DIVISION 1 – GENERAL REQUIREMENTS

DIVISION 2 - SITE WORK

DIVISION 3 – CONCRETE

SECTION 01010
SUMMARY OF WORK

PART 1 GENERAL

1.01 DESCRIPTION

A. The work to be performed under this Contract consists of furnishing and installing all labor, materials, tools, equipment and incidentals required to complete the Work.

B. All work shall be as specified and in accordance with the City of Atlanta, Department of Watershed Management and Department of Public Works standards.

1.02 PROJECT LOCATION

The Work of this Contract is located in the City of Atlanta, Georgia, as shown in the Drawings included as part of the Technical Specifications.

1.03 SCOPE OF WORK

A. The Work of this Contract is outlined in the Technical Specifications and generally includes the following:

1. Construction services for installing storm pipes, curb inlets, replacing concrete curbs and sidewalks, pavement repair and resurfacing, and green infrastructure installation.

2. Coordination with existing utilities and relocating, as necessary.

3. Abandonment of existing utilities including water lines, sewers, storm drains, and appurtenances.

4. Furnishing and installing new utilities and appurtenances, as required.

5. Installing and transferring service connections, where required.

6. Connecting new utilities to existing, where required.

7. Plantings on the Project site.

8. Temporary and permanent erosion and sedimentation control.

9. Traffic control during construction.

10. Right-of-way restoration, including pavement replacement.

11. All associated miscellaneous work, including site restoration and cleanup.

12. Environmental remediation of approximately

B. The Contractor shall furnish and install all labor, materials, equipment and incidentals which are reasonable and properly inferable and necessary for the proper completion of the work, whether specifically indicated in the Contract Documents or not.

C. The Contractor shall perform the work complete, in place and ready for continuous service and shall include repairs, replacements and restoration required as a result of all damages that occur as a result of construction under this contract.

1.04 WORK COORDINATION

A. The Contractor shall coordinate his/her work with all public and private utilities. The Contractor shall ensure that all utilities in each street are field marked by the utility owner or designated agent prior to beginning any excavation in that street.

B. The Contractor shall also coordinate his/her work with owners of private and public property where access is required for the performance of the work. Legal access will be acquired and provided by the City DWM.

1.05 CONDITIONS OF THE SITE

A. The Contractor shall make all necessary investigations to determine the site conditions in the project area and any unique features that may affect the prosecution of the work.

B. The Contractor will be held responsible for any damage to and for maintenance and protection of existing utilities and structures.

1.06 PARTIAL CITY DWM OCCUPANCY

The existing facilities or pipelines to which these improvements are being made or connected to will remain in operation during construction.

PART 2 PRODUCTS

(NOT USED)

PART 3 EXECUTION

(NOT USED)

+++ END OF SECTION 01010 +++

SECTION 01020

DEFINITIONS

PART 1 GENERAL

DEFINED TERMS

1. *Abandonment* - Shall mean the permanent termination of the use of, or of service from in or on, a facility.
2. *Acceptance* - The formal written acceptance by the City of the fully and finally completed Work.
3. *Addenda* - Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
4. *Addenda* - Revisions to the Proposal Documents issued by the City prior to opening of the Bid.
5. *Agreement* - The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.
6. *Agreement* - The written agreement for the performance of and payment for the Work, which includes by reference and is a part of the Agreement Documents, executed on behalf of the City and the Contactor, also called City-Contractor Agreement.
7. *Agreement Documents* - Includes this Agreement and its Exhibits, Appendices, Work Orders, Change Orders, Documentation, Drawings, and Specifications, including
8. Construction Services Agreement
    a. General Scope of Services
    b. Compensation and Fee Schedule
    c. Work Orders
    d. Legislation
    e. Supplement Conditions and Technical Specifications
    f. Additional Contract Documents
    g. Office of Contract Compliance
    h. Insurance and Bonding Requirements
9. *Agreement Price* - The price or prices for the Work or items of Work set forth in the Bid.
10. *Agreement Term* - "The meaning is set forth in Article 2, unless otherwise expressly amended or changed, pursuant to the City's authorized approval in conformance with the City of Atlanta Code of Ordinances and applicable law.
11. *AMR System* - The Automatic Meter Reading (AMR) system being used by the City.
12. *Applicant* - Shall mean any person, company or corporation who intends or plans to request for water services for a new development.
13. *Application for Payment* - The form approved by the City that is to be used by Contractor in requesting progress payments or final payment, together with such supporting documentation as is required in the Agreement Documents. The Application for Payment may also be called Payment Application or Progress Payment.

14. *Approved, Directed, Ordered, Or Their Derivatives* - Approved, as directed, or ordered by the Engineer or the City, unless otherwise clearly indicated.
15. *Asbestos* - Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.
16. *Bid* - The offer or bid of the Bidder submitted in the prescribed manner on the prescribed form setting forth the prices for the Work to be performed together with supplemental information as required by the Agreement Documents.
17. *Bidder* - Any person, firm, partnership, corporation or any combination thereof submitting a Bid for the Work.
18. *Bidding Documents* - The Bidding Requirements and the proposed Contract Documents (including all Addenda).
19. *Bidding Requirements* - The advertisement or invitation to bid, Instructions to Bidders, Bid security of acceptable form, if any, and the Bid Form with any supplements.
20. *Bonds* - "Bid, Performance Bonds, Payment Bonds, and other instruments of security furnished by Contractor and its surety in accordance with the Agreement Documents.
    a. Bond means a written instrument of surety approved by the City with a valid Certificate of Authority issued by the United States Department of Treasury under Sections 9304 to 9308 of Title One of the United States Code as security to the City, on behalf of a Bidder or the Contractor, to guaranty faithful performance of acts, duties or obligations under the Contract Documents and includes the following.
    b. Bid Bond means the security instrument furnished with a Bid to guaranty that, if the Bidder is awarded the Contract, the Bidder will execute the Agreement within the time specified in the Bidding Documents.
    c. Payment Bond means the security instrument furnished by the Contractor and its surety on the Payment Bond Form as a guaranty that Contractor will pay in full all bills and accounts for materials and labor used in the Work. "
21. *Change* - Any change in the Work authorized by the City's Authorized Representative, including Field Changes, Work Authorizations or Change Orders.
22. *Change Directive* - A written order prepared by the Owner and signed by the Owner directing a Change in the Work prior to or absent an agreement or adjustment, if any, in the Agreement Price or Agreement Time, or both.
23. *Change Order* - The meaning is set forth in Specification 01260 Contract Modifications and Procedures.
24. *City* - Shall mean the City of Atlanta, Georgia, and shall include all agencies, establishments or officials of the government of the City. The City may also be referred to from time to time as the "Owner."
25. *City Representative* - The meaning is set forth in City of Atlanta or duly authorized representative assigned to administer the technical aspects of the Agreement.
26. *City-Contractor Agreement* - The written agreement for the performance of and payment for the Work executed on behalf of the City and the Contactor, which is both a part of the Agreement Documents and includes all Agreement Documents by reference. The City-Contractor Agreement may also be called "Agreement."
27. *City's Contractor* - Shall mean the legally authorized representative of the City, a

private contractor, or other concerned agency performing Work under a direct Agreement with the City.

28. *Claim* - Any demand, contention, or assertion seeking additional time or money under the terms of this Agreement. Claims by the Contractor must be made in writing and contain all of the following or such Claims are released: (a) a narrative statement describing the amount and bases of the Claim; (b) the precise number of days claimed as a result of any delay; and (c) a detailed calculation of the precise amount of additional compensation claimed with all required supporting Documentation.
29. *Construction* - Shall mean the actual site preparation, building and all related Work, including facility relocation and adjustments.
30. *Construction Easement/Temporary Easement* - Any space or area dedicated to the City or other entity for the purpose of utilities or location of utilities for a specific period of time.
31. *Construction Equipment* - Equipment used in the performance of the Work but not incorporated therein.
32. *Contract* - The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.
33. *Contract Documents* - The Agreement Documents referenced above.
34. *Contract Price* - The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement.
35. *Contract Times* - The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any; (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.
36. *Contractor* - Any firm, partnership, corporation, joint venture, LLC or any combination thereof who enters into a contractual Agreement with the City. This excludes Subcontractors/Sub-consultants.
37. *Cost of the Work* – The sum of all costs necessarily incurred and paid by Contractor in the proper performance of the Work.
38. *Customer* - The authorized representative of the entity which owns the private water service line to which the Water Service being constructed will be connected.
39. *CPM Schedule* - A logic tied computerized network schedule incorporating all elements of the Work, prepared and updated in accordance with the requirements of the Special Conditions, subject to approval of the City.
40. *Day* - A calendar day of twenty-four (24) hours lasting from midnight one day to midnight the next day.
41. *Department* - Shall mean the Department of Watershed Management.
42. *Design Clarification Memoranda* – Correspondence issued by the Owner to the Contractor providing clarifying details to the Contract.
43. *Designer* - Shall refer to the firm licensed to practice engineering in the State of Georgia that seals the plans and specifications prior to bid.
44. *Detector Check* - A specific type of check valve used on a fire service line to prevent water from flowing backwards from a facility into a water distribution system.

45. *Detector Check Vault* - The enclosure around a Detector Check including the top slab and hatch which comprise the top of the vault.
46. *Documentation* - The meaning is set forth in Article 4.
47. *Drawings* - Include, without limitation: all renderings, technical and design drawings, specifications, plans, layouts, diagrams, illustrations, descriptions, calculations, schedules, graphs, performance charts, shop drawings; as-built drawings; all graphic or pictorial material needed to show locations, dimensions, elevations, sections, and details; all documents necessary to fix and describe the size, quality and composition of the Project (or parts thereof); supplier operating and maintenance manuals, recommended spare parts lists, documents required to support permitting and licensing, and any other data pertinent to operation of the Project.
48. *Effective Date of the Agreement* - The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.
49. *Emergency Work* – Work to be performed by the Contractor which poses an imminent threat to the public health, safety, general welfare or the City's water or wastewater system.
50. *Engineer* – shall refer to the firm licensed to practice engineering in the State of Georgia that seals plans and specifications prior to bid.
51. *Equipment* - Equipment incorporated or to be incorporated in the Work.
52. *Field Change* - A Change in Work that includes changes or adjustments to quantities or budget items but does not include a Change in the overall Agreement Price, overall Agreement Time or use of allowance items, which is required as a result of field conditions that require such adjustments. A Field Change does not include a Work Authorization, a Change Order or a Change Directive and is agreed upon and executed by an authorized City representative and the Contractor.
53. *Field Order* - A written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.
54. *Field Test Records* – The body of information collected by the Contractor during construction containing Quality Control and other technical verifications specific to the Contract.
55. *Final Completion* - Point in time where the City has confirmed to the Contractor in writing that the Services required by a Work Order have achieved Substantial Completion, Contractor has completed all punch-list items associated with a Work Order, and Contractor has provided all Documentation required by the Agreement Documents and Work Orders for Final Completion.
56. *Final Payment* - The final amount of compensation due under a Work Order or this Agreement (as applicable) and shall not become due until Contractor satisfies all of the requirements of the Agreement Documents.
57. *Force Account* - A method of payment, other than lump sum or unit price, for Work ordered by Change Order and paid for in accordance with force account procedures.
58. *GDOT* - The Georgia Department of Transportation.
59. *General Conditions* - The General Conditions of the Agreement for construction that govern the rights, duties, and obligations of the parties.
60. *General Requirements* - Sections of Division 01 of the Specifications. The General

Requirements are applicable to all Sections of the Specifications and to the entire Work.

61. *Hazardous Environmental Condition* - The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto.
62. *Hazardous Waste* - The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.
63. *Inspector* - The authorized representative of the City assigned to make detailed inspection of any or all portions of the Work or Materials thereof.
64. *Laws and Regulations; Laws or Regulations* - Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
65. *Liens* - Charges, security interests, or encumbrances upon Project funds, real property, or personal property.
66. *Liquidated Damages* - Amounts shall be as stipulated in the Agreement. Liquidated damages shall apply to the Contract Times for the Project. Liquidated Damages shall be both additive and cumulative. Liquidated Damages shall end upon Substantial Completion, Completion of the Work associated with each Milestone Date, and upon final completion of the Work.
67. *Long Side* – A term which identifies that the water main to which a Meter or Detector Check is connected is located on the opposite side of the road as the Meter or Detector Check. In this situation the Water Service Line which connects the Meter or Detector Check to the water main is often referred to as a long side water service line or a long side service line.
68. *MARTA* - Shall mean the Metropolitan Atlanta Rapid Transit Authority, or its designated legal representatives.
69. *Materials* - Materials incorporated or to be incorporated in the Work unless otherwise clearly indicated.
70. *Meter* – A meter including all components of the meter and meter reading system located within or on a Meter Box, Meter Vault, or Detector Check Vault (e.g. the strainer, registers, meter interface units, antennas, antenna cables, etc.)
71. *Meter Box* - The enclosure around a water meter including the frame and lid which comprise the top of the box. Meter Boxes are used for Meters that are $\leq$ 2-inches in diameter,
72. *Meter Vault* - The enclosure around a water meter including the top slab and hatch which comprise the top of the vault. Meter Vaults are used for Meters that are $\geq$ 3-inches in diameter,
73. *Milestone* - A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.
74. *Minimum Quantity* - One dollar ($1.00) in United States Currency, which is the minimum amount of Services that shall be ordered by the City pursuant to this Agreement.
75. *Modifications* - Binding changes, addenda, revisions, or the like, to the Work or the Agreement Documents, including Changes to Work made by Change Order, Work

Authorization, Field Change or Change Directive as required by GC-41.

76. *Notice of Award* - The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.
77. *Notice of Intent or Letter of Intent to Award* - The written notice of the acceptance of the Bid from the City to a Bidder.
78. *Notice to Proceed ("NTP")* - Written communication issued by the City to Contractor authorizing it to proceed with the Work and establishing the date of commencement of the Agreement time and on which Contractor shall start to perform its obligations in accordance with the Agreement Documents.
79. *Owner* - Same as "City" above.
80. *Parts* - Any equipment, supplies, parts, etc., provided by the City or a City Third Party Service Provider to the Contractor.
81. *PCBs* - Polychlorinated biphenyls.
82. *Permanent Easement* - Any space or area dedicated to the City or other entity for the purpose of constructing and/or maintain existing or future utilities.
83. Petroleum - Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils."
84. *Plans* - That portion of the Agreement Documents describing in drawings, the shapes, outlines, dimensions, characteristics, scope and other similar requirements governing the Work, or portions thereof, prepared by the Designer and including revisions thereto. The term is used interchangeably with the word "Drawings" and includes without limitation Standard Details and Drawings.
85. *Preassembled Detector Check Vault* – A Detector Check Vault provided by a Third Party City Service Provider which has been preassembled with the internal piping, Detector Check, Detector Check bypass assembly, Meter, and piping stubouts to which the Water Service Line will be connected. The antenna and antenna cable for the Meter, and the pipe supports for the piping and appurtenances, will be provided with the Preassembled Detector Check Vault, but will be installed by the Contractor at the Project Site.
86. *Preassembled Meter Vault* – A Meter Vault provided by a Third Party City Service Provider which has been preassembled with the internal piping, Meter, gate valves, bypass, and piping stubouts to which the Water Service Line will be connected. The antenna and antenna cable for the Meter, and the pipe supports for the piping and appurtenances, will be provided with the Preassembled Meter Vault, but will be installed by the Contractor at the Project Site.
87. *Progress Schedule* - A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.
88. *Project* - Project(s) specifically identified in Work Orders issued pursuant to this Agreement.
89. *Project Manual* - The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be

bound in one or more volumes, is contained in the table(s) of contents.

90. *Project Site* - The location where the Work Order is being performed.
91. Public Space/Public Right-of-Way - Shall mean the area between private property lines under the jurisdiction of the City, county, state or federal government, including, but not limited to, an alley, roadway, median, sidewalk, public way, or any combination thereof.
92. *Punch List* - Shall mean the lists prepared by the City's Representative or Design Consultant prior to Substantial Completion and through Final Completion indicating items of Work not in accordance with the requirements of the Contract Documents and which must be performed, corrected and accomplished prior to acceptance of the Work.
93. *Quality Assurance* – Shall mean the procedure or procedures performed by the Owner to ensure conformity to the Contract Documents.
94. *Quality Control* – Shall mean the procedure or procedures performed by the Contractor to ensure that quality parameters outlined in the Contract documents are being fully met.
95. *Radioactive Material* - Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.
96. *Record Drawings* – The latest detailed representation of all installed water facilities associated with the Work for use by the Owner with all necessary information included to effectively operate and maintain the system.
97. *Replacement Facility* - Shall mean that facility, meeting the Department's current standards, which will be constructed or provided, as a consequence of the rearrangement of an existing facility or portion thereof.
98. *Request for Information* – A formal inquiry from the Contractor to the City requesting additional information or clarification to the Contract.
99. *Resident Engineer* - The City's Engineer who is assigned to the Site or any part thereof.
100. *Resident Project Representative* - The authorized representative of Engineer who may be assigned to the Site or any part thereof.
101. *Responsive Bid* - A Bid which is accurate and complete with respect to Bid schedules and information submitted relative to the technical qualifications and financial responsibility and is able to comply with Equal Opportunity and other requirements of the Agreement Documents.
102. *Samples* - Shall mean physical examples furnished by Contractor, which illustrate materials, equipment or workmanship. Approved Samples in conformance with the Contract Documents establish the standards of the Work.
103. *Schedule of Submittals* - A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.
104. *Schedule of Values* - A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.
105. *Scope of Services* - See "Work."
106. *Services* - The specific tasks and activities to be performed by Contractor as identified in a Work Order issued pursuant to this Agreement, as well as all ancillary and

incidental tasks and activities not expressly identified in a Work Order but which are reasonably necessary to be performed in order to complete the tasks and activities expressly identified in a Work Order.

107. *Shop Drawings* - Shall mean drawings, diagrams, illustrations, schedules or other data illustrating the Work, and all illustrations, brochures, standard schedules, performance charts, specifications, instructions, diagrams, and other information prepared by a Subcontractor, Supplier, vendor or manufacturer and submitted by Contractor as required in the Contract Documents.
108. *Short Side* – A term which identifies that the water main to which a Meter or Detector Check is connected is located on the same side of the road as the Meter or Detector Check. In this situation the Water Service Line which connects the Meter or Detector Check to the water main is often referred to as a short side water service line or a short side service line.
109. *Sidewalk Area* - Shall mean that portion of a street between the curb lines and the adjacent property lines intended primarily for the use of pedestrians whether paved or in use.
110. *Site* - The areas required for the performance of the Work.
111. *Special Conditions* - Terms which supplement items covered in General Conditions.
112. *Specifications, Technical Specifications* - Shall mean those portions of the Contract Documents consisting of written technical descriptions, provisions or requirements of the Work to be performed under the Contract Documents, including, but not limited to, the quantities or quality of materials, equipment, construction systems or applications. Standards for specifying materials or testing that are cited in the Specifications are part of the Contract Documents.
113. *Standards* - Shall mean those current Standards of Engineering analysis and design, including Installation and Material Specifications, which the City utilizes in the design and construction of its own projects.
114. *State* - The State of Georgia.
115. *Subcontractor* - An individual, firm, corporation or any combination thereof having a direct contract with Contractor for the performance of a part of the Work at the site.
116. *Submittals* - All administrative documents, Shop Drawings, Samples, product data, manufacturer's literature, quality control documents, design related documents, record documents, contract close-out documents, and/or any other specified document prepared or assembled by or for Contractor and submitted by Contractor to the Owner and/or Engineer.
117. *Substantial Completion* - As applicable to a Work Order, means that point in time in which the Services that are the subject of a Work Order are capable of being used for their intended purpose and comply with all of the requirements of Article 9, the Specifications, and the other Agreement Documents.
118. *Successful Bidder* - The Bidder submitting a responsive Bid to whom Owner makes an award.
119. *Supplementary Conditions* - That part of the Contract Documents which amends or supplements these General Conditions.
120. *Supplier* - Any individual, firm, or corporation who supplies Material or Equipment for the Work (including that fabricated to a special design) but who does not perform or

provide significant labor at the Site.

121. *Temporary Facility* - Shall mean a facility constructed for whatever purpose and not intended to be permanent.
122. *Third Party City Service Provider* – An entity which provides services to the City and who is connected or associated with the Work being performed by the Contractor, but for whom the Contractor is not responsible.
123. *Total Sum* - The total maximum amount of compensation for which all Work Orders may potentially be issued pursuant to this Agreement. Contractor's entitlement to payment under this Agreement shall not exceed the Total Sum.
124. *Transfer Meter Service* – A designation used to identify that an existing Water Service which is connected to an existing water main is to be transferred to a different water main. Typically this involves abandoning the existing Water Service and constructing a new Water Service that taps into a new water main.
125. *Underground Facilities* - All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
126. *Unit Price Work* - Work to be paid for on the basis of unit prices.
127. *Utility* - Shall mean and include all public, private, or cooperatively owned lines, facilities and systems for producing, transmitting or distributing communications, power, electricity, heat, gas, oil, crude products, water, steam, waste, storm water, and other similar commodities, such as public owned fire and police signal systems, which directly or indirectly serve the public or any part thereof.
128. *Water Mains* – Physical structures, located primarily underground, composed of pipe and fittings designed to convey potable water.
129. *Water Service* - A piping system which extends from a City water main to the point of connection with a private water service line, including all piping, equipment, and appurtenances associated with providing water to a customer. A Water Service includes, but is not limited to, the tapping sleeve and gate valve or curb cock; the Water Service Line, a Meter and/or Detector Check with all associated appurtenances (e.g. gate valves, bypass, Detector Check bypass assembly, etc.); and the Meter Box, Meter Vault or Detector Check Vault.
130. *Water Service Line* – The piping which extends from the water main to the point of connection with a private water service line.
131. *Work* - All the Services specified, indicated, shown, or contemplated by the Agreement Documents and applicable Work Orders, as well as the furnishing by Contractor of all materials, equipment, labor, methods, processes, construction, manufacturing, tools, plants, design, supplies, power, water, transportation and any other things necessary or incidental to complete such Services in accordance with the Agreement Documents and applicable Work Orders that will ensure a functional and complete Project(s).
132. *Work Authorization* - A Change in Work that adds, changes or removes scope of work from the Agreement but does not include a change in Agreement Time or Agreement Price; or the utilization of an allowance or contingency item, as permitted and defined

by the Agreement documents. A Work Authorization does not include a Change Order, a Field Change or a Change Directive and is agreed upon and executed by an authorized City representative and the Contractor.

133. *Work Change Directive* - A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.
134. *Work Order* - An order executed by the City, substantially in the form and substance provided in Exhibit A to this Agreement that specifies the Services to be provided by Contractor to the City, the agreed amount of payment for such Services, and the time limitations for completing the Services.
135. *Work Order Commencement Date* - The date identified in a notice to proceed and/or a Work Order issued by the City, which instructs the Contractor to start the performance of Services required by a Work Order. The times for Substantial Completion and Final Completion will be measured from the Work Order Commencement Date.
136. *Work Product* - The meaning is set forth in Article 6.
137. *Working Days* - Generally, Monday, Tuesday, Wednesday, Thursday, and Friday; however, on some projects, Saturday and/or Sunday may be considered working days, if specified as working days by the City. Holidays are not considered Working Days.
138. *Written Notice* - A written statement transmitted from one party to an authorized representative of another party.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

+ + + END OF SECTION 01020 + + +

SECTION 01040
COORDINATION

PART 1 GENERAL

1.01 SUMMARY

A. Coordinate execution of the Work with subcontractors and the City DWM as required to maintain operation of the existing facilities and satisfactory progress of the Work.

B. The City DWM may require a written explanation of the Contractor's plan for accomplishing separate phases of the Work.

PART 2 PRODUCTS

(NOT USED)

PART 3 EXECUTION

3.01 CUTTING AND PATCHING

A. Carefully fit around, close up, repair, patch, and point around the work specified herein to the satisfaction of the Contractor.

B. Do not cut or alter the work of any subcontractor, except with the written consent of the subcontractor whose work is to be cut or altered, or with the written consent of the Contractor. All cutting and patching or repairing made necessary by the negligence, carelessness or incompetence of the Contractor or any of its subcontractors, shall be done by, or at the expense of, the Contractor and shall be the responsibility of the Contractor.

3.02 COORDINATION

A. The Contractor shall consult with the City DWM on a daily basis while performing demolition, excavation, or any other alteration activity. No water or sewer function, utility or structure shall be altered, shut off or removed unless approved in advance, and in writing, by the City DWM. The Contractor shall give the City DWM at least 48 hours advanced notice, in writing, of the need to alter, shut off or remove such function.

B. Coordinate the Work with the City DWM and revise daily activities if needed so as to not adversely affect system operations. Such revisions in the proposed work schedule will be accomplished with no additional compensation to the Contractor.

3.03 CITY DWM'S RESPONSIBILITIES

All existing water system valves shall be located, uncovered as necessary and operated by the City DWM.

3.04 PROTECTION AND RESTORATION OF WORK AREA

A. General: Return all items and all areas disturbed, directly or indirectly by work under these Specifications, to their original condition or better, as quickly as possible after work is completed.

1. The Contractor shall plan, coordinate, and prosecute the work such that disruption to personal property and business is held to a practical minimum.

2. All construction areas abutting lawns and yards of residential or commercial property shall be restored promptly. Backfilling of underground facilities, ditches, and disturbed areas shall be accomplished on a daily basis as work is completed. Finishing, dressing, and grassing shall be accomplished immediately thereafter, as a continuous operation within each area being constructed and with emphasis placed on completing each individual yard or business frontage. Care shall be taken to provide positive drainage to avoid ponding or concentration of runoff.

3. Handwork, including raking and smoothing, shall be required to ensure that the removal of roots, sticks, rocks, and other debris is removed in order to provide a neat and pleasing appearance.

4. The City DWM shall be authorized to stop all work by the Contractor when restoration and cleanup are unsatisfactory and to require appropriate remedial measures.

B. Man-made Improvements: Protect, or remove and replace, all fences, walkways, mail boxes, pipe lines, drain culverts, power and telephone lines and cables, property pins and other improvements that may be encountered in the Work.

C. Cultivated Growth: Do not disturb cultivated trees or shrubbery unless approved by the City DWM. Any such trees or shrubbery which must be removed shall be heeled in and replanted under the direction of an experienced nurseryman.

D. Cutting of Trees: Do not cut trees for the performance of the work except as absolutely necessary. Protect trees that remain in the vicinity of the work from damage from equipment. Do not store spoil from excavation against the trunks. Remove excavated material stored over the root system of trees within 30 days to allow proper natural watering of the root system. Repair any damaged tree over 3-inches in diameter, not to be removed, under the direction of an experienced nurseryman. All trees and brush that require removal shall be promptly and completely removed from the work area and disposed of by the Contractor. No stumps, wood piles, or trash piles will be permitted on

the work site.

E. Disposal of Rubbish: Dispose of all materials cleared and grubbed during the construction of the Project in accordance with the applicable codes and rules of the appropriate county, state and federal regulatory agencies.

F. Swamps and Other Wetlands

1. The Contractor shall not construct permanent roadbeds, berms, drainage structures or any other structures which alter the original topographic features within the easement.

2. All temporary construction or alterations to the original topography will incorporate measures to prevent erosion into the surrounding swamp or wetland. All areas within the easement shall be returned to their original topographic condition as soon as possible after work is completed in the area. All materials of construction and other non-native materials shall be disposed by the Contractor.

3. The Contractor shall provide temporary culverts or other drainage structures, as necessary, to permit the free migration of water between portions of a swamp, wetland or stream which may be temporarily divided by construction.

4. The Contractor shall not spread, discharge or dump any fuel oil, gasoline, pesticide, or any other pollutant to adjacent swamps or wetlands.

G. Refer to Section 02920.

3.05 WATER FOR CONSTRUCTION PURPOSES

A. All water required for construction shall be furnished by the City DWM. It shall be available by connecting to the City DWM's water system at a point approved by the City DWM. There shall be installed in every connection to the City DWM's water supply, a water meter with backflow preventer meeting the requirements of the City DWM. The Contractor shall meter all water usage. The Contractor shall notify the City DWM one week in advance prior to connecting to the water system.

B. A total of the metered water used shall be submitted to the City DWM with each monthly application for payment

3.06 EXISTING UTILITIES AND OBSTRUCTIONS

A. The Contractor shall call the Utilities Protection Center (UPC) (800-282-7411) as required by Georgia Law (O.C.G.A. Sections 25-9-1 through 25-9-13) and shall call all utilities, agencies or departments that own and/or operate utilities in the vicinity of the construction work site at least 72 hours (three business days) prior to construction to verify the location of the existing utilities.

B. Existing Utility Locations: The following steps shall be exercised to avoid interruption of existing utility service.

1. Provide the required notice to the utility owners and allow them to locate their facilities according to Georgia law. Field utility locations are valid for only 10 days after original notice. The Contractor shall ensure, at the time of any excavation that a valid utility location exists at the point of excavation.

2. Expose the facility, for a distance of at least 200 feet in advance of pipeline construction, to verify its true location and grade. Repair, or have repaired, any damage to utilities resulting from locating or exposing their true location.

3. Avoid utility damage and interruption by protection with means or methods recommended by the utility owner.

4. Maintain a log identifying when phone calls were made, who was called, area for which utility relocation was requested and work order number issued, if any. The Contractor shall provide the City DWM an updated copy of the log bi-weekly, or more frequently if required.

C. Conflict with Existing Utilities

1. Horizontal Conflict: Horizontal conflict shall be defined as when the actual horizontal separation between a utility, main, or service and the proposed improvement does not permit safe installation by the use of sheeting, shoring, tying-back, supporting, or temporarily suspending service of the parallel or crossing facility. The Contractor may propose an alignment change of the proposed improvement to avoid horizontal conflicts if the new alignment remains within the available right-of-way or easement, complies with regulatory agency requirements and after a written notification to and acknowledgement of the City DWM. Where such realignment is denied by the City DWM, the Contractor shall arrange to have the utility, main, or service relocated.

2. Vertical Conflict: Vertical conflict shall be defined as when the actual vertical separation between a utility, main, or service and the proposed improvement does not permit the crossing without immediate or potential future damage to the utility, main, or service. The Contractor may change the proposed grade of the proposed improvement to avoid vertical conflicts if the changed grade maintains adequate cover and complies with regulatory agencies requirements after written notification to and acknowledgement of the City DWM. Where such relocation is denied by the City DWM, the Contractor shall arrange to have the utility, main, or service relocated.

D. Electronic Locator: The Contractor shall have available, at all times, an electronic pipe locator and a magnetic locator, in good working order, to aid in locating existing pipe lines

or other obstructions.

E. Water and Sewer Separation

1. Water mains should maintain a minimum 10 foot edge-to-edge separation from sewer lines, whether gravity or pressure. If the main cannot be installed in the prescribed easement or right-of-way and provide the 10 foot separation, the separation may be reduced, provided the bottom of the water main is a minimum of 18-inches above the top of the sewer. Should neither of these two separation criteria be possible, the water main shall be installed below the sewer with a minimum vertical separation of 18 inches.

2. The water main, when installed below the sewer, shall be encased in concrete with a minimum 6-inch concrete thickness to the first joint in each direction. Where water mains cross the sewer, the pipe joint adjacent to the pipe crossing the sewer shall be cut to provide maximum separation of the pipe joints from the sewer.

3. No water main shall pass through, or come in contact with, any part of a sanitary sewer manhole.

3.07 PIPE DISTRIBUTION

A. Pipe shall be distributed and placed in such a manner that will not interfere with traffic.

B. Distribution and stringing of pipe along the route will be limited to the total length which will be installed in one work day/work shift. The City DWM reserves the right to reduce the distance in residential and commercial areas based on the effects of the pipe distribution on the adjacent property owners.

C. No street or roadway may be closed for unloading of pipe without first obtaining permission from the proper authorities. The Contractor shall furnish and maintain proper warning signs and obstruction lights for the protection of traffic along highways, streets and roadways upon which pipe is distributed.

D. No distributed pipe shall be placed inside drainage ditches.

E. Distributed pipe shall be placed as far as possible from the roadway pavement, but no closer than five feet from the roadway pavement, as measured edge-to-edge.

3.08 CONSTRUCTION OPERATIONS

The Contractor shall ensure that all work areas and roadways are free from excess excavated material, debris, mud, soil, rocks, etc. at the end of each work day. Contractor shall be responsible for sweeping all areas at the end of each work day.

+ + + END OF SECTION 01040 + + +

SECTION 01050

PROJECT MEETINGS

PART 1 GENERAL

1.01 SCOPE

A. Work under this Section includes all scheduling and administering of pre-construction and progress meetings as herein specified and necessary for the proper and complete performance of this Work.

B. Owner Responsibilities:

1. Scheduling
2. Make physical arrangements for the meetings.

C. Engineer Responsibilities:

1. Preside at meetings.
2. Record minutes and include significant proceedings and decisions.
3. Distribute copies of the minutes to participants.

1.02 PRE-BID MEETING

A. A pre-bid meeting will be held at the time and place to be designated in the Instructions to Bidders.

B. The Engineer will be available to discuss the project and answer pertinent questions. No oral interpretation will be made as to the meaning of the Documents. Interpretation, if deemed necessary by the Engineer, will be in the form of an Addendum to the Contract Documents.

1.03 PRECONSTRUCTION CONFERENCE

A. The City shall schedule the preconstruction conference prior to the issuance of the Notice to Proceed.

B. Representatives of the following parties are to be in attendance at the meeting:

1. Owner (City)
2. Engineer
3. Contractor's project staff including at a minimum the project manager, field superintendent, quality control coordinator, subcontractor coordinator.
4. Major subcontractors

5. Representatives of governmental or regulatory agencies when appropriate.

C. The agenda for the preconstruction conference shall consist of the following as a minimum:

1. Distribute and discuss a list of major subcontractors and a tentative construction schedule.
2. Critical work sequencing.
3. Designation of responsible personnel and emergency telephone numbers.
4. Processing of field decisions and change orders.
5. Adequacy of distribution of Contract Documents.
6. Schedule and submittal of shop drawings, product data and samples.
7. Pay request format, submittal cutoff date, pay date and retainage.
8. Procedures for maintaining record documents.
9. Use of premises, including office and storage areas and Owner's requirements.
10. Major equipment deliveries and priorities.
11. Safety and first aid procedures.
12. Security procedures.
13. Housekeeping procedures.
14. Work hours.
15. General regard for community relations.

1.04 PROGRESS MEETINGS

A. Progress meetings will be held monthly during the performance of the Work of this Contract. Additional meetings may be called as progress of work dictates.

B. Engineer will preside at meetings and record minutes of proceedings and decisions. Engineer will distribute copies of minutes to participants.

C. Attendance:

1. Owner (City)
2. Engineer
3. Contractor’s project staff including at a minimum the project manager, field superintendent, quality control coordinator, subcontractor coordinator, and safety representative.
4. Subcontractors, only with Engineer's approval or request, as pertinent to the agenda.
5. Representatives of governmental or other regulatory agencies as appropriate.

D. Minimum Agenda:

1. Review and approve minutes of previous meetings.
2. Review work progress since last meeting.
3. Review work progress planned for the next period.

4. Status of Overall Project Schedule, identify problems which impede planned progress.
5. Review Contractor's corrective measures and procedures to regain plan schedule.
6. Review Contractor's revision to the construction schedule.
7. Review submittal schedule.
8. Review Request for Information process.
9. Review Change Management items and status of individual Change documents.
10. Review Notices, Punch lists, and project coordination issues.
11. Note field observations, problems and decisions.
12. Review testing and quality control measures and associated issues.
13. Complete other current business.
14. Schedule next progress meeting.

1.05 SHUTDOWN COORDINATION MEETINGS:

A. One week minimum prior to significant planned shutdowns, Contractor shall arrange and convene a coordination meeting.

B. Meeting participants shall include Owner, Engineer, Contractor, and involved subcontractors.

C. Meeting agenda shall include Contractor’s review/presentation of a detailed work plan and schedule as required in Section 01310 Construction Progress Schedule, Owner input regarding facility operations, and all other pertinent coordination topics.

1.06 QUALITY CONTROL AND COORDINATION MEETINGS

A. Scheduled by the Engineer on a regular basis and as necessary to review test and inspection reports, and other matters relating to quality control of Work and work of other contractors.

B. Attendees will include:

1. Contractor’s project staff including at a minimum the project manager, superintendent, quality control coordinator, subcontractor coordinator.
2. Subcontractors and Suppliers, as necessary.
3. Engineer's representatives.

1.02 PRE-INSTALLATION MEETINGS

A. When required in individual Specification Sections, convene at site prior to commencing Work of that section.

B. Require attendance of entities directly affecting, or affected by, Work of that Section.

C. Notify the Engineer four (4) days in advance of meeting date.

D. Provide suggested agenda to Engineer to include reviewing conditions of installation, preparation and installation or application procedures, and coordination with related Work and work of others.

1.03 OTHER MEETINGS

In accordance with Contract Documents and as may be required by the Owner or Engineer.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

+ + + END OF SECTION 01050 + + +

SECTION 01051
PRE-BLAST VIDEO SURVEY AND INSPECTION

PART 1 – GENERAL

1.01 SCOPE

A. The work specified in this section includes performing the pre-blast video surveys and inspections for all tunnel and pipe installation construction.

B. The work specified in this section shall be performed by a video survey and inspection specialist, experienced in this type of work. The specialist will be approved by the Engineer. The specialist shall supply six (6) complete copies of the pre-blast survey videos.

C. The cost of pre-blast video survey and inspection shall be paid for by the Contractor.

PART 2 – PRODUCTS

NOT APPLICABLE

PART 3 – EXECUTION

3.01 GENERAL REQUIREMENTS

A. The Contractor shall perform a pre-blast video survey and inspection in advance of construction to document the existing conditions of buildings, facilities, structures, utilities, roads, driveways and related work.

3.02 PRE-BLAST VIDEO SURVEY AND INSPECTION

A. Video survey and inspection of buildings, structures, facilities, utilities and related work in the immediate vicinity of the site, and along the entire length of the tunnel and pipe installation shall be performed by a specialty subcontractor with documented experience in pre-blast video survey and inspection for open cut and tunnel construction.

B. Survey and inspection corridor for the open cut and tunnel construction shall be four hundred (200) feet on each side of the centerline of the pipe.

C. The video surveys and inspections shall clearly document the existing conditions and be completed before any operations have begun and subject areas disturbed by any construction activities.

D. The video surveys and inspection notes, reports, etc. shall be submitted to the Engineer.

E. The video surveys and inspections shall make an examination of the interior and exterior of buildings, structures, facilities and utilities, and record by notes, measurements, photographs, video, etc., conditions which might be aggravated by construction activities.

F. Prior to blasting, video surveys and inspections of residences and other private structures existing within the survey and inspection corridor shall have been completed. The Contractor shall notify the Engineer at least seven (7) days prior to the inspections so a representative of the Engineer may be present.

G. Pre-blast survey shall include glossy, high quality, color photographs and accompanying mega-pixel digital images.

+++END OF SECTION 01051+++

SECTION 01055
CONSTRUCTION STAKING

PART 1 GENERAL

1.01 SCOPE

A. Construction staking shall include all of the surveying work required to layout the Work and control the location of the finished Project. The Contractor shall have the full responsibility for constructing the Project to the correct horizontal and vertical alignment.

B. The Contractor shall assume all costs associated with rectifying work constructed in the wrong location.

C. Work under this Section also includes surveying work required to prepare Record Drawings as specified herein.

1.02 QUALITY ASSURANCE

A. The Contractor shall hire, at the Contractor's own expense, a Surveyor with current registration in the State of Georgia, acceptable to the City DWM, to provide project construction staking and confirmation of the vertical and horizontal alignment.

B. Any deviations from the Contractor' shall be confirmed by the Contractor prior to construction of that portion of the Project.

1.03 SUBMITTALS

A. Submit name and address of Registered Surveyor to City DWM.

B. On request of City DWM submit documentation to verify accuracy of construction staking.

C. Submit record drawings in accordance with PART 3 of the Section.

PART 2 PRODUCTS

(NOT USED)

PART 3 EXECUTION

3.01 PROJECT CONDITIONS

A. The City DWM may order changes to the location of some of the components of the Project or provide clarification to questions regarding the correct alignment.

B. The City DWM may provide the following:

1. One vertical control point on the Project site.
2. A minimum of two horizontal control points on the Project site.

3.02 GENERAL

A. From the information to be provided as indicated in paragraph 3.01 above, the Contractor shall:

1. Be responsible for establishing GPS control coordinate control system, setting reference points and/or offsets, establishment of baselines, and all other layout, staking, and all other surveying required for the construction of the Project.

    a. The horizontal position of all points shall be referenced to the North American datum of 1983 (1986 adjustment) in the Georgia State Plane West 1002 Coordinate System.
    b. The vertical position of all points shall be referenced to the North American Vertical datum of 1988.
    c. All coordinate values shall be delivered as grid coordinates in US Survey Feet.
    d. The minimum data accuracy required for all record drawings shall be +/- 0.10 USFT (one tenth of one foot).

2. Safeguard all reference points, stakes, grade marks, horizontal and vertical control points, and shall bear the cost of re-establishing same if disturbed.

3. Stake out the limits of construction to ensure that the Work does not deviate from the indicated limits.

4. Stake out the pipeline horizontal and vertical alignment.

5. Be responsible for all damage done to reference points, baselines, center lines and temporary bench marks, and shall be responsible for the cost of re-establishment of reference points, baselines, center lines and temporary bench marks as a result of the operations.

6. Maintain a complete, accurate log of all control and survey work as it progresses.

B. Baselines shall be defined as the line to which the location of the Work is referenced, i.e., edge of pavement, road centerline, property line, right-of-way or survey line.

3.03 STAKING PRECISION

A. The precision of construction staking shall match the precision of components location indicated on the Contractor's design drawings. Staking of utilities shall be done in accordance with standard accepted practice for the type of utility.

B. The precision of construction staking required shall be such that the location of the water main or sewer or storm drain can be established for construction and verified by the Contractor. Where the location of components of the water main or sewer or storm drain, (i.e., fittings, valves, manholes, road crossings, etc.) are not dimensioned, the establishment of the location of these components shall be based upon scaling these locations from the Contractor's design drawings with relation to readily identifiable land marks, i.e. survey reference points, power poles, manholes etc.

C. Paved Surfaces: The Contractor shall establish a reference point for establishing and verifying the paving subgrade and finished grade elevations. Any variance with grades shown on the Contractor's design drawings shall be identified and confirmed by the Contractor and prior to constructing the base.

D. The Contractor's attention is directed to Section 01040.

3.04 RECORD DRAWINGS

A. Water Mains

1. The Contractor shall submit record drawings which show the final installed location of water mains and survey data for all installed pipe, valves and fittings, appurtenances, and service connections 3-inches in diameter and greater. Coordinates (x, y, and z) shall be obtained for each joint of pipe, valve, fitting, and appurtenance.

2. In addition, the location of all valves and fittings and main tap location for service connections 3-inches in diameter and greater shall be indicated by at least 2 ties (measured distances) from permanent fixed objects within the public right of way, as accepted by the City DWM, to allow the City DWM to locate the water main and components in the future without the use of GPS instruments.

B. Sewers and Storm Drains

1. The Contractor shall submit record drawings which show the final installed location of the sewer and storm drain and survey data for all installed sewer and storm drain pipe, tunnel and casing limits and service connections. Survey data shall consist of final coordinates for all manholes, catch basins, tunnel and casing

limits and service connections and invert elevations for all manholes, catch basins and other structures.

2. In addition, the location or station of all sewer service connection tie-in points to the main line sewer shall be indicated on the Contractor's design drawings, as accepted by the City DWM, to allow the City DWM to locate the service connections in the future without the use of GPS instruments.

C. The record drawings shall also indicate the horizontal and vertical location, dimensions and materials of all utilities encountered during excavation.

D. One PDF of record drawings shall be furnished to the DWM for review. Each record drawing shall be stamped with the name of the Contractor, signed and dated by the Contractor's Project Manager and signed.

+ + + END OF SECTION 01055 + + +

SECTION 01060
REGULATORY REQUIREMENTS

PART 1 GENERAL

1.01 SCOPE

A. Permits and Responsibilities: The Contractor shall be responsible for complying with all applicable federal, state, county and municipal laws, codes and regulations, in connection with the prosecution of the Work and for obtaining all permits including but not limited to NPDES permits for storm water discharges from the Work site.

B. Permits and applications for this project are identified in PART 3 of this Section.

C. The Contractor shall comply with all requirements of the permitting authority, whether permits were obtained by the Contractor or not.

PART 2 PRODUCTS

(NOT USED)

PART 3 EXECUTION

3.01 NPDES PERMITS FOR STORM WATER DISCHARGES

The Contractor shall comply with the provisions of the Authorization to Discharge under the National Pollutant Discharge Elimination System, Storm Water Discharges Associated with Construction Activity for Infrastructure Construction Projects, Georgia Environmental Protection Division General Permit No. GAR 100002, including but not limited to filing permit applications, filing Notice of Intent (NOI), filing Notice of Termination (NOT), performing inspections and monitoring and performing record keeping as required.

3.02 GDOT ENCROACHMENT PERMITS

The City of Atlanta has submitted a GDOT Encroachment Application for the Work crossing and along the right of way of Northside Drive (US 41). The Contractor shall comply with the provisions of the permit.

3.03 CITY LANE CLOSURE PERMITS

Contractor, will submit permit applications to the City's Department of Public Works, Office of Transportation for all lane closures required for completion of the project.

Refer to Section 01550.

3.04 OTHER PERMITS

The Contractor shall submit applications for and obtain all other permits required in conjunction with completion of the Work.

3.05 GENERAL

A. The Contractor shall pay for all remaining permits, fees and licenses required for construction of the Project.

B. The Contractor shall examine all permits and conform to the requirements contained therein, including the purchase of additional bonds or insurance as specified therein, and such requirements are hereby made a part of this Contract as though the same were set forth herein. Failure to examine the permit and agreement applications will not relieve the Contractor from compliance with the requirements stated therein.

+ + + END OF SECTION 01060 + + +

SECTION 01070

ABBREVIATIONS

PART 1 GENERAL

1.01 THE REQUIREMENT

A. The following is a partial list of typical abbreviations which may be used in the Specifications, and the organizations to which they refer:

AASHTO	-	American Association of State Highway and Transportation Officials
ACI	-	American Concrete Institute
ACIFS	-	American Cast Iron Flange Standards
AFBMA	-	Anti-Friction Bearing Manufacturer's Association
AGA	-	American Gas Association
AGMA	-	American Gear Manufacturers Association
AIA	-	American Institute of Architects
AISC	-	American Institute of Steel Construction
AISI	-	American Iron and Steel Institute
ANSI	-	American National Standard Institute
API	-	American Petroleum Institute
ASCE	-	American Society of Civil Engineers
ASHRAE	-	American Society of Heating, Refrigeration, and Air Conditioning Engineers
ASME	-	American Society of Mechanical Engineers
ASTM	-	American Society for Testing and Materials
AWS	-	American Welding Society
AWWA	-	American Water Works Association
CEMA	-	Conveyor Equipment Manufacturer's Association
CRSI	-	Concrete Reinforcing Steel Institute
DIPRA	-	Ductile Iron Pipe Research Association
Fed Spec	-	Federal Specifications
GDOT		Georgia Department of Transpiration
IEEE	-	Institute of Electrical and Electronic Engineers
IPCEA	-	Insulated Power Cable Engineers Association
ISO	-	Insurance Services Offices
NBS	-	National Bureau of Standards
NEC	-	National Electric Code
NEMA	-	National Electrical Manufacturers Association
OSHA	-	Occupational Safety and Health Act
PCI	-	Precast Concrete Institute
UL	-	Underwriters Laboratories, Inc.

USGS - United States Geological Survey

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

+ + + END OF SECTION + + +

SECTION 01091
CODES AND STANDARDS

PART 1 GENERAL

1.01 DESCRIPTION

A. Whenever reference is made to conforming to the standards of any technical society, organization, body, code or standard, it shall be construed to mean the latest standard, code, specification or tentative specification adopted and published at the time of advertisement for Bids. This shall include the furnishing of materials, testing of materials, fabrication and installation practices. In those cases where the Contractor's quality standards establish more stringent quality requirements, the more stringent requirement shall prevail. Such standards are made a part hereof to the extent which is indicated or intended.

B. The inclusion of an organization under one category does not preclude that organization's standards from applying to another category.

C. In addition, all work shall comply with the applicable requirements of local codes, utilities and other authorities having jurisdiction.

D. All material and equipment, for which a UL Standard, an AGA or NSF approval or an ASME requirement is established, shall be so approved and labeled or stamped. The label or stamp shall be conspicuous and not covered, painted, or otherwise obscured from visual inspection.

E. The standards which apply to this Project are not necessarily restricted to those organizations which are listed in paragraph 1.02 of this Section.

1.02 STANDARD ORGANIZATIONS

A. Piping and Valves:

ACPA	American Concrete Pipe Association
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
AWWA	American Water Works Association
CISPI	Cast Iron Soil Pipe Institute
DIPRA	Ductile Iron Pipe Research Association
FCI	Fluid Controls Institute
MSS	Manufacturers Standardization Society
NCPI	National Clay Pipe Institute
NSF	National Sanitation Foundation
PPI	Plastic Pipe Institute

B. Materials:

AASHTO	American Association of State Highway and Transportation Officials
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials

C. Painting and Surface Preparation:

NACE	National Association of Corrosion Engineers
SSPC	Steel Structures Painting Council

D. Aluminum:

AA	Aluminum Association
AAMA	American Architectural Manufacturers Association

E. Steel and Concrete:

ACI	American Concrete Institute
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
CRSI	Concrete Reinforcing Steel Institute
NRMA	National Ready-Mix Association
PCA	Portland Cement Association
PCI	Pre-stressed Concrete Institute

F. Welding:

ASME	American Society of Mechanical Engineers
AWS	American Welding Society

G. Government and Technical Organizations:

APHA	American Public Health Association
APWA	American Public Works Association
ASCE	American Society of Civil Engineers
ASQC	American Society of Quality Control
ASSE	American Society of Sanitary Engineering
CFR	Code of Federal Regulations
CSI	Construction Specifications Institute
EPA	Environmental Protection Agency
FS	Federal Specifications
ISEA	Industrial Safety Equipment Association
ISO	International Organization for Standardization
ITE	Institute of Traffic Engineers
MUTCD	Manual of Uniform Traffic Control Devices

NBFU	National Board of Fire Underwriters
NFPA	National Fluid Power Association
NBS	National Bureau of Standards
OSHA	Occupational Safety and Health Administration
SPI	Society of the Plastics Industry, Inc.
USDC	United States Department of Commerce
WEF	Water Environment Federation

H. Roadways:

AREMA	American Railway Engineering and Maintenance–of-Way Association
GDOT	Georgia Department of Transportation

I. Plumbing:

AGA	American Gas Association
PDI	Plumbing Drainage Institute
SPC	SBCC Standard Plumbing Code

J. Equipment:

AFBMA	Anti-Friction Bearing Manufacturers Association, Inc.
AGMA	American Gear Manufacturers Association
OPEI	Outdoor Power Equipment Institute, Inc.
PTI	Power Tool Institute, Inc.

PART 2 PRODUCTS

(NOT USED)

PART 3 EXECUTION

(NOT USED)

+ + + END OF SECTION 01091 + + +

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SECTION 01200

MEASUREMENT AND PAYMENT

PART I – GENERAL

1.01 SCOPE

A. Work includes furnishing of all labor, tools, materials, and performing all operations required to complete the Work satisfactorily, in-place, as specified and as indicated on the Drawings.

B. All costs of required items of work and incidentals necessary for the satisfactory completion of the Work shall be considered as included in the Total Bid. The cost of work not directly covered by the pay items to include but not limited to mobilization, proposal and Record Document preparation, street plates (installation, maintenance and removal) shall be considered incidental to the contract and no additional compensation shall be allowed.

C. There shall be no special compensation consideration given for work performed after-hours, weekends or on holidays in the execution of the work.

D. The Contractor shall take no advantage of any apparent error or omission on the Drawings, Specifications, or within the Contract document. Submitted items for payment that can reasonably be construed as duplicate compensation or 'double dipping' in the evaluation of the pay applications will receive particular scrutiny. The City's Authorized Representative shall be permitted to make corrections and interpretations as deemed necessary for fulfillment of the intent of the Contract Documents.

E. Final payment shall not be released without the approval of all required Record Documents as approved by the City's Authorized Representative.

1.02 SUBMITTALS

A. Within 30 days of the Notice to Proceed, the Contractor shall submit to the City's Authorized Representative for approval, in the form directed or deemed acceptable to the City's Authorized Representative, a complete schedule of values of the various portions of the Work, including quantities and unit prices, aggregating the Contract Price. An unbalanced breakdown providing for overpayment to the Contractor on items of Work, to be performed first, will not be approved.

B. Submit application for payment on a form approved by the City's Authorized Representative. Form shall contain unit price items, lump sum items and allowance items in accordance with the Bid Schedule.

1.03 UNIT PRICE ITEMS

A. Payment for all work shall be in accordance with the unit price bid items contained in the Bid Schedule and shall be full compensation for all labor, materials, and equipment required to furnish, install, construct, restore in kind and test the Work covered under the unit price bid item. Work for which there is no price schedule item will be considered incidental to the Work and no additional compensation shall be allowed.

B. Payment will be made only for the actual quantities of Work performed in compliance with the Drawings and Specifications. The Contractor will be paid an amount equal to the approved quantity times the applicable unit price. Any unused balance of the unit price work shall revert to the City upon completion of the project.

C. Intentionally Omitted.

D. Payment shall include pick-up and return delivery of materials that are indicated to be provided by the City, items unused or items to be salvaged.

1.04 LUMP SUM ITEMS

A. Payment of lump sum items established in the Contractor's Bid shall be full compensation for all labor, materials, and equipment required to furnish, install, construct, restoration in kind, and test the Work covered under the lump sum bid items.

B. Payment of the lump sum items established in the Contractor's Bid shall also fully compensate the Contractor for any other work which is not specified or shown, but which is necessary to complete the Work.

C. The lump sum items shall be specifically subdivided by activity, broken-out in the Bid Schedule.

D. Payments for the lump sum items specifically broken-out in the Bid Schedule will be based upon physical progress for each activity in accordance with the breakdown of the Lump Sum prices agreed to in the Agreement Documents.

1.05 MEASUREMENT OF QUANTITIES

A. Final payment quantities shall be determined from the record drawings and daily reports. The record drawing lengths, dimensions and quantities, etc. shall be determined by a survey after completion of all required work. The precision of final

payment quantities shall match the precision shown for that item in the Bid Schedule. Measurements will be taken according to the United States standard measurements and in the manner as specified in these Specifications.

B. Measurement Devices:

1. Scales shall be inspected, tested, and certified by the applicable Weights and Measures Department within the past year and shall be of sufficient size and capacity to accommodate the conveying vehicle;

2. Metering devices shall be inspected, tested, and certified by the applicable department within the past year;

3. Volume shall be determined by cubic dimension by multiplying mean length by mean width by mean height or thickness, or by differences in surveyed surfaces, as agreed upon by City's Authorized Representative;

4. Area shall be determined by square dimension by multiplying mean length by mean width or height;

5. Linear measurement shall be measured by linear dimension, along the item centerline or mean chord;

6. Stipulated price measurement shall include items measured by number, weight, volume, area, length or combination thereof as appropriate:

Item	Method of Measurement
AC	Acre - Field Measure
AL	Allowance
BCY	Bank Cubic Yard – Field Measure in-situ excavation volumes within limits specified or shown
CY	Cubic Yard - Field Measure within limits specified or shown, or measured in vehicle by volume, as specified
CCY	Compacted Cubic Yard – Field Measure compacted fill volumes within limits specified or shown
EA	Each - Field Count
GAL	Gallon - Field Measure
HR	Hour
LB	Pound(s) - Weight Measure by Scale
LCY	Loose Cubic Yard - Field Measure within limits specified or shown, or measured in vehicle by volume, as specified
LF	Linear Foot - Field Measure
LS	Lump Sum - Unit is one; no measurement shall be made
SF	Square Foot – Field Measure
SY	Square Yard – Field Measure

TON Ton - Weight Measure by Scale (2,000 pounds)

C. General:

1. No separate or additional payment shall be made for the requirements contained in the General or Special Conditions of the Contract Documents. The cost for complying with these requirements shall be included in the unit price bid for the items to which they pertain.

2. No separate or additional payment shall be made for the requirements contained in the individual specification sections contained in the Technical Specifications of these Contract Documents. The cost for complying with these requirements shall be included in the unit price bid for the items to which they pertain.

3. No separate or additional payment shall be made for mobilization and demobilization of the Project Site. The cost for mobilization and demobilization shall be included in the unit price bid for the items to which it pertains.

1.06 SECTION 1 – UNIT PRICE BID ITEMS

Item 1 – Mobilization

A. The mobilization lump sum amount provided in the Bid is allowed by the City to defray some of the initial mobilization costs of the Contractor in the preliminary stages of the Project. These costs may include temporary facilities for Contractor and Engineer, temporary utilities, site planning, submittals and scheduling. The Mobilization lump sum is provided in the bid to cover the costs for project controls support as described in Section 01350, temporary facilities and controls described in Section 01500 as well as any miscellaneous facilities or support for City staff, described in the Contract Documents but not covered by a unit price item.

B. The Contractor shall not consider this entirely representative of its costs to be incurred prior to any other items of work becoming eligible for payment. The Contractor shall, however, consider this a limit of the City's obligation for any costs incurred prior to any actual work being performed on the Project site. Partial payments against the mobilization lump sum shall be based on actual invoices and other supporting information to document actual costs incurred. All of the lump sum mobilization dollar amounts not expended shall revert to the City at the completion of the project. Should the final mobilization costs be less than the specified amount for mobilization the remaining amount shall be credited to the City and the Contract will be adjusted accordingly by change order. The amount of change order will not recognize any changes in handling costs at the site, labor, overhead, profit and other expenses caused by the adjustment to the mobilization item. Any mobilization costs

anticipated or incurred by the Contractor in excess of the mobilization lump sum amount shall be included by the Contractor in its unit price bid items.

Item 2 – Permits

A. The lump sum amount provided in the Bid is allowed by the City to cover permitting costs as specified in the General and Special Conditions. Partial payments against the Permits lump sum shall be based on actual invoices and other supporting information to document actual costs incurred. Should the final permitting costs be less than the specified amount for permits the remaining amount shall be credited to the City and the Contract will be adjusted accordingly by change order. The amount of change order will not recognize any changes in handling costs at the site, labor, overhead, profit and other expenses caused by the adjustment to the permits item.

Item 3 – Security and Safety

A. The Contractor shall bid a lump sum amount, not to exceed 0.75 percent of the total bid for the project, less the total value of all allowances (Items 200-205), for Security and Safety as specified in Section 1540, Security and Safety. Any costs in excess of this amount the Contractor expects to incur for Security and Safety throughout the term of the project shall be considered as incidental to the various unit price items of work to be performed, and said excess shall be included within the amounts bid for those unit price items.

B. The City will pay the Contractor for Security and Safety in equal monthly installments. Each installment will equal the lump sum bid amount for Item 3 prorated over the term of the Contract. Payment will constitute full compensation for all work necessary to provide security and safety in accordance with the Specifications, including, but not limited to, labor and equipment, during the preceding month.

C. The City reserves the right to withhold payment for this item if either of the following events occur during the month for which payment is requested: 1) An OSHA Recordable accident for which the Contractor or any of his subcontractors or vendors is found at fault, 2) the Contractor receives a notice of non-compliance regarding its safety program.

Item 4 – Traffic Regulations

A. The Contractor shall bid a lump sum amount, not to exceed 3.00 percent of the total bid for the project, less the total value of all allowances (Items 200-205), for Traffic Regulation as specified in Section 01550, Traffic Regulation, or as shown on the Drawings. Any costs in excess of this amount the Contractor expects to incur for Traffic Regulation throughout the term of the project shall be considered as incidental to the various unit price items of work to be performed, and said excess shall be included within the amounts bid for those unit price items.

B. The amount bid shall include any requirements for off-duty police traffic control, as well as design, submittal review, operation and maintenance manual submission, storage handling or testing costs specified in Section 1550, Traffic Regulations. Payment for materials and

installation of traffic signal equipment shall be under the Replacement and Repair of Traffic Control Devices Allowance.

C. The City will pay the Contractor for Traffic Regulation in equal monthly installments. Each installment will equal the lump sum bid amount for Item 4 prorated over the term of the Contract. Payment will constitute full compensation for all work necessary to provide Traffic Regulation in accordance with the Plans and Specifications, including, but not limited to, labor and equipment, during the preceding month.

Item 5 – Erosion and Sediment Control Monitoring Plan

A. The Contractor shall bid a lump sum amount, not to exceed 0.20 percent of the total bid for the project, less the total value of all allowances (Items 200-205), for an Erosion and Sediment Control Monitoring Plan as specified in Section 02125 Temporary and Permanent Erosion and Sedimentation Control, or as shown on the Drawings, or as directed by the Engineer. Any costs in excess of this amount the Contractor expects to incur for the Erosion and Sediment Control Monitoring Plan throughout the term of the project shall be considered as incidental to the various unit price items of work to be performed, and said excess shall be included within the amounts bid for those unit price items.

B. The amount bid shall include work required to develop the Erosion and Sediment Control Monitoring Plan, implement erosion and sedimentation control monitoring as required by the plan, and submit any necessary documentation associated with the plan to the City of Atlanta's Department of Watershed management and State of Georgia including the Notice of Intent. Payment for construction exits, check dams, disturbed area stabilization-mulching, disturbed area stabilization-temporary seeding, retrofitting, sediment barrier, inlet sediment traps, temporary sediment basins and storm drain outlet protection will be made under Bid Items 11 through 16.

C. The City will pay the Contractor for the Erosion and Sedimentation Control Monitoring Plan in equal monthly installments. Each installment will equal the lump sum bid amount for Item 5 prorated over the term of the Contract. Payment will constitute full compensation for all work necessary to provide a complete Erosion and Sedimentation Control Monitoring Plan in accordance with the Plans and Specifications, including, but not limited to, labor and equipment, during the preceding month.

Item 6 – Removal of Trees Greater than 12-inches

A. Measurement for payment for the removal of trees greater than 12 inches in diameter shall be on a per Each basis. All other clearing and grubbing and site preparation work required for removal of trees greater than 12 inches shall be considered as an integral part of the Work and no separate measurement and payment will be made unless specified otherwise in other sections of these Specifications. All clearing, grubbing and removal of trees smaller than or equal to 12 inches in diameter shall be considered an integral part of the Work and no separate measurement and payment will be made. Payment will be per each tree greater than 12 inches

removed. Payment will constitute full compensation for all work necessary for complete femoral of trees in accordance with the Plans and Specifications, including, but not limited to, labor, materials and equipment

Item 7 – Rock Excavation

A. Measurement for payment for rock excavation shall be on a per cubic yard basis. Payment will constitute full compensation for all work necessary for rock excavation in accordance with the Plans and Specifications, including, but not limited to, labor, materials arid equipment

B. For pipeline excavation, the volume of rock excavation shall be calculated by multiplying trench width times the horizontal distance along the survey centerline times vertical height of rock excavation.

C. For all other structures including manholes, maximum width shall be 24 inches beyond each edge of the completed structure. Depth for payment purposes shall be no deeper than 12 inches below the bottom of the manhole or structure.

D. No payment will be made for rock excavation below the required grade or outside the width pay limits as specified under paragraph Section 02225- Trench Excavation and Backfilling.

E. Payment shall include the cost of removal and disposal of the rock from the site.

F. Payment for rock excavation associated with trenchless pipe installation (items 17) shall be considered incidental to the respective work.

Item 8 – Flowable Fill

A. Measurement for payment for Flowable Fill if called for in the Plans or ordered or approved by the Engineer shall be paid for by the cubic yard. The payment volume shall be calculated by multiplying the allowable trench width pursuant to Section 02510 Asphalt Paving times the length of the trench to be filled measured along the centerline as indicated in the Plans times the vertical depth. Payment will constitute full compensation for all work necessary to install the material, including, but not limited to, the purchase, delivery to the work site, on-site storage, delivery to the work areas, surface preparation, placement and cleanup, labor and equipment required for the handling and installation of the product.

Item 9 – Contaminated Soil Removal

A. Measurement for payment for hydrocarbon contaminated soil removal shall be on a per Ton basis. Payment will be made based on the actual weight of material removed including all labor, equipment supplies, sampling analyses, transportation and disposal and all other cost necessary to complete the Work. Payment will constitute full compensation for all work necessary for

contaminated soil removal and disposal, including, but not limited to, labor, materials, equipment, and disposal.

Item 10 – Construction Exit

A. Measurement for payment of construction exits will be on a per each basis. Payment will constitute full compensation for all work necessary to construct construction exits, including, but not limited to, the purchase, delivery to the work site, on-site storage, delivery to the work areas, surface preparation, placement and cleanup, labor and equipment required for the handling and installation of the product in accordance with the requirements of the Manual for Erosion and Sediment Control in Georgia, current version.

Item 11 – Disturbed Area Stabilization – Mulching

A. Measurement for payment of disturbed area stabilization — mulching will be on a per square yard basis. Payment will constitute full compensation for all work necessary to stabilize the disturbed areas with mulch, including, but not limited to, the purchase, delivery to the work site, on-site storage, delivery to the work areas, surface preparation, placement and cleanup, labor and equipment required for the handling and installation of mulch stabilization in accordance with the requirements of the Manual for Erosion and Sediment Control in Georgia, current version.

Item 12 – Disturbed Area Stabilization – Seeding

A. Measurement for payment of disturbed area stabilization- temporary seeding will be on a per square yard basis. Payment will constitute full compensation for all work necessary to stabilize disturbed areas by temporary seeding, including, but not limited to, the purchase, delivery to the work site, on-site storage, delivery to the work areas, surface preparation, placement and cleanup, labor and equipment required for the handling and installation of temporary seeding in accordance with the requirements of the Manual for Erosion and Sediment Control in Georgia, current version.

Item 13 – Sediment Barrier, Type C

A. Measurement for payment of Sediment Barrier will be on a per linear foot basis. Payment will constitute full compensation for all work necessary to install all types of sediment barriers, including, but not limited to, the material purchase, delivery to the work site, on- site storage, delivery to the work areas, surface preparation, placement and cleanup, labor and equipment required for the handling and installation of sediment barriers in accordance with the requirements of the Manual for Erosion and Sediment Control in Georgia, current version.

Item 14 - Inlet Sediment Trap

A. Measurement for payment of Inlet Sediment Trap will be on a per each basis. Payment will constitute full compensation for all work necessary to install inlet sediment traps, including, but

not limited to, the purchase, delivery to the work site, on-site storage, delivery to the work areas, surface preparation, placement and cleanup, labor and equipment required for the handling and installation of inlet sediment traps in accordance with the requirements of the Manual for Erosion and Sediment Control in Georgia, current version.

Item 15 - Storm Drain Outlet Protection

A. Measurement for payment of Storm Drain Outlet Protection will be on a per each basis. Payment will constitute full compensation for all work necessary to install the material, including, but not limited to, the purchase, delivery to the work site, on-site storage, delivery to the work areas, surface preparation, placement and cleanup, labor and equipment required for the handling and installation of the product in accordance with the requirements of the Manual for Erosion and Sediment Control in Georgia, current version.

Item 16 – Construct and Remove Block and Gravel Inlet Protection

B. Measurement for payment of Block and Gravel Inlet Protection will be on a per each basis. Payment will constitute full compensation for all work necessary to install inlet sediment protection, including, but not limited to, the purchase, delivery to the work site, on-site storage, delivery to the work areas, surface preparation, placement and cleanup, labor and equipment required for the handling and installation of inlet sediment traps in accordance with the requirements of the Manual for Erosion and Sediment Control in Georgia, current version.

Item 17 – Install SD1 Type B Compost Filter Sock

A. Measurement for payment of Compost Filter Sock will be on a per linear foot basis. Payment will constitute full compensation for all work necessary to install all types of sediment barriers, including, but not limited to, the material purchase, delivery to the work site, on- site storage, delivery to the work areas, surface preparation, placement and cleanup, labor and equipment required for the handling and installation of sediment barriers in accordance with the requirements of the Manual for Erosion and Sediment Control in Georgia, current version.

Item 18 - Trenchless Pipe Installation, 84" Steel Casing, 54" Ductile Iron Carrier Pipe

A. Measurement for payment for Trenchless Pipe Installation shall be on a linear foot basis. Payment will constitute full compensation for all work necessary for a complete installation including, but not limited to, labor, materials and supplies, and equipment required for the handling and installation of the casing and carrier pipe, access and receiving shafts, shaft support, shoring and bracing removal, groundwater control, annular space fill, spacers, casing end plugs and other associated materials, and surface settlement monitoring, on-site storage, delivery to the work areas, site preparation, restoration and cleanup.

Item 19 - Install Cleanout and Reconnect Service Lateral to Existing Combined Sewer

A. Measurement for payment for Service Lateral Reconnection to Existing Combined Sewer shall be on a per each basis. Payment will constitute full compensation for all work necessary for a complete installation, including, but not limited to, labor and equipment required for the

installation of the service lateral reconnection to existing combined sewers, excavation, provision of full- bodied ductile iron tees, vitrified clay wyes or service saddles and the connection of new service line described below to combined sewer using same, installation of cleanout including up to 10' of 6" PVC or vitrified clay piping, associated fittings as shown on standard details and connection of new service line to existing house connection, testing including dye testing, backfill and cleanup.

B. Any saw cutting of asphalt pavement excavation, removal and disposal of asphalt or concrete pavements and excavated material, trench foundation, backfill, or cleanup associated with the reconnection of the service lateral to the existing combined sewer shall be considered incidental to this work. Service lateral Reconnection to an existing combined sewer shall also include the disconnection of existing services, and removal and disposal of existing sanitary sewer service lateral that will no longer be used as incidental to the work.

Item 20 - Service Lateral from Ex. Combined Sewer to Property Line

A. Measurement for payment for Service Line from Sanitary Sewer to Property Line shall be on a per linear foot basis. Payment will constitute full compensation for all work necessary for a complete installation, including, but not limited to, labor and equipment required for the installation of the service line from existing combined sewer to property line, saw cutting asphalt pavement, excavation, removal and disposal of asphalt or concrete pavements and excavated material, trench foundation, installation of new 6" PVC or vitrified clay piping not provided under Item xx, Sanitary Sewer Service Lateral Reconnection to Existing Combined Sewer, fittings, backfill, testing and cleanup.

B. No additional payment will be made for saw cutting of pavement due to pavement thickness or material changes.

Item 21 - Grout Fill of Abandoned Storm Pipe, 8" - 15" Diameter

A. Measurement for payment for grout fill of abandoned sewer lines shall be on a linear foot basis. Payment will constitute full compensation for all work necessary for a complete in place grout fill, including all labor, material, and equipment required for grout fill of abandoned sewers.

Item 22 - Abandonment of Existing Manholes

A. Measurement for payment for the abandonment of combined sewer manholes shall be on a per each basis. Payment will constitute full compensation for all work necessary for abandonment of existing manholes, including all labor, material, and equipment. No separate payment shall be made for stone aggregate backfill used in filling the abandoned manholes.

Item 23 - Abandonment of Ex. Storm Lines

A. Measurement for payment for removal and backfill of abandoned storm lines shall be on a linear foot basis. Payment will constitute full compensation for all work necessary for removal and backfill of sewer lines, including all labor, material and equipment including

but not limited to excavation, removal of the existing sewer, backfilling, compaction, testing, and cleanup.

Items 24 to 25, 8" – 12" Push on Joint Ductile Iron Water Main, 0'-4' of Cover

A. Measurement for payment of furnishing and installing ductile iron water distribution pipe will be on a linear foot basis as determined by measurement along the centerline of the pipe in-place. Payment will constitute full compensation for all work necessary for installation of ductile iron water distribution pipe, including but not limited to furnishing, transporting, storing, and installing the pipe, ground penetrating radar pipe location along the pipeline route, saw cutting asphalt pavement, excavation, removal and disposal of asphalt or concrete pavements and excavated material, excavation support system, utility support system, dewatering, temporary water service, backfilling and compaction, cleaning, testing, and all other specified work.

B. Depth of installation is as indicated on the drawing details, or defined in the specifications, or as directed by the Engineer. Excavation is unclassified.

Items 26 to 27, 8"-12" Diameter Push on Joint Ductile Iron Water Main, Addition for Deeper Bury, 4'-10' of Cover

A. Measurement for payment of Ductile Iron Water Distribution Pipe, Push On Joint (size) Diameter, Addition for Deep Bury, 4'—10' Deeper will be on a per linear foot basis. Payment for installing water main pipe at a lower grade than indicated will be based upon the actual depth as instructed by the Engineer, in accordance with the provisions of the contract documents. Payment for water main installed at depths greater than that shown in the drawings will be made in addition to the unit prices in this section. Payment will constitute full compensation for labor, materials, and equipment necessary to install the water distribution pipe at a depth greater than 4 feet.

B. Depth of installation is as indicated on the drawing details or defined in the specification, or as directed by Engineer. Excavation is unclassified.

Item 28 - Furnish and Install Ductile Iron Mechanical Fittings, 6"-12" Diameter

A. Measurement for payment to furnish and install ductile iron fittings shall be at the unit price bid per ton for such fittings furnished. Weight shall be based on published weights provided by the fitting manufacturer. Payment for furnishing and installing fittings shall constitute full compensation for all work required to furnish and install the fittings, including but not limited to: providing and installing joint restraint; purchasing, transporting, storing, and delivering to the worksite necessary materials; tools; equipment; labor; excavation; dewatering; backfilling; compaction; site restoration, and cleanup.

Items 29 to 30, 8" -12" Mechanical Joint Gate Valve and Valve Box

A. Measurement for payment to furnish and install gate valves (6"-12") will be on a per each basis. Payment will be based upon actual quantity, of each valve furnished and installed in accordance with the requirements of the Contract Documents. Payment will constitute full compensation for all work necessary to install the valves, including, but not limited to, the purchase, delivery to the work site, on-site storage, delivery to the work areas, surface preparation, placement and cleanup, including valve box, extension, and concrete collar, if required.

Items 31 to 34, Transfer 3/4-inch to 2-inch Water Service

A. Measurement for payment for water service transfer will be on a per each basis for the actual number of water services transferred from an existing water main to a new, relocated water main. Payment for water service transfer shall constitute full compensation for the complete transfer of the water service from the main to the meter; the meter shall not be relocated. This item shall include all fittings piping, restoration, to transfer the service, including pressure testing and disinfection, including connection to the meter. Work shall be performed by a licensed plumber.

Item 35 to 38, Relocation of Existing Water Service 3/4 -inch to 2"

A. Measurement for payment for water service relocation is on a per each basis. Payment will constitute full compensation for all work necessary to relocate the service including relocation of the water meter, including, but not limited to, the purchase, delivery to the work site, on-site storage, delivery to the work areas, surface preparation, placement and cleanup, required for the complete relocation of the water service from the main to the property line. The existing meter shall be reset as directed by the Engineer. This item shall include all fittings, piping, and restoration, to relocate the service, including removal of the existing service, pressure testing and disinfection, including connection to the relocated meter. Work shall be performed by a licensed plumber.

Items 39 to 42, Furnish and Install Copper Piping, 3/4-inch to 2-inch

A. Measurement for payment to furnish and install copper pipe for water service will be on linear foot basis determined by measurement along the centerline of the pipe in-place, Payment for furnishing and installing copper piping shall constitute full compensation for all work required to furnish and install the pipe, including but not limited to materials, tools, equipment, labor, excavation, dewatering, backfilling, compaction, transporting, storing, and cleanup.

B. Depth of installation is as indicated on the drawing details, or defined in the specifications, or as directed by the Engineer. Excavation is unclassified.

Item 43 - Furnish and Install Fire Hydrant Assembly, New Main

A. Measurement for payment for furnishing and installing fire hydrant assemblies shall be at the unit price bid per each and shall include but is not limited to transporting, storing,

furnishing, and installing. Payment for furnishing and installing fire hydrant assemblies will be made at the unit price per each and shall constitute full compensation for the construction of fire hydrant assemblies, complete, including fire hydrant, fire hydrant extensions, tee, 4 linear feet of 6" restrained joint ductile iron piping, valves and valve boxes, concrete collars and thrust blocks, gravel pockets and all fittings as shown Details W- I, W-2 and W-3.

Items 44 to 46, Furnish and Install Cut-In Tee and Valve to 6" -12" Ductile Iron Pipe

A. Measurement for payment to furnish and install cut-in tee and valves will be based upon actual quantity each, of tee and valves furnished, installed and tested, in accordance with the requirements of the Contract Documents. Payment for furnishing and installing cut-in tee and valves will be made at the unit price per each and shall constitute full compensation for the complete installation of the cut-in, valve and valve box.

Items 47 to 49, Cut and Plug Existing 6"-12" Water Main

A. Measurement for payment of cutting, plugging and abandonment of existing water mains will be per each. Payment for abandoning existing water mains and installing caps will be made at the unit price per each, and shall constitute full compensation for all labor, materials and supplies required to cut and plug existing water mains.

Items 50 to 70, Furnish and Install Reinforced Concrete Pipe, Class III, 18" – 54" Diameter

A. Measurement for payment for reinforced concrete storm pipe will be per linear foot as measured from centerline of manhole to centerline of manhole or centerline of inlet to centerline of inlet. Payment shall be full compensation for furnishing all labor, tools, equipment, materials, and incidental necessary to complete the reinforced concrete pipe installation work.

B. Payment shall be full compensation for all labor, materials, equipment, tools, and incidentals necessary to complete the Work in accordance with the Plans and Specifications, including, ground penetration radar pipe location along the storm pipe route, saw cutting asphalt pavement, excavation, removal and disposal of asphalt or concrete pavements and excavated material, excavation support system, utility support system, connections to manholes/junction boxes/inlets, flow diversion, trench foundation, pipe, backfill material, backfilling compaction, dewatering, testing and associated work, complete and in place.

C. No additional payment will be made for saw-cutting of pavement due to pavement thickness or material changes.

Items 71 to 72, Furnish and Install Ductile Iron Pipe, PC 350, 54" Diameter

A. Measurement for payment for ductile iron pipe will be per linear foot as measured from centerline of manhole to centerline of manhole. Payment shall be full compensation for

furnishing all labor, tools, equipment, materials, and incidental necessary to complete the ductile iron pipe installation work.

B. Payment shall be full compensation for all labor, materials, equipment, tools, and incidentals necessary to complete the Work in accordance with the Plans and Specifications, including, ground penetration radar pipe location along the storm pipe route, saw cutting asphalt pavement, excavation, removal and disposal of asphalt or concrete pavements and excavated material, excavation support system, utility support system, connections to manholes/junction boxes/inlets, flow diversion, trench foundation, pipe, backfill material, backfilling compaction, dewatering, testing and associated work, complete and in place.

C. No additional payment will be made for saw-cutting of pavement due to pavement thickness or material changes.

Items 73 to 74, Furnish and Install Storm Inlet, GDOT 1033F - 1034F, 0'-6' Deep

A. Measurement for payment of new storm sewer inlet structure shall be on a per each basis. Payment will constitute full compensation for all work necessary to install the storm sewer inlet structure, including, but not limited to, the purchase, delivery to the work site, on-site storage, delivery to the work areas, and site excavation preparation, placement, backfill, and cleanup.

Item 75 to 76, Furnish and Install Storm Inlet, GDOT 1033F and 1034F, Greater than 6' Deep

A. Measurement for payment for storm inlet greater than 6vertical feet in height shall be per vertical foot installed. Payment will be made only for the portion of the total depth in excess of 6'. Total depth shall be measured from the invert of the storm pipe to the top of the inlet. Payment for storm inlet (greater than 6 ft. depth) shall be full compensation for furnishing all labor, materials and supplies, and equipment necessary to complete installation of inlet assemblies greater than 6 ft. in vertical height.

Items 77 to 79, Pre-cast Concrete Manhole Installation, 48" -72" Diameter Base, 0 feet to 10 feet depth

A. Measurement for payment for precast concrete manholes (0 to 10 ft. depth) shall be per each. Payment for precast concrete manholes shall be full compensation for furnishing all labor materials and supplies, and equipment for installation of complete manhole assemblies excluding the manhole frames and covers. Work includes, but is not limited to: excavation and site preparation; purchase and delivery to the work site of a new precast concrete manhole assembly, complete excluding frame and cover, including manhole steps, manhole tees, saddles, manhole base, barrel, and cone; installation of the assembly; construction of the invert; testing; backfill; and cleanup.

B. The cost for flexible manhole sleeves (boots) with stainless steel clamps and bolt *assemblies* as well as bitumastic coated steel strap anchors shall be included in the cost for manholes.

Item 80 to 82, Pre-cast Concrete Manhole Riser, 48" – 72" Diameter, greater than 10 feet

B. Measurement for payment for Precast Concrete Manholes greater than 10 vertical feet in height shall be per vertical foot installed. Payment will be made only for the portion of the total depth in excess of 10'. Total depth shall be measured from the invert of the sewer to the top of the manhole cone, or from the top of the saddle to the top of the manhole cone. This unit item shall also be used for manhole height adjustments greater than 16 inches. Payment for precast concrete manholes (greater than 10 ft. depth) shall be full compensation for furnishing all labor, materials and supplies, and equipment necessary to complete installation of manhole assemblies greater than 10 ft. in vertical height.

C. The cost for flexible manhole sleeves (boots) with stainless steel clamps and bolt assemblies as well as bitumastic coated steel strap anchors shall be included in the cost for manholes.

Item 83 Pre-cast Concrete Junction Box, 4' x 4', Height 5.5'

A. Measurement and payment for pre-cast concrete junction box shall be per each basis at the specified height. Payment will constitute full compensation for all labor, material and supplies necessary to install the storm structure, including but not limited to the flat transition slab, frame and cover.

Item 84 – Pre-cast Concrete Junction Box, 5' x 5', Height 7.5'

A. Measurement and payment for pre-cast concrete junction box shall be per each basis at the specified height. Payment will constitute full compensation for all labor, material and supplies necessary to install the storm structure, including but not limited to the flat transition slab, frame and cover.

Item 85 – Pre-cast Concrete Junction Box, 5' x 5', Height 6.0'

A. Measurement and payment for pre-cast concrete junction box shall be per each basis at the specified height. Payment will constitute full compensation for all labor, material and supplies necessary to install the storm structure, including but not limited to the flat transition slab, frame and cover.

Item 86 - Furnish and Install Manhole Frame and Cover

A. Measurement for payment for manhole frames and covers shall be per each. Payment for manhole frame and covers shall be full compensation for furnishing all labor, materials and supplies and equipment, for the installation of the manhole frame and cover, complete.

Item 87 to 88, Type B Base for Permanent Asphalt Pavement Replacement

A. Measurement for payment for Type B Base for Permanent Asphalt pavement replacement shall be per square yard, determined by multiplying the longitudinal length of the pavement cut times the specified payment width of the trench pursuant to Section 02510 Asphalt Paving. Payment will be full compensation for furnishing all labor, materials, tools, and equipment necessary to install Type B Base for Permanent Asphalt Pavement Replacement and shall include furnishing, hauling, preparation and placement of Type B base materials and prime coat for permanent asphalt paving. Pavement thickness shall be as shown on the standard details.

B. Any pavement damaged outside the payment width shall be repaired as specified in Section 02705 Removing and Replacing Pavement and no additional payment will be allowed for such work outside the payment width.

Item 89 - Type E Topping for Permanent Asphalt Pavement Replacement

A. Measurement for payment for Type E Topping for Permanent asphalt pavement replacement shall be per square yard, determined by multiplying the longitudinal length of the pavement to be replaced by the specified payment width. Payment will be full compensation for furnishing all labor, materials, tools, and equipment necessary to install Type E Topping for Permanent Asphalt Pavement and shall include furnishing, hauling, surface preparation and placement of Type E Topping and tack coat for permanent asphalt paving.

B. Any installation or removal of temporary asphalt or crushed stone paving required shall be considered incidental to the permanent paving work. Pavement thickness shall be as shown on the standard details.

Item 90 to 91, Concrete Curb and Concrete Curb and Gutter

A. Measurement for payment of concrete curb and gutter, concrete curb, or granite curb and concrete valley gutter shall be made on a per linear foot basis.

B. Payment will constitute full compensation for all work necessary to install the curb and gutter, including, but not Limited to, the purchase, delivery to the work site, on-site storage, delivery to the work areas, excavation, backfilling, compaction, placement, disposal of existing materials. all joints, all special construction at driveways and other entrances or points, and cleanup. Payment shall include all approaches through curb and gutter indicated on the Plans.

Item 92 - Concrete Sidewalk

A. Measurement for payment for concrete sidewalk replacement shall be per square yard. Payment will be full compensation for furnishing all labor, materials, tools, and equipment

necessary to install concrete sidewalk and shall include: excavation; backfilling; compaction; disposal of existing materials; all joints; all special construction at driveways or other entrances and points; hauling and placing materials; and incidentals necessary to complete the work. Payment shall include all approaches through curb and gutter indicated on the Plans.

Item 93 - Wheelchair Ramps

A. Measurement for payment for wheelchair ramps shall be per square yard. Payment will be full compensation for furnishing all labor, materials, tools, and equipment necessary to install wheelchair ramps including saw cut, removal and disposal of existing concrete, site preparation, hauling and placing materials, joint installation, and cleanup.

Item 94 - New Granite Curb

A. Measurement for payment of new granite curb shall be made on a per linear foot basis. Payment will constitute full compensation for all work necessary to install the new granite curb, including, but not limited to, the purchase, delivery to the work site, on-site storage, delivery to the work areas, removal and disposal of the existing granite curb, site preparation, and the installation of new granite curb, placement of joints, and cleanup.

Item 95 to 96, Driveways, Commercial and Residential

A. Measurement for payment for new concrete driveway, residential and commercial shall be per square yard. Payment will be full compensation for furnishing all labor, materials, tools, and equipment necessary to install driveways including saw cut, removal and disposal of existing concrete driveway sections, forming, delivering to the worksite, placing and finishing concrete for new driveway sections, and clean up.

B. No extra compensation will be made for provision and maintenance of temporary paving. No separate measurement and payment will be made for any materials equipment or labor associated with steel plate bridging.

C. No separate measurement and payment will be made for items associated with temporary patch paving.

D. No additional payment will be made for saw-cutting of pavement due to pavement thickness or material changes.

Item 97 - Pavement Milling

A. Measurement for payment for pavement milling shall be per square yard. Payment will be full compensation for furnishing all labor, tools, and equipment necessary for pavement milling including, removal and disposal of pavement.

B. The depth of milling will range from zero (0) inches measured at the roadway centerline to a depth

of three (3) inches measured at each edge of pavement. The Engineer shall determine the section(s) of roadway that will require pavement milling.

Item 98 to 103, Pavement Markings

A. Measurement for payment for furnishing and installing pavement markings will be per linear foot as determined by measurement along the centerline of the pavement markings in-place, in accordance with the requirements of the Specifications. Removal of temporary pavement markings is considered incidental. Payment will be full compensation for pavement markings, including furnishing all labor, materials, tools, and equipment necessary for the installation of new pavement markings.

B. Locations and quantities of such existing pavement markings, to be restored, shall be verified with the ENGINEER prior to disturbing the existing pavement markings.

Item 104 to 111, Thermoplastic Directional Arrow, Stop Bars, Cross Bars, and School Zone Text

A. Measurement for payment for cross bars, school zone text and directional arrows shall be per each. Payment shall constitute full compensation for all labor, materials and equipment necessary to complete the work including clean up

Item 112 - Topsoil

A. Measurement for payment for topsoil shall be per cubic yard. Payment shall constitute full compensation for all labor, materials and equipment necessary to place topsoil, including excavation hauling, placement, and finish grading of all topsoil furnished.

B. Topsoil will only be paid for when unavailable or in insufficient quantities at the site of the Work as determined by the Engineer.

C. Payment will be made only for topsoil imported to the site of the Work.

D. No payment shall be made for topsoil stripped from the site of the Work.

Item 113 - Fine Grading, Cleanup, Seeding and Fertilization of Right-of-Way

A. Measurement for payment for fine grading, cleanup, seeding, and fertilization of right-of-way will be on a linear foot basis. Payment shall constitute full compensation for all labor, materials and equipment necessary to complete the work.

B. No additional compensation will be allowed for disposition of material and structures encountered in the Work.

Item 115 - Class B Unreinforced Concrete

A. Measurement for payment of Class B unreinforced concrete will be made on a cubic yard basis. Concrete will not be measured and paid for separately when included in another item of work for which payment is based on units of length or area. Payment will constitute full compensation for all work necessary to install the unreinforced concrete, including, but not limited to the purchase, delivery to the work site, on-site storage, and delivery to the work areas; site preparation; placement of formwork and concrete; and cleanup.

B. Payment for concrete encasement of water and sewer lines shall be calculated by multiplying the specified trench width times the longitudinal distance measured along the center line as indicated in the Plans times the depth from twelve (12) inches above the pipe barrel to twelve (12) inches below the pipe barrel.

Item 116 - Sod

A. Measurement for payment for sod will be per square yard basis. Payment shall constitute full compensation for all labor, materials and equipment necessary to place sod, including ground preparation, furnishing and placing all mulch, sod, fertilizer, and water to create a satisfactory stand.

Item 117 - Seeding

A. Measurement for payment for seeding will be per square yard bas›s. Payment shall constitute full compensation for all labor, materials and equipment necessary to complete seeding, including ground preparation, furnishing and placing all mulch, seed, fertilizer and water to create a satisfactory stand.

Item 118 - Documentation Program

A. The Contractor shall bid a lump sum amount, not to exceed 3.00 percent of the total bid for the project, less the total value of all allowances (Items 200-205), for a Documentation Program. Any costs in excess of this amount the Contractor expects to incur for the Documentation Program throughout the term of the project shall be considered as incidental to the various unit price items of work to be performed, and said excess shall be included within the amounts bid for those unit price items.

B. The Documentation Program bid item is included in the bid to cover, in whole or in part, the costs for pre and post construction surveys and inspection as described in SC-1, detection of movement as described in SC-7, utility location and coordination as described in SC-8, project meetings as described in SC-15, maintenance of the construction schedule as described in SC-16, surveying, and record drawing maintenance as described in Section 01720 Record Documents, construction photographs as described in Section 01320, project documentation tracking and control systems as described in Section 01350, construction staking as described in Section 01055, and any other specific requirements for documentation described in the Contract Documents.

C. The City will pay the Contractor for the Documentation Program in equal monthly

installments. Each installment will equal the lump sum bid amount for Item 111 prorated over the term of the Contract. Payment will constitute full compensation for all work necessary to provide project documentation in accordance with the Specifications, including, but not limited to, labor, materials, and equipment, during the preceding month.

Item 119 - Tree Restoration in Right-of-Way

A. Measurement for payment for tree restoration in the right of way will be on a per Each basis. Payment shall constitute full compensation for all labor, materials and equipment necessary to complete the work, including ground preparation, staking, as well as furnishing and placing all mulch, trees, staking, seed, fertilizer and water.

1.07 SECTION 2 - ALLOWANCES

A. The allowances specified in the Bid Schedule are to establish a fund to pay the cost of items for which the City could not establish accurate quantities and/or detailed scope of work. This work shall be completed only at the written direction of the Engineer, and the cost of such work shall be approved prior to performance of the work.

B. The Contractor shall be responsible for the payment for these services to the appropriate payee providing such service and shall submit evidence of payments to the Engineer prior to its inclusion in the progress payments.

C. Payment will be made for invoices submitted by the Contractor subject to the Contract Documents. Contractor will not receive any additional compensation for bond or insurance costs for work executed using allowance funding.

D. Allowance allocations shall only be paid to the Contractor for completed work authorized by the Engineer. All allowance dollar amounts not expended shall revert to the City at the completion of the project. Should the final allowance costs be less than the specified amount of the allowance the Contract will be adjusted accordingly by change order The amount of change order will not recognize any changes in handling costs at the site, labor, overhead, profit and other expenses caused by the adjustment to the allowance item.

Item 200 - Owner Controlled Contingency

A. An allowance has been established as the value of this item. This allowance shall be used to pay the costs, where the amounts are determined in GC-41.2.4, Force Account Work. This allowance will be used to cover any additional Engineer directed work necessitated as part of this project which is not shown on the drawings or covered by the included in the unit price bid item.

Item 201, City Directed Site Restoration

A. An allowance has been established as the value of this item. This allowance shall be used to pay the costs, where the amounts are determined as specified in General Condition Article GC-41.2.4, Force Account Work for additional site restoration work on private property not shown on the drawings or described in the specifications as directed by the Engineer.

B. The costs of final grading, site restoration consisting of grassing, shrub, and tree plantings, and maintenance thereof, shown in the Drawings and/or required by the Specifications are not covered in this allowance item, and are to be included in the appropriate unit price Bid Items. The re-grassing or re-sodding of property disturbed by the Contractor as well as the restoration of the landscaping and, structures are pan of the Contractor's unit price bid amounts under the appropriate items.

Item 202 - Concrete or Rock Excavation

A. An allowance has been established as the value of this item. The allowance shall be used to pay for costs, where the amounts are determined as specified in General Conditions Article GC-41.2.4, Force Account Work for Concrete or Rock Excavation as directed by the Engineer in excess of the estimated quantity as specified in Item 8, Rock Excavation.

Item 203 - Unforeseen Conditions

A. An allowance has been established as the value of this item. This allowance shall be used to pay the costs, where the amounts are determined as specified in General Condition Article GC-41.2.4, Force Account Work for Utility Conflicts as directed by the Engineer. This allowance will be used to pay the cost of: relocating utilities or other structures, not shown on the Drawings, or reasonably anticipated based upon a pre-bid inspection of project conditions and the work site; additional work to resolve unforeseen utility conflicts; or demolishing structures not shown on the Drawings.

B. Where areas of hydrocarbon contaminated soil have been identified, these have been noted on the drawings. The costs associated with the remediation of these areas have been identified under Section 1, Bid Item No. X, Contaminated Soil Removal on the Bid Schedule

Item 204 - Partnering Session

A. An allowance has been established as the value of this item. This allowance will be used to pay for the City's share of the costs for Partnering as specified in the Special Conditions. The City will select the Consultant to be used for this purpose.
B. The other 50 percent of this cost shall be the Contractor's expense.

+++++END OF SECTION 01200+++++

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SECTION 01260

CONTRACT MODIFICATION PROCEDURES

PART 1 GENERAL

1.01 SCOPE

A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

1. Owner may, in anticipation of possibly ordering an addition, deletion or revision to the Work, request Contractor to prepare a proposal of cost and times to perform Owner's contemplated changes in the Work. Contractor's written proposal shall be transmitted to the City's Authorized Representative promptly, but not later than fourteen calendar days after Contractor's receipt of Owner's written request and shall remain a firm offer for a period not less than sixty days after receipt by Engineer.
2. Contractor is not authorized to proceed on an Owner contemplated change in the Work prior to Contractor's receipt of a Change Order (or Work Change Directive) incorporating such change into the Work.
3. Owner's request for proposal or Contractor's failure to submit such proposal within the required time period will not justify a claim for an adjustment in Contract Price or Contract Time (or Milestones).
4. The Owner shall not be liable to the Contractor for any costs associated with the preparation of proposal associated with the Owner's contemplated changes in the Work.

B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made.

C. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented, except in the case of an emergency or in the case of uncovering Work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 EXECUTION OF CHANGE ORDERS

A. Owner and Contractor shall execute appropriate Change Orders recommended by the City's Authorized Representative covering:

1. changes in the Work which are: (i) ordered by Owner, (ii) required because of acceptance of defective Work or Owner's correction of defective Work, or (iii) agreed to by the parties;
2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and
3. changes in the Contract Price or Contract Times which embody the substance of any written
4. decision rendered by Engineer; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and
5. Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule.

B. In signing a Change Order, the Owner and Contractor acknowledge and agree that:

1. The stipulated compensation (Contract Price or Contract Time, or both) set forth in the Change Order includes payment for:
   a. the Cost of the Work covered by the Change Order,
   b. Contractor's fee for overhead and profit,
   c. interruption of Progress Schedules,
   d. delay and impact, including cumulative impact, on other work under the Contract Documents, and
   e. extended home office and jobsite overhead;
2. the Change Order constitutes full mutual accord and satisfaction for the change to the Work;
3. No reservation of rights to pursue subsequent claims on the Change Order will be made by either party; and
4. No subsequent claim or amendment of the Contract Documents will arise out of or as a result of the Change Order.

C. Notification of Surety:

If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such

notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

D. Claims and Disputes:

1. City's Authorized Representative's Decision Required: All Claims shall be referred to the City's Authorized Representative for decision. A decision by the City's Authorized Representative shall be required as a condition precedent to any exercise by the Contractor of any rights or remedies they may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.
2. Notice: Written notice stating the general nature of each Claim shall be delivered by the claimant to City's Authorized Representative to the Contract promptly (but in no event later than 30 calendar days after the start of the event giving rise thereto). The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with written supporting data shall be delivered to the City's Authorized Representative within 60 calendar days (and monthly thereafter for continuing events) after the start of such event.

   City's Authorized Representative may allow additional time for claimant to submit additional or more accurate data in support of such Claim. A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 3.02.A.2. A Claim for an adjustment in Contract Times shall be prepared in accordance with the provisions of Paragraph 3.02.B.2. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to the City's Authorized Representative and the claimant within 30 days after receipt of the claimant's last submittal (unless City's Authorized Representative allows additional time).
3. City's Authorized Representative Action: City's Authorized Representative will review each Claim and, within 30 calendar days after receipt of the last submittal of the claimant, if any, and take one of the following actions in writing:
   a. deny the Claim in whole or in part;
   b. approve the Claim; or
   c. notify the party that the City's Authorized Representative is unable to resolve the Claim if, in the City Authorized Representative's sole discretion, it would be inappropriate for the City's Authorized Representative to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.
4. In the event that the City's Authorized Representative does not take action on a Claim within said 30 days, the Claim shall be deemed denied.
5. City's Authorized Representative's written action will be final and binding.
6. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this specification.

3.02 CHANGE OF CONTRACT PRICE

A. Change of Contract Price:

1. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the City's Authorized Representative.
2. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:
   a. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved; or
   b. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum value fixed by the Owner or by unit price values fixed by the Owner (which may include an allowance for overhead and profit); or
   c. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached on the basis of the Cost of the Work plus a Contractor's fee for overhead and profit.
3. Contractor's Fee: The Contractor's fee for overhead and profit shall be determined as follows:
   a. a mutually acceptable fixed fee; or
   b. if a fixed fee is not agreed upon, then a fee based on the Section 01200 Measurement and Payment, Item - Time and Materials.

B. Change of Contract Times:

1. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract.
2. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this specification.

C. Delays:

1. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times may be extended in an amount equal to the time lost due to such delay if a Claim is made therefor. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated, fires, floods, epidemics, abnormal weather conditions, quarantine restrictions, strikes, freight embargoes, acts of war (declared or not declared), or acts of God.
2. If Owner or other contractors or utility owners performing other work for Owner, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the

performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

3. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor may be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays.
4. Owner, Engineer, and their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.
5. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

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SECTION 01297

APPLICATIONS FOR PAYMENT

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

Submit Applications for Payment to the City's Authorized Representative in accordance with the schedule established by Conditions of the Contract and Agreement Between City and Contractor.

1.02 RELATED REQUIREMENTS

A. Agreement Between City and Contractor.

B. Conditions of the Contract: Progress Payments, Retainages and Final Payment.

C. Section 01350 Project Document Tracking and Control System

D. Section 01720 Record Documents.

1.03 FORMAT AND DATA REQUIRED

A. Submit applications in E-builder software.

B. Provide itemized data on continuation sheet: format, schedules, line items and values. Values used shall be those of the Schedule of Values accepted by the City's Authorized Representative.

1.04 PREPARATION OF APPLICATION FOR EACH PROGRESS PAYMENT

A. Application Form:

1. Fill in required information, including that for Change Orders executed prior to date of submittal of application.
2. Fill in summary of dollar values to agree with respective totals indicated on continuation sheets.
3. Execute certification with signature of a responsible officer of Contract firm.
4. Application shall be incorporated into the latest version of E-builder software.

B. Continuation Sheets:

1. Fill in total list of all scheduled component items of Work, with item number and scheduled dollar value for each item.
2. Fill in dollar value in each column for each scheduled line item when work has been performed or products stored.
   Round off values to nearest dollar, or as specified for Schedule of Values.
3. List each Change Order executed prior to date of submission, at the end of the continuation sheets.
   List by Change Order Number, and description, as for an original component item of work.
4. To receive approval for payment on component material stored on site, submit copies of the original invoices with the application for payment first made for these materials. Copies of paid invoices must be submitted for all materials stored longer than sixty (60) days to continue to receive approval for payment on the materials. If paid invoices are not submitted for materials in storage longer than sixty (60) days, those materials shall not be considered in the Application for Payment.

1.05 SUBSTANTIATING DATA FOR PROGRESS PAYMENTS

A. When the City's Authorized Representative requires substantiating data; Contractor shall submit suitable information, with a cover letter identifying:

   1. Project.
   2. Application number and date.
   3. Detailed list of enclosures.
   4. For stored products:
      a. Item number and identification as shown on application.
      b. Description of specific material.

B. Submit one copy of data and cover letter for each copy of application.

C. As a prerequisite for payment, Contractor is to submit a "Surety Acknowledgment of Payment" letter showing amount of progress payment, which the Contractor is requesting.

D. The Contractor is to maintain an updated set of drawings to be used as record drawings in accordance with Section 01720. As a prerequisite for monthly progress payments, the Contractor is to exhibit the updated Record Drawings for review by the City's Authorized Representative.

E. The Contractor shall submit all applicable test reports of installed products in order to request payment for that product.

F. The Contractor shall maintain an updated construction schedule. As a prerequisite for monthly progress payments, Contractor shall submit the updated construction schedule with the applications for progress payments. If the Contractor fails to submit the required updated schedule within the time prescribed, the City's Authorized Representative may withhold approval of progress payment estimates until such time as the Contractor submits the required updated schedule. Submit one copy for each copy of the application.

G. The Contractor shall demonstrate, as a prerequisite for monthly progress payments, compliance with all requirements specified in Erosion and Sedimentation Control requirements of this project to the City. If the Contractor fails to demonstrate compliance with the applicable Erosion and Sedimentation Control requirements, the City may withhold approval of progress payment estimates until such time as the Contractor demonstrates to the City's Authorized Representative full compliance with the approved erosion and sedimentation control permit.

H. The Contractor shall provide, as a prerequisite for monthly progress payments, an accumulating cost curve (tabular and diagram), indicating schedule, forecast and actual progress.

1.06 PREPARATION OF APPLICATION FOR FINAL PAYMENT

A. Fill in Application form as specified for progress payments.

B. Use continuation sheet for presenting the final statement of accounting.

1.07 SUBMITTAL PROCEDURE

A. Submit Applications for Payment to the City at the times stipulated in the Agreement. Application for Payment request shall be submitted through eBuilder.

B. Number: Five copies of each Application.

C. When the City's Authorized Representative finds Application properly completed and correct, he/she will transmit certificate for payment to City for approval and processing.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

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SECTION 01300

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 DESCRIPTION

This Section specifies the general methods and requirements of submissions applicable to the following work-related Submittals: Shop Drawings, Product Data, Samples, Requests for Information, Construction Schedules, Work Plan, and Submittal Schedules as defined in 01020 Definitions. Detailed submittal requirements are specified in the technical specifications sections. All submittals shall be clearly identified by reference to Specification Section, Paragraph, Drawing No. or Detail as applicable. Submittals shall be clear and legible and of sufficient size for sufficient presentation of data.

1.02 GENERAL PROCEDURES FOR SUBMITTALS

Coordination of Submittal Times: Prepare and transmit each submittal sufficiently in advance of performing the related work or other applicable activities, or within the time specified in the individual work sections of the Specifications, so that the installation will not be delayed by processing times including disapproval and resubmittal (if required), coordination with other submittals, testing, purchasing, fabrication, delivery and similar sequenced activities. No extension of time will be authorized because of the Contractor's failure to transmit submittals sufficiently in advance of the Work. Submittal entries to be input into E-builder or as directed by the City's Authorized Representative.

1.03 SHOP DRAWINGS, WORKING DRAWINGS, PRODUCT DATA, SAMPLES, PRECONSTRUCTION VIDEO

A. Shop Drawings:

1. Shop drawings, as defined above, and as specified in individual work Sections include, but are not necessarily limited to, custom-prepared data such as fabrication and erection/installation (working) drawings, scheduled information, setting diagrams, actual shop work manufacturing instructions, custom templates, special wiring diagrams, coordination drawings, individual system or equipment inspection and test reports including performance curves and certifications, as applicable to the Work.
2. Within fourteen (14) days of the Notice to Proceed, the Contractor shall submit an anticipated log of all shop drawings to the Engineer for review and approval to ensure the timely execution of work.
3. Layout drawings prepared specifically for the Project shall have a plan scale of not less than 1/4 inch = 1 foot.

4. All shop drawings submitted by subcontractors for approval shall be sent directly to the Contractor for checking. The Contractor shall be responsible for their submission at the proper time so as to prevent delays in delivery of materials.
5. The Contractor shall check all subcontractors' shop drawings regarding measurements, size of members, materials, and details to satisfy himself/herself that they conform to the intent of the Drawings and Specifications. Shop drawings found to be inaccurate or otherwise in error shall be returned to the subcontractors for correction before submission thereof.
6. All details on shop drawings submitted for approval shall show clearly the relation of the various parts to the main members and lines of the structure, and where correct fabrication of the work depends upon field measurements, such measurements shall be made and noted on the drawings before being submitted for approval.
7. For electronic submittals, drawings and the necessary data shall be submitted electronically to the Owner or Owner's Representative as specified below.
    a. Submittal documents shall be in color to facilitate use of red line markups. All electronic files shall be in Portable Document Format (PDF) as generated by Adobe Acrobat Professional Version 7.0 or higher. The PDF file(s) shall be fully indexed using the Table of Contents, searchable with thumbnails generated. PDF images must be at a readable resolution. For most documents, they should be scanned or generated at 300 dots per inch (dpi). Use of higher resolution is acceptable with the Owner or Owner's Representative approval.
    b. Optical Character Recognition (OCR) capture must be performed on these images so that text can be searched, selected and copied from the generated PDF file.
    c. The PDF documents shall have a bookmark created in the navigation frame for each major entry ("Section" or "Chapter") in the Table of Contents. Thumbnails shall be generated for each page or graphic in the PDF file.
8. The opening view for each PDF document shall be as follows:
    a. Initial View: Bookmarks and Page
    b. Magnification: Fit in Window
    c. The file shall open to Contractor's transmittal letter, with bookmarks to the left. The first bookmark shall be linked to the Table of Contents.
    d. PDF document properties shall include the submittal number for the document title and Contractor's name for the author.
    e. Electronic submittal file sizes shall be limited to 10 MB. When multiple files are required for a submittal the least number of files possible shall be created.
    f. Contractor shall post submittals and retrieve the Owner or Owner's Representative's submittal review comments through the Project website accessible through the Internet. Instruction on procedures for posting and retrieving submittals will be provided after award of the Contract.

B. Product Data:

Product data as defined above, and as specified in individual Sections, include, but are not necessarily limited to, standard prepared data for manufactured products

(sometimes referred to as catalog data), such as the manufacturer's product specification and installation instructions, availability of colors and patterns, manufacturer's printed statements of compliances and applicability, roughing-in diagrams and templates, catalog cuts, product photographs, standard wiring diagrams, printed performance curves and operational-range diagrams, production or quality control inspection and test reports and certifications, mill reports, product operating and maintenance instructions and recommended spare-parts listing and printed product warranties, as applicable to the Work.

Where manufacturer's publications in the form of catalogs, brochures, illustrations or other data sheets are submitted such submittals shall specifically indicate the item for which approval is requested. Identification of items shall be made electronically or in ink. Submittals showing only general information are not acceptable. All submittals shall be provided in English.

C. Working Drawings:

1. When used in the Contract Documents, the term "working drawings" shall be considered to mean the Contractor's plans for temporary structures such as temporary bulkheads, support of open cut excavation, support of utilities, ground water control systems, pedestrian bridges, temporary traffic and signage plans, forming and false work; and for such other work as may be required for construction but does not become an integral part of the Project.
2. Working drawings shall be prepared and sealed by a registered Professional Engineer, currently licensed to practice in the State of Georgia. The Contractor shall submit a letter of certification from the Professional Engineer stating that he/she has prepared the designs and has verified that the materials/ equipment have been installed as designed. No working drawings or calculations/computations relating to the working drawings shall be submitted to the City's Authorized Representative unless specifically requested in writing.

D. Samples:

Samples as defined above and as 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 City's Authorized Representative or Owner for independent inspection and testing, as applicable to the Work.

E. Pre-Construction Photos/Video Recording:

Submit Pre-Construction Photos/Video Recording per Section 01320.

F. Test Reports:

Submit test reports to City's Authorized Representative and follow all requirements per Section 01410.

G. Record Drawings:

Submit Record Drawings per Section 01720.

1.04 CONTRACTOR'S RESPONSIBILITIES

A. The Contractor shall review shop drawings, product data and samples, including those by subcontractors, prior to submission to determine and verify the following:

1. Field measurements
2. Field construction criteria
3. Catalog numbers and similar data
4. Conformance with the Specifications

B. Each shop drawing, sample and product data submitted by the Contractor shall have affixed to it the following Certification Statement including the Contractor's Company name and signed by the Contractor: "Certification Statement: 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 Contract requirements." Shop drawings and product data sheets 11-in x 17-in and smaller shall be bound together in an orderly fashion and bear the above Certification Statement on the cover sheet. The cover sheet shall fully describe the packaged data and include a listing of all items within the package. Provide to the City's Authorized Representative a copy of each submittal transmittal sheet for shop drawings, product data and samples at the time of submittal of said drawings, product data and samples to the City and/or City's Authorized Representative.

C. Each submittal shall be transmitted by a standard transmittal sheet which shall fully describe the transmitted data and include a listing of all items within the submittal.

D. The Contractor shall utilize a 10-character submittal identification numbering system in the following manner:

1. The first character shall be a D, S, P, M, or R, which represents Shop/Working Drawing and other Product Data (D), Sample (S), Preliminary Submittal (P), Operating/Maintenance Manual (M), or Request for Information (R).
2. The next five digits shall be the applicable Specification Section Number.
3. The next three digits shall be the numbers 001-999 to sequentially number each initial separate item or drawing submitted under each specific Section number.

4. The last character shall be a letter, A-Z, indicating the submission, or resubmission of the same Drawing, i.e., "A=1st submission, B=2nd submission, C=3d submission, etc. A typical submittal number would be as follows:

   D-03300-008-B

D	=	Shop Drawing
03300	=	Specification Section for Concrete
008	=	The eighth initial submittal under this specification section
B	=	The second submission (first resubmission) of that particular shop drawing

E. Notify the City and/or City's Authorized Representative in writing, at the time of submittal, of any deviations in the submittals from the requirements of the Contract Documents.

F. Shop Drawings shall be submitted as a single complete package for any operating system and shall include all items of equipment and any mechanical units involved or necessary for the functioning of such system.

G. The review and approval of shop drawings, samples or product data by the City and/or City's Authorized Representative shall not relieve the Contractor from his/her responsibility with regard to the fulfillment of the terms of the Contract. All risks of error and omission are assumed by the Contractor and the City's Authorized Representative will have no responsibility therefore. Where errors, deviations, and/or omissions are discovered at a later date in any of the submittals, the City's Authorized Representative's prior review of the submittals does not relieve the Contractor of the responsibility for correcting all errors, deviations, and/or omissions.

H. No portion of the work requiring a shop drawing, sample, or product data shall be started nor shall any materials be fabricated or installed prior to the approval or qualified approval of such item. Fabrication performed, materials purchased or on-site construction accomplished which does not conform to approved shop drawings and data shall be at the Contractor's risk. The City will not be liable for any expense or delay due to corrections or remedies required to accomplish conformity.

I. Project work, materials, fabrication, and installation shall conform with approved shop drawings, applicable samples, and product data.

1.05 SUBMISSION REQUIREMENTS

A. Make submittals promptly in accordance with approved schedule, and in such sequence as to cause no delay in the Work or in the work of any other contractor.

B. Each submittal, appropriately coded, will be returned within 30 calendar days following receipt of submittal by the City and/or City's Authorized Representative.

C. Number of submittals required:

1. Shop Drawings as defined in Paragraph 1.02 A: Five copies.
2. Product Data as defined in Paragraph 1.02 B: Five copies.
3. Samples: Submit the number stated in the respective Specification Sections.

D. Submittals shall contain:

1. The date of submission and the dates of any previous submissions.
2. The Project title and number.
3. Contractor identification.
4. The names of:
   a. Contractor
   b. Supplier
   c. Manufacturer
5. Identification of the product, with the specification section number, page and paragraph(s).
6. Field dimensions, clearly identified as such.
7. Relation to adjacent or critical features of the Work or materials.
8. Applicable standards, such as ASTM or Federal Specification numbers.
9. Contractor certification statement and identification of deviations from Contract Documents.
10. Identification of revisions on resubmittals.
11. An 8-in x 3-in blank space for Contractor and City stamps.

E. Facsimiles or copies of facsimiles will not be accepted as submittals.

F. After review of shop and working drawings, City and/or City's Authorized Representative will return four copies of the submittal to the Contractor.

1.06 REVIEW OF SHOP DRAWINGS, PRODUCT DATA, WORKING DRAWINGS AND SAMPLES

A. The review of shop drawings, data, and samples will be for general conformance with the design concept and Contract Documents. They shall not be construed:

1. As permitting any departure from the Contract requirements;
2. As relieving the Contractor of responsibility for any errors, including details, dimensions, and materials;
3. As approving departures from details furnished by the City and/or City's Authorized Representative, except as otherwise provided herein.

B. The Contractor remains responsible for details and accuracy, for coordinating the work with all other associated work and trades, for selecting fabrication processes, for techniques of assembly, and for performing work in a safe manner.

C. If the shop drawings, data or samples as submitted describe variations and show a departure from the Contract requirements which City and/or City's Authorized Representative finds to be in the interest of the City and to be so minor as not to involve a change in Contract Price or time for performance, the City and/or City's Authorized Representative may return the reviewed drawings without noting an exception.

D. Submittals will be returned to the Contractor under one of the following codes.

Code 1 -"APPROVED" is assigned when there are no notations or comments on the submittal. When returned under this code the Contractor may release the equipment and/or material for manufacture.

Code 2 -"APPROVED AS NOTED". This code is assigned when a confirmation of the notations and comments IS NOT required by the Contractor. The Contractor may release the equipment or material for manufacture; however, all notations and comments must be incorporated into the final product.

Code 3 -"APPROVED AS NOTED/CONFIRM". This combination of codes is assigned when a confirmation of the notations and comments IS required by the Contractor. The Contractor may release the equipment or material for manufacture; however, all notations and comments must be incorporated into the final product. This confirmation shall specifically address each omission and nonconforming item that was noted. Confirmation is to be received by the City's Authorized Representative within 15 calendar days of the date of the City's Authorized Representative's transmittal requiring the confirmation.

Code 4 -"APPROVED AS NOTED/RESUBMIT". This combination of codes is assigned when notations and comments are extensive enough to require a resubmittal of the package. This resubmittal is to address all comments, omissions and non-conforming items that were noted. Resubmittal is to be received by the City's Authorized Representative within 15 calendar days of the date of the City's Authorized Representative's transmittal requiring the resubmittal.

Code 5 -"NOT APPROVED" is assigned when the submittal does not meet the intent of the Contract Documents. The Contractor must resubmit the entire package revised to bring the submittal into conformance. It may be necessary to resubmit using a different manufacturer/vendor to meet the Contract Documents.

Code 6 -"COMMENTS ATTACHED" is assigned where there are comments attached to the returned submittal which provide additional data to aid the Contractor.

Code 7 - "RECEIPT ACKNOWLEDGED" is assigned to acknowledge receipt of a submittal that is not subject to the City's Authorized Representative's review and approval, and is being filed for informational purposes only. This code is generally

used in acknowledging receipt of means and methods of construction work plans, field conformance test reports, and health and safety plans.

Codes 1 through 5 designate the status of the reviewed submittal with Code 6 showing there has been an attachment of additional data. Code 7 will be used as may be necessary.

E. Resubmittals will be handled in the same manner as the initial 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 City's Authorized Representative, 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 of revision that is not in accordance to the Contract Documents as may be required by the City's Authorized Representative.

F. Partial submittals will not be reviewed. The City's Authorized Representative will be the only judge as to the completeness of a submittal. Submittals not complete will be returned to the Contractor, and will be considered "Not Approved" until resubmitted. The City's Authorized Representative may, at his/her option, provide a list or mark the submittal directing the Contractor to the areas that are incomplete.

G. Repetitive Review:

1. Shop drawings and other submittals will be reviewed no more than twice at the City's expense. All subsequent reviews will be performed at times convenient to the City's Authorized Representative and at the Contractor's expense, based on the City and/or City's Authorized Representatives then prevailing rates. The Contractor shall reimburse the City for all such fees invoiced to the City by the City's Authorized Representative. Submittals are required until approved.
2. Any need for more than one resubmission, or any other delay in obtaining City's Authorized Representative's review of submittals, will not entitle Contractor to extension of the Contract Time.

H. If the Contractor considers any correction indicated on the shop drawings to constitute a change to the Contract Documents, the Contractor shall give written notice thereof to the City's Authorized Representative at least seven working days prior to release for manufacture.

I. When the shop drawings have been completed to the satisfaction of the City's Authorized Representative, the Contractor shall carry out the construction in accordance therewith and shall make no further changes therein except upon written instructions from the City's Authorized Representative.

J. Request for Information (RFI) shall be submitted on a standard form provided by the City's Authorized Representative. RFI's shall indicate their importance to the timely completion of the project. RFI's will be processed as a shop drawing with 7 days allowed for review time.

1.07 DISTRIBUTION

Distribute reproductions of approved shop drawings and copies of approved product data and samples, where required, to the job site file and elsewhere as directed by the City's Authorized Representative. Number of copies shall be as directed by the City's Authorized Representative but shall not exceed six (6).

1.08 SCHEDULES

Provide all schedules required in 01310 Construction Progress Schedule

1.09 CONSTRUCTION PHOTOGRAPHS

The General Contractor shall engage a competent photographer to take photographs at the locations and at such stages of the construction as directed by the City's Authorized Representative. At a minimum, photos shall be taken prior to construction to document existing conditions, during construction to show monthly progress, and after construction is complete. Digital photos shall be submitted monthly in an electronic format.

1.10 PROFESSIONAL ENGINEER (P.E.) CERTIFICATION FORM

If specifically required in other Sections of these Specifications, the Contractor shall submit an Engineering Certification issued by a Professional Engineer licensed in the State of Georgia for each item required, in the form attached to this Section, completely filled in and stamped.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

(P.E. CERTIFICATION FORM ATTACHED)

+ + + END OF SECTION 01300 + + +

P.E. CERTIFICATION FORM

The undersigned hereby certifies that he/she is a Professional Engineer registered in the State of Georgia and that he/she has been employed by (Name of Contractor) _____

_____ to design_____ _____

in accordance with Specification Section _____ for the (Name of Project) _____

_____. The undersigned further certifies that

he/she has performed the design of the _____

_____, that said design is in conformance with all applicable local, state and federal codes, rules, and regulations, and that his/her signature and P.E. stamp have been affixed to all calculations and drawings used in, and resulting from, the design.

The undersigned hereby agrees to make all original design drawings and calculations available to the

(Insert Name of City) _____

_____
or City's representative within the immediate five working days following written request by the City.

_____ _____
P.E. Name Signature

_____
Address

_____ _____
Contractor's Name Signature

_____
Title

_____
Address

SECTION 01310
SCHEDULING THE WORK

PART 1 – GENERAL

1.01 SCOPE

A. This section describes the scheduling and progress reporting requirements of the Contract. The primary objectives of the requirements of this Section are:

1. To assist the City and Engineer in evaluating the progress of the Work.

2. To provide for optimum coordination and sequencing of the Work by the City, Contractor, and any related work or services provided by other parties which may affect the Project.

3. To permit the timely prediction or detection of events or occurrences that might affect the timely prosecution of the Work.

1.02 GENERAL SCHEDULING REQUIREMENTS

A. The Work of this Contract shall be planned, scheduled, executed, and reported using the critical path method (CPM). Through the Mobilization / Project Management / Demobilization bid item, the Contractor shall purchase and use the following software program to develop its Schedule Submittal:

1. Primavera Engineering and Construction, version to be specified by the Engineer

B. A comprehensive schedule shall be developed by the Contractor and submitted to the Engineer for review prior to commencement of said work. Upon acceptance by the Engineer, the schedule will be merged into the City's overall schedule.

C. At a minimum, the schedule shall include the activities for each asset as deemed appropriate to clearly illustrate and document the Work. The activities listed below are repetitive for the same type of rehabilitation when organized on an asset basis and generally considered standard industry practice. This set of standard activities will be used to harmonize multiple rehabilitation contracts by the City and shall not be revised or in text or grouping without approval from the Engineer.

Planning & Administrative Activities by Contract Type:

Description	Contract Type
Bond & Insurance Submittal	ALL

Product Submittals	ALL
Permits	ALL
Right of Entry Acquisition	N/A
72 Hour Disruption Notice	N/A
Door Hanger Notification	N/A
Application for Payment Submission	ALL
Application for Payment Review	ALL
Project Record Submittals	ALL
Project Closeout Document Submittals	ALL

Construction Activities by Rehabilitation Type:

Description	**Rehab Type**
Pre-Construction Survey	ALL
Locate Existing Utilities	N/A
Install Access Road	ALL
Install/ Maintain/ Remove Traffic Control	ALL
Install/ Maintain/ Remove Bypass Pumping	ALL
Pre-CCTV Existing Pipeline	N/A
Rehabilitate Service Laterals	N/A
Precondition Existing Pipeline	N/A
Install Liner/ Reinstate Services	N/A
Install Launch Pit/ PB / Reinstate Services	N/A
Install New Pipeline/ Reinstate Services	N/A
Post CCTV Review	N/A
Post CCTV Submission to COA	N/A
Manhole Rehabilitation	N/A
Test New Installation	ALL
Site Restoration	ALL
Pavement Replacement	ALL
Asphalt Pavement Milling & Topping	N/A

Milestones by Contract Type:

Description	**Contract Type**
Contract Execution	ALL
Notice to Proceed	ALL
Pre-construction Meeting	ALL
(" ") Public Information Meeting	ALL
Trial Test Methodology Acceptance	ALL
Storm drainage basin (" ") Substantial Completion	ALL
Storm drainage basin (" ") Final Completion	ALL
Contract Substantial Completion	ALL
Contract Final Completion	ALL

D. The Schedule Submittal, as defined herein, shall represent the Contractor's commitment and intended plan for completion of the Work in compliance with the Contract completion date and interim milestone dates specified. The Schedule Submittal shall take into account all foreseeable activities to be accomplished by any separate consultants or the City, and interface dates with utility companies, the City's operations, and others. The Schedule Submittal shall anticipate all necessary manpower and resources to complete the Work within the dates set forth.

E. Once reviewed and accepted by the Engineer, the Schedule Submittal will become the Schedule of Record.

F. The Contractor is responsible for determining the sequence of activities, the time estimates of the detailed reconnaissance/investigative and rehabilitation activities, as well as the means, methods, techniques and procedures to be employed. The schedule shall clearly indicate the proposed sequence of work. The Schedule of Record shall represent the Contractor's best judgement of how it will execute the Work in compliance with the Contract requirements. The Contractor shall ensure that Schedule of Record is current and accurate and is properly and timely monitored, updated and revised as Project conditions and the Contract Documents may require.

G. The City will work with the Contractor to assign and schedule the work in a logical and efficient manner. However, all items in this contract shall be priced such that each item can be assigned independently or combined at the City's sole discretion, in regard to both quantity and scope. There shall be no consideration of any claim for extra payment arising from a decision by the City to assign potential work items under this contract in any combination or in combination with another contract utilizing alternate technologies.

1.03 SCHEDULE SUBMITTALS

A. The Contractor shall submit the qualifications of the scheduler(s) proposed to be used on the project immediately after NTP. The scheduler(s) is subject to the approval of the Engineer. The Contractor shall use the services of a scheduler(s) who has verifiable training and credentials in preparing and maintaining a computerized CPM Construction Schedule using Primavera software as specified herein. The qualifications of the scheduler(s) should be a minimum of 4 years experience in project scheduling for civil, structural, architectural, or related engineering disciplines. The scheduler(s) should have direct experience developing, maintaining, updating, modifying project schedules utilizing Primavera products, ideally Primavera Engineering and Construction. The cost for providing a qualified scheduler(s) shall be included in the Project Control Tools bid item.

B. Within 30 days from receipt of Notice to Proceed, a baseline / comprehensive schedule shall be submitted by the Contractor to the Engineer for approval. The Contractor shall submit the complete schedule in electronic format as directed by the Engineer. At a minimum, the schedule output shall include the following:

1. Activities with attributes or codes
2. Estimated activity durations in working days. (Not to exceed 15 working days for the construction activities.)
3. All logic ties
4. The critical path activities differentiated from other activities
5. All activities for submittal of shop and working drawings, videos, test results, procurement, fabrication, delivery, installation and testing of critical materials.
6. Related activities shall be grouped on the network diagram
7. A time scale located at the top and/or bottom of the network diagram showing calendar days and months
8. Earliest start date
9. Earliest finish date
10. Actual start date
11. Actual finish date
12. Latest start date
13. Latest finish date
14. Calendar Definition
15. Total float
16. All constraints
17. Lag – No lag is allowed in the baseline/ comprehensive schedule
18. Monetary value of activity (from Schedule of Values)

C. The Contractor shall participate in a review and evaluation of the baseline schedule with the Engineer. Any revisions necessary as a result of this review shall be resubmitted to the Engineer within 10 calendar days after the conference. The mutually acceptable schedule shall then be used by the Contractor for planning, organizing and directing the work and for reporting progress. If the Contractor desires to make changes in its method of performing the Work, he shall notify the Engineer in writing stating the reason for the changes.

D. The Contractor shall demonstrate competence in the use of CPM scheduling through the submission of a fully compliant CPM Construction Schedule with the initial CPM submission. In the event the Contractor fails to provide a baseline schedule in a timely manner or fails to demonstrate competence in the CPM scheduling, the Engineer may direct the Contractor to employ the services of a Scheduling Firm that can demonstrate competence. The Contractor shall comply with such directive at no additional cost to the City.

E. Each activity shall use the following format:

xxxx.yyyyyy

Where xxxx is the last four digits of the contract number (FC #), and yyyyyy is for the Contractor's use according to a template provided by the Engineer at the pre-construction conference.

F. Activities and milestones to appear on the Schedule Submittal shall include, but not be limited to, City reviews that impact the Work, obtaining required permits, dewatering and dredging, sitework, paving, submittals, coordination requirements, and dates of Substantial and Final Completion.

G. The Engineer shall have the right to require the Contractor to modify any portion of the Contractor's Schedule Submittal, or Recovery Schedule, as herein required, (including cost loading) with the Contractor bearing the expense thereof, which the Engineer reasonably determines to be:

1. Impractical or unreasonable

2. Based upon erroneous calculations or estimates

3. Required to ensure proper coordination by the Contractor of the Work of its subconsultants and with the work or services being provided by any separate consultants

4. Necessary to avoid undue interference with the City's operations

5. Necessary to ensure completion of the Work by the milestone and completion dates set forth in the Contract Documents

6. Required in order for the Contractor to comply with the requirements of this Section or any other requirements of the Contract Documents

7. Not in accordance with the Contractor's actual operations

H. The electronic version of the schedule shall be submitted on a CD, in a form and format acceptable to the Engineer, including all required submission information resident in the computer system and containing all of the files associated with the schedule.

I. Each week the Contractor will provide the Engineer and Public Information (PI) Office with a detailed two week look-ahead schedule. The schedule must be in the format required by the PI Office.

1.04 UPDATING OF THE SCHEDULE / PROGRESS REPORTS

A. The Engineer shall review the Contractor's report of actual progress at each progress meeting. Prepared by the Contractor, said report shall set forth up-to-date and accurate progress. The Contractor in consultation with all principal subconsultants shall prepare said report. The Contractor will perform a complete schedule update on a monthly basis or at the discretion of the Engineer.

1. The Contractor shall submit the updated schedule in electronic format as directed by the Engineer. The Contractor shall submit hard copies of the schedule output including, but not limited to:

   a. 30-day Look-ahead Report including but not limited to planned activities within the next thirty days

   b. Milestones to be completed

2. The Contractor shall provide written explanation of all changes in activity durations, relationships, and constraints with the schedule output. Changes will require written approval by the Engineer.

B. The Schedule Report of the Contractor shall show the activities, or portions of activities, completed during the reporting period, the actual start and finish dates for these activities, remaining duration and estimated completion dates for activities currently in progress.

C. At the progress meeting a total review of the Project will take place including but not limited to, the following:

1. Current update of the Schedule of Record in format as prescribed by Engineer

2. Anticipated detailed construction activities for the subsequent report period

3. Critical items pending

4. Contractor requested changes to the Schedule of Record

B. The Contractor shall submit a narrative with the progress report which shall include, but not be limited to, a narrative describing actual Work accomplished during the reporting period, a description of problem areas, current and anticipated delaying factors and their impact, explanations of corrective actions taken or planned, any proposed newly planned activities or changes in sequence, and proposed logic for a Recovery Schedule, if required, as further described herein.

C. No invoice for payment shall be submitted and no payment whatsoever will be made to the Contractor until the Schedule of Record, and narrative reports as defined herein, are updated.

1.05 SCHEDULE REVISIONS

A. Should the Contractor desire to or be otherwise required under the Contract Documents to make modifications or changes in its method of operation, its sequence of Work or the duration of the activities in the Schedule of Record, it shall do so in accordance with the requirements of this Specification Section and the Contract Documents. The approved Schedule of Record may only be revised by written approval of the Engineer as provided herein.

B. The Contractor shall submit requests for revisions to the Schedule of Record to the Engineer using the Schedule Revision Form provided by the Engineer. The Contractor shall identify revisions and description of logic for rescheduling work and substantiate that the milestone and completion dates will be met as listed in the Contract Documents. Proposed revisions acceptable to the Engineer and City will be approved in writing and incorporated into the Schedule of Record.

C. Requests for revision will be accompanied by evidence acceptable to the Engineer that the Contractor's subcontractors are in agreement with the proposed revisions.

D. If there are separate consultants on the Project, the approval of the separate consultants shall be obtained to make the proposed schedule revisions. If accepted by the Engineer and City, the revisions shall be binding upon the Contractor and all separate consultants on the Project.

E. The impact of all change orders to this Contract shall be included in the project schedule.

1.06 RECOVERY SCHEDULE

A. Should the updated Schedule of Record, at any time during the Contractor's performance, show that, in the sole opinion of the Engineer, the Contractor is behind schedule for any milestone or completion date for any location or category of work, the Contractor, at the request of the Engineer, shall prepare a Schedule Revision for the purpose of displaying recovery. The revision shall identify how the Contractor intends to reschedule its Work in order to regain compliance with the Schedule of Record within thirty (30) calendar days.

B. The Contractor shall prepare and submit to the Engineer a one month maximum duration Recovery Schedule, incorporating the best available information from subconsultants, subcontractors and others which will permit a return to the Schedule of Record at the earliest possible time. The Contractor shall prepare a Recovery Schedule to the same level of detail as the Schedule of Record. The Recovery Schedule shall be prepared in coordination with other separate consultants on the Project.

C. Within two (2) calendar days after submission of the Recovery Schedule to the Engineer, the Contractor shall participate in a conference with the Engineer to review and evaluate the Recovery Schedule. Within two (2) calendar days of the conference, the Contractor shall submit the revisions necessitated by the review for the Engineer's review and acceptance. The Contractor shall use the accepted Recovery Schedule as its plan for returning to the Schedule of Record.

D. The Contractor shall confer continuously with the Engineer to assess the effectiveness of the Recovery Schedule. As a result of these conferences, the Engineer will direct the Contractor as follows:

1. If the Engineer determines the Contractor continues behind schedule, the Engineer will direct the Contractor to prepare a Schedule Revision and comply with all of the requirements of a Schedule Revision as stated herein and the other requirements of the Contract Documents; provided, however, that nothing herein shall limit in any way the rights and remedies of the City and Engineer as provided elsewhere in the Contract Documents; or

2. If the Engineer determines the Contractor has successfully complied with provisions of the Recovery Schedule, the Engineer will direct the Contractor to return to the use of the approved Schedule of Record.

1.07 FLOAT TIME

A. Float or slack time shown on the currently approved Schedule of Record is not for exclusive use or benefit of either the City or the Contractor and is available for use by either of them according to whichever first needs the benefit of the float to facilitate the effective use of available resources and to minimize the impact of Project problems, delays, impact, acceleration or changes in the Work which may arise during performance. The Contractor specifically agrees that float time may be used by the City in conjunction with their review activities or to resolve Project problems. The Contractor agrees that there will be no basis for any modification of the milestone or completion dates or an extension of the Contract Time, or a claim for additional compensation as a result of any Project problem, delay, impact, acceleration, or change order which only results in the loss of available float on the currently approved Schedule of Record. Unless otherwise stated herein, float as referenced in these documents, is total float. Total float is the period of time measured by the number of working days each non-critical path activity may be delayed before it and its succeeding activities become part of the critical path. If a non-critical path activity is delayed beyond its float period, that activity then becomes part of the critical path and controls the end date of the project. Thus, the delay of the non-critical path activity beyond its float period will cause delay to the project itself.

B. Float time shown on the Schedule of Record shall not be used arbitrarily by the Contractor in a manner which, in the opinion of the Engineer, unnecessarily delays separate subcontractors from proceeding with their work in a way which is detrimental to the interests of the City. Liability for delay of the project completion date rests with the party actually causing delay to the project completion date. For example, if Party A uses some, but not all of the float time and Party B later uses the remainder of the float time as well as additional time beyond the float time, Party B shall be liable for the costs associated with the time that represents a delay to the project's completion date. Party A would not be responsible for any costs since it did not consume all of the float time and additional float time remained, therefore, the project's completion date was unaffected.

****END OF SECTION 01310****

SECTION 01320
CONSTRUCTION PHOTOGRAPHY

PART 1 GENERAL

1.01 SCOPE

A. The Contractor shall furnish all labor, equipment and materials required to provide the City DWM with digital construction photography of the Project as specified herein.

B. The Contractor shall provide for professional videos and photographs to be made prior to and after construction to provide documentation of conditions and aid in any damage claims assessment. All conditions which might later be subject to disagreement shall be shown in sufficient detail to provide a basis for decisions.

C. Video and photo files shall become the property of the City DWM and none of the video or photographs herein shall be published without express permission of the City DWM.

1.02 PRE AND POST CONSTRUCTION PHOTOGRAPHY

A. Prior to the beginning of any work, the Contractor shall provide for professional videos and photographs of the work area to record existing conditions.

1. The Contractor shall furnish a complete videotaped record of the Project site. The video tape shall include the date of taping and shall contain audio commentary to emphasize existing conditions.

2. The Project site shall be videotaped prior to beginning of construction. The Contractor shall furnish three sets of compact disks containing the videotaped data to the City DWM.

3. The Project site shall also be videotaped at the completion of construction when directed by the City DWM. The video tape shall show the same areas and features as in the preconstruction videos. The Contractor shall furnish three sets of compact discs containing the videotaped data to the City DWM.

B. The pre-construction videos shall be submitted to the City DWM within 15 calendar days after receipt of construction Notice to Proceed by the Contractor. Post construction videos and photographs shall be provided prior to final acceptance of the Project.

1.03 PROGRESS PHOTOGRAPHS

A. Photographs shall be taken to record the general progress of the Project during each pay period. Photographs shall be representative of the primary work being performed at the

time.

B. All photographs shall be taken with a digital camera. The photographs shall include the date and time marking in the digital record. All photographs shall be labeled on a tab connected to the bottom of the photo to indicate date and description of work shown.

PART 2 PRODUCTS

2.01 PHOTOGRAPHS

A. Photography and video files shall be provided in CD-ROM format.

B. Photographs shall also be provided in hard copy format. The photographs shall include the date and time marking on the photograph. All photographs shall be labeled on a tab connected to the bottom of the photograph. Tab label shall contain:

1. Project name.

2. Orientation of view.

3. Description of work shown.

C. All compact disks (CDs) furnished under this section shall be suitable for viewing with Windows Media Player.

PART 3 EXECUTION

3.01 SUBMITTALS

A. No construction shall start until pre-construction photography has been completed and accepted by the City DWM.

B. A minimum of ten photographs shall be submitted with each application for payment. The view selection will be as determined by the City DWM. Photographs shall be submitted in electronic format acceptable to the City DWM.

C. Construction photographs shall be submitted with each payment request. Failure to include photographs may be cause for rejection of the payment request.

D. The Contractor shall be responsible for all discrepancies not documented in the pre-construction videos and photography.

+ + + END OF SECTION 01320 + + +

SECTION 01350

PROJECT DOCUMENT TRACKING AND CONTROL SYSTEMS

PART 1 GENERAL

1.01 SCOPE

A. The Contractor shall utilize the City of Atlanta's e-Builder Project Management System. The primary function of the system is to facilitate timely processing and approval of all contract documentation in coordination with the overall Project Schedule established by these Specifications and the Contractor. This system will utilize e-Builder software for document tracking and control or other software as determined by the City of Atlanta. The e-Builder software will:

1. Facilitate communication among the Owner, Engineer and Contractor;
2. Facilitate turn-around time with regard to responses and approvals;
3. Provide a central location for all Project information to facilitate all Project participants in performing their tasks based on the latest Project data;
4. Provide a standard system of project administration with accountability.
   a. Pay Application Process.
   b. Submittals.
   c. RFIs.
   d. Change Notifications.
   e. Daily logs.

B. The Contractor shall be required to utilize the web-based e-Builder system to generate documents in the proper format for submission to the City. The Contractor shall access the system through the internet using a compatible web browser.

C. The Contractor shall be required to generate Project documents and records utilizing the aforementioned system. The Contractor shall be required to transmit and submit the Project documents within the system to the City.

D. The Contractor shall utilize a high capacity scanner capable of scanning 11 x 17 documents, double sided, on site for the entire duration of the Project. All documents must be scanned into e-Builder.

E. The Contractor shall utilize e-Builder to create and maintain Project documents, including, but not limited to the following:

1. Company Directory: Addresses, Phone Numbers, Personnel Contacts, etc.
2. Drawings Log: Current Drawing revision log
3. Submittals (Integrated with Project Schedule through Activity codes)
4. Transmittals
5. Requests for Information and Answers (RFIs)

6. Change Documents, Including:
    a. Requests for Proposal (RFPs)
    b. Work Authorizations (WAs)
    c. Change Order Requests (CORs)
    d. Change Orders (CO)
    e. Design Clarifications (DC)
7. Daily Reports (Daily Diaries).
8. Field Decisions & Clarification Memos
9. Notice of Non-Compliance
10. Construction Issue Memos
11. Punchlists
12. Meeting Minutes & Agendas
13. Correspondence
14. Work Plans
15. Start-up Plans
16. Equipment Operation and Maintenance Training; and
17. Spare Parts lists.

F. The Contractor shall utilize the complete capabilities of e-Builder to meet the requirements of this Section. The Contractor shall provide a highly trained and experienced construction project controls person knowledgeable in construction work sequencing, productivity, scheduling and invoicing. This person, along with the Contractor's management team, shall work closely with the City to deliver the documents outlined in this Section

G. Software Provision and Training

1. The City of Atlanta shall provide access to e-Builder software at no cost. The City of Atlanta will provide training in the use of e-Builder software to at least one Contractor's employee at no cost. It shall be the responsibility of the Contractor to ensure that staff attend City-provided training and are afterwards proficient in the use of e-Builder software.
2. The Contractor shall be required to establish an internet connection to connect to e-Builder, permit the forwarding and receipt of documents.

H. The Contractor shall meet with the City within 15 days after the Contract is awarded to discuss access requirements and the Contractor's plan to utilize e-Builder and execute the document control functions herein.

I. Access through the internet to e-Builder shall be operational within 15 days following the pre-construction meeting date.

1.02 COMPANY DIRECTORY

The Contractor and the City will monitor and manage the Company Directory. The directory must include Company name, Company abbreviation, contact names,

address, phone numbers and e-mail addresses.

1.03 DRAWING LOG

The City will maintain a log of initial "issued for construction" drawings in e-Builder. Information shall include drawing number, title and revision number. In addition to logging the initial project drawing list, the City will maintain a log on e-Builder of all subsequent revisions to these drawings and any sketches resulting from clarification memos, RFIs, field orders and Change Orders. It is the Contractor's responsibility to utilize the latest drawings and sketches in the performance of the work.

1.04 SUBMITTALS/SHOP DRAWINGS

A. Requirements: This section specifies supplemental requirements to General Conditions related to the processing of submittals and shop drawings. The Contractor will utilize e-Builder to log and track submittals, as well as generate associated transmittal letters.

B. Submittals & Product Data: A list of all required submittals will be entered into e-Builder by the Contractor. Submittals shall be incorporated into packages, with the submittal numbering format to be provided by the COA's engineer. The Contractor will log and track all submittals utilizing e-Builder. Each review cycle shall be entered into e-Builder. The Contractor shall identify as activities in the CPM schedule, to include all data submittals, as well as those involving complex reviews and long lead deliveries, and all procurement items required for construction activities. Submittal schedule information shall be updated monthly with the Contractor's updated project CPM schedule.

C. Guarantees/Warranties: A list of all required Guarantee/Warranty submittals will be entered into e-Builder by the Contractor. These submittals shall be identified as individual submittals within the submittal packages with numbering as specified above.

D. Work Plans, Start-up Plans, O&M Submittals and Spare Parts: All testing, Start-up and O&M submittals will be entered into e-Builder by the Contractor. These submittals shall be identified as individual submittals within the submittal packages identified with numbering as specified above.

E. Submittal Procedures: The Contractor shall prepare all submittal packages utilizing the submittal numbering system, description and packaging conventions described above. Submittals prepared by the Contractor, which fail to follow the conventions described above, will be returned "amend and resubmit". Should the Contractor determine that a submittal is required and is not covered by the listing within e-Builder, the contractor, consultation with the City to determine the submittal number, description and packaging will be required.

1.05 CORRESPONDENCE

The City shall monitor and manage the correspondence, Non-Compliance Notices, Field Decisions & Clarification Memos and Construction Issue Memo logs. The Contractor is responsible for generating Project correspondence within e-Builder, and forwarding the correspondence to the City.

1.06 TRANSMITTAL LOG

The Contractor and the City will monitor and manage the transmittal log. All Project transmittals shall be created electronically, automatically sequentially numbered and logged into e-Builder system as they are created. The Contractor is responsible for utilizing the system to create transmittals for items transmitted to the Owner, Engineer, Resident Inspection Staff and other Contractors.

1.07 REQUESTS FOR INFORMATION & ANSWERS

The Contractor shall be responsible for generating RFIs on the e-Builder system. The Contractor shall notify the City when an RFI is submitted. The City will monitor and manage the RFI log. The City will generate an Answer document in response to each RFI and forward them to the Contractor. e-Builder will track "Ball in Court" for all RFIs and Answers, as well as date of original generation and response date. In addition the RFIs will reference the relative Specification Section and Drawings. The e-Builder will identify the date of the request and the originator, responsible party for a response and the date of the response.

1.08 CHANGE DOCUMENTS

Change documents include Request for Proposals (RFPs), Work Authorization Requests (WARs), Work Authorizations (WAs), Change Orders Requests (CORs), Design Clarifications (DCs), and Change Orders (COs). All change documents will be monitored and managed by the City utilizing e-Builder. The e-Builder will track "Ball in Court" status of all change documents.

1.09 PUNCHLISTS

The City will monitor and manage Punchlists and will create Punchlists that will be accessible to the contractor within e-Builder. The Contractor shall address the punchlist items that have been assigned to the Contractor within e-Builder. Once accepted as complete, the City will access the punchlist and close it out.

1.10 MEETING MINUTES AND AGENDA

The City shall monitor and manage the meeting minute process. The City will forward meeting minutes to the Contractor electronically. The City will log the

meeting minute items into e-Builder within 3 days of the meeting date.

1.11 PROGRESS PAYMENTS /REQUISITIONS FOR PAYMENT

The e-Builder process will manage payment application. There will be no need for hard copies, however the contractor will need to print out the cover sheet sign, scan and upload it onto e-Builder. The contractor is responsible for creating progress payment applications directly from e-Builder. Required information within the Pay Application shall be coordinated with the City's Project Manager. Failure of a Contractor to maintain project record documents, maintain "As-Built" record documents, and maintain current and properly prepared daily reports or to submit the project schedule will be just cause for withholding of the monthly or final payment.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

+++ END OF SECTION 01350 +++

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SECTION 01351
PUBLIC RELATIONS AND COMMUNICATIONS

PART 1 GENERAL

1.01 SCOPE

The Contractor shall provide all labor, materials, equipment and incidentals required to meet the requirements and responsibilities related to public relations and communications as specified herein during performance of the Work.

1.02 STAFFING

A. The Contractor shall employ one (1) full time Public Information Officer (PIO) whose specific duties and job shall be to perform customer service related functions and to continuously coordinate and provide information and services as required by the City's Office of Public Relations and Communications and other City staff as necessary.

1. PIO must have had the responsibilities of receiving, logging, tracking, responding and resolving customer/citizen complaints and claims, providing notices to and personal interaction with affected customers/citizens regarding project impact and projected work schedules of the Contractor, reviewing project schedules and "look-ahead" to determine projected areas of impact from the Work.

2. PIO must have a minimum of one (1) year of experience in performing this type of work on similar projects.

B. The City shall provide a Public Information Manager (PIM) whose specific duties and job shall be to perform customer service related functions and to continuously coordinate and provide information and services as required by the City's Office of Public Relations and Communications and other City staff as necessary.

PART 2 PRODUCTS

(NOT USED)

PART 3 EXECUTION

3.01 PUBLIC INFORMATION KICK-OFF MEETING

A. Prior to commencement of Work and following the preconstruction conference, the Contractor, PIO and the City DWM shall attend a public information meeting hosted by

City Council members whose districts will be impacted by construction and the Office of Public Relations and Communications. At this meeting the following items will be discussed:

1. Contractor's responsibilities.

2. Contractor's relationship with the City's Office of Public Relations and Communications and the City DWM.

3. Functions and responsibilities of the Public Information Officer (PIO) employed by the Contractor as required under paragraph 1.02 above. The Contractor's PIO and backup individual shall be identified to the Customer Care Call Center with 24/7 PIO contact telephone numbers provided.

3.02 RESPONSIBILITIES OF THE PUBLIC INFORMATION OFFICER

A. Responsibilities of the Public Information Officer (PIO) shall include, but not be limited to, the following elements:

1. Receiving, logging, tracking and resolving customer/citizen complaints and claims either received directly or by the City and providing periodic updates and reports as specified.

2. Providing notice to affected customers/citizens in the event there are scheduled service outages or other work elements required for the performance of Work that are scheduled which will have an impact on the neighborhood or property owners.

3. Attendance and participation in scheduled project progress meetings for discussion, updates and resolution to customer/citizen complaints, claims, review of schedules and other matters as required.

4. In the event Work is required on private property where an easement has been acquired, the PIO shall notify the property owner at least fourteen (14) days in advance of commencement of the Work in writing.

5. Prior to commencement of work in any neighborhood, the PIO shall provide notice to the customers/citizens thirty (30) days in advance. In addition, twenty-four (24) hours prior to actual commencement of the work, the PIO shall notify the customers/citizens via door or mailbox hanger as hereinafter provided for in this Section.

6. The PIO shall be on twenty-four (24) hour call, seven (7) days a week and be equipped with a mobile phone. In the event of the PIO being unavailable, the Contractor shall designate a second individual to handle the responsibilities and

functions who shall be fully familiar and aware of the duties and prosecution of the work.

7. The Contractor/PIO must report all complaints to the Customer Care Call Center (404-658-6500) and to the City's PIO within six (6) hours of receipt. Conversely, all calls received by the Customer Care Call center will be transmitted to the City's PIO within forty-eight (48) hours of receipt and the PIO must perform follow-up within twenty-four (24) hours with resolution after receipt of the notice. Upon receipt of the information the Customer Care Call Center will create a file to document the incident.

8. The PIO shall assist the Contractor's Traffic Control Officer in coordination of all street closures, detours and traffic pattern changes with the Public Involvement Officer and the Department of Public Works and the GDOT. As required above, the PIO must provide notice to the affected areas in advance of the scheduled closures, detours and traffic pattern changes.

9. In the event there is an emergency involving the public or a situation where media inquiries and responses are possible, the PIO shall be notified immediately. The PIM will then coordinate with the City's Media Relations Manager for appropriate action. **Under no circumstance shall any employee, Subcontractor or vendor of the Contractor make any comments to the media regarding the project at any time.**

3.03 CUSTOMER SERVICE TRACKING SOFTWARE

A. The Contractor shall use the City's e-Builder software, as specified in Section 01350, to track and enter information from customers/citizens regarding complaints, claims and inquiries. All related information shall be updated on a daily basis by the PIO. Tracking information and responses shall be coordinated with the PIM.

B. Reports shall be provided as weekly updates on all activities and on specific cases within twenty-four (24) hours when requested.

C. Information recorded shall include but not be limited to the following:

1. Date complaint/claim/inquiry received.

2. Name, address and telephone number of individual filing complaint/claim/inquiry.

3. Nature of complaint/claim/inquiry.

4. Address where problem is located if different than above.

5. Action required, date, action taken, date action completed.

6. Follow-up with person who filed under 2 above to verify satisfaction or status.

7. Documents associated with actions taken.

8. Any information regarding resolution with the Contractor's, Subcontractor's or vendor's insurance company shall be fully documented.

3.04 IDENTIFICATION BADGES AND SECURITY

A. All members of the Contractor's staff and his subcontractor's permanent staff at or above the level of foreman who will be working on-site will be issued an ID badge by the City. The ID badge will list the worker's name and company affiliation and will include a picture. All members will go to the Office of Safety & Security to have their ID's made.

B. It shall be the Contractor's responsibility to collect the ID badges from any employee who is discharged or resigns prior to completion of the project as well as at completion of the project so that all ID badges are returned to the Office of Security and Safety. The Contractor will be charged a fee of $25.00 per badge for any badge not returned at completion of the project. For any ID badges lost during the term of the project that must be reissued, there will be a charge of $15.00 per ID badge. The Contractor shall deduct these charges from his periodic or closeout payment request or the City will deduct.

C. Since lower level personnel of the Contractor, Subcontractor or vendor will not be issued ID badges, the Contractor must maintain a daily sign-in sheet for daily workers under his supervision. The Contractor must be able to identify any employee on the site as a bona fide worker if asked and if not able to identify, the City DWM will direct the Contractor to remove the individual from the site

D. The Contractor shall develop a security plan for use on the job site during construction. The plan shall include, as a minimum, the use of pre-employment background checks and drug tests, crime prevention and anti-theft procedures, workplace violence and care of project documents. All staff working on the site shall be familiar with the requirements of the Security Plan.

E. City ordinances prohibit the carrying of weapons on City streets. Any person bringing weapons to the jobsite shall be removed immediately.

F. All of the Contractor's staff at or above the level of foreman shall attend a 4-hour mandatory Security Training session conducted by the Office of Security and Safety. Multiple training sessions will be offered and staff must complete the training at least within 1 month of commencing work on the jobsite. All costs associated with the training will be considered as incidental to the Contract.

G. Persons on the jobsite shall report any suspicious activity by workers or by others at the jobsite area first to the Atlanta Police Department by calling 911 and then immediately to the Director of Security and Safety.

3.05 DOORHANGERS

A. The Contractor shall produce door hangers required for notice to customers/citizens and residents from the template provided by the PIM (SEE EXAMPLE AT END OF THIS SECTION) as specified hereinabove in paragraph 3.02. Door hangers shall be utilized for notification in the event of, but not limited to, the following events:

1. Planned service disruption/outages

2. Road closures/detours/traffic pattern changes

3. Access/entrance to property

4. Work start-up

5. Blasting

3.06 IMPACTED AREA ADDRESS DATABASE

A. The Contractor shall provide the Office of Communications and Public Outreach with a database of addresses and phone numbers (and names if available) of all project impacted residences, businesses and facilities at least three (3) weeks prior to project start-up. The database will be used by the PIM for regular citizen communications and notifications.

B. The Contractor shall copy the PIM on all correspondence and Right of Entry Agreements with citizens and property owners.

3.07 SCHEDULE

A. The PIO and PIM shall be provided a copy of the detailed CPM project construction schedule. The PIO will provide notification to the impacted area at least two (2) weeks prior to project start-up.

B. The Contractor shall inform the PIM through the weekly progress meetings of any project schedule changes or changes in “disruptive work” such as blasting, road closures, etc., that would have significant impact on citizens or require prior citizen notification.

3.08 MEDIA RELATIONS AND JOB SITE INQUIRIES

A. As specified above in paragraph 3.02, only authorized persons shall release any information to media inquiries. The Contractor’s field personnel shall at all times have

project information cards available that will be provided to media and citizens if inquiries are made on-site. All inquiries shall be directed to the person referred to on the card and citizens shall be referred to the PIO and/or PIM.

B. Project information cards shall be produced by the Contractor from the template provided by the PIM. (SEE EXAMPLE AT END OF THIS SECTION)

3.09 TRAINING

All of the Contractor's staff at or below the level of superintendent shall attend a mandatory Public Relations Training and Protocol Procedures Training. The purpose of this training is to teach construction crews on how to deal with citizens, the media, etc. and how to conduct themselves on the jobsite. This training is approximately one (1) hour in length and will be facilitated by City staff at a designated City facility. Training will be provided at no cost to the Contractor.

3.10 VEHICLE SIGNS AND PROJECT SITE SIGNAGE

A. The Contractor shall place pre-approved magnetic signs on all job-site project vehicles. The signage template will be provided by the PIM with the signs to be produced by the Contractor.

B. All project sites shall have pre-approved project signs in accordance with the template provided by the PIM and signs produced by the Contractor. Some of the signs shall be mounted on moveable skids so they can be relocated as the project progresses on various streets in project area.

3.11 NOTIFICATIONS

A. The Contractor shall provide the following notifications as required by the PIM:

1. Anticipated work start date must be three (3) weeks prior so PIM may send out two (2) week notice mailer.

2. Service disruptions - notify PIM and Call Center at least 72 hours in advance so that 48 hour notice may be issued; notice to citizens via door hangers and/or automated phone message 24 hours prior to disruption.

3. Street Closure or Partial Closure - notify PIM and Call Center at least 72 hours in advance to permit 48 hour automated phone message; notify fire, police other emergency services and other authorities 24 hours prior to street closure.

4. Significant work in neighborhood- blasting, directional drilling, trenchless installation, open cut, etc.-door hangers or automated phone messages are required-notify the PIM and Call Center at least 72 hours in advance to permit 48 hour

automated phone message; notification to citizens via door hangers and/or automated phone messages 24 hours in advance.

B. The Contractor shall be fully responsible for notification to all emergency related services for detours, closures (partial or full) or traffic pattern changes and as such they must be detailed in their traffic control plan and implemented through the Contractor's Traffic Control Manager and per all permitting requirements. Refer to Section 01550.

C. The Contractor shall be fully responsible for distributing all notifications a minimum of 48 hours in advance of service outages for schools, nursing homes hospitals, medical clinics, assisted living facilities or other types of facilities and shall also make personal contact with facility representatives no later than 60 minutes prior to the outage.

D. The Contractor shall at all times coordinate with the PIM and Call Center to provide detailed schedules and street locations for service disruptions or street closures to ensure that Call Center is well equipped to provide adequate response to citizen inquiries.

+ + + END OF SECTION 01351 + + +

Sample Door Hanger

NOTICE OF SEWER SYSTEM IMPROVEMENT WORK

City of Atlanta
Department of Watershed Management

The City is pleased to announce that we are moving forward with plans to fix our sewer system to meet state and federal requirements.

We are now at the point where construction activities are about to begin on your street for the South River Capacity Relief Projects. These planned improvements will reduce the incidents of sewage backups, leaks and sanitary sewer overflows.

The particular work planned for your street is checked below.

- o OPEN-CUT CONSTRUCTION
- o TUNNELING
- o SMOKE TESTING
- o ROAD CLOSURES AND/OR DETOURS
- o OTHER _____

We will do our best to minimize any inconvenience to you. All personnel are required to wear Clean Water Atlanta identification badges. If you have any questions or concerns, please contact William Horton, the Public Information Manager for this project at 770-294-3240 or call the Clean Water Atlanta Help Line at 404-529-9211.

If you have any questions, please call the Department of Watershed Management Helpline at 404-529-9211.

Sample Project Information Card
(Tri-Fold)

City will enter into an easement agreement with the owner. The City's real estate agents are currently negotiating access agreements with the affected property owners.

Sewer separation contractors may use different technologies to construct the new sewers; including open-cut and tunnel construction. Neighborhoods in the separation area will experience some disruption, such as partial or complete street closures, traffic rerouting, storage of materials and equipment near construction sites, brief interruptions in sewer service, dust and noise. The City will take every practical measure to reduce disruption during the sewer separation projects.

If you have any concerns about work in your area or would like additional information, you contact the Project Help Line at 404-529-9211 or visit the City's Public Information Office located at 290 M.L.K. Blvd., Suite 103. The office is open from 8:00 am to 5:00 pm, Monday through Friday.

City of Atlanta
Shirley Franklin
Mayor

City Council
Lisa Borders
President

Carla Smith
Kwanza Hall
Ivory Young
Cleta Winslow
Natalyn Archibong
Anne Fauver
Howard Shook
Clair Muller
Felicia Moore
C.T. Martin
Jim Maddox
Joyce Sheperd
Ceasar Mitchell
Mary Norwood
H. Lamar Willis

CLEAN WATER ATLANTA

Stockade Project Information Card

COMBINED SEWER OVERFLOW REMEDIATION PROGRAM

The federal Environmental Protection Agency and state Environmental Protection Division have approved the City's plan to eliminate water quality violations from combined sewer overflows (CSOs). This plan includes a combination of deep-rock storage tunnels, new treatment facilities and the separation of combined sewers in selected basins- Greensferry, McDaniel and the Stockade sub-basin portion of the Intrenchment Creek basin.

You live in the Stockade Basin. Work in this basin extends roughly as far south as Lester Avenue, as far east as Stovall Street (north of I-20) or Ormewood Terrace (South of I-20), as far north as Decatur Street and as far west as Boulevard. Sewer separation construction activities commenced on May 1, 2005 and are slated for completion by December 2007.

WHAT HOMEOWNERS MIGHT EXPERIENCE DURING SEWER SEPARATION

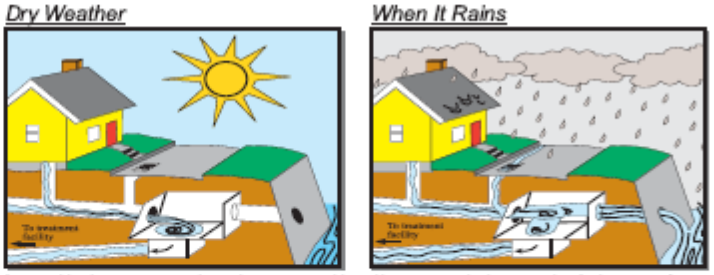
Most of the homes and businesses in the Greensferry, McDaniel and Stockade areas are connected to a combined sewer system. The combined system will be converted to a separated sewer system under the federal consent decree program. Sewer separation involves constructing new sanitary or storm sewers within a combined sewer service area. This allows wastewater and stormwater, currently collected in the same pipe, to be collected in separate pipes. The wastewater would be carried to an existing treatment plant where pollutants are removed before discharge to the South River. Separately treated stormwater would be collected and discharged to a local stream.

The Department of Watershed Management has been working with elected officials and community leaders to keep affected residents and business owners update about this project and to address specific neighborhood concerns.

Most of the existing combined sewers run beneath city streets but some were constructed in areas that are now private property. If a sewer is on private property and there is no existing easement, the

EXISTING COMBINED SEWER SYSTEM

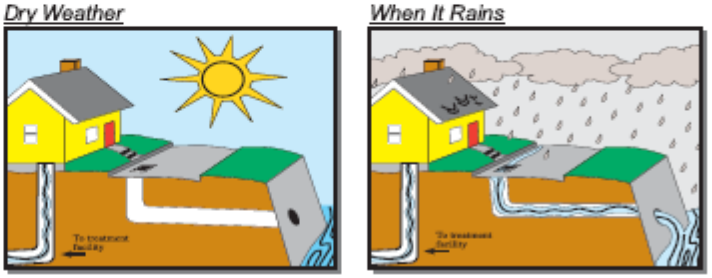
Dry Weather *When It Rains*



In a combined sewer system, domestic sewage combine with stormwater in the same pipe. In the event of heavy rains, the stormwater can cause an overflow into a receiving stream.

AFTER SEPARATION

Dry Weather *When It Rains*



In a separate sewer system, domestic sewage and stormwater flow into separate pipes. The sewage is diverted to a wastewater treatment plant and stormwater is released untreated to a receiving stream.

Sample Door Hanger
(Two-Sided)

Date: _____

Dear Water Customer:

Because of maintenance/repairs to the water system in your community, your service will be briefly interrupted on:

Date: _____

Time: _____

Your service will be restored at approximately:

_____

We apologize for the inconvenience and assure you that our efforts will help ensure clean, safe water for Atlantans and our downstream neighbors for generations to come.

Thank you for your understanding.

Please call 404-658-7220 if you have concerns or questions regarding this work.

_____
Watershed Management Representative

City of Atlanta
Department of Watershed Management
55 Trinity Avenue, S.W., Suite 5400
Atlanta, GA 30303

Date: _____

Dear Water Customer:

Because of maintenance/repairs to the water system in your community, your service will be briefly interrupted on:

Date: _____

Time: _____

Your service will be restored at approximately:

_____

We apologize for the inconvenience and assure you that our efforts will help ensure clean, safe water for Atlantans and our downstream neighbors for generations to come.

Thank you for your understanding.

Please call 404-658-7220 if you have concerns or questions regarding this work.

_____
Watershed Management Representative

City of Atlanta
Department of Watershed Management
55 Trinity Avenue, S.W., Suite 5400
Atlanta, GA 30303

Sample Project Information Card
(Tri-Fold Outside)

Here are some suggestions for dealing with discoloration at your taps:

- Allow the water to run for a few minutes.
- Do not use hot water during this time to prevent sediment from entering and settling in your hot water heater.
- If the discoloration persists for longer than an hour, call 404.658.7220 to report the condition.

Questions or Concerns?

Project Helpline - 404.589.3070
www.atlantawatershed.org
www.facebook.com/atlwatershed
www.twitter.com/atlwatershed

City of Atlanta
Kasim Reed
Mayor

City Council
Ceasar C. Mitchell
President

Carla Smith
Kwanza Hall
Ivory Young
Cleta Winslow
Natalyn Archibong
Alex Wan
Howard Shook
Yolanda Adrean
Felicia Moore
C.T. Martin
Keisha Lance Bottoms
Joyce Sheperd
Michael Julian Bond
Aaron Watson
H. Lamar Willis

CLEAN WATER ATLANTA

Water Distribution System Improvements

The City of Atlanta's Department of Watershed Management is embarking on a program to improve its existing water distribution system. The water distribution system covers approximately 640-square-miles and provides service to residents and businesses in Atlanta, Sandy Springs and South Fulton County. The system is comprised of over 2,500 miles of distribution mains and approximately 25,000 hydrants.

The purpose of the system improvements is to increase water flow & pressures, eliminate water quality issues and increase pipe capacity to satisfy minimum pipe diameter standards.

Upgrades to the water system will take place in approximately 50 selected areas of the system within Atlanta city limits. Improvements will consist of the installation of 100,000 feet of new eight-inch to 16-inch water mains. New hydrants within the existing right-of-way will also take place while existing undersized water mains and hydrants will be abandoned. New service connections will also be provided to water customers after the new mains have been installed, tested and disinfected. These enhancements

Sample Project Information Card
(Tri-Fold Inside)

will be completed under four separate construction contracts. Each contract will cover a separate quadrant of the City (Southeast, Southwest, Northwest and Northeast).

Construction is slated to begin April 2011 for the Southeast area and expected to last one year. Construction for the three remaining contracts will begin in 90-day intervals, with an expected completion date of January 2013.

What to Expect?

Construction – The installation of the new water pipes will require open-cut construction. You will notice crews drilling to break the asphalt and using heavy machinery to install the new pipes. Some dust accumulation on plants, patio furniture and parked cars, can result.

Obstruction of Traffic – There will be temporary lane closures and blocked intersections to allow crews to work safely in the roadway. Detour signs will be posted when necessary. Please exercise caution as you travel through project areas.

Water Main Breaks /Water Service Disruptions – The probability of a water main break is greater where construction is in progress simply because of the use of heavy machinery near buried utility pipes. When a water main breaks, water service to the area is suspended temporarily to allow repair of the pipe. Customers will also experience a scheduled service disruption when water service is transferred from the old mains to the new mains.

Water Discoloration – Distribution mains and connection pipes that supply water service to homes and businesses are made of iron. As they age, these pipes accumulate iron sediment. Under normal conditions, water flows in one direction in the pipes and sediment is never noticed. However, any interruption of water flow in your pipes; i.e., water shut-off, opening of a hydrant or valve can lead to some water discoloration. When the water is turned off and back on again, the water in the mains reverses flow as a result of pressure changes, causing sediment to dislodge and mix with the water. The discolored water is not harmful to your health, and usually the water will return to normal within one hour of the disturbance.

Low Water Pressure – This is another effect of sediment mixing with water when the water is turned off during an interruption and turned back on again. As the sediment flows with the water through your tap, it clogs the filter screen located at the mouth of the tap. This blockage will reduce the water flow. Removing the screen and rinsing out the sediment usually addresses this issue.

Water Pressure Surge – When water service is transferred to the new mains, water pressure is significantly enhanced, causing water to enter service pipes at an increased rate. This pressure surge can cause your service pipes to break. Ensure that your service pipes are in good condition and talk to your plumber about installing a pressure reducing valve to safeguard your pipes and fixtures.

SECTION 01400
QUALITY ASSURANCE/QUALITY CONTROL

PART 1 GENERAL

1.01 SCOPE

This section includes requirements for the implementation of the Contractor's quality assurance and quality control program.

1.02 SITE INVESTIGATION AND CONTROL

A. Contractor shall check and verify all dimensions and conditions in the field continuously during construction. Contractor shall be solely responsible for any inaccuracies built into the Work due to Contractor's and subcontractor's failure to comply with this requirement.

B. Contractor shall inspect related and appurtenant Work and report in writing to the City DWM any conditions that will prevent proper completion of the Work. Failure to report any such conditions shall constitute acceptance of all Site conditions, and any required removal, repair, or replacement caused by unsuitable conditions shall be performed by the Contractor solely and entirely at Contractor's expense.

1.03 INSPECTION OF THE WORK

A. All work performed by the Contractor and subcontractors shall be inspected by the Contractor and non-conforming Work and any safety hazards in the work area shall be noted and promptly corrected. The Contractor is responsible for the Work to be performed safely and in conformance to the Contract.

B. The Work shall be subject to inspection by representatives of the City DWM acting on behalf of the City DWM to ensure strict compliance with the requirements of the Contract Documents. Such inspection may include mill, plant, shop, or field inspection, as required. The City DWM or any inspector(s) shall be permitted access to all parts of the Work, including plants where materials or equipment are manufactured or fabricated.

C. The presence of the City DWM, or any inspector(s), however, shall not relieve the Contractor of the responsibility for the proper execution of the Work in accordance with all requirements of the Contract. Compliance is the responsibility of the Contractor. No act or omission on the part of the City DWM, or any inspector(s) shall be construed as relieving Contractor of this responsibility. Inspection of Work later determined to be non-conforming shall not be cause or excuse for acceptance of the non-conforming Work. The City DWM may accept non-conforming Work when adequate compensation is offered and it is in the City DWM's best interest as determined by the City DWM.

D. All materials and articles furnished by the Contractor or subcontractors shall be subject to rigid documented inspection, by qualified personnel, and no materials or articles shall be used in the Work until they have been inspected and accepted by the Contractor's Quality Control representative and the City DWM or other designated representative. No Work shall be backfilled, buried, cast in concrete, covered, or otherwise hidden until it has been inspected. Any Work covered in the absence of inspection shall be subject to uncovering. Where uninspected Work cannot be easily uncovered, such as in concrete cast over reinforcing steel, all such Work shall be subject to demolition, removal, and reconstruction under proper inspection at the Contractor's expense.

E. All materials, equipment and/or articles furnished to the Contractor by the City DWM shall be subject to rigid inspection by the Contractor's Quality Control representative before being used or placed by the Contractor. The Contractor shall inform the City DWM, in writing, of the results of said inspections within one working day after completion of inspection. In the event the Contractor believes any material or articles provided by the City DWM to be of insufficient quality for use in the Work, the Contractor shall immediately notify the City DWM.

1.04 TIME OF INSPECTION AND TESTS

A. Samples and test specimens required under these Specifications shall be furnished and prepared for testing in ample time for the completion of the necessary tests and analyses before said articles or materials are to be used. The Contractor shall furnish and prepare all required test specimens at Contractor's own expense.

B. Whenever the Contractor is ready to backfill, bury, cast in concrete, hide, or otherwise cover any Work under this Contract, the City DWM shall be notified not less than three work days in advance to request inspection before beginning any such Work of covering. Failure of the Contractor to notify the City DWM at least three work days in advance of any such inspections shall be reasonable cause for the City DWM to order a sufficient delay in the Contractor's schedule to allow time for such inspection. The costs of any remedial or corrective work required, and all costs of such delays, including its impact on other portions of the Work, shall be borne by the Contractor.

1.05 SAMPLING AND TESTING

A. The Contractor shall retain and pay for an independent materials testing agency approved by the City DWM. This independent testing agency will develop and submit a testing plan for quality assurance on each type of work activity. The testing agency will document the processes and procedures utilized to verify and maintain quality work. When not otherwise specified, all sampling and testing shall be in accordance with the methods prescribed in the most current standards, as applicable to the class and nature of the article or materials considered. However, the City DWM reserves the right to use any generally accepted system of inspection which, in the opinion of the City DWM, will ensure the City DWM that the quality of the workmanship is in full accord with the Contract.

B. The City DWM reserves the right to abbreviate, modify the frequency of or waive tests or quality assurance measures, but waiver of any specific testing or other quality assurance measure, whether or not such waiver is accompanied by a guarantee of substantial performance as a relief from the specified testing or other quality assurance requirements as originally specified, and whether or not such guarantee is accompanied by a performance bond to assure execution of any necessary corrective or remedial work, shall not be construed as a waiver of any technical or qualitative requirements of the Contract.

C. Notwithstanding the existence of such waiver, the City DWM shall reserve the right to make independent investigations and tests as specified in the following paragraph and failure of any portion of the Work to meet any of the qualitative requirements of the Contract, shall be reasonable cause for the City DWM to require the removal or correction and reconstruction of any such Work.

D. In addition to any other inspection or quality assurance provisions that may be specified, the City DWM shall have the right to independently select, test, and analyze, at the expense of the City DWM, additional test specimens of any or all of the materials to be used. Results of such tests and analyses shall be considered along with the tests or analyses made by the Contractor to determine compliance with the applicable specifications for the materials so tested or analyzed provided that wherever any portion of the Work is discovered, as a result of such independent testing or investigation by the City DWM, which fails to meet the requirements of the Contract, all costs of such independent inspection and investigation and all costs of removal, correction, reconstruction, or repair of any such Work shall be borne by the Contractor.

1.06 CONTRACTOR'S QUALITY ASSURANCE/QUALITY CONTROL REQUIREMENTS

A. The Contractor shall establish and execute a Quality Assurance/Quality Control (QA/QC) program for the services that are being procured from the Contractor. The program shall provide the Contractor with adequate measures for verification and conformance to defined requirements by the Contractor's personnel and subcontractors (including fabricators and suppliers). This program shall be described in a Plan responsive to this Section. It shall utilize the services of an independent testing agency/company that is industry certified to provide quality assurance and compliance with the standards specified.

B. The Contractor shall furnish the City DWM a project specific QA/QC Plan. The Plan shall contain a comprehensive account of Contractor's QA/QC procedures as applicable to this job. The Contractor shall furnish for review by the City DWM, no later than 14 days after receipt of notice to proceed, the QA/QC plan proposed to be implemented. The plan shall identify personnel, procedures, control, instructions, tests, records, and forms to be used. Construction will be permitted to begin only after acceptance of the QA/QC Plan. The detailed requirements for this Plan are delineated in the following paragraphs. No payments will be made to the Contractor until the QA/QC Plan is fully accepted by the City DWM.

C. The QA/QC Plan shall describe and define the personnel requirements described herein. The Contractor shall employ a full time on-site QA/QC Manager to manage, address and resolve all quality control issues.

1. The QA/QC Manager shall be as identified by the Contractor and approved by the City DWM. The QA/QC Manager shall have a minimum of five (5) years of construction experience in pipe line installation. The QA/QC Manager shall be onsite at all times while work is being performed by the contractor, to remedy and demonstrate that work is being performed properly and to make multiple observations of all Work in progress. This individual shall be dedicated solely to QA/QC activities and shall have no supervisory or managerial responsibility over the work force. The QA/QC Manager shall not be assigned any other duties or roles by the Contractor.

2. The Contractor shall provide additional personnel who are assigned to assist the QA/QC Manager as required to fulfill the requirements of the QA/QC Plan. The Contractor shall provide a copy of the letter to the QA/QC Manager signed by an authorized official of the firm which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the QA/QC Manager, including authority to stop work which is not in compliance with the contract. The QA/QC Manager shall issue letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities. Copies of these letters shall also be furnished to the City DWM.

D. The Contractor's QA/QC program shall ensure the achievement of adequate quality throughout all applicable areas of the Project. A customized QA/QC Plan shall be developed that discusses each type of work that the Contractor is responsible for within the Project. The QA/QC Plan shall describe the program and include procedures, work instructions and records and a description of the quality control organization.

1. The description of the quality control organization shall include a chart showing lines of authority staffing plan and acknowledgment that the QA/QC staff shall implement the system for all aspects of the work specified. The staffing plan shall identify the name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a QA/QC function including the QA/QC Manager.

2. In addition, the Plan shall describe methods relating to areas that require special testing and procedures as noted in the specifications.

E. Identification and Control of Items and Materials: Procedures to ensure that items or materials that have been accepted at the site are properly used and installed shall be described in the QA/QC Plan.

F. The procedures shall provide for proper identification and storage, and prevent the use of incorrect or defective materials.

G. Inspection and Tests: The Contractor shall have written procedures defining a program for control of inspections performed and these procedures shall be described in the QA/QC Plan.

1. Inspections and tests shall be performed and documented by qualified individuals. At a minimum, "qualified" shall mean having performed similar QA/QC functions on similar type projects for a minimum of five (5) years and possession of industry standards certification and license. Records of personnel experience, training and qualifications shall be submitted to the City DWM for review and approval.

2. The Contractor shall maintain and provide to the City DWM, within two working days of completion of each inspection and test, adequate records of all such inspections and tests. Inspection and test results shall be documented and evaluated to ensure that requirements have been satisfied.

3. Procedures shall include:

a. Specific instructions defining procedures for observing all Work in process and comparing this Work with the Contract requirements (organized by specification section).
b. Maintaining and providing daily QA/QC inspection reports. Such reports shall, at a minimum, include the following:
   i. Dated list of Item(s) inspected
   ii. Location of the test sample(s)
   iii. Logs, detailed locational drawings and confirmation reports
   iv. Quality characteristics in compliance
   v. Quality characteristics not in compliance
   vi. Corrective/remedial actions taken
   vii. Statement of certification
   viii. QC Manager’s signature
c. Specific instructions for recording all observations and requirements for demonstrating through the reports that the Work observed was in compliance or a deficiency was noted and action to be taken.
d. Procedures to preclude the covering of deficient or rejected Work.
e. Procedures for halting or rejecting Work.
f. Procedures for resolution of differences between the QA/QC representative(s) and the production representative(s).
g. Method of documenting QA/QC process and results including:
   i. Automatic exception reporting
   ii. Resolution tracking
   iii. Quality Confirmation Test reports
   iv. Sample retention index and storage

4. The QA/QC Plan shall identify all contractual hold/inspection points as well as any Contractor imposed hold/inspections points.

5. The QA/QC Plan shall include procedures to provide verification and control of all testing provided by the Contractor including:

    a. Individual test records containing the following information:
        i. Item tested –item number and description
        ii. Test results
        iii. Test designation
        iv. Test work sheet including location sample was obtained
        v. Acceptance or rejection
        vi. Date sample was obtained
        vii. Retest information, if applicable
        viii. Control requirements
        ix. Tester signature
        x. Testing QC staff initials
    b. Maintaining and providing to the City DWM daily testing records. Such records shall, at a minimum, contain the following:
        i. Dated list of Item(s) inspected
        ii. Location of the test sample(s)
        iii. Logs, detailed location drawings and confirmation reports
        iv. Quality characteristics in compliance
        v. Quality characteristics not in compliance
        vi. Corrective/remedial actions taken
        vii. Statement of certification
    c. QC Manager's signature providing for location maps/drawings (i.e. lift drawings, laying schedules, etc.) for all tests performed or location of Work covered by the tests.
    d. Maintaining copies of all test results.
    e. Ensuring City DWM receives independent copy of all tests.
    f. Ensuring testing lab(s) are functioning independently and in accordance with the specifications.
    g. Ensuring re-tests are properly taken and documented.

H. Control of Measuring and Test Equipment: Measuring and/or testing instruments shall be adequately maintained, calibrated, certified and adjusted to maintain accuracy within prescribed limits. Calibration shall be performed at specified periods against valid standards traceable to nationally recognized standards and documented.

I. Supplier Quality Assurance: The QA/QC Plan shall include procedures to ensure that procured products and services conform to the requirements of the Specifications. Requirements of these procedures shall be applied, as appropriate, to subcontractors and suppliers. QA/QC inspections and certifications shall not be deferred to the Contractor's subcontractors or suppliers.

J. Deficient, Defective and Non-conforming Work and Corrective Action

1. The QA/QC Plan shall include procedures for handling of deficiencies and non-conformances. Deficiencies and non-conformances are defined as documentation, drawings, material, and equipment or Work not conforming to the specified requirements or procedures. The procedures shall prevent non-conformances by identification, documentation, evaluation, separation, disposition and corrective action to prevent recurrence. Conditions having adverse effects on quality shall be promptly identified and reported to the senior level management. The cause of conditions adverse to quality shall be determined and documented and measures implemented to prevent recurrence. In addition, at a minimum, this procedure shall address:

    a. Personnel responsible for identifying deficient and non-complying items within the work.
    b. How and by whom deficient and non-compliant items are documented "in the field".
    c. The personnel and process utilized for logging deficient and non-compliant work at the end of each day onto a Deficiency Log.
    d. Tracking processes and tracking documentation for Deficient and Non-Compliant items.
    e. Personnel responsible for achieving resolution of outstanding deficiencies.
    f. Once resolved, how are the resolutions documented and by whom.

K. Special Processes And Personnel Qualifications

1. The QA/QC Plan shall include detailed procedures for the performance and control of special process (e.g. welding, soldering, heat treating, cleaning, plating, nondestructive examination, etc.).

2. Personnel performing special process tasks shall have the experience, training and certifications commensurate with the scope, complexity, or nature of the activity. They shall be approved by the City DWM before the start of Work on the Project.

L. Audits

1. The Contractor's QA/QC program shall provide for documented audits to verify that QA/QC procedures are being fully implemented by the Contractor as well as its subcontractors. Audit records shall be made available to the City DWM upon request.

2. The Contractor shall provide to the City DWM, a quarterly report indicating any outstanding and unresolved exceptions to the QA/QC program or contract documents. The report will include documentation on any standards modifications, corrections, failed tests and a review of field procedures and checks and balances effectiveness.

M. Documented Control/Quality Records

1. The Contractor shall establish methods for control of Contract that describe how documents are received and distributed to assure the correct issue of the document being used. The methods shall also describe how as-built data are documented and furnished to the City DWM.

2. The Contractor shall maintain evidence of activities affecting quality, including operating logs, records of inspections and tests, audit reports, material analyses, personnel qualification and certification records, procedures, and document review records.

3. Quality records shall be maintained in a manner that provides for timely retrieval, and traceability. Quality records shall be protected from deterioration, damage, and destruction. The Contractor shall maintain an automated exceptions list of any non-conforming or defective or substandard work.

4. The Contractor shall provide a list with specific records as specified in the Contract Documents which will be furnished to the City DWM at the completion of activities and in conjunction with logs and location drawings.

N. Acceptance of QA/QC Plan: The City DWM's review and acceptance of the Contractor's QA/QC Plan shall not relieve the Contractor from any of its obligations for the performance of the Work. The Contractor's QA/QC staffing is subject to the City DWM's review and continued acceptance. The City DWM, at its sole option, without cause, may direct the Contractor to remove and replace the QA/QC representative. No Work covered by the QA/QC Plan shall start until the City DWM's acceptance of Contractor's QA/QC plan has been obtained.

O. The City DWM may perform independent quality assurance audits to verify that actions specified in Contractor's QA/QC Plan have been implemented. No City DWM audit finding or report shall in any way relieve Contractor from any requirements of this Contract.

1.07 TESTING SERVICES

A. All tests which require the services of a laboratory to determine compliance with the Contract Documents shall be performed by an independent commercial testing firm acceptable to City DWM. The testing firm's laboratory shall be staffed with experienced technicians, properly equipped and fully qualified to perform the tests in accordance with the specified standards. All standard quality assurance testing and installation verification testing will be at the expense of the Contractor.

B. Testing, when required, will be in accordance with all pertinent codes and regulations and with procedures and requirements of the American Society for Testing and Materials (ASTM).

C. The City DWM shall have the right to inspect work performed by the independent testing laboratory both at the project and at the laboratory. This shall include inspection of the manual, equipment calibrations, proficiency sample performance, etc.).

D. Testing services provided by the City DWM, if any, are for the sole benefit of the City DWM; however, test results shall be available to the Contractor. Testing necessary to satisfy Contractor's internal quality control procedures shall be the sole responsibility of Contractor.

E. Testing Services Provided by the Contractor

1. Unless otherwise specified, and in conjunction with, all other specified testing requirements, the Contractor shall provide the following testing services, and submit a detailed testing plan for each along with proposed forms for City DWM's review.

2. Moisture-density and relative density tests on embankment, fill, and backfill materials.

3. In-place field density test on embankments, fills and backfill.

4. QC testing of all precast and/or pre-stressed concrete

5. All other tests and engineering data required for the City DWM's review of materials and equipment proposed to be used in the Work

6. In addition, the following QC tests shall be performed by the Contractor:

    a. Holiday testing of pipeline and all other coatings systems applied to surfaces as required by the City DWM.
    b. Slumps, air bucket tests, compression tests and other confirmation tests.
    c. Air testing of field-welded joints for steel pipe or pipe cylinders and fabricated specials.
    d. All testing and inspection of welding work including, but not limited to, welding procedure qualifications, welder operator qualifications, all work performed by the certified welding inspector, all appropriate nondestructive testing of welds and all repair and retest of weld defects.

7. Testing, including sampling, shall be performed by the Contractor's testing firm's laboratory personnel, in the manner and frequency indicated in the Specifications. The City DWM shall have the right to stipulate the location of the confirmation tests. The Contractor shall provide preliminary representative samples of materials to be tested, to the testing firm's laboratory, in required quantities.

8. The testing firm's laboratory shall perform all laboratory tests within a reasonable time consistent with the specified standards and will furnish a written report of each test.

9. Where such inspection and testing are to be conducted by an independent laboratory agency, the sample or samples shall be selected by such laboratory or agency or the City DWM and shipped to the laboratory by the Contractor at Contractor's expense.

10. Notify laboratory sufficiently in advance of operation to allow for the assignment of personnel and schedules of tests.

F. Transmittal of Test Reports:

1. Written reports of tests and engineering data furnished by Contractor for City DWM's review of materials and equipment proposed to be used in the Work shall be submitted as specified for Shop Drawings. Final transmittal of all Project testing records will be required as a final close-out submittal for the release of retainage.

2. Promptly process and distribute all required copies of test reports and related instructions to insure all necessary retesting or replacement of materials with the least possible delay in progress of the Work.

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+ + + END OF SECTION 01400 + + +

SECTION 01410
TESTING LABORATORY SERVICES

PART 1 GENERAL

1.01 SCOPE

A. This Section includes testing which the City DWM may require, beyond that testing required of the manufacturer, to determine if materials provided for the Project meet the requirements of these Specifications.

B. This section also includes all testing required by the City DWM to verify if work performed by the Contractor is in accordance with the requirements of these specifications, i.e., concrete strength and slump testing, soil compaction, etc.

C. This section does not include testing required in various sections of these specifications to be performed by the manufacturer, i.e., testing of pipe. Where no testing requirements are described in various sections of these specifications, but the City DWM decides that testing is required to demonstrate compliance with material or performance standards, the City DWM may require testing to be performed under current pertinent standards for testing.

D. An independent testing laboratory shall be selected by the Contractor to complete the testing. The laboratory must be approved in writing by the City DWM before any testing services are performed.

E. The Contractor shall pay directly for the services of the independent testing laboratory for all testing required under this Contract.

F. Employment of the testing laboratory shall in no way relieve the Contractor of Contractor's obligation to perform work meeting the requirements of the Contract.

G. Testing laboratory services will be required for, but not be limited to:

1. Cement
2. Aggregate
3. Concrete
4. Steel and Metals
5. Welding

6. Backfill and Compaction
7. Bituminous Pavement

1.02 LABORATORY DUTIES

A. Cooperate with the City DWM and Contractor.

B. Provide qualified personnel promptly on notice.

C. Perform specified inspections, sampling and testing of materials.

1. Comply with specified standards, ASTM, other recognized authorities, and as specified.

2. Ascertain compliance with requirements of the Contract Documents.

D. Promptly notify the City DWM and Contractor of irregularity or deficiency of work which are observed during performance of services.

E. Promptly submit copies of report of inspections to the City DWM with the following information included:

1. Date issued

2. Project title and number

3. Testing laboratory name and address

4. Name and signature of inspector

5. Date of inspection or sampling

6. Record of temperature and weather

7. Date of test

8. Identification of product and Specification section
9. Location of sample or test in the Project

10. Type of inspection or test

11. Results of test and observations regarding compliance with the Contract Documents

12. Interpretation of test results, when requested by the Contractor

F. Perform additional services as required.

G. The laboratory is not authorized to:

1. Release, revoke, alter or enlarge on requirements of the Contract Documents

2. Approve or accept any portion of the Work

3. Perform any duties of the Contractor.

1.03 CONTRACTOR RESPONSIBILITIES

A. Cooperate with laboratory personnel; provide access to Work and/or manufacturer's requirements.

B. Provide to the laboratory, representative samples, in required quantities, of materials to be tested.

C. Furnish copies of mill test reports.

D. Furnish required labor and facilities to:

1. Provide access to Work to be tested;

2. Obtain and handle samples at the site;

3. Facilitate inspections and tests;

4. Build or furnish a holding box for concrete cylinders or other samples as required by the laboratory.

E. Notify the laboratory sufficiently in advance of operation to allow for the assignment of personnel and schedules of tests.

F. Laboratory Tests: Where such inspection and testing are to be conducted by an independent laboratory agency, the sample(s) shall be selected by such laboratory or agency and shipped to the laboratory by the Contractor at Contractor's expense.

G. Copies of all correspondence between the Contractor and testing agencies shall be provided to the City DWM.

1.04 QUALITY ASSURANCE

Testing shall be in accordance with all pertinent codes and regulations and with

procedures and requirements of the American Society for Testing and Materials (ASTM).

1.05 PRODUCT HANDLING

Promptly process and distribute all required copies of test reports and related instructions to insure all necessary retesting or replacement of materials with the least possible delay in the progress of the Work.

1.06 FURNISHING MATERIALS

The Contractor shall be responsible for furnishing all materials necessary for testing.

1.07 CODE COMPLIANCE TESTING

Inspections and tests required by codes or ordinances or by a plan approval authority, and made by a legally constituted authority, shall be the responsibility of, and shall be paid for by the Contractor, unless otherwise provided in the Contract Documents.

1.08 CONTRACTOR'S CONVENIENCE TESTING

Inspection or testing performed exclusively for the Contractor's convenience shall be the sole responsibility of the Contractor.

1.09 SCHEDULES FOR TESTING

A. Establishing Schedule

1. The Contractor shall, by advance discussion with the testing laboratory selected by the City DWM, determine the time required for the laboratory to perform its tests and to issue each of its findings, and make all arrangements for the testing laboratory to be on site to provide the required testing.

2. Provide all required time within the construction schedule.

B. When changes of construction schedule are necessary during construction, coordinate all such changes of schedule with the testing laboratory as required.

C. When the testing laboratory is ready to test according to the determined schedule, but is prevented from testing or taking specimens due to incompleteness of the Work, all extra costs for testing attributable to the delay will be back charged to the Contractor and shall not be borne by the City DWM.

1.10 TAKING SPECIMENS

Unless otherwise provided in the Contract Documents, all specimens and samples for tests will be taken by the testing laboratory.

1.11 TRANSPORTING SAMPLES

The Contractor shall be responsible for transporting all samples, except those taken by testing laboratory personnel, to the testing laboratory.

PART 2 PRODUCTS

(NOT USED)

PART 3 EXECUTION

3.01 TESTS AND CERTIFICATIONS

A. As a minimum, the following tests shall be performed and the following certification provided:

1. Cement: Certified test results by cement manufacture or by independent laboratory shall be furnished as required by the City DWM.

2. Aggregate and Mortar Sand: Certified test results by aggregate producer or by independent laboratory shall be furnished as required by the City DWM.

3. Concrete:

   a. Certified test results of all concrete in accordance with ASTM C31, C39 and C172.
   b. Slump tests:
      (1) Perform slump tests on the job in accordance with ASTM standards.
      (2) One (1) slump test shall be performed for each 25 cubic yards of concrete.

B. Steel and Miscellaneous Metal: Reinforcing steel, structural steel and miscellaneous metal may be inspected visually on site by the City DWM.

C. Welding: 1 percent of all structural welds during construction shall be inspected either visually or by an independent laboratory as required by the City DWM.

D. Laboratory tests of compacted backfill shall be made in accordance with ASTM D698. In-place density tests shall be made in accordance with ASTM D1556 or D2922. Compaction testing shall be required as specified in paragraph 3.16 of Section 02225.

E. Bituminous Concrete Pavement: Material testing for bituminous concrete shall be

performed as directed by the City DWM. Refer to paragraph 3.11 of Section 02705.

+ + + END OF SECTION 01410 + + +

SECTION 01500

TEMPORARY CONTROL OF CONSTRUCTION OPERATIONS

PART 1 – GENERAL

1.01 SCOPE

The work covered by this Section includes furnishing all labor, equipment, and materials required for temporary control of construction operations.

1.02 RELATED SECTIONS

The Work of the following Sections specifically apply to the Work of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of Work.

1. Section 02125 Temporary and Permanent Erosion and Sedimentation Control.
2. Section 02885 Surface Water Diversion and Dewatering

1.03 PUMPING

A. The Contractor shall furnish and operate pumping and appurtenant piping for dewatering, flow rerouting, or any similar purposes.

B. Standard Pumping equipment (as opposed to Reduced Noise Emitting Pumps ex. Quiet Zone, etc.) that could disturb the public shall be operated only during a standard workday or as approved in writing by the Engineer.

1.04 TEMPORARY FACILITIES

A. The Contractor shall provide all temporary facilities for water, heat, electric light, and power as required for the work during the entire period of operations. Contractor shall be responsible for payment of utility costs for the duration of construction.

B. The Contractor shall provide temporary toilets as required and shall maintain them in a sanitary condition for the duration of the work and remove them at completion.

C. On or before the completion of the work, the Contractor shall remove all temporary facilities, together with all rubbish and trash, as directed by the Engineer.

1.05 STORAGE

The Contractor shall secure adequate storage to accommodate the required equipment, vehicles, and materials for the period of performance of the Contract.

1.06 USE OF PREMISES

A. The Contractor shall not load nor permit any part of any structures to be loaded with a weight that will endanger its safety.

B. The Contractor shall confine his apparatus, the storage of materials and the operations of his workers to the limits defined by laws, ordinances, permits, or directions of the Engineer and shall not unduly encumber the premises with his materials.

C. The Contractor shall enforce the instructions of the Engineer regarding signs, advertisements, fire and smoking.

1.07 FLOW CONTROLS

See Specification Section 02885 Surface Water Diversion and Dewatering for requirements.

1.08 MAINTENANCE OF EXISTING OPERATION

A. The Contractor shall schedule all demolition and construction and maintain continuous operation of the existing wastewater system facilities.

B. Piping to be abandoned shall be plugged with concrete in a manner approved by the Engineer, so as to be made watertight. All active utilities traversing the site shall be preserved in operating condition.

1.09 MAINTENANCE DURING CONSTRUCTION

A. The Contractor shall maintain, at his expense, the work during construction and until final acceptance of all work under the Contract. Continuous and effective work shall be prosecuted day by day, with adequate equipment and forces as required to keep the backfill, pavement, structures, pipe lines and other features in satisfactory and acceptable condition at all times.

B. In the event the Contractor fails to remedy any unsatisfactory situation, within twenty-four hours after receipt of written notice from the Engineer describing the unsatisfactory conditions, the City may immediately proceed with adequate forces and equipment to maintain the project; and the entire cost of this maintenance will be deducted from the monies otherwise due the Contractor under the Contract.

C. As an alternative to the above specified maintenance, the cost of all of the items, which are not properly maintained, may be deducted at the Contract Prices from the current partial payment request even if such items have been paid for in previous estimates.

1.10 CLEAN-UP AND DISPOSAL

A. At the end of each day's operation, the Contractor shall thoroughly clear the work site of all dirt or debris, and generally restore the site to an acceptable condition. Upon completion of the work, all excess material and rubbish shall be removed from the job site and disposed of. The surrounding construction area shall be left in as good a condition as that which existed prior to construction.

B. The Contractor shall transport and expeditiously dispose of all materials removed from the construction site. Disposal shall be at a site approved by the Engineer at no additional cost to the City and in a manner consistent with all-applicable codes and regulations.

1.11 CONSTRUCTION ALONG HIGHWAYS, STREETS, AND ROADWAYS

A. Install pipe lines and appurtenances along highways, streets and roadways in accordance with the applicable regulations of, and permits issued by, the Georgia Department of Transportation and City of Atlanta, with reference to construction operations, safety, traffic control, road maintenance and repair.

B. Traffic Controls:

1. The Contractor shall provide, erect, and maintain all necessary barricades; suitable and sufficient lights and other traffic control devices; provide qualified flagmen where necessary to direct traffic; take all necessary precautions for the protection of the work and the safety of the public. Flagmen shall be certified by a Georgia DOT-approved flagman training program.

2. Construction traffic control devices and their installation shall be in accordance with the current Manual on Uniform Traffic Control Devices for Streets and Highways.

3. Placement and removal of construction traffic control devices shall be coordinated with the Georgia Department of Transportation and City a minimum of 48 hours in advance of the activity.

4. Placement of construction traffic control devices shall be scheduled ahead of associated construction activities. Construction time in street right-of-way shall be conducted to minimize the length of time traffic is disrupted.

Construction traffic control devices shall be removed immediately following their useful purpose. Traffic control devices used intermittently, such as "Flagmen Ahead," shall be removed and replaced when needed.

5. Existing traffic control devices within the construction work zone shall be protected from damage. Traffic control devices requiring temporary relocation shall be located as near as possible to their original vertical and horizontal locations. Original locations shall be measured from reference points and recorded in a log prior to relocation. Temporary locations shall provide the same visibility to affected traffic as the original location. Relocated traffic control devices shall be reinstalled in their original locations as soon as practical following construction.

6. Construction traffic control devices shall be maintained in good repair and shall be clean and visible to affected traffic for daytime and nighttime operation. Traffic control devices affected by the construction work zone shall be inspected daily.

7. Construction warning signs shall be black legend on an orange background. Regulatory signs shall be black legend on a white background. Construction sign panels shall meet the minimum reflective requirements of the Georgia Department of Transportation and City of Atlanta. Sign panels shall be of durable materials capable of maintaining their color, reflective character and legibility during the period of construction.

8. Channelization devices shall be positioned preceding an obstruction at a taper length as required by the current Manual on Uniform Traffic Control Devices for Streets and Highways, as appropriate for the speed limit at that location. Channelization devices shall be patrolled to insure that they are maintained in the proper position throughout their period of use.

C. Construction Operations:

1. Perform all work along highways, streets and roadways to minimize interference with traffic.

2. Stripping: Where the construction area is along a road right-of-way, strip and stockpile all sod, topsoil and other material suitable for right-of-way restoration.

3. Trenching, Laying and Backfilling: Do not open the trench any further ahead of construction operations than is necessary. Backfill and remove excess material immediately behind laying operations. Complete excavation and backfill for any portion of the trench in the same day.

4. Shaping: Reshape damaged slopes, side ditches, and ditch lines immediately after completing backfilling operations. Replace topsoil, sod and any other materials removed from shoulders.

5. Construction operations shall include cleanup and utility exploration.

D. Excavated Materials: Do not place excavated material along highways, streets and roadways in a manner that obstructs traffic. Sweep all scattered excavated material off the pavement in a timely manner.

E. Drainage Structures: Keep all side ditches, culverts, cross drains, and other drainage structures clear of excavated material. Care shall be taken to provide positive drainage to avoid ponding or concentration of runoff.

F. Landscaping Features: Landscaping features shall include, but are not necessarily limited to, fences, property corners, cultivated trees, and shrubbery, man-made improvements, subdivision signs, and other signs within the right-of-way and easement. The Contractor shall take extreme care in moving landscape features and promptly re-establishing these features.

G. Maintaining Highways, Streets, Roadways and Driveways:

1. Maintain streets, highways, roadways and driveways in suitable condition for movement of traffic until completion and final acceptance of the work.

2. During the time period between pavement removal and completing permanent pavement replacement, maintain highways, streets, and roadways by the use of steel running plates. The edges of running plates shall have asphalt placed around their periphery to minimize vehicular impact. The backfill above the pipe shall be compacted, as specified elsewhere up to the existing pavement surface to provide support for the steel running plates.

3. Furnish a road grader or front-end loader for maintaining highways, streets, and roadways. Make the grader or front-end loader available at all times.

4. Immediately repair all driveways that are cut or damaged. Maintain them in a suitable condition for use until completion and final acceptance of the work.

1.12 ACCESS ROADS

Streets, road and drives used by the Contractor for access to and from the site of the work shall be protected from damage caused by the normal traffic of vehicles used for or in connection with construction work. Any such damage done shall be

repaired immediately and left in good condition at the end of the construction period. Any new access road construction shall be “all weather” and have drainage structures placed as shown or as required.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

+++ END OF SECTION +++

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SECTION 01510
TEMPORARY FACILITIES

PART 1 GENERAL

1.01 SCOPE

A. Temporary facilities required for this work include, but are not necessarily limited to:

1. Temporary utilities such as water and electricity.

2. Sanitary facilities.

3. Potable water.

4. Temporary heat and ventilation.

5. Parking facilities

1.02 GENERAL

A. Installation: Furnish and install temporary facilities as required for the performance of the Work.

B. Maintenance: Maintain temporary facilities in proper and safe condition throughout progress of the Work. In the event of loss or damage, immediately make all repairs and replacements necessary, at no additional cost to the City DWM.

C. Removal: Remove temporary facilities as rapidly as progress of the Work will permit. Clean and repair damage caused by temporary installations or use of temporary facilities.

1.03 TEMPORARY UTILITIES

A. General:

1. Pay all costs for temporary utilities until Project completion.

2. Costs for temporary utilities shall include all power for testing equipment.

B. Temporary Water:

1. Refer to Section 01040 for requirements related to utilization of water for construction purposes.

2. Provide all necessary temporary piping, and upon completion of the Work, remove all temporary piping and water meters.

C. Temporary Electricity:

1. Provide all necessary wiring for the Contractor's use.

2. Furnish, locate and install area distribution boxes such that the individual trades may use their own construction type extension cords to obtain adequate power and artificial lighting at all points where required and for safety.

1.04 SANITARY FACILITIES

Prior to starting the Work, the Contractor shall furnish, for use of Contractor's personnel on the job, all necessary toilet facilities which shall be secluded from public observation. Toilet facilities shall be either chemical toilets or shall be connected to the City DWM's sanitary sewer system. All facilities, regardless of type, shall be kept in a clean and sanitary condition and shall comply with the requirements and regulations of the area in which the Work is performed. Adequacy of these facilities will be subject to the City DWM's' review and maintenance of facilities must be satisfactory to the City DWM at all times.

1.05 POTABLE WATER

The Contractor shall be responsible for furnishing a supply of potable drinking water for employees, subcontractors, inspectors, engineers and the City DWM who are associated with the Work.

1.06 TEMPORARY HEAT AND VENTILATION

Provide temporary heat and ventilation as required to maintain adequate environmental conditions to facilitate progress of the work, to meet specified minimum conditions for the installation of materials and to protect materials and finishes from damage due to temperature or humidity.

1.07 PARKING FACILITIES

Parking facilities for the Contractor's and Contractor's subcontractors' personnel shall be the Contractor's responsibility.

PART 2 PRODUCTS

(NOT USED)

PART 3 EXECUTION

(NOT USED)

+ + + END OF SECTION 01510 + + +

SECTION 01530

PROTECTION OF EXISTING FACILITIES

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Contractor shall be responsible for the preservation and protection of property adjacent to the work site against damage or injury as a result of his operations under this Contract. Any damage or injury occurring on account of any act, omission or neglect on the part of the Contractor shall be restored in a proper and satisfactory manner or replaced by and at the expense of the Contractor to an equal or superior condition than previously existed.

B. Contractor shall comply promptly with such safety regulations as may be prescribed by the Owner or the local authorities having jurisdiction and shall, when so directed, properly correct any unsafe conditions created by, or unsafe practices on the part of, his employees. In the event of the Contractor's failure to comply, the Owner may take the necessary measures to correct the conditions or practices complained of, and all costs thereof will be deducted from any monies due the Contractor. Failure of the Engineer to direct the correction of unsafe conditions or practices shall not relieve the Contractor of his responsibility hereunder.

C. In the event of any claims for damage or alleged damage to property as a result of work under this Contract, the Contractor shall be responsible for all costs in connection with the settlement of or defense against such claims. Prior to commencement of work in the vicinity of property adjacent to the work site, the Contractor, at his own expense, shall take such surveys as may be necessary to establish the existing condition of the property. Before final payment can be made, the Contractor shall furnish satisfactory evidence that all claims for damage have been legally settled or sufficient funds to cover such claims have been placed in escrow, or that an adequate bond to cover such claims has been obtained.

1.02 PROTECTION OF WORK AND MATERIAL

A. During the progress of the work and up to the date of final payment, the Contractor shall be solely responsible for the care and protection of all work and materials covered by the Contract.

B. All work and materials shall be protected against damage, injury or loss from any cause whatsoever, and the Contractor shall make good any such damage or loss at his own expense. Protection measures shall be subject to the approval of the Engineer.

1.03 BARRICADES, WARNING SIGNS AND LIGHTS

A. The General Contractor shall provide, erect and maintain as necessary, strong and suitable barricades, danger signs and warning lights along all roads accessible to the public, as required by the authority having jurisdiction, to insure safety to the public. All barricades and obstructions along public roads shall be illuminated at night and all lights for this purpose shall be kept burning from sunset to sunrise.

B. Each Contractor shall provide and maintain such other warning signs and barricades in areas of and around their respective work as may be required for the safety of all those employed in the work, the Owner's operating personnel, or those visiting the site.

1.04 EXISTING UTILITIES AND STRUCTURES

A. The term existing utilities shall be deemed to refer to both publicly-owned and privately-owned utilities such as electric power and lighting, telephone, water, gas, storm drains, process lines, sanitary sewers and all appurtenant structures.

B. Where existing utilities and structures are indicated on the Drawings, it shall be understood that all of the existing utilities and structures affecting the work may not be shown and that the locations of those shown are approximate only. It shall be the responsibility of the Contractor to ascertain the actual extent and exact location of existing utilities and structures. In every instance, the Contractor shall notify the proper authority having jurisdiction and obtain all necessary directions and approvals before performing any work in the vicinity of existing utilities.

C. Prior to beginning any excavation work, the Contractor shall, through field investigations, determine any conflicts or interferences between existing utilities and new utilities to be constructed under this project. This determination shall be based on the actual locations, elevations, slopes, etc., of existing utilities as determined in the field investigations, and locations, elevation, slope, etc. of new utilities as shown on the Drawings. If an interference exists, the Contractor shall bring it to the attention of the Engineer as soon as possible. If the Engineer agrees that an interference exists, he shall modify the design as required. Additional costs to the Contractor for this change shall be processed through a Change Order as detailed elsewhere in these Contract Documents. In the event the Contractor fails to bring a potential conflict or interference to the attention of the Engineer prior to beginning excavation work, any actual conflict or interference which does arise during the Project shall be corrected by the Contractor, as directed by the Engineer, at no additional expense to the Owner.

D. The work shall be carried out in a manner to prevent disruption of existing services and to avoid damage to the existing utilities. Temporary connections shall be provided, as required, to insure uninterruption of existing services. Any damage resulting from the work of this Contract shall be promptly repaired by the Contractor at his own expense in a manner approved by the Engineer and further subject to the requirements of any authority having jurisdiction. Where it is required by the authority having jurisdiction that they

perform their own repairs or have them done by others, the Contractor shall be responsible for all costs thereof.

E. Where excavations by the Contractor require any utility lines or appurtenant structures to be temporarily supported and otherwise protected during the construction work, such support and protection shall be provided by the Contractor. All such work shall be performed in a manner satisfactory to the Engineer and the respective authority having jurisdiction over such work. In the event the Contractor fails to provide proper support or protection to any existing utility, the Engineer may, at his discretion, have the respective authority to provide such support or protection as may be necessary to insure the safety of such utility, and the costs of such measures shall be paid by the Contractor.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

+ + + END OF SECTION + + +

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SECTION 01540
SECURITY AND SAFETY

PART 1 GENERAL

1.01 SECURITY PROGRAM

A. The Contractor shall protect the Work, including all field offices and temporary facilities and their contents from theft, vandalism and unauthorized entry.

B. The Contractor shall initiate a site security program at the time of mobilization onto the worksite, which provides adequate security for site stored and installed material.

C. The Contractor shall maintain the security program throughout the Contract duration.

D. The Contractor shall be wholly responsible for the security of their storage and lay down areas and for all their plant, material, equipment and tools at all times.

E. The Contractor shall provide the City DWM with a list of 24 hour emergency phone numbers including chain of command.

1.02 ENTRY CONTROL

A. The Contractor shall restrict entry of unauthorized personnel and vehicles onto the Project site.

B. The Contractor shall allow entry only to authorized persons with proper identification.

C. The Contractor shall maintain an Employee Log and Visitor Log and make the log available to the City DWM upon request. The log shall be submitted to the City DWM bi-weekly or as necessary. Sample logs are included at the end of this section.

D. The Contractor shall require all visitors to sign the Visitor Acknowledgment of the Program Site Rules/Visitor Log, which includes a release form. Copies of these forms shall be submitted to the City DWM bi-weekly and maintained in the Contractor's security files on-site.

E. The Contractor shall require all employees to sign the Employee Acknowledgment of Project Site Rules Log included at the end of this Section. All employees, subcontractor employees and lower tier contractor employees will receive a new employee orientation. Signing the Employee Log by the employee is certifying that the orientation training has been received.

F. The Contractor and City DWM have the right to refuse access to the site or request that a person or vehicle be removed from the site if found violating any of the Project safety, security conduct rules.

1.03 BARRICADES, LIGHTS AND SIGNALS

A. The Contractor shall furnish and erect such barricades, fences, lights and danger signals and shall provide such other precautionary measures for the protection of persons or property and of the work as necessary. Barricades shall be painted in a color that will be visible at night. From sunset to sunrise, the Contractor shall furnish and maintain at least one light at each barricade and sufficient numbers of barricades shall be erected to keep vehicles from being driven on or into any work under construction.

B. The Contractor will be held responsible for all damage to the work and any resulting injuries due to failure of barricades, signs and lights and whenever evidence is found of such damage, the Contractor shall immediately remove the damaged portion and replace it at Contractor's cost and expense. The Contractor's responsibility for the maintenance of barricades, signs and lights shall not cease until the Project has been accepted by the City DWM.

1.04 RESTRICTIONS

The Contractor shall not allow cameras on site or photographs taken except with approval of the City DWM .

1.05 CONTRACTOR SAFETY/HEALTH AND SECURITY PLAN

A. Prior to the performance of any work the Contractor will prepare a contract specific Safety/Health and Security Plan signed by an officer of the Contractor's organization. Adequacy of the plan shall be the responsibility of the Contractor.

B. The City DWM will not review the Contractor's safety plan for the adequacy of the plan. The plan shall:

1. Identify the person(s) responsible for implementation and enforcement of Safety/Health and Security rules and regulations for this Project.

2. Generally address safe work procedures for the activities within the Contractor's scope of work.

3. Included a new employee orientation program, which addresses job and site specific rules, regulations and hazards.

4. Include the Contractor's Drug Free Work Place Policy including substance abuse prevention and testing program.

5. Include provisions to protect all of the Contractor's employees, other persons and organizations who may be affected by the work from injury, damage or loss.

6. Comply with current Fed/OSHA, Safety/Health and Security Plan, facility safety program (when applicable), and locally accepted safety codes, regulations and practices.

7. Include a site specific emergency action and evacuation plan.

8. Include Hazard Communication/Right To Know Program.

9. Include security procedures for the Contractor's work, tools, and equipment.

10. Include the capability of providing the City DWM with documentation to show compliance with their plan, plus accidents and investigation reports.

11. Address any other specific contract requirements.

C. Provide a Job Safety Analysis (JSA) for the scope of work, prior to the start of work.

D. Review of the Contractor's Safety Plan by the City DWM shall not impose any duty or responsibility upon the City DWM for the Contractor's performance of the work in a safe manner.

E. The Contractor shall be fully responsible for the safety and health of its employees, its subcontractors and lower tier contractors during performance of its work.

F. The Contractor shall provide the City DWM with all safety reports, training records, competent person list, and accident reports prepared in compliance with Fed/OSHA and the Project Safety/Health and Security Plan.

1.06 PROJECT SAFETY COORDINATOR

A. The Contractor shall be responsible for the safety of the Contractor’s and the City DWM’s personnel and all other personnel at the site of the Work. The Contractor shall have a Project Safety Coordinator on the job site. The Project Safety Coordinator shall maintain and keep available safety records and up-to-date copies of all pertinent safety rules and regulations.

B. The Project Safety Coordinator shall:

1. Ensure compliance with all applicable health and safety requirements of all governing legislation.

2. Schedule and conduct safety meetings and safety training programs as required by law for all personnel engaged in the work.

3. Post all appropriate notices regarding safety and health regulations at locations that afford maximum exposure to all personnel at the job site.

4. Post the name, address and hours of the nearest medical doctor; names and addresses of nearby clinics and hospitals; and the telephone numbers of the fire and police departments.

5. Post appropriate instructions and warning signs with regard to all hazardous areas or conditions.

6. Have proper safety and rescue equipment adequately maintained and readily available for any contingency. This equipment shall include such applicable items as: proper fire extinguishers, first aid kits, safety ropes and harnesses, stretcher, life savers, oxygen breathing apparatus, resuscitators, gas detectors, oxygen deficiency indicators, explosion meters, and any other equipment mandated by law.

7. Make inspections at least once daily in accordance with an inspection checklist report form to ensure that all machines, tools and equipment are in safe operating condition; that all work methods are not dangerous; and that all work methods are free of hazards.

8. Submit to the City DWM upon request copies of all inspection checklist report forms, safety records and all safety inspection reports and certifications from regulating agencies and insurance companies.

9. Notify the City DWM of a serious accident immediately, followed by a detailed written report within twenty-four (24) hours. A “serious accident” is defined as an accident requiring an absence from work of more than 2 days and/or hospitalization.

10. Notify the City DWM immediately in the event of a fatal accident.

11. Notify City DWM of any accident claim against the Contractor or any sub-contractor immediately, followed up by a detailed written report on the claim and its resolution.

12. Review safety aspects of the Contractor’s submittals as applicable.

VISITOR ACKNOWLEDGMENT OF THE PROJECT SITE RULES

By signing this Visitor's Log, I acknowledge that I understand and agree to abide by the project rules outlined below.

In consideration of my receipt of a visitor's pass as issued by the City DWM directly or indirectly for the City DWM, I waive on behalf of myself, my heirs, employer, legal representatives and assigns and hereby release and discharge the City DWM, and their subcontractors and consultants and each of their directors, officers, employees, representatives and agents from any and all claims, actions, causes of action or any charge of any kind whatsoever which may arise or could arise in the future as a result of my being present at the facility including injury, death or property damage whether or not caused by the fault or negligence of any of the parties released hereunder.

I further acknowledge that I have been briefed on specific hazards, hazardous substances that are on site and the site emergency action procedure.

PROHIBITED ACTIVITIES

- Unauthorized removal or theft of City DWM's property
- Violation of safety or security rules or procedures
- Possession of firearms or lethal weapons on jobsite
- Acts of sabotage
- Destruction or defacing City DWM's property
- Failure to use sanitary facilities
- Failure to report accidents or job related injuries
- Being under the apparent influence of drugs, alcohol or other intoxicants or in possession of drugs, alcohol or other intoxicants on the property
- Wearing shorts or tennis shoes on the jobsite
- Failure to wear a hardhat/safety glasses.
- Gambling at any time on the project
- Fighting, threatening behavior, or engaging in horseplay on the project
- Smoking in unauthorized areas on the project
- Open fire cooking or making unauthorized fires on project property
- Selling items or raffles without authorization
- Use of unauthorized cameras on the project
- Use of radio or television in the construction area
- Failure to park personal vehicle in authorized parking area
- Failure to wear designated identification [Site Specific]
- Failure to use designated gates

I have read, understand and agree to abide by the PROJECT SITE RULES. Furthermore, I understand failure to abide by these rules is grounds for being denied access to the project site. I have received a personal copy for my use and reference.

VISITOR LOG

THE SIGNING OF THIS LOG ACKNOWLEDGES I HAVE READ AND UNDERSTAND AND AGREE TO ABIDE BE THE PROJECT RULES OUTLINE ABOVE. THIS IS NOT A VEHICLE ACCESS PERMIT.

VISITOR'S NAME PRINT	SIGNATURE	COMPANY VISITED	DATE	IN	OUT

EMPLOYEE ACKNOWLEDGMENT OF THE PROJECT SITE RULES

By signing this Employee Log, I acknowledge that I understand and agree to abide by the project rules outlined below.

PROHIBITED ACTIVITIES

- Unauthorized removal or theft of City DWM's property
- Violation of safety or security rules or procedures
- Possession of firearms or lethal weapons on jobsite
- Acts of sabotage
- Destruction or defacing City DWM's property
- Failure to use sanitary facilities
- Failure to report accidents or job related injuries
- Under the apparent influence of drugs, alcohol or other intoxicants or in possession of drugs, alcohol or other intoxicants on the property
- Wearing shorts or tennis shoes on the jobsite
- Failure to wear a hardhat
- Gambling at any time on the project
- Fighting, threatening behavior, or engaging in horseplay on the project
- Smoking in unauthorized areas on the project
- Open fire cooking or making unauthorized fires on project property
- Selling items or raffles without authorization
- Use of unauthorized cameras on the project
- Use of radio or television in the construction area
- Failure to park personal vehicle in authorized parking area
- Failure to wear designated identification [Site Specific]
- Failure to use designated gates

I have read, understand and agree to abide by the PROJECT SITE RULES. Furthermore, I understand failure to abide by these rules is grounds for being denied access to the project site. I have received a personal copy for my use and reference.

EMPLOYEE LOG

BY SIGNING THIS LOG ACKNOWLEDGMENT I HAVE READ AND UNDERSTAND AND AGREE TO ABIDE BY THE PROJECT RULES OUTLINED ABOVE AND ALL STATE, FEDERAL, LOCAL OR ANY OTHER CONTRACT OBLIGATIONS THAT MAY APPLY. I FURTHER ACKNOWLEDGE THAT I HAVE BEEN ORIENTATED AS TO THE SITE SPECIFIC HAZARDS, ANY HAZARDOUS SUBSTANCES I MAY BE EXPOSED TO WHILE ON THE SITE AND THE SITE/COMPANY EMERGENCY ACTION PROCEDURES, BY A REPRESENTATIVE OF THE COMPANY.

EMPLOYEE NAME (PRINT)	SIGNATURE	COMPANY NAME	DATE

+ + + END OF SECTION 01540 + + +

SECTION 01550
TRAFFIC REGULATION

PART 1 GENERAL

1.01 SCOPE

The work specified in this section includes the provision of products, permits, services, procedures and personnel by the Contractor to effect traffic control during the Work.

1.02 TRAFFIC CONTROL MANAGER

A. The Contractor shall designate a qualified individual as the Traffic Control Manager (TCM) who shall be responsible for selecting, installing and maintaining all traffic control devices in accordance with the Manual of Uniform Traffic Control Devices (MUTCD).

B. A written resume documenting the experience and credentials of the TCM shall be submitted and accepted by the City DWM prior to beginning any work that involves traffic control.

C. The TCM shall be available on a twenty-four (24) hour basis to perform his duties. If the work requires traffic control activities to be performed during the daylight and nighttime hours it may be necessary for the Contractor to designate alternate TCMs. An alternate TCM must meet the same requirements and qualifications as the primary TCM and be accepted by the City DWM prior to beginning any traffic control duties.

D. The Traffic Control Manager's traffic control responsibilities shall have priority over all other assigned duties.

E. As the representative of the Contractor, the TCM shall have full authority to act on behalf of the Contractor in administering the Traffic Control Plan. The TCM shall have appropriate training in safe traffic control practices in accordance with Part VI of the MUTCD. In addition to the TCM all other individuals making decisions regarding traffic control shall meet the training requirements of the Part VI of the MUTCD.

F. The TCMs shall supervise the initial installation of traffic control devices. The City DWM prior to the beginning of construction will review the initial installation. Modifications to traffic control devices as required by sequence of operations or staged construction shall be reviewed by the TCMs.

PART 2 PRODUCTS

2.01 SIGNS, SIGNALS, AND DEVICES

A. The Contractor shall provide post-mounted and wall-mounted traffic control and informational signs as specified and required by local jurisdictions.

B. The Contractor shall provide automatic traffic control signals as approved by local jurisdictions.

C. The Contractor shall provide traffic cones, drums and flashing lights as approved by local jurisdictions.

D. The Contractor shall provide City of Atlanta police officers and certified flaggers and flagger's equipment as required by GDOT.

PART 3 EXECUTION

3.01 PERMITS

A. The Contractor shall obtain permits from authorities having jurisdiction over road closures before closing any road. The Contractor shall use forms provided by authorities having jurisdiction (City of Atlanta Division of Traffic and Transportation, GDOT, etc.). Refer to Section 01060, Regulatory Requirements.

B. Permit applications shall indicate the time (in days), length (in feet), the number of lanes, and the purpose of the closure.

C. All permits are approved for operations during off-peak hours 9:00 a.m. to 4:00 p.m. unless special approval is received.

D. Operations between the hours of 6:00 p.m. and 10:00 p.m. and Saturdays and Sundays must be approved by the City DWM

E. Full street closure permits require ninety-six (96) hours advance notice prior to street closure. The following additional information is required prior to approval:

1. The recommended detour route with signage and Traffic Management Plan as per the Manual of Uniform Traffic Control Devices (MUTCD).

2. A copy of the resident and/or business notification letters about the closure. The residents/businesses located between the detour route must be notified about the closure at least five (5) business days prior to the proposed closure.

F. The City of Atlanta Division of Traffic and Transportation will return full street closure permit applications to the Contractor with a cover letter to the Fire Chief, Chief of Police, Grady Memorial Hospital, MARTA and the Atlanta Board of Education. The Contractor shall have received the permit application and cover letter at least seventy-two (72) hours before commencing street closure activities.

G. Lane closure permits require a minimum of forty-eight (48) hour notice prior to lane closure. The Contractor shall continuously maintain the safety of the traveling public during lane closures in accordance with the requirements of the MUTCD and as stipulated by public officers.

H. The City of Atlanta Division of Traffic and Transportation will return the lane closure applications to the Contractor with a cover letter with copies to the Fire Chief, Chief of Police, Grady Memorial Hospital, MARTA and the Atlanta Board of Education. The Contractor shall have received the permit application and cover letter at least seventy-two (72) hours before commencing lane closure activities.

3.02 PREPARATION OF TRAFFIC CONTROL PLANS

The Contractor shall develop detailed staging and traffic control plans for performing specific areas of the Work including but not limited to all requirements for certified flaggers, additional traffic control devices, traffic shifts, detours, paces, lane closures or other activities that disrupt traffic flow. The Contractor shall submit these plans in accordance with the Specifications to receive final approvals from permitting agencies and provide any and all required traffic control devices as required by both the permitting agencies and these specifications at no additional cost to the City DWM.

3.03 CONSTRUCTION PARKING CONTROL

A. The Contractor shall control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles and City DWM’s operations.

B. The Contractor shall monitor parking of construction personnel’s vehicles in existing facilities and maintain vehicular access to and through parking areas.

C. The Contractor shall prevent parking on or adjacent to access roads or in non-designated areas.

3.04 MAINTENANCE OF TRAFFIC

A. Whenever and wherever, in the City DWM’s opinion, traffic is sufficiently congested or public safety is endangered, the Contractor shall furnish uniformed officers to direct traffic and to keep traffic off the highway area affected by construction operations.

B. When the Contract requires the maintenance of vehicular traffic on an existing road, street, or highway during the Contractor's performance of Work the Contractor shall keep

such road, street, or highway open to all traffic and shall provide such maintenance as may be required to safely accommodate traffic. The Contractor shall furnish, erect and maintain barricades, warning signs, flaggers, and other traffic control devices in conformity with the requirements of the local jurisdictions.

C. The Contractor shall also construct and maintain in a safe condition any temporary connections necessary to ingress into and egress from abutting property or intersecting roads, streets, or highways. The Contractor shall maintain traffic in accordance with any traffic control plans furnished with and made a part of the plan assembly.

D. The Contractor shall make his own estimate of all labor, materials, equipment, and incidentals necessary for providing the maintenance of traffic as specified in this section.

E. The cost of maintaining traffic shall be included in the Contractor's bid.

3.05 UNIFORMED POLICE OFFICER FOR TRAFFIC CONTROL

A. The Contractor shall provide uniformed City of Atlanta police officers to regulate traffic when construction operations are ongoing:

1. In all signalized intersections

2. In streets designated as "collector" streets

3. In all full street closings

4. In GDOT right of ways

B. Officers will be currently employed by the City of Atlanta, be in full uniform and have full arrest power while working.

C. Officers will be employed and paid by the Contractor.

D. It is the officers' responsibility to assist in the direction of traffic within the construction site.

3.06 FLAGGERS FOR TRAFFIC CONTROL

The Contractor shall provide Georgia Department of Transportation (GDOT) certified trained and equipped flaggers to regulate traffic when construction operations or traffic encroach on public traffic lanes.

3.07 FLASHING LIGHTS

The Contractor shall use flashing lights during hours of low visibility to delineate traffic lanes and to guide traffic.

3.08 HAUL ROUTES

A. The Contractor shall consult with authorities and establish public thoroughfares to be used for haul routes and site access and obtain a haul route permit as specified in Section 01060.

B. The Contractor shall confine construction traffic to designated haul routes.

C. The Contractor shall provide traffic control at critical areas of haul routes to regulate traffic and minimize interference with public traffic.

3.09 ROAD CLOSURES ON CITY STREETS AND ROADS

A. No street or road shall be closed without the permission of the City DWM of any street or road and the fire department having jurisdiction. Prior to closing a street, road or highway, signs shall be posted for a minimum of seven (7) days prior to actual closing, forewarning of the imminent closing. The City DWM shall determine the information to be placed upon the signs by the Contractor. Where traffic is diverted from the Work, the Contractor shall provide all materials and perform all work for the construction and maintenance of all required temporary roadways, structures, barricades, signs and signalization.

B. To obtain approval to close a road or street maintained by the City, the Contractor shall proceed as follows:

1. The Contractor shall obtain approval of his traffic plan from the City DWM . The traffic plan must be in accordance with the requirements of the City of Atlanta.

2. The Contractor shall obtain a utility permit.

3. The Contractor shall apply in writing to the City and obtain a permit to close the road on a specific date. Routine permit approval by the City requires from one (1) to two (2) weeks depending on when the application is received.

4. The Contractor shall obtain a permit from the City before posting closure signs. Signs must be posted for seven (7) days prior to the first day of closure. Signs shall be acceptable to the City DWM.

5. Emergency road closures will be handled by the City DWM.

3.10 PROCEDURES FOR TRAFFIC DETOUR ROUTE PLAN

A. The Contractor shall provide a sketch map showing his traffic detour route plan to the City DWM. The sketch map need not be drawn to scale but should resemble, as closely as possible, the actual location. The sketch map shall be drawn in a manner so as to provide emergency agencies a better understanding of the detour for quick response. The sketch map shall include directional arrows showing the flow of traffic.

B. "Road Closed Ahead" signs shall be erected before the start point of the detour indicating the name of the street closed.

C. Detour signs with appropriate directional arrows shall be erected at every intersection along the detour route until the end of the detour, when the traffic is back to the original street.

D. The Contractor shall erect an "End Detour" sign at the end of the detour.

E. Each detour and "End Detour" sign shall be accompanied by an accessory plate indicating the name of the street being detoured.

F. The Contractor shall apply appropriate traffic control measures in accordance with the requirements of the MUTCD and the City of Atlanta Department of Public Works.

3.11 BARRICADES AND WARNING SIGNS

A. The Contractor shall furnish, erect, and maintain all barricades and warning signs for hazards necessary to protect the public and the Work. When used during periods of darkness, such barricades, warning signs and hazard markings shall be suitably illuminated or reflectorized.

B. For vehicular and pedestrian traffic, the Contractor shall furnish, erect, and maintain barricades, warning signs, lights, and other traffic control devices in conformity with the requirements of the Georgia Department of Transportation and the City of Atlanta Department of Public Works.

C. The Contractor shall furnish and erect all barricades and warning signs for hazards prior to commencing Work which requires such erection and shall maintain the barricades and warning signs for hazards until their dismantling r.

3.12 REMOVAL

The Contractor shall remove equipment and devices when no longer required and repair damage caused by installation.

3.13 RIGHT OF WAY MANUAL

Included at the end of this Section are copies of the title page and pages 42 through and including page 52 from the City's Right-of Way Manual. These pages include Appendices A, B and C which indicate street designations and Appendix D which covers restrictions for working within the City's right of way. These restrictions shall also apply to GDOT right of ways.

+ + + END OF SECTION 01550 + + +

SECTION 01551

SITE ACCESS AND STORAGE

PART 1 GENERAL

1.01 THE REQUIREMENT

A. Access Roads

1. The General Contractor shall maintain temporary access roads as required to perform the work of this Contract.
2. Access roads shall be located within the property lines of the Owner unless the Contractor independently secures easements for his use and convenience. Contractor shall submit written documentation to the Engineer for any Contractor secured easements across privately held property. Easement agreement shall specify terms and conditions of use and provisions for site restoration. A written release from the property owner certifying that all terms of the easement agreement have been complied by the Contractor shall be furnished to the Engineer prior to final payment.
3. Existing access roads used by the Contractor shall be suitably maintained by the Contractor at his expense during construction. Contractor shall not be permitted to restrict Owner access to existing facilities. Engineer may direct Contractor to perform maintenance of existing access roads when Engineer determines that such work is required to insure all weather access by the Owner.
4. The Contractor shall obtain and pay all cost associated with any bonds required by the Virginia Department of Transportation for the use of State maintained roads.

B. Parking Areas

1. Parking is available for construction personnel on residential streets where approved by the Engineer and the Owner. Parking shall not impede access to driveways and mailboxes.

C. Restoration

1. At the completion of the work, the surfaces of land used for access roads and parking areas shall be restored by each Contractor to its original condition and to the satisfaction of the Engineer. At a minimum, such restoration shall include establishment of a permanent ground cover adequate to restrain erosion for all disturbed areas.

D. Traffic Regulations

1. Contractor shall obey all traffic laws and comply with all the requirements, rules and regulations of the GDOT, etc. and other local authorities having jurisdiction to maintain adequate warning signs, lights, barriers, etc., for the protection of traffic on public roadways.
2. Traffic shall be maintained at all times and driveways shall remain accessible at all times.

E. Storage of Equipment and Materials

1. Contractor shall store his equipment and materials at the job site in accordance with the requirements of the General Conditions, the Supplemental Conditions, and as hereinafter specified. All equipment and materials shall be stored in accordance with manufacturer's recommendations and as directed by the Owner or Engineer, and in conformity to applicable statutes, ordinances, regulations and rulings of the public authority having jurisdiction. Where space or strip heaters are provided within the enclosure for motors, valve operators, motor starters, panels, instruments, or other electrical equipment, the Contractor shall make connections to these heaters from an appropriate power source and operate the heaters with temperature control as necessary until the equipment is installed and being operated according to its intended use.
2. Contractor shall enforce the instructions of Owner and Engineer regarding the posting of regulatory signs for loadings on structures, fire safety, and smoking areas.
3. Contractor shall not store materials or encroach upon private property without the written consent of the owners of such private property.
4. Contractor shall not store unnecessary materials or equipment on the job site, and shall take care to prevent any structure from being loaded with a weight which will endanger its security or the safety of persons.
5. Materials shall not be placed within ten (10) feet of fire hydrants. Gutters, drainage channels and inlets shall be kept unobstructed at all times.
6. Contractor shall provide adequate temporary storage buildings/facilities, if required, to protect materials or equipment on the job site.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

+ + + END OF SECTION 01551 + + +

SECTION 01580

PROJECT IDENTIFICATION AND SIGNS

PART 1 GENERAL

1.01 SCOPE

The work under this Section requires the Contractor to furnish, utilize and maintain project signage and custom vinyl magnetic vehicle signs throughout the duration of the project.

1.02 DESIGN

The Contractor shall submit to the Engineer for approval a scale drawing showing the graphic design, style of lettering, and colors, configured to match the design issued by the City Public Involvement (PI) Office. The PMT and/or PI Office will provide the art ready templates for all CWA signage.

PART 2 PRODUCTS

2.01 MATERIALS

A. Project Signs

1. All building and graphic materials shall be exterior grade and suitable for environmental exposure without any visible fading, warping or delaminating.
2. All lumber shall be pressure treated number 2 grade with a minimum of 0.25 pounds per cubic foot wood preservative.
3. All fasteners shall be hot dip galvanized.
4. Each project sign shall be painted white with color sign graphic as indicated on Attachment 1.
5. The minimum sign size shall be 96 inches wide by 48 inches high.

B. Magnetic Vehicle Signs

1. Each sign shall be durable nylon having a 100% magnetic surface with strong magnetic cling.
2. The minimum sign size shall be 24 inches wide by 12 inches high.
3. The magnetic sign graphic shall have a professional appearance with fade resistant color printed layout.

C. Yard Signs

1. Yard signboards shall be made of corrugated plastic panel suitable for exterior use with color graphic print on both sides.
2. Each signboard shall be securely attached to a single metal wire stand frame. The wire frame shall be zinc coated or galvanized surface to resist corrosion.
3. The minimum sign size shall be 36 inches wide by 24 inches high.

PART 3 – EXECUTION

3.01 GENERAL

A. Project Signs

1. The Contractor shall construct each project signboard to accommodate the minimum dimensions per sample attached at the end of this section.
2. Each sign shall have a minimum of two end post securely anchored to a minimum depth of 2 feet below grade. Each post shall be sufficient length to provide a finished bottom edge signboard elevation 4 feet above grade without splices or other wood joints unless otherwise directed by the City.
3. All fasteners shall be flush with surface with smooth wood edges in a constructed in a neat manner free of irregular cuts, tear out or other undesirable visible defects.
4. The project sign shall be located at the project entrance as directed by the City Public Information officer.

B. Magnetic Vehicle Signs

1. Contractor shall utilize the magnetic signs for all vehicles performing work under this Contract while the vehicles are on the site or otherwise engaged in the Contract Work.
2. Contractor shall place the magnetic signs on each vehicle in a high visibility location. If the signs are to be placed on the sides of vehicles, two signs shall be utilized per vehicle (one sign per side). If the signs are to be placed on the rears of vehicles, one sign per vehicle shall be acceptable.
3. Contractor shall replace the signs during the project as necessary or as directed by the Engineer.

B. Yard Signs

1. Contractor shall install and maintain yard signs as directed by the City Public Information Officer (PIO).

3.02 MAINTENANCE

A. Contractor shall periodically inspect and maintain all signage in good condition throughout the Contract period at no additional cost to the City.

+ + + **END OF SECTION 01580** + + +

ATTACHMENT 1

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SECTION 01590

FIELD OFFICES

PART 1 GENERAL

1.01 SCOPE

A. The Contractor shall provide all temporary facilities and necessary staff personnel for the proper completion of the Work as specified.

B. Maintain temporary facilities in proper and safe condition through the progress of the Work. In the event of loss or damage, immediately make all repairs and replacements necessary subject to approval of the Engineer and at no additional cost to City. At completion of the Work remove all such temporary facilities or as directed by the Engineer.

1.02 REQUIREMENTS

A. General

1. The materials, equipment, and furnishings provided under this Section shall be new, and shall meet all the applicable codes and regulations.
2. Make all provisions, and pay all costs of furnishing, installation, maintenance, professional services, permit fees, property leases, and site work including all utilities for the temporary facilities.

B. Field Personnel

1. The Contractor's administrative field office shall be maintained at a staffing level sufficient to plan, coordinate and have authority to promptly execute the Work on site with the corresponding City personnel. At a minimum, the Contractor's project manager, public information officer, safety officer, superintendent and one administrative support person shall occupy and be available at the field office each workday.

C. Field Office Construction

1. Temporary mobile/modular field office buildings shall be structurally sound, weather tight, with floors raised above ground. Mobile/modular buildings shall comply with GA-DCA/SBCC/ADA requirements, and shall be G E – Modular Space, Williams-Scottsman or equal.
2. Temporary field office buildings shall have temperature transmission resistance compatible with occupancy and storage requirements. The office buildings shall be properly skirted as approved by the Engineer.

1.03 CONTRACTOR'S FACILITIES

A. Contractor shall submit a plan of the temporary field office building layout to the Engineer for approval within 15 days of the Notice to Proceed. Contractor's facilities shall have a first aid station and be centrally located to the Work. The Contractor's field office shall have a storage facility (for both materials and equipment). Insufficient, inadequate, improper facilities or equipment shall be brought to acceptable condition or shall be removed from the site.

B. The Contractor's administrative field office shall include a dedicated meeting/conference room for hosting bi-weekly progress or other meetings with City and Engineer representatives. Size the room to comfortably seat a minimum of ten (10) people. Proper ventilation, temperature control and lighting are required, and shall be provided to the satisfaction of the Engineer.

C. The location of stationary and mobile equipment shall be subject to the Engineer's approval.

D. First Aid Station: Contractor shall provide a suitable first aid station at the administrative field office and the Contractor's operational field office. Each station shall be equipped with all facilities and medical supplies necessary to administer emergency first aid treatment. Contractor shall have standing arrangements for the removal and hospital treatment of any injured person. The information reflecting this arrangement shall be clearly posted for easy visibility. All first aid supplies and emergency ambulance service shall be made available by the Contractor to the Contractor's, City's, and Engineer's personnel.

1.04 ENGINEER'S FACILITIES

A. The Contractor shall provide the Engineer adequate space in the Contractor's field office for administrative work, as well as the storage of such materials and equipment necessary for the performance of Engineering oversight activities. The Contractor shall provide the Engineer access to power, lighting, heating and cooling, potable water, sanitary facilities, a printer, and the internet.

1.05 COMMUNICATIONS SERVICES

A. General

1. Make all necessary arrangements for outside telephone and internet access service to Contractor's field office. All portions of the communication system shall be maintained in good working condition.
2. At a minimum, furnish two telephone lines to the Contractor's field office. One will be used for a dedicated facsimile machine.

3. All expenditures for installation costs of hardware, lines, line extensions, service charges, and recurring service charges for telephone and internet access service shall be included in the unit price for the Contractor's temporary facilities item.

1.06 PARKING FACILITIES

A. General

1. Provide parking, either graveled or paved, adjacent to Contractor's administrative field office and Contractor's operational field office, without necessitating jockeying of cars, for a minimum of 2 cars for the use of City's or Engineer's personnel when visiting the Contractor's field office. The parking surfaces shall be promptly and adequately maintained by the Contractor for the duration of the Contract.
2. Additional parking facilities required by the Contractor shall be the Contractor's responsibility.

1.07 FACILITIES FOR PROJECT CONTROL TOOLS

A. The Contractor shall have adequate computer system capability in its field office facilities to connect to and use the City's Project Control Tools (refer to Section 01350). The connection method shall be based upon the physical connections availability at the various field and office locations. The priority preference for these connections is: DSL, Cable Modems, and if necessary T1 connections. No dial-up modems will be allowed. The monthly charges for these services shall be paid by the Contractor for the duration of the contract. Costs shall be included in the unit price item for the Contractor's temporary facilities.

B. The Contractor's connection computer(s) must have a minimum operating system of Windows 2000 or greater, 1.8 Hz speed with 256mb RAM. The Internet Explorer web browser must be version 5.5 or greater. The Contractor's printers must not be USB connection printers. The printer(s) must be a dedicated printer, HP LaserJet compatible.

C. No partial payment for the Contractor's temporary facilities unit price item will be approved until all connections are provided and installed to the satisfaction of the City's Project Controls Support Group.

1.08 SECURITY AND MAINTENANCE

A. General

1. Provide periodic indoor and outdoor maintenance and cleaning for temporary structures, furnishings, equipment and services as specified herein above.

2. Provide racks and files for Project Record Documents to be turned over to the City at the completion of the project.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 PREPARATION

A. Fill and grade sites for temporary structures to provide surface drainage.

3.02 INSTALLATION

A. Construct temporary administrative field office, Contractor's operational field office, first aid station, and storage facilities on proper foundations and complete connections for all utility services.

B. Determine the need for temporary utility services, including utility services for Contractor's field office and first aid station, and make all arrangements with utility companies and governmental agencies to secure such services. Temporary utility services shall be furnished, installed, connected, and maintained by Contractor in a workmanlike manner, and shall be removed in like manner prior to final project acceptance.

3.03 MAINTENANCE AND CLEANING

A. At a minimum, repair and clean the offices, parking areas and access routes and provide complete professional janitorial services, including toilet paper and paper towels, in the Contractor's field office. Contractor's field office cleaning shall be done to the satisfaction of the Engineer. These services shall include sweeping, vacuuming, dusting, emptying of trash, cleaning of washbasins, bathroom and shower facilities, mopping and waxing of all floors. Contractor shall also provide for exterminating services of the offices if requested by the Engineer.

3.04 REMOVAL

A. Remove or discontinue temporary field offices, contents and services at a time when no longer needed.

+ + + END OF SECTION 01590 + + +

SECTION 01600

MATERIALS AND EQUIPMENT

PART 1 GENERAL

1.01 THE REQUIREMENT

A. Furnish and Install

1. Where the words "furnish", "provide", "supply", "replace", or "install" are used, whether singularly or in combination, they shall mean to furnish and install, unless specifically stated otherwise.

2. In the interest of brevity, the explicit direction "to furnish and install" has sometimes been omitted in specifying materials and/or equipment herein. Unless specifically noted otherwise, it shall be understood that all equipment and/or materials specified or shown on the Drawings shall be furnished and installed under the Contract as designated on the Drawings.

1.02 EQUIPMENT AND MATERIALS

A. All equipment, materials, instruments or devices incorporated in this project shall be new and unused, unless indicated otherwise in the Contract Documents. Equipment and materials to be incorporated into the work shall be delivered sufficiently in advance of their installation and use to prevent delay in the execution of the work, and they shall be delivered as nearly as feasible in the order required for executing the work.

B. The Contractor shall protect all equipment and materials from deterioration and damage, including provisions for temporary storage buildings as needed and as specified in Section 01550, Site Access and Storage. Storage of equipment and materials shall be in locations completely protected from flooding, standing water, excessive dust, falling rock, brush fire, etc. Storage areas shall be located sufficiently distant from all construction activities and the movement of construction vehicles to minimize the potential for accidental damage. Any equipment or materials of whatever kind which may have become damaged or deteriorated from any cause shall be removed and replaced by good and satisfactory items at the Contractor's expense for both labor and materials.

1.03 SUBSTITUTIONS

A. Requests for substitutions of equipment or materials shall conform to the requirements of the General Conditions, Supplemental Conditions, and as hereinafter specified.

1. Contractor shall submit for each proposed substitution sufficient details, complete descriptive literature and performance data together with samples of the materials, where feasible, to enable the Owner and Engineer to determine if the proposed substitution is equal.

2. Contractor shall submit certified tests, where applicable, by an independent laboratory attesting that the proposed substitution is equal.

3. A list of installations where the proposed substitution is equal.

4. Requests for substitutions shall include full information concerning differences in cost, and any savings in cost resulting from such substitutions shall be passed on to the Owner.

B. Where the approval of a substitution requires revision or redesign of any part of the work, including that of other Contracts, all such revision and redesign, and all new drawings and details therefore, shall be provided by the Contractor at his own cost and expense, and shall be subject to the approval of the Owner and Engineer.

C. In the event that the Engineer is required to provide additional engineering services because of a substitution, then the Engineer's charges for such additional services shall be charged to the Contractor by the Owner in accordance with the requirements of the General Conditions, and the Supplemental Conditions.

D. In all cases the Owner and Engineer shall be the judge as to whether a proposed substitution is to be approved. The Contractor shall abide by their decision when proposed substitute items are judged to be unacceptable and shall in such instances furnish the item specified or indicated. No substitute items shall be used in the work without written approval of the Owner and Engineer.

E. Contractor shall have and make no claim for an extension of time or for damages by reason of the time taken by the Engineer in considering a substitution proposed by the Contractor or by reason of the failure of the Engineer to approve a substitution proposed by the Contractor.

F. Acceptance of any proposed substitution shall in no way release the Contractor from any of the provisions of the Contract Documents.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

+++ END OF SECTION +++

SECTION 01610
TRANSPORTATION AND HANDLING

PART 1 GENERAL

1.01 SCOPE

A. The Contractor shall provide transportation of all equipment, materials and products to the Work site. In addition, the Contractor shall provide preparation for shipment, loading, unloading, handling and preparation for installation and all other work and incidental items necessary or convenient to the Contractor for the satisfactory prosecution and completion of the Work.

B. All equipment, materials and products damaged during transportation or handling shall be repaired or replaced by the Contractor at no additional cost to the City DWM prior to being incorporated into the Work.

1.02 TRANSPORTATION

A. All equipment shall be suitably boxed, crated or otherwise protected during transportation.

B. Where equipment will be installed using existing cranes or hoisting equipment, the Contractor shall ensure that the weights of the assembled sections do not exceed the capacity of the cranes or hoisting equipment.

C. Small items and appurtenances such as gauges, valves, switches, instruments and probes which could be damaged during shipment shall be removed from the equipment prior to shipment, packaged and shipped separately. All openings shall be plugged or sealed to prevent the entrance of water or dirt.

1.03 HANDLING

A. All equipment, materials and products shall be carefully handled to prevent damage or excessive deflections during unloading or transportation.

B. Lifting and handling drawings and instructions furnished by the manufacturer or supplier shall be strictly followed. Eyebolts or lifting lugs furnished on the equipment shall be used in handling the equipment. Shafts and operating mechanisms shall not be used as lifting points. Spreader bars or lifting beams shall be used when the distance between lifting points exceeds that permitted by standard industry practice.

C. Under no circumstances shall equipment or products such as pipe, structural steel, castings, reinforcement, lumber, piles, poles, etc., be thrown or rolled off of trucks onto the ground.

D. Slings and chains shall be padded as required to prevent damage to protective coatings and finishes.

PART 2 PRODUCTS

(NOT USED)

PART 3 EXECUTION

(NOT USED)

+ + + END OF SECTION 01610 + + +

SECTION 01611
STORAGE AND PROTECTION

PART 1 – GENERAL

1.01 SCOPE

A. The work under this Section includes, but is not necessarily limited to, the furnishing of all labor, tools and materials necessary to properly store and protect all materials, equipment, products and the like, as necessary for the proper and complete performance of the Work.

B. The Contractor shall store materials, supplies, and equipment at the site in such orderly fashion and in such locations as approved by the Engineer that will not unduly interfere with the progress of the Work or the work of any other contractors, or the activities of City personnel.

1.02 STORAGE AND PROTECTION

A. Storage:

1. Maintain ample space for foot traffic at all times, except as otherwise approved by the Engineer.

2. All property damaged by reason of storing of material shall be properly replaced at no additional cost to the City.

3. Packaged materials shall be delivered in original unopened containers and so stored until ready for use.

4. All materials shall meet the requirements of these Specifications at the time that they are used in the Work.

5. Store products in accordance with manufacturer's instructions.

B. Protection:

1. Use all means necessary to protect the materials, equipment, and products of every section before, during and after installation and to protect the installed work and materials of all other trades.

2. All materials shall be delivered, stored, and handled to prevent the inclusion of foreign materials and damage by water, breakage, vandalism, or other causes.

3. Substantially constructed weathertight storage sheds, with raised floors, shall be provided, and maintained as may be required to adequately protect those materials and products, which may require protection from damage

by the elements, stored on the site.

C. Replacements: In the event of damage, immediately make all repairs and replacements necessary for the approval of the Engineer and at no additional cost to the City.

D. Equipment and products stored outdoors shall be supported above the ground on suitable wooded blocks or braces arranged to prevent excessive deflection or bending between supports. Items such as pipe, structural steel and sheet construction products shall be stored with one end elevated to facilitate drainage.

E. Unless otherwise permitted in writing by the Engineer, building products, and materials such as cement, grout, plaster, gypsum board, particleboard, resilient flooring, acoustical tile, paneling, finish lumber, insulation, wiring, etc., shall be stored indoors in a dry location. Building products such as rough lumber, plywood, concrete block, and structural tile may be stored outdoors under a properly secured waterproof covering.

F. Tarps and other coverings shall be supported above the stored equipment or materials on wooden strips to provide ventilation under the cover and minimize condensation. Tarps and covers shall be arranged to prevent ponding of water.

1.03 EXTENDED STORAGE

A. In the event that certain items of major equipment such as air compressors, pumps, and mechanical aerators have to be stored for an extended period of time, the Contractor shall provide satisfactory long-term storage facilities that are acceptable to the Engineer. The Contractor shall provide all special packaging, protective coverings, protective coatings, power, nitrogen purge, desiccants, lubricants, and exercising necessary or recommended by the manufacturer to properly maintain and protect the equipment during the period of extended storage.

****END OF SECTION 01611****

SECTION 01650

WARRANTIES

PART 1 GENERAL

1.01 PROJECT MAINTENANCE AND WARRANTY

A. Maintain and keep in good repair the Work covered by these Drawings and Specifications until acceptance by the Owner.

B. The Contractor shall warrant for a period of one year from the date of Owner's written acceptance of the Work and/or Owner's written final acceptance of the Project, as defined in the Contract Documents, that the completed Work is free from all defects due to faulty products or workmanship and the Contractor shall promptly make such corrections as may be necessary by reason of such defects. The Owner will give notice of observed defects with reasonable promptness. In the event that the Contractor should fail to make such repairs, adjustments or other work that may be made necessary by such defects, the Owner may do so and charge the Contractor the cost thereby incurred. The Performance Bond shall remain in full force and effect throughout the warranty period.

C. The Contractor shall not be obligated to make replacements which become necessary because of ordinary wear and tear, or as a result of improper operation or maintenance, or as a result of improper work or damage by another Contractor or the Owner, or to perform any work which is normally performed by a maintenance crew during operation.

D. In the event of multiple failures of major consequences prior to the expiration of the one year warranty described above, the affected unit shall be disassembled, inspected and modified or replaced as necessary to prevent further occurrences. All related components which may have been damaged or rendered non-serviceable as a consequence of the failure shall be replaced. A new warranty period equal to the original warranty period shall be provided against defective or deficient design, workmanship, and materials and shall commence on the day that the item is reassembled and placed back into operation. As used herein, multiple failure shall be interpreted to mean two (2) or more successive failures of the same kind in the same item or failures of the same kind in two or more items. Major failures may include, but are not limited to, cracked or broken housings, piping, or vessels, excessive deflections, bent or broken shafts, broken or chipped gear teeth, premature bearing failure, excessive wear or excessive leakage around seals. Failures which are directly and clearly traceable to operator abuse, such as operations in conflict with published operating procedures or improper maintenance, such as substitution of unauthorized replacement parts, use of incorrect lubricants or chemicals, flagrant over-or under-lubrication and using maintenance procedures not conforming with published

maintenance instructions, shall be exempted from the scope of the one year warranty. Should multiple failures occur in a given item, all products of the same size and type shall be disassembled, inspected, modified or replaced as necessary and re-warranted for the original full warranty period.

E. The Contractor shall, at Contractor's own expense, furnish all labor, materials, tools and equipment required and shall make such repairs and removals and shall perform such work or reconstruction as may be made necessary by any structural or functional defect or failure resulting from neglect, faulty workmanship or faulty materials, in any part of the Work performed by the Contractor. Such repair shall also include refilling of trenches, excavations or embankments which show settlement or erosion after backfilling or placement.

F. Except as noted on the Drawings or as specified, all structures such as embankments and fences shall be returned to their original condition prior to the completion of the Contract. Any and all damage to any facility not designated for removal, resulting from the Contractor's operations, shall be promptly repaired by the Contractor at no cost to the Owner.

G. The Contractor shall be responsible for all road and entrance reconstruction and repairs and maintenance of same for a period of one (1) year from the date of final acceptance. In the event the repairs and maintenance are not made immediately and it becomes necessary for the Owner of the road to make such repairs, the Contractor shall reimburse the owner of the road for the cost of such repairs.

H. In the event the Contractor fails to proceed to remedy the defects upon notification within ten (10) days of the date of such notice, the Owner reserves the right to cause the required materials to be procured and the work to be done, as described in the Drawings and Specifications, and to hold the Contractor and the sureties on Contractor's bond liable for the cost and expense thereof.

I. Notice to Contractor for repairs and reconstruction will be made in the form of a registered letter addressed to the Contractor at Contractor's home office.

J. Neither the foregoing paragraphs nor any provision in the Contract Documents, nor any special guarantee time limit implies any limitation of the Contractor's liability within the law of the place of construction.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

+ + + END OF SECTION + + +

SECTION 01700

PROJECT CLOSEOUT

PART 1 GENERAL

1.01 SCOPE

A. Final Cleaning

1. At the completion of the work, the Contractor shall remove all rubbish from and about the site of the work, and all temporary structures, construction signs, tools, scaffolding, materials, supplies and equipment which he or any of his Subcontractors may have used in the performance of the work. Contractor shall broom clean paved surfaces and rake clean other surfaces of grounds.

2. Contractor shall thoroughly clean all materials, equipment and structures; all marred surfaces shall be touched up to match adjacent surfaces; dirty filters and burned out lights replaced as required; all glass surfaces cleaned and floors cleaned and polished so as to leave work in a clean and new appearing condition.

3. Contractor shall maintain cleaning until project, or portion thereof, is occupied by the Owner.

E. Final Cleanup; Site Rehabilitation

1. Before finally leaving the site, the Contractor shall wash and clean all exposed surfaces which have become soiled or marked, and shall remove from the site of work all accumulated debris and surplus materials of any kind which result from his operation, including construction equipment, tools, sheds, sanitary enclosures, etc. The Contractor shall leave all equipment, fixtures, and work, which he has installed, in a clean condition. The completed project shall be turned over to the Owner in a neat and orderly condition.

2. The site of the work shall be rehabilitated or developed in accordance with other sections of the Specifications and the Drawings. In the absence of any portion of these requirements, the Contractor shall completely rehabilitate the site to a condition and appearance equal or superior to that which existed just prior to construction, except for those items whose permanent removal or relocation was required in the Contract Documents or ordered by the Owner.

F. Final Inspection

1. Final cleaning and repairing shall be so arranged as to be finished upon completion of the construction work. The Contractor will make his final cleaning and repairing,

and any portion of the work finally inspected and accepted by the Engineer shall be kept clean by the Contractor, until the final acceptance of the entire work.

2. When the Contractor has finally cleaned and repaired the whole or any portion of the work, he shall notify the Engineer that he is ready for final inspection of the whole or a portion of the work, and the Engineer will thereupon inspect the work. If the work is not found satisfactory, the Engineer will order further cleaning, repairs, or replacement.

3. When such further cleaning or repairing is completed, the Engineer, upon further notice, will again inspect the work. The "Final Payment" will not be processed until the Contractor has complied with the requirements set forth, and the Engineer has made his final inspection of the entire work and is satisfied that the entire work is properly and satisfactorily constructed in accordance with the requirements of the Contract Documents.

G. As-Builts

See Section 01720 Record Documents.

H. Project Close Out

1. As construction of the project enters the final stages of completion, the Contractor shall, in concert with accomplishing the requirements set forth in the Contract Documents, attend to or have already completed the following items as they apply to his contract:

   a. Scheduling equipment manufacturers' visits to site.

   b. Required testing of project components.

   c. Scheduling start-up and initial operation.

   d. Scheduling and furnishing skilled personnel during initial operation.

   e. Correcting or replacing defective work, including completion of items previously overlooked or work which remains incomplete, all as evidenced by the Engineer's "Punch" Lists.

   f. Attend to any other items listed herein or brought to the Contractor's attention by the Engineer.

2. Just before the Engineer's Certificate of Substantial Completion is issued, the Contractor shall accomplish the cleaning and final adjustment of the various building components as specified in the Specifications and as follows:

a. Clean all glass and adjust all windows and doors for proper operation.

b. Clean all finish hardware after adjustment for proper operation.

c. Touch up marks or defects in painted surfaces and touch up any similar defects in factory finished surfaces.

d. Wax all resilient flooring materials.

e. Remove bitumen from gravel stops, fascias, and other exposed surfaces.

f. Remove all stains, marks, fingerprints, soil, spots, and blemishes from all finished surfaces, tile, stone, brick, and similar surfaces.

3. In addition, and before the Certificate of Substantial Completion is issued, the Contractor shall submit to the Engineer (or to the Owner if indicated) certain records, certifications, etc., which are specified elsewhere in the Contract Documents. A partial list of such items appears below, but it shall be the Contractor's responsibility to submit any other items which are required in the Contract Documents:

a. Test results of project components.

b. Performance Affidavits for equipment.

c. Certification of equipment or materials in compliance with Contract Documents.

d. Operation and maintenance instructions or manuals for equipment.

e. One set of neatly marked-up record drawings showing as-built changes and additions to the work under his Contract.

f. Any special guarantees or bonds (Submit to Owner).

g. Licensed surveyor’s report showing elevations of weirs specified in the Contract Drawings and the final surveyed elevation.

4. The Contractor's attention is directed to the fact that required certifications and information under Item 3 above, must actually be submitted earlier in accordance with other Sections of the Specifications.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

+ + + END OF SECTION 01700 + + +

SECTION 01720
RECORD DOCUMENTS

PART 1 – GENERAL

1.01 SCOPE

A. The work under this Section includes, but is not necessarily limited to, the compiling, maintaining, recording, and submitting of project record documents as herein specified.

B. Record documents include, but are not limited to:

1. Drawings

2. Specifications

3. Change orders and other modifications to the Contract

4. Engineer field orders or written instructions, including Requests for Information (RFI) and Clarification Memorandums

5. Reviewed shop drawings, product data and samples

6. Test records

7. As-built drawings and/or maps, indicating the locations and types of work performed (stormwater asset ID numbers clearly shown where appropriate). Position survey coordinates, top of stormwater structure cover and invert elevations shall be indicated on the drawing for all stormwater structures which are newly constructed, replaced or adjusted to grade. Where service laterals are rehabilitated or replaced (whether partial or complete to property line) indicate approximate location on drawing, as well as method of rehabilitation/repair. As-built pipe diameters and materials shall also be indicated.

8. Map corrections - printed map marked up illustrating the approximate position of any unmapped stormwater structures or pipes discovered (no survey required).

9. Geographic Information System (GIS) data – updated GIS data set indicating the as-built position and attributes for all replaced and rehabilitated stormwater pipes, structures and lateral piping.

C. The Contractor shall maintain a current set of Record Drawings and GIS data on the Project site throughout the Contract Time.

1.02 MAINTENANCE OF DOCUMENTS AND SAMPLES

A. Storage:

1. Store documents and samples in the Contractor's field office, apart from documents used for construction

2. Provide files and racks for storage of documents

3. Provide locked cabinet or secure storage space for storage of samples

B. File documents and samples in accordance with format of these Specifications

C. Maintenance:

1. Maintain documents in a clean, dry, legible condition and in good order.

2. Do not use record documents for construction purposes.

3. Maintain one copy of all record documents at the site.

D. Make documents and samples available at all times for inspection by Engineer.

E. Failure to maintain the Record Documents in a satisfactory manner may be cause for withholding payment.

1.03 QUALITY ASSURANCE

A. Unless noted otherwise, Record Drawings and corresponding GIS data shall provide dimensions, distances, coordinates to the nearest 0.1 foot in North American Datum of 1983 (1986 adjustment) Georgia State Plane West 1002 System format. All coordinate values shall be provided as grid coordinates in US Survey Feet.

B. Unless noted otherwise, Record Drawings and corresponding GIS data shall provide elevations to the nearest 0.01 foot referenced to the North American Vertical Datum of 1988 (NAVD88) format. All coordinate values shall be provided as grid coordinates in US Survey Feet.

C. GPS data shall be collected using e-GPS Solutions or equivalent internet- based real time GPS network. The network shall provide continuous error correction and accuracy which meets or exceeds the requirements of Section 1.07 Data Accuracy.

D. Any transformation or adjustment necessary to project surveyed coordinates to the Reference Coordinate System will be the responsibility of the Contractor.

E. The Contractor shall employ a Professional Land Surveyor (PLS) licensed in the

State of Georgia to prepare the Record Drawings from a post-construction, field survey of all stormwater structures and pipes newly constructed, replaced or otherwise adjusted in position or elevation. Additionally, the Contractor shall submit the corresponding GIS data accordingly to indicate the as-built condition and GIS data attributes of these structures and pipelines. Replacement methods include open cut. Point repairs, abandonment and removal of stormwater lines or structures is considered rehabilitation work. A post construction survey is not required for these types of rehabilitation; however, the GIS data attributes shall be updated to indicate the physical as-built condition.

1.04 DATA ACCURACY

A. High Resolution: For all stormwater structures, the equipment and means used by Contractor must generate the position of points with a minimum accuracy of three (3) centimeters horizontal and three (3) centimeters vertical. To determine the accuracy obtained, Contractor's GPS system will be calibrated daily against a known point (monuments) prior to beginning work and when the work is completed. The Contractor shall submit a report to the Engineer certifying calibration was accomplished and indicating the reference system. Data delivered to the Engineer arising from the GPS survey shall be certified by a Professional Land Surveyor. When the GPS equipment cannot be set directly on the point, conventional surveying methods will be used to establish the position to the stated level of accuracy.

B. Calibration shall be carried out at least on a daily basis in accordance with the GPS equipment manufacturer's instructions. Additional calibrations may be required during the course of the working day for large fluctuations of temperature and/or humidity, also in accordance with the manufacturer's instructions and tolerances. The Contractor shall submit a report to the Engineer certifying calibration was accomplished and indicating the reference system.

1.05 INTERFERENCE

A. A GPS position is required for all newly constructed, replaced or adjusted Storm point structures regardless of the overhead conditions or other nearby obstructions which may interfere with satellite signals, at no additional cost. In the event coverage conditions do not allow all positions to be obtained by setting directly over the point, rangefinders or other conventional surveying methods may be used to obtain the position of the point(s).

1.06 RECORDING

A. Label each document "PROJECT RECORD" in neat, large printed letters.

B. Recording:

1. Record information concurrently with construction progress.

2. Do not conceal any work until required information is recorded.

1.07 RECORD DRAWINGS

A. Record Drawings shall be reproducible, shall have a title block indicating that the drawings are Record Drawings, the name of the company preparing the Record Drawings, and the date the Record Drawings were prepared. The Contractor will be provided paper sepias of the Drawings, or it may elect to provide reproducible drawings via another method. Reproducible shall be defined as being translucent so as to allow a blueline print to be produced.

B. Legibly mark drawings to record actual construction, including:

a. All Construction:

a. Changes of dimension, diameter, or material and detail

b. Location and type of work performed on each stormwater structure or pipe segment (indicate asset ID numbers)

c. Changes made by Requests for Information (RFI), field order, clarification memorandums or by change order

d. Details not on original Drawings

e. The distance (length) between access covers on pipe segments where work was performed.

b. Structures:

a. Position coordinates, as well as invert and top elevations of stormwater structures where stormwater structures or pipe have been newly constructed, replaced or adjusted/raised to grade.

1.08 SPECIFICATIONS

A. Legibly mark each section to record:

1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed

2. Changes made by Requests for Information (RFI), field order, clarification memorandums, or by change order

1.09 GIS DATA

A. Coordinate and attribute data shall be provided in both electronic and hard copy format at the completion of each stormwater basin, but not less than monthly. The hard copy data must be submitted for approval by the Engineer. Electronic data will not be accepted without hard copy data.

B. The hard copy data shall include a cover letter and printed spreadsheet that corresponds to the electronic data submitted. If the survey work is performed by a subcontractor, the cover letter shall provide certification of data accuracy by a Professional Land Surveyor (PLS) licensed in the State of Georgia. If the survey work is performed by the prime Contractor, the cover letter shall provide certification of data accuracy by a Professional Land Surveyor (PLS) licensed in any State in the United States of America. The hard copy data must be bound, with the PLS seal placed on the cover letter; OR, the hard copy data may be submitted unbound, with the PLS seal placed on each and every sheet of unbound data submitted.

C. The attached GPS Certification Form shall be signed and sealed by a Registered Land Surveyor in Georgia and submitted for each storm drainage basin.

D. The electronic data table submittal shall include four completed worksheets to form a workbook in Microsoft Excel format containing position survey data and physical attributes of the replacement and rehabilitation work. All pipe material, pipe shape and pipe type code values shall be provided. Numerical value measurement data precision shall be 1/1000 or three decimal places. Each data worksheet shall include individual data records arranged in template formats and header values conforming to examples provided below;

Storm Structure Replacement or Rehabilitation Worksheet:

PointGISID	X_Coord_US	Y_Coord_US	Z_Elev_US	REHAB_METH	Comments	Install Date	Scope Status
23040113201	2204663.500	1349506.320	859.950	Replace Storm Structure Top, Frame and Cover	Replaced Inlet with GDOT Type C Catch Basin	mm/dd/yyyy	Original scope completed as designed

Pipeline Rehabilitation Worksheet (Use for stormwater line open cut replacement):

PipeGISID	PipeDia	PipeWidth	PipeHeight	PipeGuage	PipeShape	PipeUSDpth	PipeDSDpth
23040113201T23040116501	12.000	0.000	0.000	1.125	C	8.600	15.840

Cont'd

PipeMatl	X_Coord_US	Y_Coord_US	Z_Elev_US	US_Pipe_Elev	X_Coord_DS	Y_Coord_DS	Z_Elev_DS
PE	2204663.500	1349506.320	859.950	851.350	2204313.580	1349469.870	864.350

Cont'd

DS_Pipe_Elev	Length	Slope	REHAB_METH	COMMENTS	Install Date	Scope Status
848.510	351.813	0.008072	OC		mm/dd/yyyy	Original Scope completed as designed

Point Repair Rehabilitation Worksheet:

PipeGISID	PipeDia	PipeWidth	PipeHeight	PipeGuage	PipeShape	PipeMatl
23040113201T23040116501	12.000	0.000	0.000	1.125	C	VC

Cont'd

REHAB_METH	DISTFRMUSMH	PR_LENGTH	PR_MATERIAL	COMMENTS	Install Date	Scope Status
External	12.700	4.500	VC		mm/dd/yyyy	Rehab scope method revised from original scope

1.08 SUBMITTAL

A. At work assignment or contract closeout (whichever comes first), the Contractor shall submit two copies of Record Documents to the Engineer.

B. The submittal shall include a transmittal letter, in duplicate, containing;

1. Date
2. Project title and number
3. Contractor's name and address
4. Title and number of each record document and
5. Signature of Contractor or Contractor's authorized representative.

C. Additionally, the Contractor shall edit the digital PDF(s) files furnished for each storm drainage basin to include all changes based upon actual field conditions. The Contractor shall submit marked up map(s) showing the position of unmapped and

incorrectly positioned stormwater structure(s) and/or pipelines discovered during the work. All map(s) shall be marked up with red text and delivered to the Engineer upon the completion of each storm drainage basin. Supplemental sketches shall also be provided in red text, as necessary to clearly depict the actual site conditions including, but not limited to congested areas and established access roads. A legend shall be added to the title block indicating the symbology, color coding and descriptions. The date, the words "As-Built" and company name shall also be included in the title block.

****END OF SECTION 01720****

ATTACHMENT A

GPS CERTIFICATION

The purpose of this form is to provide the City of Atlanta with additional GPS/Survey information necessary to maintain the GIS system. This form should be completed for each storm drainage basin and submitted with the Certified GPS.

Name of Storm Drainage Basin	Contractor Name:	Surveyor Name:
	Contact Number:	Contact Number:

Brief description of survey equipment used: (Manufacturer, Model No., Age)

Reference Coordinate System used:

a. Horizontal
   - Datum
   - Adjustment
   - Coordinate System
   - Unit of Measure

b. Vertical
   - Datum
   - Geoid Model
   - Unit of Measure

c. Geodetic monuments used or name of network RTK service

_____

d. Scale factors for Conventional Survey

_____

e. If calibration or transformation was applied, list parameters

f. _____

g. Are coordinate Grid or Ground?

_____

Signature and Seal of Surveyor Date

SECTION 01740

CLEANING AND DISPOSAL

PART 1 GENERAL

1.01 SCOPE OF WORK

During the progress of the Work Contractor shall keep the Project work area and other immediate impacted areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations. At the completion of the Work, the Contractor shall remove from the Project work area, all waste materials, rubbish, debris, tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

1.02 RELATED WORK

Each Section: Cleaning for specific products or work.

1.03 DISPOSAL AND CLEANING

Conduct cleaning and disposal operations to comply with codes, ordinances, regulations and anti-pollution laws.

PART 2 PRODUCTS

2.01 MATERIALS

A. Use only those cleaning materials which will not create hazards to health or property and which will not damage surfaces.

B. Use only those cleaning materials and methods recommended by manufacturer of the surface material to be cleaned.

C. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 EXECUTION

3.01 DURING CONSTRUCTION

A. Execute periodic cleaning to keep the work, the site and adjacent properties free from accumulations of waste materials, rubbish and windblown debris, resulting from construction operations.

B. Provide on-site containers for the collection of waste materials, debris and rubbish.

C. Remove waste materials, debris and rubbish from the site periodically and dispose of at legal disposal areas away from the site.

D. Refer to Section 01060 for Stormwater discharges

3.02 DUST CONTROL

A. Clean interior spaces prior to the start of finish painting and continue cleaning on an as-needed basis until painting is finished.

B. Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly-coated surfaces.

3.03 FINAL CLEANING

A. Employ skilled workmen for final cleaning.

B. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels and other foreign materials from sight-exposed interior and exterior surfaces.

C. Wash and shine glazing and mirrors.

D. Polish glossy surfaces to a clear shine.

E. Ventilating Systems:

1. Clean permanent filters and replace disposable filters if units were operated during construction.
2. Clean ducts, blowers and coils if units were operated without filters during construction.

F. Broom clean exterior paved surfaces; rake clean other surfaces of the grounds.

G. Prior to final completion, or Owner occupancy, conduct an inspection of sight-exposed interior and exterior surfaces and all work areas, to verify that the entire work is clean.

+ + + END OF SECTION + + +

SECTION 01770

CLOSEOUT PROCEDURES

PART 1 SCOPE

1.01 SUBMITTALS

A. Quality Control Submittals: Written procedures for maintaining and markup of Record Documents.

B. Contract Closeout Submittals: Submit prior to processing of application for final payment.

1. Record Documents
2. Complete set of Approved Shop Drawings and Samples
3. Two (2) copies of all Special Bonds, Special Warranties, and Service Agreements.
4. Consent of Surety to Final Payment
5. Releases or Waivers of Liens and Claims
6. Release from Agreements.
7. Certificates of Inspection and Occupancy if required by local jurisdiction.
8. Registry of training sessions conducted and list of attendees for all manufacturer's operation and maintenance training session.
9. Registry of final maintenance and lubrication of filter and/or oil lube protected equipment.
10. Registry of all Spare Parts and Special Tools provided to the Owner as required by individual specification sections organized by specification section inclusive of documentation depicting receipt by Owner.
11. Final Application for Payment: Submit in accordance with procedures and requirements stated in paragraph 14.07 of the General Conditions.
12. A final written tabulation, plus other documentation as may be required, of all taxes, including sales tax, paid by the CONTRACTOR to assist the OWNER in obtaining sales and/or use tax refunds for eligible machinery and equipment used for the primary purpose of reducing or eliminating air or water pollution as provided for in Chapter 48-8-3 (36) and (37) of the Official Code of Georgia.

1.02 FINAL PAYMENT

A. Neither the Final Payment nor the retainage shall become due until Contractor submits to the Engineer:

1. An affidavit that all payrolls, bills for Materials and Equipment, and other indebtedness connected with the Work have been paid or otherwise satisfied;
2. Consent of surety, if any, to Final Payment;

3. Clear title for all vehicles and/or trailers, if any, to remain as City property;
4. Complete set of as-built record Drawings;
5. Documentation for all state sales taxes paid by Contractor including completed State Department of Revenue Refund forms and all necessary back up documentation required by the Department of Revenue;
6. If required by the Engineer or City, other data establishing payment or satisfaction of all such obligations, such as receipts, releases, and waivers of liens arising out of the Agreement, to the extent and in such form as may be designated by the Engineer or City. If any Subcontractor refuses to furnish a release or waiver required by the Engineer or City, Contractor may furnish a bond satisfactory to the City to indemnify the City against any such loss. If any lien or indebtedness remains unsatisfied after all payments are made, Contractor shall refund to the City all monies that the latter may be compelled to pay in discharging such lien or other indebtedness, including, without limitation, all costs, expenses, arbitration fees, reasonable attorneys' fees, expert fees, or consultant fees incurred in connection with same; and
7. As a condition of Final Payment on the Project, Contractor shall, prior to final payment, complete and submit to the City, all of the invoice documentation and the State of Georgia Revenue Department forms required to obtain the sales tax refund on all applicable equipment expenditures. This submittal shall include the certified forms and auditable back-up necessary to substantiate the expenditures for State refund.

1.03 PROJECT RECORD DOCUMENTS

See Section 01720 Record Documents

1.04 RELEASES FROM AGREEMENTS

A. Furnish Owner written releases from property owners or public agencies where side agreements or special easements have been made, or where Contractor's operations have not been kept within the Owner's construction right-of-way.

B. In the event Contractor is unable to secure written releases, inform the Owner of the reasons:

1. Inform Owner of the reasons.
2. Owner or its representatives will examine the site, and Owner will direct Contractor to complete Work that may be necessary to satisfy terms of the side agreement or special easement.
3. Should Contractor refuse to perform this Work, Owner reserves the right to have it done by separate contract and deduct the cost of same from the Contract Price, or require the Contractor to furnish a satisfactory Bond in a sum to cover legal claims for damages.

4. When Owner is satisfied that Work has been completed in agreement with the Contract Documents and terms of side agreement or special easement, the right is reserved to waive the requirement for written release if:
    a. Contractor's failure to obtain such statement is due to the grantor's refusal to sign, and this refusal is not based upon any legitimate claims that Contractor has failed to fulfill the terms of the side agreement or special easement, or
    b. Contractor is unable to contact or has had undue hardship in contacting the grantor.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

+ + + END OF SECTION 01770 + + +

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CERTIFICATE OF DESIGN

The undersigned hereby certifies that he/she is a Professional Engineer registered in the state of _____ and that he/she has been employed by (Name of Contractor) _____ to design _____ in accordance with Specifications Section _____ for the (Name of Project) _____ The undersigned further certifies that he/she has performed similar designs previously and has performed the design of the _____; that said design is in conformance with all applicable local, state, and federal codes, rules, and regulations and professional practice standards; that his/her signature and Professional Engineer (P.E.) Stamp have been affixed to all calculations and drawings used in, and resulting from, the design; and that the use of that stamp signifies the responsibility of the undersigned for that design.

The undersigned hereby certifies that he/she has Professional Liability Insurance with limits of $1,000,000.00 and a Certificate of Insurance is attached.

The undersigned hereby agrees to make all original design drawings and calculations available to the Town/City of _____ or Owner's representative within seven (7) days following written request therefore by the Owner.

P.E. Name	Contractor's Name
Signature	Signature
Title	Title
Address	Address

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CERTIFICATE OF UNIT RESPONSIBILITY

For Specification Section _____

_____

In accordance with Section 01 61 16, paragraph 4 of the contract documents, the undersigned manufacturer accepts unit responsibility for all components of equipment furnished under specification Section _____. Equipment supplied by the manufacturer is covered and the equipment will be operated according to the O&M manual. We hereby certify that these components are compatible and comprise a functional unit suitable for the specified and indicated performance and design requirements.

_____ _____

Notary Public Name of Corporation

_____ _____

Commission expiration date Address

Seal By: _____

Duly Authorized Official

_____

Legal Title of Official

Date: _____

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SECTION 01800
MAINTENANCE

PART 1 - GENERAL

1.01 DESCRIPTION

A. Proponent will be required to maintain stored and installed equipment and materials until Final Acceptance of the Work as defined by the General Conditions. Work included, but is not limited to:

1. Perform all required maintenance.

2. Repair and maintain protective coatings.

3. Repair and replace scratched and damaged materials and equipment.

4. Maintain and operate new equipment placed into service.

B. Work per this Section starts on the date the equipment and materials are received and continued until the Date of Final Acceptance.

C. Proponent will monitor equipment storage and subsequently the operation and material functionality on a continual basis during the specified time period. Any deterioration of materials or malfunction of equipment will be followed by swift repair action to minimize the damage. Such repair may include repair and technical services by an independent contractor if the Engineer deems the Proponent's efforts are ineffective in correcting the problem.

D. All costs for maintenance and repair of stored and installed equipment and materials, including costs from an independent contractor, during the specified time period will be the sole responsibility of the Proponent.

+++ END OF SECTION 01800 +++

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SECTION 01900
SEISMIC REQUIREMENTS

PART 1 GENERAL

1.01 SCOPE

A. This section establishes the minimum seismic design requirements for mechanical and non-structural components required to complete the Work.

B. The Contractor shall be responsible for the seismic requirements specified including the conformance of work for all subcontractors, manufacturers and suppliers with regard to the indicated and specified seismic requirements.

1.02 REFERENCES

A. American Society of Civil Engineers:

1. ASCE 7: Minimum Design Loads for Buildings and Other Structures.

B. American Petroleum Institute:

1. STD 650: Welded Steel Tanks for Oil Storage

C. American Society of Mechanical Engineers:

1. B 31: Code for Pressure Piping

2. Boiler and Pressure Vessel Code

D. International Code Council (ICC):

1. International Building Code

E. Manufacturers Standardization Society of the Valve and Fitting Industry:

1. SP-58: Pipe Hangers and Supports - Materials, Design and Manufacture

1.03 DEFINITIONS

A. Components are defined as systems, equipment, parts, or other elements, including supporting structures and attachments.

B. The reference building code is defined as the building code cited on the structural drawings or specified herein for the design of the basic structure.

C. The specified seismic criteria is defined as the seismic criteria cited on the structural drawings or specified herein for the design of the basic structure.

1.04 SEISMIC DESIGN REQUIREMENTS

A. Refer to structural drawings for seismic requirements and also conform to the requirements specified herein.

B. Non-structural components shall be designed and constructed to resist the seismic forces and displacements based upon ASCE 7, the reference building code, and the specified seismic criteria. In the case of conflict the more stringent requirements shall govern.

C. The interrelationship of components and their effect on each other shall be such that the failure of one component shall not cause the failure of any other component.

D. Components shall be anchored to the building structure to transfer seismic forces. Connections shall be bolted, welded or otherwise positively anchored to the structure. Anchorage shall not rely on friction for force transfer.

E. Exceptions: Exemption from the requirements for seismic analysis and design are permitted only to the extent permitted in the reference code.

1.05 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Condition of the Contract Documents. In addition, the following specific information shall be provided:

1. Certification signed and sealed by a Professional Structural Engineer holding current registration in the State of Georgia stating that all systems, equipment and other elements, including supporting structures, attachments and connections are designed to withstand the required seismic forces and displacements.

2. Codes and specifications to which structural design conforms.

1.06 SPECIFIC COMPONENTS

A. Piping Systems: Support and bracing of piping systems shall account for the weight and hydrodynamic effects of the contents.

B. Pressure Piping: Pressure piping support and bracing shall conform to ASME B31 in addition to the force and displacement requirements of the reference code.

PART 2 PRODUCTS

(NOT USED)

PART 3 EXECUTION

(NOT USED)

****END OF SECTION 01900****

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SECTION 02000
SITE WORK

PART 1 - GENERAL

1.01 DESCRIPTION

A. These general site work requirements apply to all site work operations. Refer to specification sections for specific product and execution requirements.

1.02 QUALITY ASSURANCE

A. Comply with all applicable local, state, and federal requirements regarding materials, methods of work, and disposal of excess and waste materials.

B. Obtain and pay for all required inspections, permits, and fees. Provide notices required by governmental authorities.

1.03 PROJECT CONDITIONS

A. Locate and identify existing underground and overhead services and utilities within contract limit work areas. Provide adequate means of protection of utilities and services designated to remain. Repair utilities damaged during site work operations at Contractor's expense.

B. Arrange for disconnection and seal or cap all utilities and services designated to be removed before start of site work operations. Perform all work in accordance with the requirements of the applicable utility company or agency involved.

C. When uncharted or incorrectly charted underground piping or other utilities and services are encountered during site work operations, notify the Engineer and the applicable utility company immediately to obtain procedure directions. Cooperate with the applicable utility company in maintaining active services in operation.

D. Locate, protect, and maintain bench marks, monuments, control points and project engineering reference points. Reestablish disturbed or destroyed items at Contractor's expense.

E. Perform site work operations and the removal of debris and waste materials to assure minimum interference with streets, walks, and other adjacent facilities.

F. Obtain governing authorities' written permission when required to close or obstruct street, walks and adjacent facilities. Provide alternate routes around closed or obstructed traffic ways when required by governing authorities.

G. Control dust caused by work. Dampen surfaces as required. Comply with pollution control regulations of governing authorities.

H. Protect existing buildings, paving, and other services or facilities on site and adjacent to the site from damage caused by site work operations. Cost of repair and restoration of damaged items at Contractor's expense.

I. Protect and maintain street lights, utility poles and services, traffic signal control boxes, curb boxes, valves and other services, except items designated for removal. Remove or coordinate the removal of traffic signs, parking meters and postal mail boxes with the applicable governmental agency. Provide for temporary relocation when required to maintain facilities and services in operation during construction work.

J. Preserve from injury or defacement all vegetation and objects designated to remain.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Materials and equipment: As selected by Contractor, except as indicated in contract documents.

PART 3 - EXECUTION

3.01 PREPARATION

A. Examine the areas and conditions under which site work is performed. Do not proceed with the work until unsatisfactory conditions are corrected.

B. Consult the records and drawings of adjacent work and of existing services and utilities which may affect site work operations.

+++ END OF SECTION 02000 +++

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SECTION 02010

SUBSURFACE CONDITIONS

PART 1 -- GENERAL

1.01 SCOPE

A. MC Squared, Inc. has been employed by the Engineer to perform a subsurface investigation for the Project. The data from this investigation is presented in the following document.

1. "Geotechnical Engineering Services Report – Upper Proctor Creek Capacity Relief Project, City of Atlanta, Fulton County, Georgia", dated November 2018, MC^2 Project No. A051807.043.

B. This subsurface investigation information is offered as an aid in bidding only and is not a part of the Contract Documents. The subsurface investigation information is available for Contractor's information but are not a warranty of subsurface conditions. The Owner, the Engineer, and the Geotechnical Engineer assume no responsibility for any variation between materials encountered during construction and those indicated on the subsurface information nor for any variation between location of the water table encountered and that indicated on the subsurface information.

C. Contractor shall visit site and acquaint himself with site conditions. Prior to bidding, prospective Contractors may make their own site and subsurface investigations to satisfy themselves with site and subsurface conditions. Contractor shall be responsible for obtaining for himself rights of ingress and egress to private property for site and subsurface investigation and shall assume all responsibility for any damage to property caused as a result of his investigation.

+++END OF SECTION+++

SECTION 02020
USE OF EXPLOSIVES

PART 1 - GENERAL

1.01 SCOPE

A. This section covers the use of explosives and blasting. Limit the use of explosives in the works to the practicable minimum by utilizing mechanical means of excavation to the maximum feasible extent. Blasting shall be limited to the work sites.

B. Definitions:

1. Controlled blasting is excavation of rock in which the blast hole size, spacing, depth and burden, and the charge size, depth and delay sequence are carefully controlled to excavate the rock to the required limits. Controlled blasting minimizes overbreak and fracturing of the rock beyond the design lines.

1.02 GENERAL

A. Perform blasting only with a permit from the appropriate jurisdictional agency. Necessary permits include an Explosives License issued by the Georgia Safety Fire Commissioner, and users' permits obtained from Fulton County and from the City of Atlanta. Obey all local, State, Federal and other Governmental regulations applying to transportation, handling, storage and use of explosives, including the requirements of the Bureau of Fire Prevention of the City of Atlanta, Fulton County and the State of Georgia, and applicable regulations of the Occupational Safety and Health Administration.

B. Perform blasting operations in trenches, shafts and other open excavations only during daylight hours. No blasting shall be performed on Saturdays, Sundays or on the public holidays observed by the City and listed in the Special Conditions. If an emergency prevents a blast being fired during the permitted hours and the holes are loaded, the blast shall be fired as soon as safety allows. In the event that blasting is found necessary outside the permitted hours, the Contractor shall inform local residents within hearing and vibration range and the jurisdictional agencies prior to firing. The Contractor shall report in writing to the Engineer the following day the conditions which required it to blast outside the permitted hours.

C. Furnish, install and operate at each site where blasting is being performed using electric methods of initiation an approved thunderstorm monitor and lightning warning device. Make adequate provisions for transmitting alarms from the device to all locations where preparation for blasting using electric initiation are in progress. Install and maintain the system in accordance with the manufacturer's recommendations. Test the entire monitoring and alarm system for satisfactory operation at intervals not exceeding two weeks, and suspend blasting operations

until any defects have been corrected.

D. Employ the services of a blasting consultant, satisfactory to the Engineer and experienced in predicting and evaluating the effects of blasting on nearby structures, such that vibration levels at these structures do not exceed a level which will damage the structures or their contents, or cause undue alarm to their occupants. Employ the blasting consultant to plan and evaluate blasting operations.

1.03 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:

1. At least 60 days prior to commencement of blasting operations, a copy of all applicable licenses and permits for the purchase, transportation, storage and use of explosives.

2. At least 60 days prior to commencement of blasting operations, a blasting monitoring plan including the name of the Blasting Vibration Consultant who will be responsible for establishing the monitoring program and interpreting the vibration readings; names of the trained personnel provided to operate the monitoring equipment; the type and model of blasting seismograph proposed for use; the number and location of proposed monitoring stations; the methods to be used to coordinate blast detonation with recording of the blast; and the steps to be taken if blasting vibrations exceed or seem likely to exceed the vibration limits.

3. At least 60 days prior to any blasting operation, the initial blast design for that location including number, location, diameter, depth and inclination of drill holes on a scale drawing of the excavation or heading face; type and weight of explosive in each hole; delay arrangement showing delay period in each hole; total weight of explosive in the blast and maximum charge per delay; the method of detonation; calculations of peak particle velocities and air blast overpressures; and the precautions to be taken to prevent flying rock or other debris. Manufacturers' data sheets shall be provided for all explosives and accessories to be used.

4. At least 15 days prior to any blasting operation, the blasting safetyplan including: health and safety requirements of all governing legislation; certificates from all regulating agencies and relevant insurance companies; outline of safety training program for the Contractor's and Engineer's personnel; communication and warning procedures; samples of all report and inspection forms; and lightning protection plan.

5. Within the working day following each blast, the blasting records and information for each blast detonated:

a. A complete description including the location, date for exact time of the blast; name and signature of person responsible for charge loading and firing and their blaster permit number; details of each blast as listed above for the initial blast design and any departures from the blast design; comments regarding any misfires, unusual results or unusual effects; any other records required by applicable regulations; and the name and signature of the person preparing the report.

b. The monitoring record including the location, date and exact time of the blast; general weather conditions; the locations of seismographs and type of ground on which they were located, instrument identification and their distances from the blast; the measured peak particle velocities; air blast overpressure records, if appropriate; and the name and signature of the observer.

1.04 QUALITY ASSURANCE

A. Workforce Experience:

1. The blasting consultant shall have at least 10 years of blasting experience in tunneling. The blasting consultant shall be on call throughout the entire period that blasting is performed and shall be available at the site within 5 days at any time that the blasting consultant's services may be necessary as determined by the Engineer.

2. Blasting supervisors shall have a minimum of 5 years' experience in supervising the loading and firing of charges for the excavation of tunnels and shall have all necessary licenses and permits required by the appropriate jurisdictional agencies.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Use only non-nitroglycerine explosives.

B. Store explosives and detonators in the manufacturers' boxes with date codes to allow the Engineer to determine their age of the materials. All explosives and detonators used in the work shall be less than one year old. Blasting products shall not be brought onto the site if the date codes are missing. When in the Engineer's opinion any blasting product is either of excessive age or in a deteriorated condition, that material shall not be used until its age or quality can be shown to be satisfactory.

2.02 EQUIPMENT

A. Use dust suppressant measures with air-powered or air-flush rock drilling

equipment.

B. Wet down the muck pile after blasting to control dust during mucking operations.

PART 3 - EXECUTION

3.01 GENERAL

A. Firing shall be permitted only after the proper precautions have been taken for the protection of all persons, work and property.

B. The following limits on peak particle velocities and air blast overpressure, or such lower limits as established by the Contractor's Blasting Vibration Consultant, shall apply:

1. At structures and utilities in the vicinity of blasting operations, the peak particle velocity resulting from blasting shall not exceed:

a. Frequency < 3 Hz: 0.2 inches/second.
b. Frequency 3 - 10 Hz: 0.5 inches/second.
c. Frequency 10 - 40 Hz: varying linearly 0.5 to 1.0 inches/second.
d. Frequency > 40 Hz: 1.0 inches/second.

The above limits are adopted from modified blasting level criteria given in U.S. Bureau of Mines Recommendations RI-8507.

2. In the permanent concrete works, the peak particle velocities resulting from blasting shall not exceed 2 inches per second.

3. At the nearest structure liable to damage from air blast overpressure, the mean peak air blast overpressure shall not exceed 0.01 psi.

Measure readings for peak particle velocity in three orthogonal directions by equipment approved by the Engineer that is either continually recording or triggered by a preset level of vibration. Determine particle velocity in each frequency range by spectral analysis. Zero crossing method to determine frequency is not acceptable.

C. Blasting within 50 feet of permanent concrete work will be permitted only after approval of the Contractor's plans showing the relative positions of the concrete and the area to be blasted, and the blasting technique to be employed. All concrete work shall be protected by limiting the size of blasts, covering blasts and by other means until it is established that there is no danger of damage caused by either vibration or flying rock.

D. Exercise all possible care in drilling and blasting operations to ensure the stability of the remaining rock and to keep overbreak to a minimum. Controlled blasting techniques shall be used.

E. At each work site where blasting is being performed, erect signboards of adequate size stating that blasting operations are taking place in the work site and such signs shall be clearly visible at all points of access to the work site.

F. Monitor the first blast at each location as a test case, and modify the initial blast design for that location if the monitoring record indicates that the vibration and air blast overpressure limits were exceeded or may be exceeded in subsequent blasts. Resubmit the blast design to the Engineer. Continue vibration recording and air blast overpressure monitoring for every blast, and further adjustments to the blast design shall be made when the records indicate vibration or air blast overpressure in excess of the established limits.

G. Before the firing of any blast where flying material may result in damage to persons, property or the work, cover the rock to be blasted with a suitable matting to prevent flying debris. After a blast is fired, remove all loose and shattered rock or other loose material which may endanger the structure or the workers, and make the excavation safe before continuing with the work. Carry out similar checks on previously excavated sections at least every 48 hours and recheck the support system, tightening lagging and blocking, and adding rock dowels, mesh and other support measures as required. Before drilling new blast holes, thoroughly clean the face and examined the face for holes containing undetonated explosive.

H. In the event that damage occurs due to blasting work, suspend all blasting immediately and make a report to the Engineer. Before resuming blasting, adjust the blast design and resubmit it to the Engineer, and take any other appropriate measures to control the effects of blasting.

I. If blasting causes excessive overbreak or excessive fracturing of the surrounding rock, or is otherwise detrimental to the work, modify the blast design as necessary to achieve the desired result, and resubmit it to the Engineer.

+++ END OF SECTION 02020 +++

SECTION 02050
DEMOLITION

PART 1 - GENERAL

1.01 SCOPE:

A. The work covered under this Section includes furnishing all labor, equipment and material required to remove, handle, crush and dispose of all equipment, materials and piping as shown on the Drawings, directed by the Engineer or required for the completion of the Work, including all necessary excavation and backfilling.

B. Where structural tile and brick is removed from existing structures, the work shall include all patching and reconditioning to restore the remaining tile or brick to its existing state and to provide a proper joint for joining the existing to new construction.

C. Where concrete is cut from existing structures under this Section to permit setting or inserting pipes, flumes, equipment or appurtenances, the work shall include all reconcreting, dressing and finishing of openings to the required lines and dimensions or as necessary for the placing and fixing of inserts.

D. The work specified herein and shown on the Drawings is intended to give a general idea of the scope of this work but must not be construed as covering it entirely. The Contractor shall visit the site and judge the amount of work required and the problems anticipated in the performance of the work.

E. Requirements for removal of pavement and abandonment of site utilities is specified in Section 02200.

F. Many obstructions are not shown on the Drawings. Bidders are advised to carefully inspect the existing facilities before preparing the Bid Proposal. This Contract shall include removal and replacement of obstructions such as electrical conduits and wire.

1.02 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:

1. The Contractor shall submit to the Engineer, prior to beginning work, a schedule of demolition and detail methods to be used on each facility to be demolished.

2. The Contractor shall develop and submit a demolition plan which includes a demolition schedule comparable to a room finish schedule that covers:

a. Each building surface affected by demolition.
b. Proposed method and materials for demolition and patching.
c. Catalog cuts and samples of the materials to be used.

PART 2 - PRODUCTS

2.01 MATERIALS

A. The Contractor shall provide all materials and equipment in suitable and adequate quantity as required to accomplish the work shown, specified herein, and as required to complete the project.

B. All concrete, mortar, grout, and backfill used in patching, plugging or repairing shall comply in all respects with the applicable material requirements of these Specifications.

PART 3 - EXECUTION

3.01 GENERAL

A. Shutdown of Existing Operations and Utilities

1. The existing system is required to remain in service during construction of the new and modification of the existing facilities.

2. Total shutdown of the existing facilities to perform any new construction, to make the required structural or piping modifications, and, and/or to make or install the required electrical service or system modifications, will not be permitted and partial shutdown of the various existing facilities will be permitted as defined in Section Special Conditions.

3. Prior to making any piping or structural connections or modifications to existing facilities, obtain specified timing and schedule approval.

B. PROTECTION

1. Take care to prevent the spread of dust and flying particles. Sprinkle rubbish and debris with water to keep dust to a minimum.

2. Maintain adequate fire protection, including extinguisher and operative water-hose lines during demolition.

C. PERSONNEL: Perform work by personnel experienced in this type work and in such a manner as to eliminate hazards to persons and property without interference with new work and with use of adjacent areas, public rights-of-way, utilities and structures.

3.02 CONCRETE DEMOLITION

A. Remove concrete using hand-held equipment unless otherwise approved by the Engineer. All necessary precautions shall be taken during removal of concrete to prevent debris from falling and damaging adjacent piping, equipment, and facilities.

C. Where new concrete will be placed against a removal surface, preserve intact the existing reinforcing steel that would/will project into the new concrete. Allow the existing bars to project one lap length into the new concrete, or where this is not possible, weld new bars to the existing bars. Welds shall develop the full strength of the existing bars. Welding shall comply with ASTM A706.

D. Where specifically shown or where the surface will be exposed, the removal may be accomplished by saw cutting completely through the concrete. The concrete around any exposed reinforcing steel shall be chipped back and the exposed reinforcing steel cut a minimum of 1-½-inches back from the finished face of the concrete. The face of the new concrete surface shall be grouted to fill all the depressions at cut reinforcing and any other voids and to cover the exposed aggregate and shall be trowel finished. Non-shrink grout shall be used as directed by the Engineer. Except as otherwise noted or required, concrete pads and bases for equipment and supports which are on grade shall be removed to a depth 6 inches below finished grade or 6 inches below the bottom of any new slab to be placed over it.

E. Preserving Existing Reinforcing: Where holes or openings are to be cut in existing concrete, preserve intact existing steel reinforcing. Where existing reinforcing must be removed, and where directed by the Engineer, new bars of sufficient size shall be spliced in and around the objects to be inserted in the opening. Such shall be welded to the ends of existing bars. Welds shall be of such size and length as to develop the full strength of the existing bars.

3.03 MASONRY DEMOLITION

A. Existing masonry to be removed shall be broken by air hammer and chisel in such manner as to leave adjoining portions of the structure in an undisturbed condition. In removing existing masonry, special care shall be taken to cut it as closely as possible to the required shape and with no projection into the neat outside line of the new work. The surfaces of all concrete and masonry shall be sufficiently rough to bond well with the new work.

B. Contractor shall remove masonry within the limits of the opening or penetration to the nearest complete undamaged brick. Completed demolition of a masonry opening or penetration shall have no sawcut, chipped or otherwise damaged brick on its perimeter.

C. Before any new masonry is built on or against existing concrete or masonry, the latter shall be scrupulously freed from all dirt, gravel, boulders, ice, snow or other objectionable substances.

D. Existing reinforcement shall lap the reinforcement in the new masonry as shown on the Drawings or as directed by the Engineer.

3.05 PROTECTION OF WORK AND EXISTING FACILITY

A. Perform the work in a manner that will not damage parts of the structure, facility, or system not intended to be removed. If in the opinion of the Engineer, the method of demolition or cutting may endanger or damage parts of the structure(s) or affect the operation of the facilities, promptly change the method when so notified by the Engineer. Perform all cutting required regardless whether such cutting is specifically indicated. Examine the existing structures, evaluate conditions to be encountered in accomplishing the work, and accommodate such requirements accordingly in the Bid Proposal. No blasting will be permitted.

B. The Contractor shall exercise full care and shall use such methods and equipment during removal as will maintain the usefulness of the various materials and equipment removed.

C. Any damage done to structures or equipment during removal and any patching, plugging of holes or repairs necessitated because of removal of equipment and piping shall be repaired to the satisfaction of the Engineer and the cost thereof shall be included in the Contract Price.

3.06 DISPOSAL

A. Disposal: All rubble and waste material shall be removed from each work area in order to provide a clean area for plant operations. Such removal and cleanup is to be completed upon conclusion of daily work, outage period, or a specific work period. Removal of waste material from the work areas constitutes physical removal of the debris, rubble, or waste from the building proper or work site to a proper storage container or stockpile. If material is stockpiled for later disposal, the stockpile location shall be as approved by the Engineer. Should stockpiling not be approved an appropriate container may be used, or the Contractor may dispose of the material directly. If stockpiling is approved, disposal of stockpiled materials shall be accomplished at a frequency no less other than weekly. Waste containers shall be located as approved by the Engineer. Waste material is considered to be any item or material that is removed from an existing condition and is not intended for reinstallation or salvage to the City. The Contractor shall be fully responsible for proper disposal of waste materials in accordance with all federal, state and local laws at no additional cost to the City.

B. Contractor shall not dispose of any trash, material, equipment or litter into water reclamation center facilities or tanks. Contractor shall be responsible for any damage to any facilities, tanks or equipment which is damaged by any such foreign material.

3.08 REHABILITATION

A. Certain areas of existing structures, piping, conduits and the like may be affected by work necessary to complete the modifications. The Contractor is responsible to rehabilitate those areas affected by the construction activities.

+++ END OF SECTION 02050 +++

SECTION 02060
CRUSHED STONE AGGREGATE

PART 1 - GENERAL

1.01 SCOPE

A. This section includes installation of crushed stone aggregate; and any other similar, incidental or appurtenant operation which may be necessary to properly complete the Work.

B. The Contractor shall provide all services, labor, materials, and equipment required for all installation of crushed stone aggregate and related operations necessary or convenient to the Contractor for furnishing complete Work as shown on the Plans or specified in these Contract Documents.

1.02 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents.

1.03 QUALITY ASSURANCE

A. Reference Standards: The Contractor shall comply with the applicable provisions and recommendations of the latest editions of the following standards, except as otherwise shown on the Plans or specified in these specifications.

1. AASHTO M147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base, and Surface Courses.

2. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Hammer and a 457-mm (18-in) Drop.

3. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

4. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3)).

5. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soils Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3)).

6. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).

7. ASTM D4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Coarse aggregate shall be crushed stone per GDOT Standards, of solid composition, free from dirt and adherent coatings, and suited for the class of its intended usage.

B. Unless otherwise specified elsewhere in these Specifications or directed by the Engineer, gradation of coarse aggregate shall conform with size Number 467, Number 57, or Number 67 as described in ASTM C33.

C. The nominal maximum size of coarse aggregate used in concrete shall not be larger than one-fifth 1/5 of the narrowest dimension between sides of the forms, one-third 1/3 of the depth of slabs, or three-fourths ¾ of the minimum clear spacing between reinforcing bars as described in ACI 68-50.

D. Sand shall be clean and sharp, free from all deleterious substances, and shall conform to the requirements of ASTM C33.

PART 3 - EXECUTION

3.01 EXAMINATION

A. The Contractor shall verify that subgrade has been inspected and that gradients and elevations are correct and dry.

3.02 AGGREGATE PLACEMENT

A. The Contractor shall place coarse aggregates in areas shown on the Plans or directed by the Engineer.

B. The Contractor shall place and compact coarse aggregate in accordance with the requirements of Section 02315 - Excavation and Backfill for Structures.

C. The Contractor shall level and contour surfaces to elevations and gradients indicated on the Plans.

D. The Contractor shall add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.

E. The Contractor shall add water to assist compaction. If excess water is apparent, the Contractor shall remove aggregate and aerate to reduce moisture content.

F. The Contractor shall use mechanical vibrating tamping in areas inaccessible to compaction equipment.

3.03 TOLERANCES

A. Flatness: Maximum variation of 0.2 feet measured with a ten (10) foot straight edge.

B. Variation from True Elevation: Within 0.2 feet.

C. Base: Compacted to ninety-eight percent (98%) standard proctor density as determined by ASTM D-698.

+++END OF SECTION 02060+++

SECTION 02110
CLEARING AND GRUBBING

PART 1 - GENERAL

1.01 SCOPE

A. Work described in this Section includes furnishing all labor, materials, equipment, tools and incidentals required for all clearing and grubbing including, but not limited to, the removal from the Site of trees, stumps, roots, brush, structures, abandoned utilities, trash, debris and all other materials found on or near the surface of the ground in the construction area and understood by generally accepted engineering practice not to be suitable for construction of the type contemplated.

B. The extent of route clearing is that minimum degree of clearing necessary to carry out all construction activities including construction of appurtenances and other additional clearing needed for access purposes.

C. Clearing and grubbing operations shall be coordinated with temporary and permanent erosion control requirements.

D. Clearing operations include, but are not limited to, the following:

1. Protection of existing trees and other vegetation
2. Removal of trees and other vegetation
3. Clearing
4. Removing above-grade improvements
5. Removing underground improvements
6. Restoring damaged improvements
7. Protecting above-grade and underground improvements
8. Erosion control of disturbed areas

1.02 JOB CONDITIONS

A. Protection of Existing Improvements:

1. Provide barricades, coverings, or other types of protection necessary to prevent damage to existing improvements.
2.
2. Protect improvements on adjoining properties as well as those on the project site. Restore improvements damaged by this work to their original condition, as acceptable to the Engineer. Replace property line monuments (such as iron pins) removed or disturbed by clearing operations under the direction of a Land Surveyor licensed in the State of Georgia.

B. Protection of Existing Trees and Vegetation:

1. Protect existing trees and other vegetation to avoid cutting, breaking or skinning of roots, skinning and bruising of bark, smothering of trees by stockpiling construction materials or excavated materials within drip lines, foot or vehicular traffic, and parking of vehicles or equipment within drip line. Provide temporary fences, barricades or guards as required to protect trees and vegetation to be left standing.

2. Provide protection for tree roots over 1-1/2 inches diameter that are cut during any construction operation. Coat the cut faces with emulsified asphalt, or other acceptable coating, especially formulated for horticultural use on cut or damaged plant tissues. Temporarily cover all exposed roots of trees with wet burlap to prevent roots from drying out; provide earth cover as soon as possible.

3. Repair or replace damaged trees and vegetation resulting from any construction operation, in a manner acceptable to the Engineer. A qualified arborist approved by the engineer shall perform tree damage repair at no cost to the City. Replace damaged trees that cannot be repaired and restored to full-growth status, as determined by the Engineer.

PART 2 – PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 EXISTING TREES AND VEGETATION

A. Avoid cutting or injuring trees and vegetation outside easement line and outside areas to be cleared, Contractor shall be responsible for damages outside these lines.

3.02 CLEARING AND GRUBBING

A. Clearing operations shall begin no more than seven days before beginning construction work for any area.

B. Materials to be cleared, grubbed and removed from the project site include but are not limited to vegetation, trees, stumps, roots, lawns, shrubbery, gardens, paving, miscellaneous structures, debris, and abandoned utilities to the minimum practicable extent to complete the work. Limit clearing to a single lane work route without provision for construction vehicles to pass utility operation. Determine and stake limitations of construction easement or right-of-way prior to commencement of work and keep construction activity within such limits.

C. Grubbing shall consist of completely removing roots, stumps, trash and other debris from all areas to be graded so that topsoil is free of roots and debris. Topsoil is to be left sufficiently clean so that further picking and raking will not be required.

D. All stumps, roots, foundations and planking embedded in the ground shall be removed

and disposed of. Stumps and roots larger than 1 inch shall be grubbed and removed to a depth not less than 4 feet below grade. All holes or cavities which extend below the subgrade elevation of the proposed work shall be filled with crushed rock or other suitable material, compacted to the same density as the surrounding material. Piling and butts of utility poles shall be removed to a minimum depth of two feet below the limits of excavation for structures, trenches and roadways or two feet below finish grade, whichever is lower.

E. Landscaping features shall include, but are not necessarily limited to: fences, cultivated trees, cultivated shrubbery, property corners, man made improvements, subdivision and other signs shall be moved off the easement. The Contractor shall take extreme care in moving landscape features and shall reestablish these features as directed by the Engineer

F. Surface rocks and boulders shall be grubbed from the soil and removed from the site or used as fill in accordance with Section 02200, Earthwork.

G. Where the tree limbs interfere with utility wires, or where the trees to be felled are in close proximity to utility wires, the tree shall be taken down in sections to eliminate the possibility of damage to the utility.

H. Any work pertaining to utility poles shall comply with the requirements of the appropriate utility.

I. All fences adjoining any excavation or embankment that, in the Contractor's opinion, may be damaged or buried, shall be carefully removed, stored and replaced. Any fencing that is damaged shall be replaced with new fence material of equal or better quality and construction.

J. Stumps and roots shall be grubbed and removed to a depth not less than two feet below grade. All holes or cavities which extend below the subgrade elevation of the proposed work shall be filled with crushed rock or other suitable material, compacted to the same density as the surrounding material

K. Burying of residual materials and organics will not be allowed.

L. The Contractor shall utilize special precautions required for the protection and preservation of trees, cultivated shrubs, sod, fences, etc. situated within the construction area but not directly within excavation and/or fill limits. The Contractor shall be responsible for repair or replacement of any items damaged as a result of its operations.

M. Remove lawn sod by cutting into maximum size which can be handled without tearing, stripping sod and underlying topsoil, and stockpiling for use in restoring the surface area. Water sod and otherwise maintain sod in viable, growing condition. Alternative means of lawn sod replacement may be approved by the Engineer.

N. Remove above-grade structures only where shown on the Drawings or as authorized by the Engineer.

3.02 HOLES AND DEPRESSIONS

A. Fill holes, depressions and voids created or exposed by clearing operations with non-organic soil material approved by the Engineer, unless further excavation or earthwork is indicated.

B. Place fill material in horizontal layers not exceeding six inches loose-depth and compact to a 95 per-cent standard Proctor.

3.03 DISPOSAL OF WASTE MATERIALS

A. Disposal General Requirements: Dispose cleared matter daily so as to maintain site in a safe and neat condition throughout the contract period. Owners of the property may remove merchantable timber, buildings or other items from the work site before the Contractor begins operations, and no assurance exists that any such material will be on the work site when the Contractor begins work.

B. On-Site Disposal:

1. When authorized by the Engineer, cut tree trunks and limbs, over two inches in diameter, into 48-inch lengths and neatly stack within work limits on the same property as that on which the tree originally grew.

2. On undeveloped property, distribute brush, trees and limbs less than two inches in diameter, within the work area from which cut, as directed by the Engineer. On developed property, remove all such clearing waste and properly dispose of it off-site.

C. The debris resulting from the clearing and grubbing operation shall be hauled to a disposal site secured by the Contractor and shall be disposed of in accordance with all requirements of federal, state, county and municipal regulations. No debris of any kind shall be deposited in any stream or body of water, or in any street or alley. No debris shall be deposited upon any private property except with written consent of the property owner. In no case shall any material or debris be left on the project site, shoved onto abutting private properties, or buried on the project site.

+++ END OF SECTION 02110 +++

SECTION 02125

TEMPORARY AND PERMANENT EROSION AND SEDIMENTATION CONTROL

PART 1 GENERAL

1.01 SCOPE

A. Work under this section includes furnishing all labor, materials, equipment and incidentals required to install and maintain temporary and permanent erosion and sedimentation controls as shown on the Drawings and as specified herein. Work under this Section also includes the subsequent removal of temporary erosion and sedimentation controls at completion of the project.

B. Temporary and permanent erosion and sedimentation controls include mulching and grassing of disturbed areas and structural barriers at those locations which will ensure that erosion during construction will be maintained within acceptable limits. Acceptable limits are as established by the Georgia Environmental Protection Division (EPD) and applicable codes, ordinances, rules, regulations and laws of local and municipal authorities having jurisdiction.

C. The temporary and permanent erosion and sedimentation control measures shown on the Drawings are minimum requirements. The Contractor shall notify the City's Authorized Representative of any changes and/or additions to the erosion and sedimentation control measures necessary to accommodate the Contractor's means and methods of operation. Any additional erosion and sedimentation control measures required by the Contractor's means and methods of operation will be installed by the Contractor at no additional cost to the City.

D. The Contractor shall be solely responsible for the control of erosion and sediment production within the Project area. The Contractor shall install controls that will ensure that storm water and drainage from the disturbed area of the Project site will be filtered or otherwise managed to minimize impacts on receiving waters and/or existing storm drains. Discharged waters shall be free of soil particles and shall meet all applicable permit turbidity requirements.

1.2 RELATED WORK

A. Section 01300 Submittal Procedures

B. Section 02200 Earthwork

C. Section 02207 Aggregate Materials

D. Section 02222 Excavation

E. Section 02270 Vegetative Erosion Control and Bank Stabilization

F. Section 02273 Riprap

G. Section 03300 Cast-In-Place Concrete

1.3 SUBMITTALS

Submittals shall be made in accordance with the requirements of Section 01300 Submittal Procedures.

1.4 QUALITY CONTROL

A. The Contractor shall designate a worksite erosion control supervisor. The supervisor shall have the responsibility and authority to coordinate all equipment, personnel and materials needed to maintain project site erosion and sediment control in accordance with the management practices and standards established in the Manual for Erosion and Sediment Control in Georgia and the Drawings and Specifications.

B. Within fifteen (15) days after receipt of the Notice to Proceed, the Contractor shall submit the name and contact data for the designated erosion control supervisor. The supervisor shall be an individual with an active minimum Level 1 certification as issued by the Georgia Soil and Water Conservation Commission.

PART 2 PRODUCTS

2.01 MATERIALS

A. Silt fence shall be as detailed on the Drawings and shall meet the requirements of the latest version of the Georgia Soil and Water Commission Manual for Erosion and Sediment Control.

B. Hay bales shall be clean, seed-free cereal hay type, rectangular in shape.

C. Woven wire fence backing shall be galvanized steel chicken-wire with maximum ½-inch mesh.

D. Filter stone shall be crushed rock conforming to Georgia Department of Transportation Table 800.01, Size Number 57.

E. Concrete block shall be hollow, non-loadbearing type.

F. Concrete shall be 3000 psi minimum in accordance with Section 03300 Cast-in-Place Concrete.

G. Plywood shall be ¾-inch thick exterior type.

H. Rip Rap shall be in accordance with Section 02273 Riprap.

I. Filter fabric for use under riprap shall be in accordance with Section 02273 Riprap.

2.04 CONSTRUCTION EXIT STONE

Stone shall be sound, tough, durable stone resistant to the action of air and water. Slabby or shaley pieces will not be acceptable. Aggregate size shall be in accordance with the National Stone Association Size R-2 (1.5 to 3.5-inch stone) or Type 3 Riprap as specified in Section 02273, Riprap.

2.05 GRASS

See Section 02270 Vegetative Erosion Control and Bank Stabilization for detailed specifications on grassing.

2.06 WATER

A. Water shall be free of excess and harmful chemicals, organisms and substances which may be harmful to plant growth or obnoxious to traffic. Salt or brackish water shall not be used.

B. Refer to Section 01040 for requirements related to utilization of water for construction purposes.

C. Provide all necessary temporary piping, meters, and fittings, and upon completion of the Work, remove all temporary piping, meters, and fittings.

2.07 EROSION CONTROL FABRIC

A. Erosion control fabric shall be Futerra Erosion Control Blanket manufactured by Profile Products LLC, or equal.

B. Fabric shall be a non-woven erosion control/vegetation blanket comprised of wood fiber and crimped, interlocking synthetic fibers laminated by an accelerated photodegradable polypropylene netting.

C. Fabric shall be 100% bio- or photo-degradable within 10 months of installation.

PART 3 EXECUTION

3.01 GENERAL

A. Basic Principles:

1. Conduct the earthwork and excavation activities in such a manner to fit the topography, soil type and condition.
2. Minimize the disturbed area and the duration of exposure to erosion elements.
3. Stabilize disturbed areas within 13 days of completed work.
4. Safely convey run-off from the site to a stable outlet.
5. Retain sediment on site that is generated on site.
6. Minimize encroachment upon watercourses.

B. Temporary Erosion and Sedimentation Control: Temporary erosion and sedimentation control procedures shall be directed toward:

1. Preventing soil erosion at the source.
2. Preventing silt and sediment from entering any waterway if soil erosion cannot be prevented.
3. Preventing silt and sediment from migrating downstream in the event it cannot be prevented from entering the waterway.

C. Permanent Erosion Control: Permanent erosion control measures shall be implemented to prevent sedimentation of waterways and to prevent erosion of the Project site.

3.02 SEDIMENTATION AND EROSION CONTROL MEASURES

A. Temporary and permanent erosion and sedimentation control measures shall prevent erosion and prevent sediment from exiting the site. If, in the opinion of the City's Authorized Representative, the Contractor's temporary erosion and sedimentation control measures are inadequate, the Contractor shall provide additional maintenance for existing measures or additional devices to control erosion and sedimentation on the site at no additional cost to the Owner.

B. All erosion and sedimentation control devices and structures shall be inspected by the Contractor daily and immediately prior to and after each rainfall occurrence. Any device or structure found to be damaged shall be repaired or replaced by the end of the day. Sediment ponds shall be cleaned out prior to the silt reaching the height or elevation shown on the Drawings. The Contractor shall copy the Owner on the daily reports.

C. All erosion and sedimentation control measures and devices shall be constructed and installed as shown on the Drawings or specified herein and maintained until adequate permanent disturbed area stabilization has been provided or permanent pavement has been installed and accepted by the City's Authorized Representative. After adequate permanent stabilization has been provided or permanent pavement has been installed and accepted by the City's Authorized Representative, all temporary erosion and sedimentation control structures and devices shall be removed.

3.03 SEDIMENT CONTROL

A. Construction Exit:

1. Construction exit(s) shall be placed as shown on the Drawings and as directed by the City's Authorized Representative. A construction exit shall be located at any point traffic will be leaving a disturbed area to a public right-of-way, street, alley, sidewalk or parking area.
2. Placement of Construction Exit Material: The ground surface upon which the construction exit material is to be placed shall be prepared to a smooth condition free from obstructions, depressions or debris. The plastic filter fabric shall be placed to provide a minimum number of overlaps and a minimum width of one foot of overlap at each joint. The stone shall be placed with its top elevation conforming to the surrounding roadway elevations. The stone shall be dropped no more than three feet during construction.
3. Construction Exit Maintenance: The Contractor shall regularly maintain the exit with the top dressing of stone to prevent tracking or flow of soil onto public rights-of-way and paved surfaces as directed by the City's Authorized Representative.
4. Construction Exit Removal: Construction exit(s) shall be removed and properly disposed of when the disturbed area has been properly stabilized, the tracking or flow of soil onto public right-of-way or paved surfaces has ceased and as directed by the City's Authorized Representative.

B. Sediment Barriers:

1. Sediment barriers shall include, but are not necessarily limited to, silt fences, hay bales, rock check dams and inlet sediment traps and any device which prevents sediment from exiting the disturbed area.
2. Silt fences, hay bales and rock check dams shall not be used in any flowing stream, creek or river.
3. Sediment barriers shall be installed as shown on the Drawings and as directed by the City's Authorized Representative.
4. Sediment barriers shall be maintained to ensure the depth of impounded sediment is no more than one half of the original height of the barrier or as directed by the City's Authorized Representative. Torn, damaged, destroyed or washed out barriers shall be repaired, reinforced or replaced with new material and installed as shown on the Drawings and as directed by the City's Authorized Representative.
5. Sediment Barrier Removal:
   a. Sediment barrier shall be removed once the disturbed area has been stabilized with a permanent vegetative cover or permanent pavement has been installed and the sediment barrier is no longer required as directed by the City's Authorized Representative.
   b. Accumulated sediment shall be removed from the barrier and removed from

the site.

c. All non-biodegradable parts of the barrier shall be disposed of properly. Hay bales may be spread evenly across disturbed areas as mulching material.

d. Disturbed areas created by barrier removal shall be permanently stabilized.

3.04 EROSION CONTROL

A. Grassing:

1. Grassing shall be as specified in paragraph 3.05 of this Section
2. Temporary Stabilization: Temporary stabilization shall be provided as shown on the Drawings and conforming to these Specifications to control erosion on the site. Temporary stabilization shall be provided to any area which will not receive permanent stabilization within the next 14 calendar days. Partial payment requests may be withheld for those portions of the Project not complying with this requirement.
3. Permanent Stabilization
   a. Permanent stabilization shall be provided as shown on the Drawings and conforming to these Specifications to control erosion on the site. Permanent stabilization shall be provided to all areas of land disturbance within seven calendar days of the completion of land disturbance for any area greater than 0.25 acre. Partial payment requests may be withheld for those portions of the Project not complying with this requirement.
   b. Grass or sod removed or damaged in residential areas shall be replanted with the same variety within seven calendar days of the completion of work in any area.
   c. Where permanent stabilization cannot be immediately established because of an inappropriate season, the Contractor shall provide temporary stabilization. The Contractor shall return to the site at the appropriate season to provide permanent stabilization in areas that received only temporary stabilization.

B. Erosion Control Blanket:

1. Erosion control blankets shall be applied to sloped areas as indicated on the Drawings and where in excess of 2 to 1 slope. Blankets shall be laid on finished grades that have been seeded, insuring good contact with the soil. Soil surface shall be smooth and free of rocks, roots, debris and other obstructions.
2. Secure blankets with biodegradable staples or stakes at the top of slopes in a 6-inch deep x 6-inch wide anchoring trench. Secure blankets with staples or stakes per the manufacturer's recommendations, increasing the spacing at overlapping edges. Blankets shall be overlapped by a minimum of 8-inches. Provide a 6-inch deep x 6-inch wide anchoring trench at the toe of the slope or shoreline.

3.05 GRASSING

A. General:

1. Refer to Section 02270 Vegetative Erosion Control and Bank Stabilization for detailed specifications on permanent seeding.
2. When final grade has been established, all bare soil, unless otherwise required by the Contract Documents, shall be seeded, fertilized and mulched in an effort to restore to a protected condition.
3. Specified permanent grassing shall be performed at the first appropriate season following establishment of final grading in each section of the site.
4. All references to grassing, unless noted otherwise, shall relate to establishing permanent vegetative cover as specified herein for seeding, fertilizing, mulching, etc.
5. Permanent grassing shall be of a perennial species.

B. Grassing activities shall comply with Section 02270 Vegetative Erosion Control and Bank Stabilization and the Georgia Soil and Water Commission Manual for Erosion and Sediment Control, 2016 Edition, specifically for the selection of species, planting dates and application rates for seeding, fertilizer and mulching. Where permanent vegetative cover cannot be immediately established due to season or other circumstances, the Contractor shall provide temporary vegetative or mulch cover.

3.06 CLEAN-UP

Remove and dispose of all excess erosion and sedimentation control devices and materials when no longer needed or at the completion of construction as directed by the City's Authorized Representative.

++++END OF SECTION++++

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SECTION 02150
SHEETING, SHORING AND BRACING

PART I GENERAL

1.01 SCOPE

A. This section specifies requirements for sheeting, shoring, and bracing of trenches and excavations greater than five (5) feet in depth. Where shoring, sheeting, bracing or other supports are necessary, they shall be furnished, placed, maintained, and except as specified otherwise, removed by the Contractor.

B. Design Requirements:

1. The design, planning, installation and removal, if required, of all sheeting, shoring, lagging, and bracing shall be accomplished in such a manner as to maintain the required excavation or trench section and to maintain the undisturbed state of the soils below and adjacent to the excavation.

2. The Contractor shall design sheeting, shoring, and bracing in accordance with the OSHA Safety and Health Standards as well as state and local requirements.

3. Horizontal strutting below the barrel of a pipe and the use of pipe as support are not acceptable.

4. When the construction sequence of structures requires the transfer of bracing to the completed portions of any new structure or to any existing structure, the Contractor shall perform a complete design analysis of the expected impact of that bracing on the structure. This action shall in no way absolve the Contractor of responsibility of damage resulting from said bracing.

1.02 REFERENCES

This section contains references to the following documents. They are a part of this section as specified and modified. In case of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.

Reference	Title
OSHA 2207	OSHA Safety and Health Standards, Revised 1987

1.03 SUBMITTALS

A. Prior to starting any excavation work requiring sheeting, shoring, and bracing, the Contractor shall prepare plans for trench and excavation support systems. No provisions of the above requirements shall be construed as relieving the Contractor of his overall responsibility and liability for the work.

B. The Contractor shall submit a Certification of Compliance properly identified with the project name and project location to the City DWM. The Certification shall state that the sheeting, shoring and bracing have been designed in accordance with the prevailing codes and standards by a Professional Engineer registered in the State of Georgia with the Engineer's seal and signature appearing on the certification. Calculations shall not be submitted unless specifically requested by the City DWM.

PART 2 PRODUCTS

(NOT USED)

PART 3 EXECUTION

3.01 GENERAL

A. The construction of sheeting, shoring and bracing shall not disturb the state of soil adjacent to the trench and below the excavation bottom.

B. Trench sheeting below the top of a pipe shall be left in place.

C. Excavation shall not be started until the design for support systems has been accepted by the Engineer.

+ + + END OF SECTION 02150 + + +

SECTION 02200
EARTHWORK

PART 1 – GENERAL

1.01 SCOPE

A. The work under this Section includes earthwork and related operations, including, but not limited to; excavating all classes of material encountered; trenching; handling; storage; transportation; and disposal of all excavated and unsuitable material; construction of fills and embankments; backfilling around structures; backfilling all pits; compacting; all sheeting; shoring and bracing; preparation of subgrades; surfacing and grading; and any other similar, incidental, or appurtenant earthwork operation which may be necessary to properly complete the Work.

B. The Contractor shall provide all services, labor, materials, and equipment required for all earthwork and related operations necessary or convenient to the Contractor for furnishing complete Work as shown on the Drawings or specified in these Contract Documents.

1.02 GENERAL

A. Safety: Comply with local regulations and with provisions of the "Manual of Accident Prevention in Construction" of the Associated General Contractors of America, Inc. Occupational Safety and Health Act (OSHA) and all other applicable safety regulations.

B. The elevations shown on the Drawings as existing are taken from the best available data and are intended to give reasonable information about the existing elevations. The Contractor shall verify conditions to determine the exact quantities of excavation and fill required.

C. Earthwork operations shall be performed in a safe and proper manner with appropriate precautions being taken against all hazards.

D. All excavated and filled areas for structures, trenches, fills, topsoil areas, embankments and channels shall be maintained by the Contractor in good condition at all times until final acceptance by the City. All damage caused by erosion or other construction operations shall be repaired by the Contractor using material of the same type as the damaged material at no cost to the City.

E. The Contractor shall control grading in a manner to prevent water running into excavations. Obstruction of surface drainage shall be avoided and means shall be provided whereby storm water can flow uninterrupted in existing open ditches or channels; other surface drains; or temporary drains.

F. No classification of excavated materials will be made, except for rock excavation. Excavation work shall include the removal and subsequent handling of all materials excavated or otherwise removed in performance of the Work, regardless of the type, character, composition or condition thereof.

G. The soil testing will be performed by the Contractor's testing laboratory. As a minimum at least one density test shall be performed for every 5,000 square feet of fill area and every two feet of fill lift.

H. Should the Owner choose to conduct its own testing, the Contractor shall make all necessary excavations and shall supply any samples of materials necessary for conducting compaction and density tests. The cost of all retests made necessary by the failure of materials supplied by the Contractor, his agents or subcontractors, to conform to the requirements of these Contract Documents shall be paid by the Contractor. Contractor shall provide at least 24 hours advance notice of earthwork operations to the Testing Laboratory. Testing Laboratory shall provide reports to the Engineer with copies to the Contractor certifying (and sealed by a Registered Georgia Engineer) that the earthwork is in conformance with the plans and specifications. The Testing laboratory shall witness the placement of all fill, unless otherwise directed by the Engineer.

I. All earthwork operations shall comply with the requirements of OSHA Construction Standards, Part 1926, Subpart P, Excavations, Trenching, and Shoring, and Subpart O, Motor Vehicles, Mechanized Equipment, and Marine Operations, and shall be conducted in a manner acceptable to the Engineer.

J. Stockpile Areas: Provided there is space available, stockpiling material may be on site.

1.03 SUBMITTALS

Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:

A. Copies of permits obtained by the Contractor for the work.

B. Test results, certification of compliance, source and samples of all imported materials.

C. Samples of fill materials to be used. Samples shall be submitted 2 weeks in advance of use and shall consist of 0.5 cubic feet of each type of material.

D. Test reports for compaction.

1.04 QUALITY ASSURANCE

Reference Standards. Comply with all Federal, State and local laws or ordinances, as well as all applicable codes, standards, regulations and/or regulatory agency requirements including the partial listing below:

A. ASTM C136, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.

B. ASTM D1556, Test Method for Density of Soils in Place by the Sand Cone Method.

C. ASTM D1557, Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb (4.5-kg) Rammer and 18-in. (457-mm Drop).

D. ASTM D3107, Test Method for Moisture Content of Soil and Soil Aggregate in Place by Nuclear Methods (Shallow Depth).

PART 2 – PRODUCTS

2.01 MATERIALS

A. Earthwork Materials

1. Controlled Fill:

a. Proposed fill soils shall be laboratory tested prior to construction use to determine their suitability. All fill material shall be subject to the approval of the Engineer.

b. Notification: For approval of imported fill material, notify the Engineer and Testing Laboratory at least three (3) weeks in advance of intention to import material, designate the proposed borrow area, and permit the Testing Laboratory to sample as necessary from the borrow area for the purpose of making acceptance tests to prove the quality of the material. Test results shall be submitted to the Engineer for approval. All fill shall be free of organic matter or debris, have a low to moderate plasticity, (PI$\leq$15) uniform composition, and be free of rock fragments greater than three inches in dimension. Soils selected for use as fill material shall also have a standard Proctor (ASTM D 698) maximum dry density of at least 90 pounds per cubic foot.

c. All on-site fill material shall be soil exclusive of organic matter, frozen lumps or other deleterious substances.

d. It shall contain no rocks or earth clumps over 3-inches maximum in dimension.

2. Structural Fill and Structural Backfill:

a. Select on site materials may be suitable. Testing and recommendation of suitability shall be made by the Testing Laboratory and submitted by the Contractor to the Engineer for approval.

b. Imported material shall be sand, uniformly graded crushed rock or other select material recommended by the Testing Laboratory and submitted by the Contractor to the Engineer for approval. Graded aggregate base material as specified in Section 02705, Removing and Replacing Pavement, is acceptable for structural fill and backfill.

c. Crushed Rock: Crushed rock used for bedding and drainage stone shall conform to the Georgia Department of Transportation Standard Specifications for construction of Road and Bridges, Section 800 for No. 57 Stone.

3. Coarse Aggregate: Coarse aggregate shall conform to the Georgia Department of Transportation Standard Specifications of Transportation Systems construction of Road and Bridges, Section 800 for No. 57 Stone, Group II, and shall have the following gradation:

Sieve size	Percent Passing	
1-½ inch	100	-
1 inch	95	100
¾ inch	-	-
½ inch	25	60
3/8 inch	-	-
#4	0	10
#8	0	5

4. Top Soil: Dark organic weed free loam.

B. Sheeting, Bracing and Timbering: The Contractor shall furnish, place and maintain all sheeting, bracing and timbering required to properly support trenches and other excavations in open cut and to prevent all movement of the soil, pavement, structures, or utilities outside of the trench or pit.

1. General:

a. All cofferdams, sheeting, bracing and timbering shall be designed, sealed and signed by a registered Professional Engineer in the State of Georgia at the Contractor's expense. A copy of the drawings and design computations shall be submitted to the Engineer for the project files.

b. Sheeting, bracing and timbering shall be so placed as to allow the Work to be constructed to the lines and grades shown on the Drawings.

c. If at any time the method being used by the Contractor for supporting any material or structure in or adjacent to any excavation is not reasonably safe the Engineer may require and the Contractor shall provide additional bracing and support necessary to furnish the added degree of safety. The Contractor shall provide such added bracing and support by such method as Contractor may elect to use, but the taking of such added precautions shall in no way relieve the Contractor of sole and final responsibility for the safety of lives, work and structures.

d. All sheeting and shoring in contact with the concrete or masonry shall remain in place. The sheeting or shoring above the structure may remain in place or be cut off. No sheeting shall be left in place within three feet below the ground surface.

e. There shall be no payment for sheeting, bracing, and timbering left in place.

2. Timber:

   a. Timber may be substituted for steel sheet piling when approved by the Engineer. Timber for shoring, sheeting or bracing shall be sound and free of large or loose knots and in good condition. Size and spacing shall be in accordance with OSHA regulations.

   b. Remove bracing and sheeting in units when backfill reaches the point necessary to protect the work and adjacent property. Leave sheeting in place when it cannot be safely removed. Cut off sheeting left in place below the finished ground surface by three feet.

3. Steel Sheet Piling:

   Steel sheet piling shall be the continuous interlock type. The weight, depth and section modulus of the sheet piling shall be sufficient to restrain the loads of earth pressure and surcharge from existing foundations. Procedure for installation and bracing shall be so scheduled and coordinated with the removal of the earth that the ground under existing structures shall be protected against lateral or vertical movement at all times. In addition to the drawings and computations, the Contractor shall provide closure and sealing details between sheet piling and existing facilities, as well as method of excavation within sheet piling to the Engineer for review before commencing with construction operations. The contractor shall be responsible for all damage to existing utilities and structures resulting from installation of sheet piling. Damage to existing utilities and/or structures resulting from installation of sheet piling shall be repaired at the Contractor's expense.

C. Other Materials: All other materials not specifically described, but required for proper completion of the work of this Section, shall be as selected by the Contractor subject to the prior approval of the Engineer.

D. Stockpile area: The stockpile area shown on the drawings, or as directed by the Engineer, shall be used to stockpile soil material for backfilling around structures and to stockpile needed topsoil.

PART 3 – EXECUTION

3.01 GENERAL

A. Benching of Slopes: When the embankment is to be placed and compacted on hillsides, or when new embankment is to be compacted against existing embankments, or when the embankment is to be built ½ width at a time, the slopes that are steeper than 4:1 as measured at right angles to the embankment shall be continuously benched over those areas as the work is brought up in layers. Benching shall be of sufficient width to permit the operation of placing and compacting equipment. Each successive cut shall begin at the intersection of the original ground and the vertical side of the previous cut. Material thus cut shall be

recompacted along with the new embankment material. Proof roll subgrade prior to placement of fill material.

B. Topsoil:

1. Remove all topsoil to a depth at which subsoil is encountered, from all areas, which are to be cut to lower grades or filled.

2. Topsoil to be used for finish grading may be stored on the site. It shall be piled properly, sloped to drain and covered.

C. Bracing and Sheeting:

1. Furnish, install, and maintain all sheeting, bracing, and shoring as may be required to properly support the sides of all excavations and to prevent all movement of earth, which could in any way injure the work, adjacent property, or workmen.

2. Properly support all trenches for duct bank installation so as to conform to all pertinent rules and regulations and these Specifications. All trenches deeper than 5 feet shall be shored unless cut to the angle of repose of the excavated soils.

3. Exercise care in the removal of sheeting, shoring, bracing and timbering to prevent collapse or caving of the excavation faces being supported and damage to the work and adjacent property.

4. Do not leave any sheeting or bracing in the trench or excavation after completion of the work, unless approved or instructed by the Engineer. The cost of removing sheeting or bracing shall be at the Contractor's expense.

5. All sheeting and shoring in contact with concrete or masonry shall remain in place. The sheeting and shoring above the structure may remain or be cut off. No sheeting or shoring left in place shall be within three feet below the ground surface.

D. Obstructions:

1. Remove and dispose of all trees, stumps, roots, boulders, pavement, pipes and the like, as required for the performance of the work.

2. Exercise care in excavating around catch basins, inlets, manholes, piping, duct banks, underground vaults, etc.

3. Avoid removing or loosening castings or pushing dirt into structures.

4. Damaged or displaced castings shall be repaired and replaced, and dirt entering the structures during the performance of the work shall be removed at no additional cost to the City.

E. Utilities to be Abandoned:

1. When pipes, conduits, sewers or other structures are removed from the trench leaving dead ends in the ground, such ends shall be fully plugged and sealed as indicated on the Drawings.

2. Abandoned structures such as manholes, catch basins or chambers shall be entirely removed unless otherwise specified or indicated on the Drawings.

3. All materials from abandoned utilities which can be readily salvaged shall be removed from the excavation and stored on the site at a location as directed by the Engineer.

4. All salvageable materials will remain the property of the City unless otherwise indicated by the Engineer.

F. Extra Earth Excavation:

In case soft material, which, in the opinion of the Engineer is not suitable, is encountered in the bottom of a trench or underneath a structure, the soft material shall be removed and replaced with structural fill or coarse aggregate.

G. Cutting Paved Surfaces and Similar Improvements:

1. Remove existing pavement as necessary for installing utilities and appurtenances or as otherwise shown on the Drawings.

2. Before removing any pavement, mark the pavement neatly, paralleling pipe lines and existing street lines. Space the marks to match the width of the trench.

3. Sawcut the asphalt pavement along the marks before breaking away from the part of pavement that should remain.

4. Do not pull pavement with machines until completely broken and separated from pavement to remain.

5. Do not disturb or damage the adjacent pavement. If the adjacent pavement is disturbed or damaged, remove and replace the damaged pavement. Refer to Section 02705 for replacement of damaged or removed pavement.

   NOTE: No additional payment will be made for removing and replacing damaged adjacent pavement.

6. Remove and replace sidewalks disturbed by construction for their full width and to the nearest undisturbed joint.

7. The Contractor may tunnel under curbs that are encountered. Remove and replace any curb disturbed by construction to the nearest undisturbed joint.

H. Dewatering:

1. The proposed dewatering plan shall be submitted by the Contractor to the Engineer for approval at least ten (10) working days prior to the beginning of any excavation.

2. Furnish, install, maintain and operate necessary pumping and other equipment for dewatering the various parts of the Work and for maintaining the foundation and other parts free from water as required for constructing each part of the Work.

3. By the use of well points, pumps, tile drains or other approved methods, the Contractor shall prevent the accumulation of water in excavated areas. Should water accumulate, it shall be promptly removed.

4. Excavations shall be continuously dewatered to maintain a ground water level no higher than 3 feet below the lowest point in the excavation.

5. Piezometric observation wells shall be required, to monitor the ground water level, to insure proper dewatering prior to excavation below the static water table. The number of wells required will vary depending on the size and depth of structures and shall be included in the plan.

6. The cost for all dewatering and discharge shall be at the Contractor's expense and shall be considered incidental.

3.02 EXCAVATION

A. Method:

1. All excavation shall be by open cut from the surface except as indicated on the Drawings.

2. All excavations for appurtenances and structures shall be made in such manner and to such depth and width as will give ample room for building the structures and for bracing, sheeting, and supporting the sides of the excavation, for pumping and draining groundwater and wastewater which may be encountered, and for the removal from the trench of all materials excavated.

3. Water shall not be allowed to accumulate in excavations. Contractor shall provide sufficient temporary pumping to assure that surface and ground waters do not saturate foundation soils.

4. Take special care so that soil below the bottom of the structure to be built is left undisturbed.

B. Grades:

1. Excavate to lines and grades indicated on the Drawings.

2. Where excavation grades are not indicated on the Drawings, excavate as required to accommodate installation.

C. Disposal of Excavated Material:

1. Remove and legally dispose of all excavated material not needed to complete filling, backfilling, and grading.

2. Dispose of excess excavated material at locations secured by the Contractor and in accordance with all requirements of federal, state, county and municipal regulations. No debris of any kind shall be deposited in any stream or body of water, or on any street or alley. No debris shall be deposited on any private property except by written consent of the property owner. In no case shall any material be left on the Project site, or be buried in embankments or trenches on the Project site. With recommendation of the Testing Laboratory and approval by the Engineer, demolished, crushed concrete may be acceptable for use in fill areas.

3. Excavated materials shall be placed adjacent to the work to be used for backfilling as required.

4. Excavated materials shall be placed sufficiently back from the edge of the excavation to prevent caving of the trench wall, to permit safe access along the trench and to not cause any drainage problem. Excavated material shall be placed so as to not damage existing landscape or man-made improvements. Surcharging of any bank is not allowed.

D. Rock Excavation:

1. Rock excavation shall mean rock requiring drilling and blasting that occupies an original volume of at least one (1) cubic yard. Rock shall be considered as material which cannot be removed with a crawler tractor equal to a D-8 Caterpillar, equipped with a single-tooth ripper or by an excavator trackhoe equal to a Caterpillar 225 rated with a ¾ cubic yard capacity with a bucket curling pullout capacity of 25,000 pounds.

2. Where rock is encountered within the excavation for structures, it shall be excavated to the lines and grades indicated on the Drawings or as otherwise directed by the Engineer. The Contractor shall be responsible for obtaining any blasting permits required.

3. If excess excavation is made or the material becomes disturbed so as to require removal below final subgrade elevations or beyond the prescribed limits, the resulting space shall be refilled with Class B concrete in accordance with Section 03300, Cast-in-Place Concrete.

3.03 EXCAVATING FOR STRUCTURES

A. Excavation:

1. All excavation is unclassified and shall be included in the Contractor's Base Bid.

2. Excavation shall include all substances to be excavated. Excavation for structures shall be to limits not less than 2 feet outside wall lines, to allow for formwork and inspection.

3. Where rock excavation is carried below grade the Contractor shall backfill to grade using concrete or structural fill.

4. Where unsuitable material is encountered excavate material to a depth acceptable to the Engineer and fill with compacted structural fill as required.

B. Excavation for Foundations: Footings and slabs on grades shall rest on undisturbed earth, rock or compacted materials to insure proper bearing.

1. Unsuitable Foundation Material

a. Any material in the opinion of the Engineer which is unsuitable for the foundation shall be removed and replaced with coarse aggregate or structural fill material as directed by the Engineer.

b. No determination of unsuitability will be made until all requirements for dewatering are satisfactorily met.

2. Foundation in Rock: Foundations for a structure shall be on similar materials. Should excavation for a foundation be partially in rock, the Contractor shall undercut that portion of the rock 12-inches and bring the excavation to grade with compacted crushed stone.

C. Construction Observations:

All excavations should be examined by the Engineer prior to reinforcing steel placement to verify that the design bearing pressure is available. All excavations should be clean, level and free of ponded water, mud and loose, frozen or water-softened soils. If it is necessary for an excavation to remain open overnight, or if rain is imminent, a 3-to 4-inch thick "mud mat" of Class B concrete may be placed in the bottom of the excavation to protect the bearing soils until reinforcing steel and concrete can be placed.

D. Unsuitable Bearing:

If unsuitable bearing for foundations is encountered at the elevations indicated on the Drawings, the Engineer shall be notified immediately.

3.04 EXCAVATION BELOW GRADE AND REFILL

If the bottom of any excavation is taken out below the limits shown on the Drawings or specified, it shall be refilled to the bottom grade, at the Contractor's expense, except where rock or unsuitable soil is encountered. The refill shall be 6-inch layers of structural fill or other material satisfactory to the Engineer. The type of material to be used shall be the Engineer's option.

3.05 BACKFILL AND FILL PLACEMENT

A. Compaction of fill shall be accomplished by placing the fill material in horizontal lifts of eight-inches (8") maximum loose thickness and mechanically compacting each lift to at least the specified dry density.

B. All fill placement shall be witnessed by an experienced soils technician of the Testing Laboratory and fill density and moisture tests for each lift shall be performed to verify that the specified degree of compaction is being achieved.

C. Prior to placement of any material in embankments, the area within embankment limits shall be stripped of topsoil and all unsuitable materials removed as described under Excavation. Area to receive fill shall then be scarified to a depth of at least 6-inches.

D. The fill shall be brought to the proposed elevation by placing and compacting only approved fill materials upon a subgrade approved by the Engineer.

E. Fill materials shall be placed in continuous approximately horizontal layers extending the full width of the embankment cross-section and the full dimension of the excavation where practicable.

F. The fill shall be placed at a moisture content that corresponds to a +/- 3% of the optimum moisture content, as determined by the standard Proctor moisture-density relationship test.

G. Compaction:

1. The fill shall be uniformly compacted to a dry density that corresponds to at least 95% of the standard Proctor maximum dry density (ASTM D 698) of the fill soil.

2. The upper twelve-inches (12") of fill beneath the structures and pavement areas shall be compacted to 98% of the standard Proctor maximum dry density.

3. Scarification and recompacting of the upper fill soils immediately prior to the slab-on-grade and/or pavement construction shall be required.

4. Compaction of embankments shall be by sheepsfoot rollers with staggered uniformly spaced knobs and suitable cleaning devices. The projected area of each knob and the number and spacing of the knobs shall be such that the total weight of the roller and ballast when distributed over the area of one (1) row of knobs shall be 250 psi. Placement and compaction of materials shall extend beyond the final contours sufficiently to insure compaction of the material at the resulting final surface. Final contours shall then be achieved by a tracked bulldozer or grader shaping the face of the embankment.

5. The backfill placement in trenches and behind structures shall be uniformly compacted to a dry density that corresponds to at least 95% of the standard Proctor maximum dry density (ASTM D 698) of the fill soil. In confined areas requiring portable compaction equipment the fill material shall be placed in horizontal lifts of four-inches (4") maximum loose thickness.

6. If tests indicate that density of backfill fill is less than that specified, the area shall be either be recompacted or undercut, filled, and compacted until specified density is achieved.

H. Final Grading: Upon completion of construction operations, the area shall be graded to finish contour elevations and grades shown on the Drawings. Graded areas shall be made to blend with remaining ground surfaces. All surfaces shall be left smooth and free to drain.

I. Moisture:

1. If fill material is too wet, provide and operate approved means to assist the drying of the fill until suitable for compaction.

2. If fill material is too dry, provide and operate approved means to add moisture to the fill layers.

J. Proofrolling:

1. All areas where pavement or structures are to be built on compacted fill and other areas where indicated on the Drawing, shall be proofrolled to detect soft spots prior to the placement of fill material or construction of foundations.

2. Proofrolling shall consist of the moving a 20-30 ton loaded dump truck or pneumatic tire roller over the subgrade after the subgrade is shaped. Proofrolling shall be witnessed by the Engineer.

3. Pneumatic-tired rollers shall have not fewer than four pneumatic tired wheels which shall be of such size and ply that tire pressures can be maintained between 80 and 100 pounds per square inch for 25,000 pound wheel load during rolling operations. Unless otherwise required, rolling shall be done with tires inflated to 90 psi. The roller wheels shall be located abreast in a rigid steel frame. Each wheel shall be loaded with an individual weight box so that each wheel will bear an equal load when traversing uneven ground. The weight boxes shall be suitable for ballast loading such that the load per wheel shall be 25,000 pounds. The spacing of the wheels shall insure that the distance between the nearest edges of adjacent tires shall be not greater than one-half of the tire width of a single tire at the operating pressure for a 25,000 pound wheel load. The roller shall be operated not faster than 5 feet/second.

4. Subgrade shall be proofrolled with 6 passes. Depressions that develop during the proofrolling operation shall be filled with suitable material and those filled areas shall be proofrolled with 6 passes. If, after having been filled and proofrolled, the subgrade still contains depressions, the soil shall be undercut to the full depth of the soft material or 5 feet whichever is less, backfilled, and rolled to achieve a compacted subgrade.

5. After the proofrolled subgrade has been accepted by the Engineer, the surface of the subgrade shall be finish rolled with a smooth steel wheel roller weighing not less than

10 tons. Finished surface of the subgrade shall be within a tolerance of 0.04 feet at every point.

6. Conduits, pipes, culverts and underdrains shall be neither disturbed nor damaged by proofrolling operations. Rollers shall neither pass over, nor approach closer than 5 feet to conduits, pipes, culverts and underdrains unless the tops of those facilities are deeper than 3 feet.

K. During wet or rainy periods, aeration (drying) shall be required to reduce the fill materials to the required moisture condition. During dry periods, water shall be added to achieve the proper moisture content for compaction. Silty soils, which are wet, shall require aeration prior to compaction even during dry periods.

3.06 BACKFILLING AROUND STRUCTURES

A. General:

1. Remove debris from excavations before backfilling.

2. Do not backfill against foundation walls until so instructed by the Engineer

3. Wherever possible, backfilling shall be simultaneous on both sides of walls to equalize lateral pressures.

4. Do not backfill on only one (1) side of vertically spanning walls unless walls are adequately shored or permanent construction is in place to furnish lateral support on both top and bottom of the wall.

3.07 GRADING

A. General:

1. Perform all rough and finish grading required to attain the elevations indicated on the Drawings.

2. Perform rough grading to an accuracy of plus or minus 0.10 feet.

B. Grading Around Buildings: Control the grading around buildings so the ground is pitched to prevent water from running into the excavated areas of a building or damaging other site features.

C. Treatment After Completion of Grading:

1. After grading is completed, permit no further excavation, filling or grading, except with the approval of the Engineer.

2. Use all means necessary to prevent the erosion of freshly graded areas during construction and until such time as permanent drainage and erosion control measures have been installed.

3.08 EXCESS WATER CONTROL

A. Unfavorable Weather:

1. Do not place, spread or roll any fill material during unfavorable weather conditions.

2. Do not resume operations until moisture content and fill density are satisfactory to the Engineer.

3. Any inundated area that freezes shall be removed and refilled at the Contractor's expense.

B. Provide berms or channels to prevent flooding of the subgrade. Promptly remove all water collected in depressions.

C. Pumping, Drainage and Dewatering:

1. Provide, maintain and use at all times during construction adequate means and devices to promptly remove and dispose of all water from every source entering the excavations or other parts of the Work.

2. Dewater by means, which will insure dry excavations, preserve final lines and grades, and do not disturb or displace adjacent soil.

3. All pumping and drainage shall be done with no damage to property or structures and without interference with the rights of the public, owners of private property, pedestrians, vehicular traffic or the work of other contractors, and in accordance with all pertinent laws, ordinances, and regulations.

4. Do not overload or obstruct existing drainage facilities.

3.09 SETTLEMENT

A. The Contractor shall be responsible for all settlements of backfill, fills, and embankments, which may occur within one (1) year after final acceptance of the Work by the City.

B. The Contractor shall make, or cause to be made, all repairs or replacements made necessary by settlement within thirty (30) days after receipt of written notice from the Engineer.

3.10 CLEANING

Upon completion of the work of this Section, remove all rubbish, trash and debris resulting from construction operations. Remove surplus equipment and tools. Leave the site in a neat and orderly condition acceptable to the Engineer, and in conformance with the General Conditions of the Contract Documents.

+++END OF SECTION 02200+++

SECTION 02201

SITE PREPARATION

PART 1 - GENERAL

1.01 SCOPE

A. This section covers the work necessary to remove all interfering or objectionable material from the areas shown on the Plans, designated in these Specifications, as directed by the Engineer, or as necessary to complete the Work. Site preparation required in temporary easement areas shall be approved by the Engineer before commencing Work, unless specified otherwise in these Specifications.

B. Site preparation includes, but is not limited to, removing from the site of the Work, trees, stumps, roots, brush, structures, abandoned utilities, trash, debris, and all other materials found on or near the surface of the ground in the site of the Work and understood by generally accepted engineering practice not to be suitable for construction of the type contemplated. Precautionary measures that prevent damage to existing features to remain are part of the Work.

C. Site preparation activities shall be coordinated with temporary and permanent erosion and sediment control procedures.

D. Related Work Specified Elsewhere:

1. Section 02315 - Excavation and Backfill for Structures

1.02 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:

1. The Contractor shall submit the disposal agreement and release to the Engineer.

1.03 REGULATORY REQUIREMENTS

A. The Contractor shall comply with applicable codes, ordinances, rules, and regulations and laws of local, municipal, state, or federal authorities having jurisdiction over the Work. All required permits of a temporary nature shall be obtained for construction operations by the Contractor.

B. Open burning will not be allowed.

PART 2 - PRODUCTS

2.01 EQUIPMENT

A. The Contractor shall furnish equipment of the type normally used in site preparation activities including, but not limited to, tractors, trucks, loaders, and root rakes.

PART 3 - EXECUTION

3.01 SITE INVESTIGATION

A. The Contractor shall verify that existing plant life designated to remain is tagged or identified.

B. The Contractor shall identify an area for placing removed material and inform the Engineer for his approval.

C. The Contractor shall make test holes when necessary for locating underground obstructions. The Contractor shall notify the Georgia Utilities Protection Center in accordance with applicable Georgia law.

3.02 PROTECTION

A. The Contractor shall identify the locations of all utilities in the project area.

B. Where utilities are to be crossed, they shall be uncovered by hand excavation methods before other excavation near them is started. The Contractor shall coordinate all utility locations with the utility owner and the Georgia Utilities Protection Center. Every pipe for water, gas, drainage, or other use, and every conduit, foundation, or other underground structure encountered shall be carefully protected from damage or displacement.

C. The Contractor shall not remove vegetation which has been marked or identified to be saved by the Engineer. If any vegetation so marked appears to be in conflict with areas to be cleared, the Contractor shall inform the Engineer for his decision.

D. The Contractor shall protect benchmarks and survey control points around the site of the Work.

E. As shown on the Drawings or when directed by the Engineer, the Contractor shall provide fences to protect trees to remain at the site of the Work.

F. The Contractor shall protect slopes and control erosion in accordance with the requirements of Section 02125 – Temporary and Permanent Erosion and Sedimentation Control. The Contractor shall be responsible for the prevention and control of soil erosion and gullying as a result of the construction. The Contractor shall prevent excessive erosion within the project area. Ground where the soil has been exposed shall be revegetated with grass. Slopes in channel relocations shall be

seeded and fertilized above the water line. Fill slopes shall be provided with adequate slope protection as detailed on the Plans or as directed by the Engineer. All soil left within the easement areas and right-of-way shall be leveled off, dressed out, and seeded in a manner that will permit the ground surface to return to a natural state where approved by the Engineer.

G. Construction operations shall be planned and conducted in such a manner so as to prevent adverse impact on streams, lakes, and reservoirs with sediment or other harmful material used in the construction of the project. The Contractor shall comply with all regulations of the Environmental Protection Agency and the Georgia Department of Natural Resources, Environmental Protection Division (EPD).

H. The discharge ends of all channel relocations shall be aligned to provide direct flow into existing stream beds without an abrupt direction change.

3.03 DUST CONTROL

A. The Contractor shall control dust in accordance with the requirements of the General Conditions of the Contract Document.

3.05 SITE CLEARING AND GRUBBING

A. Prior to starting construction operations, the Contractor shall remove all vegetative growth, debris, and other objectionable matter standing or lying on the surface within the limits of the areas to be excavated or filled; and shall demolish and remove such buildings and other structures as are specifically designated on the Plans for removal.

B. Clearing shall be performed to provide access and to ensure the safety of employees working at the site of the Work.

C. The Contractor shall remove trees and plants in a manner so as to prevent injury to remaining trees, plants, and structures, which are to be preserved. All stumps shall be completely removed and disposed of in accordance with the requirements of this section.

D. The Contractor shall remove undergrowth and deadwood without disturbing subsoil. The Contractor shall not bury any vegetation or debris.

E. The Contractor shall saw cut along neat lines for removal of paving, curbs and gutters as required to perform the Work.

F. Materials to be cleared, grubbed, and removed from the site of the Work include, but are not limited to, all trees, stumps, roots, brush, trash, organic matter, paving, miscellaneous structures, debris, and abandoned utilities.

G. Grubbing shall consist of completely removing roots, stumps, trash, and other debris from all graded areas so that topsoil is free of roots and debris. Topsoil is to be left

sufficiently clean so that further picking and raking will not be required.

H. All stumps, roots, foundations, and planking embedded in the ground shall be removed and disposed of. Piling and butts of utility poles shall be removed to a minimum depth of two (2) feet below the limits of excavation for structures, trenches, and roadways or two (2) feet below finish grade, whichever is lower.

I. Landscaping features shall include, but are not necessarily limited to, fences, cultivated trees, cultivated shrubbery, property corners, man-made improvements, and subdivision and other signs within the right-of-way and easement. The Contractor shall take extreme care in moving landscape features and promptly re-establishing these features.

J. Surface rocks and boulders shall be grubbed from the soil and removed from the site of the Work if not suitable or required as riprap.

K. Where tree limbs interfere with utility wires, or where the trees to be felled are in close proximity to utility wires, the tree shall be taken down in sections to eliminate the possibility of damage to the utility.

L. Any work pertaining to utility poles shall comply with the requirements of the appropriate utility.

M. All fences adjoining any excavation or embankment that, in the Contractor's opinion, may be damaged or buried, shall be carefully removed, stored, and replaced. Any fencing that, in the Engineer's opinion, is significantly damaged shall be replaced with new fence material to match the existing fence.

N. The Contractor shall exercise special precautions for the protection and preservation of trees, cultivated shrubs, sod, fences, etc. situated within the limits of the construction area but not directly within excavation and/or fill limits. The Contractor shall be held liable for any damage caused by the Contractor's operations.

O. The Contractor shall be responsible for all damages to existing improvements resulting from the Contractor's operations.

3.06 REMOVAL OF EXISTING STRUCTURES AND MATERIALS

A. All existing structures encountered within the established lines, grades, or trenching sections shall be removed by the Contractor, unless such existing structures are otherwise specified to be relocated, adjusted up or down, salvaged, abandoned in place, reused in the Work, or to remain in place.

B. Should the Contractor encounter an existing structure (above or below ground) in the site of the Work for which the disposition is not indicated on the Plans, the Engineer shall be notified prior to disturbing such structure. The disposition of existing structures so encountered will be determined by the Engineer in accordance with the provisions of the Contract.

C. It is intended that all existing materials or structures that may be encountered (within the lines, grades, or trenching sections established for completion of the Work) be utilized in the Work if they are suitable and acceptable to the Engineer. Such existing materials or structures which are not suitable or acceptable for use in the Work shall be disposed of as specified in this section.

3.07 TOPSOIL STRIPPING

A. The Contractor shall remove topsoil from areas to be further excavated or graded.

B. Excavated soil shall be stockpiled at an area approved by the Engineer. Stockpiled soil shall be protected from erosion.

C. The Contractor shall not excavate wet soil.

3.08 BURNING OF MATERIAL ON THE SITE OF THE WORK

A. Burning of material on the site of the Work, is not permitted.

3.09 MATERIAL STORAGE AND DISPOSAL

A. The Contractor shall stockpile excavated material off site within five (5) days of its removal from the excavation, to the satisfaction of the Engineer, until required for backfill or fill. The Contractor shall place, grade, and shape stockpiles for proper drainage and erosion control.

B. All materials removed during site preparation and by excavation which are suitable for the purpose shall be used whenever practical for backfilling and for such other purposes as may be shown on the Plans or directed by the Engineer. All materials not used for such purposes shall be considered as waste materials and disposed of by the Contractor in an approved manner.

E. The Contractor shall locate and retain soil materials away from the edge of excavations. The Contractor shall not store soil materials within drip line of trees indicated to remain.

G Fuels, oils, bitumen, or other greasy or chemical substances originating from construction operations shall not be allowed to enter or be placed where it may contaminate soil, groundwater, or surface water.

H. On completion of any part of the Work, proper disposal shall be made of all surplus or unused materials left within the construction limits of such work and the surface of the Work shall be left in a neat and workmanlike condition.

I. Where materials are to be disposed of on private property, the Contractor shall furnish to the Engineer a copy of a written release (Chain of Custody) signed and approved by the private property owner, allowing the Contractor to dispose of the waste material on

that private property, prior to beginning disposal operations.

J. All waste material resulting from site preparation and excavation activities shall be disposed of in accordance with the regulations established by the United States Environmental Protection Agency (EPA), the Georgia Department of Natural Resources, Environmental Protection Division (EPD), and in a manner approved by the Engineer.

K. Spoil areas shall be seeded in accordance with the requirements of Section 02920 - Site Restoration.

3.10 REMOVAL AND MANAGEMENT OF CONTAMINATED AND HAZARDOUS MATERIALS

A. If contaminated material is encountered during site preparation, abandonment, excavation, trenching, or any other activities at the site of the Work, the Contractor shall immediately notify the Engineer. Contaminated material shall be removed and managed in accordance with applicable Federal, State, and local laws and regulations.

3.11 DISPOSAL OF DEBRIS

A. The debris resulting from site preparation operations shall be hauled to a disposal site secured by the Contractor and shall be disposed of in accordance with all requirements of Federal, State, and local laws and regulations. No debris of any kind shall be deposited in any stream or body of water, or in any street or alley. No debris shall be deposited upon any private property except with written consent of the property owner. In no case shall any material or debris be left on the site of the Work, shoved onto abutting private properties, or buried on the site of the Work.

+++END OF SECTION 02201+++

SECTION 02207

AGGREGATE MATERIALS

PART 1 -- GENERAL

1.01 SCOPE

The Contractor shall furnish all labor, equipment and materials required to complete all work associated with the installation of aggregate material beneath foundations, as backfill and as roadway subgrades and other related and incidental work as required to complete the work shown on the Drawings and specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01091 - Codes and Standards

B. Section 02200 - Earthwork

C. Section 02125 – Temporary and Permanent Erosion and Sedimentation Control

D. Section 02273 - Riprap

E. Section 03300 - Cast-in-Place Concrete

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Without limiting the generality of the other requirements of the Specifications, all work herein shall conform to the applicable requirements of the following documents. All references refer to the most current issue available at the time of Bid.

1. Georgia Department of Transportation (GDOT) Standard Specifications, Construction of Transportation Systems.

2. ASTM C 127 Test for Specific Gravity and Absorption of Coarse Aggregate.

3. ASTM C 136 Test for Sieve Analysis of Fine and Coarse Aggregates.

4. ASTM C 535 Test for Resistance to Degradation of Large Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

1.04 SUBMITTALS

082905BR

A. Submit the following in accordance with Section 01300, Submittals.

1. Materials gradation and certification.

2. ASTM C127, ASTM C136, and ASTM C535 test results

PART 2 -- PRODUCTS

2.01 CRUSHED STONE, SCREENED GRAVEL AND GRADED AGGREGATE BASE (GAB)

A. Crushed stone or screened gravel shall meet the requirements of Aggregate Standard Size Number indicated on the drawings or individual specification sections, as defined by GDOT Standard Specifications.

B. GAB shall meet the requirements of GAB as defined by GDOT Standard Specifications.

2.02 SELECT SAND

Select sand shall meet the requirements of the GDOT Standard Specifications for materials and gradation. The size used shall be as indicated on the drawings or individual specification sections, as defined by the GDOT Standard Specifications.

PART 3 -- EXECUTION

3.01 CRUSHED STONE, SCREENED GRAVEL AND GRADED AGGREGATE BASE (GAB)

A. Contractor shall install crushed stone, screened gravel and ABC in accordance with the GDOT Standard Specifications and as shown on the Drawings and indicated in the Contract Documents.

1. Unless otherwise stated herein or shown on the Drawings, all mat foundations (bottom slabs) for the proposed structures shall have a blanket of crushed stone or GAB 6-inches thick minimum placed directly beneath the proposed mat. The blanket shall extend a minimum of 12 inches beyond the extremities of the mat.

2. For subgrade preparation at structures and structural fill, the foundation material shall be GAB where specifically specified on Drawings, otherwise, crushed stone or screened gravel shall be used.

3. For ground under drains, pipe bedding, and drainage layers beneath structures the coarse aggregate shall meet the requirements indicated on Drawings or individual specifications, as defined by the GDOT Standard Specifications.

3.02 SELECT SAND

A. Contractor shall install select sand in accordance with the GDOT Standard Specifications and as shown on the Drawings and indicated in the Contract Documents.

- END OF SECTION -

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SECTION 02214

FLOWABLE FILL

PART 1 -- GENERAL

1.01 SCOPE

The Contractor shall furnish all labor, equipment, materials and services, including pumping and application equipment, necessary for the manufacture, transportation and placement of all cementitious flowable fill as shown on the Drawings or as recommended by the Engineer.

1.02 RELATED WORK

A. Section 01300 Submittal Procedures

B. Section 02200 Earthwork

C. Section 02222 Excavation

D. Section 03300 Cast-in-Place Concrete

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. American Concrete Institute (ACI)

1. SP-150-94 - Controlled Low-Strength Materials

B. American Society for Testing and Materials (ASTM)

1. ASTM C 94-15a – Standard Specification for Ready-Mixed Concrete

2. ASTM C 143 - Standard Test Method for Slump of Hydraulic-Cement Concrete

3. ASTM C 685-14 - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing

4. ASTM D 4832-10 - Standard Test Method for Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders.

5. ASTM D 6023 - Standard Test Method for Density (Unit Weight), Yield, Cement Content, and Air Content (Gravimetric) of Controlled Low-Strength Material (CLSM)

1.04 QUALITY CONTROL

The Contractor shall engage the services of a testing laboratory experienced in the design and testing of flowable fill materials and mixes, to perform material evaluation

tests and to design mixes for flowable fill. A trial mix shall be performed to verify the flowable fill mix design. The trial mix shall also report slump, air content, yield, cement content, and dry unit weight per ASTM C143 and ASTM D6023.

1.05 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of Section 01300 Submittal Procedures.

B. Product Data: Provide manufacturer data on the cement and admixtures.

C. Mix Designs: Contractor shall submit mix designs for approval by the Engineer.

D. Aggregates: Submit, in airtight containers, 100-lb sample of each type of aggregate to testing laboratory.

E. Materials Source: Submit name of imported aggregate material suppliers. Provide materials of each type from same source throughout the Work unless permission is given by the Engineer to change source.

1.06 DELIVERY, STORAGE, AND HANDLING:

Deliver and handle all products and equipment required in strict compliance with manufacturer's recommendations. Protect from damage due to weather, excessive temperatures, and construction operations.

PART 2 -- PRODUCTS

2.01 CEMENTITIOUS FLOWABLE FILL

A. Flowable fill (controlled low strength material) shall be a uniform mixture of sand, Type II Portland cement, fly ash, admixtures, and water. The mix design shall produce a flowable material with little or no bleed water, which produces a minimum compressive strength of 200 psi and maximum compressive strength of 500 psi at 28 days. The cured material shall be excavatable and have a maximum dry weight of 100 pounds per cubic foot. Slump of mix at the point of application shall be 7-inches to 10-inches.

B. Admixtures specifically designed for flowable fill shall be used to improve flowability, reduce unit weight, control strength development, reduce settlement and reduce bleed water. Admixtures shall be Rheocell-Rheofill by BASF Construction Chemicals; Darafill by Grace Construction Products; or equal.

C. Fine Aggregate shall consist of natural or manufactured siliceous sand, clean and free from deleterious substances, and graded within the following limits:

Sieve Size	Percent Passing by Weight
3/8"	100

No. 4	95 to 100
No. 8	80 to 100
No. 16	50 to 85
No. 30	25 to 60
No. 50	10 to 30
No. 100*	2 to 10

D. For manufactured sand, the percent passing the No. 100 Sieve may be increased up to 20%.

PART 3 -- EXECUTION

3.01 EXAMINATION

Examine conditions under which materials will be installed and notify Engineer in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.02 PLACEMENT

A. Flowable fill shall be either batched and premixed by an approved producer, dispensed from ready-mix trucks, and placed by approved methods and equipment; may also be mixed in small quantities (less than 1 cubic yard) using the approved design mix, onsite personnel, and portable drum mixing equipment. Individual onsite batches shall be documented by the Contractor and should include record of weights and volumes of mix constituents used per individual batch mix.

B. Tanks, pipes and other members to be encased in flowable fill shall be adequately secured.

C. Ensure that there are no exposed metallic pipes, conduits, or other items that will be in contact with the flowable fill after placement. If so, replace with non-metallic materials or apply manufacturers recommended coating to protect metallic objects before placing the flowable fill. Replacement or protection of metallic objects is subject to the approval of the Engineer.

D. Flowable fill shall be placed so as to completely fill the space to receive it with no trapped air pockets or other voids. Positive means of allowing the air to escape shall be provided where necessary and after approval of the Engineer.

E. Where placed against, around and inside existing structures, lift heights shall be limited so as not to overload the structure. The Engineer shall approve lift heights and procedures. Specific procedures and methods shall be included in the Contractor's shop drawing submittals.

F. Where flowable fill is placed around piping and other elements subject to floating within the fill space, positive means shall be taken to provide temporary balancing loads to prevent uplift, or fill lift heights shall be limited to prevent uplift. Contractor is responsible for the cost of correcting work if uplift causes a loss of specified grades.

G. Application of loads or placement of other fill materials or concrete on top of flowable fill shall not occur until the flowable fill surface is determined to be suitable for loading per ASTM D6024, and is subject to the approval of the Engineer.

3.03 PROTECTION AND CURING

Protect exposed surfaces of flowable fill from premature drying, wash by rain or running water, wind, mechanical injury, and excessively hot or cold temperature. Curing method shall be subject to approval by the Engineer.

3.04 FIELD QUALITY CONTROL

A. Flowable fill shall be sampled and tested in conformance with either ASTM C 94 or C 685. Samples for tests shall be taken for every 150 cubic yards of material, or a fraction thereof, for each day's placement. Tests shall include temperature reading and four compressive strength cylinders. Compressive strength sampling and testing shall conform to ASTM D 4832 with one specimen tested at 7 days, two at 28 days, and one held for each batch of four specimens.

B. Sampling and testing shall be performed by a qualified, independent commercial testing laboratory. Test results should be submitted within 48 hours of testing completion.

END OF SECTION

SECTION 02222

EXCAVATION

PART 1 -- GENERAL

1.01 SCOPE

A. This specification section includes the excavation of any unsuitable material observed during construction, as determined by the Engineer, prior to embankment fill placement or excavation for keyways, cutoffs, general slope flattening, structures, pipes, or any other miscellaneous items as indicated on the Drawings, specified in these Specifications, or as recommended by the Engineer.

B. The Contractor will take all necessary precautions to prevent damage to otherwise suitable foundation materials for the specified construction. Any damages caused by the Contractor shall be repaired to the satisfaction of the Engineer at no additional cost to the Owner.

1.02 RELATED WORK

A. Section 02010 Subsurface Conditions

B. Section 02110 Clearing and Grubbing

C. Section 02125 Temporary and Permanent Erosion and Sedimentation Control

D. Section 02200 Earthwork

E. Section 02273 Riprap

F. Section 02885 Surface Water Diversion and Dewatering

G. Section 03300 Cast-In-Place Concrete

1.03 QUALITY CONTROL

A. No excavation shall be performed unless the Engineer responsible for quality control of the earthwork is on site.

PART 2 -- PRODUCTS

NOT USED

PART 3 -- EXECUTION

3.01 EXAMINATION

A. The elevations shown on the drawings as existing are taken from the best available data and are intended to give reasonable, accurate information about the existing elevations. If the information is not precise, the Contractor should satisfy himself as to the exact quantities of excavation and fill required.

B. Verify that survey benchmark and intended elevations for the Work are as indicated.

C. Identify required lines, levels, contours, and datum.

D. Stake and flag locations of known utilities.

E. Locate, identify, and protect utilities that remain from damage.

F. Protect plant life, lawns, and other features remaining.

3.02 PREPARATION

A. All earthwork operations shall comply with the requirements of OSHA Construction Standards, Part 1926 Safety and Health Regulations for Construction.

B. Earthwork operations shall be performed in a safe and proper manner with appropriate precautions being taken against all hazards.

C. All excavated and filled areas for structures, trenches, fills, topsoil areas, embankments and channels shall be maintained by the Contractor in good condition at all times until final acceptance by the Owner. All damage caused by erosion or other construction operations shall be repaired by the Contractor using material of the same type as the damaged material.

D. The Contractor shall control grading in a manner to prevent water running into excavations.

E. Identify required lines, levels, contours, and datum locations.

F. The Contractor shall exercise special precautions for the protection and preservation of trees, cultivated shrubs, sod, fences, buildings, and other structures which are located in the construction area but not within designated clearing limits as shown on the Drawings or within the limits of embankments, excavations, or proposed structures. The Contractor shall be responsible for the repair and/or replacement of any of the aforementioned items damaged by his operation or construction activities.

G. Protect benchmarks and survey control points, from excavating equipment and vehicular traffic.

3.03 EXCAVATION

A. All excavations shall be barricaded in such a manner as to prevent persons from falling or walking into any excavation.

B. Excavations shall provide adequate working space and clearances for the work to be performed therein.

C. Contractor shall notify the Engineer of unexpected subsurface conditions and discontinue work in affected area until notified to resume work.

D. Contractor shall assume responsibility for design and construction of any necessary excavation shoring and bracing capable of supporting excavations and construction loads. Materials and methods selected shall be Contractor's option and responsibility.

E. Unless otherwise stated or approved in advance by the Engineer, all excavations shall be configured with 1.5(H):1(V) or flatter slopes.

F. Excavations shall be made to the lines, grades, and dimensions shown on the Drawings or established by the Engineer.

G. All excavations shall be evaluated and approved by the Engineer prior to placement of fill or concrete.

H. Remove lumped subsoil and other debris larger than 3 inches in diameter.

I. Slope banks with machine.

J. Grade top perimeter of excavation to prevent surface water from draining into excavation.

K. Hand trim excavation as necessary and remove loose matter.

L. Contractor shall provide and maintain on site at all times during excavation a straight edge blade attachment or straight edge backhoe bucket for the excavator used to perform excavation in the various areas of construction. This equipment shall be used for final cleanup of exposed subgrades in areas where a small tracked bulldozer is not able to operate without damaging the otherwise suitable subgrade.

M. Unsuitable material must be removed from beneath planned embankment areas to expose the residual materials that will act as the subgrade for the Earthfill.

N. Where unstable soil, soft clay, spongy, swampy or other unsuitable materials for subgrade or foundation purposes are encountered below the excavation limits, they shall be removed to the level of suitable material and disposed of. Areas so excavated shall be backfilled with Class B concrete or with compacted layers of crushed rock, sand, or other approved material conforming to the specific requirements for the backfill to the lines and grades shown on the Drawings. The type of material used for backfill shall be specified by the Engineer.

O. The Engineer will determine actual limits for removal of the unsuitable material.

P. A dewatering system may be required during excavation procedures to allow for dry surfaces on which initial and subsequent fill may be placed may be placed.

Q. Contractor should consider excavation and replacement of unsuitable materials within small areas to prevent rapid deterioration of subgrades due to exposure and construction traffic. Larger areas may be worked depending on extent of dewatering, compaction and actual stability of exposed soils.

R. Correct areas over excavated in accordance with Section 02200.

3.04 EXCAVATED MATERIALS

A. So far as practicable, as determined by the Engineer, all suitable materials from excavation for specified permanent construction shall be used in the permanent construction required under these specifications.

B. Excavated materials that are unsuitable for, or are in excess of, embankment or other earthwork requirements, as determined by the Engineer, shall be hauled from the site and disposed of by the Contractor at off-site locations arranged by the Contractor. All aspects of any and all off-site disposal areas will be coordinated between the Contractor and the off-site property owner and shall be performed in a manner that meets all applicable laws and regulation pertaining thereto.

C. The Contractor's operations in excavations shall be such that the excavations will yield as much suitable material for subsequent construction as practicable, and shall be subject to the approval of the Engineer.

D. Where practicable, as determined by the Engineer, suitable materials shall be excavated separately from the materials to be wasted and the suitable materials shall be segregated by loads during the excavation operations. The suitable materials shall be placed in the designated final locations directly from the excavation, or shall be placed in temporary stockpiles and later placed in the designated locations as recommended by the Engineer.

E. In excavating materials that are suitable for use as earthfill, the Engineer will designate the depths of cut that will result in the best gradation of materials, and the cuts shall be made to such designated depths.

F. Excavated materials which, after drainage or drying, are suitable for use as earthfill but which, when excavated, are too wet for immediate compaction shall be placed in temporarily stockpiles until the moisture content is reduced sufficiently to permit them to be placed, or may be placed subject to the provisions of Section 02200 relative to materials in which the moisture content is greater than that required for proper compaction.

G. Should hard particles having maximum dimensions of more than 3 inches be found in otherwise approved Earthfill materials, they shall be removed by the Contractor either

at the site of the excavation or after being transported to the area of fill placement, but before the materials are compacted. Such materials shall be wasted.

3.05 FIELD QUALITY CONTROL

A. The Contractor shall provide for visual evaluation of all bearing surfaces by the Engineer.

B. Allowable bearing values of all areas beneath structures shall be tested. Tests shall be by penetrometer, rodding, rolling or other methods approved by the Engineer.

C. The Engineer, prior to the next phase of construction, shall approve all bearing surfaces for structures.

3.06 PROTECTION

A. Prevent displacement or loose soil from falling into excavation; maintain soil stability.

B. Protect bottom of excavations and soil adjacent to and beneath foundations from freezing.

+++ END OF SECTION +++

SECTION 02223
EXCAVATION BELOW NORMAL GRADE AND CRUSHED STONE REFILL

PART 1 GENERAL

1.01 SCOPE

A. If in the opinion of the Engineer, the material at or below the normal grade of the bottom of the trench is unsuitable for the foundation, it shall be removed to the depth directed by the Engineer and replaced with crushed stone. Normal grade of trench bottom is defined as follows:

Pipe Diameter (Inches)	Normal Grade below Pipe (Inches)
8 - 21	8
24 or greater	12

B. Normal grade below manholes, vaults and other structures shall be 12-inches.

C. The pipe bedding material is not included in the Scope of this Section.

PART 2 PRODUCTS

2.01 MATERIALS

A. Crushed Stone shall be as specified in Section 02225.

PART 3 EXECUTION

3.01 EXCAVATION AND DRAINAGE

A. Whatever the nature of unstable material encountered or the ground water conditions, drainage in excavations shall be complete and effective.

B. If the Contractor excavates below grade through error or for his own convenience, or fails to properly dewater the excavation, or disturbs the sub grade before dewatering is sufficiently complete, he may be directed by the Engineer to excavate below grade as set forth in the preceding paragraph, in which case the work excavating below grade and finishing and placing the refill shall be performed at the Contractor's own expense.

3.02 REFILL

A. If the material at the level of trench bottom is unsuitable for foundations, the Engineer may require compaction of the unsuitable soil. The Engineer may also require the removal of the unsuitable material to such depth and width as he may direct and be replaced with crushed stone.

+++ END OF SECTION 02223 +++

SECTION 02225
TRENCH EXCAVATION AND BACKFILL

PART I GENERAL

1.01 SCOPE

A. The Contractor shall furnish all labor, materials, equipment, and incidentals required to perform all excavation and backfill required to complete the work as shown on the Drawings and as specified herein. The work shall include, but not be necessarily limited to, excavation and backfill for pipe and appurtenances, manholes and vaults, backfill and compaction, disposal of surplus and unsuitable material and all related work such as sheeting and bracing and dewatering.

B. Work shall also include the removal of trees, stumps, brush, debris or other obstacles which remain after clearing and grubbing operations, which may obstruct the work, and the removal of all other materials, including rock, to the extent necessary to install the pipe and appurtenances in conformance with the lines and grades shown on the Drawings and as specified herein.

C. Backfill shall include the refilling and compaction of the fill in the trenches and excavations up to the surrounding ground surface.

D. The trench is divided into five specific areas:

1. Foundation: The area beneath the bedding, sometimes also referenced to as trench stabilization.

2. Bedding: The area above the trench bottom (or foundation) and below the bottom of the barrel of the pipe.

3. Haunching: The area above the bottom of the barrel of the pipe up to a specified height above the bottom of the barrel of the pipe.

4. Initial Backfill: The area above the haunching material and below a plane 12-inches above the top of the barrel of the pipe.

5. Final Backfill: The area above a plane 12-inches above the top of the barrel of the pipe.

E. The choice of method, means, techniques, and equipment rests with the Contractor. The Contractor shall select the method and equipment for trench excavation and backfill depending upon the: type of material to be excavated and backfilled, the depth of excavation, the amount of space available for operation of equipment, storage of excavated material, proximity of man-made improvements to be protected and available easement or right of way.

1.02 QUALITY ASSURANCE

A. Reference Standards: The Contractor shall comply with the applicable provisions and recommendations of the latest editions of the following standards, except as otherwise shown on the Drawings or specified herein.

1. ASTM C33 – Standard Specification for Concrete Aggregates
2. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
3. ASTM D698 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3)
4. ASTM D4253 – Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using A Vibratory Table
5. ASTM D6938 – Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
6. ASTM D1556 – Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
7. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil using Modified Effort (56,000 ft-lbf/ft^3)
8. ASTM D2937 – Standard Method for Density of Soil in Place by the Drive-Cylinder Method

B. Density: All references to "maximum dry density" shall mean the maximum dry density defined by ASTM D698, except that for cohesionless, free draining soils "maximum dry density" shall mean the maximum index density as determined by ASTM D4253. Determination of the density of foundation, bedding, haunching, or backfill materials in place shall meet with the requirements of ASTM D1556, ASTM D6938 or ASTM D2937.

C. Sources and Evaluation Testing: Testing of materials to certify conformance with the Specifications shall be performed by an independent testing laboratory.

1.03 SUBMITTALS

A. The Contractor shall submit record documents in accordance with the requirements of the General Conditions. The Contractor shall record locations of all pipelines installed referenced to survey benchmarks. The Contractor shall also include the locations of all underground utilities encountered and/or rerouted. The Contractor shall provide dimensions, materials, elevations, inverts and direction of flow. The Contractor shall use GPS technology or conventional survey methods to locate utilities.

1.04 SAFETY

A. Perform all trench excavation and backfilling activities in accordance with the Occupational Safety and Health Act of 1970 (PL 91-596), as amended. The Contractor

shall pay particular attention to the Safety and Health Regulations Part 1926, Subpart P "Excavations" as described in OSHA publication 2226.

1.05 TESTING

A. Testing shall be performed by an approved independent laboratory.

B. Compaction testing shall be performed in accordance with the requirements of ASTM D1556 or ASTM D6938.

PART 2 PRODUCTS

2.01 TRENCH FOUNDATION MATERIALS

A. Crushed Stone: Crushed stone shall be utilized for trench foundation (trench stabilization) and shall meet the requirements of the Georgia Department of Transportation Specification 800.01, Group I (limestone, marble, or dolomite) or Group II (quartzite, granite, or gneiss). Stone size shall be between No. 57 and No. 4, inclusive.

2.02 BEDDING AND HAUNCHING MATERIALS

A. Sewers and Storm Drains: Crushed stone utilized for bedding and haunching shall meet the requirements of the Georgia Department of Transportation Specification 800.01, Group I (limestone, marble, or dolomite) or Group II (quartzite, granite, or gneiss). Stone size shall be between No. 57 and No. 4, inclusive.

B. Unless specified otherwise, bedding and haunching materials shall be crushed stone as specified below.

C. Crushed stone utilized for bedding and haunching shall meet the requirements of Section 02207 – Aggregate Materials and of the Georgia Department of Transportation Specifications Construction of Transportation System 800.2.01, Group I (limestone, marble, or dolomite) or Group II (quartzite, granite, or gneiss). Stone size shall be No. 57.

D. Filter Fabric - Non-Woven Type

1. Filter fabric associated with bedding shall be a UV stabilized, spunbonded, continuous filament, needle-punched, polypropylene, non-woven geotextile.

2. The fabric shall have an equivalent open size (EOS or AOS) of 120 - 70. The fabric shall also conform to the minimum property values listed in the following table:

		Test Procedure	Average Value

Fabric Property	Unit			
			Typical	Minimum
Weight	oz/yd^2	ASTM D 3776	8.3	
Thickness	mils	ASTM D 1777	105	
Grab Strength	lbs.	ASTM D 4632	240	210
Grab Elongation	%	ASTM D 4632	>50	50
Tear Strength	lbs.	ASTM D 4533	100	85
Mullen Burst	psi	ASTM D 3786	350	320
Puncture Resistance	lbs.	ASTM D 4833	115	100
Permittivity	sec^{-1}	ASTM D 4491	1.7	
Water Permeability	cm/sec	ASTM D 4491	0.4	
Water Flow Rate	gpm/ft^2	ASTM D 4491	120	
UV Resistance (500 hrs)	%	ASTM D 4355	>85	
pH			2 - 13	

3. If ordered by the Engineer, the filter fabric manufacturer shall furnish the services of a competent factory representative to supervise and/or inspect the installation of pipe. This service will be furnished for a minimum of 10 days during initial pipe installation.

4. Filter fabric shall be equal to Polyfelt TS 700, Trevira 1125 or SuPac 7-MP.

2.03 INITIAL BACKFILL

A. Initial backfill material shall be crushed stone as specified for bedding and haunching materials.

2.04 FINAL BACKFILL

A. Final backfill material shall be Graded Aggregate Base (GAB) in accordance with Georgia Department of Transportation Standard Specification Construction of Transportation Systems Section 815 Group 1 Aggregates. The Contractor shall install GAB to the subbase elevation in paved areas.

2.05 SELECT BACKFILL

A. Select backfill shall be materials that meet the requirements as specified for bedding, haunching, initial backfill or final backfill materials, including compaction requirements.

2.06 CONCRETE

A. Concrete for bedding, haunching, initial backfill, or encasement shall have a compressive strength of not less than 3,000 psi, with not less than 5.5 bags of cement per cubic yard and a slump between 3 and 5-inches. Ready-mixed concrete shall be mixed and transported in accordance with ASTM C94. Reinforcing steel shall conform to the requirements of ASTM A615, Grade 60.

2.07 FLOWABLE FILL

A. Controlled strength flowable fill shall be used as trench backfill only when authorized, in writing, by the Engineer.

B. Controlled low strength flowable fill shall conform to Section 600 of the Georgia Department of Transportation Standard Specifications for Construction of Roads and Bridges – latest edition.

C. Flowable fill design mix shall be for "excavatable" fill. Design mix shall be submitted to the Engineer for approval in accordance with Section 600.3.03 of the GDOT Standard Specifications.

2.08 GRANULAR MATERIAL

A. Granular material, where required for trench backfill, shall be sand, river sand, crushed stone or aggregate, pond screenings, crusher run, recycled concrete, or other angular material. Granular material shall meet gradation requirements for Size No. 57 or finer.

2.09 GRADED AGGREGATE BASE

A. Graded aggregate base shall be Class "A" meeting the requirements of the Georgia Department of Transportation Specification Section 815.01.

PART 3 EXECUTION

3.01 TRENCH EXCAVATION

A. Topsoil and grass shall be stripped a minimum of 6-inches over the trench excavation site and stockpiled separately for replacement over finished graded areas.

B. Trenches shall be excavated to the lines and grades shown on the Drawings with the centerlines of the trenches on the centerlines of the pipes and to the dimensions which provide the proper support and protection of the pipe and other structures and accessories.

C. Trench Width:

1. The sides of all trenches shall be vertical to a minimum of one foot above the top of the pipe. Unless otherwise indicated on the Drawings, the maximum trench width shall be equal to the sum of the outside diameter of the pipe plus two feet.

The minimum trench width shall be that which allows the proper consolidation of the haunching and initial backfill material.

2. Excavate the top portion of the trench to any width within the construction easement or right-of-way which will not cause unnecessary damage to adjoining structures, roadways, pavement, utilities, trees or private property. Where necessary to accomplish this, provide sheeting and shoring.

3. Where rock is encountered in trenches, excavate to remove boulders and stones to provide a minimum of 12-inches clearance between the rock and any part of the pipe, manhole, vault or other structure.

D. Trench Depth:

1. The trenches shall be excavated to the required depth or elevation which allow for the placement of the pipe and bedding to the dimensions and elevations shown on the Drawings.

2. Where rock is encountered in trenches for pipelines, excavate to the minimum depth which will provide a clearance below the pipe barrel of 8-inches for pipe 21-inches in diameter and smaller and 12-inches clearance for larger pipe, manholes and other structures. Remove boulders and stones to provide above minimum clearances between the rock and any part of the pipe, manhole, vault or other structure.

E. Excavated Materials:

1. Excavated materials shall be placed adjacent to the work to be used for backfilling as required. Top soil shall be carefully separated and lastly placed in its original location.

2. Excavated material shall be placed sufficiently back from the edge of the excavation to prevent caving of the trench wall, to permit safe access along the trench and not cause any drainage problems.

3. Excavated material shall be placed so as not to damage existing landscape features or man-made improvements and also allow access to valves and hydrants.

3.02 SHEETING, SHORING AND BRACING

A. Sheeting, shoring and bracing is specified in Section 02150.

B. Protection of the excavation against caving or settling of the banks shall be the sole responsibility of the Contractor. The Contractor shall protect the sides of his excavation by sheeting and bracing as may be necessary. No actions or instructions by the Engineer shall be regarded as the responsibility for security of the trench or the

surrounding areas. The full responsibility remains with the Contractor.

B. The Contractor shall furnish, put in place and maintain sheeting and bracing required to support the side of the excavation and prevent loss of ground which could damage or delay the work or endanger adjacent structures or vehicular traffic. If the Engineer is of the opinion that at any point sufficient or proper supports have not been provided, he may order additional supports placed at the expense of the Contractor. Compliance with such order shall not relieve the Contractor from his responsibility for the sufficiency of such supports. Care shall be taken to prevent voids outside of the sheeting, but if voids are formed, they shall be immediately filled and rammed.

D. The Contractor shall leave in place to be imbedded in the backfill of the trench, all wood sheeting, bracing and other related items as shown on the Drawings, or which the Engineer may direct him in writing to leave in place at any time during the progress of the work for the purpose of preventing injury to structures, utilities, or property, whether public or private. The Engineer may direct that timber used for sheeting and bracing in the trench be cut off at any specified elevation, after backfilling and tamping has reached this level.

E. All sheeting and bracing not left in place shall be carefully removed in such manner as not to endanger the construction of other structures, utilities or property, whether public or private.

F. The right of the Engineer to order sheeting and bracing left in place shall not be construed as creating any obligation on his part to issue such orders, and his failure to exercise his right to do so shall not relieve the Contractor from liability for damages to persons or property occurring from or upon the work occasioned by negligence or otherwise, growing out of a failure on the part of the Contractor to leave in place in the trench sufficient sheeting and bracing to prevent any caving or moving of the ground adjacent to the sides of the trench.

G. The Contractor shall receive no payment, other than that included in the price to be paid for pipe, for any extra timber used for sheeting, bracing and other related items. The Contractor shall receive no payment for such timber which was used for the convenience of the Contractor.

3.03 TEST PITS

A. Test pits for the purpose of locating underground utilities or structures as an aid in establishing the precise location of new work may be excavated by the Contractor. Test pits shall be backfilled as soon as the desired information has been obtained. The backfilled surface shall be maintained in a satisfactory condition for travel until resurfaced as hereinafter specified.

B. Excavation and backfill of test pits shall be considered work incidental to the project and the cost shall be included in the appropriate bid item.

C. If, for any reason, a test pit is left open for any period of time, it shall be properly barricaded and lighted by the Contractor.

3.04 ROCK EXCAVATION

A. Definition of Rock: Any material which, in the opinion of the Engineer, cannot be excavated with conventional excavating equipment, and must be removed by drilling and blasting.

B. Blasting:

1. Exhaust other practical means of excavating prior to utilizing blasting as a means of excavation. Provide licensed, experienced workmen to perform blasting. Conduct blasting operations in accordance with all existing ordinances and regulations. Protect all buildings and structures from the effects of the blast. Repair any resulting damage. If the Contractor repeatedly uses excessive blasting charges or blasts in an unsafe or improper manner, the Engineer may direct the Contractor to employ an independent blasting consultant to supervise the preparation for each blast and approve the quantity of each charge.

2. Refer to Section 02020, Use of Explosives

C. Removal of Rock: Dispose of rock off site that is surplus or not suitable for use as rip rap or backfill.

D. The Contractor shall notify the Engineer prior to any blasting. Additionally, the Contractor shall notify the City and local fire department before any charge is set.

E. Following review by the Engineer regarding the proximity of permanent buildings and structures to the blasting site, the Engineer may direct the Contractor to employ an independent, qualified specialty sub-contractor, approved by the Engineer, to: monitor the blasting by use of a seismograph; identify the areas where light charges must be used, conduct pre-blast and post-blast inspections of structures, including photographs or videos; and maintain a detailed written log.

3.05 DEWATERING EXCAVATIONS

A. Dewater excavation continuously to maintain a water level two feet below the bottom of the trench.

B. Control drainage in the vicinity of excavation so the ground surface is properly pitched to prevent water running into the excavation.

C. There shall be sufficient pumping equipment, in good working order, available at all times, to remove any water that accumulates in excavations. Where the utility crosses natural drainage channels, the work shall be conducted in such a manner that unnecessary damage or delays in the prosecution of the Work will be prevented.

Provision shall be made for the satisfactory disposal of surface water to prevent damage to public or private property.

D. In all cases, accumulated water in the trench shall be removed before placing bedding or haunching, laying pipe, placing concrete or backfilling.

E. Where dewatering is performed by pumping the water from a sump, crushed stone shall be used as the medium for conducting the water to the sump. Sump depth shall be at least two feet below the bottom of the trench. Pumping equipment shall be of sufficient quantity and/or capacity to maintain the water level in the sump two feet below the bottom of the trench. Pumps shall be a type such that intermittent flows can be discharged. A standby pump shall be required in the event the operating pump or pumps clog or otherwise stop operation.

F. Dewater by use of a well point system when pumping from sumps does not lower the water level two feet below the trench bottom. Where soil conditions dictate, the Contractor shall construct well points cased in sand wicks. The casing shall be jetted into the ground, followed by the installation of the well point, filling casing with sand and withdrawing the casing.

3.06 TRENCH FOUNDATION AND STABILIZATION

A. The bottom of the trench shall provide a foundation to support the pipe and its specified bedding. The trench bottom shall be graded to support the pipe and bedding uniformly throughout its length and width.

B. If, after dewatering as specified above, the trench bottom is spongy, or if the trench bottom does not provide firm, stable footing and the material at the bottom of the trench will still not adequately support the pipe, the Engineer may determine that the trench bottom is unsuitable and the Engineer may then order trench stabilization by directing the Contractor to over excavate trench bottom and fill with crushed stone.

C. Where the replacement of unsuitable material with crushed stone does not provide an adequate trench foundation, the trench bottom shall be excavated to a depth of at least two feet below the specified trench bottom. Place filter fabric in the bottom of the trench and support the fabric along the trench walls until the trench stabilization, bedding, haunching and pipe have been placed at the proper grade. The ends of the filter fabric shall be overlapped above the pipe.

D. Where trench stabilization is provided, the trench stabilization material shall be compacted to at least 95 percent of the maximum dry density, unless shown or specified otherwise.

3.07 BEDDING AND HAUNCHING

A. Prior to placement of bedding material, the trench bottom shall be free of any water, loose rocks, boulders, or large dirt clods.

B. Bedding material shall be placed to provide uniform support along the bottom of the pipe and to place and maintain the pipe at the proper elevation. The initial layer of bedding placed to receive the pipe shall be brought to the grade and dimensions indicated on the Drawings. All bedding shall extend the full width of the trench bottom. The pipe shall be placed and brought to grade by tamping the bedding material or by removal of the excess amount of the bedding material under the pipe. Adjustment to grade line shall be made by scraping away or filling with bedding material. Wedging or blocking up of pipe shall not be permitted. Applying pressure to the top of the pipe, such as with a backhoe bucket, to lower the pipe to the proper elevation or grade shall not be permitted. Each pipe section shall have a uniform bearing on the bedding for the length of the pipe, except immediately at the joint.

C. At each joint, excavate bell holes of ample depth and width to permit the joint to be assembled properly and to relieve the pipe bell of any load.

D. After the pipe section is properly placed, add the haunching material to the specified depth. The haunching material shall be shovel sliced, tamped, chinked or otherwise consolidated to provide uniform support for the pipe barrel and to fill completely the voids under the pipe, including the bell hole. Prior to placement of the haunching material, the bedding shall be clean and free of any water, loose rocks, boulders, or dirt clods.

E. Pipe Bedding:

1. The Contractor shall furnish and install pipe on the type and thickness of bedding as shown on the Drawings or as specified by the Engineer.

F. Manholes, Vaults and Other Structures: Excavate to a minimum of 12-inches below the planned elevation of the base of the manhole, vault or structure. Place and compact crushed stone bedding material to the required grade before constructing the manhole, vault or structure.

G. Compaction:

1. Bedding and haunching materials under pipe, manholes, vaults, structures and accessories shall be compacted to a minimum of 95 percent of the maximum dry density, unless shown or specified otherwise.

2. Bedding and haunching materials within the limits of restrained joint pipe shall be compacted to a minimum of 95 percent of the maximum dry density, unless shown or specified otherwise.

3.08 INITIAL BACKFILL

A. Initial backfill shall be placed to anchor the pipe, protect the pipe from damage by

subsequent backfill and ensure the uniform distribution of the loads over the top of the pipe.

B. Place initial backfill material carefully around the pipe in uniform layers to a depth of at least 12-inches above the pipe barrel. Layer depths shall be a maximum of 6-inches for pipe 18-inches in diameter and smaller and a maximum of 12-inches for pipe larger than 18-inches in diameter.

C. Backfill on both sides of the pipe simultaneously to prevent side pressures.

D. Compact each layer thoroughly with suitable hand tools or tamping equipment.

E. Initial backfill shall be compacted to a minimum 95 percent of the maximum dry density, unless shown or specified otherwise. Initial backfill within the limits of restrained joint pipe shall be compacted to a minimum 95 percent of the maximum dry density, unless shown or specified otherwise.

F. If materials excavated from the trench are not suitable for use as backfill materials, provide select backfill material conforming to the requirements of this Section for initial backfill.

3.09 CONCRETE ENCASEMENT FOR PIPELINES

A Where concrete encasement is shown on the Drawings for pipelines, excavate the trench to provide a minimum of 12-inches clearance from the barrel of the pipe. Lay the pipe to line and grade on solid concrete blocks or solid bricks. In lieu of bedding, haunching and initial backfill, place concrete to the full width of the trench and to a height of not less than 12-inches above the pipe bell. Do not backfill the trench for a period of at least 24 hours after concrete is placed.

3.10 FINAL BACKFILL

A. Backfill carefully to restore the ground surface to its original condition.

B. The top 6-inches of backfill shall be topsoil or graded aggregate base material, depending upon the trench location.

C. Excavated material which is unsuitable for backfilling, and excess material, shall be disposed of in a manner approved by the Engineer. Surplus soil may be neatly distributed and spread over the site, if approved by the Engineer, except that surplus soil shall not be distributed and spread over the site in areas under Corps of Engineers jurisdiction. If such spreading is allowed, the site shall be left in a clean condition and shall not affect pre-construction drainage patterns. Surplus rock from the trenching operations shall be removed from the site.

D. If materials excavated from the trench are not suitable for use as backfill materials, provide select backfill material conforming to the requirements of this Section.

E. Pipelines: After initial backfill material has been placed and compacted, backfill with final backfill material. Place backfill material in uniform layers, compacting each layer thoroughly as follows:

1. In 6-inch layers, if using light power tamping equipment, such as a "jumping jack"

2. In 12-inch layers, if using heavy tamping equipment, such as hammer with tamping feet

F. Manholes, Vaults and other Structures:

1. Backfilling shall be carried up evenly on all walls of an individual structure simultaneously. A variation of 2-feet in elevation will be the maximum allowable. Backfill shall not be allowed against walls until they and their supporting slabs, if applicable, have attained sufficient strength. Backfill shall be subject to the approval of the Engineer.

2. In locations where pipes pass through walls, the Contractor shall take the following precautions to consolidate the backfill up to an elevation of at least 2-feet above the bottom of the pipe:

   a. Place fill in such areas for a distance of not less than 3-feet either side of the centerline of the pipe in level layers not exceeding 6-inches in depth.
   b. Thoroughly compact each layer with a power tamper to the satisfaction of the Engineer.

3. Temporary bracing shall be provided as required during construction of all structures to protect partially completed structures against construction loads, hydraulic pressure and earth pressure. The bracing shall be capable of resisting all loads applied to the walls as a result of backfilling.

G. Final backfill shall be compacted to a minimum 95 percent of the maximum dry density, unless specified otherwise. Final backfill underlying pavement and backfill under dirt and gravel roads and within the limits of restrained joint pipe shall be compacted to a minimum 95 percent of the maximum dry density, unless specified otherwise.

H. Concrete or bituminous asphalt removed during construction shall not be placed in backfill.

I. The surface of filled areas shall be graded to smooth true lines in conformance with the grades or elevations shown on the Drawings.

3.11 ADDITIONAL MATERIAL

A. Where final grades above the pre-construction grades are required to maintain minimum cover, additional fill material will be as shown on the Drawings. Utilize excess material excavated from the trench, if the material is suitable. If excess excavated materials are not suitable, or if the quantity available is not sufficient, provide additional suitable fill material.

3.12 BACKFILL WITHIN RIGHT-OF-WAYS

A. Compact backfill within the limits of the any right-of-way including the backfill underlying pavement and sidewalks, and backfill under dirt and gravel roads to a minimum 95 percent of the maximum dry density.

3.13 BACKFILL WITHIN GEORGIA DOT RIGHT-OF-WAY

A. Backfill within the Georgia DOT right-of-way shall meet the requirements stipulated in the "Utility Accommodation Policy and Standards", published by the Georgia Department of Transportation.

3.14 FLOWABLE FILL

A. Where flowable fill is utilized, excavate the trench to provide a minimum of 6-inches clearance on either side of the pipe barrel. Lay the pipe to line and grade on solid concrete blocks or bricks. In lieu of bedding, haunching and initial backfill, place flowable fill to the full width and depth of the trench.

B. Flowable fill shall be protected from freezing for a period of 36 hours after placement. Minimum temperature of flowable fill at point of delivery shall be 50 degrees F.

3.15 COMPACTED GRANULAR MATERIAL

A. Where compacted granular material is required as initial and final backfill material, it shall be placed after bedding and haunching material specified elsewhere has been placed. Compacted granular material shall be compacted to a minimum 95 percent of the maximum dry density.

3.16 TESTING AND INSPECTION

A. The soils testing laboratory is responsible for compaction tests in accordance with paragraph 1.02 of this Section.

B. Compaction tests:

1. Compaction tests will be required in existing or proposed streets, sidewalks, driveways and other existing or proposed paved areas at varying depths and at intervals as determined by the Engineer.

2. Minimum requirements for compaction testing shall be a minimum of one (1) test for each 400 feet or less of pipeline and one (1) test at each manhole, vault and other structure unless soil conditions or construction practices, in the opinion of the Engineer, warrant the need for additional tests. One (1) complete compaction test shall consist of individual tests in the same vertical plane over the installed pipe, beginning at a depth of 2-feet above the top of the pipe and at successive two feet vertical increments up to the top of the backfill.

3. The Engineer shall direct where additional compaction tests will be performed along the Project route.

C. The soils testing laboratory shall be responsible for inspecting and testing stripped site, sub grades and proposed fill materials.

D. The Contractor's duties relative to testing include:

1. Notifying laboratory of conditions requiring testing.
2 Coordinating with laboratory for field testing.
3. Providing excavation as necessary for laboratory personnel to conduct tests.
4. Paying costs for additional testing performed beyond the required scope.
5. Paying costs for re-testing where initial tests reveal non-conformance with specified requirements.

E. Inspection

1. Earthwork operations, acceptability of excavated materials for bedding or backfill, and placing and compaction of bedding and backfill shall be subject to inspection by the Engineer.

2. Foundations and shallow spread footing foundations shall be inspected by a geotechnical engineer, who shall verify suitable bearing conditions.

F. Contractor shall comply with applicable codes, ordinances, rules, regulations and laws of local, municipal, state and federal authorities having jurisdiction.

+ + + END OF SECTION 02225 + + +

SECTION 02270

VEGETATIVE EROSION CONTROL AND BANK STABILIZATION

PART 1 -- GENERAL

1.01 SCOPE

The Contractor shall provide erosion control and streambank stabilization including but not limited to fertilizing, seeding, planting, mulching, installation of erosion control fabric, guarantee and maintenance for all disturbed areas shown on the Drawings, in accordance with this specification, and as directed by the Engineer.

1.02 RELATED WORK

A. Section 01300 Submittal Procedures

B. Section 02125 Temporary and Permanent Erosion and Sedimentation Control

C. Section 02273 Riprap

1.03 REFERENCED SPECIFICATIONS, CODES, AND STANDARDS

A. "Manual for Erosion Control in Georgia", published by the Georgia Soil and Water Conservation Commission

B. "Guidelines for Streambank Restoration", published by the Georgia Soil and Water Conservation Commission in cooperation with Metro Atlanta Association of Conservation Districts, USDA Natural Resources Conservation Service, and the Georgia Environmental Protection Division.

1.04 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of Section 01300 Submittal Procedures.

B. Product Information:

1. Manufacturer's product information for erosion control fabrics, geo-textile fabrics (natural and synthetic fiber) and cellular confinement systems must be provided to the Engineer for written approval, prior to installation.

2. Information regarding the composition, infiltration rate, and chemical analysis of soil amendments including, but not limited to, fertilizer (natural and synthetic), agricultural lime, plant material compost, leaf or straw mulch, and peat moss must be provided to the Engineer for written approval prior to installation.

3. Information regarding the species mix and germination rates of erosion control grass seed mixes must be provided to the Engineer for written approval prior to installation.

C. Certificates:

1. Supplier or manufacturer's certificates, stating the source, quantity, and type of material, shall accompany each delivery. All certificates shall be submitted to the Engineer at the time of delivery. No materials or products shall be left at the project site without first notifying the Engineer.

2. Certificates of inspection of commercial plant material, as may be required by Federal, state, local, or other authorities having jurisdiction, must accompany the plant material shipment and must be submitted to the Engineer at the time of delivery.

D. Samples:

1. Grass seed: two-pound samples of each type of grass seed must be submitted to the Engineer for approval before the bulk grass seed is delivered to the project site. The samples shall be accompanied by a supplier's or dealer's germination rate and percentage of weed seed certifications. The Contractor shall plant the grass seed in test plots designated by the Engineer and analyze the plots for germination rates and weed content. Grass seed shall not be delivered to the project site without written approval from the Engineer. Approval of the seed samples by the Engineer shall not affect the right of the Engineer or Owner to reject the seed upon or after delivery.

E. Reports:

1. Soil Fertility Test: Independent laboratory test results for pH, organic material, texture, soluble salts, nitrogen, phosphorus, potassium, iron and micro-nutrients.

2. Soil Percolation Test: Independent laboratory test results for on-site soil percolation rates defining the infiltration rate through the top 8-inches of soil. Information to be used to assist in determining irrigation requirements.

1.05 SITE DISTURBANCE MINIMIZATION AND EROSION HAZARD REDUCTION

A. The Contractor shall be responsible for minimizing the amount of disturbed area on the site during construction. To accomplish this task the Contractor shall:

1. Install required temporary erosion control measures, as specified on the Drawings prior to initiating any ground disturbing activities within the project site. The Contractor shall notify the Engineer when all temporary erosion control measures have been installed. The Engineer shall, within 24 hours following such notification, inspect all temporary erosion control measures installed by the Contractor. Following inspection the Engineer will notify the Contractor, in writing, that the installation of the temporary erosion control measures meets the Contract requirements and authorize the Contractor to proceed with ground-disturbing activities.

2. Limit site access to the approved site access locations shown on the Drawings unless otherwise authorized in writing by the Engineer.

3. Limit the amount of exposed soils, in areas where vegetation removal is required, to the smallest practical area and for the shortest practical time period.

4. Extract, salvage, and store all woody vegetation that has to be removed during construction but which can be replanted following the completion of construction.

    (a) Salvaged plant material shall be stored in a temporary nursery. The Owner, in conjunction with the Engineer, shall designate the approved location of the temporary nursery area prior to the initiation of plant salvage activities.

    (b) The Engineer will review and approve the Contractor's plant salvage methods prior to the initiation of plant salvage activities.

    (c) The Contractor shall provide temporary irrigation as necessary to maintain healthy plants based on site and climate conditions at the temporary nursery location.

5. Salvage and stockpile onsite soils removed during clearing and grading activities and designated as suitable for reuse within the project site.

    (a) All salvaged soil shall be covered with erosion control fabric or plastic to prevent wind or rainfall induced erosion.

    (b) Protective covering shall be anchored around the edges of the stockpile area using sandbags or other anchoring systems as approved by the Engineer.

6. Protect all vegetation within the project site that has not been specifically identified for removal or that is outside of any areas designated for clearing, grading, or construction activities. Vegetation to be preserved shall be identified and clearly marked using florescent pink or florescent orange flagging (attached to each plant) prior to initiation of clearing, grading, or construction activities.

    (a) Vegetation to be preserved shall include all existing vegetation vital to streambank stabilization that is not within a designated clearing, grading, or construction area.

    (b) Any vegetation providing food and/or critical habitat for any species listed as rare, threatened, or endangered by any Federal or state agencies shall be preserved. Such vegetation shall not be located within any areas of the project site designated for clearing, grading, or construction activities.

    (c) All vegetation within the delineated boundaries of jurisdictional or regulated wetland areas shall be preserved unless otherwise directed by the Engineer or as identified on the Drawings.

(d) Any impacts to vegetation within delineated wetland area caused by or related to clearing, grading, or construction related activities within the project site shall be mitigated in accordance with applicable Federal, state, and/or local regulations.

(e) The Contractor shall be responsible for insuring that any Federal, state, or local permits required to alter delineated jurisdictional or regulated wetlands have been acquired and are included as part of the Contract Documents.

7. The Contractor shall establish all clearing limits within the project site in accordance with Contract Documents. Clearing limits shall be delineated in the field using "Hi-Vis Barrier Fencing" or authorized substitute.

(a) The barrier fence shall be installed by attaching the fence material to 6-foot metal fence posts driven into the ground a minimum of 2 feet at 6-foot intervals along the edge of those areas within the site that are not designated for clearing, grading, or construction related activities. The barrier fence shall be attached to the fence posts using loops of No. 9 wire; three loops spaced equidistant along each fence post.

(b) The Contractor shall install barrier fence around all areas where existing vegetation is to be preserved or protected.

(c) Barrier fence is reusable and shall be removed after all construction-related activities within the project site have ceased or as directed by the Engineer.

B. The Contractor shall notify the Engineer when ground-disturbing activities have ceased within an area of the site where all construction activities (excluding those activities inside of structures) has been completed.

1. This notification shall occur within 24-hours following the completion of ground-disturbing activities.

2. The Engineer shall inspect those areas and notify the Contractor, in writing, that the Contractor shall apply erosion control seed/mulch mixtures to reduce or eliminate erosion hazards within those disturbed areas.

3. The Contractor shall, within 24-hours after receiving notification from the Engineer, apply erosion control seed/mulch mixes in accordance with the Contract Documents.

1.06 ACQUISITION OF PLANT MATERIALS

A. The Contractor shall obtain all live plant materials (cuttings and whole plants) from local plant suppliers (nurseries, landscaping companies, plant collectors, etc.). All live plant material shall be from plant stocks grown within a 50-mile radius of the project site. Locally grown or harvested plant materials are generally better adapted to local growing conditions and tend to be more resistant to plant diseases and climatic

variations than plants grown or plant materials harvested from outside the local area of the project.

1. If the Contractor is unable to obtain the specified plant materials from the local area the Contractor shall notify the Engineer in writing regarding the inability to obtain specified plant material. The Engineer shall notify the Contractor in writing regarding authorized plant material substitutions or alternative sources.

B. The Contractor shall abide by all Federal, state, and local regulations regarding the collection of plant materials. The Contractor shall be responsible for obtaining all required collection permits (or shall insure that the Contractor's plant material supplier has obtained all required collection permits) from any and all Federal, state, or local jurisdictions with permitting or regulatory authority regarding plant material collection.

1. In addition to any and all Federal, state, and local permits or authorizations the Contractor shall insure that any plant materials collected on private property were obtained with written permission or authorization from the property owner.

C. All plant materials (cuttings or whole plants) collected from natural (non-nursery) locations shall be collected during the time period when those plants are dormant. All whole plants collected from natural (non-nursery) setting shall be collected in such a manner as to protect the plant's root system from a distance 3 inches to 6 inches outside the drip line of the plant to the stem and to a depth equal to or slightly greater than the radius of the drip line. All whole plants collected form natural (non-nursery) settings shall have the excavated root ball wrapped in burlap (tied with twine) to protect the root system.

PART 2 -- PRODUCTS

2.01 FERTILIZER

A. The Contractor shall have the native soil, within the project site and in those areas where plant materials (cuttings or whole plants) will be installed, tested to determine if fertilizers need to be added to the soil to assure viable plant growth and survival. The addition of fertilizer to the soil will not be required except in those soils with test results indicating low soil fertility or low organic content.

B. The Contractor shall ameliorate natural soils with low soil fertility values with commercial, chemical type fertilizer, which has a certified composition of 10 percent nitrogen, 10 percent available phosphoric acid, and 10 percent soluble potash (10-10-10). Any chemical fertilizers added to the native soils shall be of a type that conforms to all applicable Federal, state, and local laws and regulations. Fertilizer shall be applied at a rate of 500 to 700 pounds per acre. The Contractor shall supply the fertilizer in one of the following forms:

1. A dry free-flowing granular fertilizer, suitable for application by an agricultural or commercial grade fertilizer spreader.

2. A soluble form that will permit complete suspension of insoluble particles in water, suitable for application by a power sprayer (or commercial hydro-seeder).

3. A homogenous pellet, suitable for application through a "Ferti-Blast™" gun or other similar device.

4. A tablet or other form of controlled release with a minimum one-year release period.

C. The Contractor shall be responsible for assuring the application of fertilizers is consistent with Federal, state, and local laws and regulations particularly in those areas within 25 feet of open water or wetland ecosystems.

D. The Contractor shall provide the fertilizer in the form specified by the Contract Documents or as directed by the Engineer.

E. The Contractor may, with written authorization from the Engineer, use natural, composted materials to elevate low soil fertility. The Contractor shall provide the Engineer with the results of soil fertility tests conducted to evaluate the fertility of the native soil/organic compost mixture.

2.02 LIME

A. The Contractor shall apply agricultural lime to the native soils unless soil test results indicate that the addition of agricultural lime is unnecessary.

B. The Contractor shall provide the Engineer with test results indicating the application of agricultural lime is unnecessary.

C. Agricultural lime shall be of a standard manufacture, flour grade, meeting the requirements of ASTM C-602.

2.03 WHOLE LIVE PLANTS

A. The following describes the types of whole live plants that may be required as a part of this contract.

1. Seedlings: Plants grown from cuttings, seeds, or other approved propagation methods (i.e., air rooting). These plants do not normally show form characteristics of the species and are generally less than three years of age and less than 24 inches in height. Measurement for purposes of payment or design is in 3-inch height increments.

2. Whips: Bareroot, broadleaf trees, generally unbranched and between 2 feet and 6 feet in height. Measurement for purposes of payment or design is in 1-foot height increments.

3. Broadleaf Trees: Branched deciduous trees over 6-feet in height. Measurement for purposes of payment or design is by mainstem diameter or in 1-foot height increments.

4. Coniferous Trees: Coniferous trees over 2 feet in height. Measurement for purposes of payment or design is in 1-foot height increments.

5. Shrubs: Typically multi-stem or single-stemmed plants species that are less than 30 feet in height at maturity. Shrubs used in restoration projects are typically between 2-foot and 4-foot in height when delivered to a project site. Shrubs can be either delivered with a burlap wrapped root ball or in containers ranging from a 1-gallon to 5-gallon size. Measurement for purposes of payment or design is typically by container size or in 1-foot height increments.

6. Groundcover Species: Typically low growing or prostrate plants delivered to a project site in 4-inch, 6-inch, 10-inch, or 1-gallon size nursery pots. The species can vary form woody to herbaceous plants. Measurement for purposes of payment or design is typically based on container size.

2.04 MULCH AND OTHER AMENDMENTS

A. Bark or Wood Chip Mulch: Bark or Wood Chip Mulch shall be derived from pine or hemlock species. Local hardwood species can be used with authorization from the Engineer. The mulch shall be ground so that a minimum of 95 percent of the material by loose volume will pass through a 1.5-inch mesh screen (sieve) and no more than 55 percent of the material by loose volume will pass through a ¼-inch mesh screen (sieve). The mulch shall not contain any resin, tannin, or other compounds in quantities that would be detrimental to plant life, water quality or aquatic organisms.

B. Wood Cellulose Fiber Mulch: Wood Cellulose Fiber Mulch shall be used, as part of the hydro-seeding application shall be a fibrous wood cellulose product produced and marketed specifically for use in hydro-seeding applications. Mulch shall be produced from natural or recycled wood fiber such as woodchips, mill wastes, logging slash, or recycled construction wastes.

1. Mulch shall be free of any rock, plastic, metal, or other non-woody material.

2. Mulch shall be treated with a non-toxic green dye that facilitates inspection and application. The dye must be certified to contain less than 250 ppm of boron and certified as non-toxic to both plants and animals.

3. Mulch shall be manufactured in such a manner that after addition to water and agitation in slurry tanks the fibers stay uniformly suspended to form homogenous slurry.

4. When hydraulically applied to the ground the mulch shall allow the absorption and percolation of water.

5. Each package of mulch shall be tagged or marked to show dry weight and a certification of at least 93 percent organic content on an oven-dry basis as determined by ASTM 586.

6. The moisture content of the mulch shall be no greater than 15 percent as determined by oven-dried weight.

2.05 SEED

A. The Contractor shall supply specified seed mixes, which are certified a minimum of 95% pure with a germination rate of 80% or greater, to the project site in the supplier's original, unopened bags. The Contractor shall insure that a certification tag is attached to each bag that displays or clearly identifies:

1. Scientific and common names of the seed

2. Species names of all grass, legume, or cover crop seed included in the mix

3. Lot number of the mix

4. Percentage of weed seed and inert material

5. Germination rate

6. Purity percentage

2.06 SOD

A. Sod shall contain a minimum of 85% perennial grass species adapted to average climatic conditions at the project site. Any proposed substitute grass seed mixes, available in the local market at the time sod is to be installed at the site, shall be submitted to the Engineer for review and approval.

1. Sod shall be field grown for one calendar year or longer and have a well-developed root structure.

2. Sod shall be free of thatch, weeds, undesirable plant species, nematodes, diseases, and insect damage.

3. Sod shall be free of stones larger than 1-inch diameter, large chunks (>1 cubic inch in size) of woody material, and all human-made products such as plastic, glass, metal objects, and concrete.

4. Prior to harvest the sod shall be green, in an active and vigorous state of growth, and mowed to a height not less than ¼-inch and no greater than 1-inch.

5. Sod shall be cut in rectangular pieces with straight edges. Any sod with torn ends or irregular edges shall be rejected by the Engineer.

2.07 TALL WOODEN STAKES

These shall be untreated wooded stake or poles, preferably cedar, 5 feet to 8 feet in length, and either nominally 2-inch by 4-inch dimension lumber or 3-inch diameter poles.

2.08 TACKIFIER

A. Tackifier used in hydro-seeding or mulching applications to hold the seed or mulch product to the soil or slope shall conform the following:

1. Tackifier shall be derived from organic plant sources containing no growth or germination inhibiting materials.

2. When combined with water the tackifier shall have the property of even dispersion and suspension and shall blend evenly in slurry (i.e. a water and wood cellulose fiber mix).

3. Tackifier shall be mixed with a dyed wood cellulose fiber at a rate of 150 pounds of fiber per acre to monitor application rates and coverage.

2.09 EROSION CONTROL FABRICS/GEOSYNTHETICS

A. Acceptable erosion control products include:

1. Jute Matting or Coconut Fiber (Coir) Matting - Natural fiber products that are woven into a fabric that is typically produced in widths ranging from 4 feet to 16 feet (or more) and delivered to the end user in rolls. These materials are generally rolled out over an area of disturbed soil to stabilize the soil, reduce splash erosion, and provide a seedbed for the erosion control seed mix. This product shall be anchored using nine-inch 2-legged wooden or metal staples or as otherwise specified by the product manufacturer.

   (a) Jute matting or coconut fiber matting shall be provided in rolls that are 4 feet (48 inches) wide and 50 yards (150 feet) with finished edges on the long sides.

   (b) The matting shall be a woven material made of twisted, unbleached "yarn" with a weave opening of ¼-inch to ¾-inch square.

   (c) Selected materials used shall be consistent with the site conditions, anticipated runoff velocities, soil characteristics, and rainfall intensities. The Engineer prior to procurement and delivery to the site shall approve selected materials.

   (d) All manufacturers' specifications shall be provided to the Engineer for approval.

2. Erosion Control Blanket - Manufactured product combining two layers of woven synthetic material with a layer of straw, coconut fiber, shredded bark, or wood fiber (excelsior) sandwiched between the synthetic fabric layers. This product is manufactured in rolls of varying widths and lengths and is available from a variety of manufacturers and suppliers. Acceptable manufacturers include Belton Industries,

North American Green, and CSI Geosynthetics. Products vary in specification and shall be selected based on their applicability to the project site conditions. Product is anchored using nine-inch, 2-legged wooden or metal staples or as specified by the product manufacturer.

(a) Selected material used shall be consistent with the site conditions, anticipated runoff velocities, soil characteristics, and rainfall intensities.

(b) All manufacturers' product specifications shall be provided to the Engineer for approval.

3. Plastic (Polyethylene) Sheeting - This product is used to temporarily cover exposed soils to prevent erosion or to cover areas where seed has been applied but temperatures are below germination levels and surface erosion risk is moderate to high. This product is generally anchored with sandbags.

(a) Plastic sheeting shall be clear and a minimum thickness of 6 mils.

4. Cellular Confinement System - the cellular confinement system shall meet or exceed the following specifications:

(a) Expanded Dimension: 8 feet x 20 feet

(b) Collapsed Dimension: 11 feet 5 inches by 5 inches

(c) Panel Thickness (Nominal): 0.047 inches

(d) Panel Weight: 57 pounds (deeper cells weigh more)

(e) Individual Cell Depth: 4 inches (other depths available)

(f) Cell Area: 38 square inches

(g) Cell Seam Node Pitch: 13 inches

(h) Welds per Seam: 3

(i) Seam Tensile Peel Strength: 225 PSI

(j) Installation Temp. Range: -16 degrees to 110 degrees F.

(k) Polymer Material: HDPE (High Density Polyethylene)

(l) Color: Black

(m) Carbon Black Content: 2%

(n) Chemical Resistance: Superior

2.010 WARRANTY

A. The manufacturer shall warranty that the products under this specification are free from defects in materials and workmanship.

B. The Contractor is responsible for ensuring the quality of all materials upon receipt, and that materials installed are as specified. The Contractor shall replace and/or reinstall any materials deemed defective by the Engineer at no additional cost to the Owner.

PART 3 -- EXECUTION

3.01 GENERAL

A. Weather Conditions:

1. The Contractor is responsible to monitor weather conditions and weather forecasts to ensure that no areas of exposed soil shall be developed unless the appropriate erosion control measures can be implemented at least 12 hours prior to a predicted rain event.

2. No seeding, fertilizing, or mulching shall be done:

   (a) when wind velocity exceeds 4 mph

   (b) within 12 hours after rain

   (c) when ground is frozen

   (d) if compacted soils have not been scarified prior to application

B. Soil Preparation:

1. The ground to be seeded or planted shall be graded in conformance with the Contract Drawings unless otherwise directed by the Engineer.

2. The ground shall be scarified (loosened) to alleviate compaction and manipulated to remove large rocks (>3-inch diameter), roots or pieces of wood (>24 cubic inches) and all human-made materials exposed within the seeding, planting, sod installation, and/or erosion control fabric or cellular confinement system placement areas.

3. The Contractor may leave larger rocks and roots or pieces of woody debris if authorized by the Engineer or as shown on the Contract Drawings.

C. Grading and Shaping:

1. Unless otherwise specified, slopes steeper than 4:1 shall be graded and shaped to promote plant establishment.

2. In all areas where over-excavation is specified to allow incorporation of soil amendments, the Contractor shall notify the Engineer within 24 hours prior to final over-excavation grading and prior to the incorporation of any soil amendment products.

3. No soil amendment products shall be added to the native soil material until the Engineer approves the amendment.

4. Final grades shall be the elevation of the ground as shown on the Contract Documents after all soil amendments have been added.

5. The Contractor shall notify the Engineer within 48 hours prior to completion of final grading.

6. Final grading shall be inspected and approved by the Engineer. Unless otherwise authorized the Contractor shall not commence seeding, sod installation, erosion control fabric placement, installation of cellular confinement systems, or construction of bank stabilization measures until the final grading has been approved.

D. Soil Amendments:

1. Prior to seeding any areas the soil will be tested to determine the need for the addition of agricultural lime, organic compost, and/or fertilizers. The Engineer will collect the appropriate samples and submit those samples for testing. Results of the testing will be transmitted to the Contractor to allow determination of soil amendment needs.

2. Soil amendments such as fertilizer, lime, and mulch may be added separately as in the Dry Method described below (see Section 3.02) or incorporated into a water-based homogenous slurry that is applied by hydroseeding methods (see Section 3.03).

3. Soil amendments shall not be applied by water-based slurry on slopes steeper than 3:1.

3.02 DRY METHOD SEEDING

A. Seeding: The Contractor shall notify the Engineer not less than 24 hours in advance of any seeding operation and shall not begin work until area prepared or designated for seeding have been approved. Following approval by the Engineer, seeding shall commence as soon as possible. Seed shall be applied at the specified rate and with the seed mix specified in the Contract Documents. Dry seeding shall be conducted with one of the following procedures:

1. Use an approved blower system with an adjustable disseminating device capable of maintaining a constant measured rate of material discharge that will provide an even distribution of seed at the rate specified and in the area specified;

2. An approved power-drawn drill or seeder capable of maintaining a constant measured rate of material discharge that will apply an even distribution of seed at the rate specified and in the area specified;

3. A hand-operated seeder capable of maintaining a constant measured rate of material discharge that will an even distribution of seed at the rate specified and in the area specified; or

4. By hand broadcasting with frequent assessment of application rates. If hand applications are used the seed shall be incorporated into the upper ¼-inch of topsoil using rake or other method approved by the Engineer.

B. Any reseeding ordered by the Engineer and not considered to be the Contractor's responsibility shall be performed by the Contractor and Payment made at unit contract prices for the areas reseeded.

C. Fertilizer: Fertilizer shall be applied in accordance with the procedures and requirements specified for seeding in Section 3.02.A. Fertilizer shall be placed at the rate and composition specified.

1. If specifications are not provided in the Contract Documents, fertilizer application rates and composition shall be determined by the results of a certified soil nutrient analysis.

   (a) The Contractor shall collect soil samples from within the project area and from stockpiles of soils imported to the site prior to initiating construction.

   (b) The Contractor shall submit the samples to a certified testing facility for soil nutrient analysis.

   (c) The Contractor shall forward the results of the soil nutrient tests along with recommended fertilization rates to the Engineer for review and approval.

2. Aerial or broadcast application of fertilizer application within 25 feet of the edge of an open, flowing or still, body of water or wetlands shall be prohibited.

3. Spot applications of fertilizer may be made, as necessary, within 25 feet of open water or using equipment other than aerial application equipment or blowers. Caution shall be exercised when applying fertilizer adjacent to a water body or wetland because of the risks of adversely impacting water quality (and aquatic organisms).

D. Mulch Application: Specified mulch shall be spread evenly at the specified rates or 1,500 pounds over seeded areas within 24 hours after seeding unless otherwise directed by the Engineer.

1. Distribution of straw mulch shall be by means of an approved type mulch spreader, which utilizes forced air to blow mulch on seeded areas. In spreading straw mulch, the Contractor shall not use equipment that chops the straw into short (less than 6 inch) stalks.

2. In areas that are not accessible by mechanized mulching equipment, the Contractor shall mulch the area using hand methods approved by the Engineer.

3.03 HYDROSEEDING

A. Equipment: Hydroseeding is a method of applying a slurry-mixture that may contain grass seed (and/or the seeds of other native plants), fertilizer, wood cellulose fiber (dyed), tackifier, and water. The components of a hydroseed mix shall be mixed in tank (part of an approved hydroseeder) that uses water as a carrying agent and maintains continuous agitation and circulation through the use of internal mixing paddles (inside the mixing tank). The mixture shall be homogenous and dischargeable through a nozzle.

1. The approved hydroseeder shall have sufficient tank capacity to be able to cover ½-acre of seeding area per tank load.

2. The tank shall have a discharge system capable of discharging slurry at a continuous, uniform, specified application rate at a distance of 500 feet horizontally from and at an elevation difference of 150 feet vertically above the hydroseeder.

3. Discharge lines shall be large enough to prevent blockage as slurry passes through the lines.

4. The hydroseeder shall be equipped with discharge spray nozzles that will provide a uniform distribution of the specified slurry.

5. The Engineer shall inspect and authorize use of any hydroseeder delivered to the project site prior to the Contractor initiating any hydroseeding activity.

B. Mixture: The following mixture shall be used unless an alternate is approved by the Engineer:

1. Proportions per acre are:

   (a) 2,500 pound of wood cellulose fiber mulch,

   (b) 120 pounds of tackifier or soil stabilizer,

   (c) 60 pounds of fertilizer (or more if soil nutrient tests indicate a high nutrient need),

   (d) 3,000 gallons of water, and

   (e) Grass seed, using the specified seed mix and application rates.

2. Preparation: As the mixture components are being placed in the tank the agitator should be running at a slow to medium speed to assure good blending of the materials and a complete homogenous mixture of the ingredients.

   (a) fill the tank 1/3 full of water,

(b) add ½ of the total amount of tackifier or stabilizer needed,

(c) add three 50 pound bales of wood cellulose fiber,

(d) add ½ the total fertilizer required.

(e) add enough water to bring the tank to half and increase the speed of the agitator to a fast speed.

(f) add remaining 200 pounds of wood cellulose fiber when the tank is ¾-full.

(g) add remaining tackifier and fertilizer.

(h) add remaining water and begin immediately to apply slurry to areas designated for seeding.

C. The grass seed to be used for this project shall be specified Contract Documents, in pertinent Special Provisions, or by the Engineer.

1. Application:

(a) All of the slurry prepared must be applied within two hours following the start of mixture preparation.

(b) Slurry shall not be applied if there is a forecast for rain within 3 days following application.

3.04 SOD PLACEMENT

A. Sod Placement Period: Sod placement will be authorized by the Engineer after determining the earliest and latest start dates that will allow for a reasonable chance of success when sod is installed. The installation may start as early as May 15th and should be completed prior to November 1st each year.

B. Designated Sod Placement Areas: Sod shall be placed in areas as designated on the Contract Drawings or as directed by the Engineer.

C. Sod Placement Procedures: The Contractor shall notify the Engineer a minimum of 48 hours prior to sod installation to allow an inspection of the prepared areas. The Contractor is responsible for insuring the sod placement area has smooth scarified soils, is properly graded, has an appropriate soil moisture prior to sod placement, and is free of larger rock (>2-inches diameter), woody debris, and human-made products.

1. On long steep slopes sod shall be laid perpendicular to the fall line of the slope.

2. In ditches sod shall be laid at right angles to the flow line.

3. When required, or as directed by the Engineer, sod sections placed on steep slopes shall be pinned using 2 anchoring pins on each side of the sod section.

4. All air pockets shall be removed from under the sod by trampling or rolling with a compacting roller.

5. Frayed ends of sod sections will be removed. Holes in sod area shall be patched with new, undamaged sod.

D. Finishing: The Contractor shall ensure the sod installation results in smooth parallel rows tightly packed together and in a relatively straight line. Sod sections shall be placed immediately adjacent to one another, as tightly packed together as possible. All joints shall be butted tightly together and staggered laterally. Sod sections shall not be stretched or reduced in size so they will fit.

E. Watering: Irrigation may be required in sodded areas installed during the warmer, drier periods of the year. The Contractor shall have appropriate temporary irrigation equipment on site prior to starting the installation of sod. Irrigation of the sod shall commence at the end of the first day sod placement in initiated. Watering shall be provided at a rate of 1.5-inches per week (7 days). Watering shall be the responsibility of the Contractor.

3.05 EROSION CONTROL PLAN IMPLEMENTATION

A. Silt Fence Installation: Silt fence shall be installed as shown on the Contract Drawings, as described in the Temporary Erosion and Sediment Control Plan (TESCP) or as directed by the Engineer. Silt fence shall be installed a minimum of 48 hours prior to the time the Contractor initiates construction activities (i.e. clearing, grubbing, and grading).

B. Erosion Proofing Ingress/Egress Points: The Contractor shall place quarry spalls at all ingress/egress points on the site that are transitions for pavement to grassed or bare native soil. These transition areas will be 24 feet long and 12 feet wide. The Contractor shall place a geo-textile on the native soil prior to placing quarry spalls to prevent spalls from being pushed into the ground during wet site conditions.

C. Application of Straw Mulch: See Section 3.02.C.

D. Erosion Control Blankets:

1. Placement:

   (a) Biodegradable erosion control blanket shall be used on all slopes 4H:1V and steeper.

   (b) The erosion control blanket shall be spread only on prepared, fertilized and seeded surfaces.

(c) On all slopes, the erosion control blanket shall be laid up-and-down the slope in the direction of water flow.

(d) Waste of erosion control material shall be minimized by limiting overlaps as specified and by utilizing the full length of the netting at roll ends.

(e) The erosion control blanket shall also be used on flatter areas where surface soil protection is considered critical to the establishment of vegetation and stabilization of erosive forces (i.e. water, wind, raveling, drying, etc.).

(f) Proper selection of materials is critical for specific slopes and slope distances. No one product is applicable for all situations. The erosion control products should be selected on a case-by-case basis in consultation with the manufacturer.

2. Anchoring Process:

(a) Ends and sides of adjoining pieces of material shall be overlapped 6-inches and 4-inches respectively and stapled. Six anchors shall be installed across ends. A common row of staples shall be used at side joints. Staple through both blankets, placing staples approximately 6-inches apart.

(b) The top edge of the erosion control blanket shall be anchored in a 6-inch deep by 6-inch wide trench. Backfill and compact trench after stapling.

(c) Anchorage shall be by means of 9-inch long, two-legged staples driven vertically and full-length into the ground. The legs shall be spread 3 inches to 4 inches apart at the ground to improve resistance to pullout. In loose soils the use of 18-inch metal/washer pins may be required to properly anchor the blankets.

(d) All 3:1 or greater slopes shall be stapled with 2 staples per square yard in a triangular pattern. Staples shall be installed per the manufacturer's recommended staple pattern guide.

(e) The erosion control blanket shall not be stretched, but should be laid loosely over the ground to avoid the blanket being pulled downslope.

(f) The erosion control blanket shall not be rolled out onto ground containing frost within the 9-inch penetration zone of the anchorage staples. Further, no stapling shall be undertaken while any frost exists within the staple penetration zone.

(g) Refer to Specification Section 02125 Erosion and Sedimentation Control for additional product requirements.

3.06 BANK STABILIZATION

A. Brush Mattress:

1. General Description: Brush mattress stabilization system is a combination of living material that forms a protective cover of vegetation over a relatively shallow slope (flatter than 2H to 1V gradient). The eroding surface shall be protected by placing layers of live branch cuttings directly on the slope with the basal ends of the cuttings located at or very near the toe of the slope and the growing tip oriented up the slope parallel to the fall line. Live stakes interspersed in the brush mattress shall be used as anchor points for tying a network of heavy duty landscaping twine to bind the brush mattress to the slope. In addition the toe of the treated slope shall be protected with either live or dead fascines anchored into the slope using stout stakes.

2. Construction Requirements:

    (a) Preparation Time: Live branch cuttings shall be collected locally and within 5 days prior to planned installation. Live cuttings shall be stored in a cool, shaded area to avoid desiccation. Live stakes and live fascines (bundles of live branch cuttings) shall be prepared immediately (within 1 day – 24 hours) prior to installation.

    (b) Planting Period: Plants shall be planted when willows or other suitable species used are dormant. This period extends from the time the leaves start to turn yellow in the autumn to the time new growth starts in the spring.

    (c) Construction Sequence:

    (d) Anchor the lower edge of the brush mattress in a trench, using a fascine to anchor and protect the lower bank edge from undermining.

    (e) Place live branches on slope with butt ends pushed into soil below the mean high water level with growing tips placed at a slight angle in the direction of stream flow.

    (f) Branches shall be placed to give coverage of approximately 4 branches every 6 linear inches.

    (g) Pound wooden stakes to ½ their length into soil between branches 3-feet on center.

    (h) Wrap wire or jute (heavy duty landscaping twine) around stakes and over branches as tightly as possible.

    (i) Once the twine or wire has been placed and made as tight as possible by hand, pound wooden stakes further into the ground to tighten the wire or jute and compress branches to slope.

    (j) Tamp live stakes between wooden stakes.

(k) After fascines and branches are installed, place soil on top slightly exposed material. Fill voids between the branches of the brush mattress with loose soil to promote rooting.]

B. Branch Packing:

1. General Description: Branch packing is a process of placing alternating layers of live cuttings and soil in a hole, gully, or slump area in a slope or streambank. Live cuttings shall be oriented so the growth end points out of the hole, gully, or slump area and the basal end is embedded into the native soil. The layers of live cuttings shall be placed at approximately a 20-degree to 30-degree angle above horizontal with the growth end higher in elevation than the basal end. In large hole, gully, or slump areas dormant posts or tall wooden stakes shall be installed vertically, within the area being stabilized, in a pattern designed to allow a network of heavy landscaping twine to be tied to the vertical posts and over the top of the last live branch layer to hold that layer in place. The last layer of live branch cuttings shall be covered with soil. In addition, the vertical posts or stakes add horizontal stability to the layers of live cuttings.

2. Construction Sequence:

(a) Begin at the lowest point, drive stakes 3 to 4 feet vertically into the ground. Set the stakes 1 to 1.5 feet apart.

(b) Place an initial layer of branches 4 to 6 inches thick at the bottom between the vertical stakes. Place additional branches in a crisscross pattern covering the entire surface of the layer. Add a layer of soil no thicker than 120 inches and compact it.

(c) The thickness of the layer shall be determined by the steepness of the slope (thinner when steeper) and/or problems with bank seepage.

(d) Growing tips of branches shall protrude slightly from the filled surface to retard velocity and filter sediment.

(e) Growing tips of branches shall protrude slightly from the filled surface to retard flow velocity and filter sediment.

(f) Install a relief drain at the rear of the trench and above the base flow level. Place outlet at or above flow level to protect against further slumping.

(g) The final installation shall conform to the existing slope.

C. Brush Layering:

1. General Description:

(a) A layer of soil shall be wrapped in a coir fabric to form an approximately 12-inch thick "soft gabion" which shall be placed over the layer of live cuttings. More live cuttings shall be placed on top of the soft gabion and another soft gabion shall be placed on top of those cuttings and so on.

(b) Alternating layers of live cuttings and soft gabions shall be installed so the face of the gabions forms a slope ranging from 1H:1V to 3H:1V. The live cuttings shall protrude out of the soft gabion reinforced slope face approximately 2 to 3 feet.

(c) Brush layering/soft gabion systems over 7 feet in height and 20 feet in length shall have an Engineering analysis for completed determine slope stability prior to construction. The Contractor shall be consult with the Engineer prior to initiating construction of a vegetated soft gabion wall. The Contractor shall be responsible for collecting slope and soil stability information at slope or bank restoration sites where brush layering/soft gabion systems are proposed for installation.

2. Construction Sequence:

(a) The slope shall be prepared by excavating a native soil bench at the lowest elevation of the affected area. In the case of a streambank that is typically at the ordinary high water mark.

(b) The bench shall be constructed the full length of the effected area and shall be reinforced at the toe of the effected area using rock or dead plant cutting fascines to protect the toe from additional erosive forces. The bench shall be cut into the slope approximately 4 to 6 feet at a downward angle of approximately 5-degrees. The back slope of the treatment area is shall be cut at 0.5 to 1 or steeper.

(c) Soil excavated from the treatment area during the construction of the bench shall be stockpiled in an area designated by the Engineer. This soil shall be mixed with fertilizer and mulch.

(d) Live branch cuttings; shall be collected locally, brought to the project site, inspected and approved by the Engineer. Following acceptance by the Engineer, the Contractor shall place the bundles of live cuttings in close proximity to the work area. The Contractor shall protect the cuttings from animal damage and desiccation.

(e) After excavation has been completed, the soil has been removed and the treatment area has been prepared and a layer of live cuttings shall be placed in the bottom of the cut bench and covered with native soil. The basal end of the cuttings shall be pushed into the soil at the vertical slope to provide contact with groundwater. The basal end of the cuttings shall be placed into the treatment

area so they are oriented perpendicular to the slope face. The growth end of the cuttings shall protrude from the bank approximately 2 to 3 feet. There shall be 8 to 12 live cuttings per linear foot of bench in each brush layer.

(f) After the brush layer has been placed, roll out the coir fabric over the top of the live cuttings, insuring the selvage edge on one side of the roll is against the back slope of the cut-bench. Lay the remaining width of the material out so ½ the fabric width is laying flat and the other ½ is bunched up and laying on the live cuttings outside of the area where soil is to be placed.

(g) With the soft gabion fabric in place, add a layer of soil 14 inches to 16 inches thick (loose) and compact to a layer 10 inches to 12 inches thick. Containment boards shall be used to contain the outer edge or nose of the soft gabion and prevent soil from being cast down the slope or into the water.

(h) After the soil has been compacted roll the ½ of the fabric that was not covered by the soil over the top of the soil to form a coir pillow or soft gabion filled with soil.

(i) Using dead stout stakes anchor the selvage edges of the fabric into the back wall of the cut-bench area. The Contractor shall exercise care when anchoring the ends of the soft gabion to avoid having soil emigrate out of the soft gabions and to reduce the risk of failure at the ends of the gabions.

(j) During dry weather conditions the Contractor shall irrigate each brush layer/soft gabion combination.

(k) The Contractor shall continue steps (e) through (i) until the desired elevation has been reached and the bank or slope stabilization area is fully treated.

D. Cellular Confinement Systems:

1. General Description: The cellular confinement system is a three dimensional system used for soil stabilization. It is defined as a series of symmetrical shaped cells joined together sharing common walls such that the final system confines infill material within the cells and reduces both vertical and lateral movement.

2. Construction Sequence:

(a) The Contractor shall verify site conditions are as shown on the Contract Drawings. Notify the Engineer if site conditions are not acceptable. The Contractor shall not begin preparation or installation until unacceptable conditions have been corrected or the Engineer has authorized initiation of work.

(b) The Contractor shall install the cellular containment system according to standard practices recommended by the manufacturer in accordance with the purpose of the application.

(c) The Contractor shall prepare the subgrade in accordance with manufacturer's specifications. Excavate or fill foundation soils so the top of installed cellular confinement system is flush with or slightly lower than adjacent terrain or final grade.

(d) Anchor cellular confinement sections at crest of slope. Use type of anchor and frequency of anchoring indicated on the Contract Drawings or as directed by the Engineer or per the Manufacturer's specifications.

(e) Expand cellular confinement sections down slope. Ensure each Geoweb section is expanded uniformly to required dimensions and outer cells of each layer are correctly aligned. Interleaf or overlap edges of adjacent sections in each layer, according to which sidewall profiles abut. Ensure upper surfaces of adjoining Geoweb sections are flush at joint and adjoining cells are fully anchored. Anchor with specified anchors per manufacturer's recommendations.

(f) Place infill in expanded cells with suitable material handling equipment, such as a backhoe, front-end loader, conveyor, or crane-mounted skip. Limit drop height to a maximum of 1 m (3 feet). Avoid displacement of cellular confinement sections by infilling from the crest to toe of slope. Overfill and compact infill in accordance with consistency of material and cell depth as follows: overfill screened topsoil between 25 50m (1 to 2-inches) and lightly tamp or roll to leave soil flush with top edge of cell walls. Apply specified surface treatment.

E. Live Staking:

1. Construction Sequence:

(a) Plants shall be planted when willow, or other species suitable for use in vegetated riprap projects, is dormant. This period extends from the time the leaves start to turn yellow in the autumn to the time new growth starts in the spring. The Contractor shall schedule plant material installation for early spring just before the plants come out of the dormancy period.

(b) Prior to installation the Contractor shall dip the butt end of all plant specimens (i.e. live stacks) into a liquid mycorrhizae root dip gel (rooting hormone with soil bacteria) to stimulate root growth.

(c) Live stakes shall be planted right side up with the butt ends planted into the ground. In order to identify the top of the stakes, the butt ends should be pointed

or otherwise marked at the time of cutting. Alternatively the tops of the stakes may be painted with a water-soluble latex paint.

(d) The Contractor shall ensure that live stakes are to be planted as deep as possible. About 80 percent of the stake shall be inserted into the ground. The Contractor shall avoid stripping the bark or bruising the stake. The Contractor shall not pound the stakes with an ax or sledge. In hard ground the Contractor shall use an iron bar to prepare holes for the cuttings.

(e) The Contractor shall tamp soil around the live stakes after they have been placed into the ground. The live stakes shall be firm in the ground so that they cannot be easily moved or pulled out.

3.07 IRRIGATION (WATERING)

A. Short-term Irrigation: Trees and shrubs shall be thoroughly soaked after planting and provided with additional water at intervals necessary to provide for good health and growth of the planting. The Contractor shall be responsible for ensuring that adequate short-term irrigation is provided for the project.

1. The Contractor is responsible for providing water for irrigation and must adhere to all related legal and permit requirements.

2. Upon completion of planting, all planted and seeded areas within the project site shall be soaked to saturation by a fine spray. The new plantings and seedings shall be watered by an on-site sprinkling system during dry weather or whenever necessary for proper establishment of the planting and/or seeding until final project acceptance.

3. At no time shall the planting be allowed to dry out.

4. The Contractor shall implement appropriate measures to avoid excessive watering, soil washing (sheet erosion), excessive soil saturation, and/or areas of excess standing surface water.

5. Any damage to soils or plants that result from the Contractor's excessive or irregular irrigation (watering) practices shall be repaired within 24-hours by the Contractor at no additional cost to the OWNER.

6. Long-term Irrigation: The Contractor shall be responsible for providing an appropriate irrigation system to allow for watering of planted and seeded areas, that were constructed during as part of the project.

7. The Contractor shall provide irrigation after the initial construction period and throughout the maintenance and guarantee period. This Contractor responsibility extends to any performance monitoring periods that may be associated with agency permits issued to authorize the project work.

8. The Contractor shall review all short-term and long-term irrigation system proposals with the Engineer to ensure that said systems are adequate. No irrigation systems shall be installed or implemented without review and approval by the Engineer. Approvals from the Engineer shall be obtained 2-weeks prior to the time to begin required irrigation.

3.08 MAINTENANCE PRIOR TO ACCEPTANCE

A. The Contractor shall maintain the planted areas in a satisfactory condition until final acceptance of the project. Such maintenance shall include the filling, leveling, and repairing of any washed or eroded areas, as may be necessary, and sufficient watering to maintain the plant materials in a healthy condition. The Engineer may require replanting of any areas in which the establishment of the vegetative ground cover does not appear to be developing satisfactorily.

1. Plants shall be maintained in a vigorous, thriving condition by watering, cultivating, weeding, pruning, spraying, and other operations necessary. No trees or shrubs will be accepted unless they are healthy and show satisfactory foliage conditions.

B. At time of acceptance of the completed project, all seeded areas shall be totally established with no bare spots. In addition, all seeded areas shall have no more than 5 percent aerial coverage by non-native invasive plant species and 0 percent aerial coverage by noxious weeds.

C. At the time of acceptance of the complete project all planted areas shall have a minimum of 85 percent survival of vegetative species (trees, shrubs, perennials).

D. Vegetation/Pest Management:

1. Maintenance of grass species within the erosion control areas outside a critical wildlife or fish habitat areas shall be undertaken using conventional mowing, trimming, weeding, and other vegetative management techniques.

2. The Contractor shall remove all noxious weeds and non-native, invasive plant species from within the project areas as regularly as necessary to prevent establishment of any noxious or non-native, invasive plant species.

3. The Contractor shall be responsible for the removal of animal pest species from the project area if said pest species are adversely impacting the health of the erosion plantings or seedings.

   (a) The Contractor shall submit a plan for pest control to the Engineer detailing the pest problems and the recommended approach for controlling and/or eliminating said pest problems within the project area.

   (b) The Contractor shall, through consultation with appropriate Federal, state, and local agencies, determine the regulatory requirements related to pest control.

4. Pesticide and herbicide use shall be implemented in accordance with all applicable Federal, state, and local regulations and policies.

    (a) The Contractor shall be responsible for acquisition of all permits and licenses require for use and application of pesticides and herbicides.

    (b) The Contractor shall be responsible for appropriate storage and disposal of all chemical agents used within the project site for the purposes of controlling or eradicating pests or undesirable vegetation.

    (c) The Contractor shall be responsible for all "chain of custody" requirements associated with all chemical constituents used for the control and/or eradication of pest and/or undesirable vegetation.

    (d) The Contractor shall not use pesticides and/or herbicides in critical wildlife and fish habitats (i.e. riparian zones, nesting cover, etc.)

    (e) The Contractor shall employ a licensed pesticide applicator as required by any Federal, State or local laws.

E. The Contractor shall provide adequate protection to all newly seeded areas including the installation of approved temporary fences to prevent trespassing and damage, as well as erosion control, until the end of the one-year correction period.

F. The Contractor shall replace any materials or equipment damaged by its employees or subcontractors.

G. The Contractor shall periodically inspect all erosion control blankets and matting following installation, particularly after rainstorms, to check for erosion and undermining. Any dislocation or failure shall be repaired within 24 hours. If washouts or breakage occurs, the Contractor shall reinstall the material after repairing the damage. The Contractor shall continue to monitor the project until it becomes permanently stabilized.

3.09 FINAL INSPECTION, ACCEPTANCE, AND GUARANTEE

A. Inspection of seeding and planting work shall be completed at conclusion of the maintenance period.

B. Written notice requesting inspection shall be submitted to the Engineer and Owner at least 10 days prior to the anticipated inspection date.

C. The Contractor shall submit inspection reports and/or maintenance records to the permitting agencies that have the ultimate approval authority with regard to when an erosion control project is successful.

D. Final acceptance of the work prior to beginning the guarantee period of the contract will be accepted upon written approval by the Engineer and/or Owner, which is based on the satisfactory completion of all work, including maintenance, but exclusive of the replacement of plant material or any required seeding.

E. The Contractor shall replace, as soon as weather conditions permit, all dead plants and all plants not in a vigorous, thriving condition, which are observed at the end of the one-year correction period.

F. Plants used for replacement shall be of the same size and variety specified in the Contract Documents unless otherwise directed by the Engineer. Plants shall be furnished, planted, staked, and mulched as specified in the Contract Documents.

G. At time of final acceptance of the completed project, all seeded areas shall be totally established with no bare spots. In addition, all seeded areas shall have no more than 5 percent aerial coverage by non-native invasive plant species and 0 percent aerial coverage by noxious weeds.

H. At the time of acceptance of the completed project all areas where bank stabilization techniques were implemented shall have a minimum of 85 percent survival of vegetative species (trees, shrubs, perennials) installed. In addition, the vegetative species (trees, shrubs, perennials) shall provide 85 percent aerial cover.

I. Prior to final acceptance the Contractor shall provide the Engineer with a written report (with photographs) documenting the condition of onsite plants and seedings. This report shall be used as part of the final project inspection and acceptance.

3.010 MAINTENANCE/GUARANTEE AFTER ACCEPTANCE

A. The Contractor shall be responsible for a period of one year after date of acceptance of all work under the Contract, for all plant replacements including trees, shrub seedlings, perennials and any other portion of the bank stabilization treatment requiring maintenance or replacement.

B. The work covered by the maintenance and guarantee portions of these specifications consists of providing all replacements of plants, labor, materials, equipment, and supplies and performing all operations in connection with maintenance and guarantees.

C. The Contractor shall provide the Engineer and Owner with a monthly record describing all maintenance activities performed including dates, materials, irrigation schedule and other pertinent activities. The person who actually supervised and/or performed the work shall sign the report.

D. The inspection of seeded areas is independent of the final inspection and maintenance period.

END OF SECTION

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SECTION 02273
RIPRAP

PART 1 – GENERAL

1.01 SCOPE

A. The Contractor shall provide stone riprap, including associated earthwork and geotextile filter material, complete and in place, in accordance with the Contract Documents.

1.02 REFERENCED SPECIFICATIONS, CODES, AND STANDARDS

A. This Section references the following Commercial Standards:

Georgia Department of Transportation (GA DOT), Standard Specifications Construction of Transportation Systems, 2013 Edition

ASTM C 88	Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C 535	Standard Test Method for Resistance to Degradation of Large Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
AASHTO T 85	Standard Method of Test for Specific Gravity and Absorption of Coarse Aggregate
AASHTO T 210	Method of Test for Aggregate Durability Index. AASHTO T 134
	Optimum Moisture Content

1.03 CONTRACTOR SUBMITTALS

A. The Contractor shall submit samples of all materials proposed to be used in the work in accordance with the requirements in Section GC-28 – Working Drawings, Shop Drawings, Data on Material and Equipment, Samples and Licenses. Sample size shall be as determined by the testing laboratory.

B. Testing certificates from a qualified testing agency shall be submitted prior to acceptance of the rock source to verify the conformity to the requirements of the Contract Documents. Contractor shall, if requested, coordinate inspection of the rock source by the Engineer.

PART 2 – PRODUCT

2.01 STONES FOR RIPRAP

A. All Stone for riprap shall be sound, durable pieces of quarried stone weighing 156-pounds per cubic foot or more. The stone shall be angular and random in shape; rounded boulders or cobbles shall not be used. Flat, slabby, or shaley pieces will not be acceptable. Stones shall be resistant to weathering and to water action and free from overburden, spoil, and organic material and shall meet the gradation requirements below.

B. Riprap shall be of the type indicated on the Drawings and shall conform to the size types as follows:

Type 2 – equivalent to GA DOT specification for "Plain Riprap":

Percent by Weight	Volume (cu.. ft.)	Weight (lb.)	Diameter (in.)
65 – 100 %	0.75 – 2.0	125 - 320	15 – 24
10 – 65 %	0.04 – 0.75	7 - 125	5 – 15
0 – 10 %	0.0 – 0.04	0 - 7	0 – 15

Type 3 – equivalent to GA DOT specification for "Dumped Riprap – Type 3":

Percent by Weight	Volume (cu. ft.)	Weight (lb.)	Diameter (in.)
65 – 100 %	0.10 – 1.0	17 – 65	6 – 18
10 – 65 %	0.01 – 0.1	2 – 17	2 – 6
0 – 10 %	0.0 – 0.01	0 - 2	0 – 2

C. Stones shall consist of durable, sound, hard, angular rock meeting the following requirements for durability absorption ratio, soundness test, and abrasion test:

Durability Absorption Ratio	Acceptability
Greater than 23	Passes
10 to 23	Passes only if Durability Index is 52 or greater
Less than 10	Fails

$$\text{Durability Absorption Ratio} = \frac{\text{Durability Index (Coarse)}}{\text{\% absorption} + 1}$$

D. The durability index and percent absorption shall be determined by AASHTO T 210 and AASHTO T 85, respectively. The minimum apparent specific gravity of the stones shall be 2.5 as determined by AASHTO T 85.

E. Stones shall have less than 10 percent loss of weight after five cycles, when tested per ASTM C 88.

F. Stones shall have a wear not greater than 40 percent, when tested per ASTM C 535.

G. Control of gradation shall be by visual inspection. The Contractor shall furnish a sample of the proposed gradation of at least 5 tons or 10 percent of the total riprap weight, whichever is less. If approved, the sample may be incorporated into the finished riprap at a location where it can be used as a frequent reference for judging the

gradation of the remainder of riprap. Any difference of opinion between the Engineer and the Contractor shall be resolved by checking the gradation of two random truckloads of stones. Arranging for and the costs of mechanical equipment, a sorting site, and labor needed in checking gradation shall be the Contractor's responsibility.

H. The acceptability of the stones will be determined by the Engineer prior to final placement.

2.02 GEOTEXTILE FABRIC FILTER

A. Geotextile fabric shall meet the requirements of GA DOT Section 881.06 for woven fabrics, having physical properties as follows:

Tensile Strength - any direction (ASTM D 4634)	200 lbs Bursting Strength
(ASTM D 3786)	500 psi Elongation Before
Breaking (ASTM D 4634)	10 – 35% Percent Open
Area (GDT: 88)	4.0 – 6.0%

B. Fabric shall be Mirafi Filterweave 403 or approved equal.

PART 3 – EXECUTION

3.01 SURFACE PREPARATION

A. Surfaces to receive filter materials and riprap, including the toe trench and slope, shall be brought to the line and grade indicated and shall be smooth and firm, free of brush, trees, stumps, and other objectionable material. Where filling of depressions is required or a filled bank is constructed, the new material shall be compacted with hand or mechanical tampers to a minimum of 85-percent of maximum density.

B. The Contractor shall remove and exclude all stormwater, groundwater and creek or stream water from the excavation. Sump pumps and sand bags or portable dams, diversions, or other approved means, shall be used to remove and exclude water and continuously maintain water level below the bottom of the excavation. Water shall be removed and excluded until both geotextile filter material and riprap have been placed. Any water removed from the excavation shall not be discharged into any surface stream or other water body unless such discharge meets water quality standards. Removed water may be disposed on-site by land application using sprinklers in an area designated by the Engineer or by discharge into an approved treatment system.

C. Cleared and excavated materials shall be hauled off site to an appropriate disposal location arranged by the Contractor and at its sole expense unless otherwise indicated or specified.

D. Riprap installed at the toe of a stream bank below the elevation of the water in a stream to

prevent scour from undermining the riprap shall be backfilled and covered with native soil to the original grade. The backfilled native soil shall be compacted with hand or mechanical tampers to a minimum of 80- percent of maximum density.

3.02 PLACEMENT OF GEOTEXTILE FABRIC

A. The fabric shall be placed with the long dimension running up the slope, with the upstream strip overlapping the downstream strip. Use a minimum of 2-foot overlap for each overlap. Use a wider overlap if recommended by the geotextile manufacturer.

B. The fabric shall be placed loosely with sufficient folded or gathered material to prevent stretching and tearing during riprap placement.

C. The fabric shall be anchored into place using securing pins with type and spacing as recommended by the manufacturer. In addition, the fabric shall be secured at the toe and crest of the slope using anchor trenches at least 2-feet deep. If a stream bank extends sufficiently above a stream such that riprap would not be installed to the top of the bank, then the fabric shall be anchored in a 2-foot deep trench up-slope from the top of the minimum free-board of 0.5 feet above the flow resulting from a 50-year, 24-hour storm runoff event.

3.03 STONE RIPRAP

A. Placement of riprap shall begin at the toe and proceed up the slope. The stones shall be placed, or dumped from a height of not more than three feet and placed with equipment or by hand. Sufficient hand work shall be performed to produce a neat and uniform surface, true to the lines and grades indicated on the Drawings.

B. Dumped riprap shall be used only where there is an existing road access to the top and/or bottom of the stream bank. Riprap shall be dumped into place, beginning at the toe and proceeding up the slope, and may be spread using suitable equipment. Care must be taken to prevent damage to the underlying filter material. Sufficient hand work shall be performed to produce a neat and uniform surface, true to the lines and grades indicated on the Drawings.

****END OF SECTION 02273****

SECTION 02302
GRANITE CURB

PART 1 GENERAL

1.01 SCOPE

A. Work under this Section furnishing all labor, materials, equipment and incidentals required to install prefabricated granite curb, curb corners, transition curb and curb inlets as specified herein and as shown on the Drawings.

B. The Contractor shall also be responsible for removing and replacing the existing granite curb as specified herein and as directed by the Engineer.

1.02 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:

1. 2 samples of finished product granite curb. Samples shall show anticipated color variations of grain structure, inclusions and other visual characteristics.

2. No final cutting or finishing shall be made until the sample is approved by the Engineer.

1.03 QUALITY ASSURANCE

A. Reference Standards: The Contractor shall comply with the applicable provisions and recommendations of the latest editions of the following standards, except as otherwise shown on the Drawings or specified herein.

1. ASTM C170 – Test Method for Compressive Strength Of Dimension Stone

2. ASTM C615 – Standard Specification for Granite Dimension Stone

3. ASTM C880 – Test Method for Flexural Strength of Dimensional Stone

1.04 DEFECTIVE WORK

A. Any piece of granite showing manufacturing flaws or imperfections upon receipt on the job site shall be referred to the Engineer for a determination on its suitability for installation. If rejected by the Engineer, it shall be immediately removed from the job site.

PART 2 PRODUCTS

2.01 MATERIALS

A. Granite Curb

1. Stone curb shall be granite and shall comply with ASTM C615.

2. The granite shall be sound, durable and free from cracks or seams which impair its structural integrity and of a smooth splitting and machining character. The granite curb shall be approved granite curb and shall match exactly the existing curbs in color, texture and size.

3. Granite curb shall be not less than 3-feet or more than 8-feet in length, 16-inches in depth and matched width at the top or 6-inches wide.

4. Granite curb shall have a saw finish on the top with no projections or depressions greater than 1/8-inch.

5. The front of curb shall be split face and have a batter finished surface. The granite shall have no projections or depressions greater than 1/4-inch to grade line. The remainder of the face shall be free from projections greater than 1-inch.

6. The back of the curb shall be parallel to the face and shall have no projections or depressions which exceed a batter of 1-inch in 3-inches from the top.

7. The ends for the full width of the stone curb shall be close jointed, square to the top and face. The remainder of the end shall be cut so that there will be a close joint.

8. The bottom of the stones shall be square.

B. Concrete: Concrete shall be 3000 psi as specified in Section 03300, Cast-In-Place Concrete.

PART 3 EXECUTION

3.01 SETTING GRANITE CURB

A. Curb trenches shall be opened to their full width and depth well in advance of the setting of the curb. The foundation for the curb shall be concrete. The bottom layer of concrete shall be 6-inches thick. The concrete in front and back of the curb shall be deposited simultaneously to the required height.

B. Curb shall be set with close joints. The top front edge of the curb shall present an unbroken line and the face a plane surface with a batter of 1 to 12.

C. The curb at the corners of intersecting joints shall be of the same quality as the curb hereinbefore specified and shall be set in the same manner. On curbs, where drainage

inlets are located, special shaped stones as may be required shall be furnished and set. At wheelchair ramps and wherever required, transition curb shall be furnished and set.

3.02 REMOVING AND REINSTALLING EXISTING GRANITE CURB

A. In locations where existing granite curb conflicts with pipe installation and hydrant removal and replacement, the Contractor shall remove the existing curb.

B. The Engineer will determine whether any granite curb that removed is acceptable for reinstallation.

C. Removed curb approved for reinstallation shall be cleaned and stored by the Contractor until reinstallation.

D. Reinstallation of curb shall include saw cutting the existing pavement a minimum of 1-inch, removing pavement to subgrade, excavation of base and subgrade as necessary to install the curb, installing the curb and backfilling and compacting the completed installation.

E. Any curb that is damaged by the Contractor, which renders it unsuitable for reinstallation, as determined by the Engineer, shall be removed from the site and be replaced with new curb by the Contractor at no additional cost to the Owner.

+ + + END OF SECTION 02302 + + +

SECTION 02315
EXCAVATION AND BACKFILL FOR STRUCTURES

PART 1 - GENERAL

1.01 SCOPE

A. This section includes excavation and backfill for structures, disposal of excess materials, handling and disposal of contaminated materials, cleanup, and any other similar, incidental, or appurtenant operation which may be necessary to properly complete the Work.

B. The Contractor shall provide all services, labor, materials, and equipment required for all excavation and backfill for structures and related operations necessary or convenient to the Contractor for furnishing a complete Work as shown on the Plans or specified in these Specifications.

C. Related Work Specified Elsewhere:

1. Section 02201 – Site Preparation

1.02 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Requirements of the Contract Documents. In addition, the following specific information shall be provided:

1. The Contractor shall submit a work plan for excavation and backfill for each structure with complete written description, which identifies details of the proposed method of construction and the sequence of operations for construction relative to excavation and backfill activities. The descriptions, with supporting illustrations, shall be sufficiently detailed to demonstrate to the Engineer that the procedures meet the requirements of the Plans and these Specifications.

2. The Contractor shall submit a Surface Water Diversion and Dewatering plan in accordance with the requirements of Section 02885 - Surface Water Diversion and Dewatering.

3. The Contractor shall submit backfill material sources and product quality information.

4. The Contractor shall submit record documents in accordance with the requirements of the General Conditions of these Specifications. The Contractor shall record the locations of sewers, as installed, referenced to survey benchmarks. The Contractor shall include locations of utilities encountered or rerouted. The Contractor shall give

horizontal dimensions, elevations, inverts, gradients, and label type of utility.

5. The laboratory shall submit the following reports directly to the Engineer from the testing services, with a copy to the Contractor:

   a. Test reports on borrow material.
   b. Verification of each footing subgrade.
   c. Field density test reports.
   d. One optimum moisture-maximum dry density curve for each type of soil encountered.
   e. Report of actual unconfined compressive strength and/or results of bearing tests of each strata tested.

1.03 QUALITY ASSURANCE

A. Reference Standards: The Contractor shall comply with the applicable provisions and recommendations of the latest editions of the following standards, except as otherwise shown on the Plans or specified in these Specifications.

1. ASTM C33 - Concrete Aggregates.
2. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
3. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soils Using Standard Effort (12,400 ft-lbf/ft^3) (600 kN-m/m^3)
4. ASTM D1556 - Standard Test Method for Density of Soil in Place by the Sand-Cone Method.
5. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft^3) (2700 kN-m/m^3)
6. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
7. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
8. ASTM D4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

1.04 TESTING

A. Tests and analysis of fill and borrow material shall be performed in accordance with the requirements of ASTM D-698.

B. Testing and analysis of backfill material for soil classification and compaction shall be performed by an approved independent commercial testing laboratory provided by the City in accordance with the requirements of Section 01410 - Testing Laboratory Services. The Contractor shall coordinate testing.

C. Compaction testing will be performed in accordance with the requirements of ASTM D1556 or ASTM D2292.

D. The Contractor shall make all necessary excavations and shall supply any samples of materials necessary for conducting tests.

E. If tests indicate Work does not meet specified requirements, the Contractor shall remove Work, replace, and retest at no cost to the City.

1.05 DEFINITIONS

A. Excavation:

1. Removal of earth and rock to form cavities for the construction of foundations and structures.

2. A cavity formed by the removal of earth and rock.

B. Earth:

1. Unconsolidated material in the crust of the earth derived by weathering and erosion including:

a. Materials of both inorganic and organic origin.
b. Boulders less than one-third (⅓) cubic yard in volume, gravel, sand, silt, and clay.
c. Materials which can be excavated with backhoe, trenching machine, drag line, clam shell, bulldozer, highlift, or similar excavating equipment without the use of explosives, rock rippers, rock hammers, or jack hammers.

C. Rock:

1. A natural aggregate of mineral particles connected by strong and permanent cohesive forces. Rock includes:

a. Limestone, sandstone, dolomite, granite, marble, and lava.
b. Boulders one-third (⅓) cubic yard or more in volume.
c. Materials which cannot be excavated by equipment which is used to remove earth overburden without the use of explosives, rock rippers, rock hammers, or jack hammers.
d. Materials which cannot be excavated with a backhoe, trenching machines, drag line, clam shell, bulldozer, highlift, or similar excavating equipment without the use of explosives, rock rippers, rock hammers, or jack hammers.

D. Undercutting:

1. Excavation of rock and unsuitable earth below the bottom of a foundation, structure, or pipe to be constructed or installed.

E. Subgrade:

1. Undisturbed bottom of an excavation.

F. Topsoil:

1. Earth containing sufficient organic materials to support the growth of grass.

G. Structure Foundation Bedding;

1. Crushed aggregate meeting minimum standards for gradation as set forth by the Georgia Department of Transportation (GDOT) for Number 57 stone.

H. Structure Foundation Backfill:

1. Crushed aggregate placed as directed by the Engineer to stabilize an unsuitable subgrade below structure foundations. The gradation shall be determined by the Engineer.

1.06 JOB CONDITIONS

A. All operations shall be performed by the Contractor in strict conformance with Federal, State, and
local safety requirements. Particular attention is directed to safety regulations for excavations and entering confined spaces.

B. Test borings and other exploratory operations may be made by the Contractor at no cost to the City.

C. The Contractor shall verify that survey benchmarks and intended elevations for the Work are as indicated on the Plans.

D. The Contractor shall locate existing underground utilities in the site of the Work.

E. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, the Contractor shall consult the utility owner immediately for directions. The Contractor shall cooperate with utility companies in keeping respective services and facilities in operation. The Contractor shall repair damaged utilities to the satisfaction of the utility owner.

F. The Contractor shall not interrupt existing utilities serving any facilities except when permitted in writing by the Engineer and then only after acceptable temporary utility services have been provided.

G. The Contractor shall provide a minimum of forty-eight (48) hours' notice to the Engineer and utility owner and receive written notice to proceed before interrupting any utility.

H. The Contractor shall demolish and completely remove from the site of the Work existing

underground utilities indicated on the Plans to be removed. The Contractor shall coordinate with utility companies for shut-off of services if lines are active. No separate payment shall be made.

I. The Contractor shall notify the Engineer of unexpected subsurface conditions and discontinue work in the affected area until notification to resume work.

J. It is intended that the Plans show the approximate locations of all known existing surface and subsurface utilities. However, the location of many gas mains, water mains, conduits, sewers, etc., is unknown and the City assumes no responsibility for failure to show any or all of these structures on the Plans or to show them in their exact locations. It is mutually agreed that such failure will not be considered sufficient basis for claims for Extra Work or for increasing the pay quantities, unless an obstruction encountered is such as to necessitate substantial changes in the lines or grades or requires the building of special structures or utilities, provisions for which are not made in the Plans, in which case the provisions in these Specifications for Extra Work shall apply.

K. The elevations shown on the Plans as existing are taken from the best existing data and are intended to give reasonable information about the existing elevations. They are not precise, and the Contractor shall determine the exact quantities of excavation and fill required.

L. All excavated and filled areas for structures, trenches, fill, topsoil areas, embankments, and channels shall be maintained by the Contractor in good condition at all times until final acceptance by the City. All damage caused by erosion or other construction operations shall be repaired by the Contractor using new material of the same type as the damaged material.

M. Earthwork within the rights-of-way of the Georgia Department of Transportation, Fulton County, Corps of Engineers, Public Utilities, or others, shall be done in accordance with the requirements and provisions of the permits issued by those agencies for the construction within their respective rights-of-way. Such requirements and provisions, where applicable, shall take precedence and supersede the provisions of these Specifications. All construction activities in wetland areas encountered on this project shall comply with the requirements of the Nationwide Permits, Corps of Engineers Regulations, 33 CFR, Part 330.

N. The Contractor shall control grading in a manner so as to prevent water running into excavations. Obstruction of surface drainage shall be avoided and means shall be provided whereby stormwater can be uninterrupted in existing gutters, other surface drains, or temporary drains. The Contractor shall maintain access to all fire hydrants, valves, and meters.

O. It is understood and agreed that the Contractor has made a thorough investigation of the surface and subsurface conditions of the site of the Work and any special construction problems which might arise as a result of nearby watercourses and floodplains, particularly in areas where construction activities may encounter water-bearing sands and

gravels or limestone solution channels. The Contractor shall be responsible for providing all services, labor, equipment, and materials necessary or convenient to him for completing the Work within the time specified in the Plans and these Specifications.

P. At various locations throughout the Work, the Contractor will be working close to existing sewers. Many of these sewers are old and many are brick and are readily subject to damage. Off street, the Contractor is prohibited from driving over these sewers with trucks and equipment unless it is absolutely necessary or stockpiling material on them. When the Contractor must cross these sewers to perform his work, he will present a plan for approval by the Engineer for accomplishing this, to include fill, bridging, lighter equipment or other means to prevent damage to the sewer. It shall be the Contractor's responsibility to repair any damage to the existing sewers, whether on or off street, at no additional cost to the City and to the satisfaction of the Engineer.

1.07 ENCOUNTERING CONTAMINATED OR HAZARDOUS MATERIALS

A. The Contractor shall provide all labor, materials, supplies, and incidentals to protect onsite workers and the surrounding public from exposure to potentially hazardous substances, notify the City and the Engineer, and stop all work until further notified by the Engineer.

B. An emergency situation or imminent hazard may include, but not be limited to, the following:

1. Buried drum(s) or containers with unknown or known toxic contents.

2. Groundwater or soils of unnatural color.

3. Spills or leaks of chemicals, solvents, or petroleum products.

4. Unusual odors.

5. Other perceived threats.

C. If a potentially hazardous substance is discovered during construction activities, the Contractor shall not remove it from the site of the Work. The Contractor shall leave the potentially hazardous substance in place and stop all work in the immediate area of the perceived threat. If the hazardous materials appear to be leaking or otherwise spreading, the Contractor shall contain or abate the spread of the material in accordance with Federal, State, and local laws, regulations, policies, and standards. The Contractor shall take all measures to prevent the release of the material to the environment and protect all onsite workers and the public from potential exposure.

D. If groundwater appears to be contaminated, the Contractor shall construct temporary sheet metal piles and dewater the area of concern to prevent the spread of contamination. The Contractor shall contain, store, treat, and dispose of all Surface Water Diversion and Dewatering water or contaminated groundwater in accordance with Federal, State, and

local laws, regulations, policies, and standards.

E. During the course of substance containment or evacuation of site personnel, the Contractor shall protect onsite workers (including protective clothing, breathing apparatus, etc.), non-workers, or the general public from contact with or exposure to the contaminated substances or materials.

F. In the event that potentially hazardous materials are discovered, the Contractor shall immediately notify the City and the Engineer. It is the City's responsibility to notify Federal, State, and local regulatory authorities, if required. Once a remedial solution is agreed upon, the Contractor may proceed to remove the materials following all established guidelines.

G. Hazardous or contaminated waste is material present on the site of the Work that has been determined by the Engineer to exceed Type 3 HSRA standards for any depth or Type 3 HSRA surface soil criteria per Georgia Department of Natural Resources (DNR) Environmental Protection Division (EPD), Chapter 391-3-19, Hazardous Site Response.

H. Hydrocarbon contaminated soils shall be handled as a contaminated waste.

I. The requirements for excavating, handling, hauling, and disposal of hazardous or contaminated materials as described in this section shall also apply to hazardous or contaminated materials encountered in the work included under Section 02324 - Trenching and Backfilling for Piping Systems.

1.08 REGULATORY REQUIREMENTS FOR CONTAMINATED MATERIALS

A. The Contractor shall comply with all the laws, ordinances, codes, rules, and regulations of the Federal, State, and local authorities having jurisdiction over any of the Work specified in this section. The Contractor shall meet all Federal EPA and State of Georgia Department of Transportation regulations for shipping of hazardous or contaminated waste materials to approved offsite disposal facilities. The Contractor shall obtain all Federal, State, and local permits required for the transportation and disposal of materials described in this section. The Contractor shall meet any regulatory requirements imposed by the Treatment, Storage, and Disposal (TSD) Facility. Regulations pertaining to the transport and disposal of such materials include, but are not limited to the following:

1. Department of Transportation 49 CFR 172 through 179.

2. Department of Transportation 49 CFR 387 (46 FR 30974, 47073).

3. Department of Transportation DOT-E 8876.

4. Environmental Protection Agency 40 CFR 136 (41 FR 52779).

5. Environmental Protection Agency 40 CFR 261, 262 and 761.

6. Resource Conservation and Recovery Act (RCRA).

7. Motor Carrier Act of 1980 (Sections 29 and 30).

B. Any transporter of hazardous substances shall be licensed in the State of Georgia in accordance with all applicable laws and regulations.

C. The Contractor shall comply with Occupational Safety and Health Administration (OSHA) Standards and Regulations contained in Title 29 Code of Federal Regulations, Part 1910.120 "Hazardous Waste Operations and Emergency Response".

PART 2 - PRODUCTS

2.01 EQUIPMENT

A. The Contractor shall perform excavation with equipment suitable for achieving the requirements of this Specification.

B. The Contractor shall use equipment which will produce the degree of compaction specified. Backfill within three (3) feet of walls shall be compacted with hand operated equipment. The Contractor shall use hand operated power compaction equipment where use of heavier equipment is impractical or restricted due to weight limitations.

2.02 MATERIALS

A. Unsuitable material: Unsuitable soil materials are the following:

1. Materials that are classified as ML, CL-ML, MH, PT, OH, and OL according to ASTM D-2487.

2. Materials that cannot be compacted to the required density due to either gradation, plasticity, or moisture content.

3. Materials that contain large clods, aggregates, stones greater than four (4) inches in any dimension, debris, vegetation, waste, or any other deleterious materials.

4. Materials that are contaminated with hydrocarbons or other chemical contaminants.

B. Suitable Material:

1. Suitable soil shall be free of debris, roots, wood, scrap material, vegetation, refuse, soft unsound particles, deleterious, or objectionable materials and shall not be frozen.

2. Materials that are classified as GW, GP, GM, GC, SW, SP, SM, SC according to ASTM 2487.

C. Borrow:

1. Material from offsite must be suitable material as defined in these Specifications.

2. The Contractor shall identify the location of the Borrow pit and provide laboratory testing showing the suitability of the borrow material.

3. Type A - Coarse Limestone: GDOT #57, Pit Run, natural stone, free of shale, clay, friable material, sand, debris, graded in accordance with ANSI/ASTM C-136.

4. Type B - Fine aggregate: GDOT #8910, Pit Run, natural stone, free of shale, clay, friable material, sand, debris, graded in accordance with ANSI/ASTM C-136.

5. Type C - Sand: Natural river or bank sand, washed, free of silt, clay, loam, friable or soluble materials, or organic matter, graded in accordance with ANSI/ASTM C-136.

6. Type D - Select Fill: Material excavated from the site of the Work and approved by the Engineer.

7. Type E - Structural Fill: GDOT #78, Pit Run, natural stone, free of shale, clay, friable material, sand, debris, graded in accordance with ANSI/ASTM C-136.

8. Subsoil: Reused soil approved by the Engineer, free of gravel larger than 2 inches.

PART 3 - EXECUTION

3.01 GENERAL

A. For the purposes of this section, excavation and backfill for structures shall be considered as excavation and backfill for any area immediately adjacent to, bearing upon, or underneath physical structures such as buildings, utilities, retaining walls, sidewalks, pavements, stream structures, etc.

B. The Contractor shall comply with all Federal, State, and local safety rules and regulations including those established by OSHA.

C. The Contractor shall avoid settlement of surrounding soil due to equipment operations, excavation procedures, vibration, Surface Water Diversion and Dewatering, or other construction methods.

D. The Contractor shall protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by excavation and backfill operations.

3.02 INSPECTION

A. The Contractor shall verify that stockpiled material to be reused is acceptable to the

Engineer.

B. The Contractor shall verify that areas to be backfilled are free of debris, snow, ice, or water and surfaces are not frozen.

C. The Contractor shall inspect existing structures to determine their condition.

3.03 PROTECTION

A. The Contractor shall protect trees, shrubs, lawns, existing structures, and other permanent objects outside of grading limits and within the grading limits as designated on the Plans.

B. The Contractor shall protect and support above-grade and below-grade utilities which are to remain.

3.04 PREPARATION

A. The Contractor shall set up necessary street detours and barricades in preparation for excavation if construction will affect traffic. The Contractor shall maintain barricades and warning devices at all times for streets and intersections where work is in progress, or where affected by the Work, and is considered hazardous to traffic movements.

B. The Contractor shall stake, mark, or identify required lines, levels, slopes, grading, and datum.

C. The Contractor shall compact subgrade to density as required for subsequent backfill materials.

D. The Contractor shall cut out soft areas of subgrade not capable of insitu compaction and backfill with fill or foundation backfill as directed by the Engineer, and compact to density equal to or greater than the requirements for subsequent backfill material at the direction of the Engineer.

E. The Contractor shall, prior to placement of aggregate subbase or base course material at paved areas, compact subsoil or subbase to ninety-eight (98) percent of its maximum dry density in accordance with the requirements of ASTM D-698.

3.05 EXCAVATION FOR STRUCTURES

A. The Contractor shall comply with all Federal, State, and local safety rules and regulations including those established by OSHA.

B. The Contractor shall perform excavation work so that the structure can be installed to depths and alignments as indicated on the Plans. The Contractor shall use caution during excavation work to avoid disturbing surrounding ground and existing facilities and improvements. The Contractor shall keep excavation to the absolute minimum necessary.

C. Upon discovery of unknown utilities, badly deteriorated utilities not designated for removal, or concealed conditions; the Contractor shall discontinue work and notify the Engineer to obtain instructions before proceeding in such areas.

D. The Contractor shall immediately notify the agency or company owning any line which is damaged, broken, or disturbed. The Contractor shall obtain approval from the Engineer and agency for any repairs or relocations, either temporary or permanent.

E. The Contractor shall avoid settlement of surrounding soil due to equipment operations, excavation procedures, vibration, Surface Water Diversion and Dewatering, or other construction methods.

F. The Contractor shall provide surface drainage during construction to protect work and to avoid nuisance to adjoining property. Where required, the Contractor shall provide proper Surface Water Diversion and Dewatering in accordance with the requirements of Section 02885 - Surface Water Diversion and Dewatering.

G. The Contractor shall conduct hauling operations on approved haul routes in such a manner so that trucks and other vehicles do not create a dirt nuisance in streets. Hauling routes shall be approved by the City's Bureau of Traffic and Transportation (call 404-330-6501). The Contractor shall verify that truck beds are sufficiently tight, loaded, and covered in such a manner that objectionable materials will not spill onto streets.

H. The Contractor shall maintain permanent benchmarks, monumentation, property markers, and other reference points. When working on private properties the Contractor shall locate property markers. Unless otherwise directed by the Engineer, the Contractor shall replace those which are damaged or destroyed by the Work. Replacement of permanent benchmarks, monumentation, property markers, and other reference points shall be performed by a surveyor registered in the State of Georgia.

I. The Contractor shall provide sheeting, shoring, and bracing where required to safely complete the Work, to prevent excavation from extending beyond limits indicated on the Plans, and to protect the Work and adjacent structures or improvements. The Contractor may use trench boxes for this purpose but shall not stack them more than 20 feet or two boxes high. Where indicated in the Plans or directed by the Engineer, the Contractor shall use augered piles and lagging. Auger driven piles shall be used instead of vibratory driven piles when near structures or existing sewers.

J. The Contractor shall prevent voids from forming outside sheeting. The Contractor shall immediately fill voids with material approved by the Engineer.

K. After completion of the structure, the Contractor shall remove sheeting, shoring, and bracing unless the Engineer has approved in writing that such temporary structures may remain. In no event shall any timber sheeting/shoring be left in place. The Contractor shall remove sheeting, shoring, and bracing in such a manner so as to maintain safety during backfilling operations and to prevent damage to the Work and adjacent structures

or improvements.

L. The Contractor shall immediately fill and compact voids left or caused by removal of sheeting with low strength flowable fill or other material approved by the Engineer.

M. The Contractor shall reuse suitable stockpiled material where allowed within 24 hours of its being excavated.

N. When required to use steel plates over excavated openings in City streets on a temporary basis, the Contractor shall paint them bright traffic orange. When the plate must be left in place more than two days, the Contractor will provide asphalt ramps on all four edges. The Contractor shall plan his work so that use of steel plates is held to a practical minimum.

3.06 EXCAVATION OF CONTAMINATED MATERIALS

A. It is important that excavated contaminated materials are delivered to the correct destination and not commingled with suitable excavated materials. The Contractor shall utilize survey and excavation stakes with ribbon to designate the areas where contaminated material is to be excavated. Excavation equipment and transport vehicles shall be marked to indicate that they are being used to excavate and haul contaminated material so that they will not be commingled with equipment performing normal excavation, hauling, and stockpiling operations.

B. The Contractor shall not perform any excavation activities in contaminated areas until all such areas are surveyed and staked in the field and excavation equipment and transport vehicles have been marked to the satisfaction of the Engineer.

C. Access to areas containing contaminated materials shall be strictly controlled by the Contractor. Work and decontamination procedures in these areas shall be performed in accordance with the Contractor's site-specific Safety, Health, and Security Plan as specified in Section 01540 - Security and Safety.

D. Soil confirmational sampling will be required after the excavations are completed. If the contaminant remains, further special handling will take place until the contaminant is absent or below levels established by applicable Federal, State, and local laws and regulations.

E. The Contractor shall perform all required chemical analyses in accordance with Federal, State, and local laws and regulations as well as transporter or landfill profile requirements of all excavated hazardous or contaminated materials for the purposes of obtaining approvals for proper transport and disposal. The Contractor shall prepare manifests and other documentation required by the landfill for acceptance. The City will sign all waste manifests and bills of lading as the waste generator. The Contractor shall submit copies of all signed manifests and bills of lading to the Engineer prior to disposal.

F. At each location where hazardous or contaminated wastes are encountered, the

Contractor shall design and construct a decontamination pad to be used to decontaminate equipment and vehicles exiting excavated areas. The Contractor shall be responsible for the maintenance and operation of the decontamination station (decontamination pad and wash down equipment) throughout the duration of the Work. The Contractor shall provide a collection system for the decontamination pad wash water. The Contractor shall collect and contain all wash water resulting from the decontamination process. At the completion of the work at the location, and at no additional cost to the City, the Contractor shall dismantle and properly dispose of the decontamination pad and resulting contaminants along with the contaminated soil specified herein.

G. The minimum design requirements of the decontamination pad are as follows:

1. Pad shall have adequate size to accommodate the width and length of the largest piece of equipment that will be used in contaminated areas and the minimum length of an eighteen (18) wheel trailer dump truck.

2. Pad shall be equipped with three (3) feet high splash guards draped inside the bermed pad to prevent over-spray.

3. Pad shall be sloped to a low point sump to allow for collection and containment of decontaminated water.

H. Wash down equipment shall at a minimum, include both a high pressure water and steam system. The Contractor shall provide all decontamination pad and cleaning equipment, power required to generate steam and high pressure water.

I. All decontamination water within the decontamination pad shall be collected, pumped to, and contained in an above ground secure storage tank. Decontamination water shall be handled, treated, and disposed of in accordance with Federal, State, and local laws and regulations. The Contractor shall have adequate storage facilities to properly contain all decontamination water.

3.07 BACKFILLING FOR STRUCTURES

A. The Contractor shall backfill areas to contours and elevations with materials specified in this section.

B. The Contractor shall systematically backfill to allow maximum time for natural settlement. The Contractor shall not backfill over porous, wet, frozen, or spongy subgrade surfaces.

C. Granular Fill: The Contractor shall place and compact materials in continuous layers not exceeding eight (8) inches compacted depth.

D. Soil Fill: The Contractor shall place and compact material in continuous layers not exceeding twelve (12) inches compacted depth.

E. The Contractor shall employ a placement method that does not disturb or damage foundation perimeter drainage utilities in trenches.

F. The Contractor shall maintain the optimum moisture content of backfill materials to attain required compaction density.

G. The Contractor shall backfill against supported foundation walls. The Contractor shall not backfill against unsupported foundations walls.

H. The Contractor shall backfill simultaneously on each side of unsupported foundation walls until supports are in place.

I. The Contractor shall slope grade away from buildings at a minimum two (2) inches in ten (10) feet, unless noted otherwise on the Plans or directed by the Engineer.

J. The Contractor shall make grade changes gradual and blend slope into level areas.

K. The Contractor shall promptly remove surplus backfill materials from the site of the Work.

L. The Contractor shall leave fill material stockpile areas completely free of excess fill materials.

M. Concrete walls or structures shall not be backfilled until after fourteen (14) days have passed from the end of the concrete pour of the wall or structure to be backfilled.

3.08 FIELD QUALITY CONTROL

A. Field inspection and testing shall be performed in accordance with the requirements of the General Conditions of the Contract Documents.

B. Tests and analysis of fill material will be performed in accordance with the requirements of ASTM D-698.

C. Compaction testing will be performed in accordance with the requirements of ASTM D-698. Compaction tests shall be performed during backfilling on every 2 vertical feet of fill material placed. One test shall be performed on each side of the structure for a total of two tests per every 2 vertical feet of fill placed.

D. If tests indicate that Work does not meet specified requirements, the Contractor shall remove Work, replace, and retest at no cost to the City.

E. The Contractor shall proof roll compacted fill surfaces under slabs-on-grade paving.

F. Structural fill under paved areas and sidewalks shall be in accordance with the requirements of the Georgia Department of Transportation Standard Specifications Construction of Transportation Systems, latest edition.

3.09 SCHEDULE

A. Structure Foundation Bedding: Type A fill, placed in six (6) inch lifts, compacted to ninety-eight (98) percent standard proctor density as determined by ASTM D-698.

B. Structural Foundation and Pavement Backfill: Type E fill, placed in six (6) inch lifts, compacted to ninety-eight (98) percent standard proctor density as determined by ASTM D-698.

C. Interior Slab-on-Grade: Type A fill, six (6) inches, compacted to ninety-eight (98) percent. Cover with Type B fill, two (2) inches thick, compacted to ninety-eight (98) percent.

D. Exterior Side of Foundation Walls, Retaining Walls, and Structure Walls: Subsoil fill, to subgrade elevation, each lift, compact to ninety (90) percent.

E. Structural Fill Under Grass Areas: Subsoil fill, to six (6) inches below finish grade, compacted to eighty (80) percent.

3.10 DISPOSAL OF EXCESS MATERIAL

A. The Contractor shall dispose of excess material in accordance with the requirements of Section 02201A - Site Preparation.

B. The Contractor shall remove all excess material from the site within 24 hours of its being excavated.

3.11 DISPOSAL OF CONTAMINATED MATERIALS

A. All hazardous or contaminated material excavated from the site of the Work shall be disposed of at an EPD approved landfill.

B. All contaminated material shall be disposed of in accordance with instructions provided by the disposal facility. All material shall be weighed by the landfill prior to disposal. Copies of certified tare weights and certified weight tickets shall be provided to the Engineer on a daily basis within forty-eight (48) hours of disposal of the material. The Contractor shall be responsible for payment of tipping fees charged by the landfill for disposal of hazardous or contaminated waste. Payment for tipping fees shall be based upon the monthly invoices submitted by the landfill for the actual weight of hazardous or contaminated waste disposed with corresponding individual certified weight tickets attached. The Contractor shall be reimbursed only the actual amount of the tipping fees paid to the landfill for hazardous or contaminated waste disposal, which is to be added to and included in the unit price pay item per ton.

C. The limits for excavation for hazardous or contaminated waste staked out by the

Contractor and agreed upon by the Engineer shall be strictly adhered to. When trench boxes or shoring is used to perform the excavation, the limits of contaminated waste will be considered the inside width of the trench box or shoring. When trench boxes or shoring is not required, a reasonable slope for the sides of excavations to insure the safety of the workers will be allowed with the toe of the slope conforming to the surveyed limits. All materials within such excavations shall be considered contaminated waste. Sloppy excavation procedures which cause mixing of contaminated waste with suitable materials and results in excessive tipping fees being charged to the City shall be the responsibility of the Contractor and the Contractor shall not be reimbursed for tipping fees incurred as a result of such activities.

D. The Contractor shall not be reimbursed for any tipping fees incurred for the disposal of excavated materials not classified as hazardous or contaminated waste by the Engineer.

E. If the Contractor for any reason should dispose of hazardous or contaminated waste at any location other than in an approved landfill or in a manner not in strict accordance with instructions provided by the landfill, the Contractor shall be responsible for correcting the problem to the satisfaction of the Engineer and all costs associated with correcting the problem will be borne by the Contractor. The Contractor is advised that significant financial damages could result from mixing hazardous or contaminated waste with other materials.

F. Contaminated waste shall not be reused in the Project. All certified weight tickets, invoices, and other paperwork associated with this activity shall be clearly labeled with the words "South River Relief Sewer Project".

3.12 CLEANUP

A. After completing the Work, the Contractor shall remove all debris and construction materials and equipment from the site of the Work; grade and smooth over the surface on both sides of the line; and leave the entire construction area in a clean, neat, and serviceable condition. The Contractor shall restore the site to the original or better condition in accordance with the requirements of Section 02920 - Site Restoration.

+++END OF SECTION 02315+++

SECTION 02405
BLASTING

PART 1 - GENERAL

1.01 SCOPE

A. This Section covers the work necessary for the use of explosives and blasting in connection with rock excavation for tunnels, intake chambers and construction shafts, and for excavations required for the Contractor's convenience.

B. Specifications in this Section govern blast design, blast limitations, explosive materials, equipment, labor and supervision for transportation and storage of explosives, drilling and loading of blast holes, protection of existing facilities, test blasts, and damage repairs due to Contractor's blasting operations.

1.02 DEFINITIONS

A. Smoothwall Blasting (Trim Blasting): A controlled blasting technique used to produce smooth walls. The trim holes are located around the perimeter of the excavation but not along the floor or sidewall holes lower than 3 feet from the floor. Trim charges are decoupled to reduce the linear charge density and are placed in holes with reduced spacing and are fired after main charge.

B. Peak Particle Velocity (PPV): The maximum of the three ground vibration velocities measured in the vertical, longitudinal and transverse directions. Velocity units are expressed in inches per second (ips).

C. Air-Overpressure: Temporary changes in ambient air pressure caused by blasting. Air-overpressure is expressed in units of psi or dB. Measurements for blasting are made with microphones having a flat frequency response for over-pressure in the 2 to 200 Hz range. A-weight or C-weight microphones shall not be used for these measurements.

D. Occupied Building: Structure on or off construction limits that is occupied by humans or livestock.

E. Residential Building: Includes single and multi-family dwellings, hotels, motels and any other structure containing sleeping quarters.

F. Scaled Distance: A factor describing relative vibration energy based on distance and charge-per-delay. For ground vibration control and prediction purposes, Scaled Distance (Ds) is obtained by dividing the distance of concern (D) by the square root of the charge-per-delay (W) - $Ds=D/(W)^{½}$.

G. Charge-per-Delay(W): For purposes of vibration control, any charges firing within any 8-millisecond time period are considered to have a cumulative effect on vibration and air-overpressure effects. Therefore, the maximum charge-per-delay equals the sum of the weight of all charges firing within any 8-millisecond time period. For example, if two 10 lb. charges fire at 100 ms and one 15 lb. charge fires at 105 ms, the maximum

charge per delay would be 35 lbs.

H. Line Drilling: A method of controlling overbreak, in which a series of very closely spaced holes are drilled at the perimeter of the excavation. Line holes are generally not loaded with explosives; however, in some applications alternating holes may be loaded with light charges using detonating cord.

I. Pre-splitting: A blasting technique in which the perimeter charges are detonated first in the firing sequence or as a separate blast ahead of production blasting. This technique is designed to generate a fracture in the plane of the pre-split holes drilled along the perimeter of the excavation.

J. Production Holes: Blast holes in the main body of the rock mass being removed by drilling and blasting.

K. Stemming: Crushed stone, tamped clay or other inert earth material placed in the unloaded collar area of blastholes for the purpose of confining explosive charges and limiting rock movement and air overpressure.

L. Buffer Holes: Holes with reduced energy charges drilled adjacent to smoothwall, trim or open line-drilled holes at the perimeter of the excavation. The explosive charge in buffer holes is generally between 50 and 75 percent of the charge used in normal production blastholes. Buffer holes are usually drilled parallel to adjacent holes at the excavation perimeter.

M. Primary Initiation: The method whereby the blaster initiates the blast(s) from a remote and safe location. Primary initiation systems use pneumatic tubing or shock-tubes to convey firing energy from blasters to blast locations.

N. Sub-drilling: The portion of the blasthole that is drilled below or beyond the desired excavation depth or limit. Subdrilling is generally required to prevent the occurrence of high or tight areas of unfractured rock between blastholes.

O. Surface Blasting: All excavations where surface blasting techniques are required.

P. Controlled Blasting: Excavation in the rock in which the various elements of the blast, including hole size, position, alignment, depth, spacing, burden, charge size, distribution and delay sequence are carefully controlled to excavate the rock to the desired lines with a relatively uniform surface with minimal overbreak and fracturing of rock beyond the design excavation limits and to maintain resulting noise, overpressure and peak particle velocity within specified maximum limits.

Q. Prohibited Persons: Persons prohibited from handling or possessing explosive materials as defined by the seven categories described in Section 555.11 of 27 CFR ATF Rules).

R. Delay: Distinct pause of pre-determined time between detonations of single charges or groups of charges.

1.03 REFERENCED STANDARDS

A. U.S. Department of Justice, Alcohol, Tobacco and Firearms and Explosives Division (ATF27 CFR Part 555, Implementation of the Safe Explosives Act, Title XI, Subtitle C of Public Law 107-296; Interim Final Rule).

B. Institute of Makers of Explosives

1. Dos and Don'ts - Instructions and Warnings for Consumers in Transporting, Storing, Handling, and Using Explosive Materials

2. Destruction of Commercial Explosives

3. Suggested Code of Regulations for the Manufacture, Transportation, Storage, Sale, Possession and Use of Explosive Materials

4. Safety in the Transportation, Storage, Handling and Use of Explosive Materials

5. Safety Guide for the Prevention of Radio Frequency Radiation Hazards in the Use of Electric Blasting Caps

C. National Fire Protection Association (NFPA)

1. NFPA 495 - Code for the Manufacture, Transportation, Storage and Use of Explosive Materials, Current Edition

2. NFPA 498 - Standard for Explosives, Motor Vehicle Terminals, Current Edition

D. U.S. Department of Labor, Occupational Safety and Health Administration (OSHA), Construction Standards and Interpretations 29 CFR Part 1926, Subpart U, Section 1926.900, “Blasting and Use of Explosives”, final rule dated December 16, 1972.

E. Official Code of Georgia (OCGA); Code Section 25 - Georgia Blasting Standards Act of 1978, Code Section 25-9-1, et seq.

F. Vibration Subcommittee of the International Society of Explosive Engineers (ISEE), blast monitoring equipment operation standards.

1.04 QUALITY CONTROL

A. The design and execution of blasting shall be performed under the on-site supervision of a licensed blaster certified in the State of Georgia.

B. The Contractor shall perform blast monitoring as required to satisfy its legal obligation relative to all permits and all applicable federal, state and local codes, laws, regulations and ordinances, and its contractual responsibilities, including safety.

C. The Engineer may perform blast monitoring to verify conformance with regard to air-overpressure (noise) and peak particle velocity criteria defined by this Section.

D. Qualifications and Clearance Status:

1. The blasting supervisors (blasters-in-charge) shall have a minimum of 10 years experience, directly related to the specific types of excavation blasting they will oversee. All blasting supervisors shall be able to document the completion of at least three projects of similar scope and complexity.

2. All blasters and supervising shift foremen shall be properly qualified and licensed in accordance with applicable federal, state and local government regulations. Necessary permits include an Explosives License issued by the Georgia Fire Safety Commissioner.

3. Retain the services of an experienced blasting consultant with at least 10 years experience in monitoring blasting operations (test blasts and production blasts), interpreting ground vibration, air overpressure, and impulse amplitudes for similar construction projects, and to prepare all blasting plans, test-blasting plans, and revisions to any of these plans. All blasting plans, test-blasting plans and revisions shall be reviewed by and covered by a signed review letter from by the blasting consultant. The blasting consultant will not be required to sign the individual blast plans provided they are signed by an on-site licensed blaster.

4. All persons that handle explosive materials, have control over them, or access to them, must not be prohibited persons, as defined in Section 555.11 of 27 CFR (ATF Rules).

1.05 SUBMITTALS

A. Permits: Submit a copy of all applicable permits and licenses for transportation, storage, and use of explosives to the Engineer prior to the start of blasting operations. Submitted permits must include a copy of Federal ATF blasting license listing all responsible persons, blasting use and storage permits issued by the Georgia State Fire Marshal's Office, and any other necessary local permits. No explosives can be brought to any work sites until all necessary permits have been submitted to the Engineer.

B. Regulations: Contractor shall obtain at least two copies of all applicable federal, state and local codes, laws, regulations and ordinances regarding the use of explosives. One copy of these codes, laws, regulations and ordinances shall be submitted to the Engineer at least 14 days prior to blasting. The second copy shall be maintained on-site in the Contractor's office, for review by all Contractor personnel involved in blasting.

C. Contractor Qualifications and Evidence of Experience: Submit resumes of proposed blasting supervisors to the Engineer. Resumes shall contain a listing of experience, references with phone numbers and copies of all required blasting licenses.

D. Blast Designs and Safety Measures: Submit to the Engineer the following information for initial test blasts and proposed production blast design for each shaft or tunnel heading as appropriate:

1. Number, location, diameter, depth and orientation of drill holes on a scaled

drawing of the excavation or tunnel heading face;

2. Type of explosive and weight of charge in each hole;

3. Type and nomenclature of detonators;

4. Type and distribution of stemming used to fill hole collars for charge confinement;

5. Total amount of explosives in the blast and maximum charge-per-delay;

6. Delay arrangement showing delay period in each hole;

7. Description of the proposed blasting system; and type of firing source;

8. Specific measures taken to protect structures, buried utilities and other facilities that may be potentially affected by blasting operations;

9. Type and methods of shaft covers, matting and containment of blast area to mitigate fly rock;

10. Description of and locations of signage used to announce blast warning signals to any persons that might enter blast areas;

11. Clearing, guarding and communication procedures to confirm that all persons are evacuated to safe areas and that blast areas are secured prior to blasting;

12. Prediction calculations for noise (air-overpressure) and peak particle velocity (PPV) at the closest structure and at other adjacent structures, pipelines or facilities that maybe potentially affected by blasting operations;

13. Any redesign of the blasting program shall be submitted to the Engineer.

E. Blasting Records: Maintain a record of each blast detonated. Submit to the Engineer the following records and information the same day the blasting is performed:

1. Depth of blast holes and the location of the blast point in relation to Project stationing;

2. Type, strength and quantities of all explosives, types and quantities of detonators, powder factor (lb/cy), and actual firing times of all charges;

3. Total explosive loadings per round and maximum charge per delay;

4. Type of rock blasted;

5. Reference to approved blast design submittal noting any modification;

6. Time spent scaling rock and approval of rock scaling by designated individual;

7. On a diagram of the approved blast pattern indicate any holes not drilled, drilled but not loaded, changes in spacing or in pattern of delay charges or in loading of holes. Include notes explaining why changes were made;

8. Submit an evaluation of the blast indicating tights, areas of significant overbreak and any recommended adjustments for future blasts;

9. Comments by the blaster in charge regarding any misfires, unusual results, or unusual effects;

10. Date and exact firing time of blast; name of person in responsible charge of loading and firing and blaster permit number;

11. Signature and title of person making recording entries;

12. Record of peak overpressure: Two copies of all blast vibration monitoring data obtained independent of monitoring performed by the Engineer. Submit hard copies of 4-channel waveforms for each blast;

13. Any other records required by federal, state and local codes, laws, regulations and ordinances.

F. Blasting Safety and Security Plans:

1. A complete description of the clearing and guarding procedures that will be employed to ensure personnel, staff, visitors, and all other persons are at safe locations during blasting. This information shall include details regarding visible warning signs or flags, audible warning signals, method of determining blast area zones, access blocking methods, guard placement and guard release procedures, primary initiation method, and the system by which the blaster-in-charge will communicate with site security guards.

2. Detailed description of how explosives will be safely stored, transported and used at the various work sites. Plans shall explain how storage magazines and explosive transport vehicles will satisfy all applicable regulations. This plan shall also indicate how explosives will be inventoried, secured and guarded to prevent theft or unauthorized use of explosives.

3. If the Georgia State Fire Marshal authorizes overnight storage of the explosives, the Contractor must submit a detailed storage plan that includes scaled maps indicating proposed location of detonator and explosives that will be stored overnight, distances to nearest occupied buildings, roadways and other limiting items in the American Table of Distances.

4. Include Material Safety Data Sheets (MSDS) and specific details about hazard communication programs for employees.

5. Equipment that will be used to monitor the approach of lightning storms and in the event of such, evacuation and site safety security plans.

6. Contingency plans for handling of misfires caused by cut-offs or other causes.

7. Fire prevention plan details, including smoking policies, procedures and limitations for work involving any open flames or sparks, description and location of all fire fighting equipment, and fire fighting and evacuation plans.

8. Initial and ongoing blasting and fire safety training programs.

9. Description of the personal protective equipment that will be used by the Contractor's personnel, including but not limited to, safety glasses, hard-toe footwear, hard hats and gloves.

10. Description of blast monitoring equipment and listing of individuals that will operate such equipment. Submittal shall indicate that all equipment meets the standards defined in Article 2.02 of this Section.

11. The Contractor's Safety Representative shall ensure that ongoing blasting work complies with all applicable regulations.

12. Submit copies of ATF Employee Possessor questionnaire forms (OMB No. 1140-0072) or ATF letters of clearance for all employees that will possess explosives for this work as defined in 27 CFR Part 555. Contractor employees, without submitted evidence of satisfactory ATF clearance, must not handle, control or have access to explosive materials.

13. Ground vibration and air-overpressure monitoring records: submit two copies of all 4-channel monitoring records done independently of the monitoring performed by the Engineer.

14. Deliver to the Engineer, 14 days prior to the start of blasting at any location, two bound copies of the property condition inspection reports (condition survey) containing all field notes, sketches, diagrams, photos and videos as required in Special Conditions-1 Pre-Construction Video Survey and Inspection.

G. Notification:

1. For all work sites prior to starting blasting, the Contractor shall notify the appropriate local municipal officials, above- and below-ground utility owners and the Engineer who will notify the general public expected to be potentially affected, of the Contractor's intent to conduct controlled blasting operations. Notice shall be given to all operators of all buried pipes, cables, conduits and overhead utility lines and poles located within a 200-foot radial distance of the blast area.

2. Notification to appropriate local municipal officials and utility owners or

operators shall be done in writing, at least 48 hours prior to the start of blasting at a particular site or sooner if so required by any applicable local law or regulation, and shall indicate the expected frequency of blasting, hours that blasting might occur and the expected date that blasting will be completed. Upon completion of blasting at the particular site, utility owners or operators shall be notified that blasting has ceased in the area for the duration of the Project.

3. The Contractor shall furnish the Engineer with a list of those parties notified in accordance herewith prior to the start of such blasting. The list shall include names, addresses and telephone numbers.

4. The Contractor must submit copies of written notification letters sent to the responsible fire protection agency for any sites where explosives are stored overnight. These letters shall be submitted to the Engineer at least 48 hours before any explosives are stored at the site. These letters must be submitted by the Contractor to the responsible fire protection agency, 48 hours before explosives are stored at the site.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver all explosives to magazines by land transportation in accordance with all applicable federal, state and local codes, laws, regulations and ordinances.

B. Storage of Explosives

1. Transportation, use and storage of explosives shall be as prescribed by the most stringent of the rules promulgated by all federal, state and local codes, laws, regulations and ordinances, and these Specifications.

2. Initiation devices shall not be stored, transported, or kept in the same place in which other explosives are stored, transported, or kept.

3. Only those explosive materials required for a 24-hour period shall be allowed at the construction sites. Storage of explosives during non-blasting periods is not permitted and the day-storage magazine shall be empty during these periods. The South River site is excluded from this restriction if the Contractor can obtain permits for overnight storage of explosives at this site from the Georgia State Fire Marshall. If storage permits are obtained, the maximum amount of explosives must not exceed limits set by ATF rules (American Table of Distances).

4. Provide a dedicated on-site vehicle that meets all applicable DOT and OSHA standards regarding the transportation of explosive materials from the magazine to the shaft collar or blasting site. Records shall be maintained that clearly show the quantities and types of all explosive materials and detonators received from suppliers and returned to them. The differences in received and returned quantities must accurately correspond to the amounts reported in blasting records.

5. No statement in these Specifications shall be considered to relieve the Contractor from sole responsibility for the safe transportation, use and storage of explosives.

1.08 JOB CONDITIONS

A. Extra caution and skill will be required to accomplish the Work in a satisfactory manner. Blasting must be safely performed in close proximity to residential communities and other structures. Effects of blasting must also be controlled to maintain the integrity of the grouted rock adjacent to the tunnel and shaft excavations to minimize groundwater inflows. The Engineer will exercise its prerogative to examine carefully the qualifications of any persons whose knowledge and skills may bear on the outcome of the Work. In addition, the Engineer may reject any person who is deemed unqualified for any tasks that may be required.

B. Methods of construction shall be such as to ensure the safety of the Work, Project participants, the public, third parties, and adjacent property, whether public or private. All work shall comply with all federal, state and local codes, laws, regulations, and ordinances. The Contractor is solely responsible for maintaining safe working conditions at the jobsite at all times.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Only explosive and initiation devices packaged by federally-licensed explosives manufacturing firms shall be used in blasting. All explosives and Blasting agents to be used underground shall meet the Fume Class I requirement of the Institute of Makers of Explosives (IME). This restriction does not apply to detonation cords that may be used for trunk lines or in controlled perimeter blasting charges.

B. Only packaged or cartridge type, non-flowing explosives shall be used in the works. Black powder and nitroglycerine are prohibited for all blasting.

C. Non-electric detonating devices shall be used.

D. Only explosives designed and manufactured for smoothwall (trim) blasting shall be used in perimeter holes for blasting in the shafts, tunnels and diversion structure excavations. The linear charge-weight-per-foot of explosives used in shaft perimeter and tunnel back and rib holes shall not exceed 0.4 lb/ft. This limitation does not apply to the primer stick, which must not weigh more than 0.5 pounds. Cartridge configurations and detonating cord shall be included in the linear charge weight-per-foot.

E. Explosives, blasting agents, primers, initiators, and ancillary blasting materials shall be kept in original packaging with clearly marked date codes. All explosives and initiating devices used shall be less than one year old.

F. If the Engineer determines that a blasting product appears to be in a damaged or deteriorated condition, the suspect product shall not be used until its condition can be determined. Products found to be damaged or in a deteriorated condition shall be

immediately returned to the supplier for safe disposal.

2.02 BLAST MONITORING EQUIPMENT

A. Equipment for on-site and off-site particle velocity and air overpressure monitoring shall be 4-channel (one overpressure and three seismic channels) units capable of digitally storing collected data. Equipment must be capable of printing ground motion time histories and summaries of peak motion intensities, frequencies and USBM RI8507 PPV frequency plots. Printed report records must also include date, time of recording, operator name, instrument number and date of last calibration.

1. Instruments shall have a flat frequency response between 2 and 250 Hz for particle velocity and from 2 to 200 Hz for air-overpressure.

2. The digitizing sampling rate for peak particle velocity and air overpressure measurements shall be at least 1,024 samples per second.

3. Seismographs shall be capable of performing a self-test of velocity transducers and printed event records shall indicate whether or not the sensor test was successful.

4. Seismographs used for off-site compliance monitoring shall be capable of recording overpressure from 100 to 148 dB-L, and particle velocity from 0.05 to 5.0 inches/second.

5. Systems shall be capable of providing printed event reports that include all peak measurements, frequencies and complete waveform plots.

6. Seismographs shall have adequate memory to digitally record the entire duration of the blast-induced motion.

7. All seismograph/software systems shall be capable of saving back-up copies of all event files.

8. If the frequency of blast-induced ground motion for close-in blasting is expected to exceed 250 Hz, monitoring shall be done with instruments that measure acceleration with intensities up to 10 gs and at frequencies between 200 and 5,000 Hz.

B. The Contractor shall supply the Engineer with four blast monitoring units as described in Article 2.02, Paragraph A, for the duration of the blasting and for each area of the project where blasting is taking place. The Contractor shall provide for annual calibration for each of the blast monitoring units and any repair or maintenance required.

2.03 CONDITION SURVEY

Prior to the commencement of any underground operations or surface blasting operation, a pre-construction survey shall be conducted following Section 01051.

PART 3 - EXECUTION

3.01 GENERAL BLASTING LIMITATIONS

A. Blasting is not allowed on Sundays or Holidays.

B. Blasting vibration and air-over pressure (noise) limitations are defined in Articles 3.05 and 3.06 below.

3.02 WARNING SYSTEM

A. The Contractor shall erect signboards of adequate size stating that blasting operations are taking place in the area, and such signs shall be clearly visible at all points of access to the area. These signs shall also clearly display the audible warning signals (horn signals) that will be used to warn all people in the area of the impending blast.

B. An audible blast warning system shall be established, publicized, and operated only during blasting hours.

C. The Contractor shall operate a system to ensure that no personnel remain underground during blasting operations and blasting operations shall not be undertaken until it can be demonstrated that all personnel are accounted for and in a safe location.

3.03 BLASTING OPERATIONS

A. The Engineer shall be notified 24 hours before blasts occur at any specific location. The Contractor shall provide the Engineer with a schedule for all blasts and shall notify the Engineer if any blast is delayed for more than one hour. However, the Contractor will be allowed to re-shoot missed holes and tights, as they are uncovered without advance notice to the Engineer.

B. Acceptable Controlled Blasting methods will be those utilizing smooth wall blasting, cushion blasting, and line drilling techniques. Use of "pre-splitting" in shafts and surface excavations is specifically prohibited. Maximum drill round lengths, including subdrilling shall not exceed 0.75 times the minimum dimension of the tunnel or shaft opening. The first eight feet of any tunnel or shaft excavation shall utilize rounds that do not exceed four feet in length. The 4-foot round length restriction does not include subdrilling which shall not exceed 6 inches.

C. Holes shall not be charged with explosives at the same time that drilling or other mechanized equipment not needed to charge the round is being operated within 50 feet of the blast area.

D. The first blasting operation shall be conducted by the Contractor as a test case. The first test blasts shall be no larger than 25 percent of the planned production design blast sized as measured by charge-weight-per-delay. The second and third test blasts shall be no larger than 60 and 100 percent respectively of the planned production design blast. Alternate test blasting plans may be proposed by Contractor with approval of Engineer.

After each test blast and review of test blasting data, the Contractor and Engineer shall meet to review the program. Modifications to the blasting program may be required as a result of this review. Drilling and delay patterns, amount and type of explosive to be used in subsequent production blasts shall be revised according to the results of the test case.

E. Monitoring and recording of air-overpressure and vibration will be performed by the Engineer for every blast round. The results will be provided to the Contractor within 24 hours of the blast, for review. Changes in drilling and delay patterns and amount of explosives shall be made when tests indicate vibrations and/or overpressures in excess of that specified herein. Any major changes in the production blast design shall be submitted to the Engineer.

F. All blasts in shaft and open cut excavations shall be covered with a sufficient number of steel cable mats or other substantial covering device in order to prevent injury to persons and property, including the structure and equipment used in connection with shaft or tunnel operation, from flying rock or other material

G. When blasting underground, the Contractor shall ventilate the shaft and tunnel prior to personnel entering. After a blast is fired, all loose and shattered rock or other loose material, which may endanger the structure or the workers shall be removed and the excavation made safe before proceeding with work. Before drilling of blast holes for a new round, the face shall be thoroughly cleaned and examined for missed holes and unexploded charges. Blasting techniques shall be developed and improved as work progresses. The fact that the removal of loose or shattered rock or other loose material may enlarge the excavation beyond the required limits shall not relieve the Contractor of responsibility for such removal and subsequent additional backfill or concrete, and the Contractor shall not be entitled to additional payment for over excavation or overbreak.

H. No blasting is allowed within 40 feet of freshly placed concrete or grouted rock until 12 hours has elapsed since placement. Shotcrete is exempt from these requirements.

I. All transportation of explosives on the surface or underground and any handling, blast charging or tie-in operations shall be stopped immediately upon the approach of an electrical storm, and all persons shall immediately be evacuated from the blasting area to a place of safety. Persons underground shall be notified of the approach and cessation (all clear) of an electrical storm, each by means of different signals. In shafts, tunnels or other excavation handing explosives, loading of holes, connecting up or firing of charges shall not be performed during an electrical storm and all persons shall withdraw to a safe distance from a partially or totally loaded face. During such storms, explosives on the surface shall be left in OSHA-approved transport containers, delivery vehicles, day-storage boxes or in approved storage magazines. At all times, explosives shall be watch guarded and secured by the Contractor's personnel that are in safe locations.

J. All light and power circuits shall be disconnected and/or removed to a point not less than 100 feet from the face while explosives are being transported into the area and while the loading operations are taking place. During the loading operations only

OSHA approved lighting may be used.

3.05 VIBRATION/AIR-OVERPRESSURE (NOISE) LIMITATIONS

A. Air- overpressure shall not exceed 130 decibels when monitored with an instrument with a 2-hertz high pass at any occupied structure. Air overpressure monitoring shall take place at the nearest residential or business structures susceptible to damage or claims of annoyance.

B. All measurements of blast-induced air-overpressure shall be done in accordance with the standards developed by the Vibration Section of the International Society of Explosives Engineers.

3.06 VIBRATION LIMITATIONS AND CONTROL

A. The maximum intensity of motion in the vertical, longitudinal and transverse directions, measured in the ground near any building or other surface structure shall not exceed 0.5 inches per second at any frequency of motion

B. The maximum intensity of motion in the vertical, longitudinal and transverse directions, measured on the ground above any buried utility lines or pipes shall not exceed 4 inches per second at any frequency of motion.

C. The Contractor shall monitor each blast with four (4) seismographs located, as approved, between the blast area and the closest structures and/or utilities. The seismographs used shall be capable of recording Particle Velocity and frequency for three (3) mutually perpendicular components of vibration in the range generally found with Controlled Blasting.

D. All measurements of blast-induced ground motion shall be performed in accordance with the standards developed by the Vibration Section of the International Society of Explosives Engineers.

3.07 SUSPENSION OF BLASTING

A. Blasting operations may be suspended by the Engineer for any of the following reasons:

1. The Contractor's safety precautions are inadequate.

2. Air overpressure or ground motion levels exceed specified limits.

3. Existing structural conditions on and off site are aggravated and are damaged by blasting.

4. Blasting causes instability of slopes or causes damage to rock outside the prescribed limits of excavation.

5. The results of the blasting, in the opinion of the Engineer, are not satisfactory.

6. Failure of the Contactor to adhere to the submitted and accepted blast plan.

B. Blasting operations shall not resume until the Engineer has approved the Contractor's revised blasting plan with modifications correcting the conditions causing the suspension.

3.08 PRE-BLAST/POST-BLAST INSPECTIONS

Pre-blast and post-blast inspections will be performed in conformance with Section 01051.

3.09 DAMAGE REPAIR

When blasting operations damage off-site properties or a portion of the work or material surrounding or supporting the work, promptly repair or replace damaged items to the condition that existed prior to the damage, to the satisfaction of the Engineer.

+ + + END OF SECTION 02405 + + +

SECTION 02449

TRENCHLESS PIPE CONSTRCTION

PART 1- GENERAL

1.01 SCOPE

A. This section describes microtunneling and modified direct jack methods and minimum construction requirements to properly install the casing pipe as described in this Section and/or shown on the Plans including carrier pipe installation, pipe testing and post-installation closed circuit TV inspection. The Contractor shall furnish and install all materials and equipment and perform all labor necessary to fulfill the requirements of the Plans and these Specifications.

B. Available information on the subsurface conditions of the Work and available information from the subsurface investigation are described in the Geotechnical Engineering Services Reports prepared by MC Squared, Inc. and dated November 2018 and January 2019.

C. Related Work Specified Elsewhere:

1. Section 01200 - Measurement and Payment
2. Section 02150 – Sheeting and Shoring
3. Section 02315 - Excavation and Backfill for Structures
4. Section 002225 - Trench Excavation and Backfill

1.02 SUBMIITALS

A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:

1. The Engineer will review submitted plans, details, and data for compliance with the requirements of this Section. Such review shall not be construed to relieve the Contractor in any way of responsibilities under the Contract. The Contractor shall not commence work on any item requiring a submittal until the submittal has been reviewed and accepted by the Engineer.
2. All Contractor submittals requiring structural design shall be signed and sealed by a professional engineer registered in the State of Georgia
3. The Contractor shall allow thirty (30) working days for review by the Engineer considering the complexity of this Work.
4. The Contractor shall submit the following items for review and approval by the Engineer:

a. MTBM design drawings and technical specifications, including but not limited to trailing equipment, configuration of the cutterhead, size of overcut and MTBM manufacturer's operation manual.

b. Resumes detailing experience and education for the MTBM operators and Project Superintendent and experience related to filling the void between the casing wall and carrier pipe.

c. Pipe lubrication details and pipe lubricants proposed for use during installation, including manufacturer's literature.

d. Guidance system, grade and alignment control details including procedures for surveying, controlling, and checking alignment and grade.

e. Methods to control, handle, treat, and dispose of slurry/water.

f. Details of spoil removal, spoil surface storage, processing, and disposal.

g. Details of jacking system, method of operation, and thrust capacity including capacity, number, and arrangement, of jacking system, pressure gauges, thrust block, and jacking frame. The Contractor shall include calculations of anticipated jacking forces required to advance the pipe. The Contractor shall describe procedures to prevent the maximum jacking force from being exceeded.

h. Details of method proposed to cushion and distribute jacking forces at the pipe joints, including cushion material and compression calculations.

i. Details of grouting the annulus space after casing pipe has been installed including injection pressure and method of controlling grout pressures.

J. Proposed plans for critical phases of microtunneling and proposed contingency plans for the potential events such as damage to pipeline structural integrity and repair; bentonite or grout spills or blowouts; loss and return to line and grade; and encountering large voids or cavities.

k. Shop drawings for casing pipe showing sizes and connection details. Calculations demonstrating that the casing pipe and pipe joints selected by the Contractor can support the construction forces (jacking forces).

I. Plans for storage and handling of casing pipe.

m. Procedures for preparing and submitting daily logs of tunneling operations, including field forms, to meet the requirements of this section.

n. A plan for testing and submittal of test results to demonstrate compliance with the Specifications and Contractor's design criteria for permanent products, materials, and installation. The plan shall identify applicable standards and procedures for testing and acceptance.

o. Design mixes for concrete and grout.

p. Method of restraining pipes and preventing the opening of pipe joints by hydrostatic pressure, near the pits after removal of jack load, and also by soil material entering the pipe joints during microtunneling and preventing closure of the joints.

q. Details to confirm the compatibility of the casing pipes with the MTBM and other microtunneling equipment.

r. A Contingency Plan outlining the procedures followed if the following events occur: surface settlement, surface heave, existing utility damage, contaminated soil, rock or groundwater, and/or removal of obstructions, if encountered during microtunneling.

s. Inspection plan of post installation of pipe.

t. Damage correction measures, if any, after casing pipe installation.

u. Breakdown of work shifts planned and size and configuration of shifts crews.

v. Description of equipment for placement of grout material to fill the annulus space between the casing pipe and carrier pipe, step by step backfilling procedures and temporary bulkheads.

5. The Contractor shall submit the following items for record purposes only and will not be subject to approval by the Engineer:

a. Protection against improper mechanical and hydraulic equipment operations, and for lifting and hoisting equipment and material.

b. Ventilation and lighting details.

c. Monitoring for hazardous gases.

d. Protection against flooding and means for emergency evacuation.

e. Safety supervision responsibilities. Description of complete safety program.

6. The Contractor shall submit, to the Engineer, construction reports for each shift within twenty-four (24) hours of the operations or at least the following.

   a. Location of MTBM face by station and progress of pipe drive during shift.

   b. Hours worked per shift, and a description of work performed.

   c. Completed pipe jacking reports to include: continuous position of the cutter head relative to the designed alignment and grade, cutter head or auger rotation and torque, continuous readings of jacking pressure reported in tons, continuous monitoring of air quality, continuous record of MTBM pitch and roll, and continuous readings of external pressure.

   d. Location and brief soil descriptions of significant soil and rock strata.

   e. Groundwater control operations.

   f. Observation of lost ground or other ground movement. ln this instance, the Engineer shall be notified immediately.

   g. indications of damaged pipe joint or pipe.

   h. Any unusual conditions or events.

   i. Operation shut-down periods or other interruptions in the work with reasons.

   J- Jacking forces.

1.03 QUALITY ASSURANCE

A. The Contractor shall supply all materials and perform all work in accordance with applicable American Society of Civil Engineers (ASCE), American Society for Testing and Materials (ASTM), American Water Works Association (AWWA), American National Standards Institute (ANSI), Occupational Safety and Health Administration (OSHA), or other recognized standards. Latest revisions of all standards are applicable. If requested by the Engineer, the Contractor shall submit evidence that the manufacturer has consistently produced products of satisfactory quality and performance over a period of at least two (2) years.

1.04 DEFINITIONS

A. Microtunneling: A remotely controlled, guided, pipe-jacking process that provides continuous support to the excavation face and does not require personnel entry into the tunnel for normal operations. This excludes guided boring or pilot tube type equipment.

B. Microtunneling Boring Machine (MTBM): A remotely-controlled, steerable, laser - guided microtunnel boring machine consisting of an articulated boring machine shield and a rotating cutting head.

C. Jacking Pit: Excavation from which MTBM is launched for installation of a pipe. A thrust wall may be incorporated to spread reaction loads to the ground.

D. Receiving Pit: Excavation into which the microtunneling equipment is driven and recovered.

E. Slurry: Water, which may contain additives, that is used to transport soils and to provide continuous support to the advancing face.

F. Lubricant: Water combined with additives and applied between the pipe and soil to minimize friction and to fill the annular space.

G. Obstruction: Any object or feature that lies completely or partially within the cross-section of the microtunnel and prevents continued forward progress or causes uncontrollable change in direction beyond specified pipeline and grade tolerance.

H. Drive: The section of pipeline installed by microtunneling methods from a jacking pit to a receiving pit.

I. Slurry System: Transportation of excavated material in slurry flow matched to excavation rate. The slurry system balances ground water pressures and separates soil from the slurry at the end of the process. Soil separation methods are not limited to mechanical means. Soil separation method may be chemical in nature.

J. Pipe String: The succession of joined individual pipes being used to advance the excavation equipment.

K. Jacking System: A system of jacks which pushes the pipe string. The extension rate is synchronized with excavation rate of the machine.

L. Intermediate Jacking Station: Hydraulic jacks installed at intermediate locations in the pipe string to allow selective advancement of discrete segments of the total pipe string.

M. Laser: An optical system projecting a beam to a target to provide guidance reference for the excavation.

N. Guidance System: Relates the actual position of the MTBM to a design reference (e.g. by a laser beam transmitted from the jacking pit along the centerline of the pipe to a target mounted in the shield).

0. Controls: The system which synchronizes excavation, removal of excavated material, and jacking of pipe to maintain overall balance to provide complete and adequate ground support at all times.

P. Overcut: The annular space between the excavated hole and the outside diameter of the jacking pi pe.

Q. Compressed Air Construction: Application of com pressed air to the pipeline and heading to maintain stability in unstable ground conditions.

R. Modified Direct Jack Method: Similar to an MTBM, but the equipment is of an open face configuration allowing access to the front of the machine for removal of obstructions. In this application a pressure balance is not maintained using slurry. The operator is positioned inside of the boring head. An Akkerman machine model WM 480 falls into this category.

1.05 WORKFORCE EXPERIENCE

A. Microtunneling is deemed to be specialty contractor work. The Project Superintendent shall have:

1. At least five (5) years of tunneling/pipe jacking experience.

2. Managed at least two (2) microtunneling projects with drive lengths exceeding five hundred (500) feet.

3. Managed at least one (1) microtunneling project with subsurface conditions similar to this Project, at least twenty (20) feet deep measured at the invert and under a hydrostatic head of at least ten (l 0) feet, using equipment similar to that intended for use on this Project.

B. The MTBM operators shall have:

1. Successfully operated a MTBM similar to the one selected by the Contractor for this Project.

2. At least two thousand (2,000) feet of microtunneling experience within the past five (5) years of which one thousand (1,000) feet have been for sizes greater than or equal to thirty (30) inches I.D.

3. Worked on at least one (1) microtunneling project with subsurface conditions similar to this Project. Operated MTBM equipment on a project with depths greater than twenty (20) feet as measured at the invert under a hydrostatic head of at least ten (10) feet using equipment similar to that intended for use on this Project.

4. The modified direct jack operator shall have completed at least one (l) project where the operator is at the machine head and compressed air was applied.

C. The filling of the void between the casing wall and carrier pipe is deemed to be specialty contractor work. The Contractor shall provide evidence of at five years of experience and at least twelve (12) similar projects.

PART 2-PRODUCTS

2.01 GROUT

A. Grout shall be used for filling the void between the installed pipe and the surrounding ground as well as the void between the casing pipe and the carrier pipe. Cement shall conform to the requirements of ASTM Cl50, Type I or Type II. Grout shall have a minimum compressive strength of one hundred (100) psi attained within twenty-four (24) hours. The grout shall be fluid enough to inject through the pipe and to fill voids, however, it shall set promptly enough to keep grout flow under control.

2.02 EQUIPMENT

A. Use of experimental equipment is at Contractor's risk. Experimental equipment is defined as any equipment which has little or no historical performance data. Experimental equipment use shall require approval by the Engineer and have been used on a minimum of three (3) projects of similar magnitude. Approval of such equipment by the Engineer does not extend to means, methods, techniques, sequences, or procedures of construction. Contractor has sole responsibility for successful use of the equipment and impact on area utilities or structures.

B. No gasoline-powered equipment will be permitted in the tunneling operation or pits. Diesel, electrical, or air-powered equipment is acceptable, subject to applicable Federal and State regulations. The Contractor shall use diesel engines equipped with scrubbers.

C. Microtunnel Boring Machine/Modified Direct Jack Machine: The Contractor shall employ equipment that will be capable of handling the various anticipated ground conditions. In addition, the MTBM and Modified Direct Jack, as applicable, shall:

1. Be capable of maintaining the tunnel face under wet and adverse soil conditions and preventing loss of ground through the machine. The MTBM shall provide satisfactory support of the excavated face at all times.

2. Be articulated to allow steering.

3. Incorporate a suitable seal between the MTBM and the leading pipe.

4. Provide protection to the electric and hydraulic motors and operating controls against water damage.

5. Use a bidirectional drive on the cutter head wheel, and/or adjustable fins or other means, to control roll.

D. Pipe Jacking Equipment: The Contractor shall provide a MTBM operation which includes a pipe jacking system with the following features:

1. Main jacks mounted in a jacking frame located in the jacking pit.

2. Jacking system which successively pushes the MTBM along with a string of connected pipes toward a receiving pit.

3. Sufficient jacking capacity to push the MTBM and the pipe string through the ground.

4. Hydraulic cylinder extension rates which are synchronized with the excavation rate of the MTBM, as determined by the soil conditions.

5. Develops a uniform distribution of jacking forces on the end of the pipe by use of spreader rings and packing.

6. Provides and maintains a pipe lubrication system at all times to lower the friction developed on the surface of the pipe during jacking.

E. Remote Control System: The Contractor shall provide a MTBM which includes a remote-control system with the following features:

1. Allows for operation of the system without the nee d for personnel to enter the tunnel.

2. Have a display available to the operator, at an operation console, showing the position of the shield in relation to a design reference together with other information such as face pressure, roll, pitch, complete guidance system, valve positions, thrust force, cutter head torque, rate of advance, and installed length.

3. Integrates the system of excavation and removal of spoil and its simultaneous replacement by pipe. As each pipe section is jacked forward, the control system shall synchronize all of the operational functions of the system including spoils removal, excavation, and jacking needs.

F. Active Direction Control: The Contractor shall provide a MTBM which includes an active direction control system with the following features:

1. Controls line and grade by a guidance system.

2. Is capable of maintaining grade to within ± one and one-half (1.5) inches and line to within± two (2) inches.

3. Provides active steering information which shall be monitored and transmitted to the operating console. As a minimum, this information shall include location of the laser beam on the target, location of the cutter head, and predicted cutter head location.

4. Provides positioning and operation information to the operator on the control console.

5. Steering connections made to the pipe string shall be carried out in such a manner that the joint to joint angle of any two adjacent pipes does not exceed 0.5 degrees.

6. The MTBM display equipment shall continuously show and automatically record the position of the head with respect to the project design line and grade.

G. The Contractor shall provide portable testing equipment at the jacking station for carbon monoxide gas, hydrogen sulfide gas, oxygen deficiency, and explosive gases.

H. All electrical systems utilized on the MTBM shall be equipped with appropriate ground fault systems. The Contractor shall use electrical systems that are insulated, not permitting any bare wire exposures.

I. All equipment shall be suitably insulated so as not to exceed the noise limitations stated in the Special Conditions.

J. Necessary equipment for pipe excavation shall include signal systems, fire extinguishers, safety equipment, and other equipment required by the Contractor's method of construction. Such equipment shall be maintained in good repair.

2.03 CARRIER PIPE

A. Shall be as shown on the Drawings and shall conform to the requirements of Section 02535 - Reinforced Concrete Storm Drain Pipe with sulfide resistant additive.

B. The carrier pipe may not be direct-jacked for microtunneling installations.

2.04 CASING PIPE

A. All steel shall conform to the requirements of ASTM A36, grade 50. The casing shall be new and unused pipe. Pipe jointing shall meet one of the following two (2) criteria:

1. Welded in accordance with ASTM A139; or

2. Permalock steel casing pipe.

B. The thicknesses of casing as shown on the Drawings are minimum thicknesses. Actual thicknesses shall be determined by the casing installer, based on its evaluation of the required forces to be exerted on the casing when jacking. Any buckling of the casing due to jacking forces shall be repaired at no additional cost to the City.

PART 3 - EXECUTION

3.01 PREPARATION

A. The Contractor shall be responsible for means and methods of microtunneling and pipe jacking operations and shall ensure the safety of the Work, the Contractor's employees, the public, and adjacent property, whether public or private.

B. The Contractor shall execute microtunneling operations so that ground loss at the surface will not occur. The completed casing pipe shall have full bearing against earth; no voids or pockets shall be left in any portion of the Work. The Contractor shall fill the annular space between the pipe and ground during microtunneling and modified direct jack operations with lubricating material.

C. The Contractor shall maintain clean working conditions inside the jacking operation area and remove spoil, debris, equipment, and other material not required for operations.

D. Intermittent entry of personnel will be permitted for maintenance and removal of equipment provided that appropriate safety precautions and procedures are taken and safety equipment is functional.

3.02 MICROTUNNEL MODIFED DIRECT JACK PIPE INSTALLATION AND TESTING

A. The Contractor shall inspect all casing pipe prior to lowering it into the drive pit to ensure that no cracked, broken, or otherwise defective materials are being used. The Contractor shall use the pipe manufacturer's recommended method for inspection or site of the Work determination for damage. Pipe delivered with visible cracks, scars, chips, or any damage in excess of the limitations specified, shall not be used. Damaged or defective pipe shall be marked as rejected and shall be promptly removed from the site of the Work.

B. The Contractor shall use proper tools and equipment to handle pipe. Slings shall be made of rope, nonmetallic webbing, or other materials that will not damage the pipe. Lifting eyes shall be use d only when approved by the pipe manufacturer.

C. The Contractor shall clean ends of pipe thoroughly. The Contractor shall remove foreign matter and dirt from pipe joints during laying. The Contractor shall lubricate joints per manufacturer' s recommendations.

D. Damaged pipe shall be jacked through to the receiving pit and be removed. Other methods of repairing the damaged conduit may be used, as recommended by the manufacturer and approved by the Engineer.

E. Prior to final acceptance and final manhole-to-manhole inspection of the casing pipe by the Engineer, the Contractor shall flush and clean all parts of the system. The Contractor shall remove all accumulated construction debris, rocks, gravel, sand, silt, and other foreign material from the sewer system at or near the closest downstream manhole. If necessary, the Contractor shall use mechanical rodding or bucketing equipment.

F. Pipe and/or joints failing acceptance shall be jacked through to the receiving pit and be removed. Other methods of repairing the damaged conduit may be used, as recommended by the manufacturer and approved by the Engineer.

3.03 GROUNDWATER CONTROL

A. The Contractor shall provide the necessary ground water control measures, to provide safe working conditions, and to prevent excessive inflow of water into the excavation during jacking operations.

B. Methods of dewatering shall be at the option and responsibility of the Contractor. The Contractor shall maintain close observation to detect settlement or displacement of surface facilities due to dewatering. Should settlement or displacement be detected, the Contractor shall notify the Engineer immediately and take such action as necessary to maintain safe conditions and prevent damage.

3.04 PITS

A. The Contractor shall conduct boring and jacking operations from a pit excavated at one end of the section to be bored. Where conditions and accessibility are suitable, the Contractor shall place the pit on the downstream end of the bore.

2. The pit shall be rectangular and excavated to the width and length required for ample working space. Adequate sheeting, shoring, and bracing for operating pits and other appurtenances shall be placed and maintained to ensure that work proceeds safely and expeditiously. The Contractor shall design the temporary support of the excavation as specified in Section 02150 – Sheeting and Shoring. The Contractor shall keep preparations dry during all operations. The Contractor shall perform pumping operations as necessary.

3. The bottom of the pit shall be firm and unyielding to form an adequate foundation upon which to work. In the event the pit bottom is not stable, the Contractor shall excavate to such additional depth as required and place a gravel sub-base or a concrete sub-base if directed by the Engineer due to soil conditions.

4. Trench excavation, all classes and types of excavation, the removal of rock, muck, debris, the excavation of all working pits and backfill shall be performed in accordance with the requirements of Section 02315 - Excavation and Backfill for Structures.

5. Upon completion of the required work, the sheeting, shoring, and bracing shall be left in place, cut off, or removed, as designated by the Engineer.

6. The pits or trenches excavated to facilitate jacking or boring operations shall be backfilled immediately after the installation of the carrier pipe has been completed.

3.05 EXCAVATION AND JACKING OF PIPE

A. Microtunnel Excavation:

1. The Contractor shall conduct microtunneling operations in accordance with applicable safety rules and regulations and use methods which include due regard for safety of workers, and protection for adjacent structures, utilities, and the public.

2. The Contractor shall keep microtunnel excavation within the easements and rights -of-way indicated on the Plans, to the lines and grades designated on the Plans.

3. The Contractor shall locate equipment powered by combustible fuels at suitable distances from pits and protect equipment to prevent the possibility of explosion and fire in pits or the pipe.

4. The rate of advance of the MTBM shall be matched with the rate of spoil removed to avoid over-excavating.

5. The Contractor shall make the excavation of a minimum sufficient size to permit pipe installation by jacking with allowance for injection of the lubricant into the annular space. The overcut shall not exceed one and one-half (1.5) inches.

B. Pipe Jacking:

l. For jacking, the Contractor shall use casing pipe that is round with a smooth, even outer surface, and has joints that allow for easy connections between pipes. Pipe ends shall be designed so that jacking loads are evenly distributed around the entire pipe joint and such that point loads will not occur when the pipe is installed. Pipe used for pipe jacking shall be capable of withstanding all forces that will be imposed by the process of installation. The Contractor shall protect the driving ends of the pipe and joints against damage.

2. The Contractor shall maintain an envelope of bentonite lubricant, or other similar material, around the exterior of the pipe during the jacking and excavation operation to reduce the exterior friction and possibility of the pipe seizing in place.

3. If the pipe "freezes" and the Contractor is unable to move it again, the Contractor may be permitted to construct a recovery access shaft, with the location subject to review by the Engineer. The Contractor shall be solely responsible for obtaining approvals for such a recovery shaft and shall be solely responsible for costs associated with the location and construction of the shaft and for maintaining traffic and utilities in the area.

4. A lubricant shall be injected from the rear of the MTBM and, if size allows, through ports in the pipes at regular intervals to reduce friction and fill any annular space remaining from the overcut of the cutter head.

5. In the event a section of pipe is damaged during the jacking operation, or joint failure occurs, as evidenced by visible ground water inflow or other

observations, the Contractor shall use one of the following procedures to connect the damage, as directed by the Engineer, at no additional cost to the City:

a. Slightly damaged pipe which passes leakage test and maintains pipe barrel and joint structural integrity, may, if access is possible, be repaired in place with a method approved by the pipe supplier.

b. Severely damaged pipe, or pipe where joint failure is evident, shall be removed from the excavation by jacking it through the excavation and removing it at receiving pit.

C. Grouting:

1. The Contractor shall completely fill voids outside the limits of the excavation created by caving or collapse of each cover over the excavation. The Contractor shall fill voids with pressure-injected sand cement grout.

2. The Contractor shall furnish and operate suitable equipment for any required grouting operations depending on the condition of the application.

3. The Contractor shall take care in grouting operations to prevent damage to adjacent utilities or other properties. The Contractor shall grout at a pressure that will not distort or imperil any portion of the Work or existing installation or structures.

4. Immediately after jacking has been completed and all the pipe in its final position, any remaining annulus void around the periphery of the installed pipes hall be filled under pressure with grout. The Contractor shall inject grout at a sufficient pressure to attain passage along the annulus around the pipe but shall not be greater than fifty (50) psi at the injection nozzle, until no grout is being taken or the volume of grout injected exceeds the designed volume of the annular space by a factor of three (3).

3.06 CONTROL OF LINE AND GRADE

A. Construction Control:

1. The Engineer will establish the baseline and benchmarks indicated on the Plans. The Contractor shall check baseline and benchmark s at the beginning of the work and report any errors or discrepancies to the Engineer.

2. The Contractor shall use the baseline and benchmarks established by the Engineer to furnish and provide reference control lines and grades for the pipe construction. The Contractor shall establish the exact location of the microtunnel excavation, pipe, and structures.

3. The Contractor shall establish and be responsible for accuracy of control for the construction of the entire Project, including pit locations, structures, excavation, pipe alignment, and grade.

4. The Contractor shall establish control points sufficiently far from the microtunnel and modified direct jack operation not to be affected by ground movement.

5. The Contractor shall maintain daily surveying records of alignment and grade. The Contractor shall submit three (3) copies of these records to the Engineer within twenty-four (24) hours of the operation. The Contractor, however, remain s fully responsible for the accuracy of its work and the correction of it, as required.

6. The Contractor shall check the primary controls for the MTBM and the modified direct jack machine against an above-ground undisturbed reference at least once each week and once for each two hundred fifty (250) feet of microtunnel constructed, or more often as needed or directed by the Engineer.

B. Line and Grade:

1. The Contractor shall record the exact position of the MTBM and the modified direct jack machine continuously to ensure the alignment is within the specified tolerances. The Contractor shall make the survey at the MTBM to allow immediate correction of misalignment before allowable tolerances are exceeded. The microtunnel guidance system may be used, however, the Contractor shall select times to measure and record this information after the air temperatures have stabilized throughout the pipe to ensure accurate readings.

2. When the excavation is off line or grade, the Contractor shall return to the design line and/or grade at a rate of not more than one (1) inch per twenty-five (25) feet.

3. The Contractor shall perform a verification survey of the installed pipe from pit to pit after removal of the MTBM and the modified direct jack machine. The Contractor shall document measured conformance to design line and grade of the pipe together with locations and deviation (distance and direction) of any out-of-tolerance locations.

4. Acceptance criteria for the pipe shall be ± two (2) inches in horizontal alignment from the theoretical at any point between pits, including the receiving end, and ± one and one-half (1.5) inches in elevation from the vertical.

5. If allowable tolerances are exceeded, the Contractor shall bear full responsibility and expense for correction (redesign, reconstruction, easement acquisition, etc.). If an obstruction is encountered, the Contractor shall assume full cost and responsibility for demonstrating that an obstruction

exists. If redesign is required, the Contractor shall obtain the services of a professional engineer registered in the State of Georgia for the redesign. The installed pipe must be capable of meeting the design flow and velocities for a full pipe condition. Plans showing the changes shall be submitted to the Engineer for review.

6. Pipe installed outside tolerance or which are outside the right-of-way shall be backfilled (grouted) and reconstructed within tolerance, if directed by the Engineer.

3.07 VENTILATION AND AIR QUALITY

A. The Contractor shall provide, operate, and maintain for the duration of casing project a ventilation system to meet safety and OSHA requirements.

3.08 DISPOSAL OF SPOIL MATERIAL AND CONSTRUCTION WATER

A. The Contractor shall remove spoil from the site of the Work and dispose of in accordance with the requirements of Section 02200 - Site Preparation.

B. Construction water shall be disposed of in accordance with all applicable Federal, State, and local codes, laws, regulations, ordinances, and Section 02340 - Slope Protection and Erosion Control.

3.09 SETTLEMENT MONITORING

A. Settlement monitoring shall be performed for all microtunnels and modified direct jack alignments eighteen (18) inches in diameter or larger.

B. The Contractor shall perform microtunneling in a manner that will minimize the movement of the ground in front of, above, and surrounding the excavation, and minimize subsidence of the surface above and in the vicinity of the excavation.

C. The Contractor shall place markers as specified in these Specifications and as directed by the Engineer. The Contractor shall place settlement markers outside of pavement area, along the centerline of the casing at twenty (100) foot intervals and offset ten (10) feet each way from the centerline of the casing. Markers shall also be placed at each shoulder of the roadway, at each edge of pavement, at the centerline of the pavement, and at ten (10) and twenty-five (25) feet in each direction from the centerline of the casing. The Contractor shall tie settlement markers to benchmarks and indices sufficiently removed as not to be affected by the casing operations. The Contractor shall assume coordination with authorities having jurisdiction over the crossing is required to complete monitoring

D. Daily readings shall be taken on all monitoring points from a period five (5) days before microtunneling is initiated to establish baseline conditions, until the overall construction period is substantially complete. Such monitoring points shall be reference d to temporary benchmarks provided by the Engineer. Benchmarks and monitoring points shall be installed in such a manner as to remain in place and undisturbed for the duration of the construction and warranty periods. All survey readings shall be recorded to the nearest one-hundredth (0.01) of a foot.

E. Operations shall be stopped when monitoring points indicate a vertical change in elevation one-half (l/2) inch or more or any surface disruption is observed. The Contractor shall propose immediate action for review and approval by the Engineer to remedy the problem at no additional cost to the City.

F. The Contractor shall cooperate fully with jurisdictional personnel. Any settlement shall be corrected by, and at the expense of, the Contractor.

G. The Contractor shall promptly report any settlement and horizontal movement immediately to the Engineer and take immediate remedial action.

3.11 INSTALLATION OF CARRIER PIPE

A. After the steel casing pipe has been installed, the carrier pipe shall be installed in the casing pipe using push-on joints. Care shall be exercised at all times to protect the coating and lining of the carrier pipe and to maintain tight, full-seated joints in the carrier pipe. The carrier pipe shall be installed at the proper line and grade without any sags or high spots.

B. The carrier pipe shall be held concentric in the casing pipe by blocks spaced radially around the pipe and secured together so that they remain firmly in place. The spacing blocks in the casing pipe shall be equally spaced longitudinally to distribute the load equally between no less than two locations per pipe joint or per stick of pipe.

C. The annular space between the casing and the carrier pipe shall be backfilled with gout to the springline elevation of the carrier pipe as shown on the Plans. A bulkhead shall be constructed at the open end of each reach of pipe section to be backfilled to retain the grout material.

D. Place grout backfill after successful testing of the carrier pipe and chamber pipe as specified in Section 02535 - Reinforced Concrete Storm Drain Pipe. Place grout using a slickline outside the carrier pipe to fill the annulus completely, and be in accordance with the Contractor's submittal as approved by the Engineer.

E. Backfilling of the annular space shall be accomplished by placing backfill in a monolithic lift provided that placement methods will not induce movement of the pipe, pipe overstressing or excessive deformation, otherwise two or more lifts shall be required.

+++END OF SECTION 02449+++

SECTION 02510
ASPHALT PAVING

PART 1 - GENERAL

1.01 SCOPE:

A. The work under this Section includes, but it is not necessarily limited to, the furnishing and installation of all asphalt paving materials and pavement base materials as indicated on the Drawings and as necessary for the proper performance of this work.

1.02 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:

1. Batch design.
2. Density and viscosity tests on each run.
3. Weight slips for pavement base and asphalt paving materials.

1.03 QUALITY ASSURANCE:

A. Unless otherwise indicated on the Drawings or herein specified, all work under this Section shall be performed in accordance with the current Georgia Department of Transportation Standard Specifications.

B. Furnish weight slips for all material incorporated in the Project to verify chat the required tonnage has been applied.

1.04 PRODUCT HANDLING:

A. Protection: Use all means necessary to protect the materials of this Section before, during and after installation and to protect the installed work and materials of all other trades.

B. Replacement: In the event of damage, immediately make all repairs and replacements necessary to gain the approval of the Engineer at no additional cost to the City.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. General: All materials and products for the work under this Section shall conform to the current Georgia Department of Transportation Standard Specifications except as otherwise specified herein.

B. Graded Aggregate Base: The sub-base shall be a minimum of 6-inches thick and a width equal to the width of the finished paving. Aggregate base shall be Class A meeting the requirements of the Georgia Department of Transportation Specification Section 815.01. Compact to at least 95% Standard Proctor Density. (ASTM D-698)

C. Base: The base for all paved roadways shall conform to the requirements of the Georgia Department of Transportation Specifications for the Hot Mix asphalt Section 828 Type "B".

D. Surface Course: The surface course for all pavement, including paint or tack coat when required by the Engineer, shall conform to the requirements of the Georgia Department of Transportation Specifications for Asphaltic Concrete, Section 828, Type "E".

E. Prime coat shall be in accordance with Section 412 of the DOT Standard Specifications.

F. Tack coat shall conform to Section 413 of the DOT Standard Specifications.

PART 3 - EXECUTION

3.01 EXCAVATING. FILLING AND GRADING:

Perform excavating and filling in accordance with Section 02200 entitled "Earthwork" of these Specifications.

3.02 INSTALLATION:

A. Asphaltic construction shall be performed in accordance with Section 400 of the Georgia Department of Transportation "Standard Specifications, Construction of Roads and Bridges".

B. Place each course in the required quantities so that
when compacted, they will conform to the indicated grade, cross section and minimum thickness as specified or as indicated on the Drawings.

3.03 CLEANING:

A. Prior to acceptance of the work of this Section, clean the pavement and related areas in accordance with the requirement s of the General Conditions of the Contract Documents.

+++ END OF SECTION 02510 +++

SECTION 02521
CONCRETE SIDEWALKS, CURBS AND GUTTERS

PART 1 - GENERAL

1.01 SCOPE

A. Work described in this Section includes furnishing all labor, materials, equipment, tools and incidentals required for construction of concrete sidewalks, concrete monolithic sidewalk and curb, concrete header curb, concrete curb, concrete gutter and concrete combined curb and gutter, which shall consist of monolithic curb and gutter respectively, all constructed of Portland cement concrete, at the locations, and to the lines, grades, cross section, form and dimensions indicated on the Drawings.

B. Cement concrete sidewalks, concrete monolithic sidewalk and gutter, concrete header curb, concrete curb, concrete curb, gutter and combined curb and gutter shall include all necessary excavation, unless otherwise indicated, and subgrade preparation; backfilling, and final clearing up; and completion of all incidentals thereto, as indicated on the Drawings or as directed by the Engineer.

1.02 PRODUCT HANDLING

A. Protection: Use all means necessary to protect concrete materials before, during and after installation and to protect the installed work and materials of all other trades.

B. Replacement: In the event of damage, immediately make all repairs and replacements necessary for the approval of the Engineer at no additional cost to the City.

1.03 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents.

PART 2 - PRODUCTS

2.01 CONCRETE REINFORCEMENT

A. Concrete reinforcement shall conform to Section 03200, Concrete Reinforcement and Dowelling.

2.02 CONCRETE AND RELATED MATERIALS

A. General: Concrete and related materials including, but not necessarily limited to, joint materials, membranes and curing compounds shall conform to Section 03300, Cast-In-Place Concrete.

B. Class: All concrete shall be Class B 3,000 psi and conform to requirements of Section 03300.

C. Water used in mixing concrete shall be fresh, clean, potable water free from injurious amounts of oil, acid, alkali, vegetable, wastewater and/or organic matter.

D. Admixtures shall meet the following requirements:

1. Except as herein specified, no curative or hardening admixtures shall be used.
2. An air entrainment agent capable of providing 3 to 6 percent air shall be used. Air entraining admixtures which are added to concrete mixtures shall conform to ASTM C 260 for Air Entraining Admixtures for Concrete.

F. Sub-base shall be constructed of durable material such as bank-run gravel. Minimum depth of sub-base shall be 3-inches.

G. Joint filler shall be a non-extruding joint material conforming to AASHTO M21 3 for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (non-extruding and resilient bituminous types). The filler for each joint shall be furnished in a single piece for the full depth and width required for the joint unless otherwise specified by the Engineer.

PART 3 - EXECUTION

3.01 EARTHWORK

A. General: All earthwork shall be performed in accordance with Section 02200, Earthwork, and as specified in this Section.

B. Backfilling

1. After the subgrade for sidewalks is compacted and at the proper grade, spread 3 inches or more of sub-base material. Sprinkle with water and compact by rolling or other approved method. Top of the compacted gravel shall be at the proper level to receive the concrete.

2. After the concrete has set sufficiently, the spaces on both sides of the curb, gutter, and combined curb and gutter shall be backfilled, and the materials compacted and left in a neat and workmanlike condition.

3. Curbs to be used in the construction of asphalt pavements shall be backfilled prior to placement of base material for asphalt pavement.

3.02 SUBGRADE PREPARATION

A. The subgrade shall be formed by excavating to the required depth below the finished surface of the respective types, in accordance with the dimensions and designs indicated on the Drawings or as directed by the Engineer, and shall be of such width as to permit the proper installation and bracing of forms. The subgrade shall be compacted by hand tamping and all soft, yielding or unsuitable material shall be removed and backfilled with satisfactory material and again compacted thoroughly to 98% of dry density per

ASTM 698 and finished to a smooth and unyielding surface. The finished grade shall be to the dimensions and design indicated on the Drawings or as directed by the Engineer for the bottom of the proposed construction.

3.03 CONCRETE CURB AND GUTTER CONSTRUCTION

A. Construct curbs to lines and grade shown or established by the Engineer. Curbs shall conform to the details shown on the Drawings.

B. Forming:

1. Forms shall be metal and of an approved section. They shall be straight, free from distortions, and shall show no vertical variation greater than □-inch in 10 feet, and shall show no lateral variation greater than ¼-inch in 10 feet from the true plane surface on the vertical face of the form.

2. Forms shall be of the full depth of the structure and be so constructed as to permit the inside forms to be securely fastened to the outside forms.

3. Securely holds the forms in place true to the lines and grades indicated on the Drawings.

4. Wood forms may be used on sharp turns and for special sections as approved by the Engineer.

5. Where wooden forms are used, they shall be free from warp and the nominal depth of the structure.

6. All mortar and dirt shall be removed from the forms and all forms shall be thoroughly oiled or wetted before any concrete is deposited.

7. The supply of the forms shall be sufficient to permit their remaining in place at least 12 hours after the concrete has been placed.

C. Joints:

1. Joints shall be constructed as indicated on the Drawings and as specified.

2. Construct joints true to line with their faces perpendicular to the surface of the structure and within ¼-inch of their designated position.

3. Thoroughly spade and compact the concrete at the faces of all joints to fill all voids.

4. Install expansion joint materials at the point of curve at all street returns.

5. Install expansion joint material behind the curb at abutment to sidewalks and adjacent structures.

6. Place contraction joints every 10 feet along the length of the curbs and gutters.

7. Form contraction joints using steel templates or division plates which conform to the cross section of the structure. Leave the templates in place until the concrete has set sufficiently to hold its shape, but remove them while the forms are still in place.

8. Contraction joint templates or plates shall not extend below the top of the steel reinforcement or shall be notched to permit the reinforcement to be continuous through the joint.

9. Contraction joints shall be a minimum of 1-1/2-inches deep.

D. Finishing:

1. Strike off the surface with a template, and finish the surface with a wood float using heavy pressure, after which, contraction joints shall be made and the surface finished with a wood float or steel trowel.

2. Finish the face of the curbs at the top and bottom with an approved finishing tool of the radius indicated on the Drawings.

3. Finish edges with an approved finishing tool having a 1/4-inch radius.

4. Provide a final broom finish by lightly combing with a stiff broom after troweling is complete.

5. The finished surface shall not vary more than 1/8-inch in 10 feet from the established grade.

E. Concrete Curing:

1. After finishing operations have been completed and immediately after the free water has left the surface, the surface of the structure shall be completely coated and sealed with a uniform layer of curing compound specified in Section 03300, Cast-In-Place Concrete.

2. The compound shall be applied in one or two applications as directed by the Engineer. When the compound is applied in two (2) increments, the second application shall follow the first application within 30 minutes.

3. The compound shall be applied continuously by means of an automatic self-propelled, pressure sprayer as approved by the Engineer at the rate directed by the Engineer, but not less than 1 gallon per 200 square feet of surface.

4. The equipment shall provide adequate stirring of the compound during application.

5. Should the method of applying the compound not produce uniform coverage, its

use shall be discontinued, and the curing shall be by another method approved by the Engineer.

F. Protection:

1. Provide and use sufficient coverings for the protection of the concrete in case of rain or breakdown of curing equipment.

2. Provide necessary barricades and lights to protect the work and rebuild or repair to the approval of the Engineer. All damage caused by people, vehicles, animals, rain, the Contractor's operations and the like shall be repaired by the Contractor at no additional expense to the City.

3.04 SIDEWALK CONSTRUCTION

A. Sidewalks shall be a minimum of 4 inches thick, unless otherwise noted.

B. At locations where the new sidewalk is to abut existing concrete, sawcut concrete for a depth of 2 inches and chip the old concrete back to sound material on a straight line, clean the surface, and apply a neat cement paste just prior to pouring the new sidewalk.

C. Joint:

1. Place preformed asphalt expansion joints as in the adjacent curb, where the sidewalk ends at the curb, and around posts, poles, or other objects protruding through the sidewalk.

2. Provide contraction joints transversely to the walks at locations opposite the construction joints in the curb. These joints shall be straight and at right angles to the surface of the walk.

D. Finishing:

1. Broom the surface with a fine-hair broom at right angles to the length of the walk and tool all edges, joints, and markings. Mark the walks transversely with a jointing tool.

E. Concrete Curing

1. After the finishing operations have been completed and immediately after the free water has left the surface, the surface of the structure shall be completely coated and sealed with a uniform layer of curing compound specified in Section 03300, Cast-In-Place-Concrete.

2. The compound shall be applied in one or two applications as directed by the Engineer. When the compound is applied in two (2) increments, the second application shall follow the first application within 30 minutes.

2. The compound shall be applied continuously by means of an automatic

self-propelled, pressure sprayer as approved by the Engineer at the rate directed by the Engineer, but not less than 1 gallon per 200 square feet of surface.

3.

4. The equipment shall provide adequate stirring of the compound during application.

5. Should the method of applying the compound not produce uniform coverage, its use shall be discontinued, and the curing shall be by another method approved by the Engineer.

F. Protection:

1. Protect the sidewalks from damage for a period of seven days.

2. All damage caused by people, vehicles, rain, animals and the Contractor, shall be repaired by the Contractor at no additional expense to the City.

3.05 REPLACEMENT CONCRETE CURB AND SIDEWALK

A. When a section is removed, the existing sidewalk or curb shall be cut to a neat line, perpendicular to both the centerline and the surface of the concrete slab. Existing concrete shall be cut along the nearest existing construction joints; if such joints do not exist, the cut shall be made at minimum distances shown on the Drawings.

B. Existing concrete sidewalks and curbs that have been cut and removed for construction purposes shall be replaced with the same width and surface as the portion removed. sidewalks shall have a minimum uniform thickness of 4-inches. The new work shall be neatly jointed to the existing concrete so that the surfaces of the new work shall form an even, unbroken plane with the existing surfaces.

C. All work shall conform to the requirements for new sidewalks and curbs as detailed in this Section.

3.06 CLEANING

A. All excess or unsuitable material shall be disposed of as specified in Section 02050, Demolition.

B. All surfaces of the Work and adjacent surfaces shall be broom clean. The contractor shall use pressure washing and other means approved by the Engineer to remove splashed and spilled concrete from the Work and adjacent surfaces.

C. Disturbed seeded areas shall be reseeded per the requirements of Section 02933, Seeding.

+++ END OF SECTION 02521 +++

SECTION 02535
REINFORCED CONCRETE STORM DRAIN PIPE

PART 1 – GENERAL

1.01 SCOPE

The Contractor shall furnish all labor, materials, equipment and incidentals required to install all reinforced concrete storm drain pipe.

1.02 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the Contract. In addition, the following specific information shall be provided to the City DWM as part of the Project record:

1. Product Data: Descriptive details and shop drawings covering full details of pipe, fittings, specials, joints and the assembly thereof, joint materials and details thereof, and full details and cuts of all castings to be incorporated into the Work.

2. Manufacturer's Installation Instructions: Special procedures required to install products specified.

3. Manufacturer's Certificate: A manufacturer's certificate certifying that products meet or exceed specified requirements.

B. Submit shop drawings to the City DWM showing a complete laying plan of all pipe, including all fittings, adapters, and specials along with the manufacturer's drawings and specifications indicating complete details of all items. The pipe details shall include stationing, pipe class or design and supporting computations; and laying schedule which specifies pipe class, class coding, pipe stationing for all changes in grade or horizontal alignment, transition stations for various pipe classes and the limits of each.

1.03 QUALITY ASSURANCE

A. Reference Standards: The Contractor shall comply with the applicable provisions and recommendations of the latest editions of the following standards.

1. ASTM C33 – Specification for Concrete Aggregate

2. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe

3. ASTM C150 – Standard Specifications for Portland Cement

4. ASTM C443 - Standard Specification for Joints for Concrete Pipe and Manholes using Rubber gaskets

5. ASTM C655 – Standard Specifications for Reinforced Concrete D-Load Culvert, Storm Drain and Sewer Pipe

6. ASTM C1479 - Standard Practice for Installation of Precast Concrete Sewer, Storm Drain, and Culvert Pipe Using Standard Installations.

7. ASTM C1619 – Standard Specification for Elastomeric Seals for Joining Concrete Structures

1.04 TRANSPORTATION AND HANDLING

A. Furnish equipment and facilities for unloading, handling, distributing and storing pipe, fittings, valves and accessories. Make equipment available at all times for use in unloading. Do not drop or dump materials. Any materials dropped or dumped will be subject to rejection without additional justification.

B. Handle pipe, fittings and accessories carefully to prevent shock or damage. Handle pipe by rolling on skids, forklift or front loader. Do not use material damaged in handling.

1.05 STORAGE AND PROTECTION

A. Store all pipe which cannot be distributed along the route. Make arrangements for the use of suitable storage areas.

B. Stored materials shall be kept safe from damage. The interior of all pipes, fittings and other appurtenances shall be kept free from dirt or foreign matter at all times.

C. Pipe shall be stored per the manufacturer's recommendations.

D. Store joint gaskets in a cool location, out of direct sunlight. Gaskets shall not come in contact with petroleum products. Gaskets shall be used on a first-in, first-out basis.

1.06 ACCEPTANCE

A. Acceptance of pipe shall be on the basis of plant load-bearing tests of the pipe, material tests and inspection of manufactured pipe for visual defects and imperfections as described in paragraph 5.1.1 of ASTM C76.

B. All pipe shall be manufactured in accordance with the American Concrete Pipe Association QCast Storm Sewer quality assurance program. If pipe producer is not QCast certified, each length of pipe shall be stamped by a regular employee of an approved testing agency.

C. If producer is not QCast certified, provide results of tests on pipe, pipe materials, joint

material, and made-up joints by an independent testing laboratory. Include materials, absorption, crushing and hydrostatic leakage tests on pipe of each size in accordance with applicable specifications.

D. Inspect pipe after delivery for QCast or laboratory stamp, shape, cracks, uniformity, blisters and imperfect surfaces, hammer test, damaged ends and gasket grooves. Any pipe repaired or patched is subject to rejection if such repairs or patches are not sound and properly finished.

E. Pipe shall not be shipped until it has attained full specified 28 day compressive strength.

PART 2 – PRODUCTS

2.01 GENERAL

A. All reinforced concrete storm drain pipe shall conform to the requirements ASTM C76, except as specifically extended, modified or amended in this section.

B. All reinforced concrete storm drain pipe shall meet the standards for ASTM C76 Class III. All reinforced concrete storm drain pipe shall have a minimum of a B wall thickness unless shown otherwise on the plans.

2.02 CONCRETE PIPE

A. Reinforced concrete storm drain pipe shall be manufactured in accordance with ASTM C76 and shall be furnished in not less than eight (8) foot lengths. Special pieces and closure pieces may be of shorter lengths than specified in this section. Pipe shall be manufactured wet cast, dry cast, or centrifugally cast.

B. No lifting holes shall be provided in the wall of the pipe. Care shall be exercised in handling and transporting the pipe so as to protect the full interior wall of the pipe. No inward projecting hooks or lift bars shall be used in lifting pipe. Extreme care shall be applied to handling pipe immediately after manufacture to prevent development of "cure" cracks and stress cracks due to transporting pipe before full length of curing time.

C. All reinforced concrete storm drain pipe shall be made with concrete with a twenty eight (28) day minimum compressive strength of 4000 psi and the absorption shall not exceed nine (9) percent. All cement and aggregate shall conform to the requirements of ASTM C76. Coarse aggregate shall meet the requirements of ASTM C33 of a size that provides a workable homogeneous, high quality concrete mixture, considering the particular wall thickness. Cement, for reinforced concrete pipe, shall be Type I/II Portland cement. The requirements of this article shall apply to all reinforced concrete pipe manufactured under the requirements of ASTM C76 and ASTM C443.

D. Reinforcement shall consist of either wire conforming to the standard specification for deformed steel wire for concrete reinforcement (ASTM A496), welded deformed steel wire fabric for concrete reinforcement (ASTM A497), bars of intermediate grade steel conforming to standard specifications for billet steel bars for concrete reinforcement (ASTM A615, Grade 60) or from fabricated deformed steel mats for concrete reinforcing (ASTM A184). Steel areas shall be in accordance with ASTM C76. Pipe with a diameter of 42-inches and larger shall be reinforced with two (2) full circular steel cages. Elliptical steel cages or quadrant steel cages shall not be allowed. Reinforcing steel shall be positioned in accordance with the clearances specified in ASTM C76. Clearance shall be provided for the full length of the pipe from bell end to spigot end of the pipe. Steel positioning shall not vary within the forms more than +/-10% of the wall thickness or +/-one-half (1/2)-inch, whichever is greater.

E. Variations of the internal diameter of the pipe shall comply with paragraph 12.1 of ASTM C76. The planes of the ends of the pipe shall be perpendicular to the longitudinal axis of the pipe except as specified for beveled end pipe (special pieces below). The ends of the pipe shall be of such a design that the pipe, when laid, shall form a continuous conduit with smooth and uniform interior surface. Minor repairs to the pipe are allowed as outlined in accordance with ASTM C76. Minor repairs made at the point of manufacture or in the field shall be filled with a permanent non-shrinking patching compound. Mortar patching compound shall be similar and equal to Embeco 167 Mortar as manufactured by Master Builders, Thoropatch as manufactured by Thoroseal Products, or equal. The QCast Inspector shall inspect the lengths of pipe before they are shipped to the project site and shall require the manufacturer to apply the mortar as directed. No mortar shall be applied without prior approval of the QCast Inspector.

F. A record of pipe supplied for the project shall be furnished to the City DWM by the manufacturer. All pipe shipped to the site of the Work shall be clearly marked as to type, date of manufacture, and name or trademark of manufacturer. The historical record of pipe supplied shall contain: class, date of manufacture, dates of inspection, date of shipment, and dates and results of compressive tests on cylinders and cores.

G. The Contractor shall not unload the pipe from trucks at the site of the Work in a manner that might damage the pipe. It shall be the responsibility of the Contractor to assure that the pipe is manufactured, loaded, transported, unloaded, stored, and installed in a manner which does not result in damage to the pipe.

H. The Contractor reserves the right to reject any and all pipe until it meets all the requirements of these specifications.

2.03 SPECIAL PIECES

Special pieces of pipe such as bends shall be manufactured from cut lengths of straight pipe, and shall have carry-over reinforcement across adjoining planes in accordance with industry standards.

2.04 JOINTS

All joints and gaskets shall meet the requirements of ASTM C443.

2.05 SPECIAL DESIGN PIPE

A. Special designs of reinforced concrete pipe shall be in accordance with the requirements of ASTM C76 Section 7.2 - modified or special designs.

B. The pipe manufacturer shall not manufacture reinforced concrete pipe, test pipe, or produce pipe until approval has been obtained from the Contractor in writing. The manufacture of pipe shall have concrete cover over the inside steel cage and cover over the outside steel cage, in accordance to ASTM C76 standards, shall provide two complete circular mats of steel, and shall provide the strengths of steel as specified in this section. Pipe shall be designed per applicable sections of ASTM C76.

C. The pipe manufacturer shall be required upon receiving the order from the Contractor to submit to the Contractor and City DWM as part of the project record, the design for the classes of pipe to be manufactured. Manufacturing drawings shall be required for each pipe size and pipe class. The drawings shall be working drawings to reflect sizes of steel (circumferential, longitudinal, spacer, and stirrups steel) as well as steel placement.

D. Submission of certified three-edge-bearing tests already made may be considered as verification of Special Design in lieu of D-Load tests.

E. The City DWM may select at random two full length joints of each class or size of pipe to be tested to D-loads that would produce applicable (ASTM C76) cracking. Tests shall be in accordance with applicable sections of ASTM C76 or as amended in this section. The test shall be performed in the presence of the QCast inspector.

PART 3 – EXECUTION

3.01 LAYING CONCRETE PIPE

A. Excavation for the pipe and preparation of the trench bottom, including bedding to receive the pipe, shall be done in accordance with the requirements of Section 02225. In the preparation of the pipe bedding, the Contractor shall take into consideration any variation in thickness of the pipe wall, and the bed must be prepared to suit the particular piece of pipe to be lowered into place. Preparation of the compacted bed shall be such that when the pipe is lowered in place and pulled to secure full compressive pack of the rubber joint ring, a smooth and uniform flow line on the specified grades will be secured. An interior inspection of the sewer will be made after sufficient time has elapsed for the backfill to attain its settlement in the trench.

B. The pipe interior and joints shall be clean when lowered in the trench and shall be

kept clean thereafter. The exposed ends of pipe in the trench shall be closed by suitable bulkheads at all times when pipe laying is not in progress. Each section of pipe shall be securely anchored in place before the next adjoining pipe is laid and the joint between the sections is made.

C. No tools or equipment shall be used in the laying of the pipe that will damage the pipe. The trenching equipment shall not be used to force a joint of pipe into its proper position on grade by application of pressure on top of the pipe along its partial or full length. All pipe joints shall be brought home by use of properly designed equipment for the specific purpose in accordance with industry standards. Pipe lengths that have received damage to wall, spigot, or socket shall be replaced or repaired to the satisfaction of the Contractor. Such replacement or repair shall be at the Contractor's expense.

D. The Contractor shall secure the following results with the pipe and joint used:

1. A tight joint with gasket fully compressed and joint openings completely filled.

2. Pipeline shall have a smooth and uniform interior section free from cracks, pits, voids, or crazing as defined in Sections 13 and 15 of ASTM C76. Longitudinal and transverse cracks with a width less than 0.01-inch shall be considered hairline and minor. Seal longitudinal and transverse cracks having a width equal to or greater than 0.01-inch and less than 0.10-inch if there is displacement across the crack and the soil pH is less than 5.5. Replace pipes having longitudinal and transverse cracks greater than 0.10-inch.

E. Backfilling shall be in accordance with the requirements of Section 02225.

3.02 CLEANING

At the conclusion of the work, the Contractor shall clean all pipe by flushing with water or other means to remove all dirt, stone wood or other materials which may have entered the pipe during construction.

3.03 TESTING

Additional testing and inspection required for acceptability of installed storm sewers is specified in Section 02650.

3.04 CLEANUP

After completing each section of storm drain, the Contractor shall remove all debris and construction materials and equipment from the site of the Work; grade and smooth over the surface on both sides of the line; and leave the entire construction area in a clean and neat condition. The Contractor shall restore the site of the Work to its original or better condition.

+ + + END OF SECTION 02535 + + +

SECTION 02538

SANITARY SEWER SERVICE LATERAL RECONNECTION AND REPAIRS

PART 1 - GENERAL

1.1 SCOPE

The work covered under this section shall consist of disconnecting service connections from the existing combined sewers and reconnecting the lateral to the existing combined sewers after the completion of the installation of the separate storm water pipe as shown on the Plans or as directed by the Engineer, and as specified in this section.

The service connections shall be connected to the existing lateral, as necessary to provide service to live service connections.

Related Work Specified Elsewhere:

Section 01200 - Measurement and Payment

Section 02315 - Excavation and Backfill for Structures

Section 02225 — Trench Excavation and Backfilling

Section 02535 - Reinforced Concrete Storm Sewer Pipe

Section 02664 - Ductile Iron Sanitary Sewer Pipe and Fittings

Section 02920 - Site Restoration

Section 03300 - Cast-In-Place Concrete

SUBMITTALS

Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided.

1. The Contractor shall submit product data for each pipe product, fitting, coupling, and adapter.

2. The Contractor shall show reconnected services on the Record Drawings.

3. The Contractor shall submit work plans detailing sanitary sewer service lateral reconnection and repair methods.

1.3 QUALITY ASSURANCE

A. Reference Standards: The Contractor shall comply with the applicable provisions and recommendations of the latest editions to the following standards, except as otherwise shown on the Plans or specified in these Specifications.

1. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe.

2. ASTM C700 - Standard Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated.

3. ASTM D1784 - Standard Specification for Rigid Polyvinyl Chloride (PVC) Compounds and Chlorinated Polyvinyl Chloride (CPVC) Compounds.

4. ASTM D1785 - Standard Specification for Poly (Vinyl Chloride) (PLC) Plastic Pipe, Schedule 40, 80, and 120.

5. ASTM D3034 - Standard Specification for Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings.

6. ASTM D3212 - Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.

7. ANSI A21.11 - Rubber Gaskets Joints for Cast Iron and Ductile Lon Pressure Pipe and Fittings.

8. ASTM A 746 - Standard Specification for Ductile hon Gravity Sewer Pipe.

PART 2–PRODUCTS

2.1 SERVICE CONNECTIONS

A. All materials shall be pre-approved by the Engineer.

B. Service connections shall be made at the top or from the side at forty-five (45) degrees of the sewer line using same diameter pipe as currently connected to the combined sewer, minimum six (6) inches, as shown on the Plans, or as directed by the Engineer. Service pipe from the connection at the main line to the property line shall be Ductile Iron Pipe conforming to the requirements of Section 02664 - Ductile Iron Sanitary Sewer Pipe and Fittings if the main line is Ductile Iron Pipe or Reinforced Concrete Pipe.

C. Service pipe beyond the property line shall be the same material as existing or PVC conforming to the requirements of Section 02545 - Polyvinyl Chloride Gravity Sewer Pipe.

D. Connection of service lines or risers to sewer lines twelve (12) inches in diameter or less shall be by means of standard tees or wyes, or as indicated on the Plans. Connection of service lines or risers to sewer lines larger than twelve (12) inches shall be accomplished by tapping saddle.

PART 3 - EXECUTION

3.1 PROTECTION

A. The Contractor shall control traffic in accordance with the requirements of Section 01550 - Traffic Regulation.

B. The Contractor shall not allow sand, debris, or runoff to enter sewer system.

C. The Contractor shall ensure that wastewater does not backup into private property. The Contractor shall establish a plan to prevent sewer backups when reconnections are not accomplished in a timely manner.

D. The Contractor shall provide for diversion of wastewater if necessary, in accordance with the requirements of Section 02600 - Wastewater Flow Control. The Engineer may direct the Contractor to use cleanouts to bypass wastewater from adjacent facilities if the possibility of wastewater backup is likely.

E. The Contractor shall be responsible for any and all damage to property due to his work.

3.2 PREPARATION

A. The Contractor shall provide a minimum of forty-eight (48) hours written notice to property owners whose sanitary sewer service will be interrupted.

B. The Contractor shall properly disconnect existing connections from the existing combined sewer and reconnect to the new sanitary sewer, as described in this section.

C. The Contractor shall reconnect service connections, including those that go to unoccupied or abandoned buildings, unless directed otherwise by the Engineer.

The Contractor shall complete reconnection of all service lines within six (6) hours

D. The Contractor shall install stone backfill to subbase elevation in paved areas.

3.3 RECONNECTION TO NEW SANITARY SEWER MAINS

A. The Contractor shall install a full-bodied ductile iron tee or wye on the new sanitary sewer main for each service connection if the main line is ductile iron pipe except where the sanitary sewer is greater than twelve (12) inches where the Contractor shall use a tapping saddle. The Contractor shall install a vitrified clay tee or wye on the new sanitary sewer main for each service connection if the main line is vitrified clay pipe except where the sanitary sewer is greater than twelve (12) inches where the contractor shall use a tapping saddle. The Contractor shall use a tapping saddle for all service connections if the main line is reinforced concrete pipe.

B. The Contractor shall remove and replace cracked, offset, or leaking service line up to the easement line or property line whichever applies.

C. The Contractor shall make up the connection between the new main and the existing service line using ductile iron sewer pipe conforming to the requirements of Section 02664 - Ductile hon Sanitary Sewer Pipe and Fittings, if the main line

is ductile iron pipe or reinforced concrete pipe, and approved couplings, as detailed on the Plans.

D. The Contractor shall test new service connections before backfilling.

E. The Contractor shall install crusher run to the sub base elevation in paved areas.

3.4 INSTALLATION

A. Minimum slope for lateral service lines shall be one-quarter (1/4) inch per foot, unless the existing service lateral is at a lower slope, whereby the Contractor shall lay the service lateral at the existing slope. All specifications for gravity sewer lines end appurtenances shall apply to lateral service lines.

B. The Contractor shall install wyes or tees in locations shown on the Plans or as designated by the Engineer for future connection of service laterals or connection to live existing services. The Contractor shall plug the branch of the wye or tee until service laterals are installed. The Contractor shall record the location of fittings installed on a copy of the Plans to be submitted as Record Drawings.

1. Service laterals to be extended from main sewers over twelve (12) feet in depth where the property being served does not require the full depth, may be brought up to grade with a riser pipe as shown on the Detail Drawings.

   Service laterals from main sewers less than twelve (12) feet in depth will be extended on a straight uniform grade from the main point to the terminus. Service laterals shall be extended to the right-of-way line or easement line, as applicable, unless otherwise shown on Plans or directed by the Engineer. Laterals shall not exceed a depth of twelve (12) feet below finish grade at the end of the lateral at the right-of-way or easement line unless specifically authorized by the City.

2. Laterals Crossing Pavement: Laterals may be installed beneath the pavement by open trench if permitted by the City, or the Georgia Department of Transportation, where applicable based on the location of the Work. The open trench method shall meet the requirements of Section 02225 - Trench Excavation and Backfill. If an open trench is not permitted, the procedures described in this section shall be followed.

3. At the locations shown on the Plans, or as directed by the Engineer, service

laterals shall be installed in an encasement pipe by boring and jacking as shown on the Plans. Requirements of Section 02449 Trenchless Pipe Construction - Jacking and Boring shall be followed in such instances. A sufficiently large boring pit shall be excavated to allow for proper alignment of the drilling equipment and to allow the service lateral to be pushed through the encasement pipe. The horizontal alignment of the encasement pipe shall not vary by more than two (2) feet at the upstream end of the service lateral from a line drawn at right angles to the sanitary sewer at the wye branch or riser.

C. If the service connection ends in rock, the Contractor shall excavate the rock an additional ten (10) feet beyond the plugged end.

D. All sewer service connections shall be provided with a cleanout at the easement or right-of-way line. Cleanouts shall be installed in accordance with the Detail Drawings.

3.5 PLUGGING SERVICE LATERALS AFTER DISCONNECTION FROM THE COMBINED SEWER

A. The Contractor shall plug service laterals, at point of disconnection, using concrete conforming to the requirements of Section 03300 - Cast-In-Place Concrete.

3.6 UTILITY SERVICE REPAIRS

A. Where service connections or lines from water or was mains or sewers to the user's premises are disconnected, broken, damaged, or otherwise rendered inoperable by the Contractor for any reason, the Contractor shall, at its own expense, arrange with the respective utility company for any repairs of lines under their jurisdiction, or for any lines not within their jurisdiction, the Contractor shall repair or replace same and restore service to the premises.

3.7 TESTING

Following completion of gravity sanitary sewer and reconnecting service laterals for each manhole to manhole segment, the Contractor shall perform CCTV, smoke testing, or any other testing method approved by the Engineer to confirm that all

service laterals within that manhole to manhole segment are reconnected.

3.8 CLEANUP

A. The Contractor shall replace pavements, curbs and gutters, driveways, or sidewalks removed or damaged by excavation in accordance with the requirements of Section 02705 - Removing and Replacing Pavement. In unpaved areas, the Contractor shall bring the surface to grade and slope surrounding the excavation. The Contractor shall replace a minimum of four (4) inches of topsoil and seed according to the requirements of Section 02920 - Site Restoration.

+++END OF SECTION 02538+++

SECTION 02545

POLYVINYL CHLORIDE GRAVITY SEWER PIPE

PART 1 – GENERAL

1.01 SCOPE

A. This section includes Specifications for polyvinyl chloride gravity sewer pipe for sanitary sewer installations as shown on the Plans and as specified in these Specifications.

B. The Contractor shall provide all services, labor materials, and equipment required for all polyvinyl chloride gravity sewer pipe installation and acceptance testing and related operations necessary or convenient to the Contractor for furnishing a complete Work as shown on the Plans or specified in these Specifications.

C. Related Work Specified Elsewhere;

1. Section 01200 – Measurement and Payment
2. Section 02200 – Earthwork
3. Section 02225 – Trench Excavation and Backfilling
4. Section 02538 – Sanitary Sewer Service Lateral Reconnection and Repairs
5. Section 02600 – Wastewater Flow Control
6. Section 02650 – Testing for Acceptance of Sanitary and Storm Sewers.
7. Section 02885 – Surface Water Diversion and Dewatering

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:

1. Product Data: The Contractor shall submit, for the Engineers approval, descriptive details and shop drawings covering full details of pipe, fittings, specials, joints and assembly thereof, joint materials and details thereof, and full details and cuts of al casting to be incorporated into the Work.
2. Manufacturer’s Installation Instructions: The Contractor shall submit special procedures required to install products specified.

3. Manufacturer's Certificate: The Contractor shall submit a manufacturer's certificate certifying that products meet or exceed the requirements of ASTM D3034, ASTM F1336, and the requirements of these Specifications.

4. Record Drawings: At project closeout, the Contractor shall submit record drawings of installed sewer piping and products.

1.03 QUALITY ASSURANCE

A. Reference Standards: The Contractor shall comply with the applicable provisions and recommendations of the latest editions of the following standards, except as otherwise shown on the Plans or specified in these Specifications.

1. ASTM D3034 – Standard Specifications for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

2. ASTM D3212a – Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.

3. ASTM F1336 – Standard Specifications for Poly (Vinyl Chloride) (PVC) Gasketed Sewer Fittings.

4. ASTM F477 – Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

5. ASTM D448 – Standard Sizes of Course Aggregate for Highway Construction.

6. ASTM D2321- Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications.

7. ASTM F1417-92(1998) – Standard Test Method of Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air.

1.04 TESTING

A. Pipe joints, and fitting shall comply with the latest revisions of ASTM D3034, ASTM F1336, and be tested in accordance with the requirements of ASTM F1417.

1.05 ACCEPTANCE

A. Acceptance shall be on the basis of in-plant testing and inspection of manufactured pipe for visual defects and imperfections in accordance with the requirements of ASTM D3034 and ASTM F1336.
B. The Contractor shall provide manufacturers' results of testing on pipe, joint materials, and assemble joints as required by the city. These tests shall include material and hydrostatic leakage tests on pipe of each size in accordance with requirements of ASTM D3034 and ASTM F1417.
C. The Contractor shall inspect the pipe after delivery for shape, cracks, uniformity, blisters and imperfect surfaces, damaged ends, and gasket grooves. The Contractor shall not use repaired or patched pipe or pipe with repaired or patched gasket groves or shoulders. Imperfections in the barrel or socket of a pipe or fitting will be rejected.

PART 2 – PRODUCTS

2.01 POLYVINYL CHLORIDE PIPE (PVC), FOR SEWER SERVICE LATERALS OUTSIDE RIGHT OF WAY

A. All polyvinyl chloride gravity sewer pipe shall be SDR 35 and conform to all requirements of ASTM D3034, ASTM F1336, and the Georgia Department of Natural Resources, "Guidelines for Gravity Sewer," dated March 29, 1996. Acceptance shall be on the basis of hydrostatic pressure testing as described in ASTM F1417.

2.02 JOINTS

A. Joints for PVC and Fittings shall conform to the requirements of ASTM D3212 using elastomeric gaskets conforming to ASTM F477.

2.03 FITTINGS AND SPECIALS

A. the Contractor shall provide fittings and specials to meet the Project requirements and in accordance with the requirements of ASTM F1336.
B. The Contractor shall provide service connections and associated fittings as required to reconnect existing service connections to the PVC. Connections shall be made by using factory made wyes or tees as directed by the Engineer.

2.04 PIPE MARKINGS

A. All pipe and fittings shall be clearly marked with the name of trademark of manufacturer, the plant where the pipe was made, and strength designation.

PART 3 – EXECUTION

3.01 INSTALLATION

A. The Contractor shall install PVC pipe in accordance with the requirement of ASTM D2321.

B. Excavation for the pipe and preparation of the trench bottom, including bedding to receive the pipe shall be done in accordance with the requirements of this section and section 02225 – Trench Excavation and Backfilling.

C. Trench backfilling shall be performed in accordance with the requirements of Section 02225 – Trench Excavation and Backfilling and the Manufacturer's recommendations.

D. Bedding for PVC pipe shall be Class B as shown on City of Atlanta Standard Detail G-2, or as required by the manufacturer.

E. Pipe bedding shall be placed on a flat undisturbed or restored trench bottom with a minimum thickness of four (4) inches beneath the pipe barrel or $1/8^{th}$ of the outside diameter of the pipe; whichever is greater. For trenches cut into rock, the minimum bedding placed under the pipe shall be six (6) inches or $1/8^{th}$ of the outside diameter of the pipe; whichever is greater. Pipe haunching materials shall be shovel-sliced in the haunch area of the pipe.

F. The pipe shall be placed true to line and grade. Bell holes shall be dug, and the barrel of the pipe provided with uniform and continuous support.

G. Standard sizes for bedding materials shall be in accordance with the requirements of ASTM D448, Section 02060 – Crushed Stone Aggregate, and Section 02225 – Trench Excavation and Backfilling.

3.02 ACCEPTANCE TESTING

A. After installation, backfilling, and cleaning, acceptance testing shall be performed by low pressure air testing as specified in Section 02650 – Testing for Acceptance of Sanitary and Storm Sewers.

B. Air Testing

1. Testing shall be performed by the low-pressure air test method conforming to the requirements of ASTM F1417.

2. Each section between manholes or structures shall be plugged. Air will be introduced into the plugged system. The system passes the test if the air loss, as measured by the pressure drop from 3.5 psi to 2.5 psi, does not occur within

the time interval found in ASTM F1417 or the NCPI pamphlet, “Low Pressure Air Test for Sanitary Sewers.”

3. Lines which fail any acceptance testing shall be evaluated and the source of leakage corrected. The line shall then be rested for compliance with the requirements of these specifications.

+++ END OF SECTION 2545 +++

SECTION 02580

PAVEMENT MARKINGS and TRAFFIC SIGNING

PART I - GENERAL

1.01 DESCRIPTON

A. The Work specified in this Section consists of furnishing and applying permanent pavement markings and removing existing pavement markings, which conflict with the permanent pavement markings. Crosswalks, stop lines, arrows and word markings shall be thermoplastic. Apply paint markings as shown on plans.

B. Definitions: Pavement Markings: Word markings, arrows, solid and broken stripes, and or parking stall lines.

C. This work includes fabricating and installing traffic signs according to the details on the Plans and the Manual on Uniform Traffic Control Devices. Construction shall be in accordance with GDOT SSCTS 636.3.05

1.02 REFERENCED DOCUMENTS

A. U.S. Department of Transportation, Federal Highway Administration (DOT/FHWA): Manual of Uniform Traffic Control Devices for Streets and Highways (MUTCD)

B. Georgia Department of Transportation, Standard Specifications Construction of Transportation Systems (GDOT SSCTS) 2001 Edition.

Section 636 Highway Signing
Section 652 Painting Traffic Stripe
Section 653 Thermoplastic Traffic Stripe
Section 870 Paint
Section 910 Sign Fabrication
Section 911 Sign Posts
Section 912 Sign Blanks and Panels
Section 913 Reflectorizing Materials
Section 914 Sign Paint
Section 916 Delineators
Section 917 Reflective and Nonreflective Characters

C. Drawings and general provisions of the Contract, including General and Supplementary Conditions, and Division 1 Specification Sections, apply to this section.

1.03 QUALITY CONTROL: Equipment

A. Pavement cleaning equipment: Capable of efficiently cleaning pavement without causing damage.

B. Paint machine: Striping equipment shall be capable of traveling uphill and downhill at a uniform, predetermined speed and producing a uniform application of paint. Paint machine shall be pressurized spray type capable of applying paint and glass beads at a uniform rate through nozzles which spray paint and glass beads directly onto pavement. Machine shall be able to apply two separate stripes, either solid or broken, concurrently. Each paint tank shall have a mechanical agitator. Each nozzle shall have a cutoff valve, which will automatically apply broken lines and shall have guide lines, which consist of metallic shrouds or air blasts. Hand-painting equipment shall consist of hand paint guns, templates, and guides.

C. Thermoplastic applicator: GDOT SSCTS Section 653.3.02-

1.04 SUBMITTALS

Submit the following in accordance with Section 01300, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES:

A- Descriptions of thermoplastic material composition and physical properties and type and composition of paint.

B- Description of equipment proposed for removing existing pavement markings. Equipment shall be approved by the ACC Engineer before removal begins

1.05 JOBSITE CONDITIONS:

Schedule pavement marking and sign placement for weekends. Coordinate installation with the ACC Engineer.

A. If surface to which pavement markings will be applied will bear traffic while markings are being applied, furnish and place warning and directional signs in a manner which will control traffic and protect pavement markings and workers during application. Place warning signs before beginning each operation and place extra signs wen ahead of pavement marking equipment in accordance with the MUTCD

B. Apply pavement markings only when pavement surface is free from foreign matter and moisture, air temperature in shade is warmer than 50 degrees F, and wind conditions will cause neither dust to be deposited on freshly marked pavement surface nor paint to fog adjacent pavement

C. Stripe and bead only during daylight. Applied pavement markings shall be dry before sunset to permit traffic to cross markings without damaging markings.

PART 2 - PRODUCTS

2.01 PAINT FOR MARKING SURFACES

A. White and yellow traffic paint; GDOT SSCTS Article 870.2.02; white paint shall be No. 5A Waterborne White Traffic Line Paint, and yellow paint shall be No. 5B Waterborne Yellow Traffic Line Paint.

2.02 MARKING TEMPLATES**:** MUTCD. Conform to configurations and dimensions indicated.

2.03 THERMOPLASTIC: GDOT SSCTS Section 653.2

2.04 GLASS BEADS: GDOT SSCTS Section 913.2.

PART 3 - EXECUTION

3.01 EXAMINATION:
Examine surfaces on which pavement markings win be applied for conditions which would adversely affect application of pavement markings and the permanence and quality of the work. Ensure surfaces on which pavement markings will be applied are free of dust, grease, oil, and all foreign matter and moisture.

3.02 REMOVAL

Remove existing pavement markings which conflict with final pavement markings to the fullest extent possible by any method which does not materially damage the surface or texture of the pavement. Remove sand and other material deposited on the pavement as a result of the removal process as work progresses. Allow no accumulation of sand and other material, which might interfere with drainage or constitute a hazard to traffic.

A. Remove existing pavement markings and obtain acceptance of removal from the Authority's Engineer before applying new markings.

B. If pavement markings are removed by blast cleaning and such removal is within ten feet of a vehicle, immediately remove residue and dust with a vacuum attachment operating concurrently with the blasting operation.

C. Do not paint over existing pavement markings with black paint.

3.03 PREPARATION

A. Surface Preparation: Before applying pavement markings, clean pavement surfaces in accordance with GDOT SSCTS Sections 652-3.02 and 653.3.03.

B. Equipment and Mixing: In accordance with GDOT SSCTS Sections, 652-3.02 and 653.3.03.

3.04 APPLICATION

A. Apply paints by machine in accordance with GDOT SSCTS Section 652.3.05, except apply paint by hand in areas and for markings, which are not adaptable to machine application. If glass beads are not applied by the paint machine, deposit a uniform thickness of beads on applied wet paint at a rate of not less than 6 pounds of beads per gallon of applied paint. Glass beads are not required on parking stall lines.

B. Apply thermoplastic pavement markings in accordance with GDOT SSCTS Section 653.3.05.

TOLERANCES

A. Widths of stripes may vary minus zero and plus 1/4 inch. Lengths of striped segments may vary plus and minus 6 inches.

B. Variation of letter sizes of messages, patterns of messages, and directional arrows shall be neither smaller than indicated nor more than 15 percent larger

3.06 ADJUSTING: Correct or remove pavement markings which fail to present a clean-cut and uniform day and night appearance, which fail to satisfy the requirements of this Section, or which are marred or damaged by traffic and other causes. Remove portions of pavement markings, which deviate more than the allowable tolerances and apply new pavement markings. Completely remove spilled, dripped, tracked, misted, and spattered pavement markings by a non-solvent method which will not damage underlying surface, and in a manner acceptable to the Authority's Engineer at no additional cost to the Authority.

3.07 PROTECTION:

Protect freshly applied pavement markings with cones and other devices until markings become totally dry. Remove protective devices not later than sunset of day of application.

3.08 ACCEPTANCE

A. Paint pavement markings, which have dried to the extent that they will be neither displaced nor marred by vehicular traffic, and which have been placed, as indicated will be inspected for acceptance by the Authority's Engineer. Thermoplastic pavement markings will be inspected for acceptance by the Authority's Engineer 30 days after completion of work.

B. Unacceptable pavement markings shall be removed and replaced with new markings by the Contractor at no additional cost to the Authority. After acceptance, the Contractor will not be responsible for maintenance.

+++++END OF SECTION 02580++++

SECTION 02600

WASTEWATER FLOW CONTROL

PART 1 – GENERAL

1.01 SCOPE

A. This section includes planning wastewater flow control; plugging and blocking; pumping and bypassing; flow control precautions; and any other similar, incidental, or appurtenant flow control operation which may be necessary to properly complete the Work.

B. The Contractor shall provide all services, labor, materials, and equipment required for all flow control and related operations necessary or convenient to the Contractor for furnishing a complete Work as shown on the Plans or specified in these Specifications.

C. Related Work specified Elsewhere:

1. Section 01200 – Measurement and Payment

2. Section 02538 – Sanitary Sewer Service Lateral Reconnection and Repair

3. Section 02650 – Testing for Acceptance of Sanitary and Storm Sewers

1.02 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:

1. The design installation, and operation of the wastewater flow control system shall be the Contractors responsibility. The Contractor shall employ the services of a vendor that can demonstrate to the Engineer that the vendor specializes in the design and operation of wastewater flow systems. The vendor shall provide at least three (3) references of projects of similar size and complexity as this project, which were successfully performed by the vendor's firm within the past three (3) years. The references shall include the name of the agency, the name of the project, the date of the project, and the agency contact. (telephone, fax, and e-mail). The bypass system shall meet the requirements of all codes and regulatory agencies having jurisdiction. Vendor references shall be submitted in the Engineer for review prior to the Preconstruction Conference.

2. The Contractor shall prepare with the vendor a general description of the proposed Wastewater Flow Control Plan and submit it to the Engineer at least fifteen (15) days prior to the Preconstruction Conference. The Wastewater Flow Control Plan shall include the make and model of temporary bypass

pumps, the certified noise levels of the pumps and generator, the means used to maintain and operate the bypass pumps, and a written statement that all bypass pumping shall comply with the requirements of these Specifications.

3. During the course of the project, the detailed, work specific Wastewater Control Plan utilizing multiple pumps, or a single pump greater than four (4) inches discharge, shall be submitted to the Engineer at least ten (10) days before required. This plan shall outline all provisions and precautions to be taken by the Contractor regarding the handling of existing wastewater flows. This plan shall be specified and complete, including such items as schedules, locations, elevations, capacities of equipment, materials, and all other incidental items necessary and/or required to insure adequate wastewater control. The plan shall also include details of protection of the access and bypass pumping locations from damage due to the discharge flows, and compliance with the requirements and permit conditions specified in these Specifications. No construction shall begin until all provisions and requirements have been reviewed and accepted by the Engineer.

4. The contractor shall submit two (2) copies of the wastewater control plan for each sewer bypass set-up with sufficient detail including the following:

    a. Staging areas for pumps.

    b. Sewer plugging method and types of plugs.

    c. Number, size, material, location, and method of installation of suction piping.

    d. Bypass pump size, capacity, number of each size to be on the site of the Work and power requirements.

    e. Calculations of static lift, friction losses, and flow velocity (pump curves) showing pump-operating range.

    f. Standby power generator size and location.

    g. Downstream piping and discharge plan.

    h. Method of protecting discharge manholes or structures from erosion and damage.

    i. Thrust and restraint block size and locations.

    j. Sections showing suction and discharge pipe depth, embedment, select fill, and special backfill where required.

    k. Certified decibel levels of individual pumps, the combined decibel level if multiple pumps will be operated simultaneously =, and the method of noise control for each pump and/or generator.

l. Any temporary pipe supports, including rollers and elevated rollers, as well as anchoring required.

m. Design plans and computations for access to bypass pumping locations.

n. Calculations for selection of bypass pumping pipe size.

o. Schedule for installation of and maintenance of bypass pumping lines.

p. Plan indicating selection location of bypass pumping line locations.

q. The Plan shall indicate the means by which flows from laterals are provided for either by plugging, containing, or subsidiary pumping. Building laterals shall not be disconnected or plugged overnight. Plugging of laterals is only allowed from 9 a.m. until 5 p.m. of the same day.

5. Any proposal to implement wastewater flow control arrangement on sewers, including plugging and/or blocking, high velocity nozzles, and/or bypass and/or diversion pumping as well as any sewer rehabilitation, repair, or replacement construction, shall be outlined in writing and submitted to the Engineer at least ten (10) days prior to the implementation of the wastewater flow control system, sewer rehabilitation, repair, or replacement.

6. All proposed wastewater flow control arrangements, including flow, bypass and/or diversion plans, shall indicate or show the location and position, in detail necessary, any special features where pipes or hoses cross roadways, including intersections, such as temporary trenches, support bridges, ramp-overs, etc.

7. All proposed wastewater flow control arrangements, including wastewater flow bypass and/or diversion pumping plans for sewers, shall also include an emergency response plan to be followed in the event of a failure of the wastewater flow control system. The Contractor shall provide names and phone numbers for twenty-four (24) hour emergency contact.

8. The Contractor shall notify the Engineer twenty-four (24) hours prior to commencing actual wastewater flow control operations. The Contractor's Wastewater Flow Control Plan shall be approved by the Engineer before the Contractor shall be allowed to commence wastewater flow control work.

1.03 GENERAL

A. The objective of wastewater flow control is to:

1. Maintain an efficient and uninterrupted level of service to wastewater collection system users while maintenance or construction operations (including rehabilitation, repair, replacement, or connection of newly constructed facilities) are facilitated on the segment or segments being

bypassed and/or from which flow is being diverted, within the wastewater collection system.

2. Ensure that all levels of wastewater flow are continuously and effectively handled around the segment or segments of sewer being bypassed and or from which flow is being diverted by:

    a. Ensuring that bypass and diversion pumps are adequately fueled, lubricated, and maintained.

    b. Ensuring backup spare parts are expeditiously applied to the flow bypass and/or diversion pumping system in the event of component breakdown.

    c. Ensuring that an emergency backup plan is smoothly implemented in the event of system failure.

    d. Preventing backup, spillage, flooding, or overflow onto streets, yards, and unpaved areas or into buildings; adjacent ditches; storm sewers; and waterways; while flow bypass or diversion pumping takes place and ensuring that installation, startup, and subsequent disassembly of flow bypass and diversion pumping system is smoothly transitioned.

1.04 REGULATORY REQUIREMENTS

A. The work if this section shall comply with the current versions, with revisions, of the following:

    1. OSHA 29 CFR 1910.146 (permit-required confined-space regulations)

B. All Work and testing shall comply with the applicable Federal codes, including Federal Occupational Safety and Health Act of 1970 and the Construction Safety Act of 1969, as amended, and applicable state and local codes and standards; and to the extent applicable with the requirements of the Underwriter's Laboratories, Inc. and National Electric Code.

PART 2 – PRODUCTS

2.01 PIPE FOR FLOW DIVERSION

A. Ductile Iron Pipe: Ductile iron pipe as specified in Section 02664 – Ductile Iron Pipe and Fittings is acceptable for use for flow diversion during construction.

B. Polyethylene Pipe: Polyethylene material shall comply with the requirements for Type III polyethylene, C-5 and P-34 as tabulated in ASTM D12248 and have the Plastic Pipe Institute recommended designation PE3406. The material shall also have an average specified base resin density of between .94 g/cc and 0.955 g/cc (ASTM D1505). Pipe made from these resins must have a long-term strength (50 years) rating of 1,250 psi or more per hydrostatic design basis categories of ASTM D2837. The polyethylene resin shall contain antioxidants and be stabilized

against ultraviolet degradation to provide protection during processing during processing and subsequent weather exposure. The polyethylene resin shall have an environmental stress crack resistance, conditions C as shown in ASTM D1693, to be greater that five-hundred (500) hours, twenty (20) percent failure. All pipe shall be made from virgin quality material. No rework compound, except that obtained from the manufacturer's own production of the same formulation shall be used. The polyethylene resin shall have average melt flow index, condition E as shown in ASTM D1238, not in excess 0.25 g/10 min. pipe shall be homogenous throughout, and free of visible cracks, holes, foreign material, blisters, or other deleterious faults. Diameters and wall thickness shall be measured in accordance with the requirements of ASTM D21222. Pie joining will be done by thermal butt fusion method in accordance with the requirement of ASTM D657.

2.02 PUMPING EQUIPMENT

A. All pumps used shall be fully automatic se-priming units that do not require the use of foot-valves or vacuum pumps in the priming system. The pumps may be electric or diesel powered, provided they meet all specified sound level requirements. If electric pumps are used, the combined generator/pump system shall meet the specified sound level requirements. All pumps used shall be constructed to allow dry running for long periods of time to accommodate the cyclical nature of effluent flows.

B. Unless specified otherwise in these Specifications or approved by the Engineer, all pumps (and generators if used) shall be fully sound attenuated and shall produce a noise level of sixty-five (65) dBA or less at a distance of twenty-three (23) feet.

C. The Contractor shall provide necessary stop/start controls for each pump.

D. The Contractor shall include one stand-by pump of each size to be maintained on site of Work. Back-up pumps shall be on-line, isolated from the primary system by a valve.

E. The Contractor shall design all piping, joints, and accessories to withstand twice maximum system pressure of fifty (50) psi, whichever. The back-up pump, appropriate piping, fuel, lubrication, and spare parts shall be incorporated into the bypass arrangement at the site of the Work, ready for use in case of breakdown. A bypass "drill" shall be carried out by the Engineer before the bypass arrangement is accepted on all sewer greater than twelve (12) inches in diameter, at no cost to the City. The drill shall demonstrate the incorporation of all standby equipment to handle flows when the main pump set is switched off. The Engineer's instruction following the drill shall be adhere to in full at no cost to the City.

F. No more than two (2) pump discharge hoses shall be used for wastewater flow control over a length of the line segment(s). If the flow exceeds the capacity of (2)

"hoses" then rigid piping shall be used. The rigid piping shall consist of Ductile Iron Pipe, HDPE, or steel pipes with suitable pressure rated couplings to withstand twice the maximum system pressure or fifty (50) psi, whichever is greater.

G. Under no circumstances will aluminum "irrigation" type piping or glued PVC pipe be allowed. Discharge hose will only be allowed in short sections and by specific permission from the Engineer.

2.03 SYSTEM DESCRIPTION

A. Design Requirements:

1. Bypass pumping systems shall have sufficient capacity to pump peak flows in the pipes being bypassed (flows in the existing combined sewers can increase dramatically during periods of wet weather). The Contractor shall provide all pipeline plugs, pumps of adequate size to handle wet weather peak flows, and temporary discharge piping to ensure that the total flow of the mainline is safely diverted around the section to be repaired. Wastewater flow control system will be required to be operated twenty-four (24) hours per day.

2. Bypass pumping systems used to temporarily pump completed portions of the newly separated sewer into the existing combined trunk shall be sized using the COA Gravity Sewer Design Guide, latest revision available.

3. The Contractor shall have adequate standby equipment available and ready for immediate operation and use in the event of an emergency or breakdown. One (1) standby pump for each size pump utilized shall be installed at the mainline flow bypassing locations, ready for use in the even of primary pump failure.

4. The wastewater flow control system shall be capable of bypassing the flow around the work area and of releasing any amount of flow, up to full available flow, into the work are as necessary for satisfactory performance of the Work.

5. The Contractor shall make all arrangements for bypass pumping during the time when the mainline is shut down for any reason. The wastewater flow control system shall overcome any existing force main pressure on discharge.

B. Performance Requirements:

1. It is essential to the operation of the existing wastewater system that there is no interruption in the flow of wastewater throughout the duration of the project. To this end, the Contractor shall provide, maintain, and operate all temporary facilities such as dams, plugs, pumping equipment (both primary and back-up units as required), conduits, all necessary power, and all other labor and equipment necessary to intercept the wastewater flow before it reaches the point where it would interfere with the Work, carry it past the Work, and return it to the existing sewer downstream of the work.

2. The design, installation, and operation of the wastewater flow control system shall be the Contractor's responsibility. The wastewater flow control system shall be the Contractor's responsibility.

3. The Contractor shall provide all necessary means to safely convey the wastewater past the work area. The Contractor will not be permitted to stop or impede the mainline flows under any circumstances.

4. The Contractor shall maintain wastewater flow around the work are in a manner that will not cause surcharging of sewers, damage to sewers, and that will protect public and private property from damage and flooding.

5. The Contractor shall protect water resources, wetlands, and other natural resources.

3.01 PLANNING

A. All materials used for wastewater flow control shall be pre-approved by the Engineer prior to commencing wastewater flow control activities.

B. Before any wastewater flow control equipment is installed, the Contractor shall desilt the segment of sewer to e bypassed while it is still under flow. Subsequent jetting and final cleaning before rehabilitation or repair shall be undertaken while the segment of sewer is bypassed.

C. The Contractor is responsible for locating any existing utilities in the area the Contractor selects to locate the bypass pipelines. The Contractor shall locate his bypass pipelines to minimize any disturbances to existing utilities and shall obtain approval of the pipeline locations from the Engineer. All costs associated with relocating utilities and obtaining all approvals shall be paid by the Contractor.

D. During all wastewater flow control operations, the Contractor shall protect mainlines, manholes, and all local sewer lines from damage inflicted by any equipment. The Contractor shall be responsible for all physical damage to mainlines, manholes, and all local sewer lines caused by human or mechanical failure.

E. When wastewater flows at the upstream manhole of the manhole section being repaired are above the maximum allowable requirements for television inspection, or do not allow the proper sewer or manhole repair, the flows shall be reduced to the levels required by one of the following methods: plugging/blocking of the flows or pumping/bypassing of the flows as approved by the Engineer.

F. In some applications, the wastewater flow may be plugged and contained within the capacity of the collection system. This only be done when it has been determined, by the Engineer, that the system can accommodate the surcharging without any adverse impact.

G. If required by the Engineer, for television inspection, before abandoning a sewer, the Contractor shall block the sewer line completely. No flow, except infiltration/inflow, will be allowed through the respective sewer line being televised.

H. When sewer line flows are too excessive to plug while service lines are being removed and reconnected to the new sanitary sewer, the Contractor shall submit a written plan and pumped/bypass the flow as acceptable to the Engineer.

I. When existing combined, storm or sanitary sewers are required to be taken up, moved or rebuilt, the Contractor, at his own expense, shall provide and maintain temporary outlets and connections for all private r public drains, sewers, and sewer outlets connected to or served by the sewers to be rebuilt, and where necessary, shall provide adequate pumping facilities; and shall maintain these services until such time as the permanent sewers and connections are built and in service at no cost to the City.

J. During construction, flows in sections of the existing combined sewer being rehabilitated/repaired by removal and replacement shall be accommodated by temporary flow diversion. Wastewater flow diversion shall be accomplished as specified in this section, unless otherwise shown on the Plans.

K. The contractor shall use the provided construction easement for the flow diversion if not otherwise shown in the Plans. It shall be the Contractor's option to law diversionary pipe within the construction easement. The Contractor shall use ingenuity and skill to develop a flow diversion program. The program must keep the wastewater flowing without discharge or spills into the creek or on the ground. The Contractor shall seek and obtain inspection of each section of newly laid sewer before taking the diversion out of service and placing the newly laid section in service.

L. In sections of the existing combined sewer being rehabilitated/repaired by laying a new line parallel to the existing combined sewer, the existing sewer may be used to accommodate the existing flow, and no temporary flow diversion will be necessary if the existing combined sewer is not damaged or its use restricted by the Contractor's operations.

M. All pipe materials utilized in wastewater flow diversion during construction shall be in good condition, and free of defects, and leaks. Any defective material shall be replaced by the Contractor at no cost to the City. Upon completion of the job, pipe materials shall be removed from the site.

N. The Contractor shall complete all wastewater flow control activities with the minimum sound level compatible with accepted industry standards for sound attenuated temporary pumping systems.

O. When pumps are operating, an experienced bypass/diversion pump maintenance operator, mechanic, and or/or assistant shall continuously be on site to monitor the operation of the entire bypass/diversion system. The operator, mechanic, and/or assistant shall comprehensively, methodically, and continuously:

1. Adjust pump speed as appropriate so as not to adversely impact upstream or downstream flow condition levels.

2. Check that the effectiveness and security of bulkheads, dams, diaphragms, plugs, valves, weirs, and all other flow control devices are working effectively and according to plan.

3. Check the integrity of hoses and coupling along the entire bypass/diversion system.

4. Monitor fuel tanks and top up as appropriate.

5. Monitor lubrication levels and top up as necessary.

6. Facilitate minor repairs as required.

7. Report on potential problems arising.

8. Inspect bypass-pumping system at east hourly to ensure that the system is working correctly.

9. Maintain adequate supply of spare parts on site as required.

3.03 DEPTH OF FLOW

A. In performing television inspection, joint testing, and joint sealing work, the Contractor shall control the depth of flow in the sewer within the following guidelines:

MAXIMUM PIPE FLOW DEPTH			
TELEVISION INSPECTION		JOINT TESTING AND SEALING	
PIPE SIZE	% PIPE DIA	PIPE SIZE	%PIPE DIA
6”-10”	20	6”-12”	25

12”-24”	25	15”-24”	30
27” or larger	30	27” or larger	35

B. When sewer line flows, as measured in the first manhole upstream of the sewer segment being rehabilitated, televised, or tested exceed the maximum depth listed above or inspection of the complete pipe periphery is necessary for effective testing, sealing, or line work, the Contractor shall implement wastewater flow control methods at no additional cost to the City.

3.04 PLUGGING AND BLOCKING

A. The Contractor shall insert a sewer line plug into the line at a manhole upstream from the section being inspected or repaired. The plug shall be so designed that all or any portion of the operation flow can be released. During the inspection portion of the operation, flows shall be shut off or reduced to within the maximum flow limits specified. During repairs, the flows shall be shut off or pumped/bypassed, as approved by the Engineer. Wastewater flow shall be restored to normal following completion of work within the subject manhole to manhole section.

3.05 PUMPING AND BYPASS

A. When Bypass Pumping is required, a pump size shall be recommended by the Contractor and approved by the Engineer. The Contractor shall supply the necessary pumps, conduits, and other equipment to divert the flow of wastewater around the manhole section in which the Work is to be performed. The bypass system shall be of sufficient capacity to handle existing flows plus additional flow that may occur during periods of rainstorms. The Contractor shall be responsible for furnishing the necessary labor and supervision to set up and operate the pumping and bypassing system. A “setup” consists of the necessary pumps, conduits, and other equipment required to divert the flow of wastewater around a manhole to manhole section, from start to finish of work performed in the manhole to manhole section.

B. Wastewater shall be pumped directly into the nearest available downstream manhole, provided that the existing sewer has capacity to transport the flow. The Contractor shall be responsible for keeping the pumps running continuously twenty-four (24) hours a day if required, until the bypass operation is no longer required. The Contractor shall have standby pumps at all times.

C. Pumps and equipment shall be continuously monitored by a maintenance person capable of starting, stopping, refueling, and maintaining theses pumps during the bypass operations. If pumping is required on a twenty-four (24) hour basis, engines shall be equipped in a manner to keep noise to a minimum.

3.06 FLOW CONTROL PRECAUTIONS

A. Where the wastewater flow is blocked or plugged, the Contractor shall be responsible for taking sufficient precautions to protect public health. The sewer lines shall also be protected from damage. The following apply:

   1. No wastewater shall be allowed to back up into any homes or buildings.

   2. No wastewater shall overflow any manholes, cleanouts, or any other access to the sewers.

   3. No interruption of water and sewer utilities users upstream of inspection/reap are shall be allowed to occur.

   4. If any of the above occur, the Contractor shall provide bypass pumping to alleviate one or all of the conditions. Additionally, the Contractor shall observe the conditions upstream of the plug and be prepared to immediately start bypass pumping, if needed.

B. Any sump pumps, bypass pumps, trash pumps, or any other type of pump which pulls wastewater or any type of material out of the manhole or sewer shall discharge the material into another manhole, or appropriate vehicle or container approved by the Engineer. Under no circumstances shall this material be discharged, stored, or deposited on the ground, swale, road, or open environment.

C. The Contractor shall take appropriate steps to ensure that all pumps, piping, and hoses that carry raw wastewater are protected from traffic. Traffic control shall be performed in accordance with the requirements of Section 01550 – Traffic Regulation.

D. In the event, during any from of "Wastewater Flow Control," that raw wastewater is spilled, discharged, leaked, or otherwise deposited in the open environment, due to the Contractor's work, the Contractor shall be responsible for any cleanup of solids and stabilizing of the area affected. This work shall be performed at the Contractor's expense with no additional cost to the city. The Contractor shall also be responsible for notifying the sewer system maintenance personnel and complying with any and all regulatory requirements for cleaning up the spill at no additional cost to the City.

E. During wastewater flow control operations, the Contractor shall take proper precautions to prevent damage to existing sanitary sewer facilities, flooding, or damage to public or private property.

F. The Contractor shall make repairs or replacements or rebuild such damaged section or sections of existing sewers, as directed by the Engineer. All such repairs, replacements, and rebuilding shall be paid for by the Contractor. The Contractor shall make such provisions as are necessary for handling all flows in existing sewers, connections, and manholes by pipes, flues, or by other approved

methods at all times, when his operations would, in any way, interfere with normal functioning of those facilities.

G. The Contractor shall make such provisions as are necessary for handling all flows in existing sewers, connections, and manholes by pipes, flumes, or by other approved methods at all times, when his operations would, in any way, interfere with normal functioning of those facilities.

H. The contractor shall be responsible for the removal of any debris and sedimentation in the existing sewers, laterals, and manholes, etc., which is attributable to the Work.

I. All operations shall be performed by the Contractor in strict accordance with OSHA and any applicable local safety requirements. Particular attention is directed to safety regulations for excavations and entering confined spaces.

J. It is the Contractor's responsibility to notify in writing any property owner having a sewer connection being reconnected to the new sanitary sewer that such work is being performed. The contractor shall notify property owners forty (48) hours prior to commencing service reconnection. The Contractor shall be solely responsible for any damage caused by property service connection backups caused by his Work.

K. Piping used for temporary flow diversion of storm, combined, or gravity sewers shall not be used for temporary flow diversion of potable water.

+++ END OF SECTION 2600 +++

SECTION 02607
MANHOLES, JUNCTION BOXES, CATCH BASINS AND INLETS

PART 1 - GENERAL

1.01 SCOPE

A. Work described in this Section includes furnishing all labor, materials, equipment, tools and incidentals required to install cast-in-place, and precast concrete manholes, junction boxes, catch basins and inlets. The term manholes, as used, herein and shown on the Drawings includes manholes, junction boxes, catch basins and inlets. All work shall be installed, adjusted, tested and placed in operation in accordance with these Specifications, the manufacturer's recommendations and as shown on the Drawings.

1.02 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:

1. Complete shop drawings and engineering data on frames, covers, steps and precast manhole sections and flotation calculations shall be submitted to the Engineer in accordance with the requirements of the General Conditions of the Contract Documents.

1.03 QUALITY ASSURANCE

A. Prior to delivery, all basic materials specified herein shall be tested and inspected by an approved independent commercial testing laboratory or, if approved by the Engineer, certified copies of test reports prepared by the manufacturer's testing laboratory will be acceptable. All materials which fail to conform to these Specifications shall be rejected.

B. After delivery to the site, any materials which have been damaged in transit or are otherwise unsuitable for use in the Work shall be rejected and removed from the site.

1.04 QUALITY STANDARDS

A. Manufacturers offering products that comply with these specifications include:
   1. Standard manhole frame and cover.
      a. Vulcan Foundry, VM-26.
      b. Neenah Foundry, Series R-1700.
      c. Or equal.

   2. Manhole adjusting rings.
      a. Neenah Foundry, R1979-H.
      b. Higgins Foundry,.
      c. Or equal.

3. Manhole rungs.
    a. M.A. Industries.
    b. Or equal.

1.05 WARRANTY

A. Provide a warranty against defective materials and workmanship in accordance with the requirements of the General Conditions of the Contract Documents.

PART 2 - PRODUCTS

2.01 GENERAL

A. Manholes shall be constructed of specified materials to the sizes, shapes and dimensions and at the locations shown on the Drawings or as otherwise directed by the Engineer. The height or depth of the manhole will vary with the location, but unless shown otherwise on the Drawings, shall be such that the top of the manhole frame will be at the finished grade of the pavement or ground surface and the invert will be at the designated elevations.

2.02 MATERIALS AND CONSTRUCTION

A. Concrete and Reinforcement:

1. The concrete used in manhole and junction chamber construction shall be Class "A" concrete conforming to the requirements of Section 03300, Cast-In-Place Concrete.

2. Steel reinforcement shall conform to the requirements of Section 03200, Concrete Reinforcement and Dowelling.

3. Brick. The brick shall conform to the requirements of AASHTO M 91.

4. Mortar. The mortar for brick masonry and similar work shall be composed of 1 part of portland cement and 2 parts of mortar sand, by volume. The portland cement shall conform to the requirements of AASHTO M 45. Hydrated lime may be added to the mixture of sand and cement in an amount not to exceed 15 percent of the weight of cement used. The hydrated lime shall meet the requirements of ASTM C 6. The water shall be clean and free of deleterious amounts of acids, alkalies, or organic material. If the water is of questionable quality, it shall be tested in accordance with AASHTO T 26.

B. Precast Concrete Manholes:

1. Precast concrete manholes shall consist of precast reinforced concrete sections, a conical or flat slab top section, and a base section conforming with the typical manhole details as shown on the Drawings.

2. The precast manhole section shall be manufactured, tested and marked in accordance

with the latest provisions of ASTM C 478.

3. The minimum compressive strength of the concrete for all sections shall be 4,000 psi.

4. The maximum allowable absorption of the concrete shall not exceed 8 percent of the dry weight.

5. The circumferential reinforcement in the riser sections, conical top sections and base wall sections shall consist of one (1) line of steel and shall be not less than 0.17 square inches per lineal foot.

6. The ends of each reinforced concrete manhole riser section and the bottom of the manhole top section shall be so formed that when the manhole risers and the top are assembled, they will make a continuous and uniform manhole.

7. Joints of the manhole sections shall be of the tongue and groove type. Sections shall be joined using 0-ring rubber gaskets conforming to the applicable provisions of ASTM C443, latest revision, or filled with an approved preformed plastic gasket meeting the requirements of Federal Specifications 55-5-00210, "Sealing Compound, Preformed Plastic for Pipe Joints", Type 1, Rope Form.

8. Each section of the precast manhole shall have not more than two (2) holes for the purpose of handling and laying. These holes shall be tapered and shall be plugged with rubber stoppers or mortar after installation.

9. Polypropylene plastic manhole steps shall be installed in each section of the manhole in accordance with the City of Atlanta standard details, No. MH-22. (PP-2 manhole Step).

C. Brick Structures:

1. Foundations. A prepared foundation shall be placed for all brick structures after the foundation excavation is completed and accepted. Unless otherwise specified, the base shall consist of reinforced concrete mixed, prepared, and placed in accordance with the requirements of Section 03300. The foundation shall be built to the correct elevation and shall be finished to cause the least possible resistance to flowing water.

2. Laying Brick. All brick shall be clean and thoroughly wet before laying so that they will not absorb any appreciable amount of additional water at the time they are laid. All brick shall be laid in freshly made mortar. Mortar that is not used within 45 minutes after water has been added shall be discarded. Retempering of mortar shall not be permitted. An ample layer of mortar shall be spread on the beds and a shallow furrow shall be made in it which can be readily closed by the laying of the brick. All bed and head joints shall be filled solid with mortar. End joints of stretchers and side or cross joints of headers shall be fully buttered with mortar and a shoved joint made to squeeze out mortar at the top of the joint. Any bricks that may be loosened after the mortar has taken its set shall be removed, cleaned, and re-laid with fresh mortar.

No broken or chipped brick shall be used in the face, and no spalls or bats shall be used except where necessary to shape around irregular openings or edges; in which case, full bricks shall be placed at ends or corners where possible, and the bats shall be used in the interior of the course. In making closures, no piece of brick shorter than the width of a whole brick shall be used; and wherever practicable, whole brick shall be used and laid as headers.

3. Joints. All joints shall be slushed with mortar at every course, but slushing alone will not be considered adequate for making an acceptable joint. Exterior faces shall be laid up in advance of backing. Exterior faces shall be back plastered or pargeted with a coat of mortar not less than _-inch thick before the backing is laid up. Prior to pargeting, all joints on the back of face courses shall be cut flush. Unless otherwise noted, joints shall be not less than ¼-inch nor more than ½-inch wide and whatever width is adopted shall be maintained uniform throughout the work.

4. Pointing. Face joints shall be neatly struck, using the weather joint. All joints shall be finished properly as the laying of the brick progresses. When nails or line pins are used, the holes shall be immediately plugged with mortar and pointed when the nail or pin is removed.

5. Cleaning. Upon completion of the work, all exterior surfaces shall be thoroughly cleaned by scrubbing and washing down with water and, if necessary to produce satisfactory results, cleaning shall be done with a 5 percent solution of muriatic acid which shall then be rinsed off with liberal quantities of clean fresh water.

6. Curing and cold weather protection. In hot or dry weather the brick masonry shall be protected and kept moist for at least 48 hours after laying the brick. Brick masonry work or pointing shall not be done when there is frost in the brick or when the air temperature is below 50 degrees F unless the Contractor has on the project, ready to use, suitable covering and artificial heating devices necessary to keep the atmosphere surrounding the masonry at a temperature of not less than 60 degrees F for the duration of the curing period.

D. Frames and Covers:

1. Frames and covers shall be cast iron conforming to the minimum requirements of Federal Specifications WWOI-652 or to ASTM A 48 for Class 30 Gray Iron Castings. All castings shall be made accurately to the required dimensions, fully interchangeable, sound, smooth, clean, and free from blisters and/or other defects. Defective castings which have been plugged or otherwise treated shall not be used. All castings shall be thoroughly cleaned and painted or coated with a bituminous paint. Each casting shall have its actual weight in pounds stenciled or painted on it in white paint.

2. Standard manhole frames and covers shall have a minimum of 22-inches clear inside diameter and shall be a minimum of 5-inches high, with guide ring, and shall weigh not less than 446 pounds, total. Manhole covers shall be as detailed on the Drawings.

3. The contact surfaces of all manhole covers and the corresponding supporting rings in the frames shall be machined to provide full perimeter contact.

4. All sanitary and storm sewer manhole covers shall have the word "PROPERTY OF THE CITY OF ATLANTA" cast on the top in letters 1-inch high.

5. An adjusting ring shall be provided for each manhole in a street.

6. Provide solid manhole and handhole covers and frames for electrical underground systems. Covers shall have letters "HIGH VOLTAGE", "LOW VOLTAGE", "SIGNAL", as applicable, embossed on top.

PART 3 - EXECUTION

3.01 CONSTRUCTION OF CAST-IN-PLACE CONCRETE MANHOLES

A. Cast-in-place manholes, excluding curved manhole bases, shall be constructed in place with the base, barrel, and conical section all monolithically cast using removable forms of material and design approved by the Engineer.

B. The vertical forms, vertical and horizontal wall spacers, steps and placing cone must be carefully positioned and firmly clamped in place before any placement is made. The wall spacers must be located 90 degrees from each other. The forms shall be firmly supported with bottom of the forms at the proper elevation to permit the base to be deposited through the vertical forms.

C. No pipe penetration shall be formed within 12-inches of a corner, on a square bases, or within 12-inches of another penetration, in any direction, for circular bases.

D. The manhole base shall be deposited down through the wall forms onto undisturbed earth or shall be rock bearing. It shall be evenly distributed around the walls and vibrated both inside and outside the forms until there is a minimum slope of 60 degrees from the bottom of the forms to the bearing surface both inside and outside of the manhole. When this is complete and before additional concrete is added, the concrete must be carefully vibrated on each side of each sewer pipe.

E. The base shall be concentric with the manhole, except where eccentric alignment with ladder is required, and have a minimum diameter of 4-feet or 16-inches greater than the outside diameter of the manhole whichever is greater, and 10-inch minimum thickness under the lowest pipe. Minimum wall thickness shall be 6-inches.

F. Additional concrete must be deposited in evenly distributed layers of approximately 18-inches with each layer vibrated to bond it to the preceding layer. The wall spacers must be raised as the placements are made. The concrete in the area from which the spacer is

withdrawn shall be carefully vibrated. Excessive vibration shall be avoided.

G. Adjustment rings shall be provided between the conical section and the manhole frame. The rings shall be cast-in-place using building felt between pours to create a weakened joint or as directed by the Engineer. If adjustment of the lid elevation is called for, concrete adjusting rings shall be used.

H. All manhole bases, including curved manhole bases and inverts shall be constructed of Class "A" concrete in accordance with details on the Drawings. Inverts shall be smooth and accurately shaped and have the same cross section as the invert of the sewers which they connect. The manhole base and invert shall be carefully formed to the required size and grade by gradual and even changes in sections, care being exercised to form the incoming and outgoing sewer pipes into the wall of the manhole at the required elevations. Changing directions of flow through the sewer shall be made to a true curve with as large a radius as the size of the manhole will permit. The invert and flow channel shall be formed during or immediately after the placing of the concrete and brush-finished as soon as the concrete has sufficiently set.

I. Form marks and offsets shall not exceed 1-inch on the outside surface of the manhole. Form marks and offsets shall not exceed 1/2-inch inside of the manhole. All offsets on the inside surface of the manhole shall be smoothed and rubbed so there is no projection or irregularity capable of scratching a worker or catching and holding water or other materials. Honeycombed areas shall be completely removed immediately upon removal of the forms and replaced with a Class "A" concrete as directed by the Engineer, or patched with epoxy grout.

J. Should circumstances make a joint necessary, a formed groove or reinforcing dowels shall be required in the top of the first placement for shear protection. Immediately before the second placement is made, the surface of the cold joint shall be thoroughly cleaned and wetted with a layer of mortar being deposited on the surface.

K. Concrete setting time and backfilling shall be in accordance with the applicable requirements of Section 03300. Masonry work shall be allowed to set for a period of not less than 24 hours. Outside forms, if any, then shall be removed and the manhole backfilled and compacted. All loose or waste material shall be removed from the interior of the manhole. The manhole cover then shall be placed and the surface in the vicinity of the work cleaned off and left in a neat and orderly condition.

3.02 CONSTRUCTION OF PRECAST CONCRETE MANHOLES

A. After placing manhole base, inverts shall be constructed using Class "A" concrete and 3 to 5 inches slump range in accordance with details on the Drawings and inverts shall have the same cross section as the invert of the sewers which they connect. The manhole invert shall be carefully formed to the required size and grade by gradual and even changes in sections. Changes in directions of flow through the sewer shall be made to a true curve

with as large a radius as the size of the manhole will permit.

B. After the base section has been set, and inverts formed, the precast manhole sections shall be placed thereon, care being exercised to form the incoming and outgoing sewer pipes into the wall of the manhole at the required elevations.

C. The cast iron frame for the manhole cover shall be set at the required elevation and properly anchored to the riser section. Where manholes are constructed in paved areas, the top surface of the frame and cover shall be tilted to conform to the exact slope, crown and grade of the existing adjacent pavement.

D. After backfilling has been completed, the excavated area, if located in a street, alley or sidewalk, shall be provided with a temporary surface.

3.03 MANHOLES OVER EXISTING SEWERS

A. Construct manholes over existing operating sewer lines at the locations shown. Perform necessary excavation as specified hereinbefore, break into existing line, and construct manhole.

B. Maintain flow through existing sewer lines at all times, and protect new concrete and mortar work for a period of 7 days after the concrete has been placed. Advise Engineer on plans for diverting sewage flow and obtain Engineer's approval before starting. Engineer's approval will not relieve the Contractor of responsibility for maintaining adequate capacity for flow at all times and adequately protecting new and existing work.

C. Construct the new base under the existing sewer and the precast sections as specified herein.

D. Break out the existing pipe within the new manhole, cover the edges with mortar, and trowel smooth.

3.04 INSPECTION AND TESTING

A. After completion, all manholes will be inspected. The Contractor shall make, at Contractor's expense, all necessary changes, modifications, and/or adjustments required to assure satisfactory operation.

+++ END OF SECTION 02607 +++

SECTION 02635

STORM SEWERS AND CULVERTS

PART 1- GENERAL

1.1 SCOPE

A. This section includes excavation; laying and installing storm sewers and culverts; mortar; pipe joints; installation of manholes and inlets; connecting new sewers to existing sewers; backfilling; testing; cleaning and restoration of site; final acceptance; and any other similar, incidental, or appurtenant storm sewer or culvert operation which may be necessary to properly complete the Work.

B. The Contractor shall provide all services, labor, materials, and equipment required for all storm sewers and culverts and related operations necessary or convenient to the Contractor for furnishing a complete Work as shown on the Plans or specified in these Specifications.

C. Related Work Specified Elsewhere:

1. Section 01200 - Measurement and Payment
2. Section 02200 - Site Preparation
3. Section 02315 - Excavation and Backfill for Structures
4. Section 02225 – Trench Excavation and Backfilling
5.
6. Section 02535 - Reinforced Concrete Storm Sewer Pipe
7. Section 02607 - Manholes, Junction Boxes, Catch Basins, and Inlets
8. Section 02641 - Precast Concrete Manholes
9. Section 02510 - Pavement Repairs
10. Section 02920 - Site Restoration
11. Section 03300 - Cast-In-Place Concrete

1.2 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents.

1.3 QUALITY ASSURANCE

A. Reference Standards: The Contractor shall comply with the applicable provisions and recommendations of the latest editions of the following standards, except as otherwise shown on the Plans or specified in these Specifications.

1. ASTM A74 - Standard Specification for Cast Lori Soil Pipe and Fittings.

2. ASTM C14 - Standard Specification for Concrete Sewer, Storm Drain, and Culvert Pipe.

3. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.

4. ASTM C443 - Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.

5. ASTM C564 - Standard Specification for Rubber Gaskets for Cast hon Soil Pipe and Fittings.

6. ASTM D 1784 - Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CVCP) Compounds.

7. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.

8. ASTM D2729 - Standard Specification for Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

PART 2 - PRODUCTS

2.1 MANHOLES AND INLETS

A. Manholes for storm sewer installations shall conform to the requirements of Section 02641 - Precast Concrete Manholes.

B. Inlet configuration shall conform to state or local requirements as shown on the Detail Drawings. Inlet construction shall be the same as the existing inlet structure being replaced except that all inlets with traps shall be replaced with inlets without traps.

2.02 STORM SEWER AND CULVERTS

A. Reinforced Concrete Pipe: Reinforced concrete pipe shall conform to the requirements of Section 02535 - Reinforced Concrete Storm Sewer Pipe.

PART 3 — EXECUTION

3.01 GENERAL

A. The Contractor shall control traffic in accordance with the requirements of Section 01550 -Traffic Regulations.

B. All activities shall be performed in accordance with the manufacturers' recommendations and regulations established by OSHA. Particular attention shall be drawn to those safety requirements involving working with scaffolding and entering confined spaces.

C. The Contractor shall identify the locations of all underground utilities prior to commencing excavation activities. The Contractor shall consult with utility companies to verify the locations of underground utilities.

D. The Contractor shall notify the agency, or company owning any utility line which is damaged, broken, or disturbed. The Contractor shall obtain approval from the Engineer and the utility owner prior to performing any temporary or permanent repairs, or relocation of utilities.

E. The Contractor shall install and operate a Suface Water Diversion and Dewatering system in accordance with the requirements of Section 02885 - Suface Water Diversion and Dewatering.

3.02 EQUIPMENT

A. The Contractor shall provide appropriate hoisting equipment to handle the pipe while unloading and placing it in its final position without damage to the pipe.

B. The Contractor shall provide hand tampers and pneumatic tampers to obtain the required compaction of the pipe bedding and backfill, as specified.

3.03 EXCAVATION

A. The Contractor shall excavate to depths required to install storm sewer to grades shown on the Plans.

B. The Contractor shall perform all rock excavation to the specified depth shown on the Plans plus the required additional depth for bedding. Rock excavation shall

consist of the removal of boulders and detached rock, one-half (1/2) cubic yard in volume or greater, and of all rock in place in ledges or masses which can be removed only by the use of bars and sledges or by blasting.

C. Where rock or soil containing rocks or gravel, hardpan, or other unyielding foundation material is encountered in trench excavation, the pipe shall be bedded in accordance with the requirements of one (1) of the classes of bedding but with the following additions: The hard unyielding material shall be excavated below the elevations of the bottom of the pipe or pipe bell to a depth of at least eight (8) inches or one-half (1/2) inch for each foot of fill over the top of the pipe, whichever is greater, but not more than three-quarters (3/4) the nominal diameter of the pipe. The cushion shall consist of a fine compressive material, such as silty clay or loam, slightly compacted, and shaped as required for the specified class of bedding. The cost of furnishing and placing the cushion material shall be included in the bid.

D. Excavated material not required or acceptable for backfill shall be disposed of by the Contractor offsite. Common excavations shall not be carried below the required depth; but when it is, the trench shall be backfilled at the Contractor's sole expense with material approved by the Engineer.

3.04 LAYING AND INSTALLING PIPE

A. The Contractor shall install the pipe in accordance with the manufacturer's recommendations and as specified in this section.

B. The Contractor is responsible for accurately placing pipe to the exact line and grade shown on the Plans. The elevation and alignment of the pipe shall be checked by transit and level rod every fifty (50) feet for smaller pipe and every joint for pipe forty-eight (48) inches and larger. The pipe section may be adjusted by use of "Come-along" of approved design and anchorage. The practice of bumping or snatching (with backhoe or crane, etc.) used to adjust pipe after placement in the trench, will not be permitted. The Contractor shall furnish all labor and materials necessary for controlling the line and grade.

C. The Contractor shall provide the necessary mason's lines and supports to ensure installation of the pipe to line and grade. The Contractor's facilities for lowering the pipe into the trench shall be such that neither the pipe nor the trench will be damaged or disturbed.

D. The Engineer shall inspect all pipe before it is Ibid. and reject any section that is damaged by handling or is defective to a degree which will materially affect the function and service of the pipe.

E. The laying of the pipe in the finished trench shall be started at the lowest point and laid upgrade. When bell-and spigot pipe is used, the bell shall be laid upgrade.

F. The pipe shall be firmly and accurately set to line and grade so that the invert will be smooth and uniform. The pipe shall be protected from water during placing and until

the mortar in the joint has thoroughly set.

G. For bell and spigot pipe, bell holes shall be of sufficient size to allow ample room for properly making the pipe joints. Bell holes shall be cut not more than five (5) joints ahead of pipe laying. Each joint shall be laid so that it will form a close concentric joint with the adjoining pipe and so as to avoid sudden offsets or inequalities in the flow line.

H. When bell and spigot pipes are used, spaces for the pipe belts shall be dug in the pipe subgrade to accommodate the bells. These spaces shall be deep enough to ensure that the bells do not bear the load of the pipe; they shall not be excessively wide in relation to the longitudinal direction of the trench. When the pipes are laid, the barrel of each section of pipe shall be in contact with the quadrant-shaped bedding throughout its full length, exclusive of the bell, to support the entire load of the pipe.

I. Pipe shall not be laid on frozen ground.

J. Water shall not be allowed to run or stand in the trench while pipe laying is in progress or before the trench has been backfilled. The Contractor shall not open up at any time more trench than his available pumping facilities are able to dewater. Movement of water that would tend to erode or affect the trench walls will not be allowed.

K As the work progresses, the interior of all pipe in place shall be thoroughly cleaned. After each line of pipe has been laid, it shall be carefully inspected and all earth, trash, rags, and other foreign matter removed from the interior.

L Backfilling of trenches shall be started immediately after the pipe is in place and the joints completed, inspected, and approved by the Engineer.

M. Pipe which is not true in alignment, or which shows any settlement after laying, shall be taken up and relaid without extra compensation.

3.05 MORTAR

A. The mortar shall be of the desired consistency for caulking and filling the joints of the pipe or too caulking and filling between the pipe and the drainage structures. Mortar that is not used within forty-five (45) minutes after water has been added shall be discarded.

3.06 PIPE JOINTS

A. Pipe joints for concrete pipe shall be of the tongue-and-groove type unless noted otherwise on the Plans. Rubber gasket joints shall be used for joining pipe.

B. For bell and spigot pipe, the inside of all bells and the outside of all spigots shall be wiped to remove all dirt, water, or other foreign matter so that their surfaces are clean and dry when the pipes are jointed.

C. Rubber ring gasket joints for concrete sewer pipe shall be installed according to the pipe

manufacturer's specifications and recommendations. Extreme care shall be used in joining large diameter pipe to avoid damaging the rubber ring or displacing it from the proper operating position.

D. After the joints have been completed, they shall be inspected by the Engineer before they are covered. Any leaks or defects discovered at any time after completion of the work shall be repaired immediately. AH pipe in place shall be carefully protected from damage until the backfilling operations have been completed. Any pipe which has been disturbed after jointing shall be removed, the joint cleaned and remade, and the pipe relaid at the Contractor's expense.

3.07 INSTALLATION OF MANHOLES AND INLETS

A. Precast Concrete Manholes with Cast-In-Place Bottoms

1. After completion of excavation, setting reinforcing steel and placing inlet and outlet pipes, but prior to placing concrete for invert slab, the Contractor shall set precast concrete blocks on the foundation to support the first joint of the manhole barrel which shall be lowered into the excavation, grooved end first, and set on concrete blocks. The Contractor shall align the first section of the manhole barrel vertically and adjust it to proper grade prior to placing the invert slab which shall be poured immediately after setting the first section of the manhole barrel.

2. Prior lo setting subsequent manhole barrel sections, the Contractor shall paint both tongue and groove ends with factory *recommended* primer. The Contractor shall allow the primer to set in accordance with the manufacturer's recommendation. The Contractor shall place "Ram-nek", or equivalent, plastic rope on tongue end, lower next section into position, and remove excess material from interior of structure. The Contractor shall add additional material on exterior of joint, if necessary, for a completely water-tight joint.

B. Precast Concrete Manholes with Precast Base Sections:

1. Two (2) lift holes shall be cast into each cone or riser section for purposes of handling and placement.

2. Openings for inlet and discharge sewer pipes shall be provided in the manhole base section or in the riser section. Openings shall be at positions and elevations as indicated on the Plans or predetermined in the field, and may be cast into the manhole wall or mechanically cored on completed sections. Where pipes are to be sealed into manhole wall with mortar, opening shall be large enough to permit such variations in both horizontal and vertical positions as field conditions may dictate. Mortar for sealing pipes into manholes shall be one part Portland cement and two (2) parts sand by volume. The amount of water used in the mixture shall be enough to produce a stiff workable mix but shall in no case exceed five and one- half (5-1/2) gallons per sack of cement. Sand shall conform to Specification M-45

and cement to Specification M-85 of ASSHTO.

3. After completion of the excavation, the Contractor shall set the precast base section on a foundation of clean crushed stone to support the base section of the manhole. The Contractor shall align the precast base section vertically and adjust it to proper grade and elevation prior to placing additional sections. Sections shall be installed per manufacturer's recommendation. Lift holes shall be sealed water tight.

C. Main and Lateral Pipes: The Contractor shall neatly cut off main and lateral pipes hush with inside of the manhole or inlet where they enter the structure walls. The Contractor shall fill in all irregularities and rough edges with non-shrinking grout.

D. Inverts: The Contractor shall shape inverts for smooth how across the structure floor or provide sump to collect sediment as shown on the Plans. The Contractor shall use concrete and mortar to obtain proper grade and contour finish surface with fine textured wood float.

E. Cast Iron Frames, Covers, and Grates: All covers for manholes shall have cast in place words denoting sewer or storm per the City Standard Detail. After completion of manhole or inlet, the Contractor shall set cast iron frame in full mortar bed after adjusting to required elevation.

F. Manhole and Inlet Adjustment: Manhole covers or grating shall be adjusted by using precast adjustment rings, brick masonry and grout. All work shall be done in good workmanlike manner by competent workmen and the unit re-established in proper working order at its new elevation.

3.08 CONNECTING NEW SEWERS TO EXISTING SEWERS

A. Connections shall be made to all existing sewer lines in the vicinity of the Work, as shown on the Plans or as directed by the Engineer, and with the written approval of the City.

B. Connections to existing manholes shall be made by coring a hole in the wall of the existing manholes, installing a boot, inserting a minimum length of eighteen (18) feet of pipe into the hole, filling around same with non-shrinking grout and troweling the inside and outside surfaces of the joint to a neat finish.

C. Connections of new sewers to existing sewers shall be plugged, and shall remain plugged until final acceptance by the Engineer.

3.09 FIELD QUALITY CONTROL FOR STORM DRAINAGE SYSTEM

A. All pipe joints shall be as near watertight as it is practical to construct them with the materials and methods specified.

B. Flushing Sewers. The Contractor shall flush all storm sewers with water in sufficient volume to obtain free flow through each line. The Contractor shall remove all obstructions and correct all defects discovered. The Contractor shall remove all sift and trash from catch basins and inlets just prior to final acceptance of the Work.

C. Deflection Testing: Pipes deformed or deflected more than five (5) percent shall be removed and replaced at the Contractor's expense. The City reserves the right to have a deflection test performed with the use of a mandrel. The mandrel shall be at least ninety-five (95) percent of the nominal diameter of the installed pipe. Testing shall be at the Contractor's expense.

3.10 BACKFILLING

3.10.1 The trench shall be backfilled and compacted in accordance with the requirements of Section 02225- Trench Excavation and Backfilling.

3.11 TESTING

A. The Contractor shall test selected sections of the storm sewer as directed by the Engineer in accordance with the requirements of Articles 3.01.E and 3.01.F of Section 02650 - Testing for Acceptance of Sanitary and Storm Sewers. The City reserves the right to participate in all such tests. The City shall be the judge of the final acceptance of the Work.

3.12 CLEANING AND RESTORATION OF SITE

A. After the backfill is completed, the Contractor shall remove all surplus material, din, and rubbish from the site. Surplus dirt may be deposited in embankment or shoulders. The Contractor shall restore all disturbed areas to their original condition.

B. After all work is completed, the Contractor shall remove all tools and other equipment, leaving the entire site free of debris, clear, and in good condition.

C. The Contractor shall restore the site of the Work in accordance with the requirements of Section 02920 - Site Restoration.

3.13 FINAL ACCEPTANCE

A . At the time of final acceptance of the Work performed under the Contract, the

utilities covered by this section shall be completed in every respect and shall be in perfect operating condition. All surplus materials of every character resulting from the Work of this section shall have been removed. Storm sewers shall be free from sand, silt, or any other obstructions.

+++ END OF SECTION 02635 +++

SECTION 02641
PRECAST CONCRETE MANHOLES

PART 1 - GENERAL

1.01 SCOPE

A. This section includes precast concrete manholes installation; frames and covers; pipe connections at manholes; manhole testing; backfill; cleanup; and any other similar, incidental, or appurtenant operation which may be necessary to properly complete the Work.

B. The Contractor shall provide all services, labor, materials, and equipment required for all precast concrete manholes and related operations necessary or convenient to the Contractor for furnishing a complete Work as shown on the Plans or specified in these Specifications.

C. Related Sections Specified Elsewhere:

1. Section 02205 - Dewatering
2. Section 02315 - Excavation and Backfill for Structures
3. Section 02225 – Trench Excavation and Backfilling
4. Section 02535 – Reinforced Concrete Storm Drain Pipe
5. Section 02635 - Storm Sewers and Culverts
6. Section 02607 - Catch Basins and Inlets
7. Section 02650 - Testing for Acceptance of Sanitary and Storm Sewers.
8. Section 02510 - Pavement Repairs
9. Section 02920 - Site Restoration
10. Section 03300 - Cast-In-Place Concrete

1.02 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided.

1. The Contractor shall submit manufacturer's data and details of the following items for approval:

a. Shop drawings of manhole sections and base units and construction details, including reinforcement, jointing methods, and materials.

b. Summary of criteria used in the manhole design including, as a minimum, material properties, loadings, load combinations, and dimensions assumed.

c. Materials to be used in fabricating drop connections.

d. Materials to be used for pipe connections at manhole walls.

e. Materials to be used for stubs and stub plugs, if required.

f. Materials and procedures for corrosion resistant liner and coatings, if required.

g. Plugs to be used for vacuum testing.

h. Manufacturer's data for pre-mix (bag) concrete, if used for channel inverts and benches.

i. Description of the proposed method of concrete curing.

1.03 QUALITY ASSURANCE

A. Reference Standards: The Contractor shall comply with the applicable provisions and recommendations of the latest editions of the following standards, except as otherwise shown on the Plans or specified in these Specifications.

1. ASTM C270 - Standard Specification for Mortar for Unit Masonry.

2. ASTM C443 - Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe using Rubber Gaskets.

3. ASTM C478 - Standard Specification for Precast Reinforced Concrete Manhole Sections.

4. ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes.

5. ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (non-shrink).

4. Prior to delivery, all basic materials specified in this section shall be tested and inspected by an approved independent commercial testing laboratory or, if approved by the Engineer, certified copies of test reports prepared by the manufacturer's testing laboratory will be acceptable. All materials which fail to conform to these Specifications shall be rejected.

5. After delivery to the site of the Work, any materials which have been damaged in transit or are otherwise unsuitable for use in the Work shall be rejected and removed from the site of the Work.

D. The precast concrete producer shall demonstrate adherence to the standards set forth in the National Precast Concrete Association Quality Control Manual. The precast concrete producer shall meet requirements written below.

1. Qualifications, Testing and Inspection

a. The Precast concrete producer shall have been in the business of producing precast concrete products similar to those specified for a minimum of 5 years. The precast concrete producer shall maintain a permanent quality control department or retain an independent testing agency on a continuing basis. The agency shall issue a report, certified by a licensed engineer, detailing the ability of the precast concrete producer to produce quality products consistent with industry standards.

b. The Precast concrete producer shall show that the following tests are performed in accordance with the ASTM standards indicated. Tests shall be performed for each 150 cu. yd. of concrete placed, but not less frequently than once per week.

(1.) Slump: C143

(2.) Compressive Strength: C31, C192, and C39

(3.) Air Content (when air-entrained concrete is being used): C231 or C173

(4.) Unit Weight: C138

c. The Precast concrete producer shall provide documentation demonstrating compliance with this subparagraph.

d. The plant shall notify the Engineer when the precast products are being produced for the project. The City may place an inspector in the plant when the products covered by this specification are being manufactured."

1.04 DESIGN CRITERIA

A. Manholes shall be constructed of specified materials to the sizes, shapes, and dimensions and at the locations shown on the Plans or as otherwise directed by the Engineer. The height or depth of the manhole will vary with the locations, but unless shown otherwise on the Plans shall be such that the top of the manhole frame will be at the finished grade of the pavement or higher than the ground surface as shown on the Plans and the invert will be at the designed elevations.

PART 2 – PRODUCTS

2.01 PRECAST CONCRETE MANHOLES

A. Unless specified otherwise in the Plans or in the Special Conditions, all manholes will be precast concrete manholes as specified in this section.

B. The precast reinforced concrete manholes shall be constructed in accordance with the requirements of ASTM C478. Reinforced concrete manholes shall consist of manhole base sections, riser sections, transition sections, and conical sections as described in this section. The manhole components shall be configured to minimize the number of joints required per manhole (see Detail Drawings). The Engineer may require any manhole that is not composed of the minimum number of sections to be replaced.

C. Portland cement concrete used in the precast reinforced concrete manholes shall have a minimum compressive strength of 4000 psi at twenty-eight (28) days.

1. The concrete shall contain type II Portland cement with a C3A content of five and one-half (5½) percent or less and meet the requirements of ASTM C478.

2. Aggregate for concrete, except for maximum size and gradation, shall be as specified in applicable sections of these Specifications.

3. To aid in achieving the specified concrete compressive strength, newly cast manholes shall be cured in accordance with the requirements of ASTM C478. The method of curing proposed must be submitted to the Engineer prior to manufacture. Manholes shall be cured for a minimum of seven (7) days prior to shipment to the site unless otherwise instructed by the Engineer.

4. The manhole manufacturer shall test the compressive strength of a minimum of two (2) concrete cylinders per calendar week. Reports verifying the results of the compression tests shall be maintained at the manufacturer's facility. Reports shall be made available for inspection and review by the City's representatives. The manhole manufacturer shall permit the City's representatives to make unannounced reviews of compression test records and inspection of manufacturing facilities at any time during normal business hours.

5. The manhole manufacturer shall notify the City of all manholes delivered for use in the City's sanitary sewer system which were manufactured during a week for which a concrete compressive strength test yielded a result of less than 4,000 psi.

   a. Such notification shall be in the form of a letter sent to:

      City of Atlanta Department of Watershed Management
      Construction Management Group
      750 Selig Drive, Suite F
      Atlanta, GA 30336

b. Notification shall include (at a minimum) the project name, Contractor name, date of manhole component manufacture, and description of manhole component(s) affected.

c. The City may require additional testing, repairs, or removal and replacement, at no additional cost to the City, of any or all manhole components provided for use in the City's sanitary sewer systems which were manufactured during a calendar week for which a concrete compressive strength test yields a result of less than 4,000 psi.

D. Reinforcing steel shall be bars of intermediate grade, open hearth, billet steel, conforming to the requirements of ASTM A615, or Cold-Drawn Steel Wire for Concrete Reinforcement conforming to the requirements of ASTM A82; or of wire fabric conforming to the requirements of ASTM A185. The circumferential reinforcement in the riser and conical top sections shall have an area of not less than 0.12 square inches per linear foot.

E. The interior and exterior surfaces of the manhole shall have a smooth hard finish, and shall be free from cracks, chips, and spalls.

F. The maximum allowable absorption of the concrete used for manhole construction shall not exceed eight (8) percent of the dry weight.

G. Manhole base sections shall be circular, wet cast, and may be supplied in forty-eight (48) inches, sixty (60) inches, seventy-two (72) inches, eighty-four (84) inches, and ninety-six (96) inches diameters. Heights shall range from forty-eight (48) inches to ninety-six (96) inches depending on availability with diameter and as specified or approved by the Engineer. All base sections shall be supplied with Manhole Lift System inserts as manufactured by Press-Seal Gasket Corporation. Lifting eye bolts, also manufactured by Press-Seal Gasket Corporation, shall be supplied to the Contractor upon request. Manhole bases manufactured with pipe openings eighteen (18) inches or less shall be furnished with Kor-N-Seal flexible pipe-to-manhole connectors. Pipes with diameters greater than eighteen (18) inches shall be secured with a concrete cradle installed to the springline of the pipe utilizing Class "B" concrete conforming to he requirements of Section 03300 - Cast-In-Place Concrete.

H. Riser sections shall be circular, wet or dry cast, and may be supplied in forty-eight (48) inches, sixty (60) inches, seventy-two (72) inches, eighty-four (84) inches and ninety-six (96) inches diameters. Heights shall range from sixteen (16) inches to forty-eight (48) inches in sixteen (16) inch multiples depending on availability with diameter and as specified or approved by the Engineer. All riser sections shall be supplied with Manhole Lift System inserts as manufactured by

Press-Seal Gasket Corporation. Lifting eye bolts, also manufacture by Press-Seal Gasket Corporation, shall be supplied to the Contractor upon request.

I. Transition sections shall be wet or dry cast. Conical transition sections shall be supplied for sixty (60) inches to forty-eight (48) inches diameter transitions. Conical transitions shall be thirty-two (32) inches high. Sixteen (16) inches high conical transitions may only be used when approved by the City. All conical transition sections shall be supplied with a Manhole Lift System as manufactured by Press-Seal Gasket Corporation. Flat slab transitions shall be supplied for base sections seventy-two (72) inches to ninety-six (96) inches in diameter. Flat slab transitions shall be manufactured structurally to meet individual project requirements. Clear access openings shall be provided to accommodate riser sections as shown in the Plans or as detailed in the Detail Drawings.

J. Conical sections shall be wet or dry cast, eccentric only. Concentric sections will not be allowed. Conical sections shall transition from forty-eight (48) inches diameter to a twenty-four (24) inches clear access opening and be thirty-six (36) inches high. They shall be supplied with a Manhole Lift System as manufactured by Press-Seal Gasket Corporation

K. Precast manhole riser joints shall be offset tongue and groove type, supplied with Tylox Super Seal pre-lubricated gasket as manufactured by Hamilton Kent. Each joint shall also be supplied with Conseal CS-231 waterstop sealant as manufactured by Concrete Sealants, in widths as recommended by the manufacturer.

L. The ends of each reinforced concrete manhole riser section and the bottom end of the manhole top section shall be so formed that when the manhole risers and the top are assembled, they will make a continuous uniform manhole.

M. Standard manholes of precast concrete construction, and other manholes of precast concrete construction having entering sewers of twenty-four (24) inches diameter or smaller shall have precast openings in the manhole walls for incoming or outgoing sewers as indicated on the Plans.

N. All components of a manhole for a particular location shall be clearly marked in order that the manhole may be correctly assembled to suit construction conditions existing at that particular location.

O. All precast concrete manhole base sections and drop manhole bases shall be set on a foundation of #57 compacted stone aggregate, twelve (12) inch minimum thickness, and covering the entire bottom of the excavation for the manhole. Aggregate size may be adjusted by the Engineer based on field conditions.

P. Manhole steps shall conform to the requirements of this section.

2.02 STRUCTURAL MATERIALS AND CASTINGS

A. Structural steel shall conform to the requirements of ASTM A283, unless otherwise indicated on the Plans.

B. Steel castings shall conform to the requirements of ASTM A27. The grades to be used will be specified in the Special Conditions or indicated on the Plans.

C. Gray iron castings shall conform to the requirements of ASTM A48. All castings shall be clean and free of scale, adhesions, or inclusions. Gray iron castings for manhole or inlet frames and covers or gratings shall be cast from Class 30B cast iron. Bearing surfaces between manholes, inlet frames, and covers or gratings shall be such that the cover or grating shall seat in any position onto the frame without rocking. Bearing surfaces for standard manhole frames and covers shall be machined.

D. Aluminum castings shall conform to the requirements of ASTM B108.

E. Structural aluminum shall conform to the requirements of either ASTM B209, B221, B308, B241, or B211, as applicable. Finished bolts and nuts shall be given an anodic coating of at least 0.0002 inches in thickness.

2.03 FRAMES, COVERS, AND STEPS

A. New manhole rims, toe pockets, frames, and covers shall be cast iron conforming to the requirements of ASTM A48 for Class 30 Gray Iron Castings. All castings shall be made accurately to the required dimensions, fully interchangeable, sound, smooth, clean, and free from blisters or other defects. Defective castings which have been plugged or otherwise treated shall not be used. All castings shall be thoroughly cleaned and painted or coated with bituminous paint. Each casting shall have its actual weight in pounds stenciled or painted on it in white paint.

B. Manhole frames and covers shall be as detailed on the Plans, and as manufactured by Vulcan Foundry, or as manufactured by the Griffin Foundry Co., Russell pipe & Foundry Co., or equal. Manhole covers shall be vented except those located within the one-hundred (100) year flood plain, within three (3) feet of curb for a two (2) lane road, or within the outside lane of a multi-lane road.

C. Sanitary sewer manhole covers shall have the words cast on the top in letters two (2) inches high per the City Standard Detail.

D. Manhole inlet steps shall be made of steel reinforced copolymer polypropylene model PS-1 PF. They shall be installed at maximum sixteen (16) inch intervals.

Manhole steps shall be as shown in the Detail Drawings with rod and pull ratings meeting OSHA standards.

2.04 SPECIALTY ITEMS

A. One piece manholes shall be manufactured in accordance with the requirements of ASTM C478 and as detailed in the Detail Drawings. They shall be cast utilizing 4000 psi concrete containing type II cement with a C3A content of five and one-half (5½) percent or less. They shall be manufactured within a minimum eight (8) inches thick base with dowel steel reinforcement and waterstop. They shall be used only in situations which will not accommodate a twenty-four (24) inch base section and twenty-four (24) inch conical section.

B. 36" x 48" Manhole Tees shall be manufactured in accordance with the requirements of ASTM C478 and as detailed in the Detail Drawings. They shall be cast utilizing 4000 psi concrete containing type II cement with a C3A content of five and one-half (5½) percent or less.

C. Saddle manholes shall be manufactured in accordance with the requirements of ASTM C478 and as shown in the Detail Drawings. They shall be cast utilizing 4000 psi concrete containing type II cement with a C3A content of five and one-half (5½) percent or less.

D. Drop Manholes (Memphis Tees) shall be manufactured in accordance with the requirements of ASTM C478 and as detailed in the Detail Drawings. They shall be cast utilizing 4000 psi concrete containing type II cement with a C3A content of five and one-half (5½) percent or less.

2.05 BRICK

A. Brick shall comply with the following requirements for which its use is intended. Bricks with holes through them will not be allowed in the Work.

B. Bricks used to adjust manhole frame to grade shall conform to the requirements of ASTM C32 for grade SM. Bricks shall conform to the following dimensions, unless otherwise approved by the Engineer.

	Depth (Inches)	Width (Inches)	Length (Inches)
Standard Size	$2\text{-}^{1}/_{4}$	$3\text{-}^{3}/_{4}$	8
Allowable Variation	$+^{1}/_{4}$	$+^{1}/_{4}$	$+^{1}/_{2}$

C. All brick shall be new and whole, of uniform standard size, and with substantially straight and parallel edges and square corners. Bricks shall be of compact

textures, burned hard entirely through, tough and strong, free from injurious cracks and flaws, and shall have a clear ring when struck together. No soft or salmon brick shall be used in any part of the Work. Brick shall be culled after delivery, if required, and no culls shall be used except at such places, to such extent, and under such conditions as may be approved by the Engineer.

2.06 CONCRETE

A. Concrete shall conform to requirements of Section 03300 - Cast-In-Place Concrete.

2.07 MORTAR

A. Mortar shall be prepared only in the quantities needed for immediate use. Mortar which has been mixed for more than thirty (30) minutes or which has set or has been retempered shall not be used in the Work.

PART 3 - EXECUTION

3.01 GENERAL

A. All activities shall be performed in accordance with the manufacturer's recommendations and regulations established by OSHA. Particular attention shall be drawn to those safety requirements involving working with scaffolding and entering confined spaces.

B. The Contractor shall verify that lines and grades are as specified in the Plans.

3.02 INSTALLATION

A. Manholes shall be constructed to the sizes, shapes, and dimensions as detailed in the Detail Drawings and at the locations shown on the Plans. They shall be constructed of precast concrete sections conforming to the requirements of this section. The manholes shall be assembled with the fewest number of sections to make up required height, thereby reducing the number of joints. The composition of the manhole must be approved by the Engineer. The Engineer may require any manhole that is not composed of the minimum number of sections to be replaced. The depth of the manhole will vary with the location, but in all cases it shall be such as will place the cover (or lid) at the finished grade of the pavement or ground surface or as otherwise indicate on the Plans. In undeveloped or rural areas, manholes shall be furnished to a height of two (2) feet above ground. Concentric cone sections and flat top manholes, except for shallow depth where approved by the Engineer, will not be allowed; only eccentric cones will be used.

B. Precast concrete manholes for reinforced concrete sewers forty-eight (48) inches diameter and larger shall be as specified above, except that they shall be installed

on a saddle constructed on the barrel of the sewer. Precast concrete manholes for sewers thirty (30), thirty-six (36), and forty-two (42) inches shall be saddle-types or precast base types as specified in the Plans. Reinforcing steel in the saddle shall be welded to the reinforcing steel of the pipe. The design of these saddles shall be approved by the Engineer prior to manufacture.

C. All joints for precast manhole stacks shall be offset tongue and groove with Tylox Super Seal pre-lubricated gaskets as manufactured by Hamilton Kent. Each joint shall also be sealed with Conseal CS-231 waterstop sealant as manufactured by Concrete Sealants. The width and installation of the joint sealant shall be in accordance with the manufacturer's recommendations. All joints shall be supplied with 3" x 16" x ½" inch bitumastic coated steel strap anchors. Three (3) strap anchors, one-hundred and twenty (120) degrees apart shall be required per joint.

D. Where the difference in the invert elevation of two (2) or more sewers, eighteen (18) inches in diameter or smaller, intersecting in one (1) manhole is two (2) feet or more, a Drop Manhole (Memphis Tee) shall be constructed in the manner shown in the Detail Drawings. They shall be similar in construction to the standard manhole, except that a drop connection of a pipe and fittings of the proper size and material shall be constructed outside the manhole and supported by Class B concrete as indicated on the Plans and in the Detail Drawings. The manhole and the drop connection shall be placed on twelve (12) inch reinforced concrete base as detailed in the Detail Drawings. The drop connection piping assembly shall be bolted to the barrel of the manhole riser using a minimum of four $^{5}/_{8}$-inch diameter stainless steel (316) bolts with suitable washers to prevent failure caused by pulling the bolt head through the manhole wall.

E. Base sections shall be precast with the vertical walls of sufficient height to allow entry of the required pipes as shown on the Plans, and as detailed in the Detail Drawings. Manhole inverts shall be constructed of cement mortar and shall have the same cross-section as the invert of the sewers which they connect. The manhole invert shall be carefully formed to the required size and grade by gradual and even changes in sections. Changes in direction of flow through the sewer shall be made with a true curve with as large a radius as the size of the manhole will permit.

F. All water standing in the trench shall be removed before placing of concrete is started, and the foundation maintained in a dry condition.

G. Shallow manholes shall be constructed to the sizes, shapes, and dimensions as detailed in the Detail Drawings, and at the locations shown on the Plans. They shall be constructed of precast concrete sections as shown on the Plan and as directed by the Engineer.

H. The top elevation of manhole frames shall be adjusted to grade in areas such as streets, alleys, and parking lots or where indicated on the Plans. A maximum

adjustment of twelve (12) inches will be allowed using brick and mortar. Adjustments greater than twelve (12) inches must be made by changing precast riser sections. The brick used will be in accordance with the requirements of this section.

3.03 PIPE CONNECTIONS AT MANHOLES

A. Openings in manhole walls for incoming and outgoing sewers shall be precast or cored and after installation sealed with an approved non-shrink grout. These manholes shall be installed on a choked and compacted stone bedding as detailed in the Detail Drawings.

B. A flexible manhole connector may be approved by the Engineer as an alternate method of sealing the space between the manhole wall and the pipe. Flexible manhole sleeves shall be required for all pipes eighteen (18) inches and smaller. The manhole connector shall be Kor-N-Seal or equal and conform to the requirements of ASTM C923 and shall be made from ethylene propylene rubber (EPDM) designed to be resistant to ozone, weather elements, chemicals, including acids, alkalis, animal and vegetable fats, oils, and petroleum products. Manhole sleeves shall be secured to the pipe by a stainless steel clamp and bolt assembly conforming to the requirements of ASTM C923 and ASTM A167.

C. All stainless steel elements of the manhole connector shall be totally non-magnetic Series 304 Stainless, excluding the worm screw for tightening the steel band around the pipe which shall be Series 305 Stainless. The worm screw for tightening the steel band shall be torqued by a break-away torque wrench available from the precast manhole supplier, and set for 60-70 inch/lb. The connector shall be installed in the manhole wall by activating the expanding mechanism in strict accordance with the recommendation of the connector manufacturer. The connector shall be of a size specifically designed for the pipe material and size being utilized on the Project.

3.04 MANHOLE TESTING

A. All manholes shall be vacuum tested in accordance with the requirements of Section 02650 - Testing for Acceptance of Sanitary and Storm Sewers.

3.05 BACKFILL

A. The Contractor shall place and compact backfill materials, in the area of excavation surrounding manholes in accordance with the requirements of Section 02315 - Excavation and Backfill for Structures.

B.

3.06 CLEANUP

A. After the manhole installation work has been completed and all testing accepted by the Engineer, the Contractor shall cleanup the area. All excess material and debris not incorporated into the permanent installation shall be disposed of by the Contractor. Disturbed grassed areas shall be seeded or sodded. Site restoration shall be performed in accordance with the requirements of Section 02920 - Site Restoration.

+++ END OF SECTION 02641 +++

SECTION 02642
MANHOLE HEIGHT ADJUSTMENT

PART 1 - GENERAL

1.01 SCOPE

A. This section includes manhole entry and procedures for manhole height adjustment; and any other similar, incidental, or appurtenant operation which may be necessary to properly complete the Work.

B. The Contractor shall provide all services, labor, materials, and equipment required for all manhole height adjustments and related operations necessary or convenient to the Contractor for furnishing a complete Work as shown on the Plans or specified in these Specifications.

C. Related Work Specified Elsewhere:
1. Section 02315 - Excavation and Backfill for Structures
2. Section 02920 - Site Restoration

1.02 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents.

1.03 QUALITY ASSURANCE

A. Reference Standards: The Contractor shall comply with the applicable provisions and recommendations of the latest editions of the following standards, except as otherwise shown on the Plans or specified in these Specifications.

1. ASTM C32 - Standard Specification for Sewer and Manhole Brick (Made From Clay or Shale).

2. ASTM A48/A48M - Standard Specification for gray iron castings.

PART 2 - PRODUCTS

2.01 BRICK

A. Brick shall conform to the requirements of ASTM C32 for grade SM. Bricks shall conform to the following dimensions, unless otherwise approved by the Engineer:

	Depth (inches)	Width (inches)	Length (inches)
Standard Size	2¼	3¾	8
Allowable Variation	±¼	±¼	±½

B. All brick shall be new and whole, of uniform standard size and with substantially straight and parallel edges and square corners. Bricks shall be of compact textures, burned hard entirely through, tough and strong, free from injurious cracks and flaws, and shall have a clear ring when struck together. No soft or salmon brick shall be used. Brick shall be culled after delivery, if required, and no culls shall be used except at such places, to such extent, and under such conditions as may be approved by the Engineer.

2.02 MORTAR

A. The Contractor shall use mortar meeting the requirements of ASTM C270 Type S unless directed otherwise by the Engineer.

B. The Contractor shall prepare mortar only in quantities needed for immediate use. Mortar which has been mixed for more than thirty (30) minutes, which has set, or which has been re-tempered shall not be used.

PART 3 - EXECUTION

3.01 MANHOLE ENTRY

A. The Contractor shall exercise extreme caution during any manhole entry operations. Particular attention shall be paid while working on larger diameter sewers. The Contractor shall implement all necessary safety precautions, in accordance with OSHA regulations, to give maximum protection at all times to persons or property at or near the site of the Work.

3.02 PROCEDURES FOR MANHOLE HEIGHT ADJUSTMENT

A. The Contractor shall utilize maps, surveys, sounding instruments, or information from local residents to determine approximate locations of buried manholes. Manholes shall be exposed utilizing hand techniques or by carefully probing with mechanical equipment. Manhole exposure in paved areas shall be accomplished by making a square cut in the surface with sufficient width to allow for the excavation of the material around the manhole to expose it to a depth necessary for adequate adjustment.

B. The Contractor shall adjust the top elevation of the manhole frame to grade where indicated on the Plans or directed by the Engineer using brick and mortar conforming to the requirements of this section. A maximum adjustment of twelve (12) inches will be allowed using brick and mortar. Mortar shall be applied to create a smooth finish on the interior and exterior prior to backfill. Adjustments greater than twelve (12) inches shall be made by removing the cone section and adding the appropriate precast riser section.

C. When a manhole height adjustment is performed in a paved area and the manhole is not to be rehabilitated by any other method, then the Contractor shall install a manhole frame seal in accordance with the requirements of Section 02644 - Manhole Frame Sealing.

+++END OF SECTION 02642 +++

SECTION 02643
MANHOLE FRAME AND COVER INSTALLATION

PART 1 - GENERAL

1.01 SCOPE

A. This section includes procedures for manhole frame and cover installation; and any other similar, incidental, or appurtenant operation which may be necessary to properly complete the Work.

B. The Contractor shall provide all services, labor, materials, and equipment required for all manhole frames and cover installations and related operations necessary or convenient to the Contractor for furnishing a complete Work as shown on the Plans or specified in these Specifications.

C. Related Work Specified Elsewhere:
1. Section 02315 - Excavation and Backfill for Structures
2. Section 02920 - Site Restoration

1.02 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:

1. The Contractor shall submit shop drawings of manhole frames and covers to the Engineer for approval before installation.

1.03 QUALITY ASSURANCE

A. Reference Standards: The Contractor shall comply with the applicable provisions and recommendations of the latest editions of the following standards, except as otherwise shown on the Plans or specified in these Specifications.

1. American Society for Testing and Materials (ASTM).

PART 2 - PRODUCTS

2.01 GENERAL

A. The Contractor shall provide and install complete manhole covers and frames at each new sanitary sewer manhole, and in all other locations shown on the Plans or specified.

B. Manhole covers and frames shall conform to these specifications, the Plans, all referenced standards, the requirements of the manhole manufacturer, and appropriate industry standards.

C. Manhole covers shall be of either Standard Type (non-bolted) or Bolt-Down Type,

as indicated on the Plans or as otherwise specified. If not otherwise indicated, manhole covers shall be Standard Type.

D. The Contractor shall provide manhole covers and frames approved by the City.

2.02 MATERIALS

A. Manhole covers and frames shall be constructed of cast iron conforming to the requirements of ASTM A48Class 30, as a minimum. Tensile strength of the cast iron shall be a minimum of 30,000 psi.

B. Covers and frames shall be "Heavy Duty" type, rated for a minimum of H-20 loading.

C. All castings shall be sound, smooth and clean, and free of blisters, pits, cracks, and other defects. Castings judged to be defective by the Engineer will be rejected, and shall be replaced by the Contractor at no additional cost to the City.

D. Casting tolerances shall be $\pm$ $^{1}/_{16}$ -inch, with an additional one-sixteenth ($^{1}/_{16}$) inch per foot of dimension.

E. Manhole covers shall be cast with two (2) non-penetrating type pick-holes, located as indicated in the Detail Drawings. Pick-holes shall conform to the dimensions indicated in the Detail Drawings. Manhole covers shall be vented except those located within the one-hundred (100) year flood plain, within three (3) feet of curb for a two (2) lane road, or within the outside lane of a multi-lane road.

F. Frames shall have integrally cast, full perimeter mud rings. Frames shall be cast with four (4), one (1) inch diameter holes in the flange for anchor bolts. Anchor bolt holes shall be located as shown in the Detail Drawings.

G. The seating surfaces of frames and covers shall be machined flat to ensure contact between the cover and frame along the full perimeter, in accordance with Federal Specifications RR-F-621.

H. Gaskets shall be provided and installed on all manhole frames. Gaskets shall be secured to the seating surface of the frame with a non-degrading glue by the manufacturer. Gaskets shall be flat, one-eights ($^{1}/_{8}$) inch thick, black neoprene, with a tensile strength of 2,000 psi.

I. For manhole covers indicated as Bolt-Down Type, frames shall be cast and machined to accept four (4) cover bolts, on the pattern shown in the Detail Drawings. Covers shall be cast with four (4) holes, three-quarter (¾) inch diameter, for the bolts on the pattern shown in the Detail Drawings. Bolts shall be stainless steel, $^{5}/_{8}$" - 1½ x 2" hex-head cap screws, and shall be provided with all bolt-down type covers. Bolts shall include stainless steel washers and rubber sealing gaskets.

J. Covers and frames shall bear the emblem of "City of Atlanta Sewer" or "City of Atlanta Storm" as applicable, as illustrated in the Detail Drawings. No substitute cover designs will be accepted.

K. Covers shall be cast with four (4) stacking lugs, each five-eights ($^5/_8$) inch wide by two (2) inches long, on the bottom of the lid.

L. Covers and frames shall conform to the following critical dimensions:

	Standard	Bolt-Down
Overall frame height	6 $^3/_4$ to 8"	6 $^3/_4$ to 8"
Cover diameter	23 ½"	23 ½"
Cover thickness, min.	1 $^3/_8$"	1 $^3/_8$"
Frame opening for cover	23 $^{11}/_{16}$"	23 $^3/_4$"
Frame opening for entry	22"	20 $^5/_8$"
Mud ring O.D.	25 $^7/_8$"	25 $^3/_4$"
Mud ring height, min.	$^3/_4$"	1 $^5/_8$"

PART 3 - EXECUTION

3.01 PROCEDURES FOR MANHOLE FRAME AND COVER INSTALLATION

A. The Contractor shall prepare the manhole top cone for frame installation per manhole and manhole cover manufacturer recommendations.

B. The Contractor shall prepare and install manhole frames and covers per manufacturer recommendations.

C. The Contractor shall check the installation of gaskets and replace all missing gaskets.

D. The Contractor shall install new frames and covers to the required elevations shown on the Plans or to the existing grade as directed by the Engineer.

E. The Contractor shall check the manhole covers for fit in the frame. If a manhole cover is either excessively loose or tight in the frame, or rocks, wobbles, or otherwise moves in its frame, the frame and cover shall be removed and replaced by the Contractor at no additional cost to the City.

F. The Contractor shall install and tighten stainless steel bolts on all Bolt-Down Type covers.

+++ END OF SECTION 02643 +++

SECTION 02650
TESTING FOR ACCEPTANCE OF SANITARY AND STORM SEWERS

PART 1 GENERAL

1.01 SCOPE

A. This section includes sanitary and storm sewer inspection and testing methods; joint testing procedures; manhole testing methods; allowable testing limits for sanitary sewers; and any other incidental or appurtenant operations which may be necessary to properly complete the Work.

B. The Contractor shall provide all labor, materials, and equipment required for all sanitary and storm sewer testing and related operations necessary or convenient for completing the Work as shown on the Drawings or specified herein.

1.02 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents.

1.03 QUALITY ASSURANCE

A. Reference Standards: The Contractor shall comply with the applicable provisions and recommendations of the latest editions of the following standards, except as otherwise shown on the Drawings or specified in these Specifications.

1. ASTM C828 – Test Method for Low-pressure Air Test of Vitrified Clay Pipe Lines

2. ASTM C969 – Standard Practice for Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines

3. ASTM C1103 - Standard Practice For Joint Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines

4. ASTM C1244 – Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill

5. ASTM F1417 – Standard Practice for Installation Acceptance of Plastic non-pressure Sewer Lines Using Low Pressure Air

1.04 ACCEPTANCE TESTS

A. Upon completion of all or a part of a sanitary sewer installation, the Contractor shall test and/or inspect the sewer for acceptability. The method(s) of testing and/or inspection shall be as specified in the individual Specifications sections. Testing and inspection shall

be performed in accordance with the requirements of this Section.

B. One or more of the following tests and/or inspections may be required:

1. Infiltration of Water

2. Exfiltration of Water

3. Exfiltration of Air under Pressure

4. Smoke Testing

5. Joint Testing

6. Direct Visual Inspection

7. Deflection Testing

8. Dye Testing

9. Closed Circuit Television Inspection (CCTV).

C. The specified testing method shall be completed by the Contractor when directed by the Engineer. The Contractor shall notify the Engineer 48 hours in advance prior to the Contractor performing any testing.

D. Prior to any testing, all lines shall be cleaned of debris and flushed clean. Debris shall be caught and removed from the line and shall not be flushed into existing live sanitary sewers.

1.05 TEST SECTIONS

A. Unless otherwise specified or directed by the Engineer, each section of sanitary sewer between manholes shall be tested by the air testing method.

B. The Contractor may at his option divide the installed sewer into subsections of more convenient length for testing. If the section or subsection tested does not pass the tests, it shall be repaired and the test repeated until a satisfactory test is obtained.

C. The Engineer may allow alternate testing methods at his discretion or require additional testing methods if, in his opinion, they are warranted.

PART 2 PRODUCTS

(NOT USED)

PART 3 EXECUTION

3.01 SANITARY AND STORM SEWER INSPECTION AND TESTING METHODS

A. All Testing Methods: All wyes, tees, and stubs shall be plugged with flexible jointed caps, or acceptable alternate, and securely fastened to withstand the internal test pressure. Plugs or caps shall be readily removable.

B. The Contractor shall clean and test lines before requesting final acceptance. Where any obstruction is met, the Contractor shall clean the sewers by means of rods, swabs, or other instruments. When requested by the Engineer, the Contractor shall flush out lines and manholes before final inspection.

C. Pipe lines shall be straight and show a uniform grade between manholes, except for curves specifically shown on the Drawings. The Contractor shall correct any discrepancies discovered during inspection at no cost to the City.

D. Water Tightness

1. All sewers constructed shall be tested for water tightness. Infiltration and exfiltration tests shall be performed on all new sewers constructed as specified in this section, except for those new sewers constructed which have active services tied into them as the pipe is being installed. In such cases the water tightness of the sewers less than or equal to thirty-six (36) inches in diameter shall be based on a visual inspection, and for sewers forty-two (42) inches in diameter and larger based on the individual joint test as specified in this section.

2. All visible leaks, regardless of the amount of leakage, shall be repaired at the Contractor's expense.

E. Infiltration Tests

1. The Contractor shall install weirs in manholes selected by the Engineer to determine the leakage of ground water into the sewer. The Contractor shall install weirs for a minimum of four hours before measuring flow. If leakage in any section of the sewer line exceeds one hundred (100) gallons per inch of diameter per day per mile, the Contractor shall locate and repair leaks. Repair methods shall be approved by the Engineer. After repairs are completed, the Contractor shall re-test for leakage.

2. Infiltration testing shall be performed before sanitary sewer lateral connections or reconnections are made.

3. The Contractor shall furnish, install and remove the weirs, plugs, and bulkheads required to perform the leakage tests.

4. Weirs shall be V-notch type equal to Pollard.

F. Exfiltration Tests

1. Low-Pressure Air Test:

a. Prior to air testing, the section of sewer between manholes shall be thoroughly cleaned and wetted. Immediately after cleaning or while the pipe is water soaked, the sewer shall be tested with low-pressure air. At the Contractor's option, sewers may be tested in lengths between manholes or in short sections using inflatable balls pulled through the line from manhole to manhole.

b. Air shall be slowly supplied to the plugged sewer section until the internal air pressure reaches approximately four (4) psi. After this pressure is reached and the pressure allowed to stabilize (approximately two (2) to five (5) minutes), the pressure shall be reduced to three and one-half (3.5) psi before starting the test.

c. Record the drop in pressure for the test period. If the pressure drop is equal to or less than one (1) psi during the test time, then the line will pass the test. If the pressure drops more than one (1) psi during the test time, the line will fail the test and the Contractor shall locate the failure, make necessary repairs, and retest the line.

d. The minimum test time for various pipe sizes and types is as follows:

e.

Nominal Pipe Size(Inches)	Time (Min/100 feet)	
	VCP, RCP	DIP, PVC
6	0.7	5.7
8	1.2	7.6
10	1.5	9.4
12	1.8	11.3
15	2.1	14.2
18	2.4	17.0
21	3.0	19.8
24	3.6	22.8
30	4.8	35.4
36	6.0	51.2
42	7.3	69.5

Required test equipment, including inflatable balls, braces, air hose, air source, time meter, rotameter as applicable, cut-off valves, pressure reducing valve, 0-15 psi pressure gauge, 0-5 psi pressure gauge with gradations in 0.1 psi and accuracy of ± two (2) percent shall be provided by the Contractor.

Testing equipment shall be equal to Cherne Air-Loc Testing Systems.

f. The Contractor shall keep records of all tests made. Copies of records shall be given to the Engineer. Records shall show date, line number and stations, operator, and such other pertinent information as required by the Engineer.

g. The Contractor shall take safety precautions in the performance of the air testing. Plugs shall be properly secured and care be exercised in their removal. Every precaution shall be taken to avoid the possibility of over-pressurizing the sewer line.

2. Individual Joint Test: Pipe joints for sewers thirty (30) inches in diameter and larger shall be air tested individually. The joint tester assembly shall be placed over the joint and the joint area pressurized to four (4) psi. The pressure shall not drop more than two (2) psi in ten (10) seconds. The joint tester assembly shall be equal to Cherne Industries, Inc.

G. Smoke Testing

1. Smoke testing may be used only to locate leaks and in no case shall be considered conclusive or a substitute for air tests, infiltration tests, or exfiltration tests. In all cases a smoke test shall be accompanied by an air test, infiltration test or exfiltration test. The Engineer may order a smoke test if another leakage test fails and the source of the leak cannot be determined by other means. Smoke testing shall only be performed where ground water is low. Smoke shall be blown into a sealed section of sewer under pressure and the Contractor and Engineer shall observe for any smoke appearing on top of the ground indicating the presence of leaks.

2. The Engineer may require that the Contractor excavate the sewer to determine the source of any smoke appearing during the smoke test. All leaks or breaks discovered by the smoke tests shall be repaired and/or corrected by the Contractor at his own expense in a manner acceptable to the Engineer. Equipment and supplies required for smoke tests shall be furnished by the Contractor.

3. The Contractor may perform smoke tests at any time during construction at his option; however, any such tests shall not supplant the final test of the completed work.

H. Deflection Test

1. The Contractor shall test all PVC gravity sewers for excessive deflection by passing a mandrel through the pipe. Deflection of the pipe shall not exceed five (5) percent.

2. The mandrel size shall be based upon the maximum possible inside diameter for the type of pipe being tested, taking into account the allowable manufacturing tolerances of the pipe. The mandrel shall be configured as shown on the Drawings and shall have an odd number of legs, or vanes, with a quantity equal to or greater than nine

(9). The legs of the mandrel shall be permanently attached to the mandrel. A mandrel with variable sizes shall not be allowed. The mandrel shall be constructed of steel, aluminum, or other material approved by the Engineer, and shall have sufficient rigidity so the legs of the mandrel will not deform when pulled through the pipe. The Contractor shall provide a proving ring for each size mandrel, with a tolerance of no more than 0.02-inch clearance, and the mandrel dimensions shall be checked by the Engineer, using this proving ring, before use by the Contractor.

3. The Contractor shall excavate and properly install any section of pipe not passing this test and re-test until results are satisfactory.

4. This test shall be performed twice:

   a. Once within the first thirty (30) days of installation, and
   b. Once during final inspection, but no sooner than thirty (30) days after pavement backfill is done, at the completion of this Contract.

I. Dye Testing

1. Dye testing shall be used only to confirm service connection or disconnection and in no case shall be considered conclusive or a substitute for air tests, infiltration tests or exfiltration tests. Dye testing shall only be performed where ground water is low. Dye shall be introduced into the service lateral and the Contractor and Engineer shall observe for any dye appearing on sanitary or storm sewers. Equipment and supplies required for dye tests shall be furnished by the Contractor.

2. The Contractor may conduct dye tests at any time during construction at his option; however, any such tests shall not supplant the final test of the completed work.

J. Closed Circuit Television Inspection

1. The Engineer shall require that the interior of all new gravity sewers be subjected to a televised inspection. Such internal inspection shall be conducted and documented in accordance with the requirements of Section 02655, Sanitary Sewer System Cleaning and Television Inspection.

2. Prior to Final Acceptance the City shall be provided with one copy of the TV inspection report and CD-ROMs showing the entire length of the gravity sewer tested. The report shall contain the condition of pipe, type of pipe, depth, location of services, length, type of joints, roundness and distance between manholes. Any pipe found to be cracked, leaking, misaligned, bellied, or otherwise defective shall be removed and replaced by the Contractor.

3.02 JOINT TESTING PROCEDURES

A. Joint Testing Procedures: Each sanitary sewer joint shall be individually air tested using a packer or other approved testing device at a test pressure of four (4) psi plus one-half

(1/2) psi per vertical foot of depth up to a maximum of ten (10) psi. The packer or testing device shall be positioned within the sanitary sewer so as to straddle the joint to be tested. The ends of the packer or testing device shall be expanded to isolate the pipe joint from the remainder of the sewer and create a void space between the packer or testing device and the pipe joint. The sealing elements shall be inflated with air in accordance with the test equipment manufacturer's instructions. Air shall then be introduced into the void space until the required test pressure is recorded on the void pressure meter. If the required test pressure cannot be developed, the joint will fail the test. After the void pressure is observed to be equal to or greater than the required test pressure, the air flow shall be stopped. If the pressure holds or drops less than two (2) psi in fifteen (15) seconds, the joint is acceptable.

1. All test monitoring shall be above ground and in a location to allow for simultaneous and continuous observation by the Engineer. The void pressure data shall be transmitted electronically from the void to the monitoring equipment.

2. Prior to starting the sanitary sewer joint testing, a two (2) part control test shall be performed as follows:

    a. A demonstration test shall be performed in a test cylinder constructed in such a manner that a minimum of three (3) known leak sizes (0.062, 0.094, 0.125 inch diameter) can be simulated. During the demonstration test, the Contractor shall use a test cylinder gauge to measure void pressure. The Contractor shall also install the void pressure monitoring equipment in the same manner as will be done to measure the void pressure at a sanitary sewer joint. The Contractor shall then apply pressure to the void space. During the demonstration test, the void pressure reading on the test cylinder gauge shall be the same as that observed on the void pressure monitoring equipment at all times during the test. If the pressure reading on the test cylinder gauge is not the same as the pressure reading observed on the void pressure monitoring equipment at all times, the Contractor shall repair or otherwise modify the packer or testing device and perform the test until the results are satisfactory to the Engineer. The demonstration test may be required, by the Engineer, at any other time during the joint testing work.
    b. Upon entering each manhole to manhole section with the test equipment, but prior to the commencement of joint testing, the packer or testing device shall be positioned on a section of sound sanitary sewer between pipe joints. The Contractor shall then perform the test at the required pressure. If the test indicates that the sanitary sewer will not meet the joint test requirements, the Contractor shall inform the Engineer who will have the discretion of modifying the joint test requirements.

3. During the sanitary sewer joint testing work, the Contractor shall keep the following records:

    a. Manhole to manhole section tested.

b. Test pressure used.
c. Location (footage) of each joint tested.
d. Test results for each joint tested.

B. Lamping Procedures: Lamping will be performed on all sewer pipelines by the Engineer.

3.03 MANHOLE TESTING

A. All new manholes, rehabilitated manholes, manhole inserts and replacement manholes shall be tested by the Contractor using the vacuum test method, following the manufacturer's recommendations. Vacuum testing of manholes and structures shall be performed after curing of linings and installation of inserts. Any leakage in the manhole or structure, before, during, or after the test shall be repaired at no cost to the City..

B. Prior to testing manholes for watertightness, all lift holes shall be plugged with a non-shrink grout, all joints between precast sections shall be properly sealed and all pipe openings shall be temporarily plugged and braced.

C. Vacuum Tests:

1. The manhole, after preparation as noted above, shall be vacuum tested. All testing shall be performed in accordance with the requirements of ASTM C1244. A vacuum shall be drawn and the vacuum drop over a specified time period shall be used to determine the acceptability of the manhole.

2. The test head shall be placed at the inside of the top of the manhole in accordance with the manufacturer's instructions. A vacuum of ten (10) inches of mercury [five (5) psi] shall be drawn on the manhole, the valve on the vacuum line of the test head closed and the vacuum pump shut off. The time shall be measured for the vacuum to drop from ten (10) inches of mercury [five (5) psi] to nine (9) inches of mercury [four and one-half (4.5) psi]. The manhole shall pass the vacuum test if the time for the vacuum reading to drop from 10-inches of mercury to 9-inches of mercury meets or exceeds the values indicated in the table below.

MINIMUM TEST TIMES FOR VARIOUS MANHOLE DIAMETERS				
	Manhole Diameter (Inches)			
	48	60	66	72
Depth (Feet)	Time (Seconds)			
8	20	28	29	33
10	25	33	36	41
12	30	39	43	49
14	35	48	51	57
16	40	52	58	67

18	45	59	65	73
20	50	65	72	81
22	55	72	79	89
24	59	78	87	97
26	64	85	94	105
28	69	91	101	113
30	74	96	108	121

D. For manholes less than 8-feet in depth, the minimum value listed shall be used.

E. If the manhole fails the initial test, necessary repairs shall be made with non-shrink grout. Retesting shall proceed until a satisfactory test is obtained.

F. Vacuum testing equipment shall be equal to that as manufactured by P.A. Glazier, Inc.

G. The City reserves the right to have third party consultants perform construction materials testing and assessments to any new manhole.

3.04 ALLOWABLE TESTING LIMITS FOR SANITARY SEWERS

A. No infiltration and exfiltration of ground water or other leakage into or out of the sewer shall be allowed during the twenty-four (24) hour test period.

B. Any visible or audible leaks into the sewer shall be repaired or corrected as directed by the Engineer.

+ + + END OF SECTION 02650 + + +

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SECTION 02655
STORM SYSTEM CLEANING AND TELEVISION INSPECTION

PART 1 GENERAL

1.01 SCOPE

The Contractor shall furnish all labor, materials, equipment and incidentals required to complete all stormwater system cleaning and television inspection.

1.02 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the Contract Documents. In addition, the following specific information shall be provided:

1. The Contractor shall provide to the City DWM the following information in writing prior to the set deadline, or at the indicated frequency, whichever is applicable.

Type of Submittal	Time/Frequency of Submittal
Experience Record of Contractor/Subcontractor	At Preconstruction Conference
Listing of Safety Precautions and Traffic Control Measures	At Commencement
Listing of CCTV Equipment	At Commencement
Manufacturers Details of CCTV Equipment	At Commencement
Internal Stormwater Inspection Project Schedule	At Preconstruction Conference
Listing of Cleaning Equipment & Procedures	At Commencement
Listing of Flow Diversion Procedures	At Commencement
Listing of Preconditioning Procedures	At Commencement
Listing of Backup and Standby Equipment	At Commencement
Location where Debris from Cleaning will be Disposed	At Commencement
Updated Schedule of Planned Inspections/Cleaning of Stormwater Reaches	Post Commencement and Weekly

Two (2) copies of CCTV findings (2 hard copies of fully detailed logs incorporating a summary statistical breakdown of defects and main findings, two (2) electronic discs of fully detailed logs and CD-ROMS of video output)	One (1) week After Completion of Section
Daily Logs and Progress Reports	Daily
Confined Space Entry Logs	Daily

2. Daily reports and weekly reports survey shall be e-mailed to the City DWM.

3. The Contractor shall complete a daily written record (diary) detailing the work carried out and any small items of Work which were incidental to the Work. The Contractor shall include in his daily record and reference to the following:

   a. Delays: Dense traffic, lack of information, sickness, labor, or equipment shortage, etc.
   b. Weather: Conditions, e.g. rain, sunny, windy, etc.
   c. Equipment: On site, e.g. specialty cleaning, by-pass equipment, etc.
   d. Submittals: To the City DWM.
   e. Personnel: On site by name, e.g., all labor, specialty services, etc.
   f. Accident: Report, e.g. all injuries, vehicles, etc.
   g. Incident: Report, e.g. damage to property, property owner complaint, etc.
   h. Major defects encountered, including collapsed pipe, if any: Cave-ins, sink holes, etc.

4. The City DWM shall certify receipt of the daily record noting any items and adding any observations with reference to claims for payment to the Contractor. The City DWM may at his discretion, for which the Contractor must receive direction in writing, provide for an exception to this requirement for weekly submission of progress rather than for daily submission.

1.03 GENERAL

A. Internal stormwater system condition assessment shall be used to determine the structural and service condition of storm pipes prior to abandonment, preconditioning or rehabilitation. Assessment shall be performed using pan and tilt color camera CCTV.

B. Internal stormwater system condition assessment shall also be used to inspect newly constructed stormwater pipes and to survey individual storm water lines that have been preconditioned to further assess condition and record findings.

C. It is the responsibility of the Contractor to comply with OSHA regulations, the City of Atlanta's Safety Guidelines, and the City of Atlanta's Confined Space entry Guidelines as applicable. The Contractor shall provide written documentation that all workers have received the training required under these regulations and guidelines.

D. Two forms of internal condition assessment are required as part of this Contract as follows:

1. Storm Pipe Survey: Detailed viewing of the storm pipe ("survey") either manually or with the aid of CCTV equipment, to assess internal structural condition, service condition, and identify and locate miscellaneous construction features as well as assess the structural and service condition of laterals. Data logging shall be required.

2. Storm Pipe Inspection: Viewing the storm pipe ("pull-through") pursuant to investigative work possibly incorporating a radio-sonde transmitter for locating purposes and/or following other operational activity including:

   a. Locating stormwater structure (s) and/or lateral(s) with or without radio-sonde.
   b. Storm pipe preconditioning and cleaning activities.
   c. Storm system rehabilitation including point repairs.
   d. Such other similar purposes as may be required by the City DWM.

E. Storm system inspection shall be carried out manually or with the aid of CCTV equipment, to assess overall condition. Data logging shall not be required.

1.04 REQUIREMENTS AND EXTENT OF SURVEY/INSPECTION

A. The Contractor shall survey and/or inspect pipelines with color pan and tilt CCTV imagery as specified so as to record all relevant features and to confirm their structural and service condition. Surveys/inspections of pipelines shall be carried out in accordance with the reporting format determined by the City DWM.

B. All CCTV operator(s) responsible for direct reporting of stormwater system condition shall have a minimum of three (3) years previous experience in surveying, processing, and interpretation of data associated with CCTV surveys/inspections. The Contractor shall provide the City DWM with written documentation that all CCTV survey operators meet these experience requirements. Documentation shall include a list of projects undertaken as well as client name and telephone number for reference.

C.

D. The Contractor shall complete a daily written record detailing the Work carried out as described in this section.

1.05 FIELD SUPERVISION BY CONTRACTOR

The Contractor shall maintain on the site of the Work at all times a competent field supervisor in charge of the Survey/Inspection. The field supervisor shall be responsible for the safety of all workers and site conditions as well as ensuring that all work is conducted in conformance with the requirements of these specifications and to the level of quality specified.

1.06 APPLICATION OF INSPECTION TYPE

A. The following guidelines concerning the use of CCTV shall be followed:

1. CCTV alone shall be used for internal condition assessment where the depth of flow of wastewater is less than twenty-five (25) percent of overall stormwater pipe diameter at the start of the survey. The Contractor shall make an informed decision to continue should the depth of flow increase beyond the twenty-five (25) percent level but no greater than forty (40) percent of pipe diameter at any time throughout the length.

1.07 RESPONSIBILITY FOR OVERFLOWS OR SPILLS

A. It shall be the responsibility of the Contractor to schedule and perform the Work in a manner that does not cause or contribute to incidence of overflows or spills of wastewater from the stormwater system.

B. In the event that the Contractor's activities contribute to overflows or spills, the Contractor shall immediately take appropriate action to contain and stop the overflow, clean up the spillage, disinfect the area affected by the spill, and notify the City DWM in a timely manner.

C. The Contractor shall indemnify and hold harmless the City DWM for any fines or third-party claims for personal or property damage arising out of a spill or overflow that is fully or partially the responsibility of the Contractor, including the legal, engineering, and administrative expenses of the City in defending such fines and claims.

PART 2 PRODUCTS

2.01 SURVEY/INSPECTION UNITS

The Contractor shall provide sufficient survey/inspection units and all relevant ancillary equipment, including standby units in the event of breakdown, in order to complete all stormwater system surveys/inspections as specified in this section.

2.02 SURVEY/INSPECTION VEHICLE

A. The survey/inspection vehicle shall comprise two totally separate areas.

B. One area shall be designated as the viewing area and shall be insulated against noise and extremes in temperature, shall be air conditioned and shall be provided with means of controlling external and internal sources of light in a manner capable of ensuring that the monitor screen display is in accordance with the requirements of this section. Seating accommodation shall be provided to allow two (2) people, in addition to the operator, to view clearly the on-site monitor, which shall display the survey/inspection as it proceeds.

C. The second area shall be a working area and shall be reserved for equipment, both operational and stored. No equipment utilized within the stormwater system shall be allowed to be stored in the viewing area.

2.03 CCTV SURVEY/INSPECTION AND OPERATIONAL EQUIPMENT REQUIREMENTS

A. The surveying/inspecting equipment shall be capable of surveying/inspecting a length of stormwater pipe up to at least one-thousand five-hundred (1500) feet when entry onto the stormwater pipe may be obtained at each end and up to one-hundred (100) feet by rodding or up to seven-hundred and fifty (750) feet where a self-propelled unit is used, where entry is possible at one (1) end only. The Contractor shall maintain this equipment in full working order.

B. Each survey/inspection unit shall contain a means of transporting the CCTV camera equipment in a stable condition through the stormwater pipe under survey and/or inspection. Such equipment shall ensure the maintained location of the CCTV camera equipment when used independently on or near to the central axis of a circular shaped stormwater pipe when required in the prime position.

C. Where the CCTV camera head are towed by winch and bond through the stormwater pipe, all winches shall be stable with either lockable or ratcheted drums. All bonds shall be steel or of an equally non-elastic material to ensure the smooth and steady progress of the CCTV camera equipment. All winches shall be inherently stable under loaded conditions.

D. Each unit shall carry sufficient numbers of guides and rollers such that, when surveying or inspecting, all bonds are supported away from pipe and stormwater structures and all CCTV cables and/or lines used to measure the CCTV camera's head location within the stormwater pipe are maintained in a taut manner and set at right angles where possible, to run through or over the measuring equipment.

E. Each unit shall carry a range of flow control plugs or diaphragms for use in controlling the flow during the survey/inspection. A minimum of one (1) item of each size of plug or diaphragm ranging from six (6) inches to two (2) feet diameter inclusive shall be carried.

F. Each survey/inspection unit shall have on call equipment available to carry out the flushing, rodding, and jetting of stormwater pipes when such procedures are deemed to be necessary.

PART 3 EXECUTION

3.01 CLEANING PRIOR TO INTERNAL CONDITION INSPECTION

A. Cleaning of the stormwater system prior to internal inspection will be determined by the Contractor.

3.02 STORMWATER SYSTEM CLEANING UNITS AND EQUIPMENT

A. The Contractor shall provide sufficient stormwater system cleaning units and equipment, including standby units in the event of breakdown, in order to complete cleaning operations as specified.

3.03 CLEANING OF STORMWATER SYSTEM

A. Cleaning means the removal and extraction of silt, debris, and obstructions from the stormwater system which actually prevent entry and use of CCTV equipment, or the completion of the stormwater pipe run and/or manned-entry inspection of stormwater system, or which is specifically requested by the Contractor. In general cleaning shall not be required as part of the internal condition inspection service unless specifically instructed by the Contractor.

B. No cleaning shall be required prior to:

2. Internal inspection completed following construction of new stormwater system pipe and structural components.

3.04 EXTENT OF CLEANING

A. Cleaning shall be required for existing lines to the extent indicated on the Drawings.

B. The Contractor shall:

1. Provide and/or manage the equipment necessary for proper jetting, rodding, bucketing, brushing, root cutting, flushing, and vacuum uplift or any other approved removal and extraction system necessary to remove and extract silt, debris, and obstructions from the stormwater pipes and structures which would otherwise preclude use of CCTV equipment and/or manned-entry inspection of the stormwater system.

2. Demonstrate the performance capabilities of the cleaning equipment and method for use when requested by the Contractor. If results obtained by the demonstration are not satisfactory, the Contractor shall select other methods or equipment that will clean the stormwater line and repeat the demonstration.

3. Install a gauge to monitor working pressure on the discharge of high-pressure pumps for jetting equipment.

4. Provide more than one (1) type of equipment or attachments on a single reach or at a single location as required.

C. The Contractor shall exert all reasonable care to avoid damage to all stormwater system components during the cleaning operation. Mechanical equipment used for cleaning shall be equipped with an overload clutch to limit the risk of damage to the pipe.

3.05 REMOVAL OF DEBRIS WITH CLEANING

The Contractor shall provide all equipment and personnel necessary to safely remove and extract silt and debris from the stormwater pipe through existing stormwater structure access, load it onto trucks for disposal, and dispose of the silt and debris at approved sites.

3.06 CCTV - GENERAL

A. CCTV Camera Head Prime Position: The CCTV camera head shall be positioned to reduce the risk of picture distortion. In circular stormwater lines the CCTV camera lens head shall be positioned centrally (i.e. in prime position) within the stormwater pipe. In non-circular stormwater lines, picture orientation shall be taken at mid-height, unless otherwise agreed, and centered horizontally. In all instances the camera lens head shall be positioned looking along the axis of the stormwater line when in prime position. A positioning tolerance of ± 10% of the vertical stormwater line dimension shall be allowed when the camera is in prime position.

B. CCTV Camera Head Speed: The speed of the CCTV camera in the stormwater line shall be limited to eight (8) inches per second for surveys to enable all details to be extracted from the ultimate CD-ROM recording.

C. CCTV Color Camera: The Contractor shall provide a color pan and tilt camera(s) to facilitate the survey and inspection of all laterals. These will be carried out as part of the normal CCTV assessment as the survey or inspection proceeds. A three-hundred sixty (360) degrees rotational scan indicating general condition must be implemented at every fifty (50) feet interval (min.) along stormwater lines, and at stormwater structures and any salient, specified, defect features. The tilt arc must not be less than two-hundred twenty-five (225) degrees.

D. Linear Measurement:

1. The CCTV monitor display shall incorporate an automatically updated record in feet and tenths of a foot of the footage of the camera or center point of the transducer, whichever unit is being metered, from the cable calibration point. The relative positions of the two (2) center points shall also be noted.

2. The Contractor shall use a suitable metering device, which enables the cable length to be accurately measured; this shall be accurate to ± 1% or three (3) inches whichever is the greater.

3. The Contractor shall demonstrate compliance with the tolerances in this section, using one or both of the following methods in conjunction with a linear measurement audit form which shall be completed each day during the survey:

    a. Using of a cable calibration device.
    b. Tape measurement of the surface between stormwater structures.
    c. A quality control form will be completed and submitted by the Contractor depicting the level of accuracy achieved.

4. If the Contractor fails to meet the required standard of accuracy, the City DWM shall instruct the Contractor to provide a new device to measure the footage. The City DWM retains the right to instruct the Contractor in writing, to re-survey those lengths of the stormwater line first inspected with the original measuring device using the new measuring device.

E. Data Display, Recording, and Start of Survey/Inspection:

1. At the start of each stormwater pipe length being surveyed or inspected and each reverse set-up, the length of pipeline from zero (0) footage, the entrance to the pipe, up to the cable calibration point shall be recorded and reported in order to obtain a full record of the stormwater pipe length. Only one (1) survey shall be indicated in the final report. All reverse set-ups, blind stormwater structures, and buried structures shall be logged on a separate log. Video digits shall be recorded so that every recorded feature has a correct tape elapsed time stamp. Each log shall make reference to a start (ST) and finish (FH) stormwater structure unless abandonment took place because of blockage. Stormwater structure number shall be indicated in the remark's column of the detail report. Surveys must not extend over two (2) tapes.

2. The footage reading entered on to the data display at the cable calibration point must allow for the distance from the start of the survey/inspection to the cable calibration point such that the footage at the start of the survey is zero (0).

3. In the case of surveying through a stormwater structure where a new header sheet must be completed, the footage shall be set at zero (0) with the camera focused on the outgoing pipe entrance.

4. At the start of each stormwater structure length a data generator shall electronically generate and clearly display on the viewing monitor and subsequently on the CD-ROM recording a record of data in alpha-numeric form containing the following minimum information:

    a. Automatic update of the camera's footage position in the stormwater line from adjusted zero (0).
    b. Stormwater pipe dimensions.
    c. Stormwater Structure/pipe length reference numbers.
    d. Date of survey.
    e. Road name/location.
    f. Direction of survey.
    g. Time of start of survey.
    h. Stormwater pipe use (CS - Combined Sewer, ST - Stormwater Line).
    i. Material of construction of the pipe.

5. The size and position of the data display shall be such as not to interfere with the main subject of the picture.

6. Once the survey of the pipeline is under way, the following minimum information shall be continually displayed:

    a. Automatic update of the camera's footage position in the stormwater line from adjusted zero (0).
    b. Stormwater pipe dimensions in inches.
    c. Stormwater structure or pipe length reference number (PLR). General convention allows upstream stormwater structure number to be designated PLR.
    d. Direction of survey, i.e., downstream or upstream.

7. Correct adjustment of the recording apparatus and monitor shall be demonstrated by use of the test tape or other device approved by the Contractor. Satisfactory performance of the camera shall be demonstrated by the recording of the appropriate test device at the commencement of each day for a minimum period of thirty (30) seconds.

8. Footage and corresponding time elapsed video digit shall be given throughout survey/inspection for all relevant defects and construction features encountered unless otherwise agreed.

9. Where silt encountered is greater than ten (10) percent of the diameter of the pipe, the depth of silt shall be measured and recorded at approximately fifty (50) foot intervals.

10. CD-ROM capacity shall be adequate to record two (2) hours of video inspection. Recording of a single segment shall not extend over more than one (1) video tape.

No unrecorded gaps shall be left in the recording of a segment between surveys/inspections as the original video tape.

11. Only segments between stormwater structures on the same stormwater reach or stormwater basin shall be included on one (1) CD-ROM. There shall be no "split surveys" or "split-basins" between CD-ROMs.

12. All continuous defects shall incorporate a start and finish abbreviation in the log report.

3.07 MAN ENTRY SURVEY - GENERAL

A. Photographic Camera Position - General Illustration of Stormwater Structures and Pipe Interior:

1. The hand-held photographic camera or CCTV camera shall be positioned to reduce the risk of picture distortion. In circular stormwater lines the camera lens shall be positioned centrally looking along the axis of the stormwater line. In non-circular stormwater lines picture orientation shall be taken at mid-height, unless otherwise agreed, and centered horizontally.

2. The hand held photographic camera or CCTV camera shall be positioned so that the long side of the photograph or CD-ROM frame is horizontal.

B. Photographic Camera Position - Laterals/Specific Defect:

1. A means of accurately locating the photographic or camera's footage and any recorded lateral or defect, along the stormwater line shall be provided, to an accuracy of ± 1% or six (6) inches whichever is greater. When requested by the City DWM in writing at any time during a survey or inspection, the Contractor shall demonstrate compliance with this tolerance.

2. The device used by the Contractor to measure the footage along the stormwater line will be compared with a standard tape measure. The results will be noted. If the Contractor fails to meet the required standard of accuracy, the City DWM shall instruct the Contractor to provide a new device to measure the footage. The City DWM retains the right to instruct the Contractor in writing to re-survey those lengths of stormwater line inspected with the original measuring device at no extra cost.

C. Photographic Quality: The in-line photographic camera or hand held CCTV system and suitable illumination shall be capable of providing an accurate, uniform and clear record of the stormwater line's internal condition. In-line lighting standards shall meet the requirements of applicable codes regarding safety and power.

3.08 CCTV AND MANNED ENTRY SURVEY DATA SPECIFICATION

A. Survey Reporting:

1. No later than fourteen (14) days following the completion of a pipeline survey/inspection, the Contractor shall submit to the City DWM two CD-ROMs. The supplied data and information shall remain the property of the City DWM.

B. Site Coding Sheets: Each pipe length, i.e. the length of pipe between two (2) consecutive stormwater structures, shall be entered separately electronically. Thus where the Contractor elects to "pull through" a stormwater structure during a CCTV Survey or "walk through" during a “Man Entry” survey, a new coding sheet shall be started at the stormwater structure "pulled or walked through" and the footage re-set to zero (0) on the coding sheet. Where a length of pipe between consecutive stormwater structures is surveyed from each end (due to an obstruction) two (2) coding sheets shall be used. Where a length of stormwater line between two (2) consecutive stormwater structures cannot be surveyed or attempted for practical reasons a (complete header) coded sheet shall be made out defining the reason for abandonment. At uncharted stormwater structures, a new coding sheet shall be started and the footage re-set to zero (0).

C. Measurement Units: All dimensions shall be in feet and inches. Measurement of pipes shall be to the nearest inch.

D. CCTV and Man-Entry Photographs:

1. Photographs shall be taken of all defective laterals and pipeline defects where requested in writing. Where a defect is continuous or repeated the photographs shall be taken at the beginning of the defect and at not less than ten (10) foot intervals thereafter. Where photographs are not otherwise required a general condition photograph shall be taken not more than fifty (50) feet after the previous photograph.

2. CCTV photographs must clearly and accurately show what is displayed on the monitor, which shall be in proper adjustment.

3. Photographs shall be supplied in an electronic format suitable to the City DWM and shall be identified in relation to the photograph number (cross referenced to the site survey sheet) street location, stormwater line dimensions, stormwater structure start and finish numbers, survey direction, footage and date when the photograph was taken.

4. The annotation shall be clearly visible and in contrast to its background, shall have a figure size no greater than fourteen (14) point, and be type printed in upper case.

5. The annotation shall be positioned so as not to interfere with the subject of the photograph.

E. Control Sample Photographs and/or Electronic Files: The City DWM may issue a written instruction to the Contractor to provide a sample of the photographs and/or CCTV

tapes taken during the contract period which the Contractor shall provide within five (5) working days of receiving the written instruction.

3.09 CCTV PERFORMANCE

A. Color CCTV: All CCTV work shall use color CCTV reproduction.

B. CCTV Picture Quality:

1. An approved test device shall be provided and be available on the site of the Work throughout the Contract, enabling the tests specified in this clause to be checked.

2. The test card shall be Marconi Regulation Chart No. 1 or its approved derivatives with a color bar, clearly differentiating between colors, with no tinting, to show the following: White, Yellow, Cyan, Green, Magenta, Red, Blue, and Black.

3. At the start of each and every working shift, the camera shall be positioned centrally and at right angles to the test card at a distance where the full test card just fills the monitor screen. The Contractor shall ensure that the edges of the test card castellations coincide with the edges of the horizontal and vertical scan (raster). The card shall be illuminated evenly and uniformly without any reflection. The illumination shall be to the same color temperature as the color temperature of the lighting that recorded for subsequent use by the City DWM, the recording time shall be at least thirty (30) seconds. The type of camera used shall be identified on the test recording. The recording must show the camera being introduced into the test device and reaching its stop position.

C. Shades of Gray: The gray scale shall show equal changes in brightness ranging from black to white with a minimum of five (5) clearly recognizable stages.

D. Color: With the monitor adjusted for correct saturation, the six (6) colors plus black and white shall be clearly resolved with the primary and complementary colors in order of decreasing luminance. The gray scale shall appear in contrasting shades of gray with no tint.

E. Linearity: The background grid shall show squares of equal size, without convergence/divergence over the whole picture. The center circle shall appear round and have the correct height/width relationship (± 5%).

F. Resolution: The live picture shall be clearly visible with no interference and capable of registering a minimum number of TV lines/pictures height lines. The resolution shall be checked with the monitor color turned down. In the case of tube cameras this shall be six-hundred (600) lines.

F. Color Constancy:

1. To ensure the camera shall provide similar results when used with its own illumination source, the lighting shall be fixed in intensity prior to commencing the survey. In order to ensure color constancy, generally no variation in illumination shall take place during the survey.

2. The Contractor shall note that the City DWM may periodically check both the live and picture color consistency against the color bar. Any differences will require re-survey of the new length or lengths affected, at the Contractor's expense.

H. Playback and CD-ROM Labeling:

1. CD-ROM playback imaging shall be linked to electronic output of alpha-numeric data so that if necessary direct interrogation of database can take place with simultaneous viewing of CCTV images.

2. Each CD-ROM disc shall be labeled by reference to the header record for the survey section completed together with the following information:

a. Sequential (unique) CD-ROM number.
b. Basin/catchment worked in.
c. Survey company name and logo.
d. Survey date.

I. CCTV Focus/Iris/Illumination: The adjustment of focus and iris shall allow optimum picture quality to be achieved and shall be remotely operated. The adjustment of focus and iris shall provide a minimum focal range from six (6) inches in front of the camera's lens to infinity. The distance along the stormwater line in focus from the initial point of observation shall be a minimum of twice the vertical height of the stormwater line. The illumination must allow an even distribution of the light around the stormwater line perimeter without the loss of contrast picture, flare out, or shadowing.

J. Contractor's Data Quality Control Procedure:

1. The Contractor shall operate a quality control system, which will effectively gauge the accuracy of all survey reports produced by the operator.

2. The system shall be such that the accuracy of reporting is a function particularly of:

a. The number of faults not recorded (omissions).
b. The correctness of the coding and classification of each fault recorded.

3. The minimum levels of accuracy to be attained under the various survey headings are as follows:

a. Header Accuracy: ninety-five (95) percent.
b. Detail Accuracy: eighty-five (85) percent.

K. The Contractor's data quality control program shall include routine outside auditing of the work completed by a qualified subcontractor. The qualified subcontractor shall meet the minimum specified Contract requirements for the performance of the Work and shall be approved in writing by the Contractor. The accuracy of the Contractor's data shall be based on the percentage of the data confirmed correct by the subcontractor. The minimum acceptable accuracy of the data shall be eighty-five (85) percent. The general sequence of the auditing shall be as follows:

1. The City DWM shall randomly select one (1) day per month, typically in the first week of the month, and the work performed during this day shall be reviewed and/or repeated by the qualified subcontractor.

2. If the work is greater than or equal to eighty-five (85) percent accurate, no further outside auditing will be required for the month unless requested by the City DWM at his sole discretion.

3. If the work is less than eighty-five (85) percent accurate, the Contractor shall at its own expense repeat and/or correct the work and have the work re-audited by the qualified subcontractor.

4. If the work is still less than eighty-five (85) percent accurate, the Contractor shall repeat and/or correct and have the work re-audited, at its own expense, until the work is greater than or equal to eighty-five (85) percent accurate.

5. When this re-audited work is found to be greater than or equal to eighty-five (85) percent accurate, the Contractor shall have the work of another randomly selected day in the same month reviewed and/or repeated by the qualified subcontractor at the Contractor's own expense.

6. Steps 2 through 5 shall be repeated at the Contractor's own expense until the selected day is eighty-five (85) percent accurate on the initial audit.

7. The occurrence of five (5) randomly selected days not achieving eighty-five (85) percent accuracy on initial subcontractor review will constitute cause for dismissal.

8. If the Contractor successfully meets the eighty-five (85) percent accuracy requirement for the initial randomly selected day for two (2) consecutive months, the Contractor may subsequently audit one (1) day every other month. The Contractor may continue auditing one (1) day every other month until the initial randomly selected day does not meet eighty-five (85) percent accuracy, at which time it must resume auditing one (1) day every month.

3.10 COLLAPSED STORMWATER PIPES/DEFECTIVE STORMWATER STRUCTURES

A. Any pipe found with greater than ten (10) percent deformation (i.e. collapsed or near to collapse) shall be reported to the City DWM immediately for remedial action. B. Any

stormwater system component found broken, cracked, with missing covers or surcharged, shall be reported to the City DWM immediately for remedial action.

C. Any stormwater system component found where the existing conditions pose a threat of personal injury to the public, such as a collapsed stormwater line or structure top with attendant depression to roadway, shall be protected by the Contractor until the City DWM arrives at the site of the Work

D. Any stormwater structure found where the existing conditions pose a threat of personal injury to the public, such as broken, cracked, or missing covers or covers found in traveled portions of any sidewalk or roadway shall be protected by the Contractor until the City DWM arrives at the site of the Work.

E. In the event of emergency, the Contractor shall call 404-546-3611, William Douty, SAMD.

3.11 TRAFFIC CONTROL

A. The Contractor shall control traffic in accordance with the requirements of Section 01550.

+++ End Section 02655 +++

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SECTION 02664

DUCTILE IRON PIPE AND ACCESSORIES

PART I -- GENERAL

1.01 SCOPE

A. Furnish all labor, materials, equipment and incidentals required for the complete installation of ductile iron pipe and accessories as shown on the Drawings and as specified herein.

B. Supply all products and perform all work in accordance with applicable American Society for Testing and Material (ASTM), American Water Works Association (AWWA), American National Standards Institute (ANSI), or other recognized standards. Latest revisions of all standards are applicable.

1.02 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of Section 01300 Submittals. In addition, the following specific information shall be provided:

1. Product data and engineering data, including shop drawings.
2. Evidence that manufacturers have consistently produced products of satisfactory quality and performance for a period of at least two (2) years.
3. Written certification that all products furnished comply with all applicable requirements of these specifications.

B. Submit shop drawings to the City's Authorized Representative for review showing a complete laying plan of all pipe, including all fittings along with the manufacturer's drawings and specifications indicating complete details of all items. The above shall be submitted to the City's Authorized Representative for review before fabrication and shipment of these items.

1.03 QUALITY CONTROL

Reference Standards: The design, manufacturing and assembly of elements of the products herein specified shall comply with the applicable provisions and recommendations of the latest editions of the following standards, except as otherwise shown on the Drawings or otherwise specified.

1. ANSI/AWWA C104/A21.4 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings

2. ANSI/AWWA C110/A21.10 - Ductile-Iron and Gray-Iron Fittings
3. ANSI/AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
4. ANSI/AWWA C115/A21.15 – Flanged Ductile-Iron Pipe with Ductile- Iron or Gray-Iron Threaded Flanges
5. ANSI/AWWA C150/A21.50 - Thickness Design of Ductile-Iron Pipe
6. ANSI/AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast
7. ANSI/AWWA C153/A21.53 – Ductile-Iron Compact Fittings for Water Service
8. ANSI/AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances
9. ANSI /AWS D11.2 – Guide for Welding Iron Castings

1.04 TRANSPORTATION AND HANDLING

A. Furnish equipment and facilities for unloading, handling, distributing and storing pipe, fittings and accessories. Make equipment available at all times for use in unloading. Do not drop or dump materials. Any materials dropped or dumped will be subject to rejection without additional justification. Pipe handled on skids shall not be rolled or skidded against the pipe on the ground.

B. Handle pipe, fittings, and accessories carefully to prevent shock or damage. Handle pipe by rolling on skids, forklift, or front end loader. Do not use material damaged in handling. Slings, hooks or pipe tongs shall be padded and used in such a manner as to prevent damage to the exterior coatings and internal lining of the pipe.

C. Pipe opening shall be tarped during trucking to prevent truck fumes from getting inside pipe in delivery.

1.05 STORAGE AND PROTECTION

A. Store all pipes which cannot be distributed along the route in a secure location.

B. Stored materials shall be kept safe from damage. The interior of all pipes, fittings and other appurtenances shall be kept free from dirt or foreign matter at all times.

C. Pipe shall not be stacked higher than the limits recommended by the manufacturer. The bottom tier shall be kept off the ground on timbers, rails or concrete. Pipe in tiers shall be alternated: bell, plain end; bell, plain end. At least two rows of timbers shall be placed between tiers and chocks, affixed to each other in order to prevent movement. The timbers shall be large enough to prevent contact between the pipes in adjacent tiers.

D. Stored mechanical and push-on joint gaskets and lubricant shall be placed in a cool location out of direct sunlight. Gaskets shall not come in contact with petroleum

products. Gaskets shall be used on a first-in, first-out basis.

E. Mechanical joint bolts shall be handled and stored in such a manner that will ensure proper use with respect to types and sizes.

1.06 PIPE LOCATION

Ductile Iron Pipes shall be installed in the location shown on the Drawings and as specified herein. Any deviations must be approved by the City's Authorized Representative.

PART 2 -- PRODUCTS

2.01 DUCTILE IRON PIPE

A. Ductile iron pipe shall be manufactured in accordance with AWWA C151/ ANSI A21.51. All Ductile Iron Pipe shall be manufactured in the United States of America. All pipes, except specials, shall be furnished in nominal lengths of 18 to 20 feet. Sizes will be as shown on the Drawings. All pipe shall have a minimum pressure rating as indicated in the following table and corresponding minimum wall thickness, unless otherwise specified or shown on the Drawings:

Pipe Sizes (inches)	**Pressure Class (psi)**
3 – 12	350
14 – 18	350
20	300
24	250
30 – 64	200

B. Fittings shall be ductile iron and shall conform to AWWA C110/ ANSI A21.10 or AWWA C153/ ANSI A21.53 with a minimum rated working pressure of 250 psi.

C. Joints shall be mechanical joint for pipe and fittings. Mechanical joints shall conform to AWWA C111/ ANSI A21.11.

D. Gaskets for mechanical joints shall be made of vulcanized styrene butadiene (SBR) as specified in ANSI/AWWA C111/A21.11 unless specified otherwise. Reclaimed or natural rubber shall not be used. Gaskets shall be free from porous areas, foreign material and other defects that make them unfit for the use intended.

E. Bolts and Nuts

1. Provide the necessary bolts for connections. All bolts and nuts shall be threaded in accordance with ANSI B1.1, Coarse Thread Series, Class 2A external and 2B internal fit.
2. Bolts and nuts for mechanical joints shall be tee head bolts and nuts of high-strength low-alloy steel having minimum yield strength of 45,000 psi. Dimensions of bolts and nuts shall be in accordance with the dimensions shown in AWWA C111/ ANSI A21.11.
3. Flanged joints shall be bolted with through stud or tap bolts of required size as directed. Bolt length and diameter shall conform to ANSI/AWWA C115 for Class 125 flanges shown in ANSI/ASME B16.1.
4. Bolts for exposed service shall be zinc plated, cold pressed, steel machine bolts conforming to ASTM A307, Grade B. Nuts for exposed service shall be zinc plated, heavy hex conforming to ASTM A563. Zinc plating shall conform to ASTM B633, Type II.
5. Bolts for submerged service shall be stainless steel machine bolts conforming to ASTM A193, Grade B8. Nuts shall be heavy hex, stainless steel conforming to ASTM A194, Grade 8.

F. Mechanical joint glands shall be ductile iron.

G. Thrust collars shall be welded-on ductile iron body type designed to withstand thrust due to 250 psi internal pressure on a dead end from either direction on that pipe size. The thrust collars shall be continuously welded to the pipe by the pipe manufacturer.

H. Solid sleeves shall be used to connect plain end ductile iron pipe. Solid sleeves shall meet the requirements of AWWA C110/ ANSI A21.10 for long pattern and have a minimum pressure rating of 250 psi. Solid sleeves shall have mechanical or restrained joints as specified in this section or as shown on the Drawings. Solid sleeves shall be used only in locations shown on the Drawings or at the discretion of the City or City Representative.

I. Cement Lining:

1. Interior surfaces of all ductile iron pipe and fittings shall be cleaned and lined with a cement mortar lining applied in conformity with ANSI/AWWA C104/A21.4. If lining is damaged or found faulty upon delivery, the damaged pipe sections shall be repaired or removed from the site as directed by the City's Authorized Representative.
2. The minimum lining thickness shall be as shown in the following table. Lining shall be square and uniform with regard to the longitudinal axis of the pipe.

Pipe Diameter	Minimum Lining Thickness

(Inches)	(Inches)
3 – 12	1/8
14 – 24	3/32
30 – 64	1/8

J. Pipe Coating: Ductile iron pipe shall be coated with a layer of Zinc to a mass of 200 g/m2. The Zinc spray shall be factory applied prior to the black asphaltic coating. The coating system shall conform to ISO 81791. Fittings shall be ductile iron and have a coating consisting of Tnemec Series 94H20 Hydro-Zinc Primer and Tnemec Series 22 Epoxoline Finish Coat Polyamine Epoxy. Both primer and finish coat shall be ANSI/NSF Std. 61 Certified. The coating system as applied shall have a zinc level of at least 200 g/m2. All fittings shall have a cement-mortar lining with an asphaltic seal coat and an asphaltic coating on the exterior. Unless otherwise specified, pipe and fittings shall be coated with a 1 mil asphaltic coating as specified in AWWA C151/ ANSI A21.51.

K. Acceptance will be on the basis of the City Authorized Representative's inspection and the manufacturer's written certification that the pipe was manufactured and tested in accordance with the applicable standards.

PART 3 -- EXECUTION

3.01 LAYING AND JOINTING PIPE AND ACCESSORIES

A. Lay all pipe and fittings to accurately conform to the lines and grades as shown on the Drawings or as established by the City's Authorized Representative.

B. Pipe Installation:

1. Proper equipment, tools and facilities shall be provided for the safe performance of the Work. All pipe and fittings shall be lowered carefully into the trench by means of slings, ropes or other suitable tools or equipment in such a manner as to prevent damage to water main materials and protective coatings and linings. Under no circumstances shall water main materials be dropped or dumped into the trench.
2. All pipe and fittings, and other appurtenances shall be examined carefully for damage and other defects immediately before installation. Defective materials shall be marked and held for inspection by the City or City Representative, who may prescribe corrective repairs or reject the materials.
3. All lumps, blisters and excess coating shall be removed from the socket and plain ends of each pipe, and the outside of the plain end and the inside of the bell shall be wiped clean and dry and free from dirt, sand, grit or any foreign materials before the pipe is laid. No pipe containing dirt shall be laid.

4. Foreign material shall be prevented from entering the pipe while it is being placed in the trench. No debris, tools, clothing or other materials shall be placed in the pipe at any time.
5. As each length of pipe is placed in the trench, the joint shall be assembled and the pipe brought to correct line and grade. The pipe shall be secured in place with approved backfill material.
6. It is not mandatory to lay pipe with the bells facing the direction in which work is progressing.
7. Applying pressure to the top of the pipe, such as with a backhoe bucket, to lower the pipe to the proper elevation or grade, shall not be permitted.

C. Alignment and Gradient:

1. Lay pipe straight in alignment and gradient or follow true curves as nearly as practicable. Do not deflect any joint more than the maximum deflection recommended by the manufacturer.
2. Maintain a transit, level and accessories at the work site to lay out angles and ensure that deflection allowances are not exceeded.

D. Expediting of Work: Excavate, lay the pipe, and backfill as closely together as possible. Do not leave un-jointed pipe in the trench overnight. Backfill and compact the trench as soon as possible after laying and jointing is completed. Cover the exposed end of the installed pipe each day at the close of work and at all other times when work is not in progress. If necessary to backfill over the end of an uncompleted pipe or accessory, close the end with a suitable plug, either push-on, mechanical joint, restrained joint or as approved by the City's Authorized Representative.

E. Joint Assembly:

1. All type joints shall be assembled in accordance with the manufacturer's recommendations.
2. Each joint shall be inspected by the Contractor to ensure that it has been "homed" 100 percent.

F. Cutting Pipe: The Contractor shall cut the pipe and bevel the end, as necessary, to provide the correct length of pipe necessary for installing the fittings, valves, accessories and closure pieces in the correct location. Only push-on or mechanical joint pipe shall be cut. Cement lining shall be undamaged.

3.02 THRUST RESTRAINT

A. Thrust Collars: Collars shall be constructed as shown on the Drawings.

++++++**END OF SECTION 02664**++++

SECTION 02683
SUBSURFACE INFILTRATION FACILITIES

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. Section includes construction of subsurface infiltration facilities for the interception, temporary storage and infiltration of stormwater runoff from impervious areas directed to the facilities through inlets, roof leaders, pretreatment systems, or other directly piped connections. Subsurface infiltration facilities include modified French drains, dry wells, subsurface stone galleries, and proprietary manufactured products.

1.02 SYSTEM DESCRIPTION

A. Modified French drains (MFD) shall consist of perforated piping installed in shallow excavated trenches filled with washed drainage stone, surrounded by geotextile, and covered with soil. MFD components shall conform to the Green Infrastructure typical detail for "Infiltration Trench", with the exception that the surface layer shall conform to the topsoil specifications in Section 02922, Amended Soil and Mulch.

B. Dry wells shall consist of seepage tanks set in the ground and surrounded with washed drainage stone and geotextile (on sides and bottom only). Alternately, water can flow into a pit filled with washed stone via a perforated pipe with a perforated standpipe in place of the tank.

C. Subsurface stone galleries shall consist of excavated pits filled with washed drainage stone, surrounded by geotextile (on sides and bottom only), covered with soil, and include influent piping

D. Open-bottom chamber products or other proprietary manufactured systems shall be furnished for subsurface infiltration facilities if indicated on the Drawings. The systems shall meet structural requirements for minimum cover, overburden support, and live loads for anticipated surface use without compacting subsoils. Additional drainage stone may be required for structural support if indicated on the Drawings.

E. Subsurface infiltration facilities shall all include overflow mechanisms such as surcharge pipes or connections to larger infiltration areas. These are designed to adequately convey discharges from major storm events to the downstream drainage system.

1.03 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the Contract Documents.

B. Submit the following for review and approval prior to shipment of materials to the Site.

1. Manufacturers' documentation indicating conformance with the specifications for perforated and non-perforated pipe and fittings.

2. Certificates and test reports, signed by the material producers of drainage stone and choker course, indicating that the materials meet or exceed the specifications.

3. Geotextile product certification as specified in Section 02125.

4. Manufacturers' documentation (including product data sheets and specifications) for precast reinforced concrete and other proprietary manufactured systems to be furnished, indicating the systems can meet design runoff reduction volume (RRv) for the Site and other specified design criteria.

5. Shop drawings showing fabrication and construction details for proprietary manufactured systems.

C. Submit the following at completion of the Work:

1. Field Quality Control: Submit test reports and inspection reports (as applicable)

1.04 QUALITY ASSURANCE

A. Comply with the requirements of governmental authorities having jurisdiction.

1.05 DELIVERY, STORAGE AND HANDLING

A. All manufactured products shall be inspected upon delivery to the Site. Damaged or defective materials shall be rejected or repaired as approved by the Owner's representative.

B. Conform to manufacturer's recommendations for handling and storage of products.

C. Granular materials of different gradations shall be delivered to the Site using clean equipment, and separately stockpiled in areas approved by the Owner's representative. Adequately protect to preserve the materials' fitness and quality.

1.06 PROJECT CONDITIONS

A. The Contractor is solely responsible for excavation slope stability. Excavation work shall be in compliance with applicable local, state and federal regulations (including OSHA).

B. Work shall be performed in a manner that does not damage or disturb existing utilities, structures, vegetation, and other site features not indicated to be removed.

1.07 SEQUENCING AND SCHEDULING

A. Coordinate subsurface infiltration facility construction with associated work specified in other sections.

PART 2 PRODUCTS

2.01 CHOKER COURSE AND DRAINAGE STONE

A. Choker course material and washed drainage stone shall conform to the material specifications in Section 02681.

2.02 SPECIAL GRANULAR BEDDING AND BACKFILL

A. Granular bedding and backfill for open-bottom chamber products and other proprietary manufactured systems shall conform to the manufacturer's recommendations.

2.03 GEOTEXTILE

A. Specified in Section 02125.

2.04 PIPING

A. Perforated and non-perforated piping shall conform to the applicable specifications in Section 02681.

B. Furnish required fittings (including tees, elbows and caps) to provide a complete installation.

2.05 CHECK DAMS

A. Check dams shall be constructed of concrete, stone, or other approved materials. Stone check dams shall conform to COA Standard Detail ER-G CD001.

B. Concrete structures shall be cast-in-place or precast reinforced concrete constructed to the dimensions indicated on the Drawings. Unless otherwise specified, minimum compressive strength of concrete shall be 3000 psi.

C. Concrete formwork, reinforcement, concrete materials and mix design, and accessories shall conform to the applicable requirements of Division 03 Specifications.

2.06 PROPRIETARY MANUFACTURED SYSTEMS

A. Furnish open-bottom chamber products, dry well structures and other pre-fabricated or field assembled manufactured systems as indicated on the Drawings.

B. Manufactured systems shall meet the following requirements:

1. Manufactured products shall be designed and fabricated by the manufacturer for the anticipated loading and burial conditions as indicated on the Drawings.

2. Furnish systems constructed of high density polyethylene (HDPE) or other materials as indicated on the Drawings and approved by the Owner's representative. Sizes and numbers of structures shall be as indicated.

PART 3 EXECUTION

3.01 PREPARATION

A. Establish required dimensions and elevations for subsurface infiltration facility construction.

B. Erosion and sediment control measures shall be implemented to protect construction areas. Conform to the requirements indicated on the Drawings and as specified in Section 02125.

3.02 EARTHWORK

A. Excavate in accordance with the applicable requirements of Section 02200 as modified in this Section. Excavate to the required dimensions, side slopes and depths shown on the Drawings. Exposed subgrade soils at bottom of excavation shall not be compacted. Low ground pressure equipment shall be used for excavation. Bottom of the excavation shall be flat or gently sloping toward the downstream end (if applicable).

B. Prior to placement of choker course (if applicable) and drainage stone, bottom of the excavations shall be scarified (by raking, disking or tilling) to a minimum depth of six inches.

C. Conform to manufacturer's recommendations for excavation and preparation of subgrade for installation or construction of open-bottom chamber products and other proprietary manufactured systems.

D. Excavated materials shall be removed from the construction areas and placed in other locations on the site or off-site where approved by the Owner's representative.

3.03 GEOTEXTILE INSTALLATION

A. Place geotextile on exposed excavated side slopes where indicated on the Drawings prior to placement of drainage stone as specified in Section 02125, Geotextile.

B. Provide pipe penetrations through geotextile in accordance with the manufacturer's recommendations to provide a soil tight seal.

3.04 INSTALLATION OF DRAINAGE STONE

A. Place drainage stone in excavations to the horizontal limits of the excavations. Total depth of drainage stone shall be as indicated on the Drawings.

B. For required total depths up to 12 inches, place drainage stone in a single lift.

C. For required total depths greater than 12 inches, place drainage stone in lifts of equal thickness, with no compacted lift more than 12 inches thick or less than 3 inches thick.

D. Lightly compact drainage stone by tamping with the bucket of placement equipment or using manually guided compaction equipment such as vibratory plate compactors.

E. Coordinate placement of drainage stone with installation of geotextile, piping and structures.

F. Protect stone storage section from adjacent runoff during construction to avoid clogging of system.

3.05 INSTALLATION OF MANUFACTURED SYSTEMS

A. Install products at the required elevations, orientation and location as indicated on the Drawings. Bottom of structures shall be leveled and properly stabilized on subgrade or prepared granular base.

B. Conform to manufacturer's recommendations for construction of the systems, including placement and assembling of joints, pipe penetrations and other details for a complete system.

C. Place drainage stone or other specified granular backfill around and over installed structures in uniform layers.

D. Systems shall be tested prior to completion of construction as recommended by the manufacturer.

3.06 PIPE INSTALLATION

A. Examine pipe and fittings before installation and assure no defective materials are incorporated. Keep inside of pipes and fittings free of dirt and debris.
Lay perforated piping in drainage stone at the required locations, alignment and elevations as indicated on the Drawings. Connect to structures (if applicable), adjacent piping and other facilities as indicated.

B. For modified French drains, perforated pipe shall be sloped between 0.5 and 6 percent, unless otherwise indicated.

C. Install non-perforated outlet pipes, standpipes and cleanouts, as applicable, at the required locations and orientation as indicated on the Drawings.

D. Pipe and fittings shall be joined in accordance with manufacturers' recommendations and reference standards, to provide stable and watertight connections.

E. Whenever pipe laying is not actively in progress, the open ends of the piping shall be closed by a temporary plug or cap to prevent soil and other foreign matter from entering the piping.

3.07 BACKFILLING

A. Continue placement of drainage stone up to required elevation or depth in each area.

B. After placement of drainage stone to required depth, lay geotextile over top of drainage stone and overlap adjacent panels.

C. Place soil backfill over completed geotextile-wrapped drainage stone backfill in layers not exceeding six inches loose thickness up to finish grade. Each layer shall be thoroughly compacted using manually guided compaction equipment.

D. Placement and compaction of drainage stone and soil backfill shall be performed in a manner that will not damage piping and structures. Products that are damaged shall be replaced at no additional cost to the Project.

3.08 MAINTENANCE AND PROTECTION

A. Prior to the Owner's final acceptance of the Work, Contractor shall perform maintenance and protection of the construction as specified in this Section. In addition, for the one year warranty period, Contractor shall correct or remove and replace defective work as approved by the Owner's representative in accordance with the terms of the Contract.

B. Remove all debris from within the limits of the constructed stormwater quality facilities.

C. Protect the constructed areas from erosion and keep free from accumulation of debris. Damage to the constructed areas shall be fully repaired as approved by the Owner's representative.

D. Where settling occurs prior to final acceptance of the Work, remove finished surfacing, backfill with additional granular material and make other repairs as necessary and as approved by the Owner's representative.

++++++**END OF SECTION 02683** ++++++++

SECTION 02705
REMOVING AND REPLACING PAVEMENT

PART 1 – GENERAL

1.01 SCOPE

A. The work to be performed under this Section shall consist of removing and replacing the existing pavement, sidewalks, steps, patios, curbs, and gutters in paved areas where such have been removed for construction of utilities and appurtenances.

B. Existing pavement, sidewalks, curbs, and gutters shall be replaced, to meet the current City of Atlanta standards, or to match existing pavement sidewalk, curb, or gutters; whichever is more stringent.

1.02 SUBMITTALS

A. If required by the City or Engineer, provide certificates stating that materials supplied comply with the Specifications. Certificates shall be signed by the asphalt producer and the Contractor.

1.03 CONDITIONS

A. Weather Limitations:

1. Apply bituminous tack coat only when the ambient temperature in the shade has been at least 50 degrees F for 12 hours immediately prior to application.

2. Do not conduct paving operations when surface is wet or contains excess of moisture that would prevent uniform distribution and required penetration.

3. Construct asphaltic courses only when atmospheric temperature in the shade is above 40 degrees F, when the underlying base is dry and when weather is not rainy.

4. Place base course when air temperature is above 35 degrees F and rising.

B. Grade Control: Establish and maintain the required lines and grades for each course during construction operations.

PART 2 – PRODUCTS

2.01 MATERIALS AND CONSTRUCTION

A. Graded Aggregate Base: The sub-base shall be a minimum of 6-inches thick and a width equal to the width of the finished paving. Aggregate base shall be Class A,

meeting the requirements of the Georgia Department of Transportation Specification Section 815.01. Compact to at least 95% Standard Proctor Density. (ASTM D-698)

B. Base: The base for all asphaltic paved roadways shall conform to the requirements of the Georgia Department of Transportation Specifications for the Hot Mix Asphaltic Concrete Section 828, 19 mm Superpave mix design.

C. Tack Coat: Tack coat shall conform to Section 413 of the Georgia Department of Transportation Standard Specifications.

D. Surface Course: The surface course for all asphaltic pavement, including paint or tack coat when required by the Engineer, shall conform to the requirements of the Georgia Department of Transportation Specifications for Hot Mix Asphaltic Concrete, Section 828, 9.5mm Superpave, Level C mix design.

E. Concrete: Provide concrete and reinforcing for concrete pavement or base courses in accordance with the requirements of the Georgia Department of Transportation Standard Specifications, Section 430. The concrete shall be minimum 3,000 psi compressive strength or as otherwise shown on the Drawings.

F. Special Surfaces: Where pavement, sidewalks, steps, patios, curbs, or gutters are disturbed or damaged which are constructed of specialty type surfaces, e.g., brick or stone, these facilities shall be restored utilizing similar, if not original, materials. Where the nature of these surfaces dictate, a specialty contractor shall be used to restore the surfaces to their previous or better condition. Special surfaces shall be removed and replaced to the limits to which they were disturbed.

2.02 TYPES OF PAVEMENTS

A. General: All existing pavement removed, destroyed or damaged by construction shall be replaced with the same type and thickness of pavement as that existed prior to construction, unless otherwise directed by the Engineer. Materials, equipment and construction methods used for paving work shall conform to the Georgia Department of Transportation specifications applicable to the particular type required for replacement, repair, or new pavements.

B. Aggregate Base: Aggregate base shall be constructed in accordance with the requirements of the Georgia Department of Transportation Standard Specifications. The maximum thickness to be laid in a single course shall be 6-inches compacted. If the design thickness of the base is more than 6-inches, it shall be constructed in two or more courses of approximate equal thickness. After the material placed has been shaped to line, grade, and cross-section, it shall be rolled until the course has been uniformly compacted to at least 100 percent of the maximum dry density when Group 2 aggregate is used, or to at least 98 percent of maximum dry density when Group 1 aggregate is used.

C. Concrete Pavement: Concrete pavement or base courses shall be replaced with concrete. The surface finish, joint pattern and joint sealant of the replaced concrete

pavement shall conform to that of the existing pavement. The surface of the replaced concrete base course shall be left rough. The slab depth shall be equivalent to the existing concrete pavement or base course, but in no case less than 6-inches thick. Transverse and longitudinal joints removed from concrete pavement shall be replaced at the same locations and to the same types and dimensions as those removed. Concrete pavements or concrete base courses shall be reinforced.

D. Asphaltic Concrete Base, Bituminous Tack Coat, and Surface Course: Asphaltic concrete base, tack coat, and surface course construction shall conform to Georgia Department of Transportation Standard Specifications. The pavement mixture shall not be spread until the designated surface has been previously cleaned and prepared; surface is intact, firm, properly cured, dry and the tack coat has been applied. Apply and compact the base in maximum layer thickness by asphalt spreader equipment of design and operation approved by the Engineer. After compaction, the black base shall be smooth and true to established profiles and sections. Apply and compact the surface course in a manner approved by the Engineer. Immediately correct any high, low, or defective areas by cutting out the course, replacing with fresh hot mix, and immediately compacting to conform and thoroughly bond to the surrounding area.

E. Surface Treatment Pavement: Bituminous penetration surface treatment pavement shall be replaced with the thickness indicated on the Drawings.

F. Gravel Surfaces: Existing gravel road, drive, and parking area replacement shall meet the requirements of graded aggregate base course. This surfacing may be authorized by the Engineer as a temporary surface for paved streets until replacement of hard surfaced pavement is authorized.

G. Temporary Measures: During the period between pavement removal and complete replacement of permanent pavement, maintain highways, streets, and roadways by the use of steel running plates anchored to prevent movement. The backfill above the pipe shall be compacted, as specified in Section 02200 of these Specifications, up to the existing pavement surface to provide support for the steel running plates. All pavements shall be replaced within seven calendar days of their removal.

PART 3 – EXECUTION

3.01 LOCATIONS FOR PAVEMENT REPLACEMENT

A. Pavement Replacement:

1. All trenches for roadway crossings

2. All trench longitudinal installations

3. All locations where pavement must be removed or is damaged in the execution of the Work

B. "Graded Aggregate" pavement repair shall be used only where approved by the Engineer.

3.02 REMOVING PAVEMENT

A. General: Remove existing pavement as necessary for installing the pipeline and appurtenances. Existing pavement and sub-base shall be removed for trench construction and pipe installation.

B. Remove and replace pavement and base beyond pipeline trench to outer edge of existing pavement or roadway if remaining existing pavement width is 24-inches or less from side of trench to outer edge of pavement or roadway.

C. Marking: Before removing any pavement, mark the pavement neatly paralleling pipelines and existing street lines.

D. Saw Cutting: Under no circumstances shall the Contractor be allowed to remove concrete or asphalt without prior saw cutting. Asphalt pavement shall be saw cut along the marks using suitable equipment. The saw cutting shall be deep enough to produce an even, straight cut.

E. Machine Pulling: Do not pull pavement with machines until the pavement is completely broken and separated from pavement to remain.

F. Damage to Adjacent Pavement: Do not disturb or damage the adjacent pavement. If the adjacent pavement is disturbed or damaged, remove and replace the damaged pavement.

G. Sidewalks and Patios: Remove and replace any sidewalks or patios disturbed by construction for their full width and to the nearest undisturbed joint.

H. Curbs and Gutters: Tunnel under or remove and replace any curb and/or gutter, which is disturbed by construction to the nearest undisturbed joint.

I. Steps: Completely remove and replace any steps, constructed of concrete or special surfaces, which are disturbed by construction.

3.03 REPLACING PAVEMENT

A. Preparation of Subgrade: Upon completion of backfilling and compaction of the backfill, arrange to have the compaction tested by an independent testing laboratory approved by the Engineer. Testing shall be paid for separately by the City directly to the testing laboratory. After compaction testing has been satisfactorily completed, replace all pavements, sidewalks, and curbs removed.

1. The existing street pavement or surface shall be removed or milled along the lines of the work from edge of pavement to edge of pavement. Pavement shall be replaced from edge of existing pavement to edge of existing pavement.

2. Trench backfill shall be compacted for the full depth of the trench as specified in Section 02200 of these Specifications.

3. Temporary trench backfill along streets and driveways shall include 6-inches of crushed stone or cherty clay as a temporary surfacing of the trenches. This temporary surface shall be maintained carefully at grade, dust-free, by the Contractor until the backfill of the trench has thoroughly compacted in the opinion of the Engineer, and permission is granted to replace the street pavement.

4. When temporary crushed stone or chert surface is considered by the Engineer to be sufficient surface for gravel pavement, the surface shall be graded smooth and to an elevation that will make the final permanent surfacing level with the adjacent surfacing that was undisturbed.

B. Pavement Replacement:

1. Replace and repave all street and roadway pavement from edge of pavement to edge of pavement as shown on the Exhibit "A", Detail G-7, Type III Pavement Replacement Detail herein. Replace driveways, sidewalks, and curbs with the same material, to nearest existing undisturbed construction joint and to the same dimensions as those existing.

2. If the temporary crushed stone or chert surface is to be replaced, the top 6-inches shall be removed and the crushed stone surfacing for unpaved streets or the base for the bituminous surface shall be placed.

3. Following this preparation, the chert or crushed stone base shall be primed with a suitable bituminous material and surfaced with the proper type of bituminous surface treatment.

4. Where the paved surface is to be replaced with asphaltic concrete pavement, concrete pavement or with a concrete base and a surface course, the temporary chert or crushed stone surface and any necessary backfill material, additional existing paving and new excavation shall be removed to the depth and width shown on the Drawings. All edges of the existing pavement shall be cut to a straight, vertical edge. Care shall be used to get a smooth joint between the old and new pavement and to produce an even surface on the completed street. Concrete base slabs and crushed stone bases, if required, shall be placed and allowed to cure for three days before bituminous concrete surface courses are applied. Expansion joints, where applicable, shall be replaced in a manner equal to the original joint.

5. Where driveways or roadways, constructed of specialty type surfaces, e.g., brick or stone are disturbed or damaged, these driveways and roadways shall be restored utilizing similar materials. Where the nature of these surfaces dictate, a specialty contractor shall be used to restore the surfaces to their previous or better condition. Special surfaces shall be removed and replaced to the limits to which they were disturbed.

C. Pavement Resurfacing:

1. After all pipeline installations are complete and existing pavement has been removed or milled from edge of pavement to edge of pavement, apply tack coat and surface course as specified.

2. Resurfacing limits shall be perpendicular to the road centerline. The limits of resurfacing shall be 10 feet beyond the edge of the pavement replacement on the main road being resurfaced.

3. Where pavement is damaged with potholes, the Contractor shall remove all existing loose pavement material and fill the hole with black base, as specified, to the level of the existing pavement.

D. Pavement Striping: Pavement striping removed or paved over shall be replaced with the same type, dimension, and material as original unless directed otherwise by the Engineer.

E. Installation of Traffic Plates: Following completion of sewer works including backfilling but prior to replacement of pavement, steel plates shall be used to temporarily carry vehicular traffic as follows:

1. All Steel plates shall meet ASTM structural specifications having "A36" designation with minimum yield stress of 36 ksi (ksi = kilopounds per square inch).

2. Asphaltic patching material (cold mix) shall be used to secure the steel plate around its edges. Alternatively, all sides of the plate or plates must be secured to the ground surface with A.R.E.A. standard railroad spikes. No spikes shall be left lying on the highway.

3. Trench must be backfilled to within eight (8) inches from top of existing pavement prior to placing the steel plate.

4. No plate is allowed over a trench having a width greater than 48 inches when adequate soil conditions are present. When the trench is greater than 48 inches, the entire lane containing the trench shall be closed. Before closing a lane, a "Lane Closure Permit" must be obtained from the City of Atlanta, Department of Public Works, Office of Transportation (404-330-6501). At least 24 hours prior notification is required for the "Lane Closure Permit".

5. All necessary warning signs, barricades, and lights shall be adequately provided and placed for the safety of the public and in full conformity with the latest edition of the MUTCD at no additional cost to the City. Before closing a "Lane Closure Permit" must be obtained from the City of Atlanta. The Department of Public Works, Office of Transportation (404-330-6501) must be notified at least 24 hours in advance.

6. The width of a trench is measured normal to the length of the trench. The largest reading of the measurements is the determining factor for width. For a series of steel plates on any continuous trench, all plates must have the same thickness.

7. Trench must be fully covered with a minimum of twelve (12) inches of asphalt taper on all sides of the plate.

8. Upon the completion of the work, the existing surface shall be cleaned and pavement restored to the City of Atlanta standards.

3.04 SIDEWALK, CURB, AND GUTTER REPLACEMENT

A. Construction:

1. All damaged concrete sidewalks, curbs, or gutters shall be replaced.

2. See Section 02521 for concrete sidewalk construction.

3. See Section 02521 for concrete curb and gutter construction.

4. When a section is removed, the existing sidewalk, curb, or gutter shall be cut to a neat line, perpendicular to both the centerline and the surface of the concrete slab. Existing concrete shall be cut along the nearest existing construction joints; if such joints do not exist, the cut shall be made at minimum distances shown on the Drawings.

5. Existing concrete sidewalks, curbs, and gutters that have been cut and removed for construction purposes shall be replaced with the same width and surface as the portion removed. Sidewalks shall have a minimum uniform thickness of 4-inches. The new work shall be neatly jointed to the existing concrete so that the surface of the new work shall form an even, unbroken plane with the existing surfaces.

6. The subgrade shall be formed by excavating to a depth equal to the thickness of the concrete, plus 2-inches. Subgrade shall be of such width as to permit the proper installation and bracing of the forms. Subgrades shall be compacted by hand tamping or rolling. Soft, yielding or unstable material shall be removed and backfilled with satisfactory material. Place 2-inches of porous crushed stone under all sidewalks, curbs, and gutters and compact

thoroughly, then finish to a smooth, unyielding surface at proper line, grade, and cross-section.

B. Joint for Curbs and Gutters:

1. Joints shall be constructed to match existing and as specified in Section 02521.

2. Expansion joints shall be required to replace any removed expansion joints or in new construction. Expansion joints shall be true and even, shall present a satisfactory appearance, and shall extend to within 1/2-inch of the top of finished concrete surface.

C. Finishing:

1. Strike off the surface with a template and finish the surface with a wood float using heavy pressure, after which, contraction joints shall be made and the surface finished with a wood float or steel trowel.

2. Finish the face of the curbs at the top and bottom with an approved finishing tool of the radius indicated on the Drawings.

3. Finish edges with an approved finishing tool having a 1/4-inch radius.

4. Provide a final broom finish by lightly combing with a stiff broom after troweling is complete.

5. The finished surface shall not vary more than 1/8-inch in 10 feet from the established grade.

D. Driveway and Sidewalk Ramp Openings:

1. Provide driveway openings of the widths and at the locations directed by the Engineer.

2. Provide sidewalk ramp openings in conformance with the applicable regulations and as directed by the Engineer.

3. Concrete shall be suitably protected from freezing and excessive heat. It shall be kept covered with burlap or other suitable material and kept wet until cured. Provide necessary barricades to protect the work. All damage caused by people, vehicles, animals, rain, the Contractor's operations and the like shall be repaired by the Contractor, at no additional expense to the City.

3.05 MAINTENANCE

A. The Contractor shall maintain the surfaces of roadways built and pavements replaced until the acceptance of the Project. Maintenance shall include

replacement, scraping, reshaping, wetting, and re-rolling as necessary to prevent raveling of the road material, the preservation of reasonably smooth surfaces and the repair of damaged or unsatisfactory surfaces, to the satisfaction of the Engineer. Maintenance shall include sprinkling as may be necessary to abate dust from the gravel surfaces.

3.06 SUPERVISION AND APPROVAL

A. Pavement restoration shall meet the requirements of the regulatory agency responsible for the pavement. Obtain agency approval of pavement restorations before requesting final payment.

B. Obtain the Engineer's approval of restoration of pavement, such as private roads and drives that are not the responsibility of a regulatory agency.

C. Complete pavement restoration as soon as possible after backfilling.

D. Failure of Pavement: Should any pavement restoration or repairs fail or settle during the life of the Contract, including the bonded period, promptly restore or repair defects.

E. Prior to acceptance and approval of any asphaltic concrete binder and/or topping which is installed for the purpose of City maintenance, a representative of the City of Atlanta's Department of Traffic and Transportation may require one or all of the following tests: 1) coring, 2) extraction, 3) compaction, 4) density. The frequency and location of these tests will be left up to the discretion of the Inspector/Engineer. Testing shall be paid for separately by the City directly to the testing laboratory.

3.07 CLEANING

A. The Contractor shall remove all surplus excavation materials and debris from the street surfaces and rights-of-way and shall restore street, roadway, or sidewalk surfacing to its original condition.

3.08 TRAFFIC CONTROL

A. Refer to Specification Section 01500: Temporary Control of Construction Operations for requirements.

+++ END OF SECTION 02705 +++

SECTION 02885

SURFACE WATER DIVERSION AND DEWATERING

PART 1 -- GENERAL

1.01 SCOPE

A. Design, construct, and maintain surface water diversion and foundation dewatering including well points, pumps, vacuum systems, sumps, dikes, levees, cofferdams and diversion and drainage channels as necessary to maintain the areas free from water and to protect the areas to be occupied by permanent work from water damage.

B. The Contractor shall be responsible for the stability of all-temporary and permanent slopes, grades, foundations, materials and structures during the course of the Contract. Repair and replace all slopes, grades, foundations, materials and structures damaged by water, both surface and subsurface, to the lines, grades, and conditions existing prior to the damage, at no additional cost to the Owner.

C. The Contractor shall be responsible for and shall repair at his expense any damage to the foundations, structures, or any other part of the work caused by floods, water, or failure of any part of the diversion or dewatering works.

1.02 RELATED WORK

A. Section 01300 Submittal Procedures

B. Section 02110 Clearing and Grubbing

C. Section 02125 Temporary and Permanent Erosion and Sedimentation Control

D. Section 02200 Earthwork

E. Section 02222 Excavation

F. Section 02273 Riprap

1.03 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of Section 01300 Submittal Procedures.

B. Water Control Plan: Prior to beginning any Work the Contractor shall submit for approval a Water Control Plan showing his proposed method for surface water diversion during construction and removal of water from foundations. The plan may be placed in operation upon approval, but nothing in this section shall relieve the Contractor from full responsibility for the adequacy of the diversion and protection works.

PART 2 -- PRODUCTS

NOT USED

PART 3 -- EXECUTION

3.01 EXAMINATION

The Contractor shall verify the existing conditions.

3.02 DIVERSION AND CARE OF SURFACE WATER

A. The Contractor shall provide measures to route surface water to allow for installation of any materials required below the prevailing water level and to prevent damage to the foundation subgrade, embankment fill, articulated concrete block, riprap, armoring units, permanent ditches, structures, conduits and all other project features.

B. All cofferdams and diversion ditches should be constructed to sufficiently handle storm flows without risk of damage to areas under construction. Contractor shall repair any damages to areas under construction due to insufficiencies in storm water handling facilities at no additional cost to the Owner.

C. All dewatering activities shall comply with Section 02125 Erosion and Sedimentation Control.

3.03 REMOVAL OF WATER FROM FOUNDATIONS

A. The Contractor should be aware that considerable removal and control of surface water and groundwater may be required during construction activities that require construction below prevailing groundwater and surface water levels at the time of construction. These activities may require lowering the general groundwater level up to 5 feet or more below existing grades.

B. Dewatering shall be accomplished in a manner that will prevent the loss of fines from the foundation.

C. The Contractor will maintain the stability of the excavated slopes and bottom of the trenches.

D. The Contractor shall perform dewatering, as recommended by the Engineer, such that groundwater is lowered in all work areas to a depth of at least three feet below the planned/actual excavation level.

E. The dewatering system should function continuously, 24 hours a day, 7 days a week until structures, drains, and fill (if appropriate) is placed to a level of at least three feet above stabilized groundwater levels.

F. Construction operations shall be performed in the dry.

G. The Contractor must use well points, cased wells and/or similar means of effectively dewatering the work area. Shallow sumps and trenches will not provide adequate dewatering.

H. The Contractor will be required to control seepage along the bottom of the excavation.

I. All destabilized subgrade conditions caused by inadequate or untimely dewatering operations shall be undercut and backfilled with suitable backfill material at no additional cost to the Owner.

J. The Contractor shall install temporary groundwater monitoring wells at locations recommended by the Engineer to confirm that the groundwater has been lowered to the level recommended by the contract documents prior to excavating to the required grades. No excavation will be permitted below the prevailing groundwater levels.

3.04 REMOVAL OF DIVERSION AND DEWATERING WORKS

A. All temporary diversion and dewatering works shall be removed in a manner approved by the Engineer.

B. The portions of the dewatering works that are to remain in place such as well points or cased wells shall be filled with sand or cement grout as recommended by the Engineer.

C. Outflow from dewatering systems shall be channeled into a natural drainage features in such a manner as to prevent erosion and sediment control problems due to the erosive force of the outflow stream.

+++END OF SECTION+++

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SECTION 02900

TREES, SHRUBS, PERENNIALS AND GROUND COVER GENERAL

1.1 DESCRIPTION OF WORK

A. The work covered under this section applies to furnishing all equipment, materials, and labor necessary for soil preparation; planting of trees, shrubs, herbaceous perennials, ground cover, bare root plants, procurement and proper installation of live stakes, dormant woody cuttings, as applicable; protection, maintenance, guarantee, and replacement of plants; and all related items as shown on the drawings and specified herein.

B. Related Work Specified Elsewhere:

1. Section 02922 Amended Soil and Mulch

C. It is not contemplated that planting shall occur where the depth of soil over underground construction or obstructions is insufficient to accommodate the roots or where impervious soil will require drainage. Where such conditions are encountered in excavation of planting areas, other locations for underground construction or for the planting may be designated by the Owner or Owner's Representative.

1. Removal of underground obstructions, relocation of underground construction and provision of drainage for planting areas shall be done only as directed by the Owner or Owner's Representative.

2. If changes in the location of the work or if removal of obstructions involve additional work, the Contractor shall proceed in accordance with the "General Conditions" of the Contract for construction.

D. All planting shall be performed by personnel with experience with these planting procedures and under the supervision of a qualified planting foreman capable of executing the requirements of this specification.

E. The Contractor shall take all necessary precautions to avoid damage to existing sidewalks, fencing, paving, curbs, lighting, and other site improvements and Contractor shall replace any existing site improvements damaged by his operations at his own expense to match the pre-damaged condition and to a manner acceptable to the Owner or Owner's Representative.

1.2 QUALITY ASSURANCE

A. Size, quality, root ball preparation, and grading standards shall conform to the American Association of Nurserymen, Inc., as published in the "American Standard for Nursery Stock," ANSI Z60.1, latest approved revision.

B. Plant names indicated comply with "Standardized Plant Names" as adopted by the latest edition of the American Joint Committee of Horticultural Nomenclature. Names of varieties not listed conform generally with names accepted by the nursery trade. Provide stock true to botanical name and legibly tagged.

C. The Contractor shall be responsible for all certificates of inspection of plant materials that may be required by federal, state, or other authorities to accompany shipments of plants. All plants must be inspected and approved by the Owner or Owner's Representative before they are planted. Inspection and approval of plants upon delivery shall be for quality, size, and variety only and shall not in any way impair the right of rejection for failure to meet other requirements during progress of the work.

D. Fertilizer shall conform to the local, state, and federal laws applicable to its manufacture and labeling.

1.3 PLANT GUARANTEE AND REPLACEMENT

A. Guarantee

1. Plants shall be alive, healthy, and vigorous at the end of the guarantee period.
2. The guarantee period all plant material other than trees planted as 'recompense' shall be for a period of one year after installation and Owner final acceptance of the plants. Guarantee period for 'recompense trees' shall be for a period of two years after installation and Owner final acceptance of the plants.
3. Damage to plant material resulting from disease, drought, insect infestation, improper maintenance, winter burn, except breakage resulting from freezing rains or winds of 60 mph and greater, shall be the liability of the Landscape Contractor
4. Contractor is required to control weeds and invasive species that threaten the survival of all installed plantings.
5.

B. Replacement

1. Live stake, bare rooted and containerized plants and shrubs shall have a one year warranty after completion and acceptance of each contract item as listed in bid package. Replacement plants shall then have an additional 60-day warranty.
2. Recompense trees shall have a two-year warranty after completion and acceptance of each contract item as listed in bid package. Recompense trees will be inspected after one year. Replacement trees will have an additional one-year

warranty. Any replacement recompense trees requiring replacement after 2 years will have an additional 60 warranty.

PART 2 PRODUCTS

2.1 PLANTS

A. The names of plants required under this contract conform to those given in "Standardized Plant Names," latest edition, prepared by American Joint Committee on Horticultural Nomenclature. Each plant shall be tagged or labeled at the source with full botanical name on a waterproof tag.

B. Plant specimens shall conform to those indicated on the Drawings and two specimens of each plant shall be furnished for approval unless otherwise noted on the plant list.

C. Plants shall be nursery grown locally, unless otherwise noted, and have a habit of growth that is normal for the species. They shall be sound, healthy, vigorous, and free from insect pests, plant diseases, and injuries. All plants shall equal or exceed the measurements specified in the Plant List, which are minimum acceptable sizes. They shall be measured before pruning with branches in normal position. No pruning shall be done until the plants have been inspected by the Owner or Owner's Representative and in no case shall the plants supplied under this contract be pruned back to such an extent that they no longer meet specifications. All trees and shrubs shall have been transplanted or root pruned at least once in the 3 years previous to contract date. Root bound container plants will not be accepted.

D. Substitutions of genus, species, or variety will be permitted only upon submission of proof, in writing, that the specified plant or its alternative is not obtainable in the continental United States. Written authorization for substitution must be obtained from the Owner or Owner's Representative.

E. Bare root plants and plants used for branch layering or live stakes may be field collected in a legal manner.

F. All balled and burlaped trees shall be dug with firm, natural balls of earth of sufficient diameter and depth to encompass the fibrous and feeding root system necessary for full recovery of the plant. Balls shall be firmly wrapped with burlap or similar material and bound with twine, cord or wire mesh. Where necessary to prevent breaking or cracking of the ball during the process of planting, the ball may be secured to a platform.

G. Container grown plants shall be healthy, vigorous, well-rooted, and shall have become established in the container in which they are delivered. These plants shall have been

in the established container long enough for the fibrous roots to have developed so that the root mass will retain its shape and hold together when removed from the container. No plants shall be loose in the container and shall not be pot bound. sufficiently rigid to firmly hold the soil protecting the root during transporting, handling, and planting.

2.2 MISCELLANEOUS MATERIALS

A. Water shall be free from ingredients harmful to plant life. Hose and other watering equipment required for the work shall be furnished by the Contractor.

B. Mulch shall be shredded hardwood mulch as defined in Section 02922 or tightly baled pine straw which is clean, fresh, dark reddish-brown, and free of branches, cones, foreign matter, insects and disease.

C. Fertilizer shall be as recommended by soil analysis and as specified within Section 3.3 G and 3.5A, within these specifications.

D. Stakes for securing container or balled and burlapped trees in the ground shall be a minimum of 24-inches in length, 2-inches x 2-inches wooden stakes. Wooden stakes shall be rot resistant wood, e.g., redwood, oak, western cedar, or pressure treated southern pine.

PART 3 EXECUTION

3.1 SOIL PREPARATION

A. Prior to planting, soil samples shall be taken within each planting zone (minimum of one per 5,000 square ft.) and include a composite sample of each zone with a minimum of four subsamples per instructions from the UGA Extension Service and be analyzed for the appropriate parameters by the UGA Extension Service or State approved soil analytical laboratory. All soil sample results shall be submitted to the Owner for their records. The Contractor shall add the appropriate amount of the deficient elements to the soil prior to planting.

3.2 TIME OF PLANTING

A. When other sections of the work have progressed sufficiently to commence the work of planting, and the Owner or Owner's Representative have accepted the preceding work, planting operations shall be conducted immediately under favorable weather conditions. These seasons shall be as follows:

   1. Permanent Seed

a. Permanent seed shall be planted between March 1and June 1, or September 1 and October 31, depending on the type of grasses.
b. Follow recommendations of seed supplier.

2. Shrubs and Trees (container plantings)
   a. Planting shall occur between November and March, preferably after the first frost

3. Shrubs and Trees (bare root plantings)
   a. Planting shall occur between November and March, preferably after the first frost

4. Other Ground Cover
   a. Planting shall occur between November and March

5. At the option and on the full responsibility of the Contractor, planting operations may be conducted under unseasonable conditions without additional compensation.

3.3 PRODUCT HANDLING AND STORAGE

1. .

B. Balled and burlapped plants shall be dug and prepared for shipment in a manner that will not damage roots or branches. The balls or roots of plants not planted immediately on delivery shall be covered with moist soil or mulch, or other protection from drying winds and sun. All plants shall be watered as necessary, until planted. Balled plants shall not be lifted by the trunk of the plant.

3.4 PLANTING OF, TREES, SHRUBS, PERENNIALS, BARE ROOTS, AND GROUND COVER

A. Except as otherwise specified, the Contractor's work shall conform to accepted horticultural practices as used in the trade.

B. Live stakes, trees, shrubs, balled and burlapped, containerized plants and seed mixtures shall be planted during their individual dormant seasons, as directed in the planting schedule, or as advised by a commercial plant supplier. Trees, shrubs, balled and burlapped, containerized plants shall be installed per the recommendations shown on the individual labels and as directed in the planting schedule, or as advised by a commercial plant supplier.

C. The Owner or Owner's Representative shall verify the staked location of all trees, shrubs, bare root plants and branch layer plants prior to installation with labeled stakes to be furnished for this purpose by the Contractor.

D. Planting pits shall be dug and soil for planting readied before plants are delivered. Pits shall be at least twice the diameter of the root ball or container. Contractor shall get

approval of the planting pit locations from the Owner or Owner's Representative prior to plant installation.

E. Set plant material in the planting pit to proper grade and alignment. If fabric is used in container plants, remove first before setting in pit. Set plants upright, plum, and no lower than the finished grade or 2-3 inches above finished grade. Add excavated pit material to fill approximately half of the pit. Fill rest of pit soil and bring to finished grade. Lightly compact fill around root ball and be sure to fill all voids. No filling will be permitted around trunks or stems.

F. All plants shall be set on prepared soil to such depth that the finished grade level at the plant after settlement will be the same as that at which the plant has grown. They shall be planted upright and plumb. Platforms, wire and burlap for top and sides of the ball as shown on the Details shall be removed. If synthetic fabric is used instead of burlap, all fabric should be removed prior to planting. All broken, frayed, or circling roots shall be cut off cleanly. Soil shall be placed and compacted carefully to avoid injury to roots and to fill voids. When the hole is nearly filled, add water as necessary and allow it to soak away. Fill the hole to finish grade. After the ground settles additional soil shall be filled to the level of the finished grade.

G. Live stakes shall be installed using a dead blow (shot or sand filled) hammer or rubber mallet to tamp the stakes into the ground, only when the soil is too hard or rocky to allow direct driving of stakes. Stakes should be embedded at least 2/3 of their length.

H. All trees, shrubs, perennials, ground cover, bare root plants, and branch layer plants shall be installed per the Drawings and Details.

I. Excess excavated soil from planting operations shall be removed from the site and properly disposed of by the Contractor.

J. All containerized plants shall be fertilized per soil test recommendations within 2 days of installation. Balled and burlapped trees and shrubs shall not be fertilized for the first year after planting.

K. If applicable, staking shall be accomplished as shown on Drawings and done only as recommended by Owner or Owner's Representative. Supports shall be removed immediately after the guarantee period.

L. Unless shown otherwise on the Drawings, all plants shall be mulched with a 3-inch minimum layer of mulch within 2 days of planting. This mulch shall entirely cover the area of the planting pit, bed, or saucer around each plant.

M. Owner or Owner's Representative shall review and approve method of planting for branch layering and bare planting prior to Contractor beginning installation of these items.

N. Contractor shall furnish sequencing report to Owner or Owner's Representative for review and approval showing branch layering installation sequencing, including but not limited to, method of creating branch material, soaking timeframe and location, and handling of material prior to being planted.

3.5 PRUNING AND REPAIR

A. Upon completion of the work under the contract, all new trees and shrubs shall have been pruned and any injuries repaired. The amount of pruning shall be limited to the minimum necessary to remove dead or injured twigs and branches and to compensate for the loss of roots as a result of transplanting operations. Pruning shall be done in such a manner as not to change the natural habit or shape of the plant. All cuts shall be made flush, leaving no stubs. On all bruises or scars on the bark and cuts over ¾-inch in diameter, the injured cambium shall be traced back to living tissue and removed; wounds shall be smoothed and shaped so as not to retain water.

3.6 INSPECTION FOR ACCEPTANCE

A. Upon completion of all planting and after written notification, inspection of the landscape work to determine partial completion of the contract work, exclusive of maintenance and replacement of plants, will be made by the Owner or Owner's Representative. Inspection of the work will be made again by the Owner or Owner's Representative at the end of the guarantee period.

3.7 MAINTENANCE

A. Maintenance shall begin immediately after each plant is planted and shall continue until final acceptance is established by the Owner or Owner's Representative. Planting shall be protected and maintained as necessary by watering, fertilizing, and replanting as necessary throughout the guarantee period.

+++END OF SECTION+++

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SECTION 02920

SITE RESTORATION

PART 1 GENERAL

1.01 SCOPE

A. The Contractor shall provide all, labor, materials, equipment, and incidentals required for all site restoration and related operations necessary shown on the Drawings or specified in these Specifications.

B. This section includes disposition of materials and structures encountered in the Work, all cleanups and any other similar, incidental, or appurtenant operations which may be necessary to properly complete the Work.

1.02 SUBMITTALS

Submittals shall be made in accordance with the requirements of 01300 Submittal Procedures. In addition, the following specific information shall be provided:

1. The Contractor shall submit certificates of inspection as required by government authorities. The Contractor shall submit other data substantiating that materials comply with specified requirements.
2. The Contractor shall submit instructions recommending procedures to be established by the City for maintenance of site restoration work for one (1) full year.

1.03 QUALITY CONTROL

A. The Contractor shall ship site restoration materials with certificates of inspection required by authorities having jurisdiction. The Contractor shall comply with regulations applicable to site restoration materials.

B. If specified site restoration materials are not obtainable, the Contractor shall submit proof of non-availability to the City's Authorized Representative together with proposal for use of equivalent material.

1.04 SAFETY REQUIREMENTS

A. Hazards Control:

1. The Contractor shall store volatile wastes in covered metal containers, and remove from the site of the Work daily.
2. The Contractor shall prevent accumulation of wastes that create hazardous conditions.
3. The Contractor shall provide adequate ventilation during use of volatile or noxious substances.

B. The Contractor shall conduct cleaning and disposal operations in compliance with local ordinances and environmental laws and regulations.

1. The Contractor shall not burn or bury rubbish and waste materials on the site of the Work.
2. The Contractor shall not dispose of volatile wastes such as mineral spirits, oil, or fuel in surface waters, open drainage ditches, or storm or sanitary drains.

1.05 DELIVERY

The Contractor shall deliver packaged materials in containers showing weight, analysis, and name of manufacturer. The Contractor shall protect materials from deterioration during delivery and while stored at the site of the Work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 DISPOSITION OF MATERIALS AND STRUCTURES ENCOUNTERED IN THE WORK

A. Existing materials or structures that may be encountered (within the lines, grades, or trenching sections established for completion of the Work), if unsuitable or unacceptable to the City's Authorized Representative for use in the Work, and for which the disposition is not otherwise specified, shall either be disposed of by the Contractor or shall remain the property of the City as further provided in this section.

B. At the option of the City, any existing materials or structures of "value" encountered in the Work shall remain the property of the City. The term "value" shall be defined by the City.

C. Any existing materials or structures encountered in the Work and determined not to be of "value" by the City, shall be legally disposed of by the Contractor.

3.02 JOB CONDITIONS

A. The Contractor shall determine the locations of underground utilities and perform Work in a manner which will avoid possible damage. The Contractor shall hand excavate, as

required. The Contractor shall maintain grade stakes set by others until removal is mutually agreed upon by parties concerned.

B. All bare earth areas within the limit of work shall be grassed, mulched, or covered with other plant material.

C. On a continuous basis, the Contractor shall maintain the site of the Work free from accumulations of waste, debris, and rubbish caused by his operations.

D. At completion of the Work, the Contractor shall remove waste materials, rubbish, tools, equipment, machinery, and surplus materials, and clean all sight-exposed surfaces. The Contractor shall leave the site of the Work clean and ready for occupancy or use.

E. The Contractor shall proceed with the complete site restoration work as rapidly as portions of the site of the Work become available, working within seasonal limitations for each kind of site restoration work required. The Contractor will not be allowed to postpone cleanup and seeding or sodding until the end of the Work.

F. When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, the Contractor shall notify the City's Authorized Representative before planting.

G. The Contractor shall install materials during normal planting seasons for each type of site restoration work.

H. The Contractor may, at his option, employ additional measures (other than those specified) to prevent loss of, or damage to the Work resulting from the effects of wind and/or water. No additional compensation will be made for the employment of such additional measures.

3.03 CLEANUP

A. During site restoration work, the Contractor shall keep pavements clean and the site of the Work in an orderly condition.

B. The Contractor shall protect site restoration work and materials from damage due to site restoration operations, operations by other contractors, and trades and trespassers. The Contractor shall maintain protection during installation and maintenance periods. The Contractor shall treat, repair, or replace damaged site restoration work as directed by the City's Authorized Representative.

C. Immediately upon completion of any section of the Work and before payment therefore has been made, the Contractor shall remove from the site of the Work all construction equipment, temporary structures, and debris, and shall restore the site of the Work to a condition equal to or better than that which existed prior to construction. Waste

materials shall be disposed of at locations satisfactory to the City or affected regulatory agencies.

D. The Contractor shall not remove barricades and warning and direction signs until directed by the City's Authorized Representative.

E. After completion of all Work required by the Contract and before final payment has been made, the Contractor shall make a final cleanup of each separate part of the Work; shall restore all surfaces to a neat and orderly condition; and shall remove all construction equipment, tools, and supplies.

3.04 INSPECTION AND ACCEPTANCE

A. When site restoration work is completed, including maintenance, the City's Authorized Representative will, upon request, make an inspection to determine acceptability.

B. Where inspected by the City's Authorized Representative site restoration work does not comply with the requirements, the Contractor shall replace rejected work and continue specified maintenance until re-inspected by the City's Authorized Representative and found to be acceptable. The Contractor shall remove rejected plants and materials promptly and replace at his expense.

++++ END OF SECTION ++++

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SECTION 02922

AMENDED SOIL AND MULCH

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. Section includes furnishing and installation of amended soil (engineered soil mix) and mulch for bioretention areas, bioswales and other stormwater quality facilities.

B. Related Work Specified Elsewhere in the Existing COA DWM Specifications:
   1. Section 02125 – Temporary and Permanent Erosion and Sedimentation Control

C. Related Work Specified Elsewhere in the Green Infrastructure Specifications:
   1. Section 02371 – Green Infrastructure Geotextiles
   2. Section 02681 – Subdrainage for Stormwater Quality Facilities

1.02 REFERENCES

A. ASTM International:

   1. ASTM C 33, Standard Specification for Concrete Aggregates

   2. ASTM D 2974, Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils

   3. ATM D 3385, Standard Test Method for Infiltration Rate of Soils in Field Using Double-Ring Infiltrometer

   4. ASTM D 4542, Standard Test Method for Pore Water Extraction and Determination of the Soluble Salt Content of Soils by Refractometer

   5. ASTM D 4972, Standard Test Method for pH of Soils

   ASTM D 5268, Standard Specification for Topsoil Used for Landscaping Purposes

1.03 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the Contract Documents.

B. Submit the following for review and approval prior to shipment of materials to the Site:

1. Written documentation from manufacturers or suppliers for materials to be furnished under this Section. Include description of origin and composition of the materials.

2. Material test results including infiltration rate. Source quality control test results.

3. Minimum 1-gallon samples of proposed materials.

1.04 QUALITY ASSURANCE

A. Contractor shall retain the services of an approved independent soil testing firm to perform testing of engineered soil mix as specified in this Section.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle materials in a manner to prevent damage and deterioration.

B. Engineered soil mix and mulch shall be delivered to the Site using clean equipment, and separately stockpiled in areas approved by the Owner's representative. Adequately protect to preserve the materials' fitness and quality.

1.06 PROJECT CONDITIONS

A. Conform to the specifications in this Section for required environmental conditions for construction work, including site moisture conditions, ambient temperature.

B. Existing site conditions impacting the work are indicated on the Drawings.

1.07 SCHEDULING

A. Coordinate furnishing and placement of specified materials with related construction work specified in other referenced specification sections.

PART 2 PRODUCTS

2.01 SOURCE QUALITY CONTROL

A. Proposed materials and sources of supply shall be approved by the Owner's representative as specified, prior to use of the materials in the construction.

B. The independent testing firm shall sample and analyze proposed engineered soil mix as specified in this Section.

C. Tests on amended soil shall be performed once per location for pH and organic content. Tests for remaining parameters are required for every 500 cubic yards of soil mix, and at a minimum once per location.

2.02 ENGINEERED SOIL MIX

A. Engineered soil mix shall consist of a mixture of sand, clay, silt and organic matter meeting the following specifications:

1. Classified as a sandy loam or loamy sand.
2. Sand Content: 70%-80%% clean washed sand (dry weight basis), conforming to the gradation requirements for fine aggregate in ASTM C 33.
3. Fines (Clay and Silt) Content: Not greater than 10% including topsoil (dry weight basis).
4. Topsoil: 10%- 20% (dry weight basis).
5. Compost: 5% to 10% (dry weight basis).
6. Infiltration rate: At least 1 inch per hour, and preferred rate of 1 to 2 inches per hour (as determined using ASTM D 3385 or other approved test method).
7. pH: 5.5 to 6.5 (as determined using ASTM D 4972.
8. Organic Content: 3 to 10 percent (as determined using ASTM D 2974 or other approved test method).
9. Concentration of Soluble Salts: Not to exceed 500 ppm (as determined using ASTM D 4542).

B. Alternate Soil Mix Materials: Engineered soil mixtures utilizing alternate or synthetic materials are acceptable provided the overall composition is completely equivalent to the infiltration performance specifications in paragraph 2.02.A above. Contractor shall submit a request for substitution of materials along with test results for the proposed alternate mix.

C. Composted Material: Compost shall be a well decomposed, stable, weed-free organic matter source derived from waste materials including yard debris, wood wastes or other organic materials, not including biosolids, meeting the standards developed by the US Composting Council (USCC).

D. Existing topsoil on the Site may be used as a component of the engineered soil mix. The existing topsoil shall be treated for weeds, tested for pH, organic content, grain size analysis, and permeability to identify necessary amendments. Topsoil shall conform to the requirements of subsection 2.03.

E. In the event that sufficient topsoil cannot be obtained from on-site excavation, topsoil may be obtained from outside the limits of the Project as approved by the Owner's representative.

F. Engineered soil mix shall not be incorporated into the Work until it is has been approved by the Owner's representative.

2.03 TOPSOIL

A. Topsoil, as a component of engineered soil mix, shall be natural, friable, fertile, loam, sandy loam, silt loam, or sandy clay loam per USDA soil triangle. It shall be a uniform native upland topsoil, free from subsoil, objectionable weeds, litter, stiff clay, stones larger than one-inch in diameter, stumps, roots, trash, toxic substances, or any other material which may be harmful to plant growth or hinder planting operations.

B. Composition of topsoil material shall be in accordance with ASTM D5268.

2.04 MULCH

A. Mulch shall consist of finely shredded (double shredded) hardwood mulch, or equivalent material, and shall be well mixed and homogenous, uniform in color and free of foreign material and viable plant seeds. Mulch shall meet the following criteria:

1. 90% of material passing the 1/2 inch screen.
2. Organic Content: 35% to 65% (dry weight basis).
3. pH: 6.0 to 8.0 (as determined using ASTM D 4972).

2.05 DRAINAGE STONE AND UNDERRDRAIN PIPING

A. Specified in Section 02681.

2.06 GEOTEXTILE

A. Specified in Section 02371.

PART 3 EXECUTION

3.01 PREPARATION

A. Erosion and sediment control measures shall be implemented to protect construction areas. Conform to the requirements indicated on the Drawings and as specified in Section 02125.

B. Excavate for stormwater quality facilities and construct underdrain system (if required) as specified in Section 02681 and other applicable specification sections.

C. Prior to placing the underdrain and the engineered soil, the bottom of the excavation (below the bottom of the underdrain and engineered soil mix) shall be roto-tilled or excavated to a minimum depth of 6 inches to alleviate any compaction of the facility bottom. Smooth surface of existing soils. Any substitute method must be approved by the Owner's representative prior to use. Any ponded water shall be removed from the bottom of the facility and the soil shall be friable before loosening.

D. Install underdrain, if applicable, as directed in Section 02681.

3.02 GEOTEXTILE INSTALLATION

A. Specified in Section 02371.

3.03 PLACEMENT OF ENGINEERED SOIL MIX

A. Engineered soil shall be thoroughly mixed and tested prior to placement.

B. Place engineered soil mix to the depth and limits indicated on the Drawings. Installation of engineered soil mix, shall be completed in a manner that will ensure preservation of the infiltrative capacity of the underlying soils. The moisture content of the soil shall be low enough to prevent clumping and compaction during placement.

C. No heavy equipment shall be used within 10 feet of the limits of stormwater quality facilities before, during, or after placement of the engineered soil mix.

D. The engineered soil mix shall be placed in horizontal layers not to exceed six inches loose depth, and lightly hand-tamped, wetted, or compacted with a small water-filled landscape roller, to reduce the potential for excessive settling.

E. Uniformly grade engineered soil mix to achieve a smooth surface, free of irregular surface changes. Do not over-work or excessively compact the soil mix. Grade to cross-sections, thickness and elevations indicated on the Drawings. Settling of soil by walking on surface and working with hand equipment is acceptable.

3.04 PLACEMENT OF MULCH

A. Place mulch on top of completed engineered soil mix and around vegetation plantings to a uniform depth of two to four inches. Place to the full limits of each bioretention area as indicated.

B. Where possible, do not allow mulch to touch plant foliage.

3.05 FIELD QUALITY CONTROL

A. Test drainage of amended soil by filling stormwater quality facility with water twice in succession. Notify Owner’s representative of water retention exceeding 24 hours.

3.06 MAINTENANCE AND PROTECTION

A. Remove all debris from within the limits of the constructed stormwater quality facilities.

B. Protect the constructed areas from erosion and keep free from accumulation of debris. Divert post-construction stormwater runoff around the areas until vegetative cover has been established.

C. Damage to the constructed areas shall be fully repaired as approved by the Owner's representative.

+++++END OF SECTION 02922++++

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SECTION 03100

CONCRETE FORMWORK

PART 1 -- GENERAL

1.01 THE REQUIREMENT

Provide materials, labor, and equipment required for the design and construction of all concrete formwork, bracing, shoring and supports in accordance with the provisions of the Contract Documents.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 03200 - Reinforcing Steel

B. Section 03250 - Concrete Accessories

C. Section 03290 - Joints in Concrete

D. Section 03300 - Cast-in-Place Concrete

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.

1. Georgia State Minimum Standard Building Code

2. ACI 318 - Building Code Requirements for Structural Concrete

3. ACI 301 - Specifications for Structural Concrete for Buildings

4. ACI 347 - Recommended Practice for Concrete Formwork

5. U.S. Product Standard for Concrete Forms, Class I, PS 1

6. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials

1.04 SUBMITTALS

A. Submit the following in accordance with Section 01300, Submittals.

1. Manufacturer's data on proposed form release agent

2. Manufacturer's data on proposed formwork system including form ties

1.05 QUALITY ASSURANCE

Concrete formwork shall be in accordance with ACI 301, ACI 318, and ACI 347.

PART 2 -- PRODUCTS

2.01 FORMS AND FALSEWORK

A. All forms shall be smooth surface forms unless otherwise specified.

B. Wood materials for concrete forms and falsework shall conform to the following requirements:

1. Lumber for bracing, shoring, or supporting forms shall be Douglas Fir or Southern Pine, construction grade or better, in conformance with U.S. Product Standard PS20. All lumber used for forms, shoring or bracing shall be new material.

2. Plywood for concrete formwork shall be new, waterproof, synthetic resin bonded, exterior type Douglas Fir or Southern Pine high density overlaid (HDO) plywood manufactured especially for concrete formwork and shall conform to the requirements of PS1 for Concrete Forms, Class I, and shall be edge sealed. Thickness shall be as required to support concrete at the rate it is placed, but not less than 5/8-inch thick.

C. Other form materials such as metal, fiberglass, or other acceptable material that will not adversely affect the concrete and will facilitate placement of concrete to the shape, form, line and grade indicated may be submitted to the Engineer for approval, but only materials that will produce a smooth form finish equal or better than the wood materials specified will be considered.

2.02 FORMWORK ACCESSORIES

A. Form ties shall be provided with a plastic cone or other suitable means for forming a conical hole to insure that the form tie may be broken off back of the face of the concrete. The maximum diameter of removable cones for rod ties, or of other removable form-tie

fasteners having a circular cross-section, shall not exceed 7/8-inch, and all such fasteners shall be such as to leave holes of regular shape for reaming.

B. Form ties for water-retaining structures shall have integral waterstops. Removable taper ties may be used when acceptable to the Engineer. A preformed mechanical EPDM rubber plug shall be used to seal the hole left after the removal of the taper tie. Plug shall be X-Plug by the Greenstreak Group, Inc., or approved equal. Friction fit plugs shall not be used.

C. Form release agent shall be a blend of natural and synthetic chemicals that employs a chemical reaction to provide quick, easy and clean release of concrete from forms. It shall not stain the concrete and shall leave the concrete with a paintable surface. Formulation of the form release agent shall be such that it would minimize formation of "bug holes" in cast-in-place concrete.

PART 3 -- EXECUTION

3.01 FORM DESIGN

A. Forms and falsework shall be designed for total dead load, plus all construction live load as outlined in ACI 347. Design and engineering of formwork and safety considerations during construction shall be the responsibility of the Contractor.

B. Forms shall be of sufficient strength and rigidity to maintain their position and shape under the loads and operations incident to placing and vibrating the concrete. The maximum deflection of facing materials reflected in concrete surfaces exposed to view shall be 1/240 of the span between structural members.

C. All forms shall be designed for predetermined placing rates per hour, considering expected air temperatures and setting rates.

3.02 CONSTRUCTION

A. The type, size, quality, and strength of all materials from which forms are made shall be subject to the approval of the Engineer. No falsework or forms shall be used which are not clean and suitable. Deformed, broken or defective falsework and forms shall be removed from the work.

B. Forms shall be smooth and free from surface irregularities. Suitable and effective means shall be provided on all forms for holding adjacent edges and ends of panels and sections tightly together and in accurate alignment so as to prevent the formation of ridges, fins, offsets, or similar surface defects in the finished concrete. Joints between the forms shall be sealed to eliminate any irregularities. The arrangement of the facing material shall be orderly and symmetrical, with the number of seams kept to a practical minimum.

C. Forms shall be true to line and grade, and shall be sufficiently rigid to prevent displacement and sagging between supports. Curved forms shall be used for curved and circular structures. Straight panels joined at angles will not be acceptable for forming curved structures. Forms shall be properly braced or tied together to maintain their position and shape under a load of freshly-placed concrete. Facing material shall be supported with studs or other backing which shall prevent both visible deflection marks in the concrete and deflections beyond the tolerances specified.

D. Forms shall be mortar tight so as to prevent the loss of water, cement and fines during placing and vibrating of the concrete. Specifically, the bottom of wall forms that rest on concrete footings or slabs shall be provided with a gasket to prevent loss of fines and paste during placement and vibration of concrete. Such gasket may be a 1 to 1-1/2 inch diameter polyethylene rod held in position to the underside of the wall form.

E. All vertical surfaces of concrete members shall be formed, and side forms shall be provided for all footings, slab edges and grade beams, except where placement of the concrete against the ground is called for on the Drawings. Not less than 1-inch of concrete shall be added to the thickness of the concrete member as shown where concrete is permitted to be placed against trimmed ground in lieu of forms. Such permission will be granted only for members of comparatively limited height and where the character of the ground is such that it can be trimmed to the required lines and will stand securely without caving or sloughing until the concrete has been placed.

F. All forms shall be constructed in such a manner that they can be removed without hammering or prying against the concrete. Wood forms shall be constructed for wall openings to facilitate loosening and to counteract swelling of the forms.

G. Adequate clean-out holes shall be provided at the bottom of each lift of forms. Temporary openings shall be provided at the base of column forms and wall forms and at other points to facilitate cleaning and observation immediately before the concrete is deposited. The size, number and location of such clean-outs shall be as acceptable to the Engineer.

H. Construction joints shall not be permitted at locations other than those shown or specified, except as may be acceptable to the Engineer. When a second lift is placed on hardened concrete, special precautions shall be taken in the way of the number, location and tightening of ties at the top of the old lift and bottom of the new to prevent any unsatisfactory effect whatsoever on the concrete. For flush surfaces at construction joints exposed to view, the contact surface of the form sheathing over the hardened concrete in the previous placement shall be lapped by not more than 1 inch. Forms shall be held against hardened concrete to prevent offset or loss of mortar at construction joints and to maintain a true surface.

I. The formwork shall be cambered to compensate for anticipated deflections in the formwork due to the weight and pressure of the fresh concrete and due to construction loads. Set forms and intermediate screed strips for slabs accurately to produce the designated

elevations and contours of the finished surface. Ensure that edge forms and screed strips are sufficiently strong to support vibrating screeds or roller pipe screeds if the nature of the finish specified requires the use of such equipment. When formwork is cambered, set screeds to a like camber to maintain the proper concrete thickness.

J. Positive means of adjustment (wedges or jacks) for shores and struts shall be provided and all settlement shall be taken up during concrete placing operation. Shores and struts shall be securely braced against lateral deflections. Wedges shall be fastened firmly in place after final adjustment of forms prior to concrete placement. Formwork shall be anchored to shores or other supporting surfaces or members to prevent upward or lateral movement of any part of the formwork system during concrete placement. If adequate foundation for shores cannot be secured, trussed supports shall be provided.

K. Runways shall be provided for moving equipment with struts or legs. Runways shall be supported directly on the formwork or structural member without resting on the reinforcing steel.

3.03 TOLERANCES

A. Unless otherwise indicated in the Contract Documents, formwork shall be constructed so that the concrete surfaces will conform to the tolerance limits listed in ACI 117.

B. Structural framing of reinforced concrete around elevators and stairways shall be accurately plumbed and located within 1/4 in. tolerance from established dimensions.

C. The Contractor shall establish and maintain in an undisturbed condition and until final completion and acceptance of the project, sufficient control points and bench marks to be used for reference purposes to check tolerances. Plumb and string lines shall be installed before concrete placement and shall be maintained during placement. Such lines shall be used by Contractor's personnel and by the Engineer and shall be in sufficient number and properly installed. During concrete placement, the Contractor shall continually monitor plumb and string line form positions and immediately correct deficiencies.

D. Regardless of the tolerances specified, no portion of the building shall extend beyond the legal boundary of the building.

3.04 FORM ACCESSORIES

A. Suitable moldings shall be placed to bevel or round all exposed corners and edges of beams, columns, walls, slabs, and equipment pads. Chamfers shall be 3/4 inch unless otherwise noted.

B. Form ties shall be so constructed that the ends, or end fasteners, can be removed without causing appreciable spalling at the faces of the concrete. After ends, or end fasteners of form ties have been removed, the embedded portion of the ties shall terminate not less than

2 inches from the formed face of the concrete that is exposed to water or enclosed surfaces above the water surface, and not less than 1 inch from the formed face of all other concrete. Holes left by the removal of form tie cones shall be reamed with suitable toothed reamers so as to leave the surface of the holes clean and rough before being filled with mortar as specified in Section 03350 - Concrete Finishing. No form-tying device or part thereof, other than metal, shall be left embedded in the concrete. Ties shall not be removed in such manner as to leave a hole extending through the interior of the concrete member. The use of snap-ties which cause spalling of the concrete upon form stripping or tie removal will not be permitted. No snap ties shall be broken off until the concrete is at least three days old. If steel panel forms are used, rubber grommets shall be provided where the ties pass through the form in order to prevent loss of cement paste.

3.05 APPLICATION - FORM RELEASE AGENT

Forms for concrete surfaces that will not be subsequently waterproofed shall be coated with a form release agent. Form release agent shall be applied on formwork in accordance with manufacturer's recommendations.

3.06 INSERTS AND EMBEDDED ITEMS

Sleeves, pipe stubs, inserts, anchors, expansion joint material, waterstops, and other embedded items shall be positioned accurately and supported against displacement prior to concreting. Voids in sleeves, inserts, and anchor slots shall be filled temporarily with readily removable material to prevent the entry of concrete into the voids.

3.07 FORM CLEANING AND REUSE

The inner faces of all forms shall be thoroughly cleaned prior to concreting. Forms may be reused only if in good condition and only if acceptable to the Engineer. Light sanding between uses will be required wherever necessary to obtain uniform surface texture. Unused tie rod holes in forms shall be covered with metal caps or shall be filled by other methods acceptable to the Engineer.

3.08 FORM REMOVAL AND SHORING

A. Forms shall not be disturbed until the concrete has attained sufficient strength. Sufficient strength shall be demonstrated by structural analysis considering proposed loads, strength of forming and shoring system, and concrete strength data. Shoring shall not be removed until the supported member has acquired sufficient strength to support its weight and the load upon it. Members subject to additional loads during construction shall be adequately shored to sustain all resulting stresses. Forms shall be removed in such manner as not to impair safety and serviceability of the structure. All concrete to be exposed by form removal shall have sufficient strength not to be damaged thereby.

B. Provided the strength requirements specified above have been met and subject to the Engineer's approval, forms may be removed at the following minimum times. The Contractor shall assume full responsibility for the strength of all such components from which forms are removed prior to the concrete attaining its full design compressive strength. Shoring may be required at the option of the Engineer beyond these periods.

Ambient Temperature (°F.) During Concrete Placement

	Over 95°	70°-95°	60°-70°	50°-60°	Below 50°
Walls	5 days	2 days	2 days	3 days	Do not remove until directed by Engineer (7 days minimum)
Columns	7 days	2 days	3 days	4 days	
Beam Soffits	10 days	7 days	7 days	7 days	
Elevated Slabs	12 days	7 days	7 days	7 days	

C. When, in the opinion of the Engineer, conditions of the work or weather justify, forms may be required to remain in place for longer periods of time.

D. An accurate record shall be maintained by the Contractor of the dates of concrete placings and the exact location thereof and the dates of removal of forms. These records shall be available for inspection at all times at the site, and two copies shall be furnished the Engineer upon completion of the concrete work.

3.09 RESHORING

A. When reshoring is permitted or required the operations shall be planned in advance and subjected to approval by the Engineer.

B. Reshores shall be placed after stripping operations are complete but in no case later than the end of the working day on which stripping occurs.

C. Reshoring for the purpose of early form removal shall be performed so that at no time will large areas of new construction be required to support their own weight. While reshoring is under way, no construction or live loads shall be permitted on the new construction. Reshores shall be tightened to carry their required loads but they shall not be overtightened so that the new construction is overstressed. Reshores shall remain in place until the concrete has reached its specified 28-day strength, unless otherwise specified.

D. For floors supporting shores under newly placed concrete, the original supporting shores shall remain in place or reshores shall be placed. The shoring or reshoring system shall have a capacity sufficient to resist the anticipated loads and in all cases shall have a capacity equal to at least one-half of the capacity of the shoring system above. Reshores shall be located directly under a reshore position above unless other locations are permitted.

E. In multi-story buildings, reshoring shall extend over a sufficient number of stories to distribute the weight of newly placed concrete, forms, and construction live loads so the design superimposed loads of the floors supporting shores are not exceeded.

+++ END OF SECTION 03100 +++

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SECTION 03200

REINFORCING STEEL

PART 1 -- GENERAL

1.01 THE REQUIREMENTS

A. Provide all concrete reinforcing including all cutting, bending, fastening and any special work necessary to hold the reinforcing steel in place and protect it from injury and corrosion in accordance with the requirements of this section.

B. Provide deformed reinforcing bars to be grouted into reinforced concrete masonry walls.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 03100 - Concrete Formwork

B. Section 03250 - Concrete Accessories

C. Section 03300 - Cast-in-Place Concrete

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.

1. Georgia State Minimum Standard Building Code

2. CRSI - Concrete Reinforcing Institute Manual of Standard Practice

3. ACI SP66 - ACI Detailing Manual

4. ACI 315 - Details and Detailing of Concrete Reinforcing

5. ACI 318 - Building Code Requirements for Structural Concrete

6. ICC-ES AC193 Acceptance Criteria for Expansion and Screw Anchors (Concrete)

7. WRI - Manual of Standard Practice for Welded Wire Fabric

8. ASTM A 615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcing

9. ASTM A 1064- Standard Specification for Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete

1.04 SUBMITTALS

A. Submit the following in accordance with Section 01300, Submittals.

1. Detailed placing and shop fabricating drawings, prepared in accordance with ACI 315 and ACI Detailing Manual - (SP66), shall be furnished for all concrete reinforcing. These drawings shall be made to such a scale as to clearly show joint locations, openings, and the arrangement, spacing and splicing of the bars.

2. Mill test certificates - 3 copies of each.

3. Description of the reinforcing steel manufacturer's marking pattern.

4. Requests to relocate any bars that cause interferences or that cause placing tolerances to be violated.

5. Proposed supports for each type of reinforcing.

6. Request to use splices not shown on the Drawings.

7. Request to use mechanical couplers along with manufacturer's literature on mechanical couplers with instructions for installation, and certified test reports on the couplers' capacity.

8. Request for placement of column dowels without the use of templates.

9. Request and procedure to field bend or straighten partially embedded reinforcing.

10. International Code Council–Evaluation Services Report (ICC-ES ESR) for dowel adhesives.

11. Certification that all installers of dowel adhesive are certified as Adhesive Anchor Installers in accordance with the ACI-CRSI Anchor Installer Certification Program.

12 Adhesive dowel testing plan.

1.05 QUALITY ASSURANCE

A. If requested by the Engineer, the Contractor shall provide samples from each load of reinforcing steel delivered in a quantity adequate for testing. Costs of initial tests will be paid by the Owner. Costs of additional tests due to material failing initial tests shall be paid by the Contractor.

B. Provide a list of names of all installers who are trained by the Manufacturer's Field Representative on this jobsite prior to installation of products. Record must include the installer name, date of training, products included in the training and trainer name and contact information.

C. Provide a copy of the current ACI/CRSI "Adhesive Anchor Installer" certification cards for all installers who will be installing adhesive anchors in the horizontal to vertically overhead orientation.

D. Special inspections for adhesive dowels shall be conducted in accordance with the manufacturer's instructions and Specification Section 01450. Downward installations require periodic inspection and horizontal and overhead installations require continuous inspection.

PART 2 -- PRODUCTS

2.01 REINFORCING STEEL

A. Bar reinforcing shall conform to the requirements of ASTM A 615 for Grade 60 Billet Steel reinforcing. All reinforcing steel shall be from domestic mills and shall have the manufacturer's mill marking rolled into the bar which shall indicate the producer, size, type and grade. All reinforcing bars shall be deformed bars. Smooth reinforcing bars shall not be used unless specifically called for on Drawings.

B. Welded wire fabric reinforcing shall conform to the requirements of ASTM A 1064 and the details shown on the Drawings.

C. A certified copy of the mill test on each load of reinforcing steel delivered showing physical and chemical analysis shall be provided, prior to shipment. The Engineer reserves the right to require the Contractor to obtain separate test results from an independent testing laboratory in the event of any questionable steel. When such tests are necessary because of failure to comply with this Specification, such as improper identification, the cost of such tests shall be borne by the Contractor.

D. Field welding of reinforcing steel will not be allowed.

E. Use of coiled reinforcing steel will not be allowed.

2.02 ACCESSORIES

A. Accessories shall include all necessary chairs, slab bolsters, concrete blocks, tie wires, dips, supports, spacers and other devices to position reinforcing during concrete placement. Wire bar supports shall be plastic protected (CRSI Class 1).

B. Concrete blocks (dobies), used to support and position bottom reinforcing steel, shall have the same or higher compressive strength as specified for the concrete in which it is located.

2.03 MECHANICAL COUPLERS

A. Mechanical couplers shall develop a tensile strength which exceeds 100 percent of the ultimate tensile strength and 125 percent of the yield strength of the reinforcing bars being spliced. The reinforcing steel and coupler used shall be compatible for obtaining the required strength of the connection.

B. Where the type of coupler used is composed of more than one component, all components required for a complete splice shall be supplied.

C. Hot forged sleeve type couplers shall not be used. Acceptable mechanical couplers are Dayton Superior Dowel Bar Splicer System by Dayton Superior, Dayton, Ohio, or approved equal. Mechanical couplers shall only be used where shown on the Drawings or where specifically approved by the Engineer.

D. Where the threaded rebar to be inserted into the coupler reduces the diameter of the bar, the threaded rebar piece shall be provided by the coupler manufacturer.

2.04 DOWEL ADHESIVE SYSTEM

A. Where shown on the Drawings, reinforcing bars anchored into hardened concrete with a dowel adhesive system shall use a two-component adhesive mix which shall be injected with a static mixing nozzle following manufacturer's instructions.

B. All holes shall be drilled in accordance with the manufacturer’s instructions except that core drilled holes shall not be permitted unless specifically allowed by the Engineer. Cored holes, if allowed by the manufacturer and approved by the Engineer, shall be roughened in accordance with manufacturer’s requirements.

C. Thoroughly clean drill holes of all debris, drill dust, and water in accordance with manufacturer’s instructions prior to installation of adhesive and reinforcing bar.

D. Degree of hole dampness shall be in strict accordance with manufacturer recommendations. Installation conditions shall be either dry or water-saturated. Water filled or submerged holes shall not be permitted unless specifically approved by the Engineer.

E. Injection of adhesive into the hole shall be performed in a manner to minimize the formation of air pockets in accordance with the manufacturer's instructions.

F. Embedment Depth:

1. The embedment depth of the bar shall be as shown on the Drawings. Although all manufacturers listed below are permitted, the embedment depth shown on the Drawings is based on "Pure 110+" by DeWalt" ESR 3298 issued 7/2016. If the Contractor submits one of the other named dowel adhesives from the list below, the Engineer shall evaluate the required embedment and the Contractor shall provide the required embedment depth stipulated by the Engineer specific to the approved dowel adhesive.

2. Where the embedment depth is not shown on the Drawings, the embedment depth shall be determined to provide the minimum allowable bond strength equal to the tensile strength of the rebar according to the manufacturer's ICC-ES ESR.

3. The embedment depth shall be determined using the actual concrete compressive strength, a cracked concrete state, maximum long term temperature of 110 degrees F, and maximum short term temperature of 140 degrees F. In no case shall the embedment depth be less than the minimum, or more than the maximum, embedment depths stated in the manufacturer's ICC-ES ESR.

G. Engineer's approval is required for use of this system in locations other than those shown on the Drawings.

H. The adhesive system shall be IBC compliant for use in both cracked and uncracked concrete in all Seismic Design Categories and shall be "Epcon C6+ Adhesive Anchoring System" as manufactured by ITW Redhead, " HIT-HY 200 Adhesive Anchoring System" as manufactured by Hilti, Inc. "SET-XP Epoxy Adhesive Anchors" as manufactured by Simpson Strong-Tie Co. or "Pure 110+ Epoxy Adhesive Anchor System" by DeWalt. Fast-set epoxy formulations shall not be acceptable. No or equal products will be considered, unless pre-qualified and approved.

I. All individuals installing dowel adhesive system shall be certified as an Adhesive Anchor Installer in accordance with the ACI-CRSI Anchor Installation Certification Program.

PART 3 – EXECUTION

3.01 TEMPERATURE REINFORCING

Unless otherwise shown on the Drawings or in the absence of the concrete reinforcing being shown, the minimum cross sectional area of horizontal and vertical concrete reinforcing in walls shall be 0.0033 times the gross concrete area and the minimum cross

sectional area of reinforcing perpendicular to the principal reinforcing in slabs shall be 0.0020 times the gross concrete area. Temperature reinforcing shall not be spaced further apart than five times the slab or wall thickness, nor more than 18 inches.

3.02 FABRICATION

A. Reinforcing steel shall be accurately formed to the dimensions and shapes shown on the Drawings and the fabricating details shall be prepared in accordance with ACI 315 and ACI 318, except as modified by the Drawings.

B. The Contractor shall fabricate reinforcing bars for structures in accordance with the bending diagrams, placing lists and placing Drawings.

C. No fabrication shall commence until approval of Shop Drawings has been obtained. All reinforcing bars shall be shop fabricated unless approved to be bent in the field. Reinforcing bars shall not be straightened or rebent in a manner that will injure the material. Heating of bars will not be permitted.

D. Welded wire fabric with longitudinal wire of W9.5 size or smaller shall be either furnished in flat sheets or in rolls with a core diameter of not less than 10 inches. Welded wire fabric with longitudinal wires larger than W9.5 size shall be furnished in flat sheets only.

3.03 DELIVERY, STORAGE AND HANDLING

A. All reinforcing shall be neatly bundled and tagged for placement when delivered to the job site. Bundles shall be properly identified for coordination with mill test reports.

B. Reinforcing steel shall be stored above ground on platforms or other supports and shall be protected from the weather at all times by suitable covering. It shall be stored in an orderly manner and plainly marked to facilitate identification.

C. Reinforcing steel shall at all times be protected from conditions conducive to corrosion until concrete is placed around it.

D. The surfaces of all reinforcing steel and other metalwork to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar and other foreign substances immediately before the concrete is placed. Where there is delay in depositing concrete, reinforcing shall be reinspected and if necessary recleaned.

3.04 PLACING

A. Reinforcing steel shall be accurately positioned as shown on the Drawings and shall be supported and wired together to prevent displacement, using annealed iron wire ties or suitable clips at intersections. All reinforcing steel shall be supported by concrete, plastic or plastic protected (CRSI Class 1) metal supports, spacers or metal hangers which are strong and rigid enough to prevent any displacement of the reinforcing steel. Where

concrete is to be placed on the ground, supporting concrete blocks (or dobies) shall be used in sufficient numbers to support the reinforcing bars without settlement. In no case shall concrete block supports be continuous.

B. The portions of all accessories in contact with the formwork shall be made of plastic or steel coated with a 1/8 inch minimum thickness of plastic which extends at least 1/2 inch from the concrete surface. Plastic shall be gray in color.

C. Tie wires shall be bent away from the forms in order to provide the specified concrete coverage.

D. Reinforcing bars additional to those shown on the Drawings, which may be found necessary or desirable by the Contractor for the purpose of securing reinforcing in position, shall be provided by the Contractor at no additional cost to the Owner.

E. Reinforcing placing, spacing, and protection tolerances shall be within the limits specified in ACI 318 except where in conflict with the Building Code, unless otherwise specified.

F. Reinforcing bars may be moved within one bar diameter as necessary to avoid interference with other concrete reinforcing, conduits, or embedded items. If bars are moved more than one bar diameter, or enough to exceed placing tolerances, the resulting arrangement of bars shall be as acceptable to the Engineer.

G. Welded wire fabric shall be supported on slab bolsters spaced not less than 30 inches on centers, extending continuously across the entire width of the reinforcing mat and supporting the reinforcing mat in the plane shown on the Drawings.

H. Reinforcing shall not be straightened or rebent unless specifically shown on the drawings. Bars with kinks or bends not shown on the Drawings shall not be used. Coiled reinforcement shall not be used.

I. Dowel Adhesive System shall be installed in strict conformance with the manufacturer's recommendations and as required in Article 2.04 above. A representative of the manufacturer must be on site prior to adhesive dowel installation to provide instruction on proper installation procedures for all adhesive dowel installers. Testing of adhesive dowels shall be as indicated below. If the dowels have a hook at the end to be embedded in subsequent work, an approved mechanical coupler shall be provided at a convenient distance from the face of existing concrete to facilitate adhesive dowel testing while maintaining required hook embedment in subsequent work.

J. All adhesive dowel installations in the horizontal or overhead orientation shall be conducted by a certified Adhesive Anchor Installer as certified by ACI/CSRI per ACI 318-11 9.2.2. Current AAI Certificated must be submitted to the Engineer of Record for approval prior to commencement of any adhesive anchor installations.

K. Adhesive Dowel Testing

1. At all locations where adhesive dowels are shown on the Drawings, at least 10 percent of all adhesive dowels installed shall be tested to the value indicated on the Drawings, with a minimum of one tested dowel per group. If no test value is indicated on the Drawings but the installed dowel is under direct tension, the Contractor shall notify the Engineer to verify the required test value.

2. Contractor shall submit a plan and schedule indicating locations of dowels to be tested, load test values and proposed dowel testing procedure (including a diagram of the testing equipment proposed for use) prior to conducting any testing. The testing equipment shall have a minimum of three support points and shall be of sufficient size to locate the edge of supports no closer than two times the anchor embedment depth from the center of the anchor.

3. Where Contract Documents indicate adhesive dowel design is the Contractor's responsibility, the Contractor shall submit a plan and schedule indicating locations of dowels to be tested and load test values, sealed by a Professional Engineer currently registered in the State of Georgia. The Contractor shall also submit documentation indicating the Contractor's testing procedures have been reviewed and the proposed procedures are acceptable.

4. Adhesive Dowel shall have no visible indications of displacement or damage during or after the proof test. Concrete cracking in the vicinity of the dowel after loading shall be considered a failure. Dowels exhibiting damage shall be removed and replaced. If more than 5 percent of tested dowels fail, then 100 percent of dowels shall be proof tested.

5. Proof testing of adhesive dowels shall be performed by an independent testing laboratory hired directly by the Contractor. The Contractor shall be responsible for costs of all testing, including additional testing required due to previously failed tests.

3.05 SPLICING

A. Reinforcing bar splices shall only be used at locations shown on the Drawings. When it is necessary to splice reinforcing at points other than where shown, the splice shall be as acceptable to the Engineer.

B. The length of lap for reinforcing bars, unless otherwise shown on the Drawings shall be in accordance with ACI 318 for a class B splice.

C. Laps of welded wire fabric shall be in accordance with ACI 318. Adjoining sheets shall be securely tied together with No. 14 tie wire, one tie for each 2 running feet. Wires shall be staggered and tied in such a manner that they cannot slip.

D. Mechanical splices shall be used only where shown on the drawings or when approved by the Engineer.

E. Couplers which are located at a joint face shall be a type which can be set either flush or recessed from the face as shown on the Drawings. The couplers shall be sealed during concrete placement to completely eliminate concrete or cement paste from entering. After the concrete is placed, couplers intended for future connections shall be plugged and sealed to prevent any contact with water or other corrosive materials. Threaded couplers shall be plugged with plastic plugs which have an O-ring seal.

3.06 INSPECTION

A. The Contractor shall advise the Engineer of his intentions to place concrete and shall allow him adequate time to inspect all reinforcing steel before concrete is placed.

B. The Contractor shall advise the Engineer of his intentions to place grout in masonry walls and shall allow him adequate time to inspect all reinforcing steel before grout is placed.

3.07 CUTTING OF EMBEDDED REBAR

The Contractor shall not cut embedded rebar cast into structural concrete without prior approval.

+++ END OF SECTION 03200+++

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SECTION 03250

CONCRETE ACCESSORIES

PART 1 -- GENERAL

1.01 THE REQUIREMENT

Furnish all materials, labor and equipment required to provide all concrete accessories including waterstops, expansion joint material, joint sealants, expansion joint seals, contraction joint inserts, and epoxy bonding agent.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 03100 - Concrete Formwork

B. Section 03290 - Joints in Concrete

C. Section 03300 - Cast-in-Place Concrete

D.Section 07900 Joint Fillers, Sealants and Caulking

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.

1.	ASTM C881	Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
2.	ASTM D412	Standard Tests for Rubber Properties in Tension
3.	ASTM D 624	Standard Test method for Rubber Property - Tear Resistance
4.	ASTM D 638	Standard Test Method for Tensile Properties of Plastics
5.	ASTM D1751	Standard Specifications for Preformed Expansion Joint fillers for Concrete Paving and Structural Construction (nonextruding and resilient bituminous types)

6. ASTM D 1752 Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction

7. ASTM D 1171 Standard Test Method for Ozone Resistance at 500 pphm

8. ASTM D 471 Standard Test Method for Rubber Properties

1.04 SUBMITTALS

A. Submit the following in accordance with Section 01300, Submittals.

1. Manufacturer's literature on all products specified herein including material certifications.

2. Proposed system for supporting PVC waterstops in position during concrete placement

3. Samples of products if requested by the Engineer.

PART 2 -- PRODUCTS

2.01 POLYVINYL CHLORIDE (PVC) WATERSTOPS

A. PVC waterstops for construction joints shall be flat ribbed type, 6 inches wide with a minimum thickness at any point of 3/8 inches.

B. Waterstops for expansion joints shall be ribbed with a center bulb. They shall be 9 inches wide with a minimum thickness at any point of 3/8 inch unless shown or specified otherwise. The center bulb shall have a minimum outside diameter of 1 inch and a minimum inside diameter of 1/2 inch.

C. The waterstops shall be manufactured from virgin polyvinyl chloride plastic compound and shall not contain any scrap or reclaimed material or pigment whatsoever. The properties of the polyvinyl chloride compound used, as well as the physical properties of the waterstops, shall exceed the requirements of the U.S. Army Corps. of Engineers' Specification CRD-C572. The waterstop material shall have an off-white, milky color.

D. The required minimum physical characteristics for this material are:

1. Tensile strength - 1,750 psi (ASTM D-638).

2. Ultimate elongation - not less than 280% (ASTM D-638).

E. No reclaimed PVC shall be used for the manufacturing of the waterstops. The Contractor shall furnish certification that the proposed waterstops meet the above requirements.

F. PVC waterstops shall be as manufactured by BoMetals, Inc., DuraJoint Concrete Accessories, or Sika Greenstreak.

G. All waterstop intersections, both vertical and horizontal, shall be made from factory fabricated corners and transitions. Only straight butt joint splices shall be made in field.

2.02 RETROFIT WATERSTOPS

A. Retrofit waterstops shall be used where specifically shown on Drawings for sealing joints between existing concrete construction and new construction.

B. Retrofit waterstops shall be PVC waterstops fabricated from material as described in Section 2.01 of this Specification.

C. Retrofit waterstop shall be attached to existing concrete surface as shown on Drawings.

D. Use of split waterstop in lieu of specially fabricated retrofit waterstop will not be acceptable.

E. Retrofit Waterstop manufacturer must provide a complete system including all Waterstop, stainless steel anchoring hardware, and epoxy for installation.

F. For construction joints, retrofit waterstop shall be style number 609 by Sika Greenstreak, RF-638 by BoMetals, Inc., Type 18 kit by DuraJoint Concrete Accessories, or approved equal. For expansion joints, retrofit waterstop shall be style number 667 by Sika Greenstreak, RF-912 by BoMetals, Inc., Type 18-9 kit by DuraJoint Concrete Accessories, or approved equal.

2.03 CHEMICAL RESISTANT WATERSTOPS

A. Where specifically noted on Contract Drawings, chemical resistant waterstops shall be used instead of PVC waterstops.

B. Chemical resistant waterstops for construction joints shall be ribbed with a center bulb. They shall be 6 inches wide with a minimum thickness at any point of 3/16 inches.

C. Chemical resistant waterstops for expansion joints shall be ribbed tear web. They shall be 9 inches wide with a tear web designed to accommodate 1 inch of free movement minimum.

D. Chemical resistant retrofit waterstop shall be a minimum of 2½" wide along the ribbed side and a minimum 5" wide along the side attached to the existing concrete surface. Retrofit

waterstop shall include a centerbulb and shall have a minimum thickness of 3/16". Retrofit waterstop manufacturer shall provide a complete system including waterstop, stainless steel anchoring hardware and epoxy for installation.

E. Chemical resistant waterstops shall be manufactured from a fully crosslinked thermoplastic vulcanizate rubber.

F. Waterstops shall be TPER by BoMetals, Inc., Earth Shield TPV/TPE-R by JP Specialties, Inc., Westec TPER by Westec Barrier Technologies, or TPE-R by DuraJoint Concrete Accessories.

2.04 HYPALON RUBBER WATERSTOPS

Hypalon rubber waterstops shall be Sikadur Combiflex by Sika Corporation or approved equal. Minimum width of waterstop material shall be twelve (12) inches unless shown otherwise on Contract Drawings.

2.05 EXPANDING RUBBER WATERSTOP

A. Expanding rubber shall be designed to expand under hydrostatic conditions. Waterstops shall be Adeka Ultra Seal MC-2010MN by Adeka Ultra Seal/OCM, Inc., or Hydrotite CJ-1020-2K by Sika Greenstreak, for concrete thickness greater than nine inches. For thicknesses less than nine inches, Adeka Ultra Seal KBA-1510FF or Hydrotite CJ-1020-2K shall be used.

B. Waterstop shall be a chemically modified natural rubber product with a hydrophilic agent.

C. Waterstop has a stainless steel mesh or coextrusion of non-hydrophilic rubber to direct expansion in the thickness direction and restrict the expansion in the longitudinal direction.

2.06 WATERSTOP ADHESIVE

A. Adhesive between waterstops and existing concrete shall be 20+F Contact Cement by Miracle Adhesives Corporation, Neoprene Adhesive 77-198 by JGF Adhesives, Sikadur 31 Hi-Mod Gel by Sika Corporation, DP-605 NS Urethane Adhesive by 3M Adhesive Systems.

B. Hydrophilic, non-bentonite water swelling elastic sealant shall be used to bond expanding rubber waterstops to rough surfaces. Hydrophilic elastic sealant shall be P-201 by Adeka Ultra Seal/OCM, Inc., Leakmaster LV-1 by Sika Greenstreak, or approved equal.

2.07 JOINT SEALANTS

Joint sealants shall comply with Section 07900, Joint Fillers, Sealants, and Caulking.

2.08 EXPANSION JOINT MATERIAL

A. Preformed expansion joint material shall be non-extruding, and shall be of the following types:

1. Type I - Sponge rubber, conforming to ASTM D1752, Type I.

2. Type II - Cork, conforming to ASTM D1752, Type II.

3. Type III - Self-expanding cork, conforming to ASTM D1752, Type III.

4. Type IV - Bituminous fiber, conforming to ASTM Designation D1751.

2.09 EXPANSION JOINT SEAL

A. Expansion Joint Seal System shall consist of a preformed neoprene profile, installed using the same dimensions as the joint gap, bonded with a two-component epoxy adhesive and pressurized during the adhesive cure time.

B. The expansion joint system shall be Hydrozo/Jeene Structural Sealing joint system by Hydrozo/Jeene, Inc.

2.10 CONTRACTION JOINT INSERTS

Contraction joint inserts shall be Zip-Cap by Greenstreak Plastic Products, Zip-Joint by BoMetals, Inc. control joint formers.

2.11 EPOXY BONDING AGENT

Epoxy bonding agent shall conform to ASTM C881 and shall be Sikadur 32 Hi-Mod, Sika Corporation, Lyndhurst, N.J.; Euco #452 Epoxy System, Euclid Chemical Company, Cleveland, OH, MasterInject 1500 by BASF Master Builder Solutions (BASF).

2.12 EPOXY RESIN BINDER

Epoxy resin binder shall conform to the requirements of ASTM C-881, Type III, Grade 3, Class B and C for epoxy resin binder and shall be Sikadur 23, Low-Mod-Gel, manufactured by the Sika Corporation, Lyndhurst, N.J., Flexocrete Gel manufactured by DuraJoint Concrete Accessories or Euco #352 Gel, Euclid Chemical Company, MasterEmaco ADH 327 or 327 RS by BASF Master Builder Solutions.

PART 3 -- EXECUTION

3.01 PVC AND CHEMICAL RESISTANT WATERSTOPS

A. PVC and chemical resistant waterstops shall be provided in all construction and expansion joints in water bearing structures and at other such locations as required by the Drawings.

B. Waterstops shall be carefully positioned so that they are embedded to an equal depth in concrete on both sides of the joint. They shall be kept free from oil, grease, mortar or other foreign matter. To ensure proper placement, all waterstops shall be secured in correct position at 12" on center along the length of the waterstop on each side, prior to placing concrete. Such method of support shall be submitted to the Engineer for review and approval. Grommets or small pre-punched holes as close to the edges as possible will be acceptable for securing waterstops.

C. Splices in PVC waterstops and chemical resistant waterstops shall be made with a thermostatically controlled heating element. Only straight butt joint splices will be allowed in the field. Factory fabricated corners and transitions shall be used at all intersections. Splices shall be made in strict accordance with the manufacturer's recommended instructions and procedures. At least three satisfactory sample splices shall be made on the site. The Engineer may require tests on these splices by an approved laboratory. The splices shall exhibit not less than 80 percent of the strength of the unspliced material.

D. All splices in waterstops will be subject to rigid review for misalignment, bubbles, inadequate bond, porosity, cracks, offsets, discoloration, charring, and other defects which would reduce the potential resistance of the material to water pressure at any point. All defective joints shall be replaced with material which will pass said review and all faulty material shall be removed from the site and disposed of by the Contractor at no additional cost to the Owner.

E. Retrofit waterstops shall be installed as shown on Contract Drawings using approved waterstop adhesive and Type 316 stainless steel batten bars and expansion anchors.

F. Waterstop installation and splicing defects which are unacceptable include, but are not limited to the following:

1. Tensile strength not less than 80 percent of parent material.

2. Overlapped (not spliced) Waterstop.

3. Misalignment of Waterstop geometry at any point greater than 1/16 inch.

4. Visible porosity or charred or burnt material in weld area.

5. Visible signs of splice separation when splice (24 hours or greater) is bent by hand at sharp angle.

3.02 HYPALON RUBBER AND EXPANDING RUBBER WATERSTOPS

A. Waterstops shall be installed only where shown on the Drawings.

B. Waterstops shall be installed in strict accordance with manufacturer's recommendations.

3.03 WATERSTOP ADHESIVE

A. Adhesive shall be applied to both contact surfaces in strict accordance with manufacturer's recommendations.

B. Adhesive shall be used where waterstops are attached to existing concrete surfaces.

3.04 INSTALLATION OF EXPANSION JOINT MATERIAL AND SEALANTS

A. Type I, II, or III shall be used in all expansion joints in structures and concrete pavements unless specifically shown otherwise on the Drawings. Type IV shall be used in sidewalk and curbing and other locations specifically shown on the Drawings.

B. All expansion joints exposed in the finish work, exterior and interior, shall be sealed with the specified joint sealant. Expansion joint material and sealants shall be installed in accordance with manufacturer's recommended procedures and as shown on the Drawings.

C. Expansion joint material that will be exposed after removal of forms shall be cut and trimmed to ensure a neat appearance and shall completely fill the joint except for the space required for the sealant. The material shall be held securely in place and no concrete shall be allowed to enter the joint or the space for the sealant and destroy the proper functions of the joint.

D. A bond breaker shall be used between expansion joint material and sealant. The joint shall be thoroughly clean and free from dirt and debris before the primer and the sealant are applied. Where the finished joint will be visible, masking of the adjoining surfaces shall be carried out to avoid their discoloration. The sealant shall be neatly tooled into place and its finished surfaces shall present a clean and even appearance.

E. Type 1 joint sealant shall be used in all expansion and contraction joints in concrete, except where Type 7 or Type 8 is required as stated below, and wherever else specified or shown on the Drawings. It shall be furnished in pour grade or gun grade depending on installation requirements. Primers shall be used as required by the manufacturer. The sealant shall be furnished in colors as directed by the Engineer.

F. Type 8 joint sealant shall be used in all concrete pavements and floors subject to heavy traffic and wherever else specified or shown on the Drawings.

G. Type 7 joint sealant shall be used for all joints in chlorine contact tanks and wherever specified or shown on the Drawings.

3.05 EXPANSION JOINT SEAL

The expansion joint seal system shall be installed as shown on the Drawings in strict accordance with the manufacturer's recommendations.

3.06 CONTRACTION JOINT INSERTS

A. For contraction joints in slabs, inserts shall be floated in fresh concrete during finishing.

B. For contraction joints in walls, inserts shall be secured in place prior to casting wall.

C. Inserts shall be installed true to line at the locations of all contraction joints as shown on the Drawings.

D. Inserts shall extend into concrete sufficient depth as indicated on the Drawings or specified in Section 03290, Joints in Concrete.

E. Inserts shall not be removed from concrete until concrete has cured sufficiently to prevent chipping or spalling of joint edges due to inadequate concrete strength.

3.07 EPOXY BONDING AGENT

A. The Contractor shall use an epoxy bonding agent for bonding fresh concrete to existing concrete as shown on the Drawings.

B. Bonding surface shall be clean, sound and free of all dust, laitance, grease, form release agents, curing compounds, and any other foreign particles.

C. Application of bonding agent shall be in strict accordance with manufacturer's recommendations.

D. Fresh concrete shall not be placed against existing concrete if epoxy bonding agent has lost its tackiness.

3.08 EPOXY RESIN BINDER

Epoxy resin binder shall be used to seal all existing rebar cut and burned off during demolition operations. Exposed rebar shall be burned back 1/2-inch minimum into existing concrete and the resulting void filled with epoxy resin binder.

+++END OF SECTION +++

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SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Provide all labor, equipment, materials and services necessary for the manufacture, transportation and placement of all plain and reinforced concrete work, as shown on the Drawings or as ordered by the Engineer.

B. The requirements in this section shall apply to the following types of concrete:

1. Class A Concrete: Normal weight structural concrete in all structures, sidewalks and pavement.

2. Class B Concrete: Normal weight structural concrete used for duct bank encasements, catch basins, fence and guard post embedment, concrete fill, and other areas where specifically noted on Contract Drawings.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 03100 - Concrete Formwork

B. Section 03200 - Reinforcing Steel

C. Section 03250 - Concrete Accessories

D. Section 03290 - Joints in Concrete

E. Section 03350 - Concrete Finishes

F. Section 03370 - Concrete Curing

G. Section 03600 - Grout

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Without limiting the generality of the Specifications, all work herein shall conform to or exceed the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.

1.	Georgia State Minimum Standard Building Code	
2.	ACI 214	Guide to Evaluation of Strength Test Results of Concrete
3.	ACI 301	Specifications for Structural Concrete
4.	ACI 304	Guide for Measuring, Mixing, Transporting, and Placing Concrete
5.	ACI 305	Guide to Hot Weather Concreting
6.	ACI 306	Guide to Cold Weather Concreting
7.	ACI 309	Guide for Consolidation of Concrete
8.	ACI 318	Building Code Requirements for Structural Concrete and Commentary
9.	ACI 350	Code Requirements for Environmental Engineering Concrete Structures
10.	ASTM C 31	Standard Practice for Making and Curing Concrete Test Specimens in the Field
11.	ASTM C 33	Standard Specification for Concrete Aggregates
12.	ASTM C 39	Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
13.	ASTM C42	Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
14.	ASTM C 88	Standard Test Method for Soundness of Aggregates by use of Sodium Sulfate or Magnesium Sulfate
15.	ASTM C 94	Standard Specification for Ready-Mixed Concrete
16.	ASTM C 114	Standard Test Method for Chemical Analysis of Hydraulic Cement
17.	ASTM C 136	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
18.	ASTM C 138	Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete

19.	ASTM C 143	Standard Test Method for Slump of Hydraulic Cement Concrete
20.	ASTM C 150	Standard Specification for Portland Cement
21.	ASTM C 172	Standard Practice for Sampling Freshly Mixed Concrete
22.	ASTM C 192	Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory
23.	ASTM C 231	Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
24.	ASTM C 260	Standard Specification for Air-Entraining Admixtures for Concrete
25.	ASTM C 295	Standard Guide for Petrographic Examination of Aggregates for Concrete
26.	ASTM C 457	Standard Test Method for Microscopical Determination of the Air-Void System in Hardened Concrete
27.	ASTM C 494	Standard Specification for Chemical Admixtures for Concrete
28.	ASTM C 595	Standard Specification for Blended Hydraulic Cements
29.	ASTM C 618	Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
30.	ASTM C 989	Standard Specification for Slag Cement for Use in Concrete and Mortars
31.	ASTM C 1077	Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
32.	ASTM C 1260	Test Method for Potential Alkali Reactivity of Aggregates (Mortar Bar Method)
33.	ASTM C 1567	Standard Test Method for Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)
34.	ASTM C 1602	Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete

35. ASTM C 1778 Reducing the Risk of Deleterious Alkali – Aggregate Reaction in Concrete

1.04 SUBMITTALS

A. Submit the following in accordance with Section 01300 Submittal Procedures.

1. Sources of all materials and certifications of compliance with specifications for all materials.

2. Certified current (less than 1 year old) chemical analysis of the Portland Cement or Blended Cement to be used.

3. Certified current (less than 1 year old) chemical analysis of fly ash or slag cement to be used.

4. Aggregate test results showing compliance with required standards, i.e., sieve analysis, potential reactivity, aggregate soundness tests, petrographic analysis, mortar bar expansion testing, etc.

5. Manufacturer's data on all admixtures stating compliance with required standards.

6. Concrete mix design for each class of concrete specified herein.

7. Field experience records and/or trial mix data for the proposed concrete mixes for each class of concrete specified herein.

1.05 QUALITY ASSURANCE

A. Tests on materials used in the production of concrete shall be required as specified in PART 2 -- PRODUCTS. These tests shall be performed by an independent testing laboratory approved by the Engineer at no additional cost to the Owner.

B. Trial concrete mixes shall be tested when required in accordance with Article 3.01 at no additional cost to the Owner.

C. Field quality control tests, as specified in Article 3.10, unless otherwise stated, will be performed by a materials testing consultant employed by the Owner. However, the Contractor shall be charged for the cost of any additional tests and investigation on work performed which does not meet the Specifications. Any individual who samples and tests concrete to determine if the concrete is being produced in accordance with this Specification shall be certified as a Concrete Field Testing Technician, Grade I, in

accordance with ACI CP-2. Testing laboratory shall conform to requirements of ASTM C-1077.

1.06 CONCRETE COORDINATION CONFERENCE

A. Unless waived by the Engineer, prior to any concrete submittals and at least 35 days prior to the start of the concrete construction schedule, the Contractor shall conduct a meeting at the site. The purpose of the meeting is to review the proposed concrete mix designs, to discuss the proposed approaches and procedures for mixing, transporting, placing, testing, finishing, and curing of all aspects of concrete work to ensure the concrete construction is performed in accordance with the Specifications, and to clarify roles of the parties involved. The Contractor shall send a concrete coordination conference agenda to all attendees 20 days prior to a mutually agreed upon date for the conference.

B. As a minimum the agenda shall include:

1. Concrete Materials and Mix Designs

2. Inspection Responsibilities

3. Concrete Sampling and Testing Specification Requirements

4. Cylinder Storage and Transportation

5. Acceptance/Rejection Responsibility and Authority for Fresh Concrete

6. Concrete finishing

7. Concrete Curing

8. Test Report Distribution

9. Miscellaneous Items

C. The Contractor shall require responsible representatives of every party who is concerned with the concrete work to attend the conference, including but not limited to the following:

1. Contractor’s superintendent

2. Engineer

3. Owner’s representative (if he chooses to attend)

4. Laboratory retained for trial batching and construction quality control testing for the concrete.

5. Any subcontractors involved in placing, finishing, and curing of concrete

6. Concrete supplier

7. Concrete pumping subcontractor (if pumping is being proposed)

D. Minutes of the meeting shall be recorded, typed, and printed by the Contractor and distributed to all attendees and any other concerned parties within five days of the meeting.

PART 2 -- PRODUCTS

2.01 HYDRAULIC CEMENT

A. Portland Cement

1. Portland Cement shall be Type II conforming to ASTM C 150. Type I cement may be used provided either fly ash or slag cement is also included in the mix in accordance with Articles 2.02 or 2.03 respectively.

2. When potentially reactive aggregates as defined in Article 2.05 are to be used in concrete mix, cement shall meet the following requirements:

a. For concrete mixed with only Portland Cement, the total alkalies in the cement (calculated as the percentage of NA_2O plus 0.658 times the percentage of K_2O) shall not exceed 0.40%.

b. For concrete mixed with Portland Cement and an appropriate amount of fly ash (Article 2.02) or slag cement (Article 2.03) the total alkalies in the Portland Cement (calculated as the percentage of NA_2O plus 0.658 times the percentage of K_2O) shall not exceed 0.85%.

3. When non-reactive aggregates as defined in Article 2.05 are used in concrete mix, total alkalies in the cement shall not exceed 1.0%.

4. The proposed Portland Cement shall not contain more than 8% tricalcium aluminate and more than 12% tetracalcium aluminoferrite.

B. Blended Cement

1. Blended cements shall be Type IP (Portland Fly Ash Cement) or Type IS (Portland Slag Cement) conforming to ASTM C 595.

2. Type IP cement shall be an interground blend of Portland Cement and fly ash in which the fly ash constituent is between 15% and 25% of the weight of the total blend.

3. Type IS cement shall be an interground blend of Portland Cement and slag cement in which the slag constituent is between 35% and 50% of the weight of the total blend.

4. Fly ash and slag cement used in the production of blended cements shall meet the requirements of Articles 2.02 and 2.03, respectively.

5. When reactive aggregates as defined in Article 2.05 are used in concrete mix, the total alkalies in the Portland Cement (calculated as the percentage of Na_2O plus 0.658 times the percentage of K_2O) shall not exceed 0.85%. The percentage of fly ash or slag cement shall be set to meet provisions of Article 2.05.G.3.

C. Different types of cement shall not be mixed nor shall they be used alternately except when authorized in writing by the Engineer. Different brands of cement or the same brand from different mills may be used alternately. A resubmittal will be required if different cements are proposed during the Project.

D. Cement shall be stored in a suitable weather-tight building so as to prevent deterioration or contamination. Cement which has become caked, partially hydrated, or otherwise damaged will be rejected.

2.02 FLY ASH

A. Fly ash shall meet the requirements of ASTM C 618 for Class F, except that the loss on ignition shall not exceed 4%. Fly ash shall also meet the optional physical requirements for uniformity as shown in Table 3 of ASTM C 618.

B. For fly ash to be used in the production of type IP cement, the Pozzolan Activity Index shall be greater than 75% as specified in Table 3 of ASTM C 595.

C. Where reactive aggregates as defined in Article 2.05 are used in concrete mix, the fly ash constituent shall be between 15% and 25% of the total weight of the combined Portland Cement and fly ash. The percentage of fly ash shall be set to meet the mean mortar bar expansion requirements in provisions of Article 2.05.G.2.

D. For Type A1 concrete as required for use in environmental concrete structures, i.e. process structures or fluid containing structures, inclusion of fly ash or slag cement in the concrete mix, is mandatory.

E. Additional fly ash shall not be included in concrete mixed with Type IS or IP cement.

2.03 SLAG CEMENT

A. Slag cement shall meet the requirements of ASTM C 989 including tests for effectiveness of slag in preventing excessive expansion due to alkali-aggregate reactivity as described in Appendix X-3 of ASTM C 989.

B. Where reactive aggregates as defined in Article 2.05 are used in concrete mix, the slag cement constituent shall be between 35% and 40% of the total weight of the combined Portland Cement and slag. The percentage of slag cement shall be set to meet the mean mortar bar expansion requirements in provisions of Article 2.05.G.2.

C. For Type A1 concrete as required for use in environmental concrete structures, i.e. process structures or fluid containing structures, inclusion of fly ash or slag cement in the concrete mix, is mandatory.

D. Additional slag cement shall not be included in concrete mixed with type IS or IP cement.

2.04 WATER

A. Water used for mixing concrete shall be clear, potable and free from deleterious substances such as objectionable quantities of silty organic matter, alkali, salts and other impurities.

B. Water shall not contain more than 100 PPM chloride.

C. Water shall not contain more than 500 PPM dissolved solids.

D. Water shall have a pH in the range of 4.5 to 8.5.

E. Water shall meet requirements of ASTM C 1602.

2.05 AGGREGATES

A. All aggregates used in normal weight concrete shall conform to ASTM C 33.

B. Fine Aggregate (Sand) in the various concrete mixes shall consist of natural or manufactured siliceous sand, clean and free from deleterious substances, and graded within the limits of ASTM C 33.

C. Coarse aggregates shall consist of hard, clean, durable gravel, crushed gravel or crushed rock. Coarse aggregate shall be size #57 or #67 as graded within the limits given in ASTM C 33 unless otherwise specified.

D. Aggregates shall be tested for gradation by sieve analysis tests in conformance with ASTM C 136.

E. Aggregates shall be tested for soundness in accordance with ASTM C 88. The loss resulting after five cycles shall not exceed 10 percent for fine or coarse aggregate when using either magnesium sulfate or sodium sulfate.

F. All aggregates shall be evaluated in accordance with ASTM C 1778 to determine potential reactivity. All aggregates shall be considered reactive unless they meet the requirements below for non-reactive aggregates. Aggregates with a lithology essentially similar to sources in the same region found to be reactive in service shall be considered reactive regardless of the results of the tests above.

1. Non-reactive aggregates shall meet the following requirements:

   A petrographic analysis in accordance with ASTM C295 shall be performed to identify the constituents of the fine and coarse aggregate. Non-reactive aggregates shall meet the following limitations:

   (a) Optically strained, microfractured, or microcrystalline quartz, 5.0%, maximum.

   (b) Chert or chalcedony, 3.0%, maximum.

   (c) Tridymite or cristobalite, 1.0%, maximum.

   (d) Opal, 0.5%, maximum.

   e) Natural volcanic glass in volcanic rocks, 3.0%, maximum.

2. Concrete mix with reactive aggregate shall meet the following requirements:

   If aggregates are deemed potentially reactive as per ASTM C-1778 and fly ash or slag cement is included in proposed concrete mix design, proposed concrete mix including proposed aggregates shall be evaluated by ASTM C-1567. Mean mortar bar expansions at 16 days shall be less than 0.08%. Tests shall be made using exact proportion of all materials proposed for use on the job in design mix submitted.

   If aggregates are deemed potentially reactive as per ASTM C-1778 and a straight cement mix without fly ash or slag cement is proposed for concrete mix design, aggregates shall be evaluated by ASTM C-1260. Mean mortar bar expansions at 16 days shall be less than 0.08%.

G. Contractor shall submit a new trial mix to the Engineer for approval whenever a different aggregate or gradation is proposed.

2.06 STRUCTURAL MACRO FIBERS

A. Structural macro fibers shall meet requirements of ASTM C 1116 with a minimum length of 2 inches, an aspect ratio between 50 and 90, and a minimum toughness rating R10, 50=60 (approximate) in accordance with ASTM C 1609. Fibers shall be used only where specifically required on Contract Drawings or where specifically approved by Engineer.

B. Acceptable structural macro fibers are Tuf Strand SF by the Euclid Chemical Company, Strux 90/40 by W.R. Grace, or equal.

2.07 ADMIXTURES

A. Air entraining agent shall be added to all concrete unless noted otherwise. The agent shall consist of a neutralized vinsol resin solution or a purified hydrocarbon with a cement catalyst which will provide entrained air in the concrete in accordance with ASTM C 260. The admixture proposed shall be selected in advance so that adequate samples may be obtained and the required tests made. Air content of concrete, when placed, shall be within the ranges given in the concrete mix design.

B. The following admixtures are required or used for water reduction, slump increase, and/or adjustment of initial set. Admixtures permitted shall confirm to the requirements of ASTM C 494. Admixtures shall be non-toxic after 30 days and shall be compatible with and made by the same manufacturer as the air-entraining admixtures.

1. Water reducing admixture shall conform to ASTM C 494, Type A and shall contain no more than 0.05% chloride ions. Acceptable products are “Eucon Series” by the Euclid Chemical Company, “Master Pozzolith Series” by BASF, and “Plastocrete Series” by Sika Corporation.

2. High range water reducer shall be sulfonated polymer conforming to ASTM C 494, Type F or G. The high range water reducer shall be added to the concrete at either the batch plant or at the job site and may be used in conjunction with a water reducing admixture. The high range water reducer shall be accurately measured and pressure injected into the mixer as a single dose by an experienced technician. A standby system shall be provided and tested prior to each day’s operation of the job site system. Concrete shall be mixed at mixing speed for a minimum of 100 mixer revolutions after the addition of the high range water reducer. Acceptable products are “Eucon 37” or Plastol 5000 by the Euclid Chemical Company, “Master Rheobuild 1000 or Master Glenium Series” by BASF, and “Daracem 100 or Advaflow Series” by W.R. Grace.

3. A non-chloride, non-corrosive accelerating admixture may be used where specifically approved by the Engineer. The admixture shall conform to ASTM C 494, Type C or E, and shall not contain more chloride ions than are present in municipal drinking water. The admixture manufacturer must have long-term non-corrosive test data from an independent testing laboratory (of at least a year’s duration) using an acceptable accelerated corrosion test method such as that using

electrical potential measures. Acceptable products are "Accelguard 80/90 or NCA" by the Euclid Chemical Company and "Daraset" by W.R. Grace.

4. A water reducing retarding admixture may be used where specifically approved by the Engineer. The admixture shall conform to ASTM C494, Type D and shall not contain more than 0.05% chloride ions. Acceptable products are "Eucon NR or Eucon Retarder 100" by the Euclid Chemical Company, "Pozzolith Retarder" by BASF, and "Plastiment" by Sika Corporation.

C. Admixtures containing calcium chloride, thiocyanate or more than 0.05 percent chloride ions are not permitted. The addition of admixtures to prevent freezing is not permitted.

D. The Contractor shall submit manufacturer's data including the chloride ion content of each admixture and certification from the admixture manufacturer that all admixtures utilized in the design mix are compatible with one another and properly proportioned prior to mix design review.

2.08 CONCRETE MIX DESIGN

A. The proportions of cement, aggregates, admixtures and water used in the concrete mixes shall be based on the results of field experience or preferably laboratory trial mixes in conformance with Section 5.3. "Proportioning on the Basis of Field Experience and/or Trial Mixtures" of ACI 318 and ACI 350. When trial mixes are used they shall also conform to Article 3.01 of this Section of the Specifications. If field experience records are used, concrete strength results shall be from concrete mixed with all of the ingredients proposed for use on job used in similar proportions to mix proposed for use on job. Contractor shall submit verification confirming this stipulation has been followed. Field experience records and/or trial mix data used as the basis for the proposed concrete mix design shall be submitted to the Engineer along with the proposed mix.

B. Structural concrete shall conform to the following requirements. Cementitious materials refer to the total combined weight of all cement, fly ash, and slag cement contained in the mix.

1. Compressive Strength (28-Day)

   a. Concrete Class A — 5,000 psi (minimum)

   b. Concrete Class B — 3,000 psi (minimum)

2. Water/cementitious materials ratio, by weight

	Maximum	Minimum
a. Concrete Class A	0.40	0.37

	b. Concrete Class B	0.50	0.39
3.	Slump range	4" nominal unless high range water reducing admixture is used. 8” max if high range water reducing admixture is used.	
4.	Air Content		
	a. Class A	4.5% ±1.5%	
	b. Class B	3% Max (non air-entrained)	

PART 3 -- EXECUTION

3.01 TRIAL MIXES

A. When trial mixes are used to confirm the quality of a proposed concrete mix in accordance with Section 5.3, "Proportioning on the Basis of Field Experience and/or Trial Mixtures" of ACI 318 and ACI 350, an independent qualified testing laboratory designated and retained by the Contractor shall test a trial batch of each of the preliminary concrete mixes submitted by the Contractor. The trial batches shall be prepared using the aggregates, cement and admixtures proposed for the project. The trial batch materials shall be of a quantity such that the testing laboratory can obtain enough samples to satisfy requirements stated below. Tests on individual materials stated in PART 2 -- PRODUCTS should already be performed before any trial mix is done. The cost of laboratory trial batch tests for each specified concrete mix will be borne by the Contractor and the Contractor shall furnish and deliver the materials to the testing laboratory at no cost to the Owner.

B. The independent testing laboratory shall prepare a minimum of fifteen (15) standard test cylinders in accordance with ASTM C 31 in addition to conducting slump (ASTM C 143), air content (C 231) and unit weight (C 138) tests. Compressive strength test on the cylinders shall subsequently be performed by the same laboratory in accordance with ASTM C 39 as follows: Test 3 cylinders at age 7 days; test 3 cylinders at age 21 days; test 3 cylinders at age 28 days and test 3 cylinders at 56 days. The cylinders shall be carefully identified as "Trial Mix, Contract No. _____, Product _____." If the average 28-day compressive strength of the trial mix is less than that specified, or if any single cylinder falls below the required strength by more than 500 psi, the mix shall be corrected, another trial batch prepared, test cylinders taken, and new tests performed as before. Any such additional trial batch testing required shall be performed at no additional cost to the Owner. Adjustments to the mix shall be considered refinements to the mix design and shall not be the basis for extra compensation to the Contractor.

3.02 PRODUCTION OF CONCRETE

A. All concrete shall be machine mixed. Hand mixing of concrete will not be permitted. The Contractor may supply concrete from a ready mix plant or from a site mixed plant. In selecting the source for concrete production the Contractor shall carefully consider its capability for providing quality concrete at a rate commensurate with the requirements of the placements so that well bonded, homogenous concrete, free of cold joints, is assured.

B. Ready-Mixed Concrete

1. At the Contractor's option, ready-mixed concrete may be used meeting the requirements for materials, batching, mixing, transporting, and placing as specified herein and in accordance with ASTM C 94.

2. Truck mixers shall be equipped with electrically-actuated counters by which the number of revolutions of the drum or blades may be readily verified. The counter shall be of the resettable, recording type, and shall be mounted in the driver's cab. The counters shall be actuated at the time of starting mixers at mixing speeds.

3. Each batch of concrete shall be mixed in a truck mixer for not less than 100 revolutions of the drum or blades at the rate of rotation designated by the manufacturer of equipment. Additional mixing, if any, shall be at the speed designated by the manufacturer of the equipment as agitating speed. All materials including mixing water shall be in the mixer drum before actuating the revolution counter for determining the number of revolutions of mixing.

4. Truck mixers and their operation shall be such that the concrete throughout the mixed batch, as discharged, is within acceptable limits of uniformity with respect to consistency, mix and grading. If slump tests taken at approximately the 1/4 and 3/4 points of the load during discharge give slumps differing by more than one inch when the specified slump is 3 inches or less, or if they differ by more than 2 inches when the specified slump is more than 3 inches, the mixer shall not be used on the work unless the causing condition is corrected and satisfactory performance is verified by additional slump tests. All mechanical details of the mixer, such as water measuring and discharge apparatus, condition of the blades, speed of rotation, general mechanical condition of the unit and clearance of the drum, shall be checked before a further attempt to use the unit will be permitted.

5. Ready-mixed concrete shall be delivered to the site for the work and discharge shall be completed before the drum has been revolved 300 revolutions and within the time requirements stated in Article 3.03 of this Section.

6. Each and every concrete delivery shall be accompanied by a delivery ticket containing at least the following information:

    a. Date and truck number
    b. Ticket number
    c. Mix designation of concrete
    d. Cubic yards of concrete
    e. Cement brand, type and weight in pounds
    f. Weight in pounds of fine aggregate (sand)
    g. Weight in pounds of coarse aggregate (stone)
    h. Air entraining agent, brand, and weight in pounds and ounces
    i. Other admixtures, brand, and weight in pounds and ounces
    j. Water, in gallons, stored in attached tank
    k. Water, in gallons, maximum that can be added without exceeding design water/cementitious materials ratio
    l. Water, in gallons, actually used (by truck driver)
    m. Time of loading

n. Time of delivery to job (by truck driver)

7. Any truck delivering concrete to the job site, which is not accompanied by a delivery ticket showing the above information will be rejected and such truck shall immediately depart from the job site.

8. The use of non-agitating equipment for transporting ready-mixed concrete will not be permitted. Combination truck and trailer equipment for transporting ready-mixed concrete will not be permitted. The quality and quantity of materials used in ready-mixed concrete and in batch aggregates shall be subject to continuous inspection at the batching plant by the Engineer.

C. Site Mixed Concrete

1. Scales for weighing concrete ingredients shall be accurate when in use within ±0.4 percent of their total capacities. Standard test weights shall be available to permit checking scale accuracy.

2. Operation of batching equipment shall be such that the concrete ingredients are consistently measured within the following tolerances:

a.	Cement, fly ash, or slag cement	± 1 percent
b.	Water	± 1 percent
c.	Aggregates	± 2 percent
d.	Admixtures	± 3 percent

3. Each batch shall be so charged into the mixer that some water will enter in advance of the cement and aggregates. Water shall continue for a period which may extend to the end of the first 25 percent of the specified mixing time. Controls shall be provided to prevent batched ingredients from entering the mixer before the previous batch has been completely discharged.

4. The concrete shall be mixed in a batch mixer capable of thoroughly combining the aggregates, cement, and water into a uniform mass within the specified mixing time, and of discharging the concrete without harmful segregation. The mixer shall bear a manufacturer's rating plate indicating the rate capacity and the recommended revolutions per minute and shall be operated in accordance therewith.

5. Mixers with a rate capacity of 1 cu.yd. or larger shall conform to the requirements of the Plant Mixer Manufacturers' Division of the Concrete Plant Manufacturers' Bureau.

6. Except as provided below, batches of 1 cu. yd. or less shall be mixed for not less than 1 minute. The mixing time shall be increased 15 seconds for each cubic yard or fraction thereof of additional capacity.

7. Shorter mixing time may be permitted provided performance tests made in accordance with of ASTM C 94 indicate that the time is sufficient to produce uniform concrete.

8. Controls shall be provided to insure that the batch cannot be discharged until the required mixing time has elapsed. At least three-quarters of the required mixing time shall take place after the last of the mixing water has been added.

9. The interior of the mixer shall be free of accumulations that will interfere with mixing action. Mixer blades shall be replaced when they have lost 10 percent of their original height.

10. Air-entraining admixtures and other chemical admixtures shall be charged into the mixer as solutions and shall be measured by means of an approved mechanical dispensing device. The liquid shall be considered a part of the mixing water. Admixtures that cannot be added in solution may be weighed or may be measured by volume if so recommended by the manufacturer.

11. If two or more admixtures are used in the concrete, they shall be added separately to avoid possible interaction that might interfere with the efficiency of either admixture or adversely affect the concrete.

12. Addition of retarding admixtures shall be completed within 1 minute after addition of water to the cement has been completed, or prior to the beginning of the last three-quarters of the required mixing, whichever occurs first. Retarding admixtures shall not be used unless approved by the Engineer.

13. Concrete shall be mixed only in quantities for immediate use and within the time and mixing requirements of ASTM C 94.

3.03 CONCRETE PLACEMENT

A. No concrete shall be placed prior to approval of the concrete mix design. Concrete placement shall conform to the recommendations of ACI 304.

B. Prior to concrete placement, all reinforcement shall be securely and properly fastened in its correct position. Formwork shall be clean, oiled and form ties at construction joints shall be retightened. All bucks, sleeves, castings, hangers, pipe, conduits, bolts, anchors, wire, and any other fixtures required to be embedded therein shall be in place. Forms for openings to be left in the concrete shall be in place and anchored by the Contractor. All loose debris in bottoms of forms or in keyways shall be removed and all debris, water, snow, ice and foreign matter shall be removed from the space to be occupied by the concrete. The Contractor shall notify the Engineer in advance of placement, allowing

sufficient time for a concurrent inspection and for any corrective measures which are subsequently required.

C. On horizontal joints where concrete is to be placed on hardened concrete, flowing concrete containing a high range water reducing admixture or cement grout shall be placed with a slump not less than 8 inches for the initial placement at the base of the wall. Concrete or cement grout shall meet all strength and service requirements specified herein for applicable class of concrete. This concrete shall be worked well into the irregularities of the hard surface.

D. All concrete shall be placed during the daylight hours except with the consent of the Engineer. If special permission is obtained to carry on work during the night, adequate lighting must be provided.

E. When concrete arrives at the project with slump below that suitable for placing, as indicated by the Specifications, water may be added to bring the concrete within the specified slump range provided that the design water-cementitious materials ratio is not exceeded. The water shall be incorporated by additional mixing equal to at least half of the total mixing required. Water may be added only to full trucks. On-site tempering shall not relieve the Contractor from furnishing a concrete mix that meets all specified requirements.

F. Concrete shall be conveyed as rapidly as practicable to the point of deposit by methods which prevent the separation or loss of the ingredients. It shall be so deposited that rehandling will be unnecessary. Discharge of the concrete to its point of deposit shall be completed within 90 minutes after the addition of the cement to the aggregates. In hot weather, or under conditions contributing to quick stiffening of the concrete, the time between the introduction of the cement to the aggregates and discharge shall not exceed the requirements stated in Article 3.09 of this Section.

G. Where concrete is conveyed to position by chutes, a practically continuous flow in the chute shall be maintained. The angle and discharge arrangement of the chute shall be such as to prevent segregation of the concrete ingredients. The delivery end of the chute shall be as close as possible to the point of deposit and in no case shall the free pour from the delivery end of the chute exceed five feet, unless approved otherwise.

H. Special care must be exercised to prevent splashing of forms or reinforcement with concrete, and any such splashes or accumulations of hardened or partially hardened concrete on the forms or reinforcement above the general level of the concrete already in place must be removed before the work proceeds. Concrete shall be placed in all forms in such way as to prevent any segregation.

I. Placing of concrete shall be so regulated that the pressure caused by the wet concrete shall not exceed that used in the design of the forms.

J. All concrete for walls shall be placed through openings in the form spaced at frequent intervals or through tremies (heavy duct canvas, rubber, etc.), equipped with suitable hopper heads. Tremies shall be of variable lengths so the free fall shall not exceed five (5) feet and a sufficient number shall be placed in the form to ensure the concrete is kept level at all times.

K. When placing concrete which is to be exposed, sufficient illumination shall be provided in the interior of the forms so the concrete, at places of deposit, is visible from deck and runways.

L. Concrete shall be placed so as to thoroughly embed all reinforcement, inserts, and fixtures.

M. When forms are removed, surfaces shall be even and dense, free from aggregate pockets or honeycomb. To achieve this, concrete shall be consolidated using mechanical vibration, supplemented by forking and spading by hand in the corners and angle of forms and along form surfaces while the concrete is plastic under the vibratory action. Consolidation shall conform to ACI 309.

N. Mechanical vibration shall be applied directly to the concrete, unless otherwise approved by the Engineer. The bottom of vibrators used on floor slabs must not be permitted to ride the form supporting the slab. Vibration shall be applied at the point of deposit and in the area of freshly placed concrete by a vertical penetration of the vibrator. Vibrators shall not be used to move concrete laterally within the forms.

O. The intensity of vibration shall be sufficient to cause settlement of the concrete into place and to produce monolithic joining with the preceding layer. It shall be of sufficient duration to accomplish thorough compaction and complete embedment of reinforcement and fixtures with a vibrator transmitting not less than 7,500 impulses per minute. Since the duration of vibration per square foot of surface is dependent on the frequency (impulses per minute), size of vibrator, and slump of concrete, the length of time must therefore be determined in the field. Vibration, however, shall not be continued in any one location to the extent that pools of grout are formed.

P. Care shall be taken to prevent cold joints when placing concrete in any portion of the work. The concrete placing rate shall be such as to ensure that each layer is placed while the previous layer is soft or plastic, so that the two layers can be made monolithic by penetration of the vibrators. Maximum thickness of concrete layers shall be 18 inches. The surface of the concrete shall be level whenever a run of concrete is stopped.

Q. To prevent featheredges, construction joints located at the tops of horizontal lifts near sloping exposed concrete surfaces shall be inclined near the exposed surface, so the angle between such inclined surface and the exposed concrete surface will be not less than 50°.

R. In placing unformed concrete on slopes, the concrete shall be placed ahead of a non-vibrated slip-form screed extending approximately 2-1/2 feet back from its leading edge.

The method of placement shall provide a uniform finished surface with the deviation from the straight line less than 1/8 inch in any concrete placement. Concrete ahead of the slip-form screed shall be consolidated by internal vibrators so as to ensure complete filling under the slip-form. Prior to placement of concrete on sloped walls or slabs, the Contractor shall submit a plan specifically detailing methods and sequence of placements, proposed concrete screed equipment, location of construction joints and waterstops, and/or any proposed deviations from the aforementioned to the Engineer for review and approval.

S. Concrete shall not be placed during rains sufficiently heavy or prolonged to wash mortar from coarse aggregate on the forward slopes of the placement. Once placement of concrete has commenced in a block, placement shall not be interrupted by diverting the placing equipment to other uses.

3.04 PLACING FLOOR SLABS ON GRADE

A. The subgrade for slabs on ground shall be well drained and of adequate and uniform loadbearing nature. The in-place density of the subgrade soils shall be at least the minimum required by the specifications. No foundation, slab, or pavement concrete shall be placed until the depth and character of the foundation soils have been inspected and approved by the materials testing consultant.

B. The subgrade shall be free of frost before concrete placing begins. If the temperature inside a building where concrete is to be placed is below freezing it shall be raised and maintained above 50° long enough to remove all frost from the subgrade.

C. The subgrade shall be moist at the time of concreting. If necessary, it shall be dampened with water in advance of concreting, but there shall be no free water standing on the subgrade nor any muddy or soft spots when the concrete is placed.

D. Thirty-pound felt paper shall be provided between edges of slab-on-grade and vertical and horizontal concrete surfaces, unless otherwise indicated on the Drawings.

E. Contraction joints shall be provided in slabs-on-grade at locations indicated on the Drawings. Contraction joints shall be installed as per Section 03290 - Joints in Concrete.

F. Floor slabs shall be screeded level or pitched to drain as indicated on the Drawings. Finishes shall conform with requirements of Section 03350 - Concrete Finishes.

3.05 PLACING CONCRETE UNDERWATER - Not Used

3.06 PLACING CONCRETE UNDER PRESSURE

A. Where concrete is conveyed and placed by mechanically applied pressure, the equipment shall have the capacity for the operation. The operation of the pump shall be such that a continuous stream of concrete without air pockets is produced. To obtain the least line

resistance, the layout of the pipeline system shall contain a minimum number of bends with no change in pipe size. If two sizes of pipe must be used, the smaller diameter should be used at the pump end and the larger at the discharge end. When pumping is completed, the concrete remaining in the pipelines, if it is to be used, shall be ejected in such a manner that there will be no contamination of the concrete or separation of the ingredients.

B. Priming of the concrete pumping equipment shall be with cement grout only. Use of specialty mix pump primers or pumping aids will not be allowed.

C. No aluminum parts shall be in contact with the concrete during the entire placing of concrete under pressure at any time.

D. Prior to placing concrete under pressure, the Contractor shall submit the concrete mix design together with test results from a materials testing consultant proving the proposed mix meets all requirements. In addition, an actual pumping test under field conditions is required prior to acceptance of the mix. This test requires a duplication of anticipated site conditions from beginning to end. The batching and truck mixing shall be the same as will be used; the same pump and operator shall be present and the pipe and pipe layouts will reflect the maximum height and distance contemplated. All submissions shall be subject to approval by the Engineer.

E. If the pumped concrete does not produce satisfactory end results, the Contractor shall discontinue the pumping operation and proceed with the placing of concrete using conventional methods.

F. The pumping equipment must have two cylinders and be designed to operate with one cylinder only in case the other one is not functioning. In lieu of this requirement, the Contractor may have a standby pump on the site during pumping.

G. The minimum diameter of the hose (conduits) shall be four inches.

H. Pumping equipment and hoses (conduits) that are not functioning properly shall be replaced.

I. Concrete samples for quality control in accordance with Article 3.10 will be taken at the placement (discharge) end of the line.

3.07 ORDER OF PLACING CONCRETE

A. In order to minimize the effects of shrinkage, the concrete shall be placed in units as bounded by construction joints shown on the Drawings and maximum lengths as indicated on Drawings. Where required on the Drawings and wherever else practical, the placing of such units shall be done in a strip pattern in accordance with ACI 302.1. A minimum of 72 hours shall pass prior to placing concrete directly adjacent to previously placed concrete.

3.08 CONCRETE WORK IN COLD WEATHER

A. Cold weather concreting procedures shall conform to the requirements of ACI 306.

B. The Engineer may prohibit the placing of concrete at any time when air temperature is 40°F. or lower. If concrete work is permitted, the concrete shall have a minimum temperature, as placed, of 55°F. for placements less than 12" thick, 50°F. for placements 12" to 36" thick, and 45°F. for placements greater than 36" thick. The temperature of the concrete as placed shall not exceed the aforementioned minimum values by more than 20°F, unless otherwise approved by the Engineer.

C. All aggregate and water shall be preheated. Precautions shall be taken to avoid the possibility of flash set when aggregate or water are heated to a temperature in excess of 100°F. in order to meet concrete temperature requirements. The addition of admixtures to the concrete to prevent freezing is not permitted. All reinforcement, forms, and concrete accessories with which the concrete is to come in contact shall be defrosted by an approved method. No concrete shall be placed on frozen ground.

3.09 CONCRETE WORK IN HOT WEATHER

A. Hot weather concreting procedures shall conform to the requirements of ACI 305.

B. When air temperatures exceed 85°F., or when extremely dry conditions exist even at lower temperatures, particularly if accompanied by high winds, the Contractor and his concrete supplier shall exercise special and precautionary measures in preparing, delivering, placing, finishing, curing and protecting the concrete mix. The Contractor shall consult with the Engineer regarding such measures prior to each day's placing operation and the Engineer reserves the right to modify the proposed measures consistent with the requirements of this Section of the Specifications. All necessary materials and equipment shall be on hand an in position prior to each placing operation.

C. Preparatory work at the job site shall include thorough wetting of all forms, reinforcing steel and, in the case of slab pours on ground or subgrade, spraying the ground surface on the preceding evening and again just prior to placing. No standing puddles of water shall be permitted in those areas which are to receive the concrete.

D. The temperature of the concrete mix when placed shall not exceed 90°F.

E. Temperature of mixing water and aggregates shall be carefully controlled and monitored at the supplier's plant, with haul distance to the job site being taken into account. Stockpiled aggregates shall, if necessary, be shaded from the sun and sprinkled intermittently with water. If ice is used in the mixing water for cooling purposes, it must be entirely melted prior to addition of the water to the dry mix.

F. Delivery schedules shall be carefully planned in advance so that concrete is placed as soon as practical after it is properly mixed. For hot weather concrete work (air temperature greater than 85°F), discharge of the concrete to its point of deposit shall be completed within 60 minutes from the time the concrete is batched.

G. The Contractor shall arrange for an ample work force to be on hand to accomplish transporting, vibrating, finishing, and covering of the fresh concrete as rapidly as possible.

3.10 QUALITY CONTROL

A. Field Testing of Concrete

1. The Contractor shall coordinate with the Engineer's project representative the on-site scheduling of the materials testing consultant personnel as required for concrete testing.

2. Concrete for testing shall be supplied by the Contractor at no additional cost to the Owner, and the Contractor shall provide assistance to the materials testing consultant in obtaining samples. The Contractor shall dispose of and clean up all excess material.

B. Consistency

1. The consistency of the concrete will be checked by the materials testing consultant by standard slump cone tests. The Contractor shall make any necessary adjustments in the mix as the Engineer and/or the materials testing consultant may direct and shall upon written order suspend all placing operations in the event the consistency does not meet the intent of the specifications. No payment shall be made for any delays, material or labor costs due to such eventualities.

2. Slump tests shall be made in accordance with ASTM C 143. Slump tests will be performed as deemed necessary by the materials testing consultant and each time compressive strength samples are taken.

3. Concrete with a specified nominal slump shall be placed having a slump within 1” (higher or lower) of the specified slump. Concrete with a specified maximum slump shall be placed having a slump less than the specified slump.

C. Unit Weight

1. Samples of freshly mixed concrete shall be tested for unit weight by the materials testing consultant in accordance with ASTM C 138.

2. Unit weight tests will be performed as deemed necessary by the Engineer and each time compressive strength samples are taken.

D. Air Content

1. Samples of freshly mixed concrete will be tested for entrained air content by the materials testing consultant in accordance with ASTM C 231.

2. Air content tests will be performed as deemed necessary by the materials testing consultant and each time compressive strength samples are taken.

3. In the event test results are outside the limits specified, additional testing shall occur. Admixture quantity adjustments shall be made immediately upon discovery of incorrect air entrainment.

E. Compressive Strength

1. Samples of freshly mixed concrete will be taken by the materials testing consultant and tested for compressive strength in accordance with ASTM C 172, C 31 and C 39, except as modified herein.

2. In general, one sampling shall be taken for each placement in excess of five (5) cubic yards, with a minimum of one (1) sampling for each day of concrete placement operations, or for each one hundred (100) cubic yards of concrete, or for each 5,000 square feet of surface area for slabs or walls, whichever is greater.

3. Each sampling shall consist of at least five (5) 6x12 cylinders or (8) 4x8 cylinders. Each cylinder shall be identified by a tag, which shall be hooked or wired to the side of the container. The materials testing consultant will fill out the required information on the tag, and the Contractor shall satisfy himself that such information shown is correct.

4. The Contractor shall be required to furnish labor to the Owner for assisting in preparing test cylinders for testing. The Contractor shall provide approved curing boxes for storage of cylinders on site. The insulated curing box shall be of sufficient size and strength to contain all the specimens made in any four consecutive working days and to protect the specimens from falling over, being jarred or otherwise disturbed during the period of initial curing. The box shall be erected, furnished and maintained by the Contractor. Such box shall be equipped to provide the moisture and to regulate the temperature necessary to maintain the proper curing conditions required by ASTM C 31. Such box shall be located in an area free from vibration such as pile driving and traffic of all kinds and such that all specimen are shielded from direct sunlight and/or radiant heating sources. No concrete requiring inspection shall be delivered to the site until such storage curing box has been provided. Specimens shall remain undisturbed in the curing box until ready for delivery to the testing laboratory but not less than sixteen hours.

5. The Contractor shall be responsible for maintaining the temperatures of the curing box during the initial curing of test specimens with the temperature preserved between 60°F and 80°F as measured by a maximum-minimum thermometer. The Contractor shall maintain a written record of curing box temperatures for each day curing box contains test specimens. Temperature shall be recorded a minimum of three times a day with one recording at the start of the work day and one recording at the end of the work day.

6. When transported, the cylinders shall not be thrown, dropped, allowed to roll, or be damaged in any way.

7. Compression tests shall be performed in accordance with ASTM C 39. For 6x12 cylinders, two test cylinders will be tested at seven days and two at 28 days. For 4x8 cylinders, three test cylinders will be tested at seven days, three at 28 days. The remaining cylinders will be held to verify test results, if needed.

F. Evaluation and Acceptance of Concrete

1. Evaluation and acceptance of the compressive strength of concrete shall be according to the requirements of ACI 214, ACI 318, and ACI 350.

2. The strength level of concrete will be considered satisfactory if all of the following conditions are satisfied.

   a. Every arithmetic average of any three consecutive strength tests equals or exceeds the minimum specified 28-day compressive strength for the mix (see Article 2.08).

   b. No individual compressive strength test results falls below the minimum specified strength by more than 500 psi.

3. In the event any of the conditions listed above are not met, the mix proportions shall be corrected for the next concrete placing operation.

4. In the event that condition 2B is not met, additional tests in accordance with Article 3.10, paragraph H shall be performed.

5. When a ratio between 7-day and 28-day strengths has been established by these tests, the 7-day strengths shall subsequently be taken as a preliminary indication of the 28-day strengths. Should the 7-day test strength from any sampling be more than 10% below the established minimum strength, the Contractor shall:

   a. Immediately provide additional periods of curing in the affected area from which the deficient test cylinders were taken.

b. Maintain or add temporary structural support as required.

c. Correct the mix for the next concrete placement operation, if required to remedy the situation.

6. All concrete which fails to meet the ACI requirements and these specifications is subject to removal and replacement at no additional cost to the Owner.

G. When non-compliant concrete is identified, test reports shall be sent immediately to the Engineer for review.

H. Additional Tests

1. When ordered by the Engineer, additional tests on in-place concrete shall be provided and paid for by the Contractor.

2. In the event the 28-day test cylinders fail to meet the minimum strength requirements as outlined in Article 3.10, paragraph F, the Contractor shall have concrete core specimens obtained and tested from the affected area immediately.

a. Three cores shall be taken for each sample in which the strength requirements were not met.

b. The drilled cores shall be obtained and tested in conformance with ASTM C 42. The tests shall be conducted by a materials testing consultant approved by the Engineer.

c. The location from which each core is taken shall be approved by the Engineer. Each core specimen shall be located, when possible, so its axis is perpendicular to the concrete surface and not near formed joints or obvious edges of a unit of deposit.

d. The core specimens shall be taken, if possible, so no reinforcing steel is within the confines of the core.

e. The diameter of core specimens should be at least 3 times the maximum nominal size of the course aggregate used in the concrete, but must be at least 2-inches in diameter.

f. The length of specimen, when capped, shall be at least twice the diameter of the specimen.

g. The core specimens shall be taken to the laboratory and when transported, shall not be thrown, dropped, allowed to roll, or damaged in any way.

h. Two (2) copies of test results shall be mailed directly to the Engineer. The concrete in question will be considered acceptable if the average compressive strength of a minimum of three test core specimens taken from a given area equal or exceed 85% of the specified 28-day strength and if the lowest core strength is greater than 75% of the specified 28-day strength.

3. In the event that concrete placed by the Contractor is suspected of not having proper air content, the Contractor shall engage a materials testing consultant approved by the Engineer, to obtain and test samples for air content in accordance with ASTM Specification C 457.

3.11 CARE AND REPAIR OF CONCRETE

A. The Contractor shall protect all concrete against injury or damage from excessive heat, lack of moisture, overstress, or any other cause until final acceptance by the Owner. Particular care shall be taken to prevent the drying of concrete and to avoid roughening or otherwise damaging the surface. Care shall be exercised to avoid jarring forms or placing any strain on the ends of projecting reinforcing bars. Any concrete found to be damaged, or which may have been originally defective, or which becomes defective at any time prior to the final acceptance of the completed work, or which departs from the established line or grade, or which, for any other reason, does not conform to the requirements of the Contract Documents, shall be satisfactorily repaired or removed and replaced with acceptable concrete at no additional cost to the Owner.

B. Areas of honeycomb shall be chipped back to sound concrete and repaired as directed.

C. Concrete formwork blowouts or unacceptable deviations in tolerances for formed surfaces due to improperly constructed or misaligned formwork shall be repaired as directed. Bulging or protruding areas, which result from slipping or deflecting forms shall be ground flush or chipped out and redressed as directed.

D. Areas of concrete in which cracking, spalling, or other signs of deterioration develop prior to final acceptance shall be removed and replaced, or repaired as directed. This stipulation includes concrete that has experienced cracking due to drying or thermal shrinkage of the concrete. Structural cracks shall be repaired using an approved epoxy injection system. Non-structural cracks shall be repaired using an approved hydrophilic resin pressure injected grout system, unless other means of repair are deemed necessary and approved. All repair work shall be performed at no additional cost to the Owner.

E. Concrete which fails to meet the strength requirements as outlined in Article 3.10, paragraph F, will be analyzed as to its adequacy based upon loading conditions, resultant stresses and exposure conditions for the particular area of concrete in question. If the concrete in question is found unacceptable based upon this analysis, that portion of the structure shall be strengthened or replaced by the Contractor at no additional cost to the

Owner. The method of strengthening or extent of replacement shall be as directed by the Engineer.

- END OF SECTION -

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SECTION 03350

CONCRETE FINISHES

PART 1 -- GENERAL

1.01 THE REQUIREMENT

Furnish all materials, labor, and equipment required to provide finishes of all concrete surfaces specified herein and shown on the Drawings.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 03100 – Concrete Formwork

B. Section 03300 – Cast-in-Place Concrete

C. Section 03600 – Grout

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.

1. ACI 301 – Specifications for Structural Concrete for Buildings

2. ACI 318 – Building Code Requirements for Structural Concrete

1.04 SUBMITTALS

A. Submit the following in accordance with Section 01300 – Submittals.

1. Manufacturer's literature on all products specified herein.

PART 2 -- PRODUCTS

2.01 CONCRETE FLOOR SEALER

Floor sealer shall be Diamond Clear VOX or Super Diamond Clear VOX by the Euclid Chemical Company, MasterKure CC 300 SB by BASF Master Builder Solutions.

2.02 CONCRETE LIQUID DENSIFIER AND SEALANT

Concrete liquid densifier and sealant shall be a high performance, deeply penetrating concrete densifier and sealant. Product shall be odorless, colorless, VOC-compliant, non-yellowing siliconate based solution designed to harden, dustproof and protect concrete floors subjected to heavy vehicular traffic and to resist black rubber tire marks on concrete surfaces. The product must contain a minimum solids content of 20% of which 50% is siliconate. Acceptable products are Diamond Hard by the Euclid Chemical Company, Seal Hard by L&M Construction Chemicals and MasterKure HD 210 WB by BASF Master Builder Solutions.

2.03 NON-METALLIC FLOOR HARDENER

The specified non-metallic mineral aggregate hardener shall be formulated, processed, and packaged under stringent quality control at the manufacturer's owned and controlled factory. The hardener shall be a factory-blended mixture of specifically processed graded mineral aggregate, selected Portland cement, and necessary plasticizing agents. Acceptable products shall be "Surflex" by the Euclid Chemical Company, "Harcol" by Sonneborn, "Maximent" by BASF, and "Mastercon" by BASF.

2.04 NON-OXIDIZING HEAVY DUTY METALLIC FLOOR HARDENER

Non-oxidizing heavy duty metallic floor hardener shall be formulated, processed, and packaged under stringent quality control at the manufacturer's owned and controlled factory. The hardener shall be a mixture of specifically processed non-rusting aggregate, selected Portland cement, and necessary plasticizing agents. Product shall be "Diamond-Plate" by the Euclid Chemical Company, or Masterplate by BASF Construction Chemicals.

2.05 NON-SLIP FLOORING ADDITIVE

Non-slip flooring additives for slip resistant floors shall be non-metallic. Non-slip flooring additives shall be Frictex NS by BASF Construction Chemicals, A-H Alox by Anti-Hydro, or Euco Grip by the Euclid Chemical Company.

PART 3 -- EXECUTION

3.01 FINISHES ON FORMED CONCRETE SURFACES

A. After removal of forms, the finishes described below shall be applied in accordance with Article 3.05 - Concrete Finish Schedule. Unless the finish schedule specifies otherwise, all surfaces shall receive at least a Type I finish. The Engineer shall be the sole judge of acceptability of all concrete finish work.

1. Type I - Rough: All fins, burrs, offsets, marks and all other projections left by the forms shall be removed. Projections, depressions, etc. below finished grade required to be removed will only be those greater than ¼-inch. All holes left by removal of ends of ties, and all other holes, depressions, bugholes, air/blow holes or voids shall be filled solid with cement grout after first being thoroughly wetted and then struck off flush. The only holes below grade to be filled will be tie holes and any other holes larger than ¼-inch in any dimension. Honeycombs shall be chipped back to solid concrete and repaired as directed by the Engineer. All holes shall be filled with tools, such as sponge floats and trowels, that will permit packing the hole solidly with cement grout. Cement grout shall consist of one part cement to three parts sand, epoxy bonding agent (for tie holes only) and the amount of mixing water shall be as little as consistent with the requirements of handling and placing. Color of cement grout shall match the adjacent wall surface.

2. Type II - Grout Cleaned: Where this finish is required, it shall be applied after completion of Type I finish. After the concrete has been predampened, a slurry consisting of one part cement (including an appropriate quantity of white cement in order to produce a color matching the surrounding concrete) and 1-1/2 parts sand passing the No. 16 sieve, by damp loose volume, shall be spread over the surface with clean burlap pads or sponge rubber floats. Mix proportions shall be submitted to the Engineer after a sample of the work is established and accepted. Any surplus shall be removed by scraping and then rubbing with clean burlap.

3. Type III - Smooth Rubbed: Where this finish is required, it shall be applied after the completion of the Type II finish. No rubbing shall be done before the concrete is thoroughly hardened and the mortar used for patching is firmly set. A smooth, uniform surface shall be obtained by wetting the surface and rubbing it with a carborundum stone to eliminate irregularities. Unless the nature of the irregularities requires it, the general surface of the concrete shall not be cut into. Corners and edges shall be slightly rounded by the use of the carborundum stone. Brush finishing or painting with grout or neat cement will not be permitted. A 100 square foot example shall be established at the beginning of the project to establish acceptability.

3.02 SLAB AND FLOOR FINISHES

A. The finishes described below shall be applied to floors, slabs, flow channels and top of walls in accordance with Article 3.05 - Concrete Finish Schedule. The Engineer shall be the sole judge of acceptability of all such finish work.

1. Type "A" - Screeded: This finish shall be obtained by placing screeds at frequent intervals and striking off to the surface elevation required. When a Type "F" finish is subsequently to be applied, the surface of the screeded concrete shall be roughened with a concrete rake to 1/2” minimum deep grooves prior to final set.

2. Type "B" - Wood or Magnesium Floated: This finish shall be obtained after completion of a Type "A" finish by working a previously screeded surface with a wood or magnesium float or until the desired texture is reached. Floating shall begin when the water sheen has disappeared and when the concrete has sufficiently hardened so that a person's foot leaves only a slight imprint. If wet spots occur, water shall be removed with a squeegee. Care shall be taken to prevent the formation of laitance and excess water on the finished surface. All edges shall be edged with an 1/8-inch tool as directed by the Engineer. The finished surface shall be true, even, and free from blemishes and any other irregularities.

3. Type "C" - Cork Floated: This finish shall be similar to Type "B" but slightly smoother than that obtained with a wood float. It shall be obtained by power or band floating with cork floats.

4. Type "D" - Steel Troweled: This finish shall be obtained after completion of a Type "B" finish. When the concrete has hardened sufficiently to prevent excess fine material from working to the surface, the surface shall be compacted and smoothed with not less than two thorough and complete steel troweling operations. In areas which are to receive a floor covering such as tile, resilient flooring, or carpeting, the applicable Specification Sections and Contract Drawings shall be reviewed for the required finishes and degree of flatness. In areas that are intermittently wet such as pump rooms, only one troweling operation is required to provide some trowel marks for slip resistance. All edges shall be edged with an 1/8-inch tool as directed by the Engineer. The finish shall be brought to a smooth, dense surface, free from defects and blemishes.

5. Type "E" - Broom or Belt: This finish shall provide the surface with a transverse scored texture by drawing a broom or burlap belt across the surface immediately after completion of a Type "B" finish. All edges shall be edged with an 1/8-inch tool as directed by the Engineer.

6. Type "F" - Swept in Grout Topping: This finish shall be applied after a completion of a Type "A" finish. The concrete surface shall be properly cleaned, washed, and coated with a mixture of water and Portland Cement. Cement grout in accordance with Section 03600 shall then be plowed and swept into neat conformance with the blades or arms of the apparatus by turning or rotating the previously positioned mechanical equipment. Special attention shall be paid to true grades, shapes and tolerances as specified by the manufacturer of the equipment. Before beginning this finish, the Contractor shall notify the Engineer and the equipment manufacturer of the details of the operation and obtain approval and recommendations.

7. Type “G” Hardened Finish: This finish shall be applied after completion of a Type “B” or Type “C” finish and prior to application of a Type “D” finish. Hardeners shall be applied in strict accordance with the manufacturer’s requirements. Hardeners shall be applied using a mechanical spreader. The hardener shall be

applied in two shakes with the first shake comprising 2/3 of the total amount. Type "D" finish shall be applied following completion of application of the hardener.

a. Non-metallic floor hardener shall be applied where specifically required on the Contract Drawings at the rate of 1.0 pounds/ft.^{2}.

b. Non-oxidizing heavy duty metallic floor hardener shall be applied at the loading docks and where specifically required on the Contract Drawings or specified herein at the rate of 1.5 pounds/ft.^{2}.

8. Type "H" - Non-Slip Finish: This finish shall be provided by applying a non-slip flooring additive concurrently with the application of a Type "D" finish and/or installation of floor sealants. Application procedure shall be in accordance with manufacturer's instructions. Finish shall be applied where specifically required on the Contract Drawings or specified herein.

9. Type "J" - Raked Finish: This finish shall be provided by raking the surface as soon as the condition of the concrete permits by making depressions of ±1/4 inch.

3.03 CONCRETE SEALERS

A. Concrete sealers shall be applied where specifically required on the Contract Drawings or specified herein.

B. Sealers shall be applied after installation of all equipment, piping, etc. and after completion of any other related construction activities. Application of sealers shall be in strict accordance with manufacturer's requirements.

C. Sealers shall be applied to all floor slabs not painted and not intended to be immersed.

D. Floor slabs subjected to vehicular traffic shall be sealed with the concrete liquid densifier and sealer.

E. All other floor slabs to receive sealer shall be sealed with concrete floor sealer.

3.04 FINISHES ON EQUIPMENT PADS

A. Formed surfaces of equipment pads shall receive a Type III finish.

B. Top surfaces of equipment pads, except those surfaces subsequently required to receive grout and support equipment bases, shall receive a Type "D" finish, unless otherwise noted. Surfaces which will later receive grout shall, before the concrete takes its final set, be made rough by removing the sand and cement that accumulates on the top to the extent that the aggregate will be exposed with irregular indentations in the surface up to 1/2 inch deep.

3.05 CONCRETE FINISH SCHEDULE

Item	Type of Finish
Inner face of walls of tanks, flow channels, wet wells, perimeter walls, and miscellaneous concrete structures:	
From 1 feet below water surface to bottom of wall	II
From top of wall to 1 feet below water surface	II
Exterior concrete walls below grade	I
Exterior exposed concrete walls, ceilings, beams, manholes, hand holes, miscellaneous structures and columns (including top of wall) to one foot below grade. All other exposed concrete surfaces not specified elsewhere	II
Exterior concrete sidewalks, steps, ramps, decks, slabs on grade and landings exposed to weather	E
Floors of process equipment tanks indicated on Drawings to receive grout topping	F

- END OF SECTION –

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SECTION 03600

GROUT

PART 1 -- GENERAL

1.01 THE REQUIREMENT

Furnish all materials, labor, and equipment required to provide all grout used in concrete work and as bearing surfaces for base plates, in accordance with the Contract Documents.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Requirements of related work are included in Division 1 and Division 2 of these Specifications.

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.

1.	CRD-C 621	Corps of Engineers Specification for Non-shrink Grout
2.	ASTM C 109	Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 inch or 50 mm cube Specimens)
3.	ASTM C 531	Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts and Monolithic Surfacings
4.	ASTM C 579	Test Method for Compressive Strength of Chemical-Resistant Mortars and Monolithic Surfacings
5.	ASTM C 827	Standard Test Method for Early Volume Change of Cementitious Mixtures
6.	ASTM C 144	Standard Specification for Aggregate for Masonry Mortar
7.	ASTM C 1107	Standard Specification for Packaged Dry, Hydraulic Cement Grout (Nonshrink)

1.04 SUBMITTALS

A. Submit the following in accordance with Section 01300 - Submittals.

1. Certified test results verifying the compressive strength and shrinkage and expansion requirements specified herein.

2. Manufacturer's literature containing instructions and recommendations on the mixing, handling, placement and appropriate uses for each type of grout used in the work.

1.05 QUALITY ASSURANCE

A. Field Tests

1. Compression test specimens will be taken during construction from the first placement of each type of grout and at intervals thereafter as selected by the Engineer to insure continued compliance with these Specifications. The specimens will be made by the Engineer or its representative.

a. Compression tests and fabrication of specimens for cement grout and non-shrink grout will be performed as specified in ASTM C 109 at intervals during construction as selected by the Engineer. A set of three specimens will be made for testing at seven days, 28 days and any additional time period as appropriate.

b. Compression tests and fabrication of specimens for epoxy grout will be performed as specified in ASTM C 579, Method B, at intervals during construction as selected by the Engineer. A set of three specimens will be made for testing at seven days and any other time period as appropriate.

2. The cost of all laboratory tests on grout will be borne by the Owner, but the Contractor shall assist the Engineer in obtaining specimens for testing. The Contractor shall be charged for the cost of any additional tests and investigation on work performed which does not meet the specifications. The Contractor shall supply all materials necessary for fabricating the test specimens, at no additional cost to the Owner.

3. All grout, already placed, which fails to meet the requirements of these Specifications, is subject to removal and replacement at no additional cost to the Owner.

PART 2 -- PRODUCTS

2.01 MATERIALS

A. Cement Grout

1. Cement grout shall be composed of Portland Cement and sand in the proportion specified in the Contract Documents and the minimum amount of water necessary to obtain the desired consistency. If no proportion is indicated, cement grout shall consist of one part Portland Cement to three parts sand. Water amount shall be as required to achieve desired consistency without compromising strength requirements. White Portland Cement shall be mixed with the Portland Cement as required to match color of adjacent concrete.

2. The minimum compressive strength at 28 days shall be 4000 psi.

3. For beds thicker than 1-1/2 inch and/or where free passage of grout will not be obstructed by coarse aggregate, 1-1/2 parts of coarse aggregate having a top size of 3/8 inch should be added. This stipulation does not apply for grout being swept in by a mechanism. These applications shall use a plain cement grout without coarse aggregate regardless of bed thickness.

4. Sand shall conform to the requirements of ASTM C144.

B. Non-Shrink Grout

Non-shrink grout shall conform to CRD-C 621 and ASTM C 1107, Grade B or C when tested at a max. fluid consistency of 30 seconds per CDC 611/ASTM C939 at temperature extremes of 45°F and 90°F and an extended working time of 15 minutes. Grout shall have a min. 28-day strength of 7,000 psi. Non-shrink grout shall be, "Euco N-S" by the Euclid Chemical Company, "Sikagrout 212" by Sika Corporation, “Conspec 100 Non-Shrink Non-Metallic Grout” by Conspec, “Masterflow 555 Grout” by BASF Master Builder Solutions.

C. Epoxy Grout

1. Epoxy grout shall be "Sikadur 32 Hi-Mod" by Sika Corporation, "Duralcrete LV" by Tamms Industries, or "Euco #452 Series" by Euclid Chemical, “MasterEmaco ADH 1090 RS” by BASF Master Builder Solutions.

2. Epoxy grout shall be modified as required for each particular application with aggregate per manufacturer's instructions.

D. Epoxy Base Plate Grout

Epoxy base plate grout shall be "Sikadur 42, Grout-Pak" by Sika Corporation, or "Masterflow 648" by BASF Master Builder Solutions.

2.02 CURING MATERIALS

Curing materials shall be as specified in Section 03370, Concrete Curing for cement grout and as recommended by the manufacturer for prepackaged grouts.

PART 3 -- EXECUTION

3.01 GENERAL

A. The different types of grout shall be used for the applications stated below unless noted otherwise in the Contract Documents. Where grout is called for in the Contract Documents which does not fall under any of the applications stated below, non-shrink grout shall be used unless another type is specifically referenced.

1. Cement grout shall be used for grout toppings and for patching of fresh concrete.

2. Non-shrink grout shall be used for grouting beneath base plates of structural metal framing.

3. Epoxy grout shall be used for bonding new concrete to hardened concrete.

4. Epoxy base plate grout shall be used for precision seating of base plates including base plates for all equipment such as engines, mixers, pumps, vibratory and heavy impact machinery, etc.

B. New concrete surfaces to receive cement grout shall be as specified in Section 03350, Concrete Finishes, and shall be cleaned of all dirt, grease and oil-like films. Existing concrete surfaces shall likewise be cleaned of all similar contamination and debris, including chipping or roughening the surface if a laitance or poor concrete is evident. The finish of the grout surface shall match that of the adjacent concrete. Curing and protection of cement grout shall be as specified in Section 03370, Concrete Curing.

C. All mixing, surface preparation, handling, placing, consolidation, and other means of execution for prepackaged grouts shall be done according to the instructions and recommendations of the manufacturer.

D. The Contractor, through the manufacturer of a non-shrink grout and epoxy grout, shall provide on-site technical assistance upon request, at no additional cost to the Owner.

3.02 CONSISTENCY

The consistency of grouts shall be that necessary to completely fill the space to be grouted for the particular application. Dry pack consistency is such that the grout is plastic and moldable but will not flow.

3.03 MEASUREMENT OF INGREDIENTS

A. Measurements for cement grout shall be made accurately by volume using containers. Shovel measurement shall not be allowed.

B. Prepackaged grouts shall have ingredients measured by means recommended by the manufacturer.

3.04 GROUT INSTALLATION

Grout shall be placed quickly and continuously, shall completely fill the space to be grouted and be thoroughly compacted and free of air pockets. The grout may be poured in place, pressure grouted by gravity, or pumped. The use of pneumatic pressure or dry-packed grouting requires approval of the Engineer. For grouting beneath base plates, grout shall be poured from one side only and thence flow across to the open side to avoid air-entrapment.

- END OF SECTION -

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SECTION 03732

CONCRETE REPAIRS

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall furnish all materials, labor, equipment, tools, etc., required for the repair, renovation, and replacement of concrete and/or reinforcing steel as indicated on the Drawings, specified herein, and determined by field survey.

B. The Contractor, in conjunction with the Engineer, shall determine the extent of cracked or deteriorated concrete to be rehabilitated and/or resurfaced. A summary of the work to be performed shall be submitted to the Engineer for review, and such summary shall be approved by the Engineer prior to commencement of the Work.

C. Concrete repairs include the following:

Repair of Concrete Slabs and Walls as specified on the Drawings.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Division 1 - General Requirements

B. Division 3 - Concrete

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

Shall be as specified in Section 01090, Reference Standards.

1.04 SUBCONTRACTOR/APPLICATOR QUALIFICATIONS

A. The Contractor shall furnish the name of all subcontractors/applicators which he proposes to use for this work, including necessary evidence and/or experience records to ascertain their qualifications in the application of epoxy, urethane, and polymer-modified mortars and grouts. Approved applicator qualifications shall include:

B. A minimum of 5 years experience in applying epoxy, urethane, and polymer-modified and cement-based compounds similar to those specified in this Section.

C. A letter from the manufacturer of the specified materials, on the manufacturer's letterhead, signed by an officer of the company, stating that the subcontractor/applicator has been

trained in the proper techniques for applying the product, including surface preparation and mixing, placing, curing, and caring for the manufacturer's products. This letter shall further state that the subcontractor/applicator is on the manufacturer's approved list of contractors.

1.05 SUBMITTALS

A. Material certifications and technical data sheets on all grouts, mortars, epoxy resins, aggregates and repair products specified in this Section.

B. Subcontractor/Applicator qualifications as specified in Section 1.04.

C. Shop Drawings detailing any planned deviation from the proposed construction sequence and/or method of repair.

D. The Contractor, based on their experience in their profession, may submit to the Engineer for approval, alternative materials and/or methods of work to assure the durability and watertight integrity of the repair work performed.

1.06 ADDITIONAL GUARANTEE

The Contractor shall guarantee all repair work performed under this Contract against defects in workmanship resulting in leakage and/or failure of concrete bond for a period of two years from the date of the Certificate of Substantial Completion.

PART 2 -- MATERIALS

2.01 WATER

The water used for mixing concrete repair products shall be clear, potable, and free of deleterious substances.

2.02 AGGREGATE

A. All aggregate shall conform to ASTM C-33. The aggregate supplier shall submit to the Engineer documentation that the proposed aggregates comply with ASTM C-33 and the requirements listed below:

B. Pea Gravel - Pea gravel shall meet the gradation and material requirements of Standard Size 14 as defined by ASTM C-33. Pea gravel shall be clean and free from deleterious matter and shall contain no limestone.

2.03 EPOXY BONDING AGENT

An epoxy bonding agent shall be used when applying fresh concrete to previously placed concrete. Epoxy bonding agent shall conform to ASTM C-881 Type I, II, IV or V; Grade 2 for epoxy resin adhesives, depending on the application. The class of epoxy bonding agent shall be suitable for all ambient and substrate temperatures. The epoxy resin shall be "Sikadur Hi-Mod Series" as manufactured by the Sika Corp, Lyndhurst, NJ, "CR 246" as manufactured by Sto Corporation, Atlanta, GA, "Duralbond" as manufactured by Euclid Chemical Company, Cleveland, OH, "Euco #452 Series" by the Euclid Chemical Company, or "MasterEmaco ADH series" by BASF Master Builder Solutions.

2.04 ANTI-CORROSION REBAR COATING

All reinforcing steel cut or exposed during demolition and/or repair operations shall be protected with an anti-corrosive coating. The anti-corrosive coating shall be a two-component, polymer-modified cementitious material such as "Sika Armatec 110 EpoCem " manufactured by Sika Corp., Lyndhurst, NJ, "CR 246" manufactured by Sto Corporation, Atlanta, GA, "Duralprep A.C." by the Euclid Chemical Company, or "MasterEmaco P 124" by BASF Master Builder Solutions.

2.05 STRUCTURAL CRACK REPAIR MATERIAL

Structural crack repair material shall be a two-component, polymer-modified or silica fume enhanced cementitious mortar and shall conform to EPA/USPHS standards for surface contact with potable water supplies. Structural crack repair material shall be "Sikatop 123 Plus" manufactured by Sika Corp., Lyndhurst, NJ, or "Emaco S88 CI" or "MasterSeal 590" by BASF Master Builder Solutions.

2.06 EPOXY CRACK REPAIR BINDER

Epoxy crack repair binder shall be a two-component, 100% solids, high-modulus, low viscosity epoxy adhesive designed for structural repair. The epoxy adhesive shall be "Sikadur 52" manufactured by Sika Corp., Lyndhurst, NJ, "Duralcrete LV" manufactured by Euclid Chemical Company, Cleveland, OH, "Sto Poxy Binder CR633" manufactured by Sto Corporation, Atlanta, GA, "Eucopoxy Injection Resin" by the Euclid Chemical Company, or " MasterInject 1500" by BASF Master Builder Solutions.

2.07 WATERPROOF INJECTION GROUT

Waterproof crack repair material shall be a one-component, water-activated polyurethane hydrophilic injection grout capable of 700% expansion. Polyurethane grout shall form a tough flexible foam seal that is impenetrable to water. Hydrophilic injection grout shall be "Prime Flex 900 XLV" manufactured by Prime Resins, Conyers, GA, "AV-333 Injectaflex" manufactured by Avanti International, Webster, TX, or "DeNeef Sealfoam" manufactured by Grace Construction Products. Hydrophobic injection grout shall be "Prime Flex 920" manufactured by Prime Resins, Conyers, GA, "Sikafix HHLV or

"Sikafix HH+" manufactured by Sika Corp., Lyndhurst, NJ, or "DeNeef Flex PURe" manufactured by Grace Construction Products.

2.08 SPALL REPAIR PATCHING MATERIAL

A. All spall repairs not requiring formwork shall be repaired using a two-component, polymer-modified non-shrink cementitious mortar and shall have a minimum 28-day compressive strength of 7,000 psi. Spall repair mortar for use in horizontal applications shall be "Sikatop 122 Plus" manufactured by Sika Corp., Lyndhurst, NJ, "CR 700" manufactured by Sto Corporation, Atlanta, GA, "Eucocrete Supreme" by the Euclid Chemical Company, or MBT SD-2 or Emaco R310 by BASF Construction Chemicals. Spall repair mortar for use in vertical applications shall be "Sikatop 123 Plus" manufactured by Sika Corp., Lyndhurst, NJ, "Duraltop Gel" manufactured by Euclid Chemical Company, "CR 702" manufactured by Sto Concrete Restoration Division, Atlanta, GA, "Verticoat or Verticoat Supreme" by the Euclid Chemical Company, or "MasterEmaco N 425" or "MasterEmaco N 400" by BASF Master Builder Solutions.

B. All spall repairs requiring formwork shall be repaired using a two-component, polymer-modified cementitious mortar/pea gravel mixture and shall have a minimum 28-day compressive strength of 7,000 psi. Spall repair mortar shall be "SikaTop 111 PLUS" manufactured by Sika Corp., Lyndhurst, NJ, "Eucocrete Supreme" manufactured by Euclid Chemical Company, Cleveland, OH, "Sto Flowable Mortar CR730" manufactured by Sto Corporation, Atlanta, GA, or "MasterEmaco T 310 CI" by BASF Master Builder Solutions.

C. All spall repair materials shall conform to EPA/USPHS standards for surface contact with potable water supplies.

2.9 WATERPROOF MEMBRANE PATCH

Waterproof membrane patch shall be a hypalon sealing strip secured to the concrete substrate with an epoxy adhesive. Sealing system shall be installed per manufacturer's recommendations and shall be "Sikadur Combiflex" manufactured by Sika Corp., Lyndhurst, NJ. Minimum width of waterproof membrane patch shall be twelve (12) inches unless shown otherwise on Contract Drawings.

2.10 CEMENT BASED TEXTURED COATING

Cement based textured coating shall be "SikaTop 144" manufactured by Sika Corp., Lyndhurst, NJ, "MasterSeal 581" manufactured by BASF Master Builder Solutions, "Duraltop Coating" manufactured by Euclid Chemical Company, Cleveland, OH, "Eucoseal or Tamoseal" by the Euclid Chemical Company. Cement based textured coating shall have a minimum durability of 10 years and be able to seal cracks with a width up to 1/8 inch.

2.11 STORAGE OF MATERIALS

The Contractor shall provide an area for repair material storage free from exposure to moisture in any form, before, during, and after delivery to the site. Manufactured materials shall be delivered in unbroken containers labeled with the manufacturer's name and product type. All mortar products shall be stored on raised platforms. Materials susceptible to damage by freezing shall be stored in a dry, heated, insulated area. Any material that has hardened, partially set, become caked and/or has been contaminated or deteriorated shall be rejected. All aggregates shall be stored in clean bins, scows or platforms.

PART 3 -- INSTALLATION

3.01 GENERAL REQUIREMENTS

A. No repair work shall be undertaken when ambient temperatures are below manufacturer's safe recommendations. No admixtures, except those required by the manufacturer, shall be used in the repairs specified herein. All products shall be applied in strict accordance with manufacturer's recommendations. The Contractor shall furnish and install safe scaffolding and ladders for the Engineer's prework inspection, the repair work activities, and the Engineer's final inspection

B. Sandblast or waterblast (3000-4000 psi waterjet) deteriorated areas to remove all loose concrete, existing coatings, unsound material, debris, and laitance. All surfaces shall be clean, free of dirt, grease, loose particles, and deleterious substances and shall be prepared according to manufacturer's requirements.

3.02 EPOXY BONDING AGENT

A. Existing concrete surfaces shall be roughened prior to application of bonding agent. Concrete surface shall be clean and sound, free of all foreign particles and laitance. Repair material shall be placed while bonding agent is still tacky. If bonding agent cures prior to placement of repair material, bonding agent shall be reapplied.

B. Repairing concrete with epoxy mortars shall conform to all the requirements of ACI 503.4 "Standard Specification for Repairing Concrete with Epoxy Mortars" (latest edition), except as modified herein.

3.03 ANTI-CORROSION REBAR COATING

Reinforcing steel cut or exposed during demolition and/or repair operations shall be sandblasted and cleaned prior to coating with an anti-corrosive coating. Anti-corrosive coating shall be applied as soon as the reinforcement is exposed and cleaned. Coating shall thoroughly cover all exposed parts of the steel and shall be applied according to manufacturer's recommendations.

3.04 STRUCTURAL CRACK REPAIR MATERIAL

Where indicated on the Drawings, all existing structural cracks 1/16" and wider shall be repaired with a structural crack repair material. Rout crack to 3/4" wide by 3/4" deep V-notch to expose sound concrete. Where rebar has deteriorated, crack shall be routed to expose 3/4" all around rebar. The resulting void in concrete shall be patched flush with the existing concrete surface using structural crack repair material.

3.05 EPOXY CRACK REPAIR BINDER

A. Where indicated on the Drawings, all existing structural cracks 1/4" or smaller shall be repaired by pressure injecting an epoxy crack repair binder into the prepared crack. Seal crack surface and install injection ports per manufacturer's recommendations. Holes drilled for injection ports shall not cut rebar. If rebar is encountered during drilling, the hole shall be abandoned and relocated, and the abandoned hole shall be patched immediately with non-shrink grout flush with the surface of the existing concrete. Once the surface sealing material has cured, inject crack with epoxy crack repair binder using standard pressure injection equipment as directed by the manufacturer.

B. Where indicated on the Drawings, all existing structural cracks wider than 1/4" shall be repaired by gravity feeding an epoxy crack repair binder into the prepared crack. First rout the concrete surface to form a 1/4" wide by 1/4" deep v-notch and clean the crack to remove all loose and foreign particles. Fill the crack with clean, dry sand and then pour epoxy crack repair binder into V-notch, completely filling crack. As binder penetrates into crack, additional binder shall be applied to the V-notch.

3.06 WATERPROOF INJECTION GROUT

All existing, leaking cracks 1/4" or smaller shall be repaired by pressure injecting a waterproof injection grout into the prepared crack. Seal crack surface and install injection ports per manufacturer's recommendations. Holes drilled for injection ports shall not cut rebar. If rebar is encountered during drilling, the hole shall be abandoned and relocated, and the abandoned hole shall be patched immediately with non-shrink grout flush with the surface of the existing concrete. Once the surface sealing material has cured, inject crack with waterproof injection grout using standard pressure injection equipment as directed by the manufacturer.

3.07 SPALL REPAIR PATCHING MATERIAL

All voids or spalled areas to be repaired shall be chipped back to sound concrete a minimum 1/8" deep, cleaned and repaired with spall repair patching material according to manufacturer's recommendations. All patching shall provide a final finished surface which is flat, level and even with the existing concrete surface. Repair mortar shall not be feathered to meet existing concrete surface. Final patching on horizontal surfaces shall receive a broom finish consistent with the finish on the existing structure.

3.08 WATERPROOF MEMBRANE PATCH

Thoroughly clean the concrete substrate and apply waterproof membrane patch according to manufacturer's recommendations.

3.09 CEMENT BASED TEXTURED COATING

Thoroughly clean the concrete substrate and apply cement based textured coating according to manufacturer's recommendations. All necessary concrete repairs as detailed on the Contract Drawings shall be completed prior to applying coating.

3.10 CURING

All repair products shall be cured in strict accordance with manufacturer recommendations.

3.11 WORK IN CONFINED SPACES

The Contractor shall provide and maintain safe working conditions for all employees and subcontractors. Fresh air shall be supplied continuously to confined spaces through the combined use of existing openings, forced-draft fans and temporary ducts to the outside, or by direct air supply to individual workers. Fumes shall be exhausted to the outside from the lowest level of the confined space. Electrical fan motors shall be explosion-proof if in contact with fumes. No smoking or open fires shall be permitted in or near areas where volatile fumes may accumulate.

- END OF SECTION –

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SECTION 07900

JOINT FILLERS, SEALANTS AND CAULKING

PART 1 -- GENERAL

1.01 THE REQUIREMENT

Furnish labor, materials, equipment and appliances required for the complete execution of Work shown on the Drawings and specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 03250 - Concrete Accessories

B. Section 03290 - Joints in Concrete

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.

1. ASTM C-920 Elastomeric Joint Sealants

2. ASTM D-1056 Flexible Cellular Materials - Sponge or Expanded Rubber

3. SWRI Sealant and Caulking Guide Specification

1.04 SUBMITTALS

A. In accordance with the procedures and requirements set forth in Section 01300 – Submittals, submit the following:

1. Manufacturers literature and installation instructions.

2. Color samples of each type of sealant.

1.05 QUALITY ASSURANCE

A. Applicator shall be a company specializing in the installation of sealants with a minimum of five years experience.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in unopened labeled packages.

B. Store materials in location protected from freezing or damages.

C. Reject and remove from the site materials within broken or damaged packaging.

PART 2 -- PRODUCTS

2.01 MATERIALS

A. Sealants

1. Type 1: Multi-component, non-sag, low-modulus polyurethane rubber sealant meeting ASTM C-920, Type M, Grade NS, Class 25, use NT, M, A, and O. Capable of withstanding 50% in extension or compression such as Sikaflex-2C NS/SL, Sika Corporation, or Sonolastic NP-2, Sonneborn, or DynaTrol II by Pecora Corporation.

2. Type 2: Single component polyurethane sealant meeting ASTM C-920, Type S, Grade NS, Class 25, Use NT, M, A, and O. Capable of withstanding 25% in extension or compression such as Sikaflex 1A by Sika Corporation, DynaTrol 1-XL by Pecora Corporation, or Sonolastic NP-1 by BASF Construction Chemicals.

3. Type 3: Single component, low-modulus moisture curing silicone meeting ASTM C-920, Type S, Grade NS, Class 25, Use NT, M, G, and A. Capable of withstanding 50% extension and compression. Pecora 890 by Pecora Corporation, Sonolastic Omni Seal by BASF Construction Chemicals.

4. Type 4: Single component, mildew resistant, moisture-curing silicone meeting ASTM C-920, Type S, Grade NS, Class 25, Use NT, M, G, and A. Pecora 898 by Pecora Corporation, Sonolastic Omni Plus by BASF Construction Chemicals.

5. Type 5: Single component, acrylic latex meeting ASTM C-834. AC-20+ Silicone by Pecora Corporation, Sonneborn Sonolac by BASF Construction Chemicals.

6. Type 6: High grade butyl sealant meeting Federal Specification TT-S-00-1657. BC-158 by Pecora Corporation or equal.

7. Type 7: Multi-component chemical resistant polysulfide sealant conforming to ASTM C-920, Type M, Grade NS, Class 25 such as Deck-O-Seal by W.R. Meadows, Tammsflex by DuraJoint Concrete Accessories, or Synthacalk GC2+ by Pecora Corporation.

8. Type 8: Nonsag, Multi Component, traffic grade polyurethane sealant meeting ASTM C920, Type 19, Grade NS, Class 25, use T, M, A, and O. DynaTread by Pecora Corporation, Sonolastic Ultra by BASF Construction Chemicals.

B. Primer: Non-staining primer recommended by sealant manufacturer for the substrates on this project.

C. Backer Rod: Closed cell foam, nonreactive with caulking materials, non-oily, and approved by the sealant manufacturer. Minimum density shall be 2.00 pounds per cubic foot. Use no asphalt or bitumen-impregnated fiber with sealants.

D. Joint Cleaner: Recommended by sealant or caulking compound manufacturer.

E. Bond breaker: Either polyethylene film or plastic tape as recommended by the sealant manufacturer.

F. Color: Where manufacturer's standard colors do not closely match materials being sealed, provide a custom color.

PART 3 -- EXECUTION

3.01 QUALITY CONTROL

A. Coordinate work with details shown on approved shop drawings prepared by other trades.

B. Verify conditions in the field.

C. Schedule work to follow closely the installation of other trades.

D. Apply sealants and related items in temperatures and dry conditions recommended by the manufacturers.

E. Do not paint sealant, unless recommended by sealant and paint manufacturer.

3.02 PREPARATION

A. Protect finished surfaces adjoining by using masking tape or other suitable materials.

B. Clean and prime joints before starting any caulking or sealing work.

C. Thoroughly clean joints and spaces of mortar and other foreign materials. Cleaning agent shall be Xylol or similar non-contaminating solvent to remove any film from metal surfaces. Masonry or concrete surfaces shall be brushed or air jet cleaned.

D. Joint Requirements

1. All joints and spaces to be sealed in exterior work shall be less than 1/2 inch deep and not less than 1/4 inch wide. If joints in masonry are less than that specified herein, the mortar shall be cut out to the required width and depth. All joints and spaces to receive sealant shall be completely prepared and thoroughly dry before installation of sealant.

2. Unless otherwise specified, joints and spaces which are open to a depth of 1/2 inch or greater shall be solidly filled with back-up material to within 1/4 inch of the surface. Back-up material shall be packed tightly and made continuous throughout the length of the joints. Bond breaker shall be applied as required. If joints are less than 1/4 inch deep, the back-up material may be omitted, a bond breaker substituted and the joint completely filled with sealant. The back-up material shall not project beyond the 1/4 inch depth of the open space in any joint. The following width-to-depth ratio table shall be adhered to, unless otherwise recommended by manufacturer.

	Sealant Depth	
Joint Width	Minimum	Maximum
¼ inch	1/4 inch	1/4 inch
Over 1/4 inch to 1/2 inch	1/4 inch	Equal to width
Over 1/2 inch to 1 inch	1/2 inch	Equal to width
Over 1 inch to 2 inch	1/2 inch	1/2 of width

3.03 APPLICATION

A. Exercise care before, during, and after installation so as not to damage any material by tearing or puncturing. All finished work shall be approved before covering with any other material or construction.

B. Apply sealant by an approved type of gun except where the use of a gun is not practicable, suitable hand tools shall be used. Avoid applying the compound to any surface outside of the joints or spaces to be sealed. Mask areas where required to prevent overlapping of sealant.

C. All joints shall be waterproof and weathertight.

D. Point sealed joints to make a slightly concave joint, the edges of which are flush with the surrounding surfaces. Exposed joints in the interior side of the door and other frames shall be neatly pointed flush or to match adjacent jointing work.

E. Adjacent materials which have been soiled shall be cleaned immediately and the work left in neat and clean condition.

F. Comply with sealant manufacturer's written instructions except where more stringent requirements are shown or specified and except where manufacturer's technical representative directs otherwise.

3.04 ADJUSTMENT AND CLEANING

A. Remove misplaced sealant compounds promptly using methods and materials recommended by the manufacturer, as the work progresses.

B. Allow sealants to cure and remove protective edging, of doors, louvers, saddles windows etc. as directed by the Engineer.

3.05 SCHEDULE

Schedule of Sealants

Application	**Sealant**	**Color**
Vertical and horizontal expansion and construction joints in concrete structures unless noted otherwise herein or on Drawings.	Type 1	To closely match adjacent surfaces or mortar and as selected by the Owner.
Vertical and horizontal joints bordered on both sides by masonry, precast concrete, natural stone or other porous building material, unless noted otherwise herein or on Drawings.	Type 2	To closely match adjacent surfaces or mortar and as selected by the Owner.
Vertical and horizontal joints bordered on both sides by painted metals, anodized aluminum, mill finished aluminum, PVC, glass or other non-porous building material.	Type 3	To closely match adjacent surfaces and as selected by the Owner.
Sanitary areas, joints in ceramic tile, around plumbing fixtures, countertops, and back splashes. See Note 1.	Type 4	To closely match adjacent surfaces and as selected by the Owner.
Perimeter sealing of doors, windows, louvers, piping, ducts, and electrical conduit. See Note 2.	Type 2 or Type 3	To closely match adjacent surfaces and as selected by the Owner.
Below thresholds.	Type 6	Manufacturer's standard
Submerged in liquids. See Note 4.	Type 1	Manufacturer's standard

Application	Sealant	Color
Submerged in liquids with high concentration of chlorine (> 2 ppm).	Type 7	Manufacturer's standard
Horizontal Joints exposed to vehicular or pedestrian traffic.	Type 8	To closely match adjacent surfaces.
Other joints indicated on the drawings or customarily sealed but not listed.	Type recommended by manufacturer	To closely match adjacent surfaces and as selected by the Owner.

Note 1. Sealant for Laboratory Countertop shall be as recommended by countertop manufacturer.

Note 2. Provide UL approved sealants for penetrations thru fire-rated walls and as specified in Section 07270.

Note 3. Sealants which will come in contact with potable water shall meet the requirements of NSF 61.

Note 4. Where sealant will be immersed in liquid chemicals verify compatibility prior to installation of sealant.

-++++END OF SECTION ++++++

SECTION 01 35 29
HEALTH AND SAFETY
FOR DEMOLITION AND REMEDIATION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
1. Submittals
2. Contractor's responsibility for health and safety
3. Site-Specific Health and Safety Plan
4. Air monitoring
5. Delineation of work zones
6. Personal protective equipment
7. Site Health and Safety Officer

1.02 SUBMITTALS

A. Prepare and submit Site-Specific Health and Safety Plan (HASP) to the City DWM for review prior to commencement of Site remediation and demolition activities on the Site. The Remediation Contractor's HASP shall conform to requirements of subsection 1.04 of this Section.

B. For site remediation and demolition activities, submit the following written communications to the City DWM (at a minimum) during performance of the Work:

1. Immediate notifications regarding any and all health and safety incidents.
2. Immediate notification of any and all hazards that Remediation Contractor discovers on the Site other than those identified in the Contract Documents.

C. Refer to other applicable specification section(s) for specific health and safety submittal requirements for hazardous materials assessment and abatement activities in buildings to be demolished. If required, prepare separate Site-Specific HASPs for these activities in conformance with all applicable regulations.

1.03 CONTRACTOR'S RESPONSIBILITY FOR HEALTH AND SAFETY

A. Remediation Contractor shall be responsible for the health and safety of the general public and Remediation Contractor's and subcontractors' employees who are present on the Site. Remediation Contractor will be responsible for Site access control measures and perimeter air monitoring in order to protect the public.

B. Remediation Contractor shall be responsible for emergency response planning and notification, and for actual response to any and all emergencies that may occur during the course of the Work, including emergencies occurring when Remediation Contractor is not present at the Site.

C. Utilize the services of a Certified Industrial Hygienist (CIH) or Certified Safety Professional (CSP), as appropriate, to develop and implement the HASP. The HASP shall define the Remediation Contractor's responsibility to conduct initial site-specific training, and provide support for all health and safety activities as needed, including personnel medical surveillance, air monitoring, and the upgrading or downgrading of the level of personnel protection.

D. Communicate regularly with Engineer and City DWM regarding health and safety issues for safe conduct of their duties, but such communication shall not imply any duty or responsibility on the part of Engineer and City DWM with regard to Remediation Contractor's health and safety. Engineer's and City DWM's responsibilities and duties with regard to health and safety shall be limited to employees of Engineer and City DWM. Remediation Contractor shall have responsibility and duty to Engineer and City DWM to communicate health and safety issues accurately and in a timely manner to allow Engineer and City DWM to take appropriate actions to protect their employees on the Site.

E. Remediation Contractor's duties and responsibilities to other project entities (including Prime Contractor and the City DWM) regarding health and safety shall be in accordance with the Contract Documents and applicable laws and regulations.

F. Comply with all applicable local, state, and federal health and safety standards and guidelines implemented through, but not limited to, the Occupational Safety and Health Administration (OSHA), the National Institute for Occupational Safety and Health (NIOSH), the American Conference of Governmental Industrial Hygienists (ACGIH), and United States Environmental Protection Agency (USEPA). Where these are in conflict, the most stringent requirement shall be followed.

G. Remediation Contractor shall immediately notify the City DWM in writing of any hazard that Remediation Contractor discovers or observes on the Site, other than that identified in the Contract Documents, and describe corrective measures planned or taken to eliminate or minimize such hazard.

H. Refer to other applicable sections for specific health and safety requirements which must be implemented during hazardous materials assessment and abatement activities in buildings to be demolished.

I. Remediation Contractor shall comply with all Field Orders or Work Change Directives issued by the City DWM for temporary stoppage of the Work or change in procedures of the Work in response to unacceptable release of airborne particulates detected by the ambient air monitoring program.

1.04 SITE-SPECIFIC HEALTH AND SAFETY PLAN

A. Remediation Contractor shall prepare Site-Specific Health and Safety Plan(s) (HASP) in accordance with applicable local, state and federal regulations for all remediation and demolition work on the Site in accordance with 29 CFR 1910.120, including personnel medical surveillance for blood-lead based on the anticipated length of the remedial action, 1910.1025, 1926.62, 1910.1001 and 1926.1101, related to lead remediation in soil, lead assessment and abatement in structures, and asbestos surveys and abatement.

B. In the preparation of the Remediation Contractor's HASP, Remediation Contractor shall review the Engineer's HASP (copy to be provided to Contractor), and shall include, at a minimum, the level of protection included in the Engineer's HASP.

C. The Remediation Contractor's HASP will be reviewed and commented on, but will not be approved by the City DWM or Engineer.

D. The HASP shall cover all activities associated with the specified Work, including but not limited to the following:

1. Hazardous materials assessment of buildings to be demolished.
2. Abatement of asbestos and other regulated materials if applicable (include in separate HAZWOPER HASP as needed).
3. Transportation and disposal of hazardous materials from building abatement (include in Abatement Plan).
4. Demolition of buildings.
5. Handling and off-site disposal of demolition debris.
6. Excavation, handling and stockpiling of impacted soils.
7. Site wide and task specific dust, lead particulate, and respirable silica control measures and monitoring in accordance with the latest federal standards.
8. Dewatering operations (including handling, treatment and discharge of disposal of liquids).
9. On-site stabilization of excavated materials for transport.
10. Loading and offsite hauling of excavated materials for disposal.
11. Transportation and disposal of excavated materials.

E. Implement, maintain and enforce the procedures in the HASPs at the appropriate time prior to and during the Work. The following shall be included in the Remediation Contractor's HASPs (as applicable):

1. Names of key personnel and alternates responsible for health and safety, including a Site Health and Safety Officer (specified in subsection 1.08).
2. Medical surveillance requirements in accordance with applicable OSHA regulations.
3. Copies of current OSHA health and safety training certificates and medical certifications for employees who will be working on the Site.
4. Site description and evaluation.
5. Analysis of specific work tasks and the associated hazards and protective measures.
6. A description of personal protective equipment (PPE) to be used by employees for each of the Site tasks and operations being conducted.
7. A description of engineering controls used to reduce the hazards of equipment operation and exposure to Site hazardous chemicals and substances.
8. Corrective actions and upgrading of personnel protection based on monitoring of air, personnel, and environmental sampling, with specific action levels identified.
9. Site control measures in accordance with the control program required in 29 CFR 1910 and 29 CFR 1926.
10. Frequency and types of air monitoring, personnel monitoring, and environmental sampling techniques and instrumentation to be used by the Remediation Contractor for the purpose of employee safety, including methods of maintenance and calibration of monitoring and sampling equipment. (Refer to subsection 1.05.)
11. Site sanitation procedures.
12. Decontamination procedures for equipment, personnel, vehicles, and tools.
13. Proposed location and construction of decontamination facilities.
14. Procedures for the collection, treatment, and disposal of decontamination water and residuals.
15. Hazard Communications Program and SDS requirements.
16. An emergency response plan meeting federal, state, and local requirement for safe and effective responses to emergencies, including the necessary PPE and other equipment.
17. Explanation of potential emergencies and contingency plan of action, including description of the route to the nearest appropriate hospital, hospital route map, and posting of emergency telephone numbers at the Site.
18. Logs, reports, and recordkeeping.

1.05 AIR MONITORING

A. Air monitoring shall be conducted for all Site remediation and demolition activities as specified in this subsection. Refer to other applicable sections for specific air monitoring requirements which must be implemented during abatement activities within buildings to be demolished.

B. An ambient air monitoring program shall be conducted by the Remediation Contractor for all Site remediation and demolition activities in accordance with applicable regulations.

C. The purpose of the ambient air monitoring program is to detect and mitigate potential releases of: lead-containing dust particles and other constituents of concern during excavation and handling of site soils; and hazardous air-borne particulates during building abatement and demolition activities. The program shall include perimeter monitoring and real time air sampling to monitor airborne dust and respirable silica particulates on the property.

D. The Remediation Contractor's safety professional shall design, develop and implement the air monitoring program. The program shall be included as part of the Remediation Contractor's HASP and shall conform to all applicable state and federal regulations. The safety professional shall be responsible for establishing: air monitoring strategies and protocols using real-time instrumentation; and implementing appropriate sampling and analytical procedures for time-weighted-average (TWA) monitoring.

E. Furnish and maintain appropriate real-time air monitoring equipment and properly equipped monitoring stations for perimeter TWA sampling in accordance with applicable regulations. The Remediation Contractor shall also provide personal air sampling pumps and appropriate sampling media for conducting required on-site TWA personnel sampling. Samples shall be analyzed using appropriate analytical methods.

F. Information gathered during the air monitoring program shall be used: to evaluate and adjust health and safety measures to be implemented during the Site remediation and demolition work; and to assess potential off-site migration of dust and other air-borne particulates so that control measures and contingency plans may be adjusted.

1.06 DELINEATION OF WORK ZONES

A. Prior to implementation of Site remediation and demolition work activities, establish the boundaries of the work areas as approved by the City DWM and in accordance with applicable regulations. These areas shall include Exclusion Zone(s), Contamination Reduction Zone(s), and Support Zone(s).

1.07 PERSONAL PROTECTIVE EQUIPMENT

A. Furnish and maintain materials and equipment for the health and safety of Remediation Contractor's and subcontractors' employees. Provide all required health and safety equipment, first aid equipment, tools, monitoring equipment,

PPE, decontamination equipment, and ancillary equipment and methods required to ensure worker health and safety and to comply with all applicable regulations.

B. Engineer and City DWM will furnish PPE for their employees but will use Remediation Contractor's decontamination areas and materials.

1.08 SITE HEALTH AND SAFETY OFFICER

A. Remediation Contractor shall designate a Site Health and Safety Officer (SHSO). The SHSO shall assist and represent the CIH in the continued implementation and enforcement of the HASP. The SHSO shall be assigned to the Site on a full-time basis and shall be either the Remediation Contractor's employee or a subcontractor who reports to the Remediation Contractor and the CIH in matters pertaining to Site health and safety. The name, qualifications and work experience of the SHSO shall be included in the HASP.

B. Remediation Contractor shall hold safety meetings for all workers on the Site, a minimum of once per day for each work shift (prior to initiation of on-site field activities), to address health and safety issues, changing Site conditions, activities, and personnel. Hold additional safety meetings at the start of each major task and for changes in Site conditions that affect personnel safety.

C. In the event of an unmanaged health and/or safety risk as determined by the SHSO, Remediation Contractor shall not proceed with the Work until a method for managing the risk has been determined in consultation with the City DWM, and implemented. Any health or safety risk resulting in a stoppage of work shall be reported immediately to the City DWM in writing.

D. The designated SHSO shall not be replaced without written notice to, and approval by, the City DWM. Written notice shall be submitted a minimum of one week prior to the proposed change.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 015700

TEMPORARY CONTROLS

FOR DEMOLITION AND REMEDIATION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
1. Submittals
2. Mobilization
3. Temporary utilities
4. Temporary sanitation facilities
5. Protection of existing utilities
6. Temporary barriers, signage and markers
7. Site access and parking
8. Site housekeeping
9. Noise control
10. Surface water control
11. Control of pollutants
12. Dust control

1.02 SUBMITTALS

A. The following submittals referenced in this Section shall be submitted (as applicable) to the City DWM for review:
1. Spill Prevention, Control and Countermeasures Plan (see subsection 1.12)

1.03 MOBILIZATION

A. Remediation Contractor shall mobilize to the Site and be prepared to initiate the remediation activities within the time limit determined by the City DWM.

B. Mobilization shall not proceed until the Remediation Contractor has:

1. Obtained all permits, licenses and OSHA training certificates necessary to perform the Work, where required.

2. Submitted all required initial submittals as specified.

C. Mobilization includes, but is not necessarily limited to: transportation of personnel, equipment, and operating supplies to the site; and other preparatory work at the Site.

D. All equipment mobilized to the Site shall be inspected by the Remediation Contractor to verify the condition of the equipment to ensure that it is free of obvious mechanical defects and safety deficiencies.

1.04 TEMPORARY UTILITIES

A. Conform to the requirements of Section 01510 – Temporary Facilities.

1.05 TEMPORARY SANITATION FACILITIES

A. In addition to the requirements of Section 01510, provide and maintain (as applicable) temporary toilets, washing facilities, and other sanitation facilities on the Site in accordance with 29 CFR 1910.120(n), 29 CFR 1926.51, and all other applicable laws and regulations.

1.06 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. If damaged, the utilities shall be repaired as approved by the City DWM.

B. Contact and cooperate with the City DWM and utility companies to locate utilities within defined the limits of the Site prior to beginning the Work. The Remediation Contractor will only be responsible for locating and protection (or removal or abandonment) of utilities within the limits of building demolition and site remediation as designated on the Drawings. Coordinate with utility locating, protection, abandonment or removal to be performed by others on the Site.

C. Comply with the requirements of the "Georgia Utility Facility Protection Act" (Chapter 9 of Title 25 of the Official Code of Georgia Annotated) for protection of underground utilities, including the requirement to give not less than 48 hours notice to the Utilities Protection Center of Georgia (Georgia 811).

D. Comply with the requirements of the utility owner and the "High-voltage Safety Act" (Chapter 3 of Title 46 of the Official Code of Georgia Annotated) for protection of overhead high-voltage lines, including the requirement to give notice to the Utilities Protection Center of Georgia (Georgia 811) at least 72 hours prior to commencing work in the vicinity of the high-voltage lines.

1.07 TEMPORARY BARRIERS, SIGNAGE AND MARKERS

A. Conform to the requirements of Section 01540 – Security and Safety, and as specified below.

B. For all demolition and Site remediation work, provide barriers, signs and markers to protect demolition and Site remediation work areas in conformance with all applicable local requirements and health and safety laws and regulations. Install fencing as specified in the following paragraphs. Maintain the temporary facilities on a daily basis and replace damaged materials until all demolition and site remediation has been completed and accepted.

C. Remediation Contractor shall install temporary chain link security fencing around all demolition and remediation work areas on the Site to prevent unauthorized entry and protect the public. Special emphasis shall be taken to provide security fencing, signage and other markers at limits of all work areas adjacent to roadway rights-of-way and other property boundaries.

D. Fencing shall consist of, at a minimum, 6-foot height, commercial-grade, and shall be anti-climb (using small mesh size for fence fabric). Fencing shall be constructed with required fencing materials (including posts and framework) and installation procedures to meet applicable industry standards for wind load and other loading criteria. If required by the City of Atlanta, install privacy screen fabric or slats on the fencing. Provide vehicular and pedestrian gates with locks as needed and as approved by the City DWM. Maintain fencing on a daily basis and replace or repair damaged materials for full duration of the Remediation Work.

1.08 SITE ACCESS AND PARKING

A. Remediation Contractor's vehicles shall enter and exit the Site only at the locations designated on the Drawings. Conform to the requirements of Section 01540.

B. Remediation Contractor parking and laydown areas shall occur only at locations designated or approved by the City DWM. 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 and other Site usage.

C. Repair existing off-site roads damaged by operation of remediation equipment as determined by the City DWM in compliance with requirements of the authority having jurisdiction.

1.09 SITE HOUSEKEEPING

A. Maintain a high standard of Site housekeeping and implement all measures necessary to manage the impact of the Work on public roads and rights-of-way or adjacent properties as indicated on the Drawings (including the Erosion, Sedimentation and Pollution Control ES&PC Plan) and in accordance with the Specifications.

1.10 NOISE CONTROL

A. Remediation 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. Remediation 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 all other applicable laws and regulations.

C. Noise mitigation measures shall include, but shall not be limited to, utilizing noise control devices, limiting night work hours for certain activities, and scheduling and controlling traffic.

D. Coordinate with the City DWM 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 Project. Remediation Contractor shall comply with all requirements of the City of Atlanta for work hours.

1.11 SURFACE WATER CONTROL

A. Provide methods to control surface water to prevent damage to the Work, the Site, and adjoining properties as indicated on the Drawings and specified in Section 31 23 19.

1.12 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. The SPCC Plan shall be submitted to the City DWM for review.

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 Remediation 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 smoke or other emissions from interfering with other operations on the Site and impacting the environment (including adjacent properties). Prevent toxic concentrations of chemicals, and prevent harmful dispersal of pollutants into the atmosphere. Provide air monitoring as specified in Section 01 35 29.

E. Remediation Contractor's equipment used during the Work shall conform to all applicable laws and regulations.

1.13 DUST CONTROL

A. During demolition and Site remediation work, the Remediation Contractor shall (at a minimum) implement, monitor and maintain best management practices (BMPs) for erosion and sedimentation control, including control of airborne transport of sediment (dust carried by wind) as required by the Erosion, Sedimentation and Pollution Control Plan (ESPC Plan).

B. The Remediation Contractor shall also control potential releases of dust (airborne particulates) during excavation and handling of Site soils, facility abatement activities, building demolition, and handling of demolition debris in accordance with all applicable laws and regulations as specified in Section 01 35 29.

C. Control release of airborne particulates from demolition and remediation activities at all times, including weekends, holidays and hours when the Work is not in progress.

D. Maintain excavations, stockpiles, and other areas within the Work areas free from particulates which would cause the air pollution standards to be exceeded or cause a hazard or nuisance.

E. Provide all labor, materials and equipment (including water trucks and dust suppressant) as needed to limit visible dust generation on the Site during the Work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 026114

EXCAVATION OF IMPACTED SOILS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes requirements for excavation and removal of impacted soils for Site remediation. The estimated limits of excavation are indicated on the Drawings. The extent of the excavation may be modified based on field data.

B. Related Sections:
1. Section 01055 – Construction Staking
2. Section 01 35 29 – Health and Safety for Demolition and Remediation
3. Section 01 57 00 – Temporary Controls for Demolition and Remediation
4. Section 02 61 15 – Stabilization of Excavated Impacted Soils
5. Section 02 61 17 – Stockpiling and Loading of Impacted Materials
6. Section 02 81 00 – Transportation and Disposal of Impacted Materials
7. Section 31 23 43 – Backfilling and Grading for Remediation

1.02 SUBMITTALS

A. During the progress of the Work, submit to the City DWM a written record of daily progress of the excavation work in a form acceptable to City DWM. Daily progress records shall be submitted at the beginning of the subsequent day's work.

1.03 QUALITY ASSURANCE

A. The Remediation Contractor's surveyor shall field determine and lay out the locations, elevations and horizontal limits for impacted soil removal based on information provided.

B. Confirmation sampling and analysis shall be performed by the Remediation Contractor.

1.04 PROJECT CONDITIONS

A. The Remediation Contractor is solely responsible for excavation slope stability. Excavation work shall be performed in compliance with all applicable local, state and federal regulations, including but not limited to the requirements of OSHA in 29 CFR 1926 Subpart P – Excavations. Provide shoring, bracing, sloping and/or benching as required. Special emphasis shall be taken to provide excavation support and protection at limits of all work areas adjacent to roadway rights-of-way and other property boundaries.

B. Work shall be performed in a manner that does not disturb or damage existing structures, utilities, sidewalks, streets, and other facilities not indicated to be removed as specified in Section 01 57 00.

C. The Remediation Contractor shall provide temporary controls as required for health and safety and for pollution prevention during excavation activities in accordance with the requirements of Section 01 57 00.

D. The Remediation Contractor shall take every effort necessary to prevent cross-contamination and re-contamination of cleaned areas and adjacent undisturbed areas. Equipment used for excavation and handling of contaminated materials shall be decontaminated prior to removal from the Site.

E. Work will involve the handling of materials containing substances that are potentially harmful to the health and safety of remediation personnel. Perform work in compliance with all applicable regulations. Conform to the requirements of Section 01 35 29, including preparation of a Site-Specific HASP in advance of mobilization to the Site.

1.05 COORDINATION AND SCHEDULING

A. Coordinate excavation work with (as applicable) stockpiling or direct loading, stabilization, sampling and transportation of excavated impacted soils for off-site disposal.

B. Sequence the excavation work to allow the required time for confirmation sampling and analyses and for stabilization of soils as specified in this section and in Section 02 61 15. Excavation work shall be performed in accordance with the approved Demolition and Remediation Progress Schedule and Work Plan (specified in Section 01 31 00).

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 IDENTIFICATION OF IMPACTED MATERIALS

A. Site investigations performed by previous consultants and the City DWM have identified areas on the Site that require remediation. The approximate locations, horizontal limits, and excavation depths of areas to be excavated are shown on the Drawings.

B. The process for field identification of impacted soil areas, including confirmation sampling, is specified in subsection 3.04.

C. The Remediation Contractor's personnel shall maintain awareness for environmentally suspect conditions, including but not limited to buried tanks, odors, staining, pooled liquids (other than water), and waste materials, and immediately notify the City DWM of any such suspect conditions for further evaluation.

D. The Remediation Contractor shall maintain awareness for subsurface utilities and immediately notify the City DWM of any utilities not indicated on the Drawings.

3.02 PREPARATION

A. Preparation of the Site for excavation of impacted soils includes, but is not necessarily limited to, the following:

1. Coordination with others for removal or relocation of trees, utilities and streets as needed.

2. Installation and maintenance of temporary erosion, sedimentation and pollution control measures.

3. Implementation of health and safety procedures in compliance with all applicable regulations of authorities having jurisdiction, including decontamination facilities and procedures as specified in Section 01 35 29.

4. Protection of all existing utilities (buried and above grade), structures, and other facilities on the Site not indicated to be removed.

5. Surveying to lay out the Work in accordance with the applicable requirements of Section 01055 – Construction Staking.

6. Abandonment of existing monitoring wells (if required).

7. Cutting and removal of existing asphalt pavement and concrete slabs within the limits of areas to be excavated.

8. Installation of temporary excavation support and protection at limits of excavations as required.

9. Dewatering to control and remove surface water and groundwater seepage into excavations.

3.03 EXCAVATION AND REMOVAL OF IMPACTED SOILS

A. Excavation and removal of impacted soils shall conform to the requirements of the

Georgia EPD-approved Voluntary Investigation and Remediation Plan (VIRP) (as modified in Semi-Annual Status Report #4), and as specified herein.

B. Excavate and remove all soils and other subsurface materials encountered to the full depths and limits indicated on the Drawings or as otherwise directed by the City DWM based on the results of confirmation sampling. In general, this will involve the following (unless otherwise shown or directed):

1. Excavate impacted soils down to the limits of impacted soil exceeding 400 mg/kg as indicated on the Drawings, or to groundwater table, whichever is encountered first.

2. Where the Drawings indicate excavation below the groundwater table within the horizontal limits of the impacted soil areas, all soil excavated below the groundwater table shall be stockpiled in maximum 500-ton increments and one representative sample from each stockpile shall be analyzed for total lead. Stockpiles with concentrations equal to or exceeding 400 mg/kg shall be handled in the same manner as impacted soil from above the groundwater table. An exception shall be where confirmation sampling previously verified the vertical extent of impacted soil at a level above the groundwater table.

C. All excavated soil shall be temporarily placed on-site in stockpiles of approximately 500-ton increments as specified in Section 02 61 17. One representative sample from each stockpile shall be analyzed for leachable lead using the Toxicity Characteristic Leaching Procedure (TCLP). Stockpiles exceeding the regulatory standard of 5 mg/kg TCLP lead shall be stabilized as specified in Section 02 61 15 prior to off-site transport.

D. The extent of excavation in each area shall be based on the requirements shown on the Drawings and information determined by the City DWM in the field as a result of confirmation sampling at the limits of the planned excavations as specified in subsection 3.04.

E. The limits of excavation adjacent to paved roadways, structures, buried utilities, property lines and other objects shall not extend beyond the limits determined and approved by the City DWM and other agencies having jurisdiction.

F. Excavation and removal of impacted soils in each location will be considered complete when excavation limits are in conformance with applicable regulations and the requirements of this Section as determined by the City DWM.

3.04 CONFIRMATION SAMPLING

A. Upon removal of impacted soils to the initial designated limits of excavation,

confirmation sampling shall be performed by the Remediation Contractor. Depending on the results of the confirmation sampling, additional excavation and confirmation sampling followed by City DWM's evaluation shall continue in an iterative process.

B. When initial excavation is complete at each location, discontinue excavation at that location and prepare for collection of confirmation samples. Excavation work shall proceed at other locations while test results are pending.

C. Confirmation sampling for determination of impacted soil areas to be excavated includes but is not necessarily limited to the following:

1. Collect sidewall soil confirmation samples at mid-depth at the locations indicated on the Drawings, generally at a spacing of one per 25 linear feet of sidewall (as long as the excavation depth does not extend beyond 5 feet below ground surface). In the event that the excavation extends deeper than 5 feet below ground surface, additional sidewall soil confirmation samples will be required at the same spacing.

2. Collect confirmation samples at the bottom of excavations that are above the groundwater table at the rate of one sample per 625 square feet of excavation bottom.

3. Soil confirmation samples shall be analyzed for total lead via EPA Method 6010C. The Remediation Contractor shall provide the analytical results to the City DWM for evaluation.

4. Areas where soil samples indicate total lead concentrations that are equal to or greater than 400 mg/kg will require additional excavation. The extent and direction of additional soil excavation will be determined by the City DWM after evaluating the analytical results.

5. Areas where soil samples indicate total lead concentrations less than 400 mg/kg will not require additional excavation beyond the initial excavation limits in the designated portions of the excavation.

6. The Remediation Contractor shall anticipate some delay due to laboratory turnaround times for soil sample analyses.

D. Soils with total lead concentrations exceeding 400 mg/kg are required to be removed.

E. Provide written notification to the City DWM at the start of each day's activities providing information on the excavation areas that are anticipated to be complete and ready for collection of confirmation samples during the work day.

F. Approximately 24 to 36 hours will typically be required from the time when results of laboratory analyses are submitted to the City DWM and directions are given by the City DWM to either perform additional excavation or backfill. Additional time will be required over weekends and holidays and in the event of any delays in reporting of results by the analytical laboratory. City DWM's directions will be provided both verbally and in writing.

3.05 MATERIALS HANDLING AND DISPOSAL

A. Unless otherwise approved, excavated impacted soils shall be stockpiled in approximately 500-ton increments in preparation for stabilization and characterization sampling (by Remediation Contractor) prior to being loaded into transport vehicles for off-site disposal as specified in Section 02 61 17. City DWM will provide notice to the Remediation Contractor when a given stockpile has been approved and may be loaded for transportation to the landfill. The Remediation Contractor shall keep in mind that some stockpiles may require additional stabilization and re-sampling for characterization purposes prior to transportation to the landfill as specified in Section 02 61 17.

B. Remediation Contractor shall be responsible for testing of all excavated soils on-site, stabilization of soils that exceed TCLP limits based on testing, and characterization sampling of stabilized soil as specified. Mix stabilization amendments and take other measures necessary for transportation and disposal of the materials as approved by the disposal facility as specified in Section 02 61 15.

C. Removed soils shall be loaded for transport as soon as practical after stabilization and characterization of excavated soils has been completed and approval by the City DWM has been provided.

D. Remediation Contractor shall be responsible for sampling and testing to determine the regulatory status of excavated and stabilized soils for transportation and disposal.

E. Transportation and disposal of excavated soils shall conform to the requirements of Section 02 81 00.

3.06 BACKFILLING

A. Backfilling of areas where removal of impacted soils has been completed shall proceed immediately upon receipt of approval by the City DWM.

B. If soil backfill material is placed into excavation areas by the Remediation Contractor prior to receiving results of confirmation sampling and analysis (by Remediation Contractor) and approval from the City DWM, the backfill material shall be considered contaminated. In such instances, the backfill material shall be removed from the excavation, stabilized if required, and loaded for transport to an off-site disposal facility at the Remediation Contractor's expense. The City DWM will make determination as to the limits of contamination.

C. Backfilling of excavation areas is specified in Section 31 23 43.

END OF SECTION

SECTION 02 61 15
STABILIZATION OF EXCAVATED IMPACTED SOILS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes the mixing of an approved reagent with excavated impacted soils containing lead for stabilization to immobilize constituents of concern. Section does not include in-situ stabilization.

B. Related Sections:
   1. Section 02 61 17 – Stockpiling and Loading of Impacted Materials
   2. Section 02 81 00 – Transportation and Disposal of Impacted Materials

1.02 REFERENCES

A. Code of Federal Regulations Publications (CFR):
   1. U.S. Environmental Protection Agency
      a. 40 CFR 261, Identification and Listing of Hazardous Waste

B. United States Environmental Protection Agency (USEPA):
   1. SW-846.3-3, Test Method 1311: Toxicity Characteristic Leaching Procedure (TCLP).

1.03 PERFORMANCE REQUIREMENTS

A. An ex-situ stabilization system shall be used which provides a safe, reliable method to stabilize impacted soils so that the cured soils conform to the requirements of paragraph 1.03.C and are suitable for off-site hauling and disposal. Remediation Contractor shall be responsible for the design and implementation of the stabilization process.

B. Unless otherwise approved by the City DWM, all excavated soils shall be placed into stockpiles of maximum 500-ton increments on-site and a representative sample shall be analyzed from each stockpile for TCLP lead. Requirements for stabilization, subsequent sampling and re-stabilization as needed, and disposal are specified in subsection 3.01 of this Section.

1.04 SUBMITTALS

A. Submit the following for review prior to commencement of the Work:

   1. A Soil Stabilization Work Plan covering all operations associated with the on-site ex-situ stabilization of excavated soils. This Work Plan shall be

included in the Demolition and Remediation Work Plan. The Soil Stabilization Work Plan shall include, but is not to be limited, to the following:

a. Proposed sequencing and methods for placement of excavated soil in stockpiles, initial stabilization of the soils, analytical testing, and re-stabilization and re-testing as required, showing conformance with the Specifications.

b. Description of equipment to be used for the stabilization of soils.

c. The proposed mix design and method of mixing, and the proposed source of water.

d. Reagent type and composition, certificates of analysis, and Safety Data Sheets (SDS) for all proposed stabilization products.

e. Layout drawings, including proposed stockpile plan and details.

f. Identification of potential air and dust emissions, control systems to maintain compliance with applicable regulations, and proposed testing protocol for air and dust emissions.

g. A quality control plan which addresses control and documentation of batch proportions, mixing process, sample collection, and post-stabilization testing.

h. Procedures for post-stabilization cleanup and sampling plan for the mixing areas.

B. The City DWM will review the submittals, and either approve or notify the Remediation Contractor of any deficiencies. Work shall not commence on the stabilization of the soils until the Remediation Contractor has received written approval of the submittal documents.

C. Submit the following to the City DWM during the progress of the Work:

1. Daily batch proportions and mixing quality control data.

2. Written copies of the results of all analytical testing.

1.05 QUALITY ASSURANCE

A. Analytical testing shall be performed by a qualified independent testing laboratory retained by the Remediation Contractor and approved by the City DWM.

1.06 DELIVERY, STORAGE AND HANDLING

A. Reagents shall be shipped in properly labeled containers, accompanied by certificates of analysis.

B. Conform to manufacturers' instructions for handling and storage of reagents.

PART 2 PRODUCTS

2.01 REAGENTS

A. The Remediation Contractor shall select appropriate reagent(s) (such as EnviroBlend or lime), as approved by the City DWM, and shall determine appropriate mix proportions to ensure that the performance requirements have been attained. Mix proportions may be adjusted as work proceeds to allow for changing conditions.

PART 3 EXECUTION

3.01 STABILIZATION OPERATIONS

A. All stabilization work shall be conducted in accordance with the approved Soil Stabilization Work Plan. The Remediation Contractor shall develop the Work Plan based on the requirements specified in the following paragraphs.

B. Erosion and Sedimentation Control

1. Erosion, sedimentation and pollution control measures shall be implemented prior to commencement of stabilization activities in conformance with all applicable regulations.

C. Stockpiling

1. Temporary stockpiles for excavated soils shall be located near excavations unless otherwise approved by the City DWM.

2. Stockpiling of excavated soils shall conform to the requirements of Section 02 61 17, including suitable liners to provide a physical separation between soils and the ground surface, covers, and run-on control.

D. On-Site Transportation of Excavated Soils

2. If allowed by the City DWM, excavated soils may be transported to separate on-site mixing area(s) using approved methods. Spills shall be cleaned up

immediately.

E. Stabilization Equipment

1. Stabilization shall be performed using equipment and methods capable of producing a thoroughly mixed uniform material.

2. Control the proportions of mix constituents by suitable volumetric or weight measuring devices.

F. Stabilization of Dissimilar Soils

1. Dissimilar soils may need different mixing ratios and shall not be mixed together unless approved by the City DWM.

G. Stabilization, Re-Stabilization and Disposal of Soils

1. Determination of requirements for stabilization and disposal of excavated soils shall be based on the results of sampling and analytical testing as specified.

2. After initial sampling and analytical testing, soils that indicate a lead TCLP concentration less than 5 mg/L may be transported offsite as non-hazardous material for disposal at an approved Subtitle D facility as specified in Section 02 81 00 after receipt of approval by the City DWM. Soils that indicate a TCLP concentration equal to or exceeding 5 mg/L shall require stabilization.

3. Following initial stabilization, a second representative sample shall be collected and analyzed for TCLP lead. Stabilized soils with a TCLP lead concentration less than 5 mg/L may be transported offsite as non-hazardous material for disposal at an approved Subtitle D facility as specified in Section 02 81 00 after receipt of approval by the City DWM. Soils that indicate a TCLP concentration equal to or exceeding 5 mg/L shall require a second attempt at stabilization.

4. Following the second stabilization, another representative sample shall be collected and analyzed for TCLP lead. Stabilized soils with a TCLP lead concentration less than 5 mg/L may be transported offsite as non-hazardous material for disposal at an approved Subtitle D facility as specified in Section 02 81 00 after receipt of approval by the City DWM. Soils that indicate a TCLP concentration equal to or exceeding 5 mg/L shall require disposal as hazardous material at a facility appropriate to the regulatory status of the material as specified in Section 02 81 00 after receipt of approval by the City DWM.

3.02 QUALITY CONTROL PROCEDURES

A. Mixing time, and amounts of impacted material, reagents, and water added to each batch shall be recorded. Mixing time and batch proportions shall be maintained within the limits indicated in the approved Work Plan.

B. Tests shall be performed on representative samples of stabilized material. All samples before and after stabilization shall consist of a five-point composite. Each composite sample shall consist of five grab samples that are transported to the laboratory under chain-of-custody protocols and composited in the laboratory.

C. Sampling of stabilized soil shall be conducted by the Remediation Contractor. Samples shall be obtained at the following frequency:

Parameter	Frequency
TCLP (USEPA SW-846.3-3)	1 per 500 tons stabilized or 1 per day (whichever occurs first)

D. The Remediation Contractor shall arrange for samples to be shipped to and tested by an approved testing laboratory, with turnaround times not to exceed 48 hours unless otherwise approved by the City DWM.

3.03 RECORDKEEPING

A. Maintain copies of daily batch proportions, mixing quality control data, and analytical testing results during remediation activities, and submit to the City DWM as specified in subsection 1.04.C.

END OF SECTION

SECTION 026117
STOCKPILING AND LOADING OF IMPACTED MATERIALS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes on-site temporary stockpiling of excavated impacted materials for testing and stabilization, and loading of the excavated materials for off-site transportation and disposal.

B. Related Sections:
   1. Section 02 61 15 – Stabilization of Excavated Impacted Soils
   2. Section 02 81 00 – Transportation and Disposal of Impacted Materials

PART 2 PRODUCTS

2.01 STOCKPILE PROTECTION MATERIALS

A. Furnish all materials required for construction and maintenance of stockpiles.

B. Stockpile bottom liners shall consist of polyethylene or other approved impermeable geomembrane that is resistant to weathering and degradation due to contact with impacted materials for the duration of the Work. Bottom liners shall have a minimum thickness of 20 mils. Liners shall be furnished with prefabricated shop welded seams, and dimensions maximized to provide the largest manageable sheet.

C. Stockpile covers shall be 6-mil (minimum thickness) polyethylene sheeting or other approved impermeable geomembrane.

D. Stockpile covers and liners shall be free of holes or tears. Defective material shall be repaired or replaced, as determined by the City DWM.

E. Furnish sand bags or other weights of sufficient quantity and weight to hold the stockpile covers in position.

PART 3 EXECUTION

3.01 STOCKPILING - GENERAL

A. Coordinate stockpiling and loading work with excavation work.

B. Establish separate stockpiles as necessary for management and treatment of excavated materials prior to transport of excavated materials for off-site disposal. Each soil stockpile shall consist of approximately 500 tons of soil to facilitate stabilization and characterization sampling.

C. Remediation Contractor shall establish an identification system to keep track of each separate stockpile and its status (including whether soil has been stabilized, characterized, re-stabilized, ready for transport, and other condition). Install markers such as marked flags or stakes with signs with identification symbols/numbers in each stockpile and provide tracking using a database or other suitable system.

D. Saturated soil, if encountered, shall be placed in an approved staging area constructed with perimeter berms and an appropriate liner and allowed to naturally drain/dry. The material shall not be mixed with additives to dry. Proposed construction of dewatering staging area and method of draining/drying of the material shall be included in the Dewatering Plan.

E. Remediation Contractor shall be responsible for constructing stockpiles, and for inspection, maintenance, modification and repair of stockpiles.

F. Line and cover excavated material stockpiles, and prevent precipitation and stormwater from contacting materials contained in the stockpiles.

G. Determine the quantity and layout for temporary stockpiles based on the sequencing of the Work and required rates of loading transport vehicles.

H. No more than 2,500 tons of excavated impacted soil shall be stockpiled at the Site at any one time without prior approval of the City DWM.

3.02 STOCKPILE CONSTRUCTION

A. Prepare clean areas for stockpile construction. Remove sharp stones and other debris and provide a smooth surface to protect bottom liners from puncture and tearing under anticipated loading.

B. Provide run-on controls, including berms and other facilities, to divert storm water away from stockpiles. Stormwater that contacts the stockpiled materials shall be collected and managed.

C. Install bottom liner to fully cover the ground surface for each stockpile without field seams or overlaps. Anchor the geomembrane as required to prevent displacement.

D. Install stockpile covers in a manner that minimizes wrinkles. Overlap adjacent panels of polyethylene sheeting a minimum of four feet. Place sandbags or other appropriate ballast on the covers to prevent uplift from wind. Ballast shall be placed along all

edges of the stockpile and along panel overlaps.

E. Protect the geomembrane cover from damage. Remove and replace damaged geomembrane as directed by the City DWM.

3.03 STOCKPILE MANAGEMENT

A. Excavated materials to be stockpiled shall be placed only in properly constructed and maintained stockpiles. Do not place any designated clean materials in the excavated material stockpiles.

B. Prevent contaminated soil dust from becoming airborne. Place and anchor stockpile covers at the completion of each work day and during periods of rain or wind. Cover the stockpiles whenever the stockpiles are not being used.

3.04 STOCKPILE INSPECTION

A. City DWM will inspect excavated material stockpiles frequently to verify the integrity of the stockpile liner and cover system.

B. All deficiencies noted by the City DWM shall be immediately corrected to the satisfaction of the City DWM. If necessary, stockpiled material shall be relocated to a new impacted material stockpile so that repairs can be made. The new stockpile shall be separate from other stockpiles and shall be constructed in accordance with the requirements of this Section.

C. Each stockpile shall be visually inspected by the Remediation Contractor each day for damage, and immediately repaired as necessary.

3.05 SOIL STABILIZATION

A. Conform to the requirements of Section 02 61 15 for stabilization of excavated and stockpiled soils that fail TCLP.

B. Remediation Contractor shall ensure all material is suitable for transport prior to loading (e.g. passes SW-846 Test Method 9095B: Paint Filter Liquids Test).

3.06 LOADING

A. Prepare and load all vehicles for transport and disposal of excavated materials as specified in the following paragraphs. All vehicles transporting excavated impacted materials shall be lined in accordance with applicable regulations.

B. Coordinate with the selected waste hauler to furnish all transport vehicles required for transportation of materials from the Site as specified in Section 02 81 00.

C. Visually inspect and decontaminate the exterior of all transport vehicles in compliance with all applicable regulations.

D. Coordinate loading operations and hours with the operating hours of the disposal facility.

E. Load all transport vehicles carefully to prevent spills. Stage vehicles within remediation areas so that spills will be contained within the area and easily removed. If required by the City DWM, spread polyethylene sheeting (or other geomembrane) on ground surface to cover area sufficient for vehicle loading.

F. Remediation Contractor shall be solely responsible for proper loading of, and abiding by the load limits and weight limits for, all vehicles leaving the Site. All fines, taxes, penalties or judgments resulting from overweight or improperly loaded vehicles shall be the Remediation Contractor's responsibility.

G. Soil dropped on the ground during loading of transport vehicles shall be collected and loaded into the vehicles for disposal.

H. At the completion of loading, visually inspect each transport vehicle before it leaves the Site to ensure that the material is securely contained to minimize the potential for spillage onto travel routes, including verification that the tailgate is secure and that the load is covered.

3.07 REMOVAL OF STOCKPILE CONTAINMENT MATERIALS

A. After removal and disposal of stockpiled materials, perform gross decontamination of the stockpile areas.

B. Remove bottom liners and top covers and dispose at an approved off-site disposal facility with the impacted materials at the completion of the Work in conformance with the requirements of Section 02 81 00.

END OF SECTION

SECTION 028100
TRANSPORTATION AND DISPOSAL OF IMPACTED MATERIALS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes transportation and disposal of excavated impacted soils and waste materials.

B. Related Sections:
1. Section 01 31 00 – Project Management and Coordination for Demolition and Remediation
2. Section 02 61 17 – Stockpiling and Loading of Impacted Materials

1.02 REFERENCES

A. State of Georgia Laws and Regulations:

1. Official Code of Georgia Annotated (O.C.G.A.) § 32-6-20 through 32-6-28

2. Chapter 672-2 of the "Administrative Rules and Regulations of the State of Georgia"

1.03 SUBMITTALS

A. Submit the following for review prior to commencement of the Work (as part of the Demolition and Remediation Work Plan specified in Section 01 31 00):

1. List of proposed waste haulers, and copies of all necessary permits and certifications, including haul route permits.

2. Provide identity (name), location, and regulatory status for each proposed off-site disposal facility if Remediation Contractor proposes to use off-site disposal facilities other than those listed in subsection 3.07. Provide copies of all necessary permits and certifications, and identification of haul route to each facility.

B. Submit written certification for vehicle weight scales used for measurement of quantities of materials transported to disposal facilities.

C. Submit results of analysis of excavated impacted soils for disposal, and copies of manifests.

D. Submit written certifications of proper transport and final disposal of excavated

impacted soils and waste materials within 10 working days after disposal.

1.04 DEFINITIONS

A. "Waste Materials" shall mean: demolition debris; cleared vegetation; spent PPE; rubbish; and other debris resulting from remediation activities that does not include excavated impacted soils.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 PREPARATION FOR TRANSPORT

A. Retain an approved licensed and permitted waste transporter to transport excavated impacted soils and waste materials to approved off-site disposal facilities.

B. Load materials for transport as specified in Section 02 61 17.

3.02 VEHICLE DECONTAMINATION

A. Decontaminate all vehicles and equipment used in the excavation, loading, and hauling of impacted soils prior to leaving the Site. Construct and maintain an on-site vehicle decontamination facility in conformance with all applicable regulations.

B. The vehicle decontamination facility shall be set up and operated by the Remediation Contractor. The facility shall be located at a suitable location at the limit of remediation within the Site where approved by the City DWM.

C. The facility shall be separate from, and interior of, the Construction Exit which shall be set up for erosion, sedimentation and pollution control measures.

D. Decontamination shall include physical removal of soil from the chassis (which includes undercarriage, suspension, and tire tracks) and other parts of vehicles and equipment as required. Use brushes, high-pressure water sprays or other suitable methods and tools to comply with applicable regulations.

3.03 OFF-SITE HAULING

A. Transportation of excavated impacted soils and waste materials shall be in compliance with all applicable regulations, including regulations referenced in subsection 1.02.

B. The possibilities of accidents and waste spillage or leakage during transportation shall be considered and addressed in the Remediation Contractor's Site-Specific Health and Safety Plan.

C. In the event of a release or threatened spillage of excavated impacted soils or waste materials, Remediation Contractor shall immediately inform the City DWM, and implement clean-up procedures as specified in the following paragraph 3.03.D. It is imperative that all haul routes be kept free of any contamination due to the Remediation Contractor's operations.

D. If a loaded transport vehicle is involved in a wreck or other occurrence that results in a spill, appropriate clean-up procedures shall be implemented in accordance with the requirements of the City of Atlanta and other authorities having jurisdiction. The Remediation Contractor shall provide appropriate spill response materials. Spill response materials shall be compatible with the types of materials and contaminants being handled.

E. Loaded trucks transporting excavated impacted soils or waste materials shall not leave the Site or be loaded within one hour of the time that the off-site disposal facility closes for the day unless approved by the City DWM. Loaded trucks shall dump their loads in the off-site disposal facility the same day they are loaded.

3.04 TRANSPORTATION ROUTES

A. Identify the main roadways intended for hauling of excavated impacted soils and waste materials, and obtain any required permits.

B. Trucks and vehicles leaving the Site shall not leave any accumulations of debris on public roads.

3.05 MANIFESTS

A. Excavated impacted soils meeting the TCLP lead limit of 5 mg/L and waste materials shall be classified as non-hazardous waste.

B. Excavated impacted soils that do not meet the TCLP lead limit of 5 mg/L (after two rounds of stabilization), if any, shall be classified as hazardous waste and shall be disposed of appropriately after approval from the City DWM.

C. Remediation Contractor shall prepare manifests, and prepare necessary paperwork for transportation and disposal of excavated impacted soils and waste materials.

D. All excavated impacted soils and waste materials shall be manifested in accordance with applicable regulations. The manifests shall be based on waste profiles accepted at the disposal facility.

E. The manifests shall be submitted for signature by the City DWM. Manifests may be signed by the Remediation Contractor if so authorized by the City DWM.

3.06 TRANSPORTATION REGULATIONS

A. Obtain all required transportation permits for shipment of excavated impacted soils and waste materials.

B. Transportation of excavated impacted soils and waste materials shall be in accordance with applicable local, state, and federal regulations including: 49 CFR 171 through 179.

C. Local, state and federal laws and regulations that govern the dimensions and weights of vehicles transporting materials on the public roads (including permit requirements for overweight and oversize vehicles) are referenced in subsection 1.02.

3.07 DISPOSAL FACILITIES

A. Waste shall be transported to an approved disposal facility appropriate to the regulatory status of the waste. The facilities shall conform to applicable regulations for Subtitle C or Subtitle D facilities.

B. The following are approved Subtitle D facilities:

1. Republic Services Pine Ridge Landfill, Griffin, GA

2. Waste Management – Pine Bluff Landfill, Ball Ground, GA

3. Eagle Point Landfill, Ball Ground, GA

C. Use of other facilities is contingent on approval by the City DWM.

END OF SECTION

SECTION 312343
BACKFILLING AND GRADING FOR REMEDIATION

PART 1 GENERAL

1.01 SUMMARY

A. Section includes placement and compaction of backfill material after removal of impacted soils.

B. Related Sections:
1. Section 02125 – Temporary and Permanent Erosion and Sedimentation Control
2. Section 02 61 14 – Excavation of Impacted Soils

1.02 REFERENCES

A. ASTM International:

1. ASTM D 698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort
2. ASTM D 2487, Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
3. ASTM D 2937, Standard Test Method for Density of Soil in Place by the Drive-Cylinder Method
4. ASTM D 2974, Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils
5. ASTM D 4318, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
6. ASTM D 4959, Standard Test Method for Determination of Water (Moisture) Content of Soil by Direct Heating
7. ASTM D 6938, Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

1.03 SUBMITTALS

A. Prepare and submit a Borrow Source Pre-Qualification Investigation Plan, which shall include the following:

1. Detailed description of planned field and laboratory investigation activities at the proposed borrow source(s), and itemization of how each component of the investigation will comply with specific pre-qualification requirements included in this Section.

2. General borrow area sketch identifying the site and shape of the borrow area, prior history of the site over the past 10 years, planned depth of excavation, proposed sample locations and method of sample collection.

3. Identification of all laboratories intended for use.

4. Scheduling: The City DWM shall be notified five days prior to sample collection and shall be present during field collection activities.

B. Submit the following for review prior to commencement of the work of this Section:

1. Sampling and Analysis Plan (SAP).
2. Test results and certifications for proposed borrow materials showing conformance with the Specifications.

C. Submit the following during work progress:

1. Written reports of all specified tests showing conformance of the materials and constructed work with the Specifications.

1.04 QUALITY ASSURANCE

A. Remediation Contractor shall retain the services of an approved independent Quality Control firm to perform specified testing of earthwork materials and constructed work.

1.05 DELIVERY, STORAGE AND HANDLING

A. Backfill material shall be adequately protected to preserve the fitness and quality of the materials.

PART 2 PRODUCTS

2.01 SOURCE QUALITY CONTROL

A. Soil which is purchased or otherwise imported onto the property from off-site must be accompanied by written evidence that it is appropriate for unrestricted use and that it does not exceed risk-based contaminant levels.

B. At a minimum, the pre-qualification field and laboratory investigation to define the physical and chemical characteristics of any borrow source designated to be used at the property shall include the components listed in this subsection unless an alternative geotechnical investigation program is approved by the City DWM in writing prior to performing the investigation.

C. The Remediation Contractor may submit an alternative investigation program in cases where previous information exists regarding the proposed borrow source. Any proposed alternative geotechnical investigation program, previous geotechnical information and justification for any reduction to the requirements in this Section shall be submitted by the Remediation Contractor with the Borrow Source Pre-Qualification Investigation Plan submittal.

D. Chemical Testing Requirements:

1. Representative soil samples shall be collected from each proposed borrow source and shall be tested and reported by an approved licensed analytical laboratory. One sample shall be collected for each 10,000 cubic yards of borrow material available for use, and no less than two samples from each discrete borrow area.

2. The following chemical analyses shall be performed on each borrow area pre-qualification sample collected.

   a) Total volatile organic compounds (VOCs via Test Method 8260B).

   b) Total semi-volatile organic compounds (SVOCs via Test Method 8270D).

   c) Total metals (Appendix IX, 40 CFR 264 via Test Methods 6010C & 7471B).

   d) PCB's (via Test Method 8082A).

   e) Pesticides (via Test Method 8081B) and herbicides (via Test Method 8151A).

3. Sampling shall be conducted in accordance with an approved Site Sampling and Analysis Plan (SAP) using procedures consistent with an USEPA or state guidance document.

4. Borrow soils shall have constituent levels that do not exceed the lesser of the following for all regulated substances (unless a variance is granted by the City DWM):

   a) The Hazardous Site Response Act (HSRA) Notification Concentrations provided in Appendix I of the HSRA rules 391-3-19 O.C.G.A., Section 12-8-90.

   b) The Type 1 HSRA Risk Reduction Standards calculated per 391-3-19-.07(6) of the HSRA rules.

E. Physical Testing Requirements:

1. Representative soil samples shall be collected from each proposed borrow source. One sample shall be collected for each 10,000 cubic yards of borrow material available for use, and no less than two samples from each discrete borrow area.

2. The following physical analysis shall be performed on each borrow area pre-qualification sample collected:

a) Soil Classification (ASTM D 2487)
b) Moisture-Density Curve, Standard Proctor (ASTM D 698)
c) Organic Content (ASTM D 2974)
d) Atterberg limits (ASTM D 4318)

2.02 SELECT SOIL BACKFILL

A. Select Soil Backfill material shall be imported soil and shall have characteristics consistent with SP, SW, SM, SC, SP-SC, SP-SM, ML or CL soils as defined by the Unified Soil Classification System (USCS). The soil shall be substantially free of organic matter, degradable debris or objectionable material, including but not limited to: pavement material, frozen soil and rocks larger than four inches in greatest dimension.

B. Quality Control Testing of Select Fill (after approval of borrow source):

1. Soil Classification (ASTM D 2487): Minimum of one test from borrow source for every 10,000 cubic yards of loose soil and or each change in material.

2. Proctor Moisture – Density Curve (ASTM D 698): Minimum of one test from borrow source for every 10,000 cubic yards of loose soil and for each change in material.

PART 3 EXECUTION

3.01 BORROW SOURCES AND HAULING

A. Obtain Select Soil Backfill material from approved off-site borrow source(s). The Remediation Contractor shall be responsible for obtaining all required permits or approvals from authorities having jurisdiction, unless the borrow source is being operated under an existing permit.

B. Unless otherwise provided in the Contract, the Remediation 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), and all required permits for hauling material on roadways to Project Site.

3.02 FIELD QUALITY CONTROL

A. The following tests shall be performed during placement of Select Soil Backfill material:

1. In-Place Density (using ASTM D 6938 or ASTM D 2937): Minimum of one test for each 16-inch thickness for every 2,000 square feet of material placed, and at every material change or as otherwise determined by the City DWM.

2. Moisture Content (using ASTM D 6938 or ASTM D 4959): Minimum of one test for each 16-inch thickness for every 2,000 square feet of material placed, and at every material change or as otherwise determined by the City DWM.

B. In-place density and moisture content testing performed using nuclear instruments shall be checked by comparison to test results using laboratory methods.

3.03 PREPARATION

A. Backfilling of excavations shall not proceed until the City DWM has provided written documentation approving the limits of excavations and the completion of removal of impacted materials as specified in Section 02 61 14.

3.04 PLACEMENT OF BACKFILL – GENERAL REQUIREMENTS

A. Excavations that have been completed based on the results of confirmation testing, achievement of excavations to the required limits, and subsequent approval by the City DWM shall be backfilled as specified in the following subsections.

3.05 PLACEMENT AND COMPACTION OF SELECT SOIL BACKFILL

A. Place Select Soil Backfill in uniform layers not exceeding eight inches lift thickness and compact to a minimum of 95 percent of the material’s maximum dry density as determined by ASTM D 698.

B. The moisture content of soil backfill during compaction shall be maintained within plus or minus three percentage points of the material's optimum moisture.

C. Uniformly grade backfilled areas to match existing undisturbed surrounding grade or required finish subgrade elevations (as applicable).

3.06 SURFACE STABILIZATION

A. The Contractor is responsible for temporary surface stabilization (including seeding) of completed backfilled areas as specified in Section 02125.

3.07 PROTECTION

A. Protect backfilled areas from traffic and erosion. Backfilling and grading shall be sequenced to minimize disturbance of completed areas.

B. Where completed areas are disturbed by subsequent project operations or adverse weather during the Remediation Contractor's activities, fill and reshape eroded areas as required until acceptance of the Work.

END OF SECTION

DEPARTMENT OF PUBLIC WORKS

OFFICE OF TRANSPORTATION

CITY'S PUBLIC RIGHT-OF-WAY MANUAL

City of Atlanta

Department of Public Works
Office of Transportation

City's Public Right-of-Way Manual

Department of Public Works
Office of Transportation
Transportation Engineering

Appendix A:

Arterial Streets

Alphabetical Listing

Note: Streets listed may also be classified as State or Federal Highways and may be identified by a highway number designation.

STREET NAME	SEGMENT	Miles
Baker Street, N.E.	Luckie Street to Piedmont Avenue	0.76
Bankhead Highway, N.W.	Marietta Street to City Limits	6.4
Bell Street, N.E.	Auburn Avenue to Hill Street	0.38
Bolton Road, N.W.	Fulton Industrial Blvd. to Marietta Blvd	3.0
Briarcliff Road, N.E.	Ponce de Leon to City Limits	0.47
Buford Highway, N.E.	City Limits to Piedmont Road	1.1
Campbellton Road, S.W.	Lee Street to 166	4.53
Campbellton Road, S.W.	166 to City Limits	2.65
Candler Road, N.E. & S.E.	City Limits to City Limits	0.70
Capitol Avenue, S.W.	University Avenue to MLK Jr. Drive	1.8
Cascade Road, S.W.	City Limits to Gordon Street	3.06
Central Avenue, S.W.	Dodd Avenue to Edgewood Avenue	1.4
Cheshire Bridge Road, N.E.	Piedmont Road to Buford Highway	1.4
Cleveland Avenue, S.E. & S.W.	City Limits to Jonesboro Road	2.85
Courtland Street, N.E.	North Avenue to MLK Jr., Drive	1.5
Crown Road, S.W.	City Limits to City Limits	0.55
Decatur Street, S.E.	Peachtree Street to Gunby Street	1.4
Dekalb Avenue, N.E.	City Limits to Gumby Street	3.1
East Roxboro Road, N.E.	West Roxboro Road to Wood Circle	0.2
Edgewood Avenue, N.E.	Peachtree Street to Krog Street	1.5
Fulton Industrial Blvd., S.W.	Old Gordon Road to Bolton Road	1.8
Fulton Street, S.W.	Pryor Street to Capitol Avenue	0.4
Georgia Avenue, S.W.	Glenn Street to Capitol Avenue	1.15
Glenn Street, S.E.	Murphy Avenue to Stewart Avenue	0.2
Glenwood Avenue, S.E.	Hooper Street to Clifton Street	2.35
Gordon Street, S.W.	Cascade Avenue to Glenn Street	1.2
Harris Street, N.E.	Luckie Street to Piedmont Avenue	0.7
Hightower Road, N.W.	Bankhead Highway to MLK Jr., Drive	1.7
Hill Street, S.E.	Bell Street to Glenwood Avenue	0.4
Howell Mill Road, N.E.	Collier Road to Marietta Street	2.1
International Blvd., N.E.	Northside Drive to Piedmont Avenue	1.2
James Jackson Parkway, N.W.	City Limits to Bankhead Highway	3.0
Jonesboro Road, S.E.	City Limits to McDonough Blvd.	5.4
Juniper Street, N.E.	14th Street to North Avenue	1.0
Lakewood Avenue, S.E.	166 to Jonesboro Road	1.1
Lavista Road, N.E.	Cheshire Bridge Road to City Limits	0.18
Lee Street, S.W.	City Limits to West Whitehall St.	2.4
Linbergh Drive, N.E.	Peachtree Road to Cheshire Bridge Road	2.1
Macon Drive, S.E.	Cleveland Avenue to Lakewood Avenue	1.35
Memorial Drive, S.W. & S.E.	Peachtree Street to City Limits	6.0
Marietta Blvd., N.W.	City Limits to West Marietta Street	3.3

Marietta Street, N.W.	Peachtree Street to West Marietta Street	2.5
MLK Jr. Drive, S.E. & N.W.	Hill Street to City Limits	8.7
Mitchell Street, S.W.	Martin Luther King Jr. Dr. to Capitol Avenue	0.9
Moreland Avenue, S.E. & N.E.	Ponce de Leon Avenue to City Limits	5.7
McDonough Blvd., S.E.	Moreland Avenue to University Avenue	2.5
North Avenue, N.W. & N.E.	Northside Drive to Bonaventure Avenue	2.5
Northside Drive, N.W.	Steward Avenue to Northside Parkway	7.1
Northside Parkway, N.W.	Northside Drive to City Limits	3.6
Old Gordon Road, S.W.	MLK Jr. Dr. to Fulton Industrial Blvd	0.38
Peachtree St. & Rd., N.W. & N.E.	Memorial Drive to City Limits	10.0
Peachtree Center Avenue, N.E.	Decatur Street to Edgewood Avenue	0.1
Peachtree Dunwoody Rd., N.E.	Roxboro Road to Meadowbrook Drive	1.9
Peters Street, S.W.	Trinity Street to West Whitehall Street	1.0
Piedmont Avenue, S.E. & N.E.	ML King Jr. Dr. to Cheshire Bridge Road	4.3
Piedmont Road, N.E.	Cheshire Bridge Road to Roswell Road	3.5
Ponce De Leon, N.E.	Peachtree Street to City Limits	3.2
Pryor Street, S.W.	Edgewood Avenue to University Avenue	2.3
Ridge Avenue, S.E.	Capitol Avenue to Pryor Street	0.4
Roswell Road, N.E. & N.W.	Peachtree Road to City Limits	2.7
Roxboro Road, N.E.	Peachtree Road to East Roxboro Road	0.9
Sawtell Avenue, S.E.	McDonough Blvd. to Jonesboro Road	0.7
South West Connector, S.W.	West Marietta Street to Bankhead Highway	1.0
Spring Street, S.W. & N.W.	Peachtree Street to Trinity Avenue	2.25
Stanton Road, S.W.	Campbellton Road to City Limits	0.4
Steward Avenue, S.W.	City Limits to Glenn Street	4.5
Techwood Drive, N.W.	West Peachtree Place to Walker Street	0.95
Trinity Avenue, S.W.	Spring Street to Memorial Drive	0.5
Walker Street, S.W.	Techwood Drive to Peters Street	0.4
Washington Street, S.W.	Martin Luther King Jr. Dr. to Memorial Drive	0.21
West Marietta Street, N.W.	Ashby Street to Marietta Blvd.	0.55
West Peachtree Street, N.W	Peachtree Street to Peachtree Street	2.2
West Whitehall Street, S.W.	Lee Street to Peters Street	1.52
Whitehall Street, S.W.	Memorial Drive to Murphy Avenue	0.8
Williams Street, N.E.	West Peachtree Place to International Blvd.	0.3
Total # of Arterial Streets = 75	**Total # of Miles**	**158.24**

Appendix B: State Routes

STATE ROUTE	FROM	TO
S. R. 3; U.S. 19/41 (Metropolitan Parkway)	A point 50 feet north of Mt. Zion Road (Hapeville city limits)	Northside Drive
S. R. 3 ; U.S. 19/29/41 (Northside Drive)	Metropolitan Parkway	A point 0.10 miles north of Northside Parkway
S. R. 3; U.S. 41 (Northside Parkway)	A point 0.10 miles north of Northside Drive	Cobb County Line
S. R. 8; U. S. 78/278 (Bankhead Highway)	Cobb County Line	Northside Drive
S. R. 8; U. S. 29/78/278 (North Avenue)	State Route 3/US 19/29/41 (Northside Drive)	Piedmont Avenue
S. R. 8 (Ponce De Leon Avenue)	Piedmont Avenue	Dekalb County Line
S. R. 9; U. S. 19 (14th Street)	Northside Drive	West Peachtree Street
S. R. 9; U. S. 19 (West Peachtree Street)	14th Street	Peachtree Street
S. R. 9; U. S. 19 (Peachtree St./Rd.	West Peachtree Street	Roswell Road
S. R. 9; U. S. 19 (Roswell Road)	Peachtree Road	A point 50 feet north of Meadowbrook Drive
S. R. 9; SOUTH (Spring Street)	Peachtree Street	14th Street
S. R. 10 (Freedom Pkwy.)	State Route 401/I-75	State Route 8/Ponce de Leon Avenue
S. R. 13 (Buford Highway)	Peachtree Road	Dekalb County Line
S. R. 14; U. S. 29 (Lee Street)	A point 0.05 miles north of Womack Avenue (East Point city limits)	Avon Avenue
S. R. 14; U. S. 29 (Lee Street/ West Whitehall Street)	Avon Avenue	Chapel Street
S. R. 14 (West Whitehall Street/Peters Street)	Chapel Street	Spring Street
S. R. 42; U. S. 23 (Moreland Avenue)	Dekalb County Line	A point 0.10 miles south of Custer Avenue
S. R. 42; U. S. 23 (Moreland Avenue)	A point 0.10 miles south of Custer Avenue	Ponce de Leon Avenue
S. R. 42; (Briarcliff Road)	Ponce de Leon Avenue	Dekalb County Line
S. R. 42 CONN. (Freedom Parkway Connector)	State Route 10	State Route 42
S. R. 42 SPUR (McDonough Boulevard)	Moreland Avenue	Jonesboro Road
S. R. 54 (Jonesboro Road)	Clayton County Line	Harper Road

S. R. 54 (Jonesboro Rd., McDonough Blvd., University Ave.)	Harper Road	State Route 401/I-75
S. R. 54 CONN. (Sawtell Avenue)	Jonesboro Road	McDonough Blvd.
S. R. 70 (Fulton Industrial Blvd.)	Aviation Circle	Bankhead Highway
S. R. 139 (Ralph David Abernathy Boulevard)	State Route 14/US 29/ W. Whitehall Street	Martin Luther King Jr. Drive
S. R. 139 (Martin Luther King Jr. Drive)	Ralph David Abernathy Drive	A point 0.10 mile west of Old Gordon Road
S. R. 141 (Peachtree Road)	State Route 9	Dekalb County Line

STATE ROUTE	FROM	TO
S. R. 3; U.S. 19/41 (Metropolitan Parkway)	A point 50 feet north of Mt. Zion Road (Hapeville city limits)	Northside Drive
S. R. 3 ; U.S. 19/29/41 (Northside Drive)	Metropolitan Parkway	A point 0.10 miles north of Northside Parkway
S. R. 3; U.S. 41 (Northside Parkway)	A point 0.10 miles north of Northside Drive	Cobb County Line
S. R. 8; U. S. 78/278 (Bankhead Highway)	Cobb County Line	Northside Drive
S. R. 8; U. S. 29/78/278 (North Avenue)	State Route 3/US 19/29/41 (Northside Drive)	Piedmont Avenue
S. R. 8 (Ponce De Leon Avenue)	Piedmont Avenue	Dekalb County Line
S. R. 9; U. S. 19 (14th Street)	Northside Drive	West Peachtree Street
S. R. 9; U. S. 19 (West Peachtree Street)	14th Street	Peachtree Street
S. R. 9; U. S. 19 (Peachtree St./Rd.	West Peachtree Street	Roswell Road
S. R. 9; U. S. 19 (Roswell Road)	Peachtree Road	A point 50 feet north of Meadowbrook Drive
S. R. 9; SOUTH (Spring Street)	Peachtree Street	14th Street
S. R. 10 (Freedom Pkwy.)	State Route 401/I-75	State Route 8/Ponce de Leon Avenue
S. R. 13 (Buford Highway)	Peachtree Road	Dekalb County Line
S. R. 14; U. S. 29 (Lee Street)	A point 0.05 miles north of Womack Avenue (East Point city limits)	Avon Avenue
S. R. 14; U. S. 29 (Lee Street/ West Whitehall Street)	Avon Avenue	Chapel Street
S. R. 14 (West Whitehall Street/Peters Street)	Chapel Street	Spring Street
S. R. 42; U. S. 23 (Moreland Avenue)	Dekalb County Line	A point 0.10 miles south of Custer Avenue
S. R. 42; U. S. 23 (Moreland Avenue)	A point 0.10 miles south of Custer Avenue	Ponce de Leon Avenue
S. R. 42; (Briarcliff Road)	Ponce de Leon Avenue	Dekalb County Line
S. R. 42 CONN. (Freedom Parkway Connector)	State Route 10	State Route 42
S. R. 42 SPUR (McDonough Boulevard)	Moreland Avenue	Jonesboro Road
S. R. 54 (Jonesboro Road)	Clayton County Line	Harper Road
S. R. 54 (Jonesboro Rd., McDonough Blvd., University Ave.)	Harper Road	State Route 401/I-75
S. R. 54 CONN. (Sawtell Avenue)	Jonesboro Road	McDonough Blvd.
S. R. 70 (Fulton Industrial Blvd.)	Aviation Circle	Bankhead Highway
S. R. 139 (Ralph David Abernathy Boulevard)	State Route 14/US 29/ W. Whitehall Street	Martin Luther King Jr. Drive
S. R. 139 (Martin Luther King Jr. Drive)	Ralph David Abernathy Drive	A point 0.10 mile west of Old Gordon Road
S. R. 141 (Peachtree Road)	State Route 9	Dekalb County Line

Appendix C:

Collector Streets

Alphabetical Listing

Note: Streets listed may also be classified as State or Federal Highways and may be identified by a highway number designation.

STREET NAME	SEGMENT	Miles
Alexander Street, N.E.	Marietta Street to West Peachtree Street	0.47
Arizona Avenue, N.E.	Rogers Street to Dekalb Avenue	0.1
Ashby St, S.W. & N.W.	White Street to West Marietta Street	3.5
Atlanta Avenue, S.E.	Capitol Avenue to Boulevard	1.1
Auburn Avenue, N.E.	Peachtree Street to Randolph Street	1.5
Auburn Avenue, N.E.	Randolph Street to Port Street	0.6
Avon Avenue, S.W.	Lee Street to Cascade Avenue	1.5
Austin Avenue, N.E.	Euclid Avenue to Elizabeth Street	0.3
Bakers Perry Road, S.W.	City Limits to M.L.K. Jr. Dr.	2.0
Baker Road, N.W.	Hightower Road to West North Avenue	0.9
Barge Road, S.W.	Stone Road to Fairburn Road	1.4
Barnett Street, N.E.	Ponce De Leon Avenue to Virginia Avenue	0.6
Beecher Street, S.W.	Donnelly Ave to Benjamin E Maya Drive	2.55
Benjamin E. Mays DR SW	Beecher Road to Fairburn Road	2.95
Berne Street, S.E.	Boulevard South East to Moreland Avenue	1.11
Beverly Road, N.E.	West Peachtree Street to Polo Drive	0.7
Bishop Street, N.E.	Howell Mill Road to Mecaslin Street	0.75
Blackland Road, N.E.	Roswell Road to Northside Drive	1.4
Bohler Road, N.W. ~	West Wesley Road to Defoors Perry Road	1.1
Bolton Road, N.W. - I	Barrett Road. To M.L.K. Dr. Drive	2.2
Bolton Road, N.W.	Coronet Way to Marietta Boulevard	0.3
Bouldercrest Drive, S.E.	Flat Shoals Road to Fayetteville Road	0.85
Boulder Park, S.W.	Fairburn Road to Mendell Drive	1.9
Boulevard, S.E.	North Avenue to Edgewood Avenue	1.1
Boulevard, S.E.	McDonough Blvd to Glenwood Avenue	1.95
Boulevard Drive, N.E.	Moreland Avenue to Candler Road	3.4
Brown Mills Rd, SW &SE	Crown Road to Jonesboro Road	4.2
Butler Street, N.E.	Houston St. to Martin Luther King Jr. Dr.	0.7
Butler Road, S.W.	Tell Road to Campbellton Road	1.3
Carroll Drive, N.W.	Chattahoochee Avenue to Marietta Road	0.6
Centra Villa Drive, S.W.	Cascade Avenue to Campbellton Road	1.0
Chappell Road, N.W.	Bankhead Hwy to M.L.King Jr. Dr.	1.2
Chattahoochee Ave, N.W.	Howell Mill Road to Marietta Boulevard	1.0
Cherokee Avenue, S.E.	Memorial Drive to Atlanta Avenue	1.1
Childress Drive, S.W.	Cascade Road to Campbellton Road	1.6
Claire Drive, S.W.	Lakewood Avenue to Pryor Road	0.85
Clifton Road, N.E.	Ponce De Leon Avenue to Dekalb Avenue	0.8
College Avenue, N.E.	Howard Street to City Limits	0.8
Collier Drive, N.W.	Old Gordon Road to Hightower Road	2.7
Collier Road, N.W.	Defoor Hills Road to Peachtree Street	2.4
Confederate Avenue, S.E.	Boulevard South East to Edie Avenue	0.75
Conley Road, S.E.	Jonesboro Road to City Limits	0.7

Constitution Road, S.E.	Jonesboro Road to Macon Highway	1.0
Continental Colony Pkwy S.W	Greenbriar Parkway to Hogan Road	0.6
County Line Road, S.W.	City Limits to City Limits	0.4
County Line Road, S.W.	Tell Road to City Limits	1.8
Custer Avenue, S.E.	Moreland Avenue to Boulevard	1.1
Defoor Avenue N.W.	Howell Mill Road to Collier Road	1.1
Defoor Ferry Road, N.W.	Collier Road to Coronet Way	1.9
Delmar Lane, N.W.	On Ramp to I-285 East Bound	0.9
Delow Drive, S.W.	Campbellton Road to Cascade Avenue	1.3
Derring Road, N.W.	Northside Drive to Peachtree Street	1.0
Dill Avenue, S.W.	Murphy Avenue to Stewart Avenue	0.9
Dodson Drive, S.W.	City Limits to Cascade Road	1.6
Donnelly Avenue, S.W. -	Lee Street to Cascade Avenue	1.2
East Andrews Drive, N.E.	Roswell Road to West Paces Ferry Road	0.4
East Confederate Ave, S.E.	Edie Avenue to Moreland Avenue	0.8
East Morningside Dr, N.E.	Piedmont Ave to East Rock Spring Rd	0.8
East Paces Ferry Rd, N.E.	Piedmont Road to Roxboro Road	1.15
East Rock Spring Rd, N.E.	Morningside Drive to City Limits	0.8
East Wesley Road, N.E.	Piedmont Road to Peachtree Road	1.3
Ellis Street, N.E.	Piedmont Avenue to Peachtree Street	0.3
Empire Boulevard, S.W.	Oak Drive to Brown Mills Road	0.85
Euclid Avenue, N.E.	Moreland Avenue to Austin Avenue	0.2
Fair Street, S.W.	Walker Street to Lawton Street	1.15
Fairburn Road, S.W.	City Limits to Bolton Road	3.35
Fairburn Road, S.W.	City limits to City Limits	4.1
Fayetteville Road, S.E.	Flat Shoals Road to Bouldercrest Drive	0.65
Flat Shoals Avenue, S.E.	Moreland Avenue to Bouldercrest Drive	1.1
Fiat Shoals Road, S.E.	Bouldercrest Drive to Fayetteville Road	0.85
Forrest Park Road, S.E.	Thomasville Drive to Conley Road	3.5
Forsyth Street, N.W.	Whitehall Street to Peachtree Street	0.9
Fort Street, N.E.	Irwin Street to Auburn Avenue	0.2
Fulton Street, S.E.	Capitol Avenue to Connally Street	0.35
Fulton Street, S.W. -	Humphries Street to Pryor Street	0.6
Garmon Road, N.W.	Mount Paran Road to City Limits	0.6
Georgia Avenue, S.E.	Capitol Avenue to Cherokee Avenue	0.75
Gilbert Road, S.E.	Brown Mills Road to City Limits	1.1
Glen Irish Drive, N.E.	Highland Ave to Ponce Dc Leon Avenue	0.8
Gordon Street, S.W.	Martin Luther King Jr. Dr to Cascade	1.1
Greenbrier Parkway, S.W.	Campbellton Road to Barge Road	1.4
Habersham Road, N.E.	Peachtree Battle Avenue to Roswell Road	2.8
Harbin Road, S.W.	Cascade Road to Campbellton Road	1.3
Hapeville Road, S.W.	Cleveland Avenue to Oak Drive	0.8
Harwell Road, N.W.	Bankhead Highway to Collier Drive -	1.3
Hemphill Avenue, N.W.	Northside Drive to 10th Street	0.40
Hill Street, S.E.	Milton Avenue to Glenwood Avenue	1.65
Hills Avenue, N.W.	Chattahoochee Ave to Defoor Hills Road	0.4
Hillside Drive, N.E.	Powers Ferry Road to Northside Drive	0.8
Highland Avenue, N.E.	Alaska Avenue to Piedmont Avenue	1.14
Hightower Road, N.W.	Bankhead Hwy to James Jackson Pkwy	1.1
Hogan Road, S.W.	City Limits to Continental Colony Pkwy	0.4
Hogan Road, S.W.	Fairburn Road to Stone Road	1.2

Hollywood Road, N.W.	Bolton Road to Bankhead Highways	3.0
Houston Street, N.E.	Butler Street to Peachtree Street	0.4
Howard Street, N.E.	College Avenue to Boulevard Drive	0.6
Huff Road, N.E.	Howell Mill Road to Marietta Boulevard	1.0
Hutchens Road, S.E.	Forrest Park Road to Jonesboro Road	1.1
Irwin Street, N.E.	Lake Avenue to Fort Street	1.0
Jackson Street, N.E.	Decatur Street to Highland Avenue,	0.7
James P Brawley Dr., S.W.	Greensferry Avenue to Bankhead Highway	1.75
Jefferson Street, N.W.	Ashby Street to South West Connector	0.45
Jett Road, N.E.	Powers Ferry Road to City Limits	0.6
Johnson Road, N.W.	Hollywood Road to Perry Boulevard	1.3
Johnson Road, N.E.	Lenox Road to Briar Cliff Road	0.8
Kimberly Road, S.W.	Campbellton Road to Melvin Drive	0.9
Kimberly Road, S.W.	City Limits to City Limits	0.59
Lake Avenue, N.E.	Elizabeth Street to Irwin Street	0.4
Lake Forrest Drive, NW.	Powers Ferry Road to City Limits	2.6
Lakewood Avenue, S.E.	Claire Drive to Milton Avenue	1.1
Lakewood Way, S.E.	Pryor Road to Lakewood Avenue	0.4
Langston Avenue, S.W.	Sylvan Road to Murphy Avenue	1.0
Lawton Street, S.W.	Fair Street to Donnelly Avenue	1.15
Lee Street, S.W.	White Street to West End Avenue	0.8
Lenox Road, N.E.	Cheshire Bridge Road to East Rock Spring	1.45
Lenox Road, N.E.	Peachtree Road to Buford Highway	1.8
Linkwood Road, N.W.	Collier Dr to Martin Luther King Jr. Drive	0.7
Luckie Street, N.W.	North Avenue to Forsyth Street	1.1
Lynhurst Drive, S.W.	Martin Luther King Jr. Dr to Cascade Road	2.2
McDaniel Street, S.W.	Northside Drive to University Avenue	1.7
McLendon Avenue, N.E.	Moreland Avenue to City Limits	1.8
McWilliam Road, S.E.	Brown Mills Road to Forrest Park Road	0.75
Macon Drive, S.W.	Mount Zion Road to Cleveland Avenue	0.6
Marietta Road, N.W.	Perry Boulevard to Bolton Road	2.7
Mason Turner Road, S.W.	Simpson Road to Chappell Road -	0.19
Maynard Terrace, S.E.	Glenwood Avenue to Memorial Drive	0.5
Mecaslin Street, N.E.	Bishop Street to Derring Road	0.2
Milton Avenue, S.E.	Capitol Avenue to Hill Street	0.7
Mitchell Street, S.W.	Martin Luther King Jr., Dr to Magnum St.	0.4
Moores Mill Road, N.W.	Bolton Road to West Paces Ferry Road	3.4
Montgomery Ferry Rd, N.E.	Polo Drive to Piedmont Ave	0.6
Monroe Drive, N.E.	Piedmont Cir to Ponce De Leon Ave	3.1
Mount Gilead Road, S.W.	Fairburn Road to Campbellton Road	1.2
Mount Paran Road, N.W.	City Limits to Paces Ferry Road	2.9
Mount Zion Rd, S.W. & S.E.	Stewart Avenue to Brown Mills Road	1.4
Murphy Avenue, S.W.	Glenn Street to Dill Avenue	1.55
Niskey Lake Road, S.W.	Campbellton Road to County Line Road	1.14
North Avenue, N.E.	Bonaventure Avenue to Oakdale Road	1.1
North Highland Ave, N.E.	East Rock Spring to Alaska Avenue	2.95
Northside Drive, N.W.	Northside Parkway to City Limits -	3.0
Northwest Drive, N.W.	Bolton Road to Hightower Road	1.45
Oakdale Road, N.E.	Dekalb Avenue to City Limits	1.35
Oakland Drive, S.W.	Richland to Campbellton Road	0.8
Old Ivy Road, N.E.	Piedmont Road to Wieuca Road	1.2
Old Hapeville Road, S.W.	Macon Drive to Cleveland Avenue	0.6

Ormond Street, S.E.	Cherokee Avenue to Capitol Avenue	0.75
Parkway Drive, N.E.	Highland Ave to Ponce De Leon Avenue	0.8
Parrott Avenue, N.W.	Bolton Road to Bolton Road	1.0
Peachtree Battle Ave, N.W.	Moores Mill Road to Peachtree Road	3.2
Peachtree Center Ave N.E.	Edgewood Avenue to Peachtree Street	0.6
Perkerson Road, S.W.	Stewart Avenue to Sylvan Road	1.3
Perry Boulevard, N.W.	Southwest Connector to Hollywood Road	2.9
Peyton Road, S.W.	Benjamin E Mays Drive to M.L.K. Jr. Drive	2.2
Pharr Road, N.E.	Peachtree Road to Piedmont Road	0.75
Piedmont Circle, N.E.	Piedmont Avenue to Monroe Drive	0.1
Polo Drive, N.E.	Beverly Road to Montgomery Ferry Road	0.2
Poole Creek Road, S.W.	Jonesboro Road to Brown Mills Road	1.6
Powers Ferry Road, N.W.	Roswell Road to City Limits	1.9
Pryor Road, S.W.	University Avenue to Lakewood Way	1.6
Ralph McGill Blvd, N.E.	North Avenue to Peachtree Street	2.2
Randolph Street, N.E.	Auburn Avenue to Highland Avenue	0.35
Ridgewood Road, N.W.	Paces Ferry Road to Moores Mill Road	2.5
Rogers Street, N.E.	Boulevard Drive to Arizona Avenue	0.5
Sandtown Road, S.W. -	Venetian Drive to Cascade Road	1.0
Simpson Road, N.W.	Collier Road to Marietta Street	4.2
S. River Industrial Blvd SE	Forrest Park Road to City Limits	0.6
Stone Hogan Connector SW	Stone Road to City Limits	0.4
Stone Road, S.W.	Fairburn Road to City Limits	1.8
Sydney Street, S.E.	Connelly Street to Cherokee Avenue	0.4
Sylvan Road, S.W.	Murphy Avenue to City Limits	1.9
Techwood Drive, N.W.	10th Street to 16th Street	0.6
University Avenue, S.W.	Stewart Avenue to Ridge Avenue	1.1
Veltre Circle, S.W.	Cascade Road to Benjamin E Mays Drive	0.7
Venetian Drive, S.W.	Cascade Avenue to Campbellton Road	2.0
Virginia Avenue, N.E.	North Highland Avenue to Monroe Drive	0.75
Waters Road, S.W.	Cleveland Avenue to Hapeville Road	0.4
Wells Street, S.W.	Glenn Street to Humphries Street	0.3
West Lake Avenue, N.W.	Bankhead Hwy to MLK Jr. Dr.	1.5
West North Avenue, N.W.	Baker Road to Chappell Road	1.35
West Peachtree Place, NW	Alexander Street. to Peachtree Street	0.38
West Wesley Road, N.W.	Peachtree Road to Ridgewood Road	3.9
West Wieuca Road, N.W.	Loridans Drive to Lake Forrest Drive	0.9
Westmont Road, S.W.	Venetian Drive to Beecher Street	1.3
Westview Drive, N.W.	Cordon Street to West End Avenue	1.7
Weyuian Avenue, S.W.	Capitol Avenue to Ridge Avenue	0.1
White Street, S.W.	Cordon Street to Ashby Street	0.95
Whitefoord Avenue, N.E.	Memorial Drive to Dekalb Avenue	1.0
Wieuca Road, N.E.	Peachtree Road to Loridans Drive	1.6
Willis Mill Road, S.W.	Cascade Road to Campbellton Road	1.3
Wyman Street, N.E.	Memorial Drive to Boulevard Drive	0.4
Zip Industrial, S.E.	Poole Creek Road to Brown Mills Road	0.7
10th Street, N.W.	Monroe Drive to Howell Mill Road	2.4
14th Street, N.W.	Howell Mill Road to Juniper Street	1.7

TOTAL # of Streets = 195 **Total # of Miles 246.67**

Appendix D:

Time of Day Restrictions for working in the right-of-way

Noted: Include working in inclement weather section

In an effort to minimize the negative effects of noise and traffic congestion caused by construction activities, Time of Day Limitations are imposed on construction activities in certain area of the City.

Unless specifically stipulated otherwise by a written permit from the City of Atlanta:

- No lane of any arterial street shall be blocked for any period between 7:00 AM and 9:00 AM or between 4:00 PM and 6:00 PM.
- No lane of any arterial street shall be blocked for any period exceeding 1 hour between 9:00 AM and 4:00 PM unless a uniformed police officer is employed on site to direct traffic.
- No lane of any street in a commercial or retail zone shall be blocked for any period exceeding 1 hour between 7:00 AM and 6:00 PM.
- No nighttime activities in residential areas, define language 10:00 PM to 7:00 AM excluding maintenance that does not exceed – define levels which requires a noise variance. *74.135 Section*
- No activities that create an unacceptable level of noise, dust, or disruption to normal activities of the population

Exceptions to Time of Day Restrictions

In the event of a legitimate emergency, time of day restrictions may be waived.

Emergency

In order to be recognized as an emergency for the waiver of time of day restrictions one or more of the following restrictions must exist:

- Immediate danger to life, health, or property.
- Immediate threat of environmental damage.
- Necessity to repair damage to essential facilities resulting from extreme weather events or traffic accidents.
- Loss of service to customers.
- Immediate response to the problem will result in significantly reduced inconvenience to the public in the long term.
- Delay of repair will result in further damage to facilities.
- Other extraordinary condition that can be documented as an emergency.

Within 24 hours of the occurrence of the emergency, or at the beginning of the next business day, the facility owner must notify the Department of Public Works of the location and nature of the emergency and submit the following as appropriate:

Permit has to be submit within 5 days

- Notice and explanation of any threat to public health or safety.
- Notice and explanation of any threat of environmental damage.
- An engineering plan meeting the Department of Public Works standards, illustrating the work done or remaining to be done.
- A schedule of activities.
- Payment of applicable fees

Additional requirements may apply, depending on the specific circumstances of the event.

CITY OF ATLANTA NOISE CONTROL ORDINANCE

#2

12-O-0774

A SUBSTITUTE ORDINANCE BY:
PUBLIC SAFETY COMMITTEE

AN ORDINANCE AMENDING THE CITY OF ATLANTA NOISE CONTROL ORDINANCE AS SET FORTH IN CHAPTER 74, ARTICLE IV, SEC. 74-129 et seq. SO THAT THOSE SECTIONS SHALL READ AS SET FORTH HEREIN AND ADDING CERTAIN NEW SECTIONS TO THE NOISE CONTROL ORDINANCE; AND FOR OTHER PURPOSES.

WHEREAS, based on the finding of the City Council that above certain levels, noise or noise disturbance are detrimental to the health and welfare of the citizenry and the individual's right to peaceful and quiet enjoyment, the City has had a Noise Ordinance in effect since May 27, 1986 for the purpose of preventing such noise disturbances; and

WHEREAS, the City's Noise Ordinance was the subject of litigation titled *Crossover Entertainment Group, Inc. et al v. City of Atlanta, et al* Superior Court of Fulton County CAFN 2010cv194790 which raised certain issues concerning the constitutionality of certain provisions; and

WHEREAS, as a part of the *Crossover* litigation, the City employed certain experts to assist in the defense of that case and review the Noise Ordinance; and

WHEREAS, based on certain recommendation made by the City's experts, the recommended long-term background sound level per land use set by the American National Standards Institute and research in the noise ordinances and policies of other cities of comparable size and other nearby jurisdictions, it appeared that certain adjustments were necessary to the City's Noise Ordinance; and

WHEREAS, the *Crossover* litigation and the recommendations of the City's experts also pointed out the need to adjust the training standards for responding to complaints concerning the violation of the City's Noise Ordinance; and

WHEREAS, the *Crossover* litigation and the recommendations of the City's experts also pointed out the need to balance the level of noise associated with the reasonable and legal operation of businesses with the level of noise which is generally present in a highly populated urban environment and to provide for a method to assist businesses with understanding the noise levels which generate complaints.

NOW THEREFORE, the City Council of the City of Atlanta Georgia, hereby ordains as follows:

Section 1: That Sections 74-129 through and including Sec. 74-142 of Article IV of Chapter 74 of the Code of Ordinances, City of Atlanta, Georgia, are hereby amended to read as the same are set forth in Attachment "A" recognizing that this substitute ordinance contains a different Attachment "A" than any predecessor ordinance.

Section 2: That Article IV of Chapter 74 of the Code of Ordinances, City of Atlanta, Georgia, is hereby amended by adding a new section to be numbered 74-140A which is to read as set forth in Attachment "A."

Section 3: That, to the extent provided by state or federal law, no amendment set forth herein is intended to affect any pending prosecution under any previous text of the ordinance.

Section 4: Any training received by any person authorized to enforce the Noise Ordinance that is sufficient to meet the standards set forth in the final version adopted by the Council and approved by the Mayor is found sufficient to authorize such person to enforce the regulations enacted by this ordinance if such training been conducted within the prior twelve months.

Section 5: That this ordinance become effective upon the Mayor's signature or as specified by City Charter Sec. 2-403.

Sec. 74-129. - Title.

This article shall be known and may be referred to as the "Atlanta Noise Control Code" or the "Atlanta Noise Ordinance".

Sec. 74-131. - Definitions.

The following words, terms and phrases, when used in this article, shall have the meanings ascribed to them in this article, except where the context clearly indicates a different meaning:

Ambient sound level means the total sound pressure level in the area of interest including the noise source of interest (see, also, "background sound level," this section).

A-weighting means the electronic filtering in sound level meters that models human hearing frequency sensitivity.

Background sound level is the total sound pressure level in the area of interest excluding the noise source of interest (see also, "ambient sound level," this section).

Commercial area means a group of commercial facilities and the abutting public right-of-way and public property.

Commercial property means any premises, property, or facility, regardless of its zoning classification involving traffic in goods or furnishing of services for sale or profit, including but not limited to:

(1) Banking and other financial institutions;

(2) Dining establishments;

(3) Establishments for providing retail or wholesale services;

(4) Establishments for recreation and entertainment;

(5) Office buildings;

(6) Transportation;

(7) Warehouses; and

(8) Hotels and motels.

Construction means any site preparation, assembly, erection, repair, alteration or similar action, or demolition of buildings or structures.

C-weighting means the electronic filtering in sound level meters that models a flat response (output equals input) over the range of maximum human hearing frequency sensitivity.

dBA means an A-weighted unit of sound level.

dBC means a C-weighted unit of sound level.

Daytime hours means the hours between 7:01 a.m. and 9:00 p.m.

Decibel (dB) means the unit of measurement for a sound pressure level and is equal to ten times the common logarithm of the ratio of two like quantities (see "sound pressure level").

Emergency work means any work or action necessary to deliver essential services including, but not limited to, repairing water, gas, electric, telephone, sewer facilities, or public transportation facilities, removing fallen trees on public rights-of-way, or abating life-threatening conditions.

Equivalent sound level (Leq) means the non-varying sound level that would contain the equivalent amount of energy as a varying sound level. Note that Leq can be weighted or unweighted and can be integrated over durations ranging from less than a second to many hours. The notation should indicate weighting used and duration, e.g., 85 dBC Leq (one min.) is a C-weighted 85 decibel equivalent sound level, integrated over a one minute period.

Impulsive sound means a sound having duration of less than one second with an abrupt onset and rapid decay.

Industrial facility or property means any activity and its related premises, property, facilities, or equipment involving the fabrication, manufacture, or production of durable or nondurable goods. A property's zoning does not have to be industrial as defined under the City Zoning Ordinance for a facility to be considered an industrial facility.

Maximum sound level (Lmax) means the maximum root mean square sound level measured or not to be exceeded by time varying sounds.

Motor vehicle means any vehicle that is propelled or drawn on land by an engine or motor.

Muffler means a sound-dissipative device or system for lessening the sound of the exhaust of an internal combustion engine.

Multidwelling unit building means any building wherein there are two or more dwelling units.

Municipality or municipal refers to the City of Atlanta, Georgia or the "city"

Nighttime hours means the hours between 9:01 p.m. of any given day, and 7:00 a.m. of the following day.

Noise means any sound of such level and duration as to be or tend to be injurious to human health or welfare, or which would unreasonably interfere with the enjoyment of life or property throughout the city or in any portions thereof, but excludes all aspects of the employer-employee relationship concerning health and safety hazard within the confines of a place of employment.

Noise control administrator (NCA) means any individual designated by the chief of police as the liaison with all municipal departments for issues related to noise control

and who is charged with the administration of the Noise Ordinance, maintaining records showing that Noise Control Officers are properly trained and that the sound level meters in use in the city meet the standards required by the Noise Ordinance.

Noise control officer (NCO) means any police officer or other municipal officer or employee who has received training in the standards required by this article for the measurement of ambient sound level or absolute sound level and received authorization to issue citations based on readings taken with a SLM.

Noise disturbance means any sound that due to such sound exceeding the limits set forth in this article, endangers the health, safety or welfare of any person, and therefore is detrimental to the peaceful enjoyment of private property and the use and enjoyment of public spaces including public rights of way.

Noise source means the point of origin of any noise, excluding noise emanating from any sound making device or instrument from within a motor vehicle as covered by O.C.G.A. § 40-6-14.

Peak sound level (Lpk) means the absolute positive or negative value (not the root mean square value) of the sound energy in a discrete event typically of very short duration.

Person means any individual, corporation, company, association, society, firm partnership, joint stock company, the municipality any political subdivision, agency or instrumentality of the municipality.

Plainly audible means any sound produced by a noise source, which can be heard by any person at prescribed distances or locations. Measurement standards shall be the auditory senses, based upon direct line of sight to the sound source, provided however that auditory senses may also be used to determine the location if direct line of sight to

the sound source is blocked. Words or phrases need not be discernible and low frequency sound reverberations are included.

Public right-of-way means any street, avenue, boulevard, road, highway sidewalk, or alley that is leased, owned, or controlled by a governmental entity.

Public property means any real property or structures thereon that is own leased, or controlled by a governmental entity.

Pure tone means a sound dominated by energy in a single frequency.

Real property line or property line is either (a) the imaginary line, including vertical extension, that separates one parcel of real property from another, or (b) the vertical and horizontal boundaries of a residential dwelling unit that is contained in a building containing two or more residential units or any combination of separately leased or owned spaces. As used in this article, the real property line or property line, in addition to meaning a determination that can be made by a review of a survey or other documents, means an apparent demarcation between parcels of real property as might be reasonably determined when seeking to locate a place to take the types of measurements set forth in this article.

Residential area means a group of residential properties and the abutting public rights-of-way public property.

Residential property means property used for human habitation, including but not limited to: a. Private property used for human habitation; b. Commercial living accommodations and commercial property used for human habitation including mixed use properties, including the operation of accessory uses such as deliveries; the collection of trash by private vendors; amplified or live music, movies or televisions, whether originating from inside of a structure or on an outdoor deck or patio; taxi

stands, valet parking and similar commercial noise sources; c. Recreational and entertainment property used for human habitation; and d. Community service property used for human habitation.

Sound amplification device means any radio, tape player, compact disc player, loudspeaker, television or other electronic or digital device used for the amplification of the human voice, music or other sounds.

Sound level (per ASTM C 634) means a sound pressure level obtained using a signal to which standard weighting has been applied.

Sound level meter (SLM) means an instrument used to measure sound pressure levels.

Sound pressure level (SPL) means the ratio in decibels of the square of the root mean square sound pressure divided by the square of the standard reference sound pressure of 20|gmPa. Mathematically, this is expressed as 10* log p2/P2 ref, = 20*log P/P ref, P ref, = 20|gmPa.

Tonal sound means a sound dominated by energy in a narrow band of frequencies.

Weekday means the time period of each week that begins at 11:00 p.m. on each Sunday and ends at 5:00 p.m. on each Friday.

Weekend means the time period of each week that begins at 5:00 p.m. on each Friday and ends at 11:00 p.m. on each Sunday.

Sec. 74-132. - Scope.

The provisions of this article shall apply to all property within the jurisdiction of the City of Atlanta, Georgia.

Sec. 74-133. - Declaration of policy.

The provisions hereinafter contained are enacted for the purpose of preventing noise disturbances. Above certain levels, noise or noise disturbance is detrimental to the

health and welfare of the citizenry and the individual's right to peaceful and quiet enjoyment. Therefore, it is hereby declared to be the policy of the city to prohibit noise disturbances from all sources, subject to its police power in order to secure and promote the public health, comfort, convenience, safety, welfare, and prosperity of the citizens of Atlanta. Nothing in this article is intended to deter individuals from lawfully exercising the individual right to freedom of speech or any other freedom guaranteed under the Constitutions of the United States of America or of the State of Georgia.

Sec. 74-134. - Powers, duties, and qualifications of the noise control officers and administrators; duties and responsibilities of other departments.

(a) The noise control administrator (NCA) is authorized to:

(1) Coordinate the noise control activities of all municipal departments and cooperate with all other public bodies and agencies to the extent practicable;

(2) Review the policies and actions of other municipal departments and advise such departments of the effect, if any, of such policies and actions on noise control;

(3) Delegate the duties assigned to noise control officers ("NCO's") to any duly qualified individual according to the provisions of this article upon a showing that such person received the training required by this article, provided however that no city police officer shall be required to receive any additional type of delegation from the NCA in order to enforce the provisions of section 74-136(b) in that the standards set forth in this article are sufficient for that purpose;

(4) Grant permits for temporary variances according to the provisions of of this article;

(5) Maintain the records of the training received by NCO's under which such NCO's have become eligible to receive their delegation of authority to enforce this article through the use of SLMs. The delegation of such authority to an NCO shall arise upon successful completion of the training required by this article and shall not require a separate act by the NCA beyond the transmission to the NCA of the record of completion of the required training; and

(6) Maintain the records of the specification, purchase, warranty and calibration requirements of SLMs used by NCO's.

(b) Those individuals appointed as NCO's are authorized to enforce the provisions of this article.

(1) All NCO's, including city police officers trained as NCO's, are authorized to issue a citation for violations of this article, based upon the determination of levels provided in section 74-136(a) or pursuant to section 74-136(b).

(2) City police officers shall not be required to have the specific training required by this article in order to issue citations pursuant to section 74-136(b).

(c) A person shall be qualified to be an NCO if the person has satisfactorily completed any of the following training:

(1) An instructional program in community noise analysis and migration from a certified noise control engineer, as evidenced by certification from the Institute of Noise Control Engineering (INCE); or

(2) A training program prepared or supervised by a registered professional engineer practicing in the field of acoustics or a related field that uses sound measurement equipment; or

(3) A training program prepared or supervised by an individual with academic qualifications demonstrating expertise in sound measurement; or

(4) Training given or approved by the manufacturer of noise meters used in enforcement of this ordinance; or

(5) An instructional program in community noise analysis and migration from another NCO; or

(6) Education or experience or a combination thereof certified by the NCA as equivalent to the provisions of any of the requirements of this subsection.

(d) Noise measurements taken by a NCO with SLMs shall be taken in accordance with the procedures specified in this article but no procedures shall be required to enforce section 74-136(b), including its enforcement by city police officers other than those necessary to meet the criteria set forth in that section and/or this article.

(e) The provisions of this article shall not apply to any department or agency of the city engaged in any emergency activities or as otherwise excluded under section 74-138 of this article. However, all city departments and agencies shall carry out their programs according to the law and shall cooperate with the assessment and consideration of the possible impact of their activities with regard to the reduction of noise disturbances and the other purposes of this article.

Sec. 74-135. - Sound measurement procedures.

(a) Insofar as practicable, sound will be measured while the source under investigation is operating at normal, routine conditions and, as necessary, at other conditions, including but not limited to, design, maximum, and fluctuating rates. All noise measurements shall be made as directed in this article. When instrumentation cannot be placed at or within the property line, the measurement shall be made as close

thereto as is reasonable. For the purposes of this article, noise measurements are measured on the A- or C-weighting scale, as applicable, of a sound level meter (SLM) of standard design and quality having characteristics established by the American National Standards Institute (ANSI).

(b) All tests shall be conducted in accordance with the following procedures:

(1) The NCO shall, to the extent practicable, identify all sources contributing sound to the point of measurement but shall not be required to document the absence of such sources or document that such sources would not have caused the test to be valid.

(2) Measurements for comparison of the ambient sound level of a sound source to the background noise level shall be taken at the nearest receiving property line. When a measurement is being taken to determine whether the noise source is in violation of the absolute cap set forth in Sec. 74-136(a)(1) (Table 2) or Sec. 74-136(a)(2), the measurement shall also be taken at the nearest receiving property line. Where a violation is perceived by an NCO to be occurring absent a report of noise disturbance from nearby properties, or the nearest receiving property line is not readily apparent or accessible, the NCO may take such measurements from the public right of way adjacent to the property from which the noise source originates,

(3) The SLM must be calibrated using a calibrator or method recommended by the SLM manufacturer and in the manner recommended. Automatic internal calibration of the SLM which occurs as a part of the initialization of the SLM shall be sufficient to satisfy this requirement.

(4) The SLM shall be recertified and/or recalibrated as recommended by the manufacturer.

(5) Unless the manufacturers' specifications allow adjustments to be made to compensate for the following factors, no outdoor measurements shall be taken:

a. During periods when wind speeds (including gusts) exceed 15 mph;

b. Without a windscreen, recommended by the SLM manufacturer, properly attached to the SLM;

c. Under any condition that allows the SLM to become wet; or

d. When the ambient temperature is out of the range of the tolerance of the SLM.

e. Provided however that it shall not be necessary to document the absence of the conditions set forth in this subsection for a reading to be valid.

(c) The report for each measurement session should include such facts as may be necessary to demonstrate that a violation has occurred, whether established by data captured by the SLM or supplied by a separate written report or testimony of a police officer or NCO but the absence of a written determination of any particular fact at the time of citation shall not invalidate the overall finding if it can reasonably proven at the time set for adjudication of the citation.

(1) The date, day of the week, and times at which measurements are taken;

(2) The times of calibration;

(3) The weather conditions;

(4) The identification of all monitoring equipment by manufacturer, model number, and serial number;

(5) The normal operating cycle of the sources in question with a description of the sources provided however that where the sources in question do not have a normal operating cycle, such notation shall not be required;

(6) The ambient sound level, in dB(A) or (C), depending on the measurement being taken, with the sources in question operating;

(7) The background sound level, in dB(A), without the sources in question operating provided however that where the background sound level in question cannot reasonably be measured, the correction factor for background sound levels shall be three (3) dB(A);

(8) The total accumulative time duration of the monitoring session; and

(9) A description of the measurement site, including measurement locations and relevant distances and other information sufficient for another investigator to repeat the measurements under similar conditions. Photographs which contain sufficient information for another investigator to repeat the measurements under similar conditions may be substituted at the discretion of the NCO.

(10) Information required to support the issuance of a citation shall be considered sufficient if the data captures SLM provides such information, and/or such information can be provided by the citation and/or the testimony of the NCO taking such readings and/or such other reports generated by the NCO or any police officer.

(d) Prior to taking noise measurements, the NCO shall reasonably explore the vicinity of the source in question to identify any other sound sources that could affect measurements, to establish the approximate location and character of the principal

sound source, and to select suitable locations from which to measure the sound from the source in question. Unless the reasonable exploration of the site uncovers a condition that could affect the measurements, the NCO shall not be required to make a notation that this subsection has been satisfied.

(e) When measuring continuous sound, or sound that is sustained for more than one second at a time, the SLM shall be set for the appropriate A or C weighting, slow meter response speed, and the range (if the SLM is designed to read levels over different ranges of (SPLs) shall be set to that range in which the meter reads closest to the maximum end of the scale). When the measured sound level is variable or fluctuating over a range greater than three (3) DBA, using the slow meter response speed, the fast meter response speed shall be used. In either case, both the minimum and maximum readings shall be recorded to indicate the range of monitored values.

(f) The SLM shall be placed at a minimum height of three feet above the ground or from any reflective surface. When handheld, the microphone shall be held at arm's length and pointed at the source at the angle recommended by the SLM manufacturer.

(g) If extraneous sound sources, such as aircraft flyovers or barking dogs that are unrelated to the measurements increase the monitored sound levels, the measurements should be postponed until these extraneous sounds have become of such a level as not to increase the monitored sound levels of interest.

(h) The monitoring session should last for a period of time sufficient to ensure that the sound levels measured are typical of the source in question, but in no event shall the duration of testing be less than one minute.

(i) The background sound levels shall be subtracted from the measured sound levels of the source of interest by using Table 1 to determine the sound levels from the source

of interest alone. If the ambient sound level is less than three DBA higher than the background sound level, the source level cannot be derived and a violation of the article cannot be substantiated.

(j) Information on the procedures required to support the issuance of a citation shall be considered sufficient if the SLM provides such information, and/or such information can be provided by the citation and/or the testimony of the NCO performing the test and/or such other reports generated by the NCO or any police officer.

Table 1: Correction for background levels (in dBA)

Difference between ambient and background sound levels	Correction factor to be subtracted from ambient level for source level
3	3
4, 5	2
6—9	1
10 or more	0

Sec. 74-136. - Sound level limitations.

It shall be unlawful and a violation of this code to exceed the following sound level limitations:

(a) No person shall cause, allow, or permit the operation of any noise source on a particular category of property or any public property or right-of-way in such a manner as to create a sound level that exceeds the background sound level by ten dBA or more during daytime hours or five dBA or more during nighttime hours when measured within the real property line of a receiving property, except as provided in section 74-138. Such a noise would constitute a noise disturbance under this article if it continues in excess of one minute unless otherwise provided herein, provided however that no violation can be substantiated unless the background noise level is: at least Leq. 35 dBA

(one min.) during daytime hours or Leq. 30 dBA (one min.) during nighttime hours in residential areas; at least Leq. 60 dBA (one min.) during daytime hours or Leq. 55 dBA (one min.) during nighttime hours in commercial areas; at least Leq. 65 dBA (one min.) during daytime hours or Leq. 60 dBA (one min.) during nighttime hours in industrial areas; and further provided however that this limitation shall not apply inside of multi-family dwelling unit buildings. If background noise levels are below the stated level to be used for comparison, the stated level shall be used.

(1) If the background sound level cannot be determined, the absolute sound level limits set forth in Table 2 shall be used. The classification of property as set forth in Table 2 represents the receiving property and is not intended to increase the level of any sound produced by referencing the classification of the property producing the sound in question. For the purpose of this article, the representation of the person registering a complaint shall be sufficient for the NCO to determine the category of the receiving property if it is not readily apparent from an observation of the receiving property. In those cases where an NCO is making a measurement not based on the complaint of an individual but is conducting an investigation based on the recommendation from a police officer or the NCO's own investigation, the observation of the NCO shall be sufficient to determine the category for the measurement of the receiving property.

Table 2: Maximum permissible sound levels Leq dB (A)—Averaged over one minute to minimize the possibility of interfering noise.

Receiving property	Daytime Hours	Nighttime Hours
Residential property	55	50
Commercial property	70	65

Industrial property	75	70

(2) At no time shall noise levels be produced that exceed 65dB(C) Leq (one min.) at a receiving real property line.

(3) If the noise source, measured at a receiving property line, is a pure tone, then the sound level limitations set forth in Table 2 shall be reduced by five dB.

(4) Impulsive sound sources shall not exceed 100 dB(C) Leq. measured at a receiving property line, using the fast meter response speed.

(5) Inside multi-family dwelling unit buildings, if the background sound level cannot be determined, the limit during daytime hours is 45 dB (C) Leq (one min.) and the limit during nighttime hours is 35 dB (C) Leq. for sounds originating in another dwelling within the same building. When the sound is generated from the heating, ventilation, air conditioning units or other machinery serving the premises, whether operated for the use of an individual dwelling unit or a group of dwelling units, the limit is 40 dB (C) Leq (one min.) for both daytime and nighttime hours.

(b) At the discretion of a police officer and as an alternative to making a determination based upon the ambient sound level or absolute sound level, the following standards shall be used for sounds emanating from any noise source located on any residential property, commercial property, or public property:

(1) During daytime hours, sound emanating from any noise source shall be limited in volume, tone and intensity so that the sound shall not be plainly audible to any person at a distance of 200 or more feet from the real property line of any private property on which the noise source is located, or from any noise

source located on any public property or public right-of-way; provided however that under no circumstance shall the existence of this standard prevent a violation from being found if the sound is measured as set forth in 74-136(a). A violation of this subsection may also be established by observations made in the public right of way at the distance specified from the real property line of any private property or any public property on which the noise source is located

(2) During nighttime hours, sound emanating from any noise source shall be limited in volume, tone and intensity so that the sound shall not be plainly audible to any person at a distance of 50 or more feet from the real property line of any private property on which the noise source is located, or from any noise source located on any public property or public right-or-way; provided however that under no circumstance shall the existence of this standard prevent a violation from being found if the sound is measured as set forth in 74-136(a). A violation of this subsection may also be established by observations made in the public right of way at the distance specified from the real property line of any private property or any public property on which the noise source is located

(3) The determination of the location of the real property line of any private property on which the noise source is located or the determination of the location of the public right of way line shall not be required to be made pursuant to the review of a survey or other document. In making the determination, any police officer or any NCO may use the appearance of the parcel where the noise source originates and the arrangement of the structures thereon as well as similar characteristics on surrounding parcels to make a determination as to the

approximate location of the property line or may use the apparent limits of the public right of way adjacent to the the parcel where the noise source originates.

(4) The determination of the number of feet from the real property line of any private property on which the noise source is located, or from any noise source located on any public property or public right-or-way shall not require a measurement to be taken using electronic or mechanical means and it shall be sufficient if the NCO or the police officer is able to make a good faith determination that the minimum distance has been exceeded when the plainly audible determination is made.

(5) In determining whether or not a sound emanating from a noise source violates this section, NCO's or police officers may consider the following factors:

a. Level of the noise based upon reaction to it in the same manner as it would be experienced by a reasonable person;

b. Nature of the noise on which the complaint is based;

c. Origin of the noise based on required distance;

d. Level and intensity of any background noise compared to the noise being investigated;

e. Proximity of the noise to sleeping facilities;

f. Nature and zoning of the area;

g. Density of inhabitation in the area;

h. Time of day or night the noise is occurring;

i. Duration of the noise;

j. Whether the noise is recurrent, intermittent, or constant, especially in cases where voluntary compliance is followed by a second complaint within any 24 hour period;

k. Whether the noise is produced by a business operation and an SLM measurement is reasonably available pursuant to 74-140A;

l. Whether voluntary compliance is obtained.

(4) After having made a determination under this section that a noise violates this section, police officers may issue a citation for violation of this section but shall not be required to do so upon their determination that the level of plainly audible noise is not such as would disturb a reasonable person or is no greater than the level and intensity of any background noise compared to the noise being investigated.

(6) Inside multi-family dwelling unit buildings, where it may not be possible to determine the distance from the sound source, NCO's or police officers shall determine whether the unit or area of the building producing the sound source is directly adjacent to the dwelling unit receiving the sound, in which case the owner of the sound source may be cited if after the consideration of the factors set forth in this section.

Sec. 74-137. - Specific prohibited acts.

(a) It is unlawful, and a violation of this Code, for any person to cause, allow, or permit any of the following acts unless a temporary variance has been obtained:

(1) Owning, possessing, or harboring any animal or bird that, for a continued duration in excess of 15 minutes, generates noise that is plainly audible at a distance of five feet or more from the real property line of a residential property;

(2) Loading, unloading, opening, closing, or other handling of boxes, crates, containers, building materials, liquids, or the pneumatic or pumped loading or unloading of bulk materials in liquid, gaseous, powder, or pellet form, between

9:00 p.m. and 7:00 am the following day on a weekday and between 9:00 p.m. and 9:00 a.m. the following day on a weekend day or on a legal holiday; when the noise source is located 50 feet or less from the nearest residential property line;

(3) Operating or permitting the operation of any motor vehicle or any auxiliary equipment attached to such a vehicle, for a period of longer than five minutes in any hour while the vehicle is stationary, for reasons other than traffic congestion or emergency work, and where such vehicle's manufacturer's gross weight rating is in excess of 10,000 lbs., on a public right-of-way or public property within 150 feet of a residential property during nighttime hours;

(4) Operating or permitting the operation of any power tools or other motorized equipment used in construction, drilling, earthmoving, excavating, or demolition work between 7:00 p.m. and 7:00 a.m. the following day on a weekday or between 7:00 p.m. and 9:00 a.m. on a weekend day or legal holiday, except for emergency work or by permit for temporary variance pursuant to section 74-139

(5) Compacting or collecting of refuse by persons engaged in the business of scavenging or garbage collection, whether private or municipal, during nighttime hours or before 9:00 am on a weekend day or legal holiday;

(6) Car drifting on private property within 1,000 feet of a residentially zoned district. For purposes of this section, car drifting shall mean a driving technique or motorsport where the driver intentionally over steers, causing loss of traction in the rear wheels, while maintaining control from entry to exit of a corner. A car is drifting when the rear slip angle is greater than the front slip angle, to such an

extent that the front wheels are pointing in the opposite direction to the turn (e.g. car is turning left; wheels are pointed right or vice versa).

(b) Loud sound amplification devices.

(1) Upon or within any public property or public right-of-way, no person shall play, use or operate, or permit to be played, used, or operated, any sound amplification device, so that the sound is plainly audible to any person, at a distance set forth by the provisions of section 74-136(b). The distance shall be measured from the noise source; provided however that when a measurement is taken with a SLM, the measurement shall be at the real property line of a receiving property.

(2) No person shall play, use or operate, or permit to be played, used, or operated, any sound amplification device on or within any private property, so that the sound is plainly audible to any person according to the provisions of section 74-136(b).

(3) It is an affirmative defense to charge under this section that the operator was not otherwise prohibited by law from operating the sound amplification device, and that any of the following apply:

a. The sound amplification device was being operated to request medical or emergency assistance or to warn of a hazardous road condition;

b. The sound amplification device was being operated to provide emergency information or to warn of an emergency condition;

c. The sound amplification device was authorized or permitted to be used for the purpose of giving instructions, directions, talks, addresses, lectures or transmitting music to any persons or assemblages of persons;

d. The loud sound amplification device was used in authorized or permitted public activities, such as parades, fireworks, sports events, musical productions and other activities which have the approval of the department of the city authorized to grant such approval.

(4) No part of this subsection shall be construed to allow any person to violate the provisions of section 74-136(a) if a sound level meter is employed to measure the sound associated with any specific prohibited act.

Sec. 74-138. - Exemptions.

(a) The provisions of this article shall not apply to the generation of noise by public safety vehicles, emergency signaling devices, or authorized public safety personnel for the purpose of alerting persons to the existence of any emergency.

(b) Noise from an exterior burglar alarm of any building shall be exempt from the provisions of this article, provided such burglar alarm shall terminate its operation within 15 minutes of its activation.

(c) Noises from any automobile alarm shall be exempt from the provisions of this article, provided such burglar alarm shall terminate its operation within ten minutes of its activation.

(d) Noise from domestic power tools, lawn mowers, and agricultural equipment when operated between 8:00 a.m. and 8:00 p.m. on weekdays and between 9:00 a.m. and 8:00 p.m. on weekends and legal holidays shall be exempt from the provisions of this article, provided they generate less than 85 dBA at or within any real property line of a residential property outside of the property where the noise in question originates, and all noises from tools and lawn mowers operated in association with the upkeep and maintenance of any public or private golf course shall be exempt from the provisions of

this article, provided that all such tools and lawn mowers are equipped with mufflers or are operated in conjunction with a device or system for lessening the sounds produced;

(e) Noise from church bells and chimes when a part of a religious observance or service shall be exempt from the provisions of this article during daytime hours;

(f) Noise from permitted construction activity shall be exempt from the provisions of this article, provided all motorized equipment used in such activity is equipped with functioning mufflers, except as provided in section 74-137(a)(4).

(g) Noise from snow blowers, snow throwers, and snowplows when operated with a muffler for the purpose of snow removal shall be exempt from the provisions of this article.

(h) The generation of noise in the performance of emergency work shall be exempt from the provisions of this article.

(i) The generation of noise in situations within the jurisdiction of the Federal Occupational Safety and Health Administration shall be exempt from the provisions of this article.

(j) Noise generated from celebrations, outdoor festivals or events municipally sponsored or approved whether by contract, permit or otherwise, shall be exempt from the provisions of this article.

(k) Noises resulting from the operation of the Hartsfield-Jackson Atlanta International Airport shall be exempt from the provisions of this article.

(l) Any noise resulting from activities of a temporary duration, for which a permit for temporary variance has been granted pursuant to this article, and which conforms to the conditions and. limits stated in the variance and reasonably related activities shall be exempt from the provisions of this article.

(m) Noises resulting from any practice or performance sponsored by or associated with the educational process administered by a recognized institution of learning, including, but not limited to band, choir, and orchestral performances shall be exempt from the provisions of this article.

(n) Noises that result from or arise out of or stem from the occurrence of a professional sporting event or organized sports league shall be exempt from the provisions of this article.

(o) Any noise arising out of construction, maintenance, repair or renovation activities related to the Metropolitan Atlanta Rapid Transit Authority (MARTA) bus or rail system, or the city's streetcar system, or other mass transit systems, shall be exempt from the provisions of this article.

(1) MARTA and/or the city will develop and implement procedures by which NPUs affected by construction or planned maintenance activities will be notified prior to the commencement of work.

(2) MARTA and/or the city will develop and implement procedures by which any complaints of excessive noise created by construction or planned maintenance activities and reported by citizens to MARTA are available for review by interested citizens or members of the city council.

(3) MARTA and/or the city will develop and implement procedures by which contractors conducting planned maintenance or implementing new construction on the MARTA bus or rail system, or the city's streetcar system, or other mass transit systems will be monitored so as to ensure that all work is performed in a manner that will result in the creation of the least amount of noise disturbance.

Sec. 74-139. - Conditions for permits for temporary variance; notice of approval or denial; hearings and appeals.

(a) Any person who owns the real property from which a noise source emanates or operates any noise source may, with the permission of the owner, apply to the NCA for a temporary variance from one or more of the provisions of this article, unless such noise source is specifically exempted according to the provisions of section 74-138. Applications for a permit of temporary variance shall supply information including, but not limited to:

(1) The nature and location of the noise source for which such application is made;

(2) The reason for which the permit of temporary variance is requested, including the hardship that will result to the applicant, his/her client, or the public if the permit of temporary variance is not granted;

(3) The level of noise that will occur during the period of the temporary variance;

(4) The section or sections of this ordinance for which the permit of temporary variance shall apply;

(5) A description of interim noise control measures to be taken for the applicant to minimize noise and the impacts occurring from the noise for which the variance is sought; and

(6) A specific schedule of the noise control measures that shall be taken to bring the source into compliance with this article within a reasonable time.

(al) Failure to supply the information required by the NCA shall be cause for rejection of the application.

(a2) A copy of the permit of temporary variance must be kept on file by the municipal clerk for public inspection.

(5) An affidavit stating that notice has been provided to the Office of Planning for transmission to the NPU where the variance is to be operational and that the notice required by the NCA shall be posted within three business days.

(b) The NCA shall charge the applicant a fee of $25.00 to cover expenses resulting from the processing of the application for a permit of temporary variance.

(c) The NCA shall limit the duration of the permit of temporary variance, which, in any event, shall be effective no longer than 14 days. Any person holding a permit of temporary variance and requesting an extension of time shall apply for a new permit of temporary variance according to the provisions of this section. An extension of 14 days may be granted without a second hearing in the event that there have been no complaints received by the NCA. If complaints have been received, a new application and hearing shall be required.

(d) No temporary variance shall be approved unless the applicant presents adequate proof that:

(1) Noise levels occurring during the period of the temporary variance will not constitute a danger to public health; and

(2) Compliance with the article would impose an unreasonable hardship on the applicant without some benefit to the public that will result from the completion of the activity requiring the variance.

(3) That the required notice has been posted at the site where the temporary variance is sought that a request for temporary variance has been requested and

the date on which the application has been submitted. Proof of the posting of such notice shall be by affidavit signed by the applicant.

(e) In making the determination of granting a temporary variance after having made a finding that adequate proof was provided by the applicant as required in this article, the NCA shall consider the following factors:

(1) The character and degree of interference with, the health and welfare or the reasonable use of property that is caused or threatened to be caused;

(2) The level of interference to the peaceful enjoyment of adjoining property or the public right of way above that which is allowed under this article if the temporary variance is denied; and

(3) The ability of the applicant to apply the best practical noise control measures.

(4) Any comments received from persons residing or operating businesses located within 500 feet of any property line at the site where the variance is requested.

(f) The NCA shall notify the applicant in writing of his or her determination on the application within 14 days after receipt of the application but no sooner than 7 days after receipt of the application. This notification shall inform the applicant of whether a permit for temporary variance has been approved or denied; and, if approved, shall set forth the location, dates and times of temporary variance.

(g) In the event a permit for temporary variance shall be denied, the aggrieved applicant shall have the right to a hearing before the chief of police or his or her designee, who may be a hearing officer appointed for that purpose, provided that the request for such hearing is made to the NCA within five days after receipt of the notice.

Notices that are given only by mail shall be presumed to have been received three days after the mailing. Notices given in person, hand-delivered to the address of the applicant or sent by facsimile transmission or electronic mail shall be presumed to have been delivered on the date given or sent.

(1) Hearings contesting the matters in the NCA's notice shall be held before the chief of police or the designee, shall be informal, and shall be scheduled within five business days after receipt of the request for a hearing by the NCA. The hearing may be continued at the request of the applicant or to allow the attendance of any necessary party or witness, but only from day to day. The determination on such hearing shall be made at the conclusion of the hearing, and the chief of police or the designee shall issue a written determination within one business day thereafter, which determination shall affirm or reverse the decision of the NCA.

(2) The hearing under this section shall be de novo and shall be informal. Such hearing shall evaluate the decision of the NCA and the application in accordance with the criteria of this article.

(3) The written determination of the chief of police or the designee upon the conclusion of the hearing as provide in this section shall be the final decision of the city in the matter, and such a determination shall be subject to review by the Superior Court of Fulton County by a petition setting forth an appeal and naming the City of Atlanta as the defending party.

(h) The permit of temporary variance may be revoked by the NCA if the terms of the permit of temporary variance are violated.

Sec. 74-140. - Enforcement procedures.

(a) Violation of any provision of this article shall be cause for a citation to be issued by a police officer or NCO according to procedures set forth in the City Code of Ordinances.

(b) In lieu of issuing a citation, a police officer or NCO may issue an order or warning notice requiring abatement of any sound source alleged to be in violation of this article within a reasonable time period and according to guidelines that the police officer or NCO may prescribe and document in writing. Failure to follow such guidelines shall not be a separate offense but any police officer or NCO may consider the failure to follow such order when making subsequent enforcement decisions,

(c) Penalties. Any person convicted of a violation of any provision of this article shall be subject to the following penalties:

(1) A fine not more than $1,000.00, or a period of confinement in the city jail not to exceed ten days and a probationary period not to exceed 180 days, or both.

(2) In addition to any other penalties provided in this section, the judge may issue an order requiring abatement of any noise source found to be in violation of this article within a reasonable time period, not to exceed 60 days, and according to any guidelines that the court may prescribe.

a. Any person ordered to abate any noise source found to be in violation of any provision of this article shall demonstrate to the NCA compliance with any order requiring abatement at or before the time ordered.

b. Any person failing to abate any noise source in the manner ordered by the municipal court shall be guilty of a separate offense under this section that may be prosecuted by the municipal court in any manner as is

used to enforce its orders in addition to such other punishment that the court may impose for additional violation of this article.

c. Any person failing to abate any noise source found to be in violation of any provision of this article may be liable to the city for reasonable costs and expenses incurred by the city in abating a violation.

(3) Each day during which any violation occurs shall constitute an additional, separate, and distinct offense.

(d) No provision of this article shall be construed to impair any common law or statutory cause of action, or legal remedy therefrom, of any person for injury or damage arising from any violation of this article or from other law.

Sec. 74-140A – Request for SLM reading for business operations

(a) The city recognizes the need to balance the level of noise associated with the reasonable and legal operation of businesses with the level of noise which is generally present in a highly populated urban environment and to provide for a method to assist businesses with understanding the noise levels which generate complaints. In furtherance of this policy, any business that is the subject of a complaint for which a citation could be issued under Sec. 74-136(b) may request an SLM measurement by an NCO upon their reasonable belief that the noise level of their business operation would not be in violation of Sec. 74-136(a) if an SLM reading was taken.

(b) A request from a business for an SLM reading shall be deemed to be sufficient under this article if it is made at the time that an NCO or police officer appears at the premises to investigate a complaint under this article.

(1) In the event that a police officer requests that an NCO take a reading, the business in question may continue operations until such reading is taken but it

shall not remove the officer's discretion to issue a citation under Sec. 74-136(b) if the business alters or ceases that part of the operation producing the noise to avoid the confirmation of a violation through the SLM reading and recommences operations within the next twelve hours.

(2) A police officer who chooses not to issue a citation upon a good faith belief that the noise level of the business operation would not be in violation of this article if an SLM reading is taken by an NCO is not required to seek such reading unless requested by the business to determine whether they are in compliance.

(3) A business must possess a valid business license to conduct the type of business being carried on at the location where the complaint arises before the option to permit SLM reading shall be considered. If a business license cannot be produced or the business operation does not have a valid business license, a police officer may issue a citation pursuant Sec. 74-136(b) in addition to citation for any other violations of the City Code.

(c) In the event that an SLM reading confirms a violation of this article, a citation shall be issued under Sec. 74-136(a).

(d) No police officer shall be required to honor a request for SLM reading if such request is made within thirty (30) days after a citation for a violation of Sec. 74-136(a) was issued unless the citation has been dismissed or the business can document that noise remediation efforts have been undertaken.

(e) Where an SLM measurement is not reasonably available, no police officer or NCO shall be prevented from issuing a citation for a violation of Sec. 74-136(b) but if the failure to conduct such SLM measurement is offered in defense of the citation, proof of the reasonableness of the decision not to conduct such SLM measurement shall be in the

discretion of the municipal court. It is the intention of this section to allow SLM readings to be made available to a business whenever reasonably possible.

Sec. 74-141. - Inconsistent provisions.

Insofar as the provisions of this article are inconsistent with any provision of any other title of the Code, or any rule or regulation of any government agency of the city, then the provisions of this noise control code shall be controlling.

Sec. 74-142. - Severability.

If any provision, clause, sentence or paragraph of this article, or the application thereof to any person or circumstances, shall be held invalid, such invalidity shall not affect the other provisions or application of the provisions of this article which can be given effect without the invalid provisions or application and, to this end, the provisions of this article are hereby declared to be severable.

12-O-0774

A SUBSTITUTE ORDINANCEBY:
PUBLIC/SAFETY COMMITTEE

AN ORDINANCE AMENDING THE CITY OF ATLANTA NOISE CONTROL ORDINANCE AS SET FORTH IN CHAPTER 74, ARTICLE IV, SEC. 74-129 et seq. SO THAT THOSE SECTIONS SHALL READ AS SET FORTH HEREIN AND ADDING CERTAIN NEW SECTIONS TO THE NOISE CONTROL ORDINANCE; AND FOR OTHER PURPOSES.

WHEREAS, based on the finding of the City Council that above certain levels, noise or noise disturbance are detrimental to the health and welfare of the citizenry and the individual's right to peaceful and quiet enjoyment, the City has had a Noise Ordinance in effect since May 27, 1986 for the purpose of preventing such noise disturbances; and

WHEREAS, the City's Noise Ordinance was the subject of litigation titled *Crossover Entertainment Group, Inc. et al v. City of Atlanta, et al* Superior Court of Fulton County CAFN 2010cv194790 which raised certain issues concerning the constitutionality of certain provisions; and

WHEREAS, as a part of the *Crossover* litigation, the City employed certain experts to assist in the defense of that case and review the Noise Ordinance; and

WHEREAS, based on certain recommendation made by the City's experts, the recommended long-term background sound level per land use set by the American National Standards Institute and research in the noise ordinances and policies of other cities of comparable size and other nearby jurisdictions, it appeared that certain adjustments were necessary to the City's Noise Ordinance; and

WHEREAS, the *Crossover* litigation and the recommendations of the City's experts also pointed out the need to adjust the training standards for responding to complaints concerning the violation of the City's Noise Ordinance; and

WHEREAS, the *Crossover* litigation and the recommendations of the City's experts also pointed out the need to balance the level of noise associated with the reasonable and legal operation of businesses with the level of noise which is generally present in a highly populated urban environment and to provide for a method to assist businesses with understanding the noise levels which generate complaints.

NOW THEREFORE, the City Council of the City of Atlanta Georgia, hereby ordains as follows:

Section 1: That Sections 74-129 through and including Sec. 74-142 of Article IV of Chapter 74 of the Code of Ordinances, City of Atlanta, Georgia, are hereby amended to read as the same are set forth in Attachment "A" recognizing that this substitute ordinance contains a different Attachment "A" than its predecessor ordinance.

Section 2: That Article IV of Chapter 74 of the Code of Ordinances, City of Atlanta, Georgia, is hereby amended by adding a new section to be numbered 74-140A which is to read as set forth in Attachment "A."

Section 3: That, to the extent provided by state or federal law, no amendment set forth herein is intended to affect any pending prosecution under any previous text of the ordinance

Section 4: That this ordinance become effective upon the Mayor's signature or as specified by City Charter Sec. 2-403.

ATTACHMENT
"A"

Sec. 74-129. - Title.

This article shall be known and may be referred to as the "Atlanta Noise Control Code" or the "Atlanta Noise Ordinance".

Sec. 74-131. - Definitions.

The following words, terms and phrases, when used in this article, shall have the meanings ascribed to them in this article, except where the context clearly indicates a different meaning:

Ambient sound level means the total sound pressure level in the area of interest including the noise source of interest (see, also, "background sound level," this section).

A-weighting means the electronic filtering in sound level meters that models human hearing frequency sensitivity.

Background sound level is the total sound pressure level in the area of interest excluding the noise source of interest (see also, "ambient sound level," this section).

Commercial area means a group of commercial facilities and the abutting public right-of-way and public property.

Commercial property means any premises, property, or facility, regardless of its zoning classification involving traffic in goods or furnishing of services for sale or profit, including but not limited to:

(1) Banking and other financial institutions;

(2) Dining establishments;

(3) Establishments for providing retail or wholesale services;

(4) Establishments for recreation and entertainment;

(5) Office buildings;

(6) Transportation;

(7) Warehouses; and

(8) Hotels and motels.

Construction means any site preparation, assembly, erection, repair, alteration or similar action, or demolition of buildings or structures.

C-weighting means the electronic filtering in sound level meters that models a flat response (output equals input) over the range of maximum human hearing frequency sensitivity.

dBA means an A-weighted unit of sound level.

dBC means a C-weighted unit of sound level.

Daytime hours means the hours between 7:01 a.m. and 11:00 p.m.

Decibel (dB) means the unit of measurement for a sound pressure level and is equal to ten times the common logarithm of the ratio of two like quantities (see "sound pressure level").

Emergency work means any work or action necessary to deliver essential services including, but not limited to, repairing water, gas, electric, telephone, sewer facilities, or public transportation facilities, removing fallen trees on public rights-of-way, or abating life-threatening conditions.

Equivalent sound level (Leq) means the non-varying sound level that would contain the equivalent amount of energy as a varying sound level. Note that Leq can be weighted or unweighted and can be integrated over durations ranging from less than a second to many hours. The notation should indicate weighting used and duration, e.g., 85 dBC Leq (one min.) is a C-weighted 85 decibel equivalent sound level, integrated over a one minute period.

Impulsive sound means a sound having duration of less than one second with an abrupt onset and rapid decay.

Industrial facility or property means any activity and its related premises, property, facilities, or equipment involving the fabrication, manufacture, or production of durable or nondurable goods. A property's zoning does not have to be industrial as defined under the City Zoning Ordinance for a facility to be considered an industrial facility.

Maximum sound level (Lmax) means the maximum root mean square sound level measured or not to be exceeded by time varying sounds.

Motor vehicle means any vehicle that is propelled or drawn on land by an engine or motor.

Muffler means a sound-dissipative device or system for lessening the sound of the exhaust of an internal combustion engine.

Multidwelling unit building means any building wherein there are two or more dwelling units.

Municipality or municipal refers to the City of Atlanta, Georgia or the "city"

Nighttime hours means the hours between 11:01 p.m. of any given day, and 7:00 a.m. of the following day.

Noise means any sound of such level and duration as to be or tend to be injurious to human health or welfare, or which would unreasonably interfere with the enjoyment of life or property throughout the city or in any portions thereof, but excludes all aspects of the employer-employee relationship concerning health and safety hazard within the confines of a place of employment.

Noise control administrator (NCA) means any individual designated by the chief of police as the liaison with all municipal departments for issues related to noise control

and who is charged with the administration of the Noise Ordinance, maintaining records showing that Noise Control Officers are properly trained and that the sound level meters in use in the city meet the standards required by the Noise Ordinance.

Noise control officer (NCO) means any police officer or other municipal officer or employee who has received training in the standards required by this article for the measurement of ambient sound level or absolute sound level and received authorization to issue citations based on readings taken with a SLM.

Noise disturbance means any sound that due to such sound exceeding the limits set forth in this article, endangers the health, safety or welfare of any person, and therefore is detrimental to the peaceful enjoyment of private property and the use and enjoyment of public spaces including public rights of way.

Noise source means the point of origin of any noise, excluding noise emanating from any sound making device or instrument from within a motor vehicle as covered by O.C.G.A. § 40-6-14.

Peak sound level (Lpk) means the absolute positive or negative value (not the root mean square value) of the sound energy in a discrete event typically of very short duration.

Person means any individual, corporation, company, association, society, firm partnership, joint stock company, the municipality any political subdivision, agency or instrumentality of the municipality.

Plainly audible means any sound produced by a noise source, which can be heard by any person at prescribed distances or locations. Measurement standards shall be the auditory senses, based upon direct line of sight to the sound source, provided however that auditory senses may also be used to determine the location if direct line of sight to

the sound source is blocked. Words or phrases need not be discernible and low frequency sound reverberations are included.

Public right-of-way means any street, avenue, boulevard, road, highway sidewalk, or alley that is leased, owned, or controlled by a governmental entity.

Public property means any real property or structures thereon that is own leased, or controlled by a governmental entity.

Pure tone means a sound dominated by energy in a single frequency.

Real property line is either (a) the imaginary line, including vertical extension, that separates one parcel of real property from another, or (b) the vertical and horizontal boundaries of a residential dwelling unit that is contained in a building containing two or more residential units or any combination of separately leased or owned spaces.

Residential area means a group of residential properties and the abutting public rights-of-way public property.

Residential property means property used for human habitation, including but not limited to: a. Private property used for human habitation; b. Commercial living accommodations and commercial property used for human habitation including mixed use properties, including the operation of accessory uses such as deliveries; the collection of trash by private vendors; amplified or live music, movies or televisions, whether originating from inside of a structure or on an outdoor deck or patio; taxi stands, valet parking and similar commercial noise sources; c. Recreational and entertainment property used for human habitation; and d. Community service property used for human habitation.

Sound amplification device means any radio, tape player, compact disc player, loudspeaker, television or other electronic or digital device used for the amplification of the human voice, music or other sounds.

Sound level (per ASTM C 634) means a sound pressure level obtained using a signal to which standard weighting has been applied.

Sound level meter (SLM) means an instrument used to measure sound pressure levels.

Sound pressure level (SPL) means the ratio in decibels of the square of the root mean square sound pressure divided by the square of the standard reference sound pressure of 20|gmPa. Mathematically, this is expressed as 10* log p2/P2 ref, = 20*log P/P ref, P ref, = 20|gmPa.

Tonal sound means a sound dominated by energy in a narrow band of frequencies.

Weekday means the time period of each week that begins at 11:00 p.m. on each Sunday and ends at 5:00 p.m. on each Friday.

Weekend means the time period of each week that begins at 5:00 p.m. on each Friday and ends at 11:00 p.m. on each Sunday.

Sec. 74-132. - Scope.

The provisions of this article shall apply to all property within the jurisdiction of the City of Atlanta, Georgia.

Sec. 74-133. - Declaration of policy.

The provisions hereinafter contained are enacted for the purpose of preventing noise disturbances. Above certain levels, noise or noise disturbance is detrimental to the health and welfare of the citizenry and the individual's right to peaceful and quiet enjoyment. Therefore, it is hereby declared to be the policy of the city to prohibit noise disturbances from all sources, subject to its police power in order to secure and promote

the public health, comfort, convenience, safety, welfare, and prosperity of the citizens of Atlanta. Nothing in this article is intended to deter individuals from lawfully exercising the individual right to freedom of speech or any other freedom guaranteed under the Constitutions of the United States of America or of the State of Georgia.

Sec. 74-134. - Powers, duties, and qualifications of the noise control officers and administrators; duties and responsibilities of other departments.

(a) The noise control administrator (NCA) is authorized to:

(1) Coordinate the noise control activities of all municipal departments and cooperate with all other public bodies and agencies to the extent practicable;

(2) Review the policies and actions of other municipal departments and advise such departments of the effect, if any, of such policies and actions on noise control;

(3) Delegate the duties assigned to noise control officers ("NCO's") to any duly qualified individual according to the provisions of this article upon a showing that such person received the training required by this article, provided however that no city police officer shall be required to receive any additional type of delegation from the NCA in order to enforce the provisions of section 74-136(b) in that the standards set forth in this article are sufficient for that purpose;

(4) Grant permits for temporary variances according to the provisions of of this article;

(5) Maintain the records of the training received by NCO's under which such NCO's have become eligible to receive their delegation of authority to enforce this article through the use of SLMs. The delegation of such authority to an NCO shall arise upon successful completion of the training required by this article and shall

not require a separate act by the NCA beyond the transmission to the NCA of the record of completion of the required training; and

(6) Maintain the records of the specification, purchase, warranty and calibration requirements of SLMs used by NCO's.

(b) Those individuals appointed as NCO's are authorized to enforce the provisions of this article.

(1) All NCO's, including city police officers trained as NCO's, are authorized to issue a citation for violations of this article, based upon the determination of levels provided in section 74-136(a) or pursuant to section 74-136(b).

(2) City police officers shall not be required to have the specific training required by this article in order to issue citations pursuant to section 74-136(b).

(c) A person shall be qualified to be an NCO if the person has satisfactorily completed any of the following training:

(1) An instructional program in community noise analysis and migration from a certified noise control engineer, as evidenced by certification from the Institute of Noise Control Engineering (INCE); or

(2) A training program prepared or supervised by a registered professional engineer practicing in the field of acoustics or a related field that uses sound measurement equipment; or

(3) A training program prepared or supervised by an individual with academic qualifications demonstrating expertise in sound measurement; or

(4) Training given or approved by the manufacturer of noise meters used in enforcement of this ordinance; or

(5) An instructional program in community noise analysis and migration from another NCO; or

(6) Education or experience or a combination thereof certified by the NCA as equivalent to the provisions of any of the requirements of this subsection.

(d) Noise measurements taken by a NCO with SLMs shall be taken in accordance with the procedures specified in this article but no procedures shall be required to enforce section 74-136(b), including its enforcement by city police officers other than those necessary to meet the criteria set forth in that section and/or this article.

(e) The provisions of this article shall not apply to any department or agency of the city engaged in any emergency activities or as otherwise excluded under section 74-138 of this article. However, all city departments and agencies shall carry out their programs according to the law and shall cooperate with the assessment and consideration of the possible impact of their activities with regard to the reduction of noise disturbances and the other purposes of this article.

Sec. 74-135. - Sound measurement procedures.

(a) Insofar as practicable, sound will be measured while the source under investigation is operating at normal, routine conditions and, as necessary, at other conditions, including but not limited to, design, maximum, and fluctuating rates. All noise measurements shall be made as directed in this article. When instrumentation cannot be placed at or within the property line, the measurement shall be made as close thereto as is reasonable. For the purposes of this article, noise measurements are measured on the A- or C-weighting scale, as applicable, of a sound level meter (SLM) of standard design and quality having characteristics established by the American National Standards Institute (ANSI).

(b) All tests shall be conducted in accordance with the following procedures:

(1) The NCO shall, to the extent practicable, identify all sources contributing sound to the point of measurement but shall not be required to document the absence of such sources or document that such sources would not have caused the test to be valid.

(2) Measurements for comparison of the ambient sound level of a sound source to the background noise level shall be taken at 100 feet from the noise source during daytime hours or 25 feet from the noise source during nighttime hours or the furthest point on the receiving property that is within these distances. When a measurement is being taken to determine whether the noise source is in violation of the absolute cap set forth in Sec. 74-136(a)(1) (Table 2) or Sec. 74-136(a)(2), the measurement shall be taken at the receiving property line.

(3) The SLM must be calibrated using a calibrator or method recommended by the SLM manufacturer and in the manner recommended. Automatic internal calibration of the SLM which occurs as a part of the initialization of the SLM shall be sufficient to satisfy this requirement.

(4) The SLM shall be recertified and/or recalibrated as recommended by the manufacturer.

(5) Unless the manufacturers' specifications allow adjustments to be made to compensate for the following factors, no outdoor measurements shall be taken:

a. During periods when wind speeds (including gusts) exceed 15 mph;

b. Without a windscreen, recommended by the SLM manufacturer, properly attached to the SLM;

c. Under any condition that allows the SLM to become wet; or

d. When the ambient temperature is out of the range of the tolerance of the SLM.

e. Provided however that it shall not be necessary to document the absence of the conditions set forth in this subsection for a reading to be valid.

(c) The report for each measurement session should include such facts as may be necessary to demonstrate that a violation has occurred, whether established by data captured by the SLM or supplied by a separate written report or testimony of a police officer or NCO but the absence of a written determination of any particular fact at the time of citation shall not invalidate the overall finding if it can reasonably proven at the time set for adjudication of the citation.

(1) The date, day of the week, and times at which measurements are taken;

(2) The times of calibration;

(3) The weather conditions;

(4) The identification of all monitoring equipment by manufacturer, model number, and serial number;

(5) The normal operating cycle of the sources in question with a description of the sources provided however that where the sources in question do not have a normal operating cycle, such notation shall not be required;

(6) The ambient sound level, in dB(A) or (C), depending on the measurement being taken, with the sources in question operating;

(7) The background sound level, in dB(A), without the sources in question operating provided however that where the background sound level in question

cannot reasonably be measured, the correction factor for background sound levels shall be three (3) dB(A);

(8) The total accumulative time duration of the monitoring session; and

(9) A description of the measurement site, including measurement locations and relevant distances and other information sufficient for another investigator to repeat the measurements under similar conditions. Photographs which contain sufficient information for another investigator to repeat the measurements under similar conditions may be substituted at the discretion of the NCO.

(10) Information required to support the issuance of a citation shall be considered sufficient if the data captures SLM provides such information, and/or such information can be provided by the citation and/or the testimony of the NCO taking such readings and/or such other reports generated by the NCO or any police officer.

(d) Prior to taking noise measurements, the NCO shall reasonably explore the vicinity of the source in question to identify any other sound sources that could affect measurements, to establish the approximate location and character of the principal sound source, and to select suitable locations from which to measure the sound from the source in question. Unless the reasonable exploration of the site uncovers a condition that could affect the measurements, the NCO shall not be required to make a notation that this subsection has been satisfied.

(e) When measuring continuous sound, or sound that is sustained for more than one second at a time, the SLM shall be set for the appropriate A or C weighting, slow meter response speed, and the range (if the SLM is designed to read levels over different

ranges of (SPLs) shall be set to that range in which the meter reads closest to the maximum end of the scale). When the measured sound level is variable or fluctuating over a range greater than three (3) DBA, using the slow meter response speed, the fast meter response speed shall be used. In either case, both the minimum and maximum readings shall be recorded to indicate the range of monitored values.

(f) The SLM shall be placed at a minimum height of three feet above the ground or from any reflective surface. When handheld, the microphone shall be held at arm's length and pointed at the source at the angle recommended by the SLM manufacturer.

(g) If extraneous sound sources, such as aircraft flyovers or barking dogs that are unrelated to the measurements increase the monitored sound levels, the measurements should be postponed until these extraneous sounds have become of such a level as not to increase the monitored sound levels of interest.

(h) The monitoring session should last for a period of time sufficient to ensure that the sound levels measured are typical of the source in question, but in no event shall the duration of testing be less than one minute.

(i) The background sound levels shall be subtracted from the measured sound levels of the source of interest by using Table 1 to determine the sound levels from the source of interest alone. If the ambient sound level is less than three DBA higher than the background sound level, the source level cannot be derived and a violation of the article cannot be substantiated.

(j) Information on the procedures required to support the issuance of a citation shall be considered sufficient if the SLM provides such information, and/or such information can be provided by the citation and/or the testimony of the NCO performing the test and/or such other reports generated by the NCO or any police officer.

Table 1: Correction for background levels (in dBA)

Difference between ambient and background sound levels	Correction factor to be subtracted from ambient level for source level
3	3
4, 5	2
6—9	1
10 or more	0

Sec. 74-136. - Sound level limitations.

It shall be unlawful and a violation of this code to exceed the following sound level limitations:

(a) No person shall cause, allow, or permit the operation of any noise source on a particular category of property or any public property or right-of-way in such a manner as to create a sound level that exceeds the background sound level by ten dBA or more during daytime hours or five dBA or more during nighttime hours when measured within the real property line of the receiving property, except as provided in section 74-138. Such a noise would constitute a noise disturbance under this article if it continues in excess of one minute unless otherwise provided herein, provided however that no violation can be substantiated unless the background noise level is: at least Leq. 45 dBA (one min.) during daytime hours or Leq. 40 dBA (one min.) during nighttime hours in residential areas; at least Leq. 60 dBA (one min.) during daytime hours or Leq. 55 dBA (one min.) during nighttime hours in commercial areas; at least Leq. 65 dBA (one min.) during daytime hours or Leq. 60 dBA (one min.) during nighttime hours in industrial areas; and further provided however that this limitation shall not apply inside of multi-family dwelling unit buildings. If background noise levels are below the stated level to be used for comparison, the stated level shall be used.

(1) If the background sound level cannot be determined, the absolute sound level limits set forth in Table 2 shall be used. The classification of property as set forth in Table 2 represents the receiving property and is not intended to increase the level of any sound produced by referencing the classification of the property producing the sound in question. For the purpose of this article, the representation of the person registering a complaint shall be sufficient for the NCO to determine the category of the receiving property if it is not readily apparent from an observation of the receiving property. In those cases where an NCO is making a measurement not based on the complaint of an individual but is conducting an investigation based on the recommendation from a police officer or the NCO's own investigation, the observation of the NCO shall be sufficient to determine the category for the measurement of the receiving property.

Table 2: Maximum permissible sound levels Leq dB (A)—Averaged over one minute to minimize the possibility of interfering noise.

Receiving property	Daytime Hours	Nighttime Hours
Residential property	60	50
Commercial property	70	65
Industrial property	75	70

(2) At no time shall noise levels be produced that exceed 75dB(C) Leq (one min.) during daytime hours and 70 dB(C) Leq (one min.) during nighttime hours at a receiving real property line.

(3) If the noise source, measured at a receiving property line, is a pure tone, then the sound level limitations set forth in Table 2 shall be reduced by five dB.

(4) Impulsive sound sources shall not exceed 100 dB(C) Leq. measured at a receiving property line, using the fast meter response speed.

(5) Inside multi-family dwelling unit buildings, if the background sound level cannot be determined, the limit during daytime hours is 50 dB (C) Leq (one min.) and the limit during nighttime hours is 45 dB (C) Leq. for sounds originating in another dwelling within the same building or from the heating, ventilation, air conditioning units or other machinery serving the premises, whether operated for the use of an individual dwelling unit or a group of dwelling units.

(b) At the discretion of a police officer and as an alternative to making a determination based upon the ambient sound level or absolute sound level, the following standards shall be used for sounds emanating from any noise source located on any residential property, commercial property, or public property:

(1) During daytime hours, sound emanating from any noise source shall be limited in volume, tone and intensity so that the sound shall not be plainly audible to any person at a distance of 200 or more feet from the real property line of any private property on which the noise source is located, or from any noise source located on any public property or public right-of-way.

(2) During nighttime hours, sound emanating from any noise source shall be limited in volume, tone and intensity so that the sound shall not be plainly audible to any person at a distance of 50 or more feet from the real property line of any private property on which the noise source is located, or from any noise source located on any public property or public right-or-way.

(3) In determining whether or not a sound emanating from a noise source violates this section, NCO's or police officers should consider the following factors:

a. Level of the noise based upon reaction to it in the same manner as it would be experienced by a reasonable person;

b. Nature of the noise on which the complaint is based;

c. Origin of the noise based on required distance;

d. Level and intensity of any background noise compared to the noise being investigated;

e. Proximity of the noise to sleeping facilities;

f. Nature and zoning of the area;

g. Density of inhabitation in the area;

h. Time of day or night the noise is occurring;

i. Duration of the noise;

j. Whether the noise is recurrent, intermittent, or constant, especially in cases where voluntary compliance is followed by a second complaint within any 24 hour period;

k. Whether the noise is produced by a business operation and an SLM measurement is reasonably available pursuant to 74-140A;

l. Whether voluntary compliance is obtained.

(4) After having made a determination under this section that a noise violates this section, police officers may issue a citation for violation of this section but shall not be required to do so upon their determination that the level of plainly audible noise is not such as would disturb a reasonable person or is no greater than the level and intensity of any background noise compared to the noise being investigated.

(5) Inside multi-family dwelling unit buildings, where it may not be possible to determine the distance from the sound source, NCO's or police officers shall determine whether the unit or area of the building producing the sound source is directly adjacent to the dwelling unit receiving the sound, in which case the owner of the sound source may be cited if after the consideration of the factors set forth in this section.

Sec. 74-137. - Specific prohibited acts.

(a) It is unlawful, and a violation of this Code, for any person to cause, allow, or permit any of the following acts:

(1) Owning, possessing, or harboring any animal or bird that, for a continued duration in excess of 15 minutes, generates noise that is plainly audible at a distance of five feet or more from the real property line of a residential property;

(2) Loading, unloading, opening, closing, or other handling of boxes, crates, containers, building materials, liquids, or the pneumatic or pumped loading or unloading of bulk materials in liquid, gaseous, powder, or pellet form, between 9:00 p.m. and 7:00 am the following day on a weekday and between 9:00 p.m. and 9:00 a.m. the following day on a weekend day or legal holiday, except by permit, when the noise source is located 50 feet or less from the nearest residential property line;

(3) Operating or permitting the operation of any motor vehicle or any auxiliary equipment attached to such a vehicle, for a period of longer than five minutes in any hour while the vehicle is stationary, for reasons other than traffic congestion or emergency work, and where such vehicle's manufacturer's gross

weight rating is in excess of 10,000 lbs., on a public right-of-way or public property within 150 feet of a residential property during nighttime hours;

(4) Operating or permitting the operation of any power tools or other motorized equipment used in construction, drilling, earthmoving, excavating, or demolition work between 7:00 p.m. and 7:00 a.m. the following day on a weekday or between 7:00 p.m. and 9:00 a.m. on a weekend day or legal holiday, except for emergency work or by permit for temporary variance pursuant to section 74-139

(5) Compacting or collecting of refuse by persons engaged in the business of scavenging or garbage collection, whether private or municipal, during nighttime hours or before 9:00 am on a weekend day or legal holiday, except by permit.

(6) Car drifting on private property within 1,000 feet of a residentially zoned district. For purposes of this section, car drifting shall mean a driving technique or motorsport where the driver intentionally over steers, causing loss of traction in the rear wheels, while maintaining control from entry to exit of a corner. A car is drifting when the rear slip angle is greater than the front slip angle, to such an extent that the front wheels are pointing in the opposite direction to the turn (e.g. car is turning left; wheels are pointed right or vice versa).

(b) Loud sound amplification devices.

(1) Upon or within any public property or public right-of-way, no person shall play, use or operate, or permit to be played, used, or operated, any sound amplification device, so that the sound is plainly audible to any person, at a distance set forth by the provisions of section 74-136(b). The distance shall be measured from the noise source.

(2) No person shall play, use or operate, or permit to be played, used, or operated, any sound amplification device on or within any private property, so that the sound is plainly audible to any person according to the provisions of section 74-136(b).

(3) It is an affirmative defense to charge under this section that the operator was not otherwise prohibited by law from operating the sound amplification device, and that any of the following apply:

a. The sound amplification device was being operated to request medical or emergency assistance or to warn of a hazardous road condition;

b. The sound amplification device was being operated to provide emergency information or to warn of an emergency condition;

c. The sound amplification device was authorized or permitted to be used for the purpose of giving instructions, directions, talks, addresses, lectures or transmitting music to any persons or assemblages of persons;

d. The loud sound amplification device was used in authorized or permitted public activities, such as parades, fireworks, sports events, musical productions and other activities which have the approval of the department of the city authorized to grant such approval.

(4) No part of this subsection shall be construed to allow any person to violate the provisions of section 74-136(a) if a sound level meter is employed to measure the sound associated with any specific prohibited act.

Sec. 74-138. - Exemptions.

(a) The provisions of this article shall not apply to the generation of noise by public safety vehicles, emergency signaling devices, or authorized public safety personnel for the purpose of alerting persons to the existence of any emergency.

(b) Noise from an exterior burglar alarm of any building shall be exempt from the provisions of this article, provided such burglar alarm shall terminate its operation within 15 minutes of its activation.

(c) Noises from any automobile alarm shall be exempt from the provisions of this article, provided such burglar alarm shall terminate its operation within ten minutes of its activation.

(d) Noise from domestic power tools, lawn mowers, and agricultural equipment when operated between 8:00 a.m. and 8:00 p.m. on weekdays and between 9:00 a.m. and 8:00 p.m. on weekends and legal holidays shall be exempt from the provisions of this article, provided they generate less than 85 dBA at or within any real property line of a residential property outside of the property where the noise in question originates, and all noises from tools and lawn mowers operated in association with the upkeep and maintenance of any public or private golf course shall be exempt from the provisions of this article, provided that all such tools and lawn mowers are equipped with mufflers or are operated in conjunction with a device or system for lessening the sounds produced;

(e) Noise from church bells and chimes when a part of a religious observance or service shall be exempt from the provisions of this article during daytime hours;

(f) Noise from permitted construction activity shall be exempt from the provisions of this article, provided all motorized equipment used in such activity is equipped with functioning mufflers, except as provided in section 74-137(a)(4).

(g) Noise from snow blowers, snow throwers, and snowplows when operated with a muffler for the purpose of snow removal shall be exempt from the provisions of this article.

(h) The generation of noise in the performance of emergency work shall be exempt from the provisions of this article.

(i) The generation of noise in situations within the jurisdiction of the Federal Occupational Safety and Health Administration shall be exempt from the provisions of this article.

(j) Noise generated from celebrations, outdoor festivals or events municipally sponsored or approved whether by contract, permit or otherwise, shall be exempt from the provisions of this article.

(k) Noises resulting from the operation of the Hartsfield-Jackson Atlanta International Airport shall be exempt from the provisions of this article.

(l) Any noise resulting from activities of a temporary duration, for which a permit for temporary variance has been granted pursuant to this article, and which conforms to the conditions and. limits stated in the variance and reasonably related activities shall be exempt from the provisions of this article.

(m) Noises resulting from any practice or performance sponsored by or associated with the educational process administered by a recognized institution of learning, including, but not limited to band, choir, and orchestral performances shall be exempt from the provisions of this article.

(n) Noises that result from or arise out of or stem from the occurrence of a professional sporting event or organized sports league shall be exempt from the provisions of this article.

(o) Any noise arising out of construction, maintenance, repair or renovation activities related to the Metropolitan Atlanta Rapid Transit Authority (MARTA) bus or rail system, or the city's streetcar system, or other mass transit systems, shall be exempt from the provisions of this article.

(1) MARTA and/or the city will develop and implement procedures by which NPUs affected by construction or planned maintenance activities will be notified prior to the commencement of work.

(2) MARTA and/or the city will develop and implement procedures by which any complaints of excessive noise created by construction or planned maintenance activities and reported by citizens to MARTA are available for review by interested citizens or members of the city council.

(3) MARTA and/or the city will develop and implement procedures by which contractors conducting planned maintenance or implementing new construction on the MARTA bus or rail system, or the city's streetcar system, or other mass transit systems will be monitored so as to ensure that all work is performed in a manner that will result in the creation of the least amount of noise disturbance.

Sec. 74-139. - Conditions for permits for temporary variance; notice of approval or denial; hearings and appeals.

(a) Any person who owns the real property from which a noise source emanates or operates any noise source may, with the permission of the owner, apply to the NCA for a temporary variance from one or more of the provisions of this article, unless such noise source is specifically exempted according to the provisions of section 74-138. Applications for a permit of temporary variance shall supply information including, but not limited to:

(1) The nature and location of the noise source for which such application is made;

(2) The reason for which the permit of temporary variance is requested, including the hardship that will result to the applicant, his/her client, or the public if the permit of temporary variance is not granted;

(3) The level of noise that will occur during the period of the temporary variance;

(4) The section or sections of this ordinance for which the permit of temporary variance shall apply;

(5) A description of interim noise control measures to be taken for the applicant to minimize noise and the impacts occurring from the noise for which the variance is sought; and

(6) A specific schedule of the noise control measures that shall be taken to bring the source into compliance with this article within a reasonable time.

(a1) Failure to supply the information required by the NCA shall be cause for rejection of the application.

(a2) A copy of the permit of temporary variance must be kept on file by the municipal clerk for public inspection.

(b) The NCA shall charge the applicant a fee of $25.00 to cover expenses resulting from the processing of the application for a permit of temporary variance.

(c) The NCA shall limit the duration of the permit of temporary variance, which, in any event, shall be effective no longer than 45 days. Any person holding a permit of temporary variance and requesting an extension of time shall apply for a new permit of temporary variance according to the provisions of this section.

(d) No temporary variance shall be approved unless the applicant presents adequate proof that:

(1) Noise levels occurring during the period of the temporary variance will not constitute a danger to public health; and

(2) Compliance with the article would impose an unreasonable hardship on the applicant without some benefit to the public that will result from the completion of the activity requiring the variance.

(3) That a notice has been posted at the site where the temporary variance is sought that a request for temporary variance has been requested and the date on which the application has been submitted. Proof of the posting of such notice shall be by affidavit signed by the applicant.

(e) In making the determination of granting a temporary variance after having made a finding that adequate proof was provided by the applicant as required in this article, the NCA shall consider the following factors:

(1) The character and degree of interference with, the health and welfare or the reasonable use of property that is caused or threatened to be caused;

(2) The level of interference to the peaceful enjoyment of adjoining property or the public right of way above that which is allowed under this article if the temporary variance is denied; and

(3) The ability of the applicant to apply the best practical noise control measures.

(4) Any comments received from persons residing or operating businesses located within 500 feet of any property line at the site where the variance is requested.

(f) The NCA shall notify the applicant in writing of his or her determination on the application within 14 days after receipt of the application but no sooner than 7 days after receipt of the application. This notification shall inform the applicant of whether a permit for temporary variance has been approved or denied; and, if approved, shall set forth the location, dates and times of temporary variance.

(g) In the event a permit for temporary variance shall be denied, the aggrieved applicant shall have the right to a hearing before the chief of police or his or her designee, who may be a hearing officer appointed for that purpose, provided that the request for such hearing is made to the NCA within five days after receipt of the notice. Notices that are given only by mail shall be presumed to have been received three days after the mailing. Notices given in person, hand-delivered to the address of the applicant or sent by facsimile transmission or electronic mail shall be presumed to have been delivered on the date given or sent.

(1) Hearings contesting the matters in the NCA's notice shall be held before the chief of police or the designee, shall be informal, and shall be scheduled within five business days after receipt of the request for a hearing by the NCA. The hearing may be continued at the request of the applicant or to allow the attendance of any necessary party or witness, but only from day to day. The determination on such hearing shall be made at the conclusion of the hearing, and the chief of police or the designee shall issue a written determination within one business day thereafter, which determination shall affirm or reverse the decision of the NCA.

(2) The hearing under this section shall be de novo and shall be informal. Such hearing shall evaluate the decision of the NCA and the application in accordance with the criteria of this article.

(3) The written determination of the chief of police or the designee upon the conclusion of the hearing as provide in this section shall be the final decision of the city in the matter, and such a determination shall be subject to review by the Superior Court of Fulton County by a petition setting forth an appeal and naming the City of Atlanta as the defending party.

(i) The permit of temporary variance may be revoked by the NCA if the terms of the permit of temporary variance are violated.

Sec. 74-140. - Enforcement procedures.

(a) Violation of any provision of this article shall be cause for a citation to be issued by a police officer or NCO according to procedures set forth in the City Code of Ordinances.

(b) In lieu of issuing a citation, a police officer or NCO may issue an order or warning notice requiring abatement of any sound source alleged to be in violation of this article within a reasonable time period and according to guidelines that the police officer or NCO may prescribe and document in writing. Failure to follow such guidelines shall not be a separate offense but any police officer or NCO may consider the failure to follow such order when making subsequent enforcement decisions,

(c) Penalties. Any person convicted of a violation of any provision of this article shall be subject to the following penalties:

(1) A fine not more than $1,000.00, or a period of confinement in the city jail not to exceed ten days and a probationary period not to exceed 180 days, or both.

(2) In addition to any other penalties provided in this section, the judge may issue an order requiring abatement of any noise source found to be in violation of this article within a reasonable time period, not to exceed 60 days, and according to any guidelines that the court may prescribe.

a. Any person ordered to abate any noise source found to be in violation of any provision of this article shall demonstrate to the NCA compliance with any order requiring abatement at or before the time ordered.

b. Any person failing to abate any noise source in the manner ordered by the municipal court shall be guilty of a separate offense under this section that may be prosecuted by the municipal court in any manner as is used to enforce its orders in addition to such other punishment that the court may impose for additional violation of this article.

c. Any person failing to abate any noise source found to be in violation of any provision of this article may be liable to the city for reasonable costs and expenses incurred by the city in abating a violation.

(3) Each day during which any violation occurs shall constitute an additional, separate, and distinct offense.

(d) No provision of this article shall be construed to impair any common law or statutory cause of action, or legal remedy therefrom, of any person for injury or damage arising from any violation of this article or from other law.

Sec. 74-140A – Request for SLM reading for business operations

(a) The city recognizes the need to balance the level of noise associated with the reasonable and legal operation of businesses with the level of noise which is generally

present in a highly populated urban environment and to provide for a method to assist businesses with understanding the noise levels which generate complaints. In furtherance of this policy, any business that is the subject of a complaint for which a citation could be issued under Sec. 74-136(b) may request an SLM measurement by an NCO upon their reasonable belief that the noise level of their business operation would not be in violation of Sec. 74-136(a) if an SLM reading was taken.

(b) A request from a business for an SLM reading shall be deemed to be sufficient under this article if it is made at the time that an NCO or police officer appears at the premises to investigate a complaint under this article.

(1) In the event that a police officer requests that an NCO take a reading, the business in question may continue operations until such reading is taken but it shall not remove the officer's discretion to issue a citation under Sec. 74-136(b) if the business alters or ceases that part of the operation producing the noise to avoid the confirmation of a violation through the SLM reading and recommences operations within the next twelve hours.

(2) A police officer who chooses not to issue a citation upon a good faith belief that the noise level of the business operation would not be in violation of this article if an SLM reading is taken by an NCO is not required to seek such reading unless requested by the business to determine whether they are in compliance.

(3) A business must possess a valid business license to conduct the type of business being carried on at the location where the complaint arises before the option to permit SLM reading shall be considered. If a business license cannot be produced or the business operation does not have a valid business license, a

police officer may issue a citation pursuant Sec. 74-136(b) in addition to citation for any other violations of the City Code.

(c) In the event that an SLM reading confirms a violation of this article, a citation shall be issued under Sec. 74-136(a).

(d) No police officer shall be required to honor a request for SLM reading if such request is made within thirty (30) days after a citation for a violation of Sec. 74-136(a) was issued unless the citation has been dismissed or the business can document that noise remediation efforts have been undertaken.

(e) Where an SLM measurement is not reasonably available, no police officer or NCO shall be prevented from issuing a citation for a violation of Sec. 74-136(b) but if the failure to conduct such SLM measurement is offered in defense of the citation, proof of the reasonableness of the decision not to conduct such SLM measurement shall be in the discretion of the municipal court. It is the intention of this section to allow SLM readings to be made available to a business whenever reasonably possible.

Sec. 74-141. - Inconsistent provisions.

Insofar as the provisions of this article are inconsistent with any provision of any other title of the Code, or any rule or regulation of any government agency of the city, then the provisions of this noise control code shall be controlling.

Sec. 74-142. - Severability.

If any provision, clause, sentence or paragraph of this article, or the application thereof to any person or circumstances, shall be held invalid, such invalidity shall not affect the other provisions or application of the provisions of this article which can be given effect without the invalid provisions or application and, to this end, the provisions of this article are hereby declared to be severable.

12-O-0774

AN ORDINANCE BY:
PUBLIC/SAFETY COMMITTEE

AN ORDINANCE AMENDING THE CITY OF ATLANTA NOISE CONTROL ORDINANCE AS SET FORTH IN CHAPTER 74, ARTICLE IV, SEC. 74-129 et seq. SO THAT THOSE SECTIONS SHALL READ AS SET FORTH HEREIN AND ADDING CERTAIN NEW SECTIONS TO THE NOISE CONTROL ORDINANCE; AND FOR OTHER PURPOSES.

WHEREAS, based on the finding of the City Council that above certain levels, noise or noise disturbance are detrimental to the health and welfare of the citizenry and the individual's right to peaceful and quiet enjoyment, the City has had a Noise Ordinance in effect since May 27, 1986 for the purpose of preventing such noise disturbances; and

WHEREAS, the City's Noise Ordinance was the subject of litigation titled *Crossover Entertainment Group, Inc. et al v. City of Atlanta, et al* Superior Court of Fulton County CAFN 2010cv194790 which raised certain issues concerning the constitutionality of certain provisions; and

WHEREAS, as a part of the *Crossover* litigation, the City employed certain experts to assist in the defense of that case and review the Noise Ordinance; and

WHEREAS, based on certain recommendation made by the City's experts, the recommended long-term background sound level per land use set by the American National Standards Institute and research in the noise ordinances and policies of other cities of comparable size and other nearby jurisdictions, it appeared that certain adjustments were necessary to the City's Noise Ordinance; and

WHEREAS, the *Crossover* litigation and the recommendations of the City's experts also pointed out the need to adjust the training standards for responding to complaints concerning the violation of the City's Noise Ordinance; and

WHEREAS, the *Crossover* litigation and the recommendations of the City's experts also pointed out the need to balance the level of noise associated with the reasonable and legal operation of businesses with the level of noise which is generally present in a highly populated urban environment and to provide for a method to assist businesses with understanding the noise levels which generate complaints.

NOW THEREFORE, the City Council of the City of Atlanta Georgia, hereby ordains as follows:

Section 1: That Sections 74-129 through and including Sec. 74-142 of Article IV of Chapter 74 of the Code of Ordinances, City of Atlanta, Georgia, are hereby amended to read as the same are set forth in Attachment "A"

Section 2: That Article IV of Chapter 74 of the Code of Ordinances, City of Atlanta, Georgia, is hereby amended by adding a new section to be numbered 74-140A which is to read as set forth in Attachment "A."

Section 3: That, to the extent provided by state or federal law, no amendment set forth herein is intended to affect any pending prosecution under any previous text of the ordinance

Section 4: That this ordinance become effective upon the Mayor's signature or as specified by City Charter Sec. 2-403.

ATTACHMENT "A"

Sec. 74-129. - Title.

This article shall be known and may be referred to as the "Atlanta Noise Control Code" or the "Atlanta Noise Ordinance".

Sec. 74-131. - Definitions.

The following words, terms and phrases, when used in this article, shall have the meanings ascribed to them in this article, except where the context clearly indicates a different meaning:

Ambient sound level means the total sound pressure level in the area of interest including the noise source of interest (see, also, "background sound level," this section).

A-weighting means the electronic filtering in sound level meters that models human hearing frequency sensitivity.

Background sound level is the total sound pressure level in the area of interest excluding the noise source of interest (see also, "ambient sound level," this section).

Commercial area means a group of commercial facilities and the abutting public right-of-way and public property.

Commercial property means any premises, property, or facility, regardless of its zoning classification involving traffic in goods or furnishing of services for sale or profit, including but not limited to:

(1) Banking and other financial institutions;

(2) Dining establishments;

(3) Establishments for providing retail or wholesale services;

(4) Establishments for recreation and entertainment;

(5) Office buildings;

(6) Transportation; and

(7) Warehouses.

Construction means any site preparation, assembly, erection, repair, alteration or similar action, or demolition of buildings or structures.

C-weighting means the electronic filtering in sound level meters that models a flat response (output equals input) over the range of maximum human hearing frequency sensitivity.

dBA means an A-weighted unit of sound level.

dBC means a C-weighted unit of sound level.

Daytime hours means the hours between 7:01 a.m. and 11:00 p.m.

Decibel (dB) means the unit of measurement for a sound pressure level and is equal to ten times the common logarithm of the ratio of two like quantities (see "sound pressure level").

Emergency work means any work or action necessary to deliver essential services including, but not limited to, repairing water, gas, electric, telephone, sewer facilities, or public transportation facilities, removing fallen trees on public rights-of-way, or abating life-threatening conditions.

Equivalent sound level (Leq) means the non-varying sound level that would contain the equivalent amount of energy as a varying sound level. Note that Leq can be weighted or unweighted and can be integrated over durations ranging from less than a second to many hours. The notation should indicate weighting used and duration, e.g., 85 dBC Leq (one min.) is a C-weighted 85 decibel equivalent sound level, integrated over a six-minute period.

Impulsive sound means a sound having duration of less than one second with an abrupt onset and rapid decay.

Industrial facility or property means any activity and its related premises, property, facilities, or equipment involving the fabrication, manufacture, or production of durable or nondurable goods. A property's zoning does not have to be industrial as defined under the City Zoning Ordinance for a facility to be considered an industrial facility.

Maximum sound level (Lmax) means the maximum root mean square sound level measured or not to be exceeded by time varying sounds.

Motor vehicle means any vehicle that is propelled or drawn on land by an engine or motor.

Muffler means a sound-dissipative device or system for lessening the sound of the exhaust of an internal combustion engine.

*Multidwelling unit bu*ilding means any building wherein there are two or more dwelling units.

Municipality or municipal refers to the City of Atlanta, Georgia or the "city"

Nighttime hours means the hours between 11:01 p.m. of any given day, and 7:00 a.m. of the following day.

Noise means any sound of such level and duration as to be or tend to be injurious to human health or welfare, or which would unreasonably interfere with the enjoyment of life or property throughout the city or in any portions thereof, but excludes all aspects of the employer-employee relationship concerning health and safety hazard within the confines of a place of employment.

Noise control administrator (NCA) means any individual designated by the chief of police as the liaison with all municipal departments for issues related to noise control and who is charged with the administration of the Noise Ordinance, maintaining records showing that Noise Control Officers are properly trained and that the

Noise control officer (NCO) means any police officer or other municipal officer or employee who has received training in the standards required by this article for the measurement of ambient sound level or absolute sound level and received authorization to issue citations based on readings taken with a SLM.

Noise disturbance means any sound, that due to the such sound exceeding the limits set forth in this article, endangers the health, safety or welfare of any person, and therefore is detrimental to the peaceful enjoyment of private property and the use and enjoyment of public spaces including public rights of way.

Noise source means the point of origin of any noise, excluding noise emanating from any sound making device or instrument from within a motor vehicle as covered by O.C.G.A. § 40-6-14.

Peak sound level (Lpk) means the absolute positive or negative value (not the root mean square value) of the sound energy in a discrete event typically of very short duration.

Person means any individual, corporation, company, association, society, firm partnership, joint stock company, the municipality any political subdivision, agency or instrumentality of the municipality.

Plainly audible means any sound produced by a noise source, which can be heard by any person at prescribed distances. Measurement standards shall be the auditory senses, based upon direct line of sight. Words or phrases need not be discernible and low frequency sound reverberations are included.

Public right-of-way means any street, avenue, boulevard, road, highway sidewalk, or alley that is leased, owned, or controlled by a governmental entity.

Public property means any real property or structures thereon that is own leased, or controlled by a governmental entity.

Pure tone means a sound dominated by energy in a single frequency.

Real property line is either (a) the imaginary line, including vertical extension, that separates one parcel of real property from another, or (b) the vertical and horizontal boundaries of a residential dwelling unit that is contained in a building containing two or more residential units or any combination of separately leased or owned spaces.

Residential area means a group of residential properties and the abutting public rights-of-way public property.

Residential property means property used for human habitation, including but not limited to: a. Private property used for human habitation; b. Commercial living accommodations and commercial property used for human habitation including mixed use properties; c. Recreational and entertainment property used for human habitation; and d. Community service property used for human habitation.

Sound amplification device means any radio, tape player, compact disc player, loudspeaker or other electronic or digital device used for the amplification of the human voice, music or other sounds.

Sound level (per ASTM C 634) means a sound pressure level obtained using a signal to which standard weighting has been applied.

Sound level meter (SLM) means an instrument used to measure sound pressure levels.

Sound pressure level (SPL) means the ratio in decibels of the square of the root mean square sound pressure divided by the square of the standard reference sound pressure of 20|gmPa. Mathematically, this is expressed as 10* log p2/P2 ref, = 20*log P/P ref, P ref, = 20|gmPa.

Tonal sound means a sound dominated by energy in a narrow band of frequencies.

Weekday means the time period of each week that begins at 11:00 p.m. on each Sunday and ends at 5:00 p.m. on each Friday.

Weekend means the time period of each week that begins at 5:00 p.m. on each Friday and ends at 11:00 p.m. on each Sunday.

Sec. 74-132. - Scope.

The provisions of this article shall apply to all property within the jurisdiction of the City of Atlanta, Georgia.

Sec. 74-133. - Declaration of policy.

The provisions hereinafter contained are enacted for the purpose of preventing noise disturbances. Above certain levels, noise or noise disturbance is detrimental to the health and welfare of the citizenry and the individual's right to peaceful and quiet enjoyment. Therefore, it is hereby declared to be the policy of the city to prohibit noise disturbances from all sources, subject to its police power in order to secure and promote the public health, comfort, convenience, safety, welfare, and prosperity of the citizens of Atlanta. Nothing in this article is intended to deter individuals from lawfully exercising the individual right to freedom of speech or any other freedom guaranteed under the Constitutions of the United States of America or of the State of Georgia.

Sec. 74-134. - Powers, duties, and qualifications of the noise control officers and administrators; duties and responsibilities of other departments.

(a) The noise control administrator (NCA) is authorized to:

(1) Coordinate the noise control activities of all municipal departments and cooperate with all other public bodies and agencies to the extent practicable;

(2) Review the policies and actions of other municipal departments and advise such departments of the effect, if any, of such policies and actions on noise control;

(3) Delegate the duties assigned to noise control officers ("NCO's") to any duly qualified individual according to the provisions of this article upon a showing that such person received the training required by this article, provided however that no city police officer shall be require any additional type of delegation from the NCA in order to enforce the provisions of section 74-136(b);

(4) Grant permits for temporary variances according to the provisions of of this article;

(5) Maintain the records of the training received by NCO's under which such NCO's have become eligible to receive their delegation of authority to enforce this article. The delegation of such authority to an NCO shall arise upon successful completion of the training required by this article and shall not require a separate act by the NCA beyond the transmission to the NCA of the record of completion of the required training; and

(6) Maintain the records of the specification, purchase, warranty and calibration requirements of SLM used by NCO's.

(b) Those individuals appointed as NCO's are authorized to enforce the provisions of this article.

(1) All NCO's, including city police officers trained as NCO's, are authorized to issue a citation for violations of this article, based upon the determination of levels provided in section 74-136(a) or pursuant to section 74-136(b).

(2) City police officers shall not be required to have the specific training required by this article in order to issue citations pursuant to section 74-136(b).

(c) A person shall be qualified to be an NCO if the person has satisfactorily completed any of the following training:

(1) An instructional program in community noise analysis and migration from a certified noise control engineer, as evidenced by certification from the Institute of Noise Control Engineering (INCE); or

(2) A training program prepared or supervised by a registered professional engineer practicing in the field of acoustics or a related field that uses sound measurement equipment; or

(3) A training program prepared or supervised by an individual with academic qualifications demonstrating expertise in sound measurement; or

(4) Training given or approved by the manufacturer of noise meters used in enforcement of this ordinance; or

(5) An instructional program in in community noise analysis and migration from another NCO; or

(6) Education or experience or a combination thereof certified by the NCA as equivalent to the provisions of any of the requirements of this subsection.

(d) Noise measurements taken by a NCO shall be taken in accordance with the procedures specified in this article but no procedures shall be required to enforce section 74-136(b), including its enforcement by city police officers other than those necessary to meet the criteria set forth therein.

(e) The provisions of this article shall not apply to any department or agency of the city engaged in any emergency activities or as otherwise excluded under section 74-138

of this article. However, all city departments and agencies shall carry out their programs according to the law and shall cooperate with the assessment and consideration of the possible impact of their activities with regard to the reduction of noise disturbances and the other purposes of this article.

Sec. 74-135. - Sound measurement procedures.

(a) Insofar as practicable, sound will be measured while the source under investigation is operating at normal, routine conditions and, as necessary, at other conditions, including but not limited to, design, maximum, and fluctuating rates. All noise measurements shall be made as directed in this article. When instrumentation cannot be placed at or within the property line, the measurement shall be made as close thereto as is reasonable. However, noise measurements shall not be made at a distance of less than 25 feet from the edge of a noise source unless a measurement is being taken to determine a violation of the caps set forth in 74-136(a)(2) through 74-136(a)(5). For the purposes of this article, noise measurements are measured on the A- or C-weighting scale, as applicable, of a sound level meter (SLM) of standard design and quality having characteristics established by the American National Standards Institute (ANSI).

(b) All tests shall be conducted in accordance with the following procedures:

(1) The NCO shall, to the extent practicable, identify all sources contributing sound to the point of measurement but shall not be required to document the absence of such sources or document that such sources would not have caused the test to be valid.

(2) Measurements shall be taken at 100 feet from the noise source during daytime hours or 25 feet from the noise source during nighttime hours. When a measurement is being taken to determine whether the noise source is in violation

of the absolute cap set forth in Sec. 74-136(a)(2), the measurement shall be taken at the receiving property line.

(3) The SLM must be calibrated using a calibrator or method recommended by the SLM manufacturer and in the manner recommended.

(4) The SLM must be recertified and the calibrator must be recalibrated at least once each year by the manufacturer or by a person that has been approved by the NCA. A copy of written documentation of such recertification and recalibration, in a form approved by the NCA, shall be kept by the NCA with sufficient documentation to identify the equipment to which it refers.

(5) Unless the manufacturers' specifications allow adjustments to be made to compensate for the following factors, no outdoor measurements shall be taken:

a. During periods when wind speeds (including gusts) exceed 15 mph;

b. Without a windscreen, recommended by the SLM manufacturer, properly attached to the SLM;

c. Under any condition that allows the SLM to become wet; or

d. When the ambient temperature is out of the range of the tolerance of the SLM.

e. Provided however that it shall not be necessary to document the absence of the conditions set forth in this subsection for a reading to be valid.

(c) The report for each measurement session shall include:

(1) The date, day of the week, and times at which measurements are taken;

(2) The times of calibration;

(3) The weather conditions;

(4) The identification of all monitoring equipment by manufacturer, model number, and serial number;

(5) The normal operating cycle of the sources in question with a description of the sources provided however that where the sources in question do not have a normal operating cycle, such notation shall not be required;

(6) The ambient sound level, in dB(A) or (C), depending on the measurement being taken, with the sources in question operating;

(7) The background sound level, in dB(A), without the sources in question operating provided however that where the background sound level in question cannot reasonably be measured, the correction factor for background sound levels shall be three (3) dB(A);

(8) The total accumulative time duration of the monitoring session; and

(9) A description of the measurement site, including measurement locations and relevant distances and other information sufficient for another investigator to repeat the measurements under similar conditions. Photographs which contain sufficient information for another investigator to repeat the measurements under similar conditions may be substituted at the discretion of the NCO.

(10) Information required in the report to support the issuance of a citation shall be considered sufficient if the data captures SLM provides such information, and/or such information can be provided by the citation and/or the testimony of the NCO taking such readings and/or such other reports generated by the NCO or any police officer.

(d) Prior to taking noise measurements, the NCO shall reasonably explore the vicinity of the source in question to identify any other sound sources that could affect measurements, to establish the approximate location and character of the principal sound source, and to select suitable locations from which to measure the sound from the source in question. Unless the reasonable exploration of the site uncovers a condition that could affect the measurements, the NCO shall not be required to make a notation that this subsection has been satisfied.

(e) When measuring continuous sound, or sound that is sustained for more than one second at a time, the SLM shall be set for the appropriate A or C weighting, slow meter response speed, and the range (if the SLM is designed to read levels over different ranges of (SPLs) shall be set to that range in which the meter reads closest to the maximum end of the scale). When the measured sound level is variable or fluctuating over a range greater than three (3) DBA, using the slow meter response speed, the fast meter response speed shall be used. In either case, both the minimum and maximum readings shall be recorded to indicate the range of monitored values.

(f) The SLM shall be placed at a minimum height of three feet above the ground or from any reflective surface. When handheld, the microphone shall be held at arm's length and pointed at the source at the angle recommended by the SLM manufacturer.

(g) If extraneous sound sources, such as aircraft flyovers or barking dogs that are unrelated to the measurements increase the monitored sound levels, the measurements should be postponed until these extraneous sounds have become of such a level as not to increase the monitored sound levels of interest.

(h) The monitoring session should last for a period of time sufficient to ensure that the sound levels measured are typical of the source in question, but in no event shall the duration of testing be less than one minute.

(i) The background sound levels shall be subtracted from the measured sound levels of the source of interest by using Table 1 to determine the sound levels from the source of interest alone. If the ambient sound level is less than three DBA higher than the background sound level, the source level cannot be derived and a violation of the article cannot be substantiated.

(j) Information on the procedures required to support the issuance of a citation shall be considered sufficient if the SLM provides such information, and/or such information can be provided by the citation and/or the testimony of the NCO performing the test and/or such other reports generated by the NCO or any police officer.

Table 1: Correction for background levels (in dBA)

Difference between ambient and background sound levels	Correction factor to be subtracted from ambient level for source level
3	3
4, 5	2
6—9	1
10 or more	0

Sec. 74-136. - Sound level limitations.

It shall be unlawful and a violation of this code to exceed the following sound level limitations:

(a) No person shall cause, allow, or permit the operation of any noise source on a particular category of property or any public property or right-of-way in such a manner as to create a sound level that exceeds the background sound level by ten dBA or more

during daytime hours or five dBA or more during nighttime hours when measured at or within the real property line of the receiving property, except as provided in section 74-138. Such a noise would constitute a noise disturbance under this article if it continues in excess of one minute unless otherwise provided herein, provided however that no violation can be substantiated unless the background noise level is above Leq. 55 dBA (one min.) during daytime hours or Leq. 50 dBA (one min.) during nighttime hours.

(1) If the background sound level cannot be determined, the absolute sound level limits set forth in Table 2 shall be used. The classification of property as set forth in Table 2 represents the receiving property and is not intended to increase the level of any sound produced by referencing the classification of the property producing the sound in question. For the purpose of this article, the representation of the person registering a complaint shall be sufficient for the NCO to determine the category of the receiving property if it is not readily apparent from an observation of the receiving property. In those cases where an NCO is making a measurement not based on the complaint of an individual but is conducting an investigation based on the recommendation from a police officer or the NCO's own investigation, the observation of the NCO shall be sufficient to determine the category for the measurement of the receiving property.

Table 2: Maximum permissible sound levels Leq dB (A)—Averaged over one minute to minimize the possibility of interfering noise.

Receiving property	Daytime Hours	Nighttime Hours
Residential property	65	55
Commercial property	70	65
Industrial property	75	70

(2) At no time shall noise levels be produced that exceed 85dB(C) Leq (one min.) during daytime hours and 70 dB(C) Leq (one min.) during nighttime hours at a receiving real property line.

(3) If the noise source, measured at a receiving property line, is a pure tone, then the sound level limitations set forth in Table 2 shall be reduced by five dB.

(4) Non-repetitive impulsive sound sources shall not exceed 100 dB(C) Leq. measured at a receiving property line, using the fast meter response speed.

(5) Inside multi-family dwelling unit buildings, if the background sound level cannot be determined, the limit during daytime hours is 45 dB (C) Leq (one min.) and the limit during nighttime hours is 35 dB (C) Leq. for sounds originating in another dwelling within the same building.

(b) At the discretion of a police officer and as an alternative to making a determination based upon the ambient sound level or absolute sound level, the following standards shall be used for sounds emanating from any noise source located on any residential property, commercial property, or public property:

(1) During daytime hours, sound emanating from any noise source shall be limited in volume, tone and intensity so that the sound shall not be plainly audible to any person at a distance of 200 or more feet from the real property line of any private property on which the noise source is located, or from any noise source located on any public property or public right-of-way.

(2) During nighttime hours, sound emanating from any noise source shall be limited in volume, tone and intensity so that the sound shall not be plainly audible to any person at a distance of 50 or more feet from the real property line

of any private property on which the noise source is located, or from any noise source located on any public property or public right-or-way.

(3) In determining whether or not a sound emanating from a noise source violates this section, NCO's or police officers should consider the following factors:

a. Level of the noise based upon reaction to it in the same manner as it would be experienced by a reasonable person;

b. Nature of the noise on which the complaint is based;

c. Origin of the noise based on required distance;

d. Level and intensity of any background noise compared to the noise being investigated;

e. Proximity of the noise to sleeping facilities;

f. Nature and zoning of the area;

g. Density of inhabitation in the area;

h. Time of day or night the noise is occurring;

i. Duration of the noise;

j. Whether the noise is recurrent, intermittent, or constant, especially in cases where voluntary compliance is followed by a second complaint within any 24 hour period;

k. Whether the noise is produced by a business operation and an SLM measurement is reasonably available pursuant to 74-140A;

l. Whether voluntary compliance is obtained.

(4) After having made a determination under this subsection that a noise violates this section, police officers may issue a citation for violation of this subsection but shall not be required to do so upon their determination that the level of plainly audible noise is not such as would disturb a reasonable person or

is no greater than the level and intensity of any background noise compared to the noise being investigated.

Sec. 74-137. - Specific prohibited acts.

(a) It is unlawful, and a violation of this Code, for any person to cause, allow, or permit any of the following acts:

(1) Owning, possessing, or harboring any animal or bird that, for a continued duration in excess of 15 minutes, generates noise that is plainly audible at a distance of five feet or more from the real property line of a residential property;

(2) Loading, unloading, opening, closing, or other handling of boxes, crates, containers, building materials, liquids, or the pneumatic or pumped loading or unloading of bulk materials in liquid, gaseous, powder, or pellet form, between 9:00 p.m. and 5:00 a.m. the following day on a weekday and between 9:00 p.m. and 9:00 a.m. the following day on a weekend day or legal holiday, except by permit, when the noise source is located 50 feet or less from the nearest residential property line;

(3) Operating or permitting the operation of any motor vehicle or any auxiliary equipment attached to such a vehicle, for a period of longer than five minutes in any hour while the vehicle is stationary, for reasons other than traffic congestion or emergency work, and where such vehicle's manufacturer's gross weight rating is in excess of 10,000 lbs., on a public right-of-way or public property within 150 feet of a residential area during nighttime hours;

(4) Operating or permitting the operation of any power tools or other motorized equipment used in construction, drilling, earthmoving, excavating, or demolition work between 7:00 p.m. and 7:00 a.m. the following day on a

weekday or between 7:00 p.m. and 9:00 a.m. on a weekend day or legal holiday, except for emergency work or by permit for temporary variance pursuant to section 74-139

(5) Compacting or collecting of refuse by persons engaged in the business of scavenging or garbage collection, whether private or municipal, during nighttime hours and between 9:00 p.m. and 7:00 a.m. the following day on a weekend day or legal holiday, except by permit.

(b) Loud sound amplification devices.

(1) Upon or within any public property or public right-of-way, no person shall play, use or operate, or permit to be played, used, or operated, any sound amplification device, so that the sound is plainly audible to any person, at a distance proscribed by the provisions of section 74-136(b). The proscribed distance shall be measured from the noise source.

(2) No person shall play, use or operate, or permit to be played, used, or operated, any sound amplification device on or within any private property, so that the sound is plainly audible to any person according to the provisions of section 74-136(b).

(3) It is an affirmative defense to charge under this section that the operator was not otherwise prohibited by law from operating the sound amplification device, and that any of the following apply:

a. The sound amplification device was being operated to request medical or emergency assistance or to warn of a hazardous road condition;

b. The sound amplification device was being operated to provide emergency information or to warn of an emergency condition;

c. The sound amplification device was authorized or permitted to be used for the purpose of giving instructions, directions, talks, addresses, lectures or transmitting music to any persons or assemblages of persons;

d. The loud sound amplification device was used in authorized or permitted public activities, such as parades, fireworks, sports events, musical productions and other activities which have the approval of the department of the city authorized to grant such approval.

Sec. 74-138. - Exemptions.

(a) The provisions of this article shall not apply to the generation of noise by public safety vehicles, emergency signaling devices, or authorized public safety personnel for the purpose of alerting persons to the existence of any emergency.

(b) Noise from an exterior burglar alarm of any building shall be exempt from the provisions of this article, provided such burglar alarm shall terminate its operation within 15 minutes of its activation.

(c) Noises from any automobile alarm shall be exempt from the provisions of this article, provided such burglar alarm shall terminate its operation within ten minutes of its activation.

(d) Noise from domestic power tools, lawn mowers, and agricultural equipment when operated between 8:00 a.m. and 8:00 p.m. on weekdays and between 9:00 a.m. and 8:00 p.m. on weekends and legal holidays shall be exempt from the provisions of this article, provided they generate less than 85 dBA at or within any real property line of a residential property outside of the property where the noise in question originates, and all noises from tools and lawn mowers operated in association with the upkeep and maintenance of any public or private golf course shall be exempt from the provisions of

this article, provided that all such tools and lawn mowers are equipped with mufflers or are operated in conjunction with a device or system for lessening the sounds produced;

(e) Noise from church bells and chimes when a part of a religious observance or service shall be exempt from the provisions of this article during daytime hours;

(f) Noise from permitted construction activity shall be exempt from the provisions of this article, provided all motorized equipment used in such activity is equipped with functioning mufflers, except as provided in section 74-137(a)(4).

(g) Noise from snow blowers, snow throwers, and snowplows when operated with a muffler for the purpose of snow removal shall be exempt from the provisions of this article.

(h) The generation of noise in the performance of emergency work shall be exempt from the provisions of this article.

(i) The generation of noise in situations within the jurisdiction of the Federal Occupational Safety and Health Administration shall be exempt from the provisions of this article.

(j) Noise generated from celebrations, outdoor festivals or events municipally sponsored or approved whether by contract, permit or otherwise, shall be exempt from the provisions of this article.

(k) Noises resulting from the operation of the Hartsfield-Jackson Atlanta International Airport shall be exempt from the provisions of this article.

(l) Any noise resulting from activities of a temporary duration, for which a permit for temporary variance has been granted pursuant to this article, and which conforms to the conditions and. limits stated in the variance and reasonably related activities shall be exempt from the provisions of this article.

(m) Noises resulting from any practice or performance sponsored by or associated with the educational process administered by a recognized institution of learning, including, but not limited to band, choir, and orchestral performances shall be exempt from the provisions of this article.

(n) Noises that result from or arise out of or stem from the occurrence of a professional sporting event or organized sports league shall be exempt from the provisions of this article.

(o) Any noise arising out of construction, maintenance, repair or renovation activities related to the Metropolitan Atlanta Rapid Transit Authority (MARTA) bus or rail system, or the city's streetcar system, or other mass transit systems, shall be exempt from the provisions of this article.

(1) MARTA and/or the city will develop and implement procedures by which NPUs affected by construction or planned maintenance activities will be notified prior to the commencement of work.

(2) MARTA and/or the city will develop and implement procedures by which any complaints of excessive noise created by construction or planned maintenance activities and reported by citizens to MARTA are available for review by interested citizens or members of the city council.

(3) MARTA and/or the city will develop and implement procedures by which contractors conducting planned maintenance or implementing new construction on the MARTA bus or rail system, or the city's streetcar system, or other mass transit systems will be monitored so as to ensure that all work is performed in a manner that will result in the creation of the least amount of noise disturbance.

Sec. 74-139. - Conditions for permits for temporary variance; notice of approval or denial; hearings and appeals.

(a) Any person who owns the real property from which a noise source emanates or operates any noise source may, with the permission of the owner, apply to the NCA for a temporary variance from one or more of the provisions of this article, unless such noise source is specifically exempted according to the provisions of section 74-138. Applications for a permit of temporary variance shall supply information including, but not limited to:

(1) The nature and location of the noise source for which such application is made;

(2) The reason for which the permit of temporary variance is requested, including the hardship that will result to the applicant, his/her client, or the public if the permit of temporary variance is not granted;

(3) The level of noise that will occur during the period of the temporary variance;

(4) The section or sections of this ordinance for which the permit of temporary variance shall apply;

(5) A description of interim noise control measures to be taken for the applicant to minimize noise and the impacts occurring from the noise for which the variance is sought; and

(6) A specific schedule of the noise control measures that shall be taken to bring the source into compliance with this article within a reasonable time.

(al) Failure to supply the information required by the NCA shall be cause for rejection of the application.

(a2) A copy of the permit of temporary variance must be kept on file by the municipal clerk for public inspection.

(b) The NCA shall charge the applicant a fee of $25.00 to cover expenses resulting from the processing of the application for a permit of temporary variance.

(c) The NCA shall limit the duration of the permit of temporary variance, which, in any event, shall be effective no longer than 45 days. Any person holding a permit of temporary variance and requesting an extension of time shall apply for a new permit of temporary variance according to the provisions of this section.

(d) No temporary variance shall be approved unless the applicant presents adequate proof that:

(1) Noise levels occurring during the period of the temporary variance will not constitute a danger to public health; and

(2) Compliance with the article would impose an unreasonable hardship on the applicant without some benefit to the public that will result from the completion of the activity requiring the variance.

(e) In making the determination of granting a temporary variance after having made a finding that adequate proof was provided by the applicant as required in this article, the NCA shall consider the following factors:

(1) The character and degree of interference with, the health and welfare or the reasonable use of property that is caused or threatened to be caused;

(2) The level of interference to the peaceful enjoyment of adjoining property or the public right of way above that which is allowed under this article if the temporary variance is denied; and

(3) The ability of the applicant to apply the best practical noise control measures.

(f) The NCA shall notify the applicant in writing of his or her determination on the application within 14 days after receipt of the application. This notification shall inform the applicant of whether a permit for temporary variance has been approved or denied; and, if approved, shall set forth the location, dates and times of temporary variance.

(g) In the event a permit for temporary variance shall be denied, the aggrieved applicant shall have the right to a hearing before the chief of police or his or her designee, who may be a hearing officer appointed for that purpose, provided that the request for such hearing is made to the NCA within five days after receipt of the notice. Notices that are given only by mail shall be presumed to have been received three days after the mailing. Notices given in person, hand-delivered to the address of the applicant or sent by facsimile transmission or electronic mail shall be presumed to have been delivered on the date given or sent.

(1) Hearings contesting the matters in the NCA's notice shall be held before the chief of police or the designee, shall be informal, and shall be scheduled within five business days after receipt of the request for a hearing by the NCA. The hearing may be continued at the request of the applicant or to allow the attendance of any necessary party or witness, but only from day to day. The determination on such hearing shall be made at the conclusion of the hearing, and the chief of police or the designee shall issue a written determination within one business day thereafter, which determination shall affirm or reverse the decision of the NCA.

(2) The hearing under this section shall be de novo and shall be informal. Such hearing shall evaluate the decision of the NCA and the application in accordance with the criteria of this article.

(3) The written determination of the chief of police or the designee upon the conclusion of the hearing as provide in this section shall be the final decision of the city in the matter, and such a determination shall be subject to review by the Superior Court of Fulton County by a petition setting forth an appeal and naming the City of Atlanta as the defending party.

(i) The permit of temporary variance may be revoked by the NCA if the terms of the permit of temporary variance are violated.

Sec. 74-140. - Enforcement procedures.

(a) Violation of any provision of this article shall be cause for a citation to be issued by a police officer or NCO according to procedures set forth in the City Code of Ordinances.

(b) In lieu of issuing a citation, a police officer or NCO may issue an order or warning notice requiring abatement of any sound source alleged to be in violation of this article within a reasonable time period and according to guidelines that the police officer or NCO may prescribe and document in writing. Failure to follow such guidelines shall not be a separate offense but any police officer or NCO may consider the failure to follow such order when making subsequent enforcement decisions,

(c) Penalties. Any person convicted of a violation of any provision of this article shall be subject to the following penalties:

(1) A fine not more than $1,000.00, or a period of confinement in the city jail not to exceed ten days and a probationary period not to exceed 180 days, or both.

(2) In addition to any other penalties provided in this section, the judge may issue an order requiring abatement of any noise source found to be in violation of this article within a reasonable time period, not to exceed 60 days, and according to any guidelines that the court may prescribe.

a. Any person ordered to abate any noise source found to be in violation of any provision of this article shall demonstrate to the NCA compliance with any order requiring abatement at or before the time ordered.

b. Any person failing to abate any noise source in the manner ordered by the municipal court shall be guilty of a separate offense under this section that may be prosecuted by the municipal court in any manner as is used to enforce its orders in addition to such other punishment that the court may impose for additional violation of this article.

c. Any person failing to abate any noise source found to be in violation of any provision of this article may be liable to the city for reasonable costs and expenses incurred by the city in abating a violation.

(3) Each day during which any violation occurs shall constitute an additional, separate, and distinct offense.

(d) No provision of this article shall be construed to impair any common law or statutory cause of action, or legal remedy therefrom, of any person for injury or damage arising from any violation of this article or from other law.

Sec. 74-140A – Request for SLM reading for business operations

(a) The city recognizes the need to balance the level of noise associated with the reasonable and legal operation of businesses with the level of noise which is generally

present in a highly populated urban environment and to provide for a method to assist businesses with understanding the noise levels which generate complaints. In furtherance of this policy, any business that is the subject of a complaint that is subject to a citation under Sec. 74-136(b) may request an SLM measurement by an NCO upon their reasonable belief that the noise level of their business operation would not be in violation of Sec. 74-136(a) if an SLM reading was taken.

(b) A request from a business for an SLM reading shall be deemed to be sufficient under this article if it is made at the time that an NCO or police officer appears at the premises to investigate a complaint under this article.

(1) In the event that a police officer requests that an NCO take a reading, the business in question may continue operations until such reading is taken but it shall not remove the officer's discretion to issue a citation under Sec. 74-136(b) if the business alters or ceases that part of the operation producing the noise to avoid the confirmation of a violation through the SLM reading and recommences operations within the next twelve hours.

(2) A police officer who chooses not to issue a citation upon a good faith belief that the noise level of the business operation would not be in violation of this article if an SLM reading is taken by an NCO is not required to seek such reading unless requested by the business to determine whether they are in compliance.

(3) A business must possess a valid business license to conduct the type of business being carried on at the location where the complaint arises before the option to permit SLM reading shall be considered. If a business license cannot be produced or the business operation does not have a valid business license, a

police officer may issue a citation pursuant Sec. 74-136(b) in addition to citation for any other violations of the City Code.

(c) In the event that an SLM reading confirms a violation of this article, a citation shall be issued under Sec. 74-136(a).

(d) No police officer shall be required to honor a request for SLM reading if such request is made within thirty (30) days after a citation for a violation of Sec. 74-136(a) was issued unless the citation has been dismissed or the business represents that noise remediation efforts have been undertaken.

(e) Where an SLM measurement is not reasonably available, no police officer or NCO shall be prevented from issuing a citation for a violation of Sec. 74-136(b) but if the failure to conduct such SLM measurement is offered in defense of the citation, proof of the reasonableness of the decision not to conduct such SLM measurement shall be in the discretion of the municipal court. It is the intention of this section to allow SLM readings to be made available to a business whenever reasonably possible.

Sec. 74-141. - Inconsistent provisions.

Insofar as the provisions of this articel are inconsistent with any provision of any other title of the Code, or any rule or regulation of any government agency of the city, then the provisions of this noise control code shall be controlling.

Sec. 74-142. - Severability.

If any provision, clause, sentence or paragraph of this article, or the application thereof to any person or circumstances, shall be held invalid, such invalidity shall not affect the other provisions or application of the provisions of this article which can be given effect without the invalid provisions or application and, to this end, the provisions of this article are hereby declared to be severable.

TRANSMITTAL FORM FOR LEGISLATION

TO: MAYOR'S OFFICE **ATTN: CANDACE L. BYRD**

Dept.'s Legislative Liaison: Lemuel H. Ward (for this paper only)

Contact Number: 404 330 6471

Originating Department: Law

Committee(s) of Purview: Public Safety

Chief of Staff Deadline: 5/11/12

Anticipated Committee Meeting Date(s): 5/29 agenda – 6/12 discussion

Anticipated Full Council Date: 5/21 first read & 6/18 second read

Legislative Counsel's Signature:

Commissioner's Signature:

Chief Information Officer Signature (*for IT Procurements*)

Chief Procurement Officer Signature:

CAPTION

AN ORDINANCE AMENDING THE CITY OF ATLANTA NOISE CONTROL ORDINANCE AS SET FORTH IN CHAPTER 74, ARTICLE IV, SEC. 74-129 et seq. SO THAT THOSE SECTIONS SHALL READ AS SET FORTH HEREIN AND ADDING CERTAIN NEW SECTIONS TO THE NOISE CONTROL ORDINANCE; AND FOR OTHER PURPOSES

FINANCIAL IMPACT: (if any) none

Mayor's Staff Only

Received by CPO: _____ **Received by LC from CPO:** _____
(date) (date)

Received by Mayor's Office: 5/11/12 **Reviewed by:** _____
(date) (date)

Submitted to Council: _____ **(date)**

Part II: Legislative White Paper: (This portion of the Legislative Request Form will be shared with City Council members and staff)

A. To be completed by Legislative Counsel:

Committee of Purview: Finance / Executive

Caption:

AN ORDINANCE AMENDING THE CITY OF ATLANTA NOISE CONTROL ORDINANCE AS SET FORTH IN CHAPTER 74, ARTICLE IV, SEC. 74-129 et seq. SO THAT THOSE SECTIONS SHALL READ AS SET FORTH HEREIN AND ADDING CERTAIN NEW SECTIONS TO THE NOISE CONTROL ORDINANCE; AND FOR OTHER PURPOSES

Council Meeting Date: 5/21/12

Requesting Dept.: Law

B. To be completed by the department:

1. Please provide a summary of the purpose of this legislation (Justification Statement).

The Law Department's defense of a case, *Crossover Entertainment Group, Inc. et al v. City of Atlanta, et al* Superior Court of Fulton County CAFN 2010cv194790, raised certain issues concerning the constitutionality of certain provisions. The Noise Ordinance was reviewed with the assistance of an acoustical engineering firm hired as an expert witness.

2. Please provide background information regarding this legislation.

After an injunction was filed by a recording studio and the Noise Ordinance challenged, the Law Department reviewed the entire program in connection with the defense of the case, This ordinance presents Law's recommendations for improving the ordinance based on the advice of the experts and conforms the ordinance to a program being developed to provide training on the use of sound level meters for better and more even handed enforcement.

3. If Applicable/Known: (N/A)

(a) Contract Type (e.g. Professional Services, Construction Agreement, etc):

(b) Source Selection:

(c) **Bids/Proposals Due:**

(d) **Invitations Issued:**

(e) **Number of Bids:**

(f) **Proposals Received:**

(g) **Bidders/Proponents:**

(h) **Term of Contract:**

4. **Fund Account Center: (N/A)**

5. **Source of Funds:** fees to be paid by applicants

6. **Fiscal Impact:** None

7. **Method of Cost Recovery:** N/A

This Legislative Request Form Was Prepared By: Lemuel H. Ward

GEOTECHNICAL ENGINEERING REPORT – THURMOND STREET

Geotechnical Engineering Services Report

Upper Proctor Creek Capacity Relief Project
City of Atlanta, Fulton County, Georgia

Prepared For:	Mr. Eskender Abebe, P.E., Vice President WSP-BenchMark Management LLC JV 100 Peachtree Street, Suite 1900 Atlanta, Georgia 30303
Prepared By:	MC Squared, Inc. 1275 Shiloh Road NW, Suite 2620 Kennesaw, Georgia 30144
MC² Project No.	A051807.043
Prepared:	November, 2018

November 28, 2018

Mr. Eskender Abebe, P.E.
Vice President
WSP-BenchMark Management LLC JV
100 Peachtree Street, Suite 1900
Atlanta, Georgia 30303

Subject: Geotechnical Engineering Services for
Upper Proctor Creek Capacity Relief Project
City of Atlanta, Fulton County, Georgia
MC^2 Proposal No. A051807.043

MC Squared, Inc. (**MC^2**) has completed the Geotechnical engineering services for the referenced project. This geotechnical exploration was performed in general accordance with **MC^2** Proposal No. A051807.043 dated September 11, 2018. The services were authorized through a subconsultant agreement between **MC^2** and **WSP-BenchMark Management LLC JV**, titled "Task Order No: 7" and dated February 19, 2016, effective September 28, 2018, as part of the City of Atlanta Annual Contract for Architectural, Engineering and Design Services Projects.

We trust that this report will assist you in the design and construction of the proposed project. We appreciate the opportunity to be of service on this project and should you have any questions, please do not hesitate to contact us.

Respectfully submitted,
MC Squared, Inc.

Afshin Amini, E.I.T.
Staff Engineer

Prashanth Vaddu, P.E.
Vice President of Operations
P.E. No. 039820

Sam Moussly
CEO

1275 Shiloh Road NW, Suite 2620, Kennesaw, GA 30144
T (770) 650-0873 F (770) 650-7825
www.mc2engineers.com

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APPENDIX

1 PROJECT INFORMATION

1.1 Project Authorization

Authorization to proceed with this project was issued by **WSP-BenchMark JV** through the Prime Agreement Task Order No: 7, dated February 19, 2016, effective September 28, 2018, as part of the City of Atlanta Annual Contract for Architectural, Engineering and Design Services Projects. Our geotechnical services were performed in general accordance with the items detailed in our proposal dated September 26, 2018.

1.2 Project Description

The Upper Proctor Creek Capacity Relief Project consists of Phase B and Phase C sewer separation in the vicinity of Historic Vine City neighborhood in Fulton County, Atlanta. The Client provided a 19-page PDF document, including the proposed pipeline profile. The proposed improvement includes installation of a 54-inch diameter storm sewer pipe approximately 756 lineal feet along Thurmond Street (between Maple Street and Northside Drive) using micro-tunneling. This 54-inch pipe ties into a 60-inch pipe at the western termini, near the intersection of Maple Street and Thurmond Street. The 60-inch pipe is planned to be installed using open trenching. The 54-inch pipe is planned to be installed using micro-tunneling due to the depth of installation.

Based upon our telephone conversation with BenchMark, it is our understanding that the project is currently at 30% plan submittal phase. The project alignment is currently being finalized. BenchMark has requested us to provide preliminary geotechnical field exploration, laboratory testing and engineering services for the proposed improvements.

Based upon our telephone conversation (September 14, 2018) with BenchMark, our scope will be limited to providing preliminary subsurface soil/rock and groundwater table information for Phase B-A3 in Client provided 19-page PDF document, titled as “UPPER PROCTOR CREEK CAPACITY RELIEF PROJECT IN HISTORIC VINE CITY - PHASE B 30% DESIGN” with general observations and recommendations as they relate to the proposed improvements.

A detailed exploration consisting of geophysical methods, closely spaced borings, specialized laboratory rock and soil tests will be required during a subsequent phase to assess the variation in subsurface conditions. The objective of our evaluation is limited to providing preliminary geotechnical data along the 54-in pipeline alignment along Thurmond Street (Sta. nos. 2+58 to 10+14).

2 SCOPE OF WORK AND SERVICES

Based upon our discussions with **BenchMark** (via telephone during the first and second weeks of September 2018) our scope of services is limited to reporting subsurface data at the locations identified by **BenchMark** consist of the following:

The following tasks were accomplished to achieve this objective:

1. Completed visual reconnaissance of the project site, marked test boring locations and coordinated required utility clearance through the state 811 service and private utility locator.

2. Submitted a boring location plan for review and approval by the Client.

3. Reviewed USDA Soil Survey for Fulton County and the USGS topographic maps.

4. Coordinated lane closures and traffic control with Client provided contact.

5. Completed five (5) Standard Penetration Test (SPT) borings and rock coring to the depths summarized below:

Boring No.	Approximate Station Nos.	SPT Depth (ft.)	Rock Coring Depth (ft.)	Total Boring Depth (ft.)
B-01	2+15	20	0	20
B-02	4+50	20	10	30
B-03	6+30	5	25	30
B-04	8+65	11	9	20
B-05	10+00	20	0	20

6. Measured stabilized (24-hour after drilling) groundwater table at boring B-01.

7. Visually examined all recovered soil and rock samples in the laboratory. Performed geotechnical laboratory tests on selected representative samples to develop the soil legend for the project using the Unified Soil Classification Systems, as appropriate. The laboratory testing included visual classification, percent passing the U.S. standard no. 200 sieve, grain size analyses, Atterberg Limit testing, natural moisture content determination, Corrosivity (Redox potential, Chlorides and Sulfates, pH testing, Resistivity) testing of Soils, as well as, Splitting Tensile and Unconfined Compressive Strength tests for rock core samples.

3 SITE FEATURES, GEOLOGY AND SOIL SURVEY

3.1 Site Features

The proposed pipeline traverses a residential neighborhood and an asphalt-paved road. The ground elevation along the proposed alignment varies between 950 feet and 969.0 feet. Bottom of the proposed sewer alignment is planned within the existing Thurmond Street NW right-of-way. Thurmond Street NW generally slopes down from the center of the proposed pipe alignment to the east and west. The portion of the proposed alignment within Thurmond Street NW (Sta. 2+15 to Sta. 6+25), where borings B-01, B-02 and B-03 were completed, generally slopes uphill from west to east (elevation 951 feet to elevation 967.7 feet). The portion of the proposed alignment where borings B-04 and B-05 were completed (Sta. 8+65 to Sta. 10+00) generally slopes downhill from west to east (elevation 965 feet to elevation 959 feet).

3.2 Regional Geology

The proposed sewer alignment is geologically located in the Piedmont physiographic province of Georgia in the Porphyritic granite rock type. Soils in this area have been formed by the in-place weathering of the underlying rock and are generally termed "Residual" soils. Near the ground surface, where the weathering is most advanced, residual soils may consist of Clay, Silty Sand, Clayey Silt or Silty Clay. With increased depth, soils become less weathered and generally transition to coarser-grained Sandy Silt or Silty Sand.

Partially weathered rock represents the transition zone between soil and the parent rock from which they are derived. The thickness of the zone of partially weathered rock and the depth to the relatively un-weathered rock surface have both been found to vary greatly over relatively short distances in the Northern and Southern Piedmont regions. It is not unusual to find layers of partially weathered rock in the upper soil profile.

The following is a summary of the geology of the area, obtained from the Department of Natural Resources, Environmental Protection Division, and Georgia Geologic Survey. This summary briefly describes the formation types found at or near the proposed site.

The proposed project area is geologically located within the Atlanta Group. The following members are located within the project area:

- Porphyritic Granite – This is the primary rock type located within the project area. A Porphyritic Granite is a granite that exhibits large feldspar crystals.

3.3 Fulton County Soil Survey

The U.S. Department of Agriculture - Soil Conservation Service, now known as the Natural Resources Conservation Service (NRCS), has mapped the shallow soils in this area of Fulton County. This information is available through the NRCS Web Soil Survey. The shallow soils at the project site are mapped as Urban.

The USDA Soil Survey is not necessarily an exact representation of the soils on the site. The mapping is based on interpretation of aerial maps with scattered shallow borings for confirmation. Accordingly, borders between mapping units are approximate and the change may be transitional. Differences may also occur from

the typical stratigraphy, and small areas of other similar and dissimilar soils may occur within the soil-mapping unit. As such, there may be differences in the mapped description and the boring descriptions obtained for this report. The survey may, however, serve as a good basis for evaluating the shallow soil conditions of the area.

4 FIELD EXPLORATION PROGRAM

The deeper subsurface conditions were explored by **MC^2** through a geotechnical field exploration program. The field exploration program consisted of five SPT borings. The test borings were advanced by **MC$^{2'}$**s subcontractor, Betts Environmental, LLC from October 22nd through October 24th, 2018, under the direct supervision of **MC$^{2'}$**s qualified staff geologist and overseen by a geotechnical engineer. The boring locations and depths were determined by **MC^2**, in coordination with **BenchMark**, and were located in the field by using the plans approved by **BenchMark**. The approximate boring locations and soil profiles are shown on the **Boring Location Plan (Sheets 3 through 5)** and **Subsurface Boring Profiles (Sheet 6)**. Due to the active nature of the project alignment and safety concerns, all test borings except B-01, were grouted, backfilled and patched immediately upon completion of field work. Test boring B-01 was monitored for a stabilized (24-hr) groundwater table reading and then backfilled and patched.

4.1 Geotechnical Exploration

A total of five (5) SPT borings (B-01 through B-05) were performed in general accordance with ASTM D-1586 (Standard Test Method for Penetration Test and Split Barrel Sampling of Soils) utilizing a truck-mounted drill rig using hollow stem auger drilling method. Representative soil samples were obtained using the split-barrel sampling procedure discussed below. In this procedure, a 2-in. outer-diameter, split-barrel sampler is driven into the soil by a 140-lb hammer with a free-fall of 30-in. The number of blows required to drive the sampler through a 12-in. interval is termed the Standard Penetration Resistance, or N-value, and is indicated for each sample on the boring log. The N-value may be taken as an indication of the relative density of soils in-situ. Rock core samples, where required, were collected in general accordance with ASTM D2113 using a NQ-type rock core barrel. A truck mounted drill rig equipped with an automatic hammer (Energy Transfer Ratio: 91.5%) was used at this site. This efficiency value has been used for calculation of N_{60} values.

The soil and rock samples recovered during the field exploration program were placed in approved containers labeled with the project number, boring number, sample number, blow counts, and date drilled and returned to our office to confirm field classification and perform laboratory testing, as required. All soil and rock samples collected will be retained in house for 60 days from the date this report and will be subsequently discarded without further notice unless requested otherwise in writing

5 LABORATORY TESTING

A representative set of soil and rock samples were tested in the laboratory to determine engineering properties for general geotechnical evaluation. Laboratory testing was accomplished in general accordance with ASTM standards. Lab test results are tabulated in **Summary of Laboratory Results** presented in the **Appendix**. Laboratory soil and rock tests consisted of the following:

- Thirteen (13) natural moisture content determinations, in general accordance with ASTM D2216.

- Thirteen (13) percent passing the U.S. Standard No. 200 sieve, in general accordance with ASTM D1140.

- Five (5) Atterberg Limit tests, in general accordance with ASTM D4318.

- Three (3) corrosion series test including measurement of pH, resistivity, oxidation / reduction potential, sulfate and chloride content of the soil samples, in general accordance with ASTM D4972, ASTM G57, EPA SW9056A, EPA SW9056A and ASTM G200-9.

- Four (4) unconfined compressive strength tests of rock, in general accordance with ASTM D2938-95.

- Six (6) split tensile strength test of rock, in general accordance with ASTM D3967-08.

6 SUBSURFACE CONDITIONS

6.1 Subsurface Soil and Rock Conditions

Subsurface conditions encountered at each individual boring location are discussed below:

Test Boring B-01 (Sta. 2+15, 43 feet West of PHB-A3 Structure 2): The boring location and its immediate vicinity were paved with asphalt. Approximately 3-inches of asphalt was underlain by approximately 6-inches of graded aggregate base (GAB). Below the GAB, general subsurface soil conditions encountered at boring B-01 consisted of medium to very dense micaceous Silty Sand (SM) from the ground surface to 20 feet below ground surface (BGS). No rock was encountered within the exploration depths at this location.

Test Boring B-02 (Sta. 4+50, 174 feet West of PHB-A3 Structure 3A): The boring location and its immediate vicinity were paved with asphalt. Approximately 3-inches of asphalt was underlain by approximately 6-inches of GAB. Below the GAB, general subsurface soil conditions encountered at boring B-02 consisted of very loose to very dense micaceous Silty Sand (SM) from the ground surface to 20.0 feet BGS. Auger refusal was encountered at 20 feet BGS (Elevation 942 feet). Two five-foot rock core runs were advanced from 20 feet to 30 feet BGS (Elevation 932). The recovery and rock quality designation (RQD) are tabulated below.

Run No.	Elevation (ft)		Recovery (%)	RQD (%)
	From	To		
1	942	937	80	55
2	937	932	96	93

Test Boring B-03 (Sta. 6+30, 6 feet East of PHB-A3 Structure 3A): Similar to the pavement section at boring B-02, 3-inches of asphalt was underlain by approximately 6-inches of GAB at B-03. Below the GAB, general subsurface soil conditions encountered at boring B-02 consisted of very dense Silty Sand (SM) from the ground surface (Elevation 968 feet) to approximately 5.0 feet BGS (Elevation 963 feet) and then Auger refusal was encountered at 5 feet BGS (Elevation 963 feet). Five, five-foot rock core runs were advanced from 5 feet to 30 feet BGS (Elevation 938). The recovery and RQD are tabulated below.

Run No.	Elevation (ft)		Recovery (%)	RQD (%)
	From	To		
1	963	958	23	7
2	958	953	55	30
3	953	948	92	82
4	948	943	100	100
5	943	938	85	85

Test Boring B-04 (Sta. 8+65, 149 feet West of PHB-A3 Structure 4): The boring location and its immediate vicinity were paved with asphalt. Approximately 3-inches of asphalt was underlain by approximately 6-inches of GAB. Below the GAB, general subsurface soil conditions encountered at boring B-04 loose to medium dense Silty Sand (SM) from the ground surface (Elevation 965 feet) to approximately 11 feet BGS (Elevation 954 feet). Auger refusal was encountered at 11 feet BGS (Elevation 954 feet). Three (3) rock core runs were attempted from 11 feet to 20 feet BGS (Elevation 945 feet) as tabulated below. We encountered poor rock quality in conjunction with low recovery during the first two runs followed by no recovery for the last three feet. Due to the poor rock quality and limited to no recovery we were not able to advance the coring further. Following the last attempted rock core run, we contacted **BenchMark** via telephone and e-mail on 24 October, 2018 to notify them of potential need to offset the boring to evaluate the subsurface conditions to the pipe invert elevation. We were directed by BenchMark to abandon additional efforts. Accordingly, boring B-04 was terminated approximately 5.0 feet shallower than the planned pipe bottom.

Run No.	Elevation (ft)		Recovery (%)	RQD (%)
	From	To		
1	954	950	13	0
2	950	948	15	0
3	948	945	0	0

Test Boring B-05 (Sta. 10+00, 14 feet West of PHB-A3 Structure 4): The boring location and its immediate vicinity were paved with asphalt. Approximately 3-inches of asphalt was underlain by approximately 6-inches of GAB. Below the GAB, general subsurface soil conditions encountered at boring B-05 consisted of loose micaceous Silty Sand (SM) from the ground surface to 8 feet BGS (Elevation 951 feet), underlain by loose clayey Sand (SC) to approximately 15 feet BGS (Elevation 944 feet) underlain by firm micaceous sandy SILT (ML) to approximately 20 feet BGS (Elevation 939 feet). No rock was encountered within the exploration depths at this location.

Individual soil profiles (gINT logs) along with a cross section of the test borings are presented in the **Appendix**. The descriptions detailed above are general in nature and highlight the major subsurface stratification features and material characteristics. The individual boring profiles (gINT logs) included in the **Appendix** should be reviewed for specific information at individual boring locations. The boring profiles include soil description, stratification, penetration resistances, and laboratory test results. The stratifications shown on the boring

profiles represent the conditions only at the actual boring locations. Variations may occur and should be expected between boring locations.

6.2 Groundwater Table Conditions

At the time of drilling, groundwater was not encountered in any of the borings. Groundwater was not observed in boring B-01, 24 hours after time of drilling. Due to the active nature of the project area, all test borings (except B-01) were grouted and backfilled immediately upon completion of drilling. Accordingly, stabilized groundwater table reading was attempted only for B-01 at the project site.

Our review of the USDA Fulton County Soil Survey published data indicates that the seasonal groundwater table is estimated to be deeper than 80 inches. Generally speaking, groundwater levels tend to fluctuate during periods of prolonged drought and extended rainfall and are affected by man-made influences such as drainage conveyance systems. In addition, a seasonal effect will occur in which higher groundwater levels are normally recorded in rainy seasons. If the groundwater level is critical to design or construction, temporary observation wells should be installed to monitor groundwater fluctuations over a period of time and permit more accurate determinations of wet and dry seasonal levels. Accordingly, construction activities affected by the groundwater table should be planned appropriately by the Contractor. We recommend that the contractor determine the actual groundwater levels at the time of the construction to determine groundwater impact on the construction procedure.

7 OBSERVATIONS

Based upon our geotechnical exploration, in conjunction with a review of the planned improvements, the following are our observations:

- Subsurface soils encountered in test borings B-01 and B-05 above the proposed pipe bottom are predominantly Silty and Clayey Sand soils. Borings B-02, B-03 and B-04 however, encountered hard to very hard Granitic rock close to the top of the proposed pipe elevation.

- A summary of our observations is tabulated below:

Boring No. (per plan provided by client)	Approx. Ground El. (ft.)	Approx. Pipe Top El. (ft.)	Approx. Pipe Bottom Invert El. (ft.)	Approximate Elevation of Top of Rock (ft.)	Approximate Elevation of Top of Very Dense Soil Layer (ft.)	Groundwater Table El. (ft.)
B-01	951	940.5	936	-	932 and 941	Not encountered at the time of drilling and not apparent 24 hours after the drilling
B-02	962	943.5	939	942	940	Not encountered at the time of drilling

Boring No. (per plan provided by client)	Approx. Ground El. (ft.)	Approx. Pipe Top El. (ft.)	Approx. Pipe Bottom Invert El. (ft.)	Approximate Elevation of Top of Rock (ft.)	Approximate Elevation of Top of Very Dense Soil Layer (ft.)	Groundwater Table El. (ft.)
B-03	968	945.5	941	963	962	Not encountered at the time of drilling
B-04	965	948	943.5	954	953	Not encountered at the time of drilling
B-05	959	949.5	945	-	-	Not encountered at the time of drilling

- Auger refusal material (top of rock) was encountered at a depth of 20 feet BGS in boring B-02, 5 feet BGS in Boring B-03 and 11 feet BGS in Boring B-04.

- Very poor quality rock was encountered in boring B-04 above the boring termination depth of 20 feet BGS (El 945).

- Rock elevation and quality of rock in the area vary significantly over short distances as observed in our test borings. The quality of rock above the pipe invert at boring B-04 is very poor indicating potentially a transition zone from weathered to good rock. Due to the variation in elevation of solid rock as observed within our borings, the contractor must be prepared to address tunneling through both very poor quality rock as well as good rock at the time of construction.

- It appears that your e-mail was delivered before you could finish your thoughts. Feel free to reach out to me with questions.

- The pipe invert elevation appears to be above the rock layer encountered at borings B-01 and B-05.

- Groundwater table was not encountered in the test borings at the time of our field exploration program.

- **Environmental Classification (Corrosion Tests):**
  Based on the laboratory corrosion test results, the subsurface environment at boring B-01 appears to be corrosive for steel and concrete substructures. Corrosion tests completed at boring B-02 and B-03 indicate a non-corrosive subsurface environment for both concrete and steel substructures. (refer to corrosion test results in the Appendix)

8 REPORT LIMITATIONS

Our professional services have been performed, our findings obtained, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices, for **BenchMark. MC^2** is not responsible for the conclusions, opinions or recommendations made by others based on these data.

The analyses and recommendations submitted in this report are based upon the anticipated location and type of construction, the data obtained from the soil borings performed at the locations indicated. They do not reflect any variations which may occur between these borings. If any variations become evident during the construction, a re-evaluation of the recommendations contained in this report will be necessary after we have had an opportunity to observe the characteristics of the conditions encountered. When final design plans and specifications are available, a general review by our office should be completed to check that the assumptions made in preparation of this report are correct and that earthwork and foundation recommendations are properly interpreted and implemented.

The scope of our services does not include any environmental assessment or investigation for the presence or absence of hazardous or toxic materials in the soil, groundwater, or surface water within or beyond the site studied. Any statements in this report regarding odors, staining of soils, or other unusual conditions observed are strictly for the information of our client.

For additional reference describing the scope and limitations of this report, please review the document enclosed in **Appendix** titled, “Important Information About this Geotechnical-Engineering Report.”

FIGURES

Project Location Map – Sheet 1

USDA Soil Survey and USGS Topographic Map – Sheet 2

Boring Location Map – Sheet 3

Boring Location Plan – Sheets 4 and 5

Subsurface Borings Profiles – Sheet 6

Legend – Sheet 7

Approximate Project Alignment

LEGEND:

★ Project Location

Source: Google Earth
Image Date: 3/14/18

0′ 1000′ 2000′

Graphic Scale (feet)

DATE	NAME	REVISION	APPROVED BY:

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Prashanth Vaddu, P.E.
GEORGIA LICENSE No. PE039820

	NAME	DATE
DESIGNED BY:	TC	10/2/2018
DRAWN BY:	TC	11/8/2018
CHECKED BY:	AA	11/12/2018
SUPERVISED BY:	PV	

Project Location Map

Upper Proctor Creek Capacity Relief Project
City of Atlanta, Fulton County, GA

MC² PROJ. NO.: A051807.043

SHEET NO.: 1

Custom Soil Resource Report
Soil Map (USDA - Upper Proctor Creek Capacity Relief Project)

Fulton County, Georgia			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
Ub	Urban land	2.6	100.0%
Totals for Area of Interest (AOI)		**2.6**	**100.0%**

Source: United States Department of Agriculture
The survey data is Version 12 dated October 5, 2017,
with aerial images taken May 4, 2014 to May 13, 2014.

NORTHWEST ATLANTA QUADRANGLE
GEORGIA
7.5 MINUTE SERIES TOPOGRAPHIC
NAVD: 1988 - DATE: 2017

DATE	NAME	REVISION	APPROVED BY:

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USDA Soil Survey and USGS Topographic Map

Upper Proctor Creek Capacity Relief Project
City of Atlanta, Fulton County, GA

MC² PROJ. NO.: A051807.043

SHEET NO.: 2

LEGEND:

Approximate SPT Boring Location

Source: Google Earth
Image Date: 3/14/18

0′ 100′ 200′
Graphic Scale (feet)

DATE	NAME	REVISION	APPROVED BY:

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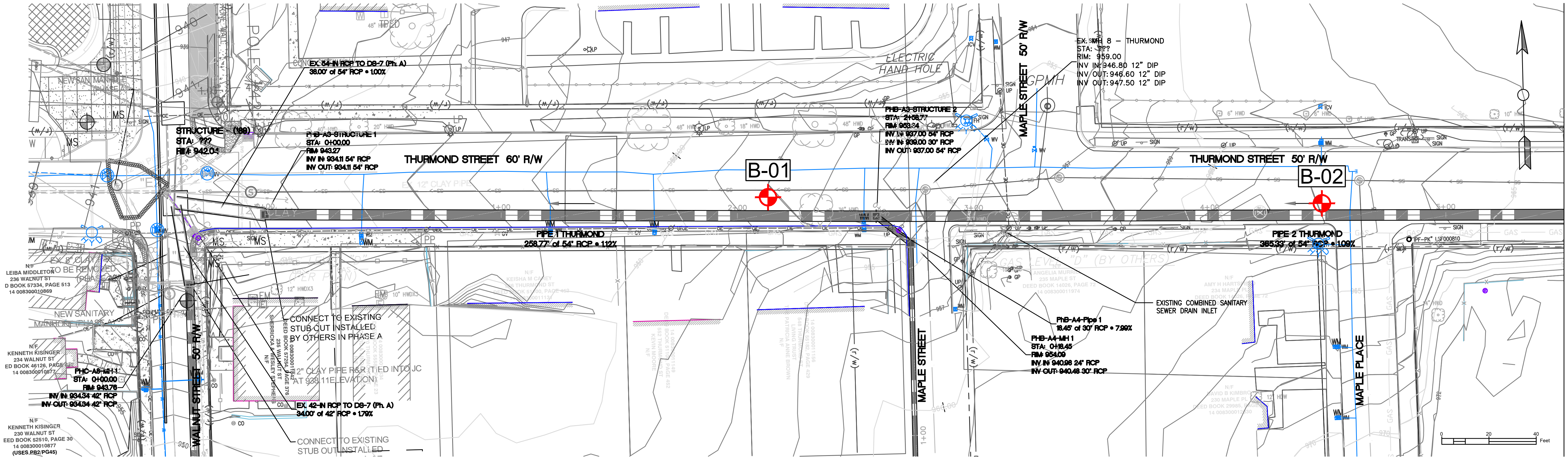
CHECKED BY:	AA	11/12/2018
SUPERVISED BY:	PV	

Boring Location Map

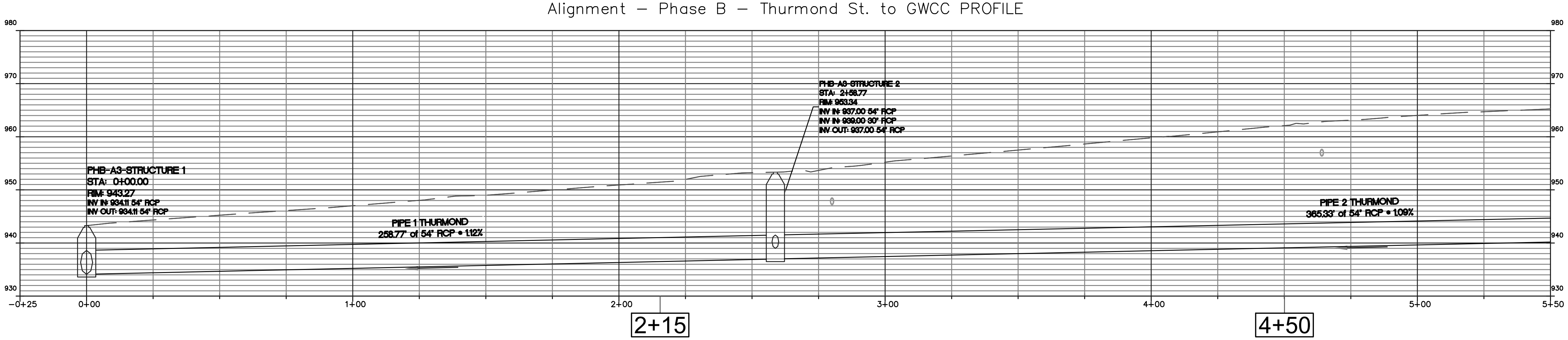
Upper Proctor Creek Capacity Relief Project
City of Atlanta, Fulton County, GA

MC² PROJ. NO.: A051807.043

SHEET NO.: 3



Alignment – Phase B – Thurmond St. to GWCC PROFILE



LEGEND:

⊕ Approximate SPT Boring Location

Source: City of Atlanta Department of Watershed Management
Drawing Number: C-103

DATE	NAME	REVISION	APPROVED BY:

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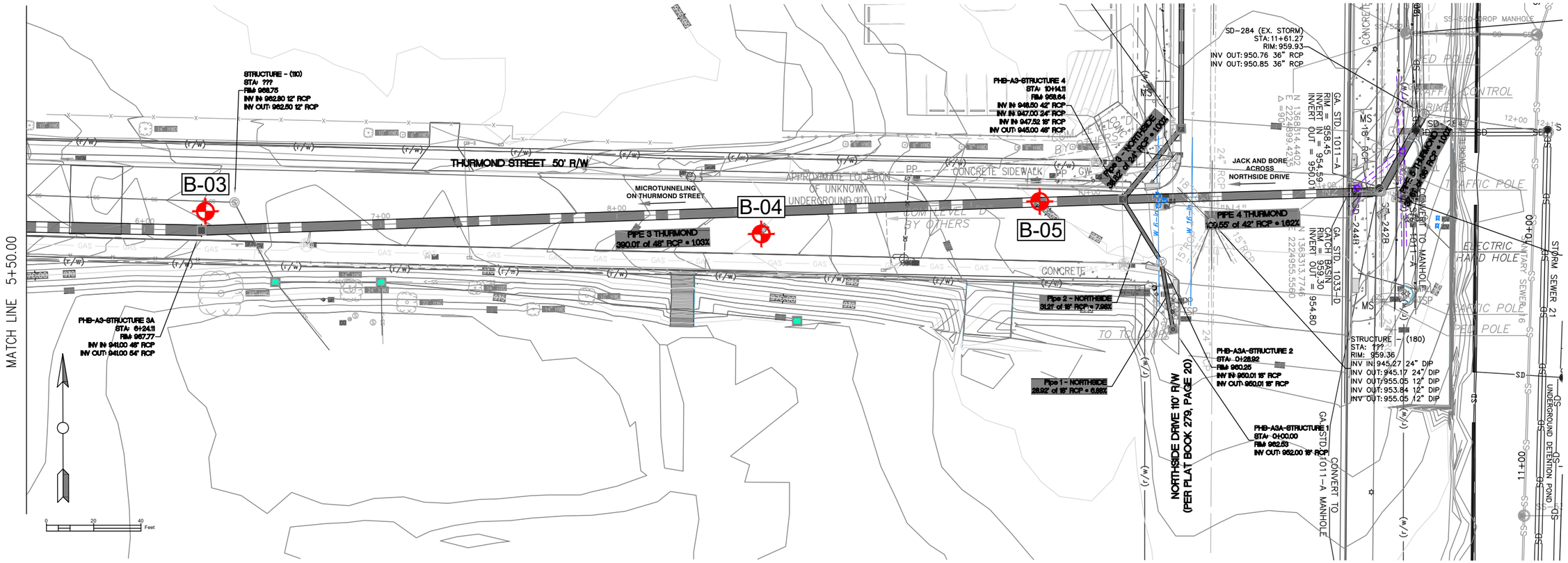
	NAME	DATE
DESIGNED BY:	TC	10/2/2018
DRAWN BY:	TC	11/8/2018
CHECKED BY:	AA	11/12/2018
SUPERVISED BY:	PV	

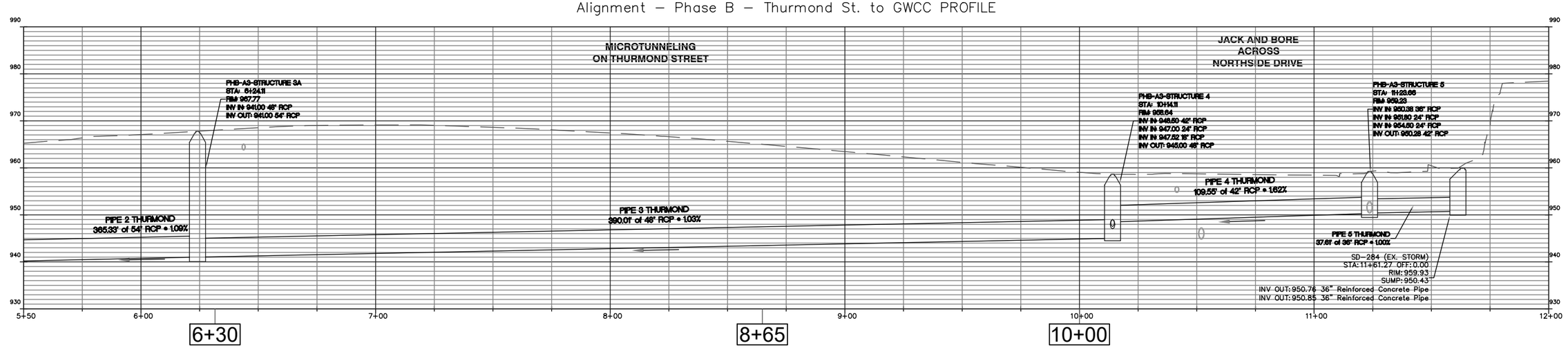
Boring Location Plan

Upper Proctor Creek Capacity Relief Project
City of Atlanta, Fulton County, GA

MC² PROJ. NO.	SHEET NO.
A051807.043	4



Alignment – Phase B – Thurmond St. to GWCC PROFILE



LEGEND:

Approximate SPT Boring Location

Source: City of Atlanta Department of Watershed Management
Drawing Number: C-104

DATE	NAME	REVISION	APPROVED BY:

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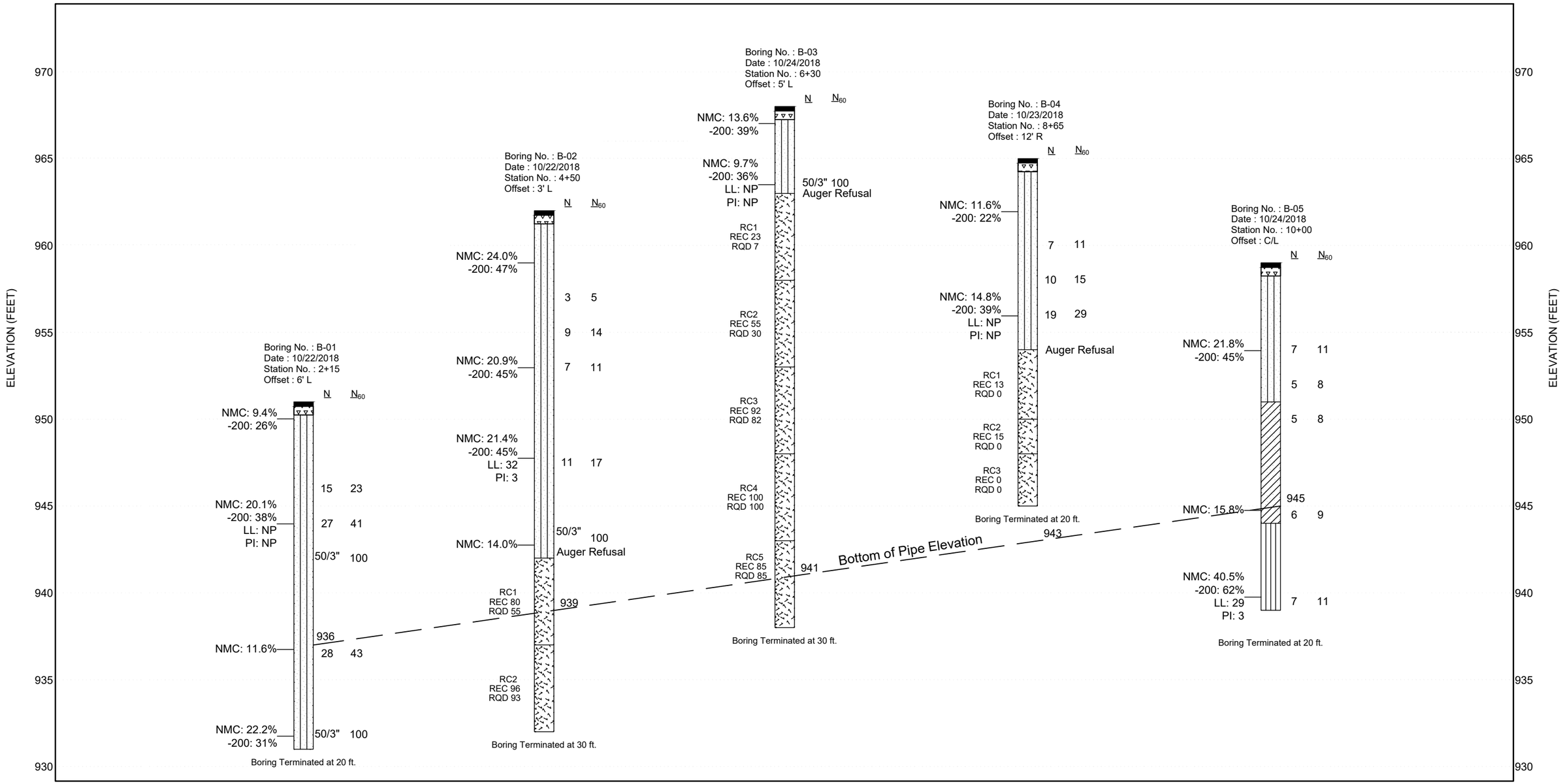
	NAME	DATE
DESIGNED BY:	TC	10/2/2018
DRAWN BY:	TC	11/8/2018
CHECKED BY:	AA	11/12/2018
SUPERVISED BY:	PV	

Boring Location Plan	MC² PROJ. NO.	SHEET NO.
Upper Proctor Creek Capacity Relief Project City of Atlanta, Fulton County, GA	A051807.043	5



*N Values Drawn At Top Of Interval

** N60 - Blowcount Corrected for Hammer Energy Rating of 91.5% (Betts Environmental)
Boring Elevations Based on Plans Provided by Client

DATE	NAME	REVISION	APPROVED BY:

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Subsurface Boring Profile

Upper Proctor Creek Capacity Relief Project
City of Atlanta, Fulton County, GA

MC² PROJ. NO.: A051807.043

SHEET NO.: 6

LEGEND

- Top Soil
- Asphalt
- Concrete
- (GAB) Graded Aggregate Base
- Limerock Base
- No. 57 Stone
- Soil Cement
- (SP) Poorly Graded Sand
- (SP-SM) Poorly Graded Sand With Silt
- (SP-SC) Poorly Graded Sand With Clay
- (SM) Silty Sand
- (SC) Clayey Sand
- (MH) Elastic Silt
- (ML) Silt
- (CL-ML) Silty Clay
- (CH) Fat Clay
- (CL) Lean Clay
- (OH) Organic Clay
- (OL) Organic Silt
- Peat
- Fill
- Bedrock
- Limestone
- (WLS) Weathered Limestone
- (PWR) Partially Weathered Rock
- Granite
- Gneiss
- Schist

NOTES:

▽	Water Table At Time Of Drilling
▼	Water Table After 24 Hours
GNE	Groundwater Not Encountered
GNA	Groundwater Not Apparent
GNM	Groundwater Not Measured
CL	Center Line
RT	Right Of Center Line
LT	Left of Center Line
BGS	Below Ground Surface
HA	Hand Auger
PA	Power Auger
NMC	Natural Moisture Content (%)
-200	Fines Passing A No. 200 Sieve (%)
PI	Plasticity Index
NP	Non Plastic
LL	Liquid Limit
OC	Organic Content (%)

N	SPT N-Value
WOH	Weight-Of-Hammer
WOR	Weight-Of-Rod
CPT	Cone Penetrometer Test
SPT	Standard Penetration Test
DT	Dilatometer Test
LOC	Loss Of Circulation
ROC	Regain Of Circulation
REC	Rock Core Recovery(%)
RQD	Rock Quality Designation
ST	Shelby Tube Sample
q_u	Unconfined Compressive Strength From Pocket Penetrometer In tsf

GRANULAR MATERIALS- RELATIVE DENSITY	SPT (BLOWS/FT)
VERY LOOSE	≤ 4
LOOSE	5-10
MEDIUM	11-30
DENSE	31-50
VERY DENSE	GREATER THAN 50
SILTS AND CLAYS CONSISTENCY	**SPT (BLOWS/FT)**
VERY SOFT	≤ 2
SOFT	3-4
FIRM	5-8
STIFF	9-15
VERY STIFF	16-30
HARD	30-50
VERY HARD	GREATER THAN 50

SPT Spoon Inside Diameter 1 3/8"
SPT Spoon Outside Diameter 2"

ASTM Standard Drop Safety Hammer
Average Hammer Drop Height 30"
Hammer Weight 140 lbs

DATE	NAME	REVISION	APPROVED BY:

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Legend

Upper Proctor Creek Capacity Relief Project
City of Atlanta, Fulton County, GA

MC² PROJ. NO.: A051807.043

SHEET NO.: 7

APPENDIX

Soil Profile (gINT Logs) – 5 Pages

Summary of Laboratory Results – 1 Page

Grain Size Distribution -- 3 Pages

Atterberg Limits' Result – 1 page

Corrosion Test Results – 1 Page

Rock Core Test Summary – 1 Page

Rock Core Testing Photographs – 20 Pages

Test Procedures – 4 Pages

Important Information about This Geotechnical-Engineering Report– 2 Pages

Soil Profile

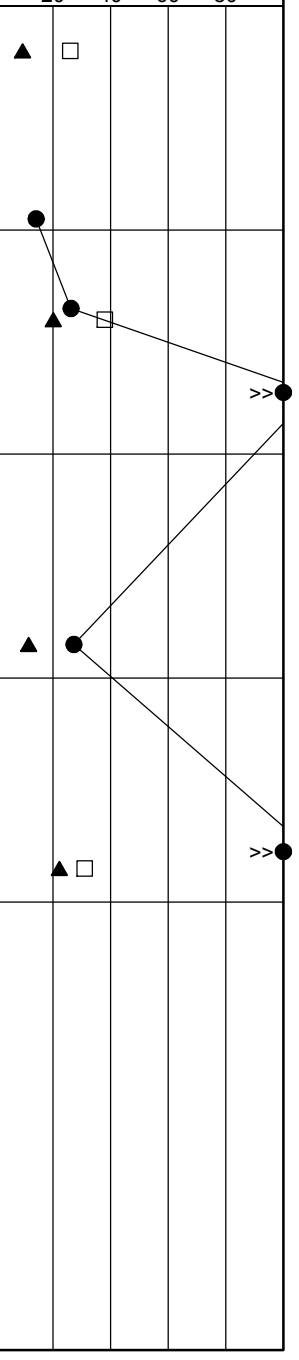
BORING ID: B-01

MC² Geotechnical • Environmental Materials Testing

CLIENT WSP - Benchmark Management LLC JV
PROJECT NAME Upper Proctor Creek Capacity Relief Project
PROJECT NUMBER A051807.043
PROJECT LOCATION City of Atlanta, Fulton County, Georgia
DATE STARTED 10/22/18 **COMPLETED** 10/22/18
GROUND ELEVATION 951 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR Bett's Environmental
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem
AT TIME OF DRILLING GNE **AT**
LOGGED BY A. Amini **CHECKED BY** P. Vaddu
END OF DRILLING ---
NOTES Sta. No. 2+15, offset 6' L
AFTER DRILLING GNE (24 hr.)

DEPTH (ft)	ELEV. (ft)	GRAPHIC LOG	USCS Group Symbol	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)
0	950			3 inches of ASPHALT Approx. 6 inches of GAB Medium to very dense, gray, brown, orange, white, silty fine SAND, micaceous	HA		
	948				HA		
5	946				SS 1	4-7-8 (15)	
	944				SS 2	6-8-19 (27)	
	942				SS 3	18-39-50/3"	
10	940		SM				
	938						
15	936				SS 4	7-12-16 (28)	
	934						
	932				SS 5	31-50/3"	
20	930			Bottom of hole at 20.0 feet.			
	928						
	926						
	924						
	922						

● SPT N VALUE ●
⊕ ORGANIC CONTENT % ⊕
PL MC LL
☐ FINES CONTENT (%) ☐
20 40 60 80



Soil Profile

BORING ID: B-02

MC² Geotechnical • Environmental Materials Testing

CLIENT WSP - Benchmark Management LLC JV
PROJECT NAME Upper Proctor Creek Capacity Relief Project
PROJECT NUMBER A051807.043
PROJECT LOCATION City of Atlanta, Fulton County, Georgia
DATE STARTED 10/22/18 **COMPLETED** 10/22/18
GROUND ELEVATION 962 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR Bett's Environmental
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem/ Rock Coring
AT TIME OF DRILLING GNE
LOGGED BY A. Amini **CHECKED BY** P. Vaddu
AT END OF DRILLING ---
NOTES 4+50, offset 3' L
AFTER DRILLING ---

DEPTH (ft)	ELEV. (ft)	USCS Group Symbol	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)
0			3 inches of ASPHALT			
			Approx. 6 inches of GAB			
	960		Very loose to very dense, brown to reddish brown, gray, silty fine SAND	HA		
	958			HA		
5				SS 1	1-2-1 (3)	
	956			SS 2	2-3-6 (9)	
	954			SS 3	3-3-4 (7)	
10	952	SM				
	950					
	948			SS 4	4-5-6 (11)	
15						
	946					
	944					
				SS 5	50/3"	
20	942		Auger Refusal at 20 feet.			
			(20' - 25') GRANITE (feldspar, quartz, biotite) white, gray, hard, fresh, 40 degree foliation, medium to coarse grained, moderately fractured, planer, no FeOx staining observed	RC 1		80 (55)
	940					
	938					
25						
	936		(25' - 30') GRANITE (feldspar, quartz, biotite) white, gray, hard, fresh, non-foliated, medium to coarse grained, moderately fractured, planar, no FeOx staining observed	RC 2		96 (93)
	934					
30	932					

● SPT N VALUE ●
⊕ ORGANIC CONTENT % ⊕
PL MC LL
☐ FINES CONTENT (%) ☐
20 40 60 80

Bottom of hole at 30.0 feet.

Soil Profile

BORING ID: B-03

MC² Geotechnical • Environmental Materials Testing

CLIENT WSP - Benchmark Management LLC JV
PROJECT NAME Upper Proctor Creek Capacity Relief Project
PROJECT NUMBER A051807.043
PROJECT LOCATION City of Atlanta, Fulton County, Georgia
DATE STARTED 10/23/18 **COMPLETED** 10/24/18
GROUND ELEVATION 968 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR Bett's Environmental
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem/ Rock Coring
AT TIME OF DRILLING GNE
LOGGED BY A. Amini **CHECKED BY** P. Vaddu
AT END OF DRILLING ---
NOTES 6+30, offset 5' L
AFTER DRILLING ---

DEPTH (ft)	ELEV. (ft)	GRAPHIC LOG	USCS Group Symbol	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)
0							
	968			3 inches of ASPHALT Approx. 6 inches of GAB			
	966		SM	Very dense, brown, gray, silty fine SAND, micaceous	HA		
	964				HA		
5					SS 1	50/3"	
	962			(5' - 10') GRANITE (feldspar, quartz, biotite) brown, white, black, moderately hard, fresh, 15 degree foliation, medium to coarse grained, moderately fractured, planar, no FeOx staining observed	RC 1		23 (7)
10	958						
	956			(10' - 15') GRANITE (feldspar, quartz, biotite) brown, white, black, moderately hard, fresh, 15 degree foliation, medium to coarse grained, moderately fractured, planar, no FeOx staining observed	RC 2		55 (30)
15	954						
	952			(15' - 20') GRANITE (feldspar, quartz, biotite) brown, white, black, moderately hard, fresh, 15 degree foliation, medium to coarse grained, moderately fractured, planar, no FeOx staining observed	RC 3		92 (82)
20	950						
	948			(20' - 25') GRANITE (feldspar, quartz, biotite) white, black, very hard, fresh, non-foliated, medium to coarse grained, slightly to very slightly fractured, planar, no FeOx staining observed	RC 4		100 (100)
25	946						
	944			(25' - 30') GRANITE (feldspar, quartz, biotite) white, black, very hard, fresh, non-foliated, medium to coarse grained, slightly to very slightly fractured, planar, no FeOx staining observed	RC 5		85 (85)
30	942						
	940						
	938						

● SPT N VALUE ●
⊕ ORGANIC CONTENT % ⊕
PL MC LL
☐ FINES CONTENT (%) ☐
20 40 60 80

Bottom of hole at 30.0 feet.

Soil Profile

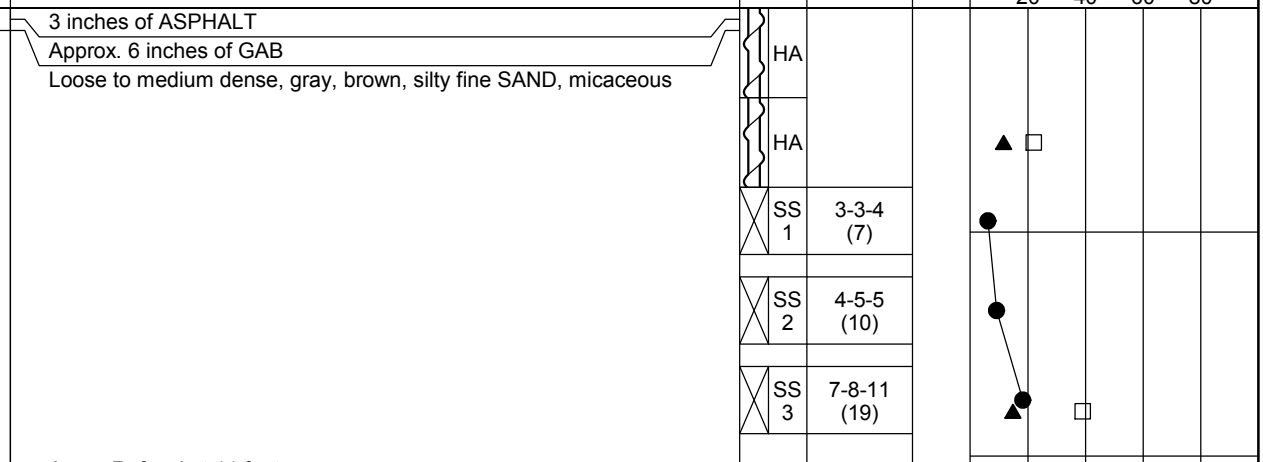
BORING ID: B-04

MC² Geotechnical • Environmental Materials Testing

CLIENT WSP - Benchmark Management LLC JV
PROJECT NAME Upper Proctor Creek Capacity Relief Project
PROJECT NUMBER A051807.043
PROJECT LOCATION City of Atlanta, Fulton County, Georgia
DATE STARTED 10/23/18 **COMPLETED** 10/23/18
GROUND ELEVATION 965 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR Bett's Environmental
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem/ Rock Coring
AT TIME OF DRILLING GNE
LOGGED BY A. Amini **CHECKED BY** P. Vaddu
AT END OF DRILLING ---
NOTES 8+30, offset 12' R
AFTER DRILLING ---

DEPTH (ft)	ELEV. (ft)	USCS Group Symbol	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)
0	964		3 inches of ASPHALT Approx. 6 inches of GAB	HA 1		
		SM	Loose to medium dense, gray, brown, silty fine SAND, micaceous	HA 2		
5	960			SS 1	3-3-4 (7)	
	958			SS 2	4-5-5 (10)	
	956			SS 3	7-8-11 (19)	
10	954		Auger Refusal at 11 feet.			
	952		(11' - 15') GRANITE (feldspar, quartz, biotite) white, gray, moderately hard, fresh, non-foliated, medium to coarse grained, very intensely to intensely fractured, planar, no FeOx staining observed	RC 1		13 (0)
15	950		(15' - 17') GRANITE (feldspar, quartz, biotite) white, gray, moderately hard, fresh, non-foliated, medium to coarse grained, very intensely to intensely fractured, planar, no FeOx staining observed	RC 2		15 (0)
	948		(17' - 20') GRANITE (feldspar, quartz, biotite) white, gray, moderately hard, fresh, non-foliated, medium to coarse grained, very intensely to intensely fractured, planar, no FeOx staining observed	RC 3		0 (0)
20	946					
	944		Bottom of hole at 20.0 feet.			
	942					
	940					
	938					
	936					

● SPT N VALUE ●
⊕ ORGANIC CONTENT % ⊕
PL MC LL
☐ FINES CONTENT (%) ☐
20 40 60 80



Soil Profile

BORING ID: B-05

MC² Geotechnical • Environmental Materials Testing

CLIENT WSP - Benchmark Management LLC JV
PROJECT NAME Upper Proctor Creek Capacity Relief Project
PROJECT NUMBER A051807.043
PROJECT LOCATION City of Atlanta, Fulton County, Georgia
DATE STARTED 10/24/18 **COMPLETED** 10/24/18
GROUND ELEVATION 959 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR Bett's Environmental
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem
AT TIME OF DRILLING GNE
LOGGED BY A. Amini **CHECKED BY** P. Vaddu
AT END OF DRILLING ---
NOTES Sta. No. 10+00, CL
AFTER DRILLING ---

DEPTH (ft)	ELEV. (ft)	USCS Group Symbol	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)
0	958		3 inches of ASPHALT Approx. 6 inches of GAB	HA		
	956	SM	Loose, gray, brown to reddish brown, silty fine SAND, micaceous	HA		
5	954			SS 1	2-3-4 (7)	
	952			SS 2	2-2-3 (5)	
	950	SC	Loose, brown to reddish brown, clayey fine SAND, micaceous	SS 3	2-2-3 (5)	
10	948					
	946					
15	944			SS 4	2-3-3 (6)	
	942	ML	Firm, brown to reddish brown, sandy SILT, micaceous			
	940			SS 5	6-5-2 (7)	
20	938		Bottom of hole at 20.0 feet.			
	936					
	934					
	932					
	930					

● SPT N VALUE ●
⊕ ORGANIC CONTENT % ⊕
PL MC LL
☐ FINES CONTENT (%) ☐
20 40 60 80

SUMMARY OF LABORATORY RESULTS-USCS

MC Squared, Inc.
1275 Shiloh Road, Suite 2620
Kennesaw, GA 30144

CLIENT WSP- BenchMark Management LLC JV

PROJECT NAME Upper Proctor Creek Capacity Relief Project

PROJECT NUMBER A051807.043

PROJECT LOCATION Atlanta, Fulton County, Georgia

Sample No.	Station/ Offset (C/L)	Soil Description	USCS Class.	%< Finer Sieve								NMC (%)	pH	Resistivity (ohm-cm)	LL %	PL %	PI %
				3/4"	#4	#10	#20	#40	#60	#100	#200						
B-01 (0'- 2')	2+15	Dark Brown Silty C to F SAND with Gravel	SM	100	81	74	66	56	45	35	26	9.4					
B-01 (6'-8')	2+15	Reddish Brown, Black Silty C to F SAND with Mica with Gravel	SM	100	95	94	92	86	78	64	38	20.1			NP	NP	NP
B-01 (13.5-15)	2+15	Reddish Brown, Black Silty C to F SAND with Mica	SM									11.6	4.4	13000			
B-01 (18.5'-20')	2+15	Gray Silty M to F SAND with Mica	SM		100	97	89	73	59	46	31	22.2					
B-02 (2'- 4')	4+50	Reddish Brown Silty C to F SAND with Mica with Gravel	SM	100	96	92	86	77	68	59	47	24.0					
B-02 (8'-10')	4+50	Reddish Brown Silty C to F SAND with Mica with Gravel	SM	100	93	90	85	79	71	61	45	20.9					
B-02 (13.5'-15')	4+50	Light Reddish Brown Silty C to F SAND with Mica	SM	100	98	97	94	87	78	64	45	21.4			32	29	3
B-02 (18.5-20)	4+50	Light Reddish Brown Silty C to F SAND with Mica	SM									14.0	6.4	13000			
B-03 (0'- 2')	6+30	Reddish Brown Silty C to F SAND with Mica with Gravel	SM	100	89	87	83	76	67	55	39	13.6					
B-03 (4'-5')	6+30	Dark Brown Silty C to F SAND with Gravel with Gravel	SM	100	80	77	74	69	62	51	36	9.7			NP	NP	NP
B-04 (2'- 4')	8+65	Reddish Brown Silty C to F SAND with Mica with Gravel	SM	100	95	92	84	71	56	39	22	11.6					
B-04 (0'-10')	8+65	Light Brown Slity M to F SAND with Mica	SM	100	100	99	97	93	84	66	39	14.8			NP	NP	NP
B-05 (4'-6')	10+00	Reddish Dark Brown, Black Silty C to F SAND with Gravel	SM	100	96	93	89	82	73	62	45	21.8					
B-05 (13.5'-15')	10+00	Reddish Dark Brown Sandy SILT with Mica	ML									15.8	7.2	14000			
B-05 (18.5'-20')	10+00	Reddish Dark Brown Sandy SILT with Mica	ML	100	100	99	97	93	88	80	62	40.5			29	26	3

GRAIN SIZE DISTRIBUTION

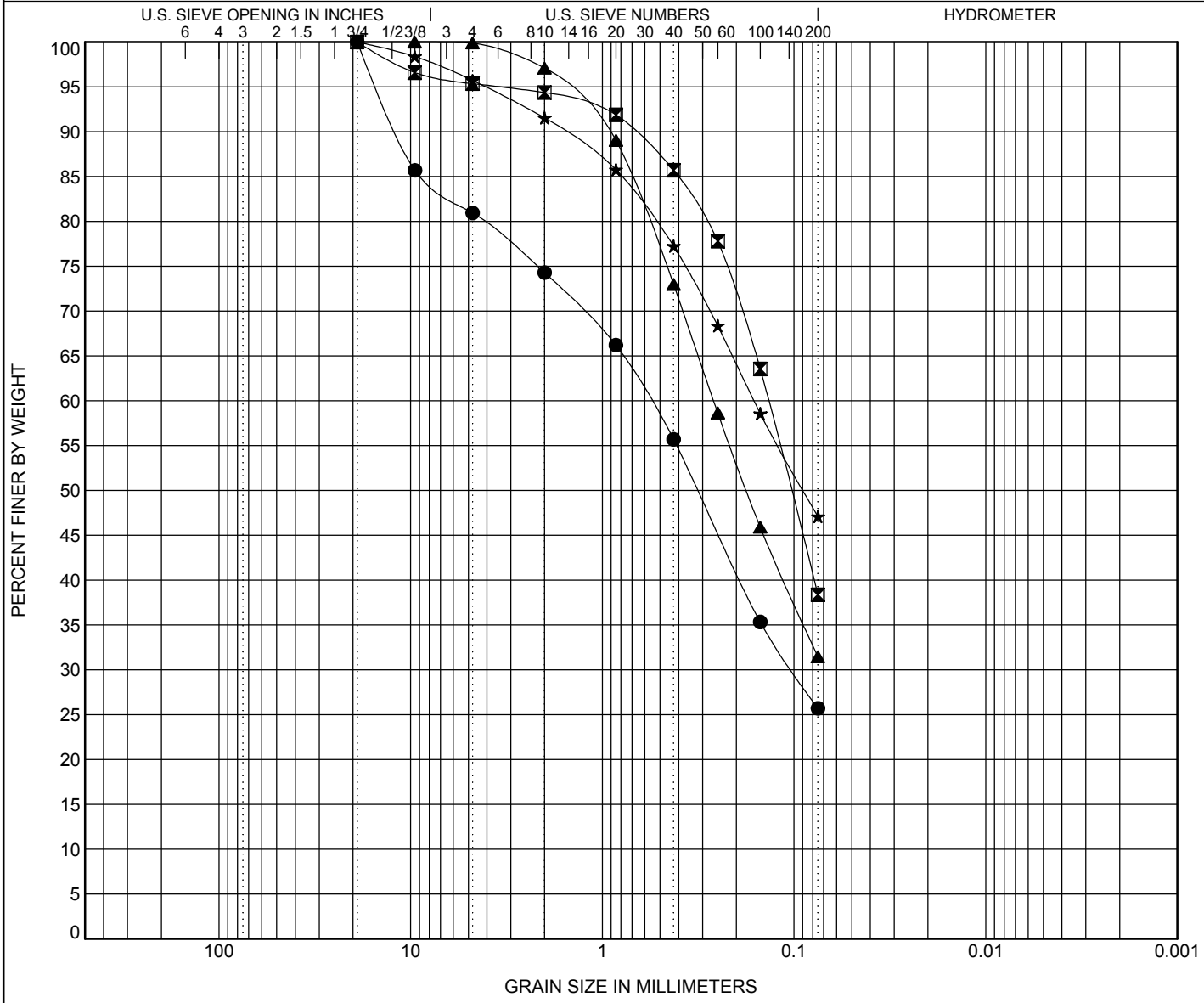
MC Squared Inc.
1275 Shiloh Road,Suite 2620
Kennesaw, GA 30144

CLIENT WSP BenchMark Management LLC JV

PROJECT NAME Upper Proctor Creek Relief Capacity

PROJECT NUMBER A051807.043

PROJECT LOCATION Atlanta, Fulton County, Georgia



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification			Classification	LL	PL	PI	Cc	Cu
●	B-01 (0'- 2')	0.0	Dark Brown Silty C to F SAND with Gravel					
⊠	B-01 (6'-8')	0.0	Reddish Brown, Black Silty C to F SAND with Mica with Gravel	NP	NP	NP		
▲	B-01 (18.5'-20')	0.0	Gray Silty, Silty M to F SAND with Mica					
★	B-02 (2'- 4')	0.0	Reddish Brown Silty C to F SAND with Mica with Gravel					

Specimen Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-01 (0'- 2')	0.0	19	0.565	0.102		19.1	55.2	25.7	
⊠	B-01 (6'-8')	0.0	19.05	0.136			4.6	57.0	38.4	
▲	B-01 (18.5'-20')	0.0	9.525	0.263			0.1	68.4	31.5	
★	B-02 (2'- 4')	0.0	19.05	0.162			4.3	48.6	47.1	

Note-Sample soaked for 16 hrs (+/- 10 min)

GRAIN SIZE DISTRIBUTION

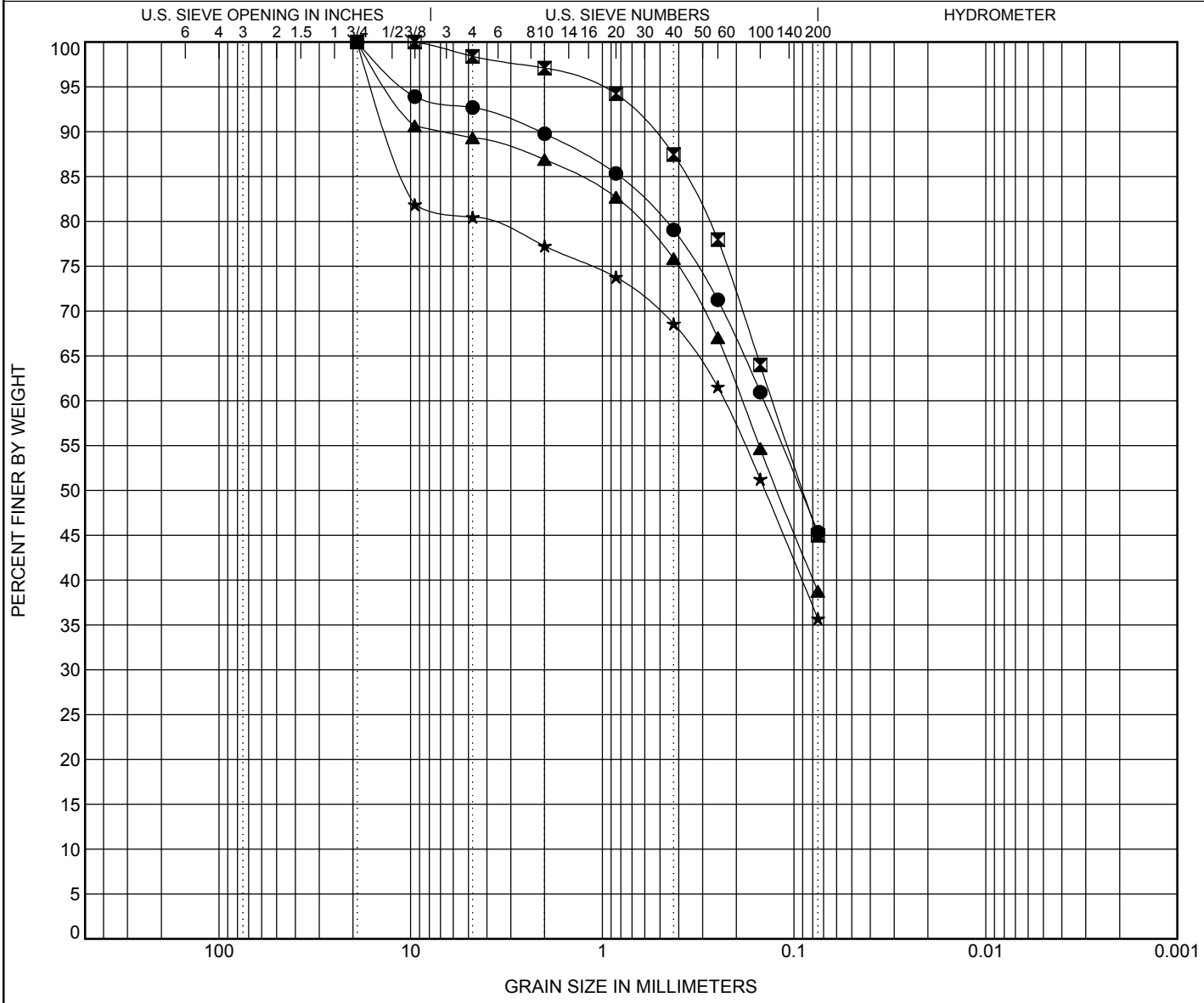
MC Squared Inc.
1275 Shiloh Road,Suite 2620
Kennesaw, GA 30144

CLIENT WSP BenchMark Management LLC JV

PROJECT NAME Upper Proctor Creek Relief Capacity

PROJECT NUMBER A051807.043

PROJECT LOCATION Atlanta, Fulton County, Georgia



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification			Classification	LL	PL	PI	Cc	Cu
●	B-02 (8'-10')	0.0	Reddish Brown Silty C to F SAND with Mica with Gravel					
⊠	B-02 (13.5'-15')	0.0	Light Reddish Brown Silty C to F SAND with Mica	32	29	3		
▲	B-03 (0'- 2')	0.0	Reddish Brown Silty C to F SAND with Mica with Gravel					
★	B-03 (4'-5')	0.0	Dark Brown Silty C to F SAND with Gravel	NP	NP	NP		

Specimen Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-02 (8'-10')	0.0	19.05	0.144			7.3	47.4	45.3	
⊠	B-02 (13.5'-15')	0.0	19.05	0.13			1.6	53.4	45.0	
▲	B-03 (0'- 2')	0.0	19.05	0.187			10.7	50.6	38.8	
★	B-03 (4'-5')	0.0	19.05	0.231			19.5	44.8	35.7	

Note-Sample soaked for 16 hrs (+/- 10 min)

GRAIN SIZE DISTRIBUTION

MC Squared Inc.
1275 Shiloh Road,Suite 2620
Kennesaw, GA 30144

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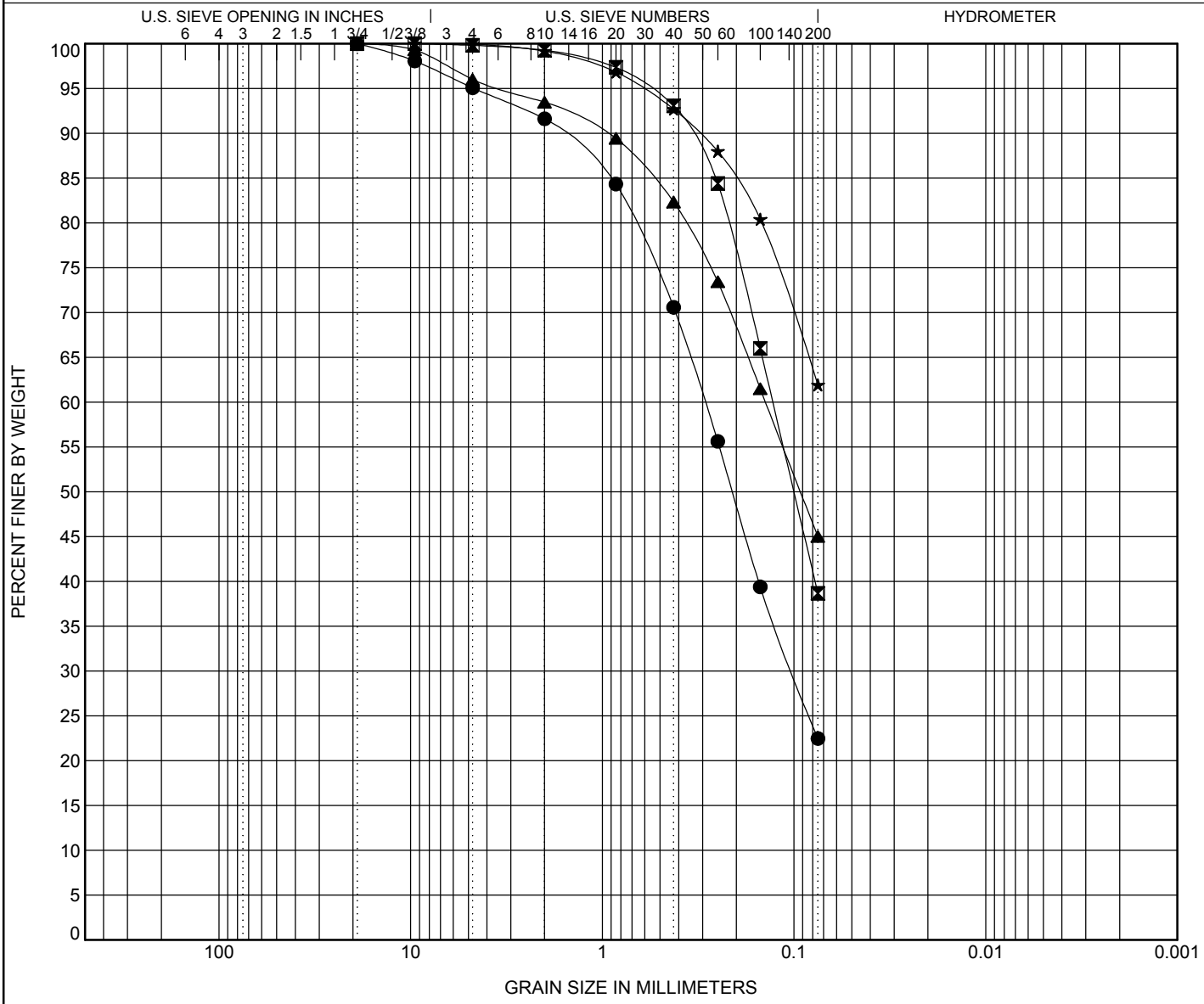
PROJECT NAME Upper Proctor Creek Relief Capacity

PROJECT NUMBER A051807.043

PROJECT LOCATION Atlanta, Fulton County, Georgia



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification			Classification	LL	PL	PI	Cc	Cu
●	B-04 (2'- 4')	0.0	Reddish Brown Silty C to F SAND with Mica with Gravel					
⊠	B-04 (8'-10')	0.0	Light Brown Slity M to F SAND with Mica	NP	NP	NP		
▲	B-05 (4'-6')	0.0	Reddish Dark Brown, Black Silty C to F SAND with Gravel					
★	B-05 (18.5'-20')	0.0	Reddish Dark Brown Sandy SILT with Mica	29	26	3		

Specimen Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-04 (2'- 4')	0.0	19.05	0.292	0.102		4.9	72.6	22.5	
⊠	B-04 (8'-10')	0.0	19.05	0.129			0.2	61.1	38.7	
▲	B-05 (4'-6')	0.0	19.05	0.141			4.0	51.0	45.0	
★	B-05 (18.5'-20')	0.0	19.05				0.1	38.0	61.9	

Note-Sample soaked for 16 hrs (+/- 10 min)

ATTERBERG LIMITS' RESULTS

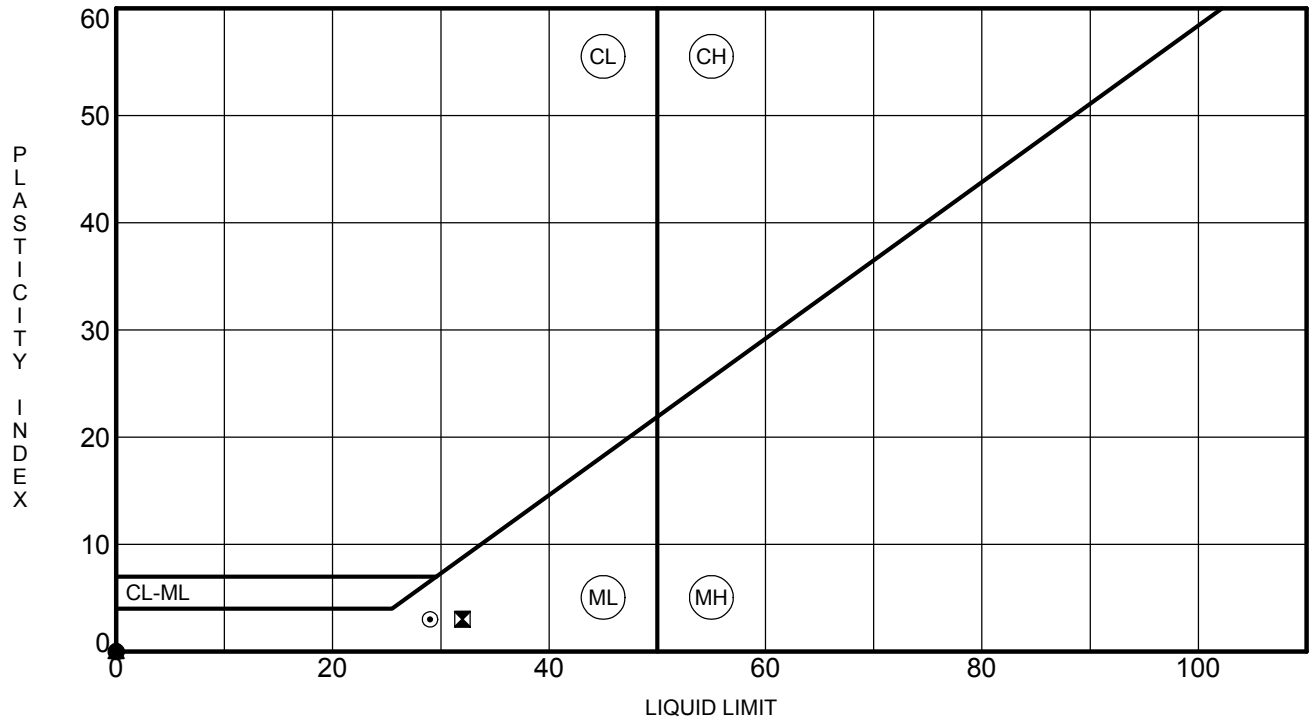
MC Squared, Inc.
1275 Shiloh Road,Suite 2620
Kennesaw, GA 30144

CLIENT WSP BenchMark Management LLC JV

PROJECT NAME Upper Proctor Creek Relief Capacity

PROJECT NUMBER A051807.043

PROJECT LOCATION Atlanta, Fulton County, Georgia



	Specimen Identification	LL	PL	PI	Fines	Classification
●	**B-01 (6'-8')**	**NP**	**NP**	**NP**	**38**	**Reddish Brown, Black Silty C to F SAND with Mica with Gravel**
⊠	**B-02 (13.5'-15')**	**32**	**29**	**3**	**45**	**Light Reddish Brown Silty C to F SAND with Mica**
▲	**B-03 (4'-5')**	**NP**	**NP**	**NP**	**36**	**Dark Brown Silty C to F SAND with Gravel with Gravel**
★	**B-04 (8'-10')**	**NP**	**NP**	**NP**	**39**	**Light Brown Slity M to F SAND with Mica**
⊙	**B-05 (18.5'-20')**	**29**	**26**	**3**	**62**	**Reddish Dark Brown Sandy SILT with Mica**

Corrosion Tests Results

Summary of Environmental Corrosion Test Results							
Boring No. / Depth (ft)	**USCS**	**pH**	**Resistivity (ohm-cm)**	**Sulfates (ppm)**	**Chlorides (ppm)**	**Env. Classification * (Soil)**	
						Steel	**Concrete**
B-01 (13.5-15)	SM	4.4	13,000	66	0.0**	Corrosive	Corrosive
B-02 (18.5-20)	SM	6.4	13,000	78	0.0**	Non-Corrosive	Non-Corrosive
B-05 (13.5-15)	ML	7.2	14,000	15	0.0**	Non-Corrosive	Non-Corrosive
Notes:							
*As per AASHTO LRFD 2014 Bridge Design Specification (version 2014) Section 10.7.5							
**Any Reading represented as “0.0” is below detection limits							
pH – tested in accordance with ASTM D4972							
Resistivity – tested in accordance with ASTM G57							
Oxidation Reduction Potential – content determined by ASTM G200-9 test method							
Sulfates – content determined by EPA SW9056A test method							
Chlorides – content determined by EPA SW9056A test method							

Boring No. / Depth	Oxidation-Reduction Potential (mV)
B-01 (13.5’- 15’)	130, 140, 140
B-02 (18.5’- 20’)	74, 55, 22
B-05 (13.5’- 15’)	25, 20, 17

MC^2
GEOTECHNICAL • ENVIRONMENTAL
MATERIALS TESTING

Rock Splitting Tensile and Unconfined Compressive Strength

Upper Proctor Creek Capacity Relief Project
City of Atlanta, Fulton County, Georgia
MC² Project No. A051807.043

Boring No.	Core Run No.	Elevation (ft.)	Depth Below Ground Surface (ft.)	Bulk Density (lb/ft³)	Compressive Strength (psi)	Splitting Tensile Strength (psi)
B-02	1	941.5 – 941.0	20.5 – 21.0	161.9	-	1,215
B-02	1	937.5 – 937.0	24.5 – 25.0	170.4	17,180	1,418
B-03	3	950.0 – 949.5	18.0 – 18.5	171.0	13,740	1,375
B-03	4	943.5 – 943.0	24.5 – 25.0	171.8	14,820	1,149
B-03	5	938.5 – 938.0	29.5 – 30.0	174.7	17,490	1,194
B-04	1	939.5 – 939.0	25.5 – 26.0	163.4	-	1,234

MC²
GEOTECHNICAL • ENVIRONMENTAL
MATERIALS TESTING

Boring No. B-02, Run 1 & Run 2
Run 1: 20 ft – 25 ft, REC = 80%, RQD = 55%
Run 2: 25 ft – 30 ft, REC = 96%, RQD = 93%

MC² Geotechnical • Environmental Materials Testing	**Geotechnical Engineering Services** **Upper Proctor Creek Capacity Relief Project** **City of Atlanta, Fulton County, Georgia**	**Prepared For:** WSP-BenchMark Management LLC JV 100 Peachtree Street, Suite 1900 Atlanta Georgia, 30303
		MC² Project No. A051807.043
	ROCK CORE PHOTOGRAPHS	**Date:** 11/10/18

Boring No. B-02, Run 1 & Run 2 WET
Run 1: 20 ft – 25 ft, REC = 80%, RQD = 55%
Run 2: 25 ft – 30 ft, REC = 96%, RQD = 93%

MC² Geotechnical • Environmental Materials Testing	**Geotechnical Engineering Services** **Upper Proctor Creek Capacity Relief Project** **City of Atlanta, Fulton County, Georgia**	**Prepared For:** WSP-BenchMark Management LLC JV 100 Peachtree Street, Suite 1900 Atlanta Georgia, 30303
		MC² Project No. A051807.043
	ROCK CORE PHOTOGRAPHS	**Date:** 11/10/18

Boring No. B-03, Run 1 & Run 2
Run 1: 5 ft – 10 ft, REC = 23%, RQD = 7%
Run 2: 10 ft – 15 ft, REC = 55%, RQD = 30%

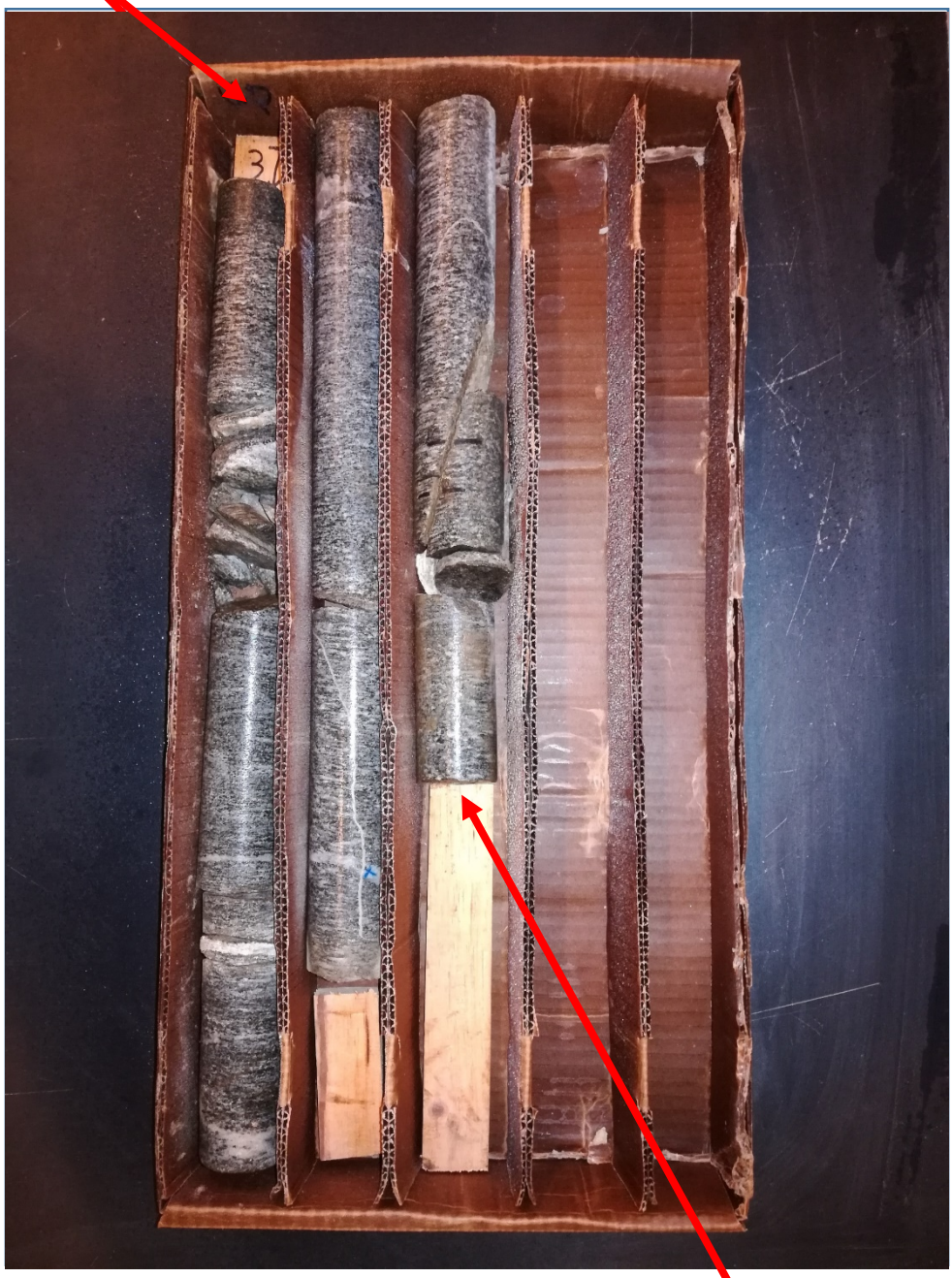
MC² Geotechnical • Environmental Materials Testing	**Geotechnical Engineering Services** **Upper Proctor Creek Capacity Relief Project** **City of Atlanta, Fulton County, Georgia**	**Prepared For:** WSP-BenchMark Management LLC JV 100 Peachtree Street, Suite 1900 Atlanta Georgia, 30303
		MC² Project No. A051807.043
	ROCK CORE PHOTOGRAPHS	**Date:** 11/10/18

Boring No. B-03, Run 1 & Run 2 WET
Run 1: 5 ft – 10 ft, REC = 23%, RQD = 7%
Run 2: 10 ft – 15 ft, REC = 55%, RQD = 30%

MC² Geotechnical • Environmental Materials Testing	**Geotechnical Engineering Services** **Upper Proctor Creek Capacity Relief Project** **City of Atlanta, Fulton County, Georgia**	**Prepared For:** WSP-BenchMark Management LLC JV 100 Peachtree Street, Suite 1900 Atlanta Georgia, 30303
		MC² Project No. A051807.043
	ROCK CORE PHOTOGRAPHS	**Date:** 11/10/18

Boring No. B-03, Run 3
Run 3: 15 ft – 20 ft, REC = 92%, RQD = 82%

MC² Geotechnical • Environmental Materials Testing	**Geotechnical Engineering Services** **Upper Proctor Creek Capacity Relief Project** **City of Atlanta, Fulton County, Georgia**	**Prepared For:** WSP-BenchMark Management LLC JV 100 Peachtree Street, Suite 1900 Atlanta Georgia, 30303
		MC² Project No. A051807.043
	ROCK CORE PHOTOGRAPHS	**Date:** 11/10/18



Boring No. B-03, Run 3 WET
Run 3: 15 ft – 20 ft, REC = 92%, RQD = 82%

MC² Geotechnical • Environmental Materials Testing	**Geotechnical Engineering Services** **Upper Proctor Creek Capacity Relief Project** **City of Atlanta, Fulton County, Georgia**	**Prepared For:** WSP-BenchMark Management LLC JV 100 Peachtree Street, Suite 1900 Atlanta Georgia, 30303
		MC² Project No. A051807.043
	ROCK CORE PHOTOGRAPHS	**Date:** 11/10/18

TOP

BOTTOM

Boring No. B-03, Run 4 & Run 5
Run 4: 20 ft – 25 ft, REC = 100%, RQD = 100%
Run 5: 25 ft – 30 ft, REC = 85%, RQD = 85%

MC² Geotechnical • Environmental Materials Testing	**Geotechnical Engineering Services** **Upper Proctor Creek Capacity Relief Project** **City of Atlanta, Fulton County, Georgia**	**Prepared For:** WSP-BenchMark Management LLC JV 100 Peachtree Street, Suite 1900 Atlanta Georgia, 30303
		MC² Project No. A051807.043
	ROCK CORE PHOTOGRAPHS	**Date:** 11/10/18

TOP

BOTTOM

Boring No. B-03, Run 4 & Run 5 WET
Run 4: 20 ft – 25 ft, REC = 100%, RQD = 100%
Run 5: 25 ft – 30 ft, REC = 85%, RQD = 85%

MC² Geotechnical • Environmental Materials Testing	**Geotechnical Engineering Services** **Upper Proctor Creek Capacity Relief Project** **City of Atlanta, Fulton County, Georgia**	**Prepared For:** WSP-BenchMark Management LLC JV 100 Peachtree Street, Suite 1900 Atlanta Georgia, 30303
		MC² Project No. A051807.043
	ROCK CORE PHOTOGRAPHS	**Date:** 11/10/18

TOP

BOTTOM

Boring No. B-04, Run 1 & Run 2 & Run 3
Run 1: 11 ft – 15 ft, REC = 13%, RQD = 0%
Run 2: 15 ft – 17 ft, REC = 15%, RQD = 0%
Run 3: 17 ft – 20 ft, REC = 0%, RQD = 0%

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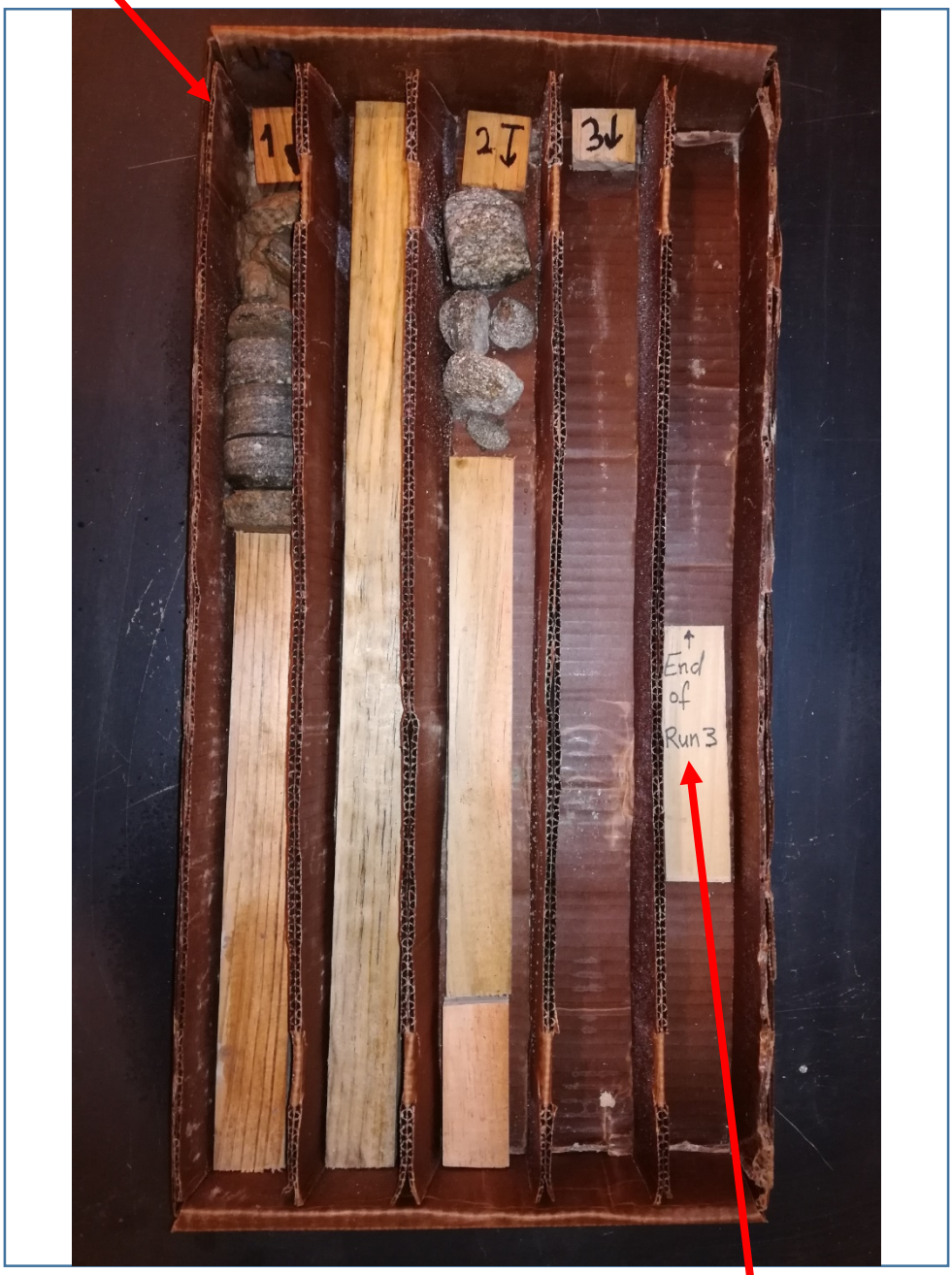
		MC² Project No. A051807.043
	ROCK CORE PHOTOGRAPHS	**Date:** 11/10/18

TOP



BOTTOM

Boring No. B-04, Run 1 & Run 2 & Run 3 WET
Run 1: 11 ft – 15 ft, REC = 13%, RQD = 0%
Run 2: 15 ft – 17 ft, REC = 15%, RQD = 0%
Run 3: 17 ft – 20 ft, REC = 0%, RQD = 0%

MC² Geotechnical • Environmental Materials Testing	**Geotechnical Engineering Services** **Upper Proctor Creek Capacity Relief Project** **City of Atlanta, Fulton County, Georgia**	**Prepared For:** WSP-BenchMark Management LLC JV 100 Peachtree Street, Suite 1900 Atlanta Georgia, 30303
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	ROCK CORE PHOTOGRAPHS	**Date:** 11/10/18

Tensile Before
B-02, Run 1, Elev. 941.5’ – 941.0’, Depth 20.5’ – 21’

Tensile After
B-02, Run 1, Elev. 941.5’ – 941.0’, Depth 20.5’ – 21’

MC² Geotechnical • Environmental Materials Testing	**Geotechnical Engineering Services** **Upper Proctor Creek Capacity Relief Project** **City of Atlanta, Fulton County, Georgia**	**Prepared For:** WSP-BenchMark Management LLC JV 100 Peachtree Street, Suite 1900 Atlanta Georgia, 30303
		MC² Project No. A051807.043
	ROCK CORE PHOTOGRAPHS	**Date:** 11/10/18

Compression Before
B-02, Run 1, Elev. 937.5’ – 937.0’, Depth 24.5’ – 25’

Compression After
B-02, Run 1, Elev. 937.5’ – 937.0’, Depth 24.5’ – 25’

MC² Geotechnical • Environmental Materials Testing	**Geotechnical Engineering Services** **Upper Proctor Creek Capacity Relief Project** **City of Atlanta, Fulton County, Georgia**	**Prepared For:** WSP-BenchMark Management LLC JV 100 Peachtree Street, Suite 1900 Atlanta Georgia, 30303
		MC² Project No. A051807.043
	ROCK CORE PHOTOGRAPHS	**Date:** 11/10/18

Tensile Before
B-02, Run 1, Elev. 937.5’ – 937.0’, Depth 24.5’ – 25’

Tensile After
B-02, Run 1, Elev. 937.5’ – 937.0’, Depth 24.5’ – 25’

MC² Geotechnical • Environmental Materials Testing	**Geotechnical Engineering Services** **Upper Proctor Creek Capacity Relief Project** **City of Atlanta, Fulton County, Georgia**	**Prepared For:** WSP-BenchMark Management LLC JV 100 Peachtree Street, Suite 1900 Atlanta Georgia, 30303
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Tensile Before
B-03, Run 3, Elev. 950.0’ – 949.5’, Depth 18.0’ – 18.5’

Tensile After
B-03, Run 3, Elev. 950.0’ – 949.5’, Depth 18.0’ – 18.5’

MC² Geotechnical • Environmental Materials Testing	**Geotechnical Engineering Services** **Upper Proctor Creek Capacity Relief Project** **City of Atlanta, Fulton County, Georgia**	**Prepared For:** WSP-BenchMark Management LLC JV 100 Peachtree Street, Suite 1900 Atlanta Georgia, 30303
		MC² Project No. A051807.043
	ROCK CORE PHOTOGRAPHS	**Date:** 11/10/18

Compression Before
B-03, Run 3, Elev. 950.0’ – 949.5’, Depth 18.0’ – 18.5’

Compression After
B-03, Run 3, Elev. 950.0’ – 949.5’, Depth 18.0’ – 18.5’

MC² Geotechnical • Environmental Materials Testing	**Geotechnical Engineering Services** **Upper Proctor Creek Capacity Relief Project** **City of Atlanta, Fulton County, Georgia**	**Prepared For:** WSP-BenchMark Management LLC JV 100 Peachtree Street, Suite 1900 Atlanta Georgia, 30303
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Tensile Before
B-03, Run 4, Elev. 943.5’ – 943.0’, Depth 24.5’ – 25.0’

Tensile After
B-03, Run 4, Elev. 943.5’ – 943.0’, Depth 24.5’ – 25.0’

MC² Geotechnical • Environmental Materials Testing	**Geotechnical Engineering Services** **Upper Proctor Creek Capacity Relief Project** **City of Atlanta, Fulton County, Georgia**	**Prepared For:** WSP-BenchMark Management LLC JV 100 Peachtree Street, Suite 1900 Atlanta Georgia, 30303
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Compression Before
B-03, Run 4, Elev. 943.5' – 943.0', Depth 24.5' – 25.0'

Compression After
B-03, Run 4, Elev. 943.5' – 943.0', Depth 24.5' – 25.0'

MC² Geotechnical • Environmental Materials Testing	**Geotechnical Engineering Services** **Upper Proctor Creek Capacity Relief Project** **City of Atlanta, Fulton County, Georgia**	**Prepared For:** WSP-BenchMark Management LLC JV 100 Peachtree Street, Suite 1900 Atlanta Georgia, 30303
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	ROCK CORE PHOTOGRAPHS	**Date:** 11/10/18

Tensile Before
B-03, Run 5, Elev. 938.5’ – 938.0’, Depth 29.5’ – 30.0’

Tensile After
B-03, Run 5, Elev. 938.5’ – 938.0’, Depth 29.5’ – 30.0’

MC² Geotechnical • Environmental Materials Testing	**Geotechnical Engineering Services** **Upper Proctor Creek Capacity Relief Project** **City of Atlanta, Fulton County, Georgia**	**Prepared For:** WSP-BenchMark Management LLC JV 100 Peachtree Street, Suite 1900 Atlanta Georgia, 30303
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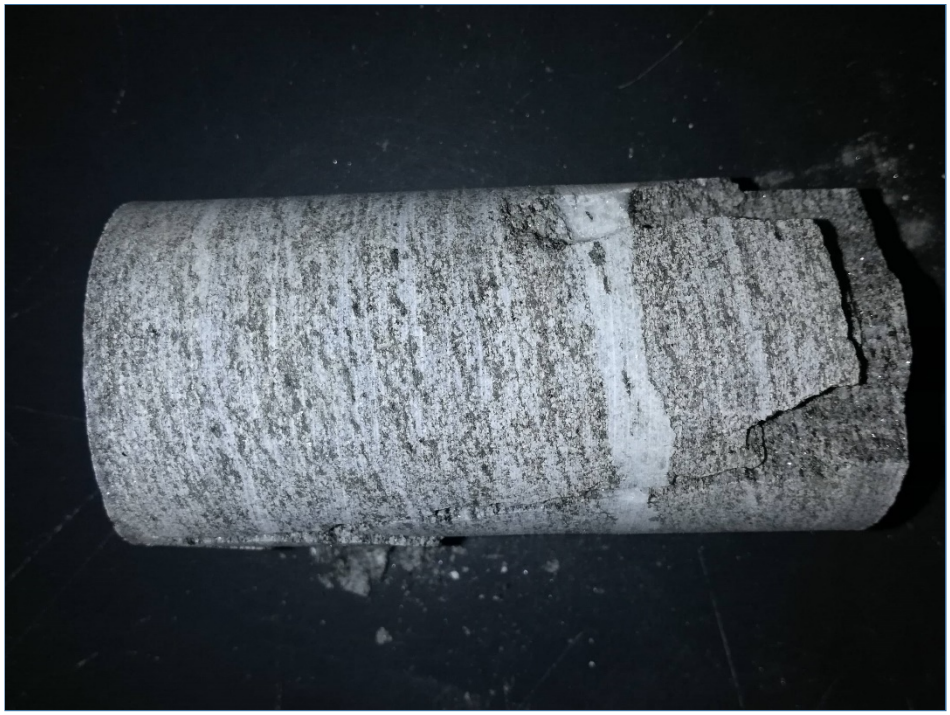
Compression Before
B-03, Run 5, Elev. 938.5’ – 938.0’, Depth 29.5’ – 30.0’



Compression After
B-03, Run 5, Elev. 938.5’ – 938.0’, Depth 29.5’ – 30.0’

MC² Geotechnical • Environmental Materials Testing	**Geotechnical Engineering Services** **Upper Proctor Creek Capacity Relief Project** **City of Atlanta, Fulton County, Georgia**	**Prepared For:** WSP-BenchMark Management LLC JV 100 Peachtree Street, Suite 1900 Atlanta Georgia, 30303
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Tensile Before
B-04, Run 1, Elev. 953.5’ – 953.0’, Depth 11.5’ – 12.0’

Tensile After
B-04, Run 1, Elev. 953.5’ – 953.0’, Depth 11.5’ – 12.0’

MC² Geotechnical • Environmental Materials Testing	**Geotechnical Engineering Services** **Upper Proctor Creek Capacity Relief Project** **City of Atlanta, Fulton County, Georgia**	**Prepared For:** WSP-BenchMark Management LLC JV 100 Peachtree Street, Suite 1900 Atlanta Georgia, 30303
		MC² Project No. A051807.043
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TEST PROCEDURES

The general field procedures employed by **MC Squared, Inc.** (**MC^2**) are summarized in the American Society for Testing and Materials (ASTM) Standard D420 which is entitled "Investigating and Sampling Soil and Rock". This recommended practice lists recognized methods for determining soil and rock distribution and groundwater conditions. These methods include geophysical and in-situ methods as well as borings.

Standard Drilling Techniques
To obtain subsurface samples, borings are drilled using one of several alternate techniques depending upon the subsurface conditions. Some of these techniques are:

In Soils:

a) Continuous hollow stem augers.
b) Rotary borings using roller cone bits or drag bits, and water or drilling mud to flush the hole.
c) "Hand" augers.

In Rock:

a) Core drilling with diamond-faced, double or triple tube core barrels.
b) Core boring with roller cone bits.

The drilling method used during this exploration is presented in the following paragraph.

Hollow Stem Augering: A hollow stem augers consists of a hollow steel tube with a continuous exterior spiral flange termed a flight. The auger is turned into the ground, returning the cuttings along the flights. The hollow center permits a variety of sampling and testing tools to be used without removing the auger.

Core Drilling: Soil drilling methods are not normally capable of penetrating through hard cemented soil, weathered rock, coarse gravel or boulders, thin rock seams, or the upper surface of sound, continuous rock. Material which cannot be penetrated by auger or rotary soil-drilling methods at a reasonable rate is designated as “refusal material”. Core drilling procedures are required to penetrate and sample refusal materials.

Prior to coring, casing may be set in the drilled hole through the overburden soils, to keep the hole from caving and to prevent excessive water loss. The refusal materials are then cored according to ASTM D-2113 using a diamond-studded bit fastened to the end of a hollow, double or triple tube core barrel. This device is rotated at high speeds, and the cuttings are brought to the surface by circulating water. Core samples of the material penetrated are protected and retained in the swivel-mounted inner tube. Upon completion of each drill run, the core barrel is brought to the surface, the core recovery is measured, and the core is placed, in sequence, in boxes for storage and transported to our laboratory.

Sampling and Testing in Boreholes

Several techniques are used to obtain samples and data in soils in the field, however the most common methods in this area are:

a) Standard Penetration Testing
b) Undisturbed Sampling
c) Dynamic Cone Penetrometer Testing
d) Water Level Readings

The procedures utilized for this project are presented below.

Standard Penetration Testing: At regular intervals, the drilling tools are removed and soil samples obtained with a standard 2-inch diameter split tube sampler connected to an A or N-size rod. The sampler is first seated 6 inches to penetrate any loose cuttings, then driven an additional 12 inches with blows of a 140-pound safety hammer falling 30 inches. Generally, the number of hammer blows required to drive the sampler the final 12 inches is designated the "penetration resistance" or "N" value, in blows per foot (bpf). The split barrel sampler is designed to retain the soil penetrated, so that it may be returned to the surface for observation. Representative portions of the soil samples obtained from each split barrel sample are placed in jars, sealed and transported to our laboratory.

The standard penetration test, when properly evaluated, provides an indication of the soil strength and compressibility. The tests are conducted according to ASTM Standard D1586. The depths and N-values of standard penetration tests are shown on the Boring Logs. Split barrel samples are suitable for visual observation and classification tests but are not sufficiently intact for quantitative laboratory testing.

Water Level Readings: Water level readings are normally taken in the borings and are recorded on the Boring Records. In sandy soils, these readings indicate the approximate location of the hydrostatic water level at the time of our field exploration. In clayey soils, the rate of water seepage into the borings is low and it is generally not possible to establish the location of the hydrostatic water level through short-term water level readings. Also, fluctuation in the water level should be expected with variations in precipitation, surface run-off, evaporation, and other factors. For long-term monitoring of water levels, it is necessary to install piezometers.

The water levels reported on the Boring Logs are determined by field crews immediately after the drilling tools are removed, and several hours after the borings are completed, if possible. The time lag is intended to permit stabilization of the groundwater level that may have been disrupted by the drilling operation.

Occasionally the borings will cave-in, preventing water level readings from being obtained or trapping drilling water above the cave-in zone.

BORING LOGS

The subsurface conditions encountered during drilling are reported on a field boring log prepared by the Driller. The log contains information concerning the boring method, samples attempted and recovered, indications of the presence of coarse gravel, cobbles, etc., and observations of groundwater. It also contains the driller's interpretation of the soil conditions between samples. Therefore, these boring records contain both factual and interpretive information. The field boring records are kept on file in our office.

After the drilling is completed a geotechnical professional classifies the soil samples and prepares the final Boring Logs, which are the basis for our evaluations and recommendations.

SOIL CLASSIFICATION

Soil classifications provide a general guide to the engineering properties of various soil types and enable the engineer to apply his past experience to current problems. In our investigations, samples obtained during drilling operations are examined in our laboratory and visually classified by an engineer. The soils are classified according to consistency (based on number of blows from standard penetration tests), color and texture. These classification descriptions are included on our Boring Logs.

The classification system discussed above is primarily qualitative and for detailed soil classification two laboratory tests are necessary; grain size tests and plasticity tests. Using these test results the soil can be classified according to the AASHTO or Unified Classification Systems (ASTM D-2487). Each of these classification systems and the in-place physical soil properties provides an index for estimating the soil's behavior. The soil classification and physical properties are presented in this report.

The following table presents criteria that are typically utilized in the classification and description of soil and rock samples for preparation of the Boring Logs.

Relative Density of Cohesionless Soils From Standard Penetration Test		**Consistency of Cohesive Soils**	
Very Loose	≤ 4 bpf	Very Soft	≤ 2 bpf
Loose	5 - 10 bpf	Soft	3 - 4 bpf
Medium Dense	11 - 30 bpf	Firm	5 - 8 bpf
Dense	31 - 50 bpf	Stiff	9 - 15 bpf
Very Dense	> 50 bpf	Very Stiff	16 - 30 bpf
		Hard	31 – 50 bpf
(bpf = blows per foot, ASTM D 1586)		Very Hard	> 50 bpf

Relative Hardness of Rock		**Particle Size Identification**	
Very Soft	disintegrates or easily compresses to touch; can be hard to very hard soil.	Boulders	Larger than 12"
Soft	May be broken with fingers.	Cobbles	3" - 12"
Moderately Soft	May be scratched with a nail, corners and edges may be broken with fingers.	Gravel	
		Coarse	3/4" - 3"
		Fine	4.76mm - 3/4"
Moderately Hard	Light blow of hammer required to break samples.	Sand	
		Coarse	2.0 - 4.76 mm
		Medium	0.42 - 2.00 mm
		Fine	0.42 - 0.074 mm
Hard	Hard blow of hammer required to break sample.	Fines (Silt or Clay)	Smaller than 0.074 mm

Rock Continuity		**Relative Quality of Rocks**	
RECOVERY = $\frac{\text{Total Length of Core}}{\text{Length of Core Run}}$ x 100 %		**RQD** = $\frac{\text{Cumulative length of all pieces} \geq 4"}{\text{Length of Core Run}}$ x 100 %	
Description	Core Recovery %	Description	RQD %
Incompetent	Less than 40	Very Poor	0 - 25 %
Competent	40 - 70	Poor	25 - 50 %
Fairly Continuous	71 - 90	Fair	50 - 75 %
Continuous	91 - 100	Good	75 - 90 %
		Excellent	90 - 100 %

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.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

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