposed to extreme heat, or which is not viable, will be rejected.

3. In the harvesting of the sod, grass more than 3-inches tall shall be mowed to a height of 3-inches, raked and removed before sod cutting begins. The sod shall be cut into square or rectangular sections which may vary in length, but which shall be of uniform width and thickness, and shall have at least ½-inch of soil adhering firmly to the roots. Care shall be exercised at all times to retain the soil on the roots of the sod during the process of cutting, transporting and planting. Sod shall be transplanted within 48 hours from the time it is harvested. While on site, sod shall be kept moist, shall be protected from exposure to the air and sun and from freezing Sod shall be cut and moved only when the soil moisture conditions are such that favorable results can be expected.

PART 3 EXECUTION

3.01 SECURING AND PLACING TOPSOIL

A. Topsoil shall be stripped from the site and stockpiled prior to grading activities per Section 02200. If on-site topsoil is insufficient, additional topsoil or compost may be brought in. Topsoil and compost shall meet the specification in Section 02922.

B. On previously graded areas, a minimum of four inches of topsoil shall be spread prior to grassing. Before placing or depositing topsoil upon any areas, all improvement within the area shall be completed, unless otherwise approved by the Owner.
On previously graded areas, a minimum of four inches of topsoil shall be spread prior to grassing.

3.02 SEEDBED PREPARATION

A. Before liming, fertilizing and seeding, the topsoil surfaces shall be trimmed and worked to true line from unsightly variation, bumps, ridges and depressions and all detrimental material, roots and stones larger than 3-inches in any dimension shall be removed from the soil.

B. Not earlier than 24 hours before the seed is to be sown, the soil surface to be seeded shall be thoroughly cultivated to a depth of not less than 2-inches with a weighted disc, tiller, pulvimixer or other equipment, until the surface is smooth and in a condition acceptable to the Engineer.

C. If the prepared surface becomes eroded as a result of rain or for any other reason, or becomes crusted before the seed is sown, the surface shall again be cultivated for seeding.

D. Ground preparation operations shall be performed only when the ground is in a tillable and workable condition, as determined by the Engineer.

3.03 FERTILIZATION AND LIMING

A. Following seedbed preparation, fertilizer shall be applied to all areas to be seeded so as to achieve the application rates shown in Table 02933-1 at the end of this Section.

B. Fertilizer shall be spread evenly over the seedbed and shall be lightly harrowed, raked, or otherwise incorporated into the soil for a depth of 1/2-inch.

C. Fertilizer need not be incorporated in the soil as specified above when mixed with seed in water and applied with hydroseeding equipment. The seed shall not remain in water containing fertilizer for more than 30 minutes when a hydraulic seeder is used.

D. Agricultural limestone shall be thoroughly mixed into the soil according to the rates in Table 02933-1. The specified rate of application of limestone may be reduced by the Engineer if pH tests indicate this to be desirable. It is the responsibility of the Contractor to obtain such tests and submit the results to the Engineer for adjustment in rates.

E. It is the responsibility of the Contractor to make one application of a maintenance fertilizer according to the recommendations listed in Table 02933-1.

F. On the approved grade, spread 20 lbs. per 1,000 sq. ft. of 10-10-10 fertilizer into top 3-inches, hand rake and smooth. The surface shall be brought to finish grade requirements, allowance being made for settlement. Finish grades shall be smooth and free from hollows or other inequalities.

G. Three weeks after construction of lawns add ammonium nitrate at the rate of 5 lbs. per 1000 sq. ft. of lawn area, and thoroughly water in.

3.04 SEEDING

A. Seed of the specified group shall be sown as soon as preparation of the seedbed has been completed. No seed shall be sown during high winds, nor until the surface is suitable for working and is in a proper condition. Seeding shall be performed during the dates shown in Table 02933-1 unless otherwise approved by the Owner. Seed mixtures may be sown together provided they are kept in a thoroughly mixed condition during the seeding operation.

B. Seed shall be uniformly sown by any approved mechanical method suitable for the

slope and size of the areas to be seeded, preferably with a broadcast type seeder, windmill hand seeder or approved mechanical power drawn seed drills. Hydro-seeding and hydro-mulching may be used on steep embankments, provided full coverage is obtained. Care shall be taken to adjust the seeder for seedings at the proper rate before seeding operations are started and to maintain their adjustment during seeding. Seed in hoppers shall be agitated to prevent segregation of the various seeds in a seeding mixture.

C. Immediately after sowing, the seeds shall be covered and compacted to a depth of 1/8 to 3/8-inch by a cultipacker or suitable roller.

D. Leguminous seeds shall be inoculated prior to seeding with an approved and compatible nitrogen-fixing inoculant in accordance with the manufacturer's mixing instructions.

E. The planting of bermuda grass shall be done only within the season extending from April 16 to August 15.

3.05 MULCHING

A. All seeded areas shall be uniformly mulched in a continuous blanket immediately after seeding. The mulch shall be applied so as to permit some sunlight to penetrate and the air to circulate and at the same time shade the ground, reduce erosion and conserve soil moisture. Approximately 25 percent of the ground shall be visible through the mulch blanket.

B. One of the following mulches shall be spread evenly over the seeded areas at the following application rates:

Wood Cellulose Fiber	1,400 pounds/acre
Straw	4,000 pounds/acre
Stalks	4,000 pounds/acre

C. These rates may be adjusted at the discretion of the Engineer at no additional cost to the Owner, depending on the texture and condition of the mulch material and the characteristics of the seeded area.

D. The Contractor shall cover structures, poles, fence and appurtenances if the mulch binder is applied in such a way that it would come in contact with or discolor the structures.

E. Mulch and binder shall be applied by suitable blowing equipment at closely controlled application rates in a manner acceptable to the Engineer.

3.06 SODDING

A. Lay sod as soon as possible after delivery to prevent deterioration. Sod shall be planted within 48 hours of being cut..

B. Full Sodding: Lay sod closely knit together with no open joints visible, and pieces not overlapped. Stagger sod units to avoid continuous seams. Lay smooth and flush with adjoining grass areas, paving, and top surfaces of curbs.

C. On slopes 2:1 and steeper, lay sod perpendicular to slope and secure every row with wooden pegs or wire sod staples at maximum 2-feet on center. Drive pegs flush with soil portion of sod.

D. Immediately after plantingoll sodded areas to ensure good bond between sod and soil and to remove minor depressions and irregularities. Ensure rolling equipment weight not over 250 pounds or less than 150 pounds.

E. Thouroughly water sodded areas after installation. Water in sufficient amounts to saturate sod and upper 4 inches of soil.

3.06 WATERING

A. The Contractor shall be responsible for maintaining the proper moisture content of the soil to insure adequate plant growth until a satisfactory stand is obtained. If necessary, watering shall be performed to maintain adequate water content in the soil.

B. Watering shall be accomplished by hoses, tank truck or sprinklers in such a way to prevent erosion, excessive runoff and overwatered spots.

3.07 MAINTENANCE

A. Upon completion of seeding operations, the Contractor shall clear the area of all equipment, debris and excess material and the premises shall be left in a neat and orderly condition.

B. The Contractor shall maintain all seeded areas without additional payment until final acceptance of the work by the Owner, and any regrading, refertilizing, reliming, reseeding or remulching shall be done at the Contractor's own expense. Repair work shall be repeated on defective areas until a satisfactory uniform stand is accomplished. A stand of grass shall be considered satisfactory when full cover over the seeded area with perennial grass that is alive and growing, leaving no bare spots larger than one square foot or the total of all bare spots within a given area shall constitute no more than 1/100 of the total area Damage resulting from erosion, gulleys, washouts or other causes shall be repaired by filling with topsoil, compacting and repeating the seeding work at the Contractor's expense.

C. The Contractor shall maintain all sodded areas without additional payment until final acceptance of the work by the Owner, and any regrading, refertilizing, or resodding shall be done at Contractor's own expense. Sodding work shall be repeated on defective areas until a satisfactory uniform stand of 95% is accomplished on maintained lawn areas. Sections of yellowed or dead sod shall be removed and replaced at no cost to the Owner. Damage resulting from erosion, gulleys, washouts or other causes shall be repaired by filling with topsoil, compacting and repeating the sodding work.

D. New sodded areas installed shall be properly cut/mowed by the Contractor a minimum of one (1) time 2-3 weeks after installation to prove the sod has "knitted" with the soil base and proper installation procedures had been followed.

E. Contractor's guarantee of one (1) year shall also cover a fully rooted stand of grass.

TABLE 02933-1

Sowing Season	Grass Seed Type	Lbs. per 1000 S.F.			
		Seed Quantity	Fertilizer	Lime	Maintenance *
1/1- 4/15	Rebel 2 Turf Type Fescue	5.75	30 lbs 6-12-12	200 lbs	10 lbs 10-10-10
4/16- 8/15	Sahara Hybrid Bermudagrass	1.75	30 lbs 6-12-12	200 lbs	10 lbs 10-10-10
8/16-12/31	Rebel 2 Turf Type Fescue	5.75	30 lbs 6-12-12	200 lbs	10 lbs 10-10-10

* Maintenance fertilizer shall be applied in the early spring following initial establishment

+++ END OF SECTION 02933 +++

SECTION 02934

NATIVE PLUG PLANTING

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. Section includes furnishing, planting and maintenance of native plug plants for stormwater quality facilities.

B. Related Work Specified Elsewhere:
   1. Section 02922 – Amended Soil and Mulch

1.02 REFERENCES

A. American Nursery and Landscape Association (ANLA): American Standard for Nursery Stock, 2004 Edition

B. Georgia Department of Transportation (GDOT):

   1. "Standard Specifications, Construction of Transportation Systems", Latest Edition (GDOT Standard Specifications)

C. U.S. Army Corps of Engineers:

   1. *Eastern Mountains and Piedmont, 2014 Regional Wetland Plant List*, Lichvar, R.W., M. Butterwick, N.C. Melvin, and W.N. Kirchner. 2014. *The National Wetland Plant List*: 2014 Update of Wetland Ratings.

1.03 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the Contract Documents.

B. Submit the following for review and approval prior to shipment of materials to the Site:

   1. Certificates of Conformance or Compliance: Before delivery, notarized certificates attesting that plants to be furnished meet the requirements specified.

   2. Digital photographs of all plants to be furnished.

   3. Documentation of qualifications for nursery and installer.

C. At completion of the Work, submit written Material and Installation Warranty as specified in subsection 1.08.

1.04 QUALITY ASSURANCE

A. Nursery Qualifications: Herbaceous vegetation shall be procured from nursery source(s) in Georgia or surrounding states. Nursery material from outside the southeast will only be accepted if southeastern grown material is unavailable and must be approved by Owner's representative prior to ordering. Nursery source shall be specialist in growing and cultivating native plugs, with three years documented experience.

B. Installer Qualifications: Company specializing in installing and planting native plugs, with three years documented experience. Up to three references for the installer shall be made provided upon request.

C. Comply with regulatory agencies for fertilizer and herbicide composition.

1.05 DELIVERY, STORAGE AND HANDLING

A. Plant plugs shall be delivered and stored in such a way as to be protected from drying winds and direct sunlight. Such protection shall encompass the entire period during which plants are in transit, being handled, or in temporary storage.

B. Plugs shall be staged in shaded locations and watered as needed to maintain soil in a moist condition.

1.06 PROJECT CONDITIONS

A. Plantings shall be performed as soon as possible after finish grades are established in each area, unless otherwise approved by the Owner's representative.

B. Temperature range and other environmental conditions shall be as appropriate to the vegetation species planted.

1.07 MAINTENANCE

A. Maintain plants immediately after planting as specified in this Section.

1.08 MATERIAL AND INSTALLATION WARRANTY

A. Provide a written one-year Material and Installation Warranty for all plants purchased and installed by Contractor. Warranty period shall extend for one year after inspection and final acceptance. Warranty shall include replacement of dead or unhealthy plants within the warranty period in accordance with the requirements of subsection 3.04.

PART 2 PRODUCTS

2.01 ACCEPTABLE NURSERIES

A. Nurseries meeting the qualifications listed in subsection 1.04.

2.02 PLANT PLUG REQUIREMENTS

A. Native plant plug species to be furnished shall be as shown on the Drawings. All materials shall be true to species. Plants shall conform to the referenced publications for acceptable native species unless otherwise determined by the Owner's representative. Cultivars and hybrids will not be permitted. Species substitutions must be approved by the Owner's representative with input from an ecologist at least two weeks before the planting is scheduled.

B. Plant plugs shall be supplied in 38-count flats, with cells measuring approximately 2 inches by 2 inches and roots measuring approximately 5 inches deep, or as otherwise approved by the Owner's representative. Plugs shall have well developed root systems filling the soil but not be overly root bound. Plant tops shall be well developed, healthy, viable, and adequately "hardened off" for outdoor planting.

C. Plug planting soil shall have been inoculated with mycorrhizal fungi at the nursery at time of seeding. Plugs shall be delivered to the planting site with adequate soil moisture, free of diseases, mold, insect infestations, or other defects.

D. Plant Materials: Certified by the U.S. or State of Georgia Department of Agriculture; free of disease or hazardous insects.

2.03 SOIL AMENDMENT MATERIALS

A. Fertilizer (if required) shall be a standard commercial fertilizer, in dry or liquid form, complying with Section 891 of the GDOT Standard Specifications. The grade of fertilizer shall be as indicated on the Drawings or as otherwise determined based on soil test results and approved by the Owner's representative.

B. Lime (if required) shall be ground dolomitic limestone designated for agricultural use, meeting the requirements of the Georgia Department of Agriculture and Subsection 882.2.01 of the GDOT Standard Specifications.

2.04 MULCH

A. Mulch shall be provided in accordance with Section 02922.

PART 3 EXECUTION

3.01 PREPARATION FOR PLANTING

A. Complete placement of required engineered soil mix, earthwork grading and other related construction prior to commencement of planting work.

B. Remove foreign materials, weeds, undesirable plants and their roots, and unsuitable subsoil. Prepare subsoil to eliminate uneven areas. Blend slopes into level areas.

C. Test drainage of amended soil by filling bed with water twice in succession. Notify Owner's representative of water retention exceeding 24 hours.

D. Unless otherwise approved by the Owner's representative, excessively dry planting subsoil shall be watered by irrigation, sprinklers, or flooding to moisten soil to a depth of three inches prior to planting.

3.02 PLANTING OF PLUGS

A. Planting of plugs shall be performed during the first optimum planting season following completion of work in an area. Planting dates shall be as indicated on the Drawings. Exceptions must be approved by the Owner's representative with input from an ecologist.

B. Perform planting at steady rate of work unless weather conditions make it impossible to work. No plant material shall be installed in frozen ground.

C. Plugs shall be installed in holes drilled by an auger or, where soil is soft and moist enough, made with a dibble bar, stick, or trowel. Holes shall be the same diameter and depth as the plug, with a tolerance of approximately plus or minus 1/2 inch.

D. Locations and spacing for installation of plugs shall be as indicated on the Drawing or as otherwise approved by the Owner's representative with input from an ecologist. Plant locations may vary depending on soil type, moisture conditions, slope, shading, and other factors for the particular plant species. Groups of five to seven plugs of the same species planted at spacing indicated on the Drawings shall be placed at intervals throughout the planting area, as opposed to planting all species intermixed randomly.

E. In areas with potential for swift water movement or the action of animals that may dislodge newly planted plugs, all plugs will be secured with 6-inch or 8-inch U-shaped wire erosion control blanket staples. Required staple length shall be determined based on the density of the planting substrate. Softer substrates will require longer length to hold plugs adequately.

F. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

G. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.03 PLACEMENT OF MULCH

A. Place mulch around plants as indicated on the Drawings.

3.04 PLANT ESTABLISHMENT

A. Begin maintenance immediately after planting to establish plants, and shall continue for a period of one year if required by the Owner.

B. Extended maintenance (for one-year period) shall include the following:

1. Control aggressive and invasive plant species by means of mowing, hand pulling or herbicide applications as required. Herbicide treatments shall be performed by licensed applicators who are experienced with native and non-native plant identification. Herbicides use shall be in full compliance with all applicable regulations and in strict accordance with label directions. Application techniques shall limit overspray and damage to off-target species.

2. Irrigate plantings as feasible and necessary to achieve one inch of water per week during the first growing season, including natural precipitation.

C. Coordinate with Owner to determine responsibilities and procedures for water supply. Unless otherwise determined by the Owner, water for plant maintenance shall be obtained and applied by Contractor until Substantial Completion.

3.05 CRITERIA FOR ACCEPTANCE

A. Final acceptance of planted areas will not be made by the Owner until a satisfactory stand of plants is evident in all application areas at the end of the first growing season. A satisfactory stand of plants is defined as: at least 80 percent of all individual plants and 90 percent of all species planted are living healthy plants.

B. If the above standards are not met, the Contractor will be responsible for supplemental plantings as approved by the Owner's representative with input from an ecologist.

3.06 WARRANTY REQUIREMENTS

A. In addition to the above, for the one-year warranty period, Contractor shall correct or remove and replace defective work as approved by the Owner's representative in accordance with the terms of the Contract.

END OF SECTION

SECTION 02949

STORMWATER PLANTERS

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. Section includes construction of contained landscaped areas designed to receive stormwater runoff from paved surfaces.

B. Related Work Specified Elsewhere:
1. Section 02125 – Temporary and Permanent Erosion and Sedimentation Control
2. Section 02200 – Earthwork
3. Section 02681 – Subdrainage for Stormwater Quality Facilities
4. Section 02900 – Trees, Plants and Ground Covers
5. Section 02922 – Amended Soil and Mulch
6. Section 02934 – Native Plug Planting
7. Section 03301 – Concrete and Reinforcing Steel

1.02 SYSTEM DESCRIPTION

A. Stormwater planters shall include the following as indicated on the Drawings:

1. Inlets and flow regulating structures.

2. Cast-in-place or precast concrete walls and check dams.

3. Drainage stone.

4. Underdrain and outlet piping.

5. Impermeable liner and upturned overflow pipe in poor soil conditions (if required).

6. Planter bioretention soils (engineered soil mix).

7. Vegetation.

8. Outflow regulating piping.

1.03 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the Contract Documents.

B. Submit the following for review and approval prior to shipment of materials to the Site :

1. Manufacturers' documentation for fabricated products

C. Submit the following at completion of the Work:

1. Field Quality Control: Submit test reports and inspection reports (as applicable)

1.04 QUALITY ASSURANCE

A. Comply with the requirements of governmental authorities having jurisdiction.

1.05 DELIVERY, STORAGE AND HANDLING

A. All manufactured products shall be inspected upon delivery to the Site. Damaged or defective materials shall be rejected or repaired as approved by the Owner's representative.

B. Conform to manufacturer's recommendations for handling and storage of products.

C. Granular materials of different gradations shall be delivered to the Site using clean equipment, and separately stockpiled in areas approved by the Owner's representative. Adequately protect to preserve the materials' fitness and quality.

1.06 PROJECT CONDITIONS

A. The Contractor is solely responsible for excavation slope stability. Excavation work shall be in compliance with applicable local, state and federal regulations (including OSHA).

B. Work shall be performed in a manner that does not damage or disturb existing utilities, structures, vegetation, and other site features not indicated to be removed.

1.07 SEQUENCING AND SCHEDULING

A. Coordinate stormwater planter construction with associated work specified in other sections.

PART 2 PRODUCTS

2.01 PRETREATMENT AND FLOW-REGULATING DEVICES

A. Pretreatment elements and flow-regulating (energy dissipation) devices shall be provided where required to filter out sediment, trash, floatables and pollutants from runoff prior to entering stormwater planters.

B. Pretreatment and energy dissipation shall be as indicated on the Drawings.

2.02 INLETS

A. Inlets shall be provided to direct stormwater into planters as indicated on the Drawings, including one or more of the following:

1. Curb cuts or wall openings at edge of planter areas

2. Sheet flow off depressed curbs as shown on the standard details

3. Trench drain inlet channels. Trench grates, frames and anchoring devices shall conform to the requirements of the Owner and as indicated on the Drawings. Concrete shall conform to the requirements of Section 03301.

2.03 RIVER COBBLES

A. River cobbles shall be locally available smooth water-washed river rock ranging in size from approximately 2-inch to 3inch diameter, unless otherwise specified or indicated on the Drawings.

2.04 GEOTEXTILE

A. Specified in Section 02371.

2.05 CONCRETE WALLS AND CHECK DAMS

A. Concrete walls and check dams shall be cast-in-place or precast reinforced concrete constructed to the dimensions indicated on the Drawings and conforming to the following requirements.

B. Concrete formwork, reinforcement, concrete materials and mix design shall conform to the applicable requirements of Section 03301. Unless otherwise specified, minimum compressive strength of concrete shall be 3,000 psi.

2.06 IMPERMEABLE LINER

A. Impermeable liner to be installed on sides of planters (when required) shall be a 30-mil minimum thickness geomembrane fabricated of linear low density polyethylene (LLDPE), high density polyethylene (HDPE), flexible polypropylene, polyvinyl chloride (PVC), or other geomembrane material approved by the Owner's representative.

2.07 CHOKER COURSE AND DRAINAGE STONE

A. Choker course material and drainage stone shall conform to the material specifications in Section 02681.

2.08 UNDERDRAIN PIPING

A. Underdrain piping shall conform to the material specifications in Section 02681.

2.09 ENGINEERED SOIL MIX AND MULCH

A. Engineered soil mix and mulch layers for planters shall conform to the material specifications in Section 02922.

2.10 OUTFLOW REGULATING DEVICES

A. Outflow regulating devices shall include non-perforated outlet piping and structures as indicated on the Drawings.

B. Non-perforated outlet piping shall conform to the material specifications in Section 02681.

2.11 VEGETATION

A. Furnish native plants, trees, shrubs, and herbaceous vegetation as indicated on the Drawings and specified in Sections 02900 and 02934.

PART 3 EXECUTION

3.01 PREPARATION

A. Establish required dimensions and elevations for stormwater planter construction.

B. Identify and mark above and below grade utilities to avoid disturbance during construction work. Conform to the requirements of Section 01040 and other applicable Contract Documents. Work shall be performed in a manner that does not damage or disturb existing pavement, utilities, structures, or other site facilities not indicated to be removed.

C. Erosion and sediment control measures shall be implemented to protect construction areas. Conform to the requirements indicated on the Drawings and as specified in Section 02125.

3.02 EARTHWORK

A. Excavate in accordance with the applicable requirements of Section 02200 as modified in this Section. Excavate to the required dimensions and depths shown on the Drawings or as otherwise approved by the Owner's representative. Exposed subgrade soils at bottom of excavation shall not be compacted. Low ground pressure equipment shall be used for excavation.

B. Bottom of the excavation shall be uniformly graded to a level surface within each designated planter area section, unless otherwise indicated on the Drawings.

C. Excavated materials shall be removed from the construction areas and disposed off-site where approved by the Owner's representative. Conform to applicable regulations for hauling and disposal of removed materials.

D. Protect the prepared bottom of excavation from compaction during construction. If required, the bottom of the excavation shall be scarified (by raking, disking or tilling) to a minimum depth of six inches.

3.03 INLETS

A. Construct inlet openings in curbs at the required locations and to the dimensions and elevations indicated on the Drawings.

B. Construct trench drains at the required locations and to the dimensions and elevations indicated on the Drawings. Construct concrete base and channel walls in coordination with trench grate installation, including setting of anchoring devices. Install trench drain components in accordance with the manufacturer's recommendations. Use manufacturer's approved installation devices to assure proper joints between channel sections. Set frames and grates so that top surface is flush with finish grade.

3.04 CONCRETE WALLS AND CHECK DAMS

A. Construct concrete planter walls and check dams at the required locations, alignment and to the dimensions and elevations indicated on the Drawings.

B. Conform to the applicable requirements of Section 03301.

C. Inlet openings shall be provided to the dimensions indicated on the Drawings.

D. Place river cobble, underlain by geotextile, for control of erosion adjacent to inlets, check dams and at other required locations as indicated on the Drawings.

3.05 IMPERMEABLE LINER INSTALLATION

A. Where required, install impermeable liner over exposed sides of excavations within the limits of planters. The surface on which impermeable liner is to be placed shall be relatively smooth and uniform, and substantially free of protruding stones and other debris.

B. Impermeable liner shall be continuous to the full dimensions of the planters as much as practicable. If more than one roll or panel is required, overlap adjacent rolls or panels a minimum of 12 inches and seaming will be required in accordance with the manufacturer's recommendations and as approved by the Owner's representative.

3.05 PLACEMENT OF SUBDRAINAGE SYSTEM

A. Place drainage stone and choker course material to the required depths and in the sequence indicated on the Drawings and as specified in Section 02681.

B. Install underdrain pipe , including cleanouts, at the locations indicated on the Drawings and as specified in Section 02681.

3.06 PLACEMENT OF ENGINEERED SOIL MIX AND MULCH

A. Place engineered soil mix and mulch to the depth and limits indicated on the Drawing and as specified in Section 02922.

B. For open bottom planters, installation of soils must be completed in a manner that will ensure preservation of the infiltrative capacity of the underlying soils. The moisture

content of the soil shall be low enough to prevent clumping and compaction during placement.

3.07 VEGETATION PLANTING

A. If placement of engineered soil mix coincides with preferred dates for planting, install plants immediately after completion of the soil mix. Place mulch or other approved stabilization material and maintain until planting is completed and established.

B. Plant native plants, trees, shrubs, and herbaceous vegetation as indicated on the Drawings and specified in Sections 02900 and 02934.

3.08 MAINTENANCE AND PROTECTION

A. Prior to the Owner's final acceptance of the Work, Contractor shall perform maintenance and protection of the construction as specified in this Section. In addition, for the one-year warranty period, Contractor shall correct or remove and replace defective work as approved by the Owner's representative in accordance with the terms of the Contract.

B. Remove all debris from within the limits of the constructed stormwater planters.

C. Protect the constructed areas from erosion and keep free from accumulation of debris. Divert post-construction stormwater runoff around the areas until vegetative cover has been established.

D. Damage to the constructed areas shall be fully repaired as approved by the Owner's representative.

END OF SECTION

SECTION 03301
CONCRETE AND REINFORCING STEEL

PART 1 GENERAL

1.01 SCOPE

A. Contractor shall furnish all labor, materials, equipment and incidentals required to complete all cast-in-place concrete work as shown on the Drawings and as specified herein.

B. Cast-in-place concrete shall be required for the following:

1. Slabs
2. Channels
3. Curb and gutters
4. Sidewalks
5. Thrust Blocks
6. Pipe encasement
7. Check dams and other structures for stormwater quality facilities
8. Miscellaneous structures

1.02 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:

1. Product data for all materials stating the location where product is to be used.
2. Certification that materials meet the specifications.
3. Manufacturer's application and installation instructions.
4. Samples of waterstops, concrete roughener, joint fillers, caulk and bonding agent.

B. Drawings and reinforcing schedules showing completed bending and placing details shall be submitted to the Owner's representative for approval as detailed in the General Conditions. No steel shall be fabricated until the drawings have been

approved.

C. If ready-mixed concrete is to be used, the manufacturer shall submit design mix for approval. Design mix shall indicate the dry proportions to be used, with evidence that these proportions will produce concrete of the quality specified.

1.03 QUALITY ASSURANCE

A. Reference Standards: The Contractor shall comply with applicable provisions and recommendations of the latest editions of the following standards, except as otherwise shown on the Drawings or specified herein.

1. ACI 301 - Specifications for Structural Concrete, Chapter 6, Joints and Embedded Items.

2. ACI 305 – Hot Weather Concreting.

3. ACI 306 – Cold Weather Concreting.

4. ACI 347 – Guide to Formwork for Concrete

5. ACI 350 - Environmental Engineering Concrete Structures, Chapter 2.8, Joints.

6. ASTM A185 – Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete

7. ASTM C33 - Standard Specification for Concrete Aggregates.

8. ASTM C94 – Standard Specification for Ready-Mix Concrete.

9. ASTM C136 – Standard Test Method for Sieve Analysis of Fine and Course Aggregates.

10. ASTM C143 – Standard Test Method for Slump of Portland Cement Concrete.

11. ASTM C150 – Standard Specification for Portland Cement.

12. ASTM C309 – Standard Specification for Liquid Membrane Forming Compounds for Curing Concrete.

13. ASTM D1752 - Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction.

B. All manufactured items shall be installed in accordance with manufacturer's instructions.

C. Construction and expansion joints shall not be added or relocated without the approval of the Owner's representative.

PART 2 PRODUCTS

2.01 FORMS

A. Forms shall be free from roughness and imperfections and adequately braced and tied to prevent movement when concrete is placed. Wooden spreaders shall not be allowed in the concrete.

B. Wire ties shall not be allowed. Metal ties or anchorages which are required in the forms shall be so constructed that the metal work can be removed for a depth of at least 1-inch from the surface of the concrete without injury to such surface by spalling or otherwise. Forms shall be thoroughly cleaned before using and shall be treated with oil or other approved materials

2.02 MATERIALS

A. Ready-Mixed Concrete:

1. Truck-mixed, ready-mixed concrete shall conform to ASTM C94 and the requirements herein, or as otherwise approved by the Owner's representative.

2. Each load of ready-mixed concrete delivered to the job site shall be accompanied by a delivery ticket. Ticket shall show all information to substantiate pre-approved design mix.

B. Cement shall be domestic Portland cement conforming to ASTM C150, Type II.

C. Aggregates

1. General

   a. Fine and course aggregates shall conform to ASTM C33 and shall be tested in accordance with ASTM C136, Aggregates shall be washed before use.
   b. When sources of aggregates are changed, test reports shall be provided for the new material. The tests shall be performed prior to commencing concrete work.

2. Coarse Aggregate: Coarse aggregate shall be hard, dense and durable gravel or crushed rock free from injurious amounts of soft and friable particles, alkali, organic matter and other deleterious substances. Gradation shall conform to ASTM C33.

3. Fine Aggregate: Fine aggregate shall be hard dense durable particles of either

sand or crushed stone graded from course to fine and shall conform to ASTM C33.

D. Reinforcing steel shall be steel bars conforming to ASTM A615, Grade 60. Reinforcing steel shall be free from rust, scale, dirt grease and injurious contaminants. Rail steel bars shall not be permitted in the Work.

E. Welded wire fabric shall conform to ASTM A185.

F. Water for washing aggregate, for mixing and for curing shall be potable, clean and free from deleterious amounts of acids, alkalis, oils and organic materials.

G. Waterstops shall be PVC (polyvinylchloride) meeting ASTM D638 test method for tensile strength of 2020 psi and ultimate elongation of 370.

1. Construction Joints:

a. Serrated with center bulb, 3/8-inch thick by 6-inches minimum width, Greenstreak #706 or equal.
b. Preformed plastic adhesive waterstop, Synko-Flex Products or approved equal. Use only where shown on the Drawings.

2. Expansion Joints: Serrated with center bulb, 3/8-inch thick by 9-inch minimum width, Greenstreak #738 or equal.

2.03 CONCRETE QUALITY

A. Unless otherwise specified or directed by the Owner's representative, concrete shall be designed for a minimum compressive strength of 3,000 psi at 28 days

B. Concrete for encasements and fill shall have a minimum compressive strength of 1,500 psi at 28 days.

2.04 CONCRETE ADMIXTURES

A. Admixtures shall not be used unless approved by the Owner's representative.

B. Do not use calcium chloride in concrete unless approved by the Owner's representative.

C. Do not use a retarder in the concrete, unless approved by the Owner's representative.

2.05 CONCRETE CURING MATERIALS

A. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 10 ounces per square yard and complying with AASHTO M182, Class 3.

B. Moisture-Retaining Cover shall conform to ASTM C171 and shall be:

1. Waterproof paper.

2. 4 mil polyethylene.

C. Curing and Sealing Compound shall conform to ASTM C309 and shall be:

1. Res-X curing compound as manufactured by the Burke Company.

2. Masterkure as manufactured by Master Builders Company.

3. Concrete Curing Compounds as manufactured by W. R. Meadows, Inc.

4. Or approved equal.

PART 3 EXECUTION

3.01 FORM WORK

A. Form work shall be installed in accordance with ACI 347.

3.02 REINFORCEMENT

A. Reinforcement shall be shipped to the site with bars of the same size and shape fastened in bundles with metal identification tags giving size and mark securely wired on. The identification tags shall be labeled with the same designation as shown on the submitted bar schedules and shop drawings.

B. All bars shall be stored off the ground and shall be protected from moisture and kept free from dirt, oil or other injurious coatings.

C. Reinforcement, where required, shall be accurately placed in exact positions as shown on the Drawings and shall be secured against displacement with annealed wire ties or suitable clips at intersections and shall have a clear space of 2-inches between the steel and the face of forms unless otherwise indicated.

D. Wire ties passing through the forms for the purpose of holding the steel in proper position will not be allowed. Concrete blocks with wire ties cast therein may be used if approved by the Owner's representative for the purpose of maintaining and clearance between the reinforcement and the forms.

E. Metal chairs shall not be used to support unit reinforcing in slabs. Instead, all reinforcing shall be supported on precast concrete blocks of the correct height. Supporting steel by means of cinder blocks or concrete building blocks will not be

permitted.

F. Unless otherwise shown, splices in reinforcement shall be lapped not less than 24 diameters. All bar splices shall be staggered whenever possible. When splicing bars of different diameters, the length of the lap shall be based on the larger bar.

G. Before being placed in position, reinforcement shall be thoroughly cleaned of all loose mill and rust scale, dirt and other coatings, including ice, that reduce or destroy bond. Where there is delay in depositing concrete after reinforcement is in place, bars shall be reinspected and cleaned when necessary.

H. In no case shall any reinforcing steel be covered with concrete until the amount and position of the reinforcement have been checked by the Owner's representative and his permission given to proceed with the concreting.

3.03 MIXING CONCRETE

A. Concrete shall be mixed until there is a uniform distribution of the materials and shall be discharged completely before the mixer is recharged. The mixer shall be rotated at a speed recommended by the mixer manufacturer and mixing shall be continued for at least 1-1/2 minutes after all materials are in the mixer. Concrete shall be placed within 1 ½ hours of the time at which water was first added, otherwise it shall be rejected. Concrete which has been remixed or retempered or to which an excess amount of water has been added shall also be rejected.

B. Adding water in controlled amounts during the mixing cycle shall be done only under the direction of the Owner's representative.

3.04 PLACING CONCRETE

A. Concrete shall not be placed until forms and method of placement have been approved by the Owner's representative. Before depositing concrete, all debris, foreign matter dirt and water shall be removed from the forms. The surface of concrete previously placed such as a manhole base or horizontal construction joint shall be cleaned and brushed with cement paste. Concrete shall not be placed in water or submerged within 24 hours after placing, nor shall running water be permitted to flow over the surface of fresh concrete within 4 hours after its placing.

B. High frequency mechanical vibrations shall be used as necessary to obtain consolidation of the concrete. Care shall be taken to avoid segregation of the aggregates by excessive vibration. Concrete adjacent to forms, reinforcing rods and around pipe stubs shall be carefully spaded or rodded.

C. Placing Concrete in Hot Weather: In hot weather (above 85 degrees F), concrete shall be placed in accordance with ACI 305.

D. Placing Concrete in Cold Weather: In cold weather (below 45 degrees F), concrete shall be placed in accordance with ACI 306.

E. At the base of walls in manholes where construction joints are used, install waterstops.

3.05 WATERSTOPS

A. Waterstops for all joints shall be continuous around all corners and intersections. Splices shall be made by welding in accordance with the manufacturer's recommendations, subject to the approval of the Owner's representative.

B. Drill holes in waterstops, just below the bulb and tie waterstops to reinforcing steel with steel tying wire as specified in this section.

C. A sufficient number of ties shall be placed, as directed by the Owner's representative, to insure that waterstops will remain in the required position during concrete placement.

3.06 CONCRETE CRADLES, ARCHES AND ENCASEMENTS

A. Concrete cradles, arches and encasements shall be placed as shown on the Drawings and as directed by the Owner's representative. Backfill shall not be placed on the concrete until directed by the Owner's representative.

B. Control joints shall be incorporated into the concrete as shown on the Drawings.

C. The pipe shall be securely braced both vertically and horizontally to restrain it against flotation while pouring the concrete. Holes left in the concrete by cross braces during the pouring shall be completely filled with concrete as directed by the Owner's representative.

3.07 FINISH

A. Float finish shall be applied to surfaces of manhole inverts and shall conform to ACI 301. Floating shall be performed with a hand or power driven float. Floating shall compact and smooth the surface and close any cracks and checking of surfaces.

3.08 CURING AND SEALING

A. Concrete curing shall be completed by water curing or using a curing and sealing compound or by a combination of both methods. Repairs or treatment of concrete surfaces shall be coordinated so that interruption of the curing will not be necessary.

3.09 PROTECTION

A. Concrete shall be protected from injurious action by sun, rain, flowing water, frost and

mechanical injury.

B. Backfill shall not be placed adjacent to constructed concrete walls until at least 21 days after concrete construction has been completed and when concrete testing indicates that the concrete has reached the specified compressive strength, unless otherwise directed by the Owner's representative.

3.10 REMOVAL OF FORMS

A. Forms shall not be removed without the approval of the Owner's representative. With an average temperature of 50 degrees F or higher, inside forms shall be retained for at least 48 hours and outside forms for at least 24 hours. With lower temperatures, forms shall be retained one day longer.

+++ END OF SECTION 03301 +++

EXHIBIT C

SCOPE OF WORK, PROJECT APPROACH, PROJECT CRITERIA

City of Atlanta

Department of Watershed Management

Boone Boulevard Green Infrastructure and Capacity Relief Project

Scope of Work, Project Approach, Project Criteria

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1.0 INTRODUCTION

1.1 General Project Description

The City of Atlanta Department of Watershed Management (City) is using the Design-Build (D-B) delivery method for the "Boone Boulevard Green Infrastructure and Capacity Relief Project" (Project) to provide green infrastructure improvements to Boone Boulevard from Mayson Turner Road to Northside Drive (approximately 6,300 feet).

The project consists of installing bike lanes, stormwater (bioretention) planters, pervious pavement, new asphalt pavement, and relevant signage and striping. Other than in specific areas shown on the Partial Design Drawings (Sheets 19-32), the existing sidewalks are to remain or be replaced at current location and elevation and will control the roadway section geometry. Existing grades of Boone Boulevard and the intersecting streets and driveways will generally remain unchanged. This Basis of Design (BOD) presents specific minimum requirements related to the features to be provided by the Design-Builder selected for the Project. This BOD is an exhibit to the Request for Proposal (RFP) document issued by the City of Atlanta Department of Watershed Management (City) for this Project. The Design-Builder shall enter into a First Source Jobs employment agreement with the City of Atlanta.

1.2 Design-Builder's Project Approach Requirements

The Design-Build team shall prepare a project approach document that describes their understanding and knowledge of the Project Requirements, Project Schedule, the Geotechnical Report, existing site conditions, existing site utilities, proposed technical specifications, and Partial Design Drawings. The Design-Builder's approach will address the elements of this project including the engineering design, project controls, coordination, and General QA/QC requirements for both design and construction phases of the Work, Permitting requirements for the site, Safety and Security Requirements, and an understanding of the importance of meeting the project schedule.

The approach should clearly describe the Design Build Team's design, permitting and construction activities that will lead to substantial and final completion of the project. This approach shall also clearly describe the proposed pervious pavement manufacturer, installation recommendations, proposed equipment and materials to be used, a description of the mechanical installation equipment and other associated equipment that will provide a successful project.

The approach shall describe how the Design Build Team will do the work, describe in detail how: permits will be acquired; the project design will be finalized; work within rights–of–way will be executed; critical traffic and road closures will be planned and coordinated with the City and Community; storage of materials will be handled; and existing utilities will be incorporated into the completed project.

The approach shall also describe how the Design Build Team will meet Envision Sustainable Infrastructure Rating System Certification for this project. The approach should identify specific credits and levels of achievement the Design Build Team will strive to attain.

1.2.1 Streetscape Improvements Allowance

A $1,000,000 allowance has been provided for streetscape improvements along Joseph E Boone Boulevard from Joseph E Lowery to Northside Drive. Proponent shall provide conceptual design and elements including materials and installation proposed for the Streetscape Allowance. The streetscape improvements may include new sidewalks, planting strips, pedestrian lighting, street furniture, and other improvements proposed by the Design-Builder. Refer to the streetscape furniture and light pole standards, manufacturer's information, and specifications included in Exhibit A-3, Technical Documents, for the City's requirements and guidelines.

1.3 Overall Requirements

The Design-Builder shall develop and coordinate the project as described in this document, the plan set and the specifications to provide fully functional stormwater planters and pervious pavement within the existing curb line of Boone Boulevard for the City of Atlanta. The stormwater planters and pervious pavement shall be designed to detain the first 1" of rainfall inside of the right-of-way. The Design-Builder is responsible for providing final construction documents and associated permits for the project. The City of Atlanta will provide some assistance on permitting. This includes, but is not limited to construction documents stamped by an engineer licensed in the State of Georgia and erosion control certifications as required for NPDES Permit(s). The Design-Builder shall provide value engineering solutions to reduce costs associated with the project.

The Design-Builder shall provide calculations and final as-built Record Drawings (hardcopy and electronic AutoCAD files) to the Department of Watershed Management, Office of Engineering Services throughout the Design-Build project. To prepare the Record Drawings, the location of curb lines, stormwater planters, horizontal and vertical limits of pervious pavement, and other features shall be surveyed in accordance with Specification Section 01055.

The Substantial Completion deadline for this project is 270 days (GI* elements) and 300 days (remaining elements**). Substantial Completion shall be no later than May 31, 2017 which shall be considered an interim milestone for purposes of this project. Final completion is 300 days from NTP. The Notice to Proceed is anticipated by June 1, 2016 or earlier. The Design-Builder may provide interim design for project for approval to begin construction along portions of the project, pending a full concept review and approval for entire project length. Design-Builder shall provide adequate protection of completed work if interim construction milestones completed to protect against damage or other impacts that would adversely affect the function of the green infrastructure or other elements. Consideration may be given to allow Design-Builder to construct planters to substantial completion without the plantings if it is outside the recommended planting season.

The Design-Builder shall also strive to meet Envision Certification for this project. It will be the responsibility of the Design-Builder to compile all of the necessary documentation, with assistance from the City.

The Design-Build Team will hold three public meetings to get input on the design from the local community prior to construction. Additionally, the Design-Build Team will provide a community liaison throughout construction. The liaison will be responsible for helping address any community issues and concerns. The liaison will also warn the community of any construction activities that will affect the residents, such as road closures.

*GI elements = completed and landscaped, functioning green infrastructure related to pervious concrete and bioretention areas

**Remaining elements – completed associated roadway, sidewalk, striping, and signaling

1.4 Add Alternates

The City has included three add alternates which are described in the following sections. These add alternates are identified with letters (A through C) for consistency with the Proposal Cost Form. Proponents shall submit cost information for each item, as described in 1.03 of the Cost Proposal Form

1.4.1 Add Alternate A – Replacement of Existing Curb and Extended Curb Tapers

The project assumes no change to existing granite curbs which are to remain in their current location or where curb tapers are labeled to be completed with striping (example: Sheet 021, Station 22+15 to 23+10). Add Alternate A includes pricing for the installation of new or reclaimed curbing along these striped taper areas, and replacing or resetting (where possible) granite cubs that are to remain in their existing location, effectively replacing all curbing between the west side of Northside Drive and Joseph E Lowery Blvd. Installation of curbing at these taper areas will include the construction and planting of a landscape strip between the curb and sidewalk and all related work necessary for the proper removal and replacement of the curbs.

1.4.2 Add Alternate B – Stormwater Planter and Street Trees

The project assumes no installation of trees in the stormwater planters and in associated landscape areas along the roadway as they may be furnished and installed by others. Add Alternate B includes pricing for furnishing and installing the street trees in the stormwater planters and elsewhere, and all related work.

1.4.3 Add Alternate C – Extension of Eastern Project Limit

The City may elect to extend the project through and east of the intersection with Northside Drive (as shown on the Drawings). Add Alternate C includes the proposed work through and east of the Intersection of Boone Blvd. and Northside Dr. The work includes two new sidewalk ramps, one new traffic signal, sidewalk pavement repair, pavement markings and other related work for completion of the bike lane extension as indicated on the Drawings.

2.0 PROJECT INFORMATION AND DESIGN CRITERIA

2.1 Project Survey

The topographic survey for the project was provided by the City of Atlanta Department of Watershed Management. The survey does not include Ivan Allen Jr. Boulevard at Northside Dr. The right-of-way and property lines are from the City of Atlanta GIS data provided by the Department of Watershed Management. Any additional information required is the responsibility of the Design-Builder. All new survey information shall be assigned a separate file designation so new data may be attached or referenced into the original electronic files. Final record drawings for the project shall include all new survey information and be provided after construction is complete. Existing utility drawings were provided by the City of Atlanta. The project design drawings will be provided to the selected Design-Builder in AutoCad format.

2.1.1 Existing Utilities

The locations of the existing utilities shown are approximate. The exact locations and sizes shall be determined in the field by the Design-Builder and the utility companies. The general locations of known utilities are shown or identified herein on the drawings and reflect the DWM's best records and on-site investigation. The DWM makes no expressed or implied guarantee of accuracy or that other utilities are not located in the construction vicinity. Therefore, the Design-Builder is responsible for verifying all existing utilities, pipe diameters, materials, and depths. A subsurface utility engineering report shall be provided by the Design-Builder and used in the final design. The Design-Builder is required to perform potholing to verify diameters, materials, and depths for water, sewer, gas, communications, and electrical utilities. The Design-Builder has the option of performing potholing as a part of the scope on storm sewer utilities if he believes that the provided invert and diameter information is inadequate for preparation of the design. All fees associated with utility relocations and/or permits, including outside utilities such as Atlanta Gaslight are the responsibility of the Design-Builder.

The Design-Builder shall provide support for existing utilities exposed during construction and repair any damaged utilities at no additional cost to the City. At some locations, residences are located at lower elevations than adjacent roadways. Utilities are assumed to extend downhill from the roadway to serve the residence. Finished floor elevations were not surveyed and as such, the Design-Builder is responsible for identifying these areas. Ensure stormwater associated with the planters and pervious pavement is contained within the roadways and is prevented from migrating along existing utilities to residences. Design-Builder shall relocate all catch basins to the new curb line.

2.1.2 Abandoned Infrastructure

Historic streetcar system maps from Wikimedia (File:Atlanta-1911.jpg) dated 1911 shows a street car line that previously extended along Boone Blvd. from Joseph E Lowery Blvd. east past Northside Drive. The Design-Builder should be aware that abandoned streetcar tracks may be present in this and possibly other sections of Joseph E. Boone Boulevard. Additionally, there is an abandoned 24" gas line along the south side of Boone Boulevard that will remain in place during construction.

2.1.3 Horizontal and Vertical Control

All new construction shall be tied to the Georgia State Plane Coordinate System (NAD 83). Vertical controls shall be referenced to NAVD 1988. All horizontal and vertical control is the responsibility of the Design-Builder.

2.2 Geotechnical Information

A geotechnical investigation report is provided in Exhibit A, Technical Documents, for information. Any additional or supplemental geotechnical investigations required will be the responsibility of the Design-Builder and must be permitted through the City of Atlanta Department of Public Works by the Design-Builder prior to land disturbance activities.

2.3 Demolition Plans

Refer to sheet 003, *Special Provisions* for additional information. The drawing scale for demolition plans shall be 1:100 or smaller. Demolitions plans should address the following:

- Existing utility information. Confirm layout is correct, complete, and current.
- Identify limits of demolition, buried structures and all utilities.
- Identify buried structures and utilities to be abandoned in place, plugged or filled.
- Indicate the extent of items to be removed or to remain and areas to be protected.
- Indicate any environmental safety issues.

2.4 Green Infrastructure

2.4.1 Drainage Areas and Design Storm

Drainage areas within the right-of-way were estimated using the topographic survey provided by the DWM. AutoCAD 2013 files containing this information will be supplied to the Design-Builder for verification as part of final design. The Drainage Areas shown on the drawings are based on existing catch basin locations. Per DWM requirements, the proposed green infrastructure will capture the first inch of precipitation inside the right-of-way. Design-Builder needs to verify and present to the City the drainage areas and volumes as part of final design. Storm sewer inlet types and locations will be engineered with the Green Infrastructure design. In areas between stormwater planters, non-bioretention planted areas shall be designed and constructed to convey water into the planters where feasible.

Storage capacity of the green infrastructure elements will be based on capturing 100-percent of the one inch storm for the given drainage area. Inlets to green infrastructure elements will be located to capture the maximum drainage areas and stormwater flow before overflowing to the catch basins and existing combined sewer system.

2.4.2 Design Assumptions Associated with Planter Sizing Calculations

The Design-Builder shall prepare the final design based on the following criteria:

- Sub-soil Infiltration Rate: 0 inches per hour (typ.)

- Depth of engineered soil in planter: 36"
- Depth of #57 stone storage: May vary based on needed storage
- Planter underdrain: 4" perforated PVC with 'upturned elbow' design, illustrated in Partial Design Drawings
- Minimum width of planter: 4'
- Utilities shown in correct alignment and location in the documents provided by the City.
- Surface ponding within the planter shall be present for no more than 24 hours after each storm event
- Volume reduction within planters varies between zones above and below underdrain. See illustration on Sheet 035, *GI Typical Details*.
- Storage volume of stormwater planters with underdrains shall be calculated with 100% RR_V credit for storage volume below the underdrain and 50% RR_V credit for storage volume above the underdrain.
- Design-Builder shall relocate existing catch basins to new curb line and connect underdrain from planters into relocated catch basins

2.4.3 Pervious Pavement

Design-Builder shall install a pervious pavement bike lane from Mayson Turner to Joseph E Lowery. The pervious pavement section shall have a 10" pervious concrete section on top of 6" stone base course and a minimum 12" storage layer in order to infiltrate the required volume. At intersections and MARTA bus stops, Design-Builder shall install 10" solid (vs. pervious) concrete in the bike lane. The stone base shall be #57 stone and the storage layer shall be GDOT #3 stone. Design-Builder shall maintain the 12" storage layer throughout the entire bike lane. Design-Builder shall install a 6" PVC underdrain along edge of bike lane. The underdrain shall be surrounded by #57 stone and wrapped in non-woven geotextile. Design-Builder shall provide field connections at existing storm drain manholes for the connection of the new underdrain pipes.

Storage volume of pervious pavement with underdrains shall be calculated with 100% RR_V credit for storage volume below the underdrain and 50% RR_V credit for storage volume above the underdrain.

2.4.4 Planting Guidance for Stormwater Planters and Landscape Strips (non-bioretention)

The stormwater planters and all other areas within the right-of-way that are not paved will be planted. Design-Builder shall coordinate with the City for preferences and approval of plantings. Design-Builder shall propose a planting scheme that meets the following goals:

- Low maintenance
- Densely planted; ideally forming a complete, weed-excluding cover within 2 to 3 years
- Attractive
- Appropriate to soil, moisture, and sun/shade conditions
- Appropriate to available planting and growing space, both vertically and horizontally; Does not interfere with traffic visibility requirements nor create unsafe conditions for bicyclists or pedestrians.

Typical planters and landscape strips shall be planted with a combination of trees, shrubs, groundcovers, and ornamental grasses and mulched with an appropriate hardwood or stone mulch. Turf grass shall not be included in any planting scheme.

The majority of the plantings will be in areas that have been previously paved and compacted. All areas outside the stormwater planters that are to be planted shall be loosened to a depth of at least three feet by excavating, deep tilling, or other method to insure suitable soil conditions for new plantings. Soils must be amended through the addition of compost or topsoil to a depth of at least 6 inches. Unamended subsoils are not appropriate for planting.

As required in the Proposal Cost Form, pricing for trees is to be provided separately from all other plantings and landscaping included in the scope as Add Alternate B.

2.4.5 Green Infrastructure Monitoring

The performance of the green infrastructure will be monitored. Design-Builder shall support monitoring as follows:

- Four of the stormwater planters shall be designed to facilitate the installation of monitoring equipment for the following parameters: Stormwater capture volume, stormwater release volume (surface and underdrain), water level within planter and media, infiltration rate into subsoil, water quality of outflow from underdrain.
- Two monitoring locations will be established in the pervious bike lane.
- Design-Builder will not be responsible for obtaining or installing monitoring sensors, but will be responsible for the following at the monitoring locations:
    - Installation of surface weirs, flumes, or other flow control structures to facilitate monitoring at inlet and outlet of stormwater planters (4 planters).
    - Conduit connection to catch basin into which the underdrains discharge (6 total)
    - Installation of monitoring well in stormwater planter and pervious bike lane monitoring locations (6 total), extending 12" into subsoil below planter and stone storage layer.

2.5 Roadway Plans and Profiles

All work within the GDOT right-of-way shall be done per the GDOT Standard Specifications and Details. Provide plan and profile sheets for Boone Blvd. from Mayson Turner Street to Northside Drive. At a minimum, follow these guidelines:

- Show all data required to remove pavement and construct new lanes, planters, pervious pavement and bike lanes.
- Establish roadway centerlines in plan view and ensure centerline profiles correspond with the plan view at the top of the sheet.
- As necessary, include horizontal and vertical curve stationing and associated data, radius, roadway widths, points of horizontal curvature (PC), points of horizontal intersection (PI) and points of horizontal tangency (PT).

- Profiles should clearly show vertical curve stationing and associated data, points of vertical curve (PVC), points of vertical intersection (PVI), points of vertical tangency (PVT), length of vertical curve (L), centerline elevations at every 100-foot station along roadway tangents and vertical curves, stationing and elevations of low points, stations identifying locations on roadway, utilities and the stormwater planter depths.
- Plans do not reflect all final permanent pavement markings required for the project. At a minimum, replace all existing pavement markings with new pavement markings. In cooperation with the Department of Public Works (DPW), develop and provide final striping and traffic control plans for DPW approval.

2.6 Roadways

Grades and Slopes: Post construction grades, slopes and elevations for roadways must largely coincide with pre-construction conditions. To prevent conflicts with driveways, cross-walks, handicap ramps, curbs, drainage structures, drainage patterns, etc., do not alter grades, slopes or elevations. ADA compliant curb cuts will be required at all locations that have new crosswalk striping. Some of the existing ramped curb cuts may not be ADA compliant. Those that are within the work zone shall be reconstructed to be ADA compliant. Driveways shown to be closed or modified were selected by the Department of Watershed Management. No coordination with the property owners has been done. The Design-Builder shall be responsible for coordinating with the property owners during construction. Driveways to be modified will be modified within the right-of-way. No work will be performed on private property. Driveways to be closed will have driveway aprons removed between the existing curb line and back of adjacent sidewalk. Curb and sidewalk will be reconstructed where driveway aprons are removed. Driveways will be regraded to relocate low point to new gutter line to avoid ponding in driveways.

2.7 Pavements

The existing pavement profile and cross slopes will not be substantially changed. The existing pavement to remain will be milled and overlaid to provide a smooth roadway surface for the traffic control markings. The Design-Builder shall use City of Atlanta standard details, specifications and guidelines for the design of pavement. Where specific design information may be lacking, the Design-Builder shall refer to information provided by the Georgia Department of Transportation (GDOT). For design of pervious pavement, see detail sheet 035 *GI Typical Details*. Pervious concrete shall be 10" thick. Design-Builder shall verify design loads of pervious pavement in the bike lanes. In areas where the bike lane requires green paint, Design-Builder shall use integrally colored concrete. COA DWM approval of pavement color is required. Non-pervious concrete is required at intersection crossings and all MARTA bus stops. Design-Builder shall place 10" thick solid concrete above 6" stone base course and maintain the 15" storage layer for stormwater at all MARTA bus stops from Mayson Turner Rd. to Joseph E Lowery Blvd and as shown on the Partial Design Drawings. Non-pervious concrete shall extend 55 LF in both directions from bus stops, see *Proposed Conditions Plans* for locations. The Design-Builder shall install expansion joints at all areas where the pervious concrete connects to the non-pervious concrete.

2.8 Sidewalks, Curbs and Handicap Ramps

Where new curb lines are to be established, the existing granite curbing should be reused wherever possible. When the condition of the existing granite curbing is too poor to allow reuse, it should be replaced with new granite curbing.

For sidewalks the Design-Builder shall follow these guidelines:

- Design and construct per COA standards and ADA requirements
- Include smooth, greased dowels to control vertical displacements at all construction and expansion joints
- Do not use steel or welded-wire mesh reinforcing as a substitute for proper water-cement ratios and an appropriate flexural concrete design mix. Metal reinforcing shall be used for all new sidewalks
- Maximum concrete joint spacing shall meet COA standards

2.9 Traffic Controls

Refer to sheet 003, *Special Provisions* for additional information. Design-Builder is responsible for designing, permitting, coordinating and implementing all traffic control required for the project through all local, state and federal authorities. Provide uniformed Officers for traffic control for all work on arterials, collectors and at signalized intersections.

2.10 Drawing Organization

The scale for the plans shall be 1" = 20' (or larger) with common match lines as necessary. Upon completion, supply DWM with PDFs and AutoCAD (dwg) files of plans. CAD files must be tied to the coordinate system of the COA survey. In general, drawings should be organized per the Sheet Index on sheet on 002, *Index of Drawings and General Notes*. As necessary, include additional demolition, traffic control, signage, and landscaping sheets.

2.11 Legend, Abbreviations, Schedules, and Notes

At a minimum, all drawings must include the following:

- A legend, scale and north arrow;
- List of acronyms and abbreviations; and
- Notes providing direction and or clarification as necessary.

Drawings must be detailed sufficiently to identify and clarify symbols, line work, and abbreviations used throughout the drawings. Label all utilities such as water, sewer and storm with City identification labels on plans.

2.12 Erosion, Sedimentation and Pollution Control Plans

Design professional must be Level II certified by the Georgia Soil and Water Conservation Commission (GWSCC). Comply with design guidelines and requirements as identified in DWM's Site Development Plan Review Submittal Requirements. Comply with all requirements as identified in applicable NPDES Permit(s).

2.13 Tree Protection

The Design-Builder shall protect from damage and preserve trees, shrubs, and other plants outside the limits of the work and within the limits of the work which are designated to remain undisturbed. The Design-Builder shall provide and maintain temporary barricades around trees and employ hand excavation and other protective measures as necessary to prevent tree injury. All tree protection measures implemented by the Design-Builder shall be approved by the City of Atlanta arborist. Trees that are approved to be removed shall be disposed of in a legal manner off site. In the event of damage to bark, trunks, limbs, or roots of plants that are not designated for removal, the Design-Builder shall mitigate damage in a manner prescribed by an ISA certified arborist and approved by the City of Atlanta arborist. The Design-Builder shall not store equipment or materials within the critical root zones of existing trees.

3.0 Coordination Requirements

3.1 Utilities

The Design-Builder must designate a utility coordinator for the project. The designated utility coordinator will be responsible for working with the City and outside utilities to facilitate resolution of conflicts encountered during design and construction. A DWM Special Projects Coordinator will assist the Design-Builder in facilitating resolution of conflicts. It is the responsibility of the Design-Builder to resolve all utility conflicts. The Design-Builder may design around conflicts or work with 3rd party utilities to arrange necessary relocations and associated costs.

The Design-Builder is responsible for field locating and determining the depths of all utilities prior to beginning work. Design-Builder shall also coordinate work with all utilities within the project limits and notify utilities prior to commencing work, immediately if damage occurs or if conflicts/emergencies arise during construction. Utilities owned by the City shall reflect City identification labels on the plans.

3.2 Vegetation and Stormwater Planter Identification

Due to possible grant-funded planting by an outside partner, the tree planting component of this contract shall be an add-alternate. The Design-Builder may be requested by the City to perform all, some, or none of the tree planting. Design-Builder is responsible for working with the DWM to finalize plant selection for the entire project, including the stormwater planters. The Design-Builder shall also develop an identification system to identify each planter. These identifications will be used to prepare individual as-built drawings for each planter showing planter configuration and any utilities that pass through or beneath the planter. The as-built drawing of the stormwater planters shall be in addition to the as-built drawings of the entire corridor that the Design-Builder shall be responsible for providing.

3.3 Project Meetings

The City Representative will schedule physical arrangements for weekly meetings throughout the progress of work, prepare meeting agenda with City and Design-Builder input, distribute written notice of each meeting, preside at meetings, record minutes to include significant proceedings and decisions, and reproduce and distribute copies of minutes within five days after each meeting to all participants and parties affected by meeting decisions. Representatives of the City, Design-Builder, and any subconsultants shall attend meetings, as needed.

The Design-Builder will coordinate a meeting with Atlanta Gas Light and other utility companies that are in conflict with the stormwater planters.

3.4 Construction Staging and Sequencing of Work

The Design-Builder is responsible for staging and sequencing all construction activities appropriately. Prior to construction, provide the City with an initial anticipated staging plan and schedule. However, once construction begins, provide the City with updated and detailed staging and sequencing plans as agreed upon in progress meetings. All construction scheduling and phasing must be coordinated through the City. The Design-Builder is responsible for providing the City regular updates to the schedule. Power and other utility outages must be planned and scheduled with the utility in advance of the planned shutdown. A written request for the outage should be submitted describing the reason for the outage, anticipated length and areas affected.

4.0 Quality Assurance

4.1 Control of Work

The Design-Builder is responsible for controlling the quality of work including work of its subcontractors, sub-subcontractors, and suppliers and for assuring quality is achieved. The Design-Builder and its subcontractors, sub-contractors, and suppliers shall be responsible for developing and maintaining a quality control program which is responsive to the requirements of this Project. This includes QC Program elements as described herein and implementing procedures necessary to assure compliance with the requirements of the Contract. An outline of the Quality Control (QC) program shall be submitted within 20 days after receipt of Notice to Proceed. The QC program and implementing procedures for quality control of work scheduled to be performed within 90 days after receipt of the Notice to Proceed, together with a schedule of the Design-Builder procedures for later work activities, shall be submitted to the City Representative for approval prior to commencement of the work but no later than 30 days following receipt of the Notice to Proceed, whichever occurs first. The QC program shall explain the Design-Builder's and its subcontractors' approach to design quality control, on-site quality control, off-site quality control, the QC organization, and documentation of quality control activities, and provide all other information necessary to demonstrate to the City and the City Representative that the Design-Builder and its subcontractors, sub-subcontractors, and suppliers will provide quality control services that ensure compliance of the work with the Contract Documents. The QC program shall identify the Design-Builder's individuals responsible

for the execution of the program, and identify those subcontractors/sub-subcontractors/suppliers working under the QC program and those working under their own Subcontract Quality Control (SQC) program. The Quality Control programs shall apply to the control of quality throughout all areas of contract performance including, as appropriate, all design phases; procurement, identification, stocking, and issue of material; the entire process of construction; the installation and testing of equipment; the training of operations and maintenance personnel; and the start-up and acceptance testing of the Project.

Overall administration of the QC program shall be vested in a responsible, authoritative element of the Design-Builder's organization, hereinafter referred to as the QC Organization, under a qualified QC Manager acceptable to the City and the City Representative, who has clear access to top level management and to subcontractors' officers responsible for the execution of the QC Program. The QC Manager's sole duty is to manage and administer the QC program unless otherwise authorized in writing by the City Representative. Such authorization can be withdrawn at any time. The QC Manager shall be assigned for the duration of the Contract, and any change is subject to the City Representative's approval. The Design-Builder shall perform the work covered by this Section with a QC Manager having at least five (5) years of experience in quality control management of construction inspection personnel performing quality control inspection on construction projects and with construction inspection personnel having at least three (3) years of experience in quality control inspection on construction projects.

As part of the QC Organization, the Design-Builder shall include specialized personnel when necessary to assist the QC Manager in the areas of civil, electrical, mechanical, structural, and materials testing. These individuals shall be responsible to the QC manager; physically present during the execution of work on their areas of responsibility, and have the necessary education and/or experience. These individuals may perform other non-conflicting duties but must be allowed sufficient time to perform their assigned quality control duties as described in the QC Program. Except for materials testing, it is preferred these individuals have a 4-year college degree from an accredited program in their respective disciplines and 5 years of experience. The materials testing technician shall have a minimum of 2 years of experience. Educational requirements may be waived by the City in lieu of relevant experience and additional relevant certifications.

As part of the QC Organization, the Design-Builder shall include a Design QC Manager who shall be responsible for Quality Control for all Design Professional Services performed as part of the Project. The Design QC Manager shall be employed by the Design-Builder's designer who is responsible for design of the Project. Minimum requirements for the Design QC Manager shall include a Civil Engineering degree, professional registration in Georgia, a minimum of ten (10) years experience in engineering and a minimum of five (5) years experience with QC programs.

The QC Organization shall be staffed by technically competent personnel with freedom to make decisions without pressure or bias. It shall have sufficient authority to ensure that quality

requirements are consistently maintained and shall be independent from that portion of the Design-Builder's organization responsible for production.

Written procedures for implementing quality control, testing, and inspection shall be used for all pertinent operations. These procedures shall contain instructions for performing the required review, testing, or inspections, contain the accept/reject criteria for each review or inspection activity listed on a checklist provided by the Design-Builder (i.e., applicable design criteria, drawing, specifications section, industry code or standard), and shall establish the schedule and/or frequency for performing he review, testing, or inspection. These procedures shall be kept current and shall be available at all locations where they will be used.

The Design-Builder shall maintain control over procurement sources to ensure the materials, equipment, and services conform to specified requirements. The Design-Builder's procurement documents shall require subcontractors and suppliers to implement their own (SQC) program, as required by this Section or implement the QC Program. Copies of procurement documents shall be provided to the City Representative upon request. When required by the Contract Documents, procurement documents shall be submitted to the City or the City Representative at the time of award/purchase. The Design-Builder and its subcontractors shall comply fully with manufacturers' instructions, including completing each step in sequence. Should manufacturers;' instructions conflict with Contract Documents, the Design-Builder is to notify the City Representative before proceeding and shall resolve the conflict in a manner that is acceptable to the City Representative. Work to be done away from the site is subject to inspection on behalf of the City during its fabrication, manufacture, or testing, or before shipment. The Design-Builder shall give notice to the City or the City Representative of the place and time where such fabrication, manufacture, testing, or shipping is to be done at least thirty (30) days in advance so that the necessary arrangements for inspections and witnessing of shop tests can be made.

The City may audit and inspect the Design-Builder's and subcontractor's Quality Control programs at any time. Such audits may be conducted on a random or routine basis and may include an audit of the Design-Builder's review and inspection records and data. Additionally, the City and the City Representative shall have the right to witness any quality control tests or inspections and shall have access to all test data, including test procedures, test specifications, and test results. Further, the City and the City Representative shall have the right to conduct independent tests or inspections of any part of the work. The City and the City Representative shall not be obligated to perform such audits, inspections, or tests and the performance or non-performance of such audits, inspections, or tests by the City or the City Representative shall not relieve the Design-Builder of any of its obligations under the Contract.

Means and methods shall be established for controlling the identification, handling, and storage of raw and fabricated material and inspection status of the material. These controls shall be maintained from the time of receipt of the material until its incorporation in the work or

delivery to the City or the City Representative, in order to protect the material from damage, deterioration, loss, or substitution.

The Design-Builder shall maintain control over construction and installation processes to assure compliance with specified requirements. In-process and final inspection and testing of construction shall be performed in accordance with written quality control, test, and inspection procedures to assure that contract requirements have been met. The results of in-process and final inspections shall be recorded on inspection checklists developed by the Design-Builder and approved by the City Representative.

Means and methods shall be established to assure conformance with requirements for special process specifications such as welding, heat treating, and nondestructive testing of materials. Certifications for personnel, procedures, and equipment shall be maintained as required to meet the requirements of the Contract Documents and all applicable codes.

Procedures shall provide for the identification and control of unsatisfactory or nonconforming work and for the prompt notification to the City Representative with recommendations for corrective action. Procedures for performing corrective work shall also be defined.

The Design-Builder shall issue monthly quality control reports to the City Representative. These reports shall address: status of the Design-Builder Quality Control program for design and construction including procedure development, status of subcontractor/supplier quality control program/procedures, number of reviews/inspections/tests performed and results of the inspections performed during the month, any quality problems experienced, corrective actions taken, and progress of work photos.

The Design-Builder shall provide design submittals for the City's review throughout the project. Proponent shall include in their proposal a suggested approach to a review and approval process to promote efficient progress and quality control which shall be finalized during negotiation with the successful proponent.

4.2 Control of Subcontractors/Suppliers

The Design-Builder is responsible for controlling the quality of work performed by its subcontractors, sub-subcontractors, and suppliers. Subcontractors and suppliers may implement their own quality control program if the Design-Builder and the City Representative approve the program. Otherwise, the Design-Builder will instruct the subcontractor or supplier to implement the QC program on all work performed and will perform the QC inspections of the subcontractor's or supplier's work and activities. The City Representative's approval of supplier QC Programs may be waived at the discretion of the City Representative. Such waivers can be withdrawn at any time.

Overall administration of the QC Program shall be vested in a responsible, authoritative element of the subcontractor's organization under a qualified QC Manager in residence at the work location. The QC Manager shall meet the same experience requirements as specified for the Design-Builder QC Manager, be acceptable to the Design-Builder and the City Representative, and have clear access to top level management. The resume of the QC Manager shall be submitted and be evaluated by the Design-Builder and the City Representative prior the commencement of work. Any subcontractors providing Design Profession Services shall implement a design QC program under a Design QC Manager and meet the same requirements outlined in this section.

4.3 On-Site Quality Control Testing and Inspection

The Design-Builder and its subcontractors shall perform reviews, inspections, tests, and other services as required by the Contract Documents and their approved QC programs, in accordance with laws, codes, rules, and regulations, and as required to assure the quality of the work. The results of all reviews, inspections, tests, and other services shall be documented and available for review if requested.

The Design-Builder shall provide reasonable notice to the City Representative so that the City Representative may witness the Design-Builder and/or subcontractors on site tests. The City Representative's witnessing of tests does not relieve the Design-Builder and/or subcontractors of their obligation to comply with the requirements of the Contract Documents.

The Design-Builder and its subcontractors shall develop a review, inspection, and test checklist identifying all required reviews, inspections, and tests as indicated in the Contract Documents and their approved QC program. The Design-Builder shall provide one copy of review, test, and inspections results to the City Representative witnessing the test and retain and file the original review, inspection, and test results in an orderly manner so that the Design-Builder can readily turn over such records to the City Representative and demonstrate to the City Representative at Substantial Completion that the work has been satisfactorily performed and tested.

4.4 Quality Control

The Design-Builder shall schedule quality control and coordination meetings on a regular basis and as necessary to review tests and inspection reports and other matters relating to quality control of work and work of subcontractors. Attendees shall include all designated representatives as necessary.

The Design-Builder shall schedule and administer the Quality Control program to ensure an acceptable level of quality for all products and services provided, as evidenced by:

- Design resulting in a system that can be efficiently operated and maintained.
- Continuous monitoring of engineering design and documentation preparation.
- Firm procurement and performance specifications.
- Firm procedures for transmission of data and information to the City and subcontractors, and ensuring the subcontractors' compliance therewith.

- Adequate testing and verification to ensure uniform product or services conforming to the design requirements.

The Quality Control program shall apply to all work including but not limited to design, components, equipment, materials, systems, services, software, and construction.

4.5 Manufacturers' Service and Reports

When specified in the Contract Documents or necessary for completion of the work, the Design-Builder and its subcontractors shall require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship and to provide instructions when necessary.

Authorized representatives of the manufacturer shall be trained and experienced in the technical applications, installation, operation, and maintenance of the respective system. Representative(s) shall be subject to acceptance by the City. No substitute representatives shall be allowed unless prior written approval by such has been issued.

Design-Builder shall report to the City in writing any observations and site decisions or instructions given by the manufacturers' representative to the Design-Builder that are supplemental or contrary to manufacturers' written instructions.

The Design-Builder shall submit manufacturer's representative's reports (in duplicate) within 10 days of each field visit, to the City Representative for review. If the durations of field visits are greater that one week, the Design-Builder shall submit weekly reports.

5.0 Operation and Maintenance Data

- Refer to Sheet 003, *Special Provisions;*
- Operation and maintenance manuals for the pervious pavement system shall be prepared and supplied by the pavement manufacturer as well as a repair sheet for the City to provide to outside utilities with restoration instructions;
- The Design-Builder shall provide individual as-builts for each stormwater planter with a specific identification for each individual planter. The as-built shall include exact locations and depths of utilities, soil mix and plantings used, and exact dimensions.
- Certified training for four City staff members regarding repairs;
- Recommended maintenance schedule; and
- Complete list of equipment needs for operation and maintenance.

C-1

REPORT OF SUBSURFACE EXPLORATION AND GEOTECHNICAL ENGINEERING EVALUATION

Report of Subsurface Exploration and
Geotechnical Engineering Evaluation
Boone Boulevard Green Project
Atlanta, Georgia
ATC + CERM JV Project No. 2013-1304-005

For

City of Atlanta
Department of Watershed Management
Atlanta, Georgia

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ATC + C.E.R.M., a joint venture
1990 Lakeside parkway, Suite 300
Tucker, GA 30084

770.427.9456, ATC Associates, Inc.
678.999.0173, CERM, LLC

January 13, 2016

City of Atlanta
Department of Watershed Management
72 Marietta Street, N.W.
Atlanta, Georgia 30303

Attention: Ms. Karen Schroeder, P.E.
Project Manager

Subject: **Report of Subsurface Exploration and Geotechnical Engineering Evaluation**
Boone Boulevard Green Project
Atlanta, Georgia
FC-4918A
ATC + CERM JV Project No. 2013-1304-005

Dear Ms. Schroeder:

ATC Associates + C.E.R.M., a joint venture (ATC + C.E.R.M. JV), is pleased to provide this report of our subsurface exploration and geotechnical engineering evaluation for the referenced project. The field study and this report were accomplished in general accordance with City of Atlanta Task order Number 2014-002 based on ATC + C.E.R.M. JV Proposal No. 11p-0214-08 dated April 9, 2014.

The following report will present a brief summary of our pertinent findings and recommendations followed by our understanding of the proposed construction, methods of exploration employed, site and subsurface conditions encountered, and conclusions and recommendations regarding the geotechnical aspects of the project. Should you have any question regarding items discussed in this report, please do not hesitate to contact the undersigned.

Sincerely,

Corporate Environmental Risk Management, L.L.C.

Kenneth A. Fluker, P.E.
Principal Engineer

GEORGIA REGISTERED No. PE029131 PROFESSIONAL ENGINEER KENNETH A. FLUKER

ATC Associates, Inc.

for Kassaman Chirmay

William J. Sheffield, P.E.
Principal Engineer

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APPENDIX

Figure 1: Vicinity Map

Figure 2: Boring Location Plan

- **Sheet 1 of 7: B-1 thru B-4**
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- **Sheet 7 of 7: B-27**

Table 1: Summary of Laboratory Test Results

Soil Test Boring Procedures

Correlation with Standard Penetration Test Results

Soil Classification Chart

Soil Boring Records (27)

Laboratory Test Results

Infiltration Test Results (25)

1.0 SUMMARY

The following is a brief summary of our pertinent findings and recommendations. The reader is referred to the remaining text of this report for elaboration on these items.

1. General subsurface conditions beneath existing pavement consist of fill, residuum, and partially weathered rock. No groundwater was encountered in any of the borings at time of boring or prior to the infiltration rate testing.

2. The on-site soils are generally suitable for reuse as structural fill. Drying the soil may be necessary during construction in order to achieve compaction. Importing borrow material to backfill trenches may be necessary if drying the existing soils is not practical.

3. Excavations to the maximum exploration depth of 6 feet can generally be accomplished using conventional heavy earthmoving equipment. However, difficult excavation is anticipated at boring B-5 due to partially weathered rock material.

2.0 PROPOSED CONSTRUCTION

The City of Atlanta has plans to improve drainage along 1.2 miles of Boone Street from McAllister Road to Northside Drive using green technology to minimize the volume of storm water discharged to the Chattahoochee River.

3.0 METHODS OF EXPLORATION

3.1 Soil Borings

To evaluate the subsurface conditions, the Department of Watershed Management (DWM) specified a total of twenty-seven (27) soil test borings drilled to a depth of 6 feet below the pavement surface. All boring locations were cored prior to drilling and two additional cores were made due to utility conflicts.

The soil test borings were advanced by twisting continuous hollow stem auger flights into the ground. Standard Penetration Tests (SPT) were performed in general accordance with ASTM Standard D 1586 and soil samples were collected for laboratory testing and visual classification. The results of the penetration tests, when properly evaluated, provide an indication of the relative consistency of the soil being sampled, the potential for difficult excavation, and the soil's ability to support loads. A more detailed description of the drilling and sampling process is included in the Appendix of this report.

Infiltration rate tests were performed in all the borings except B-3 and B-8 because the boreholes did not hold water. Infiltration tests were performed prior to backfilling the borings. Infiltration rate testing was performed by adding approximately 2 feet of water to the bottom of the borehole and timing the rate at which the water seeps into the exposed formation. The infiltration rate at 2 or more feet of head was established. Following the completion of the infiltration tests, the borings were backfilled, and the pavement was patched.

The approximate infiltration test boring locations are shown on the Boring Location Plan in the Appendix. Test boring records which describe the materials and conditions encountered in the borings, and the infiltration rate test curves are presented in the Appendix.

Soil samples recovered during the drilling process were returned to the office where they were classified in general accordance with the Unified Soil Classification System (USCS). Laboratory classification tests were performed on select samples. Detailed descriptions of the materials encountered at each boring location, along with a graphical representation of the Standard Penetration Test results, are shown on the Soil Boring Records in the Appendix.

3.2 Laboratory Tests

Laboratory testing consisted of performing 8 Atterberg limits (ASTM D 4318) determinations, 14 grain size analyses (ASTM C 136), and 21 moisture content determinations (ASTM D 2216). Laboratory test results are summarized in Table 1, and the test results are presented in the Appendix.

The Atterberg limits are index tests used to classify soil. The Atterberg Limits data consist of liquid limit (LL), plastic limit (PL) and plasticity index (PI). The liquid limit is defined as the lowest moisture content at which the soil is in a liquid state, and the plastic limit is defined as the lowest moisture content at which the soil is considered to be in a plastic state. The difference between LL and PL is PI which represents the range over which the soil behaves in a plastic state.

The grain size (or particle size) analysis provides the size and percentage of gravel, sand and fines (silt and clays size fractions) by using sieves.

The moisture content is determined by taking the difference in weight between a moist sample and an oven dried sample and comparing the difference in weight (water) to the oven dried weight.

4.0 SITE DESCRIPTION, GEOLOGY AND SUBSURFACE CONDITIONS

4.1 Site Description

The site is located along Boone Boulevard between McAllister Road and Northside Drive. The roadway consists of 3 lanes from McAllister Road to Joseph E. Lowery Boulevard and 4 lanes from Joseph E. Lowery Boulevard to Northside Drive. The road surface consists of asphaltic concrete (flexible pavement). Drainage is provided to catch basins by curb and gutter. The proposed alignment is shown on the Boring Location Plan, Figure 2, in the Appendix.

4.2 Geology

The site is located in the Piedmont Physiographic Province of Georgia. The residual soils (residuum) in the Piedmont area are the result of the chemical and physical weathering of the underlying parent rock. The weathering profile usually results in fine grained clayey silts and silty clays near the surface, where weathering is more advanced. With depth, sandy silts and silty sands are found, often containing mica. Below the residual soils, partially weathered rock is often found as a transition above relatively unweathered rock. In local practice, partially weathered rock is arbitrarily defined as residual soils with Standard Penetration Resistances in excess of 100 blows per foot (50 blows per 6 inches), and which can be penetrated by a power auger.

4.3 Subsurface Conditions

The conditions described in the following sections, and those shown in the Appendix, have been based on interpolation of the soil test borings drilled at the site using generally accepted principles and practices of geotechnical engineering. However, conditions in this geology may vary intermediate of the tested locations, and even more so on previously developed property. Although individual soil test borings are representative of the subsurface conditions at the precise boring locations on the day drilled, they are not necessarily indicative of the subsurface conditions at other locations or other times. The nature and extent of variation between the borings may not become evident until the course of construction. If such variations are then noted, it will be necessary to re-evaluate the recommendations of this report after on-site observation of the conditions. The soil test borings encountered existing pavement, wood, fill material, residuum, and partially weathered rock. Descriptions of the materials encountered in the borings are provided in the following sections.

4.3.1 Surface Pavement

Asphaltic concrete pavement overlying either stone base or Portland cement concrete was encountered in all borings. The asphaltic concrete ranged from 4 to 10 inches thick. Approximately 2 to 8 inches of stone base was encountered in borings B-2 through B-8, B-10, B-11, B-12 and B-17

beneath the asphaltic concrete and approximately 6 to 25 inches of Portland cement concrete was encountered in borings B-1, B-9, B-13 through B-16, and B-18 through B-27 beneath the asphaltic concrete.

4.3.2 Wood

Approximately 3 to 5 inches of solid wood and wood combined with concrete were encountered beneath the surface pavement in borings B-10, B-11, B-14, and B-15.

4.3.3 Fill Material

Previously placed fill material was encountered in borings B-4, B-7, B-10 and B-22 through B-27 beneath the surface pavement. The previously placed fill extends to depths ranging from 3 to 6 feet below the top of pavement. The fill is classified as clayey silt, sandy silt and silty sand with Standard Penetration Tests (SPT) ranging from 3 to 18 blows per foot. Based on the SPT results, the fill represented by the samples are considered poorly to moderately compacted.

4.3.4 Residuum

Residuum was encountered in all borings except B-24 through B-27 below the surface pavement and previously placed fill. The residuum extends from about 1½ to the maximum exploration depth of 6 feet below top of pavement. The residuum was classified as silty sand, sandy silt, sandy clay, and clayey silt, and was of low to high consistency. Standard Penetration Test results ranged from 1 to 28 bpf with 4 to 12 bpf being typical.

4.3.5 Partially Weathered Rock

Partially weathered rock was encountered in boring B-5 below the residuum. It extends to the maximum exploration depth of 6 feet below the pavement surface. The PWR was classified as silty sand.

4.3.6 Groundwater

No groundwater was encountered at the time of boring or prior to the infiltration tests. Groundwater fluctuations of 5 feet or more are common in this geology. Groundwater fluctuations are linked to changes in annual precipitation. Please note that groundwater levels may be different at other locations and times than those stated in the report.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations are based on the data gathered during this exploration, our understanding of the proposed construction, our experience with similar site and subsurface conditions and generally accepted principles and practices of geotechnical engineering. Should the proposed construction change significantly from that described in this report, we request that we be advised so that we may amend these recommendations accordingly. In addition, we request an opportunity to review the final design drawings to confirm compliance with the recommendations of this report. This report and the conclusions and recommendations presented herein are provided exclusively for the use of the City of Atlanta Department of Watershed Management, and are intended solely for design of the referenced project.

5.1 Site Preparation

Before proceeding with construction, the existing pavement surface and any wood should be stripped from proposed construction area. Following the backfill of the trenches for the proposed drainage system installation, all pavement subgrades should be evaluated prior to aggregate placement. The approval process should include proofrolling the subgrade with a fully loaded tandem axle dump truck (20-ton capacity) during a period of dry weather and under the observation of the geotechnical engineer. Any areas which "pump" or "rut" excessively under the weight of the proofrolling vehicle should be further evaluated, and may require undercutting or other remediation. The proofrolling can occasionally detect areas where weak surface conditions may exist.

5.2 Earthwork

The majority of existing soils encountered underneath the existing pavement and wood in the soil test borings visually appear suitable for reuse as structural fill. However, the moisture contents of the excavated soils may be too high to achieve compaction. Therefore, drying the existing soils may be necessary at the time of construction. If drying the existing soils is not practical, then borrow material will be necessary to backfill the trenches.

All structural fill should be placed in 6 to 8 inches loose lifts and compacted to at least 95 percent of the soil's standard Proctor maximum dry density, as determined by ASTM standard D 698. The upper foot of fill which will support pavements should be compacted to at least 98 percent of the soil's standard Proctor maximum dry density for improved support. Structural fill should be free of organic material, have a plasticity index (PI) less than 25 and contain rock sizes no larger than 4 inches.

Observation of the backfilling operations and field density testing should be performed by a soils technician to determine the degree of compaction and verify compliance with the project

specifications. At least one field density test should be made per 50 linear feet of fill for each two-foot lift. Areas which do not meet the compaction specifications should be recompacted to achieve compliance. If portable compaction equipment is used, thin loose lifts of 3 to 4 inches are recommended to achieve compaction in the sewer line trench.

5.3 Pipe Bedding

For pipes installed in trenches, the bottom of the trenches should be accurately shaped to fit the bottom of the pipe over a lateral distance of at least half of the pipe's width. Additional shaping at the bells is necessary to reduce the stress on barrel at the bell. Therefore, the bell locations should be confirmed prior to shaping to allow the necessary support. Compaction of the backfill in the triangular shaped area under the haunches of the pipe is also important for providing pipe support. If this area cannot be compacted, controlled low strength material (CLSM) is recommended until the pipe's haunches are cleared. The CLSM should not be plastic during structural fill placement.

5.4 Temporary Excavation

Construction of the proposed drainage system installation will require temporary excavations that are either sloped or shored for safety. If temporary slopes are used, they should be constructed no steeper than 1.5H:1V. Excavated soils should be stockpiled such that the toe of the stockpile is located no closer than 1.5 times the depth of the excavation from the surface edge of the excavation. More strict Occupational Safety Hazard Administration (OSHA) regulations may apply, and should be followed. However, if the regulations are lenient with regard to the recommendations stated previously, this office should be notified to evaluate the situation. Shoring or Bracing may be necessary if sufficient space is not available to safely slope the sides of the excavations. The shoring or bracing system should be designed by a GA registered professional engineer.

5.5 Difficult Excavation

Partially weathered rock was encountered in boring B-5 from 4½ to 6 feet below the pavement surface.

5.5.1 Partially Weathered Rock

In confined excavations, such as utility trenches and footings, excavation of partially weathered rock will generally require large backhoes, pneumatic spades or light blasting. In general, partially weathered rock with penetration resistances of 50 blows for more than 2 inches of penetration should be considered excavateable with large equipment or pneumatic spades. Partially weathered rock with penetration resistances of 50 blows for 2 inches or less penetration may require blasting to aid in removal.

5.5.2 Rock

At the base of partially weathered rock, or in some cases residual soil, relatively unweathered rock will be encountered. Due to the confined nature of the trench excavations, a pneumatic ram or light blasting will be necessary for removal of unweathered rock.

The definition of rock for excavation purposes can be a source of conflict during construction. The following definition has been successfully incorporated into specifications on other projects and is provided for your general guidance.

TRENCH EXCAVATION

> Blast Rock: Any material which cannot be excavated with a backhoe having a bucket curling force rated at not less than 25,700 pounds (Caterpillar Model 225 or equivalent) and occupying an original volume of at least ½ cubic yard.

The contractor should exercise extreme caution when blasting near the proposed finished grade or in localized blasting. If blasting damages soil, partially weathered rock, or rock which is to support pipes, the damaged material should be removed, and replaced by structural fill discussed in section 5.2

5.6 Infiltration Test

An infiltration rate test was performed in each of the soil test borings except B-3 and B-8 because the boreholes did not hold water. Infiltration rate testing was performed by adding approximately 2 feet of water to the bottom of the borehole and timing the rate at which the water seeps into the exposed formation. The infiltration rate at 2 or more feet of head was established. From the recorded test data, we estimated an infiltration rate on each test hole. The infiltration rate test does not differentiate between the various soil strata. The results are summarized in the following table and the infiltration rate test curves are included in the Appendix.

Boring	Estimated Infiltration Rate (inches/hour)
B-1	4.3
B-2	1.4
B-4	1.3
B-5	1.7
B-6	2.2
B-7	2.2
B-9	5.8
B-10	1.4
B-11	6.2
B-12	3.3
B-13	2.9
B-14	1.4
B-15	1.4
B-16	2.6
B-17	8.6
B-18	5.0
B-19	6.7
B-20	0.7
B-21	1.4
B-22	1.4
B-23	3.8
B-24	7.4
B-25	19.4
B-26	10.1
B-27	7.9

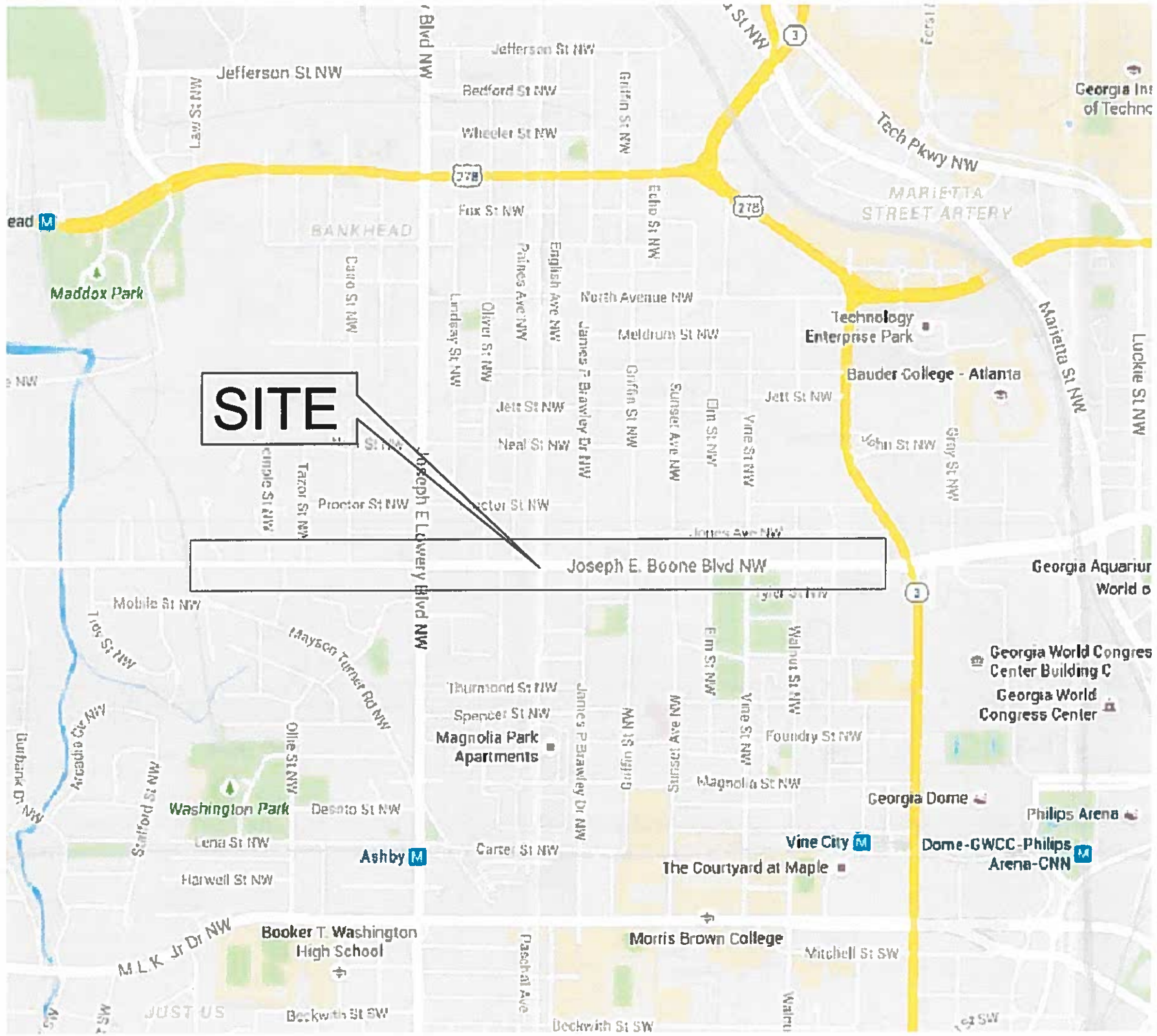
6.0 QUALIFICATIONS OF RECOMMENDATIONS

This evaluation of the geotechnical aspects of the proposed design and construction has been based on our understanding of the project and the data obtained during this study. The general subsurface conditions used in our evaluation were based on interpolation of the subsurface data between the borings. Regardless of the thoroughness of a subsurface exploration, there is the possibility that conditions will differ between boring locations, that conditions are not as anticipated by the designers, or that the construction process has modified the soil conditions. Therefore, experienced soil engineers and technicians should evaluate earthwork and foundation construction to verify that the conditions anticipated in design actually exist. Otherwise, we assume no responsibility for construction compliance with the design concepts, specifications or recommendations.

The recommendations contained in this report have been developed on the basis of the previously described project characteristics and subsurface conditions. If project criteria change, we should be permitted to determine if the recommendations should be modified. The findings of such a review will be presented in a supplemental report. Even after completion of a subsurface study, the nature and extent of variation between borings may not become evident until the course of construction. If such variations then become evident, it will be necessary to re-evaluate the recommendations of this report after on-site observations of the conditions.

These professional services have been performed, the findings derived, and recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. This warranty is in lieu of all warranties either expressed or implied. This company is not responsible for the conclusions, opinions or recommendations of others based on these data.

APPENDIX



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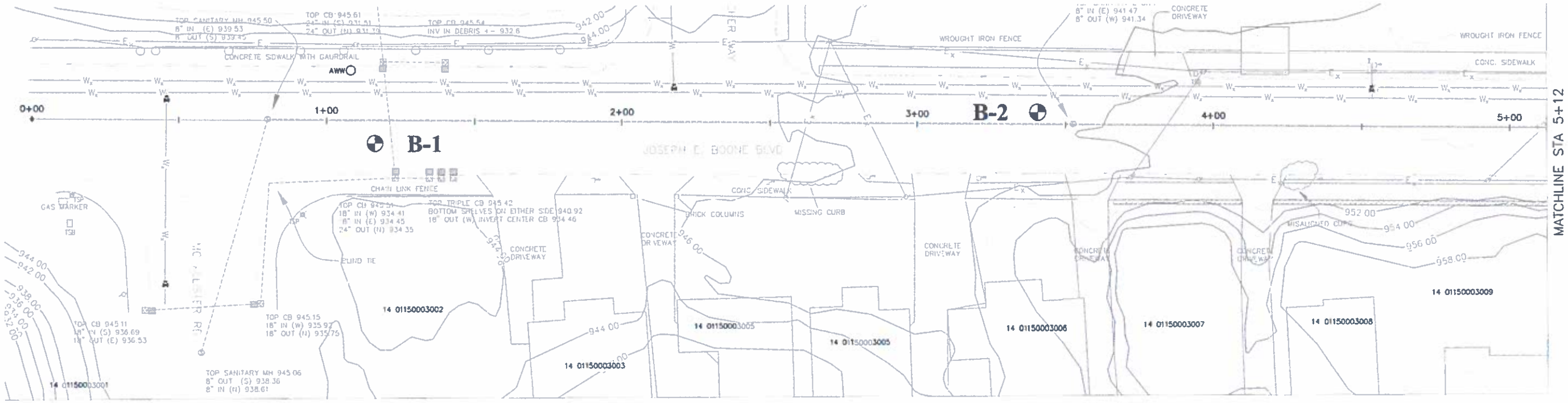
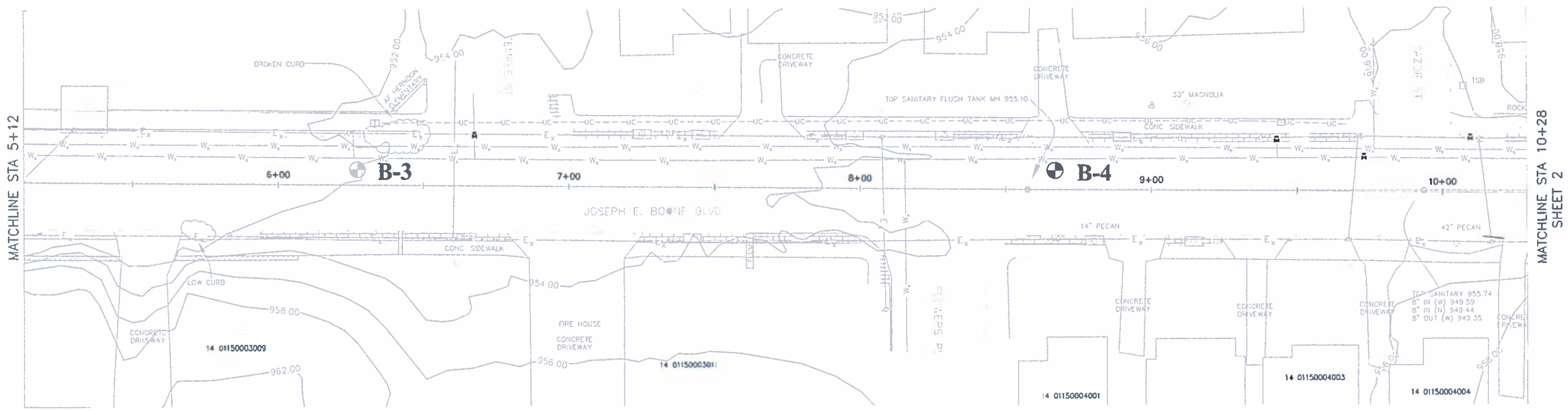
VICINITY MAP

BORING LOCATION PLAN
JOSEPH E. BOONE BOULEVARD
ATLANTA, GEORGIA

ATC + CERM JV PROJECT NO.: 2013-1304-005
DATE:5/20/2015
FIGURE NO. 1

REFERENCE: GOOGLE MAPS





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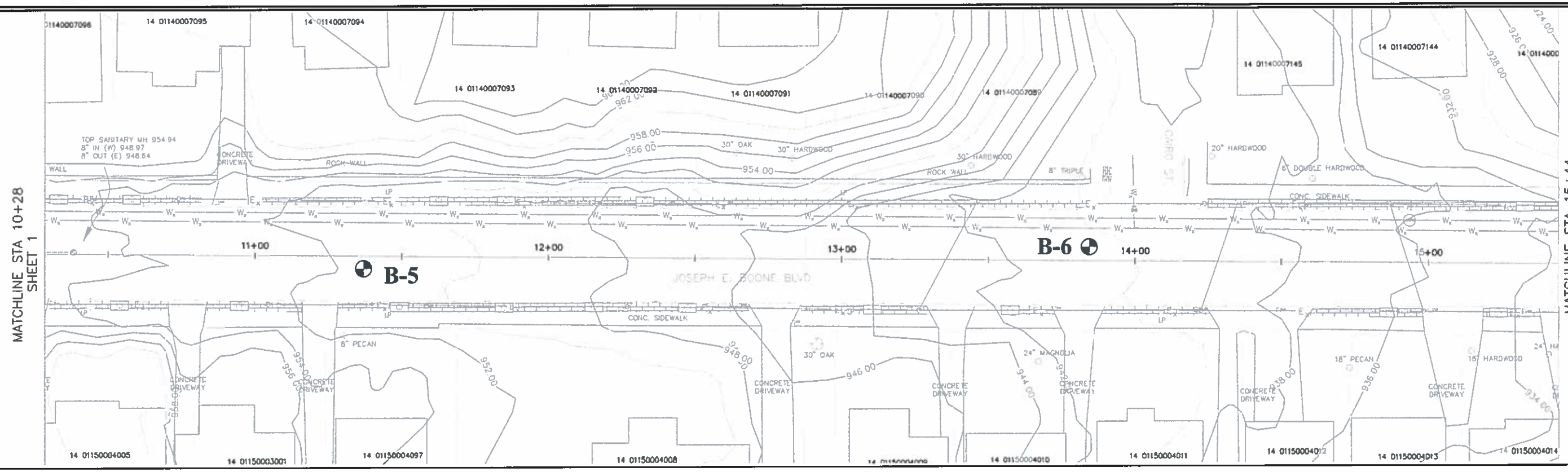
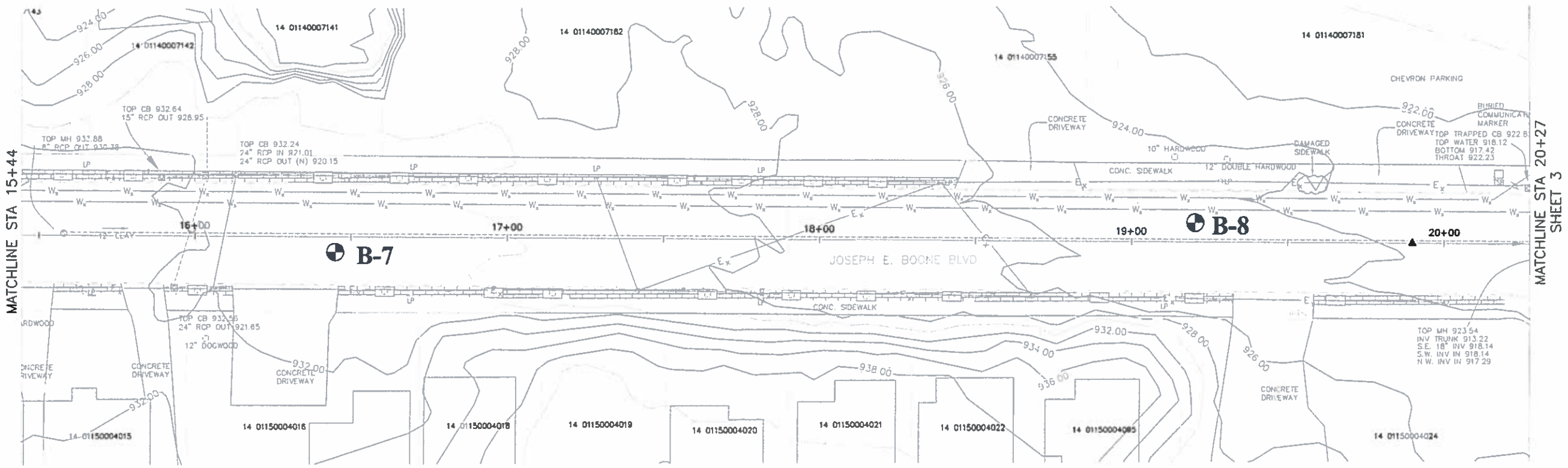
BORING LOCATION PLAN
JOSEPH E. BOONE BOULEVARD
ATLANTA, GEORGIA

ATC + CERM JV PROJECT NO.: 2013-1304-005
DATE:5/20/2015
FIGURE NO. 2 SHEET 1 OF 7

REFERENCE: CITY OF ATLANTA, DEPARTMENT OF WATERSHED MANAGEMENT, BUREAU OF ENGINEERING SHEETS 1-7, TITLED "JOSEPH E. BOONE BLVD EXISTING CONDITIONS", DATED JANUARY 2014.





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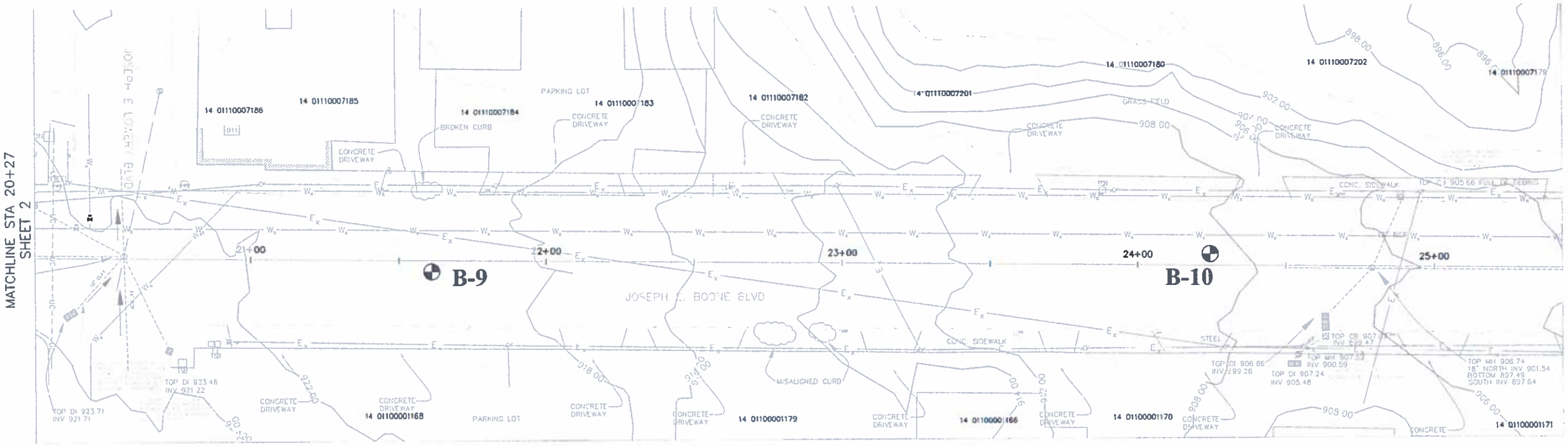
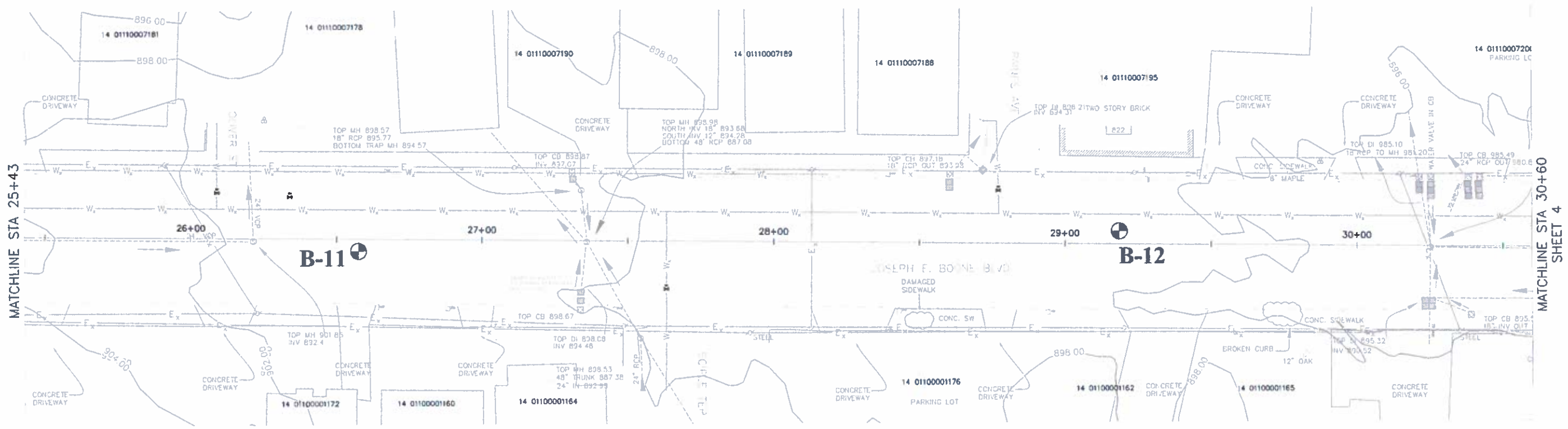
BORING LOCATION PLAN
JOSEPH E. BOONE BOULEVARD
ATLANTA, GEORGIA

ATC + CERM JV PROJECT NO.: 2013-1304-005
DATE:5/20/2015
FIGURE NO. 2 SHEET 2 OF 7

REFERENCE: CITY OF ATLANTA, DEPARTMENT OF WATERSHED MANAGEMENT, BUREAU OF ENGINEERING SHEETS 1-7, TITLED "JOSEPH E. BOONE BLVD EXISTING CONDITIONS", DATED JANUARY 2014.





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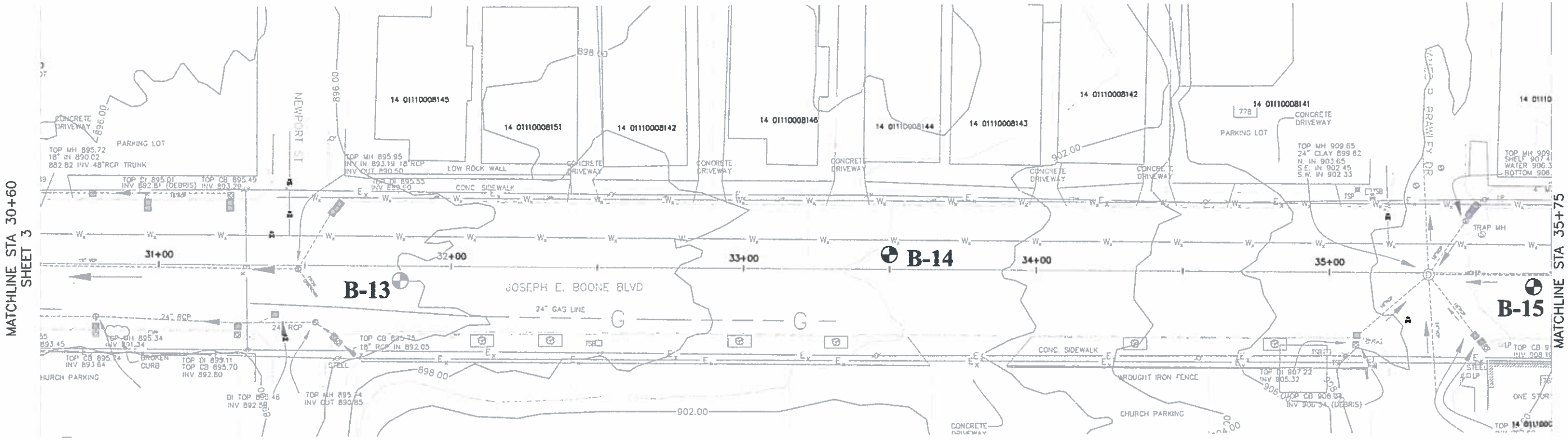
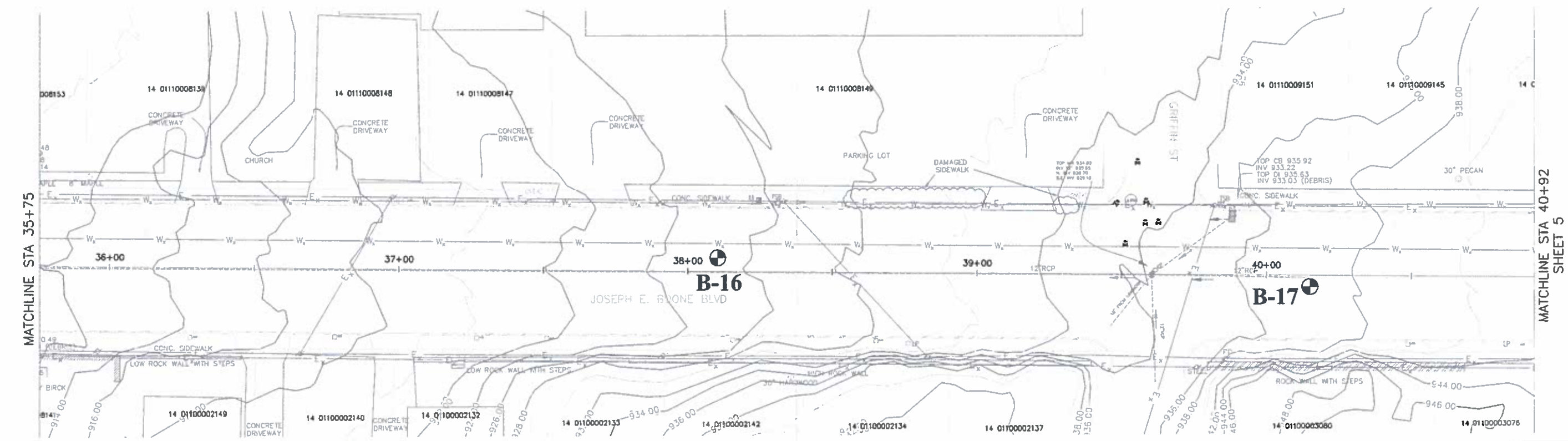
BORING LOCATION PLAN
JOSEPH E. BOONE BOULEVARD
ATLANTA, GEORGIA

ATC + CERM JV PROJECT NO.: 2013-1304-005
DATE:5/20/2015
FIGURE NO. 2 SHEET 3 OF 7

REFERENCE: CITY OF ATLANTA, DEPARTMENT OF WATERSHED MANAGEMENT, BUREAU OF ENGINEERING SHEETS 1-7, TITLED "JOSEPH E. BOONE BLVD EXISTING CONDITIONS", DATED JANUARY 2014.





Cardno ATC
Shaping the Future

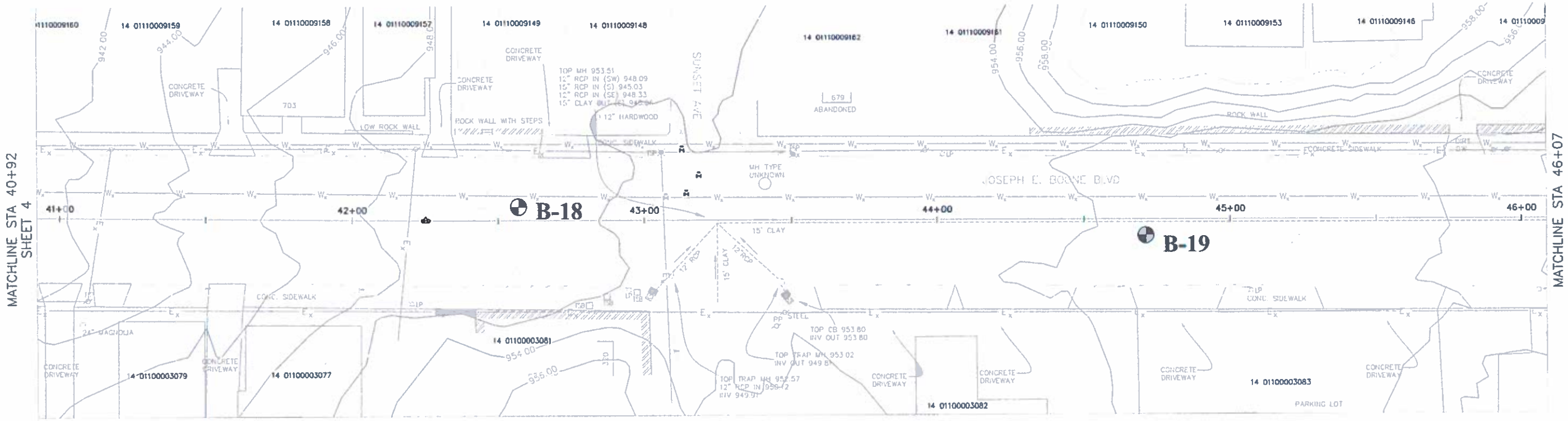
C·E·R·M

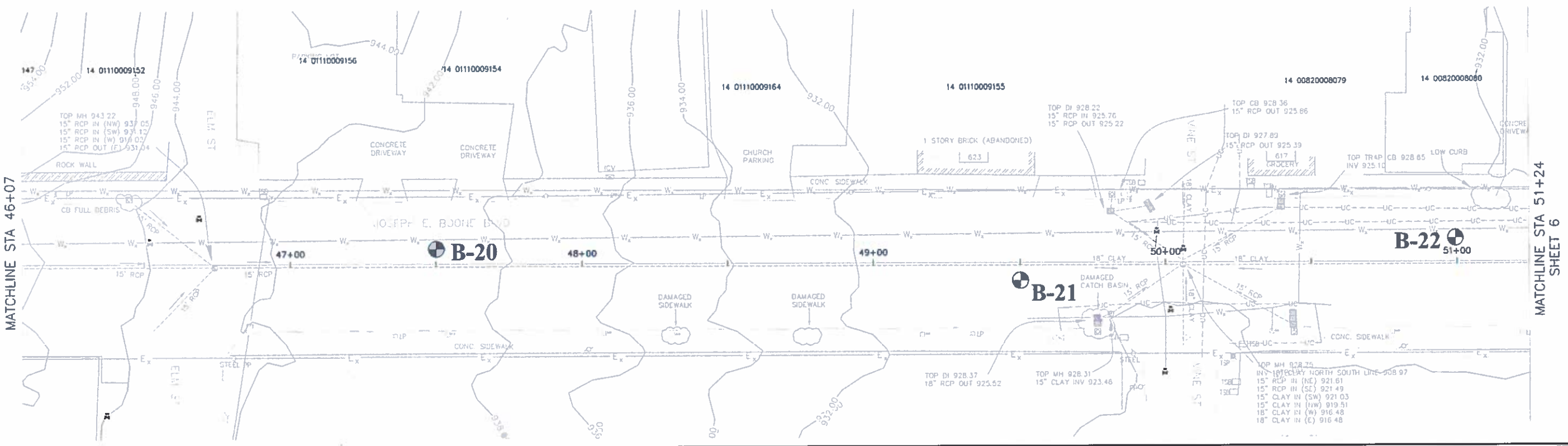
BORING LOCATION PLAN
JOSEPH E. BOONE BOULEVARD
ATLANTA, GEORGIA

ATC + CERM JV PROJECT NO.: 2013-1304-005
DATE:5/20/2015
FIGURE NO. 2

SHEET 4 OF 7

REFERENCE: CITY OF ATLANTA, DEPARTMENT OF WATERSHED MANAGEMENT, BUREAU OF ENGINEERING SHEETS 1-7, TITLED "JOSEPH E. BOONE BLVD EXISTING CONDITIONS", DATED JANUARY 2014.





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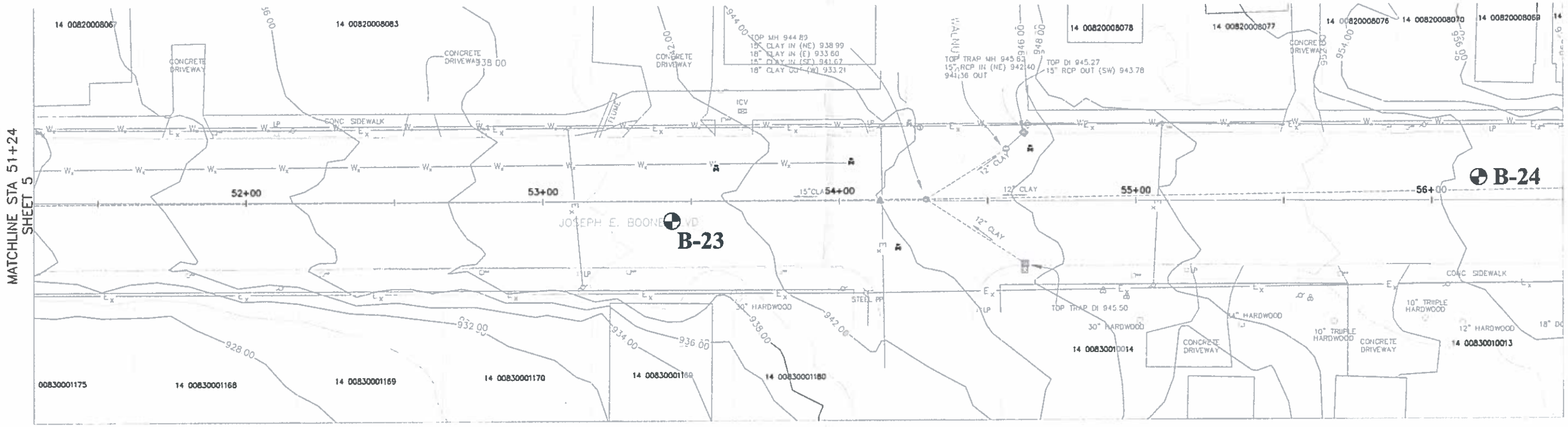
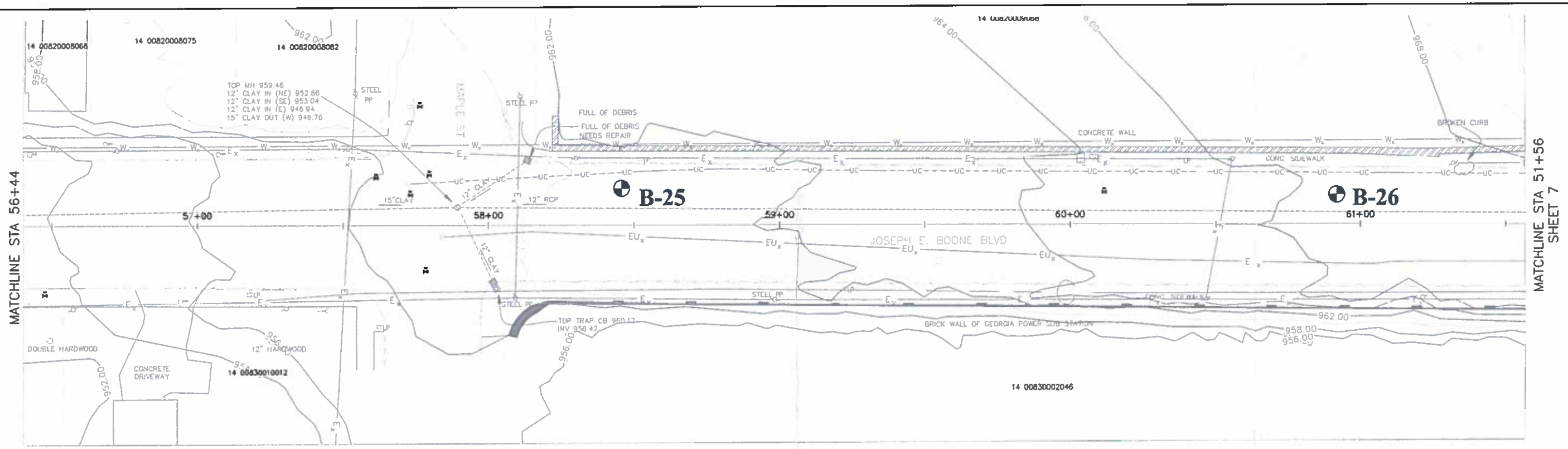
BORING LOCATION PLAN
JOSEPH E. BOONE BOULEVARD
ATLANTA, GEORGIA

ATC + CERM JV PROJECT NO.: 2013-1304-005
DATE:5/20/2015
FIGURE NO. 2 SHEET 5 OF 7

REFERENCE: CITY OF ATLANTA, DEPARTMENT OF WATERSHED MANAGEMENT, BUREAU OF ENGINEERING SHEETS 1-7, TITLED "JOSEPH E. BOONE BLVD EXISTING CONDITIONS", DATED JANUARY 2014.





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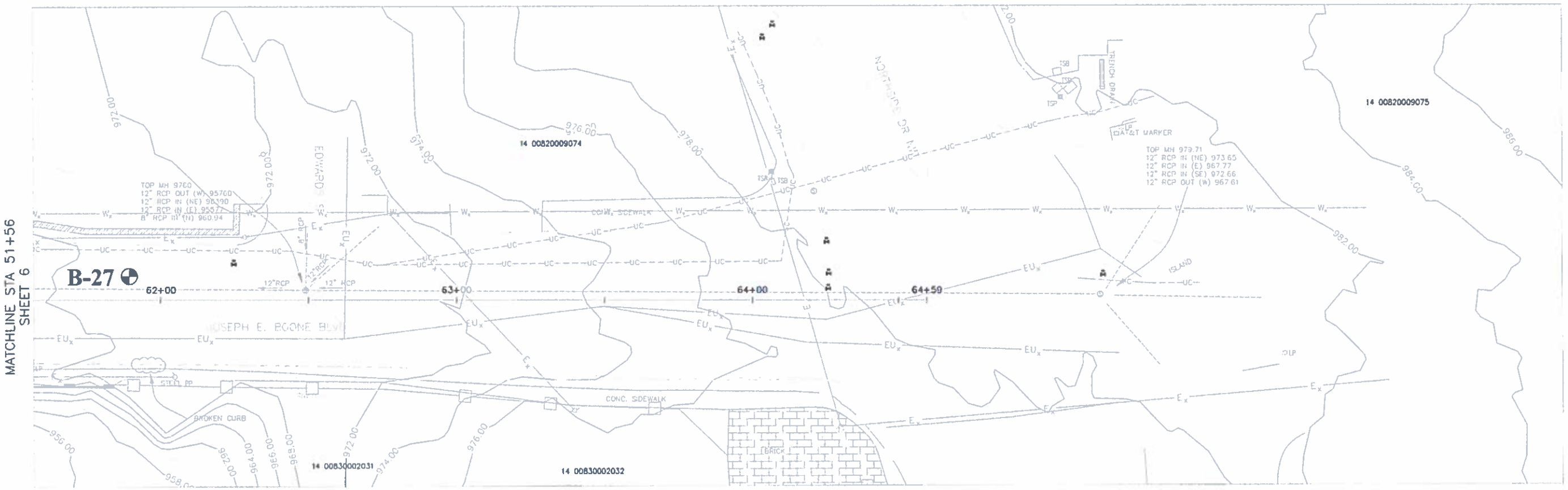
BORING LOCATION PLAN
JOSEPH E. BOONE BOULEVARD
ATLANTA, GEORGIA

ATC + CERM JV PROJECT NO.: 2013-1304-005
DATE:5/20/2015
FIGURE NO. 2 SHEET 6 OF 7

REFERENCE: CITY OF ATLANTA, DEPARTMENT OF WATERSHED MANAGEMENT, BUREAU OF ENGINEERING SHEETS 1-7, TITLED "JOSEPH E. BOONE BLVD EXISTING CONDITIONS", DATED JANUARY 2014.



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C·E·R·M

BORING LOCATION PLAN
JOSEPH E. BOONE BOULEVARD
ATLANTA, GEORGIA

ATC + CERM JV PROJECT NO.: 2013-1304-005
DATE:5/20/2015
FIGURE NO. 2 SHEET 7 OF 7

REFERENCE: CITY OF ATLANTA, DEPARTMENT OF WATERSHED MANAGEMENT, BUREAU OF ENGINEERING SHEETS 1-7, TITLED "JOSEPH E. BOONE BLVD EXISTING CONDITIONS", DATED JANUARY 2014.

Table 1
Summary of Laboratory Test Results
for
Boone Boulevard Green Project
Atlanta, GA
CERM Project No. 2013-1304-005

Boring No.	Sample Depth (ft)	Natural Moisture (%)	Atterberg Limits		% Passing No. 200 Sieve
			Liquid Limit (%)	Plasticity Index (%)	
B-1	4.5-6	19.4	NP	NP	38.2
B-2	3-4.5	21.2			
B-3	4.5-6	11.2			
B-4	1.5-3	18.3	NP	NP	51.2
B-5	1.5-3	6.6			
B-6	4.5-6	21.9	NP	NP	40.6
B-7	4.5-6	18.8	54	28	56.5
B-8	3-4.5	13.9			
B-10	1.5-3	22.4	38	9	47.9
B-11	1.5-3	26.1			35.1
B-13	4.5-6	25.8			37.3
B-14	3-4.5	19.9			
B-15	1.5-3	18.0			
B-15	4.5-6	21.3			56.6
B-20	4.5-6	20.0	66	29	71.3
B-21	3-4.5	22.5	43	19	41.2
B-22	3-4.5	15.5			34.2
B-23	3-4.5	23.1			
B-24	3-4.5	31.1			60.7
B-25	3.4.5	28.8	57	21	61.3
B-27	4.5-6	26.0			31.7

1-NP = Non Plastic

SOIL TEST BORING PROCEDURES (ASTM D 1586 and 1587)

The soil test borings were advanced by twisting continuous auger flights into the ground. At selected intervals, soil samples were obtained by driving a standard 1.4 inch I.D., 2.0 inch O.D., split tube sampler into the ground. The sampler was initially seated six inches to penetrate any loose cuttings created in the boring process. The sampler is then driven an additional 12 inches by blows of a 140-pound "hammer" falling 30 inches. The number of blows required to drive the sampler the final foot is designated the Standard Penetration Resistance.

Relatively undisturbed samples were secured using a three-inch diameter, thin-wall steel tube sampler. In this sampling procedure, the borehole is advanced to the desired level, and the tube is lowered to the bottom of the boring. It is then pushed about two feet into the undisturbed soil in one continuous stroke. The sample and tube is retrieved from the borehole and detached from the drill string.

The samples recovered were sealed against moisture loss and were transported to the office where they were classified by an engineer in general accordance with the Unified Soil Classification System (USCS).

CORRELATION OF STANDARD PENETRATION RESISTANCE WITH RELATIVE COMPACTNESS AND CONSISTENCY

Sand and Gravel

Standard Penetration Resistance Blows / Foot	Relative Compactness
0 - 4	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
30 - 50	Dense
Over 50	Very Dense

Silt and Clay

Standard Penetration Resistance Blows / Foot	Relative Consistency
0 - 1	Very Soft
2 - 4	Soft
5 - 8	Firm
9 - 15	Stiff
16 - 30	Very Stiff
31 - 50	Hard
Over 50	Very Hard

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		(LITTLE OR NO FINES)		GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
		(APPRECIABLE AMOUNT OF FINES)		GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	SAND AND SANDY SOILS	CLEAN SANDS		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		(LITTLE OR NO FINES)		SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	SANDS WITH FINES		SM	SILTY SANDS, SAND - SILT MIXTURES
		(APPRECIABLE AMOUNT OF FINES)		SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
ALLUVIUM				PT	ALLUVIUM, PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS
FILL				FILL	MATERIAL PLACED BY MAN

C·E·R·M

LOG OF BORING B-1

Project: Boone Boulevard Green Project
Location: Atlanta, GA

CERM Project No.: 2013-1304-005

Date Completed : 5/1/15

Drilling Method : Hollow Stem Auger
Sampling Method : Split Spoon

Sample Legend:
- Split Spoon

Groundwater Level Legend:
- Stabilized Water Level
- Time of Boring Water Level
- Borehole Collapse

Depth in Feet	Surface Elev. 0	Water Level	GRAPHIC	DESCRIPTION	Sample	SPT N-Value (blows/ft)	Blow Count Graph (10 – 50)
0	0			ASPHALT (8 inches)			
				CONCRETE (25 inches)			
				RESIDUUM: Loose light gray silty fine SAND (SM), micaceous, rock fragements		9	
5	-5			Very loose tan silty fine SAND (SM)		3	
10	-10						
15	-15						
20	-20						
25	-25						
30	-30						
35	-35						
40							

Boring terminated @ 6 feet.
No groundwater encountered at time of boring.

C · E · R · M

LOG OF BORING B-2

Project: Boone Boulevard Green Project
Location: Atlanta, GA

CERM Project No.: 2013-1304-005

Date Completed : 5/1/15

Drilling Method : Hollow Stem Auger
Sampling Method : Split Spoon

Sample Legend:
- Split Spoon

Groundwater Level Legend:
- Stabilized Water Level
- Time of Boring Water Level
- Borehole Collapse

Depth in Feet	Surface Elev. 0	Water Level	GRAPHIC	DESCRIPTION	Sample	SPT N-Value (blows/ft)	Blow Count Graph (10 – 50)
0	0			ASPHALT (4 inches)			
				STONE BASE (6 inches)			
				RESIDUUM: Medium dense tan silty fine SAND (SM), micaceous		23	
				Stiff to Very stiff brown fine sandy SILT (ML), micaceous		14	
5	-5					19	

Boring terminated @ 6 feet.
No groundwater encountered at time of boring.

0, 5, 10, 15, 20, 25, 30, 35, 40

C·E·R·M

LOG OF BORING B-3

Project: Boone Boulevard Green Project
Location: Atlanta, GA

CERM Project No.: 2013-1304-005

Date Completed : 5/1/15

Drilling Method : Hollow Stem Auger
Sampling Method : Split Spoon

Sample Legend:
Split Spoon

Groundwater Level Legend:
Stabilized Water Level
Time of Boring Water Level
Borehole Collapse

Depth in Feet	Surface Elev. 0	Water Level	GRAPHIC	DESCRIPTION	Sample	SPT N-Value (blows/ft)	Blow Count Graph (10 – 50)
0	0			ASPHALT (4 inches)			
				STONE BASE (5 inches)			
				RESIDUUM: Very loose to medium dense light gray silty fine to medium SAND (SM)		14	
						5	
5	-5					4	

Boring terminated @ 6 feet.
No groundwater encountered at time of boring.

10 -10
15 -15
20 -20
25 -25
30 -30
35 -35
40

C · E · R · M

LOG OF BORING B-4

Project: Boone Boulevard Green Project
Location: Atlanta, GA

CERM Project No.: 2013-1304-005

Date Completed : 5/1/15

Drilling Method : Hollow Stem Auger
Sampling Method : Split Spoon

Sample Legend:
- Split Spoon

Groundwater Level Legend:
- Stabilized Water Level
- Time of Boring Water Level
- Borehole Collapse

Depth in Feet	Surface Elev. 0	Water Level	GRAPHIC	DESCRIPTION	Sample	SPT N-Value (blows/ft)	Blow Count Graph (10 – 50)
0	0			ASPHALT (6 inches)			
				STONE BASE (4 inches)			
				FILL: Stiff red brown clayey SILT (ML), micaceous		9	
				RESIDUUM: Stiff tan fine sandy SILT (ML), micaceous		11	
5	-5					9	
10	-10						
15	-15						
20	-20						
25	-25						
30	-30						
35	-35						
40							

Boring terminated @ 6 feet.
No groundwater encountered at time of boring.

C·E·R·M

LOG OF BORING B-5

Project: Boone Boulevard Green Project
Location: Atlanta, GA

CERM Project No.: 2013-1304-005

Date Completed : 5/1/15

Drilling Method : Hollow Stem Auger
Sampling Method : Split Spoon

Sample Legend:
- Split Spoon

Groundwater Level Legend:
- Stabilized Water Level
- Time of Boring Water Level
- Borehole Collapse

Depth in Feet	Surface Elev. 0	Water Level	GRAPHIC	DESCRIPTION	Sample	SPT N-Value (blows/ft)	Blow Count Graph (10 – 50)
0	0			ASPHALT (4 inches)			
				STONE BASE (2 inches)			
				RESIDUUM: Medium dense tan silty fine to coarse SAND (SM), micaceous, rock fragemnets		16 28	
5	-5			PARTIALLY WEATHERED ROCK: Very dense tan silty fine to coarse SAND (SM), micaceous		100(50/1")	
10	-10						
15	-15						
20	-20						
25	-25						
30	-30						
35	-35						
40							

Boring terminated @ 6 feet.
No groundwater encountered at time of boring.

C · E · R · M

LOG OF BORING B-6

Project: Boone Boulevard Green Project
Location: Atlanta, GA

CERM Project No.: 2013-1304-005

Date Completed : 5/1/15

Drilling Method : Hollow Stem Auger
Sampling Method : Split Spoon

Sample Legend:
- Split Spoon

Groundwater Level Legend:
- Stabilized Water Level
- Time of Boring Water Level
- Borehole Collapse

Depth in Feet	Surface Elev. 0	Water Level	GRAPHIC	DESCRIPTION	Sample	SPT N-Value (blows/ft)	Blow Count Graph (10 – 50)
0	0			ASPHALT (6 inches)			
				STONE BASE (3 inches)			
				RESIDUUM: Very loose to loose tan silty fine SAND (SM), micaceous		8	
						4	
5	-5					2	

Boring terminated @ 6 feet.
No groundwater encountered at time of boring.

10 -10
15 -15
20 -20
25 -25
30 -30
35 -35
40

C·E·R·M

LOG OF BORING B-7

Project: Boone Boulevard Green Project
Location: Atlanta, GA

CERM Project No.: 2013-1304-005

Date Completed : 5/1/15

Drilling Method : Hollow Stem Auger
Sampling Method : Split Spoon

Sample Legend:
Split Spoon

Groundwater Level Legend:
Stabilized Water Level
Time of Boring Water Level
Borehole Collapse

Depth in Feet	Surface Elev. 0	Water Level	GRAPHIC	DESCRIPTION	Sample	SPT N-Value (blows/ft)	Blow Count Graph (10 – 50)
0	0			ASPHALT (7 inches)			
				STONE BASE (3 inches)			
				POSSIBLE FILL: Medium dense red brown silty fine SAND (SM)		18	
				RESIDUUM: Medium dense red brown silty fine SAND (SM)		11	
5	-5			Firm red brown fine sandy CLAY (CH)		8	
10	-10						
15	-15						
20	-20						
25	-25						
30	-30						
35	-35						
40							

Boring terminated @ 6 feet.
No groundwater encountered at time of boring.

C·E·R·M

LOG OF BORING B-8

Project: Boone Boulevard Green Project
Location: Atlanta, GA

CERM Project No.: 2013-1304-005

Date Completed : 4/30/15

Drilling Method : Hollow Stem Auger
Sampling Method : Split Spoon

Sample Legend:
Split Spoon

Groundwater Level Legend:
Stabilized Water Level
Time of Boring Water Level
Borehole Collapse

Depth in Feet	Surface Elev. 0	Water Level	GRAPHIC	DESCRIPTION	Sample	SPT N-Value (blows/ft)	Blow Count Graph (10 – 50)
0	0			ASPHALT (7 inches)			
				STONE BASE (8 inches)			
				RESIDUUM: Very loose tan silty fine SAND (SM), micaceous		6	
						4	
5	-5					4	
10	-10						
15	-15						
20	-20						
25	-25						
30	-30						
35	-35						
40							

Boring terminated @ 6 feet.
No groundwater encountered at time of boring.

C · E · R · M

LOG OF BORING B-9

Project: Boone Boulevard Green Project
Location: Atlanta, GA

CERM Project No.: 2013-1304-005

Date Completed : 5/1/15

Drilling Method : Hollow Stem Auger
Sampling Method : Split Spoon

Sample Legend:
- Split Spoon

Groundwater Level Legend:
- Stabilized Water Level
- Time of Boring Water Level
- Borehole Collapse

Depth in Feet	Surface Elev. 0	Water Level	GRAPHIC	DESCRIPTION	Sample	SPT N-Value (blows/ft)	Blow Count Graph (10 – 50)
0	0			ASPHALT (9 inches)			
				CONCRETE (18 inches)			
				RESIDUUM: Loose tan silty fine SAND (SM), micaceous No recovery at 2 to 3.5 feet	☒	6	
5	-5						
10	-10						
15	-15						
20	-20						
25	-25						
30	-30						
35	-35						
40							

Boring terminated @ 6 feet.
No groundwater encountered at time of boring.

C · E · R · M

LOG OF BORING B-10

Project: Boone Boulevard Green Project
Location: Atlanta, GA

CERM Project No.: 2013-1304-005

Date Completed : 4/30/15

Drilling Method : Hollow Stem Auger
Sampling Method : Split Spoon

Sample Legend:
- Split Spoon

Groundwater Level Legend:
- Stabilized Water Level
- Time of Boring Water Level
- Borehole Collapse

Depth in Feet	Surface Elev. 0	Water Level	GRAPHIC	DESCRIPTION	Sample	SPT N-Value (blows/ft)	Blow Count Graph (10 – 50)
0	0			ASPHALT (7 inches)			
				STONE BASE (6 inches)			
				WOOD AND CONCRETE (5 inches)	X	7	
				FILL: Firm red brown clayey SILT (ML),micaceous	X	7	
				RESIDUUM: Loose tan silty fine SAND (SM), micaceous			
5	-5			Medium dense tan silty fine SAND (SM), micaceous, rock fragements	X	12	

Boring terminated @ 6 feet.
No groundwater encountered at time of boring.

10 -10
15 -15
20 -20
25 -25
30 -30
35 -35
40

C · E · R · M

LOG OF BORING B-11

Project: Boone Boulevard Green Project
Location: Atlanta, GA

CERM Project No.: 2013-1304-005

Date Completed : 5/1/15

Drilling Method : Hollow Stem Auger
Sampling Method : Split Spoon

Sample Legend:
- Split Spoon

Groundwater Level Legend:
- Stabilized Water Level
- Time of Boring Water Level
- Borehole Collapse

Depth in Feet	Surface Elev. 0	Water Level	GRAPHIC	DESCRIPTION	Sample	SPT N-Value (blows/ft)	Blow Count Graph (10 – 50)
0	0			ASPHALT (10 inches)			
				STONE BASE (7 inches)			
				WOOD AND CONCRETE (4 inches)			
				RESIDUUM: Very loose to loose red brown silty fine SAND (SM), micaceous		7	
						5	
5	-5					4	

Boring terminated @ 6 feet.
No groundwater encountered at time of boring.

10 -10
15 -15
20 -20
25 -25
30 -30
35 -35
40

C · E · R · M

LOG OF BORING B-12

Project: Boone Boulevard Green Project
Location: Atlanta, GA

CERM Project No.: 2013-1304-005

Date Completed : 5/1/15

Drilling Method : Hollow Stem Auger
Sampling Method : Split Spoon

Sample Legend:
- Split Spoon

Groundwater Level Legend:
- Stabilized Water Level
- Time of Boring Water Level
- Borehole Collapse

Depth in Feet	Surface Elev. 0	Water Level	GRAPHIC	DESCRIPTION	Sample	SPT N-Value (blows/ft)	Blow Count Graph (10 – 50)
0	0			ASPHALT (7 inches)			
				STONE BASE (20 inches)			
				RESIDUUM: Very loose to loose tan silty fine SAND (SM), micaceous		4 6	
5	-5						
10	-10						
15	-15						
20	-20						
25	-25						
30	-30						
35	-35						
40							

Boring terminated @ 6 feet.
No groundwater encountered at time of boring.

C·E·R·M

LOG OF BORING B-13

Project: Boone Boulevard Green Project
Location: Atlanta, GA

CERM Project No.: 2013-1304-005

Date Completed : 5/1/15

Drilling Method : Hollow Stem Auger
Sampling Method : Split Spoon

Sample Legend:
- Split Spoon

Groundwater Level Legend:
- Stabilized Water Level
- Time of Boring Water Level
- Borehole Collapse

Depth in Feet	Surface Elev. 0	Water Level	GRAPHIC	DESCRIPTION	Sample	SPT N-Value (blows/ft)	Blow Count Graph (10 – 50)
0	0			ASPHALT (9 inches)			
				CONCRETE (8 inches)			
				RESIDUUM: Very loose to loose tan silty fine SAND (SM), micaceous		9	
						8	
5	-5					1	

Boring terminated @ 6 feet.
No groundwater encountered at time of boring.

10 -10
15 -15
20 -20
25 -25
30 -30
35 -35
40

C·E·R·M

LOG OF BORING B-14

Project: Boone Boulevard Green Project
Location: Atlanta, GA

CERM Project No.: 2013-1304-005

Date Completed : 4/30/15

Drilling Method : Hollow Stem Auger
Sampling Method : Split Spoon

Sample Legend:
- Split Spoon

Groundwater Level Legend:
- Stabilized Water Level
- Time of Boring Water Level
- Borehole Collapse

Depth in Feet	Surface Elev. 0	Water Level	GRAPHIC	DESCRIPTION	Sample	SPT N-Value (blows/ft)	Blow Count Graph (10 – 50)
0	0			ASPHALT (8.5 inches)			
				CONCRETE (5.5 inches)			
				WOOD AND CONCRETE (5 inches)			
				RESIDUUM: Medium dense tan silty fine SAND (SM), micaceous		11	
						12	
5	-5					15	

Boring terminated @ 6 feet.
No groundwater encountered at time of boring.

10 -10
15 -15
20 -20
25 -25
30 -30
35 -35
40

C·E·R·M

LOG OF BORING B-15

Project: Boone Boulevard Green Project
Location: Atlanta, GA

CERM Project No.: 2013-1304-005

Date Completed : 5/1/15

Drilling Method : Hollow Stem Auger
Sampling Method : Split Spoon

Sample Legend:
Split Spoon

Groundwater Level Legend:
Stabilized Water Level
Time of Boring Water Level
Borehole Collapse

Depth in Feet	Surface Elev. 0	Water Level	GRAPHIC	DESCRIPTION	Sample	SPT N-Value (blows/ft)	Blow Count Graph (10 – 50)
0	0			ASPHALT (8 inches)			
				CONCRETE (10 inches)			
				WOOD AND CONCERET MIX (3 inches)		6	
				RESIDUUM: Loose to medium dense tan silty fine SAND (SM), micaceous		12	
5	-5			Firm red brown fine sandy SILT (ML), micaceous		8	

Boring terminated @ 6 feet.
No groundwater encountered at time of boring.

10 -10
15 -15
20 -20
25 -25
30 -30
35 -35
40

C·E·R·M

LOG OF BORING B-16

Project: Boone Boulevard Green Project
Location: Atlanta, GA

CERM Project No.: 2013-1304-005

Date Completed : 4/30/15

Drilling Method : Hollow Stem Auger
Sampling Method : Split Spoon

Sample Legend:
- Split Spoon

Groundwater Level Legend:
- Stabilized Water Level
- Time of Boring Water Level
- Borehole Collapse

Depth in Feet	Surface Elev. 0	Water Level	GRAPHIC	DESCRIPTION	Sample	SPT N-Value (blows/ft)	Blow Count Graph (10 – 50)
0	0			ASPHALT (8.5 inches)			
				CONCERETE (15.5 inches)			
				RESIDUUM: Loose tan silty fine SAND (SM), micaceous		10	
						9	
5	-5						
10	-10						
15	-15						
20	-20						
25	-25						
30	-30						
35	-35						
40							

Boring terminated @ 6 feet.
No groundwater encountered at time of boring.

C·E·R·M

LOG OF BORING B-17

Project: Boone Boulevard Green Project
Location: Atlanta, GA

CERM Project No.: 2013-1304-005

Date Completed : 5/1/15

Drilling Method : Hollow Stem Auger
Sampling Method : Split Spoon

Sample Legend:
- Split Spoon

Groundwater Level Legend:
- Stabilized Water Level
- Time of Boring Water Level
- Borehole Collapse

Depth in Feet	Surface Elev. 0	Water Level	GRAPHIC	DESCRIPTION	Sample	SPT N-Value (blows/ft)	Blow Count Graph (10 – 50)
0	0			ASPHALT (8 inches)			
				STONE BASE (8 inches)			
				RESIDUUM: Medium dense tan silty fine SAND (SM), micaceous No recovery at 3 to 4.5 feet		12 11 23	
5	-5						
10	-10						
15	-15						
20	-20						
25	-25						
30	-30						
35	-35						
40							

Boring terminated @ 6 feet.
No groundwater encountered at time of boring.

C·E·R·M

LOG OF BORING B-18

Project: Boone Boulevard Green Project
Location: Atlanta, GA

CERM Project No.: 2013-1304-005

Date Completed : 4/30/15

Drilling Method : Hollow Stem Auger
Sampling Method : Split Spoon

Sample Legend:
- Split Spoon

Groundwater Level Legend:
- Stabilized Water Level
- Time of Boring Water Level
- Borehole Collapse

Depth in Feet	Surface Elev. 0	Water Level	GRAPHIC	DESCRIPTION	Sample	SPT N-Value (blows/ft)	Blow Count Graph (10 – 50)
0	0			ASPHALT (7 inches)			
				CONCRETE (10 inches)			
				RESIDUUM: Medium dense brown silty fine SAND (SM), micaceous		14	
						14	
5	-5			Loose tan silty fine SAND (SM), micaceous		8	
10	-10						
15	-15						
20	-20						
25	-25						
30	-30						
35	-35						
40							

Boring terminated @ 6 feet.
No groundwater encountered at time of boring.

C·E·R·M

LOG OF BORING B-19

Project: Boone Boulevard Green Project
Location: Atlanta, GA

CERM Project No.: 2013-1304-005

Date Completed : 5/1/15

Drilling Method : Hollow Stem Auger
Sampling Method : Split Spoon

Sample Legend:
- Split Spoon

Groundwater Level Legend:
- Stabilized Water Level
- Time of Boring Water Level
- Borehole Collapse

Depth in Feet	Surface Elev. 0	Water Level	GRAPHIC	DESCRIPTION	Sample	SPT N-Value (blows/ft)	Blow Count Graph (10 – 50)
0	0			ASPHALT (8.5 inches)			
				CONCRETE (10.5 inches)			
				RESIDUUM: Medium dense light gray silty fine SAND (SM), micaceous, rock fragements		20	
				Medium dense tan silty fine SAND (SM), micaceous		25	
5	-5						
10	-10						
15	-15						
20	-20						
25	-25						
30	-30						
35	-35						
40							

Boring terminated @ 6 feet.
No groundwater encountered at time of boring.

C·E·R·M

LOG OF BORING B-20

Project: Boone Boulevard Green Project
Location: Atlanta, GA

CERM Project No.: 2013-1304-005

Date Completed : 4/30/15

Drilling Method : Hollow Stem Auger
Sampling Method : Split Spoon

Sample Legend:
Split Spoon

Groundwater Level Legend:
Stabilized Water Level
Time of Boring Water Level
Borehole Collapse

Depth in Feet	Surface Elev. 0	Water Level	GRAPHIC	DESCRIPTION	Sample	SPT N-Value (blows/ft)	Blow Count Graph (10 – 50)
0	0			ASPHALT (10 inches)			
				CONCRETE (6 inches)			
				RESIDUUM: Loose to medium dense tan silty fine SAND (SM), rock fragements		10	
						12	
5	-5			Stiff red brown fine sandy SILT (MH), micaceous		14	
10	-10						
15	-15						
20	-20						
25	-25						
30	-30						
35	-35						
40							

Boring terminated @ 6 feet.
No groundwater encountered at time of boring.

C · E · R · M

LOG OF BORING B-21

Project: Boone Boulevard Green Project
Location: Atlanta, GA

CERM Project No.: 2013-1304-005

Date Completed : 5/1/15

Drilling Method : Hollow Stem Auger
Sampling Method : Split Spoon

Sample Legend:
- Split Spoon

Groundwater Level Legend:
- Stabilized Water Level
- Time of Boring Water Level
- Borehole Collapse

Depth in Feet	Surface Elev. 0	Water Level	GRAPHIC	DESCRIPTION	Sample	SPT N-Value (blows/ft)	Blow Count Graph (10 – 50)
0	0			ASPHALT (9.5 inches)			
				CONCRETE (11.5 inches)			
				RESIDUUM: Loose red brown silty fine SAND (SM), micaceous		5	
						7	
5	-5					7	

Boring terminated @ 6 feet.
No groundwater encountered at time of boring.

10 -10
15 -15
20 -20
25 -25
30 -30
35 -35
40

C · E · R · M

LOG OF BORING B-22

Project: Boone Boulevard Green Project
Location: Atlanta, GA

CERM Project No.: 2013-1304-005

Date Completed : 4/30/15

Drilling Method : Hollow Stem Auger
Sampling Method : Split Spoon

Sample Legend:
- Split Spoon

Groundwater Level Legend:
- Stabilized Water Level
- Time of Boring Water Level
- Borehole Collapse

Depth in Feet	Surface Elev. 0	Water Level	GRAPHIC	DESCRIPTION	Sample	SPT N-Value (blows/ft)	Blow Count Graph (10 – 50)
0	0			ASPHALT (8 inches)			
				CONCRETE (9 inches)			
				FILL: Firm dark gray fine sandy SILT (ML), micaceous		8	
				RESIDUUM: Loose red brown silty fine SAND (SM), micaceous		7	
5	-5					6	
10	-10						
15	-15						
20	-20						
25	-25						
30	-30						
35	-35						
40							

Boring terminated @ 6 feet.
No groundwater encountered at time of boring.

C·E·R·M

LOG OF BORING B-23

Project: Boone Boulevard Green Project
Location: Atlanta, GA

CERM Project No.: 2013-1304-005

Date Completed : 4/30/15

Drilling Method : Hollow Stem Auger
Sampling Method : Split Spoon

Sample Legend:
- Split Spoon

Groundwater Level Legend:
- Stabilized Water Level
- Time of Boring Water Level
- Borehole Collapse

Depth in Feet	Surface Elev. 0	Water Level	GRAPHIC	DESCRIPTION	Sample	SPT N-Value (blows/ft)	Blow Count Graph (10 – 50)
0	0			ASPHALT (8 inches)			
				CONCRETE (9 inches)			
				FILL: Loose tan silty fine SAND (SM), micaceous		8	
				RESIDUUM: Firm to stiff tan fine sandy SILT (ML), micaceous		8	
5	-5					9	

Boring terminated @ 6 feet.
No groundwater encountered at time of boring.

10 -10
15 -15
20 -20
25 -25
30 -30
35 -35
40

C · E · R · M

LOG OF BORING B-24

Project: Boone Boulevard Green Project
Location: Atlanta, GA

CERM Project No.: 2013-1304-005

Date Completed : 5/1/5

Drilling Method : Hollow Stem Auger
Sampling Method : Split Spoon

Sample Legend:
Split Spoon

Groundwater Level Legend:
Stabilized Water Level
Time of Boring Water Level
Borehole Collapse

Depth in Feet	Surface Elev. 0	Water Level	GRAPHIC	DESCRIPTION	Sample	SPT N-Value (blows/ft)	Blow Count Graph (10 – 50)
0	0			ASPHALT (8 inches)			
				CONCRETE (10 inches)			
				FILL: Loose light brown silty fine SAND (SM), micaceous, rock fragements		8	
				Firm to stiff tan fine sandy SILT (ML), micaceous		10	
5	-5					8	
10	-10						
15	-15						
20	-20						
25	-25						
30	-30						
35	-35						
40							

Boring terminated @ 6 feet.
No groundwater encountered at time of boring.

C·E·R·M

LOG OF BORING B-25

Project: Boone Boulevard Green Project
Location: Atlanta, GA

CERM Project No.: 2013-1304-005

Date Completed : 4/30/15

Drilling Method : Hollow Stem Auger
Sampling Method : Split Spoon

Sample Legend:
- Split Spoon

Groundwater Level Legend:
- Stabilized Water Level
- Time of Boring Water Level
- Borehole Collapse

Depth in Feet	Surface Elev. 0	Water Level	GRAPHIC	DESCRIPTION	Sample	SPT N-Value (blows/ft)	Blow Count Graph (10 – 50)
0	0			ASPHALT (10 inches)			
				CONCRETE (6 inches)			
				FILL: Loose red brown silty fine SAND (SM), rock fragements		7	
				Soft red brown clayey SILT (ML)		3	
5	-5			Soft dark brown fine sandy SILT (MH), rock fragements		3	
10	-10						
15	-15						
20	-20						
25	-25						
30	-30						
35	-35						
40							

Boring terminated @ 6 feet.
No groundwater encountered at time of boring.

C · E · R · M

LOG OF BORING B-26

Project: Boone Boulevard Green Project
Location: Atlanta, GA

CERM Project No.: 2013-1304-005

Date Completed : 4/30/15

Drilling Method : Hollow Stem Auger
Sampling Method : Split Spoon

Sample Legend:
- Split Spoon

Groundwater Level Legend:
- Stabilized Water Level
- Time of Boring Water Level
- Borehole Collapse

Depth in Feet	Surface Elev. 0	Water Level	GRAPHIC	DESCRIPTION	Sample	SPT N-Value (blows/ft)	Blow Count Graph (10 – 50)
0	0			ASPHALT (10 inches)			
				CONCRETE (7 inches)			
				FILL: Very stiff red brown fine sandy SILT (ML), wooden, micaceous		17	
				Soft red brown fine sandy SILT (ML), micaceous No recovery at 4.5 to 6 feet		4	
5	-5					4	

Boring terminated @ 6 feet.
No groundwater encountered at time of boring.

0, 5, 10, 15, 20, 25, 30, 35, 40

C · E · R · M

LOG OF BORING B-27

Project: Boone Boulevard Green Project
Location: Atlanta, GA

CERM Project No.: 2013-1304-005

Date Completed : 4/30/15

Drilling Method : Hollow Stem Auger
Sampling Method : Split Spoon

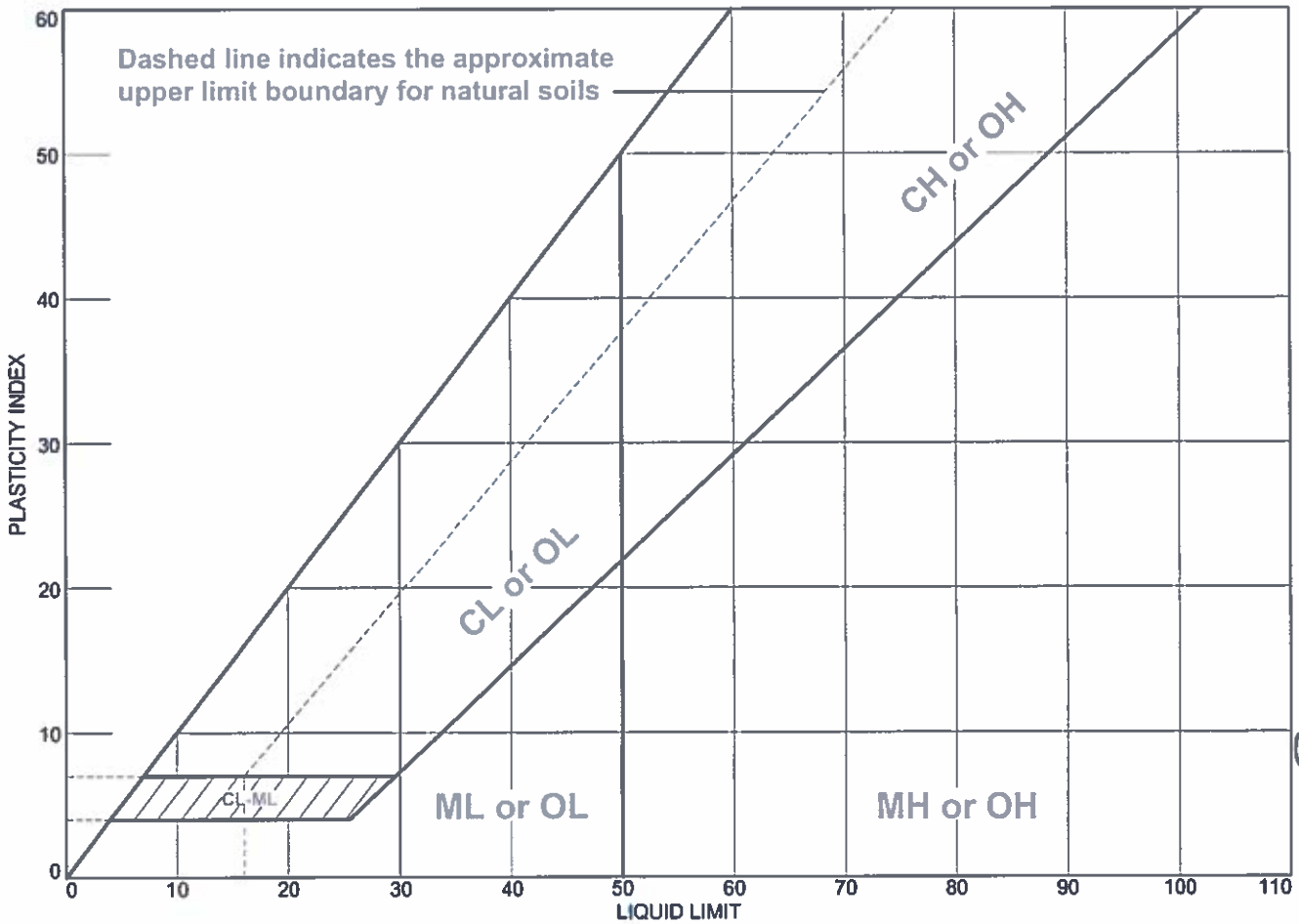
Sample Legend:
- Split Spoon

Groundwater Level Legend:
- Stabilized Water Level
- Time of Boring Water Level
- Borehole Collapse

Depth in Feet	Surface Elev. 0	Water Level	GRAPHIC	DESCRIPTION	Sample	SPT N-Value (blows/ft)	Blow Count Graph (10 – 50)
0	0			ASPHALT (10 inches)			
				CONCRETE (6 inches)			
				FILL: Stiff red brown fine sandy SILT (ML), micaceous, rock fragemnets		10	
				Very loose to loose red brown silty fine SAND (SM), micaceous		4	
5	-5					5	
10	-10						
15	-15						
20	-20						
25	-25						
30	-30						
35	-35						
40							

Boring terminated @ 6 feet.
No groundwater encountered at time of boring.

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brownish yellow micaceous silty SAND	NP	NP	NP	83.6	38.2	SM

Project No. Z066000077 **Client:** City of Atlanta

Project: Boone Blvd Green Project

●**Location:** B-1 @ 4.5-6' **Sample Number:** B-1

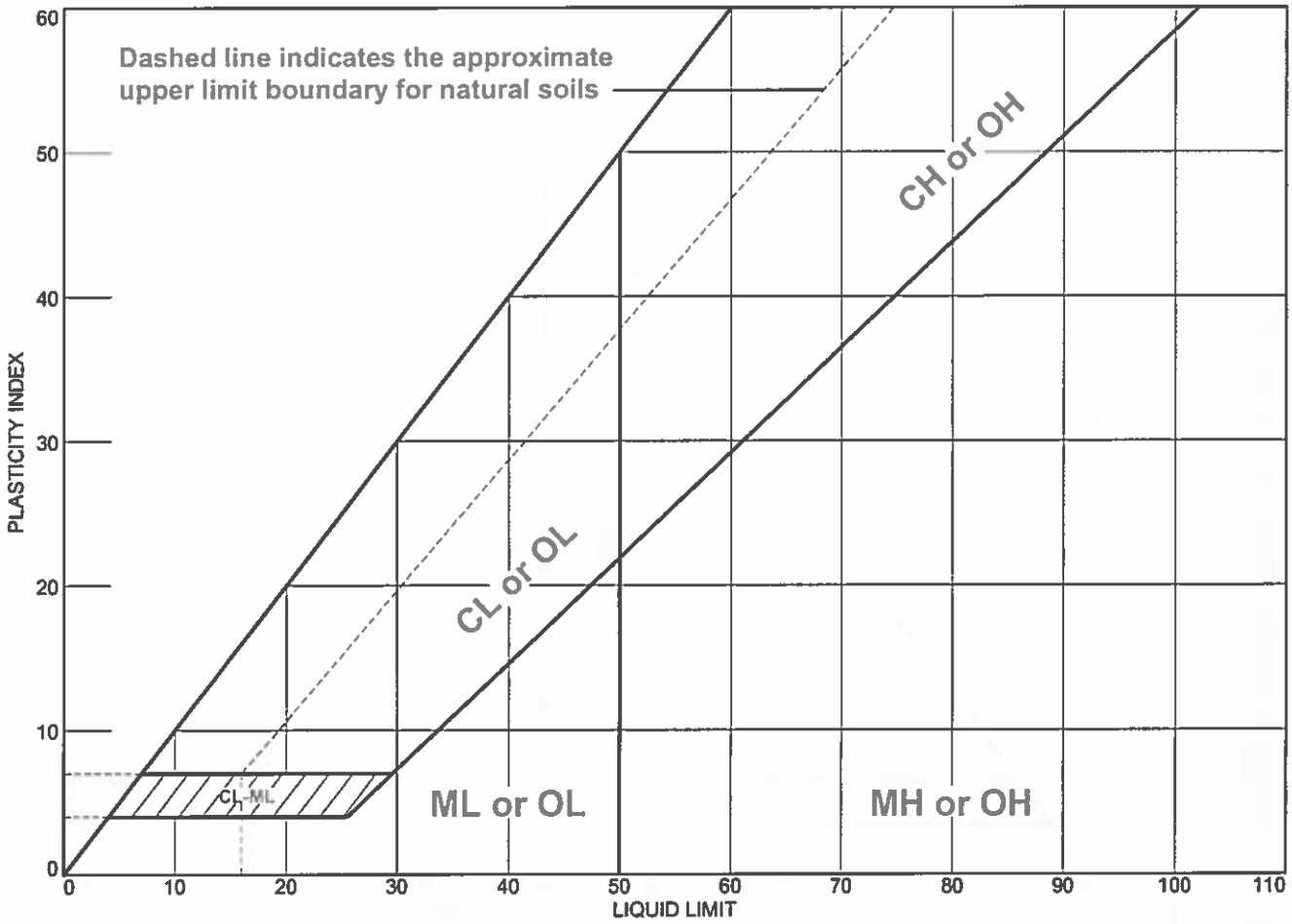
Remarks:

ATC ASSOCIATES INC.

Marietta, Georgia

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Yellow red micaceous sandy SILT	NP	NP	NP	88.1	51.2	ML

Project No. Z066000077 **Client:** City of Atlanta

Project: Boone Blvd Green Project

●**Location:** B-4 @ 1.5-3' **Sample Number:** B-4

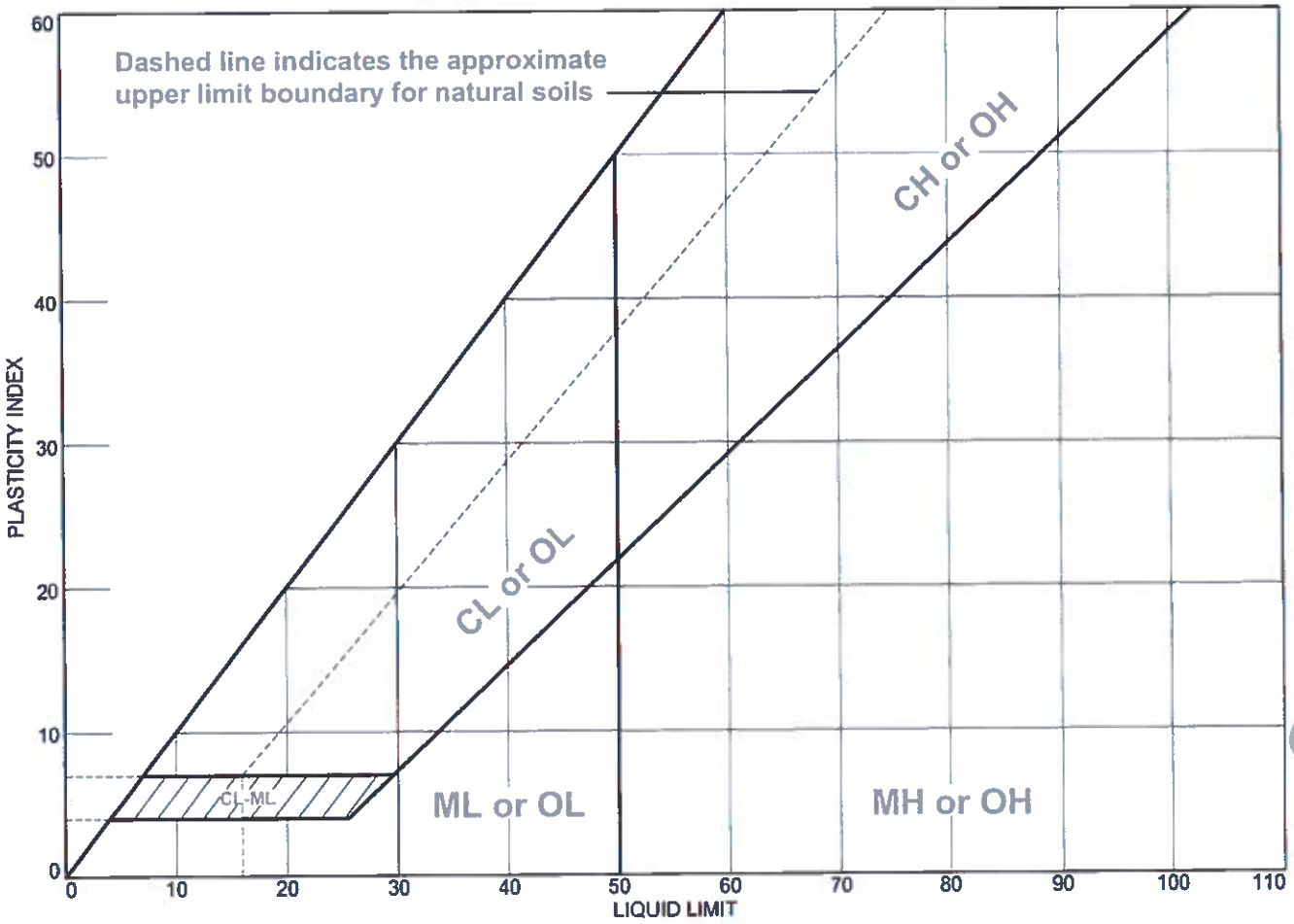
Remarks:

ATC ASSOCIATES INC.

Marietta, Georgia

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
Light brownish gray micaceous sitly SAND	NP	NP	NP	85.0	40.6	SM

Project No. Z066000077 **Client:** City of Atlanta

Project: Boone Blvd Green Project

Location: B-6 @ 4.5-6' **Sample Number:** B-6

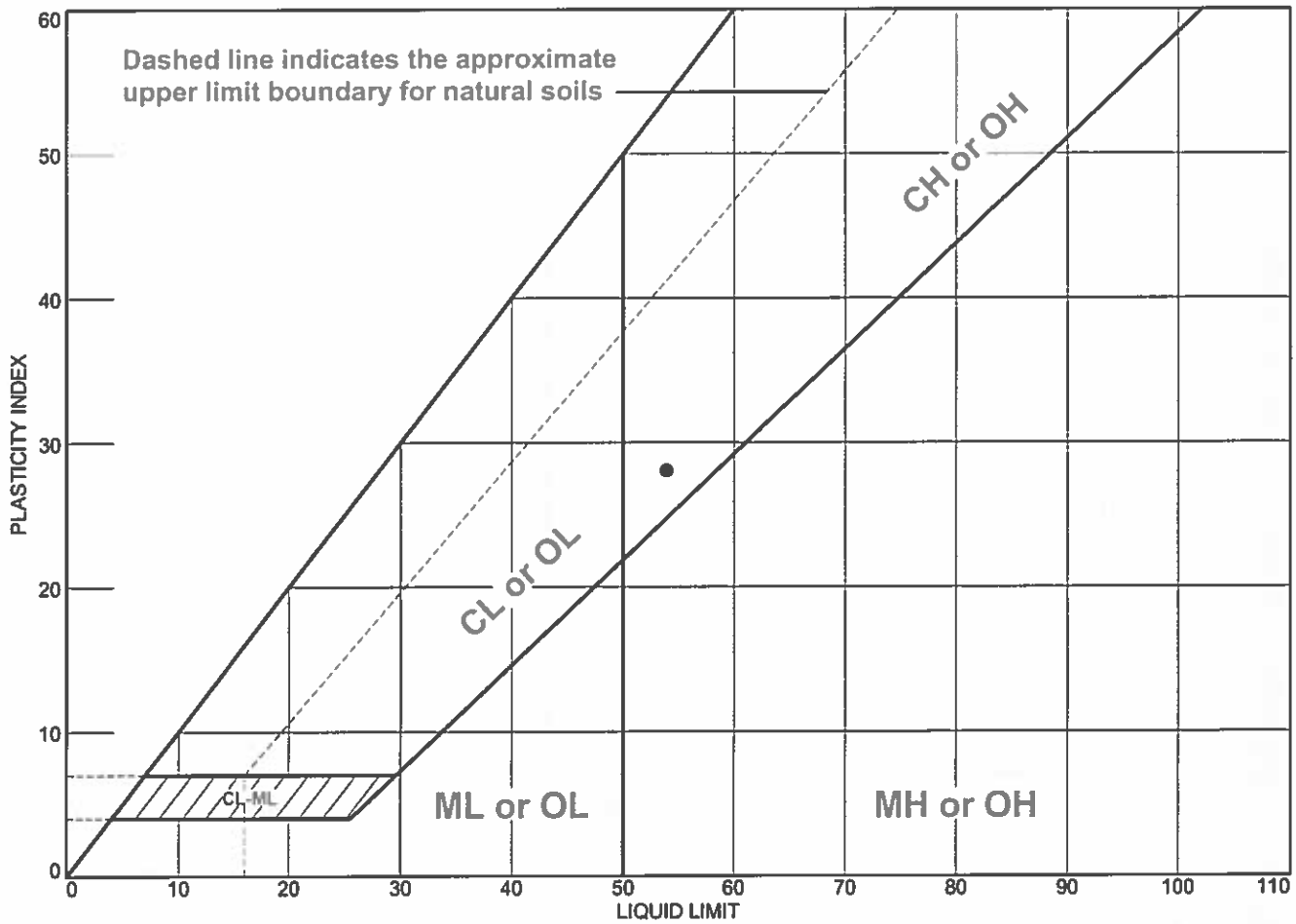
Remarks:

ATC ASSOCIATES INC.

Marietta, Georgia

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Yellowish red micaceous sandy fat CLAY	54	26	28	84.9	56.5	CH

Project No. Z066000077 **Client:** City of Atlanta

Project: Boone Blvd Green Project

●**Location:** B-7 @ 4.5-6' **Sample Number:** B-7

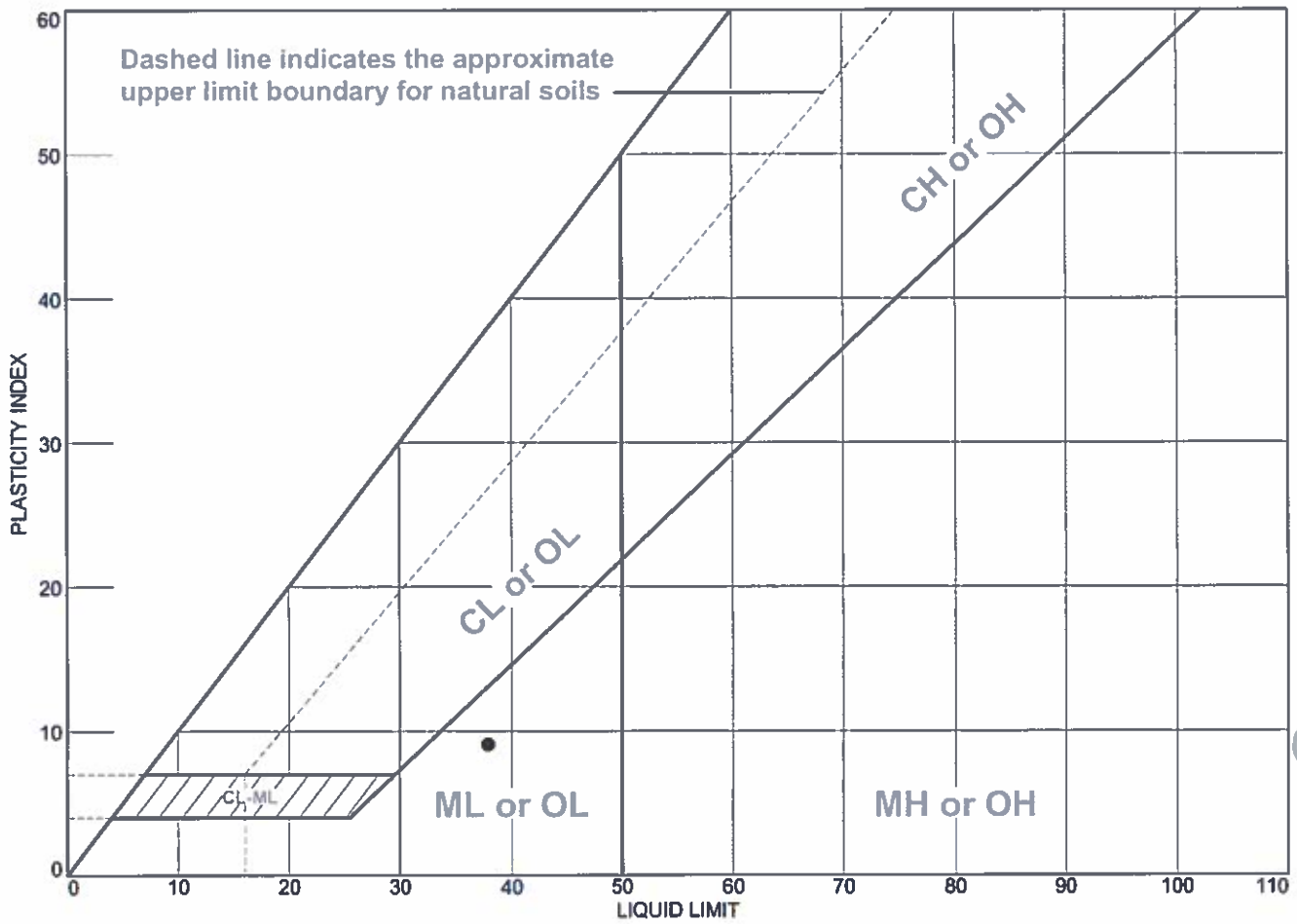
Remarks:

ATC ASSOCIATES INC.

Marietta, Georgia

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Red micaceous silty SAND	38	29	9	84.9	47.9	SM

Project No. Z066000077 **Client:** City of Atlanta

Project: Boone Blvd Green Project

●**Location:** B-10 @ 1.5-3' **Sample Number:** B-10

Remarks:

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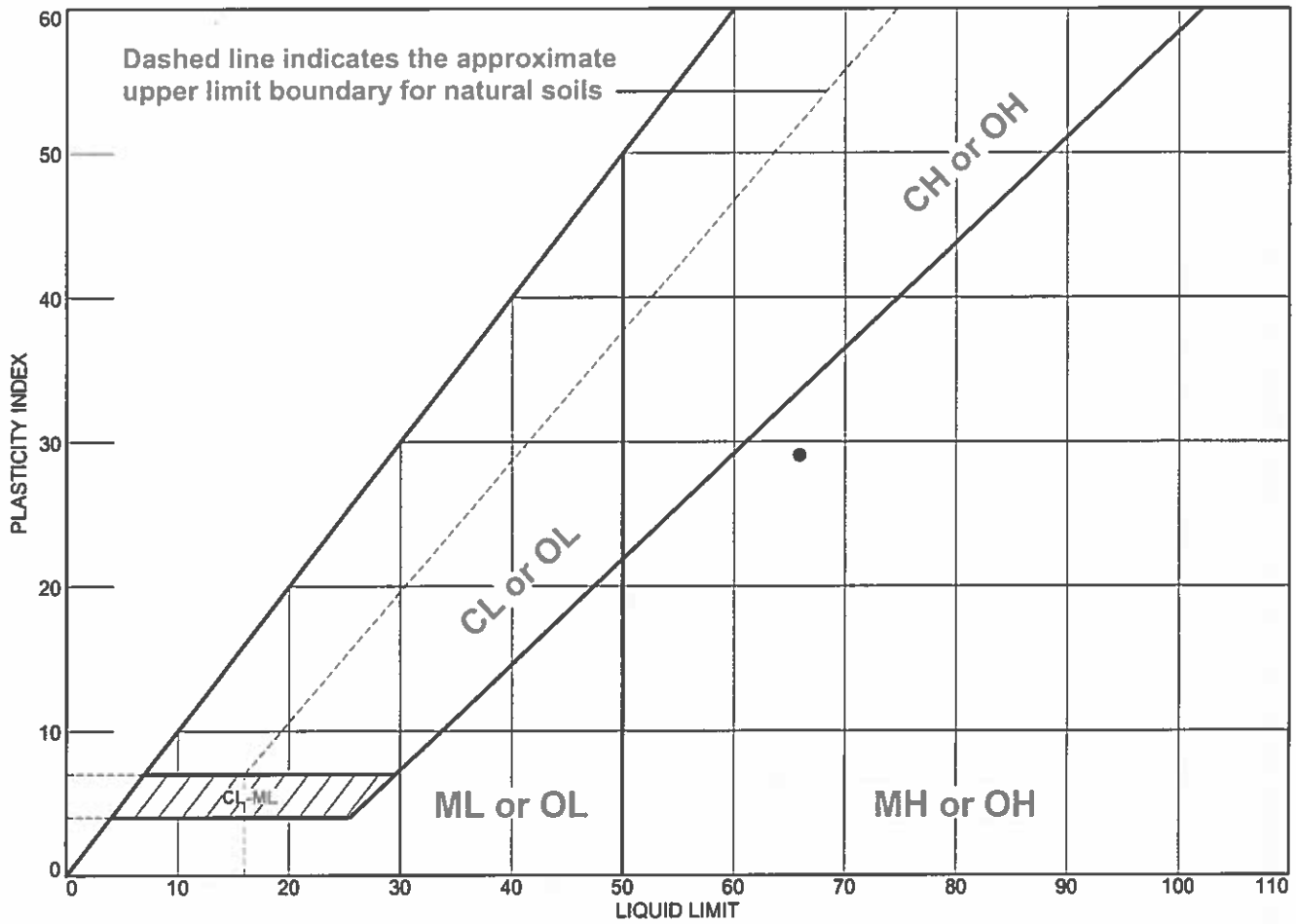
Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Red micaceous elastic SILT with sand	66	37	29	92.0	71.3	MH

Project No. Z066000077 **Client:** City of Atlanta

Project: Boone Blvd Green Project

●**Location:** B-20 @ 4.5-6' **Sample Number:** B-20

Remarks:

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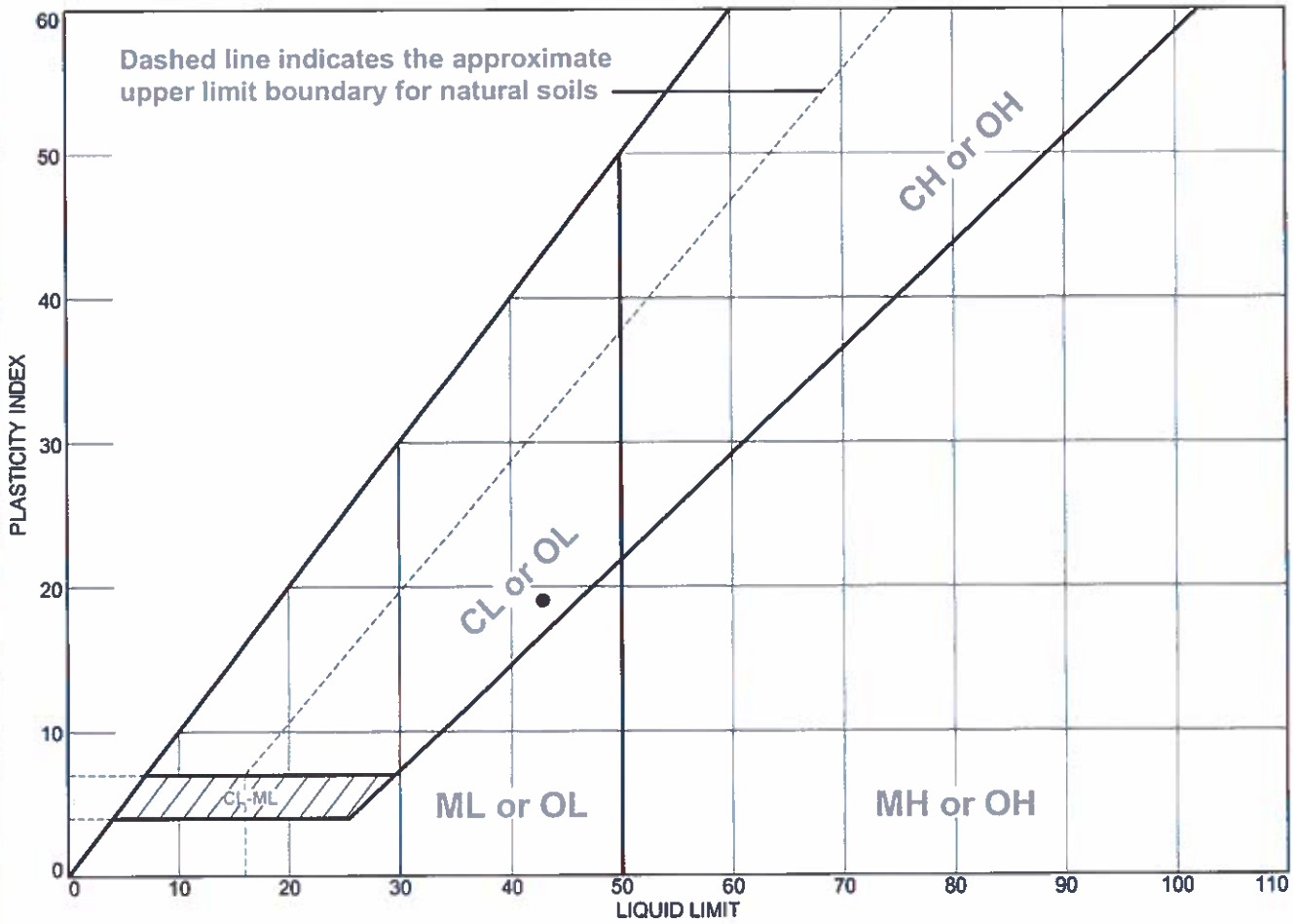
Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Red micaceous clayey SAND	43	24	19	78.0	41.2	SC

Project No. Z066000077 **Client:** City of Atlanta

Project: Boone Blvd Green Project

●**Location:** B-21 @ 3-4.5' **Sample Number:** B-21

Remarks:

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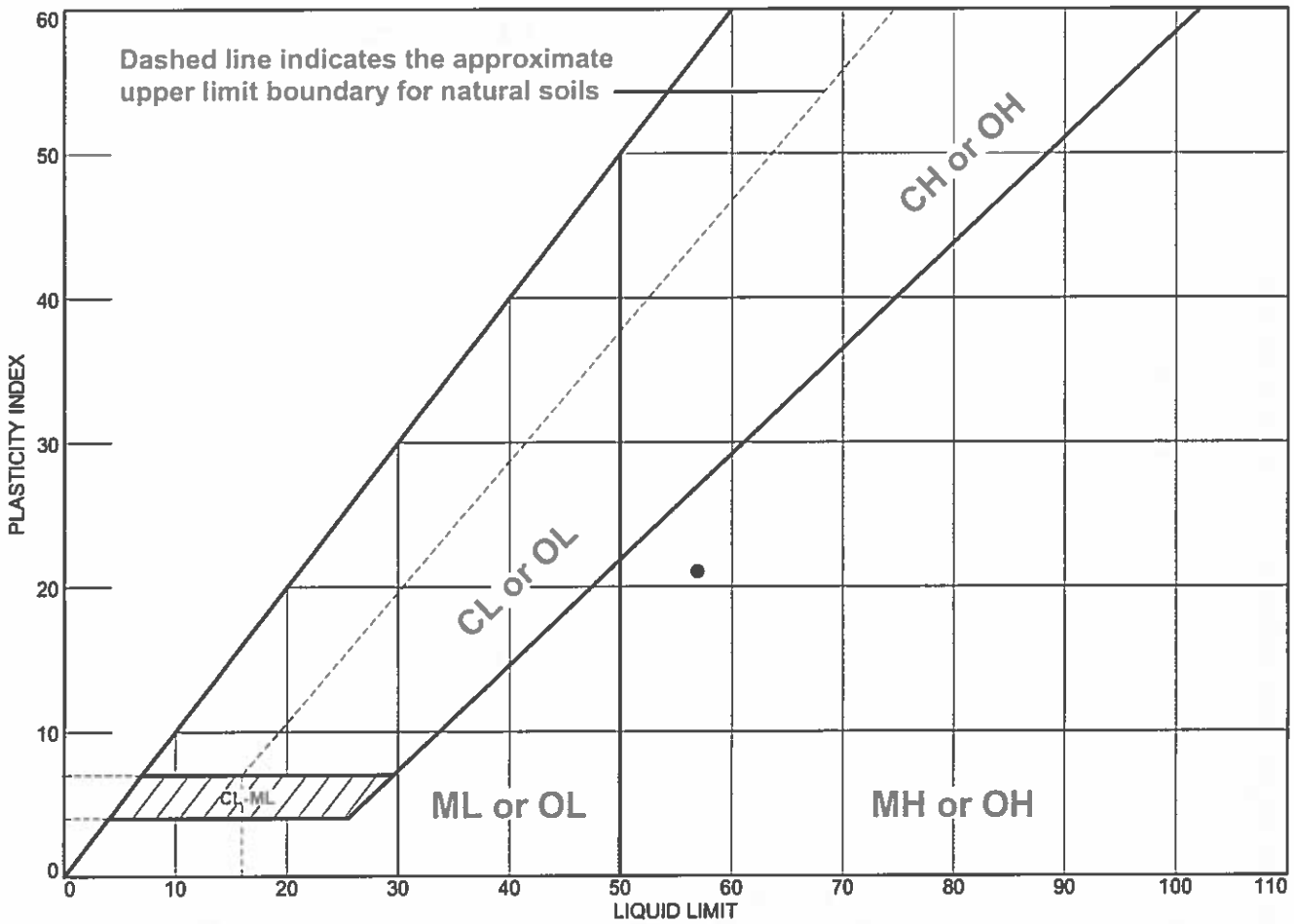
Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown micaceous sandy elastic SIIT	57	36	21	92.2	61.3	MH

Project No. Z066000077 **Client:** City of Atlanta

Project: Boone Blvd Green Project

●**Location:** B-25 @ 3-4.5' **Sample Number:** B-25

Remarks:

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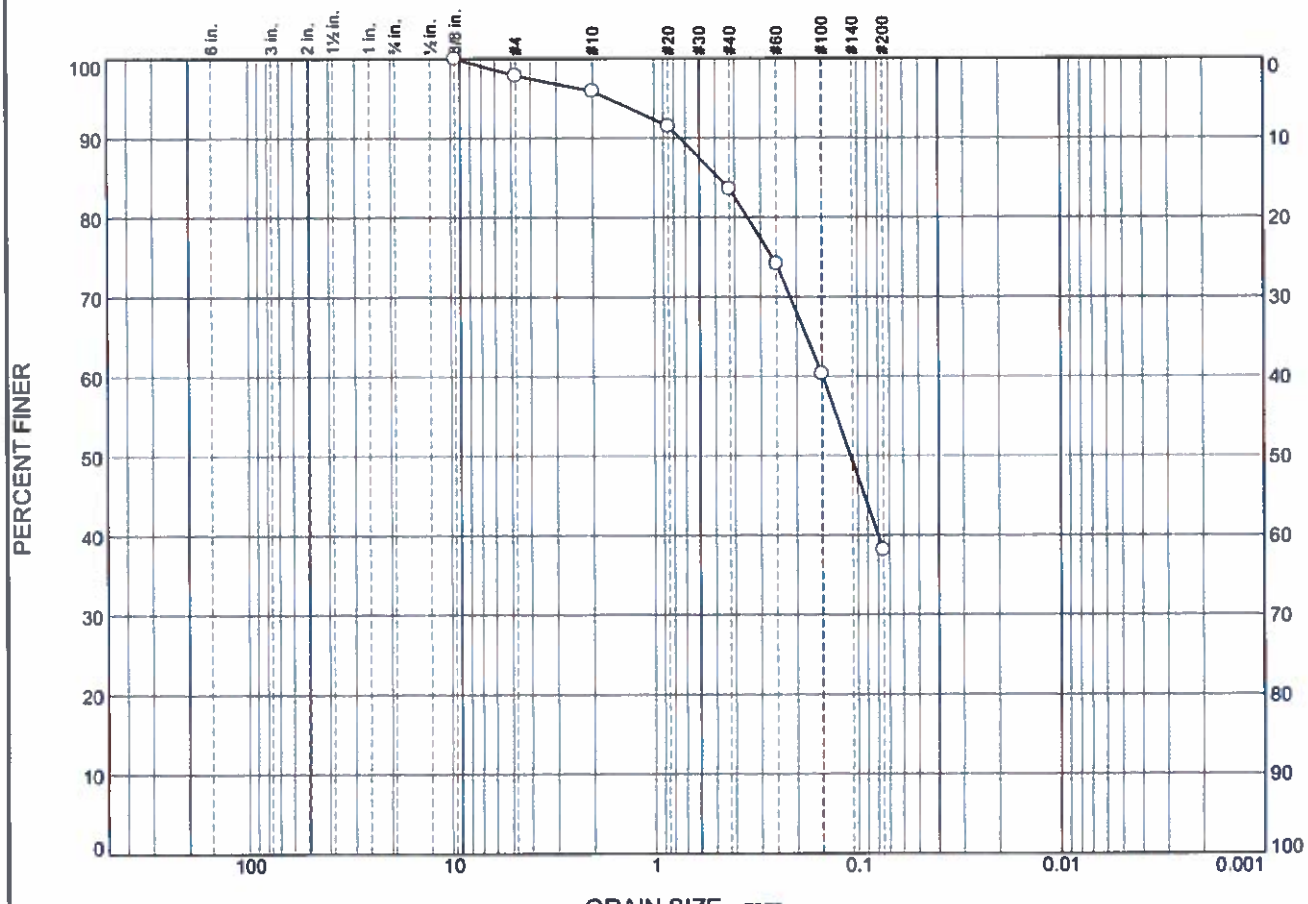
Figure

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	2.2	1.9	12.3	45.4	38.2	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	NP	NP	0.4809	0.1486	0.1086					

Material Description	USCS	AASHTO
○ Brownish yellow micaceous silty SAND	SM	A-4(0)

Project No. Z066000077 **Client:** City of Atlanta

Project: Boone Blvd Green Project

○ **Location:** B-1 @ 4.5-6' **Sample Number:** B-1

Remarks:

○MC: 19.4%

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Figure

Particle Size Distribution Report

	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.2	1.5	12.5	34.6	51.2	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	NV	NP	0.4002	0.1112						

Material Description	USCS	AASHTO
○ Yellow red micaceous sandy SILT	ML	A-4(0)

Project No. Z066000077 **Client:** City of Atlanta
Project: Boone Blvd Green Project

○ **Location:** B-4 @ 1.5-3' **Sample Number:** B-4

Remarks:
○MC: 18.3%

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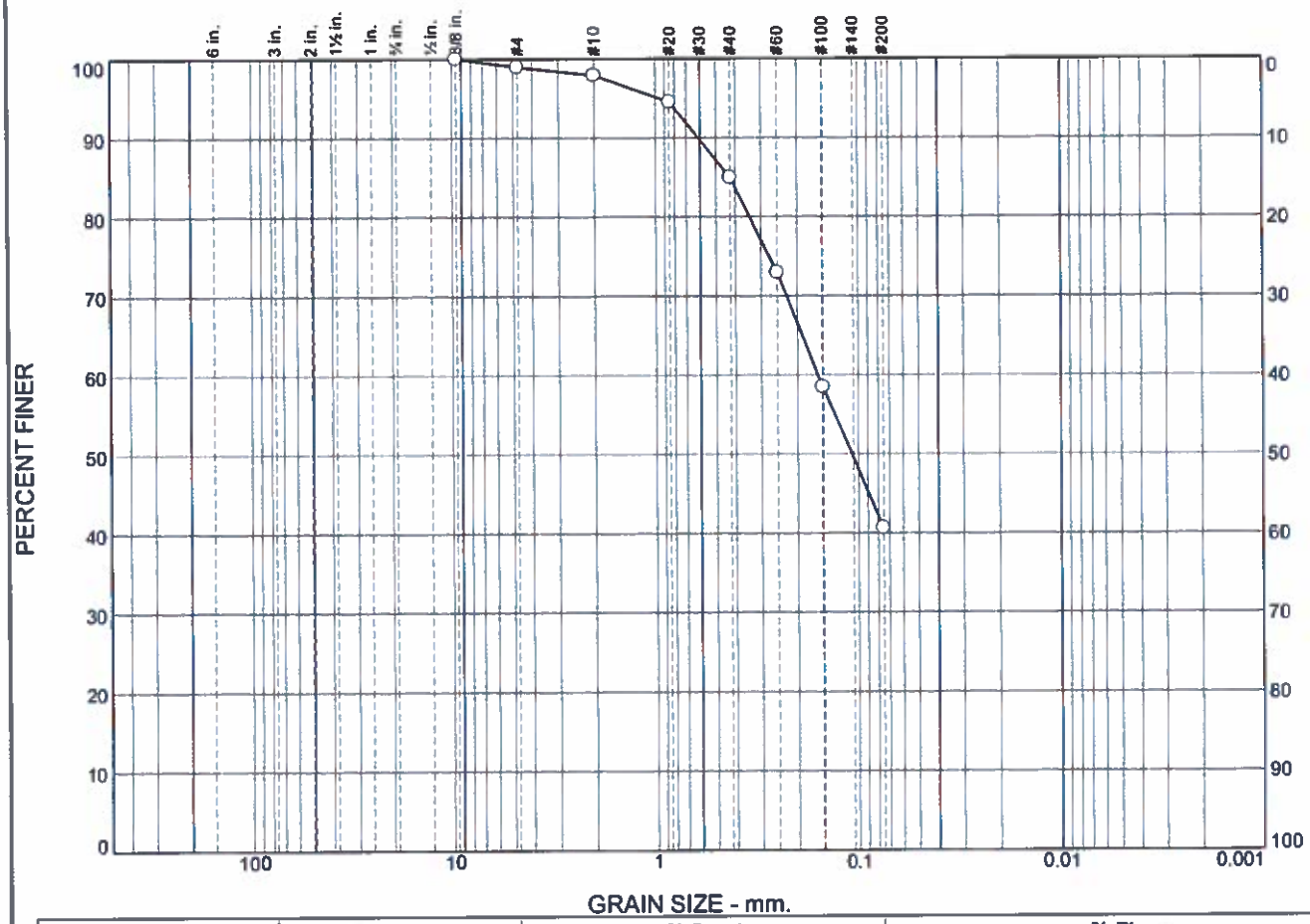
Figure

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	1.1	1.0	12.9	44.4	40.6	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	NP	NP	0.4257	0.1583	0.1079					

Material Description	USCS	AASHTO
○ Light brownish gray micaceous sitly SAND	SM	A-4(0)

Project No. Z066000077 **Client:** City of Atlanta

Project: Boone Blvd Green Project

○ **Location:** B-6 @ 4.5-6' **Sample Number:** B-6

Remarks:

○MC: 21.9%

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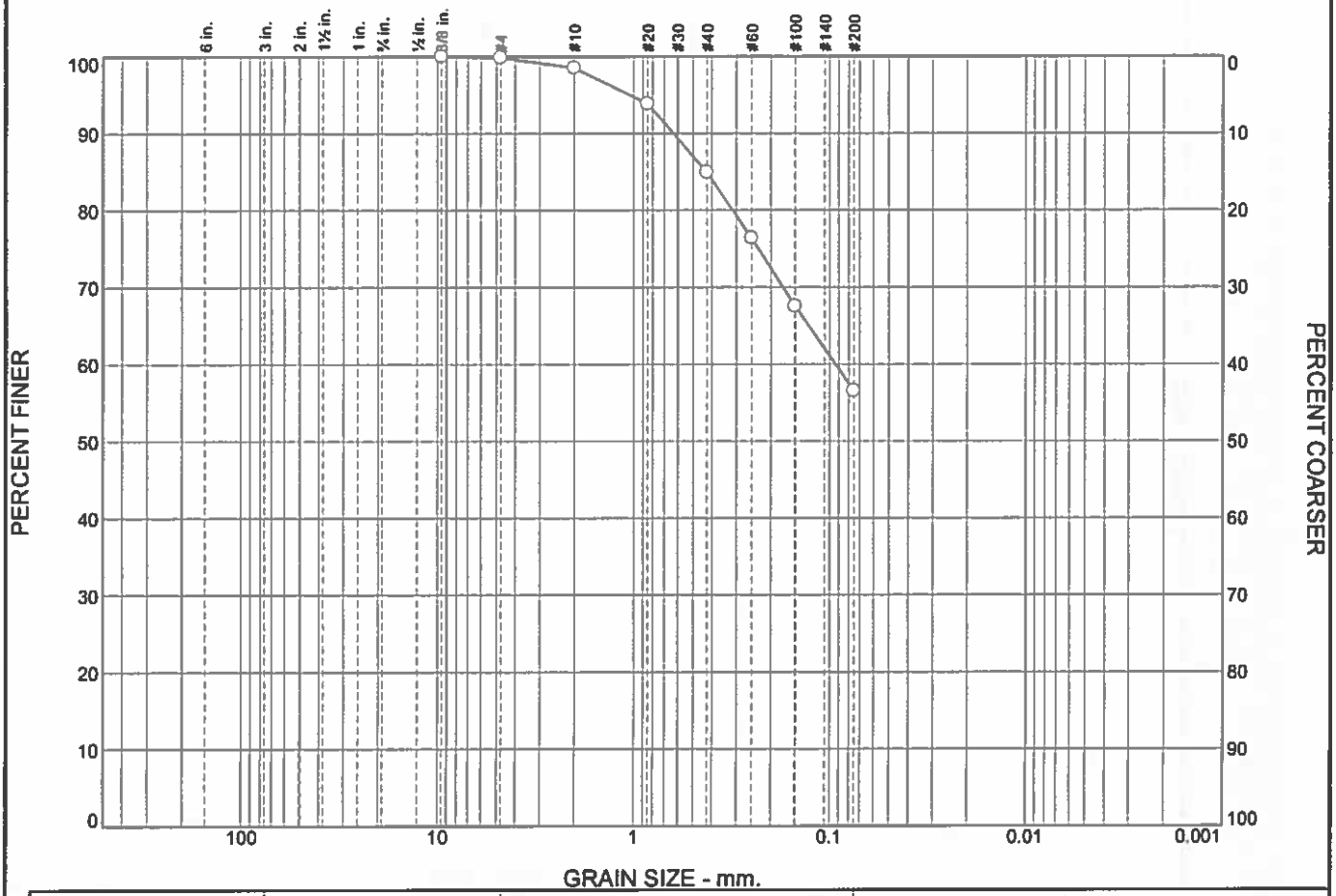
Figure

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.2	1.3	13.6	28.4	56.5	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	54	26	0.4272	0.0933						

Material Description	USCS	AASHTO
○ Yellowish red micaceous sandy fat CLAY	CH	A-7-6(13)

Project No. Z066000077 **Client:** City of Atlanta
Project: Boone Blvd Green Project

○ **Location:** B-7 @ 4.5-6' **Sample Number:** B-7

Remarks:
○MC: 18.8%

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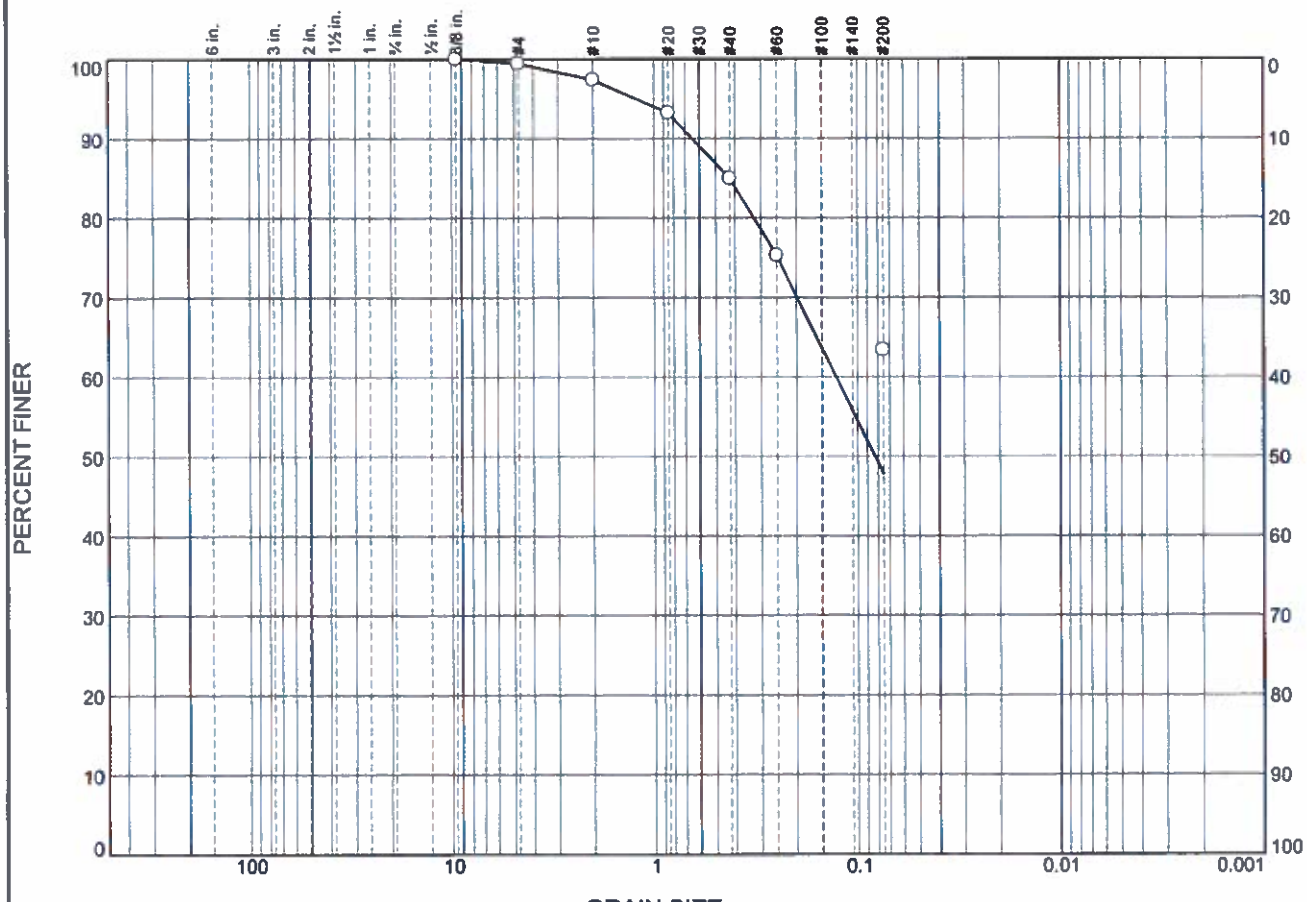
Figure

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.6	2.0	12.5	37.0	47.9	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	38	29	0.4268	0.1278	0.0824					

Material Description	USCS	AASHTO
○ Red micaceous silty SAND	SM	A-4(2)

Project No. Z066000077 **Client:** City of Atlanta
Project: Boone Blvd Green Project

○ **Location:** B-10 @ 1.5-3' **Sample Number:** B-10

Remarks:
○MC: 22.4%

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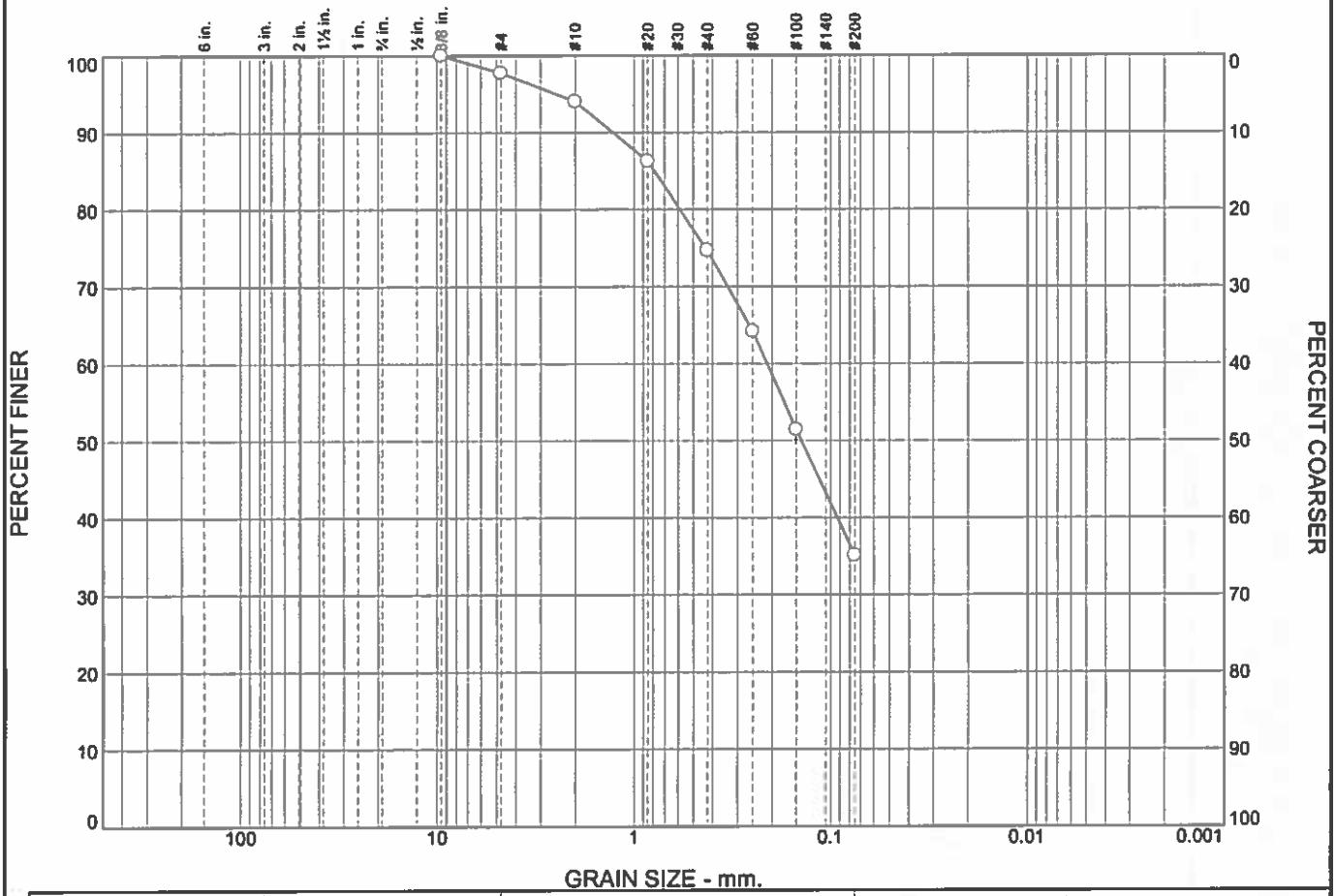
Figure

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	2.2	3.8	19.3	39.6	35.1	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.7878	0.2115	0.1411					

Material Description	USCS	AASHTO
○ Reddish brownmicaceous silty SAND		

Project No. Z066000077 **Client:** City of Atlanta

Project: Boone Blvd Green Project

○ **Location:** B-11 @ 1.5-3' **Sample Number:** B-11

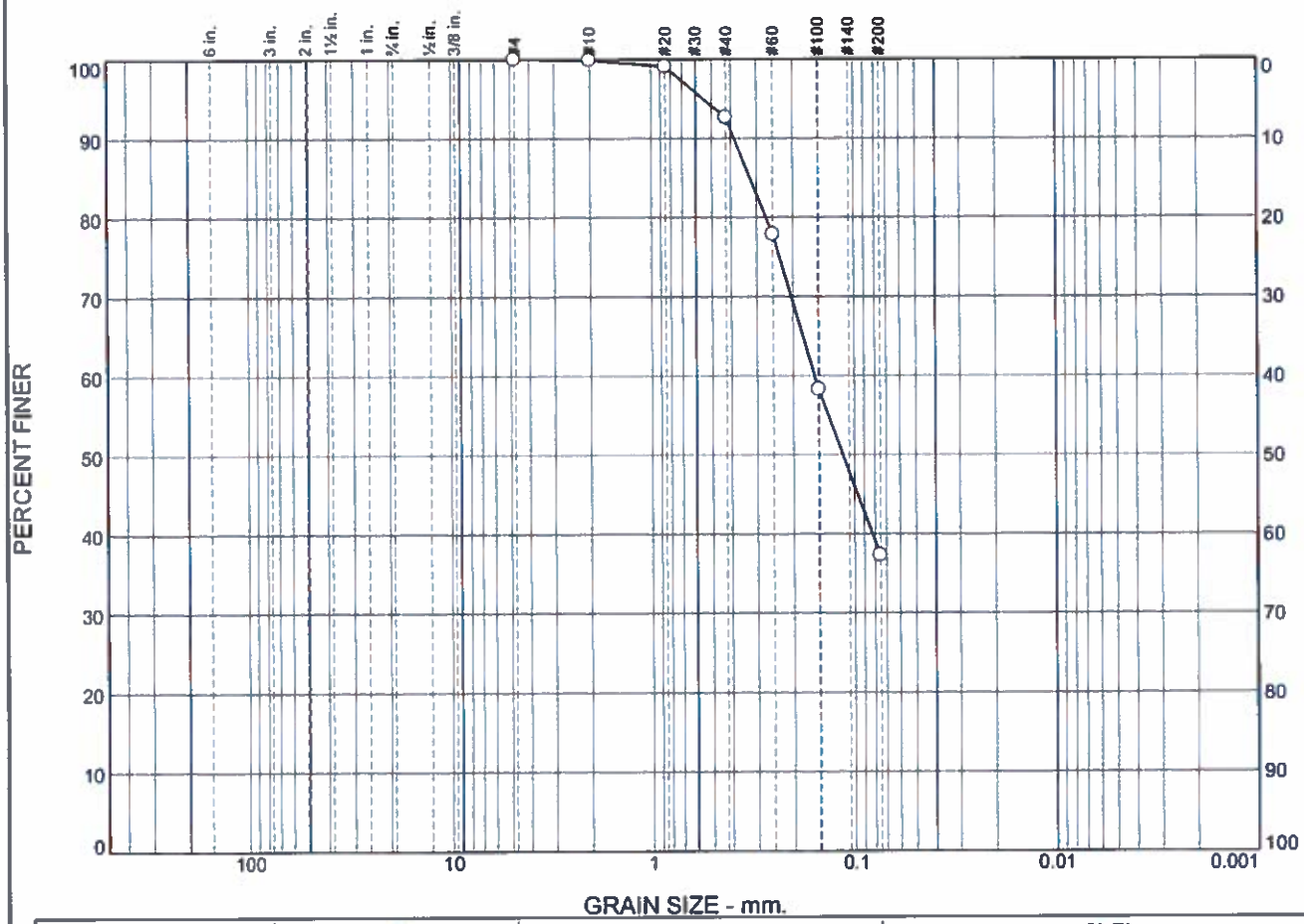
Remarks:

ATC ASSOCIATES INC.

Marietta, Georgia

Figure

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	0.1	7.3	55.3	37.3	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.3231	0.1571	0.1142					

Material Description	USCS	AASHTO
○ Very dark gray silty fine SAND		

Project No. Z066000077 **Client:** City of Atlanta
Project: Boone Blvd Green Project

○ **Location:** B-13 @ 4.5-6' **Sample Number:** B-13

Remarks:

ATC ASSOCIATES INC.

Marietta, Georgia

Figure

Particle Size Distribution Report

	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	1.3	7.8	34.3	56.6	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.2886	0.0874						

Material Description	USCS	AASHTO
○ Red micaceous sandy SILT		

Project No. Z066000077 **Client:** City of Atlanta
Project: Boone Blvd Green Project

○ **Location:** B-15 @ 4.5-6' **Sample Number:** B-15

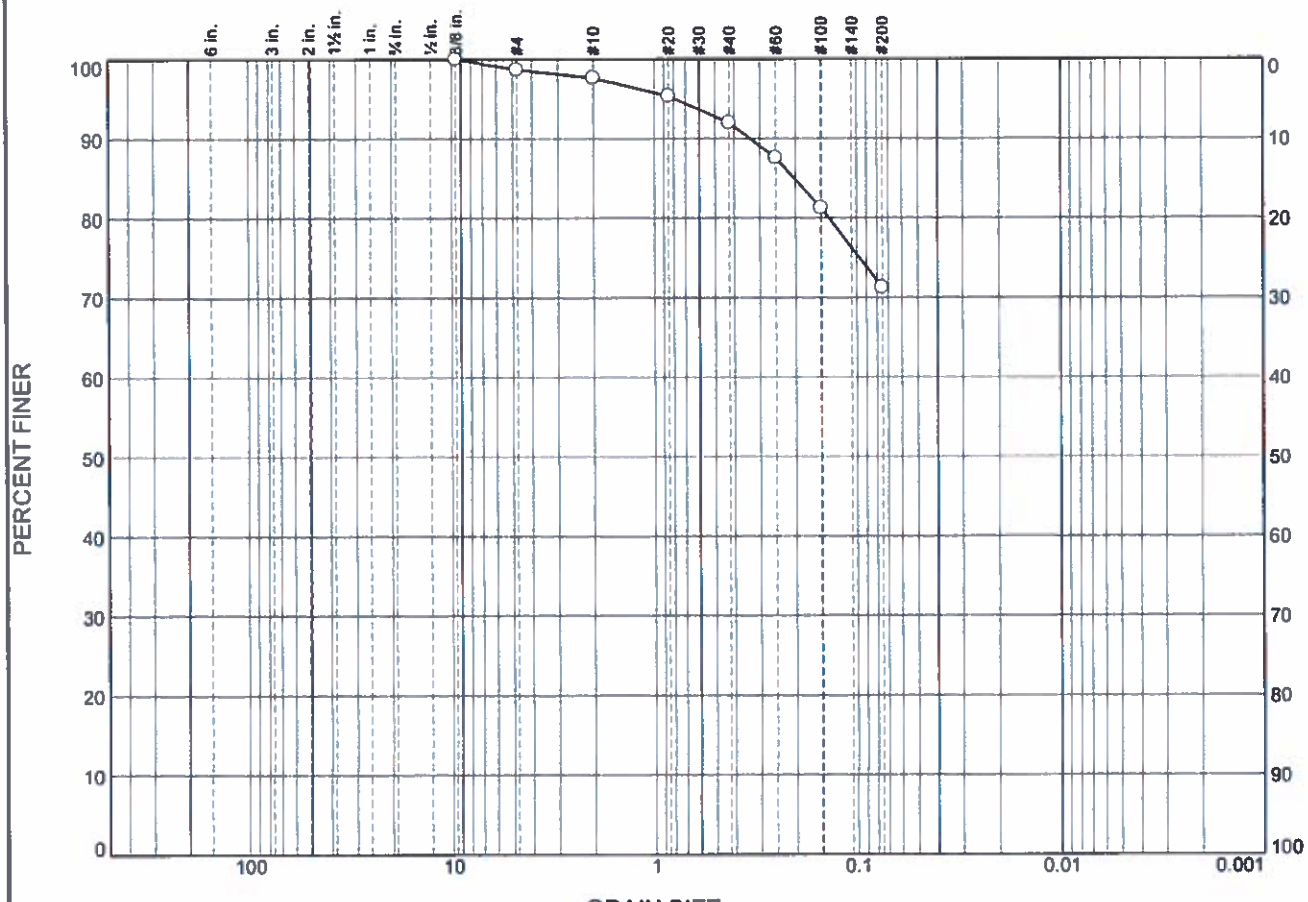
Remarks:

ATC ASSOCIATES INC.

Marietta, Georgia

Figure

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	1.3	1.1	5.6	20.7	71.3	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	66	37	0.2030							

Material Description	USCS	AASHTO
○ Red micaceous elastic SILT with sand	MH	A-7-5(23)

Project No. Z066000077 **Client:** City of Atlanta

Project: Boone Blvd Green Project

○ **Location:** B-20 @ 4.5-6' **Sample Number:** B-20

Remarks:

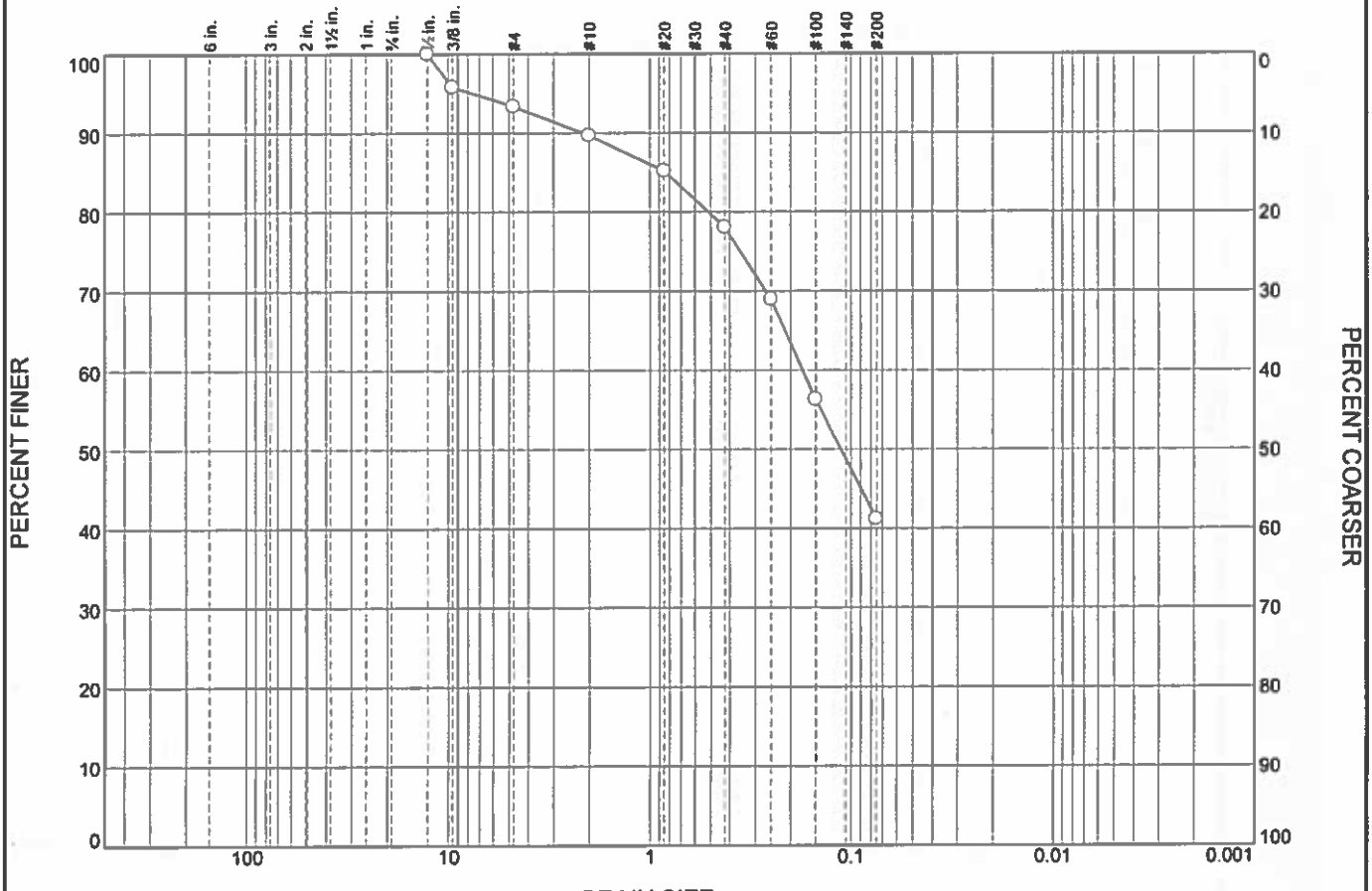
○MC: 20.0%

ATC ASSOCIATES INC.

Marietta, Georgia

Figure

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	6.6	3.7	11.7	36.8	41.2	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	43	24	0.8345	0.1741	0.1122					

Material Description	USCS	AASHTO
○ Red micaceous clayey SAND	SC	A-7-6(4)

Project No. Z066000077 **Client:** City of Atlanta
Project: Boone Blvd Green Project

○ **Location:** B-21 @ 3-4.5' **Sample Number:** B-21

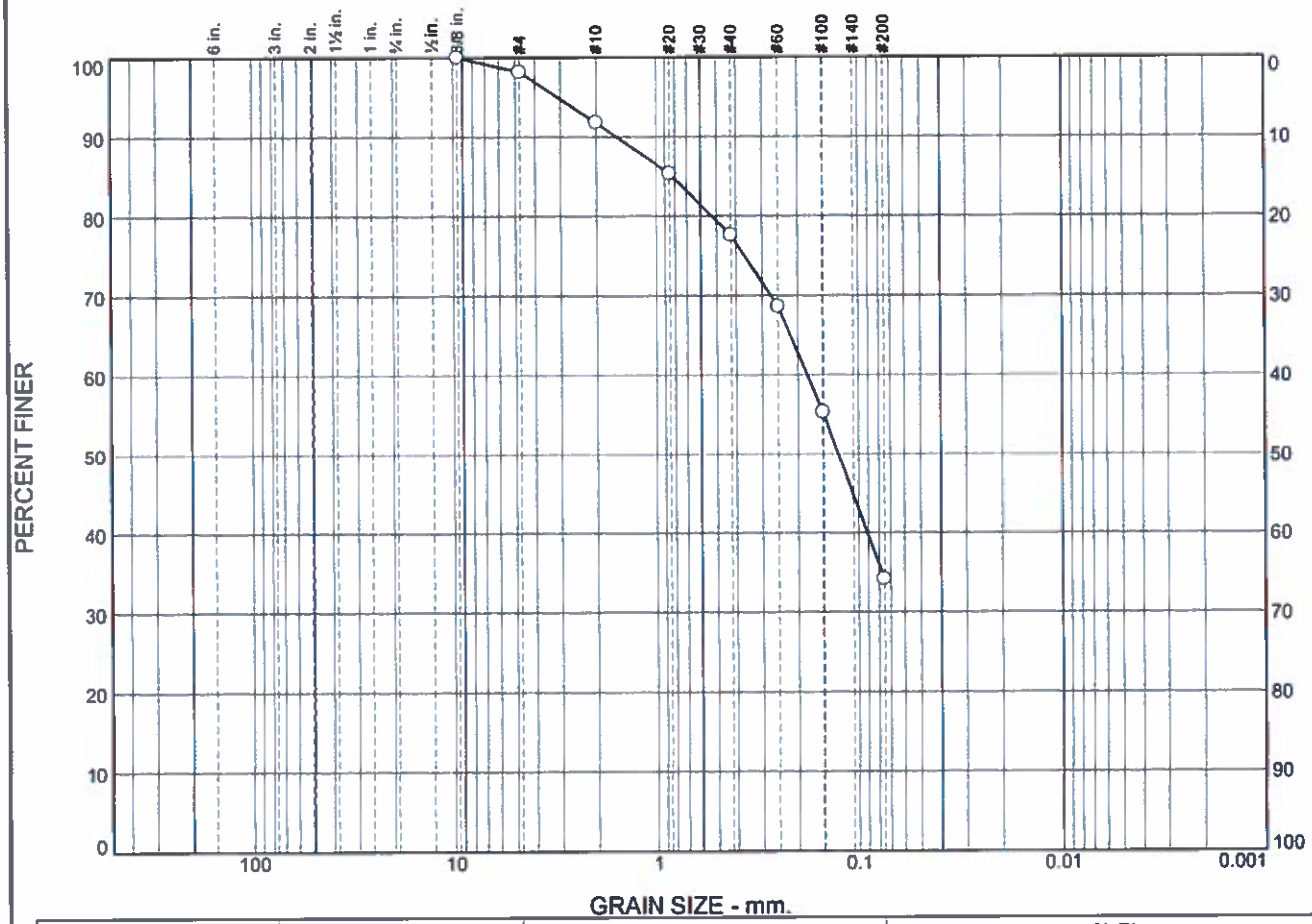
Remarks:
○MC: 22.5%

ATC ASSOCIATES INC.

Marietta, Georgia

Figure

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	1.8	6.4	14.2	43.4	34.2	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.8258	0.1797	0.1261					

Material Description	USCS	AASHTO
○ Reddish brown micaceous silty fine SAND		

Project No. Z066000077 **Client:** City of Atlanta
Project: Boone Blvd Green Project

○ **Location:** B-22 @ 3-4.5' **Sample Number:** B-22

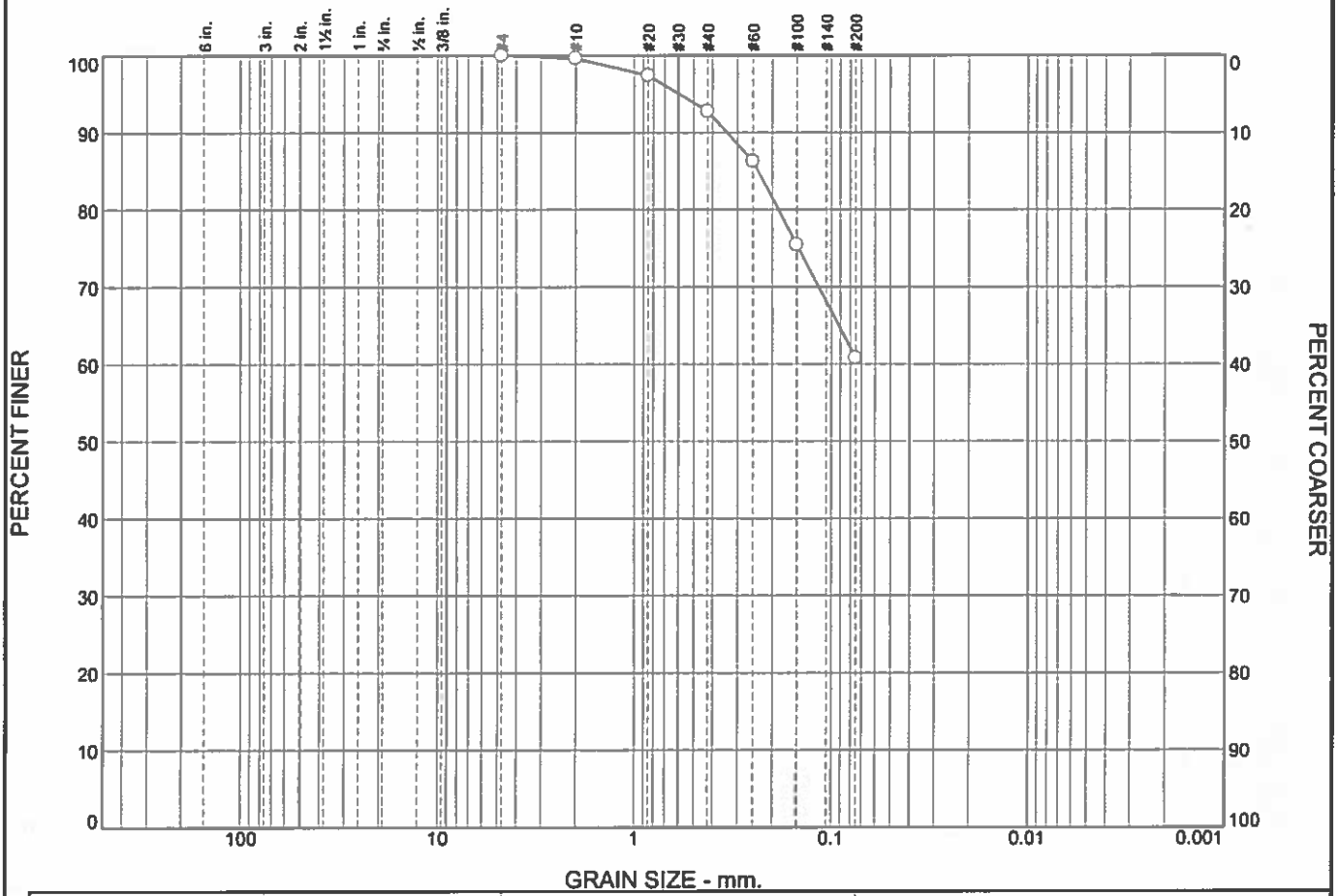
Remarks:

ATC ASSOCIATES INC.

Marietta, Georgia

Figure

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	0.4	6.8	32.1	60.7	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.2357							

Material Description	USCS	AASHTO
○ Yellowish brown micaceous sandy SILT		

Project No. Z066000077 **Client:** City of Atlanta
Project: Boone Blvd Green Project

○ **Location:** B-24 @ 3-4.5' **Sample Number:** B-24

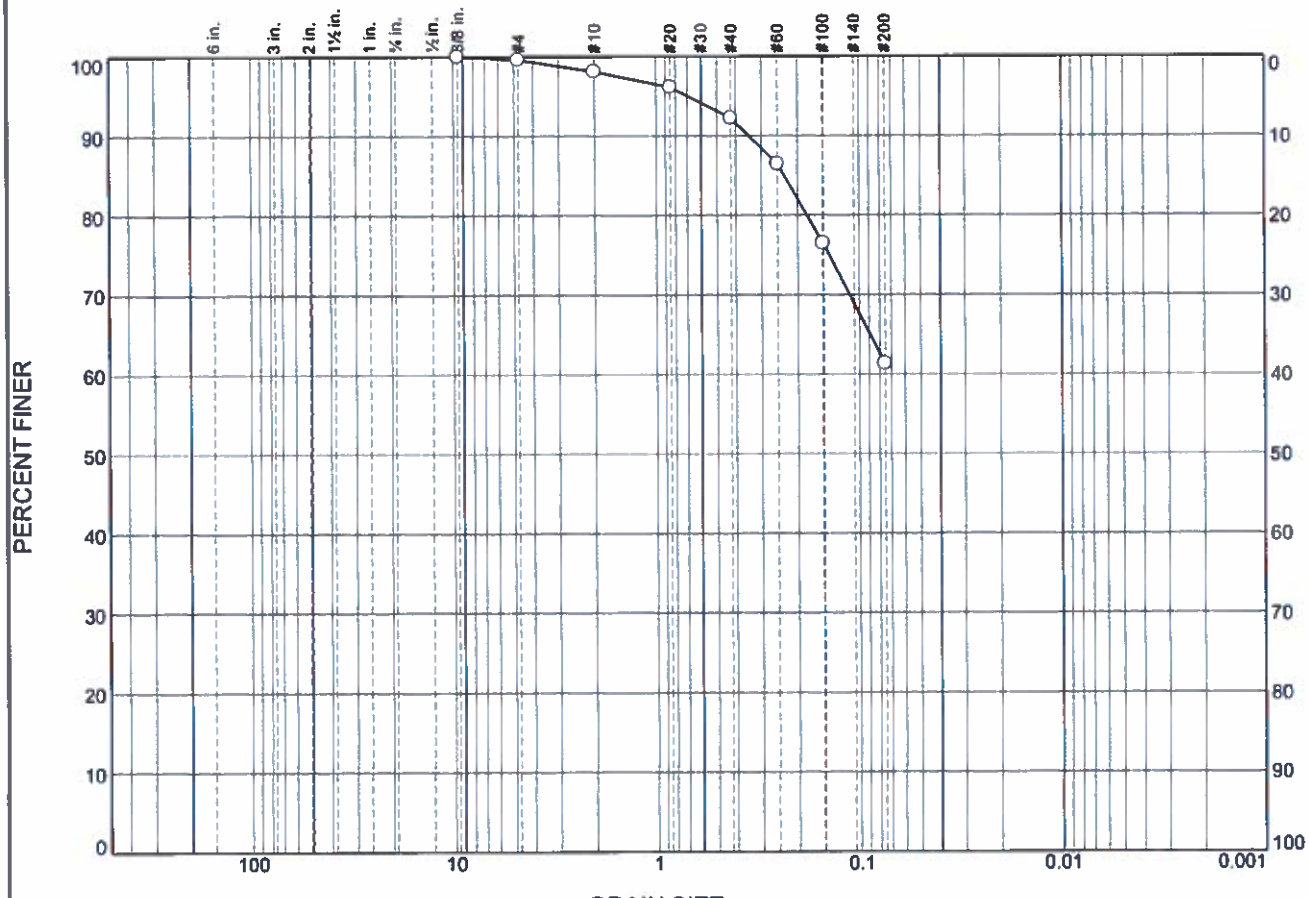
Remarks:

ATC ASSOCIATES INC.

Marietta, Georgia

Figure

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.4	1.5	5.9	30.9	61.3	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	57	36	0.2320							

Material Description	USCS	AASHTO
○ Brown micaceous sandy elastic SIIT	MH	A-7-5(12)

Project No. Z066000077 **Client:** City of Atlanta
Project: Boone Blvd Green Project

○ **Location:** B-25 @ 3-4.5' **Sample Number:** B-25

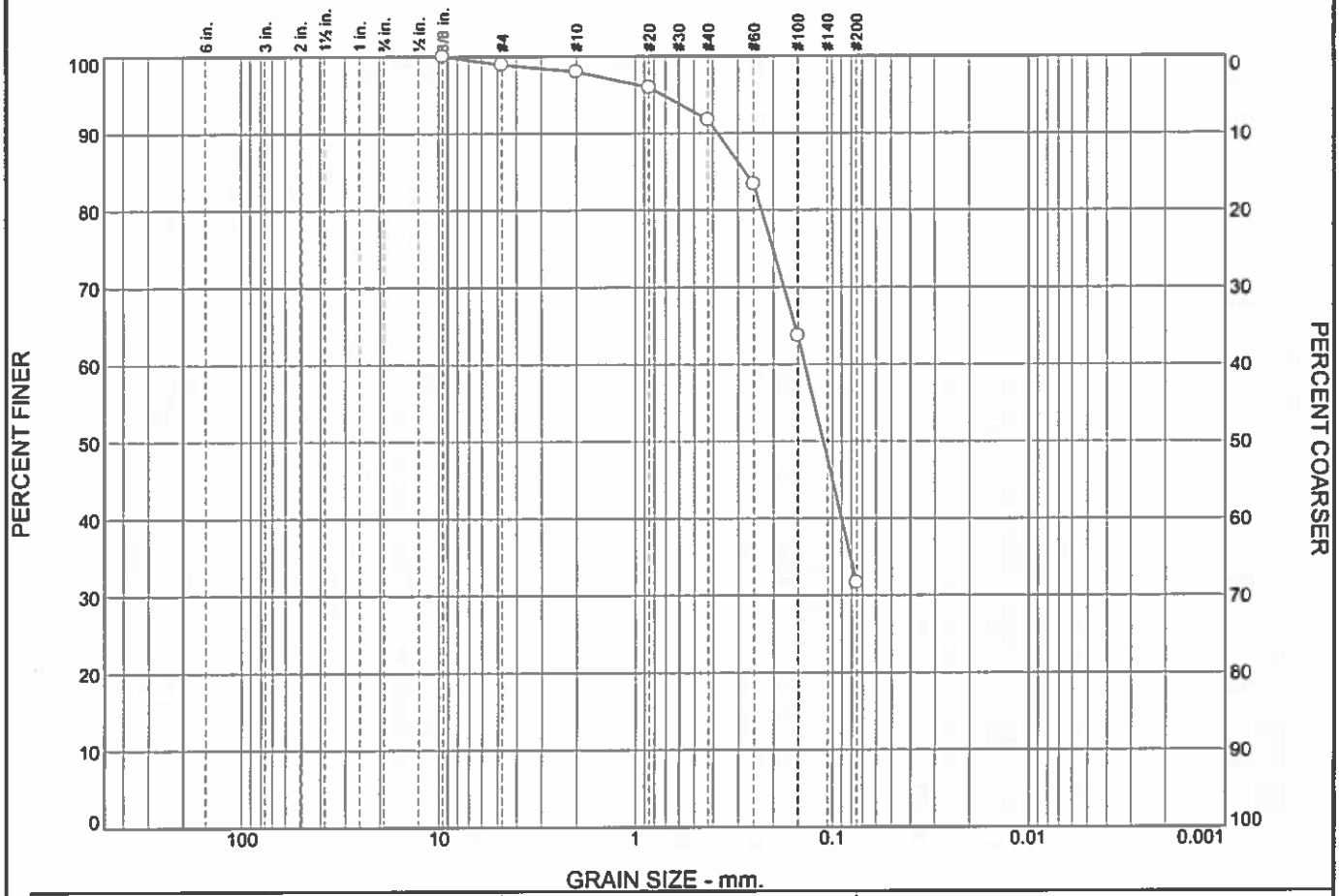
Remarks:
○MC: 28.8

ATC ASSOCIATES INC.

Marietta, Georgia

Figure

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	1.1	0.9	6.2	60.1	31.7	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.2767	0.1384	0.1115					

Material Description	USCS	AASHTO
○ Brown micaceous silty fine SAND		

Project No. Z066000077 **Client:** City of Atlanta
Project: Boone Blvd Green Project

○ **Location:** B-27 @ 4.5-6' **Sample Number:** B-27

Remarks:

ATC ASSOCIATES INC.

Marietta, Georgia

Figure

Cardno ATC

1841 West Oak Parkway, Suite F
Marietta, Georgia 30062

Phone: (770) 427-9456
Fax: (770) 427-1907

REPORT OF: MOISTURE CONTENTS

PROJECT: Boone Blvd.

DATE: 5-22-15

CLIENT: City of Atlanta

ATC JOB NO: Z066000077

TEST METHOD: ASTM D-2216

SAMPLE ID	M.C. %
B-1 @ 4.5-6'	19.36
B-4 @ 1.5-3'	18.34
B-6 @ 4.5-6'	21.87
B-7 @ 4.5-6'	18.75
B-10 @ 1.5-3'	22.41
B-20 @ 4.5-6'	20.03
B-21 @ 3-4.5'	22.48
B-25 @ 3-4.5'	28.79
B-11 @ 1.5-3'	26.08
B-13 @ 4.5-6'	25.84
B-15 @ 4.5-6'	21.27

SAMPLE ID	M.C. %
B-22 @ 3-4.5'	15.54
B-24 @ 3-4.5'	31.08
B-27 @4.5-6'	25.99
B-2 @ 3-4.5'	21.18
B-3 @ 4.5-6'	11.17
B-5 @ 1.5-3'	6.59
B-8 @ 3-4.5'	13.89
B-14 @ 3-4.5'	19.88
B-15 @ 1.5-3'	18.00
B-23 @ 3-4.5'	23.10

Sincerely,
Cardno ATC,

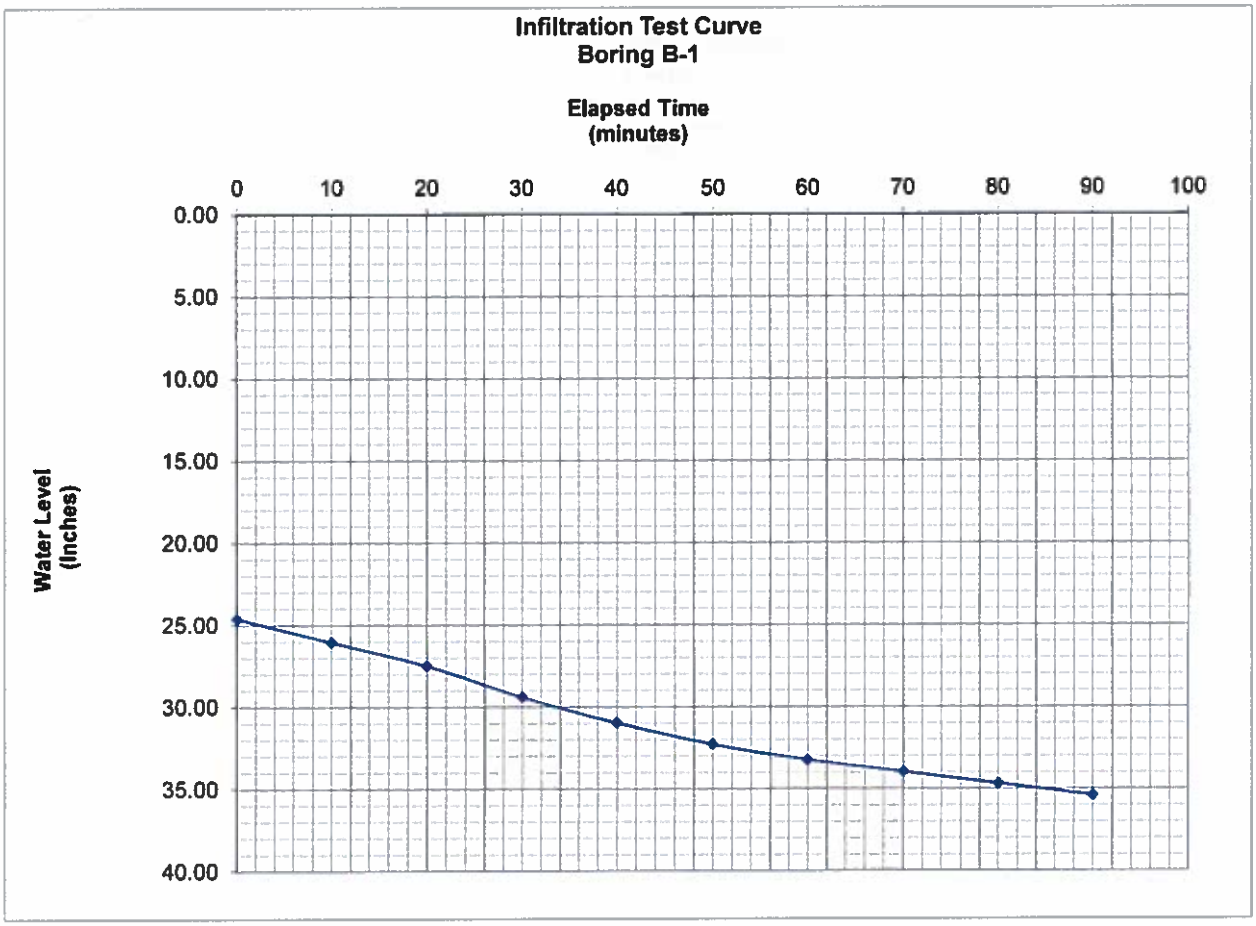
Mary Lynn Smith, P.G.
Laboratory Manager

INFILTRATION RATE TEST SUMMARY
Project Name: Boone Boulevard Green Project
ATC+CERM Project No.: 2013-1304-005
Data: 5/11/2015
Test Designation: B-1
Performed By: Devon Gwaba

B-1		
Elapsed time(min)	Water level (ft)	Water level (in)
0	2.05	24.60
10	2.17	26.04
20	2.29	27.48
30	2.45	29.40
40	2.58	30.96
50	2.69	32.28
60	2.77	33.24
70	2.83	33.96
80	2.89	34.68
90	2.95	35.40

Rate = 4.3 in/hr

All water levels are relative to top of pavement.

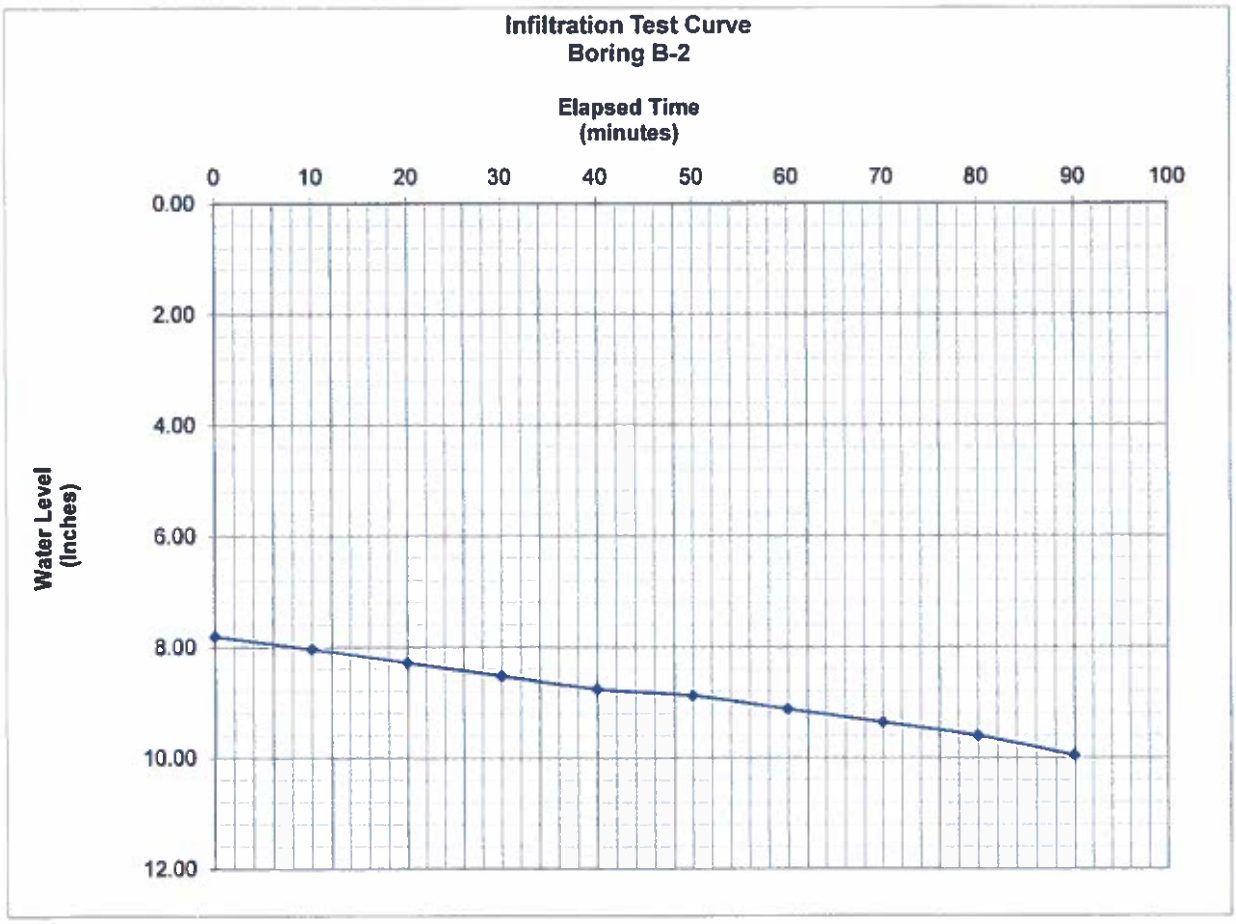


INFILTRATION RATE TEST SUMMARY
Project Name: Boone Boulevard Green Project
ATC+CERM Project No.: 2013-1304-005
Data: 5/7/2015
Test Designation: B-2
Performed By: Devon Gwaba

B-2		
Elapsed time(min)	Water level (ft)	Water level (in)
0	0.65	7.80
10	0.67	8.04
20	0.69	8.28
30	0.71	8.52
40	0.73	8.76
50	0.74	8.88
60	0.76	9.12
70	0.78	9.36
80	0.8	9.60
90	0.83	9.96

Rate = 1.4 in/hr

All water levels are relative to top of pavement.

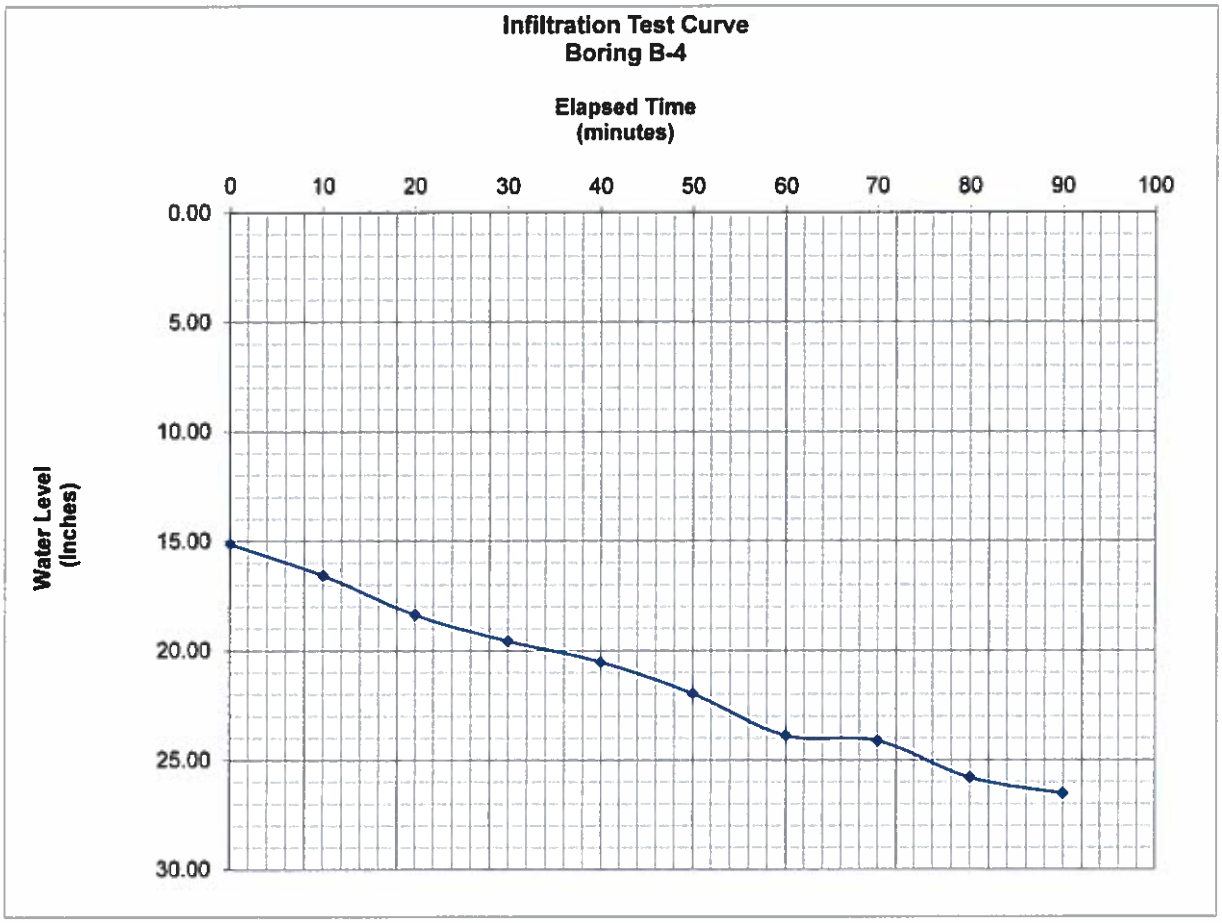


INFILTRATION RATE TEST SUMMARY
Project Name: Boone Boulevard Green Project
ATC+CERM Project No.: 2013-1304-005
Data: 5/7/2015
Test Designation: B-4
Performed By: Devon Gwaba

B-4		
Elapsed time(min)	Water level (ft)	Water level (in)
0	0.65	7.80
10	0.67	8.04
20	0.69	8.28
30	0.71	8.52
40	0.73	8.76
50	0.74	8.88
60	0.76	9.12
70	0.78	9.36
80	0.8	9.60
90	0.83	9.96

Rate = 1.3 in/hr

All water levels are relative to top of pavement.

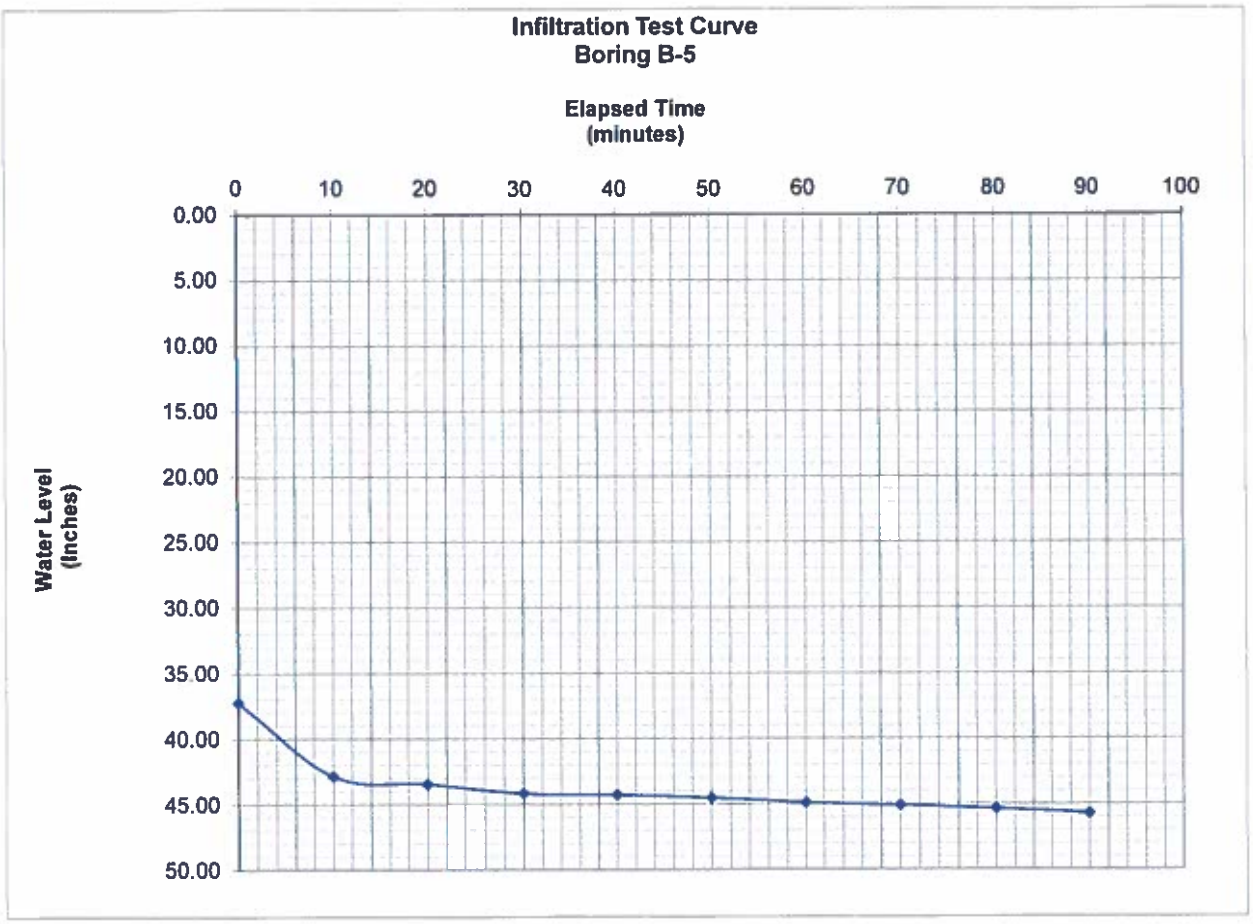


INFILTRATION RATE TEST SUMMARY
Project Name: Boone Boulevard Green Project
ATC+CERM Project No.: 2013-1304-005
Data: 5/11/2015
Test Designation: B-5
Performed By: Devon Gwaba

B-5		
Elapsed time(min)	Water level (ft)	Water level (in)
0	3.10	37.2
10	3.57	42.84
20	3.62	43.44
30	3.68	44.16
40	3.69	44.28
50	3.71	44.52
60	3.74	44.88
70	3.76	45.12
80	3.78	45.36
90	3.81	45.72

Rate = 1.7 in/hr

All water levels are relative to top of pavement.

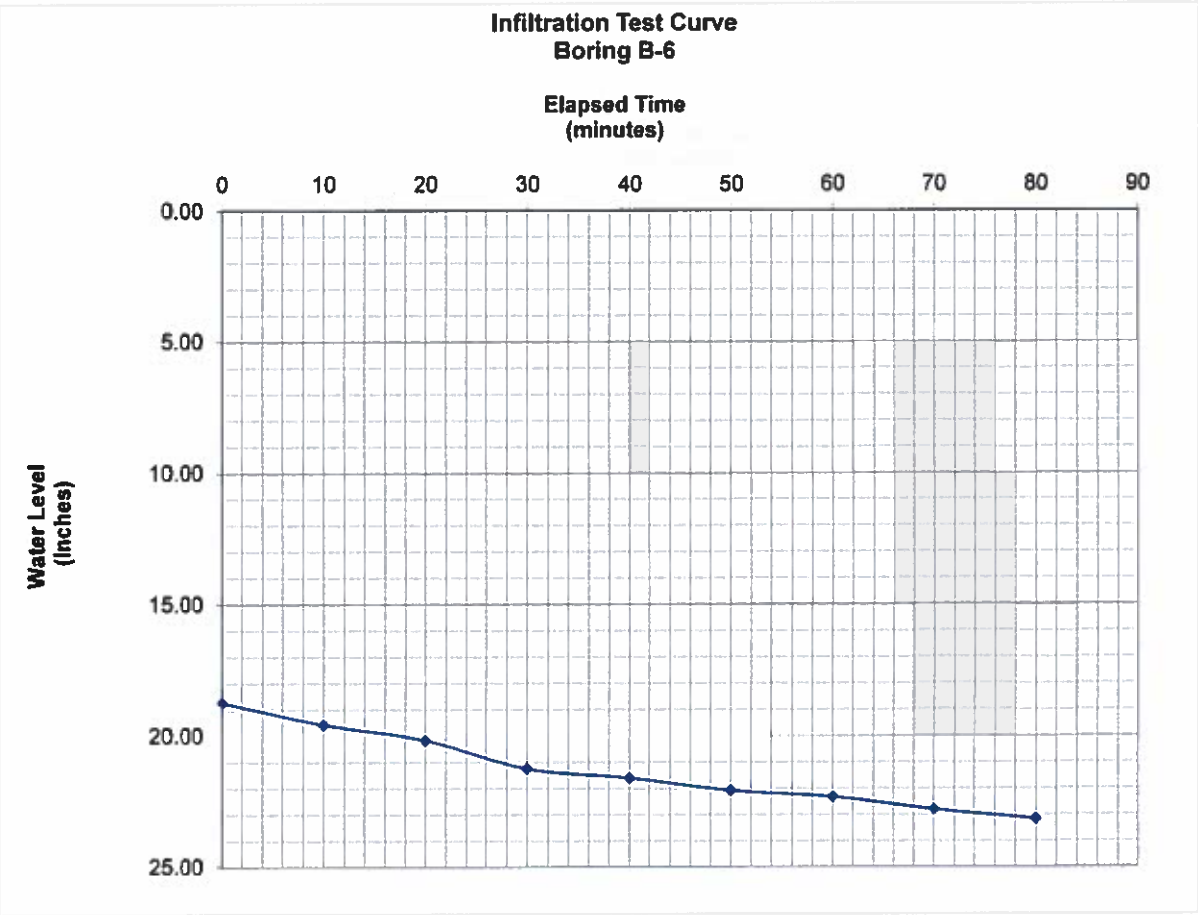


INFILTRATION RATE TEST SUMMARY
Project Name: Boone Boulevard Green Project
ATC+CERM Project No.: 2013-1304-005
Data: 5/11/2015
Test Designation: B-6
Performed By: Devon Gwaba

B-6		
Elapsed time(min)	Water level (ft)	Water level (in)
0	1.56	18.72
10	1.63	19.56
20	1.68	20.16
30	1.77	21.24
40	1.80	21.6
50	1.84	22.08
60	1.86	22.32
70	1.90	22.8
80	1.93	23.16

Rate = 2.2 in/hr

All water levels are relative to top of pavement.



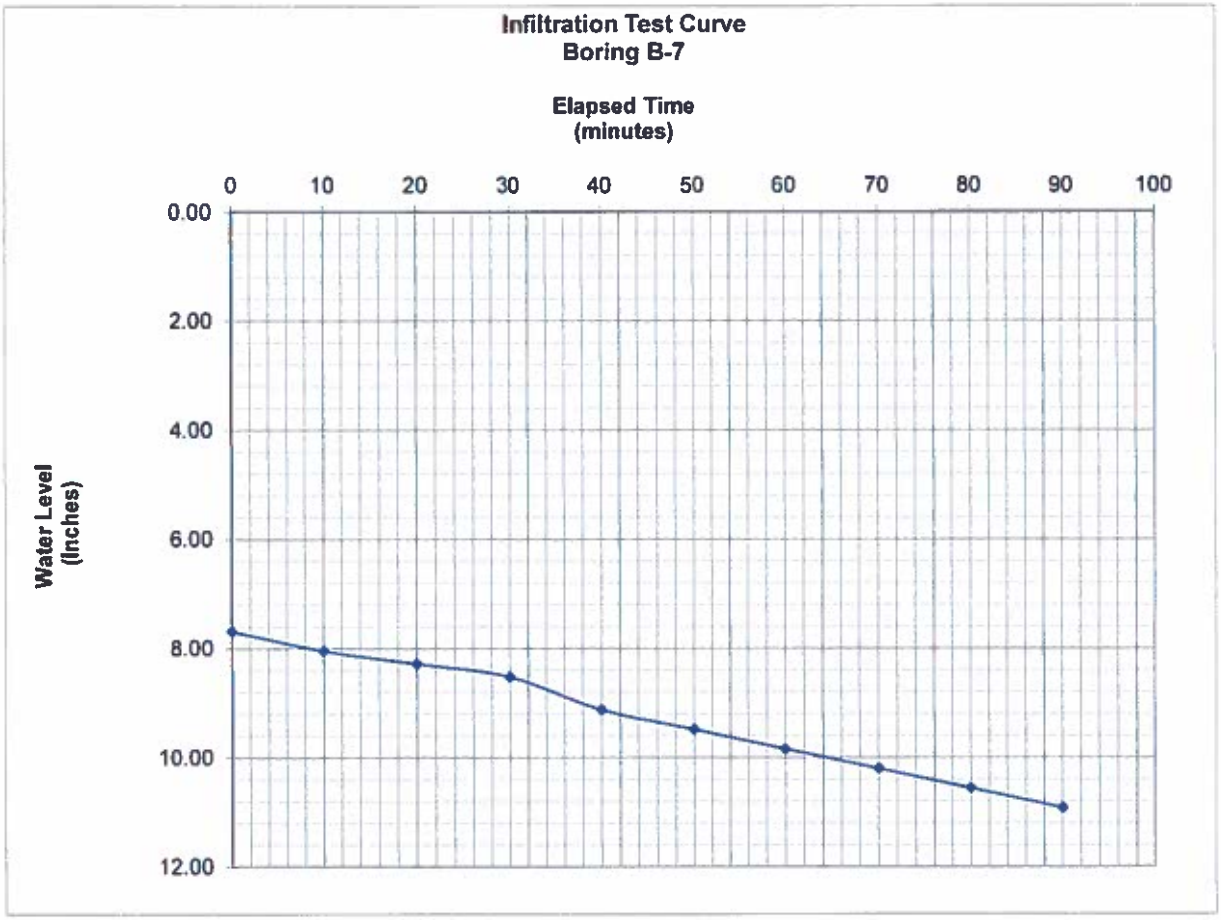
INFILTRATION RATE TEST SUMMARY

Project Name: Boone Boulevard Green Project
ATC+CERM Project No.: 2013-1304-005
Data: 5/11/2015
Test Designation: B-7
Performed By: Devon Gwaba

B-7		
Elapsed time(min)	Water level (ft)	Water level (in)
0	0.64	7.68
10	0.67	8.04
20	0.69	8.28
30	0.71	8.52
40	0.76	9.12
50	0.79	9.48
60	0.82	9.84
70	0.85	10.2
80	0.88	10.56
90	0.91	10.92

Rate = 2.2 in/hr

All water levels are relative to top of pavement.



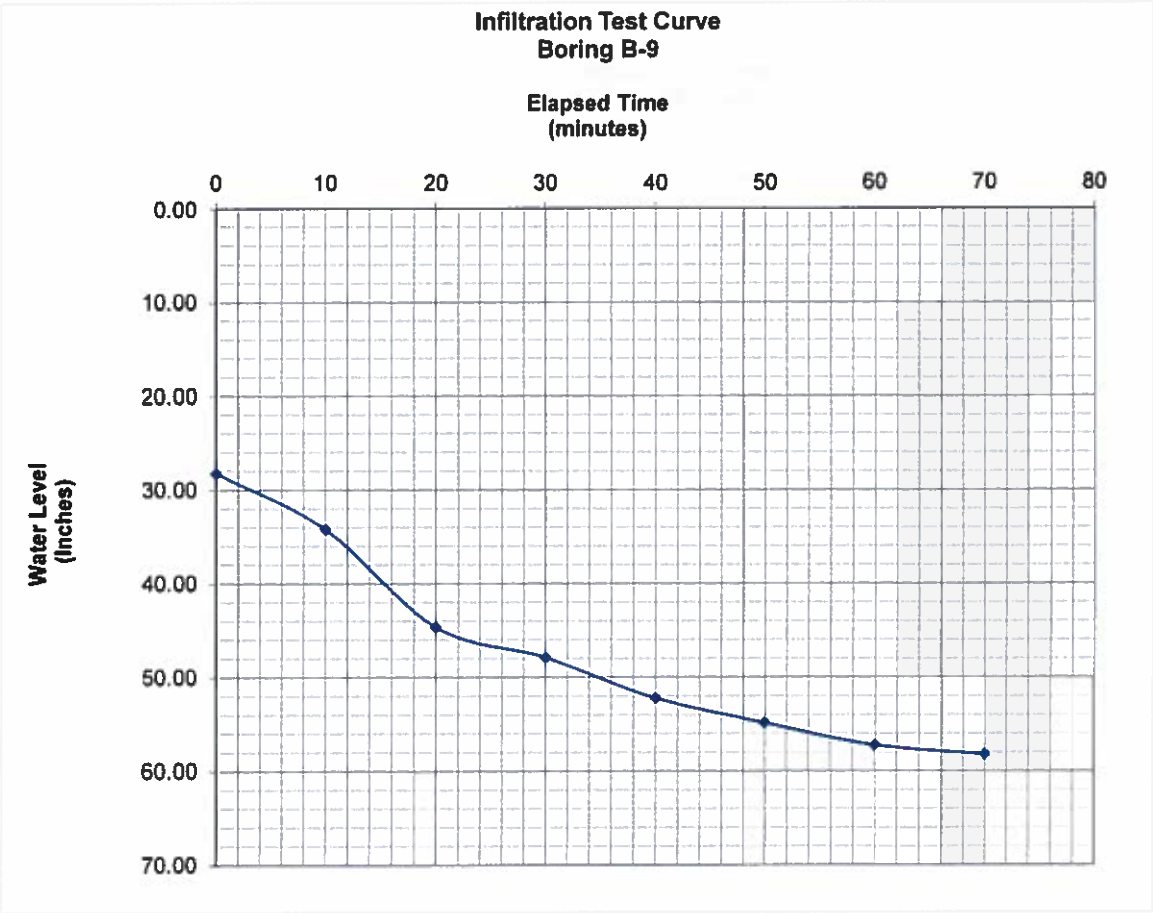
INFILTRATION RATE TEST SUMMARY

Project Name: Boone Boulevard Green Project
ATC+CERM Project No.: 2013-1304-005
Data: 5/11/2015
Test Designation: B-9
Performed By: Devon Gwaba

B-9		
Elapsed time(min)	Water level (ft)	Water level (in)
0	2.35	28.20
10	2.85	34.20
20	3.72	44.64
30	3.99	47.88
40	4.35	52.20
50	4.57	54.84
60	4.77	57.24
70	4.85	58.20

Rate = 5.8 in/hr

All water levels are relative to top of pavement.



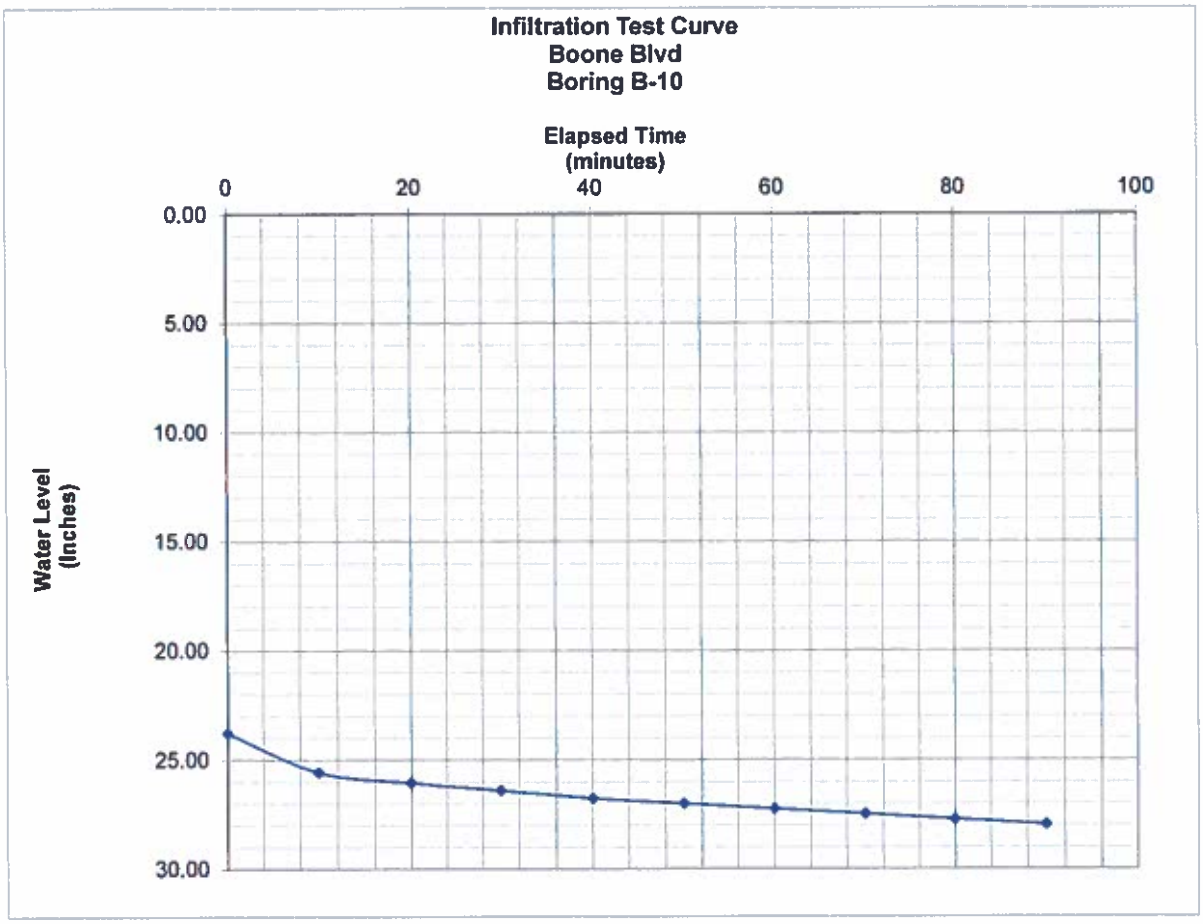
INFILTRATION RATE TEST SUMMARY

Project Name: Boone Boulevard Green Project
ATC+CERM Project No.: 2013-1304-005
Data: 5/11/2015
Test Designation: B-10
Performed By: Devon Gwaba

B-10		
Elapsed time(min)	Water level (ft)	Water level (in)
0	1.98	23.76
10	2.13	25.56
20	2.17	26.04
30	2.20	26.4
40	2.23	26.76
50	2.25	27
60	2.27	27.24
70	2.29	27.48
80	2.31	27.72
90	2.33	27.96

Rate = 1.4 in/hr

All water levels are relative to top of pavement.



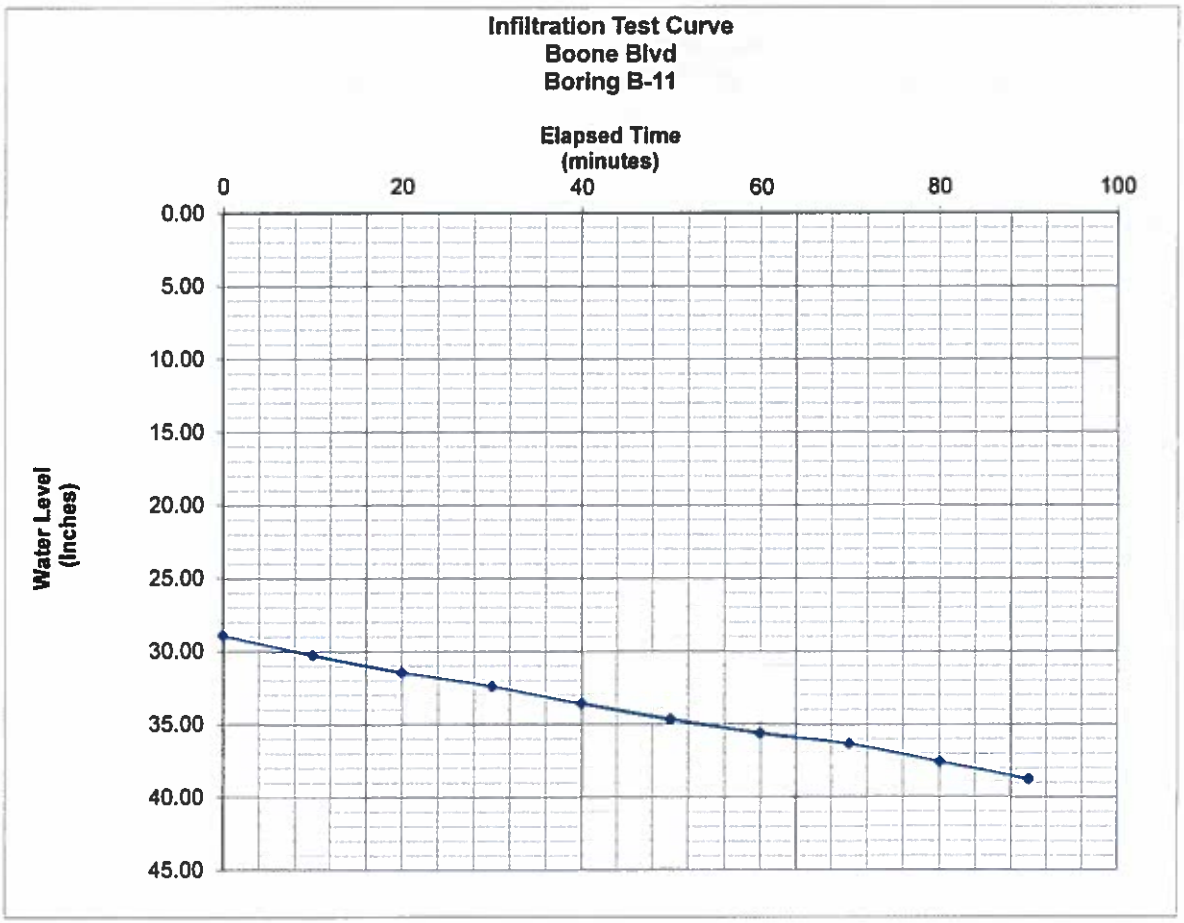
INFILTRATION RATE TEST SUMMARY

Project Name: Boone Boulevard Green Project
ATC+CERM Project No.: 2013-1304-005
Data: 5/7/2015
Test Designation: B-11
Performed By: Devon Gwaba

B-11		
Elapsed time(min)	Water level (ft)	Water level (in)
0	2.41	28.92
10	2.52	30.24
20	2.62	31.44
30	2.70	32.4
40	2.80	33.6
50	2.89	34.68
60	2.97	35.64
70	3.03	36.36
80	3.13	37.56
90	3.23	38.76

Rate = 6.2 in/hr

All water levels are relative to top of pavement.

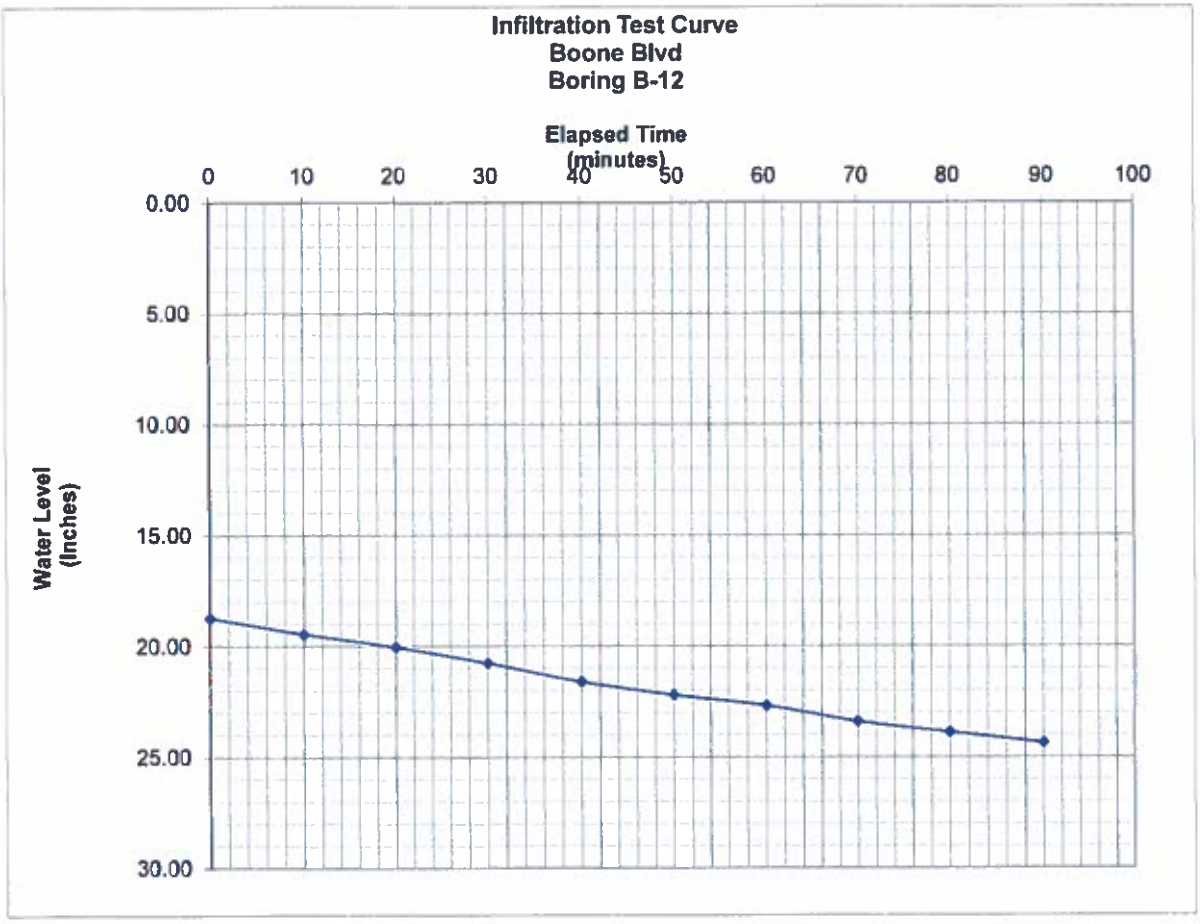


INFILTRATION RATE TEST SUMMARY
Project Name: Boone Boulevard Green Project
ATC+CERM Project No.: 2013-1304-005
Data: 5/7/2015
Test Designation: B-12
Performed By: Devon Gwaba

B-12		
Elapsed time(min)	Water level (ft)	Water level (in)
0	1.56	18.72
10	1.62	19.44
20	1.67	20.04
30	1.73	20.76
40	1.80	21.6
50	1.85	22.2
60	1.89	22.68
70	1.95	23.4
80	1.99	23.88
90	2.03	24.36

Rate = 3.3 in/hr

All water levels are relative to top of pavement.



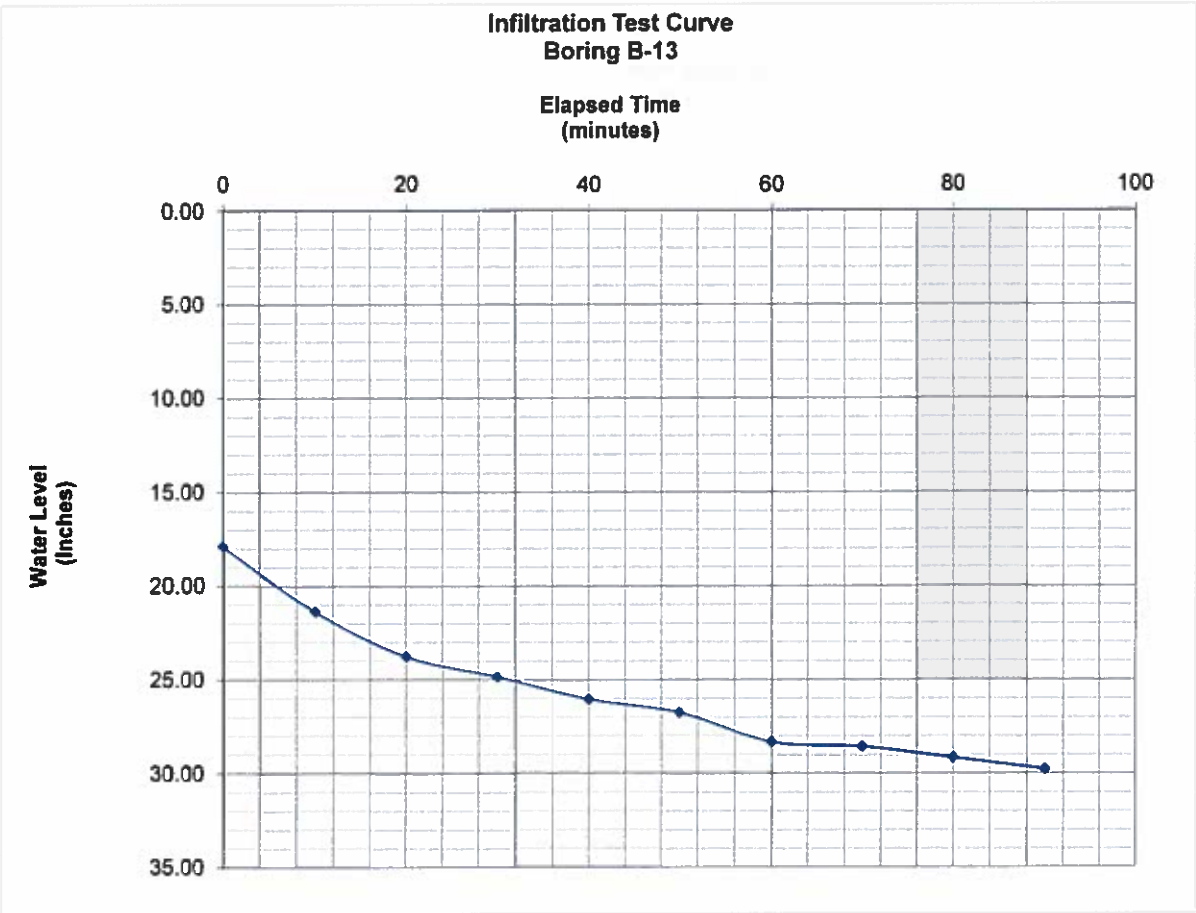
INFILTRATION RATE TEST SUMMARY

Project Name: Boone Boulevard Green Project
ATC+CERM Project No.: 2013-1304-005
Data: 5/7/2015
Test Designation: B-13
Performed By: Devon Gwaba

B-13		
Elapsed time(min)	Water level (ft)	Water level (in)
0	1.49	17.88
10	1.78	21.36
20	1.98	23.76
30	2.07	24.84
40	2.17	26.04
50	2.23	26.76
60	2.36	28.32
70	2.38	28.56
80	2.43	29.16
90	2.48	29.76

Rate = 2.9 in/hr

All water levels are relative to top of pavement.



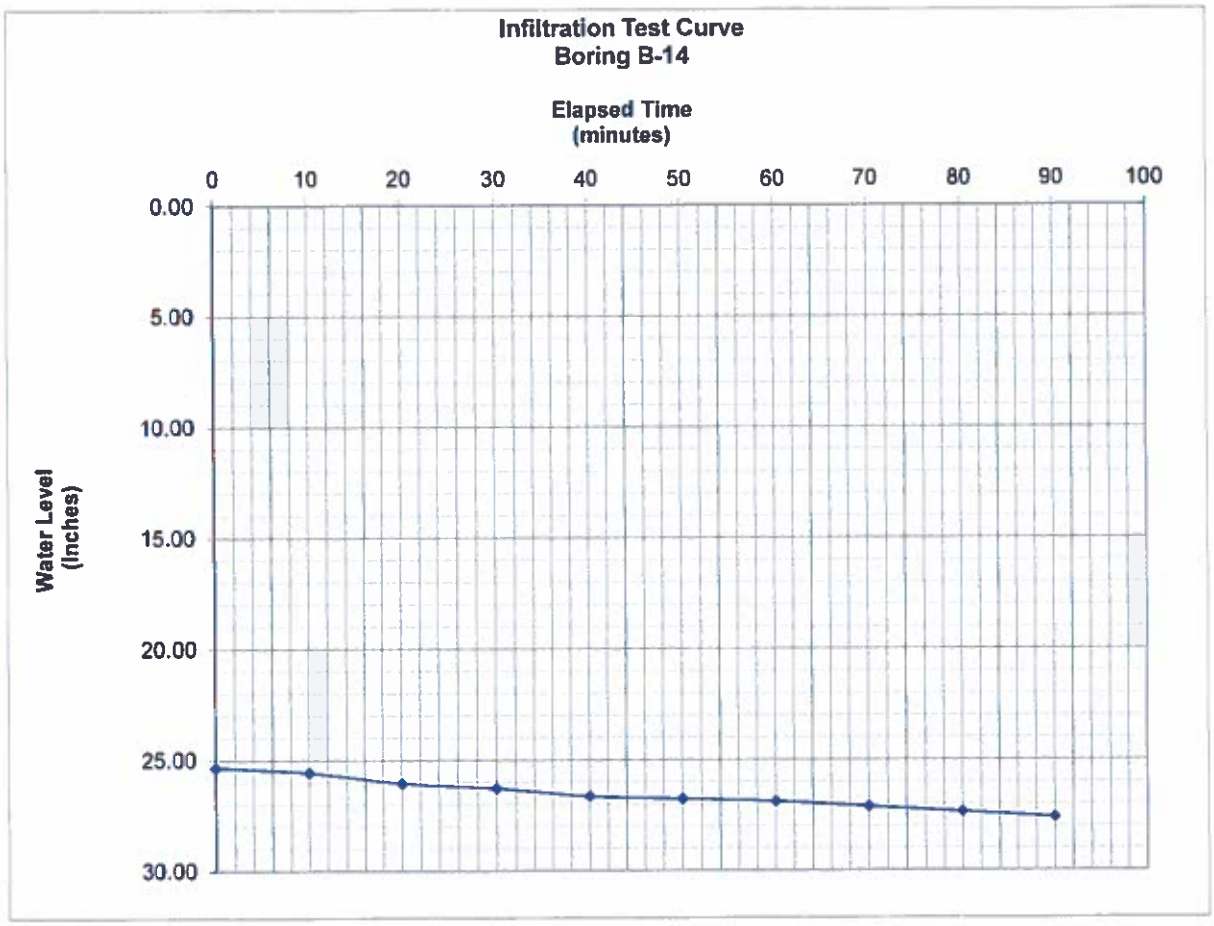
INFILTRATION RATE TEST SUMMARY

Project Name: Boone Boulevard Green Project
ATC+CERM Project No.: 2013-1304-005
Data: 5/6/2015
Test Designation: B-14
Performed By: Devon Gwaba

B-14		
Elapsed time(min)	Water level (ft)	Water level (in)
0	2.11	25.32
10	2.13	25.56
20	2.17	26.04
30	2.19	26.28
40	2.22	26.64
50	2.23	26.76
60	2.24	26.88
70	2.26	27.12
80	2.28	27.36
90	2.30	27.6

Rate = 1.4 in/hr

All water levels are relative to top of pavement.



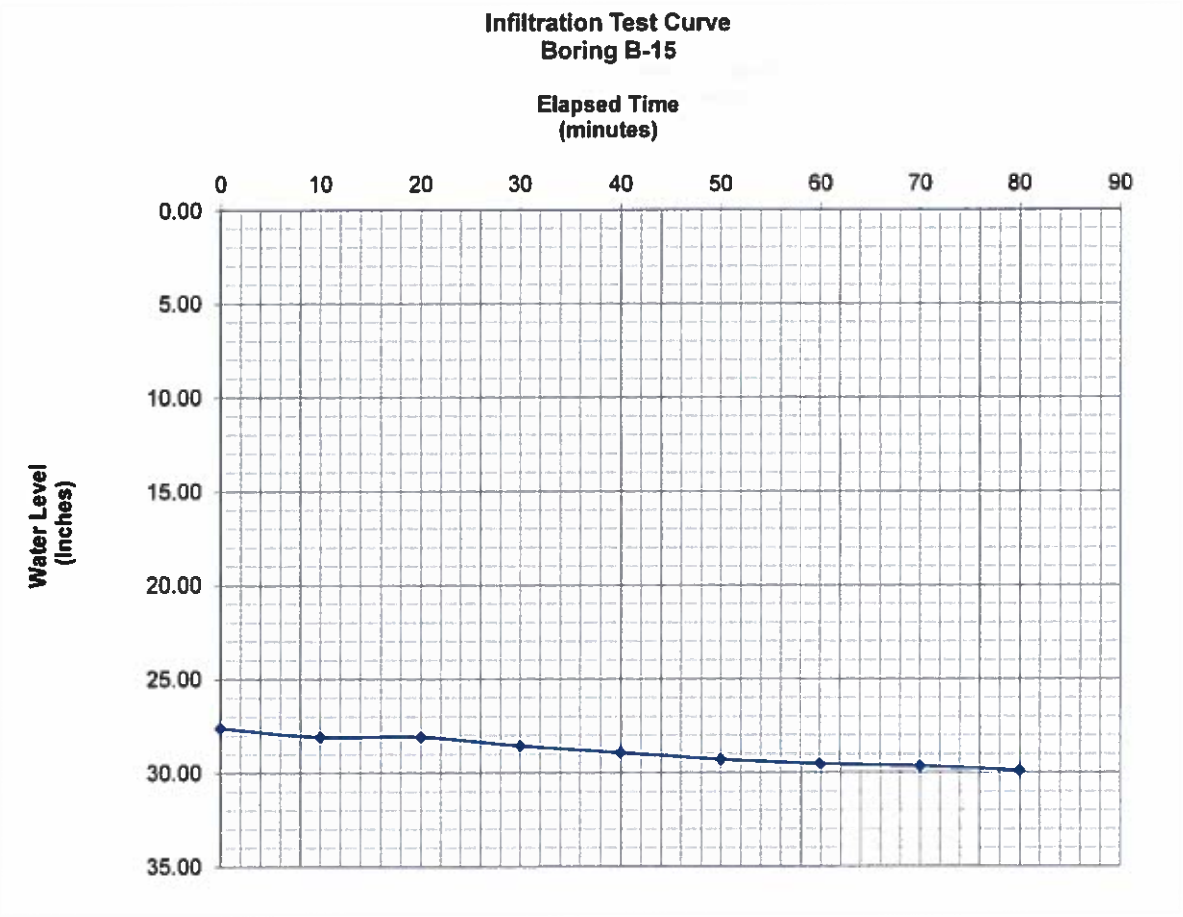
INFILTRATION RATE TEST SUMMARY

Project Name: Boone Boulevard Green Project
ATC+CERM Project No.: 2013-1304-005
Data: 5/8/2015
Test Designation: B-15
Performed By: Devon Gwaba

B-13		
Elapsed time(min)	Water level (ft)	Water level (in)
0	2.30	27.6
10	2.34	28.08
20	2.34	28.08
30	2.38	28.56
40	2.41	28.92
50	2.44	29.28
60	2.46	29.52
70	2.47	29.64
80	2.49	29.88

Rate = 1.4 in/hr

All water levels are relative to top of pavement.



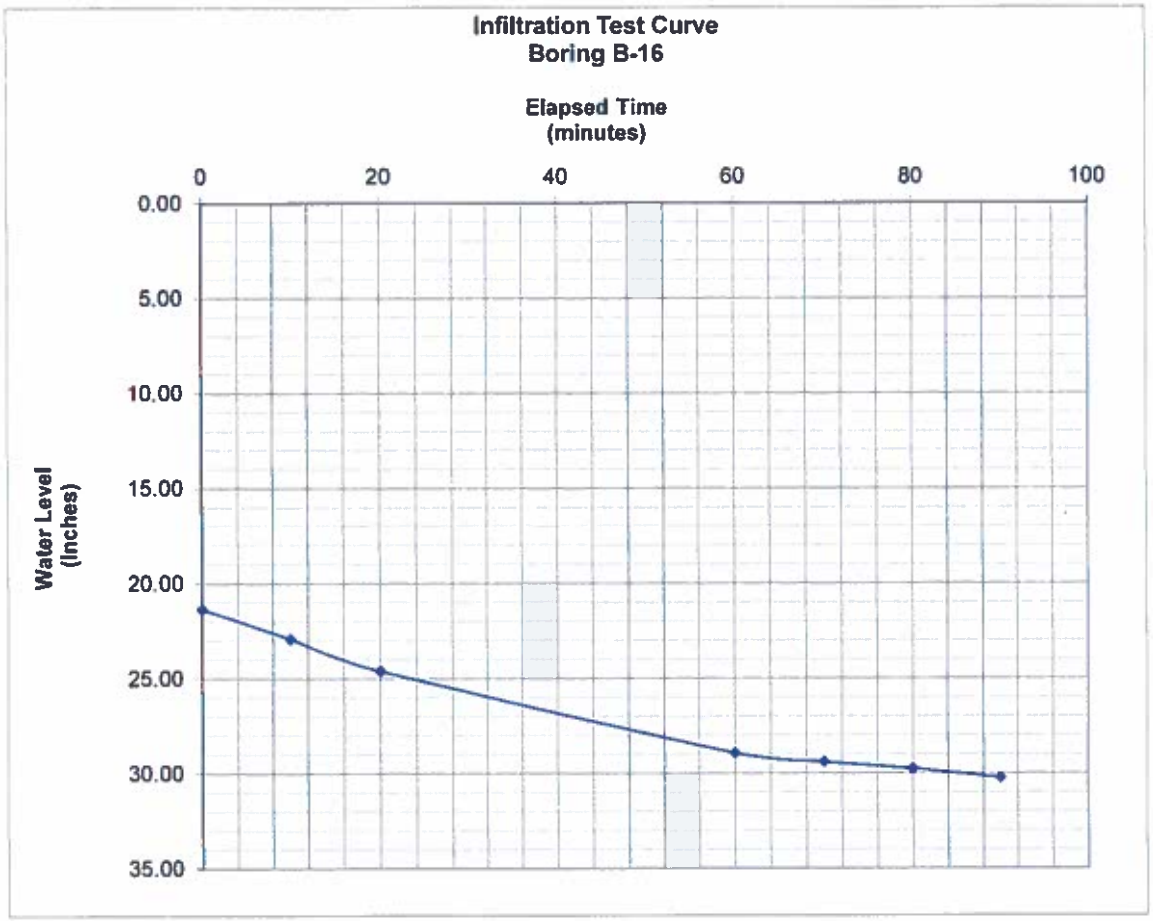
INFILTRATION RATE TEST SUMMARY

Project Name: Boone Boulevard Green Project
ATC+CERM Project No.: 2013-1304-005
Data: 5/6/2015
Test Designation: B-16
Performed By: Devon Gwaba

B-16		
Elapsed time(min)	Water level (ft)	Water level (in)
0	1.78	21.36
10	1.91	22.92
20	2.05	24.6
60	2.41	28.92
70	2.45	29.4
80	2.48	29.76
90	2.52	30.24

Rate = 2.6 in/hr

All water levels are relative to top of pavement.



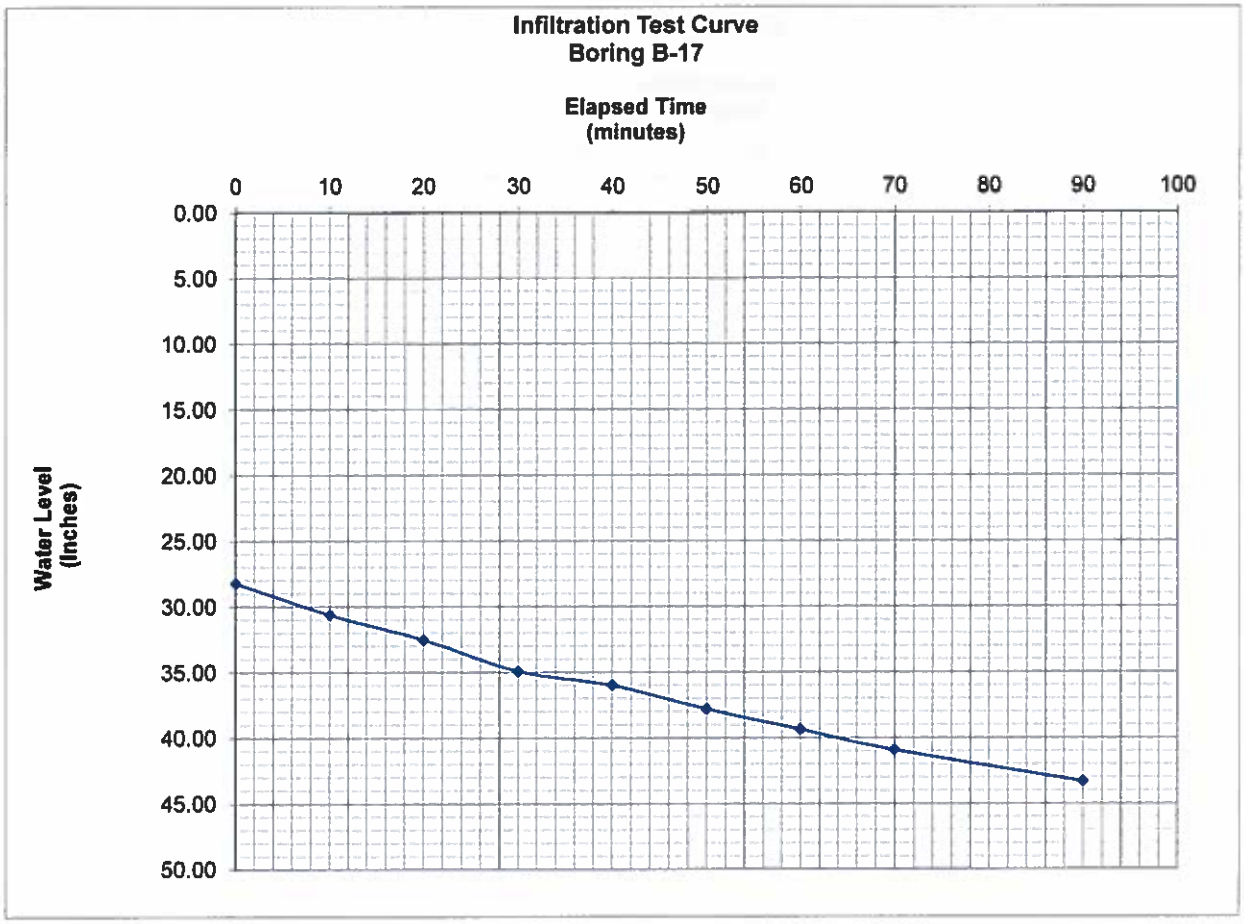
INFILTRATION RATE TEST SUMMARY

Project Name: Boone Boulevard Green Project
ATC+CERM Project No.: 2013-1304-005
Data: 5/8/2015
Test Designation: B-17
Performed By: Devon Gwaba

B-17		
Elapsed time(min)	Water level (ft)	Water level (in)
0	2.35	28.20
10	2.55	30.60
20	2.71	32.52
30	2.91	34.92
40	3.00	36.00
50	3.15	37.80
60	3.28	39.36
70	3.41	40.92
90	3.61	43.32

Rate =	8.6 in/hr

All water levels are relative to top of pavement.



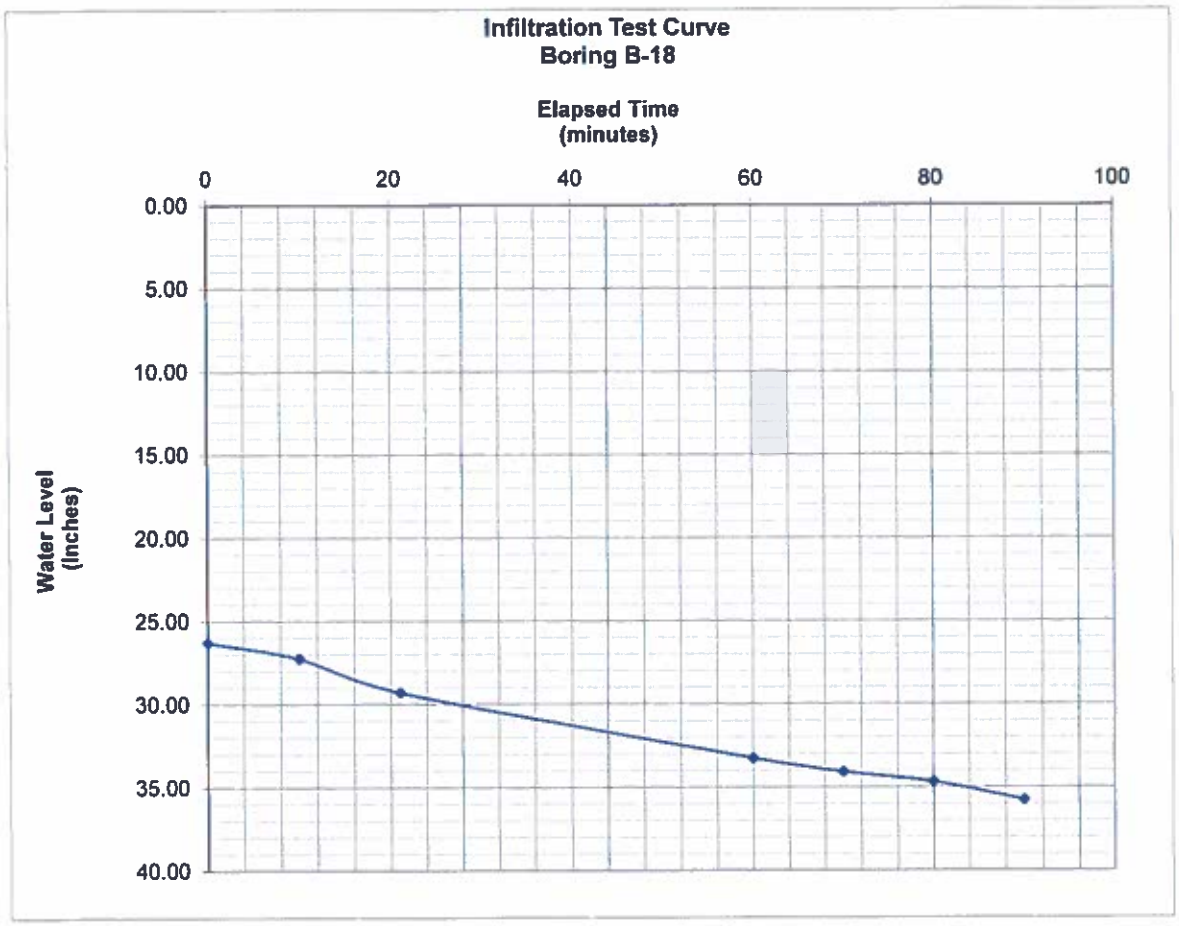
INFILTRATION RATE TEST SUMMARY

Project Name: Boone Boulevard Green Project
ATC+CERM Project No.: 2013-1304-005
Data: 5/6/2015
Test Designation: B-18
Performed By: Devon Gwaba

B-18		
Elapsed time(min)	Water level (ft)	Water level (in)
0	2.19	26.28
10	2.27	27.24
21	2.44	29.28
60	2.77	33.24
70	2.84	34.08
80	2.89	34.68
90	2.98	35.76

Rate = 5.0 in/hr

All water levels are relative to top of pavement.



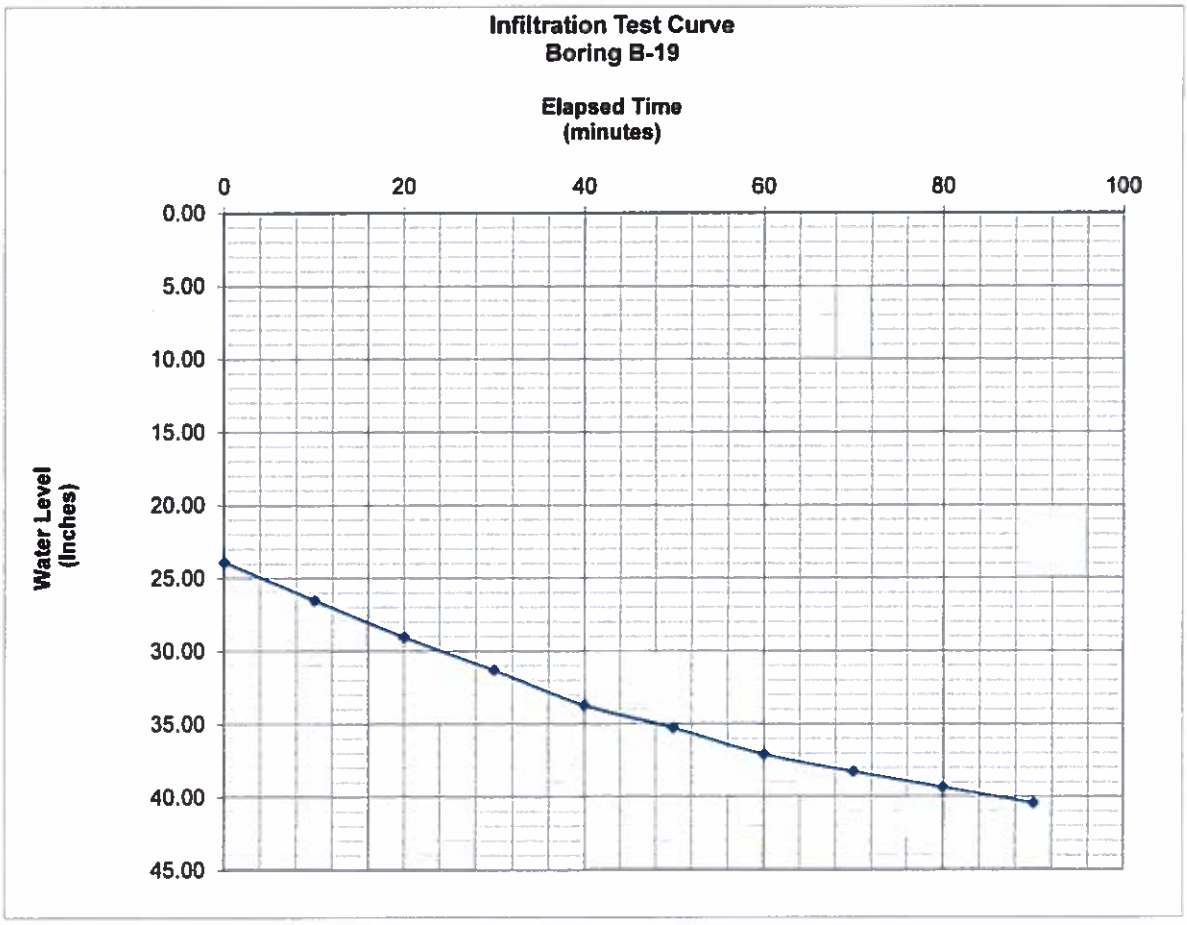
INFILTRATION RATE TEST SUMMARY

Project Name: Boone Boulevard Green Project
ATC+CERM Project No.: 2013-1304-005
Data: 5/8/2015
Test Designation: B-19
Performed By: Devon Gwaba

B-19		
Elapsed time(min)	Water level (ft)	Water level (in)
0	1.99	23.88
10	2.21	26.52
20	2.42	29.04
30	2.61	31.32
40	2.81	33.72
50	2.94	35.28
60	3.09	37.08
70	3.19	38.28
80	3.28	39.36
90	3.37	40.44

Rate = 6.7 in/hr

All water levels are relative to top of pavement.



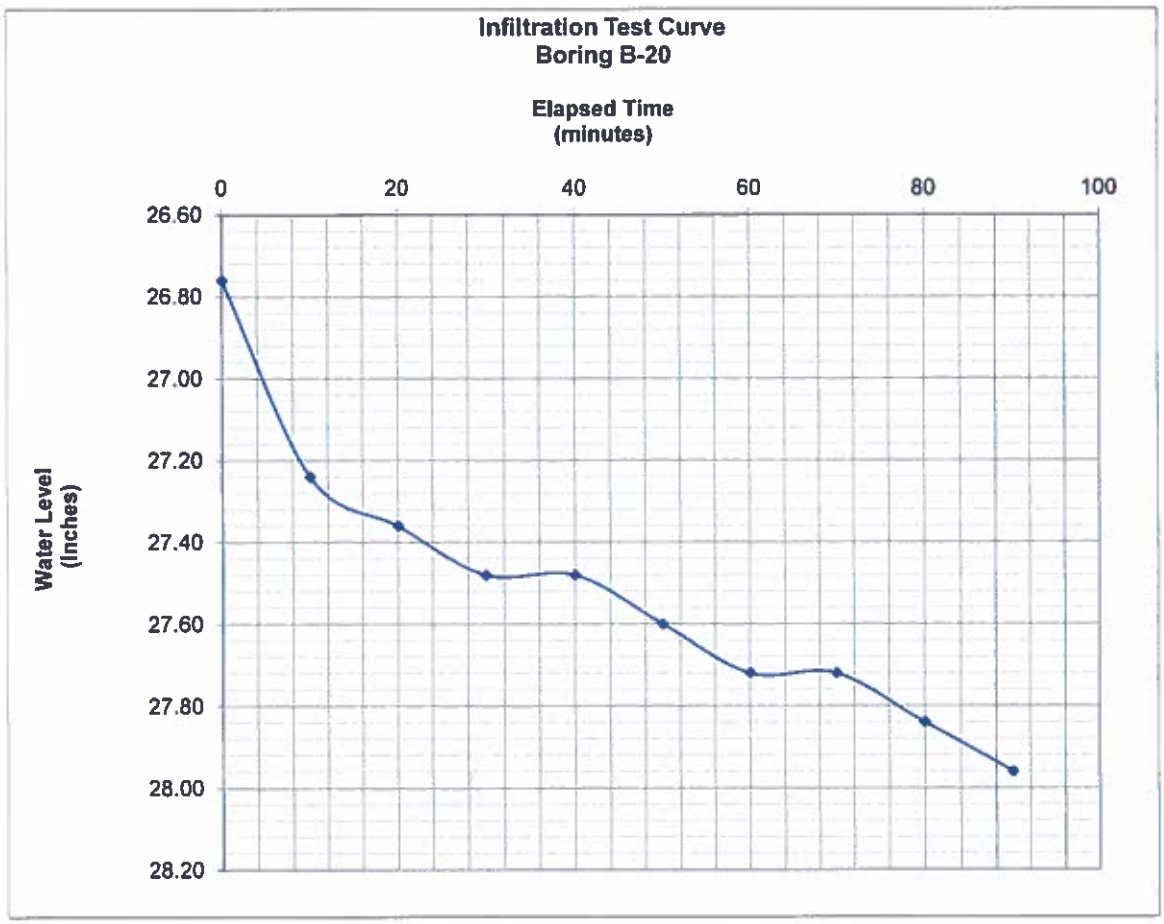
INFILTRATION RATE TEST SUMMARY

Project Name: Boone Boulevard Green Project
ATC+CERM Project No.: 2013-1304-005
Data: 5/6/2015
Test Designation: B-20
Performed By: Devon Gwaba

B-20		
Elapsed time(min)	Water level (ft)	Water level (in)
0	2.23	26.76
10	2.27	27.24
20	2.28	27.36
30	2.29	27.48
40	2.29	27.48
50	2.30	27.6
60	2.31	27.72
70	2.31	27.72
80	2.32	27.84
90	2.33	27.96

Rate = 0.7 in/hr

All water levels are relative to top of pavement.



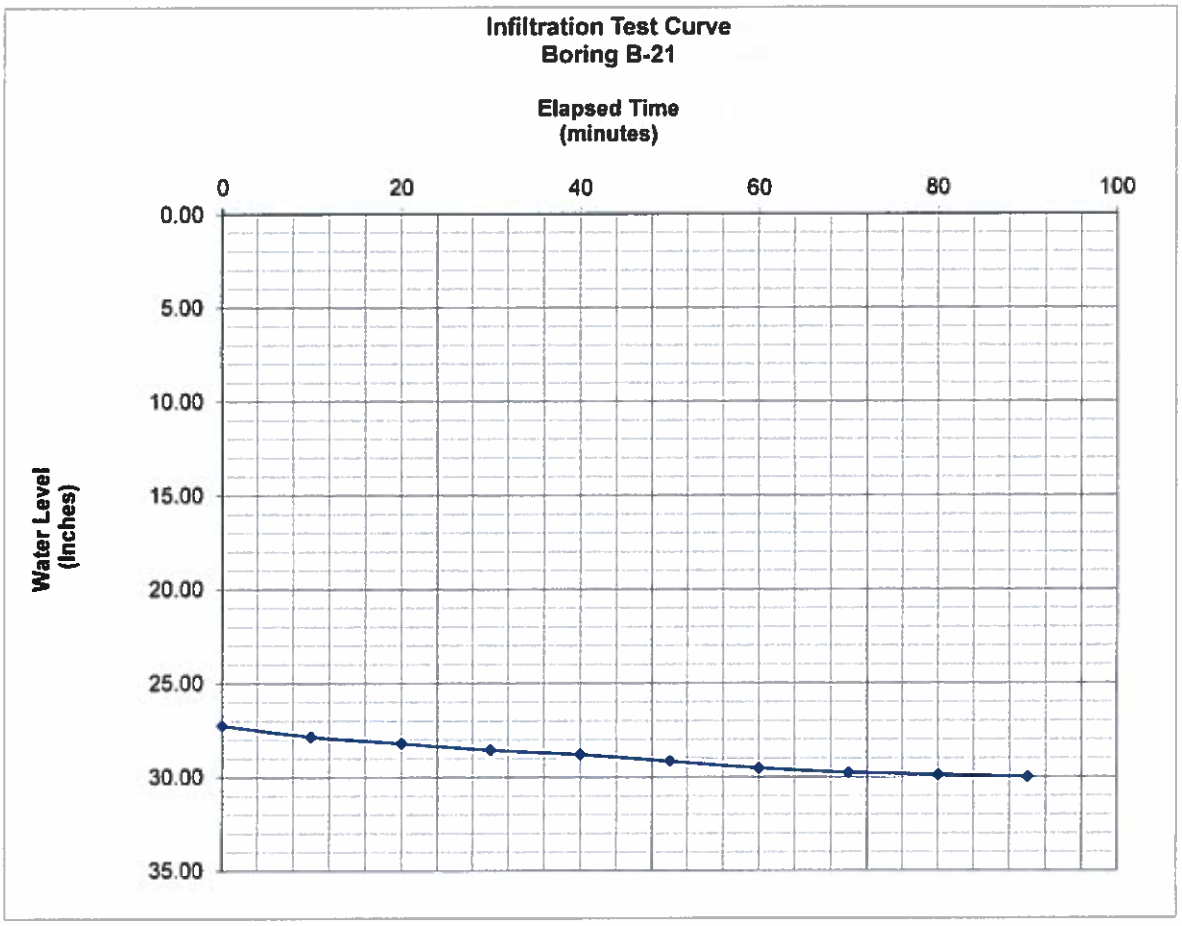
INFILTRATION RATE TEST SUMMARY

Project Name: Boone Boulevard Green Project
ATC+CERM Project No.: 2013-1304-005
Data: 5/8/2015
Test Designation: B-21
Performed By: Devon Gwaba

B-21		
Elapsed time(min)	Water level (ft)	Water level (in)
0	2.27	27.24
10	2.32	27.84
20	2.35	28.20
30	2.38	28.56
40	2.40	28.80
50	2.43	29.16
60	2.46	29.52
70	2.48	29.76
80	2.49	29.88
90	2.50	30.00

Rate = 1.4 in/hr

All water levels are relative to top of pavement.



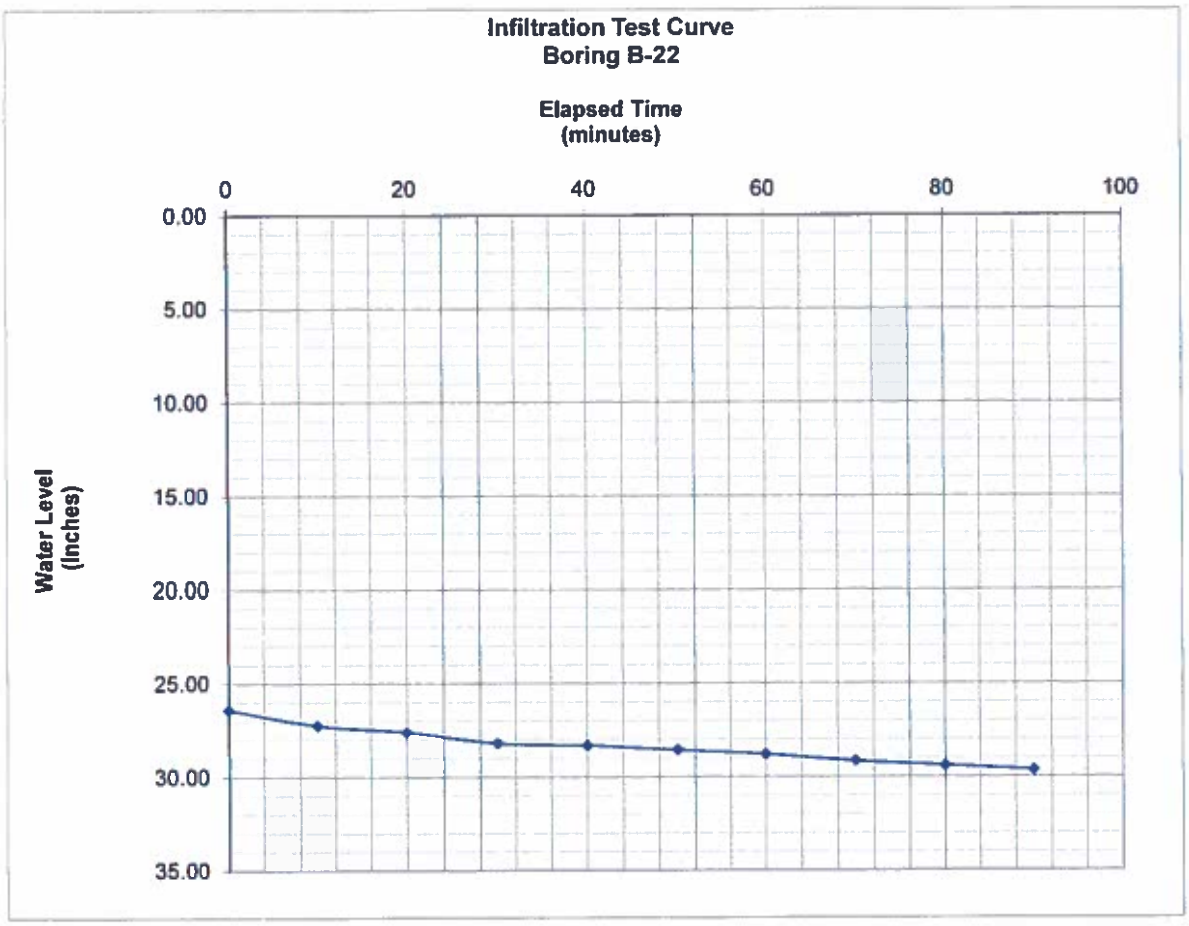
INFILTRATION RATE TEST SUMMARY

Project Name: Boone Boulevard Green Project
ATC+CERM Project No.: 2013-1304-005
Data: 5/5/2015
Test Designation: B-22
Performed By: Devon Gwaba

B-22		
Elapsed time(min)	Water level (ft)	Water level (in)
0	2.20	26.4
10	2.27	27.24
20	2.30	27.6
30	2.35	28.2
40	2.36	28.32
50	2.38	28.56
60	2.40	28.8
70	2.43	29.16
80	2.45	29.4
90	2.47	29.64

Rate = 1.4 in/hr

All water levels are relative to top of pavement.



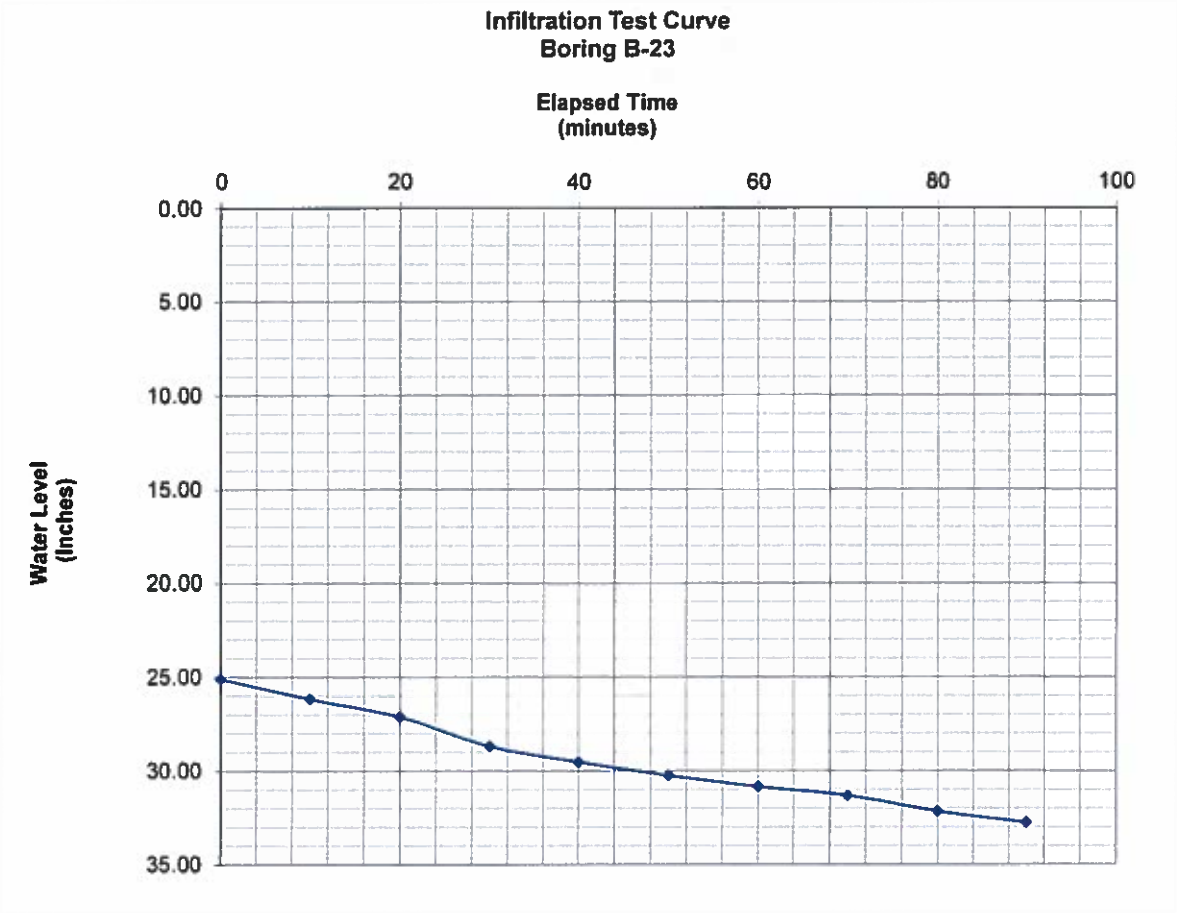
INFILTRATION RATE TEST SUMMARY

Project Name: Boone Boulevard Green Project
ATC+CERM Project No.: 2013-1304-005
Data: 5/8/2015
Test Designation: B-23
Performed By: Devon Gwaba

B-23		
Elapsed time(min)	Water level (ft)	Water level (in)
0	2.09	25.08
10	2.18	26.16
20	2.26	27.12
30	2.39	28.68
40	2.46	29.52
50	2.52	30.24
60	2.57	30.84
70	2.61	31.32
80	2.68	32.16
90	2.73	32.76

Rate = 3.8 in/hr

All water levels are relative to top of pavement.



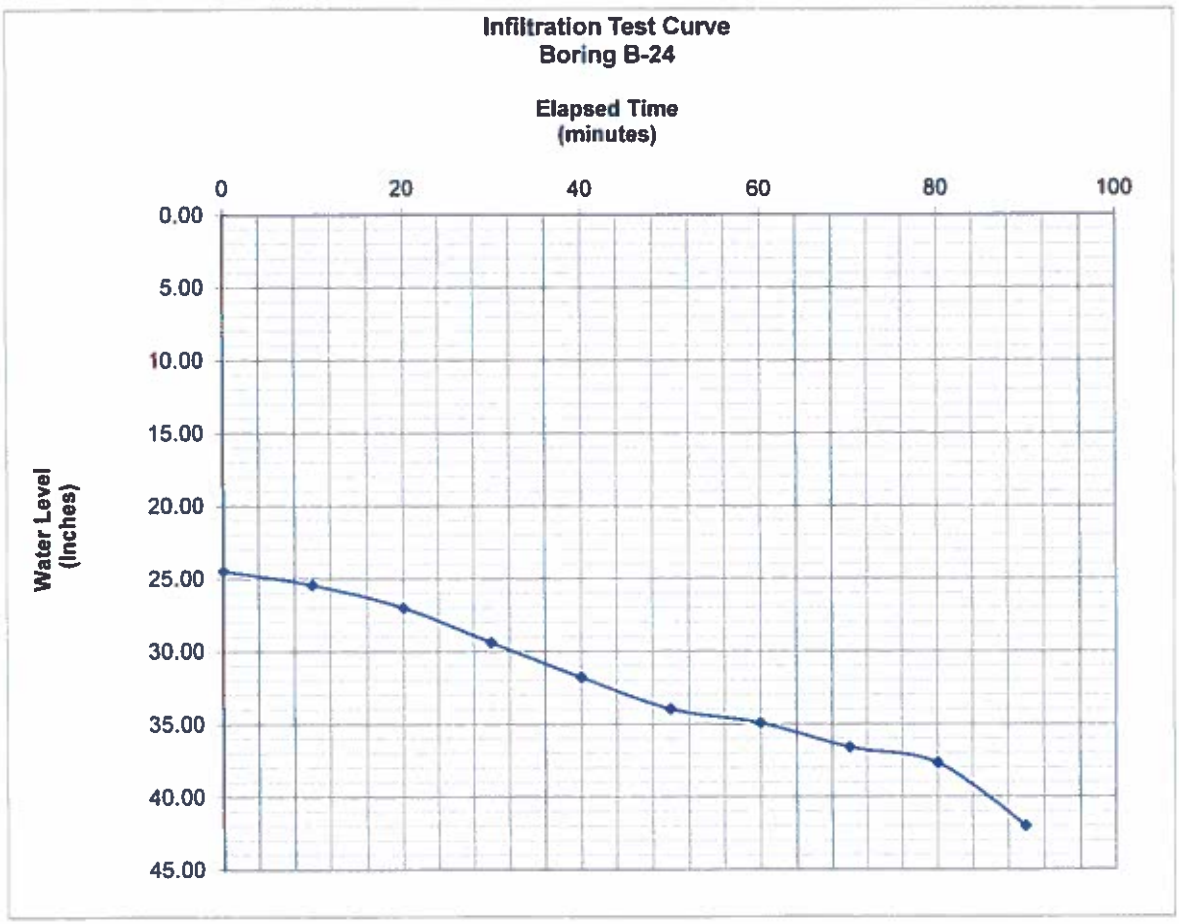
INFILTRATION RATE TEST SUMMARY

Project Name: Boone Boulevard Green Project
ATC+CERM Project No.: 2013-1304-005
Data: 5/5/2015
Test Designation: B-24
Performed By: Devon Gwaba

B-24		
Elapsed time(min)	Water level (ft)	Water level (in)
0	2.04	24.48
10	2.12	25.44
20	2.25	27.00
30	2.45	29.40
40	2.65	31.80
50	2.83	33.96
60	2.91	34.92
70	3.05	36.60
80	3.14	37.68
90	3.50	42.00

Rate = 7.4 in/hr

All water levels are relative to top of pavement.



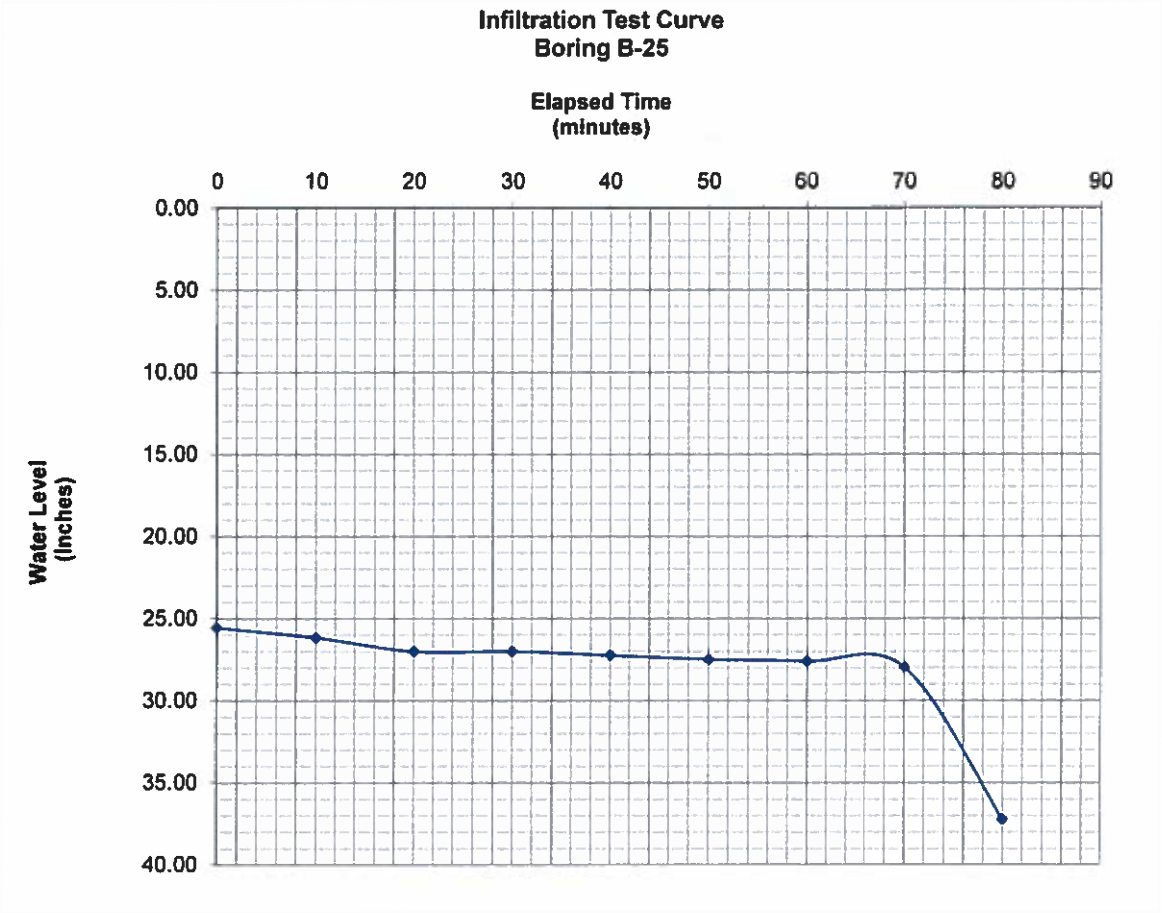
INFILTRATION RATE TEST SUMMARY

Project Name: Boone Boulevard Green Project
ATC+CERM Project No.: 2013-1304-005
Data: 5/5/2015
Test Designation: B-25
Performed By: Devon Gwaba

B-25		
Elapsed time(min)	Water level (ft)	Water level (in)
0	2.13	25.56
10	2.18	26.16
20	2.25	27.00
30	2.25	27.00
40	2.27	27.24
50	2.29	27.48
60	2.30	27.6
70	2.33	27.96
80	3.10	37.20

Rate = 19.4 in/hr

All water levels are relative to top of pavement.



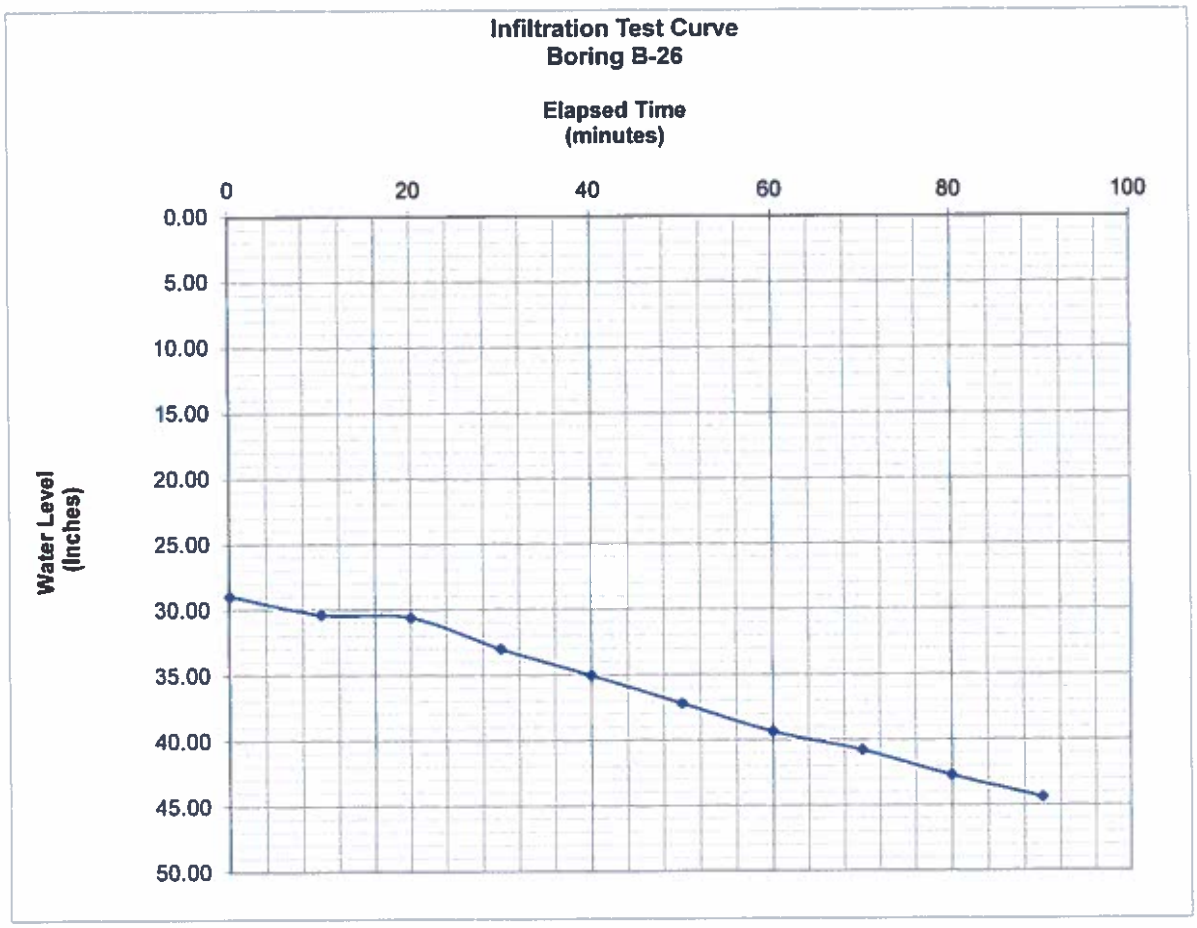
INFILTRATION RATE TEST SUMMARY

Project Name: Boone Boulevard Green Project
ATC+CERM Project No.: 2013-1304-005
Data: 5/5/2015
Test Designation: B-26
Performed By: Devon Gwaba

B-26		
Elapsed time(min)	Water level (ft)	Water level (in)
0	2.41	28.92
10	2.53	30.36
20	2.55	30.60
30	2.75	33.00
40	2.92	35.04
50	3.10	37.20
60	3.28	39.36
70	3.40	40.80
80	3.56	42.72
90	3.70	44.40

Rate = 10.1 in/hr

All water levels are relative to top of pavement.



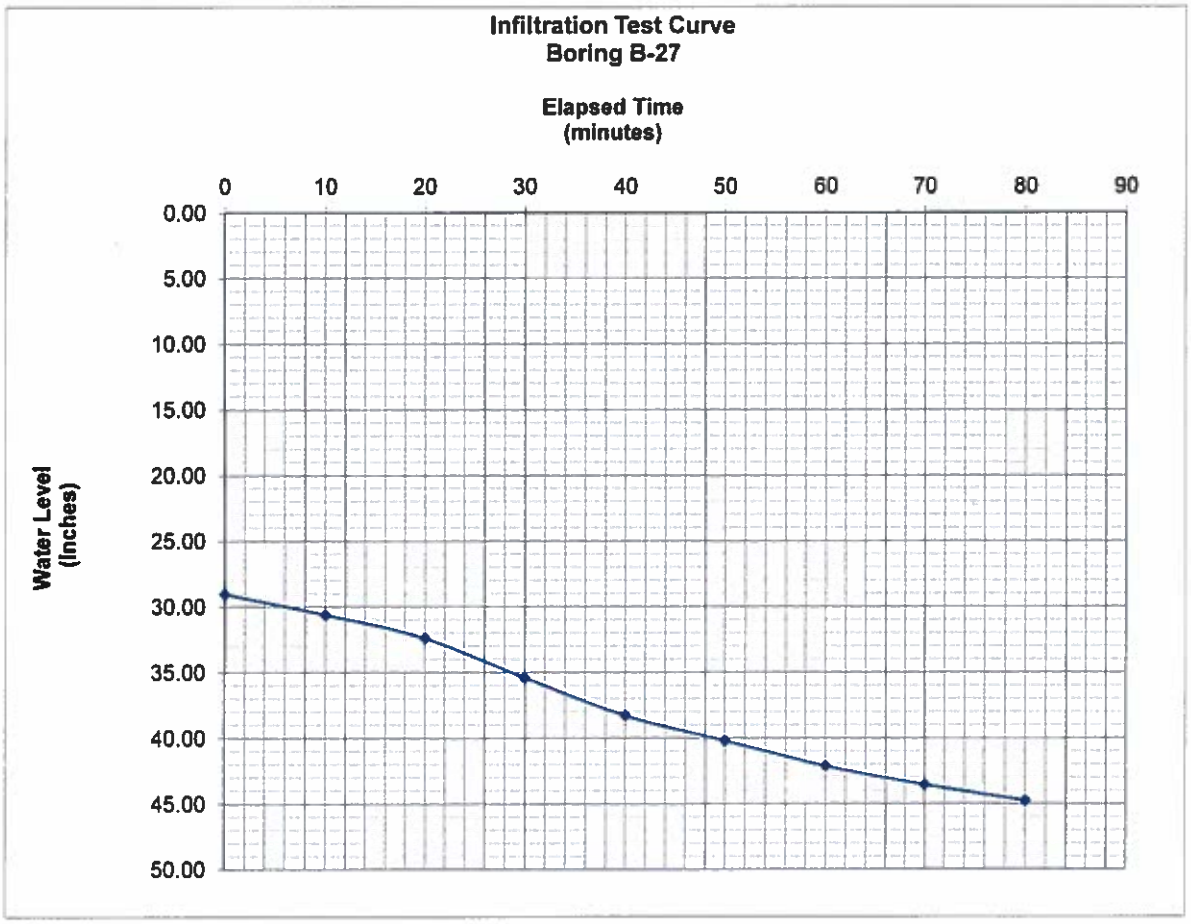
INFILTRATION RATE TEST SUMMARY

Project Name: Boone Boulevard Green Project
ATC+CERM Project No.: 2013-1304-005
Data: 5/5/2015
Test Designation: B-27
Performed By: Devon Gwaba

B-27		
Elapsed time(min)	Water level (ft)	Water level (in)
0	2.42	29.04
10	2.55	30.6
20	2.70	32.4
30	2.95	35.4
40	3.19	38.28
50	3.35	40.2
60	3.51	42.12
70	3.63	43.56
80	3.73	44.76

Rate =	7.9 in/hr

All water levels are relative to top of pavement.



02.04.2016 11:16

1

02.04.2016 11:10

2

02 04 2016 11:52

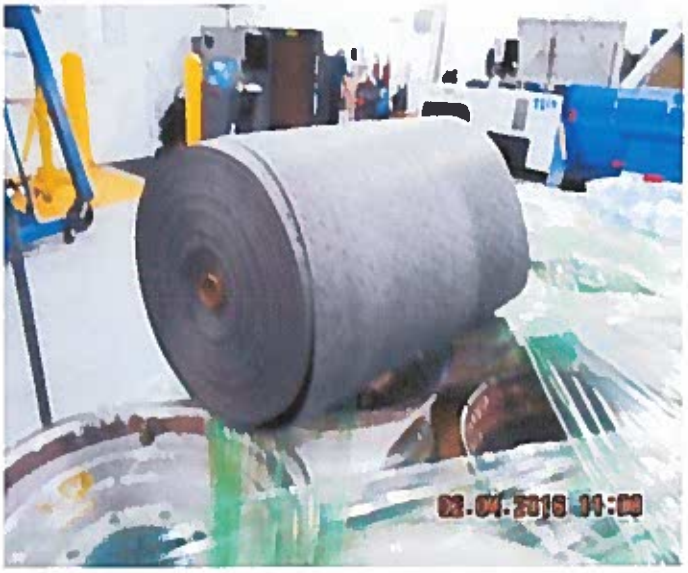
3

02.04.2016 11:51

4

02 04 2016 11:08

5


02.04.2016 11:08

6

C-2

TRAFFIC STUDY

JOSEPH E. BOONE BOULEVARD ROAD DIET
CITY OF ATLANTA DEPARTMENT OF WATERSHED MANAGEMENT
TRAFFIC STUDY

APRIL 2015

BC/DHA
A JOINT VENTURE

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Appendix B: 2014 Synchro Results
Appendix C: 2024 Synchro Results
Appendix D: Synchro Results for Modified Lowery Boulevard Configuration
Appendix E: Concept Drawings

BC / DHA
A JOINT VENTURE

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INTRODUCTION

Location

Joseph E. Boone Boulevard begins west of the intersection of Ivan Allen Jr. Boulevard and Northside Drive. It continues westward for 4 miles to Hamilton E. Holmes Drive. Boone Boulevard functions as the northern border of the Vine City and Washington Park neighborhoods and the southern border of the English Avenue and Bankhead neighborhoods. This study examines the portion of Boone Boulevard between Northside Drive to the east and Mayson Turner Road to the west, as illustrated in Figure 1. The segment is 1.2 miles long and is intersected by 19 streets, 7 at signalized intersections. The western termination of the segment sits adjacent to the future path of the Atlanta Beltline greenway and multi-use trail. The entirety of this segment is included in the City of Atlanta's Cycle Atlanta plan as a core corridor for an east-west bike route connecting the Grove Park neighborhood through Downtown to Poncey-Highland.

Figure 1, Aerial of Joseph E. Boone Boulevard with Signalized Cross-Streets

Boone Boulevard Green Infrastructure Conceptual Design

The Boone Boulevard Green Infrastructure Conceptual Design (BBGICD) was produced by the City of Atlanta with technical assistance from U.S. Environmental Protection Agency in March 2014. The report defines a conceptual design for the installation of green infrastructure along Boone Boulevard from Maple Street to James P. Brawley Drive. This infrastructure was designed to be constructed within the space between the existing curbs and includes, along with other elements, bioretention systems, extended planting strips and permeable pavements. A separate plan to implement a road diet along Boone Boulevard as part of an overall greater redevelopment plan would provide the necessary space within existing curblines to add the proposed green infrastructure. The proposed road diet would take this four-lane segment and convert it to two lanes with a complementary 5 foot bike line in each direction.

ALTERNATIVES ANALYSIS METHODOLOGY

In this study, the methodology used for evaluating traffic operations at intersections is based on the criteria that is set forth in the Transportation Research Board's Highway Capacity Manual 2010 (HCM). The HCM is the standard recognized manual for conducting traffic analysis throughout the country. Trafficware Synchro 8 software, which emulates the HCM methodology, was used for the analysis. The following is a description of the methodology employed for the analysis of signalized intersections.

Level of service (LOS) for a signalized intersection is a qualitative measure and is defined in terms of control delay per vehicle (in seconds per vehicle). Control delay refers to the portion of total delay that can be attributed to the traffic signal operation for signalized intersections. Control delay depends upon a number of variables including traffic volumes, lane configuration, the quality of progression of traffic from adjacent intersections, the cycle length, and the ratio of green time to the cycle length. The level of service criteria for signalized intersections, based on control delay, is shown in Table 1. Level of service A indicates operations with very low control delay while level of service F describes operations with extremely high control delay. Level of service F is considered to be unacceptable by most drivers. Level of service D is typically considered to be the limit of acceptable delay in urbanized areas.

Table 1, Level of Service Criteria for Signalized Intersections

Level of Service	Control Delay per Vehicle (s/veh.)
A	< 10
B	>10 - 20
C	>20 - 35
D	>35 - 55
E	>55 - 80
F	>80

Source: Highway Capacity Manual 2000

EXISTING CONDITIONS

Cross Sections

Over the full length of this corridor, Boone Boulevard passes through three distinct areas with differing widths and two discrete cross sections. From Northside Drive to Vine Street, Boone Boulevard is approximately 40 feet wide from curb to curb. At Vine Street, the road widens out to 45 feet, which is maintained until Lowery Boulevard. From Northside Drive to Lowery Boulevard, Boone Boulevard has four lanes, two in each direction as shown in Figure 2. This segment includes bicycle shared-lane markings, commonly called sharrows, which alert drivers to the presence of cyclists and help to laterally position cyclists. There is also an auxiliary left turn lane at Northside Drive. From Lowery Boulevard west to Mayson Turner Road, Boone Boulevard is approximately 32 feet wide and is a three-lane road with two westbound lanes and a single eastbound lane as shown in Figure 3. There are no auxiliary turn lanes or bicycle facilities in this segment.

Figure 2, Existing Cross Section between Northside Drive and Joseph E. Lowery Boulevard

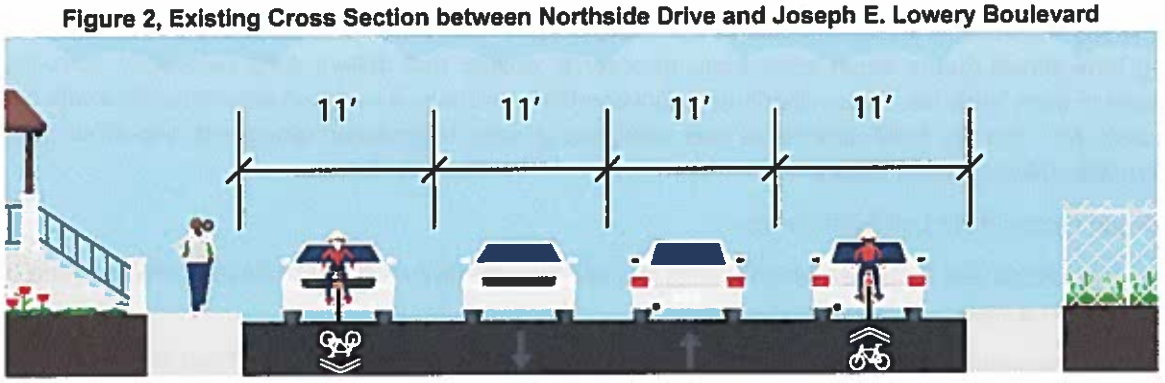
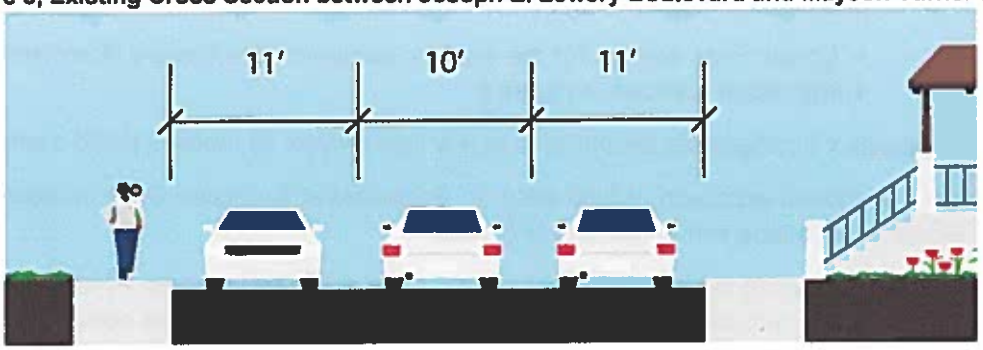


Figure 3, Existing Cross Section between Joseph E. Lowery Boulevard and Mayson Turner Road



Bus Route

MARTA's Route 51 travels along the corridor with a peak frequency of 4 buses per hour (headway of 15 minutes). There are 28 stops within the study area. There are two existing shelters, one serving the eastbound direction at Lowery Boulevard and the other serving the eastbound stop at Vine Street. All other stops are marked by a sign with no significant customer amenities. The route is primarily a commuter line, with users boarding the eastbound buses into the city in the morning and deboarding from westbound buses at the end of the workday.

INTERSECTION OPERATIONS ANALYSIS

2014 Intersection Operations

Traffic volumes were measured at each signalized intersection between Northside Drive and Mayson Turner Road along Boone Boulevard. These counts included the AM and PM peak hours (7AM - 9AM and 4PM - 6PM) and were performed in June 2014. These counts were performed at:

- Northside Drive
- Vine Street
- Sunset Avenue
- James P. Brawley Drive
- Joseph E. Lowery Boulevard
- Tazor Street
- Mayson Turner Road

The counts showed low side street volumes on many streets and specifically recorded no southbound traffic along Vine Street during either peak hour. In order to ensure that delays were calculated correctly, 10 vehicles in each peak hour were distributed between the motions in a way that was consistent with nearby cross-streets. The No Build alternative was analyzed at each intersection along with two other potential design alternatives, which include:

- Road Diet with No Left Turn Lanes
    - Road diet is applied which results in a two-lane roadway with a bicycle lane on each side of the roadway
    - Any extra width in the roadway is used for the green infrastructure outlined in the BBGICD
        - A typical cross section for the eastern segment from Northside Drive to Lowery Boulevard is shown in Figure 4
        - A typical cross section for the western segment from Lowery Boulevard to Mayson Turner Road is shown in Figure 5
    - No auxiliary turning lanes are included at any intersection; all motions share a single lane
    - The westbound approach of Ivan Allen Jr. Boulevard at Northside Drive is reconfigured to a single through lane and a right turn only lane
    - Intersections using this alternative maximize space available for green infrastructure and other amenities and reduce the locations where conflicts with the bike lanes occur
    - Intersections without dedicated left turn lanes have a heightened potential for rear end collisions and possible delays to the through movement not seen in the Synchro models
- Road Diet with Left Turn Lanes at all Signalized Intersections
    - Road diet is applied which results in a two-lane roadway with a bicycle lane on each side of the roadway
    - An auxiliary left turn lane is added to the east- and westbound approaches at each intersection which currently has a traffic signal

- Any extra width in the roadway is used for the green infrastructure outlined in the BBGICD
  - A typical cross section for the eastern segment from Northside Drive to Lowery Boulevard is shown in Figure 4
  - A typical cross section for the western segment from Lowery Boulevard to Mayson Turner Road is shown in Figure 5
- The westbound approach of Ivan Allen Jr. Boulevard at Northside Drive is reconfigured to a single through lane and a right turn only lane
- Intersections using this alternative severely restrict space available for green infrastructure
- At all signalized intersections west of Lowery Boulevard there is insufficient width available for both a left turn lane and two bike lanes. Thus this alternative is in direct conflict with the bike lanes at these intersections. For the purposes of traffic analysis, the configuration with left turn lanes was considered, but this configuration is not compatible with the goals of including bike lanes and green infrastructure and will be removed from the final recommendation
- The addition of left turn lanes will reduce the potential for rear end collisions and remove potential delays to the through movement due to turning vehicles

Both alternatives were analyzed under the assumption that signal splits would potentially change to optimize intersection delay but that cycle lengths would not be altered. All left turns in the alternatives operate in permissive mode, except for Northside Drive which has protected-permissive left turns. All signals – except for Northside Drive – currently use an 80 second cycle length. An ideal timing scheme with that cycle length was found for each intersection during each peak hour under current traffic volumes. These timing schemes were then applied to all alternatives.

Figure 4, Proposed Road Diet Cross Section between Northside Drive and Joseph E. Lowery Boulevard

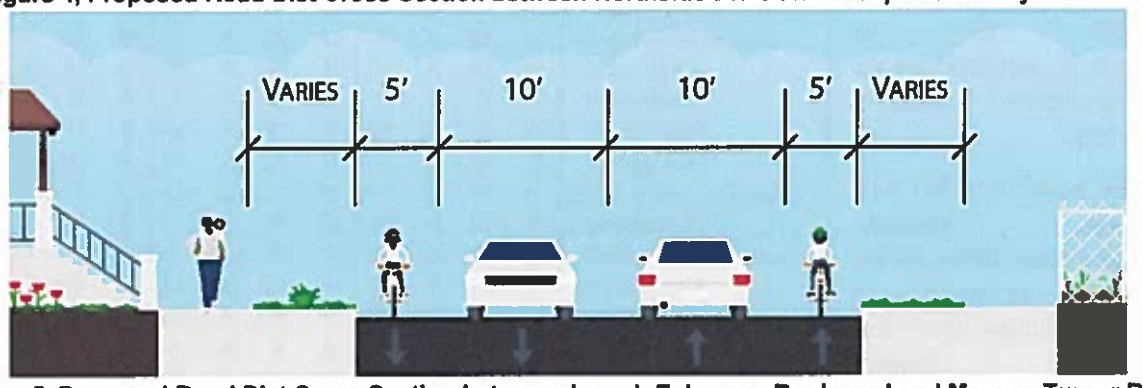
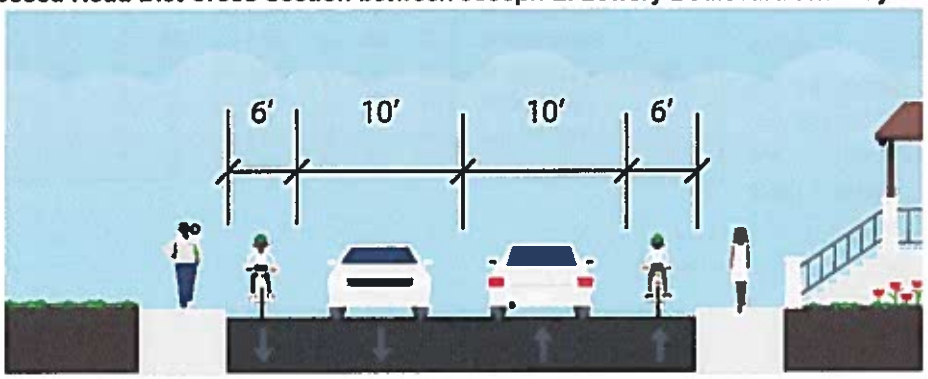


Figure 5, Proposed Road Diet Cross Section between Joseph E. Lowery Boulevard and Mayson Turner Road



Capacity Analysis

The results of the analyses for measured 2014 traffic volumes are shown in Table 2, which shows the expected delay and Level of Service (LOS) for each intersection and each approach. Synchro reports for each intersection are included in the appendix of this report. Table 2 shows the following:

- All alternatives operate with an acceptable LOS on all approaches during both peak hours except for Northside Drive, whose eastbound approach is currently LOS E in the no-build alternative
- The Road Diet reduces the number of through lanes at this intersection, resulting in an increase in delay for the eastbound and westbound movements in both road diet alternatives
- The westbound movement changes from LOS E to LOS F, but the overall intersection remains LOS D
- The addition of left turn lanes reduces intersection delay during at least one peak hour at the Northside Drive and Joseph Lowery Boulevard intersections
- Intersection delay reductions gained by the addition of left turn lanes, where present, are generally minor (less than 5 seconds)

Table 2, Peak Hour Level of Service (LOS) and Delay, 2014 Opening Year

Cross Street Approach	No Build				Road Diet-No Left Turn Lanes				Road Diet-Aux. Left Turn Lanes			
	AM		PM		AM		PM		AM		PM	
Northside Dr	**C**	**26**	**D**	**38**	**D**	**39**	**D**	**41**	**C**	**34**	**D**	**42**
Eastbound	D	52	E	64	F	160	F	109	F	124	F	104
Westbound	D	45	D	36	D	45	D	35	D	50	D	42
Northbound	C	23	C	29	C	24	C	29	C	23	C	29
Southbound	B	14	D	40	B	14	D	40	B	14	D	40
Vine St	**A**	**4**	**A**	**6**	**A**	**5**	**A**	**7**	**A**	**5**	**A**	**7**
Eastbound	A	3	A	3	A	3	A	3	A	3	A	3
Westbound	A	6	A	6	A	6	A	7	A	6	A	7
Northbound	C	22	C	22	C	22	C	22	C	22	C	22
Southbound	C	22	C	22	C	22	C	22	C	22	C	22
Sunset Ave	**A**	**5**	**A**	**6**	**A**	**6**	**A**	**7**	**A**	**6**	**A**	**7**
Eastbound	A	4	A	5	A	4	A	6	A	4	A	6
Westbound	A	5	A	5	A	5	A	6	A	5	A	6
Northbound	B	19	B	19	B	19	B	19	B	19	B	19
Southbound	B	18	B	18	B	18	B	18	B	18	B	18
James Brawley Dr	**B**	**12**	**A**	**9**	**B**	**13**	**A**	**10**	**B**	**12**	**A**	**9**
Eastbound	B	13	A	10	B	14	B	11	B	14	A	10
Westbound	A	6	A	6	A	6	A	7	A	6	A	6
Northbound	B	19	B	19	B	19	B	19	B	19	B	19
Southbound	B	18	B	19	B	18	B	19	B	18	B	19
Joseph Lowery Blvd	**B**	**12**	**B**	**17**	**B**	**12**	**C**	**21**	**B**	**12**	**B**	**17**
Eastbound	B	16	B	11	B	16	B	11	B	15	B	11
Westbound	C	24	C	26	C	25	D	40	C	25	C	27
Northbound	A	10	B	12	A	10	B	12	A	10	B	12
Southbound	A	9	B	15	A	9	B	15	A	9	B	15
Tazor St	**A**	**4**	**A**	**6**	**A**	**4**	**A**	**9**	**A**	**4**	**A**	**7**
Eastbound	A	4	A	6	A	4	A	6	A	3	A	5
Westbound	A	4	A	6	A	4	B	11	A	4	A	8
Southbound	C	26	C	22	C	26	C	22	C	26	C	22
Mayson Turner Rd	**A**	**7**	**B**	**11**	**A**	**8**	**A**	**9**	**A**	**8**	**B**	**11**
Eastbound	A	6	A	9	A	6	A	9	A	6	A	9
Westbound	A	5	B	10	A	6	A	8	A	6	B	11
Northbound	C	22	B	19	C	22	B	19	C	22	B	19

2024 Intersection Operations

Traffic Projection

The opening year for this road diet is 2014, while the design year is 2024. A compound annual growth rate of 3% was applied to the 2014 volumes to develop 2024 volumes. This 3% growth rate is based on expected residential and employment growth for the neighborhoods through which Boone Boulevard passes.

Capacity Analysis

The results of the analyses are shown in Table 3. Synchro reports for each intersection are included in the appendix of this report. Table 3 shows the following:

- All alternatives operate with an acceptable LOS on all approaches during both peak hours except for the Joseph Lowery Boulevard and Northside Drive intersections
- The westbound Movement at Joseph Lowery Boulevard operates at LOS F with a delay of 132 seconds in the Road Diet with No Left Turn Lanes alternative
- The Northside Drive eastbound approach is LOS E in the no-build condition
- The Road Diet reduces the number of through lanes at this intersection, resulting in an increase in delay for the eastbound and westbound movements
- The eastbound and westbound movements changes from LOS E to LOS F and the overall intersection changes from LOS D in the AM peak hour to LOS E/F and from LOS E in the PM peak hour to LOS F.

Table 3, Peak Hour Level of Service (LOS) and Delay, 2024 Design Year

Cross Street Approach	No Build				Road Diet-No Left Turn Lanes				Road Diet-Aux. Left Turn Lanes			
	AM		PM		AM		PM		AM		PM	
Northside Dr	**D**	**48**	**E**	**76**	**E**	**74**	**F**	**93**	**E**	**62**	**F**	**81**
Eastbound	E	60	E	66	F	162	F	179	F	123	F	112
Westbound	E	67	E	70	F	84	F	118	E	77	F	117
Northbound	D	49	C	33	E	60	C	34	E	56	C	32
Southbound	C	28	F	98	E	69	F	98	D	38	F	83
Vine St	**A**	**5**	**A**	**6**	**A**	**5**	**A**	**8**	**A**	**5**	**A**	**8**
Eastbound	A	3	A	3	A	3	A	3	A	3	A	3
Westbound	A	6	A	6	A	5	A	8	A	6	A	8
Northbound	C	22	C	22	C	23	C	22	C	22	C	22
Southbound	C	22	C	22	C	24	C	22	C	22	C	22
Sunset Ave	**A**	**5**	**A**	**6**	**A**	**6**	**A**	**7**	**A**	**6**	**A**	**7**
Eastbound	A	4	A	5	A	4	A	6	A	4	A	6
Westbound	A	5	A	5	A	5	A	6	A	6	A	6
Northbound	B	19	B	19	C	22	B	19	B	19	B	19
Southbound	B	18	B	19	C	21	B	19	B	18	B	19
James Brawley Dr	**B**	**12**	**A**	**10**	**B**	**12**	**B**	**11**	**B**	**13**	**B**	**10**
Eastbound	B	13	B	11	B	13	B	13	A	15	B	12
Westbound	A	6	A	6	A	6	A	7	A	6	A	7
Northbound	B	19	B	19	C	20	B	19	B	19	B	19
Southbound	B	19	B	19	B	20	B	19	B	19	B	19
Joseph Lowery Blvd	**B**	**13**	**C**	**20**	**B**	**13**	**D**	**48**	**B**	**13**	**C**	**20**
Eastbound	B	17	B	14	B	17	B	14	B	16	B	13
Westbound	C	24	C	31	C	27	F	132	C	26	C	31
Northbound	B	11	B	13	B	11	B	13	B	11	B	13
Southbound	B	10	C	21	A	10	C	21	B	10	C	21
Tazor St	**A**	**4**	**A**	**8**	**A**	**6**	**B**	**10**	**A**	**4**	**A**	**9**
Eastbound	A	4	A	6	A	5	A	6	A	4	A	6
Westbound	A	4	A	9	A	8	B	13	A	5	A	10
Southbound	C	26	C	22	C	23	C	22	C	26	C	22
Mayson Turner Rd	**A**	**8**	**B**	**10**	**A**	**8**	**A**	**9**	**A**	**8**	**B**	**11**
Eastbound	A	7	A	9	A	7	A	9	A	7	A	9
Westbound	A	6	A	9	A	5	A	8	A	6	B	10
Northbound	C	22	B	19	C	22	B	19	C	22	B	19

Left Turn Lane Analysis

In addition to operations analysis, the American Association of State Highway and Transportation Officials (AASHTO) and the Georgia Department of Transportation (GDOT) provide guidance as to where left turn lanes are needed in

A Policy on Geometric Design of Highways and Streets, and *Driveway and Encroachment Manual* respectively. AASHTO's guidance is based on peak hour conditions while GDOT's guidance is based on daily traffic. In order to approximate daily turn volumes, a typical peak to daily ratio of 0.09 was assumed and applied to the recorded volumes. The results of analyses based on AASHTO, GDOT and traffic operations are summarized in Tables 4 and 5. Table 4 shows the analyses for the 2014 recorded volumes and Table 5 shows the analyses for the 2024 projected volumes. Based on these results, it is recommended that a left turn lane be provided in both directions at Northside Drive. Considerations for left turn lanes at other notable intersections are discussed below.

Table 4, Left Turn Lane Analyses, 2014 Opening Year

Cross Street	AASHTO Guidance (1)	AM EB	AM WB	PM EB	PM WB	GDOT Guidance (2)	AM EB	AM WB	PM EB	PM WB	Delay Reduction (1)(3)	AM EB	AM WB	PM EB	PM WB	Left Turn Lane Recommended EB	WB
Northside Drive	Opposing Volume	344	456	1070	282	Approx LTV/day	1222	2167	556	7200	Delay Reduced w/LTL (s)	40	N/A	0	N/A	Y	Y
	Advancing Volume	456	344	282	1070												
	% Left Turns	24%	57%	18%	61%												
	Recommend LTL?	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes		Yes		No			
Vine Street	Opposing Volume	110	285	325	158	Approx LTV/day	56	0	67	0	Delay Reduced w/LTL (s)	0	0	0	0	N	N
	Advancing Volume	285	110	158	325												
	% Left Turns	2%	0%	4%	0%												
	Recommend LTL?	No	No	No	No		No	No	No	No		No	No	No	No		
Sunset Avenue	Opposing Volume	115	272	316	198	Approx LTV/day	22	56	78	0	Delay Reduced w/LTL (s)	0	0	0	0	N	N
	Advancing Volume	272	115	198	316												
	% Left Turns	1%	4%	4%	0%												
	Recommend LTL?	No	No	No	No		No	No	No	No		No	No	No	No		
Brawley Drive	Opposing Volume	125	248	340	201	Approx LTV/day	89	233	178	178	Delay Reduced w/LTL (s)	0	0	0	0	N	N
	Advancing Volume	248	125	201	340												
	% Left Turns	3%	17%	6%	5%												
	Recommend LTL?	No	No	No	No		No	Yes	No	No		No	No	No	No		
Lowery Boulevard	Opposing Volume	132	178	404	190	Approx LTV/day	244	256	222	1467	Delay Reduced w/LTL (s)	1	0	0	10	N	Y
	Advancing Volume	178	132	190	404												
	% Left Turns	12%	17%	11%	33%												
	Recommend LTL?	No	No	No	Yes		Yes	Yes	Yes	Yes		Yes	No	No	Yes		
Tazor Street	Opposing Volume	116	186	300	178	Approx LTV/day	78	0	44	0	Delay Reduced w/LTL (s)	0	0	0	0	N	N
	Advancing Volume	186	116	178	300												
	% Left Turns	4%	0%	2%	0%												
	Recommend LTL?	No	No	No	No		No	No	No	No		No	No	No	No		
Mayson Turner Road	Opposing Volume	104	196	278	189	Approx LTV/day	0	78	0	389	Delay Reduced w/LTL (s)	0	0	0	0	N	N
	Advancing Volume	196	104	189	278												
	% Left Turns	0%	7%	0%	13%												
	Recommend LTL?	No	No	No	No		No	No	No	Yes		No	No	No	No		

(1) Primary consideration for left turn need

(2) Secondary consideration for left turn need. Daily turn volume estimated from peak hour volume and assumed 0.09 k-factor

(3) Delay rounded to the nearest 10 seconds

Table 5, Left Turn Analyses, 2024 Design Year

Cross Street	AASHTO Guidance (1)	AM EB	AM WB	PM EB	PM WB	GDOT Guidance (2)	AM EB	AM WB	PM EB	PM WB	Delay Reduction (1)(3)	AM EB	AM WB	PM EB	PM WB	Left Turn Lane Recommended EB	WB
Northside Drive	Opposing Volume	344	456	1070	282	Approx LTV/day	1222	2167	556	7200	Delay Reduced w/LTL (s)	90	N/A	40	N/A	Y	Y
	Advancing Volume	456	344	282	1070												
	% Left Turns	24%	57%	18%	61%												
	Recommend LTL?	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes		Yes		Yes			
Vine Street	Opposing Volume	148	383	437	212	Approx LTV/day	78	0	89	0	Delay Reduced w/LTL (s)	0	0	0	0	N	N
	Advancing Volume	383	148	212	437												
	% Left Turns	2%	0%	4%	0%												
	Recommend LTL?	No	No	No	No		No	No	No	No		No	No	No	No		
Sunset Avenue	Opposing Volume	155	366	425	266	Approx LTV/day	33	78	100	0	Delay Reduced w/LTL (s)	0	0	0	0	N	N
	Advancing Volume	366	155	266	425												
	% Left Turns	1%	5%	3%	0%												
	Recommend LTL?	No	No	No	No		No	No	No	No		No	No	No	No		
Brawley Drive	Opposing Volume	167	334	457	271	Approx LTV/day	122	311	244	244	Delay Reduced w/LTL (s)	0	0	0	0	N	N
	Advancing Volume	334	167	271	457												
	% Left Turns	3%	17%	8%	5%												
	Recommend LTL?	No	No	No	No		No	Yes	Yes	Yes		No	No	No	No		
Lowery Boulevard	Opposing Volume	178	240	542	256	Approx LTV/day	333	344	300	1967	Delay Reduced w/LTL (s)	0	0	0	100	N	Y
	Advancing Volume	240	178	256	542												
	% Left Turns	13%	17%	11%	33%												
	Recommend LTL?	No	No	No	Yes		Yes	Yes	Yes	Yes		No	No	No	Yes		
Tazor Street	Opposing Volume	156	250	403	239	Approx LTV/day	100	0	56	0	Delay Reduced w/LTL (s)	0	0	0	0	N	N
	Advancing Volume	250	156	239	403												
	% Left Turns	4%	0%	2%	0%												
	Recommend LTL?	No	No	No	No		No	No	No	No		No	No	No	No		
Mayson Turner Road	Opposing Volume	139	263	374	254	Approx LTV/day	0	100	0	522	Delay Reduced w/LTL (s)	0	0	0	0	N	N
	Advancing Volume	263	139	254	374												
	% Left Turns	0%	6%	0%	13%												
	Recommend LTL?	No	No	No	Yes		No	No	No	Yes		No	No	No	No		

(1) Primary consideration for left turn need

(2) Secondary consideration for left turn need. Daily turn volume estimated from peak hour volume and assumed 0.09 k-factor

(3) Delay rounded to the nearest 10 seconds

Brawley Drive

The traffic at Brawley Drive is not projected to warrant left turn lanes. However, as a major north-south connector, it is recommended that left-turn lanes be built at this intersection as well. The existing roadway does not have sufficient width to contain travel lanes, bike lanes, green infrastructure and a left turn lane. As such, the green infrastructure should be removed for one block in each direction from the intersection in order to allow for the width needed to support the appropriate taper and turn lane lengths.

Lowery Boulevard

Notably, the traffic at Lowery Boulevard is projected to warrant a left turn lane only in the westbound direction. However, this design would create an unbalanced intersection with a shifting taper within the intersection. Therefore, it is recommended that left turn lanes be installed in both directions. West of Lowery Boulevard, the existing roadway does not have sufficient width to contain travel lanes, bike lanes and a left turn lane. As such, the bike lanes should be removed and replaced with shared lane markings (commonly known as "sharrows") for the length of the left turn lane and associated taper in both directions.

Temple Street

Temple Street intersects Boone Boulevard between Tazor Street and Mayson Turner Road. This intersection is not signalized, but Temple Street is the primary access point for Kipp Ways Academy, a public charter middle school. Beyond the nature of this analysis, the school may increase traffic such that a left turn lane would be warranted, but only for short periods through the day. In order to minimize disruption to the cycling facilities, the City of Atlanta has agreed to coordinate with the school to manage traffic such that only right turns are allowed onto Temple Street during necessary periods.

RECOMMENDATIONS

Several factors were considered in developing a recommendation regarding the alternatives tested, including traffic operations, continuity of bike lanes, and ability to provide green infrastructure. Each intersection's performance under different configurations was considered and the configuration that provided acceptable performance while preserving other elements was chosen. The recommendations are summarized below.

- For all intersections along Boone Boulevard except at Northside Drive, Joseph E. Lowery Boulevard, and at James P. Brawley Boulevard, the Road Diet with No Left Turns configuration is recommended
- At Northside Drive, Joseph E. Lowery Boulevard, and at James P. Brawley Boulevard, east- and westbound left turn lanes are recommended.

This alternative provides the best balance of effective traffic operations and safety while also providing substantial space for the green infrastructure outlined in the BBGICD. All intersections operate at LOS D or better conditions, except the intersection of Northside Drive at Boone Boulevard, which is expected to experience LOS E during the AM peak hour and LOS F during the PM peak hour.

Appendix E consists of a concept plan which shows the recommended intersection configuration and identifies potential locations for placement of green infrastructure. The preferred alternative provides some flexibility to the placement of curbside elements. The concept layout included in this report is just one example of how these elements could be incorporated into the corridor's design.

Green infrastructure is recommended on both sides of Boone Boulevard to provide treatment of storm water for both sides of the road. The width of this green infrastructure will vary, but can be expected to be between 6 feet and 7 feet wide on average. The approximate surface area of green infrastructure available in this recommendation is between 3,500 and 4,000 square yards, split between both sides of the road. This area does not include cut-outs for driveway access and made change during design.

With these treatments in place, Boone Boulevard will continue to function as an effective roadway for motorists while also being improved with new facilities for storm water retention and treatment and a dedicated lane for cyclists.

Special Considerations for the Northside Drive Intersection

The application of a road diet requires a reduction from two westbound vehicular lanes and one westbound bike lane to a single westbound vehicular lane and bike lane. As stated earlier, it is recommended that the outside westbound lane on Ivan Allen Jr. Boulevard at Northside Drive be reconfigured to a right turn only lane to accommodate the westbound lane reduction.

An approach with a through bike lane to the outside of a vehicular through lane that becomes a right turn only lane is addressed in the *NACTO Urban Bikeway Design Guide, Intersections, Through Bike Lanes, p104B*. This section indicates that cases where through travel lanes transition into right turn only lanes are generally inappropriate locations for use of through bike lanes without alternative treatments. For this specific situation, it is recommended that immediately before the intersection, cyclists be guided off of the roadway and directed to use the crosswalk at the intersection, then rejoining the bike lanes west of Northside Drive. This treatment is similar to the transition between the 10th Street cycle track and Beltline trail at Monroe Drive. Traffic-diverting measures such as bollards or raised pavement markers can be employed to indicate to cyclists that they should leave the bike lane and use the trail section to cross Northside Drive.

APPENDICES

Appendix A: Traffic Counts

Appendix B: 2014 Synchro Results

Appendix C: 2024 Synchro Results

Appendix D: Synchro Results for Modified Lowery Boulevard Configuration

Appendix E: Concept Drawings

APPENDIX A: TRAFFIC COUNTS

TRAFFIC DATA SERVICES

Phone: (678) 687-8266 Fax: (404) 294-6122 info@trafficdataservices.com

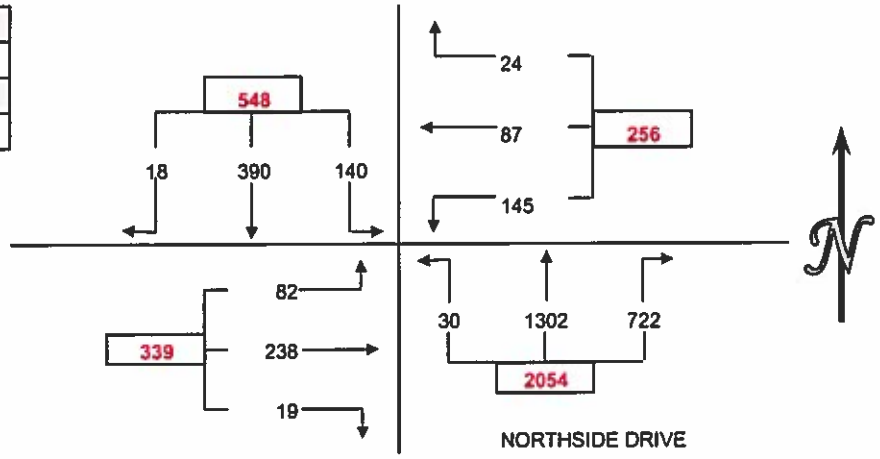
INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

CLIENT:		POND AND COMPANY
PROJECT:		CITY OF ATLANTA TRAFFIC STUDY
DATE:		TUESDAY, JUNE 10TH 2014
PERIOD:		7:00 AM TO 9:00 AM
INTERSECTION:	N/S	NORTHSIDE DRIVE
	E/W	JOSEPH E. BOONE BLVD
CITY:		ATLANTA

VEHICLE COUNTS

15 MIN COUNTS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
700-715	2	47	25	6	13	38	121	216	7	3	33	3	514
715-730	2	67	23	4	12	24	222	305	14	3	55	6	737
730-745	0	70	26	7	19	30	203	325	0	5	48	15	748
745-800	3	97	24	3	10	19	179	302	3	5	55	10	710
800-815	4	74	21	6	30	43	183	358	10	3	57	25	814
815-830	3	91	45	4	15	36	149	306	2	5	63	11	730
830-845	6	93	33	7	29	35	198	350	13	5	69	23	861
845-900	5	132	41	7	13	31	192	288	5	6	49	23	792
HOUR TOTALS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
700-800	7	281	98	20	54	111	725	1148	24	16	191	34	2709
715-815	9	308	94	20	71	116	787	1290	27	16	215	56	3009
730-830	10	332	116	20	74	128	714	1291	15	18	223	61	3002
745-845	16	355	123	20	84	133	709	1316	28	18	244	69	3115
800-900	18	390	140	24	87	145	722	1302	30	19	238	82	3197

PEAK HOUR
800-900
PEAK HOUR FACTOR
0.93



PEDESTRIAN COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-715	0	1	0	0	1
715-730	2	0	0	2	4
730-745	3	1	0	0	4
745-800	2	0	1	0	3
800-815	3	0	1	0	4
815-830	2	0	0	2	4
830-845	1	1	1	0	3
845-900	0	3	0	0	3
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL

BICYCLE COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-715	0	0	0	0	0
715-730	0	0	0	0	0
730-745	0	0	0	0	0
745-800	0	1	0	0	1
800-815	0	0	0	1	1
815-830	0	0	0	0	0
830-845	0	0	0	0	0
845-900	0	0	0	0	0
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL

PERIOD	LEG	LEG	LEG	LEG	
700-800	7	2	1	2	12
715-815	10	1	2	2	15
730-830	10	1	2	2	15
745-845	8	1	3	2	14
800-900	6	4	2	2	14

PERIOD	LEG	LEG	LEG	LEG	
700-800	0	1	0	0	1
715-815	0	1	0	1	2
730-830	0	1	0	1	2
745-845	0	1	0	1	2
800-900	0	0	0	1	1

TRAFFIC DATA SERVICES

Phone: (678) 687-8266 Fax: (404) 294-6122 info@trafficdataservices.com

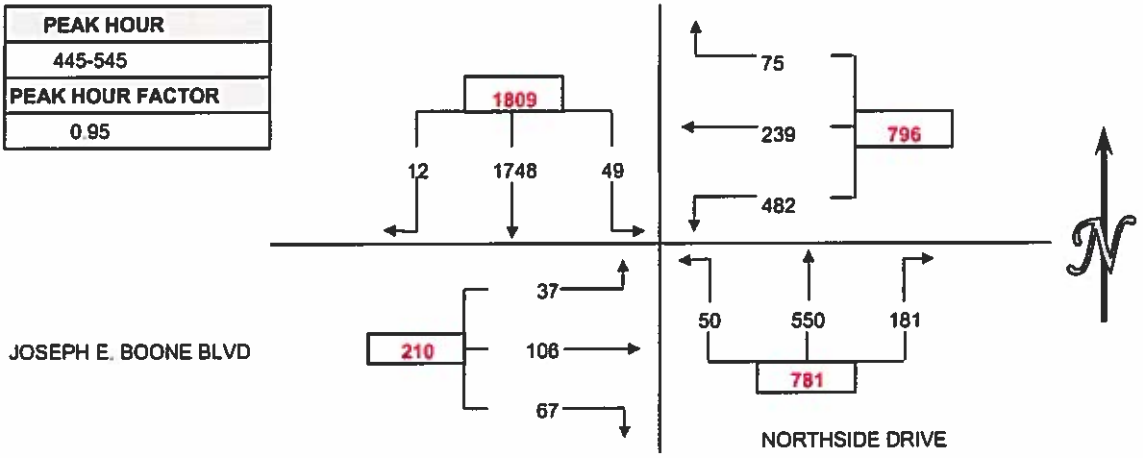
INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

CLIENT: POND AND COMPANY
PROJECT: CITY OF ATLANTA TRAFFIC STUDY
DATE: TUESDAY, JUNE 10TH 2014
PERIOD: 4:00 PM TO 6:00 PM
INTERSECTION: N/S NORTHSIDE DRIVE
E/W JOSEPH E. BOONE BLVD
CITY: ATLANTA

VEHICLE COUNTS

15 MIN COUNTS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
400-415	6	324	15	13	70	95	45	129	15	13	39	15	779
415-430	3	374	22	10	53	110	61	142	11	14	28	4	832
430-445	9	361	14	16	41	108	42	110	25	17	26	15	784
445-500	3	461	9	19	45	121	48	142	7	19	25	7	906
500-515	4	367	13	23	65	126	52	142	14	7	28	8	849
515-530	2	442	9	19	71	124	35	114	12	23	32	9	892
530-545	3	478	18	14	58	111	46	152	17	18	21	13	949
545-600	2	424	17	13	54	105	42	114	8	21	31	13	844
HOUR TOTALS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
400-500	21	1520	60	58	209	434	196	523	58	63	118	41	3301
415-515	19	1563	58	68	204	465	203	536	57	57	107	34	3371
430-530	18	1631	45	77	222	479	177	508	58	66	111	39	3431
445-545	12	1748	49	75	239	482	181	550	50	67	106	37	3596
500-600	11	1711	57	69	248	466	175	522	51	69	112	43	3534

PEAK HOUR
445-545
PEAK HOUR FACTOR
0.95



PEDESTRIAN COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
400-415	4	0	0	0	4
415-430	0	0	0	0	0
430-445	0	0	2	1	3
445-500	1	0	0	1	2
500-515	0	0	0	1	1
515-530	0	0	1	2	3
530-545	0	0	2	1	3
545-600	1	0	3	0	4
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL

BICYCLE COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
400-415	0	0	0	0	0
415-430	0	0	0	0	0
430-445	0	0	0	0	0
445-500	0	0	0	0	0
500-515	0	0	0	0	0
515-530	0	0	0	0	0
530-545	0	0	0	0	0
545-600	0	0	0	0	0
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL

PERIOD	LEG	LEG	LEG	LEG	
400-500	5	0	2	2	9
415-515	1	0	2	3	6
430-530	1	0	3	5	9
445-545	1	0	3	5	9
500-600	1	0	6	4	11

PERIOD	LEG	LEG	LEG	LEG	
400-500	0	0	0	0	0
415-515	0	0	0	0	0
430-530	0	0	0	0	0
445-545	0	0	0	0	0
500-600	0	0	0	0	0

TRAFFIC DATA SERVICES

Phone: (678) 687-8266 Fax: (404) 294-6122 info@trafficdataservices.com

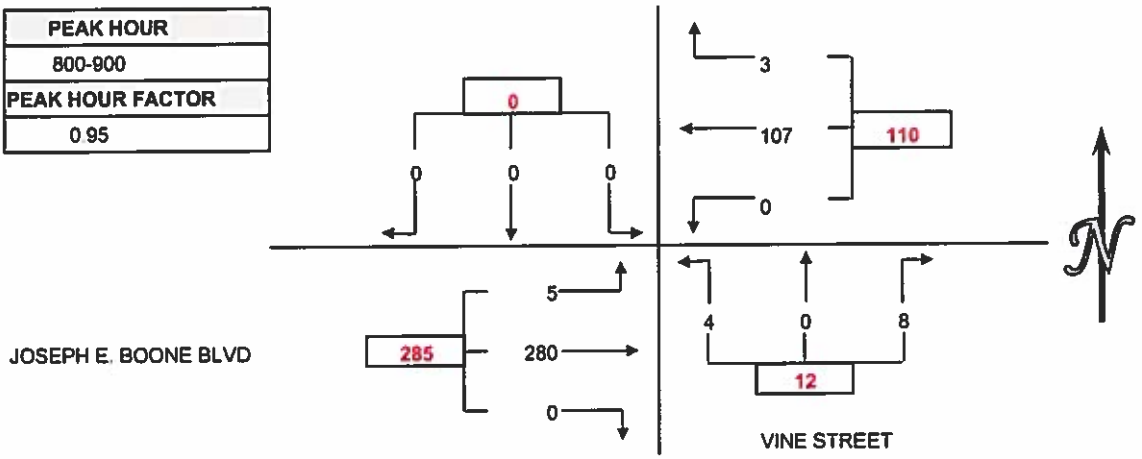
INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

CLIENT:		POND AND COMPANY
PROJECT:		CITY OF ATLANTA TRAFFIC STUDY
DATE:		TUESDAY, JUNE 10TH 2014
PERIOD:		7:00 AM TO 9:00 AM
INTERSECTION:	N/S	VINE STREET
	E/W	JOSEPH E. BOONE BLVD
CITY:		ATLANTA

VEHICLE COUNTS

15 MIN COUNTS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
700-715	0	0	0	0	17	0	2	0	2	0	38	1	60
715-730	0	0	0	0	18	0	1	0	1	0	64	0	84
730-745	0	0	0	0	23	0	2	0	1	0	60	0	86
745-800	0	0	0	1	21	0	2	0	1	0	63	0	88
800-815	0	0	0	0	29	0	5	0	0	0	71	2	107
815-830	0	0	0	2	21	0	0	0	2	0	74	2	101
830-845	0	0	0	0	26	0	1	0	1	0	69	1	98
845-900	0	0	0	1	31	0	2	0	1	0	66	0	101
HOUR TOTALS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
700-800	0	0	0	1	79	0	7	0	5	0	225	1	318
715-815	0	0	0	1	91	0	10	0	3	0	258	2	365
730-830	0	0	0	3	94	0	9	0	4	0	268	4	382
745-845	0	0	0	3	97	0	8	0	4	0	277	5	394
800-900	0	0	0	3	107	0	8	0	4	0	280	5	407

PEAK HOUR
800-900
PEAK HOUR FACTOR
0.95



PEDESTRIAN COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-715	1	0	0	0	1
715-730	0	0	3	0	3
730-745	2	3	2	0	7
745-800	1	1	2	0	4
800-815	1	0	0	1	2
815-830	1	1	0	1	3
830-845	1	0	1	0	2
845-900	5	2	0	1	8
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL

BICYCLE COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-715	0	0	0	0	0
715-730	0	0	1	0	1
730-745	0	0	0	0	0
745-800	0	0	0	0	0
800-815	0	0	0	0	0
815-830	0	1	0	0	1
830-845	0	0	0	0	0
845-900	0	0	0	0	0
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL

PERIOD	LEG	LEG	LEG	LEG	
700-800	4	4	7	0	15
715-815	4	4	7	1	16
730-830	5	5	4	2	16
745-845	4	2	3	2	11
800-900	8	3	1	3	15

PERIOD	LEG	LEG	LEG	LEG	
700-800	0	0	1	0	1
715-815	0	0	1	0	1
730-830	0	1	0	0	1
745-845	0	1	0	0	1
800-900	0	1	0	0	1

TRAFFIC DATA SERVICES

Phone: (678) 687-8266 Fax: (404) 294-6122 info@trafficdataservices.com

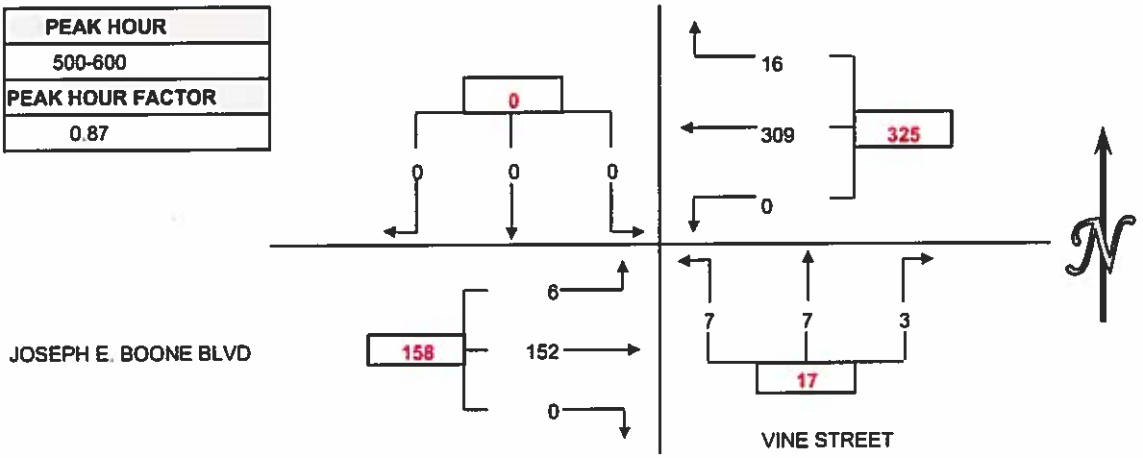
INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

CLIENT: POND AND COMPANY
PROJECT: CITY OF ATLANTA TRAFFIC STUDY
DATE: TUESDAY, JUNE 10TH 2014
PERIOD: 4:00 PM TO 6:00 PM
INTERSECTION: N/S VINE STREET
E/W JOSEPH E. BOONE BLVD
CITY: ATLANTA

VEHICLE COUNTS

15 MIN COUNTS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
400-415	0	0	0	0	74	0	2	1	0	0	43	1	121
415-430	0	0	0	2	41	0	1	0	3	0	51	2	100
430-445	0	0	0	0	74	0	0	0	4	0	37	2	117
445-500	1	0	0	1	67	0	1	1	1	0	45	4	121
500-515	0	0	0	3	73	0	0	1	2	0	34	1	114
515-530	0	0	0	7	84	0	1	1	0	0	49	2	144
530-545	0	0	0	4	75	0	1	1	2	0	31	2	116
545-600	0	0	0	2	77	0	1	4	3	0	38	1	126
HOUR TOTALS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
400-500	1	0	0	3	256	0	4	2	8	0	176	9	459
415-515	1	0	0	6	255	0	2	2	10	0	167	9	452
430-530	1	0	0	11	298	0	2	3	7	0	165	9	496
445-545	1	0	0	15	299	0	3	4	5	0	159	9	495
500-600	0	0	0	16	309	0	3	7	7	0	152	6	500

PEAK HOUR
500-600
PEAK HOUR FACTOR
0.87



PEDESTRIAN COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
400-415	1	1	0	4	6
415-430	1	3	2	0	6
430-445	2	2	2	1	7
445-500	3	1	1	1	6
500-515	2	1	3	0	6
515-530	1	0	0	0	1
530-545	0	4	1	0	5
545-600	3	0	0	0	3
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL

BICYCLE COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
400-415	0	0	0	0	0
415-430	0	0	0	0	0
430-445	0	0	0	0	0
445-500	1	0	0	2	3
500-515	0	0	0	0	0
515-530	0	0	0	0	0
530-545	0	0	0	0	0
545-600	0	0	0	0	0
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL

PERIOD	LEG	LEG	LEG	LEG	
400-500	7	7	5	6	25
415-515	8	7	8	2	25
430-530	8	4	6	2	20
445-545	6	6	5	1	18
500-600	6	5	4	0	15

PERIOD	LEG	LEG	LEG	LEG	
400-500	1	0	0	2	3
415-515	1	0	0	2	3
430-530	1	0	0	2	3
445-545	1	0	0	2	3
500-600	0	0	0	0	0

TRAFFIC DATA SERVICES

Phone: (678) 687-8266 Fax: (404) 294-6122 info@trafficdataservices.com

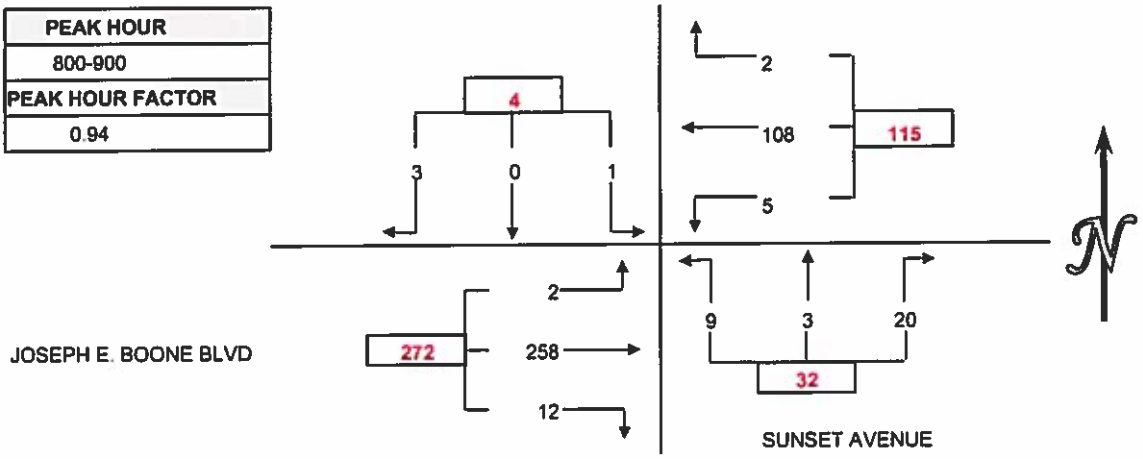
INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

CLIENT:		POND AND COMPANY
PROJECT:		CITY OF ATLANTA TRAFFIC STUDY
DATE:		TUESDAY, JUNE 10TH 2014
PERIOD:		7:00 AM TO 9:00 AM
INTERSECTION:	N/S	SUNSET AVENUE
	E/W	JOSEPH E. BOONE BLVD
CITY:		ATLANTA

VEHICLE COUNTS

15 MIN COUNTS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
700-715	2	0	1	0	18	1	0	0	1	0	40	0	63
715-730	2	0	1	0	18	1	2	0	2	1	60	0	87
730-745	0	0	3	0	21	0	6	0	1	2	53	0	86
745-800	0	0	1	0	27	1	4	1	3	2	54	0	93
800-815	1	0	0	0	26	2	3	2	1	5	72	0	112
815-830	1	0	0	1	24	1	5	0	1	3	64	1	101
830-845	1	0	0	1	28	0	4	0	3	2	65	0	104
845-900	0	0	1	0	30	2	8	1	4	2	57	1	106
HOUR TOTALS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
700-800	4	0	6	0	84	3	12	1	7	5	207	0	329
715-815	3	0	5	0	92	4	15	3	7	10	239	0	378
730-830	2	0	4	1	98	4	18	3	6	12	243	1	392
745-845	3	0	1	2	105	4	16	3	8	12	255	1	410
800-900	3	0	1	2	108	5	20	3	9	12	258	2	423

PEAK HOUR
800-900
PEAK HOUR FACTOR
0.94



PEDESTRIAN COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-715	0	0	3	1	4
715-730	2	0	3	1	6
730-745	1	0	1	0	2
745-800	4	0	0	0	4
800-815	1	0	0	0	1
815-830	0	0	2	2	4
830-845	1	0	1	0	2
845-900	1	0	0	0	1
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL

BICYCLE COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-715	0	0	0	0	0
715-730	0	0	0	0	0
730-745	0	0	0	0	0
745-800	0	0	0	0	0
800-815	0	0	0	0	0
815-830	0	0	0	1	1
830-845	0	0	0	0	0
845-900	0	0	0	0	0
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL

PERIOD	LEG	LEG	LEG	LEG	
700-800	7	0	7	2	16
715-815	8	0	4	1	13
730-830	6	0	3	2	11
745-845	6	0	3	2	11
800-900	3	0	3	2	8

PERIOD	LEG	LEG	LEG	LEG	
700-800	0	0	0	0	0
715-815	0	0	0	0	0
730-830	0	0	0	1	1
745-845	0	0	0	1	1
800-900	0	0	0	1	1

TRAFFIC DATA SERVICES

Phone: (678) 687-8266 Fax: (404) 294-6122 info@trafficdataservices.com

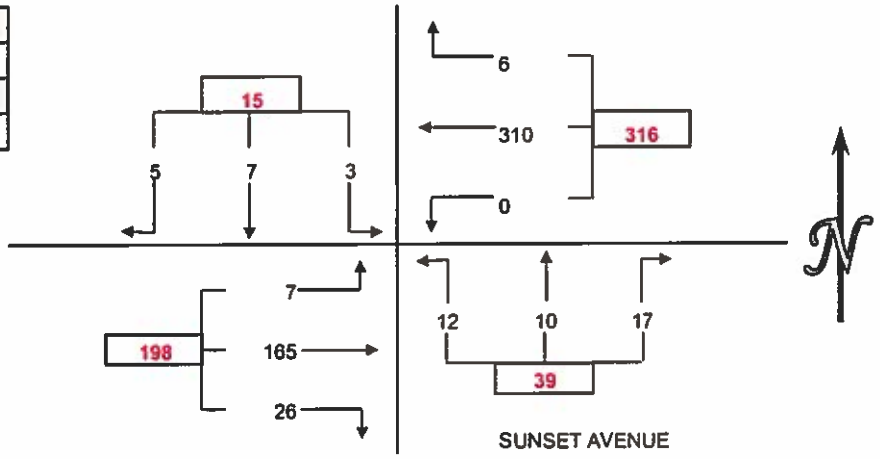
INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

CLIENT:		POND AND COMPANY
PROJECT:		CITY OF ATLANTA TRAFFIC STUDY
DATE:		TUESDAY, JUNE 10TH 2014
PERIOD:		4:00 PM TO 6:00 PM
INTERSECTION:	N/S	SUNSET AVENUE
	E/W	JOSEPH E. BOONE BLVD
CITY:		ATLANTA

VEHICLE COUNTS

15 MIN COUNTS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
400-415	1	2	0	3	30	0	2	2	11	6	44	0	101
415-430	0	2	2	2	79	0	5	0	3	7	46	4	150
430-445	1	0	1	3	83	0	6	3	5	2	39	1	144
445-500	1	5	1	1	69	0	6	3	1	8	46	1	142
500-515	1	0	0	0	72	0	1	2	3	10	28	1	118
515-530	2	2	1	2	86	0	4	2	3	6	52	4	164
530-545	1	1	2	3	72	0	0	3	2	5	31	1	121
545-600	1	3	0	4	75	0	1	3	3	4	40	0	134
HOUR TOTALS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
400-500	3	9	4	9	261	0	19	8	20	23	175	6	537
415-515	3	7	4	6	303	0	18	8	12	27	159	7	554
430-530	5	7	3	6	310	0	17	10	12	26	165	7	568
445-545	5	8	4	6	299	0	11	10	9	29	157	7	545
500-600	5	6	3	9	305	0	6	10	11	25	151	6	537

PEAK HOUR
430-530
PEAK HOUR FACTOR
0.87



PEDESTRIAN COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
400-415	5	1	4	2	12
415-430	3	1	1	1	6
430-445	4	0	3	1	8
445-500	1	0	1	3	5
500-515	1	0	3	2	6
515-530	1	0	3	1	5
530-545	1	0	3	0	4
545-600	4	0	1	1	6
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL

BICYCLE COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
400-415	0	0	0	0	0
415-430	0	0	0	0	0
430-445	0	0	0	0	0
445-500	0	0	0	0	0
500-515	0	0	1	0	1
515-530	0	0	0	0	0
530-545	0	0	0	0	0
545-600	0	0	0	0	0
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL

PERIOD	LEG	LEG	LEG	LEG	
400-500	13	2	9	7	31
415-515	9	1	8	7	25
430-530	7	0	10	7	24
445-545	4	0	10	6	20
500-600	7	0	10	4	21

PERIOD	LEG	LEG	LEG	LEG	
400-500	0	0	0	0	0
415-515	0	0	1	0	1
430-530	0	0	1	0	1
445-545	0	0	1	0	1
500-600	0	0	1	0	1

TRAFFIC DATA SERVICES

Phone: (678) 687-8266 Fax: (404) 294-6122 info@trafficdataservices.com

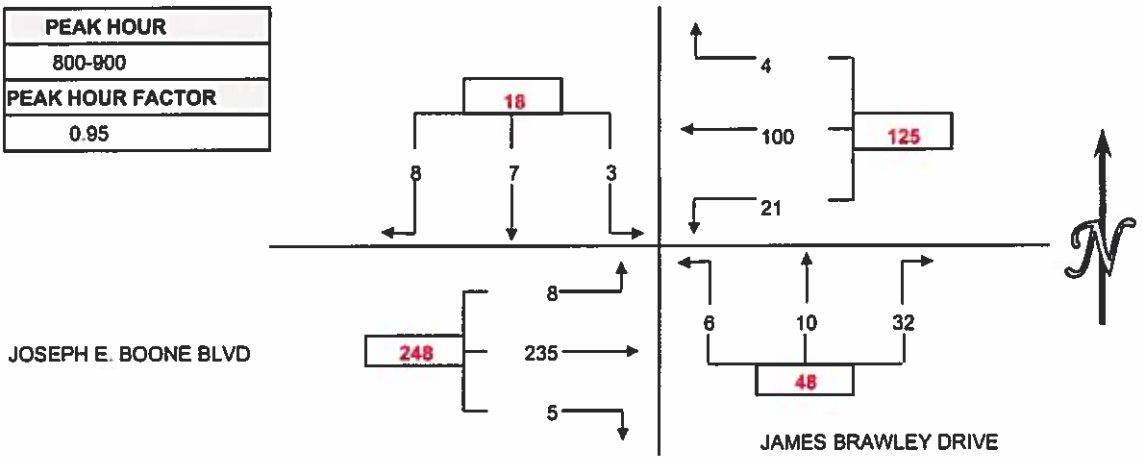
INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

CLIENT:		POND AND COMPANY
PROJECT:		CITY OF ATLANTA TRAFFIC STUDY
DATE:		TUESDAY, JUNE 10TH 2014
PERIOD:		7:00 AM TO 9:00 AM
INTERSECTION:	N/S	JAMES BRAWLEY DRIVE
	E/W	JOSEPH E. BOONE BLVD
CITY:		ATLANTA

VEHICLE COUNTS

15 MIN COUNTS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
700-715	2	0	0	1	23	1	3	1	0	0	35	3	69
715-730	4	3	0	1	18	4	9	3	3	3	49	2	99
730-745	0	0	0	1	18	2	5	0	0	4	51	0	81
745-800	2	1	1	0	26	2	6	3	2	3	51	3	100
800-815	3	5	0	0	23	3	8	4	1	2	64	2	115
815-830	4	0	1	1	17	6	9	1	1	2	63	3	108
830-845	1	1	0	0	32	3	6	1	3	1	62	2	112
845-900	0	1	2	3	28	9	9	4	1	0	46	1	104
HOUR TOTALS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
700-800	8	4	1	3	85	9	23	7	5	10	186	8	349
715-815	9	9	1	2	85	11	28	10	6	12	215	7	395
730-830	9	6	2	2	84	13	28	8	4	11	229	8	404
745-845	10	7	2	1	98	14	29	9	7	8	240	10	435
800-900	8	7	3	4	100	21	32	10	6	5	235	8	439

PEAK HOUR
800-900
PEAK HOUR FACTOR
0.95



PEDESTRIAN COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-715	3	0	1	2	6
715-730	1	0	2	1	4
730-745	3	1	1	0	5
745-800	1	0	1	2	4
800-815	0	0	0	0	0
815-830	5	2	2	3	12
830-845	5	0	1	1	7
845-900	4	0	1	3	8
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL

BICYCLE COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-715	0	0	0	0	0
715-730	1	0	0	0	1
730-745	0	0	0	1	1
745-800	0	0	0	0	0
800-815	0	0	0	0	0
815-830	0	0	0	0	0
830-845	0	0	0	0	0
845-900	0	0	0	0	0
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL

PERIOD	LEG	LEG	LEG	LEG	
700-800	8	1	5	5	19
715-815	5	1	4	3	13
730-830	9	3	4	5	21
745-845	11	2	4	6	23
800-900	14	2	4	7	27

PERIOD	LEG	LEG	LEG	LEG	
700-800	1	0	0	1	2
715-815	1	0	0	1	2
730-830	0	0	0	1	1
745-845	0	0	0	0	0
800-900	0	0	0	0	0

TRAFFIC DATA SERVICES

Phone: (678) 687-8266 Fax: (404) 294-6122 info@trafficdataservices.com

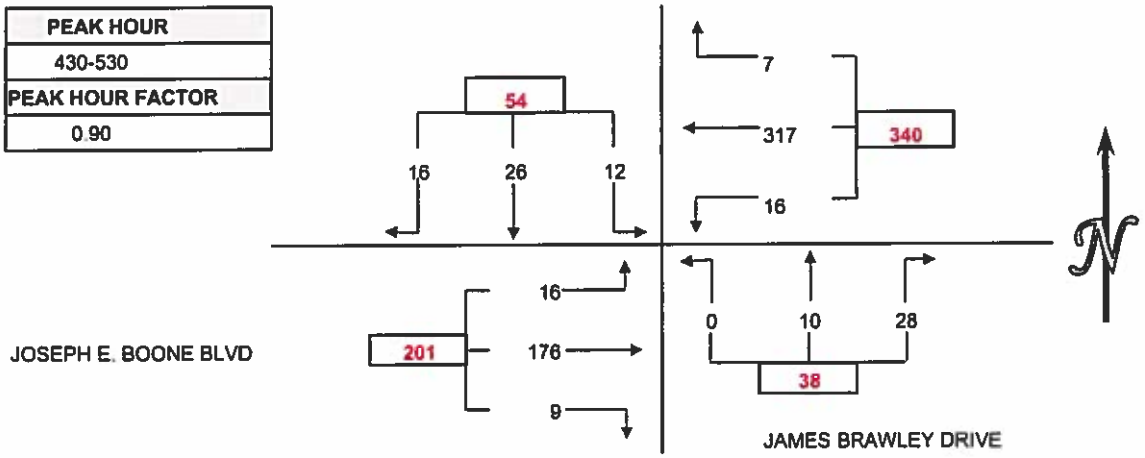
INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

CLIENT: POND AND COMPANY
PROJECT: CITY OF ATLANTA TRAFFIC STUDY
DATE: TUESDAY, JUNE 10TH 2014
PERIOD: 4:00 PM TO 6:00 PM
INTERSECTION: N/S JAMES BRAWLEY DRIVE
E/W JOSEPH E. BOONE BLVD
CITY: ATLANTA

VEHICLE COUNTS

15 MIN COUNTS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
400-415	4	6	3	4	64	11	4	3	0	6	46	1	152
415-430	8	5	2	3	53	8	4	2	0	1	52	3	141
430-445	3	7	2	2	87	3	11	3	0	3	36	2	159
445-500	4	7	4	2	66	5	3	2	0	3	51	8	155
500-515	5	8	2	2	74	4	6	1	0	2	36	3	143
515-530	4	4	4	1	90	4	8	4	0	1	53	3	176
530-545	7	7	5	0	68	9	3	1	0	5	36	3	144
545-600	7	5	2	1	75	8	6	5	0	7	40	2	158
HOUR TOTALS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
400-500	19	25	11	11	270	27	22	10	0	13	185	14	607
415-515	20	27	10	9	280	20	24	8	0	9	175	16	598
430-530	16	26	12	7	317	16	28	10	0	9	176	16	633
445-545	20	26	15	5	298	22	20	8	0	11	176	17	618
500-600	23	24	13	4	307	25	23	11	0	15	165	11	621

PEAK HOUR
430-530
PEAK HOUR FACTOR
0.90



PEDESTRIAN COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
400-415	7	0	3	14	24
415-430	2	2	2	5	11
430-445	10	4	3	7	24
445-500	7	1	0	2	10
500-515	3	0	3	2	8
515-530	10	4	0	4	18
530-545	8	0	1	9	18
545-600	8	0	2	4	14
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL

BICYCLE COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
400-415	0	0	0	0	0
415-430	0	0	0	0	0
430-445	0	0	0	0	0
445-500	0	0	0	0	0
500-515	0	0	0	0	0
515-530	0	0	0	1	1
530-545	1	0	0	1	2
545-600	0	0	0	0	0
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL

PERIOD	LEG	LEG	LEG	LEG	
400-500	26	7	8	28	69
415-515	22	7	8	16	53
430-530	30	9	6	15	60
445-545	28	5	4	17	54
500-600	29	4	6	19	58

PERIOD	LEG	LEG	LEG	LEG	
400-500	0	0	0	0	0
415-515	0	0	0	0	0
430-530	0	0	0	1	1
445-545	1	0	0	2	3
500-600	1	0	0	2	3

TRAFFIC DATA SERVICES

Phone: (678) 687-8266 Fax: (404) 294-6122 info@trafficdataservices.com

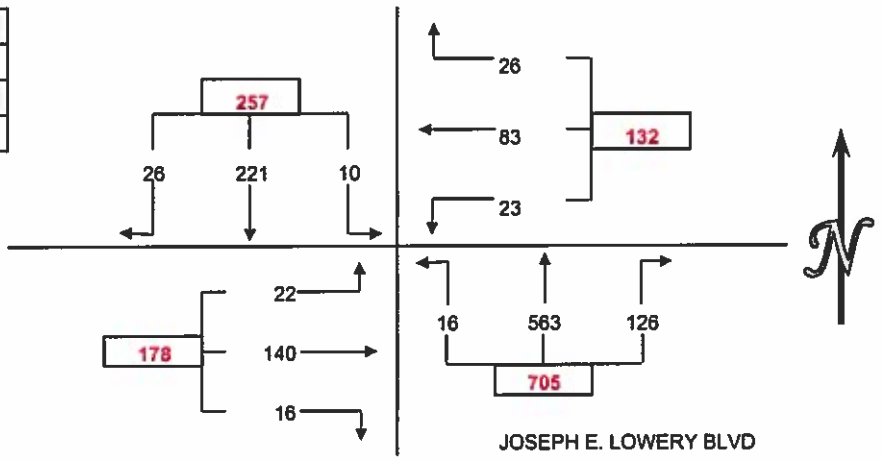
INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

CLIENT:		POND AND COMPANY
PROJECT:		CITY OF ATLANTA TRAFFIC STUDY
DATE:		TUESDAY, JUNE 10TH 2014
PERIOD:		7:00 AM TO 9:00 AM
INTERSECTION:	N/S	JOSEPH E. LOWERY BLVD
	E/W	JOSEPH E. BOONE BLVD
CITY:		ATLANTA

VEHICLE COUNTS

15 MIN COUNTS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
700-715	3	29	1	3	10	10	15	93	4	3	21	3	195
715-730	3	37	3	9	13	8	25	98	4	1	29	7	237
730-745	4	38	8	5	8	6	27	144	6	2	25	10	283
745-800	7	58	0	9	10	6	33	143	7	3	22	2	300
800-815	8	58	2	5	25	5	35	126	0	6	40	9	319
815-830	7	52	5	5	15	4	31	143	6	4	36	6	314
830-845	4	53	3	7	33	8	27	151	3	3	42	5	339
845-900	2	44	4	7	20	3	36	132	5	3	22	7	285
HOUR TOTALS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
700-800	17	162	12	26	41	30	100	478	21	9	97	22	1015
715-815	22	191	13	28	56	25	120	511	17	12	116	28	1139
730-830	26	206	15	24	58	21	126	556	19	15	123	27	1216
745-845	26	221	10	26	83	23	126	563	16	16	140	22	1272
800-900	21	207	14	24	93	20	129	552	14	16	140	27	1257

PEAK HOUR
745-845
PEAK HOUR FACTOR
0.94



PEDESTRIAN COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-715	7	3	0	1	11
715-730	3	7	0	2	12
730-745	8	4	0	1	13
745-800	8	3	0	2	13
800-815	6	1	0	4	11
815-830	10	2	1	3	16
830-845	5	2	0	1	8
845-900	9	6	0	2	17
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL

BICYCLE COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-715	1	0	0	0	1
715-730	2	1	0	0	3
730-745	0	0	0	0	0
745-800	0	0	0	0	0
800-815	0	0	0	0	0
815-830	0	0	1	0	1
830-845	0	0	0	0	0
845-900	0	0	0	0	0
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL

PERIOD	LEG	LEG	LEG	LEG	
700-800	26	17	0	6	49
715-815	25	15	0	9	49
730-830	32	10	1	10	53
745-845	29	8	1	10	48
800-900	30	11	1	10	52

PERIOD	LEG	LEG	LEG	LEG	
700-800	3	1	0	0	4
715-815	2	1	0	0	3
730-830	0	0	1	0	1
745-845	0	0	1	0	1
800-900	0	0	1	0	1

TRAFFIC DATA SERVICES

Phone: (678) 687-8266 Fax: (404) 294-6122 info@trafficdataservices.com

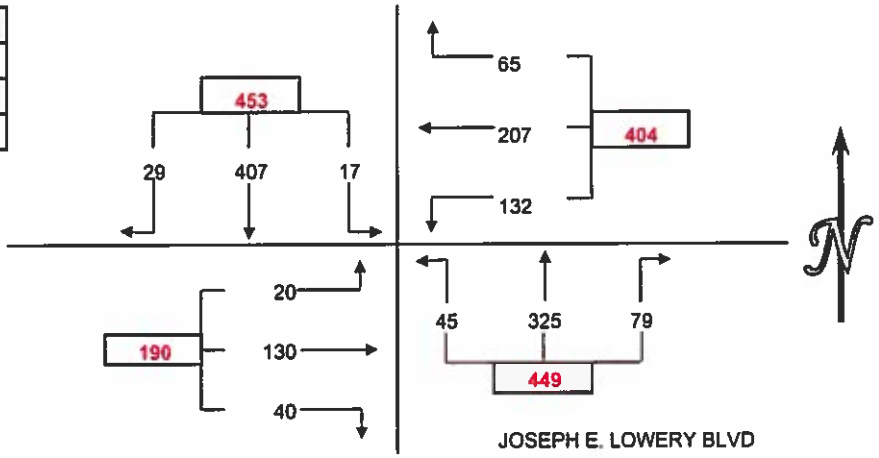
INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

CLIENT:		POND AND COMPANY
PROJECT:		CITY OF ATLANTA TRAFFIC STUDY
DATE:		TUESDAY, JUNE 10TH 2014
PERIOD:		4:00 PM TO 6:00 PM
INTERSECTION:	N/S	JOSEPH E. LOWERY BLVD
	E/W	JOSEPH E. BOONE BLVD
CITY:		ATLANTA

VEHICLE COUNTS

15 MIN COUNTS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
400-415	7	99	10	23	45	23	24	78	10	8	38	1	366
415-430	7	104	4	10	38	24	21	56	16	5	32	1	318
430-445	7	103	6	16	68	32	23	100	13	9	32	8	417
445-500	8	97	3	11	42	20	20	62	14	13	34	4	328
500-515	3	104	6	21	44	42	19	81	7	12	33	3	375
515-530	11	103	2	17	53	38	17	82	11	6	31	5	376
530-545	13	106	9	16	53	17	17	98	9	10	29	7	384
545-600	11	85	6	14	42	28	19	67	9	4	27	3	315
HOUR TOTALS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
400-500	29	403	23	60	193	99	88	296	53	35	136	14	1429
415-515	25	408	19	58	192	118	83	299	50	39	131	16	1438
430-530	29	407	17	65	207	132	79	325	45	40	130	20	1496
445-545	35	410	20	65	192	117	73	323	41	41	127	19	1463
500-600	38	398	23	68	192	125	72	328	36	32	120	18	1450

PEAK HOUR
430-530
PEAK HOUR FACTOR
0.90



PEDESTRIAN COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
400-415	6	13	5	2	26
415-430	5	14	4	1	24
430-445	7	17	8	1	33
445-500	5	14	6	2	27
500-515	8	15	3	0	26
515-530	7	17	2	5	31
530-545	6	13	4	0	23
545-600	5	10	4	1	20
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL

BICYCLE COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
400-415	0	1	1	0	2
415-430	1	0	0	0	1
430-445	0	0	2	0	2
445-500	0	0	0	0	0
500-515	0	1	0	0	1
515-530	0	0	0	0	0
530-545	0	0	0	0	0
545-600	0	0	0	0	0
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL

PERIOD	LEG	LEG	LEG	LEG	
400-500	23	58	23	6	110
415-515	25	60	21	4	110
430-530	27	63	19	8	117
445-545	26	59	15	7	107
500-600	26	55	13	6	100

PERIOD	LEG	LEG	LEG	LEG	
400-500	1	1	3	0	5
415-515	1	1	2	0	4
430-530	0	1	2	0	3
445-545	0	1	0	0	1
500-600	0	1	0	0	1

TRAFFIC DATA SERVICES

Phone: (678) 687-8266 Fax: (404) 294-6122 info@trafficdataservices.com

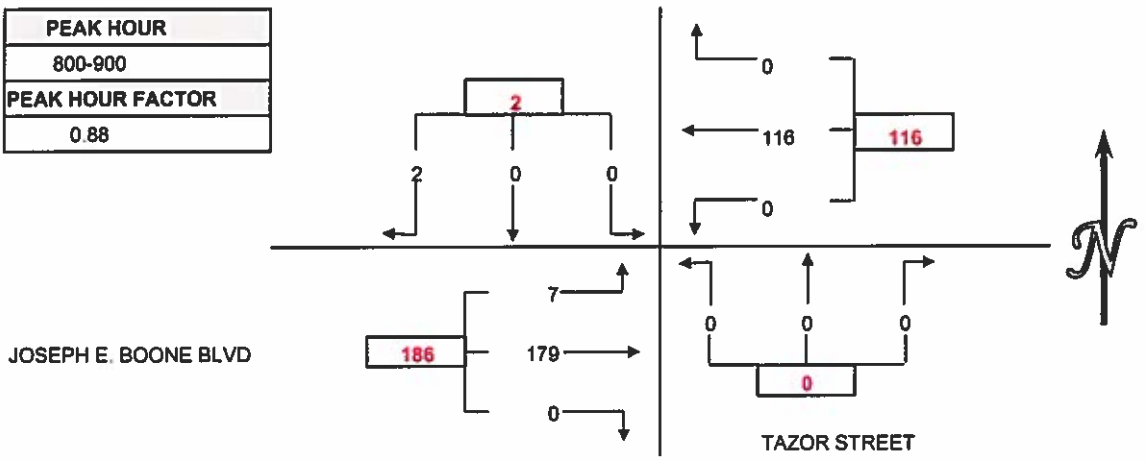
INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

CLIENT:		POND AND COMPANY
PROJECT:		CITY OF ATLANTA TRAFFIC STUDY
DATE:		TUESDAY, JUNE 10TH 2014
PERIOD:		7:00 AM TO 9:00 AM
INTERSECTION:	N/S	TAZOR STREET
	E/W	JOSEPH E. BOONE BLVD
CITY:		ATLANTA

VEHICLE COUNTS

15 MIN COUNTS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
700-715	0	0	0	0	17	0	0	0	0	0	24	0	41
715-730	0	0	0	0	16	0	0	0	0	0	36	1	53
730-745	0	0	0	0	12	0	0	0	0	0	32	0	44
745-800	1	0	0	0	28	0	0	0	0	0	33	1	63
800-815	0	0	0	0	30	0	0	0	0	0	56	0	86
815-830	0	0	0	0	26	0	0	0	0	0	45	1	72
830-845	0	0	0	0	32	0	0	0	0	0	46	2	80
845-900	2	0	0	0	28	0	0	0	0	0	32	4	66
HOUR TOTALS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
700-800	1	0	0	0	73	0	0	0	0	0	125	2	201
715-815	1	0	0	0	86	0	0	0	0	0	157	2	246
730-830	1	0	0	0	96	0	0	0	0	0	166	2	265
745-845	1	0	0	0	116	0	0	0	0	0	180	4	301
800-900	2	0	0	0	116	0	0	0	0	0	179	7	304

PEAK HOUR
800-900
PEAK HOUR FACTOR
0.88



PEDESTRIAN COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-715	4	3	0	0	7
715-730	2	0	0	0	2
730-745	3	0	0	0	3
745-800	2	0	0	1	3
800-815	1	2	0	2	5
815-830	1	0	0	2	3
830-845	3	0	0	3	6
845-900	0	0	0	0	0
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL

BICYCLE COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-715	0	0	0	0	0
715-730	1	0	0	0	1
730-745	0	0	0	0	0
745-800	0	0	0	0	0
800-815	0	0	0	0	0
815-830	0	0	0	0	0
830-845	0	0	0	0	0
845-900	0	0	0	0	0
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL

PERIOD	LEG	LEG	LEG	LEG	
700-800	11	3	0	1	15
715-815	8	2	0	3	13
730-830	7	2	0	5	14
745-845	7	2	0	8	17
800-900	5	2	0	7	14

PERIOD	LEG	LEG	LEG	LEG	
700-800	1	0	0	0	1
715-815	1	0	0	0	1
730-830	0	0	0	0	0
745-845	0	0	0	0	0
800-900	0	0	0	0	0

TRAFFIC DATA SERVICES

Phone: (678) 687-8266 Fax: (404) 294-6122 info@trafficdataservices.com

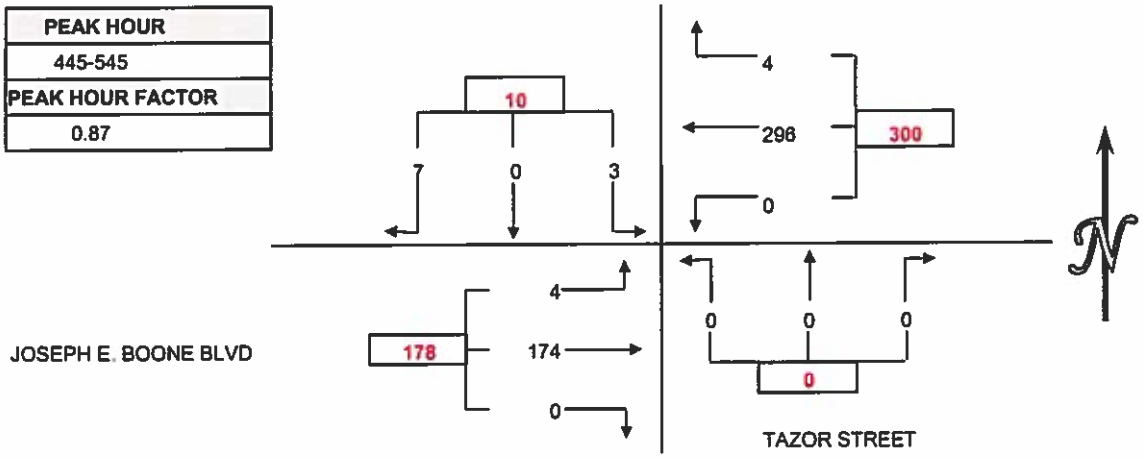
INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

CLIENT:		POND AND COMPANY
PROJECT:		CITY OF ATLANTA TRAFFIC STUDY
DATE:		TUESDAY, JUNE 10TH 2014
PERIOD:		4:00 PM TO 6:00 PM
INTERSECTION:	N/S	TAZOR STREET
	E/W	JOSEPH E. BOONE BLVD
CITY:		ATLANTA

VEHICLE COUNTS

15 MIN COUNTS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
400-415	2	0	1	1	65	0	0	0	0	0	38	1	108
415-430	2	0	1	0	67	0	0	0	0	0	34	1	105
430-445	0	0	0	1	74	0	0	0	0	0	40	0	115
445-500	1	0	3	1	80	0	0	0	0	0	56	0	141
500-515	1	0	0	0	54	0	0	0	0	0	39	1	95
515-530	3	0	0	3	74	0	0	0	0	0	37	2	119
530-545	2	0	0	0	88	0	0	0	0	0	42	1	133
545-600	1	0	1	2	64	0	0	0	0	0	66	3	137
HOUR TOTALS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
400-500	5	0	5	3	286	0	0	0	0	0	168	2	469
415-515	4	0	4	2	275	0	0	0	0	0	169	2	456
430-530	5	0	3	5	282	0	0	0	0	0	172	3	470
445-545	7	0	3	4	296	0	0	0	0	0	174	4	488
500-600	7	0	1	5	280	0	0	0	0	0	184	7	484

PEAK HOUR
445-545
PEAK HOUR FACTOR
0.87



PEDESTRIAN COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
400-415	3	0	0	0	3
415-430	7	0	0	0	7
430-445	1	0	0	0	1
445-500	7	0	0	0	7
500-515	6	0	0	0	6
515-530	3	0	0	0	3
530-545	0	0	0	0	0
545-600	3	1	0	1	5
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL

BICYCLE COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
400-415	0	0	0	0	0
415-430	0	0	0	0	0
430-445	0	0	0	0	0
445-500	0	0	0	0	0
500-515	1	0	0	0	1
515-530	2	0	0	0	2
530-545	0	0	0	1	1
545-600	0	0	0	0	0
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL

PERIOD	LEG	LEG	LEG	LEG	
400-500	18	0	0	0	18
415-515	21	0	0	0	21
430-530	17	0	0	0	17
445-545	16	0	0	0	16
500-600	12	1	0	1	14

PERIOD	LEG	LEG	LEG	LEG	
400-500	0	0	0	0	0
415-515	1	0	0	0	1
430-530	3	0	0	0	3
445-545	3	0	0	1	4
500-600	3	0	0	1	4

TRAFFIC DATA SERVICES

Phone: (678) 687-8266 Fax: (404) 294-6122 info@trafficdataservices.com

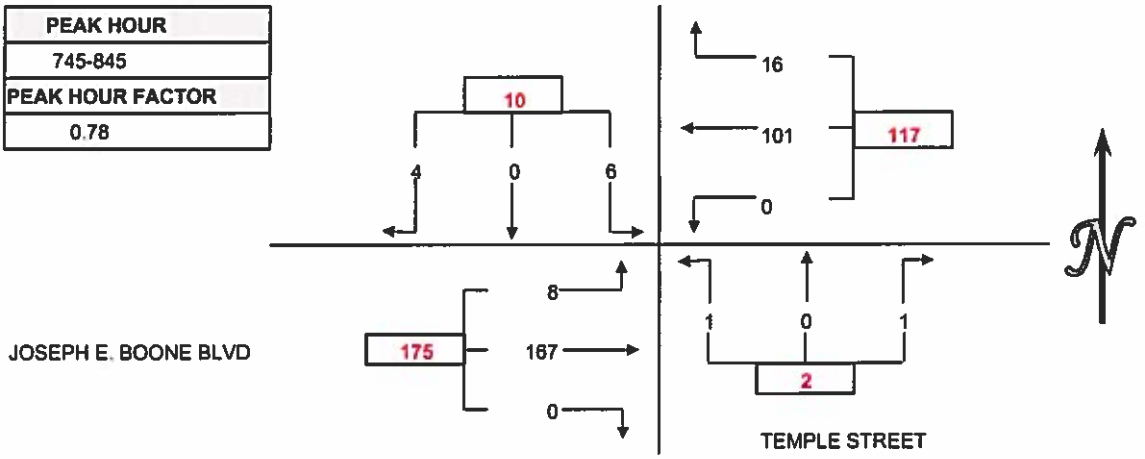
INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

CLIENT:		POND AND COMPANY
PROJECT:		CITY OF ATLANTA TRAFFIC STUDY
DATE:		TUESDAY, JUNE 10TH 2014
PERIOD:		7:00 AM TO 9:00 AM
INTERSECTION:	N/S	TEMPLE STREET
	E/W	JOSEPH E. BOONE BLVD
CITY:		ATLANTA

VEHICLE COUNTS

15 MIN COUNTS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
700-715	0	0	0	1	14	1	0	0	1	0	22	0	39
715-730	1	0	1	1	16	0	0	0	0	0	31	0	50
730-745	0	0	0	4	9	0	0	0	0	0	30	0	43
745-800	1	0	2	8	20	0	1	0	0	0	33	2	67
800-815	1	0	3	3	29	0	0	0	1	0	56	4	97
815-830	2	0	0	2	26	0	0	0	0	0	37	1	68
830-845	0	0	1	3	26	0	0	0	0	0	41	1	72
845-900	1	0	0	4	26	0	0	0	0	0	32	4	67
HOUR TOTALS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
700-800	2	0	3	14	59	1	1	0	1	0	116	2	199
715-815	3	0	6	16	74	0	1	0	1	0	150	6	257
730-830	4	0	5	17	84	0	1	0	1	0	156	7	275
745-845	4	0	6	16	101	0	1	0	1	0	167	8	304
800-900	4	0	4	12	107	0	0	0	1	0	166	10	304

PEAK HOUR
745-845
PEAK HOUR FACTOR
0.78



PEDESTRIAN COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-715	3	0	2	3	8
715-730	1	0	1	0	2
730-745	4	0	4	0	8
745-800	2	0	2	0	4
800-815	0	0	3	0	3
815-830	1	1	1	0	3
830-845	2	0	4	0	6
845-900	2	0	2	2	6
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL

BICYCLE COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-715	0	0	0	0	0
715-730	1	0	0	0	1
730-745	0	0	0	0	0
745-800	0	0	0	0	0
800-815	0	0	0	0	0
815-830	0	0	0	0	0
830-845	0	0	0	0	0
845-900	1	0	0	0	1
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL

PERIOD	LEG	LEG	LEG	LEG	
700-800	10	0	9	3	22
715-815	7	0	10	0	17
730-830	7	1	10	0	18
745-845	5	1	10	0	16
800-900	5	1	10	2	18

PERIOD	LEG	LEG	LEG	LEG	
700-800	1	0	0	0	1
715-815	1	0	0	0	1
730-830	0	0	0	0	0
745-845	0	0	0	0	0
800-900	1	0	0	0	1

TRAFFIC DATA SERVICES

Phone: (678) 687-8266 Fax: (404) 294-6122 info@trafficdataservices.com

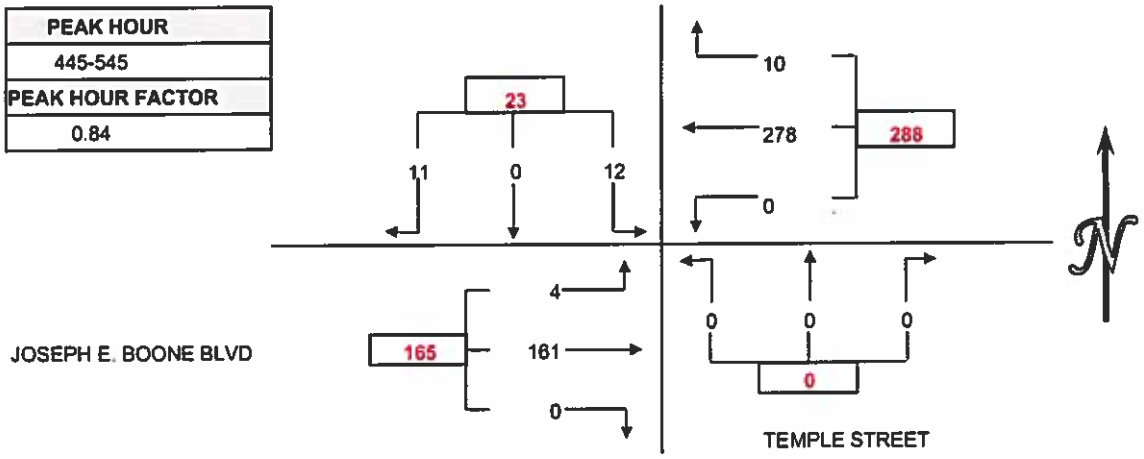
INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

CLIENT:		POND AND COMPANY
PROJECT:		CITY OF ATLANTA TRAFFIC STUDY
DATE:		TUESDAY, JUNE 10TH 2014
PERIOD:		4:00 PM TO 6:00 PM
INTERSECTION:	N/S	TEMPLE STREET
	E/W	JOSEPH E. BOONE BLVD
CITY:		ATLANTA

VEHICLE COUNTS

15 MIN COUNTS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
400-415	2	0	3	3	62	0	0	0	0	0	33	3	106
415-430	4	0	1	0	76	0	0	1	0	0	34	2	118
430-445	2	0	2	3	65	0	0	0	0	0	32	1	105
445-500	5	0	3	5	75	0	0	0	0	0	53	0	141
500-515	0	0	2	0	52	0	0	0	0	0	33	3	90
515-530	3	0	2	3	73	0	0	0	0	0	36	1	118
530-545	3	0	5	2	78	0	0	0	0	0	39	0	127
545-600	2	0	2	2	57	0	1	0	0	0	38	0	102
HOUR TOTALS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
400-500	13	0	9	11	278	0	0	1	0	0	152	6	470
415-515	11	0	8	8	268	0	0	1	0	0	152	6	454
430-530	10	0	9	11	265	0	0	0	0	0	154	5	454
445-545	11	0	12	10	278	0	0	0	0	0	161	4	476
500-600	8	0	11	7	260	0	1	0	0	0	146	4	437

PEAK HOUR
445-545
PEAK HOUR FACTOR
0.84



PEDESTRIAN COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
400-415	3	0	3	0	6
415-430	7	0	3	2	12
430-445	0	0	5	1	6
445-500	5	0	2	0	7
500-515	6	0	1	1	8
515-530	2	0	3	1	6
530-545	7	0	0	0	7
545-600	0	0	2	0	2
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL

BICYCLE COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
400-415	0	0	0	0	0
415-430	0	0	0	0	0
430-445	0	0	0	0	0
445-500	0	0	0	0	0
500-515	4	1	0	0	5
515-530	1	0	0	0	1
530-545	0	0	1	0	1
545-600	0	0	1	0	1
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL

PERIOD	LEG	LEG	LEG	LEG	
400-500	15	0	13	3	31
415-515	18	0	11	4	33
430-530	13	0	11	3	27
445-545	20	0	6	2	28
500-600	15	0	6	2	23

PERIOD	LEG	LEG	LEG	LEG	
400-500	0	0	0	0	0
415-515	4	1	0	0	5
430-530	5	1	0	0	6
445-545	5	1	1	0	7
500-600	5	1	2	0	8

TRAFFIC DATA SERVICES

Phone: (678) 687-8266 Fax: (404) 294-6122 info@trafficdataservices.com

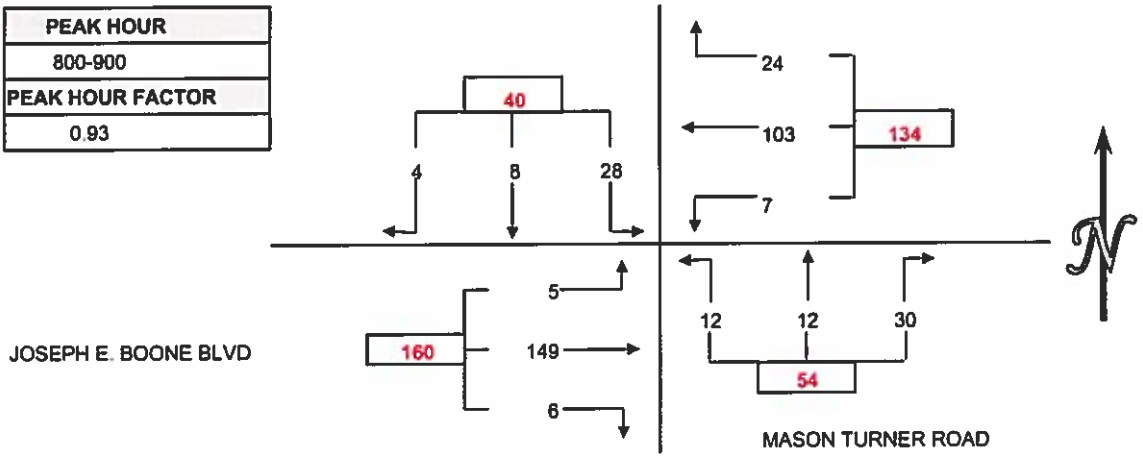
INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

CLIENT:		POND AND COMPANY
PROJECT:		CITY OF ATLANTA TRAFFIC STUDY
DATE:		TUESDAY, JUNE 10TH 2014
PERIOD:		7:00 AM TO 9:00 AM
INTERSECTION:	N/S	MASON TURNER ROAD
	E/W	JOSEPH E. BOONE BLVD
CITY:		ATLANTA

VEHICLE COUNTS

15 MIN COUNTS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
700-715	2	0	7	10	15	3	2	0	0	0	23	1	63
715-730	0	0	5	2	15	2	4	3	4	0	20	0	55
730-745	2	4	8	1	10	1	1	3	1	1	34	0	66
745-800	0	4	5	5	17	1	6	2	0	1	28	0	69
800-815	0	2	7	4	28	1	8	4	0	1	48	1	104
815-830	0	2	2	8	21	1	7	2	4	2	30	1	80
830-845	2	1	12	5	29	1	8	2	6	1	33	2	102
845-900	2	3	7	7	25	4	7	4	2	2	38	1	102
HOUR TOTALS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
700-800	4	8	25	18	57	7	13	8	5	2	105	1	253
715-815	2	10	25	12	70	5	19	12	5	3	130	1	294
730-830	2	12	22	18	76	4	22	11	5	5	140	2	319
745-845	2	9	26	22	95	4	29	10	10	5	139	4	355
800-900	4	8	28	24	103	7	30	12	12	8	149	5	388

PEAK HOUR
800-900
PEAK HOUR FACTOR
0.93



PEDESTRIAN COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-715	1	3	4	1	9
715-730	3	3	6	4	16
730-745	0	0	0	0	0
745-800	0	9	9	2	20
800-815	5	0	1	4	10
815-830	1	2	3	3	9
830-845	8	8	2	1	19
845-900	5	7	4	2	18
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL

BICYCLE COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-715	0	0	0	0	0
715-730	1	0	0	0	1
730-745	0	0	0	0	0
745-800	0	0	0	0	0
800-815	0	0	0	0	0
815-830	0	0	0	0	0
830-845	0	0	0	0	0
845-900	1	0	0	0	1
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL

PERIOD	LEG	LEG	LEG	LEG	
700-800	4	15	19	7	45
715-815	8	12	16	10	46
730-830	6	11	13	9	39
745-845	14	19	15	10	58
800-900	19	17	10	10	56

PERIOD	LEG	LEG	LEG	LEG	
700-800	1	0	0	0	1
715-815	1	0	0	0	1
730-830	0	0	0	0	0
745-845	0	0	0	0	0
800-900	1	0	0	0	1

TRAFFIC DATA SERVICES

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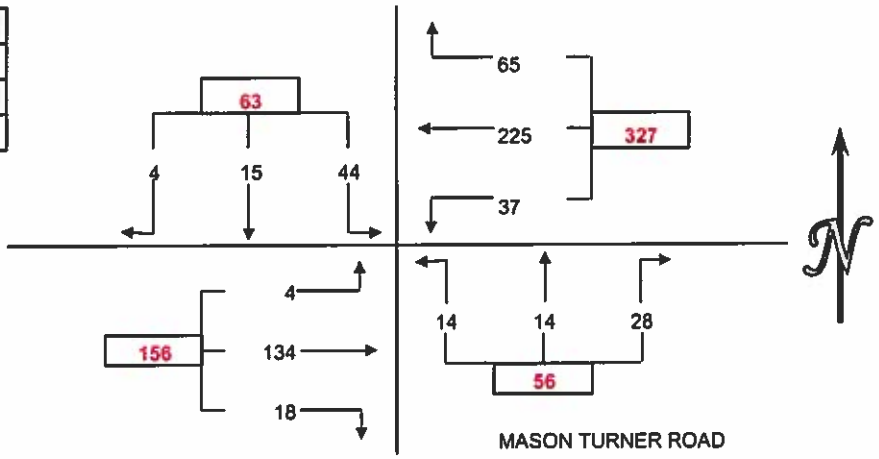
INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

CLIENT:		POND AND COMPANY
PROJECT:		CITY OF ATLANTA TRAFFIC STUDY
DATE:		TUESDAY, JUNE 10TH 2014
PERIOD:		4:00 PM TO 6:00 PM
INTERSECTION:	N/S	MASON TURNER ROAD
	E/W	JOSEPH E. BOONE BLVD
CITY:		ATLANTA

VEHICLE COUNTS

15 MIN COUNTS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
400-415	1	5	12	14	54	8	5	3	5	4	33	1	145
415-430	2	3	9	14	67	6	8	6	2	4	34	0	155
430-445	1	4	12	17	50	9	11	2	5	5	32	1	149
445-500	0	3	11	20	54	14	4	3	2	5	35	2	153
500-515	1	6	18	8	56	4	7	2	2	2	19	0	125
515-530	0	5	20	17	54	8	5	2	1	1	24	1	138
530-545	2	7	24	15	62	13	7	4	1	0	28	0	163
545-600	0	10	14	14	48	10	6	7	0	2	25	0	136
HOUR TOTALS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
400-500	4	15	44	65	225	37	28	14	14	18	134	4	602
415-515	4	16	50	59	227	33	30	13	11	16	120	3	582
430-530	2	18	61	62	214	35	27	9	10	13	110	4	565
445-545	3	21	73	60	226	39	23	11	6	8	106	3	579
500-600	3	28	76	54	220	35	25	15	4	5	96	1	562

PEAK HOUR
400-500
PEAK HOUR FACTOR
0.97



PEDESTRIAN COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
400-415	3	3	2	6	14
415-430	2	1	3	4	10
430-445	4	5	8	1	18
445-500	0	6	7	3	16
500-515	2	8	14	0	24
515-530	4	3	4	3	14
530-545	7	2	5	1	15
545-600	4	5	5	2	16
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL

BICYCLE COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
400-415	0	0	0	0	0
415-430	0	0	1	0	1
430-445	0	1	0	0	1
445-500	0	0	0	0	0
500-515	0	0	0	0	0
515-530	0	0	2	1	3
530-545	0	0	1	0	1
545-600	1	0	0	1	2
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL

PERIOD	LEG	LEG	LEG	LEG	
400-500	9	15	20	14	58
415-515	8	20	32	8	68
430-530	10	22	33	7	72
445-545	13	19	30	7	69
500-600	17	18	28	6	69

PERIOD	LEG	LEG	LEG	LEG	
400-500	0	1	1	0	2
415-515	0	1	1	0	2
430-530	0	1	2	1	4
445-545	0	0	3	1	4
500-600	1	0	3	2	6

APPENDIX B: 2014 SYNCHRO RESULTS

HCM Unsignalized Intersection Capacity Analysis
28: Boone Blvd & Temple St

7/28/2014

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	8	167	101	16	6	4
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78
Hourly flow rate (vph)	10	214	129	21	8	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		610	320			
pX, platoon unblocked						
vC, conflicting volume	150				374	75
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	150				374	75
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				99	99
cM capacity (veh/h)	1429				595	971

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	224	86	64	13
Volume Left	10	0	0	8
Volume Right	0	0	21	5
cSH	1429	1700	1700	704
Volume to Capacity	0.01	0.05	0.04	0.02
Queue Length 95th (ft)	1	0	0	1
Control Delay (s)	0.4	0.0	0.0	10.2
Lane LOS	A			B
Approach Delay (s)	0.4	0.0		10.2
Approach LOS				B

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	25.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	167	29	7	97	18	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	
Lane Util. Factor	1.00			0.95	1.00	
Frt	0.98			1.00	0.96	
Flt Protected	1.00			1.00	0.97	
Satd. Flow (prot)	1825			3527	1725	
Flt Permitted	1.00			0.94	0.97	
Satd. Flow (perm)	1825			3329	1725	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	182	32	8	105	20	9
RTOR Reduction (vph)	8	0	0	0	7	0
Lane Group Flow (vph)	206	0	0	113	22	0
Turn Type	NA		Perm	NA	NA	
Protected Phases	4			8	2	
Permitted Phases			8			
Actuated Green, G (s)	51.0			51.0	21.0	
Effective Green, g (s)	51.0			51.0	21.0	
Actuated g/C Ratio	0.64			0.64	0.26	
Clearance Time (s)	4.0			4.0	4.0	
Lane Grp Cap (vph)	1163			2122	452	
v/s Ratio Prot	c0.11				c0.01	
v/s Ratio Perm				0.03		
v/c Ratio	0.18			0.05	0.05	
Uniform Delay, d1	5.9			5.4	22.0	
Progression Factor	1.00			0.98	1.00	
Incremental Delay, d2	0.3			0.0	0.2	
Delay (s)	6.3			5.4	22.2	
Level of Service	A			A	C	
Approach Delay (s)	6.3			5.4	22.2	
Approach LOS	A			A	C	

Intersection Summary			
HCM 2000 Control Delay	7.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.14		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	20.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	7	179	116	0	0	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	
Lane Util. Factor		1.00	0.95		1.00	
Frt		1.00	1.00		0.86	
Flt Protected		1.00	1.00		1.00	
Satd. Flow (prot)		1859	3539		1611	
Flt Permitted		0.99	1.00		1.00	
Satd. Flow (perm)		1849	3539		1611	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	8	203	132	0	0	2
RTOR Reduction (vph)	0	0	0	0	2	0
Lane Group Flow (vph)	0	211	132	0	0	0
Turn Type	Perm	NA	NA		NA	
Protected Phases		4	8		6	
Permitted Phases	4					
Actuated Green, G (s)		56.0	56.0		16.0	
Effective Green, g (s)		56.0	56.0		16.0	
Actuated g/C Ratio		0.70	0.70		0.20	
Clearance Time (s)		4.0	4.0		4.0	
Lane Grp Cap (vph)		1294	2477		322	
v/s Ratio Prot			0.04		c0.00	
v/s Ratio Perm		c0.11				
v/c Ratio		0.16	0.05		0.00	
Uniform Delay, d1		4.1	3.7		25.6	
Progression Factor		0.91	0.93		1.00	
Incremental Delay, d2		0.3	0.0		0.0	
Delay (s)		4.0	3.5		25.6	
Level of Service		A	A		C	
Approach Delay (s)		4.0	3.5		25.6	
Approach LOS		A	A		C	

Intersection Summary			
HCM 2000 Control Delay	3.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.13		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	25.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	22	140	16	23	83	26	16	563	126	10	221	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			0.95			0.95			1.00	
Frt		0.99			0.97			0.97			0.99	
Flt Protected		0.99			0.99			1.00			1.00	
Satd. Flow (prot)		1807			3383			3440			1833	
Flt Permitted		0.96			0.90			0.95			0.97	
Satd. Flow (perm)		1745			3065			3260			1783	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	23	149	17	24	88	28	17	599	134	11	235	28
RTOR Reduction (vph)	0	5	0	0	19	0	0	23	0	0	5	0
Lane Group Flow (vph)	0	184	0	0	121	0	0	727	0	0	269	0
Bus Blockages (#/hr)	3	3	3	0	3	3	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		26.0			26.0			46.0			46.0	
Effective Green, g (s)		26.0			26.0			46.0			46.0	
Actuated g/C Ratio		0.32			0.32			0.58			0.58	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		567			996			1874			1025	
v/s Ratio Prot												
v/s Ratio Perm		c0.11			0.04			c0.22			0.15	
v/c Ratio		0.33			0.12			0.39			0.26	
Uniform Delay, d1		20.4			19.0			9.3			8.5	
Progression Factor		0.70			1.26			1.00			1.00	
Incremental Delay, d2		1.5			0.2			0.6			0.6	
Delay (s)		15.8			24.2			9.9			9.1	
Level of Service		B			C			A			A	
Approach Delay (s)		15.8			24.2			9.9			9.1	
Approach LOS		B			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	12.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	46.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	8	235	5	20	100	4	6	10	32	3	7	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.95			0.95			1.00			1.00	
Frt		1.00			1.00			0.91			0.94	
Flt Protected		1.00			0.99			0.99			0.99	
Satd. Flow (prot)		3502			3474			1685			1737	
Flt Permitted		0.95			0.90			0.98			0.98	
Satd. Flow (perm)		3331			3153			1667			1714	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	8	247	5	21	105	4	6	11	34	3	7	8
RTOR Reduction (vph)	0	2	0	0	2	0	0	23	0	0	5	0
Lane Group Flow (vph)	0	258	0	0	128	0	0	28	0	0	13	0
Bus Blockages (#/hr)	0	3	3	0	3	3	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		46.0			46.0			26.0			26.0	
Effective Green, g (s)		46.0			46.0			26.0			26.0	
Actuated g/C Ratio		0.58			0.58			0.32			0.32	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		1915			1812			541			557	
v/s Ratio Prot												
v/s Ratio Perm		c0.08			0.04			c0.02			0.01	
v/c Ratio		0.13			0.07			0.05			0.02	
Uniform Delay, d1		7.8			7.5			18.5			18.4	
Progression Factor		1.59			0.74			1.00			1.00	
Incremental Delay, d2		0.1			0.1			0.2			0.1	
Delay (s)		12.6			5.7			18.7			18.4	
Level of Service		B			A			B			B	
Approach Delay (s)		12.6			5.7			18.7			18.4	
Approach LOS		B			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	11.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.10		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	23.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	258	12	5	108	2	9	3	20	1	0	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.95			0.95			1.00			1.00	
Frt		0.99			1.00			0.92			0.90	
Flt Protected		1.00			1.00			0.99			0.99	
Satd. Flow (prot)		3493			3502			1683			1653	
Flt Permitted		0.95			0.95			0.96			0.98	
Satd. Flow (perm)		3335			3321			1632			1637	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	2	274	13	5	115	2	10	3	21	1	0	3
RTOR Reduction (vph)	0	4	0	0	1	0	0	14	0	0	3	0
Lane Group Flow (vph)	0	285	0	0	121	0	0	20	0	0	1	0
Bus Blockages (#/hr)	0	3	3	0	3	3	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		46.0			46.0			26.0			26.0	
Effective Green, g (s)		46.0			46.0			26.0			26.0	
Actuated g/C Ratio		0.58			0.58			0.32			0.32	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		1917			1909			530			532	
v/s Ratio Prot												
v/s Ratio Perm		c0.09			0.04			c0.01			0.00	
v/c Ratio		0.15			0.06			0.04			0.00	
Uniform Delay, d1		7.9			7.5			18.4			18.2	
Progression Factor		0.42			0.68			1.00			1.00	
Incremental Delay, d2		0.2			0.1			0.1			0.0	
Delay (s)		3.5			5.2			18.6			18.2	
Level of Service		A			A			B			B	
Approach Delay (s)		3.5			5.2			18.6			18.2	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	5.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.11		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	18.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	280	0	0	107	3	4	0	8	2	3	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.95			0.95			1.00			1.00	
Frt		1.00			1.00			0.91			0.93	
Flt Protected		1.00			1.00			0.98			0.99	
Satd. Flow (prot)		3515			3504			1667			1720	
Flt Permitted		0.95			1.00			0.96			0.98	
Satd. Flow (perm)		3352			3504			1625			1698	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	5	295	0	0	113	3	4	0	8	2	3	5
RTOR Reduction (vph)	0	0	0	0	1	0	0	9	0	0	4	0
Lane Group Flow (vph)	0	300	0	0	115	0	0	3	0	0	6	0
Bus Blockages (#/hr)	0	3	3	0	3	3	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		51.0			51.0			21.0			21.0	
Effective Green, g (s)		51.0			51.0			21.0			21.0	
Actuated g/C Ratio		0.64			0.64			0.26			0.26	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		2136			2233			426			445	
v/s Ratio Prot					0.03							
v/s Ratio Perm		c0.09						0.00			c0.00	
v/c Ratio		0.14			0.05			0.01			0.01	
Uniform Delay, d1		5.8			5.4			21.8			21.8	
Progression Factor		0.43			1.00			1.00			1.00	
Incremental Delay, d2		0.1			0.0			0.0			0.1	
Delay (s)		2.6			5.5			21.8			21.9	
Level of Service		A			A			C			C	
Approach Delay (s)		2.6			5.5			21.8			21.9	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	4.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.10		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	21.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	82	238	19	145	87	24	30	1302	722	140	390	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.91	
Frt	1.00	0.99		1.00	0.97		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3480		1770	3404		1770	3539	1583	1770	5052	
Flt Permitted	0.68	1.00		0.32	1.00		0.49	1.00	1.00	0.09	1.00	
Satd. Flow (perm)	1259	3480		589	3404		910	3539	1583	166	5052	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	88	256	20	156	94	26	32	1400	776	151	419	19
RTOR Reduction (vph)	0	5	0	0	21	0	0	0	165	0	4	0
Lane Group Flow (vph)	88	271	0	156	99	0	32	1400	611	151	434	0
Bus Blockages (#/hr)	0	3	3	0	3	3	0	0	0	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	22.0	16.0		31.0	21.0		70.0	66.0	66.0	81.0	73.0	
Effective Green, g (s)	22.0	16.0		31.0	21.0		70.0	66.0	66.0	81.0	73.0	
Actuated g/C Ratio	0.18	0.13		0.26	0.18		0.58	0.55	0.55	0.68	0.61	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Grp Cap (vph)	256	464		260	595		559	1946	870	259	3073	
v/s Ratio Prot	0.02	0.08		c0.05	0.03		0.00	c0.40		c0.05	0.09	
v/s Ratio Perm	0.05			c0.10			0.03		0.39	0.34		
v/c Ratio	0.34	0.58		0.60	0.17		0.06	0.72	0.70	0.58	0.14	
Uniform Delay, d1	42.1	48.9		36.6	42.1		10.6	20.1	19.8	17.0	10.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.6	5.3		9.8	0.6		0.2	2.3	4.7	9.3	0.1	
Delay (s)	45.7	54.2		46.4	42.7		10.8	22.4	24.5	26.3	10.2	
Level of Service	D	D		D	D		B	C	C	C	B	
Approach Delay (s)		52.1			44.8			23.0			14.3	
Approach LOS		D			D			C			B	

Intersection Summary			
HCM 2000 Control Delay	26.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	72.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
8: Mayson Turner Rd & Boone Blvd

7/29/2014

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	140	49	35	243	42	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	
Lane Util. Factor	1.00			0.95	1.00	
Frt	0.97			1.00	0.97	
Flt Protected	1.00			0.99	0.96	
Satd. Flow (prot)	1798			3517	1742	
Flt Permitted	1.00			0.90	0.96	
Satd. Flow (perm)	1798			3198	1742	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	152	53	38	264	46	12
RTOR Reduction (vph)	16	0	0	0	8	0
Lane Group Flow (vph)	189	0	0	302	50	0
Turn Type	NA		Perm	NA	NA	
Protected Phases	4			8	2	
Permitted Phases			8			
Actuated Green, G (s)	46.0			46.0	26.0	
Effective Green, g (s)	46.0			46.0	26.0	
Actuated g/C Ratio	0.58			0.58	0.32	
Clearance Time (s)	4.0			4.0	4.0	
Lane Grp Cap (vph)	1033			1838	566	
v/s Ratio Prot	c0.11				c0.03	
v/s Ratio Perm				0.09		
v/c Ratio	0.18			0.16	0.09	
Uniform Delay, d1	8.1			8.0	18.8	
Progression Factor	1.00			1.26	1.00	
Incremental Delay, d2	0.4			0.2	0.3	
Delay (s)	8.5			10.3	19.1	
Level of Service	A			B	B	
Approach Delay (s)	8.5			10.3	19.1	
Approach LOS	A			B	B	

Intersection Summary			
HCM 2000 Control Delay	10.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.15		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	31.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	4	174	296	4	3	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	
Lane Util. Factor		1.00	0.95		1.00	
Frt		1.00	1.00		0.90	
Flt Protected		1.00	1.00		0.99	
Satd. Flow (prot)		1860	3532		1657	
Flt Permitted		0.99	1.00		0.99	
Satd. Flow (perm)		1851	3532		1657	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	5	200	340	5	3	8
RTOR Reduction (vph)	0	0	1	0	6	0
Lane Group Flow (vph)	0	205	344	0	5	0
Turn Type	Perm	NA	NA		NA	
Protected Phases		4	8		6	
Permitted Phases	4					
Actuated Green, G (s)		51.0	51.0		21.0	
Effective Green, g (s)		51.0	51.0		21.0	
Actuated g/C Ratio		0.64	0.64		0.26	
Clearance Time (s)		4.0	4.0		4.0	
Lane Grp Cap (vph)		1180	2251		434	
v/s Ratio Prot			0.10		c0.00	
v/s Ratio Perm		c0.11				
v/c Ratio		0.17	0.15		0.01	
Uniform Delay, d1		5.9	5.8		21.8	
Progression Factor		0.87	1.05		1.00	
Incremental Delay, d2		0.3	0.1		0.0	
Delay (s)		5.5	6.2		21.9	
Level of Service		A	A		C	
Approach Delay (s)		5.5	6.2		21.9	
Approach LOS		A	A		C	

Intersection Summary			
HCM 2000 Control Delay	6.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.13		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	22.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	130	40	132	207	65	45	325	79	17	407	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			0.95			0.95			1.00	
Frt		0.97			0.98			0.97			0.99	
Flt Protected		0.99			0.98			1.00			1.00	
Satd. Flow (prot)		1772			3371			3428			1843	
Flt Permitted		0.94			0.75			0.87			0.98	
Satd. Flow (perm)		1668			2564			2995			1803	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	22	144	44	147	230	72	50	361	88	19	452	32
RTOR Reduction (vph)	0	12	0	0	20	0	0	22	0	0	3	0
Lane Group Flow (vph)	0	198	0	0	429	0	0	477	0	0	500	0
Bus Blockages (#/hr)	4	4	4	4	4	4	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		31.0			31.0			41.0			41.0	
Effective Green, g (s)		31.0			31.0			41.0			41.0	
Actuated g/C Ratio		0.39			0.39			0.51			0.51	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		646			993			1534			924	
v/s Ratio Prot												
v/s Ratio Perm		0.12			c0.17			0.16			c0.28	
v/c Ratio		0.31			0.43			0.31			0.54	
Uniform Delay, d1		17.0			18.0			11.3			13.2	
Progression Factor		0.60			1.38			1.00			1.00	
Incremental Delay, d2		1.2			1.4			0.5			2.3	
Delay (s)		11.4			26.2			11.8			15.4	
Level of Service		B			C			B			B	
Approach Delay (s)		11.4			26.2			11.8			15.4	
Approach LOS		B			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	16.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	69.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	16	176	9	16	317	7	0	10	28	12	26	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.95			0.95			1.00			1.00	
Frt		0.99			1.00			0.90			0.96	
Flt Protected		1.00			1.00			1.00			0.99	
Satd. Flow (prot)		3473			3491			1677			1768	
Flt Permitted		0.92			0.94			1.00			0.96	
Satd. Flow (perm)		3205			3286			1677			1713	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	18	196	10	18	352	8	0	11	31	13	29	18
RTOR Reduction (vph)	0	4	0	0	2	0	0	21	0	0	12	0
Lane Group Flow (vph)	0	220	0	0	376	0	0	21	0	0	48	0
Bus Blockages (#/hr)	0	4	4	0	4	4	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		46.0			46.0			26.0			26.0	
Effective Green, g (s)		46.0			46.0			26.0			26.0	
Actuated g/C Ratio		0.58			0.58			0.32			0.32	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		1842			1889			545			556	
v/s Ratio Prot								0.01				
v/s Ratio Perm		0.07			c0.11						c0.03	
v/c Ratio		0.12			0.20			0.04			0.09	
Uniform Delay, d1		7.8			8.2			18.5			18.7	
Progression Factor		1.25			0.68			1.00			1.00	
Incremental Delay, d2		0.1			0.2			0.1			0.3	
Delay (s)		9.8			5.7			18.6			19.1	
Level of Service		A			A			B			B	
Approach Delay (s)		9.8			5.7			18.6			19.1	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	9.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.16		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	34.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	165	26	0	310	6	12	10	17	3	7	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.95			0.95			1.00			1.00	
Frt		0.98			1.00			0.94			0.95	
Flt Protected		1.00			1.00			0.98			0.99	
Satd. Flow (prot)		3436			3501			1724			1758	
Flt Permitted		0.94			1.00			0.95			0.98	
Satd. Flow (perm)		3249			3501			1656			1736	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	8	190	30	0	356	7	14	11	20	3	8	6
RTOR Reduction (vph)	0	13	0	0	2	0	0	14	0	0	4	0
Lane Group Flow (vph)	0	215	0	0	361	0	0	32	0	0	13	0
Bus Blockages (#/hr)	0	4	4	0	4	4	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		46.0			46.0			26.0			26.0	
Effective Green, g (s)		46.0			46.0			26.0			26.0	
Actuated g/C Ratio		0.58			0.58			0.32			0.32	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		1868			2013			538			564	
v/s Ratio Prot					c0.10							
v/s Ratio Perm		0.07						c0.02			0.01	
v/c Ratio		0.12			0.18			0.06			0.02	
Uniform Delay, d1		7.7			8.1			18.6			18.4	
Progression Factor		0.65			0.61			1.00			1.00	
Incremental Delay, d2		0.1			0.2			0.2			0.1	
Delay (s)		5.1			5.1			18.8			18.4	
Level of Service		A			A			B			B	
Approach Delay (s)		5.1			5.1			18.8			18.4	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	6.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.14		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	20.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	152	0	0	309	16	7	7	3	2	5	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.95			0.95			1.00			1.00	
Frt		1.00			0.99			0.98			0.96	
Flt Protected		1.00			1.00			0.98			0.99	
Satd. Flow (prot)		3504			3485			1785			1778	
Flt Permitted		0.94			1.00			0.94			0.98	
Satd. Flow (perm)		3314			3485			1709			1757	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	7	175	0	0	355	18	8	8	3	2	6	3
RTOR Reduction (vph)	0	0	0	0	5	0	0	2	0	0	2	0
Lane Group Flow (vph)	0	182	0	0	368	0	0	17	0	0	9	0
Bus Blockages (#/hr)	0	4	4	0	4	4	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		51.0			51.0			21.0			21.0	
Effective Green, g (s)		51.0			51.0			21.0			21.0	
Actuated g/C Ratio		0.64			0.64			0.26			0.26	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		2112			2221			448			461	
v/s Ratio Prot					c0.11							
v/s Ratio Perm		0.05						c0.01			0.01	
v/c Ratio		0.09			0.17			0.04			0.02	
Uniform Delay, d1		5.6			5.9			22.0			21.9	
Progression Factor		0.48			1.00			1.00			1.00	
Incremental Delay, d2		0.1			0.2			0.2			0.1	
Delay (s)		2.7			6.0			22.1			21.9	
Level of Service		A			A			C			C	
Approach Delay (s)		2.7			6.0			22.1			21.9	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	5.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.13		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	19.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	37	106	67	482	239	75	50	550	181	49	1748	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.91	
Frt	1.00	0.94		1.00	0.96		1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3307		1770	3385		1770	3539	1583	1770	5080	
Flt Permitted	0.55	1.00		0.40	1.00		0.06	1.00	1.00	0.35	1.00	
Satd. Flow (perm)	1028	3307		736	3385		113	3539	1583	648	5080	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	39	112	71	507	252	79	53	579	191	52	1840	13
RTOR Reduction (vph)	0	63	0	0	20	0	0	0	107	0	1	0
Lane Group Flow (vph)	39	120	0	507	311	0	53	579	84	52	1852	0
Bus Blockages (#/hr)	0	4	4	0	4	4	0	0	0	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	21.0	16.0		68.0	59.0		70.0	66.0	66.0	70.0	66.0	
Effective Green, g (s)	21.0	16.0		68.0	59.0		70.0	66.0	66.0	70.0	66.0	
Actuated g/C Ratio	0.14	0.11		0.45	0.39		0.47	0.44	0.44	0.47	0.44	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Grp Cap (vph)	168	352		664	1331		96	1557	696	332	2235	
v/s Ratio Prot	0.01	0.04		c0.24	0.09		c0.01	0.16		0.00	c0.36	
v/s Ratio Perm	0.02			c0.10			0.24		0.05	0.07		
v/c Ratio	0.23	0.34		0.76	0.23		0.55	0.37	0.12	0.16	0.83	
Uniform Delay, d1	56.7	62.1		31.7	30.4		30.5	28.1	24.8	22.6	37.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.2	2.6		8.1	0.4		20.9	0.7	0.4	1.0	3.7	
Delay (s)	59.9	64.7		39.9	30.8		51.4	28.8	25.2	23.6	40.7	
Level of Service	E	E		D	C		D	C	C	C	D	
Approach Delay (s)		63.9			36.3			29.4			40.3	
Approach LOS		E			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	38.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	82.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
8: Mayson Turner Rd & Boone Blvd

9/17/2014

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	167	29	7	97	18	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	
Lane Util. Factor	1.00			1.00	1.00	
Frt	0.98			1.00	0.96	
Flt Protected	1.00			1.00	0.97	
Satd. Flow (prot)	1825			1856	1725	
Flt Permitted	1.00			0.98	0.97	
Satd. Flow (perm)	1825			1833	1725	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	182	32	8	105	20	9
RTOR Reduction (vph)	8	0	0	0	7	0
Lane Group Flow (vph)	206	0	0	113	22	0
Turn Type	NA		Perm	NA	Prot	
Protected Phases	4			8	2	
Permitted Phases			8			
Actuated Green, G (s)	51.0			51.0	21.0	
Effective Green, g (s)	51.0			51.0	21.0	
Actuated g/C Ratio	0.64			0.64	0.26	
Clearance Time (s)	4.0			4.0	4.0	
Lane Grp Cap (vph)	1163			1168	452	
v/s Ratio Prot	c0.11				c0.01	
v/s Ratio Perm				0.06		
v/c Ratio	0.18			0.10	0.05	
Uniform Delay, d1	5.9			5.6	22.0	
Progression Factor	1.00			1.04	1.00	
Incremental Delay, d2	0.3			0.2	0.2	
Delay (s)	6.3			6.0	22.2	
Level of Service	A			A	C	
Approach Delay (s)	6.3			6.0	22.2	
Approach LOS	A			A	C	

Intersection Summary			
HCM 2000 Control Delay	7.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.14		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	20.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	7	179	116	0	0	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	
Lane Util. Factor		1.00	1.00		1.00	
Frt		1.00	1.00		0.86	
Flt Protected		1.00	1.00		1.00	
Satd. Flow (prot)		1859	1863		1611	
Flt Permitted		0.99	1.00		1.00	
Satd. Flow (perm)		1850	1863		1611	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	8	203	132	0	0	2
RTOR Reduction (vph)	0	0	0	0	2	0
Lane Group Flow (vph)	0	211	132	0	0	0
Turn Type	Perm	NA	NA		Prot	
Protected Phases		4	8		6	
Permitted Phases	4					
Actuated Green, G (s)		56.0	56.0		16.0	
Effective Green, g (s)		56.0	56.0		16.0	
Actuated g/C Ratio		0.70	0.70		0.20	
Clearance Time (s)		4.0	4.0		4.0	
Lane Grp Cap (vph)		1295	1304		322	
v/s Ratio Prot			0.07		c0.00	
v/s Ratio Perm		c0.11				
v/c Ratio		0.16	0.10		0.00	
Uniform Delay, d1		4.1	3.9		25.6	
Progression Factor		0.91	1.09		1.00	
Incremental Delay, d2		0.3	0.2		0.0	
Delay (s)		4.0	4.4		25.6	
Level of Service		A	A		C	
Approach Delay (s)		4.0	4.4		25.6	
Approach LOS		A	A		C	

Intersection Summary			
HCM 2000 Control Delay	4.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.13		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	25.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	22	140	16	23	83	26	16	563	126	10	221	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			0.95			1.00	
Frt		0.99			0.97			0.97			0.99	
Flt Protected		0.99			0.99			1.00			1.00	
Satd. Flow (prot)		1807			1775			3440			1833	
Flt Permitted		0.96			0.94			0.95			0.97	
Satd. Flow (perm)		1746			1680			3260			1783	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	23	149	17	24	88	28	17	599	134	11	235	28
RTOR Reduction (vph)	0	5	0	0	11	0	0	23	0	0	5	0
Lane Group Flow (vph)	0	184	0	0	129	0	0	727	0	0	269	0
Bus Blockages (#/hr)	3	3	3	3	3	3	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		26.0			26.0			46.0			46.0	
Effective Green, g (s)		26.0			26.0			46.0			46.0	
Actuated g/C Ratio		0.32			0.32			0.58			0.58	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		567			546			1874			1025	
v/s Ratio Prot												
v/s Ratio Perm		c0.11			0.08			c0.22			0.15	
v/c Ratio		0.33			0.24			0.39			0.26	
Uniform Delay, d1		20.4			19.7			9.3			8.5	
Progression Factor		0.70			1.23			1.00			1.00	
Incremental Delay, d2		1.5			1.0			0.6			0.6	
Delay (s)		15.8			25.3			9.9			9.1	
Level of Service		B			C			A			A	
Approach Delay (s)		15.8			25.3			9.9			9.1	
Approach LOS		B			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	12.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	42.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	8	235	5	20	100	4	6	10	32	3	7	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		1.00			1.00			0.91			0.94	
Flt Protected		1.00			0.99			0.99			0.99	
Satd. Flow (prot)		1833			1818			1685			1737	
Flt Permitted		0.99			0.94			0.98			0.98	
Satd. Flow (perm)		1825			1727			1667			1714	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	8	247	5	21	105	4	6	11	34	3	7	8
RTOR Reduction (vph)	0	1	0	0	1	0	0	23	0	0	5	0
Lane Group Flow (vph)	0	259	0	0	129	0	0	28	0	0	13	0
Bus Blockages (#/hr)	3	3	3	3	3	3	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		46.0			46.0			26.0			26.0	
Effective Green, g (s)		46.0			46.0			26.0			26.0	
Actuated g/C Ratio		0.58			0.58			0.32			0.32	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		1049			993			541			557	
v/s Ratio Prot												
v/s Ratio Perm		c0.14			0.07			c0.02			0.01	
v/c Ratio		0.25			0.13			0.05			0.02	
Uniform Delay, d1		8.4			7.8			18.5			18.4	
Progression Factor		1.64			0.71			1.00			1.00	
Incremental Delay, d2		0.5			0.3			0.2			0.1	
Delay (s)		14.4			5.8			18.7			18.4	
Level of Service		B			A			B			B	
Approach Delay (s)		14.4			5.8			18.7			18.4	
Approach LOS		B			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	12.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.18		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	25.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	258	12	5	108	2	9	3	20	1	0	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.99			1.00			0.92			0.90	
Flt Protected		1.00			1.00			0.99			0.99	
Satd. Flow (prot)		1829			1833			1683			1653	
Flt Permitted		1.00			0.99			0.96			0.98	
Satd. Flow (perm)		1828			1819			1632			1637	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	2	274	13	5	115	2	10	3	21	1	0	3
RTOR Reduction (vph)	0	2	0	0	1	0	0	14	0	0	3	0
Lane Group Flow (vph)	0	287	0	0	121	0	0	20	0	0	1	0
Bus Blockages (#/hr)	3	3	3	3	3	3	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		46.0			46.0			26.0			26.0	
Effective Green, g (s)		46.0			46.0			26.0			26.0	
Actuated g/C Ratio		0.58			0.58			0.32			0.32	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		1051			1045			530			532	
v/s Ratio Prot												
v/s Ratio Perm		c0.16			0.07			c0.01			0.00	
v/c Ratio		0.27			0.12			0.04			0.00	
Uniform Delay, d1		8.6			7.7			18.4			18.2	
Progression Factor		0.40			0.66			1.00			1.00	
Incremental Delay, d2		0.6			0.2			0.1			0.0	
Delay (s)		4.1			5.3			18.6			18.2	
Level of Service		A			A			B			B	
Approach Delay (s)		4.1			5.3			18.6			18.2	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	5.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.19		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	25.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	280	0	0	107	3	4	0	8	2	3	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		1.00			1.00			0.91			0.93	
Flt Protected		1.00			1.00			0.98			0.99	
Satd. Flow (prot)		1839			1834			1667			1720	
Flt Permitted		1.00			1.00			0.96			0.98	
Satd. Flow (perm)		1836			1834			1625			1698	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	5	295	0	0	113	3	4	0	8	2	3	5
RTOR Reduction (vph)	0	0	0	0	1	0	0	9	0	0	4	0
Lane Group Flow (vph)	0	300	0	0	115	0	0	3	0	0	6	0
Bus Blockages (#/hr)	3	3	3	3	3	3	0	0	0	0	0	0
Turn Type	Perm	NA			NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		51.0			51.0			21.0			21.0	
Effective Green, g (s)		51.0			51.0			21.0			21.0	
Actuated g/C Ratio		0.64			0.64			0.26			0.26	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		1170			1169			426			445	
v/s Ratio Prot					0.06							
v/s Ratio Perm		c0.16						0.00			c0.00	
v/c Ratio		0.26			0.10			0.01			0.01	
Uniform Delay, d1		6.3			5.6			21.8			21.8	
Progression Factor		0.39			1.00			1.00			1.00	
Incremental Delay, d2		0.5			0.2			0.0			0.1	
Delay (s)		3.0			5.8			21.8			21.9	
Level of Service		A			A			C			C	
Approach Delay (s)		3.0			5.8			21.8			21.9	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	4.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.19		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	28.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
24: Northside Dr & Boone Blvd

2/12/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	82	238	19	145	87	24	30	1302	722	140	390	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.91	
Frt		0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected		0.99		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1805		1748	1840	1564	1770	3539	1583	1770	5052	
Flt Permitted		0.90		0.44	1.00	1.00	0.49	1.00	1.00	0.07	1.00	
Satd. Flow (perm)		1636		812	1840	1564	910	3539	1583	133	5052	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	88	256	20	156	94	26	32	1400	776	151	419	19
RTOR Reduction (vph)	0	1	0	0	0	20	0	0	142	0	4	0
Lane Group Flow (vph)	0	363	0	156	94	6	32	1400	634	151	434	0
Bus Blockages (#/hr)	3	3	3	3	3	3	0	0	0	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)		31.0		35.0	29.0	29.0	65.0	61.0	61.0	75.0	67.0	
Effective Green, g (s)		31.0		35.0	29.0	29.0	65.0	61.0	61.0	75.0	67.0	
Actuated g/C Ratio		0.26		0.29	0.24	0.24	0.54	0.51	0.51	0.62	0.56	
Clearance Time (s)		4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Grp Cap (vph)		428		283	444	377	521	1798	804	219	2820	
v/s Ratio Prot		c0.03		c0.03	0.05		0.00	0.40		c0.06	0.09	
v/s Ratio Perm		c0.19		0.13		0.00	0.03		c0.40	0.37		
v/c Ratio		0.85		0.55	0.21	0.02	0.06	0.78	0.79	0.69	0.15	
Uniform Delay, d1		42.2		36.5	36.4	34.6	12.8	24.0	24.2	24.4	12.8	
Progression Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		18.4		7.5	1.1	0.1	0.2	3.4	7.7	16.3	0.1	
Delay (s)		60.6		44.0	37.5	34.7	13.1	27.4	32.0	40.7	12.9	
Level of Service		E		D	D	C	B	C	C	D	B	
Approach Delay (s)		60.6			40.9			28.8			20.0	
Approach LOS		E			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	31.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	80.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
8: Mayson Turner Rd & Boone Blvd

9/17/2014

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	140	49	35	243	42	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	
Lane Util. Factor	1.00			1.00	1.00	
Frt	0.97			1.00	0.97	
Flt Protected	1.00			0.99	0.96	
Satd. Flow (prot)	1798			1851	1742	
Flt Permitted	1.00			0.95	0.96	
Satd. Flow (perm)	1798			1768	1742	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	152	53	38	264	46	12
RTOR Reduction (vph)	16	0	0	0	8	0
Lane Group Flow (vph)	189	0	0	302	50	0
Turn Type	NA		Perm	NA	Prot	
Protected Phases	4			8	2	
Permitted Phases			8			
Actuated Green, G (s)	46.0			46.0	26.0	
Effective Green, g (s)	46.0			46.0	26.0	
Actuated g/C Ratio	0.58			0.58	0.32	
Clearance Time (s)	4.0			4.0	4.0	
Lane Grp Cap (vph)	1033			1016	566	
v/s Ratio Prot	0.11				c0.03	
v/s Ratio Perm				c0.17		
v/c Ratio	0.18			0.30	0.09	
Uniform Delay, d1	8.1			8.7	18.8	
Progression Factor	1.00			0.85	1.00	
Incremental Delay, d2	0.4			0.7	0.3	
Delay (s)	8.5			8.1	19.1	
Level of Service	A			A	B	
Approach Delay (s)	8.5			8.1	19.1	
Approach LOS	A			A	B	

Intersection Summary			
HCM 2000 Control Delay	9.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.22		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	38.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	4	174	296	4	3	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	
Lane Util. Factor		1.00	1.00		1.00	
Frt		1.00	1.00		0.90	
Flt Protected		1.00	1.00		0.99	
Satd. Flow (prot)		1860	1859		1657	
Flt Permitted		0.99	1.00		0.99	
Satd. Flow (perm)		1851	1859		1657	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	5	200	340	5	3	8
RTOR Reduction (vph)	0	0	1	0	6	0
Lane Group Flow (vph)	0	205	344	0	5	0
Turn Type	Perm	NA	NA		Prot	
Protected Phases		4	8		6	
Permitted Phases	4					
Actuated Green, G (s)		51.0	51.0		21.0	
Effective Green, g (s)		51.0	51.0		21.0	
Actuated g/C Ratio		0.64	0.64		0.26	
Clearance Time (s)		4.0	4.0		4.0	
Lane Grp Cap (vph)		1180	1185		434	
v/s Ratio Prot			c0.19		c0.00	
v/s Ratio Perm		0.11				
v/c Ratio		0.17	0.29		0.01	
Uniform Delay, d1		5.9	6.5		21.8	
Progression Factor		0.87	1.63		1.00	
Incremental Delay, d2		0.3	0.5		0.0	
Delay (s)		5.5	11.0		21.9	
Level of Service		A	B		C	
Approach Delay (s)		5.5	11.0		21.9	
Approach LOS		A	B		C	

Intersection Summary			
HCM 2000 Control Delay	9.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.21		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	25.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	130	40	132	207	65	45	325	79	17	407	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			0.95			1.00	
Frt		0.97			0.98			0.97			0.99	
Flt Protected		0.99			0.98			1.00			1.00	
Satd. Flow (prot)		1772			1764			3428			1843	
Flt Permitted		0.94			0.81			0.87			0.98	
Satd. Flow (perm)		1673			1446			2995			1803	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	22	144	44	147	230	72	50	361	88	19	452	32
RTOR Reduction (vph)	0	12	0	0	9	0	0	22	0	0	3	0
Lane Group Flow (vph)	0	198	0	0	440	0	0	477	0	0	500	0
Bus Blockages (#/hr)	4	4	4	4	4	4	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		31.0			31.0			41.0			41.0	
Effective Green, g (s)		31.0			31.0			41.0			41.0	
Actuated g/C Ratio		0.39			0.39			0.51			0.51	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		648			560			1534			924	
v/s Ratio Prot												
v/s Ratio Perm		0.12			c0.30			0.16			c0.28	
v/c Ratio		0.31			0.79			0.31			0.54	
Uniform Delay, d1		17.0			21.6			11.3			13.2	
Progression Factor		0.60			1.39			1.00			1.00	
Incremental Delay, d2		1.2			10.4			0.5			2.3	
Delay (s)		11.4			40.4			11.8			15.4	
Level of Service		B			D			B			B	
Approach Delay (s)		11.4			40.4			11.8			15.4	
Approach LOS		B			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	20.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	79.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	16	176	9	16	317	7	0	10	28	12	26	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.99			1.00			0.90			0.96	
Flt Protected		1.00			1.00			1.00			0.99	
Satd. Flow (prot)		1815			1823			1677			1768	
Flt Permitted		0.96			0.98			1.00			0.96	
Satd. Flow (perm)		1756			1798			1677			1713	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	18	196	10	18	352	8	0	11	31	13	29	18
RTOR Reduction (vph)	0	2	0	0	1	0	0	21	0	0	12	0
Lane Group Flow (vph)	0	222	0	0	377	0	0	21	0	0	48	0
Bus Blockages (#/hr)	4	4	4	4	4	4	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA			NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		46.0			46.0			26.0			26.0	
Effective Green, g (s)		46.0			46.0			26.0			26.0	
Actuated g/C Ratio		0.58			0.58			0.32			0.32	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		1009			1033			545			556	
v/s Ratio Prot								0.01				
v/s Ratio Perm		0.13			c0.21						c0.03	
v/c Ratio		0.22			0.37			0.04			0.09	
Uniform Delay, d1		8.3			9.1			18.5			18.7	
Progression Factor		1.28			0.61			1.00			1.00	
Incremental Delay, d2		0.5			1.0			0.1			0.3	
Delay (s)		11.1			6.5			18.6			19.1	
Level of Service		B			A			B			B	
Approach Delay (s)		11.1			6.5			18.6			19.1	
Approach LOS		B			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	9.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.26		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	37.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	165	26	0	310	6	12	10	17	3	7	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.98			1.00			0.94			0.95	
Flt Protected		1.00			1.00			0.98			0.99	
Satd. Flow (prot)		1797			1828			1724			1758	
Flt Permitted		0.99			1.00			0.95			0.98	
Satd. Flow (perm)		1780			1828			1656			1736	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	8	190	30	0	356	7	14	11	20	3	8	6
RTOR Reduction (vph)	0	7	0	0	1	0	0	14	0	0	4	0
Lane Group Flow (vph)	0	221	0	0	362	0	0	32	0	0	13	0
Bus Blockages (#/hr)	4	4	4	4	4	4	0	0	0	0	0	0
Turn Type	Perm	NA			NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		46.0			46.0			26.0			26.0	
Effective Green, g (s)		46.0			46.0			26.0			26.0	
Actuated g/C Ratio		0.58			0.58			0.32			0.32	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		1023			1051			538			564	
v/s Ratio Prot					c0.20							
v/s Ratio Perm		0.12						c0.02			0.01	
v/c Ratio		0.22			0.34			0.06			0.02	
Uniform Delay, d1		8.3			9.0			18.6			18.4	
Progression Factor		0.63			0.55			1.00			1.00	
Incremental Delay, d2		0.5			0.9			0.2			0.1	
Delay (s)		5.7			5.8			18.8			18.4	
Level of Service		A			A			B			B	
Approach Delay (s)		5.7			5.8			18.8			18.4	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	7.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	26.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
21: Vine St & Boone Blvd

9/17/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	152	0	0	309	16	7	7	3	2	5	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		1.00			0.99			0.98			0.96	
Flt Protected		1.00			1.00			0.98			0.99	
Satd. Flow (prot)		1829			1851			1785			1778	
Flt Permitted		0.99			1.00			0.94			0.98	
Satd. Flow (perm)		1811			1851			1709			1757	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	7	175	0	0	355	18	8	8	3	2	6	3
RTOR Reduction (vph)	0	0	0	0	2	0	0	2	0	0	2	0
Lane Group Flow (vph)	0	182	0	0	371	0	0	17	0	0	9	0
Bus Blockages (#/hr)	4	4	4	0	0	0	0	0	0	0	0	0
Turn Type	Perm	NA			NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		51.0			51.0			21.0			21.0	
Effective Green, g (s)		51.0			51.0			21.0			21.0	
Actuated g/C Ratio		0.64			0.64			0.26			0.26	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		1154			1180			448			461	
v/s Ratio Prot					c0.20							
v/s Ratio Perm		0.10						c0.01			0.01	
v/c Ratio		0.16			0.31			0.04			0.02	
Uniform Delay, d1		5.8			6.6			22.0			21.9	
Progression Factor		0.44			1.00			1.00			1.00	
Incremental Delay, d2		0.3			0.7			0.2			0.1	
Delay (s)		2.9			7.3			22.1			21.9	
Level of Service		A			A			C			C	
Approach Delay (s)		2.9			7.3			22.1			21.9	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	6.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.23		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	27.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
24: Northside Dr & Boone Blvd

2/12/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	37	106	67	482	239	75	50	550	181	49	1748	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.91	
Frt		0.96		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.99		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1739		1770	1833	1558	1770	3539	1583	1770	5080	
Flt Permitted		0.90		0.62	1.00	1.00	0.06	1.00	1.00	0.35	1.00	
Satd. Flow (perm)		1584		1154	1833	1558	113	3539	1583	648	5080	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	39	112	71	507	252	79	53	579	191	52	1840	13
RTOR Reduction (vph)	0	11	0	0	0	47	0	0	107	0	1	0
Lane Group Flow (vph)	0	211	0	507	252	32	53	579	84	52	1852	0
Bus Blockages (#/hr)	4	4	4	0	4	4	0	0	0	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)		30.0		68.0	60.0	60.0	70.0	66.0	66.0	70.0	66.0	
Effective Green, g (s)		30.0		68.0	60.0	60.0	70.0	66.0	66.0	70.0	66.0	
Actuated g/C Ratio		0.20		0.45	0.40	0.40	0.47	0.44	0.44	0.47	0.44	
Clearance Time (s)		4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Grp Cap (vph)		320		679	733	623	96	1557	696	332	2235	
v/s Ratio Prot		0.02		c0.19	0.14		c0.01	0.16		0.00	c0.36	
v/s Ratio Perm		0.11		c0.15		0.02	0.24		0.05	0.07		
v/c Ratio		0.66		0.75	0.34	0.05	0.55	0.37	0.12	0.16	0.83	
Uniform Delay, d1		55.3		31.4	31.3	27.6	30.5	28.1	24.8	22.6	37.0	
Progression Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		10.2		7.3	1.3	0.2	20.9	0.7	0.4	1.0	3.7	
Delay (s)		65.5		38.8	32.6	27.7	51.4	28.8	25.2	23.6	40.7	
Level of Service		E		D	C	C	D	C	C	C	D	
Approach Delay (s)		65.5			35.9			29.4			40.3	
Approach LOS		E			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	38.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	89.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
3: Mayson Turner Rd & Boone Blvd

9/17/2014

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	167	29	7	97	18	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	
Lane Util. Factor	1.00		1.00	1.00	1.00	
Frt	0.98		1.00	1.00	0.96	
Flt Protected	1.00		0.95	1.00	0.97	
Satd. Flow (prot)	1825		1770	1863	1553	
Flt Permitted	1.00		0.62	1.00	0.97	
Satd. Flow (perm)	1825		1163	1863	1553	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	182	32	8	105	20	9
RTOR Reduction (vph)	8	0	0	0	7	0
Lane Group Flow (vph)	206	0	8	105	22	0
Parking (#/hr)					0	
Turn Type	NA		Perm	NA	Prot	
Protected Phases	4			8	2	
Permitted Phases			8			
Actuated Green, G (s)	51.0		51.0	51.0	21.0	
Effective Green, g (s)	51.0		51.0	51.0	21.0	
Actuated g/C Ratio	0.64		0.64	0.64	0.26	
Clearance Time (s)	4.0		4.0	4.0	4.0	
Lane Grp Cap (vph)	1163		741	1187	407	
v/s Ratio Prot	c0.11			0.06	c0.01	
v/s Ratio Perm			0.01			
v/c Ratio	0.18		0.01	0.09	0.05	
Uniform Delay, d1	5.9		5.3	5.6	22.1	
Progression Factor	1.00		1.17	1.08	1.00	
Incremental Delay, d2	0.3		0.0	0.1	0.3	
Delay (s)	6.3		6.2	6.2	22.3	
Level of Service	A		A	A	C	
Approach Delay (s)	6.3			6.2	22.3	
Approach LOS	A			A	C	

Intersection Summary			
HCM 2000 Control Delay	7.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.14		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	20.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	7	179	116	0	0	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	1.00		0.86	
Flt Protected	0.95	1.00	1.00		1.00	
Satd. Flow (prot)	1770	1863	1863		1611	
Flt Permitted	0.67	1.00	1.00		1.00	
Satd. Flow (perm)	1253	1863	1863		1611	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	8	203	132	0	0	2
RTOR Reduction (vph)	0	0	0	0	2	0
Lane Group Flow (vph)	8	203	132	0	0	0
Turn Type	Perm	NA	NA		Prot	
Protected Phases		4	8		6	
Permitted Phases	4					
Actuated Green, G (s)	56.0	56.0	56.0		16.0	
Effective Green, g (s)	56.0	56.0	56.0		16.0	
Actuated g/C Ratio	0.70	0.70	0.70		0.20	
Clearance Time (s)	4.0	4.0	4.0		4.0	
Lane Grp Cap (vph)	877	1304	1304		322	
v/s Ratio Prot		c0.11	0.07		c0.00	
v/s Ratio Perm	0.01					
v/c Ratio	0.01	0.16	0.10		0.00	
Uniform Delay, d1	3.6	4.0	3.9		25.6	
Progression Factor	0.93	0.91	0.89		1.00	
Incremental Delay, d2	0.0	0.3	0.2		0.0	
Delay (s)	3.4	3.9	3.6		25.6	
Level of Service	A	A	A		C	
Approach Delay (s)		3.9	3.6		25.6	
Approach LOS		A	A		C	

Intersection Summary			
HCM 2000 Control Delay	3.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.12		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	19.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	22	140	16	23	83	26	16	563	126	10	221	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95			1.00	
Frt	1.00	0.98		1.00	0.96			0.97			0.99	
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	
Satd. Flow (prot)	1770	1812		1770	1774			3440			1833	
Flt Permitted	0.68	1.00		0.61	1.00			0.95			0.97	
Satd. Flow (perm)	1271	1812		1145	1774			3260			1783	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	23	149	17	24	88	28	17	599	134	11	235	28
RTOR Reduction (vph)	0	5	0	0	14	0	0	23	0	0	5	0
Lane Group Flow (vph)	23	161	0	24	102	0	0	727	0	0	269	0
Bus Blockages (#/hr)	0	3	3	0	3	3	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	26.0	26.0		26.0	26.0			46.0			46.0	
Effective Green, g (s)	26.0	26.0		26.0	26.0			46.0			46.0	
Actuated g/C Ratio	0.32	0.32		0.32	0.32			0.58			0.58	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Grp Cap (vph)	413	588		372	576			1874			1025	
v/s Ratio Prot		c0.09			0.06							
v/s Ratio Perm	0.02			0.02				c0.22			0.15	
v/c Ratio	0.06	0.27		0.06	0.18			0.39			0.26	
Uniform Delay, d1	18.6	20.0		18.6	19.3			9.3			8.5	
Progression Factor	0.73	0.70		1.22	1.26			1.00			1.00	
Incremental Delay, d2	0.3	1.1		0.3	0.7			0.6			0.6	
Delay (s)	13.8	15.2		23.1	25.0			9.9			9.1	
Level of Service	B	B		C	C			A			A	
Approach Delay (s)		15.0			24.7			9.9			9.1	
Approach LOS		B			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	12.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	45.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	8	235	5	20	100	4	6	10	32	3	7	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	0.99			0.91			0.94	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.99	
Satd. Flow (prot)	1770	1835		1770	1830			1685			1737	
Flt Permitted	0.69	1.00		0.58	1.00			0.98			0.98	
Satd. Flow (perm)	1279	1835		1086	1830			1667			1714	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	8	247	5	21	105	4	6	11	34	3	7	8
RTOR Reduction (vph)	0	1	0	0	2	0	0	23	0	0	5	0
Lane Group Flow (vph)	8	251	0	21	107	0	0	28	0	0	13	0
Bus Blockages (#/hr)	0	3	3	0	3	3	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	46.0	46.0		46.0	46.0			26.0			26.0	
Effective Green, g (s)	46.0	46.0		46.0	46.0			26.0			26.0	
Actuated g/C Ratio	0.58	0.58		0.58	0.58			0.32			0.32	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Grp Cap (vph)	735	1055		624	1052			541			557	
v/s Ratio Prot		c0.14			0.06							
v/s Ratio Perm	0.01			0.02				c0.02			0.01	
v/c Ratio	0.01	0.24		0.03	0.10			0.05			0.02	
Uniform Delay, d1	7.3	8.4		7.4	7.7			18.5			18.4	
Progression Factor	1.60	1.63		0.73	0.71			1.00			1.00	
Incremental Delay, d2	0.0	0.5		0.1	0.2			0.2			0.1	
Delay (s)	11.7	14.2		5.5	5.6			18.7			18.4	
Level of Service	B	B		A	A			B			B	
Approach Delay (s)		14.1			5.6			18.7			18.4	
Approach LOS		B			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	12.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.17		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	26.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	258	12	5	108	2	9	3	20	1	0	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor		1.00		1.00	1.00			1.00			1.00	
Frt		0.99		1.00	1.00			0.92			0.90	
Flt Protected		1.00		0.95	1.00			0.99			0.99	
Satd. Flow (prot)		1829		1770	1836			1683			1653	
Flt Permitted		1.00		0.57	1.00			0.96			0.98	
Satd. Flow (perm)		1828		1067	1836			1632			1637	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	2	274	13	5	115	2	10	3	21	1	0	3
RTOR Reduction (vph)	0	2	0	0	1	0	0	14	0	0	3	0
Lane Group Flow (vph)	0	287	0	5	116	0	0	20	0	0	1	0
Bus Blockages (#/hr)	0	3	3	0	3	3	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		46.0		46.0	46.0			26.0			26.0	
Effective Green, g (s)		46.0		46.0	46.0			26.0			26.0	
Actuated g/C Ratio		0.58		0.58	0.58			0.32			0.32	
Clearance Time (s)		4.0		4.0	4.0			4.0			4.0	
Lane Grp Cap (vph)		1051		613	1055			530			532	
v/s Ratio Prot					0.06							
v/s Ratio Perm		c0.16		0.00				c0.01			0.00	
v/c Ratio		0.27		0.01	0.11			0.04			0.00	
Uniform Delay, d1		8.6		7.3	7.7			18.4			18.2	
Progression Factor		0.40		0.72	0.66			1.00			1.00	
Incremental Delay, d2		0.6		0.0	0.2			0.1			0.0	
Delay (s)		4.1		5.3	5.3			18.6			18.2	
Level of Service		A		A	A			B			B	
Approach Delay (s)		4.1			5.3			18.6			18.2	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	5.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.19		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	25.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	280	0	0	107	3	4	0	8	2	3	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00			1.00			1.00			1.00	
Frt	1.00	1.00			1.00			0.91			0.93	
Flt Protected	0.95	1.00			1.00			0.98			0.99	
Satd. Flow (prot)	1770	1840			1833			1667			1720	
Flt Permitted	0.68	1.00			1.00			0.96			0.98	
Satd. Flow (perm)	1271	1840			1833			1625			1698	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	5	295	0	0	113	3	4	0	8	2	3	5
RTOR Reduction (vph)	0	0	0	0	1	0	0	9	0	0	4	0
Lane Group Flow (vph)	5	295	0	0	115	0	0	3	0	0	6	0
Bus Blockages (#/hr)	0	3	3	0	3	3	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	51.0	51.0			51.0			21.0			21.0	
Effective Green, g (s)	51.0	51.0			51.0			21.0			21.0	
Actuated g/C Ratio	0.64	0.64			0.64			0.26			0.26	
Clearance Time (s)	4.0	4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)	810	1173			1168			426			445	
v/s Ratio Prot		c0.16			0.06							
v/s Ratio Perm	0.00							0.00			c0.00	
v/c Ratio	0.01	0.25			0.10			0.01			0.01	
Uniform Delay, d1	5.3	6.3			5.6			21.8			21.8	
Progression Factor	0.43	0.40			1.00			1.00			1.00	
Incremental Delay, d2	0.0	0.5			0.2			0.0			0.1	
Delay (s)	2.3	3.0			5.8			21.8			21.9	
Level of Service	A	A			A			C			C	
Approach Delay (s)		3.0			5.8			21.8			21.9	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	4.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.18		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	24.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
10: Northside Dr & Boone Blvd

2/12/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	82	238	19	145	87	24	30	1302	722	140	390	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.91	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1820		1770	1840	1564	1770	3539	1583	1770	5052	
Flt Permitted	0.70	1.00		0.21	1.00	1.00	0.49	1.00	1.00	0.08	1.00	
Satd. Flow (perm)	1297	1820		384	1840	1564	910	3539	1583	147	5052	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	88	256	20	156	94	26	32	1400	776	151	419	19
RTOR Reduction (vph)	0	2	0	0	0	20	0	0	156	0	4	0
Lane Group Flow (vph)	88	274	0	156	94	6	32	1400	620	151	434	0
Bus Blockages (#/hr)	0	3	3	0	3	3	0	0	0	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	28.0	23.0		36.0	27.0	27.0	67.0	63.0	63.0	76.0	68.0	
Effective Green, g (s)	28.0	23.0		36.0	27.0	27.0	67.0	63.0	63.0	76.0	68.0	
Actuated g/C Ratio	0.23	0.19		0.30	0.22	0.22	0.56	0.52	0.52	0.63	0.57	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Grp Cap (vph)	322	348		219	414	351	536	1857	831	214	2862	
v/s Ratio Prot	0.01	0.15		c0.05	0.05		0.00	c0.40		c0.05	0.09	
v/s Ratio Perm	0.05			c0.16		0.00	0.03		0.39	0.39		
v/c Ratio	0.27	0.79		0.71	0.23	0.02	0.06	0.75	0.75	0.71	0.15	
Uniform Delay, d1	37.1	46.2		33.7	38.0	36.2	11.9	22.4	22.2	20.8	12.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.1	16.3		17.9	1.3	0.1	0.2	2.9	6.0	17.8	0.1	
Delay (s)	39.2	62.4		51.6	39.3	36.3	12.1	25.3	28.3	38.6	12.4	
Level of Service	D	E		D	D	D	B	C	C	D	B	
Approach Delay (s)		56.8			46.0			26.2			19.1	
Approach LOS		E			D			C			B	

Intersection Summary			
HCM 2000 Control Delay	29.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	78.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
3: Mayson Turner Rd & Boone Blvd

9/17/2014

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	140	49	35	243	42	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	
Lane Util. Factor	1.00		1.00	1.00	1.00	
Frt	0.97		1.00	1.00	0.97	
Flt Protected	1.00		0.95	1.00	0.96	
Satd. Flow (prot)	1798		1770	1863	1742	
Flt Permitted	1.00		0.62	1.00	0.96	
Satd. Flow (perm)	1798		1163	1863	1742	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	152	53	38	264	46	12
RTOR Reduction (vph)	16	0	0	0	8	0
Lane Group Flow (vph)	189	0	38	264	50	0
Turn Type	NA		Perm	NA	Prot	
Protected Phases	4			8	2	
Permitted Phases			8			
Actuated Green, G (s)	46.0		46.0	46.0	26.0	
Effective Green, g (s)	46.0		46.0	46.0	26.0	
Actuated g/C Ratio	0.58		0.58	0.58	0.32	
Clearance Time (s)	4.0		4.0	4.0	4.0	
Lane Grp Cap (vph)	1033		668	1071	566	
v/s Ratio Prot	0.11			c0.14	c0.03	
v/s Ratio Perm			0.03			
v/c Ratio	0.18		0.06	0.25	0.09	
Uniform Delay, d1	8.1		7.5	8.4	18.8	
Progression Factor	1.00		1.27	1.24	1.00	
Incremental Delay, d2	0.4		0.2	0.5	0.3	
Delay (s)	8.5		9.6	11.0	19.1	
Level of Service	A		A	B	B	
Approach Delay (s)	8.5			10.8	19.1	
Approach LOS	A			B	B	

Intersection Summary			
HCM 2000 Control Delay	10.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.19		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	27.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	4	174	296	4	3	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	1.00		0.90	
Flt Protected	0.95	1.00	1.00		0.99	
Satd. Flow (prot)	1770	1863	1859		1657	
Flt Permitted	0.52	1.00	1.00		0.99	
Satd. Flow (perm)	973	1863	1859		1657	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	5	200	340	5	3	8
RTOR Reduction (vph)	0	0	1	0	6	0
Lane Group Flow (vph)	5	200	344	0	5	0
Turn Type	Perm	NA	NA		Prot	
Protected Phases		4	8		6	
Permitted Phases	4					
Actuated Green, G (s)	51.0	51.0	51.0		21.0	
Effective Green, g (s)	51.0	51.0	51.0		21.0	
Actuated g/C Ratio	0.64	0.64	0.64		0.26	
Clearance Time (s)	4.0	4.0	4.0		4.0	
Lane Grp Cap (vph)	620	1187	1185		434	
v/s Ratio Prot		0.11	c0.19		c0.00	
v/s Ratio Perm	0.01					
v/c Ratio	0.01	0.17	0.29		0.01	
Uniform Delay, d1	5.3	5.9	6.5		21.8	
Progression Factor	0.92	0.87	1.07		1.00	
Incremental Delay, d2	0.0	0.3	0.6		0.0	
Delay (s)	4.9	5.5	7.5		21.9	
Level of Service	A	A	A		C	
Approach Delay (s)		5.4	7.5		21.9	
Approach LOS		A	A		C	

Intersection Summary			
HCM 2000 Control Delay	7.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.21		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	25.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Joseph Lowery Blvd & Boone Blvd

9/17/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	130	40	132	207	65	45	325	79	17	407	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95			1.00	
Frt	1.00	0.96		1.00	0.96			0.97			0.99	
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	
Satd. Flow (prot)	1770	1769		1770	1767			3428			1843	
Flt Permitted	0.47	1.00		0.60	1.00			0.87			0.98	
Satd. Flow (perm)	869	1769		1125	1767			2995			1803	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	22	144	44	147	230	72	50	361	88	19	452	32
RTOR Reduction (vph)	0	13	0	0	14	0	0	22	0	0	3	0
Lane Group Flow (vph)	22	175	0	147	288	0	0	477	0	0	500	0
Bus Blockages (#/hr)	0	4	4	0	4	4	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	31.0	31.0		31.0	31.0			41.0			41.0	
Effective Green, g (s)	31.0	31.0		31.0	31.0			41.0			41.0	
Actuated g/C Ratio	0.39	0.39		0.39	0.39			0.51			0.51	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Grp Cap (vph)	336	685		435	684			1534			924	
v/s Ratio Prot		0.10			c0.16							
v/s Ratio Perm	0.03			0.13				0.16			c0.28	
v/c Ratio	0.07	0.25		0.34	0.42			0.31			0.54	
Uniform Delay, d1	15.4	16.7		17.3	17.9			11.3			13.2	
Progression Factor	0.65	0.59		1.43	1.44			1.00			1.00	
Incremental Delay, d2	0.4	0.9		2.0	1.9			0.5			2.3	
Delay (s)	10.3	10.7		26.8	27.7			11.8			15.4	
Level of Service	B	B		C	C			B			B	
Approach Delay (s)		10.7			27.4			11.8			15.4	
Approach LOS		B			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	17.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	65.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
7: James Brawley Dr & Boone Blvd

9/17/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	16	176	9	16	317	7	0	10	28	12	26	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.99		1.00	1.00			0.90			0.96	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.99	
Satd. Flow (prot)	1770	1820		1770	1827			1677			1768	
Flt Permitted	0.49	1.00		0.62	1.00			1.00			0.96	
Satd. Flow (perm)	918	1820		1161	1827			1677			1713	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	18	196	10	18	352	8	0	11	31	13	29	18
RTOR Reduction (vph)	0	2	0	0	1	0	0	21	0	0	12	0
Lane Group Flow (vph)	18	204	0	18	359	0	0	21	0	0	48	0
Bus Blockages (#/hr)	0	4	4	0	4	4	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA			NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	46.0	46.0		46.0	46.0			26.0			26.0	
Effective Green, g (s)	46.0	46.0		46.0	46.0			26.0			26.0	
Actuated g/C Ratio	0.58	0.58		0.58	0.58			0.32			0.32	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Grp Cap (vph)	527	1046		667	1050			545			556	
v/s Ratio Prot		0.11			c0.20			0.01				
v/s Ratio Perm	0.02			0.02							c0.03	
v/c Ratio	0.03	0.19		0.03	0.34			0.04			0.09	
Uniform Delay, d1	7.4	8.1		7.3	9.0			18.5			18.7	
Progression Factor	1.29	1.17		0.73	0.62			1.00			1.00	
Incremental Delay, d2	0.1	0.4		0.1	0.9			0.1			0.3	
Delay (s)	9.6	9.9		5.4	6.4			18.6			19.1	
Level of Service	A	A		A	A			B			B	
Approach Delay (s)		9.9			6.4			18.6			19.1	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	9.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	33.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	165	26	0	310	6	12	10	17	3	7	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.98			1.00			0.94			0.95	
Flt Protected		1.00			1.00			0.98			0.99	
Satd. Flow (prot)		1797			1828			1724			1758	
Flt Permitted		0.99			1.00			0.95			0.98	
Satd. Flow (perm)		1780			1828			1656			1736	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	8	190	30	0	356	7	14	11	20	3	8	6
RTOR Reduction (vph)	0	7	0	0	1	0	0	14	0	0	4	0
Lane Group Flow (vph)	0	221	0	0	362	0	0	32	0	0	13	0
Bus Blockages (#/hr)	0	4	4	0	4	4	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		46.0			46.0			26.0			26.0	
Effective Green, g (s)		46.0			46.0			26.0			26.0	
Actuated g/C Ratio		0.58			0.58			0.32			0.32	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		1023			1051			538			564	
v/s Ratio Prot					c0.20							
v/s Ratio Perm		0.12						c0.02			0.01	
v/c Ratio		0.22			0.34			0.06			0.02	
Uniform Delay, d1		8.3			9.0			18.6			18.4	
Progression Factor		0.68			0.55			1.00			1.00	
Incremental Delay, d2		0.5			0.9			0.2			0.1	
Delay (s)		6.1			5.8			18.8			18.4	
Level of Service		A			A			B			B	
Approach Delay (s)		6.1			5.8			18.8			18.4	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	7.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	26.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	152	0	0	309	16	7	7	3	2	5	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00			1.00			1.00			1.00	
Frt	1.00	1.00			0.99			0.98			0.96	
Flt Protected	0.95	1.00			1.00			0.98			0.99	
Satd. Flow (prot)	1770	1833			1820			1785			1778	
Flt Permitted	0.50	1.00			1.00			0.94			0.98	
Satd. Flow (perm)	935	1833			1820			1709			1757	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	7	175	0	0	355	18	8	8	3	2	6	3
RTOR Reduction (vph)	0	0	0	0	2	0	0	2	0	0	2	0
Lane Group Flow (vph)	7	175	0	0	371	0	0	17	0	0	9	0
Bus Blockages (#/hr)	0	4	4	0	4	4	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	51.0	51.0			51.0			21.0			21.0	
Effective Green, g (s)	51.0	51.0			51.0			21.0			21.0	
Actuated g/C Ratio	0.64	0.64			0.64			0.26			0.26	
Clearance Time (s)	4.0	4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)	596	1168			1160			448			461	
v/s Ratio Prot		0.10			c0.20							
v/s Ratio Perm	0.01							c0.01			0.01	
v/c Ratio	0.01	0.15			0.32			0.04			0.02	
Uniform Delay, d1	5.3	5.8			6.6			22.0			21.9	
Progression Factor	0.47	0.45			1.00			1.00			1.00	
Incremental Delay, d2	0.0	0.3			0.7			0.2			0.1	
Delay (s)	2.5	2.9			7.3			22.1			21.9	
Level of Service	A	A			A			C			C	
Approach Delay (s)		2.9			7.3			22.1			21.9	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	6.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	27.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
10: Northside Dr & Boone Blvd

2/12/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	37	106	67	482	239	75	50	550	181	49	1748	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.91	
Frt	1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1726		1770	1833	1558	1770	3539	1583	1770	5080	
Flt Permitted	0.60	1.00		0.27	1.00	1.00	0.06	1.00	1.00	0.34	1.00	
Satd. Flow (perm)	1123	1726		498	1833	1558	118	3539	1583	632	5080	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	39	112	71	507	252	79	53	579	191	52	1840	13
RTOR Reduction (vph)	0	15	0	0	0	46	0	0	111	0	1	0
Lane Group Flow (vph)	39	168	0	507	252	33	53	579	80	52	1852	0
Bus Blockages (#/hr)	0	4	4	0	4	4	0	0	0	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	25.0	21.0		71.0	63.0	63.0	67.0	63.0	63.0	67.0	63.0	
Effective Green, g (s)	25.0	21.0		71.0	63.0	63.0	67.0	63.0	63.0	67.0	63.0	
Actuated g/C Ratio	0.17	0.14		0.47	0.42	0.42	0.45	0.42	0.42	0.45	0.42	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Grp Cap (vph)	204	241		625	769	654	96	1486	664	312	2133	
v/s Ratio Prot	0.01	0.10		c0.25	0.14		c0.01	0.16		0.00	c0.36	
v/s Ratio Perm	0.03			c0.14		0.02	0.23		0.05	0.07		
v/c Ratio	0.19	0.70		0.81	0.33	0.05	0.55	0.39	0.12	0.17	0.87	
Uniform Delay, d1	53.3	61.4		30.7	29.3	25.8	32.5	30.2	26.6	24.3	39.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.1	15.3		11.0	1.1	0.1	20.9	0.8	0.4	1.2	5.1	
Delay (s)	55.3	76.8		41.7	30.4	25.9	53.4	30.9	27.0	25.5	44.8	
Level of Service	E	E		D	C	C	D	C	C	C	D	
Approach Delay (s)		73.0			36.8			31.5			44.3	
Approach LOS		E			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	41.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	87.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

APPENDIX C: 2024 SYNCHRO RESULTS

HCM Unsignalized Intersection Capacity Analysis
28: Boone Blvd & Temple St

7/29/2014

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	8	167	101	16	6	4
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78
Hourly flow rate (vph)	14	287	174	27	10	7
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		610	320			
pX, platoon unblocked					0.98	
vC, conflicting volume	201				502	100
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	201				485	100
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				98	99
cM capacity (veh/h)	1368				498	935

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	301	116	85	17
Volume Left	14	0	0	10
Volume Right	0	0	27	7
cSH	1368	1700	1700	612
Volume to Capacity	0.01	0.07	0.05	0.03
Queue Length 95th (ft)	1	0	0	2
Control Delay (s)	0.4	0.0	0.0	11.1
Lane LOS	A			B
Approach Delay (s)	0.4	0.0		11.1
Approach LOS				B

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	30.1%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
8: Mayson Turner Rd & Boone Blvd

7/29/2014

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	224	39	9	130	24	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	
Lane Util. Factor	1.00			0.95	1.00	
Frt	0.98			1.00	0.96	
Flt Protected	1.00			1.00	0.97	
Satd. Flow (prot)	1826			3528	1724	
Flt Permitted	1.00			0.94	0.97	
Satd. Flow (perm)	1826			3317	1724	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor (vph)	100%	100%	100%	100%	100%	100%
Adj. Flow (vph)	243	42	10	141	26	12
RTOR Reduction (vph)	8	0	0	0	9	0
Lane Group Flow (vph)	277	0	0	151	29	0
Turn Type	NA		Perm	NA	NA	
Protected Phases	4			8	2	
Permitted Phases			8			
Actuated Green, G (s)	51.0			51.0	21.0	
Effective Green, g (s)	51.0			51.0	21.0	
Actuated g/C Ratio	0.64			0.64	0.26	
Clearance Time (s)	4.0			4.0	4.0	
Lane Grp Cap (vph)	1164			2114	452	
v/s Ratio Prot	c0.15				c0.02	
v/s Ratio Perm				0.05		
v/c Ratio	0.24			0.07	0.06	
Uniform Delay, d1	6.2			5.5	22.1	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	0.5			0.1	0.3	
Delay (s)	6.7			5.6	22.4	
Level of Service	A			A	C	
Approach Delay (s)	6.7			5.6	22.4	
Approach LOS	A			A	C	

Intersection Summary			
HCM 2000 Control Delay	7.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.19		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	24.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	7	179	116	0	0	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	
Lane Util. Factor		1.00	0.95		1.00	
Frt		1.00	1.00		0.86	
Flt Protected		1.00	1.00		1.00	
Satd. Flow (prot)		1859	3539		1611	
Flt Permitted		0.99	1.00		1.00	
Satd. Flow (perm)		1845	3539		1611	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor (vph)	134%	134%	134%	134%	134%	134%
Adj. Flow (vph)	11	273	177	0	0	3
RTOR Reduction (vph)	0	0	0	0	2	0
Lane Group Flow (vph)	0	284	177	0	1	0
Turn Type	Perm	NA	NA		NA	
Protected Phases		4	8		6	
Permitted Phases	4					
Actuated Green, G (s)		56.0	56.0		16.0	
Effective Green, g (s)		56.0	56.0		16.0	
Actuated g/C Ratio		0.70	0.70		0.20	
Clearance Time (s)		4.0	4.0		4.0	
Lane Grp Cap (vph)		1291	2477		322	
v/s Ratio Prot			0.05		c0.00	
v/s Ratio Perm		c0.15				
v/c Ratio		0.22	0.07		0.00	
Uniform Delay, d1		4.3	3.8		25.6	
Progression Factor		0.89	0.93		1.00	
Incremental Delay, d2		0.4	0.1		0.0	
Delay (s)		4.2	3.6		25.6	
Level of Service		A	A		C	
Approach Delay (s)		4.2	3.6		25.6	
Approach LOS		A	A		C	

Intersection Summary			
HCM 2000 Control Delay	4.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.17		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	30.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	22	140	16	23	83	26	16	563	126	10	221	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			0.95			0.95			1.00	
Frt		0.99			0.97			0.97			0.99	
Flt Protected		0.99			0.99			1.00			1.00	
Satd. Flow (prot)		1807			3384			3440			1834	
Flt Permitted		0.95			0.88			0.94			0.96	
Satd. Flow (perm)		1726			3000			3247			1758	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Growth Factor (vph)	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%
Adj. Flow (vph)	31	200	23	33	118	37	23	803	180	14	315	37
RTOR Reduction (vph)	0	5	0	0	25	0	0	23	0	0	5	0
Lane Group Flow (vph)	0	249	0	0	163	0	0	983	0	0	361	0
Bus Blockages (#/hr)	3	3	3	0	3	3	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		26.0			26.0			46.0			46.0	
Effective Green, g (s)		26.0			26.0			46.0			46.0	
Actuated g/C Ratio		0.32			0.32			0.58			0.58	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		560			975			1867			1010	
v/s Ratio Prot												
v/s Ratio Perm		c0.14			0.05			c0.30			0.21	
v/c Ratio		0.45			0.17			0.53			0.36	
Uniform Delay, d1		21.3			19.3			10.4			9.1	
Progression Factor		0.69			1.23			1.00			1.00	
Incremental Delay, d2		2.5			0.4			1.1			1.0	
Delay (s)		17.1			24.2			11.4			10.1	
Level of Service		B			C			B			B	
Approach Delay (s)		17.1			24.2			11.4			10.1	
Approach LOS		B			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	60.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	8	235	5	20	100	4	6	10	32	3	7	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.95			0.95			1.00			1.00	
Frt		1.00			0.99			0.91			0.94	
Flt Protected		1.00			0.99			0.99			0.99	
Satd. Flow (prot)		3502			3472			1684			1738	
Flt Permitted		0.95			0.88			0.98			0.98	
Satd. Flow (perm)		3323			3085			1662			1712	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor (vph)	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%
Adj. Flow (vph)	11	331	7	28	141	6	8	14	45	4	10	11
RTOR Reduction (vph)	0	2	0	0	3	0	0	30	0	0	7	0
Lane Group Flow (vph)	0	347	0	0	172	0	0	37	0	0	18	0
Bus Blockages (#/hr)	0	3	3	0	3	3	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		46.0			46.0			26.0			26.0	
Effective Green, g (s)		46.0			46.0			26.0			26.0	
Actuated g/C Ratio		0.58			0.58			0.32			0.32	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		1910			1773			540			556	
v/s Ratio Prot												
v/s Ratio Perm		c0.10			0.06			c0.02			0.01	
v/c Ratio		0.18			0.10			0.07			0.03	
Uniform Delay, d1		8.1			7.7			18.6			18.4	
Progression Factor		1.54			0.72			1.00			1.00	
Incremental Delay, d2		0.2			0.1			0.2			0.1	
Delay (s)		12.6			5.6			18.9			18.5	
Level of Service		B			A			B			B	
Approach Delay (s)		12.6			5.6			18.9			18.5	
Approach LOS		B			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	11.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.14		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	28.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	258	12	5	108	2	9	3	20	1	0	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.95			0.95			1.00			1.00	
Frt		0.99			1.00			0.91			0.89	
Flt Protected		1.00			1.00			0.99			0.99	
Satd. Flow (prot)		3494			3501			1680			1645	
Flt Permitted		0.95			0.94			0.95			0.98	
Satd. Flow (perm)		3334			3305			1625			1630	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Growth Factor (vph)	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%
Adj. Flow (vph)	3	368	17	7	154	3	13	4	29	1	0	4
RTOR Reduction (vph)	0	4	0	0	1	0	0	20	0	0	3	0
Lane Group Flow (vph)	0	384	0	0	163	0	0	26	0	0	2	0
Bus Blockages (#/hr)	0	3	3	0	3	3	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		46.0			46.0			26.0			26.0	
Effective Green, g (s)		46.0			46.0			26.0			26.0	
Actuated g/C Ratio		0.58			0.58			0.32			0.32	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		1917			1900			528			529	
v/s Ratio Prot												
v/s Ratio Perm		c0.12			0.05			c0.02			0.00	
v/c Ratio		0.20			0.09			0.05			0.00	
Uniform Delay, d1		8.2			7.6			18.5			18.2	
Progression Factor		0.41			0.68			1.00			1.00	
Incremental Delay, d2		0.2			0.1			0.2			0.0	
Delay (s)		3.6			5.2			18.7			18.3	
Level of Service		A			A			B			B	
Approach Delay (s)		3.6			5.2			18.7			18.3	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	5.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.15		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	22.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	280	0	0	107	3	4	0	8	2	3	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.95			0.95			1.00			1.00	
Frt		1.00			1.00			0.91			0.93	
Flt Protected		1.00			1.00			0.98			0.99	
Satd. Flow (prot)		3515			3504			1671			1719	
Flt Permitted		0.95			1.00			0.95			0.97	
Satd. Flow (perm)		3349			3504			1616			1691	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor (vph)	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%
Adj. Flow (vph)	7	395	0	0	151	4	6	0	11	3	4	7
RTOR Reduction (vph)	0	0	0	0	1	0	0	10	0	0	5	0
Lane Group Flow (vph)	0	402	0	0	154	0	0	7	0	0	9	0
Bus Blockages (#/hr)	0	3	3	0	3	3	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		51.0			51.0			21.0			21.0	
Effective Green, g (s)		51.0			51.0			21.0			21.0	
Actuated g/C Ratio		0.64			0.64			0.26			0.26	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		2134			2233			424			443	
v/s Ratio Prot					0.04							
v/s Ratio Perm		c0.12						0.00			c0.01	
v/c Ratio		0.19			0.07			0.02			0.02	
Uniform Delay, d1		6.0			5.5			21.8			21.9	
Progression Factor		0.44			1.00			1.00			1.00	
Incremental Delay, d2		0.2			0.1			0.1			0.1	
Delay (s)		2.8			5.6			21.9			22.0	
Level of Service		A			A			C			C	
Approach Delay (s)		2.8			5.6			21.9			22.0	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	4.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.14		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	25.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
24: Northside Dr & Boone Blvd

7/29/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	82	238	19	145	87	24	30	1302	722	140	390	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.91	
Frt	1.00	0.99		1.00	0.97		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3479		1770	3403		1770	3539	1583	1770	5052	
Flt Permitted	0.65	1.00		0.20	1.00		0.42	1.00	1.00	0.06	1.00	
Satd. Flow (perm)	1212	3479		373	3403		781	3539	1583	106	5052	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Growth Factor (vph)	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%
Adj. Flow (vph)	118	343	27	209	125	35	43	1876	1040	202	562	26
RTOR Reduction (vph)	0	5	0	0	21	0	0	0	136	0	4	0
Lane Group Flow (vph)	118	365	0	209	139	0	43	1876	904	202	584	0
Bus Blockages (#/hr)	0	3	3	0	3	3	0	0	0	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	22.0	16.0		31.0	21.0		70.0	66.0	66.0	81.0	73.0	
Effective Green, g (s)	22.0	16.0		31.0	21.0		70.0	66.0	66.0	81.0	73.0	
Actuated g/C Ratio	0.18	0.13		0.26	0.18		0.58	0.55	0.55	0.68	0.61	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Grp Cap (vph)	250	463		224	595		488	1946	870	224	3073	
v/s Ratio Prot	0.02	0.10		c0.09	0.04		0.00	0.53		c0.08	0.12	
v/s Ratio Perm	0.06			c0.16			0.05		c0.57	0.52		
v/c Ratio	0.47	0.79		0.93	0.23		0.09	0.96	1.04	0.90	0.19	
Uniform Delay, d1	42.9	50.4		39.2	42.6		10.7	25.9	27.0	39.6	10.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	6.3	12.7		44.9	0.9		0.4	13.5	41.0	39.1	0.1	
Delay (s)	49.2	63.1		84.1	43.5		11.0	39.4	68.0	78.8	10.5	
Level of Service	D	E		F	D		B	D	E	E	B	
Approach Delay (s)		59.7			66.5			49.0			28.0	
Approach LOS		E			E			D			C	

Intersection Summary			
HCM 2000 Control Delay	47.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	92.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
8: Mayson Turner Rd & Boone Blvd

7/29/2014

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	188	66	47	327	56	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	
Lane Util. Factor	1.00			0.95	1.00	
Frt	0.96			1.00	0.97	
Flt Protected	1.00			0.99	0.96	
Satd. Flow (prot)	1797			3517	1742	
Flt Permitted	1.00			0.89	0.96	
Satd. Flow (perm)	1797			3137	1742	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor (vph)	100%	100%	100%	100%	100%	100%
Adj. Flow (vph)	204	72	51	355	61	16
RTOR Reduction (vph)	16	0	0	0	11	0
Lane Group Flow (vph)	260	0	0	406	66	0
Turn Type	NA		Perm	NA	NA	
Protected Phases	4			8	2	
Permitted Phases			8			
Actuated Green, G (s)	46.0			46.0	26.0	
Effective Green, g (s)	46.0			46.0	26.0	
Actuated g/C Ratio	0.58			0.58	0.32	
Clearance Time (s)	4.0			4.0	4.0	
Lane Grp Cap (vph)	1033			1803	566	
v/s Ratio Prot	c0.14				c0.04	
v/s Ratio Perm				0.13		
v/c Ratio	0.25			0.23	0.12	
Uniform Delay, d1	8.4			8.3	18.9	
Progression Factor	1.00			1.04	1.00	
Incremental Delay, d2	0.6			0.3	0.4	
Delay (s)	9.0			8.9	19.4	
Level of Service	A			A	B	
Approach Delay (s)	9.0			8.9	19.4	
Approach LOS	A			A	B	

Intersection Summary			
HCM 2000 Control Delay	10.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.20		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	38.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	4	174	296	4	3	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	
Lane Util. Factor		1.00	0.95		1.00	
Frt		1.00	1.00		0.91	
Flt Protected		1.00	1.00		0.98	
Satd. Flow (prot)		1861	3532		1664	
Flt Permitted		0.99	1.00		0.98	
Satd. Flow (perm)		1848	3532		1664	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Growth Factor (vph)	134%	134%	134%	134%	134%	134%
Adj. Flow (vph)	6	268	456	6	5	11
RTOR Reduction (vph)	0	0	1	0	8	0
Lane Group Flow (vph)	0	274	461	0	8	0
Turn Type	Perm	NA	NA		NA	
Protected Phases		4	8		6	
Permitted Phases	4					
Actuated Green, G (s)		51.0	51.0		21.0	
Effective Green, g (s)		51.0	51.0		21.0	
Actuated g/C Ratio		0.64	0.64		0.26	
Clearance Time (s)		4.0	4.0		4.0	
Lane Grp Cap (vph)		1178	2251		436	
v/s Ratio Prot			0.13		c0.00	
v/s Ratio Perm		c0.15				
v/c Ratio		0.23	0.20		0.02	
Uniform Delay, d1		6.2	6.0		21.9	
Progression Factor		0.85	1.38		1.00	
Incremental Delay, d2		0.5	0.2		0.1	
Delay (s)		5.7	8.5		21.9	
Level of Service		A	A		C	
Approach Delay (s)		5.7	8.5		21.9	
Approach LOS		A	A		C	

Intersection Summary			
HCM 2000 Control Delay	7.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.17		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	26.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	130	40	132	207	65	45	325	79	17	407	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			0.95			0.95			1.00	
Frt		0.97			0.98			0.97			0.99	
Flt Protected		0.99			0.98			1.00			1.00	
Satd. Flow (prot)		1771			3371			3428			1843	
Flt Permitted		0.91			0.70			0.83			0.97	
Satd. Flow (perm)		1620			2403			2850			1783	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%
Adj. Flow (vph)	30	194	60	197	308	97	67	484	118	25	606	43
RTOR Reduction (vph)	0	12	0	0	20	0	0	23	0	0	3	0
Lane Group Flow (vph)	0	272	0	0	582	0	0	646	0	0	671	0
Bus Blockages (#/hr)	4	4	4	0	4	4	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		31.0			31.0			41.0			41.0	
Effective Green, g (s)		31.0			31.0			41.0			41.0	
Actuated g/C Ratio		0.39			0.39			0.51			0.51	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		627			931			1460			913	
v/s Ratio Prot												
v/s Ratio Perm		0.17			c0.24			0.23			c0.38	
v/c Ratio		0.43			0.63			0.44			0.74	
Uniform Delay, d1		18.0			19.8			12.3			15.3	
Progression Factor		0.67			1.41			1.00			1.00	
Incremental Delay, d2		2.1			3.1			1.0			5.2	
Delay (s)		14.2			31.1			13.3			20.5	
Level of Service		B			C			B			C	
Approach Delay (s)		14.2			31.1			13.3			20.5	
Approach LOS		B			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	20.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	89.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	16	176	9	16	317	7	0	10	28	12	26	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.95			0.95			1.00			1.00	
Frt		0.99			1.00			0.90			0.96	
Flt Protected		1.00			1.00			1.00			0.99	
Satd. Flow (prot)		3474			3492			1677			1769	
Flt Permitted		0.90			0.93			1.00			0.95	
Satd. Flow (perm)		3151			3265			1677			1699	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%
Adj. Flow (vph)	24	262	13	24	472	10	0	15	42	18	39	24
RTOR Reduction (vph)	0	4	0	0	2	0	0	28	0	0	16	0
Lane Group Flow (vph)	0	295	0	0	504	0	0	29	0	0	65	0
Bus Blockages (#/hr)	0	4	4	0	4	4	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		46.0			46.0			26.0			26.0	
Effective Green, g (s)		46.0			46.0			26.0			26.0	
Actuated g/C Ratio		0.58			0.58			0.32			0.32	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		1811			1877			545			552	
v/s Ratio Prot								0.02				
v/s Ratio Perm		0.09			c0.15						c0.04	
v/c Ratio		0.16			0.27			0.05			0.12	
Uniform Delay, d1		8.0			8.5			18.5			18.9	
Progression Factor		1.38			0.64			1.00			1.00	
Incremental Delay, d2		0.2			0.3			0.2			0.4	
Delay (s)		11.2			5.8			18.7			19.4	
Level of Service		B			A			B			B	
Approach Delay (s)		11.2			5.8			18.7			19.4	
Approach LOS		B			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	9.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.21		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	40.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	165	26	0	310	6	12	10	17	3	7	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.95			0.95			1.00			1.00	
Frt		0.98			1.00			0.94			0.95	
Flt Protected		1.00			1.00			0.98			0.99	
Satd. Flow (prot)		3436			3501			1726			1761	
Flt Permitted		0.94			1.00			0.94			0.97	
Satd. Flow (perm)		3229			3501			1647			1724	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Growth Factor (vph)	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%
Adj. Flow (vph)	11	254	40	0	477	9	18	15	26	5	11	8
RTOR Reduction (vph)	0	15	0	0	2	0	0	18	0	0	5	0
Lane Group Flow (vph)	0	290	0	0	484	0	0	41	0	0	19	0
Bus Blockages (#/hr)	0	4	4	0	4	4	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		46.0			46.0			26.0			26.0	
Effective Green, g (s)		46.0			46.0			26.0			26.0	
Actuated g/C Ratio		0.58			0.58			0.32			0.32	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		1856			2013			535			560	
v/s Ratio Prot					c0.14							
v/s Ratio Perm		0.09						c0.03			0.01	
v/c Ratio		0.16			0.24			0.08			0.03	
Uniform Delay, d1		7.9			8.4			18.7			18.4	
Progression Factor		0.56			0.60			1.00			1.00	
Incremental Delay, d2		0.2			0.3			0.3			0.1	
Delay (s)		4.6			5.3			19.0			18.5	
Level of Service		A			A			B			B	
Approach Delay (s)		4.6			5.3			19.0			18.5	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	6.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.18		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	25.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	152	0	0	309	16	7	7	3	2	5	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.95			0.95			1.00			1.00	
Frt		1.00			0.99			0.97			0.96	
Flt Protected		1.00			1.00			0.98			0.99	
Satd. Flow (prot)		3504			3485			1780			1768	
Flt Permitted		0.94			1.00			0.93			0.98	
Satd. Flow (perm)		3299			3485			1692			1741	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Growth Factor (vph)	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%
Adj. Flow (vph)	9	234	0	0	476	25	11	11	5	3	8	5
RTOR Reduction (vph)	0	0	0	0	5	0	0	4	0	0	4	0
Lane Group Flow (vph)	0	243	0	0	496	0	0	23	0	0	12	0
Bus Blockages (#/hr)	0	4	4	0	4	4	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		51.0			51.0			21.0			21.0	
Effective Green, g (s)		51.0			51.0			21.0			21.0	
Actuated g/C Ratio		0.64			0.64			0.26			0.26	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		2103			2221			444			457	
v/s Ratio Prot					c0.14							
v/s Ratio Perm		0.07						c0.01			0.01	
v/c Ratio		0.12			0.22			0.05			0.03	
Uniform Delay, d1		5.7			6.1			22.1			21.9	
Progression Factor		0.48			1.00			1.00			1.00	
Incremental Delay, d2		0.1			0.2			0.2			0.1	
Delay (s)		2.8			6.4			22.3			22.0	
Level of Service		A			A			C			C	
Approach Delay (s)		2.8			6.4			22.3			22.0	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	6.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.17		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	22.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	50	142	90	648	321	101	67	739	243	66	2349	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95	1.00	1.00	0.91	
Frt	1.00	0.94		1.00	0.96		1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3306		1770	3385		1770	3539	1583	1770	5080	
Flt Permitted	0.49	1.00		0.29	1.00		0.06	1.00	1.00	0.24	1.00	
Satd. Flow (perm)	922	3306		543	3385		113	3539	1583	456	5080	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor (vph)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Adj. Flow (vph)	53	149	95	682	338	106	71	778	256	69	2473	17
RTOR Reduction (vph)	0	65	0	0	20	0	0	0	123	0	1	0
Lane Group Flow (vph)	53	179	0	682	424	0	71	778	133	69	2489	0
Bus Blockages (#/hr)	0	4	4	0	4	4	0	0	0	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	21.0	16.0		68.0	59.0		70.0	66.0	66.0	70.0	66.0	
Effective Green, g (s)	21.0	16.0		68.0	59.0		70.0	66.0	66.0	70.0	66.0	
Actuated g/C Ratio	0.14	0.11		0.45	0.39		0.47	0.44	0.44	0.47	0.44	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Grp Cap (vph)	157	352		638	1331		96	1557	696	247	2235	
v/s Ratio Prot	0.01	0.05		c0.34	0.13		c0.02	0.22		0.01	c0.49	
v/s Ratio Perm	0.04			c0.14			0.32		0.08	0.12		
v/c Ratio	0.34	0.51		1.07	0.32		0.74	0.50	0.19	0.28	1.11	
Uniform Delay, d1	57.2	63.3		38.4	31.6		35.5	30.1	25.7	23.8	42.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	5.7	5.2		55.5	0.6		39.8	1.1	0.6	2.8	58.2	
Delay (s)	62.9	68.4		93.9	32.2		75.3	31.3	26.3	26.6	100.2	
Level of Service	E	E		F	C		E	C	C	C	F	
Approach Delay (s)		67.5			69.6			33.0			98.2	
Approach LOS		E			E			C			F	

Intersection Summary			
HCM 2000 Control Delay	75.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	105.5%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: Mayson Turner Rd & Boone Blvd

9/17/2014

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	224	39	9	130	24	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	
Lane Util. Factor	1.00			1.00	1.00	
Frt	0.98			1.00	0.96	
Flt Protected	1.00			1.00	0.97	
Satd. Flow (prot)	1826			1857	1724	
Flt Permitted	1.00			0.98	0.97	
Satd. Flow (perm)	1826			1826	1724	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor (vph)	100%	100%	100%	100%	100%	100%
Adj. Flow (vph)	243	42	10	141	26	12
RTOR Reduction (vph)	8	0	0	0	9	0
Lane Group Flow (vph)	277	0	0	151	29	0
Turn Type	NA		Perm	NA	Prot	
Protected Phases	4			8	2	
Permitted Phases			8			
Actuated Green, G (s)	50.0			50.0	22.0	
Effective Green, g (s)	50.0			50.0	22.0	
Actuated g/C Ratio	0.62			0.62	0.28	
Clearance Time (s)	4.0			4.0	4.0	
Lane Grp Cap (vph)	1141			1141	474	
v/s Ratio Prot	c0.15				c0.02	
v/s Ratio Perm				0.08		
v/c Ratio	0.24			0.13	0.06	
Uniform Delay, d1	6.6			6.1	21.4	
Progression Factor	1.00			0.83	1.00	
Incremental Delay, d2	0.5			0.2	0.3	
Delay (s)	7.1			5.3	21.6	
Level of Service	A			A	C	
Approach Delay (s)	7.1			5.3	21.6	
Approach LOS	A			A	C	

Intersection Summary			
HCM 2000 Control Delay	7.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.19		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	24.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	7	179	116	0	0	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	
Lane Util. Factor		1.00	1.00		1.00	
Frt		1.00	1.00		0.86	
Flt Protected		1.00	1.00		1.00	
Satd. Flow (prot)		1859	1863		1611	
Flt Permitted		0.99	1.00		1.00	
Satd. Flow (perm)		1845	1863		1611	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor (vph)	134%	134%	134%	134%	134%	134%
Adj. Flow (vph)	11	273	177	0	0	3
RTOR Reduction (vph)	0	0	0	0	2	0
Lane Group Flow (vph)	0	284	177	0	1	0
Turn Type	Perm	NA	NA		Prot	
Protected Phases		4	8		6	
Permitted Phases	4					
Actuated Green, G (s)		53.0	53.0		19.0	
Effective Green, g (s)		53.0	53.0		19.0	
Actuated g/C Ratio		0.66	0.66		0.24	
Clearance Time (s)		4.0	4.0		4.0	
Lane Grp Cap (vph)		1222	1234		382	
v/s Ratio Prot			0.10		c0.00	
v/s Ratio Perm		c0.15				
v/c Ratio		0.23	0.14		0.00	
Uniform Delay, d1		5.4	5.0		23.3	
Progression Factor		0.85	1.62		1.00	
Incremental Delay, d2		0.4	0.2		0.0	
Delay (s)		5.0	8.4		23.3	
Level of Service		A	A		C	
Approach Delay (s)		5.0	8.4		23.3	
Approach LOS		A	A		C	

Intersection Summary			
HCM 2000 Control Delay	6.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.17		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	30.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	22	140	16	23	83	26	16	563	126	10	221	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			0.95			1.00	
Frt		0.99			0.97			0.97			0.99	
Flt Protected		0.99			0.99			1.00			1.00	
Satd. Flow (prot)		1807			1776			3440			1834	
Flt Permitted		0.95			0.92			0.94			0.96	
Satd. Flow (perm)		1727			1647			3247			1759	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Growth Factor (vph)	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%
Adj. Flow (vph)	31	200	23	33	118	37	23	803	180	14	315	37
RTOR Reduction (vph)	0	5	0	0	11	0	0	23	0	0	5	0
Lane Group Flow (vph)	0	249	0	0	177	0	0	983	0	0	361	0
Bus Blockages (#/hr)	3	3	3	3	3	3	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		25.0			25.0			47.0			47.0	
Effective Green, g (s)		25.0			25.0			47.0			47.0	
Actuated g/C Ratio		0.31			0.31			0.59			0.59	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		539			514			1907			1033	
v/s Ratio Prot												
v/s Ratio Perm		c0.14			0.11			c0.30			0.21	
v/c Ratio		0.46			0.34			0.52			0.35	
Uniform Delay, d1		22.1			21.2			9.8			8.6	
Progression Factor		0.65			1.18			1.00			1.00	
Incremental Delay, d2		2.8			1.8			1.0			0.9	
Delay (s)		17.1			26.8			10.8			9.5	
Level of Service		B			C			B			A	
Approach Delay (s)		17.1			26.8			10.8			9.5	
Approach LOS		B			C			B			A	

Intersection Summary			
HCM 2000 Control Delay	13.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	54.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	8	235	5	20	100	4	6	10	32	3	7	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		1.00			1.00			0.91			0.94	
Flt Protected		1.00			0.99			0.99			0.99	
Satd. Flow (prot)		1833			1817			1684			1738	
Flt Permitted		0.99			0.92			0.98			0.98	
Satd. Flow (perm)		1821			1694			1661			1710	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor (vph)	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%
Adj. Flow (vph)	11	331	7	28	141	6	8	14	45	4	10	11
RTOR Reduction (vph)	0	1	0	0	2	0	0	32	0	0	8	0
Lane Group Flow (vph)	0	348	0	0	173	0	0	36	0	0	17	0
Bus Blockages (#/hr)	3	3	3	3	3	3	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		48.0			48.0			24.0			24.0	
Effective Green, g (s)		48.0			48.0			24.0			24.0	
Actuated g/C Ratio		0.60			0.60			0.30			0.30	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		1092			1016			498			513	
v/s Ratio Prot												
v/s Ratio Perm		c0.19			0.10			c0.02			0.01	
v/c Ratio		0.32			0.17			0.07			0.03	
Uniform Delay, d1		7.9			7.1			20.0			19.8	
Progression Factor		1.55			0.71			1.00			1.00	
Incremental Delay, d2		0.7			0.4			0.3			0.1	
Delay (s)		13.0			5.5			20.3			19.9	
Level of Service		B			A			C			B	
Approach Delay (s)		13.0			5.5			20.3			19.9	
Approach LOS		B			A			C			B	

Intersection Summary			
HCM 2000 Control Delay	11.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	31.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	258	12	5	108	2	9	3	20	1	0	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.99			1.00			0.91			0.89	
Flt Protected		1.00			1.00			0.99			0.99	
Satd. Flow (prot)		1829			1832			1680			1645	
Flt Permitted		1.00			0.99			0.95			0.98	
Satd. Flow (perm)		1827			1811			1620			1627	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Growth Factor (vph)	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%
Adj. Flow (vph)	3	368	17	7	154	3	13	4	29	1	0	4
RTOR Reduction (vph)	0	2	0	0	1	0	0	21	0	0	4	0
Lane Group Flow (vph)	0	386	0	0	163	0	0	25	0	0	1	0
Bus Blockages (#/hr)	3	3	3	3	3	3	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		50.0			50.0			22.0			22.0	
Effective Green, g (s)		50.0			50.0			22.0			22.0	
Actuated g/C Ratio		0.62			0.62			0.28			0.28	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		1141			1131			445			447	
v/s Ratio Prot												
v/s Ratio Perm		c0.21			0.09			c0.02			0.00	
v/c Ratio		0.34			0.14			0.06			0.00	
Uniform Delay, d1		7.1			6.2			21.4			21.0	
Progression Factor		0.41			0.71			1.00			1.00	
Incremental Delay, d2		0.8			0.3			0.2			0.0	
Delay (s)		3.7			4.6			21.6			21.1	
Level of Service		A			A			C			C	
Approach Delay (s)		3.7			4.6			21.6			21.1	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	5.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	30.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	280	0	0	107	3	4	0	8	2	3	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		1.00			1.00			0.91			0.93	
Flt Protected		1.00			1.00			0.98			0.99	
Satd. Flow (prot)		1839			1834			1671			1719	
Flt Permitted		1.00			1.00			0.95			0.97	
Satd. Flow (perm)		1834			1834			1611			1688	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor (vph)	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%
Adj. Flow (vph)	7	395	0	0	151	4	6	0	11	3	4	7
RTOR Reduction (vph)	0	0	0	0	1	0	0	11	0	0	5	0
Lane Group Flow (vph)	0	402	0	0	154	0	0	6	0	0	9	0
Bus Blockages (#/hr)	3	3	3	3	3	3	0	0	0	0	0	0
Turn Type	Perm	NA			NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		53.0			53.0			19.0			19.0	
Effective Green, g (s)		53.0			53.0			19.0			19.0	
Actuated g/C Ratio		0.66			0.66			0.24			0.24	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		1215			1215			382			400	
v/s Ratio Prot					0.08							
v/s Ratio Perm		c0.22						0.00			c0.01	
v/c Ratio		0.33			0.13			0.02			0.02	
Uniform Delay, d1		5.8			5.0			23.3			23.4	
Progression Factor		0.40			1.00			1.00			1.00	
Incremental Delay, d2		0.7			0.2			0.1			0.1	
Delay (s)		3.0			5.2			23.4			23.5	
Level of Service		A			A			C			C	
Approach Delay (s)		3.0			5.2			23.4			23.5	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	4.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	35.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
10: Northside Dr & Boone Blvd

2/11/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	82	238	19	145	87	24	30	1302	722	140	390	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.91	
Frt		0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected		0.99		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1805		1748	1840	1564	1770	3539	1583	1770	5052	
Flt Permitted		0.88		0.27	1.00	1.00	0.41	1.00	1.00	0.06	1.00	
Satd. Flow (perm)		1605		497	1840	1564	765	3539	1583	113	5052	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Growth Factor (vph)	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%
Adj. Flow (vph)	118	343	27	209	125	35	43	1876	1040	202	562	26
RTOR Reduction (vph)	0	2	0	0	0	24	0	0	122	0	4	0
Lane Group Flow (vph)	0	487	0	209	125	11	43	1876	918	202	584	0
Bus Blockages (#/hr)	3	3	3	3	3	3	0	0	0	0	0	0
Turn Type	Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)		30.0		38.0	38.0	38.0	68.0	64.0	64.0	72.0	66.0	
Effective Green, g (s)		30.0		38.0	38.0	38.0	68.0	64.0	64.0	72.0	66.0	
Actuated g/C Ratio		0.25		0.32	0.32	0.32	0.57	0.53	0.53	0.60	0.55	
Clearance Time (s)		4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Grp Cap (vph)		401		199	582	495	467	1887	844	150	2778	
v/s Ratio Prot				c0.03	0.07		0.00	0.53		c0.07	0.12	
v/s Ratio Perm		c0.30		0.30		0.01	0.05		0.58	c0.74		
v/c Ratio		1.21		1.05	0.21	0.02	0.09	0.99	1.09	1.35	0.21	
Uniform Delay, d1		45.0		48.0	30.1	28.2	11.6	27.8	28.0	35.0	13.7	
Progression Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		116.9		77.7	0.8	0.1	0.4	19.4	57.5	193.6	0.2	
Delay (s)		161.9		125.7	30.9	28.3	11.9	47.2	85.5	228.6	13.9	
Level of Service		F		F	C	C	B	D	F	F	B	
Approach Delay (s)		161.9			84.4			60.1			68.8	
Approach LOS		F			F			E			E	

Intersection Summary			
HCM 2000 Control Delay	74.3	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.32		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	104.7%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: Mayson Turner Rd & Boone Blvd

9/17/2014

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	188	66	47	327	56	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	
Lane Util. Factor	1.00			1.00	1.00	
Frt	0.96			1.00	0.97	
Flt Protected	1.00			0.99	0.96	
Satd. Flow (prot)	1797			1851	1742	
Flt Permitted	1.00			0.93	0.96	
Satd. Flow (perm)	1797			1740	1742	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor (vph)	100%	100%	100%	100%	100%	100%
Adj. Flow (vph)	204	72	51	355	61	16
RTOR Reduction (vph)	16	0	0	0	11	0
Lane Group Flow (vph)	260	0	0	406	66	0
Turn Type	NA		Perm	NA	Prot	
Protected Phases	4			8	2	
Permitted Phases			8			
Actuated Green, G (s)	46.0			46.0	26.0	
Effective Green, g (s)	46.0			46.0	26.0	
Actuated g/C Ratio	0.58			0.58	0.32	
Clearance Time (s)	4.0			4.0	4.0	
Lane Grp Cap (vph)	1033			1000	566	
v/s Ratio Prot	0.14				c0.04	
v/s Ratio Perm				c0.23		
v/c Ratio	0.25			0.41	0.12	
Uniform Delay, d1	8.4			9.4	18.9	
Progression Factor	1.00			0.69	1.00	
Incremental Delay, d2	0.6			1.2	0.4	
Delay (s)	9.0			7.6	19.4	
Level of Service	A			A	B	
Approach Delay (s)	9.0			7.6	19.4	
Approach LOS	A			A	B	

Intersection Summary			
HCM 2000 Control Delay	9.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	47.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	4	174	296	4	3	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	
Lane Util. Factor		1.00	1.00		1.00	
Frt		1.00	1.00		0.91	
Flt Protected		1.00	1.00		0.98	
Satd. Flow (prot)		1861	1859		1664	
Flt Permitted		0.99	1.00		0.98	
Satd. Flow (perm)		1849	1859		1664	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Growth Factor (vph)	134%	134%	134%	134%	134%	134%
Adj. Flow (vph)	6	268	456	6	5	11
RTOR Reduction (vph)	0	0	1	0	8	0
Lane Group Flow (vph)	0	274	461	0	8	0
Turn Type	Perm	NA	NA		Prot	
Protected Phases		4	8		6	
Permitted Phases	4					
Actuated Green, G (s)		51.0	51.0		21.0	
Effective Green, g (s)		51.0	51.0		21.0	
Actuated g/C Ratio		0.64	0.64		0.26	
Clearance Time (s)		4.0	4.0		4.0	
Lane Grp Cap (vph)		1178	1185		436	
v/s Ratio Prot			c0.25		c0.00	
v/s Ratio Perm		0.15				
v/c Ratio		0.23	0.39		0.02	
Uniform Delay, d1		6.2	7.0		21.9	
Progression Factor		0.85	1.73		1.00	
Incremental Delay, d2		0.5	0.4		0.1	
Delay (s)		5.7	12.5		21.9	
Level of Service		A	B		C	
Approach Delay (s)		5.7	12.5		21.9	
Approach LOS		A	B		C	

Intersection Summary			
HCM 2000 Control Delay	10.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	31.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	130	40	132	207	65	45	325	79	17	407	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			0.95			1.00	
Frt		0.97			0.98			0.97			0.99	
Flt Protected		0.99			0.98			1.00			1.00	
Satd. Flow (prot)		1771			1764			3428			1843	
Flt Permitted		0.92			0.73			0.83			0.97	
Satd. Flow (perm)		1641			1300			2850			1783	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%
Adj. Flow (vph)	30	194	60	197	308	97	67	484	118	25	606	43
RTOR Reduction (vph)	0	12	0	0	9	0	0	23	0	0	3	0
Lane Group Flow (vph)	0	272	0	0	593	0	0	646	0	0	671	0
Bus Blockages (#/hr)	4	4	4	4	4	4	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		31.0			31.0			41.0			41.0	
Effective Green, g (s)		31.0			31.0			41.0			41.0	
Actuated g/C Ratio		0.39			0.39			0.51			0.51	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		635			503			1460			913	
v/s Ratio Prot												
v/s Ratio Perm		0.17			c0.46			0.23			c0.38	
v/c Ratio		0.43			1.18			0.44			0.74	
Uniform Delay, d1		18.0			24.5			12.3			15.3	
Progression Factor		0.67			1.38			1.00			1.00	
Incremental Delay, d2		2.1			98.9			1.0			5.2	
Delay (s)		14.1			132.8			13.3			20.5	
Level of Service		B			F			B			C	
Approach Delay (s)		14.1			132.8			13.3			20.5	
Approach LOS		B			F			B			C	

Intersection Summary			
HCM 2000 Control Delay	47.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	103.3%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	16	176	9	16	317	7	0	10	28	12	26	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.99			1.00			0.90			0.96	
Flt Protected		1.00			1.00			1.00			0.99	
Satd. Flow (prot)		1815			1824			1677			1769	
Flt Permitted		0.95			0.98			1.00			0.95	
Satd. Flow (perm)		1731			1789			1677			1699	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%
Adj. Flow (vph)	24	262	13	24	472	10	0	15	42	18	39	24
RTOR Reduction (vph)	0	2	0	0	1	0	0	28	0	0	16	0
Lane Group Flow (vph)	0	297	0	0	505	0	0	29	0	0	65	0
Bus Blockages (#/hr)	4	4	4	4	4	4	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA			NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		46.0			46.0			26.0			26.0	
Effective Green, g (s)		46.0			46.0			26.0			26.0	
Actuated g/C Ratio		0.58			0.58			0.32			0.32	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		995			1028			545			552	
v/s Ratio Prot								0.02				
v/s Ratio Perm		0.17			c0.28						c0.04	
v/c Ratio		0.30			0.49			0.05			0.12	
Uniform Delay, d1		8.7			10.1			18.5			18.9	
Progression Factor		1.41			0.56			1.00			1.00	
Incremental Delay, d2		0.7			1.5			0.2			0.4	
Delay (s)		13.0			7.2			18.7			19.4	
Level of Service		B			A			B			B	
Approach Delay (s)		13.0			7.2			18.7			19.4	
Approach LOS		B			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	10.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	45.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	165	26	0	310	6	12	10	17	3	7	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.98			1.00			0.94			0.95	
Flt Protected		1.00			1.00			0.98			0.99	
Satd. Flow (prot)		1797			1828			1726			1761	
Flt Permitted		0.98			1.00			0.94			0.97	
Satd. Flow (perm)		1770			1828			1647			1724	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Growth Factor (vph)	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%
Adj. Flow (vph)	11	254	40	0	477	9	18	15	26	5	11	8
RTOR Reduction (vph)	0	7	0	0	1	0	0	18	0	0	5	0
Lane Group Flow (vph)	0	298	0	0	485	0	0	41	0	0	19	0
Bus Blockages (#/hr)	4	4	4	4	4	4	0	0	0	0	0	0
Turn Type	Perm	NA			NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		46.0			46.0			26.0			26.0	
Effective Green, g (s)		46.0			46.0			26.0			26.0	
Actuated g/C Ratio		0.58			0.58			0.32			0.32	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		1017			1051			535			560	
v/s Ratio Prot					c0.27							
v/s Ratio Perm		0.17						c0.03			0.01	
v/c Ratio		0.29			0.46			0.08			0.03	
Uniform Delay, d1		8.7			9.8			18.7			18.4	
Progression Factor		0.55			0.51			1.00			1.00	
Incremental Delay, d2		0.7			1.4			0.3			0.1	
Delay (s)		5.5			6.4			19.0			18.5	
Level of Service		A			A			B			B	
Approach Delay (s)		5.5			6.4			19.0			18.5	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	7.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	33.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	152	0	0	309	16	7	7	3	2	5	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		1.00			0.99			0.97			0.96	
Flt Protected		1.00			1.00			0.98			0.99	
Satd. Flow (prot)		1830			1821			1780			1768	
Flt Permitted		0.98			1.00			0.93			0.98	
Satd. Flow (perm)		1804			1821			1692			1741	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Growth Factor (vph)	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%
Adj. Flow (vph)	9	234	0	0	476	25	11	11	5	3	8	5
RTOR Reduction (vph)	0	0	0	0	3	0	0	4	0	0	4	0
Lane Group Flow (vph)	0	243	0	0	498	0	0	23	0	0	12	0
Bus Blockages (#/hr)	4	4	4	4	4	4	0	0	0	0	0	0
Turn Type	Perm	NA			NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		51.0			51.0			21.0			21.0	
Effective Green, g (s)		51.0			51.0			21.0			21.0	
Actuated g/C Ratio		0.64			0.64			0.26			0.26	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		1150			1160			444			457	
v/s Ratio Prot					c0.27							
v/s Ratio Perm		0.13						c0.01			0.01	
v/c Ratio		0.21			0.43			0.05			0.03	
Uniform Delay, d1		6.1			7.2			22.1			21.9	
Progression Factor		0.43			1.00			1.00			1.00	
Incremental Delay, d2		0.4			1.2			0.2			0.1	
Delay (s)		3.1			8.4			22.3			22.0	
Level of Service		A			A			C			C	
Approach Delay (s)		3.1			8.4			22.3			22.0	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	7.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	33.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
10: Northside Dr & Boone Blvd

2/11/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	50	142	90	648	321	101	67	739	243	66	2349	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.91	
Frt		0.96		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.99		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1738		1770	1833	1558	1770	3539	1583	1770	5080	
Flt Permitted		0.87		0.19	1.00	1.00	0.06	1.00	1.00	0.24	1.00	
Satd. Flow (perm)		1518		357	1833	1558	115	3539	1583	443	5080	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor (vph)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Adj. Flow (vph)	53	149	95	682	338	106	71	778	256	69	2473	17
RTOR Reduction (vph)	0	11	0	0	0	58	0	0	123	0	1	0
Lane Group Flow (vph)	0	286	0	682	338	48	71	778	133	69	2489	0
Bus Blockages (#/hr)	4	4	4	0	4	4	0	0	0	0	0	0
Turn Type	Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)		24.0		68.0	68.0	68.0	69.0	65.0	65.0	71.0	66.0	
Effective Green, g (s)		24.0		68.0	68.0	68.0	69.0	65.0	65.0	71.0	66.0	
Actuated g/C Ratio		0.16		0.45	0.45	0.45	0.46	0.43	0.43	0.47	0.44	
Clearance Time (s)		4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Grp Cap (vph)		242		538	830	706	97	1533	685	253	2235	
v/s Ratio Prot				c0.34	0.18		c0.02	0.22		0.01	c0.49	
v/s Ratio Perm		0.19		c0.24		0.03	0.32		0.08	0.12		
v/c Ratio		1.18		1.27	0.41	0.07	0.73	0.51	0.19	0.27	1.11	
Uniform Delay, d1		63.0		42.1	27.5	23.1	35.7	30.9	26.3	23.5	42.0	
Progression Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		116.1		134.6	1.5	0.2	38.4	1.2	0.6	2.6	58.2	
Delay (s)		179.1		176.7	29.0	23.3	74.1	32.1	26.9	26.1	100.2	
Level of Service		F		F	C	C	E	C	C	C	F	
Approach Delay (s)		179.1			117.9			33.6			98.2	
Approach LOS		F			F			C			F	

Intersection Summary			
HCM 2000 Control Delay	93.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.20		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	114.4%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: Mayson Turner Rd & Boone Blvd

9/17/2014

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	164	29	7	97	18	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	
Lane Util. Factor	1.00		1.00	1.00	1.00	
Frt	0.98		1.00	1.00	0.96	
Flt Protected	1.00		0.95	1.00	0.97	
Satd. Flow (prot)	1825		1770	1863	1724	
Flt Permitted	1.00		0.57	1.00	0.97	
Satd. Flow (perm)	1825		1064	1863	1724	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor (vph)	134%	134%	134%	134%	134%	134%
Adj. Flow (vph)	239	42	10	141	26	12
RTOR Reduction (vph)	8	0	0	0	9	0
Lane Group Flow (vph)	273	0	10	141	29	0
Turn Type	NA		Perm	NA	Prot	
Protected Phases	4			8	2	
Permitted Phases			8			
Actuated Green, G (s)	51.0		51.0	51.0	21.0	
Effective Green, g (s)	51.0		51.0	51.0	21.0	
Actuated g/C Ratio	0.64		0.64	0.64	0.26	
Clearance Time (s)	4.0		4.0	4.0	4.0	
Lane Grp Cap (vph)	1163		678	1187	452	
v/s Ratio Prot	c0.15			0.08	c0.02	
v/s Ratio Perm			0.01			
v/c Ratio	0.23		0.01	0.12	0.06	
Uniform Delay, d1	6.2		5.3	5.7	22.1	
Progression Factor	1.00		1.09	1.05	1.00	
Incremental Delay, d2	0.5		0.0	0.2	0.3	
Delay (s)	6.7		5.8	6.2	22.4	
Level of Service	A		A	A	C	
Approach Delay (s)	6.7			6.2	22.4	
Approach LOS	A			A	C	

Intersection Summary			
HCM 2000 Control Delay	7.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.19		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	23.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	7	179	116	0	0	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	1.00		0.86	
Flt Protected	0.95	1.00	1.00		1.00	
Satd. Flow (prot)	1770	1863	1863		1611	
Flt Permitted	0.65	1.00	1.00		1.00	
Satd. Flow (perm)	1203	1863	1863		1611	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor (vph)	134%	134%	134%	134%	134%	134%
Adj. Flow (vph)	11	273	177	0	0	3
RTOR Reduction (vph)	0	0	0	0	2	0
Lane Group Flow (vph)	11	273	177	0	1	0
Turn Type	Perm	NA	NA		Prot	
Protected Phases		4	8		6	
Permitted Phases	4					
Actuated Green, G (s)	56.0	56.0	56.0		16.0	
Effective Green, g (s)	56.0	56.0	56.0		16.0	
Actuated g/C Ratio	0.70	0.70	0.70		0.20	
Clearance Time (s)	4.0	4.0	4.0		4.0	
Lane Grp Cap (vph)	842	1304	1304		322	
v/s Ratio Prot		c0.15	0.10		c0.00	
v/s Ratio Perm	0.01					
v/c Ratio	0.01	0.21	0.14		0.00	
Uniform Delay, d1	3.6	4.2	4.0		25.6	
Progression Factor	0.94	0.89	1.11		1.00	
Incremental Delay, d2	0.0	0.4	0.2		0.0	
Delay (s)	3.4	4.1	4.6		25.6	
Level of Service	A	A	A		C	
Approach Delay (s)		4.1	4.6		25.6	
Approach LOS		A	A		C	

Intersection Summary			
HCM 2000 Control Delay	4.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.16		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	22.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
6: Joseph Lowery Blvd & Boone Blvd

9/17/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	22	140	16	23	83	26	16	563	126	10	221	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95			1.00	
Frt	1.00	0.98		1.00	0.96			0.97			0.99	
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	
Satd. Flow (prot)	1770	1812		1770	1774			3440			1834	
Flt Permitted	0.63	1.00		0.53	1.00			0.94			0.96	
Satd. Flow (perm)	1175	1812		992	1774			3247			1758	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Growth Factor (vph)	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%
Adj. Flow (vph)	31	200	23	33	118	37	23	803	180	14	315	37
RTOR Reduction (vph)	0	5	0	0	14	0	0	23	0	0	5	0
Lane Group Flow (vph)	31	218	0	33	141	0	0	983	0	0	361	0
Bus Blockages (#/hr)	0	3	3	0	3	3	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	26.0	26.0		26.0	26.0			46.0			46.0	
Effective Green, g (s)	26.0	26.0		26.0	26.0			46.0			46.0	
Actuated g/C Ratio	0.32	0.32		0.32	0.32			0.58			0.58	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Grp Cap (vph)	381	588		322	576			1867			1010	
v/s Ratio Prot		c0.12			0.08							
v/s Ratio Perm	0.03			0.03				c0.30			0.21	
v/c Ratio	0.08	0.37		0.10	0.24			0.53			0.36	
Uniform Delay, d1	18.7	20.7		18.9	19.8			10.4			9.1	
Progression Factor	0.72	0.69		1.26	1.26			1.00			1.00	
Incremental Delay, d2	0.4	1.8		0.6	1.0			1.1			1.0	
Delay (s)	13.9	16.1		24.4	26.0			11.4			10.1	
Level of Service	B	B		C	C			B			B	
Approach Delay (s)		15.8			25.7			11.4			10.1	
Approach LOS		B			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	56.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	8	235	5	20	100	4	6	10	32	3	7	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	0.99			0.91			0.94	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.99	
Satd. Flow (prot)	1770	1835		1770	1829			1684			1738	
Flt Permitted	0.66	1.00		0.51	1.00			0.98			0.98	
Satd. Flow (perm)	1236	1835		951	1829			1662			1712	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor (vph)	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%
Adj. Flow (vph)	11	331	7	28	141	6	8	14	45	4	10	11
RTOR Reduction (vph)	0	1	0	0	2	0	0	30	0	0	7	0
Lane Group Flow (vph)	11	337	0	28	145	0	0	37	0	0	18	0
Bus Blockages (#/hr)	0	3	3	0	3	3	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	46.0	46.0		46.0	46.0			26.0			26.0	
Effective Green, g (s)	46.0	46.0		46.0	46.0			26.0			26.0	
Actuated g/C Ratio	0.58	0.58		0.58	0.58			0.32			0.32	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Grp Cap (vph)	710	1055		546	1051			540			556	
v/s Ratio Prot		c0.18			0.08							
v/s Ratio Perm	0.01			0.03				c0.02			0.01	
v/c Ratio	0.02	0.32		0.05	0.14			0.07			0.03	
Uniform Delay, d1	7.3	8.9		7.4	7.8			18.6			18.4	
Progression Factor	1.55	1.59		0.72	0.69			1.00			1.00	
Incremental Delay, d2	0.0	0.7		0.2	0.3			0.2			0.1	
Delay (s)	11.3	14.8		5.6	5.7			18.9			18.5	
Level of Service	B	B		A	A			B			B	
Approach Delay (s)		14.7			5.7			18.9			18.5	
Approach LOS		B			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	12.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.23		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	33.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
8: Sunset Ave & Boone Blvd

9/17/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	258	12	5	108	2	9	3	20	1	0	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor		1.00		1.00	1.00			1.00			1.00	
Frt		0.99		1.00	1.00			0.91			0.89	
Flt Protected		1.00		0.95	1.00			0.99			0.99	
Satd. Flow (prot)		1829		1770	1835			1680			1645	
Flt Permitted		1.00		0.50	1.00			0.95			0.98	
Satd. Flow (perm)		1827		938	1835			1625			1630	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Growth Factor (vph)	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%
Adj. Flow (vph)	3	368	17	7	154	3	13	4	29	1	0	4
RTOR Reduction (vph)	0	2	0	0	1	0	0	20	0	0	3	0
Lane Group Flow (vph)	0	386	0	7	156	0	0	26	0	0	2	0
Bus Blockages (#/hr)	0	3	3	0	3	3	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		46.0		46.0	46.0			26.0			26.0	
Effective Green, g (s)		46.0		46.0	46.0			26.0			26.0	
Actuated g/C Ratio		0.58		0.58	0.58			0.32			0.32	
Clearance Time (s)		4.0		4.0	4.0			4.0			4.0	
Lane Grp Cap (vph)		1050		539	1055			528			529	
v/s Ratio Prot					0.09							
v/s Ratio Perm		c0.21		0.01				c0.02			0.00	
v/c Ratio		0.37		0.01	0.15			0.05			0.00	
Uniform Delay, d1		9.2		7.3	7.9			18.5			18.2	
Progression Factor		0.38		0.72	0.65			1.00			1.00	
Incremental Delay, d2		1.0		0.0	0.3			0.2			0.0	
Delay (s)		4.4		5.3	5.5			18.7			18.3	
Level of Service		A		A	A			B			B	
Approach Delay (s)		4.4			5.5			18.7			18.3	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	5.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	31.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	280	0	0	107	3	4	0	8	2	3	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00			1.00			1.00			1.00	
Frt	1.00	1.00			1.00			0.91			0.93	
Flt Protected	0.95	1.00			1.00			0.98			0.99	
Satd. Flow (prot)	1770	1840			1833			1671			1719	
Flt Permitted	0.66	1.00			1.00			0.95			0.97	
Satd. Flow (perm)	1227	1840			1833			1616			1691	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor (vph)	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%
Adj. Flow (vph)	7	395	0	0	151	4	6	0	11	3	4	7
RTOR Reduction (vph)	0	0	0	0	1	0	0	10	0	0	5	0
Lane Group Flow (vph)	7	395	0	0	154	0	0	7	0	0	9	0
Bus Blockages (#/hr)	0	3	3	0	3	3	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	51.0	51.0			51.0			21.0			21.0	
Effective Green, g (s)	51.0	51.0			51.0			21.0			21.0	
Actuated g/C Ratio	0.64	0.64			0.64			0.26			0.26	
Clearance Time (s)	4.0	4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)	782	1173			1168			424			443	
v/s Ratio Prot		c0.21			0.08							
v/s Ratio Perm	0.01							0.00			c0.01	
v/c Ratio	0.01	0.34			0.13			0.02			0.02	
Uniform Delay, d1	5.3	6.7			5.7			21.8			21.9	
Progression Factor	0.52	0.40			1.00			1.00			1.00	
Incremental Delay, d2	0.0	0.7			0.2			0.1			0.1	
Delay (s)	2.8	3.4			6.0			21.9			22.0	
Level of Service	A	A			A			C			C	
Approach Delay (s)		3.4			6.0			21.9			22.0	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	5.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	29.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
10: Northside Dr & Boone Blvd

2/11/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	82	238	19	145	87	24	30	1302	722	140	390	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.91	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1820		1770	1840	1564	1770	3539	1583	1770	5052	
Flt Permitted	0.64	1.00		0.17	1.00	1.00	0.42	1.00	1.00	0.06	1.00	
Satd. Flow (perm)	1186	1820		324	1840	1564	781	3539	1583	110	5052	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Growth Factor (vph)	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%
Adj. Flow (vph)	118	343	27	209	125	35	43	1876	1040	202	562	26
RTOR Reduction (vph)	0	2	0	0	0	28	0	0	149	0	4	0
Lane Group Flow (vph)	118	368	0	209	125	7	43	1876	891	202	584	0
Bus Blockages (#/hr)	0	3	3	0	3	3	0	0	0	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	29.0	21.0		33.0	23.0	23.0	68.0	64.0	64.0	77.0	69.0	
Effective Green, g (s)	29.0	21.0		33.0	23.0	23.0	68.0	64.0	64.0	77.0	69.0	
Actuated g/C Ratio	0.24	0.18		0.28	0.19	0.19	0.57	0.53	0.53	0.64	0.58	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Grp Cap (vph)	325	318		209	352	299	475	1887	844	195	2904	
v/s Ratio Prot	0.02	c0.20		c0.08	0.07		0.00	0.53		c0.08	0.12	
v/s Ratio Perm	0.06			0.19		0.00	0.05		0.56	c0.59		
v/c Ratio	0.36	1.16		1.00	0.36	0.02	0.09	0.99	1.06	1.04	0.20	
Uniform Delay, d1	37.0	49.5		39.6	42.1	39.4	11.5	27.8	28.0	39.7	12.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.1	99.6		62.3	2.8	0.1	0.4	19.4	46.6	74.2	0.2	
Delay (s)	40.1	149.1		101.9	44.9	39.5	11.9	47.2	74.6	113.9	12.4	
Level of Service	D	F		F	D	D	B	D	E	F	B	
Approach Delay (s)		122.8			76.7			56.3			38.4	
Approach LOS		F			E			E			D	

Intersection Summary			
HCM 2000 Control Delay	61.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	101.0%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: Mayson Turner Rd & Boone Blvd

9/17/2014

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	140	49	0	243	42	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	
Lane Util. Factor	1.00			1.00	1.00	
Frt	0.97			1.00	0.97	
Flt Protected	1.00			1.00	0.96	
Satd. Flow (prot)	1798			1863	1742	
Flt Permitted	1.00			1.00	0.96	
Satd. Flow (perm)	1798			1863	1742	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor (vph)	134%	134%	134%	134%	134%	134%
Adj. Flow (vph)	204	71	0	354	61	16
RTOR Reduction (vph)	16	0	0	0	11	0
Lane Group Flow (vph)	259	0	0	354	66	0
Turn Type	NA		Perm	NA	Prot	
Protected Phases	4			8	2	
Permitted Phases			8			
Actuated Green, G (s)	46.0			46.0	26.0	
Effective Green, g (s)	46.0			46.0	26.0	
Actuated g/C Ratio	0.58			0.58	0.32	
Clearance Time (s)	4.0			4.0	4.0	
Lane Grp Cap (vph)	1033			1071	566	
v/s Ratio Prot	0.14			c0.19	c0.04	
v/s Ratio Perm						
v/c Ratio	0.25			0.33	0.12	
Uniform Delay, d1	8.4			8.9	18.9	
Progression Factor	1.00			1.05	1.00	
Incremental Delay, d2	0.6			0.8	0.4	
Delay (s)	9.0			10.1	19.4	
Level of Service	A			B	B	
Approach Delay (s)	9.0			10.1	19.4	
Approach LOS	A			B	B	

Intersection Summary			
HCM 2000 Control Delay	10.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	27.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	4	174	296	4	3	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	1.00		0.91	
Flt Protected	0.95	1.00	1.00		0.98	
Satd. Flow (prot)	1770	1863	1859		1664	
Flt Permitted	0.44	1.00	1.00		0.98	
Satd. Flow (perm)	817	1863	1859		1664	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Growth Factor (vph)	134%	134%	134%	134%	134%	134%
Adj. Flow (vph)	6	268	456	6	5	11
RTOR Reduction (vph)	0	0	1	0	8	0
Lane Group Flow (vph)	6	268	461	0	8	0
Turn Type	Perm	NA	NA		Prot	
Protected Phases		4	8		6	
Permitted Phases	4					
Actuated Green, G (s)	51.0	51.0	51.0		21.0	
Effective Green, g (s)	51.0	51.0	51.0		21.0	
Actuated g/C Ratio	0.64	0.64	0.64		0.26	
Clearance Time (s)	4.0	4.0	4.0		4.0	
Lane Grp Cap (vph)	520	1187	1185		436	
v/s Ratio Prot		0.14	c0.25		c0.00	
v/s Ratio Perm	0.01					
v/c Ratio	0.01	0.23	0.39		0.02	
Uniform Delay, d1	5.3	6.1	7.0		21.9	
Progression Factor	0.91	0.85	1.28		1.00	
Incremental Delay, d2	0.0	0.4	0.8		0.1	
Delay (s)	4.9	5.7	9.8		21.9	
Level of Service	A	A	A		C	
Approach Delay (s)		5.6	9.8		21.9	
Approach LOS		A	A		C	

Intersection Summary			
HCM 2000 Control Delay	8.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	31.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	130	40	132	207	65	45	325	79	17	407	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95			1.00	
Frt	1.00	0.96		1.00	0.96			0.97			0.99	
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	
Satd. Flow (prot)	1770	1768		1770	1767			3428			1843	
Flt Permitted	0.35	1.00		0.52	1.00			0.83			0.97	
Satd. Flow (perm)	654	1768		975	1767			2850			1783	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%
Adj. Flow (vph)	30	194	60	197	308	97	67	484	118	25	606	43
RTOR Reduction (vph)	0	14	0	0	14	0	0	23	0	0	3	0
Lane Group Flow (vph)	30	240	0	197	391	0	0	646	0	0	671	0
Bus Blockages (#/hr)	0	4	4	0	4	4	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	31.0	31.0		31.0	31.0			41.0			41.0	
Effective Green, g (s)	31.0	31.0		31.0	31.0			41.0			41.0	
Actuated g/C Ratio	0.39	0.39		0.39	0.39			0.51			0.51	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Grp Cap (vph)	253	685		377	684			1460			913	
v/s Ratio Prot		0.14			c0.22							
v/s Ratio Perm	0.05			0.20				0.23			c0.38	
v/c Ratio	0.12	0.35		0.52	0.57			0.44			0.74	
Uniform Delay, d1	15.7	17.4		18.8	19.3			12.3			15.3	
Progression Factor	0.72	0.66		1.42	1.44			1.00			1.00	
Incremental Delay, d2	0.9	1.4		4.8	3.3			1.0			5.2	
Delay (s)	12.3	12.9		31.5	31.0			13.3			20.5	
Level of Service	B	B		C	C			B			C	
Approach Delay (s)		12.8			31.1			13.3			20.5	
Approach LOS		B			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	20.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	82.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	16	176	9	16	317	7	0	10	28	12	26	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.99		1.00	1.00			0.90			0.96	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.99	
Satd. Flow (prot)	1770	1820		1770	1827			1677			1769	
Flt Permitted	0.40	1.00		0.56	1.00			1.00			0.95	
Satd. Flow (perm)	743	1820		1049	1827			1677			1699	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%
Adj. Flow (vph)	24	262	13	24	472	10	0	15	42	18	39	24
RTOR Reduction (vph)	0	2	0	0	1	0	0	28	0	0	16	0
Lane Group Flow (vph)	24	273	0	24	481	0	0	29	0	0	65	0
Bus Blockages (#/hr)	0	4	4	0	4	4	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA			NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	46.0	46.0		46.0	46.0			26.0			26.0	
Effective Green, g (s)	46.0	46.0		46.0	46.0			26.0			26.0	
Actuated g/C Ratio	0.58	0.58		0.58	0.58			0.32			0.32	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Grp Cap (vph)	427	1046		603	1050			545			552	
v/s Ratio Prot		0.15			c0.26			0.02				
v/s Ratio Perm	0.03			0.02							c0.04	
v/c Ratio	0.06	0.26		0.04	0.46			0.05			0.12	
Uniform Delay, d1	7.5	8.5		7.4	9.8			18.5			18.9	
Progression Factor	1.40	1.29		0.71	0.57			1.00			1.00	
Incremental Delay, d2	0.2	0.6		0.1	1.3			0.2			0.4	
Delay (s)	10.7	11.5		5.4	6.9			18.7			19.4	
Level of Service	B	B		A	A			B			B	
Approach Delay (s)		11.5			6.8			18.7			19.4	
Approach LOS		B			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	10.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	40.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	165	26	0	310	6	12	10	17	3	7	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.98			1.00			0.94			0.95	
Flt Protected		1.00			1.00			0.98			0.99	
Satd. Flow (prot)		1797			1828			1726			1761	
Flt Permitted		0.98			1.00			0.94			0.97	
Satd. Flow (perm)		1770			1828			1647			1724	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Growth Factor (vph)	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%
Adj. Flow (vph)	11	254	40	0	477	9	18	15	26	5	11	8
RTOR Reduction (vph)	0	7	0	0	1	0	0	18	0	0	5	0
Lane Group Flow (vph)	0	298	0	0	485	0	0	41	0	0	19	0
Bus Blockages (#/hr)	0	4	4	0	4	4	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		46.0			46.0			26.0			26.0	
Effective Green, g (s)		46.0			46.0			26.0			26.0	
Actuated g/C Ratio		0.58			0.58			0.32			0.32	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		1017			1051			535			560	
v/s Ratio Prot					c0.27							
v/s Ratio Perm		0.17						c0.03			0.01	
v/c Ratio		0.29			0.46			0.08			0.03	
Uniform Delay, d1		8.7			9.8			18.7			18.4	
Progression Factor		0.60			0.51			1.00			1.00	
Incremental Delay, d2		0.7			1.4			0.3			0.1	
Delay (s)		5.9			6.4			19.0			18.5	
Level of Service		A			A			B			B	
Approach Delay (s)		5.9			6.4			19.0			18.5	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	7.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	33.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	152	0	0	309	16	7	7	3	2	5	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00			1.00			1.00			1.00	
Frt	1.00	1.00			0.99			0.97			0.96	
Flt Protected	0.95	1.00			1.00			0.98			0.99	
Satd. Flow (prot)	1770	1833			1819			1780			1768	
Flt Permitted	0.41	1.00			1.00			0.93			0.98	
Satd. Flow (perm)	768	1833			1819			1692			1741	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Growth Factor (vph)	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%
Adj. Flow (vph)	9	234	0	0	476	25	11	11	5	3	8	5
RTOR Reduction (vph)	0	0	0	0	3	0	0	4	0	0	4	0
Lane Group Flow (vph)	9	234	0	0	498	0	0	23	0	0	12	0
Bus Blockages (#/hr)	0	4	4	0	4	4	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	51.0	51.0			51.0			21.0			21.0	
Effective Green, g (s)	51.0	51.0			51.0			21.0			21.0	
Actuated g/C Ratio	0.64	0.64			0.64			0.26			0.26	
Clearance Time (s)	4.0	4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)	489	1168			1159			444			457	
v/s Ratio Prot		0.13			c0.27							
v/s Ratio Perm	0.01							c0.01			0.01	
v/c Ratio	0.02	0.20			0.43			0.05			0.03	
Uniform Delay, d1	5.3	6.0			7.2			22.1			21.9	
Progression Factor	0.48	0.44			1.00			1.00			1.00	
Incremental Delay, d2	0.1	0.4			1.2			0.2			0.1	
Delay (s)	2.6	3.0			8.4			22.3			22.0	
Level of Service	A	A			A			C			C	
Approach Delay (s)		3.0			8.4			22.3			22.0	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	7.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	33.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
10: Northside Dr & Boone Blvd

2/11/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	37	106	67	482	239	75	50	550	181	49	1748	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.91	
Frt	1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1726		1770	1833	1558	1770	3539	1583	1770	5080	
Flt Permitted	0.56	1.00		0.17	1.00	1.00	0.06	1.00	1.00	0.25	1.00	
Satd. Flow (perm)	1039	1726		310	1833	1558	111	3539	1583	457	5080	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor (vph)	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%
Adj. Flow (vph)	52	150	95	680	337	106	71	776	255	69	2466	17
RTOR Reduction (vph)	0	16	0	0	0	66	0	0	123	0	1	0
Lane Group Flow (vph)	52	229	0	680	337	40	71	776	132	69	2482	0
Bus Blockages (#/hr)	0	4	4	0	4	4	0	0	0	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	25.0	20.0		66.0	57.0	57.0	71.0	67.0	67.0	73.0	68.0	
Effective Green, g (s)	25.0	20.0		66.0	57.0	57.0	71.0	67.0	67.0	73.0	68.0	
Actuated g/C Ratio	0.17	0.13		0.44	0.38	0.38	0.47	0.45	0.45	0.49	0.45	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Grp Cap (vph)	197	230		545	696	592	96	1580	707	266	2302	
v/s Ratio Prot	0.01	0.13		c0.35	0.18		c0.02	0.22		0.01	c0.49	
v/s Ratio Perm	0.04			c0.20		0.03	0.33		0.08	0.12		
v/c Ratio	0.26	1.00		1.25	0.48	0.07	0.74	0.49	0.19	0.26	1.08	
Uniform Delay, d1	53.7	65.0		44.2	35.3	29.6	35.4	29.4	25.1	22.3	41.0	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.2	58.7		126.2	2.4	0.2	39.8	1.1	0.6	2.4	43.9	
Delay (s)	56.9	123.7		170.4	37.7	29.8	75.2	30.5	25.6	24.6	84.9	
Level of Service	E	F		F	D	C	E	C	C	C	F	
Approach Delay (s)		112.0			117.3			32.3			83.3	
Approach LOS		F			F			C			F	

Intersection Summary			
HCM 2000 Control Delay	81.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	111.4%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

APPENDIX D: SYNCHRO RESULTS FOR MODIFIED LOWERY BOULEVARD CONFIGURATION

HCM Signalized Intersection Capacity Analysis
6: Joseph Lowery Blvd & Boone Blvd

9/17/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	22	140	16	23	83	26	16	563	126	10	221	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor		1.00		1.00	1.00			0.95			1.00	
Frt		0.99		1.00	0.96			0.97			0.99	
Flt Protected		0.99		0.95	1.00			1.00			1.00	
Satd. Flow (prot)		1807		1770	1774			3440			1833	
Flt Permitted		0.96		0.58	1.00			0.95			0.97	
Satd. Flow (perm)		1751		1089	1774			3260			1783	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	23	149	17	24	88	28	17	599	134	11	235	28
RTOR Reduction (vph)	0	5	0	0	14	0	0	23	0	0	5	0
Lane Group Flow (vph)	0	184	0	24	102	0	0	727	0	0	269	0
Bus Blockages (#/hr)	0	3	3	0	3	3	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		26.0		26.0	26.0			46.0			46.0	
Effective Green, g (s)		26.0		26.0	26.0			46.0			46.0	
Actuated g/C Ratio		0.32		0.32	0.32			0.58			0.58	
Clearance Time (s)		4.0		4.0	4.0			4.0			4.0	
Lane Grp Cap (vph)		569		353	576			1874			1025	
v/s Ratio Prot					0.06							
v/s Ratio Perm		c0.11		0.02				c0.22			0.15	
v/c Ratio		0.32		0.07	0.18			0.39			0.26	
Uniform Delay, d1		20.4		18.6	19.3			9.3			8.5	
Progression Factor		0.70		1.22	1.26			1.00			1.00	
Incremental Delay, d2		1.5		0.4	0.7			0.6			0.6	
Delay (s)		15.8		23.2	25.0			9.9			9.1	
Level of Service		B		C	C			A			A	
Approach Delay (s)		15.8			24.7			9.9			9.1	
Approach LOS		B			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	12.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	46.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
6: Joseph Lowery Blvd & Boone Blvd

9/17/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	130	40	132	207	65	45	325	79	17	407	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor		1.00		1.00	1.00			0.95			1.00	
Frt		0.97		1.00	0.96			0.97			0.99	
Flt Protected		0.99		0.95	1.00			1.00			1.00	
Satd. Flow (prot)		1772		1770	1767			3428			1843	
Flt Permitted		0.95		0.59	1.00			0.87			0.98	
Satd. Flow (perm)		1698		1092	1767			2995			1803	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	22	144	44	147	230	72	50	361	88	19	452	32
RTOR Reduction (vph)	0	12	0	0	14	0	0	22	0	0	3	0
Lane Group Flow (vph)	0	198	0	147	288	0	0	477	0	0	500	0
Bus Blockages (#/hr)	0	4	4	0	4	4	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		31.0		31.0	31.0			41.0			41.0	
Effective Green, g (s)		31.0		31.0	31.0			41.0			41.0	
Actuated g/C Ratio		0.39		0.39	0.39			0.51			0.51	
Clearance Time (s)		4.0		4.0	4.0			4.0			4.0	
Lane Grp Cap (vph)		657		423	684			1534			924	
v/s Ratio Prot					c0.16							
v/s Ratio Perm		0.12		0.13				0.16			c0.28	
v/c Ratio		0.30		0.35	0.42			0.31			0.54	
Uniform Delay, d1		17.0		17.3	17.9			11.3			13.2	
Progression Factor		0.60		1.43	1.44			1.00			1.00	
Incremental Delay, d2		1.2		2.2	1.9			0.5			2.3	
Delay (s)		11.4		27.0	27.7			11.8			15.4	
Level of Service		B		C	C			B			B	
Approach Delay (s)		11.4			27.5			11.8			15.4	
Approach LOS		B			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	17.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	72.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
6: Joseph Lowery Blvd & Boone Blvd

9/17/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	22	140	16	23	83	26	16	563	126	10	221	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor		1.00		1.00	1.00			0.95			1.00	
Frt		0.99		1.00	0.96			0.97			0.99	
Flt Protected		0.99		0.95	1.00			1.00			1.00	
Satd. Flow (prot)		1807		1770	1774			3440			1834	
Flt Permitted		0.95		0.51	1.00			0.94			0.96	
Satd. Flow (perm)		1735		942	1774			3247			1758	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Growth Factor (vph)	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%
Adj. Flow (vph)	31	200	23	33	118	37	23	803	180	14	315	37
RTOR Reduction (vph)	0	5	0	0	14	0	0	23	0	0	5	0
Lane Group Flow (vph)	0	249	0	33	141	0	0	983	0	0	361	0
Bus Blockages (#/hr)	0	3	3	0	3	3	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		26.0		26.0	26.0			46.0			46.0	
Effective Green, g (s)		26.0		26.0	26.0			46.0			46.0	
Actuated g/C Ratio		0.32		0.32	0.32			0.58			0.58	
Clearance Time (s)		4.0		4.0	4.0			4.0			4.0	
Lane Grp Cap (vph)		563		306	576			1867			1010	
v/s Ratio Prot					0.08							
v/s Ratio Perm		c0.14		0.04				c0.30			0.21	
v/c Ratio		0.44		0.11	0.24			0.53			0.36	
Uniform Delay, d1		21.3		18.9	19.8			10.4			9.1	
Progression Factor		0.69		1.26	1.26			1.00			1.00	
Incremental Delay, d2		2.5		0.7	1.0			1.1			1.0	
Delay (s)		17.2		24.5	26.0			11.4			10.1	
Level of Service		B		C	C			B			B	
Approach Delay (s)		17.2			25.8			11.4			10.1	
Approach LOS		B			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	13.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	62.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Joseph Lowery Blvd & Boone Blvd

9/17/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	130	40	132	207	65	45	325	79	17	407	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor		1.00		1.00	1.00			0.95			1.00	
Frt		0.97		1.00	0.96			0.97			0.99	
Flt Protected		0.99		0.95	1.00			1.00			1.00	
Satd. Flow (prot)		1771		1770	1767			3428			1843	
Flt Permitted		0.94		0.51	1.00			0.83			0.97	
Satd. Flow (perm)		1667		951	1767			2850			1783	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor (vph)	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%	134%
Adj. Flow (vph)	30	194	60	197	308	97	67	484	118	25	606	43
RTOR Reduction (vph)	0	12	0	0	14	0	0	23	0	0	3	0
Lane Group Flow (vph)	0	272	0	197	391	0	0	646	0	0	671	0
Bus Blockages (#/hr)	0	4	4	0	4	4	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		31.0		31.0	31.0			41.0			41.0	
Effective Green, g (s)		31.0		31.0	31.0			41.0			41.0	
Actuated g/C Ratio		0.39		0.39	0.39			0.51			0.51	
Clearance Time (s)		4.0		4.0	4.0			4.0			4.0	
Lane Grp Cap (vph)		645		368	684			1460			913	
v/s Ratio Prot					c0.22							
v/s Ratio Perm		0.16		0.21				0.23			c0.38	
v/c Ratio		0.42		0.54	0.57			0.44			0.74	
Uniform Delay, d1		17.9		18.9	19.3			12.3			15.3	
Progression Factor		0.67		1.41	1.44			1.00			1.00	
Incremental Delay, d2		2.0		5.2	3.3			1.0			5.2	
Delay (s)		14.0		32.0	31.0			13.3			20.5	
Level of Service		B		C	C			B			C	
Approach Delay (s)		14.0			31.3			13.3			20.5	
Approach LOS		B			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	20.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	93.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

APPENDIX E: CONCEPT DRAWINGS

LANE
BEGIN
END
LANE

Cairo Street NW
Tazor Street NW
Flowery Place NW
Temple Street NW
END
LANE

Newport Street NW
Paines Avenue NW
Scipie Terrace NW
Oliver Street NW
Joseph E Boone Blvd NW
LANE
BEGIN
LANE
END
150.5'

Elm Street
Sunset Avenue NW
Joseph E Boone Blvd NW
Griffin Street NW
126'

RED
SLO
VEH
Northside Dr NW
Edwards Street
BEGIN
LANE
RAMP TO
BIKE LANE
SPECIFIC SIGNING AND
MARKING DESIGN FOR
BIKE TREATMENT TO
BE DETERMINED IN
DETAILED DESIGN
Maple Street
Walnut Street