

# Specifications

City of Brookhaven, GA  
Parks and Recreation Department

**Site**  
**Murphey Candler Park Nature Trail**  
1551 West Nancy Creek Drive  
Brookhaven, GA 30319

<b><u>Issue/Revision Date</u></b>	<b><u>Description</u></b>
August 1, 2020	Issued for Bidding

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**GF Project Number**  
201901332

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GFA JOB NUMBER 20191332

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SECTION 01 11 00 - SUMMARY OF WORK

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Project description
- B. Work by others
- C. Owner-furnished products
- D. Work sequence
- E. Existing Site conditions

1.02 PROJECT DESCRIPTION

- A. The Work under this Contract consists of, in general, the construction of a multi-use trail at Murphey Candler Park, located at 1551 West Nancy Creek Drive, Brookhaven, GA 30319.
- B. The Work includes, but is not necessarily limited to, the following items:
  - 1. Compliance with all applicable federal, state and local laws and regulations.
  - 2. Obtaining required permits and authorizations from governing jurisdictions.
  - 3. Preparation and submittal of initial documents prior to commencement of the Work.
  - 4. Mobilization of supplies, equipment and personnel, including transportation to job site, set-up and maintenance of all equipment and temporary facilities and controls required for project execution.
  - 5. Installation and maintenance of erosion and sedimentation control measures per City of Brookhaven Standards.
  - 6. Installation and maintenance of controls for protection of vegetation (including tree protection fencing) and structures to remain in place per City of Brookhaven Standards.
  - 7. Locating and protection of all existing utilities (buried and above grade), structures, and other facilities on the Site not indicated to be removed.
  - 8. Demolition and removal of existing facilities and structures.
  - 9. Clearing and grubbing of designated areas.
  - 10. Site excavation (including subgrade stabilization as required), filling, grading and other earthwork required for construction of new facilities.
  - 11. Installation of concrete trails.
  - 12. Installation of prefabricated boardwalk and prefabricated pedestrian bridge.
  - 13. Coordination of site access over gas pipeline easement with City of Brookhaven Park & Recreation Director.
  - 14. Coordination of site access and staging at baseball field complex with City of Brookhaven Park & Recreation Director.
  - 15. Final site cleanup and demobilization.

1.03 WORK BY OTHERS

- A. During the Work, contracts may be in place for execution of other work at the Site. The Contractor shall coordinate with other contractors, consultants and/or the Owner by providing access to the site to allow activities including, but not limited to, the following:
  - 1. Construction Quality Assurance
  - 2. Construction Quality Control

1.04 WORK SEQUENCE

- A. Detailed sequencing of the Work shall be the responsibility of the Contractor as long as the requirements of these specifications are met, the Contractor's progress is according to the schedule approved by the Owner, and Contract Times stated in the Agreement are complied with.

1.05 EXISTING SITE CONDITIONS

- A. The property on which the Work will be performed (designated as the "Site"), is indicated on the Drawings.
- B. Existing Utilities and Other Facilities:
  - 1. Refer to the Drawings for available information on utilities and other facilities.
  - 2. The Contract Document present provisions regarding available information on existing utilities and other facilities, and limitations on completeness of the information.
  - 3. Existing utilities and other facilities not indicated to be removed shall be protected as specified in Section 01 50 00 and other applicable specification sections.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

**END OF SECTION 01 11 00**

SECTION 01 15 00 – CLIMATOLOGICAL DATA

PART I - GENERAL

1.01 SUMMARY:

- A. The Contractor agrees that said Work shall be executed regularly, diligently and uninterruptedly at such rate of progress as shall ensure full completion of the entire project and its many and separate components and subcontractors, vendors and suppliers, thereof within the time specified.
- B. It is expressly understood and agreed that the Contractor has visited the site where the work of the Project is to be performed, has considered all contingencies and factors affecting the Contractor's ability to perform all the Work within the time specified, including among others, delays caused by inclement weather (temperature and all forms of precipitation) and other possible delays caused by the climatological conditions prevailing in the general localities and recording stations of the City of Brookhaven, Georgia.
- C. After consideration of these factors, the Contractor has made allowances for such factors before determining and submitting his Bid and executing the Construction Agreement agreeing to the completion times and durations specified in the Contract Documents, and does, further, agree that all things considered, such completion durations are a reasonable time for completion of all Work to be performed hereunder, without the need for any extension of time or any other reasons than those specified below.
- D. The Project's completion time shall not be extended for normal inclement weather for the named locale. Inclement weather days (for temperature and all forms of precipitation) per month have been anticipated and included in the contractual time period given for project completion. The Contractor's written and documented request to the Owner for additional time may only be granted for actual days beyond those normally anticipated for the locale, per the schedule below, and only for which work was actually significantly impeded or precluded by the documented inclement weather.

January	4 Calendar Days
February	5 Calendar Days
March	6 Calendar Days
April	4 Calendar Days
May	3 Calendar Days
June	2 Calendar Days
July	2 Calendar Days
August	2 Calendar Days
September	2 Calendar Days
October	2 Calendar Days
November	2 Calendar Days
December	3 Calendar Days

- E. The burden of proof and documentation for such request for additional time beyond the days indicated shall rest solely with the Contractor. Documentation must clearly show the additional weather days (for above normal inclement temperature and all forms of precipitation) are historically unique to the City of Brookhaven, Georgia, area in general, and the Project's site in particular.
- F. Contractor shall submit all days considered to be "Inclement Weather Days" to the Owner each week for the week prior.

- G. In the granting and approving of any additional time for completion of the Project, by a mutually agreed upon and properly executed Change Order, in no instance shall a change in Contract Sum be granted to the Contractor by the Owner for any adjustments to the Contract Time due to weather.
- H. Requests for time extensions for delays due to inclement weather shall be reported by the Contractor, and considered and evaluated on a quarterly basis, as determined by the Owner. Only those actual days lost in excess of the cumulative allowable number of inclement weather calendar days, according to the schedule and data provided, will be considered. Time extensions for time losses due to weather conditions will be considered only for full complete calendar days.
- I. No deduction or reduction in the contract time shall be made due to weather conditions of temperature and precipitation below or less than the anticipated or historical forecast.
- J. Bidders shall review the climatological information as they solely deem necessary and draw their own individual conclusions for bidding and contracting purposes.

**END OF SECTION 01 15 00**

SECTION 01 22 00 - UNIT PRICES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
  - 1. Unit price work
  - 2. List of prices required
  - 3. Procedures for unit price work
  
- B. Related sections:
  - 1. Applications for payment: As outlined in General Conditions and Bid Schedule.
  - 2. Procedures for modifications to the contract: As outlined in General Conditions.
  - 3. Procedures for utilization of testing and inspection: As outlined in Specifications.
  - 4. Contract closeout procedures: As outlined in Specification 01 70 00

1.02 UNIT PRICE LIST

- A. Unit Price No. 1: Rock (Open Excavation)
  - 1. Removal of mass rock encountered and requiring excavation as defined in the specifications.
  - 2. Purpose: to adjust the contract sum when actual quantity is determined
  - 3. Quantity to be included in contract sum: 1 cubic yards
  - 4. Unit of measurement: cubic yard
  - 5. Include only the following in the unit price:
    - a. Excavation to 1' below plan subgrade, or below as defined in the specifications, hauling and disposal off site, cost of providing sufficient and suitable fill material from offsite from 1' below subgrade to original level of rock removed, overhead and profit.
  - 6. Include all other costs in the contract sum.
  - 7. Method of measurement: Measurement will be made and verified by the City as outlined in the specifications.
  
- B. Unit Price No. 2: Rock (Trench Excavation)
  - 1. Removal of trench rock encountered and requiring excavation as defined in the specifications.
  - 2. Purpose: to adjust the contract sum when actual quantity is determined.
  - 3. Quantity to be included in contract sum: 1 cubic yards
  - 4. Unit of measurement: cubic yard
  - 5. Include only the following in the unit price:
    - a. Excavation to 6" below plan subgrade, or below as defined in the specifications, hauling and disposal off site, cost of providing sufficient and suitable fill material from off site from 6" below subgrade to original level of rock removed, overhead and profit.
  - 6. Include all other costs in the contract sum.
  - 7. Method of measurement: Measurement will be made and verified by the City as outlined in the specifications.
  
- C. Unit Price No. 3: Excavation of unsatisfactory materials and replacement with suitable soil material
  - 1. Removal of unsatisfactory materials encountered and requiring excavation as directed by the City, and replacement with suitable soil material to subgrade as shown on plans.
  - 2. Purpose: to adjust the contract sum when actual quantity is determined.
  - 3. Quantity to be included in contract sum: 1 cubic yards
  - 4. Unit of measurement: cubic yard
  - 5. Include only the following in the unit price:
    - a. Excavation to plan subgrade, hauling and disposal off site, cost of providing sufficient and suitable fill material to subgrade, allowing for replacement of all suitable material removed, overhead and profit.

6. Include all other costs in the contract sum.
  7. Method of measurement: Measurement will be made and verified by the City as outlined in the specifications.
- D. Unit Price No. 4: Excavation of unsatisfactory materials and replacement with #57 crushed stone.
1. Removal of unsatisfactory materials encountered and requiring excavation as directed by the City, and replacement with suitable soil material to subgrade as shown on plans.
  2. Purpose: to adjust the contract sum when actual quantity is determined.
  3. Quantity to be included in contract sum: 1 cubic yards
  4. Unit of measurement: cubic yards
  5. Include only the following in the unit price:
    - a. Excavation to plan subgrade, hauling and disposal off site, cost of providing sufficient and suitable material to subgrade, allowing for replacement of all suitable material removed, overhead and profit.
  6. Include all other costs in the contract sum.
  7. Method of measurement: Measurement will be made and verified by the City as outlined in the specifications.
- E. Unit Price No. 5: Excavation of unsatisfactory materials and replacement with surge stone.
1. Removal of unsatisfactory materials encountered and requiring excavation, as directed by the City, and replacement with surge stone to subgrade as shown on plans.
  2. Purpose: to adjust the contract sum when actual quantity is determined.
  3. Quantity to be included in contract sum: 1 cubic yards
  4. Unit of measurement: cubic yard
  5. Include only the following in the unit price:
    - a. Excavation to plan subgrade, hauling and disposal off site, cost of providing sufficient and suitable surge stone to subgrade, allowing for replacement of all suitable material removed, overhead and profit.
  6. Include all other costs in the contract sum.
  7. Method of measurement: Measurement will be made and verified by the City as outlined in the specifications.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

**END OF SECTION 01 22 00**



SECTION 01 25 00 - SUBSTITUTIONS

PART 1 - GENERAL

1.01 SECTION INCLUDES:

- A. Requirements included
- B. Substitutions / prior approvals
- C. Submittal requirements
- D. Contractor's representation

1.02 REQUIREMENTS INCLUDED:

- A. Substitutions for products specified shall be allowed only under the conditions stated in this section.

1.03 SUBSTITUTIONS/PRIOR APPROVALS:

- A. If it is desired to use products different from those indicated in the Contract documents, the party requesting the substitution shall make written application as described herein. The burden of proving equality of proposed substitutions rests on the party making the request for substitution.
- B. Substitution requests shall only be considered from the awarded Contractor.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 SUBMITTAL REQUIREMENTS:

- A. Submit a separate request for each substitution.
- B. Support each request with the following information:
  - 1. Date of request
  - 2. Name of party proposing substitution.
  - 3. Project name.
  - 4. Specification reference.
  - 5. Complete data substantiating compliance of proposed substitution with requirements stated in Contract Documents:
    - a. Product identification, including manufacturer's name and address.
    - b. Manufacturer's literature, identify:
      - 1) Product description.
      - 2) Reference standards.
      - 3) Performance and test data.
      - 4) Manufacturer's recommendation for use and installation.
    - c. Samples, as applicable.
    - d. Name and address of similar projects on which product has been used, and date of each installation.
  - 6. Itemized comparison of the proposed substitution with product specified, list all variations.
  - 7. Data relating to changes in construction schedule.
  - 8. Any effect of substitution on separate contracts.
  - 9. List of changes required in other work or products.

10. Designation of required license fees or royalties.
11. Designation of availability of maintenance services and sources of replacement materials.

3.02 CONTRACTOR'S REPRESENTATION

- A. In connection with the use of any substitute item approved by the Owner, it shall be the General Contractor's responsibility to see that such items meet all space requirements, and that any alterations to connecting items necessitated by use of the alternate items are properly made at no increase in cost to the Owner, and that all items are in compliance with the specification requirements. Contractor shall waive all claims for additional costs caused by substitution which may subsequently become apparent.

**END OF SECTION 01 25 00**

SECTION 01 31 00 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Construction Management Plan
- B. Construction Progress Schedule
- C. Preconstruction and progress meetings
- D. Project coordination and scheduling

1.02 CONSTRUCTION MANAGEMENT PLAN

- A. Submit a Construction Management Plan within the time limit specified in subsection 1.02 of Section 01 33 00.
- B. The Construction Management Plan shall indicate how the construction activities are to be implemented and coordinated, and shall include the following at a minimum:
  - 1. Identification of key project personnel and lines of authority, and descriptions of the duties of the key personnel, and an organizational chart.
  - 2. Proposed work days and hours.
  - 3. Procedures for project communication and coordination.
  - 4. A diagram of the work site with a layout showing existing site conditions, and the location of anticipated haul routes, staging areas, office trailers, and access to the Site. The Contractor shall mark up one of the Contract Drawings to develop this diagram.
  - 5. Contractor quality control procedures.
  - 6. Lists of construction equipment, systems and materials to be used for the Work.
  - 7. Description of temporary facilities and utilities required to conduct the Work.
  - 8. Identification of all permits required to conduct the Work.
  - 9. Staging of operations, including sequencing of the Work, impact of Work on streets and properties, required timing and location of street closures if any, and routing of haul vehicles and construction equipment.
  - 10. Identification of areas for parking of equipment and personal vehicles and storage of materials.
  - 11. Traffic diversion and control plan, including a map with traffic patterns, description of signage, other required controls and route monitoring. Traffic controls must comply with the requirements specified in Section 01 50 00.

1.03 CONSTRUCTION PROGRESS SCHEDULE

- A. Submit initial Construction Progress Schedule within the time limit specified in subsection 1.02 of Section 01 33 00.
- B. Prepare the Construction Progress Schedule in the form of a horizontal bar chart. The Schedule is to be used as the baseline/target schedule.
- C. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float dates, duration, submittals with logic, and successor/predecessor logic. Identify all Critical Path elements.
- D. The Construction Progress Schedule shall be in accordance with the required work sequence and completion dates specified in the Agreement.

- E. The Construction Progress Schedule shall be revised as required to indicate anticipated and actual durations and sequence of activities. Copies of revised Schedules shall be provided to the Owner at the time of Progress Meetings for review and comment.
- F. Indicate estimated percentage of completion for each item of Work at each submission. Schedule updates shall present baseline/target bars for individual construction activities directly beneath current timeline bars for comparison purposes.
- G. Whenever it becomes apparent from the current Construction Progress Schedule that delays to the Critical Path have resulted, and hence, that the contract completion date will not be met, Contractor shall submit to the Owner for approval a written Recovery Plan stating the steps Contractor intends to take to remove or arrest the delay to the Critical Path in the Construction Progress Schedule. The Contractor shall take some or all of the following actions at no additional cost to the Project:
  - 1. Increased construction manpower in such quantities and crafts as will substantially eliminate, in the judgment of the Owner, the backlog of work.
  - 2. Increase the number of working hours per shift, shifts per working days per week, the amount of construction equipment, or any combination of the foregoing, sufficiently to substantially eliminate, in the judgment of the Owner, the backlog of work (as allowed by local ordinances and the requirements of the Contract Documents).
  - 3. Reschedule activities to achieve maximum practical concurrence of accomplishment of activities, and comply with the revised Construction Progress Schedule.
- H. The Contract Time will be adjusted by the Owner only as defined in the Contract Documents. If the Owner finds that the Contractor is entitled to any extension of the Contract Time under the provisions of this Contract, the Owner's determination as to the total number of days extensions will be based upon the currently approved Construction Progress Schedule and on all data relevant to the request for extension.

#### 1.04 PRECONSTRUCTION MEETING

- A. The Owner will schedule and administer a preconstruction meeting as specified in the following paragraphs.
- B. The location of the preconstruction conference will be at a site convenient for all parties, as designated by the Owner.
- C. Parties responsible for attending the preconstruction conference are representatives of the Owner, Contractor and other parties as appropriate.
- D. Agenda:
  - 1. Distribution of copies of the Contract Documents
  - 2. Designation of personnel – representatives of Owner, Contractor, and other parties as appropriate
  - 3. Review and clarification of the responsibilities of project personnel
  - 4. Review and clarification of the lines of communication
  - 5. Review of: Contractor's Construction Management Plan; Construction Progress Schedule; Schedule of Submittals; and lists of subcontractors and suppliers
  - 6. Procedures for submission and processing of submittals; and discussion of the importance of complete, correct, and timely submittals
  - 7. Procedures for measurement and payment, including the Schedule of Values, applications for payment, and contract modifications
  - 8. Procedures for Contractor's submittal of requests for information (RFIs), and Owner's issuance of Field Orders, interpretations and clarifications
  - 9. Discussion of construction quality assurance and quality control procedures
  - 10. Procedures for maintaining Project Record Documents
  - 11. Use of premises, including work areas, storage areas, temporary facilities, and housekeeping procedures
  - 12. Site security and work hours

- 13. Scheduling for progress meetings
- 14. Other items as appropriate

1.05 PROGRESS MEETINGS

- A. The Owner will schedule and administer regular progress meetings. The progress meetings will be held as determined by the Owner.
- B. The location of the progress meetings will be at a site convenient for all parties, as designated by the Owner.
- C. Attendance: Representatives of Owner, Contractor, and other parties as appropriate.
- D. Agenda:
  - 1. Minutes of previous meeting
  - 2. Health and safety issues
  - 3. Community and/or public issues
  - 4. Construction progress review
    - a. Contractor's estimate of planned percent completion compared to actual percent completion
    - b. Review of activities completed since last meeting
    - c. Two-week "look-ahead" of anticipated work items
  - 5. Materials and Products:
    - a. Status of submittal reviews
    - b. Substitutions
    - c. Ordering of materials and products, and delivery issues
    - d. Storage and protection of materials and products
  - 6. Deficiencies:
    - a. Identification of deficiencies
    - b. Status of correction
    - c. Field observations, problems, and conflicts
    - d. Regulatory and/or environmental issues (permits, etc.)
  - 7. Requests for information
  - 8. Progress payments
  - 9. Contract modifications
  - 10. Action items
  - 11. Other business

1.06 PROJECT COORDINATION AND SCHEDULING

- A. Coordinate scheduling, submittals, and Work of the various sections of the Specifications to assure efficient and orderly sequence of installation of interdependent construction elements.
- B. It is the responsibility of the Contractor performing the defined Scope of Work to coordinate the Work with the other trades in order to accomplish the completion of the total Project within the time required by the overall Project Schedule.
- C. Contractor acknowledges that other trades and scopes of work may be in progress in connection with the Project as required to meet the overall Project Schedule. Contractor agrees to complete the Work so as to accommodate the completion of the other trades and work packages and to provide necessary barricades and other facilities to protect the Work from other trades and work packages.
- D. Contractor shall initiate the Work in accordance with the Project Schedule, and shall thereafter proceed and complete performance of the Work promptly, diligently and in such a manner and sequence with the work of other contractors in order to permit completion of the Project within the required schedule.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01 31 00

SECTION 01 32 33 - CONSTRUCTION PHOTOGRAPHS

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions in this section are mandatory procedures for preparing and submitting construction photographs.

1.02 SUBMITTALS

- A. Take progress photographs on a monthly basis. Schedule photography to allow submittal of photos with monthly Application for Payment.
- B. Take photographs beginning at the first month of construction activity and terminating at Date of Final Acceptance.
- C. Take photographs on same day each month, weather permitting, and at same time of day.
- D. Four locations of which photos will be taken will be selected by Owner. Take photos of same standard location each month, unless otherwise directed by Owner. Assign a number of each of the standard photo locations, for comparison with previous and future submittals.
- E. In addition to photographs of standard locations, take eight photographs which best show significant elements of the Work. Locations for these photos shall be selected by the Contractor. Assign a number to each of the non-standard photograph locations, for comparison with previous and future submittals.
- F. Provide Aerial Photographs monthly of the project site before and during construction, and upon completion of the project. Photographs shall be four different views that show the entire property.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

- A. Submit photographs in electronic copy format, with Contractor's Application for Payment. Electronic format copy must be a high-resolution JPEG for 8" x 10" print, with a minimum 1536 x 1024 pixel image resolution.
- B. Identify each photograph with photograph number of location or element of Work. Provide written description of photograph number, project name, date, and Contractor's name.
- C. Aerial Photographs shall be submitted as high-resolution JPEG's for 8" x 10" print, with a minimum 1536 x 1024 pixel image resolution prior to each application for payment.

**END OF SECTION 01 32 33**

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SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Initial and progress submittals
- B. Schedule of submittals
- C. Shop drawings and samples
- D. General procedures for submittals
- E. Owner's review of submittals

1.02 INITIAL SUBMITTALS

- A. Submit the following to the Owner for review not more than 15 days after issuance of the Notice to Proceed:
  - 1. Construction Management Plan (refer to Section 01 31 00)
  - 2. Spill Prevention, Control and Countermeasures Plan (refer to Section 01 50 00)
  - 3. Initial Construction Progress Schedule (refer to Section 01 31 00)
  - 4. Schedule of Submittals (refer to this Section)

1.03 PROGRESS SUBMITTALS

- A. Submit the following to the Owner for review during the progress of the Work and at project completion:
  - 1. Applications for Payment (refer to Contract Documents)
  - 2. Shop drawings, including product data and samples
  - 3. Surveying information (refer to Section 01 71 23)
  - 4. All other miscellaneous submittals not mentioned above but specified in individual specification sections

1.04 SCHEDULE OF SUBMITTALS

- A. The Schedule of Submittals shall include the following:
  - 1. List of all submittals required, with applicable specification section number and paragraph number indicated
  - 2. The planned dates for Contractor's submittals
  - 3. The dates approved submittals will be required from the Owner
  - 4. The planned dates of manufacture, delivery and installation of materials, supplies and equipment
- B. Maintain an accurate updated Schedule of Submittals. Include the following items:
  - 1. Submittal description and file number assigned as each submittal is made
  - 2. Date sent to Owner
  - 3. Date returned to Contractor from Owner
  - 4. Status of submittal
  - 5. Date of resubmittal and return (if applicable)
  - 6. Date material released for fabrication (if applicable)
  - 7. Projected date of fabrication (if applicable)
  - 8. Projected date of delivery to Site (if applicable)

1.05 SHOP DRAWINGS

- A. The term "Shop Drawings" shall be as defined in the Contract Documents. Shop Drawings shall include:

1. Fabrication, erection, setting, and schedule drawings
  2. Manufacturers' scale drawings
  3. Manufacturers' product data (such as manufacturer's product specification and installation instructions, manufacturers' printed statements of compliance and applicability, catalog cuts, product photographs, production or quality control inspection and test reports and certifications, mill reports, and printed product warranties).
- B. All details on Shop Drawings submitted for approval shall clearly show the relationships of the various parts to the main members and lines of the structure or equipment. Where correct fabrication of the Work depends upon field measurements, such measurements shall be made and noted on the Shop Drawings before being submitted for approval.

#### 1.06 SAMPLES

- A. Furnish, for the approval of the Owner, samples required in the Specifications or requested by the Owner. Samples shall be delivered to the Owner in quantities and sizes as specified. A minimum of two samples of each item shall be submitted unless otherwise specified. The Contractor shall pre-pay all shipping charges on samples. Materials or equipment for which samples are required shall not be used in the Work until approved by the Owner.
- B. Samples specified in individual sections, include, but are not necessarily limited to, physical examples of the work such as sections of manufactured or fabricated work, small cuts or containers of materials, complete units of repetitively-used products, color/texture/pattern swatches and range sets, specimens for coordination of visual effect, graphic symbols, and units of work to be used by the Owner for independent inspection and testing, as applicable to the Work.
- C. Approval of a sample shall be only for the characteristics or use named in such approval and shall not be construed to change or modify any Contract requirements.
- D. Approved samples not destroyed in testing shall be stored at the site of the Work. Approved samples in good condition will be marked for identification and may be used in the Work, unless otherwise directed by the Owner. Materials incorporated in the Work shall match the approved samples. Samples which fail testing or are not approved will be returned to the Contractor at his expense, if so requested at time of submission.

#### 1.07 GENERAL PROCEDURES FOR SUBMITTALS

- A. Submit, with reasonable promptness and in such sequence so as to cause no delay in the Contract Work, all Shop Drawings, quality control reports, record drawings, and other submittals required by the Contract Documents. No extension of time will be authorized because of the Contractor's failure to transmit complete and acceptable submittals sufficiently in advance of incorporation of products in the Work.
- B. Provide no less than 15 days for review from the time the Owner receives them, unless otherwise agreed with the Owner.
- C. Submit the number of copies of submittal packages that Contractor requires, plus three copies which will be retained by the Owner.
- D. Submittals shall clearly indicate any deviations or variations from the requirements of the Contract Documents.
- E. All submittals shall be furnished with the following information at a minimum (as applicable to the submittal):
1. Number and title of the submittal
  2. Date of submittal
  3. Name of Contractor, subcontractor, and manufacturer

4. Clear identification of contents
  5. Contractor's certification statement as defined in subsection 1.07.F below
  6. Specification section reference
  7. Contract Drawing number reference
- F. Each submittal shall bear a stamp or specific written indication that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal. The certification shall be signed by the Contractor's authorized representative, and shall read as follows:
1. "By this submittal, I hereby represent that I have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers, and similar data, and I have checked and coordinated each item with other applicable approved Shop Drawings and all Contractor requirements"
- G. Submittal packages that do not include the Contractor's certification statement will be returned to the Contractor, without review at the Owner's option, for non-conformance with this requirement.
- H. Submittals and shop drawings to be submitted as digital 'PDF' files. Large-size shop drawings shall also be submitted with four (4) full-sized hard copies.

#### 1.08 OWNER'S REVIEW OF SUBMITTALS

- A. Owner's review is only for general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Contractor is responsible for compliance with the Contract Documents, confirming and correlating all quantities and dimensions, selecting fabrication processes and techniques (including means, methods, and sequencing) of construction, coordinating the Work with that of all other trades, and performance of the Work in a safe and satisfactory manner. The Owner's review shall not relieve the Contractor from compliance with the Contract Documents.
- B. Contractor shall not begin any work or purchase any materials or products affected by a submittal which has been returned with the notations "Revise and Resubmit" or "Not Acceptable" until a revision or correction of the submittal has been resubmitted and returned with the notations "Approved" or "Approved as Noted". Corrections noted on the submittals shall be followed without exception. The Contractor shall be responsible for and bear all costs of damages that may result from the ordering of any material or from proceeding with any part of the Work prior to the review and approval by Owner of the necessary submittals.
- C. Resubmittals will be handled in the same manner as first submittals. On resubmittals the Contractor shall direct specific attention, in writing on the letter of transmittal and on resubmitted Shop Drawings by use of revision triangles or other similar methods, to revisions other than the corrections requested by the Owner on previous submissions. Any such revisions which are not clearly identified shall be made at the risk of the Contractor. The Contractor shall make corrections to any Work done because of this type revision that is not in accordance to the Contract Documents as may be required by the Owner.
- D. Partial submittals will not be reviewed. The Owner will determine the completeness of a submittal. Submittals not complete will be returned to the Contractor. The Owner may provide a list or mark the submittal directing the Contractor to the areas that are incomplete.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

**END OF SECTION 01 33 00**

SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Regulatory requirements
- B. References
- C. Source quality control testing
- D. Quality control of installation
- E. Manufacturers' field services and reports
- F. Quality control (QC) services
- G. Duties of QC firms and laboratories
- H. Limits on authority of QC firm(s)
- I. Contractor's responsibilities

1.02 REGULATORY REQUIREMENTS

- A. Comply with all applicable local, state and federal standards and regulations.

1.03 REFERENCES

- A. Conform to latest edition of reference industry standards as of date of the Contract Documents or date otherwise specified in specification sections.
- B. If specified reference standards conflict with Contract Documents, request clarification from the Owner before proceeding.
- C. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.04 SOURCE QUALITY CONTROL TESTING

- A. Materials and equipment forming the Work under this Contract are subject to inspection and testing at the point of manufacture or fabrication. Standard specifications for quality and workmanship are indicated in the Contract Documents.
- B. Provide statements or certificates from the manufacturers, fabricators and/or suppliers as specified in individual sections.
- C. All costs of this testing and providing statements and certificates shall be a subsidiary obligation of the Contractor, and no extra charge to the Project shall be allowed on account of such testing and certification.

1.05 QUALITY CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply fully with manufacturers' instructions, including each step-in sequence.
- C. If manufacturers' instructions conflict with Contract Documents, request clarification from Owner before proceeding.
- D. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Work shall be performed by persons qualified to produce workmanship of specified quality.

1.06 MANUFACTURERS' FIELD SERVICES AND REPORTS

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel (representatives) to observe and document site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, testing and adjusting of equipment as applicable, and initiation of instructions when necessary.
- B. Submit qualifications of manufacturers' and suppliers' representatives to the Owner and 15 days in advance of required observations. Representatives are subject to approval by the Owner.
- C. The suppliers' or manufacturers' representatives shall report observations and site decisions, or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

1.07 QUALITY CONTROL SERVICES

- A. Owner will employ and pay for the services of inspection QC firms to perform specified inspection and testing services. Contractor responsible to request testing services when needed.
- B. Performance of quality control inspection and testing by Owner's QC firm(s) shall in no way relieve Contractor of obligation to perform the Work in accordance with requirements of the Contract Documents.
- C. Retesting required because of non-conformance to specifications will be charged to the Contractor by deducting inspection and testing charges from the Contract Price. Retesting charges will be determined in accordance with testing firm's standard fee schedule.
- D. Contractor shall allow sufficient time in the Construction Progress Schedule for quality control testing, evaluation, and reporting of test results. Contractor shall give particular attention to this in areas where results/approvals will be required prior to continuing with the Work.
- E. If Contractor elects to continue with work in advance of receipt of test results and the Owner's approval, it shall be understood that it shall be entirely at Contractor's risk. Owner will not be responsible for consequential delays attributable to failing test results or retesting requirements.
- F. Contractor is responsible for coordination of testing and is liable for the cost of any site visits he schedules if the site is not ready for inspection upon arrival.

1.08 DUTIES OF QC FIRMS AND LABORATORIES

- A. The Owner's QC Firm(s) shall:

1. Provide qualified personnel at the site;
2. Cooperate with Owner in performance of services;
3. Perform specified inspection, sampling, and testing of products in accordance with specified standards;
4. Promptly notify Owner of observed irregularities or non-conformance of Work or Products; and
5. Perform additional inspections and tests required by the Owner.

1.09 LIMITS ON AUTHORITY OF QC FIRM(S)

- A. The Owner's QC Firm(s) shall not release, revoke, alter, or enlarge on requirements of Contract Documents.
- B. The Owner's QC Firm(s) shall not approve or accept any portion of the Work, and shall not assume any duties of Contractor or Owner.

1.10 CONTRACTOR'S RESPONSIBILITIES

- A. Furnish incidental labor and facilities:
  1. To provide access to work to be tested;
  2. To obtain and handle samples at the Site or at the source of products to be tested;
  3. To facilitate inspections and tests; and
  4. For storage and curing of test samples as required.
- B. Coordinate with Owner sufficiently in advance of construction operations to allow for assignment of personnel and scheduling of tests and inspections.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

**END OF SECTION 01 40 00**

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SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Submittals
- B. Temporary utilities
- C. Temporary sanitation facilities
- D. Protection of existing utilities and surface facilities
- E. Protection of installed work
- F. Fencing and other barriers
- G. Public traffic control
- H. Construction roads and parking
- I. Site security
- J. Site cleaning
- K. Noise control
- L. Control of pollutants
- M. Dust control
- N. Field offices (provided by the Contractor)

1.02 SUBMITTALS

- A. The following submittals referenced in this Section shall be submitted to the Owner within the time period specified in subsection 1.02.A of Section 01 33 00:
  - 1. Traffic Control Plan (see subsection 1.09)
  - 2. Spill Prevention, Control and Countermeasures Plan (see subsection 1.14)
  - 3. Layout plan for temporary field offices; include as part of the Construction Management Plan specified in Section 01 31 00.

1.03 TEMPORARY UTILITIES

- A. Temporary Power and Lighting
  - 1. Connect to existing power service to provide required temporary electricity for the Work. Pay all costs for connection and use of service.
  - 2. Temporary electrical utilities shall be installed by a licensed electrician. All electrical connections shall meet appropriate NEMA ratings consistent with the intended service. Comply with National Electrical Code (NEC) and all other applicable federal, state and local codes and regulations.
  - 3. Coordinate with local electric utility and Owner. Obtain any necessary permits.
  - 4. Provide and maintain adequate lighting for construction operations and field offices in accordance with



applicable codes and regulations.

5. Pay costs for power service during construction.

B. Temporary Water

1. Connect to existing water source for construction operations. Pay all costs for installation, maintenance and use of the water service. Install flow meters, pipelines and accessories as required by the local water authority.
2. Provide and pay for adequate drinking water for construction personnel.

C. Provide adequate fire protection at the Site as required by local fire codes and standards.

D. Temporary Telephone Service

1. Cellular phones shall be used for on-site communication.
2. Pay all costs for telephone utility services.

E. Provide, maintain and pay for utility services to Contractor's field office (if mobilized to Site) as specified in subsection 1.16.

1.04 TEMPORARY SANITATION FACILITIES

A. Provide and maintain (as applicable) temporary potable water, toilets, washing facilities, and other sanitation facilities on construction sites in accordance with 29 CFR 1926.51, all other applicable regulations, and as discussed in the erosion, sedimentation and pollution control notes on the Drawings.

B. Job sites without a temporary sanitary sewer shall be provided with temporary toilet facilities such as chemical toilets, recirculating toilets or combustion toilets in accordance with local codes and regulations. Portable toilets shall be cleaned and serviced a minimum of one time per week by a licensed portable toilet facility provider in compliance with applicable local and state regulations. Provide a sufficient number of portable toilet facilities for Contractor's work crews, and authorized visitors. The number of toilets per employee shall conform to the requirements of 29 CFR 1926.51 at a minimum.

C. The temporary sanitation facilities shall be provided at the time of mobilization and maintained in a clean and sanitary condition for the duration of the Work.

1.05 PROTECTION OF EXISTING UTILITIES

A. Protect all existing active and inactive utilities from damage during the Work unless indicated to be removed or abandoned on the Drawings or in these Specifications. If damaged, the utilities shall be repaired at the Contractor's expense.

B. Contact and cooperate with the Owner and the utility companies to locate all utilities (including pipelines, electrical cables, power poles and other utility structures) on the Site prior to beginning the Work. Conform to the requirements of the Contract Documents for locating and protection of Underground Facilities.

C. The approximate locations of selected utilities are shown on the Drawings. Additional utilities not indicated on the Drawings or reference documents may exist. Notify Owner if unanticipated utilities are encountered and request guidance regarding whether they are to remain or be removed.

1.06 PROTECTION OF EXISTING SURFACE FACILITIES

A. Protect all existing surface facilities (including but not limited to buildings, roadways, walkways, curbs and gutters) from damage during the Work unless otherwise indicated to be demolished or abandoned.

- B. Provide protection for plant life designated to remain (or not designated for removal) as specified in Section 31 10 00.
- C. Repair or replace any existing buildings, fencing, pavement, walkways, curbs and gutters, and other surface facilities that are cracked, broken or otherwise damaged by Contractor, to original condition, or better, in accordance with local requirements at no additional cost to the Project. Assessment of damage will be made by the Owner based on field observations.

#### 1.07 PROTECTION OF INSTALLED WORK

- A. Protect installed Work and provide special protection where required in individual specification sections.
- B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to minimize damage.

#### 1.08 FENCING AND OTHER BARRIERS

- A. If requested by the Owner, install temporary chain link fencing to prevent unauthorized entry to construction areas, and to protect existing facilities and adjacent properties from damage from construction operations. Maintain fencing on a daily basis and replace or repair damaged materials.
- B. Provide barricades, covered walkways and other temporary construction required by governing authorities for public rights-of-way. All temporary construction shall be in accordance with applicable federal, state and local laws and building codes.
- C. Furnish and post signs warning the general public to prevent unauthorized access and to identify hard hat area.
- D. Clearly mark and protect open excavations using barriers, signs and other markers in accordance with all applicable regulations. Install high-visibility fencing (such as orange high-density polyethylene safety fencing), caution tape, suitable barricades, "No Trespassing" and other warning signs as required. An excavation shall be classified as "deep" if it presents a trip or fall hazard or as otherwise defined in applicable OSHA regulations. Maintain barriers and signs on a daily basis at each excavation and replace damaged materials until excavation has been backfilled.

#### 1.09 PUBLIC TRAFFIC CONTROL

- A. Coordinate with the local jurisdictions and comply with applicable requirements for maintaining and protecting traffic on all affected public roads during the Work. A Traffic Control Plan shall be developed and submitted to the Owner for review. Contractor shall submit the Traffic Control Plan to the local jurisdiction for approval and permitting as required.
- B. Protect and divert pedestrian and vehicular traffic when needed in compliance with the requirements of City of Brookhaven and other local agencies having jurisdiction. Traffic control shall include: provision of properly trained and equipped flagmen; erection of barricades; placing of lights around and in front of equipment and the Work; and the erection and maintenance of adequate warning, danger, and directional signs. Pedestrians and the traveling public shall be protected from injury or damage.
- C. Obtain and pay for all required road/lane closure permits, haul route permits, and other traffic control permits required for execution of the Work.
- D. Traffic control devices shall comply with the "Manual on Uniform Traffic Control Devices", Part 6 Temporary Traffic Control, published by U.S. Department of Transportation, latest edition.

#### 1.10 CONSTRUCTION ROADS AND PARKING

- A. Contractor's vehicles shall enter and exit the Site only at the locations designated on the Drawings.
- B. If needed, construct temporary gravel surface parking areas in area(s) approved by the Owner to accommodate construction personnel. When Site space is not adequate, provide additional off-site parking. Vehicles shall not be parked in any locations where they impede traffic or access by emergency vehicles. Vehicles shall not be parked beneath the canopy of existing trees if the trees are scheduled to remain.
- C. Repair existing roads damaged by operation of construction equipment as determined by the Owner in compliance with applicable requirements of the City of Brookhaven.

#### 1.11 SITE SECURITY

- A. Provide security and facilities to protect the Site from unauthorized entry, vandalism or theft. Initiate security program at project mobilization and maintain the security throughout the duration of the Work.

#### 1.12 SITE CLEANING

- A. Site housekeeping shall be utilized to ensure that the Site is kept in a clean and orderly condition throughout the Work. Comply with the requirements indicated on the Drawings, at a minimum, the following requirements:
  - 1. Supply all covered containers required for collection, storage and removal of trash, rubbish and debris resulting from the Work. No containers will be supplied by the Owner. Remove trash, rubbish and debris from the Site at least once each week and dispose of off-site at a licensed waste disposal facility in accordance with all applicable regulations.
  - 2. Burying of trash, debris, or similar by-products of the Work is strictly prohibited
- B. Bermed containment areas or equivalent shall be provided for washing concrete truck chutes and other placement equipment. Disposal of excess concrete or drum washout water shall not be allowed onsite.
- C. Provide weekly janitorial services for field office(s) (if mobilized for the Work) to perform cleaning and maintenance of field office and storage areas. Maintain field office approach walks free of mud, water, and snow.
- D. Implement measures to ensure that public roads and rights-of-way and adjacent properties are kept free of any impact due to the Work. These measures shall include, but shall not be limited to, the following:
  - 1. Construction and operation of construction exit(s) to prevent tracking of materials off-site.
  - 2. Covering all trucks transporting materials to and from the Site.
  - 3. Controlling dust, smoke, or other emissions from the Site as a result of the Work.
  - 4. Keeping public rights-of-way free of debris and refuse from the Site.
- E. Any impact to public roads, rights-of-way or adjacent properties shall require immediate attention and corrective action by the Contractor at no cost to the Owner.

#### 1.13 NOISE CONTROL

- A. Contractor is responsible for controlling noise levels by utilizing appropriate noise control on equipment and by complying with required work hour restrictions and other limitations imposed by authorities having jurisdiction.
- B. Contractor's vehicles and equipment shall have appropriate noise reduction and protection devices that conform to the latest OSHA standards (including 29 CFR 1926.52), and other applicable state, county and local ordinance requirements.

- C. For work performed near the property boundary or near inhabited areas, the Contractor shall consider additional noise mitigation measures if warranted by off-site property uses.
- D. Noise mitigation measures shall include, but shall not be limited to, utilizing noise control devices, limiting night work hours for noisy activities, and scheduling and controlling traffic.
- E. Coordinate with the Owner to revise work procedures and hours as needed to address noise complaints, if received, while implementing methods to preserve the project schedule without additional cost to the Owner.

#### 1.14 CONTROL OF POLLUTANTS

- A. If fuel or other petroleum-based products will be stored on-site to support equipment fleet, prepare and implement a Spill Prevention, Control and Countermeasures Plan (SPCC Plan) in accordance with the provisions of 40 CFR Part 112, Oil Pollution Prevention, latest edition. The SPCC Plan shall be submitted to the Owner for review, and shall include, but shall not be limited to, the following:
  - 1. Provisions for the prevention of spills as well as clean-up of spills of gasoline, diesel fuel, hydraulic fluids, and lubricants.
  - 2. Names and telephone numbers of local and State officials to be contacted in the event of a spill.
  - 3. List of subcontractors that may be used to manage off-site impacts of spills.
  - 4. Fire prevention and fire fighting measures to be employed for responses to fires that may occur in equipment, or elsewhere on the Site.
  - 5. Services available from the local fire department and coordination with services of the Contractor's on-site personnel.
- B. Prevent disposal of wastes, effluents, chemicals, or other such substances into sanitary or storm sewers discharging off-site without treatment in accordance with permits obtained by the Contractor.
- C. Fueling of equipment shall be performed away from storm drain inlets. If above-ground fuel storage tanks (ASTs) are present on-site, the ASTs shall be stored in an approved bermed and lined containment areas.
- D. Provide systems for control of atmospheric pollutants. Prevent dust, smoke or other emissions from impacting adjacent properties. Prevent toxic concentrations of chemicals, and prevent harmful dispersal of pollutants into the atmosphere.
- E. Contractor's equipment used during construction shall conform to all current federal, state and local laws and regulations.

#### 1.15 DUST CONTROL

- A. During construction, the Contractor shall (at a minimum) implement, monitor and maintain best management practices (BMPs) for erosion, sedimentation and pollution control (ES&PC), including airborne transport of sediment (dust carried by wind) and physical transport by vehicles as indicated on the Drawings.
- B. Control dust particles, smoke, aerosols and gaseous by-products from construction activities at all times, including weekends, holidays and hours when the Work is not in progress. Additional requirements for dust control are presented on the Drawings.
- C. Maintain excavations, stockpiles, and other areas within the Work area free from particulates which would cause the air pollution standards to be exceeded or cause a hazard or nuisance.
- D. Provide all labor, materials and equipment, including water trucks and dust suppressant, needed to limit visible dust generation during the Work.

1.16 FIELD OFFICES

- A. Furnish and maintain field office trailer(s) for Contractor's use. The field office trailer(s) shall be structurally sound, secure, and weather-tight, with floors raised above ground, and conform to all applicable regulations for the occupancy classification.
- B. The field office(s) shall be equipped with sufficient lighting, electrical outlets, restrooms, and heating, cooling and ventilating equipment and vents. All systems shall comply with applicable codes, laws and regulations.
- C. Provide and maintain all required utilities for the temporary field office(s) and associated facilities necessary to support work crews in compliance with applicable codes, laws and regulations and as acceptable to Owner from time of mobilization until Substantial Completion of the Work.
- D. Prepare and submit a layout plan of all proposed field offices, and related amenities and utilities to be used for the duration of the Project. The layout plan shall be included in the Construction Management Plan as specified in Section 01 31 00. Do not proceed with furnishing and installation of temporary field office(s) prior to Owner approval of location(s).
- E. Clean field office(s) and surrounding areas as specified in subsection 1.12.
- F. Maintain the temporary field office(s) and related temporary utilities until Substantial Completion of the Work, at which time the temporary facilities shall be removed.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

**END OF SECTION 01 50 00**

SECTION 01 57 13 - TEMPORARY SOIL EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL

1.01 SUMMARY

- A. Contractor shall implement and maintain best management practices (BMPs) and perform other required activities as indicated on the Erosion, Sedimentation and Pollution Control (ES&PC) Plan, which is included as a part of the Drawings. This Section shall be considered supplementary to the provisions and measures presented in the approved ES&PC Plan.

1.02 REFERENCES

- A. American Association of State Highway and Transportation Officials (AASHTO):
  - 1. AASHTO M 288, Geotextile Specification for Highway Applications
- B. Georgia Soil and Water Conservation Commission (GSWCC):
  - 1. "Manual for Erosion and Sediment Control in Georgia", latest edition
- C. Georgia Department of Transportation (GDOT):
  - 1. "Standard Specifications, Construction of Transportation Systems", 2001 Edition (GDOT Standard Specifications)

1.03 QUALITY ASSURANCE

- A. Comply with the requirements of pollution control laws, rules and regulations of governmental authorities having jurisdiction, and applicable permit conditions as presented on the Drawings, including, but not limited to, the following:
  - 1. State of Georgia's "Erosion and Sedimentation Act of 1975" (O.C.G.A. Title 12, Chapter 7).

1.04 PROJECT REQUIREMENTS

- A. During construction, the Contractor shall (at a minimum) implement BMPs as indicated on the ES&PC Plan. The purpose of the provisions of the ES&PC Plan are to provide for the construction, monitoring (including reporting) and maintenance of temporary control measures to control soil erosion and sediment transport within the Site and prevent the transport of sediment from the Site as a result of the Work
- B. The use of temporary control measures shall be coordinated with the permanent erosion control features specified elsewhere to the extent practical, to assure effective and continuous erosion control.

PART 2 - PRODUCTS

2.01 CONSTRUCTION EXITS

- A. Construction exits shall be constructed using aggregate and geotextile conforming to the requirements shown on the Drawings. Geotextile to be installed under the aggregate shall be nonwoven geotextile conforming to the specifications for Survivability Class 1 geotextile as defined in AASHTO M 288.

2.02 SEDIMENT BARRIERS (SILT FENCING)

- A. Filter fabric shall meet the requirements in Subsection 881.2.07 of the GDOT Standard Specifications. Minimum fabric width shall be 36 inches. Furnish Type A or Type C fence as indicated on the Drawings.

- B. Posts shall be wood or steel, a minimum of four feet in length. Wood posts are only acceptable for Type A fencing. Minimum sizes of wood posts shall be: 1.5-inch by 1.5-inch for hardwoods; and 3-inch diameter or 2-inch by 4-inch for softwoods. Steel posts shall be standard "U" or "T" sections having a minimum weight of 1.3 pounds per foot. Furnish wire staples (17 minimum gauge) or nails (14 minimum gauge) for wood posts.
- C. Furnish woven wire fence backing for Type C fencing. Woven wire shall have at least six horizontal wires. Vertical wires shall have a maximum spacing of 12 inches. The top and bottom horizontal wires shall be at least 10 gauge and all other wires shall be at least 12 1/2 gauge.

#### 2.03 DISTURBED AREA STABILIZATION WITH TEMPORARY SEEDING

- A. Grass seed for temporary vegetation shall be as indicated on the Drawings.

#### 2.04 DISTURBED AREA STABILIZATION WITH MULCHING

- A. Mulch shall be as indicated on the Drawings.

#### 2.05 OTHER TEMPORARY CONTROLS

- A. Furnish materials for other erosion, sedimentation and pollution controls as indicated on the Drawings and in accordance with the applicable requirements of the referenced GSWCC Manual.

### PART 3 - EXECUTION

#### 3.01 GENERAL PROCEDURES

- A. Comply with the requirements indicated on the Drawings and specified in this Section. Modify and enhance erosion and sedimentation controls throughout the Work as necessary to address Site conditions.
- B. Install BMPs prior to any land disturbance.
- C. Erosion and sediment control measures shown on the Drawings are minimal requirements. It is the responsibility of the Contractor to install additional measures as needed to control sediment, whether or not directed to add such measures by the Owner.
- D. Incorporate all permanent erosion and sediment control measures (including seeding) into the Project at the earliest practical time.

#### 3.02 INSTALLATION OF SILT FENCING

- A. Prior to any land disturbance or as otherwise indicated on the Drawings, install silt fencing in accordance with the details shown on the Drawings.
- B. At a minimum, temporary silt fences shall be installed at all locations along the construction limits where surface water can leave the construction area. This applies to all locations shown or noted on the Drawings and in other areas determined in the field by the Owner to require fencing.
- C. At the time of installation, the filter fabric will be rejected if it has defects, deterioration or damage incurred during manufacture, transportation, storage or installation. Replace at the Contractor's expense.

3.03 CONSTRUCTION OF CONSTRUCTION EXIT

- A. Construction exit shall be constructed in accordance with the details and requirements indicated on the Drawings.

3.04 CONSTRUCTION OF OTHER TEMPORARY CONTROLS

- A. Install and construct other required temporary erosion and sediment controls as indicated on the Drawings.

3.05 INSPECTION AND MAINTENANCE

- A. Temporary erosion and sediment control measures shall be inspected and maintained as indicated on the Drawings until completion of the Work.
- B. Replace or reconstruct ES&PC measures when the structures no longer effectively perform.

3.06 REMOVAL OF TEMPORARY CONTROL MEASURES

- A. Temporary erosion and sediment control measures shall not be removed until approved by the Owner. The upgradient areas shall be sufficiently stabilized with permanent erosion control measures as specified prior to removal.

**END OF SECTION 01 57 13**



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SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Definition of products
- B. Transportation and handling
- C. Storage and protection
- D. Product options
- E. Substitutions

1.02 DEFINITION OF PRODUCTS

- A. The term "Products" refers to new material, machinery, components, equipment, fixtures, and systems forming the Work. Products do not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components required for reuse.

1.03 TRANSPORTATION AND HANDLING

- A. Comply with the requirements of individual specification sections.
- B. Transport and handle products in accordance with manufacturers' instructions.
- C. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.
- D. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, and damage.

1.04 STORAGE AND PROTECTION

- A. Comply with to the requirements of individual specification sections.
- B. Store and protect products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight, climate controlled enclosures.
- C. For exterior storage of fabricated products, place on sloped supports, above ground.
- D. Provide off-site storage and protection when site does not permit on-site storage or protection.
- E. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation.
- F. Store loose granular materials on solid flat surfaces in well-drained areas. Prevent mixing with foreign matter.
- G. Provide equipment and personnel to store products by methods to prevent damage.

- H. Arrange storage of products to permit access for inspection. Periodically inspect to assure products are undamaged and are maintained under specified conditions.

#### 1.05 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Products of manufacturers named and meeting specifications; no options or substitutions allowed without written authorization by the Owner.
- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named in accordance with the following subsection 1.06.
- D. ALL REFERENCES TO VENDORS AND 'APPROVED MANUFACTURERS' ARE INCLUDED FOR DESCRIPTION OF QUALITY AND CONTENT OF THE DESIGNATED EQUIPMENT/MATERIALS AS A BASIS OF DESIGN. EQUIVALENT ITEMS MAY BE ACCEPTED IF THEY MEET ALL STANDARDS OF QUALITY AND PURPOSE FOR THE INTENDED USE, AS DETERMINED BY CITY OF BROOKHAVEN.

#### 1.06 SUBSTITUTIONS

- A. Owner will consider requests for Substitutions only within 30 days after date established for commencement of the Work in the Notice to Proceed.
- B. Subsequent Substitutions will be considered only when a product becomes unavailable through no fault of the Contractor. Improper planning will not be considered as a reason to increase Contract Price as a result of product substitution.
- C. In addition to the provisions of the General Conditions, a request for a Substitution constitutes a representation that the Contractor:
  - 1. Shall provide the same warranty for the Substitution as for the specified product.
  - 2. Shall coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to the Project.
- D. Substitutions will not be considered when they are indicated or implied on Shop Drawings or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- E. Substitution Submittal Procedure:
  - 1. Submit three copies of request for Substitution for consideration. Limit each request to one proposed Substitution.
  - 2. Submit Shop Drawings, product data, and certified test results attesting to the proposed product equivalence.
  - 3. Owner will notify Contractor in writing of decision to accept or reject request.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01 60 00

SECTION 01 70 00 - EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Closeout procedures.
- B. Final cleaning.
- C. Starting of systems.
- D. Demonstration and instructions.
- E. Testing, adjusting and balancing.
- F. Protecting installed construction.
- G. Project record documents.
- H. Operation and maintenance data.
- I. Manual for materials and finishes.
- J. Manual for equipment and systems.
- K. Spare parts and maintenance products.
- L. Product warranties and product bonds.
- M. Maintenance service.
- N. As-built Record Documents.

1.02 CLOSEOUT PROCEDURES

- A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Owner's review.
- B. Provide submittals to Owner as required by authorities having jurisdiction.
- C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.
- D. Owner will occupy all of building as specified in Section 01 10 00 – Summary of Work.

1.03 FINAL CLEANING

- A. Execute final cleaning prior to final project assessment.
- B. Clean and remove temporary labels, stains and foreign substances.
- C. Clean equipment and fixtures to sanitary condition with cleaning materials appropriate to surface and material being cleaned.

- D. Clean site; sweep paved areas, rake clean landscaped surfaces.
- E. Remove waste and surplus materials, rubbish, and construction facilities from site.

#### 1.04 PROTECTING INSTALLED CONSTRUCTION

- A. Protect installed Work and provide special protection where specified in individual specification sections.
- B. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- C. Protect surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- D. Prohibit traffic from landscaped areas.

#### 1.05 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
  - 1. Drawings.
  - 2. Specifications.
  - 3. Addenda.
  - 4. Change Orders and other modifications to the Contract.
  - 5. Reviewed Shop Drawings, Product Data, and Samples.
  - 6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress, not less than weekly.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
  - 1. Manufacturer's name and product model and number.
  - 2. Product substitutions or alternates utilized.
  - 3. Changes made by Addenda and modifications.
- F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
  - 1. Measured depths of foundations in relation to project benchmark.
  - 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
  - 3. Field changes of dimension and detail.
  - 4. Details not on original Contract drawings.
- G. As-built drawings:
  - 1. Contractor must submit to the Owner with request for review the full set of marked-up As-built Record Drawings and Final As-built Record Drawings as described later in this Section.
- H. Submit documents to Owner with request for final Application for Payment.

1.06 OPERATION AND MAINTENANCE DATA

- A. Submit data bound in 8-1/2 x 11 inch (A4) text pages, three D side ring binders with durable plastic covers, and complete document in 'PDF' format.
- B. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project, and subject matter of binder when multiple binders are required.
- C. Internally subdivide binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
- D. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- E. Contents: Prepare Table of Contents for each volume, with each product or system description identified, typed on white paper, in three parts as follows:
  1. Part 1: Directory, listing names, addresses, telephone numbers, websites and email addresses of Owner, Contractor, Subcontractors, and major equipment suppliers.
  2. Part 2: Operation and maintenance instructions arranged by system and subdivided by applicable specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
    - a. Significant design criteria.
    - b. List of equipment.
    - c. Parts list for each component.
    - d. Operating instructions.
    - e. Maintenance instructions for equipment and systems.
    - f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
  3. Part 3: Project documents and certificates, including the following:
    - a. Shop drawings and product data.
    - b. Certificates.
    - c. Photocopies of warranties and bonds.

1.07 MANUAL FOR MATERIALS AND FINISHES

- A. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Owner will review draft and return one copy with comments.
- B. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit documents within 10 days after acceptance.
- C. Submit one copy of completed volumes 15 days prior to final inspection. Draft copy be reviewed and returned after final inspection, with Owner comments. Revise content of document sets as required prior to final submission.
- D. Submit two sets of revised final volumes in final form within 10 days after final inspection, including digital files in 'PDF' format.
- E. Building Products, Applied Materials, and Finishes: Include product data, with catalog number, size, composition, and color and texture designations.
- F. Instructions for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

- G. Additional Requirements: As specified in individual product specification sections.
- H. Include listing in Table of Contents for applicable design data, with tabbed fly sheet and space for insertion of data.

#### 1.08 SPARE PARTS AND MAINTENANCE PRODUCTS

- A. Furnish spare parts, maintenance, and extra products in quantities specified in individual specification sections.
- B. Deliver to Project site and place in location as directed by Owner; obtain receipt prior to final payment.

#### 1.09 PRODUCT WARRANTIES AND PRODUCT BONDS

- A. Obtain warranties and bonds executed in duplicate by responsible subcontractors, suppliers, and manufacturers, within 10 days after completion of applicable item of work.
- B. Execute and assemble transferable warranty documents and bonds from subcontractors, suppliers, and manufacturers.
- C. Verify documents are in proper form, contain full information, and are notarized.
- D. Co-execute submittals when required.
- E. Include Table of Contents and assemble in three D side ring binder with durable plastic cover, and with digital files in 'PDF' format.
- F. Submit prior to final Application for Payment.
- G. Time of Submittals:
  - 1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
  - 2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
  - 3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing date of acceptance as beginning of warranty or bond period.

#### 1.10 MAINTENANCE SERVICE

- A. Furnish service and maintenance of components as required by Contract from date of Substantial Completion.
- B. Do not assign or transfer maintenance service to agent or Subcontractor without prior written consent of Owner.

#### 1.11 AS-BUILT RECORD DRAWINGS

- A. Contractor may not use record documents for construction purposes. Contractor must protect record documents from deterioration and loss in a secure location. Contractor must provide access to record documents for Owner's reference or review during normal working hours.
- B. Contractor must furnish as-built record drawings made from the Contract Drawings, or subsequent updates thereof, annotated as noted below with actual as-built conditions.
  - 1. As-built drawings must show all changes in the Work relative to the original Contract Documents; and

must show additional information of value to Owner's records but not indicated in the original Contract Documents.

- C. As-built record documents must include marked-up copies of the Contract Drawings and Specifications, including newly prepared drawings if applicable or necessary to achieve the Owner's intended result, and shop drawings including all changed conditions issued through addenda and/or change orders.
  - 1. Contractor must include marked-up product data submittals, field records for variable and concealed conditions such as excavations and foundations, and miscellaneous record information on Work that was schematically recorded only schematically or not recorded at all.
- D. The Contractor shall bear all costs associated with obtaining the original Contract Documents, and subsequent updated plots thereof, drafting as-built information, reproduction, or other related work.
  - 1. Contractor shall ensure that all as-built changes are of good drafting quality, performed by a person skilled in drafting and knowledgeable of the conventions of the trades involved.
  - 2. Contractor may utilize Contractor's staff or seek outside assistance for this drafting work provided the contractual requirements pertaining to quality, format, and content are met.

#### 1.12 FINAL AS-BUILT RECORD DRAWINGS

- A. This Section requires that the original marked-up as-built drawings and a copy of the marked-up as-built drawings be submitted to the Owner for review prior to requesting Substantial Completion inspections
  - 1. Following the Owner's review of the marked-up as-built drawings and supplemental drawings, and upon the Owner's acceptance that the marked-up information is accurate and complete, the Contractor shall proceed with preparation of a full set of professionally drafted record as-built drawings in electronic format made from Contract Drawing files.
  - 2. Contractor shall submit final as-built record drawings to the Owner in AutoCAD Civil 3D 2018.
- B. All drawings shall bear the official Project name and number. Further, all drawings, including supplemental drawings, shall also bear a stamp to the effect of 'record As-built' along with the Contractor's certification that such is an accurate reflection of actual as-built conditions. Contractor shall sign and date each certification in a format that is acceptable to the Owner.
  - 1. All drawings shall be the same size as the original Contract Documents.
  - 2. Once the final as-built record drawings are complete, the Contractor shall transmit them to the Owner within 30 calendar days after Final Completion.
  - 3. Contractor shall ensure that all drawings issued as addenda, clarifications and/or change orders are incorporated into the as-built record drawing set and fully shown on the applicable Contract Drawing. If supplemental sheets are used, Contractor must follow the requirements outlined above for supplemental shop drawing sheets.

PART 2 - - Not Used

PART 3 - - Not Used

**END OF SECTION 01 70 00**



SECTION 01 71 23 - CONSTRUCTION SURVEYING

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Surveyor qualifications
- B. Submittals
- C. Survey reference points
- D. General survey requirements
- E. Surveys for measurement and payment (where applicable)
- F. Survey documentation of the Work

1.02 SURVEYOR QUALIFICATIONS

- A. Record survey drawings for review and approval shall be performed by an independent surveying firm with a Registered Land Surveyor (RLS) licensed and registered in the State of Georgia, retained by the Contractor, and acceptable to the Owner.
- B. Qualifications documentation shall be provided for the proposed RLS, as described in subsection 1.03.A of this Section.
- C. Day to day surveying for Contractor's control purposes may be performed by Contractor's own surveyors.

1.03 SUBMITTALS

- A. Submit qualifications documentation for proposed RLS. Information shall include: name, address, telephone number, and photocopy of registration of RLS.
- B. Submit record survey drawings (specified in subsection 3.03 of this Section), certified by the RLS, along with computer files on diskette in AutoCAD Civil 3D 2018. Redline mark-ups of the Contract Drawings are not acceptable. A digitized tracing of a manually drawn record survey drawing, derived from non-digital surveying techniques, is also not acceptable.

1.04 SURVEY REFERENCE POINTS

- A. The Owner's surveyor has established benchmarks and horizontal control for the Work. Control datum for survey is that indicated on the Drawings.
- B. Contractor's RLS shall establish additional temporary benchmarks and horizontal control points as required.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 GENERAL SURVEY REQUIREMENTS

- A. Utilize recognized engineering survey practices appropriate for obtaining the information specified.

- B. Protect and preserve permanent reference points during construction.
- C. Promptly report to Owner the loss or destruction of any reference point or relocation required because of changes in grades or other reasons. Replace dislocated reference points based on original survey control. Make no changes without prior written notice to Owner.
- D. Establish elevations, lines and levels required for all items of the Work.

3.02 SURVEYS FOR MEASUREMENT AND PAYMENT

- A. Contractor shall perform surveys to determine quantities for unit price items, including control surveys to establish measurement reference lines. Notify Owner prior to starting surveys.
- B. Contractor shall submit calculations and certify the correctness of quantities for payment purposes. County will confirm quantities prior to payment.

3.03 SURVEY DOCUMENTATION OF THE WORK

- A. Maintain a complete and accurate log of control and survey work as it progresses.
- B. Record survey drawings shall be prepared to fully document the Work, as specified in individual specification sections.
- C. Contractor's RLS shall prepare and certify the record survey drawings.

**END OF SECTION 01 71 23**

## SECTION 02112 - TREE PROTECTION AND SELECTIVE TRIMMING

### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. All necessary tree protection measures shall be implemented and maintained throughout the duration of construction in order to ensure that all existing project site vegetation is protected from impact by construction activities. Tree protection operations include but are not limited to the following:
1. Staking by the Contractor and written approval of the Owner of location of tree protection measures prior to installation.
  2. Construction and maintenance of tree protection fencing, barricades, guards, tree tape, etc.
  3. Removal of vegetation as indicated in the Contract Documents.
  4. Placement and maintenance of temporary seeding as indicated in the Contract Documents.
  5. Underbrush cleanup and selective tree trimming as indicated in the Contract Documents.
- B. Related Sections:
1. Section 01 57 13 – Temporary Erosion and Sediment Control
  1. Section 02 40 00 – Demolition and Structure Moving
  2. Section 31 10 00 – Site Clearing
  3. Section 31 22 00 – Grading

#### 1.03 CODES AND STANDARDS

- A. In addition to complying with all pertinent codes and regulations, comply with the requirements of those insurance carriers providing coverage for this work.

#### 1.04 QUALITY ASSURANCE

- A. **QUALIFICATION OF THE PROJECT STAFF:** Contractor shall provide a project superintendent who shall be present at all times during tree clearing and grubbing operations and who shall direct the trimming of roots and limbs where required. The project superintendent shall be qualified in the various other trades involved including demolition, protection of property and erosion control.

#### 1.05 JOB CONDITIONS

- A. **Dust Control:** Use all means necessary to prevent the spread of dust during performance of the work of this section. Thoroughly moisten all surfaces in order to fulfill the requirements of local and state erosion and sedimentation regulations. Prevent dust from being a nuisance to the work on the site and surrounding areas.
- B. **Erosion Control:** Install and maintain per the requirements of Section 01 57 13 and the Drawings.

- C. Protection: Contractor shall use all means necessary to protect existing objects designated to remain. In the event of damage, the Contractor shall immediately make all repairs and replacements necessary as directed by the Owner at no additional cost to the Owner.
- D. Tree Protection:
1. Protect existing trees and other vegetation indicated to remain in place, against unnecessary cutting, breaking or skinning of roots, skinning and bruising of bark, smothering of roots by stockpiling construction materials or damage to roots by excavating materials within drip line, excess foot or vehicular traffic, or parking of vehicles within drip line.
  2. Provide temporary fences, barricades or guards as required to protect trees and vegetation to be left undamaged. Contractor shall not store, stack or place materials of any form under the drip line of trees to be saved. Equipment such as vehicles shall not be parked under trees or traverse beneath the drip line of trees to be saved.
  3. Water trees and other vegetation which are to remain within the limits on the contract work as required to maintain their health during the course of construction operations.
  4. Provide protection for roots over 2" diameter that are cut during construction operation. Coat any cut faces with an orange shellac, or other acceptable coating, especially formulated for horticultural use on cut or damaged plant tissues. Temporarily cover all exposed roots with wet burlap to prevent from drying out; provide earth cover as soon as possible.
  5. Repair or replace trees and vegetation damaged by construction operations, in a manner acceptable to the Owner. Tree damage repair shall be performed by a qualified tree surgeon. Replace trees which cannot be repaired and restored to full-growth status, as determined by the tree surgeon.
  6. Protect tree root system from damage due to deleterious materials in solution caused by run-off, or spillage during mixing of construction materials or drainage from stored materials. Protect root system from flooding, erosion or excessive wetting resulting from de-watering operations.
  7. Tree Penalty: The intent of this clause is to emphasize the importance of all trees to be saved. All trees to be saved shall be maintained in an undamaged condition. Damage shall be defined as the act of scarring, nailing, cutting, breaking limbs, etc., of any tree or its root system in such a manner as may cause the tree to be permanently harmed. Accidental damage due to dead trees falling, equipment breakdown or any act on the part of the operator which appears to the Owner as unavoidable would not warrant a penalty. However, the Contractor will be liable for consistently damaging trees by accidental damage. Damage due to improper location of utility trenches or ditches will not be considered accidental. The Contractor will be responsible for damage on the part of the operator or operators, whether by method of excavation, use of improper equipment, incompetency of the operator, or failure to properly inform the operator as determined by the Owner.

8. All trees on the site shall be saved except those marked specifically to be removed, those within the clearing limits on the plans; and those marked specifically on the site by the Owner to be removed. No tree, either those marked for removal on the site, or any other tree may be removed from the site prior to the Owner's inspection. Penalties for damage to or removal of any tree not specifically approved by the Owner on the site will be as follows:

Large Trees		Small Trees & Evergreen Trees	
Caliper	Price	Caliper	Price
1 1/2" - 2"	300.00	6'- 7'	200.00
2" - 2 1/2"	400.00	7'-8'	300.00
2 1/2" - 3"	500.00	8'-9'	400.00
3" - 3 1/2"	600.00	9'-10'	500.00
3 1/2" - 4"	700.00	10'-11'	600.00
4" - 4 1/2"	800.00	11'-12'	700.00
4 1/2" - 5"	900.00	12'-13'	800.00
5" - 6"	1000.00	13'-14'	900.00
6" - 7"	1500.00	14'-15'	1100.00
7" - 8"	2000.00	15'-16'	1300.00
8" - 11"	2500.00	16'-17'	1400.00
12" - 20"	3000.00	17'-18'	1600.00
21" - Larger	4000.00	18'-19'	1900.00
		19'-20'	2200.00

9. Trees that are damaged by the Contractor will be evaluated by the Owner. The Owner will determine the replacement value of damaged trees based up on the use of the Tree Penalty Chart and current material market costs. The Contractor is responsible for all costs associated with replacements.
10. Trees designated to remain on site and are removed by the Contractor will be evaluated by the Owner. The Owner will determine the replacement value of damaged trees based upon the use of the Tree Penalty Chart and current material market costs. The Contractor is responsible for all costs associated with replacements.
11. Root Rakes: No root rake devices shall be used within the drip line of trees scheduled to remain.
12. Disposal: All materials removed by the clearing operation shall be disposed of off-site. No burning of trees, stumps or other matter shall be conducted on the site, unless permission is obtained in writing from the Owner.

## PART 2 - PRODUCTS

### 2.01 TEMPORARY BARRICADES

- A. Unless otherwise approved by the Owner, use only new and solid lumber of industry accepted, pre-approved grade to construct temporary barricades around trees and areas designated to remain undisturbed.

### 2.02 TEMPORARY FENCES

- A. Unless otherwise approved by the Owner, use only orange nylon safety fencing 3'-0" height, stapled to 2" x 4" x 5'-0" wood stake post at 5'-0" on center to construct temporary fences around trees and areas designated to remain undisturbed.

### 2.03 PRUNING PAINT

- A. Use only a pruning paint specifically formulated for horticultural application to cut or damaged plant tissue and approved by the Owner for use on this work. Preferably orange shellac.

### 2.04 EXPLOSIVES

- A. The use of explosives is prohibited.

### 2.05 OTHER MATERIALS

- A. All other materials, not specifically described but required for proper completion of the work of this Section, shall be submitted by the Contractor to the Owner for approval.

## PART 3 EXECUTION

### 3.01 SITE INSPECTION

- A. The Contractor shall carefully inspect the project site and stake the limits of all tree save measures to be installed prior to commencing construction. Location and limits of staking of tree save measures must be approved in writing by the Owner.

### 3.02 SCHEDULING

- A. The Contractor shall schedule all work in a manner that will not negatively impact the operations of adjoining properties and/or the general public.
- B. The Contractor shall notify the Owner at least five (5) full working days prior to commencing clearing and tree removal work of this contract in order to receive written approval of the location and limits of tree save and erosion and sedimentation measures.

### 3.03 STAKING

- A. The Contractor shall stake the location and limits of all tree save measures.
- B. The purpose of the staking, with inspection and adjustment by the Owner, is to adjust the areas of the site to allow the Contractor maximum use of the land. Staking is subject to various degrees of adaptation which can only be determined by the Owner. The amount of adjustment is determined by the existing trees, terrain, soil conditions, sub-surface water and other intangibles which are impractical to survey in absolute accuracy.
- C. The Contractor shall notify the Owner at least five (5) working days before inspection of the construction stakeout to coordinate tree protection. During the inspection the Owner will adjust the stake-out as necessary to accommodate trees, topography and all other objects and conditions on the site. At this time the Owner will clearly mark all trees and other vegetation to be removed. The staking-inspection process must take place prior to any tree removal, grading, construction, or any other work on the site.
- D. It is a condition of this Contract that the Contractor and project superintendent attend all staking inspection meetings
- E. The staking-inspection process shall be repeated for any work not staked and approved or adjusted during the initial site visit. No work shall be done without the written approval of the location and limits of project elements by the Owner. All alignment, dimensions and elevation of any grading, excavation, construction and planting is subject to adjustment.

### 3.04 TOPSOIL REMOVAL

- A. Contractor shall not strip topsoil in tree save areas. Limit of stripping operations shall be of a sufficient distance from existing trees to prevent damage to the main root system.
- B. Topsoil shall not be stockpiled in tree save areas.

### 3.05 WOODLAND PRUNING AND UNDERBRUSHING

- A. Clear the site of brush, rubbish, dead limbs, snags, fallen trees, and any other plant material designated by the Owner to be removed. No trees, limbs and/or roots shall be cut or removed, without prior approval of Owner.

- B. Do not remove stumps in areas to be left natural. The use of root rakes or track equipment in areas designated as tree save and/or scheduled for woodland pruning and under brushing is prohibited.
- C. Prune remaining trees by removing all low hanging limbs less than 6' above the ground by cutting with a hand saw. Pruning cuts shall be made in accordance with good pruning practices. Pruner shall not cut the cambium collar. Remove all dead trees, broken trees, leaning trees and deceased trees. Refuse may be removed from the site or chipped with a chipper and spread under the trees.
- D. Underbrush all small sprouts, scrubs, vines, and weeds as defined on site by the Owner. The Owner shall meet on site with Contractor to review requirements.
- E. Do not rake or remove existing leaf or pine nettle mulch located within woodland and under brushing zones.
- F. All woodland pruning and clean up shall be conducted with handheld equipment. The use of motorized equipment is prohibited.
- G. All under brushing shall be conducted with handheld equipment. The use of motorized equipment is prohibited.

3.06 EROSION CONTROL - PERMANENT SEEDING

- A. Contractor shall sow grass as necessary during construction to prevent erosion of disturbed areas and prevent damage to tree save areas from runoff and silt. Refer to Section 01 57 13.

3.07 EROSION CONTROL - TEMPORARY SEEDING

- A. Contractor shall temporarily sow grass with appropriate grass seed in the event that permanent grass cannot be sown during the specified season. Refer to Section 01 57 13.

3.08 EROSION CONTROL - BARRIER PLACEMENT

- A. Erosion and sediment control measures must be installed and approved in writing by the Owner prior to commencing construction activities. Erosion and sediment control measures shall be placed and maintained in order to prevent the silting and erosion of adjacent streams, woodland, tree save and under brushing areas. Refer to Section 01 57 13.

3.09 FILL PLACEMENT OVER TREE ROOTS

- A. Where fill dirt is necessary to establish acceptable finished grades over tree roots, Contractor shall contact the Owner to determine extent and execution of fill placement.

3.10 CLEANUP:

- A. Contractor shall be responsible for removing all rubbish, refuse, soil, waste, and other products or elements resulting from the construction effort.



- B. All woodland, underbrush and tree save areas disturbed by construction activity shall be repaired. Contractor shall restore pre-existing natural grade through the use of hand rakes. All raked areas shall be covered with 1" deep layer of pine straw mulch, unless otherwise directed by the Owner to receive seeding. All pruning refuse shall be removed from the site, or ground and spread as mulch in the natural areas.

**END OF SECTION 02 11 20**

SECTION 03 30 02 - SITE CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes cast-in-place concrete construction of structural foundations and slabs; concrete walkways (including trails); and miscellaneous concrete work.
- B. Related Sections:
  - 1. Section 31 22 00 - Grading

1.02 REFERENCES

- A. American Association of State Highway and Transportation Officials (AASHTO):
  - 1. AASHTO M154, Standard Specification for Air-Entraining Admixtures for Concrete
  - 2. AASHTO M194, Standard Specification for Chemical Admixtures for Concrete
- B. American Concrete Institute (ACI):
  - 1. ACI 301, Specifications for Structural Concrete
  - 2. ACI 318, Building Code Requirements for Structural Concrete
- C. ASTM International:
  - 1. ASTM A 185, Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
  - 2. ASTM A 615, Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
  - 3. ASTM C 31, Standard Practice for Making and Curing Concrete Test Specimens in the Field
  - 4. ASTM C 39, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
  - 5. ASTM C 94, Standard Specification for Ready-Mixed Concrete
  - 6. ASTM C 143, Standard Test Method for Slump of Hydraulic Cement Concrete
  - 7. ASTM C 172, Standard Practice for Sampling Freshly Mixed Concrete
  - 8. ASTM C 231, Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
  - 9. ASTM C 260, Standard Specification for Air Entraining Admixtures for Concrete
  - 10. ASTM C 494, Standard Specification for Chemical Admixtures for Concrete
  - 11. ASTM D 994, Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type)
  - 12. ASTM D 1751, Standard Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)
  - 13. ASTM D 1752, Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
  - 14. ASTM C 1116, Standard Specification for Fiber-Reinforced Concrete and Shotcrete.
- D. Georgia Department of Transportation

1.03 SUBMITTALS

- A. Submit the following to the Owner, for review and approval no later than 15 days upon receipt of the City issued notice to process. Owner has 15 days to review submittal, upon which as approval or rejected will be provided. If a resubmitted is required, a new 15 days review period will start the date the resubmittal is received from contractor:
  - 1. Concrete mix designs
  - 2. Manufacturer's product data sheets for reinforcing steel, joint devices, concrete admixtures, joint fillers, joint sealants, curing aids, and other specified materials.
- B. Submit copy of truck ticket for every load of concrete delivered to the site.

#### 1.04 QUALITY ASSURANCE / QUALITY CONTROL

- A. Owner will retain the services of independent QC firm(s) to determine conformance of the materials and the constructed work with the specifications.
- B. Concrete trail and handicap ramp construction shall conform to the requirements as shown on the Drawings.

#### 1.05 PROJECT CONDITIONS

- A. Concrete placement and finishing shall be performed only during periods of acceptable ambient temperatures in accordance with the applicable requirements of ACI 301.
- B. 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.
- C. Coordinate concrete construction with site grading work and other related construction.

### PART 2 - PRODUCTS

#### 2.01 SOURCE QUALITY CONTROL

- A. Proposed materials shall be approved by the Owner as specified prior to delivery and use in the construction.

#### 2.02 REINFORCEMENT

- A. Rebars shall conform to ASTM A615, Grade 60, unfinished. Size shall be as indicated on the Drawings.
- B. Concrete Reinforcing Fibers shall be high strength industrial-grade fibers specifically engineered for secondary reinforcement of concrete and shall conform to ASTM C 1116.
- C. Furnish devices for elevating and supporting reinforcement in correct position.

#### 2.03 CONCRETE MATERIALS AND MIX DESIGNS

- A. Concrete materials and mix design shall conform to the applicable requirements as specified in the following paragraphs.
- B. Admixtures:
  - 1. The use of chemical admixtures shall be approved by the Owner.
  - 2. Air entrainment admixtures shall conform to AASHTO M154 or ASTM C260.
  - 3. Chemical admixtures (including any combination of water-reducing, retarding, and accelerating admixtures) shall conform to the requirements of AASHTO M194 or ASTM C494.
- C. Unless otherwise indicated on the Drawings or in other specification sections, concrete mix for structural foundations and slabs, trails, handicapped ramps and miscellaneous work shall be Class "A" concrete conforming to the mix design requirements as summarized below:
  - 1. Concrete mix shall be proportioned such that the 28-day compressive strength of moist cured laboratory samples achieve not less 4,500 pounds per square inch (psi) or as indicated on drawings.
  - 2. Slump Range: 2 to 4 inches
  - 3. Entrained Air Content: 2.5 to 6 percent (as determined using ASTM C231).
  - 4. Coarse aggregate size: numbers 56, 57 or 67 in accordance with drawings.
  - 5. Maximum water/cement ratio (or water/cementitious material ratio if pozzolanic materials such as fly ash

are added to Portland cement): 0.49

#### 2.04 JOINT DEVICES AND FILLER MATERIALS

- A. Expansion joint filler shall comply with ASTM D994, D1751, or D1752 unless otherwise indicated on the Drawings.

#### 2.05 JOINT SEALANTS

- A. Joint sealant shall conform to the requirements indicated on the drawings.

### PART 3 - EXECUTION

#### 3.01 FIELD QUALITY CONTROL

- A. No concrete for a specific pour shall be ordered for delivery to the Site until pertinent concrete mix design and specified materials are approved by the Owner.
- B. Sampling and testing during the placement of concrete shall conform to the requirements of ACI 301, and as specified below.
  1. Sampling Fresh Concrete: Comply with ASTM C172.
  2. Slump Testing (ASTM C143): 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. Concrete Test Specimens (ASTM C31): One set of four standard cylinders for each compressive strength test.
  5. Air Entrainment (ASTM C231): One test for each set of compressive strength test specimens.
  6. Compressive Strength Test (ASTM C39): 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 shall be tested at seven days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.

#### 3.02 SUBGRADE PREPARATION

- A. Verify that subgrade has been excavated, graded and compacted (as applicable) to the required elevations and dimensions indicated on the Drawings and as specified in Section 31 22 00.
- B. Remove and dispose of debris and other unsuitable material from the subgrade surface.
- C. Subgrade shall be in a moist condition when concrete is placed.

#### 3.03 FORMWORK

- A. Construct formwork as necessary to provide the required dimensions for concrete construction indicated on the Drawings.
- B. Forms shall have sufficient strength to withstand the pressure resulting from placement and vibration of the concrete and shall have sufficient rigidity to maintain required shape.

#### 3.04 INSTALLATION OF REINFORCEMENT

- A. Unless otherwise approved by the Owner, reinforcement shall be fabricated to the shapes and dimensions shown on the Drawings and installed where indicated.

- B. At the time of concrete placement all reinforcement shall be free from loose, flaky rust, scale (except tight mill scale), mud, oil, grease, or any other coating that might reduce the bond with the concrete.
- C. Accurately position, support, and secure reinforcement against displacement by concrete placement operations.
- D. Place reinforcement to obtain at least the minimum coverages for concrete protection as shown on the Drawings.
- E. Do not place reinforcing bars more than two inches beyond the last leg of continuous bar support. Do not use supports as bases for runways for concrete conveying equipment and similar construction loads.
- F. Tolerance for bar placement shall be plus or minus one bar diameter, but not exceeding one inch. Tolerance for cover over reinforcement shall be plus or minus one-half inch.
- G. Splices in reinforcement steel shall be in accordance with approved splicing procedures and the requirements of ACI 318 and only as approved by the Owner. Welding or butt-welding of re-bar will not be allowed.

### 3.05 INSTALLATION OF OTHER MATERIALS

- A. Items to be cast into the concrete shall be accurately placed and positioned securely.

### 3.06 CONCRETE PLACEMENT

- A. Concrete shall be placed at the locations and to the elevations and dimensions indicated on the Drawings.
- B. Mix, place and consolidate concrete in accordance with the applicable requirements of ACI 301, to suit the type of concrete and project conditions, and as specified herein.
- C. Truck mixers shall furnish a concrete batch that is homogeneous with respect to consistency, mix, and grading.
- D. Concrete that has been batched for over 1-1/2 hours shall not be placed.
- E. In order to ensure consistent slump at the point of placement, a small quantity of "trim water" may be held out at the batch plant. The amount of withheld water shall be indicated on the truck ticket, and the truck shall leave the batch plant with a full water tank.
- F. When concrete arrives at the point of delivery with a lower than specified slump and the concrete is unsuitable for placing at that slump as determined by the Owner or QC Firm, the slump may be adjusted to the required maximum by adding the withheld "trim water". Water may be added up to the amount allowed in the accepted mixture proportions as shown on the ticket, unless otherwise approved by the Owner.
- G. The addition of mixing water at the jobsite shall be in accordance with ASTM C94. The specified water/cement ratio shall not be exceeded.
- H. Do not use concrete which becomes non-plastic and unworkable, or does not meet the required quality control limits, or which has been contaminated by foreign materials.
- I. Deposit concrete as nearly in final position as practical to avoid rehandling. Do not permit concrete to drop freely a distance greater than three feet. Where longer drops are necessary, use chutes, tremies, or other conveyance to prevent separation.

- J. As soon as concrete is deposited, thoroughly agitate with mechanical vibrators and suitable hand tools to work mixture into corners of forms and around reinforcing and embedded items. Do not over-vibrate or use vibrators to transport concrete within forms.

### 3.07 FINISHING

- A. Finish concrete in accordance with the applicable requirements of ACI 301, to suit the type of concrete and project conditions, and as specified herein.
- B. Finishing of Concrete Slabs:
  - 1. Strike off (screed) concrete to required elevations and immediately start finishing and flattening operations. Ensure finishing operations are no more than necessary to remove irregularities and meet specified tolerances.
  - 2. At the Contractor's option, immediately after screeding, proceed with initial hand floating operations using appropriate tools to compact and consolidate unformed concrete slab surface. Complete floating work before any excess moisture or bleeding water is present on the surface.
  - 3. Allow concrete to stiffen before proceeding with finishing operations. No subsequent operation should be accomplished until the concrete will sustain foot pressure with only about 1/4-inch indentation.
  - 4. After evaporation of most of the bleed water has taken place, proceed with the second floating operation on slab surfaces using either hand trowels or power trowels as appropriate.
- C. On unexposed slab surfaces, trowel concrete surfaces using hand or power trowels as appropriate to produce a dense, smooth, hard surface.
- D. Provide a medium broomed finish as indicated on plans to all concrete surfaces that will receive foot or vehicular traffic.

### 3.08 JOINTS

- A. Construct the required type of joint to the dimensions and at the locations shown on the Drawings.
- B. Install expansion joint filler and waterstops where shown on the Drawings and in accordance with manufacturers' recommendations.
- C. For concrete slabs on grade, contraction and expansion joints shall be provided as indicated on the Drawings, and as specified in the following paragraphs.
- D. For trails, expansion joints shall be placed as indicated on Drawings and at intersections with building walls and other structures. Expansion joint width shall be 1/2-inch minimum. Joint filler shall extend for the full depth of the joint. Install joint filler in accordance with the manufacturer's recommendations.
- E. Contraction joints for trails shall be provided for crack control at the dimensions and spacing indicated on the Drawings and as specified below:
  - 1. Spacing of transverse contraction joints for sidewalks shall match sidewalk width.
  - 2. In all other locations, maximum spacing shall be 10 feet.
  - 3. Joints shall be formed using a 1/8-inch blade saw. Depth of each contraction joint shall be one-third of the concrete thickness.

### 3.09 CURING AND PROTECTION

- A. Immediately following finishing operations, cure and protect concrete in conformance with the applicable requirements of ACI 301, and as specified in the following paragraphs.
- B. Protect fresh concrete from direct rays of sunlight, drying winds and rain.

- C. Maintain concrete temperature below 80 degrees F at time of placement, or furnish test data or provide other proof that admixtures and mix ingredients will not produce flash set plastic shrinkage, or cracking due to heat of hydration. Ingredients may be cooled before mixing to maintain fresh concrete temperatures at 80 degrees F or less.
- D. Curing shall be performed using wet coverings such as burlap, or moisture retaining coverings such as polyethylene film. Place coverings as soon as possible after finishing operations and after concrete has hardened sufficiently to prevent surface damage. Cover entire surface, including edges. Seal and secure laps and edges with six inches minimum overlap.
- E. Exposed surfaces of concrete shall be kept continuously moist for a minimum of 3 days.
- F. Use curing compound only where approved by the Owner. Cure formed surfaces with curing compound applied in accordance with manufacturer's directions as soon as forms are removed and finishing is completed.
- G. 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.

### 3.10 TOLERANCES

- A. Tolerances for formed and unformed surfaces shall conform to the applicable requirements of ACI 301 and as specified below:
  - 1. Variation from plumb in the lines and surfaces of walls: less than 1/2 inch in 10 feet.
  - 2. Variation of the linear structure lines from established position in plan and related position of walls: 1 inch
  - 3. Variation in the thickness and height of walls: plus or minus 1/2 inch
  - 4. Slab thickness tolerance: plus or minus 1/2 inch
  - 5. Slab Surface: Maximum gap of 1/4 inch at any point between an unlevelled 10 foot straightedge and the slab, anywhere on the slab; measure within 72 hours after slab placement.

### 3.11 JOINT SEALING

- A. Install joint sealant (including accessories) at top of all expansion joints as soon as possible after proper curing of concrete in accordance with the sealant manufacturer's recommendations.

### 3.12 REMOVAL OF FORMWORK

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads (including wind load).
- B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finished concrete surfaces scheduled for exposure to view.
- C. Store removed forms in a manner that will not damage surfaces to be in contact with fresh concrete. Do not use damaged forms.

### 3.13 CORRECTION OF DEFECTIVE WORK

- A. Concrete work that does not conform to the specified requirements, including strength, tolerances, and finishes, shall be corrected at the Contractor's expense as determined by the Owner.

- B. All finished concrete on concrete trails shall drain with no puddles or areas of standing water. Areas not draining shall be removed and reconstructed or otherwise repaired using procedures acceptable to the Owner.

**END OF SECTION 03 30 02**



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SECTION 31 10 00 - SITE CLEARING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes: tree protection; clearing and grubbing of vegetation; stripping and on-site stockpiling of topsoil; and disposal of vegetation.
- B. Related Sections:
  - 1. Section 01 57 13 – Temporary Soil Erosion and Sediment Control
  - 2. Section 02 11 20 – Tree Protection and Selective Trimming

1.02 REFERENCES

- A. ASTM International:
  - 1. ASTM A 116.11, Standard Specification for Metallic-Coated, Steel Woven Wire Fence Fabric

1.03 QUALITY ASSURANCE

- A. Conform to all applicable local codes for disposal of cleared vegetation.

1.04 PROJECT CONDITIONS

- A. Site clearing shall be performed in a manner that does not disturb existing pavement, structures, utilities, other facilities and trees not indicated to be removed.
- B. The contractor shall repair at no additional costs to the Owner any areas of existing pavement, structures, utilities, other facilities and trees not indicated to be removed which become damaged during site cleaning and any other phase during construction.

PART 2 - PRODUCTS

2.01 ALL REFERENCES TO VENDORS AND 'APPROVED MANUFACTURERS' ARE INCLUDED FOR DESCRIPTION OF QUALITY AND CONTENT OF THE DESIGNATED EQUIPMENT/MATERIALS AS BASIS OF DESIGN. EQUIVALENT ITEMS MAY BE ACCEPTED IF THEY MEET ALL STANDARDS OF QUALITY AND PURPOSE FOR THE INTENDED USE, AS DETERMINED BY CITY OF BROOKHAVEN.

2.02 TREE PROTECTION FENCING

- A. Tree protection fencing shall be orange high-visibility safety fencing, PSF-Series Plastic Safety Fence manufactured by DGI Industries. Furnish metal posts and woven wire fence backing as indicated on the Drawings and as specified below.
- B. Metal posts shall be standard steel fence T-posts, 5 feet minimum length. Furnish fence post caps.
- C. Woven wire (hog wire) shall conform to ASTM A116.11, with Class 3 coating.
- D. "Tree Save Area" signs shall be attached to tree protection fencing as indicated on plans and details. Signs shall be made of corrugated plastic, printed with exterior grade graphics and include metal grommets at four corners for attaching to fence with nylon cable ties. Signs that are damaged or removed shall be replaced within 24 hours.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Implement temporary erosion and sediment control measures prior to clearing of vegetation in accordance with the Erosion, Sedimentation and Pollution Control (ES&PC) Plan as indicated in Section 01 57 13.

3.02 TREE PROTECTION

- A. Prior to commencement of clearing activities, install tree protection fencing at the locations and alignments indicated on the Drawings or as otherwise determined by the Owner. The installed locations of temporary barrier fencing shall be approved by the Owner before clearing and other construction operations will be allowed to proceed. Maintain the fencing as required.
- B. No trucks or other equipment shall be driven or parked within the drip line of any tree, except for designated trees to be saved whose limbs overspread construction areas and as approved by the Owner.

3.03 CLEARING AND GRUBBING

- A. Cut and remove existing trees, brush, shrubs, invasive plant material and other vegetation outside the limits of tree protection fencing indicated on the Drawings and as approved by the Owner.
- B. Remove roots to a minimum depth of one foot below existing grade or one foot below the proposed subgrade elevation for construction, whichever is lower.

3.04 TOPSOIL STRIPPING, STOCKPILING, AND ON-SITE PLACEMENT

- A. Excavate and remove topsoil outside the limits of tree protection fencing to an approximate depth of 4 - 6 inches below existing grade or as otherwise determined by the Owner.
- B. All grass, root fiber, decayed vegetation matter and other organic or deleterious material shall be removed such that a sound surface which provides a stable base for construction is exposed.
- C. Stockpile the removed topsoil on-site where approved by the Owner for later placement on designated surfaces to be seeded or otherwise landscaped. Protect stockpile and adjacent surfaces from erosion as stated in the Drawings.
- D. At completion of the Work, grade all excess stockpiled topsoil on-site as approved by the Owner.

3.05 DISPOSAL OF CLEARED VEGETATION

- A. Burning of cleared vegetation will not be permitted.
- B. All cleared vegetation that is not chipped and disposed on-site shall be transported off-site and disposed in accordance with all applicable local, state and federal regulations.

**END OF SECTION 31 10 00**

SECTION 31 22 00 - GRADING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes: excavation, subgrade stabilization (if required), fill placement and grading required for paved trail.
- B. Related Sections:
  - 1. Section 01 71 23 – Construction Surveying
  - 2. Section 02 11 20 – Tree Protection and Selective Trimming
  - 3. Section 31 10 00 – Site Clearing
  - 4. Section 31 23 18 – Rock Removal
  - 5. Section 31 23 19 – Dewatering

1.02 REFERENCES

- A. ASTM International:
  - 1. ASTM D 448, Standard Classification for Sizes of Aggregate for Road and Bridge Construction
  - 2. ASTM D 1556, Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method
  - 3. ASTM D 1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort
  - 4. ASTM D 2216, Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
  - 5. ASTM D 2487, Standard Practice for Classification of Soils for Project Engineering Purposes (Unified Soil Classification System)
  - 6. ASTM D 2974, Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils
  - 7. ASTM D 4318, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
  - 8. ASTM D 4643, Standard Test Method for Determination of Water (Moisture) Content of Soil by Microwave Oven Heating
  - 9. ASTM D 4959, Standard Test Method for Determination of Water (Moisture) Content of Soil by Direct Heating
  - 10. ASTM D 6938, Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
- B. Georgia Department of Transportation

1.03 SUBMITTALS

- A. Submit the following for review prior to commencement of the work of this Section:
  - 1. Proposed source(s) of borrow material.
- B. Submit the following during work progress:
  - 1. Written reports of all specified tests showing conformance of the materials and constructed work with the Specifications. Submit test results within 5 days after samples are obtained.
- C. Submit the following at completion of the work:
  - 1. Record survey drawings of completed grading as specified in this Section.

#### 1.04 QUALITY ASSURANCE / QUALITY CONTROL

- A. Owner will retain the services of Quality Control firm(s) to determine conformance of the materials and constructed work with the Specifications.
- B. Record surveys shall be performed by the Contractor's Georgia Registered Land Surveyor as specified in this Section.
- C. Excavation, grading and preparation of subgrades for pavement and structures shall conform to the requirements of applicable GDOT standards.
- D. Work within right-of-ways for construction of entrances shall conform to the requirements of City of Brookhaven as indicated on the Drawings.

#### 1.05 PROJECT CONDITIONS

- A. Site Information
  - 1. All excavation is unclassified, unless otherwise approved by the Owner. Additional test borings and other exploratory operations may be made by the Contractor, and such activities shall be at no cost to the Owner. All excavations made during the additional exploratory operations shall be backfilled to match existing or proposed grade contours.
- B. Acceptance: Claims for additional compensation for additional work due to alleged differences between actual existing site conditions and the site conditions indicated in the Contract Documents or in the geotechnical report will not be recognized.
- C. Work shall be performed in a manner that does not disturb existing utilities, structures, trees, or other site features not indicated to be removed. Any damage to existing site features shall be repaired by the contractor and returned to existing conditions at no expense to the Owner.

### PART 2 - PRODUCTS

#### 2.01 SOURCE QUALITY CONTROL

- A. Proposed materials and source of supply shall be approved by the Owner as specified, prior to delivery.
- B. Testing of soils to be used for soil fill (for determination of acceptability of soil and for quality control during compaction) shall conform to the following at a minimum rate of one test every 10,000 cubic yards and for each visible change in material:
  - 1. Soil Classification (ASTM D 2487)
  - 2. Laboratory Moisture Content (ASTM D 2216)
  - 3. Moisture-Density Curve, modified proctor (ASTM D 1557)
  - 4. Atterberg Limits (ASTM D 4318)
  - 5. Organic Content (ASTM D 2974)

#### 2.02 STABILIZER AGGREGATE (if required)

- A. Stabilizer Aggregate shall consist of coarse aggregate with gradation conforming to size number 2 aggregate (2 ½ inch to 1 ½ inch nominal size) as defined in ASTM D 448.

## 2.03 SOIL FILL

- A. Soil Fill shall be obtained from on-site grading operations and from approved off-site borrow source(s) and shall consist of: gravels with fines (GM, GC); sands with fines (SP-SM, SP-SC, SM, SC); silts (ML); inorganic clays (CL); or blends of these materials as defined by the Unified Soil Classification System (USCS). The material shall also conform to the following material specifications:
1. Plasticity Index shall be less than 10 and liquid limit shall not be greater than 50.
  2. Material shall have less than three percent by weight fibrous, organic matter as determined by ASTM D 2974.
  3. Maximum particle size shall be two inches.
  4. Substantially free of roots, trash and other material which may be compressible or which cannot be compacted properly.

## 2.04 TOPSOIL

- A. Topsoil to be placed on graded areas to be seeded or landscaped shall be obtained from on-site stockpiles of stripped topsoil. If sufficient topsoil is not present, existing soils shall be amended, as necessary, to support specified vegetation as approved by the Owner.

## PART 3 - EXECUTION

### 3.01 BORROW SOURCE

- A. Obtain borrow material from on-site and from approved off-site borrow source(s). For soil obtained from off-site borrow source(s), the Contractor shall be responsible for obtaining any permits or approvals from authorities having jurisdiction, unless the borrow source is being operated under an existing permit. Furnish off-site borrow as part of the Base Bid.
- B. Unless otherwise provided in the Contract, the Contractor is responsible for obtaining the right to procure material, pay all required fees, and develop the sources including rights-of-way for hauling from the borrow source owner(s).

### 3.02 FIELD QUALITY CONTROL

- A. The following tests shall be performed during placement of Soil Fill:
1. In-Place Density (using ASTM D 6938 or ASTM D 1556): Minimum of one test for each lift per 5,000 square feet (or every 200 linear feet along roadway alignment).
  2. Moisture Content (using ASTM D 4643, ASTM D 4959, or ASTM D 6938): Minimum of one test for each lift per 5,000 square feet (or every 200 linear feet along roadway alignment).
  3. In-place density and moisture content testing performed using nuclear instruments shall be checked by comparison to test results using laboratory methods as specified in the following subsection 3.02.B.
- B. Calibration of Test Results:
1. If selected for compaction/density testing, the calibration of each nuclear densitometer shall be checked weekly by comparison to the density measured on the same material by the sand-cone test method (ASTM D 1556). If there is more than two pounds per cubic foot difference in density, sand-cone results will be accepted over nuclear density results, as determined by the QC Firm and approved by the Owner.
  2. At least weekly, moisture content test results shall be checked by comparison to the moisture content measured on the same material using laboratory testing in accordance with ASTM D 2216 or D 4643. If there is more than five percentage points difference in moisture content, laboratory test results will be accepted over field testing, as determined by the QC Firm and approved by the Owner.
  3. If the nuclear densitometer cannot be calibrated to match the sand-cone results, and laboratory moisture content tests, the nuclear densitometer shall not be used for measurement of the in-place density and moisture content.

C. Record Surveying

1. Surveying shall be performed to record completed grading. At a minimum, survey surface elevations shall be surveyed on a 50-foot grid pattern. Establish survey points at top and bottom of all slopes, drainage ditches, and at other required locations to define constructed grades.
2. Survey data and record drawings shall be prepared by a Georgia Registered Land Surveyor as specified in Section 01 71 23.
3. Submit 1 copy of the final signed and sealed survey and an electronic file in AutoCAD Civil 3d 2018.

3.03 PREPARATION

- A. The Contractor's surveyor shall lay out the limits and elevations for site grading. Where new grades tie into existing grades, the existing grades shall be verified by the Contractor. If existing conditions vary from the Drawings, notify the Owner before proceeding with site grading. Adjustments will be made if necessary as determined by the Owner.
- B. Protect designated trees, clear and grub vegetation, and strip topsoil as specified in Section 31 10 00.
- C. Remove existing asphalt and concrete pavement, walkways, structures and other designated facilities as indicated on the Drawings.
- D. Implement, operate and maintain a dewatering system to control groundwater for excavations below groundwater level as specified in Section 31 23 19. This work shall be included as part of the Base Bid.

3.04 EXCAVATION AND GRADING

- A. After stripping of topsoil, excavate and grade existing subgrade soils for pavement, structures, and other facilities to the elevations and limits shown on the Drawings.
- B. If rock is encountered during site grading, remove rock using methods approved by the Owner. Rock removal shall be part of the Unit Pricing.
- C. Place and compact fill as specified in subsection 3.06.
- D. Shape and compact fill with uniform levels or slopes between points where elevations are shown on the Drawings, or between such points and existing grades. The graded areas shall be shaped to be free from irregular surface changes and within the tolerance specified for the location.
- E. Unless otherwise indicated on the Drawings, grade areas adjacent to structures to achieve drainage away from the structures and to prevent ponding.

3.05 PLACEMENT OF SOIL FILL

- A. Place Soil Fill in horizontal layers not exceeding eight inches loose thickness. Place to the elevations and horizontal limits required for roadway and trail subgrade as indicated on the Drawings.
- B. All Soil Fill placed within 12 inches of the finished subgrade under roadways, parking lots, and trails shall be compacted to a minimum of 95 percent of the material's maximum dry density as determined by ASTM D 1557.
- C. Soil Fill placed outside the limits described in the above paragraph B shall be compacted to a minimum of 90 percent of the material's maximum dry density as determined by ASTM D 1557.

- D. If necessary, soil shall be moisturized or dried to the correct moisture content prior to compaction. Soils within certain areas of the Site may be above optimum moisture for compaction. The Contractor shall scarify and dry the fill soils (as part of the Base Bid) as necessary to achieve proper compaction as determined by the Owner's QC Firm. Careful planning of fill operations will be required to allow drying time for individual fill lifts.
- E. Maintain the moisture content of Soil Fill to within plus or minus three percentage points of the soil's optimum moisture content, or as otherwise determined by the Owners QC Firm.
- F. Uniformly grade Soil Fill to the required finish elevations. Shape the graded surface to be free from irregular surface changes. Tolerances for grading shall be as specified in subsection 3.07.
- G. Based on the results of surveying of the finished surface, areas that are not constructed to the required elevations shown on the Drawings, within specified tolerance, shall be adjusted to the proper elevations.
- H. Excess material that remains when finish grades are achieved shall be placed on-site where approved by the Owner or hauled off site for legal disposal.

### 3.06 GRADING TOLERANCE

- A. Finished surface within limits of pavement and structures shall not vary more than one inch above or below the required elevations.
- B. Finished surface of graded areas outside limits described in the above paragraph 3.07.A (including walkway subgrade and fill slopes) shall be graded to the elevations required within a tolerance of plus or minus 2 inches.

### 3.07 PLACEMENT OF TOPSOIL

- A. Topsoil shall not be placed until all specified quality control testing has been performed for placement of Soil Fill.
- B. Place topsoil over graded soil surface in all areas to be grassed to a depth of approximately four inches unless otherwise indicated on the Drawings and approved by the Owner
- C. Topsoil will not require compaction other than that provided by the equipment used to place the material. Shape the final surface of topsoil to be free from irregular surface changes.

### 3.08 SURFACE STABILIZATION

- A. Completed graded surfaces outside the limits of pavement and structures shall be stabilized with seeded and/or mulched as indicated on the Drawings and specified in applicable specification sections.

### 3.09 MAINTENANCE AND PROTECTION

- A. Protect graded surfaces from erosion and keep free from accumulation of debris.
- B. Damage to finished surfaces during the course of construction, such as rutting under the loads imposed by earth-moving or hauling equipment, or damage due to erosion from rainfall events, shall be fully repaired prior to placement of any overlying materials.



- C. Where completed graded areas are disturbed by subsequent construction operations or erosion, regrade to the required elevations and compact to the specified density prior to further construction. Work shall include repair and reestablishment of grades in settled, eroded, and rutted areas without any additional cost to the Project.

**END OF SECTION 31 22 00**

SECTION 31 23 18 - ROCK REMOVAL

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes excavation and removal of rock within the limits of excavations using mechanical methods or blasting methods.
- B. Related Sections:
  - 1. Section 31 22 00 – Grading

1.02 DEFINITIONS

- A. "Rock" or "Blast Rock" for Grading specified in Section 31 22 00: Material that cannot be excavated with a single-tooth ripper mounted on a crawler tractor having a minimum draw bar pull rated at not less than 56,000 pounds, and occupying an original volume of at least one cubic yard.

1.03 SUBMITTALS

- A. Submit the following prior to commencement of any rock removal work requiring blasting:
  - 1. Pre-blast structural condition survey report(s) and photographs in conformance with the requirements of paragraphs 1.04 C and D.
  - 2. Documentation that personnel performing pre-blast structural condition surveys are qualified in accordance with paragraph 1.04 C.

1.04 QUALITY ASSURANCE

- A. Work shall be performed by qualified personnel in conformance with applicable local, state and federal regulations.
- B. Rock blasting shall be performed in conformance with all applicable laws and regulations, including:
  - 1. "Georgia Blasting Standards Act of 2015" (O.C.G.A. §25-8)
  - 2. U.S. Department of Justice, Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) (27 CFR 555)
- C. Contractor shall retain the services of a qualified firm to perform pre-blast structural condition surveys to determine the general baseline condition of visible and accessible existing structures and other facilities within the defined limits of the survey. The firm shall have a minimum of 5 years documented experience in the performance of surveys of the type required for this project.
- D. The pre-blast structural condition surveys shall consist of a visual assessment and photographs of accessible portions of structures (including building exteriors, slabs, floors, walls, roofs, and exposed structural members), roads, curbing, sidewalks, utility structures, and other visible facilities to identify and document existing cracks, structural distress, wall and floor defects, and other existing structural damage. The limits of the survey shall be within 1000 feet outside the limits of rock blasting or as otherwise required by applicable regulations. Significant representative cracks shall be marked and photographed with gage marks to monitor potential future movement during the construction.
- E. Obtain permits from authorities having jurisdiction before explosives are brought to site or drilling is started.

1.05 PROJECT CONDITIONS

- A. Rock excavation shall be accomplished using mechanical methods unless otherwise approved by the Owner.

- B. The Contractor is solely responsible for excavation slope stability. Excavation work shall be in compliance with OSHA regulations.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 FIELD QUALITY CONTROL

- A. Field inspection will be performed by the Owner.
- B. Rock quantities must be verified by the Owner's QC Firm prior to payment for this work.
- C. Provide for visual inspection of rock surface and cavities formed by removed rock.

3.02 ROCK REMOVAL - MECHANICAL METHOD

- A. Excavate and remove rock by the mechanical method where possible. Drill holes and utilize expansive tools to fracture rock and remove fractured layers to required depth.
- B. For general excavation, remove rock to six inches below final subgrade or as otherwise determined by the Owner.

3.03 ROCK REMOVAL - EXPLOSIVE METHOD

- A. If rock is uncovered requiring the explosive method for rock disintegration, notify the Owner. Rock removal may be accomplished using this method only if approved by the Owner, and the requirements of the following paragraphs are met.
- B. Removal of rock using the explosive method shall comply with applicable regulations as indicated in subsection 1.03, and all other pertinent laws and regulations of agencies having jurisdiction.
- C. Disintegrate rock and remove from area or trench to required depth. Conform to the requirements of paragraphs 3.02.C for depth of rock removal.

3.04 DISPOSAL OF MATERIAL

- A. Removed rock shall be removed from the site and legally disposed of.

**END OF SECTION 31 23 18**

SECTION 31 23 19 - DEWATERING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes dewatering requirements for control of groundwater and collected surface water in excavations during construction activities.

1.02 PERFORMANCE REQUIREMENTS

- A. Contractor shall be responsible for the design, implementation and removal of temporary dewatering systems required for installation of pipes and structures, subgrade stabilization, and fill placement if groundwater is encountered as part of the Base Bid price for the associated earthwork.
- B. The extent of control of water includes, but is not limited to:
  - 1. Furnishing, installing and operating all necessary pumps, piping, and accessories.
  - 2. Removing all temporary structures and equipment after they have served their purpose.

1.03 QUALITY ASSURANCE

- A. Handling, and discharge of removed water shall comply with all applicable local, state and federal environmental laws and regulations.

1.04 PROJECT CONDITIONS

- A. Some subsurface information has been obtained and is available for review by the Contractor. Contractor is responsible for determining the character of materials, extent of groundwater or other conditions to be encountered. No warranty, either expressed or implied, is made as to the accuracy of the subsurface information presented by the Owner.

1.05 COORDINATION

- A. Dewatering shall be coordinated with other phases of the Work to comply with the approved schedule, to provide required conditions for stability of excavations, control of groundwater during excavation activities, and proper discharge of removed groundwater as specified.

PART 2 - PRODUCTS

2.01 EQUIPMENT

- A. Provide and maintain at all times proper dewatering equipment to meet the maximum requirements for the removal of water from excavations as specified.
- B. Keep on hand, or have immediate access to, additional pumps of sufficient capacity to provide reasonably for any equipment breakdown.
- C. Sufficient suction and discharge hose or piping shall be available for adequate disposal of pumped liquids without causing erosion, sedimentation or other adverse consequences.

PART 3 - EXECUTION

3.01 DEWATERING

- A. If groundwater is encountered during excavations, the groundwater surface shall be lowered to an elevation below the required excavation bottom.
- B. Operate and maintain the dewatering equipment until excavation of materials, and placement and compaction of backfill is complete.
- C. Removal of liquids shall not interfere with other work.
- D. Provide erosion and sediment control necessitated by the liquid's removal and discharge operations.

3.02 HANDLING OF LIQUIDS

- A. Water removed during dewatering operations shall be discharged on-site where approved by the Owner using suitable equipment and methods.

3.03 REMOVAL OF DEWATERING SYSTEM

- A. Deactivate and remove dewatering systems at completion of backfilling.

**END OF SECTION 31 23 19**

SECTION 31 37 00 - RIPRAP

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes furnishing and placement of riprap at storm drain outlets and at other locations as indicated on the Drawings.

1.02 REFERENCES

- A. American Association of State Highway and Transportation Officials (AASHTO):
  1. AASHTO M 288, Geotextile Specification for Highway Applications

1.03 SUBMITTALS

- A. Submit the following to the Owner, for review and approval, no later than 15 days prior to scheduled delivery of specified materials to the Site
  1. Written documentation (including gradation test results) signed by the material producer, indicating that riprap meets or exceeds the specified requirements.
  2. Manufacturer's documentation (including material properties sheet and quality control certifications) for geotextile.

PART 2 - PRODUCTS

2.01 SOURCE QUALITY CONTROL

- A. Proposed materials shall be approved by the Owner as specified, prior to delivery and use in the construction.
- B. Riprap material shall meet specified gradation prior to placement. All processing shall be completed at the source.

2.02 GEOTEXTILE

- A. As specified on City of Brookhaven Standards and GDOT Specifications.

2.03 RIPRAP

- A. Riprap shall consist of hard, angular shaped stone complying with the quality requirements of City of Brookhaven Standards and GDOT Specifications.
- B. Unless otherwise indicated on the Drawings, gradation shall comply with the requirements for Type 3 Stone-Dumped Riprap (individual stones ranging in size from approximately six to twelve inches).

PART 3 - EXECUTION

3.01 PREPARATION OF SUBGRADE

- A. Excavate, grade and compact the subgrade to the lines and elevations required for placement of riprap to the thickness indicated on City of Brookhaven Standards and GDOT Specifications so that the top surface of riprap will be at the required finish grade.

### 3.02 PLACEMENT OF GEOTEXTILE

- A. Install geotextile on graded surface prior to placement of riprap as indicated on City of Brookhaven Standards and GDOT Specifications.
- B. Subgrade shall be smooth and free of litter, sharp protrusions, and large stones prior to geotextile placement.
- C. The geotextile shall be placed loosely upon the slope so that placement of the overlying materials do not stretch or tear the fabric.
- D. Bury the upper edges of the geotextile a minimum of six inches below grade at tops of slopes. Overlap adjacent sections or rolls of geotextile down the slope. Anchor geotextile at overlaps using approved pins or staples. Overlaps shall be a minimum of one foot.

### 3.03 PLACEMENT OF RIPRAP

- A. Riprap shall be placed into a well-graded mass of stone with a minimum of voids.
- B. Placement of riprap by dumping into chutes or similar methods which are likely to cause segregation of the riprap or damage to the geotextile will not be permitted.
- C. Place riprap to its full thickness in one operation. Riprap shall not be placed in layers.
- D. Rock shall be tamped into place until the surface conforms approximately to the required grade and cross section.

**END OF SECTION 31 37 00**

SECTION 32 11 23 - AGGREGATE BASE COURSE

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes construction of aggregate base course for pavement.
- B. Related Sections:
  - 1. Section 01 71 23 - Construction Surveying
  - 2. Section 31 22 00 - Grading

1.02 REFERENCES

- A. American Association of State Highway and Transportation Officials (AASHTO):
  - 1. AASHTO T2, Standard Method of Test for Sampling of Aggregates
  - 2. AASHTO T27, Standard Method of Test for Sieve Analysis of Fine and Coarse Aggregates
  - 3. AASHTO T180, Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop
  - 4. AASHTO T191, Standard Method of Test for Density of Soil In-Place by the Sand-Cone Method
  - 5. AASHTO T224, Standard Method of Test for Coarse Particles in the Soil Compaction Test
- B. Georgia Department of Transportation
- C. City of Brookhaven Standards

1.03 SUBMITTALS

- A. Submit written certification, signed by the material producer, documenting that the proposed materials to be furnished for this Project meet or exceed the specified requirements. Submit information to the Owner for review and approval no later than 15 days upon receipt of the City issued notice to process. Owner has 15 days to review submittal, upon which as approval or rejection will be provided. If a resubmittal is required, a new 15 days review period will start the date the resubmittal is received from Contractor.
- B. Submit the following during work progress and at completion:
  - 1. Written reports of all specified tests showing conformance of the materials and constructed work with the Specifications.
  - 2. Copy of truck ticket for every load of aggregate delivered to the Site.

1.04 QUALITY ASSURANCE / QUALITY CONTROL

- A. Owner will retain the services of independent Quality Control firm(s) to determine conformance of the materials and constructed work with the Specifications.
- B. Construction of aggregate base course shall conform to the requirements of City of Brookhaven Standards and GDOT Specifications.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Aggregate materials shall be adequately protected to preserve the fitness and quality of the materials.



PART 2 - PRODUCTS

2.01 SOURCE QUALITY CONTROL

- A. Proposed materials and source of supply shall be approved by the Owner prior to delivery and use in the construction.
- B. Aggregate shall meet specified gradation prior to placement. All processing shall be completed at the source or with on-site crushers. If the aggregate, at any time, deviates from the required gradation, the Contractor shall, at his own expense, correct the inconsistency to the satisfaction of the Owner.

2.02 AGGREGATE FOR BASE COURSE

- A. Furnish Graded Aggregate Base conforming to the requirements of City of Brookhaven Standards and GDOT Specifications. Unless otherwise approved by the Owner, gradation shall be as specified for Group II Aggregates as summarized below:

Sieve Size	Percent Passing, by Weight
2 inch	100
1 1/2 inch	97 - 100
3/4 inch	60 - 90
No. 10	25 - 45
No. 60	5 - 30
No. 200	4 - 11

- B. Testing of Aggregate:
  - 1. Verification testing samples shall be taken upon delivery of aggregate to the Site, at a minimum rate of one for every 1,000 tons of material, and for each visible change in material. Sampling shall be in conformance with AASHTO T2.
  - 2. The following tests shall be performed:
    - a. Sieve analysis (using AASHTO T27 or ASTM C136)
    - b. Moisture-Density relationship (using AASHTO T180, Method C; use coarse particle correction in accordance with AASHTO T224)

PART 3 - EXECUTION

3.01 FIELD QUALITY CONTROL

- A. Tests specified below shall be performed during placement and compaction of aggregate base course:
  - 1. In-Place Density (using AASHTO T191, GDT 21 or GDT 59): Minimum of one test per lift for every 5,000 square feet of material placed, and at every material change as determined by the Owner.
  - 2. If the material is too coarse (more than about 20 percent retained on the 3/4-inch sieve) to use the above methods, proper compaction will be considered to have been reached when the surface is tightly bound and shows no detectable rutting or movement under operation of compaction equipment with a minimum of three coverages of a 5-ton roller.
- B. Surveying shall be performed by, or under the direction of, a Registered Land Surveyor in the State of Georgia as specified in Section 01 71 23.
- C. Aggregate thickness, surface elevations and uniformity of surface shall be checked during construction. Construction of subsequent asphalt concrete pavement shall not proceed until the Owner reviews survey documentation for the finished surface of aggregate base course.

### 3.02 PREPARATION

- A. Installation of storm drains and other utilities within the construction limits for pavement shall be completed as specified in applicable specification sections.
- B. Pavement subgrade construction shall be completed as specified in Section 31 22 00. Surveyor shall verify that subgrade gradients and elevations are correct before placement of aggregate base course commences.

### 3.03 AGGREGATE PLACEMENT AND COMPACTION

- A. Aggregate base course shall not be placed on soft, muddy, frozen or otherwise unsuitable subgrade. Correct unsuitable subgrade conditions as specified in Section 31 22 00.
- B. Construct aggregate base course in accordance with the applicable requirements of the City of Brookhaven Standards, GDOT Specifications and as specified in the following paragraphs.
- C. Construct aggregate base course in one uniform layer, unless otherwise approved by the Owner. The total compacted thickness shall be as indicated on the Drawings. The maximum compacted thickness of each layer shall not exceed 6 inches.
- D. Place, spread, shape, and compact aggregate as continuously as practicable during each day's operations. Place the material in a manner to avoid segregation. Uncontrolled spreading shall not be permitted.
- E. Level and contour surfaces to elevations and gradients required to achieve the finish surface grades as indicated on the Drawings.
- F. At the time aggregate is placed, it shall have a moisture content sufficient to obtain the required compaction. If necessary, uniformly apply water over the aggregate during compaction. Prevent free water from appearing on the surface during, or subsequent to, compaction operations. Compaction shall follow the spreading operation closely to prevent loss of contained moisture and displacement of material.
- G. The depth of aggregate base course and aggregate shoulders shall be carefully controlled, with periodic measurements of the loose and compacted depth.
- H. Each layer shall be compacted to a density of at least 95 percent of the material's maximum dry density as determined by AASHTO T180, with coarse particle correction in accordance with AASHTO T224.
- I. Areas of aggregate base course that do not meet the specified density requirement shall be recompacted and retested.

### 3.04 MAINTENANCE AND PROTECTION

- A. The completed aggregate base course shall be maintained smooth and uniform until covered by the subsequent stage of construction.
- B. Hauling equipment and other traffic shall not be operated on the completed aggregate base course.
- C. Damaged areas shall be repaired using methods approved by the Owner.
- D. Construct asphalt pavement as soon as possible after completion of the aggregate base course to prevent damage due to weather and mechanical disturbances.

3.05 THICKNESS AND SURFACE TOLERANCES

- A. Acceptable tolerance for thickness of aggregate base course shall be plus or minus 1/2 inch.
- B. Uniformity of the surface shall conform to the requirements of the City of Brookhaven Standards and GDOT Specifications for aggregate base course under pavement.
- C. Based on the results of surveying and other measurements, areas of aggregate base course that are not constructed to the required thickness and surface elevations, within the allowed tolerances, shall be adjusted to the proper thickness and elevations as approved by the Owner at no additional cost to the Project.

**END OF SECTION 32 11 23**

SECTION 32 92 19 - SEEDING AND MULCHING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes establishing temporary and permanent grass as part of Erosion, Sedimentation and Pollution Control (ES&PC) measures on areas disturbed by construction as indicated on the Drawings.
- B. Related Sections:
  - 1. Section 01 57 13 - Temporary Soil Erosion and Sediment Control
  - 2. Section 31 22 00 - Grading
- C. SPECIAL NOTE RELATED TO SEEDING: SEE SPECIAL PROVISIONS FOR LANGUAGE RELATED TO RELEASE OF PAYMENT AND OWNER ACCEPTANCE RELATED TO ESTABLISHMENT OF TURF IN AREAS REQUIRING SEEDING.

1.02 REFERENCES

- A. Georgia Department of Transportation

1.03 SUBMITTALS

- A. Submit the following for approval at time of shipment of materials to the Site:
  - 1. Certification of grass seed from seed vendor for each grass seed mixture stating the botanical and common name and percentage by weight of each species and variety, and percentage of purity, germination and weed seed.
  - 2. Bag tags, receipts, truck weight tickets, and other information necessary to confirm application rates and types for all seed.

1.04 QUALITY ASSURANCE / QUALITY CONTROL

- A. Contractor shall retain the services of a testing firm to perform analysis of soil samples as specified in this Section. The testing firm shall be an independent laboratory approved by the Owner and recognized by the State of Georgia Department of Agriculture, with the experience and capability to conduct the testing specified.
- B. Seeding shall be accomplished according to standard local practice and as indicated on the Drawings.
- C. SPECIAL NOTE RELATED TO SEEDING: SEE SPECIAL PROVISIONS FOR LANGUAGE RELATED TO RELEASE OF PAYMENT AND OWNER ACCEPTANCE RELATED TO ESTABLISHMENT OF TURF IN AREAS REQUIRING SEEDING.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver packaged materials in containers showing weight, analysis and name of manufacturer/supplier.
- B. Protect materials from deterioration during delivery and while stored at the Site.

1.06 PROJECT CONDITIONS

- A. Perform seedbed preparation and seeding as soon as possible after completion of grading in each area.

- B. Seeding shall be performed only during the appropriate growing season for the particular seed mix as recommended by the local agricultural extension office and approved by the Owner.

#### 1.07 MAINTENANCE SERVICE

- A. Maintenance service for establishment of grassed areas shall begin immediately after seeding, and continue until final acceptance as specified in 3.06.

### PART 2 - PRODUCTS

#### 2.01 TOPSOIL

- A. Topsoil to be placed on graded areas that require seeding shall be obtained from on-site stockpiles of stripped topsoil. The soil shall be substantially free of litter, stiff clay, stones larger than one inch in diameter, objectionable weeds, litter, brush, matted or large roots, toxic substances, or any other material which may be harmful to plant growth or hinder planting operations.

#### 2.02 FERTILIZER

- A. Fertilizer shall be a standard commercial fertilizer, in dry or liquid form, complying with City of Brookhaven Standards and Georgia Department of Transportation.
- B. The grade of fertilizer shall be as indicated on the Drawings or as otherwise determined based on soil test results and as approved by the Owner.

#### 2.03 LIME

- A. Lime shall be ground dolomitic limestone designated for agricultural use, meeting the requirements of the Georgia Department of Transportation and City of Brookhaven Standards.

#### 2.04 SEED

- A. Seed shall be fresh, clean, new-crop seed mixed in the proportions specified for species and variety, meeting the requirements of the Georgia Department of Transportation and City of Brookhaven Standards.
- B. Seed mixtures for temporary and permanent grassing shall be as indicated on the Drawings.
- C. The variety and blends of seed shall not be added, deleted or substituted unless otherwise approved by the Owner. Proposed changes to the seed mixtures shall be submitted to the Owner for approval prior to use.
- D. Seed that has become wet, moldy or otherwise damaged will not be acceptable.

#### 2.05 MULCH

- A. Mulch shall be as indicated on the Drawings.

### PART 3 - EXECUTION

#### 3.01 SOIL SAMPLING

- A. An independent testing firm shall obtain at least one sample (minimum 10-ounce sample) per acre of soil to be seeded, analyze the samples to determine amounts of nitrogen, phosphorus, potassium, and pH value in the soil, and provide recommendations on fertilizer and lime to be used.

### 3.02 PREPARATION

- A. Maintain temporary erosion and sediment control measures as specified in Section 01 57 13 until a satisfactory stand of grass has been established.
- B. Fill placement and grading shall be completed as specified in Section 31 22 00.
- C. Place topsoil in areas to be grassed or landscaped as indicated on the Drawings. Shape the final surface of topsoil to be free from irregular surface changes.
- D. Surface shall be scarified to an approximate depth of 3 inches in areas to be seeded. Remove stones and sticks, roots, rubbish and other extraneous matter.

### 3.03 SEED APPLICATION TIMES

- A. Timing for temporary seeding shall be as indicated on the Drawings.
- B. Seeding for permanent vegetation shall be performed during the first optimum planting season following completion of work in an area. Planting dates are indicated on the Drawings.

### 3.04 TEMPORARY VEGETATION

- A. Seed mixture for temporary vegetation shall be uniformly applied at the rate indicated on the Drawings.

### 3.05 APPLICATION OF SOIL AMENDMENTS

- A. Uniformly apply fertilizer and lime for permanent vegetation at the rates indicated on the Drawings or as otherwise determined based on soil test results and as approved by the Owner.

### 3.06 APPLICATION OF PERMANENT SEEDING AND MULCH

- A. Uniformly apply seed for permanent vegetation in conformance with the application rates and procedures indicated on the Drawings, unless otherwise approved by the Owner.
- B. Seed may be sown with a gravity, cyclone or hydraulic seeder, or as otherwise approved by the Owner.

### 3.07 PROTECTION OF SEEDED AREAS

- A. Immediately after seeding, protect seeded areas with mulch or erosion control matting as indicated on the Drawings and as specified in the following paragraphs.
- B. Spread mulch over all other seeded areas not requiring erosion control matting. Rate and method of application shall be as indicated on the Drawings.

### 3.08 ESTABLISHMENT OF GRASS

- A. Begin maintenance of seeded areas immediately after seed placement. Water, repair washed or eroded areas, and otherwise protect and maintain the seeded areas for a minimum of 1 month after seed placement has been completed and until date of Substantial Completion.

- B. Final acceptance of seeded areas will not be made by the Owner until a satisfactory stand of grass is obtained in all areas seeded. A satisfactory stand of grass is defined as a cover of living plants, after true leaves are formed, of the seed species applied, in which gaps larger than 6" x 6" do not occur. Bare spots shall be scattered, and the total bare areas shall not comprise more than ten percent of a 10 square foot area.
- C. During the establishment period, re-seed bare and eroded areas as determined necessary by the Owner. Repair of washed or eroded areas and re-seeding of bare areas shall be performed at no additional cost to the Project.
- D. Water required to promote a satisfactory growth shall be furnished and applied by the Contractor until final acceptance of seeded areas, and will not be measured for payment. Apply water as required to supplement rainfall to provide approximately one inch of water per week over the seeded areas.
- E. When initial maintenance period has not elapsed, or if lawn is not fully established, before the grass goes dormant, maintenance and or replanting must be done during the next planting season until established. Final payment will be delayed until final acceptance by the City.

3.09 MAINTENANCE SERVICE

- A. Initial Lawn Maintenance Service: Provide full maintenance by skilled employees of landscape installer. Maintain as required in this Section. Begin maintenance immediately after each lawn area is planted and continue until acceptable lawn is established, but for not less than the following periods.
  - 1. Seeded Lawns: 60 days from date of planting completion.
  - 2. Sprigged Lawns: 60 days from date of planting completion.

**END OF SECTION 32 92 19**

# GEOTECHNICAL ENGINEERING REPORT



## **Murphey Candler Park Nature Trail** Atlanta, Georgia

### **PREPARED FOR:**

Greenberg Farrow  
1430 West Peachtree Street NW  
Suite 200  
Atlanta, Georgia 30309

NOVA Project Number: 2019162

April 14, 2020



PROFESSIONAL | PRACTICAL | PROVEN





April 14, 2020

**GREENBERG FARROW**  
1430 West Peachtree Street  
Suite 200  
Atlanta, Georgia 30309

**Attention:** Ms. Elizabeth Cole, RLA  
Senior Project Manager

**Subject:** Geotechnical Engineering Report  
**MURPHEY CANDLER PARK NATURE TRAIL**  
Brookhaven, Georgia  
NOVA Project Number 2019162

Dear Ms. Cole:

**NOVA Engineering and Environmental, LLC (NOVA)** has completed the authorized Geotechnical Engineering Report for the Murphey Candler Park Nature Trail located in Atlanta, Georgia. Our services were performed in general accordance with NOVA Proposal Number 002-20191356, dated July 30, 2019. The report briefly discusses our understanding of the project at the time of the subsurface exploration, describes the geotechnical consulting services provided by NOVA, and presents our findings, conclusions, and recommendations.

We appreciate your selection of NOVA and the opportunity to be of service on this project. If you have any questions, or if we may be of further assistance, please do not hesitate to contact us.

Sincerely,  
**NOVA Engineering and Environmental, LLC**

Allison S. Cruz, E.I.T.  
Staff Engineer



D. L. Gilmore, P.E., LEED AP  
Senior Engineer

Copies Submitted: Addressee (electronic)

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- Appendix A – Figures and Maps
- Appendix B – Subsurface Data
- Appendix C – Qualifications of Recommendations

## 1.0 INTRODUCTION

### 1.1 PROJECT INFORMATION

Our understanding of this project is based on discussions with you on July 19, 2019, review of the provided site plans, a site reconnaissance during boring layout, and our experience with similar projects.

#### 1.1.1 Site Plans and Documents

We were furnished with the following plans and documents:

- Site Staking and Layout Plan  
Prepared by: Greenberg Farrow  
Dated: Undated
- Site Details Plan  
Prepared by: Greenberg Farrow  
Dated: Undated
- Project Estimate – Brookhaven MCP Trail  
Prepared by: Bridge Brothers  
Dated: September 5, 2018
- Pedestrian Bridge  
Prepared by: Bridge Brothers  
Dated: Undated

#### 1.1.2 Proposed Construction

The proposed construction will consist of a new nature trail with six elevated boardwalks and a pedestrian bridge over Nancy Creek. The proposed nature trail will be constructed from Fox Glen Court NE to the southwestern portion of the existing Murphey Candler Park south of West Nancy Creek Drive NE. Structural loading information was not provided to NOVA.

#### 1.1.3 Site Grading

No site grading information was available during the time of this exploration. We have assumed that cuts and fills of up to 2 feet will be required for site grading.

## 1.2 SCOPE OF EXPLORATION

Greenberg Farrow engaged NOVA to provide geotechnical engineering consulting services for the Murphey Candler Park Nature Trail. This report briefly discusses our understanding of the project, describes our exploratory procedures, and presents our findings, conclusions, and recommendations.

The primary objective of this exploration was to perform a geotechnical exploration within the area(s) of the proposed construction and to assess these findings as they relate to geotechnical aspects of the planned site development. The authorized geotechnical engineering services included a site reconnaissance, soil test borings and sampling, in-situ testing, engineering evaluation of the field data, and the preparation of this report.

The services were performed as outlined in our proposal number 002-20191356, dated July 30, 2019, and in general accordance with industry standards.

As authorized per the referenced proposal, the completed geotechnical report was to include:

- A description of the site, field and laboratory testing and general soil conditions encountered, including a Boring Location Plan and individual Boring Records.
- Discussion on potential design/construction issues indicated by the exploration, such as materials that would require difficult excavation techniques, shallow groundwater table, etc.
- Recommendations for foundation design options for the proposed bridge and boardwalks, based on loads and scour depths to be provided by Greenberg Farrow.
- Recommended quality control measures (i.e. sampling, testing, and inspection requirements) for site grading and foundation construction.

The assessment of site environmental conditions, including the detection of pollutants in the soil, rock, or groundwater, at the site was also beyond the scope of this geotechnical exploration and evaluation. NOVA can provide these services, if directed by our client.

## 2.0 SITE DESCRIPTION

### 2.1 LOCATION AND LEGAL DESCRIPTION

The approximately 8-acre site is located in Brookhaven, Dekalb County, Georgia, as part of Murphey Candler Park in the southeast quadrant of the intersection of West Nancy Creek Drive NE and Ashford Dunwoody Road. The property is mapped by the Dekalb County Tax Assessor's office as part of Parcel ID 18 326 01 041 with a total of 36.84 acres. The irregular-shaped site is bounded by Ashford Dunwoody Road to the west, residential properties to the east and south, and the Murphey Candler Baseball Fields to the northeast.

A Site Location Map and a Topographic Map depicting the location of the Subject Property and its surrounding topography are included in Appendix A (Figures 1 and 2). The latitude and longitude coordinates of the subject site are 33.907° north and 84.326° west.

### 2.2 SUBJECT PROPERTY AND VICINITY GENERAL CHARACTERISTICS

The generally irregularly shaped Subject Property is located within the Chamblee, Georgia, United States Geological Survey, 7.5-minute series topographic quadrangle map. Topographically, the Subject Property slopes downward from a high point of approximately 870 feet above mean sea level (MSL) just south of Nancy Creek to approximately 865 feet-MSL in the southwestern portion of the Subject Property in the delineated wetlands. The Subject Property includes multiple channels that feed into Nancy Creek from the north and south.

### 2.3 CURRENT USE OF THE PROPERTY

Northeast of the proposed nature trail is the existing Murphey Candler Park Baseball Field Complex with multiple ballfields, concrete pathways, concession stands, and pavilions. The subject site is southwest of Murphey Candler Park and includes the existing "Perimeter Trail", in a largely undeveloped wooded land. A Plantation/Colonial Pipeline easement extends east to west near the property's southern border, north of Fox Glen Court NE, and adjacent to the delineated wetlands. Two delineated wetlands have been identified by Ecological Solutions on the south side of Nancy Creek near the south end of the property. Perpendicular to the Colonial Pipeline running north to south between the two delineated wetlands is an approximately 10-foot wide compacted gravel-sized crushed stone trail (about 2-feet thick). A sewer easement runs south from the ballfield area. It joins an easement adjacent to Nancy Creek heading west through the property. Several abandoned wood framed shed buildings were observed along the sewer easement between stations 9+00 to 10+50.

## 3.0 FIELD AND LABORATORY PROCEDURES

### 3.1 FIELD EXPLORATION

Boring locations were established in the field by a surveying company provided by the client. Wetland and property line related adjustments of the boring locations were made at the time of the field exploration. The approximate locations are shown on Figure 3 in Appendix A. Boring elevations were interpolated from the provided Proposed Boring Plan prepared by Greenberg Farrow. The referenced boring locations and elevations are approximate.

Our field exploration was conducted during the period January to March 30<sup>th</sup>, 2020. Our proposed scope of exploration included twelve (12) machine-drilled soil test borings. At the direction of the City of Brookhaven, the soil test borings south of Nancy Creek were drilled manually by hand-auger. The final boring locations were modified from those originally proposed, with eleven (11) borings performed. The modified exploration included:

- Three (3) machine-drilled soil test borings (B-1 through B-3), performed to depths of 20 to 40 feet below the existing ground surface.
- Eight (8) hand auger soil test borings (B-4 through B-11), performed to depths of 5 to 10 feet below the existing ground surface in the southern portion of the Subject Property.

The machine-drilled soil test borings were performed using the guidelines of ASTM Designation D1586, "Penetration Test and Split-Barrel Sampling of Soils". A hollow-stem auger process was used to advance the machine-drilled borings. Hand-auger advanced borings were performed using a manual hand auger and a manual dynamic cone penetrometer, following the general procedures of ASTM STP 399-66.

The number of hammer blows required to drive the sampler at the test interval was designated the "Penetration Resistance" (Standard Penetration Test, SPT, for the machine-drilled borings and manual dynamic cone penetrometer, MDCP, for the hand-auger borings). The penetration resistance was used to estimate soil strength and consistency. Representative portions of the soil samples obtained from the sampler were placed in jars and transported to our laboratory for further evaluation.

Test Boring Records in Appendix B show the SPT or MDCP resistances and present the soil conditions encountered in the borings. These records represent our interpretation of the subsurface conditions based on the field exploration data, visual examination of the split-barrel samples, and generally accepted geotechnical engineering practices. The

stratification lines and depth designations represent approximate boundaries between various subsurface strata. Actual transitions between materials may be gradual.

**Groundwater:** The groundwater levels reported on the Test Boring Records represent measurements made at the completion of the soil test boring. Upon completion of groundwater readings, the soil test borings were subsequently backfilled with the soil cuttings.

### 3.2 LABORATORY TESTING

Laboratory testing was conducted to characterize materials existing at the site using split-barrel and hand auger samples recovered from the site. The soils were classified using the Unified Soil Classification Systems. This classification system and the in-place physical soil properties provide an index for estimating the soil's behavior. These classification descriptions are included on our "Test Boring Records".

The soil samples will be discarded 30 days following the submittal of this NOVA subsurface exploration report, unless you request otherwise.

## 4.0 SUBSURFACE CONDITIONS

### 4.1 GEOLOGY

The site is located in the Piedmont Geologic Region, a broad northeasterly trending province underlain by crystalline rocks more than 350 million years old. Numerous episodes of crystal deformation have produced varying degrees of metamorphism, folding and shearing in the underlying rock. The resulting metamorphic rock types in this area of the Piedmont are predominantly a series of Precambrian age schists and gneisses, with scattered granitic or quartzite intrusions.

According to the "Geology of the Greater Atlanta Region" by McConnell and Abrams, 1984, the site is generally underlain by the Ductilely Sheared Rocks Formation (bz), shown in Figure 4 in Appendix A. This geologic formation typically consists of undifferentiated ductilely sheared rocks in the Brevard zone including button schists (bz), mylonites in Brevard zone (bzm), and mylonite in other areas (my).

Residual soils in the region are primarily the product of in-situ chemical decomposition of the parent rock. The extent of the weathering is influenced by the mineral composition of the rock and defects such as fissures, faults and fractures. The residual profile can generally be divided into three zones:

- An upper zone near the ground surface consisting of red clays and clayey silts which have undergone the most advanced weathering,
- An intermediate zone of less weathered micaceous sandy silts and silty sands, frequently described as "saprolite", whose mineralogy, texture and banded appearance reflects the structure of the original rock, and
- A transitional zone between soil and rock, termed locally as partially weathered rock (PWR). Partially weathered rock is defined locally by standard penetration resistances exceeding 100 blows per foot.

The boundaries between zones of soil, partially weathered rock, and bedrock are erratic and poorly defined. Weathering is often more advanced next to fractures and joints that transmit water, and in mineral bands that are more susceptible to decomposition. Boulders and rock lenses are sometimes encountered within the overlying PWR or soil matrix. Consequently, significant fluctuations in depths to materials requiring difficult excavation techniques may occur over short horizontal distances.



## 4.2 SOIL AND ROCK CONDITIONS

The following paragraphs provide generalized descriptions of the subsurface profiles and soil conditions encountered by the borings conducted during this exploration.

The Test Boring Records in Appendix B should be reviewed to provide more detailed descriptions of the subsurface conditions encountered at each boring location. These records represent our interpretation of the subsurface conditions based on the field logs and visual observations of samples by an engineer. The lines designating the interface between various strata on the Boring Records represent the approximate interface locations and elevations. The actual transition between strata may be gradual. Groundwater levels shown on the Boring Records represent the conditions at the time of drilling. It should be understood that soil conditions may vary between boring locations.

### 4.2.1 Surface Materials

**Topsoil:** Approximately 2 to 6 inches of topsoil was encountered in the borings, except for boring B-11. Topsoil thickness is frequently erratic and thicker zones of topsoil should be anticipated, most notably to the north of Nancy Creek and borings around delineated wetland.

**Crushed Stone:** Gravel-sized crushed stone was encountered in boring B-11 from the ground surface to hand auger refusal of 2 feet below the existing ground surface. Gravel was also observed at the ground surface boring B-10 prior to offsetting the boring location.

### 4.2.2 Fill

Fill was encountered in borings B-1 and B-2 performed north of the drainage swale adjacent to the ballfield, from below the topsoil to six feet below the existing ground surface. The fill was described as silty/clayey sand or sandy clay, with rock fragments, organics and/or other deleterious debris. Standard penetration resistances in the fill varied from 2 to 8 blows per foot (bpf). The resistances may have been amplified by the presence of debris.

BORING NUMBER	APPROXIMATE DEPTH OF FILL (feet)	APPROXIMATE ELEVATION OF FILL (feet-MSL)
B-1	6	863
B-2	6	852

### 4.2.3 Alluvium

Alluvium (water deposited soil) was encountered in borings B-1 through B-10 as depicted in the table below. The alluvium was described as sandy clay or clayey sand.

BORING NUMBER	APPROXIMATE DEPTH (EXTENT) OF ALLUVIUM	APPROXIMATE ELEVATION OF ALLUVIUM (feet-MSL)
B-1	5-½ to 12 feet	863.5 to 857
B-2	6 to 17 feet	852.5 to 841
B-3	4 to 12 feet	865 to 856
B-4	2 inches to at least extent of boring at 7-¼ feet	870 to 862
B-5	2 inches to 7 feet	870 to 861.5
B-6	2 inches to 10 feet	869 to 859.5
B-7	2 inches to 5 feet	868 to 863.5
B-8	2 inches to 5 feet	868 to 862.5
B-9	1 inch to at least extent of boring at 6 feet	866 to 860
B-10	1 inch to at least extent of boring at 6 feet	868 to 861

### 4.2.4 Residual Soils

Residual soils were encountered in the borings beneath the topsoil, fill, or alluvium, except for boring B-11. The residuum was described as silty/clayey sand or sand clay. Machine boring standard penetration resistance values ranged from 12 to 42 bpf, but more typically varied from 16 to 32 bpf. Hand auger borings DCP penetration resistance values ranged from 1 to 20+ blows over 1-¾ inches, but more typically varied from 3 to 7.

### 4.2.5 Partially Weathered Rock

Partially weathered rock (PWR) is a transitional material between soil and the underlying parent rock that is defined locally as materials that exhibit a standard penetration resistance exceeding 100 bpf.

PWR was encountered in boring B-2 during this exploration at a depth of 18 feet below the ground surface (approximate elevations of 840 feet-MSL). Lenses of PWR were also encountered within the soil matrix in boring B-3. The following

table depicts locations, depths, and approximate elevations where PWR was encountered.

BORING NUMBER	APPROXIMATE DEPTH TO PWR (feet)	APPROXIMATE ELEVATION OF PWR (feet-MSL)
B-2	18	840
B-3*	18-23	850-845
B-3*	33-38	835-830

\*Indicates a lens of PWR

#### 4.2.6 Auger Refusal Materials

Auger refusal materials are any very hard or very dense material, frequently boulders or the upper surface of bedrock, which cannot be penetrated by a power auger

Auger refusal was not encountered in the machine drilled locations. Refusal to the hand drilled augers was encountered in 4 of 8 borings at depths ranging from 2 to 7 feet below the existing ground surface.

Hand auger refusal can be the result of rocks, roots, or dense soils and is not applicable for estimating the presence of very dense material that would require ripping or blasting for material removal.

### 4.3 GROUNDWATER CONDITIONS

#### 4.3.1 General

Groundwater in the Piedmont typically occurs as an unconfined or semi-confined aquifer condition. Recharge is provided by the infiltration of rainfall and surface water through the soil overburden. More permeable zones in the soil matrix, as well as fractures, joints and discontinuities in the underlying bedrock can affect groundwater conditions. The groundwater table in the Piedmont is expected to be a subdued replica of the original surface topography.

Groundwater levels vary with changes in season and rainfall, construction activity, surface water runoff, and other site-specific factors. Groundwater levels in the metro Atlanta area are generally lowest in the late summer-early fall and highest in the late winter-early spring, with annual groundwater fluctuations of 4 to 8 feet; consequently, the water table may vary at times.

#### **4.3.2 Soil Test Boring Groundwater Conditions**

Groundwater was observed at the time of boring, where encountered, at depths ranging from 1 to 7 feet below the existing ground surface (approximate elevations ranging from 852 to 865 feet-MSL). We note that two of the hand auger borings caved upon retrieval of the augers thus preventing groundwater measurements or hand augering to desired depths. Caved depths can be indicative of actual groundwater elevations and have been included in the Test Boring Records in Appendix B.

## 5.0 CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations are based on our understanding of the proposed construction, site observations, our evaluation and interpretation of the field data obtained during this exploration, our experience with similar subsurface conditions, and generally accepted geotechnical engineering principles and practices.

Subsurface conditions in unexplored locations or at other times may vary from those encountered at specific boring locations. If such variations are noted during construction, or if project development plans are changed, we request the opportunity to review the changes and amend our recommendations, if necessary.

### 5.1 SITE PREPARATION

#### 5.1.1 General

Wood frame structures, hand formed concrete ditches, and small walls are present on the portion of the site south of Nancy Creek. Prior to proceeding with construction, these structures, along with vegetation, root systems, topsoil, and other deleterious non-soil materials, should be stripped from proposed construction areas. Clean topsoil may be stockpiled and subsequently re-used in landscaped areas. Debris-laden materials should be excavated, transported, and disposed of off-site in accordance with appropriate solid waste rules and regulations. Existing utility, pipeline and delineated wetland locations should be reviewed to assess their impact on the proposed construction and utilities and pipelines relocated/grouted in-place as appropriate.

After clearing and stripping, areas that are at grade or will receive fill should be carefully evaluated by a NOVA geotechnical engineer. Unstable materials observed during the evaluation may need to be undercut and replaced with structural fill or stabilized in-place by scarifying and re-densifying. Actual remedial recommendations can best be determined by the geotechnical engineer in the field at the time of construction.

The site should be graded during construction to maintain positive drainage away from the construction areas, to prevent ponding of storm water on the site during and shortly following significant rain events. The construction areas should be sealed and crowned with a smooth roller to minimize ponding water from storm events at the end of each day of work.

### **5.1.2 Existing / Old Fill**

The surrounding area has been developed for more than 70 years with residential homes, parks, and utilities. Previously placed fill materials were encountered during this exploration. Based on our experience, we anticipate fill materials likely exist at other locations between our borings. Old fills associated with utilities in metro Atlanta often extend to depths of 10 to 15 feet or more and are frequently erratic in composition and consistency.

### **5.1.3 Groundwater Softened Soil**

Groundwater was encountered within three feet of the ground surface in two of the borings. However, particularly for the area south of Nancy Creek, we believe the groundwater level fluctuates with the creek levels, with the groundwater being near the ground surface after extended rain events. We anticipate that water-softened soils will impact the construction of the proposed trail loop south of Nancy Creek. For those areas, we propose that subgrade remediation/stabilization be constructed for the proposed trail alignment.

For areas south of Nancy Creek, the sidewalk paths should be stripped of topsoil/root systems and a layer of geogrid, equivalent to those manufactured by TENSAR, should then be placed on the subgrade. This will reinforce the subgrade and provide a separation zone between the stone and sidewalk base. The geogrid should be designed by TENSAR's engineers to provide a more cost-effective and efficient design. We believe a 12-inch compacted layer of ASTM #57 stone placed over the geogrid, with another layer of protective woven geotextile placed above the stone, will provide an adequate stabilization layer. TENSAR's design may differ somewhat from this. Once this stabilization layer is in place, 6-inches of compacted Graded Aggregate Base (GAB) can be placed with the sidewalk constructed on the GAB. The GAB should be compacted to at 98% of its maximum dry density by the modified Proctor method (ASTM D1557). The ASTM #57 stone should be compacted by a rolling compactor to consolidate it; there are no test methods to measure #57 stone compaction.

## **5.2 STRUCTURAL FILL PLACEMENT**

### **5.2.1 Structural Fill Suitability**

The majority of the on-site soils discussed in the previous paragraphs can be categorized as SP, SP-SM, or relatively clean to slightly silty to slightly clayey fine sands based on the Unified Soil Classification System (USCS). These relatively clean, sandy soil types are considered suitable for the use of structural fill in the building and pavement areas. Moisture contents will probably require

adjustment in order to effect maximum densification, depending upon specification requirements.

Materials to be used for backfill or compacted fill construction should be evaluated and, if necessary, tested by NOVA prior to placement to determine if they are suitable for the intended use. In general, based upon the boring results, the near surface sands such as those encountered in the borings can be used as a structural fill as well as general subgrade fill and backfill, provided that the fill material is free of rubble, clay, rock, roots and organics. Any off-site materials used as fill should be approved by NOVA prior to acquisition.

Organic and/or debris-laden material is not suitable for re-use as structural fill. Topsoil, mulch, and similar organic materials can be wasted in architectural areas. Debris-laden materials should be excavated, transported, and disposed of off-site in accordance with appropriate solid waste rules and regulations.

### **5.2.2 Soil Compaction**

Fill should be placed in thin, horizontal loose lifts (maximum 8-inch) and compacted to at least 95 percent of the Standard Proctor Maximum Dry Density (SPMDD-ASTM D698). The upper 8 inches of soil beneath pavements and slab-on-grade should be compacted to at least 98 percent of the SPMDD. In confined areas, such as utility trenches or behind retaining walls, portable compaction equipment and thinner fill lifts (3 to 4 inches) may be necessary. Fill materials used in structural areas should have a target maximum dry density of at least 95 pounds per cubic foot (pcf). If lighter weight fill materials are used, the NOVA geotechnical engineer should be consulted to assess the impact on design recommendations.

Soil moisture content should be maintained within 3 percent of the optimum moisture content. We recommend that the grading contractor have equipment on site during earthwork for both drying and wetting fill soils. Moisture control may be difficult during rainy weather. ***Soils excavated from below the groundwater table will likely require significant efforts to achieve acceptable moisture contents prior to re-use as fill.***

Filling operations should be observed by a NOVA soils technician, who can confirm suitability of material used and uniformity and appropriateness of compaction efforts. The technician can also document compliance with the specifications by performing field density tests using the drive cylinder, nuclear, or sand cone testing methods (ASTM D2937, D6938, or D1556, respectively). One test per 400 cubic yards and every 2 feet of placed fill is recommended,

with test locations well distributed throughout the fill mass. When filling in small areas, at least one test per day per area should be performed.

## 5.3 GROUNDWATER CONTROL

### 5.3.1 General

Based on the planned finished boardwalk elevation and anticipated site subgrade levels, we do not anticipate significant groundwater control problems during mass grading north of Nancy Creek and areas not located around the delineated wetlands.

However, groundwater was observed in the southern portion of the site at elevations of 862 to 865 feet-MSL, approximately 1 to 3 feet above anticipated site subgrade levels. Consequently, temporary dewatering measures may be required in these areas for foundation and utility construction.

As previously noted, groundwater levels are subject to seasonal, climatic and other variations and may be different at other times and locations. The extent and nature of any dewatering required during construction will be dependent on the actual groundwater conditions prevalent at the time of construction and the effectiveness of construction drainage to prevent run-off into open excavations. If possible, the construction activities should be scheduled for the drier parts of the year, typically late summer/early fall, to limit construction costs due to saturated soils.

### 5.3.2 Temporary Dewatering

Design of a temporary dewatering system is usually the responsibility of the contractor. However, based on our experience with similar conditions, and in consideration of the excavation depths below the groundwater table (<5 feet), we believe a conventional construction dewatering system of trenches, sumps, and pumps should be possible to control both groundwater and rainfall runoff.

## 5.4 FOUNDATIONS

### 5.4.1 Bridge and Walking Deck Foundations

The soils encountered by the soil test borings are not stiff enough to support bridges or walking decks with spread footing foundation types, unless those foundations were to bear 15 to 25 feet below the existing ground surface. In the area south of Nancy Creek, deeper excavations could be required as we have no data below 10 feet due to the drilling limitations. To attain those



depths, extensive excavations would be required along with groundwater pumping. If the design team wishes to use spread footings, the excavation bottoms will need to be observed and tested by the geotechnical engineer to verify that adequate bearing is present. If spread footings are used, those that bear on the deep very stiff or dense residual soils may be designed with a design bearing pressure of 4,000 psf.

Foundation excavations should be evaluated by the NOVA geotechnical engineer prior to reinforcing steel placement to observe foundation subgrade preparation and confirm bearing pressure capacity.

Foundation excavations should be level and free of debris, ponded water, mud, and loose, frozen or water-softened soils. Concrete should be placed as soon as is practical after the foundation is excavated and the subgrade evaluated. Foundation concrete should not be placed on frozen or saturated soil. If a foundation excavation remains open overnight, or if rain or snow is imminent, a 3 to 4-inch thick "mud mat" of lean concrete should be placed in the bottom of the foundation to protect the bearing soils until reinforcing steel and concrete can be placed.

#### **5.4.2 Helical Piers**

We believe the most cost-effective and time-efficient foundation for the planned Pedestrian Bridges and walking decks will be Helical Piers, extended to adequate depths (likely 15 to 30 feet) to support planned loads. The Helical Piers will limit differential settlement between bridge/deck bents and will provide uplift capacities.

A helical pier is a segmented deep foundation system with helical bearing plates welded to a central shaft. Load is transferred from the shaft to the soil through these bearing plates. As a result of their helical shape, the helices do not auger into the soil, but rather screw into it with minimal disturbance. Helical pier sections typically consist of square or hollow shaft piers and anchors, or a combination of the two. The square shaft typically ranges in size from 1½ to 3 inches, whereas the hollow shaft typically ranges in size from 2¾ to 3½ inches in diameter.

The actual design pressure and settlement criteria is provided by the specialty design/builder. However, typical ultimate design capacities of 50 to 200 kips can be achieved with the square shaft helical pier and an ultimate capacity of 60 to 75 kips can be achieved with the hollow shaft helical pier system.

If a helical pier system is desired, NOVA can provide further geotechnical assistance for support of the foundations. Additionally, because Helical Pier systems are a proprietary design-build foundation system, the design and installation would be performed by a specialty design/build contractor. NOVA requests the opportunity to review the design parameters, including the anticipated Helical Pier embedment depths, once the specialty subcontractor is selected.

#### **5.4.3 Shallow Foundations for Pedestrian Bridge on Rammed Aggregate Piers**

As an alternate, in consideration of the moderate loads anticipated for the Pedestrian Bridge, the bridge may be supported by conventional shallow foundations bearing on an improved subgrade that has been remediated by the installation of a rammed aggregate pier (RAP) system. The RAP system will improve the density of the underlying residual soil and help reduce differential settlements. Please note that RAP systems are typically designed for approximately 1 inch of settlement.

Two types of RAP systems are commonly used in the Atlanta area: Vibro-Replacement and Geopiers®. Both systems typically result in design bearing pressures of 5 to 7 ksf (usually 6 ksf).

Both Vibro-Replacement and Geopiers® are proprietary design/build systems. A load test in accordance with ASTM specifications should be performed by the specialty contractor (under the observation of a NOVA engineer) on one RAP element (stone column) to confirm the load carrying capacity. RAP systems can also be designed to resist relatively light uplift loads.

Although RAPs are a proprietary design-build foundation system, NOVA requests the opportunity to review the design parameters, including the anticipated RAP embedment depths, once the specialty subcontractor is selected

**Vibro-Replacement:** The Vibro-Replacement system is a ground improvement technique performed by the Hayward Baker company that constructs stone columns in the subsurface soils. The stone columns provide a stiff, non-liquefiable inclusion in the loose fill zones, improve the subgrade support capacity for foundation loads, and provide drainage elements for the rapid drainage of excess pore water pressures that result from seismic events.

Two methods of Vibro-Replacement installation are available: the “wet, top-feed method” or the “dry bottom-feed method”. The wet top-feed method is the most commonly used, and least expensive, Vibro-Replacement technique. This method typically uses jetted water to remove soft material and stabilize the probe

hole so that the stone backfill, which is placed in the top of the cavity, reaches the bottom of the hole. Two horizontal counter rotating eccentric weights within the probe densify the surrounding soil and stone. However, this method creates both saturated soil spoils and large volumes of water that must be handled at the ground surface.

Due to the large quantity of water used in the wet top-feed method, this approach may raise the groundwater several feet. In addition to the obvious difficulties with foundation and utility excavations, as well as the challenges of water and spoils management and disposal, if the groundwater is raised, subgrade stability problems (“pumping”) may be experienced.

The dry bottom-feed method typically utilizes a soil auger to excavate the probe hole. Once the auger is removed, the vibrating probe is then inserted to the bottom of the augered hole, and the bottom is densified prior to the placement of aggregate. The aggregate is applied in the hole around the vibrating probe, which is raised and lowered incrementally during the application of aggregate to densify the aggregate and surrounding soils. The dry bottom-feed method typically requires soil that is stable enough to support the initial drilling of the open probe hole.

The installation of several Vibro-Replacement stone columns prior to construction should help evaluate these potential impacts and assess whether the “dry bottom-feed method” of Vibro-Replacement is more applicable to this site.

**Geopier®:** Geopiers® are similar to Vibro-Replacement as the final constructed product consists of stone columns. Consequently, we anticipate similar performance between Vibro-Replacement and Geopiers® in improving foundation support.

The Geopier® System creates a cavity in the soil by either pre-drilling to a predetermined level (using a steel casing in soft soils and high groundwater conditions), or by pushing/driving a mandrel to the designated level. Stone placed in the casing or through the mandrel is then driven vertically with an angled tamper foot to compact the stone, as well as to force the stone laterally into the cavity sidewalls.

The mandrel method displaces the soil into the sidewalls of the hole; therefore, minimal soil spoil is generated. Neither the drilled method nor the mandrel method injects water into the subsurface as part of the installation process; consequently, we do not anticipate Geopier® construction will have a significant impact to the groundwater levels.

## 5.5 PAVED TRAILS

We have assumed that the trails will be constructed with a hard surface to accommodate handicap access. We have also assumed that no truck traffic or motor vehicle traffic will be allowed on the trails, with the exception of equipment such as golf carts or 4 wheeled all-terrain utility vehicles such as John Deere Gators or Polaris UTVs.

It is important that the client and end-user understand that pavement performance requires annual maintenance, including repair of damaged areas, monitoring and sealing of cracks, and to provide adequate drainage for the life of the pavement. In particular, trails such as these, that are located in wooded areas can be damaged by root systems and plants that grow through the pavement if the trails are not diligently maintained.

The recommended section thicknesses are based on the subgrade being prepared as recommended in Section 5.1.3 “Groundwater Softened Soil” of this report.

Trail Section	Thickness
<p><b><u>Flexible Pavement:</u></b></p> <p>12.5mm GDOT Superpave OR</p>	2 inches
<p><b><u>Rigid Pavement:</u></b></p> <p><b>Jointed Portland Cement Concrete</b> <i>With sawcut or manufactured full-width expansion joints every 8 feet, sawcut joints at least 1-1/2 inches deep, sawn as soon as practical and no later than 6 hours after placement, with the appropriate curing compound placed to limit plastic shrinkage.</i></p>	4 inches
<p><b>Graded Aggregate Base (GAB) REQUIRED for FLEXIBLE OR RIGID</b> <i>From an approved GDOT source</i></p>	6 inches

We recommend a minimum compaction of 98 percent of the maximum dry density for the Graded Aggregate Base (GAB) determined by the modified Proctor test (ASTM D1557). The crushed stone should conform to applicable sections of the current GDOT Standard Specifications. A NOVA technician should observe placement and perform density testing of the base course material and asphalt.

## 6.0 CONSTRUCTION OBSERVATIONS

### 6.1 SHALLOW FOUNDATIONS

Foundation excavations should be level and free of debris, ponded water, mud, and loose, frozen or water-softened soils. All foundation excavations should be evaluated by the NOVA geotechnical engineer prior to reinforcing steel placement to observe foundation subgrade preparation and confirm bearing pressure capacity. Due to variable site subsurface and construction conditions, some adjustments in isolated foundation bearing pressures, depth of foundations or undercutting and replacement with controlled structural fill may be necessary.

### 6.2 HELICAL PILE FOUNDATIONS

Installation of all helical pile foundation elements should be observed and documented by a NOVA engineer. Subsequent foundation excavations should be level and free of debris, ponded water, mud, and loose, frozen or water-softened soils.

### 6.3 RAP FOUNDATIONS

Installation of all rammed aggregate pier foundation (RAP) elements should be observed and documented by a NOVA engineer. Subsequent foundation excavations should be level and free of debris, ponded water, mud, and loose, frozen or water-softened soils.

### 6.4 SUBGRADE

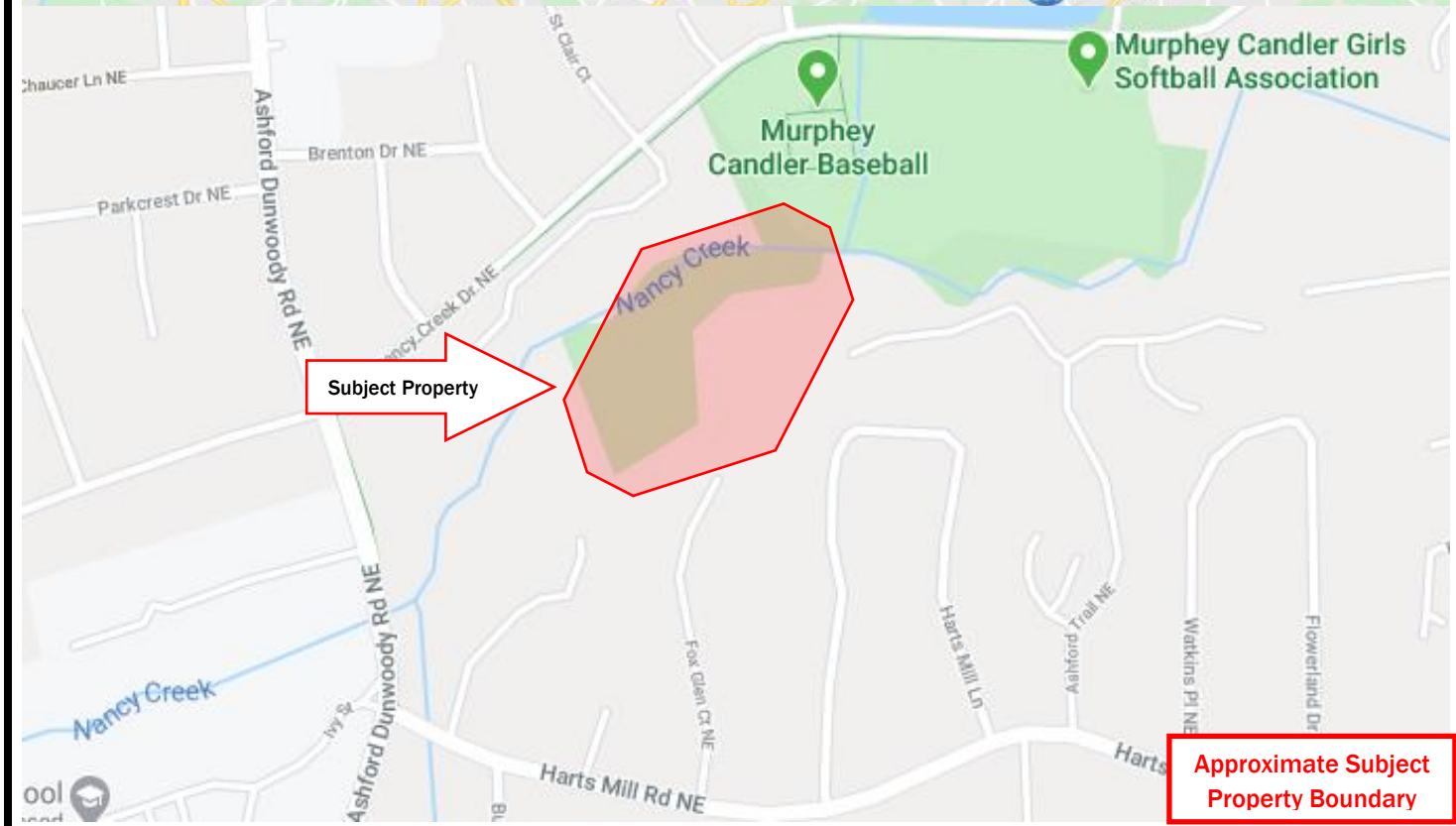
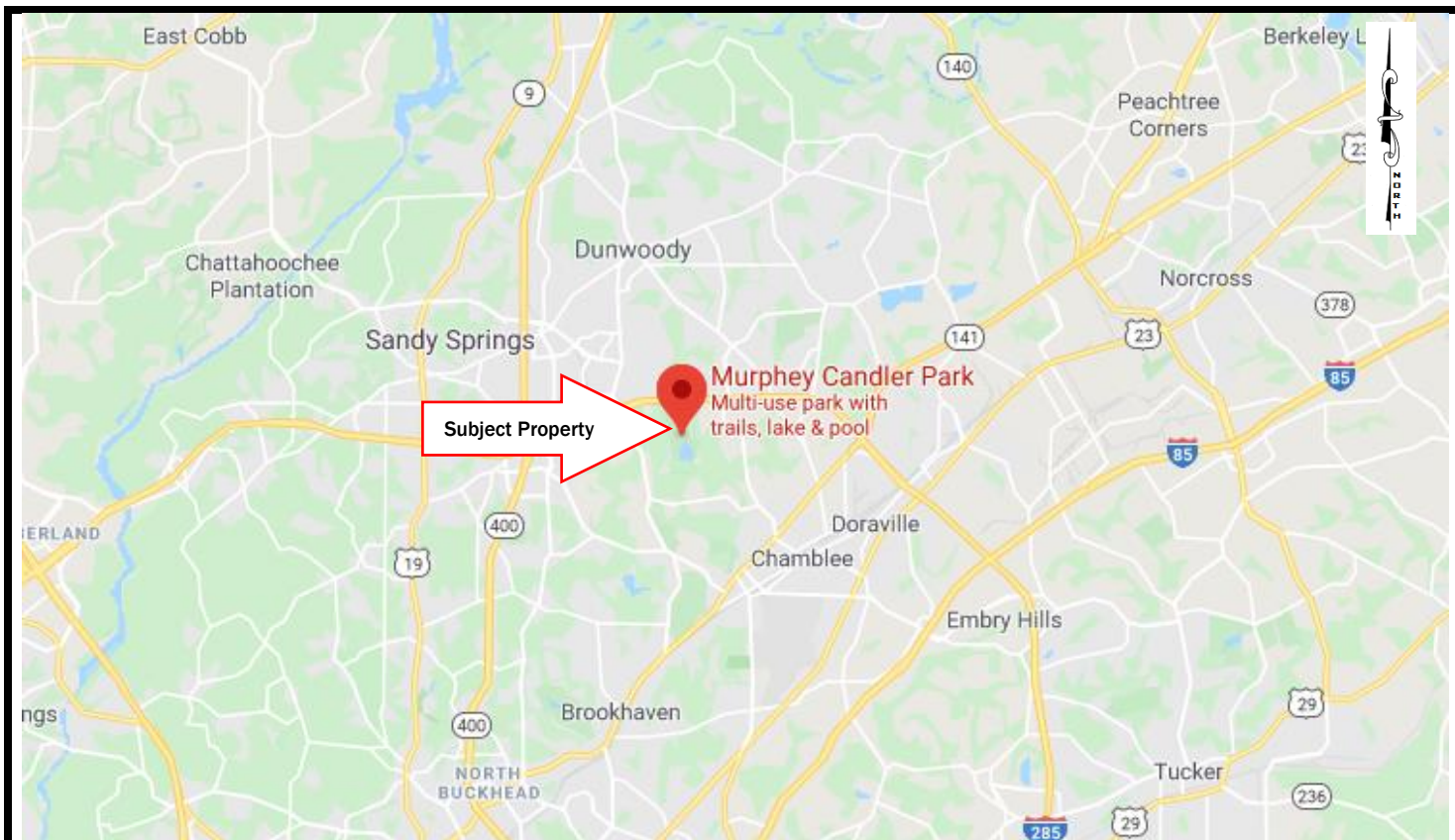
Once site grading is completed, the subgrade may be exposed to adverse construction activities and weather conditions. The subgrade should be well-drained to prevent the accumulation of water. If the exposed subgrade becomes saturated or frozen, the NOVA geotechnical engineer should be consulted.

A final subgrade evaluation should be performed by the NOVA geotechnical engineer immediately prior to pavements or slab-on-grade placement. If practical, proofrolling may be used to re-densify the surface and to detect any soil, which has become excessively wet or otherwise loosened.

# **APPENDIX A**

## **Figures and Maps**



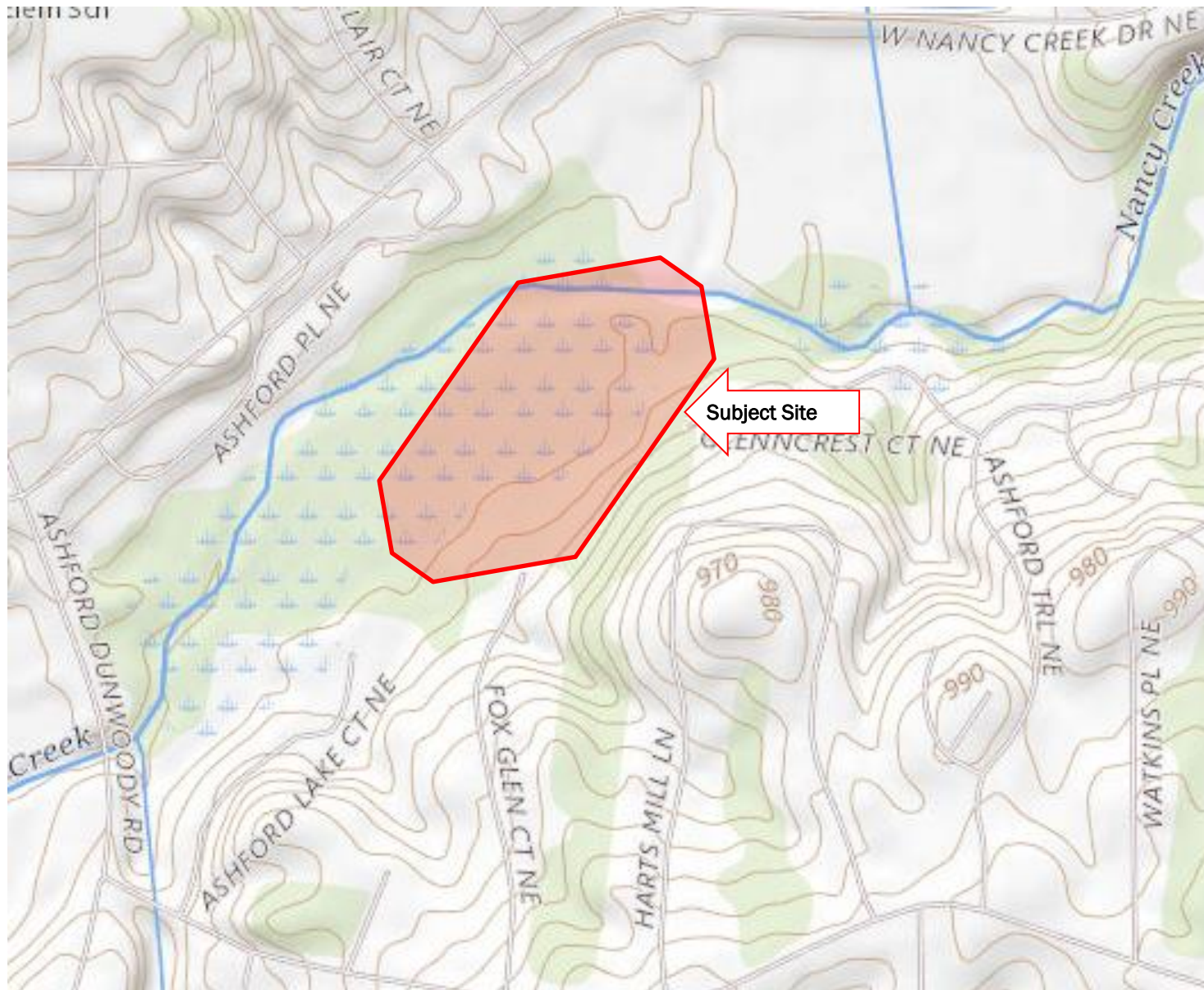


**FIGURE 1  
SITE LOCATION MAP**

SOURCE: Google Maps  
DATE: Accessed 4/6/20  
SCALES: As Shown



**GREENBERG FARROW**  
Murphey Candler Park Nature Trail  
Brookhaven, Georgia  
NOVA Project Number 2019162

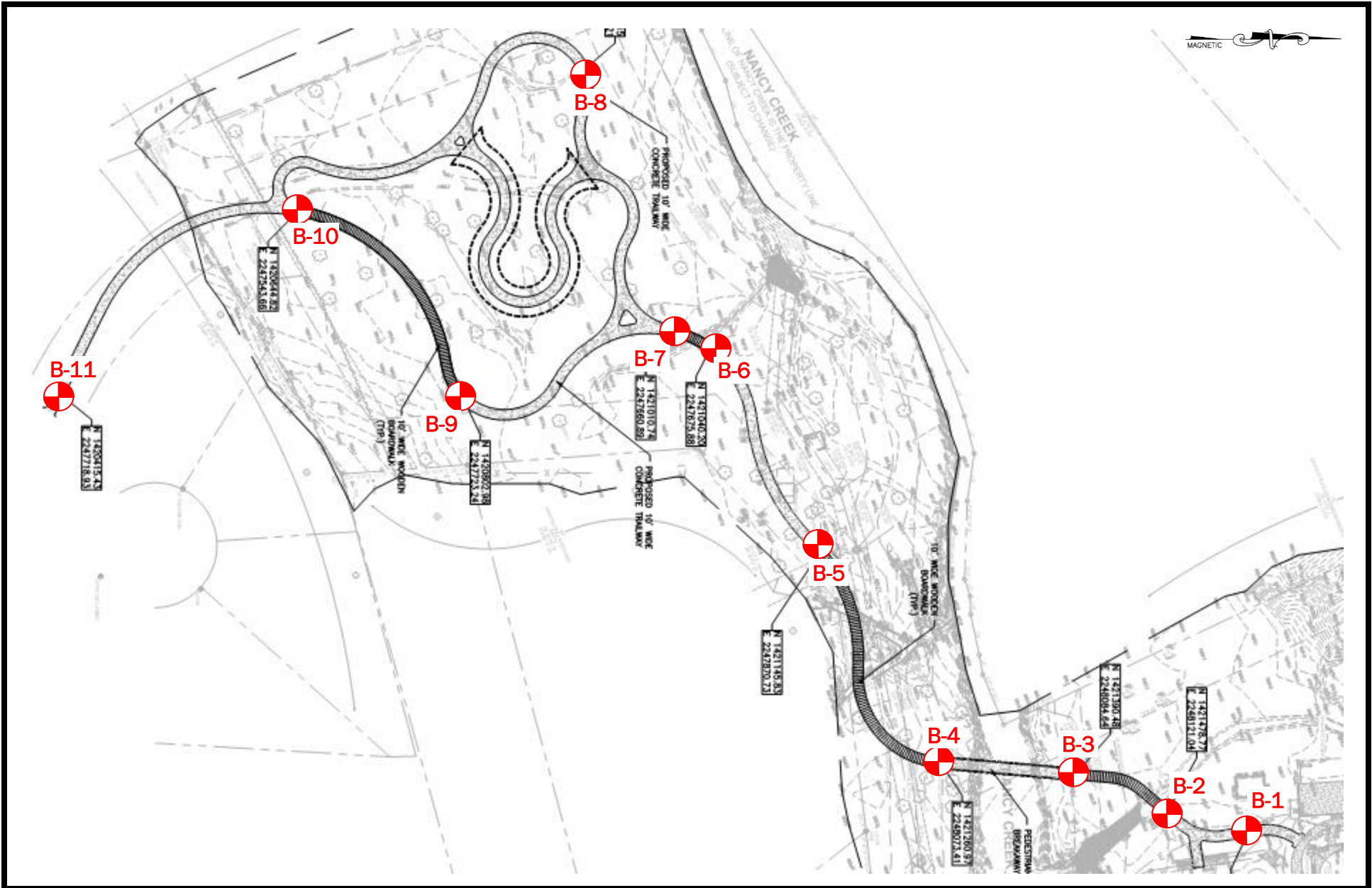


**FIGURE 2**  
**TOPOGRAPHIC MAP**  
 SOURCE: USGS Topography Map



**GREENBERG FARROW**  
 Murphey Candler Park Nature Trail  
 Brookhaven, Georgia  
 NOVA Project Number 2019162





**FIGURE 3**  
**BORING LOCATION PLAN**  
 SOURCE: Client-Provided Plan



**GREENBERG FARROW**  
 Murphey Candler Park Nature Trail  
 Brookhaven, Georgia  
 NOVA Project Number 2019162



my  
bz  
bzm

**Ductilely sheared rocks:** includes undifferentiated ductilely sheared rocks in the Brevard zone including button schists (bz), mylonites in the Brevard zone (bzm), and mylonite in other areas (my).

**FIGURE 4**  
**REGIONAL GEOLOGY**  
SOURCE: McConnell and Abrams, 1984



**GREENBERG FARROW**  
Murphey Candler Park Nature Trail  
Brookhaven, Georgia  
NOVA Project Number 2019162

# **APPENDIX B**

## **Subsurface Data**

# KEY TO SYMBOLS AND CLASSIFICATIONS

## DRILLING SYMBOLS

	Split Spoon Sample
	Undisturbed Sample (UD)
	Standard Penetration Resistance (ASTM D1586-67)
	Water Table at least 24 Hours after Drilling
	Water Table 1 Hour or less after Drilling
100/2"	Number of Blows (100) to Drive the Spoon a Number of Inches (2)
NX, NQ	Core Barrel Sizes: 2½- and 2-Inch Diameter Rock Core, Respectively
REC	Percentage of Rock Core Recovered
RQD	Rock Quality Designation – Percentage of Recovered Core Segments 4 or more Inches Long
	Loss of Drilling Water
MC	Moisture Content Test Performed

## CORRELATION OF PENETRATION RESISTANCE WITH RELATIVE DENSITY AND CONSISTENCY

	<u>Number of Blows, "N"</u>	<u>Approximate Relative Density</u>
SANDS	0 – 4	Very Loose
	5 – 10	Loose
	11 – 30	Medium Dense
	31 – 50	Dense
	Over 50	Very Dense
	<u>Number of Blows, "N"</u>	<u>Approximate Consistency</u>
SILTS and CLAYS	0 – 2	Very Soft
	3 – 4	Soft
	5 – 8	Firm
	9 – 15	Stiff
	16 – 30	Very Stiff
	31 – 50	Hard
	Over 50	Very Hard

## DRILLING PROCEDURES

Soil sampling and standard penetration testing performed in accordance with ASTM D1586-67. The standard penetration resistance is the number of blows of a 140 pound hammer falling 30 inches to drive a 2-inch O.D., 1½-inch I.D. split spoon sampler one foot. Core drilling performed in accordance with ASTM D2113-08. The undisturbed sampling procedure is described by ASTM D1587-08 (2012). Unless other arrangements are made, NOVA will dispose of all soil and rock samples remaining at the time of report completion.

### SOIL CLASSIFICATION CHART

<b>COARSE GRAINED SOILS</b>	<b>GRAVELS</b>	Clean Gravel less than 5% fines	GW	Well graded gravel
			GP	Poorly graded gravel
		Gravels with Fines more than 12% fines	GM	Silty gravel
			GC	Clayey gravel
	<b>SANDS</b>	Clean Sand less than 5% fines	SW	Well graded sand
			SP	Poorly graded sand
Sands with Fines more than 12% fines		SM	Silty sand	
		SC	Clayey sand	
<b>FINE GRAINED SOILS</b>	<b>SILTS AND CLAYS</b> Liquid Limit less than 50	Inorganic	CL	Lean clay
			ML	Silt
		Organic	OL	Organic clay and silt
			<b>SILTS AND CLAYS</b> Liquid Limit 50 or more	Inorganic
	MH	Elastic silt		
	Organic	OH		Organic clay and silt
<b>HIGHLY ORGANIC SOILS</b>				PT

### PARTICLE SIZE IDENTIFICATION

GRAVELS	Coarse	¾ inch to 3 inches
	Fine	No. 4 to ¾ inch
SANDS	Coarse	No. 10 to No. 4
	Medium	No. 40 to No. 10
	Fine	No. 200 to No. 40
SILTS AND CLAYS		Passing No. 200





**TEST BORING  
RECORD  
B-1**

PROJECT: Murphey Candler Park Nature Trail PROJECT NO.: 2019162  
 CLIENT: Greenberg Farrow  
 PROJECT LOCATION: Murphey Candler Park  
 LOCATION: STA 16+75 North of Nancy Creek ELEVATION: 869 ft-MSL  
 DRILLER: Premier Drilling, LLC. LOGGED BY: T. Schrama  
 DRILLING METHOD: Hollow Stem Auger (HSA) DATE: 4/1/2020  
 DEPTH TO - WATER> INITIAL:  $\nabla$  5' AFTER 24 HOURS:  $\nabla$  N/M CAVING> C N/E

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Depth (feet)	Elevation (ft-MSL)	Description	Graphic	Groundwater	Sample Type	N-Value	Graphic Depiction						
							BLOW COUNT	NATURAL MOISTURE	PLASTIC LIMIT	LIQUID LIMIT			
0		TOPSOIL: 6 inches											
		FILL: Loose brown red clayey medium to fine SAND											
	865	Very loose brown gray black silty fine SAND											
5		ALLUVIUM: Very soft gray fine sandy CLAY											
	860	ALLUVIUM: Loose gray clayey fine SAND											
10		RESIDUUM: Medium dense brown tan silty coarse to fine SAND with trace rock fragments											
15	855	RESIDUUM: Very stiff tan brown fine sandy CLAY											
20	850	Boring Terminated at 20 ft.											
	845												
	840												
	835												
35													



# TEST BORING RECORD B-2

PROJECT: Murphey Candler Park Nature Trail PROJECT NO.: 2019162  
 CLIENT: Greenberg Farrow  
 PROJECT LOCATION: Murphey Candler Park  
 LOCATION: STA 16+00 North of Nancy Creek ELEVATION: 858 ft-MSL  
 DRILLER: Premier Drilling, LLC. LOGGED BY: T. Schrama  
 DRILLING METHOD: Hollow Stem Auger (HSA) DATE: 4/1/2020  
 DEPTH TO - WATER> INITIAL: 6' AFTER 24 HOURS: N/M CAVING> C N/E

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Depth (feet)	Elevation (ft-MSL)	Description	Graphic	Groundwater	Sample Type	N-Value	Graphic Depiction															
							● BLOW COUNT	▲ NATURAL MOISTURE	PLASTIC LIMIT					LIQUID LIMIT								
0		TOPSOIL: 6 inches																				
		FILL: Firm red brown medium to fine sandy CLAY				8	●															
855		FILL: Very loose brown tan black silty fine SAND with trace root fragments				2	●															
5		ALLUVIUM: Very loose to loose gray silty coarse to fine SAND				2	●															
850	2					●																
10	4					●																
845		PARTIALLY WEATHERED ROCK: Sampled as very dense orange tan brown silty fine SAND				5	●															
15	100/6"																					
840		Boring Terminated at 20 ft.																		●		
20																						
835																						
25																						
830																						
30																						
825																						
35																						



**TEST BORING  
RECORD  
B-3**

PROJECT: Murphey Candler Park Nature Trail PROJECT NO.: 2019162  
 CLIENT: Greenberg Farrow  
 PROJECT LOCATION: Murphey Candler Park  
 LOCATION: STA: 15+00 North of Nancy Creek ELEVATION: 868 ft-MSL  
 DRILLER: Premier Drilling, LLC. LOGGED BY: T. Schrama  
 DRILLING METHOD: Hollow Stem Auger (HSA) DATE: 4/1/2020  
 DEPTH TO - WATER> INITIAL: 5' AFTER 24 HOURS: N/M CAVING> C N/E

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Depth (feet)	Elevation (ft-MSL)	Description	Graphic	Groundwater	Sample Type	N-Value	Graphic Depiction													
							● BLOW COUNT	▲ NATURAL MOISTURE	PLASTIC LIMIT					LIQUID LIMIT						
0		TOPSOIL: 6 inches																		
		FILL: Loose brown silty fine SAND with few rock fragments				8														
865		ALLUVIUM: Very loose clayey fine SAND with trace organics				4														
5		No Recovery				WOH														
860		ALLUVIUM: Very stiff brown fine sandy CLAY				WOH														
10		RESIDUUM: Dense gray white silty coarse to fine SAND with few rock fragments				33														
15		PARTIALLY WEATHERED ROCK: Sampled as very hard orange tan brown fine sandy CLAY				100/6"														
850		RESIDUUM: Dense tan brown clayey fine SAND				33														
25		Dense orange brown black silty fine SAND				42														
840		PARTIALLY WEATHERED ROCK: Sampled as very dense orange brown black silty medium to fine SAND with trace mica				100/10"														
35																				





**TEST BORING  
RECORD  
B-3**

PROJECT: Murphey Candler Park Nature Trail PROJECT NO.: 2019162  
 CLIENT: Greenberg Farrow  
 PROJECT LOCATION: Murphey Candler Park  
 LOCATION: STA: 15+00 North of Nancy Creek ELEVATION: 868 ft-MSL  
 DRILLER: Premier Drilling, LLC. LOGGED BY: T. Schrama  
 DRILLING METHOD: Hollow Stem Auger (HSA) DATE: 4/1/2020  
 DEPTH TO - WATER> INITIAL: 5' AFTER 24 HOURS: N/M CAVING> C N/E

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Depth (feet)	Elevation (ft-MSL)	Description	Graphic	Groundwater	Sample Type	N-Value	Graphic Depiction													
							● BLOW COUNT ▲ NATURAL MOISTURE PLASTIC LIMIT   LIQUID LIMIT 10 20 30 40 60 100													
830		PARTIALLY WEATHERED ROCK: Sampled as very dense orange brown black silty medium to fine SAND with trace mica																		
40		RESIDUUM: Dense black brown silty fine SAND			▲	31														
		Boring Terminated at 40 ft.																		
825																				
45																				
820																				
50																				
815																				
55																				
810																				
60																				
805																				
65																				
800																				
70																				

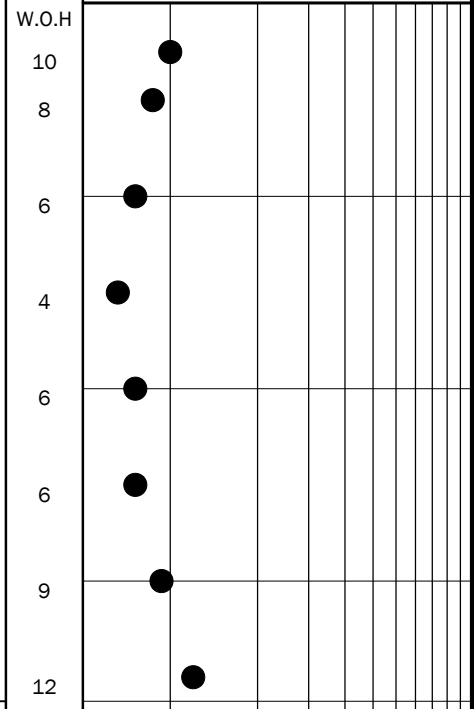
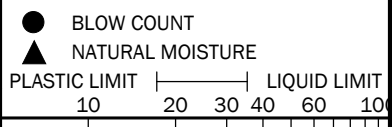


**TEST BORING  
RECORD  
B-4**

PROJECT: Murphey Candler Park Nature Trail PROJECT NO.: 2019162  
 CLIENT: Greenberg Farrow  
 PROJECT LOCATION: Murphey Candler Park  
 LOCATION: STA 13+50 South of Nancy Creek ELEVATION: 869 ft-MLS  
 DRILLER: NOVA LOGGED BY: T. Schrama  
 DRILLING METHOD: Hand Auger Boring (HA) DATE: 3/27/2020  
 DEPTH TO - WATER> INITIAL: ∅ N/E AFTER 24 HOURS: ∅ N/M CAVING> C N/E

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Depth (feet)	Elevation (ft-MSL)	Description	Graphic	Groundwater	Sample Type	N-Value	Graphic Depiction	
							PLASTIC LIMIT	LIQUID LIMIT
0		TOPSOIL: 2 inches						
		ALLUVIUM: Brown silty fine SAND						
868								
2								
866								
4								
864								
6								
862		Tan brown silty medium to fine SAND						
		Auger Refusal at 7.25 ft.						
8								
860								
10								
858								
12								
856								
14								





**TEST BORING  
RECORD  
B-5**

PROJECT: Murphey Candler Park Nature Trail PROJECT NO.: 2019162  
 CLIENT: Greenberg Farrow  
 PROJECT LOCATION: Murphey Candler Park  
 LOCATION: STA 11+00 South of Nancy Creek ELEVATION: 869 ft-MLS  
 DRILLER: NOVA LOGGED BY: T. Schrama  
 DRILLING METHOD: Hand Auger Boring (HA) DATE: 3/27/2020  
 DEPTH TO - WATER> INITIAL: 7' AFTER 24 HOURS: N/M CAVING> C

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Depth (feet)	Elevation (ft-MSL)	Description	Graphic	Groundwater	Sample Type	N-Value	Graphic Depiction	
							● BLOW COUNT	▲ NATURAL MOISTURE
0		TOPSOIL: 2 inches					PLASTIC LIMIT	LIQUID LIMIT
		ALLUVIUM: Tan brown silty fine SAND					10	20 30 40 60 100
868						3		
2						7		
						8		
866						10		
4						6		
						8		
864						6		
6						7		
						7		
862						6		
8		RESIDUUM: Red orange clayey coarse to fine SAND with trace rock fragments				7		
						7		
860						3		
10		Boring Terminated at 10 ft.				5		
858								
12								
856								
14								

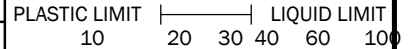


**TEST BORING  
RECORD  
B-6**

PROJECT: Murphey Candler Park Nature Trail PROJECT NO.: 2019162  
 CLIENT: Greenberg Farrow  
 PROJECT LOCATION: Murphey Candler Park  
 LOCATION: STA 8+75 South of Nancy Creek ELEVATION: 869 ft-MLS  
 DRILLER: NOVA LOGGED BY: T. Schrama  
 DRILLING METHOD: Hand Auger Boring (HA) DATE: 3/27/2020  
 DEPTH TO - WATER> INITIAL: ∇ 6' AFTER 24 HOURS: ∇ N/M CAVING> C N/E

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Depth (feet)	Elevation (ft-MSL)	Description	Graphic	Groundwater	Sample Type	N-Value	Graphic Depiction	
							● BLOW COUNT	▲ NATURAL MOISTURE
0		TOPSOIL: 2 inches				3		
0.2		ALLUVIUM: Brown tan silty fine SAND with trace root fragments				5		
2		Brown tan silty fine SAND				5		
2.2						7		
4						6		
4.2						4		
6						3		
6.2						3		
8						2		
8.2						1		
10		RESIDUUM: Brown tan silty medium to fine SAND				6		
10.2		Boring Terminated at 10 ft.						





**TEST BORING  
RECORD  
B-7**

PROJECT: Murphey Candler Park Nature Trail PROJECT NO.: 2019162  
 CLIENT: Greenberg Farrow  
 PROJECT LOCATION: Murphey Candler Park  
 LOCATION: STA 8+50 South of Nancy Creek ELEVATION: 868 ft-MLS  
 DRILLER: NOVA LOGGED BY: T. Schrama  
 DRILLING METHOD: Hand Auger Boring (HA) DATE: 3/27/2020  
 DEPTH TO - WATER> INITIAL: ∅ N/E AFTER 24 HOURS: ∅ N/M CAVING> C N/E

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Depth (feet)	Elevation (ft-MSL)	Description	Graphic	Groundwater	Sample Type	N-Value	Graphic Depiction	
							● BLOW COUNT	▲ NATURAL MOISTURE
0	868	TOPSOIL: 2 inches ALLUVIUM: Brown silty fine SAND				9	●	
2	866					3	●	
4	864					4	●	
		RESIDUUM: Brown tan white silty coarse to fine SAND with trace quartz fragments				6	●	
6	862	Auger Refusal at 5.5 ft.				16	●	
8	860							
10	858							
12	856							
14	854							

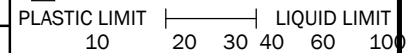


# TEST BORING RECORD B-8

PROJECT: Murphey Candler Park Nature Trail PROJECT NO.: 2019162  
 CLIENT: Greenberg Farrow  
 PROJECT LOCATION: Murphey Candler Park  
 LOCATION: STA 4+25 South of Nancy Creek ELEVATION: 867 ft-MLS  
 DRILLER: NOVA LOGGED BY: T. Schrama  
 DRILLING METHOD: Hand Auger Boring (HA) DATE: 3/30/2020  
 DEPTH TO - WATER> INITIAL:  N/E AFTER 24 HOURS:  N/M CAVING>  C  N/E

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Depth (feet)	Elevation (ft-MSL)	Description	Graphic	Groundwater	Sample Type	N-Value	Graphic Depiction	
							● BLOW COUNT	▲ NATURAL MOISTURE
0		TOPSOIL: 1 inch						
0 - 2	866	ALLUVIUM: Brown orange tan silty fine SAND				4	●	
2 - 4	864					2	●	
4 - 6	862	RESIDUUM: Brown tan silty medium to fine SAND				3	●	
6 - 7		Boring Terminated at 5 ft.				7	●	





**TEST BORING  
RECORD  
B-9**

PROJECT: Murphey Candler Park Nature Trail PROJECT NO.: 2019162  
 CLIENT: Greenberg Farrow  
 PROJECT LOCATION: Murphey Candler Park  
 LOCATION: STA 6+00 South of Nancy Creek ELEVATION: 866 ft-MLS  
 DRILLER: NOVA LOGGED BY: T. Schrama  
 DRILLING METHOD: Hand Auger Boring (HA) DATE: 3/30/2020  
 DEPTH TO - WATER> INITIAL: 1' AFTER 24 HOURS: N/M CAVING> C 6'

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Depth (feet)	Elevation (ft-MSL)	Description	Graphic	Groundwater	Sample Type	N-Value	Graphic Depiction	
							● BLOW COUNT	▲ NATURAL MOISTURE
0	866	TOPSOIL: 1 inch ALLUVIUM: Black silty fine SAND with trace root fragments				6	●	
		Brown tan silty fine SAND				3	●	
2	864					4	●	
						5	●	
4	862					5	●	
						4	●	
6	860	Boring Terminated at 6 ft.				6	●	
8	858							
10	856							
12	854							
14	852							



**TEST BORING  
RECORD  
B-10**

PROJECT: Murphey Candler Park Nature Trail PROJECT NO.: 2019162  
 CLIENT: Greenberg Farrow  
 PROJECT LOCATION: Murphey Candler Park  
 LOCATION: STA 3+50 South of Nancy Creek ELEVATION: 867 ft-MLS  
 DRILLER: NOVA LOGGED BY: T. Schrama  
 DRILLING METHOD: Hand Auger Boring (HA) DATE: 3/30/2020  
 DEPTH TO - WATER> INITIAL: 2' AFTER 24 HOURS: N/M CAVING> C N/E

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Depth (feet)	Elevation (ft-MSL)	Description	Graphic	Groundwater	Sample Type	N-Value	Graphic Depiction													
							● BLOW COUNT	▲ NATURAL MOISTURE	PLASTIC LIMIT					LIQUID LIMIT						
0		TOPSOIL: 2 inches				4	●													
		ALLUVIUM: Brown black silty fine SAND with trace organics																		
866		Brown tan silty fine SAND				14														
2						16														
864		Tan orange brown silty fine SAND				3	●													
4						2	●													
862						4	●													
6		Boring Terminated at 6 ft.				10	●													
860																				
8																				
858																				
10																				
856																				
12																				
854																				
14																				

Offset due to location in delineated wetlands.  
 Offset 1 attempted 3 feet west of boring, auger refusal at 1.5 feet in crushed stone path.  
 Offset 2 attempted 3 feet south of boring, boring terminated at 6 feet due to caving.



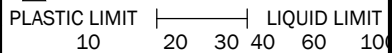


**TEST BORING  
RECORD  
B-11**

PROJECT: Murphey Candler Park Nature Trail PROJECT NO.: 2019162  
 CLIENT: Greenberg Farrow  
 PROJECT LOCATION: Murphey Candler Park  
 LOCATION: STA 0+50 South of Nancy Creek ELEVATION: 874 ft-MLS  
 DRILLER: NOVA LOGGED BY: T. Schrama  
 DRILLING METHOD: Hand Auger Boring (HA) DATE: 3/30/2020  
 DEPTH TO - WATER> INITIAL:  N/E AFTER 24 HOURS:  N/M CAVING>  C  N/E

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Depth (feet)	Elevation (ft-MSL)	Description	Graphic	Groundwater	Sample Type	N-Value	Graphic Depiction	
							● BLOW COUNT	▲ NATURAL MOISTURE
0	874	COMPACTED CRUSHED STONE				20+	●	
2	872	Auger Refusal at 1.6 ft.				20+	●	
4	870							
6	868							
8	866							
10	864							
12	862							
14	860							



Auger refusal at 1.6 feet in crushed stone path.  
 Two attempted offsets were in crushed stone path, outside of crushed stone path crossed property lines.

# **APPENDIX C**

## **Qualifications of Recommendations**

## QUALIFICATIONS OF RECOMMENDATIONS

The findings, conclusions and recommendations presented in this report represent our professional opinions concerning subsurface conditions at the site. The opinions presented are relative to the dates of our site exploration and should not be relied on to represent conditions at later dates or at locations not explored. The opinions included herein are based on information provided to us, the data obtained at specific locations during the exploration and our past experience. If additional information becomes available that might impact our geotechnical opinions, it will be necessary for NOVA to review the information, reassess the potential concerns, and re-evaluate our conclusions and recommendations.

Regardless of the thoroughness of a geotechnical exploration, there is the possibility that conditions between borings will differ from those encountered at specific boring locations, that conditions are not as anticipated by the designers and/or the contractors, or that either natural events or the construction process have altered the subsurface conditions. These variations are an inherent risk associated with subsurface conditions in this region and the approximate methods used to obtain the data. These variations may not be apparent until construction.

The professional opinions presented in this geotechnical report are not final. Field observations and foundation installation monitoring by the geotechnical engineer, as well as soil density testing and other quality assurance functions associated with site earthwork and foundation construction, are an extension of this report. Therefore, NOVA should be retained by the owner to observe all earthwork and foundation construction to document that the conditions anticipated in this exploration actually exist, and to finalize or amend our conclusions and recommendations. NOVA is not responsible or liable for the conclusions and recommendations presented in this report if NOVA does not perform these observation and testing services.

This report is intended for the sole use of Greenberg Farrow only. The scope of services performed during this exploration was developed for purposes specifically intended by Greenberg Farrow and may not satisfy other users' requirements. Use of this report or the findings, conclusions or recommendations by others will be at the sole risk of the user. NOVA is not responsible or liable for the interpretation by others of the data in this report, nor their conclusions, recommendations or opinions.

Our professional services have been performed, our findings obtained, our conclusions derived, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices in the State of Georgia. This warranty is in lieu of all other statements or warranties, either expressed or implied.

# Important Information about This

# Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

**The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.**

## **Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects**

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled.* No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

## **Read this Report in Full**

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

## **You Need to Inform Your Geotechnical Engineer about Change**

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

## **This Report May Not Be Reliable**

*Do not rely on this report* if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be, and, in general, if you are the least bit uncertain about the continued reliability of this report, contact your geotechnical engineer before applying it.* A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

## **Most of the "Findings" Related in This Report Are Professional Opinions**

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

## This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

## This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

## Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may

perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

## Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

## Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures*. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old*.

## Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, *proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration*. Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. *Geotechnical engineers are not building-envelope or mold specialists*.



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