
SECTION 01400

Quality Assurance/ Quality Control

PART 1 – GENERAL

1.01 SCOPE

This section includes requirements for implementing 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 (including subcontractor’s) failure to comply with this requirement.
- B. Contractor shall inspect all Work and report in writing to the Engineer any conditions that will prevent proper completion of the Work. Failure to report 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 Documents.
- B. The Work shall be conducted under the general observation of the Engineer and subject to inspection by representatives of the City acting on behalf of the City to ensure strict compliance with the requirements of the Contract Documents. Such inspection may include mill, plant, shop, or field inspection, as required. The Engineer 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 Engineer, or any inspector(s) shall not relieve the Contractor of the responsibility to properly execute the Work in accordance with all requirements of the Contract Documents. Compliance is the responsibility of the Contractor. No act or omission on the part of the Engineer, or any inspector(s) shall relieve 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 may accept non-

conforming Work when adequate compensation is offered and it is in the City's best interest as determined by the City.

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

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 tests and analyses before the 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 Engineer 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 Engineer at least three Work Days in advance of any such inspections shall be reasonable cause for the Engineer 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 Engineer and the City of Atlanta (Section 1.6). 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 used to verify and maintain quality work. When not otherwise specified, all sampling and testing shall be according to the methods prescribed in the most current standards, as applicable to the class and nature of the article or materials considered. However, the Engineer reserves the right to use any generally accepted system of inspection which, in the opinion of the

Engineer, will ensure the Engineer that the quality of the workmanship is in full accord with the Contract Documents.

- B. The City reserves the right to abbreviate, modify the frequency of or waive tests or quality assurance measures. 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 Documents.
- C. Despite the existence of such waiver, the City shall reserve the right to make independent investigations and tests as specified in the following paragraph. Failure of any portion of the Work to meet any of the requirements of the Contract Documents shall be reasonable cause for the City 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 shall have the right to independently select, test, and analyze, at the expense of the City, additional test specimens of any or all of the materials 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 tested or analyzed provided that wherever any portion of the Work is discovered to fail to meet the requirements of the Contract Documents, 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 work done by the Contractor. The program shall provide the Contractor with adequate measures for verification and conformance to defined requirements by his personnel and subcontractors (including fabricators, suppliers, and sub-subcontractors). 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 Engineer a project specific QA/QC Plan. The Plan shall contain a comprehensive account of Contractor's QA/QC procedures applicable to this job. The Contractor shall furnish for review by the City of Atlanta and the Engineer, 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 described in the following paragraphs. No payments will be made to the Contractor until the QA/QC Plan is fully accepted by the Engineer.

- C. The QA/QC Plan shall describe and define its personnel requirements . The Contractor shall employ a full-time, on-site Field 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 agreed to by the City. The QA/QC Manager shall have a minimum 10 years of construction experience in sanitary sewer pipe line installation. The QA/QC Manager shall be onsite at all times during 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 to assist the QA/QC Manager 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 quality control representatives outlining duties, authorities, and responsibilities. Copies of these letters shall also be furnished to the City
- D. The Contractor's QA/QC program shall ensure the achievement of adequate quality throughout the contract. A customized QA/QC Plan shall be developed for each type of work that the Contractor is responsible in 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, a 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. In addition, the Plan shall describe methods for areas that require special testing and procedures in the specifications.
 2. This plan shall require preparatory training, follow-up monitoring and ongoing observation of the work.
 - a. The preparatory training class will be required by the Contractor's and/or sub-contractor's crews before the start of each new construction activity. The City

will attend and monitor the training. This training will consist of a hands on demonstration of the work activities by the crews. The contractor crews shall demonstrate proper construction techniques in performance of the work. This will include, but not limited to, demonstrations in trench safety, flagging, pipe bedding, pipe installation, service connections, backfill installation and compaction of backfill, manhole and inlet layout and construction, plumbing, string-lining, batter boards and laser setup, static and pressure testing of pipelines and manholes, landscaping and tunneling techniques. No crews may begin work prior to successfully completing the preparatory training. This training will be monitored by the contractor's QA/QC Manager, Safety Manager and Supervisor. The QA/QC Manager shall submit a certification to the Engineer after each training session that the work crew have attended and successfully completed the training.

- b. The follow-up monitoring will take place no later than 10 days after the preparatory training. The follow-up monitoring will require the work crews to continue to demonstrate the proper means and methods of construction as performed in the preparatory training class. If in the sole judgment of the Engineer that work is not performed based on the QA/QC plan and/or the contract documents, the crews shall discontinue the work and must attend the preparatory training class again. The QA/QC Manager shall submit a certification to the Engineer after each follow-up training session that the work crews will perform the work based on the QA/QC Plan and/or Contract Documents. Any retraining will be at no cost to the City.
 - c. Ongoing monitoring will take place throughout the project. The ongoing monitoring will require the work crews to demonstrate the proper means and methods of construction as performed in the preparatory class. If in the judgment of the Engineer the work is not being performed based on the QA/QC plan and/or the Contract Documents the crews shall attend the preparatory training class again. Any retraining will be at no cost to the City.
- 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

standard certification and license. Records of personnel experience, training and qualifications shall be submitted to the engineer for review and approval.

2. The Contractor shall maintain and provide to the Engineer, 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 resolving 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 Contractor.

- a. Individual test records will contain 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 Engineer 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 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
 - c. QC Manager's signature that provide the location maps or 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 Engineer 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 lower-tier suppliers and/or subcontractors. QA/QC inspections and certifications may not be deferred to the Contractor's subs or suppliers.

J. Deficient, Defective, and Non-conforming Work; 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 procedure 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 used 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 Engineer before the start of Work on the Project.

L. Audits: 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 subtiers. Audit records shall be made available to the Engineer upon request. The Contractor will provide to the City of Atlanta a quarterly report indicating any outstanding and unresolved exceptions to the QA/QC program or contract documents. This 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 Documents that describe how Drawings and Specifications 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 Engineer.
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 nonconforming 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 Engineer at the completion of activities and in conjunction with logs and locational drawings.

N. Acceptance of QA/QC Plan: Engineer'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 Engineer's review and continued acceptance. The City, 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 Engineer's acceptance of Contractor's QA/QC plan has been obtained.

O. Engineer may perform independent quality assurance audits to verify that actions specified in Contractor's QA/QC Plan have been implemented. No Engineer 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 Engineer. 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. Contractor's independent testing laboratory shall be accredited by the American Association of State Highway and Transportation Officials (AASHTO) for the tests they will perform and as appropriate to the construction work being performed. The Contractor's laboratory shall also be AASHTO accredited in: ASTM C1077-92, "Practice

for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation”; ASTM D3740, “Practice for Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design/Construction”; and ASTM D3666, “Specifications for Minimum Requirements for Agencies Testing and Inspecting Bituminous Paving Materials”; ACI, American Concrete Institute standards and specified industry standards for sewers, waterlines, sidewalks, curbs and other applicable work.

- C. Testing, when required, will comply with all pertinent codes and regulations and with procedures and requirements of the American Society for Testing and Materials (ASTM).
- D. The Engineer 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 independent testing laboratory’s internal quality assurance records (quality assurance manual, equipment calibrations, proficiency sample performance, etc.).
- E. Contractor shall obtain Engineer’s acceptance of the testing firm before having services performed, and shall pay all costs for these testing services.
- F. Testing services provided by City, if any, are for the sole benefit of City, however, test results shall be available to Contractor. Testing necessary to satisfy Contractor’s internal quality control procedures shall be the sole responsibility of Contractor.
- G. Laboratory Duties:
 - 1. Cooperate with Engineer and Contractor.
 - 2. Provide qualified personnel promptly on notice.
 - 3. Perform specified inspections, sampling and testing of materials and methods of construction.
 - 4. Comply with specified standards, ASTM, other recognized authorities and as specified.
 - 5. Establish compliance with requirements of Contract Documents.
 - 6. Promptly notify Engineer and Contractor of irregularity or deficiency of work, which are observed during performance of services.
 - 7. Perform additional services as required.
 - 8. Transmit to the Engineer within three workdays after each test is completed two written copies and one electronic copy of the report for each test. Each report for each type of test shall be consecutively numbered. Each report shall include:
 - a. Date issued

- b. Project title and number
 - c. Testing laboratory name and address
 - d. Name and signature of inspector
 - e. Date of inspection or sampling
 - f. Record of temperature and weather
 - g. Date of test
 - h. Identification of product and Specification section
 - i. Location of Project
 - j. Type of inspection or test
 - k. Results of test
 - l. Observations regarding compliance with Contract Documents
9. Laboratory is not authorized to:
- a. Release, revoke, alter or enlarge on requirements of Contract Documents.
 - b. Approve or accept any portion of Work.

H. TESTING SERVICES FURNISHED BY CONTRACTOR

I. Unless otherwise specified, and in addition to all other specified testing requirements, Contractor shall provide all testing services as required for Engineer's review:

1. Concrete strength tests.
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. Other materials and equipment as specified herein.
5. Concrete materials and mix designs
6. Embankment, fill, and backfill materials, density, optimum moistures and compaction.
7. QC testing of all precast and/or prestressed concrete
8. All other tests and engineering data required for Engineer's review of materials and equipment proposed to be used in the Work
9. In addition, the following QC tests shall be performed by Contractor:

- a. Holiday testing of pipeline or other coatings.
 - 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.
10. Testing, including sampling, shall be performed by Contractor's testing firm's laboratory personnel, in general manner and frequency indicated in the Specifications. The Engineer and/or the City of Atlanta's representative shall have the right to stipulate the location of the confirmation tests. Contractor shall provide preliminary representative samples of materials to be tested to laboratory, in required quantities.
 11. 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.
 12. Contractor shall furnish all sample materials and cooperate in the testing activities, including sampling. Contractor shall interrupt the Work when necessary to allow testing, including sampling to be performed. Contractor shall have no claim for an increase in Contract Price or Contract Times due to such interruption. The Contractor shall be responsible for transporting all samples, except those taken by testing laboratory personnel, to the testing laboratory.
 13. When testing activities, including sampling are performed in the field by the test firm's laboratory personnel, Contractor shall furnish required labor and facilities
 - a. to provide access to Work to be tested
 - b. to obtain and handle samples at the site
 - c. to facilitate inspections and tests
 - d. build or furnish a holding box for concrete cylinders or other samples as required by the laboratory.
 14. 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 Engineer and shipped to the laboratory by the Contractor at Contractor's expense.
 15. Notify laboratory sufficiently in advance of operation to allow for the assignment of personnel and schedules of tests.
 16. The Contractor shall be responsible for furnishing all materials necessary for testing.

17. Additional testing requirements are included in Section 02546 for Grouted PVC Profile Sewer Pipe Liner System.
- J. Transmittal of Test Reports: Written reports of tests and engineering data furnished by Contractor for Engineer'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.
 1. 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.
- K. Copies of all correspondence between the Contractor and testing agencies shall be provided to the Engineer.
- L. 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.
- M. Inspection or testing performed exclusively for the Contractor's convenience shall be the sole responsibility of the Contractor.
- N. Schedules For Testing
 1. Establishing Schedule
 - a. The Contractor shall, by advance discussion with the testing laboratory determine the time required for the laboratory to perform its tests and to issue each of its findings, and make all arrangements for the testing laboratory to be on site to provide the required testing.
 - b. Provide all required time within the construction schedule.
 - c. When changes of construction schedule are necessary during construction, coordinate all such changes of schedule with the testing laboratory as required.

****END OF SECTION 01400****