Georgia Department of Transportation
Office of Materials and Testing

Standard Operating Procedure (SOP) 19

Quality Control and Quality Assurance of Concrete Pipe, Precast Drainage Structures & Miscellaneous Precast Products

I. GENERAL

The purpose of this procedure is to establish guidelines for acceptance of concrete pipe, precast concrete drainage structures and miscellaneous precast by the Georgia Department of Transportation (GDOT). This procedure outlines guidelines for producers to help ensure all products purchased by the Department, directly or through its contractors and subcontractors are produced in compliance with the plans, approved drawings, and specifications of the Department. This program will be administered by the Inspection Services Branch of the Office of Materials and Testing.

Concrete pipe, precast concrete drainage structures and miscellaneous precast that are used in Department work shall be manufactured at a Certified plant. Certified plants are defined as those plants with a Department approved quality assurance program, a Certified Concrete Pipe/Precast Technician (CPT) and with an acceptable record of production of quality products. All Certified plants under this SOP will be listed on Qualified Product List (QPL) 4, Concrete Pipe, Precast Manhole and Miscellaneous Precast Producers. Products from approved producers listed on QPL-4 may be accepted at the jobsite without additional inspection or testing, provided they arrived properly documented and undamaged.

Miscellaneous precast concrete products as they relate to this program are those items manufactured under one of the following categories:

- Right-of-Way markers
- Concrete pipe end treatments
- Precast inlets

II. Producer Initial Qualification Requirements

A. Application

Any producer of concrete pipe, precast concrete drainage structures and miscellaneous precast covered under this procedure wishing to furnish products for use in GDOT highway construction shall submit the following documentation as outlined below:

1. A written request to be considered for inclusion on QPL-4. This shall include:
    a. The company name, plant address and telephone number
    b. Names of the principal officers of the company, names of plant manager, plant engineer, production superintendent, quality control supervisor and certified precast technician or applicant
2. Plant Certification:
    a. ACPA QCast Plant Certification (American Concrete Pipe Association) and/or
    b. NPCA Plant Certification (National Precast Concrete Association).

    The QCAST or NPCA certification requirement shall not apply to producers approved prior to January 1, 2024 who have maintained a continuous GDOT certification. Any period of unapproved status for any reason, either voluntary or involuntary, will require QCAST or NPCA certification for recertification.
3. A Quality Control Plan outlining the company's quality assurance/control program. This shall include, but is not limited to, the following:

a. A statement summarizing the producers Quality Control plan.

b. The procedures for controlling and monitoring the quality of the concrete products during production.

c. The company name, plant address and telephone number

d. Names of the principal officers of the company, i.e., owner, president, etc.

e. Names of key plant personnel and specific duties, i.e., plant manager, plant engineer, production superintendent, quality control supervisor

f. Name of Certified Pipe/Precast Technician or applicant

g. List of all major production equipment

h. Listing of testing equipment for "in-house" testing. The producer shall have a plant Laboratory which is adequately supplied with the equipment necessary to perform the required testing as prescribe by the Department

i. If applicable, name, address, telephone number and services of the independent testing laboratory.

j. Shipping procedures for Department projects.

The producer shall update the Quality Control Plan annually, and any time there is a significant change in personnel, production, materials, or Quality Control Procedures.

4. A notarized Annual Guarantee stating that all concrete pipe, precast manholes, and/or miscellaneous precast material furnished for use on Georgia Department of Transportation projects are warranted to meet all requirements of the governing Plans and Specifications. The certified technician must also submit a notarized Inspector's Annual Guarantee. The Annual Guarantee(s) must carry the notarized signature of a responsible officer of the company with the authority to bind the company to contract. Both forms will be provided by the Department after receiving written request.

5. A list of all concrete products to be manufactured at the plant, including sizes.

6. The source and type of all materials used in the manufacturing of concrete products in accordance with Section IV of this procedure.

7. Concrete mix designs to be used in the manufacture of concrete products in accordance with Section IV of this procedure.

8. Producers and plants located outside the boundaries of the State of Georgia shall provide a letter stating that the company agrees to reimburse the Department for the actual cost of travel, subsistence, and extra expense incurred by the Department in the execution of the plant inspection and any subsequent inspection that may be necessary to complete the initial plant certification process. All costs are in accordance with the current Federal Per Diem and Mileage reimbursement rates.

9. All Application information shall be submitted and directed to the following address or email:

   Georgia Department of Transportation
   Office of Materials & Testing
   Inspection Services Branch
   15 Kennedy Drive
   Forest Park, Georgia 30297
   InspectionServices@dot.ga.gov

10. A plant inspection will be scheduled only after all required documents have been received, reviewed and determined to be acceptable.

11. The plant may be certified to perform work for the Department and added to the approved list, QPL-4, after all requirements have been met and approved, including:

    a. The results of the plant inspection indicate an ability to consistently furnish uniform products which conform to the Specifications and Plan drawings.

    b. The successfully completion of the written and practical examinations by the Certified Pipe/Precast Technician (CPT) applicant as outlined in Section V of this procedure.

III. Producer Re-Qualification, Removal and Reinstatement Requirements

A. Producer Re-Qualification

1. Approved producers shall be re-qualified annually.
2. At the time of re-qualification, the producer shall submit the documentation outlined in Section II.A of this procedure.
3. Annual certification renewal application shall be submitted no later than December 1 of each year in order to remain an approved source for the following calendar year.

B. Removal from the Approved List

The Department reserves the right to remove any producer from the approved list at any time confidence is lost in a producer's ability to produce material of uniform characteristics complying with the Georgia Department of Transportation Specifications. Additional reasons for removal from the approved list include, but is not limited to, the following:

1. Failing to submit annual certification renewal application by the established deadline.
2. When the source has not produced products for a Departmental project for a period of twelve (12) months.
3. Failure to maintain a current ACPA or NPCA certification.
4. Failing to employ a Certified Precast/Pipe Technician.
5. Using materials that are not on the Departments approved source list.
6. Supplying products to a GDOT project produced from concrete which does not conform to the mix design approved by the Department.
7. Failing to comply with or correct any deficiency related to any requirement in this procedure and/or Quality Control program within 30 days after receiving a written notice from the Department indicating the non-compliance issues.
8. Deviating from the requirements in the Quality Control program without Department approval.
9. Falsification of reports, test results, records, etc.

C. Reinstatement to the Approved List

Once removed from the approved list, a producer may request reinstatement in the following manner:

1. Producers shall make a written request to the State Materials and Testing Engineer requesting to be reinstated to the approved list. The request will detail the causes and solutions to the problem areas which caused removal from the approved list. In addition, the producer shall state measures taken to prevent reoccurrence of problems.
2. After reviewing the request for reinstatement, if the producer's problems have been corrected, an inspection of facilities will be made and all products in stock will be inspected.
3. After examination of data gained from subparagraph 1 and 2 above, the State Materials and Testing Engineer will decide if the producer may be reinstated to the approved list. Some cases may warrant conditional reinstatement.

IV. MATERIALS CONTROL PROGRAM

Each producer shall have an approved materials control program that ensures all materials are from sources listed on the Departments published list of approved sources.

- Aggregate – QPL-1 & 2
- Cement – QPL-3
- Redi-Mix Concrete Plants – QPL-10
- Gray Iron Castings – QPL-11
- Joint Sealers & Gaskets – QPL-21
- Manhole Steps – QPL-31
- Fly Ash – QPL-30
- Air Entraining and Chemical Admixtures – QPL-13 & 14
- Steel Reinforcement– QPL-12, 55 & 61

- Macro-Synthetic Fibers – QPL-86

A. Concrete Mix Designs

Unless otherwise shown on the project plans or required by the Specifications, concrete mixes shall be in accordance with the governing Specifications outlined in Section VI of this procedure and shall be submitted for review and approval by the Office of Materials & Testing with the initial application for plant certification. The mix design information shall include the source information and proportions of all materials and admixtures of one (1) cubic yard of concrete.

B. Concrete Raw Materials

The sampling and testing of materials must begin early enough to insure acceptability of materials prior to manufacturing timelines. Department inspectors may secure samples to verify the quality of materials as received from the sources. Plant control sampling or testing of materials from approved sources unless noted is not required.

1. Fine and coarse aggregate shall be from an approved aggregate source and maintained in separate identified stockpiles, hoppers or bins in a manner that will provide uniformity of gradation.
2. Portland cement shall be from an approved source and maintained in watertight silos or hoppers that will prevent caking, hardening or lumping of the cement. If more than one type of cement is used, each type will be maintained separately and not mixed.

C. Steel Materials and Buy America Requirements

All steel materials and products permanently incorporated in concrete products shall meet the requirements of the FHWA Buy America Policy. Provide documentation certifying that all steel materials and products meet these requirements to the State Materials and Testing Engineer upon request. All Buy America exception requests shall be made in writing to the State Materials and Testing Engineer. Buy America exception requests may or may not be approved.

1. Steel reinforcement shall be obtained from approved sources and must be traceable to a certified mill test report.

D. Curing Concrete

Concrete pipe and precast shall be cured in accordance with the requirements of AASHTO M 170 and AASHTO M 199 respectively. Special care shall be taken to prevent excessive evaporation or drying out of concrete.

E. Concrete Testing Equipment

All concrete testing equipment shall be in good working order and free of concrete buildup. Certified calibration of compressive testing machines, a decal and certification letter issued by the calibration company shall be on file at the plant. All compressive testing machines shall be recalibrated, by an independent third-party calibration company, at twelve-month intervals or as needed to verify accuracy. Provide a certified copy of all calibration certificates to the Office of Materials and Testing plant inspector at the time of inspection. In addition, producers will be able to obtain a coring device capable of securing a 4-inch (100 mm) core from a section when necessary for strength determination.

V. Technician Certification and Responsibilities

A. Certification of Technician

Personnel selected by the producer to be the Certified Concrete Pipe/Precast Technician shall establish their qualifications and proficiency by successfully completing written and practical on-the-job examinations prescribed by the Office of Materials & Testing. Quality control must be the primary function of the certified technician.

The technician must not be under the supervision of the production manager and must report only to the general manager or owner. The general manager or owner must ensure that the technician is not overburdened with other miscellaneous duties that interfere with the technician's ability to perform quality control. The certified technician shall possess the authority to halt production upon discovery of manufacturing defects and/or improper manufacturing techniques until appropriate corrections are implemented.

Producers may request additional technicians in writing to the Inspection Services Branch Chief. The letter will state the reason additional technicians are required and which will be designated as the primary and secondary technician. Only one technician will be active at the plant at any given time in order to maintain proper tracking of inspections, stamping of product and reporting of all required GDOT paperwork.

B. Technician Responsibilities

The Certified Pipe/Precast Technician shall be responsible for, but not limited to, the following:

1. Compliance with the plant's quality control program.
2. Be present during the production and shipment of concrete products.
3. Perform compressive testing of cylinders and three edge bearing test of finished pipe as required in this procedure.
4. Ensure all testing equipment is calibrated and maintained in accordance with this procedure.
5. Control all requisites for concrete mixes and determine their acceptability including testing fresh concrete (slump, air, and temperature and cylinder fabrication as required).
6. Ensure that all concrete products are properly cured as per the applicable specification.
7. Ensure that all manufacturing materials are from GDOT approved sources.
8. Maintain a daily production log.
9. Visually inspect each joint, section, unit, etc. after loading, before shipment leaves the plant.
10. Perform pre-pour inspection of dimensions for positions of reinforcement steel, correct spacing, inserts, and other integral items of the concrete structure.
11. Inspect the finished product for dimensional accuracy and appearance.
12. Provide the Office of Materials and Testing with documentation of shipping reports, inspection reports, and any other reports or documentation as required or requested by the Office of Materials and Testing Plant Inspector. All applicable forms and reports will be provided to the technician by the Department.
13. Permanently stencil all required information inside each section of approved products which meet all applicable specification requirements (i.e., pipe class, type of wall, GDOT Standard number, date of manufacture, name or trademark of the manufacturer, piece number, project number). In addition, the date of manufacture is required to be permanently indented or "scratched" on the outside of the product while concrete is still wet before curing.
14. Personally inspect each section, cull and reject any material which fails to meet the requirements.
15. Stencil on each section of material that is found to be acceptable a "CPT" inspection stamp, assigned and issued for use by the State Materials and Testing Engineer. The "CPT" stamp shall not be stenciled on the section until all required tests are completed as required by the Specifications.

An adequate amount of "CPT" stamped material shall be kept in stock so that the Department Inspectors will have an opportunity to inspect prior to shipment. Stock material shall be continuously rotated and replenished with newer material.

VI. Product Requirements and Acceptance

A. Specification Requirements for Concrete Pipe

Concrete pipe is required to be manufactured in accordance with GDOT Standard Specification Section 843 and AASHTO M170.

Concrete pipe shall be accepted on strength test results determined by the following testing methods and frequency in accordance with AASHTO T 280 and/or AASHTO T 22:

1. Three-Edge Bearing Tests

a. D-load 0.01-in. crack – 1 joint per day's production, per class and diameter. All pipe shall be tested to a minimum of 100% of the 0.01-in. specified D-load requirement or 0.01-in. crack width, whichever occurs first.
b. D-load ultimate – 1 joint per quarter (4 months), per class and diameter.

2. Concrete Cylinder Compression Tests - Pipe diameters measuring 42 in (1067 mm) and larger may be strength tested by means of compression testing of concrete cylinders, in lieu of three-edge bearing testing, at the manufacturer's discretion. The technician will prepare a minimum of three 6-by-12 in. cylinders for each day's production per class and diameter for testing purposes. 4-by-8 in cylinders may be used when the nominal maximum size of the coarse aggregate does not exceed one (1) in. This does not, however, preclude the Department from requiring Three-Edge Bearing tests on a random basis. Once the required compressive strength is equal to or greater than the required concrete strength, testing may cease, and pipe sections accepted. If after 28 days, the compressive strength does not meet the requirements the pipe sections shall be rejected. Pipe that fails to meet the strength requirements as determined by this test method may only be retested using Three-Edge Bearing testing with approval of the State Materials Engineer.

Patching of concrete pipe is limited to the repair of minor defects. Minor defects do not include through-wall cracks of any dimension, 0.010 in (0.25 mm) cracks measuring 12 in (300 mm) or more in length or damage/defects to pipe ends where such damage would prevent making a satisfactory joint. Pipe sections that are damaged or otherwise defective shall be rejected.

Pipe less than 72 hours old will not be permitted for shipment.

B. Specification Requirements for Precast

Concrete precast is required to be manufactured in accordance with the following:

1. Precast concrete catch basin, drop Inlet, and manhole units shall be manufactured according to GDOT Standard Specification Section 866 and AASHTO M199.
2. Precast reinforced concrete box culverts barrel sections and end sections shall be manufactured in accordance with GDOT Standard Specification Section 513, AASHTO M259 and GDOT Standard Details.
3. Precast pipe end sections shall be manufactured according to GDOT Standard Specification Section 866 and Standard Details.
4. Concrete right-of-way markers are required to be manufactured in accordance with GDOT Standard Specification Section 634 and Standard Detail 9003.
5. In addition, all precast shall be manufactured according to GDOT Construction Standards and Details. Any deviations or modifications from the Standard and Detail drawings are required to be approved prior to manufacture as follows:
    a. Submit a detailed design drawing to the Prime Contractor for submittal to the construction project engineer.
    b. The construction project engineer shall approve or submit the design drawing to GDOT District Design Office or the Office of Design Policy and Support for approval.
    c. A signed copy of approved design drawing shall be maintained on file at the plant for future reference.
6. Precast concrete shall be accepted on compressive strength test results of concrete cylinders in accordance with AASHTO T 280 and/or AASHTO T 22 and specification requirements. The technician will prepare a minimum of three 6-by-12 in. cylinders for each day's production for testing purposes. 4-by-8 in cylinders may be used when the nominal maximum size of the coarse aggregate does not exceed one (1) in. Once the required compressive strength is equal to or greater than the required concrete strength, testing may cease, and precast sections accepted. If after 28 days, the compressive strength does not meet the requirements the precast sections shall be rejected.

VII. Reporting

All plants shall comply with the approved system of reporting each shipment of material to GDOT projects. The following reports shall be completed and submitted by GDOT authorized plant personnel to the Office of

Materials and Testing within one week of shipment. In addition, copies of the completed shipment forms shall accompany each shipment to the project site and shall be delivered to the purchaser/contractor to be provided to the GDOT Construction Project Engineer.

A. Pipe

1. Each shipment of pipe shall be reported on form DOT 164A.
2. Inspection and testing of pipe shall be reported on form DOT 86

B. Precast

1. Each shipment of precast shall be reported on form DOT 164B.
2. Inspection and testing of precast shall be reported on form DOT 86A

C. Right-of-Way Markers

1. Each shipment of markers shall be reported on form DOT 164C.

D. Non-GDOT Project

Producers may supply GDOT approved, and CPT stamped pipe/precast to city, county and other non-GDOT projects following the same shipping and reporting procedures, except that the shipping reports are not required to be sent to the Office of Materials and Testing. These forms should instead be completed and kept on file at the producer's location indefinitely. Please note that GDOT approved, and CPT stamped pipe/precast must meet the Department standards and specifications irrespective of being supplied to GDOT or non-GDOT projects.

VIII. DOCUMENTATION

A. Plant Records

The producer is required to have orderly record files maintained and readily available at the plant for inspection. All records shall always be fully accessible to the Office of Materials and Testing Plant Inspectors and must be maintained for a minimum of three (3) years after project completion. Copies of any records requested by the Office of Materials and Testing shall be provided. These records are as follows:

1. Maintain test results and test reports on all materials that are used in the work.
2. Maintain records of production reports.
3. Maintain accurate records of all production inspected, tested and shipped.
4. Maintain certified calibration certificates of all concrete testing equipment and batch plant.
5. Maintain documentation certifying that all materials permanently incorporated into products meet the requirements of Buy America.

B. Office of Materials and Testing Records

The Office of Materials and Testing will maintain the following records:

1. The Office of Materials and Testing will maintain records of all plant certifications, quality control and technician personnel and annual guarantee.
2. Maintain records of test results of all control samples and independent assurance samples.
3. Maintain records of all inspection and testing reports, shipping reports, and materials certifications.

IX. Project Acceptance

The Construction Project Engineer may accept, at the job site, material from approved producers listed on Qualified Products List (QPL) 4 providing all necessary information is clearly marked and legible on each joint or section and there are no signs of damage due to shipping or handling. Each shipment shall include the required GDOT shipping report signed by the plant CPT for the project engineer's records.

State Materials Engineer

Director of Construction