

Section 8.2

Volume I

MANUFACTURED INCIDENTAL PRECAST/PRESTRESSED CONCRETE PRODUCTS

8.2.1 Purpose

This procedure provides guidance to Department personnel related to the implementation of the quality control and quality assurance programs for incidental precast/prestressed concrete structures. The incidental precast concrete structures (Structures) may include, but are not limited to sound barriers, retaining wall systems, concrete poles, temporary traffic barriers, light pole foundations, sign foundations, pull and junction boxes.

8.2.2 Authority

Sections 20.23(3) (a) and 334.048 (3), Florida Statutes.

8.2.3 References

Federal Aid Policy Guide 23CFR, Subchapter G Engineering and Traffic Operation, Part 637, Construction Inspection and Approval, Subpart B Quality Assurance Procedures for Construction, Section 637.209.

Design Standards Topic No. 625-010-003, Florida Department of Transportation.

American Society for Testing and Materials (ASTM) International Standard Test Methods and Specifications, Philadelphia, Pennsylvania.

American Association of State Highway and Transportation Officials (AASHTO), Part I Specifications, and Part II Tests, Washington, D.C.

Florida Department of Transportation Specifications for Road and Bridge Construction

Approved Products List, Florida Department of Transportation.

Field Sampling and Testing Manual, Florida Department of Transportation.

8.2.4 Scope

Primary offices affected by this procedure include the State Materials Office, District Materials and Research Offices, District Construction Offices, State Structures Office and State Traffic Operations Office.

8.2.5 General Information

The Incidental Precast Concrete Structures Plants (Plants) produce, inspect, store, and ship Structures meeting the requirements of the ***Specifications and Contract Documents***. The District Materials and Research Offices verify that manufactured Structures conform to the requirements of the ***Specifications and Contract Documents***. The District Materials and Research Office reviews quality control plans and arrange for the inspection of the Plants prior to the commencement of any work.

8.2.6 District Materials and Research Office Responsibilities

8.2.6.1 Plant Qualification Review Process

8.2.6.1.1 Plant's Initial and Annual Qualification Review

The Plant submits the proposed quality control plan in compliance with ***Materials Manual Section 5.6, Quality Control Program***. The District Materials and Research Office (DMRO) will make arrangements for the Plant's initial and routine annual qualification reviews, including Plants that are submitting their first quality control plan as well as the Plants that have not produced for any Department projects for more than one year.

The DMRO forms the Plant qualification review team and performs the review. The qualification review team shall include the District and State Materials Offices precast/prestressed concrete representatives. The qualification review team may also include other personnel including, District Structural Materials Engineer, District Concrete Production Manager, District and State Structures Engineers, District and State Traffic Operations Engineers, the Verification Inspector, and representative(s) of the Federal Highway Administration. The qualification review team reviews the Plant's manufacturing process, quality control testing, inspection, and documentation. The qualification review team may also review the Plant's records, forming, reinforcing steel placement, concrete placement operations, storage, and shipment of the products. The review team checks the Plant's production process.

Upon the satisfactory plant qualification reviews, the DMRO accepts (approves) the proposed quality control plan and documents the Plant's status as "A" on the Department's Production Facility Listing.

8.2.6.1.2 Maintenance of Plant Quality Control Plan and Qualification

The Plant submits, in writing, any changes to quality control plan to the District Materials Office and annually, submits the revised quality control plan or its addendum, if there are any changes.

Plants that are on the Department's list of Production Facility Listing will be subject to a Plant qualification review at any time. If the qualification review team or Verification Inspectors find any process which would result in products not meeting the Specifications, they shall immediately bring it to the attention of the Plant. The Plants with acceptable quality control plans and satisfactory qualification reviews are considered to be qualified Plants.

8.2.6.2 Routine Inspection and Materials Testing of Qualified Plants

8.2.6.2.1 General

The District Materials Offices shall make sure that the Plants perform all quality control sampling and testing of **Section 346** designated class of concrete in accordance with the ***Florida Department of Transportation Specifications Section 346***.

8.2.6.2.2 Responsibility of Verification Inspectors

8.2.6.2.2.1 General

The following are the general responsibilities of Verification Inspectors:

- (A) At a minimum frequency of once per month, review the records for materials received at the Plant and/or incorporated into the fabrication of Structures, including the certified physical property reports.
- (B) Verify that the quality control Inspectors maintain the required certification documents.
- (C) Annually, obtain samples from two randomly selected "Lots" of reinforcing steel, welded wire reinforcement and prestressing strand for testing.

- (D) Sample other Structures material components, as needed.
- (E) Check the handling and storage for each material component of Structures.
- (F) Visually check the condition of steel reinforcement.
- (G) Ensure that the Plant's quality control manager and inspectors are performing inspections in compliance with the quality control plan.
- (H) Perform random spot-checks of the finished Structures to ensure that they are fabricated in compliance with the requirements of the ***Specifications and Contract Documents***.
- (I) Perform in-depth reviews of some phases of work, as needed.
- (J) Advise the quality control manager of any observed deficiency.
- (K) Perform spot checks of the repair methods.
- (L) Advise the quality control manager of the acceptability status of quality control test results.

8.2.6.2.2.2 Sampling and Testing of Structure Material Components

8.2.6.2.2.2.1 Reinforcing Steel

Each "Lot" of the reinforcing steel is accepted based on the certified mill analysis of the steel manufacturing plant and Department's Verification samples. Take steel samples from at least two "Lots" per year. From each of the randomly selected "Lot" of reinforcing steel, take three seven-foot long samples.

Send one of the samples from each "Lot" to the State Materials Office for testing. Properly identify and tag the remaining samples for future testing in the event of failure of the first sample.

If the first sample meets the requirements of the specification, accept the "Lot". All reinforcing steel materials subsequent to the previous passing Verification tests are considered acceptable.

If the first sample fails to meet the specified requirements, send the second sample for testing. If both samples fail to meet the specified requirements, reject the "Lot" of steel.

If one sample fails and one sample passes, send the third sample to confirm material acceptability. Reject the “Lot” of the reinforcing steel if the results of any two samples of the same “Lot” fail.

8.2.6.2.2.2.2

Sampling and Testing of Welded Wire Reinforcement

The welded wire reinforcement is accepted based on certified mill analysis of the welded wire reinforcement manufacturer. The Verification Inspector may request the quality control personnel to take samples of welded wire reinforcement at any time when there is a concern related to the validity of the certification test data. The Verification Inspector will request the quality control personnel to take samples from at least two “Lots” per year. From each of the two randomly selected “Lots” of welded wire reinforcement, three samples should be taken in accordance with **ASTM A 1064**.

Send one of the samples from each “Lot” to the State Materials Office for testing. Properly identify, tag and store the remaining samples for future testing in the event of failure of the first sample. If first sample passes, the “Lot” is accepted based on the welded wire reinforcement manufacturer’s certification and Verification test results. All welded wire reinforcement deliveries to the Plant, subsequent to the previous Verification test, are considered acceptable. If the first sample fails to meet the specified requirements, the second sample shall be tested. If both samples fail to meet specified requirements, the “Lot” of material will be rejected and replaced with material meeting the requirements. If one sample fails and one sample meets the specified requirements, the third sample may be tested to confirm material acceptability. The “Lot” of the welded wire reinforcement will be rejected if the results of the two samples of the same “Lot” fail.

Reject each “Lot” of material that does not conform to the requirements of the ***Specifications and Contract Documents***.

8.2.6.2.2.2.3

Sampling and Testing of Prestressing Steel

Each “Lot” of prestressing steel is accepted based on manufacturer’s certified mill analysis and the Departments

Verification samples from at least two “Lots” per year. The Verification inspector shall randomly select the LOTs and take three five-foot long samples of prestressing strands from each of the two randomly selected “Lots”.

One sample of each “Lot” shall be submitted to the State Materials Office for testing. Properly identify, tag and store the remaining samples for future testing in the event of failure of the first sample. If first sample passes, the “Lot” is accepted based on the prestressing strand manufacturer’s certification and Verification test results. All prestressing strand deliveries to the Plant, subsequent to the previous Verification test, are considered acceptable. If the first sample fails to meet the specified requirements, the second sample shall be tested. If both samples fail to meet specified requirements, the “Lot” of material will be rejected and replaced with material meeting the requirements. If one sample fails and one sample meets the specified requirements, the third sample may be tested to confirm material acceptability. The “Lot” of the prestressing strand will be rejected if the results of the two samples of the same “Lot” fail.

Reject each “Lot” of material that does not conform to the requirements of the ***Specifications and Contract Documents***.

8.2.6.2.2.3

Inspection and Testing Prior to and During Structures Manufacturing Process

The following are general responsibilities of Verification Inspectors:

- (A) Reviews the Quality Control Plan, ***Project Plans, Standard Indexes, Shop Drawings, Specifications***, and performs a random review of the Plant’s fabrication methods, procedures, workmanship, quality control inspection records and the ***Specifications***.
- (B) Checks the Plant’s basis for acceptance of miscellaneous Structures materials.
- (C) Performs a random review and visual inspections of all other major phases of work, such as formwork, and reinforcing steel placement.
- (D) Inspects delivery, placement, and consolidation process of concrete.
- (E) Inspects finishing and curing process of concrete.

- (F) Inspects the storage of materials that will be used for the manufacturing of Structures.
- (G) Documents the results of the inspections

8.2.6.2.2.4 Post-Manufacturing Inspection of Structures

The Verification Inspector performs the following post-manufacturing inspections.

- (A) Verifies the quality control testing and inspection records of manufactured Structures.
- (B) Inspects any finished manufactured Structures, including the products that are stored in the Plant's area designated for storage of Department's products.
- (C) Visually inspects the manufactured Structures and randomly selects at least one "Lot" to determine if the Structures are free from the deficiencies. Checks the dimensions of the Structures to verify they meet the specified dimensional tolerances.
- (D) Performs visual inspection of all stored manufactured Structures and measure the dimensions of at least 5% of the randomly selected Structures in the "Lot".
- (E) Advises the quality control manager to reject any Structure that does not fully comply with the requirements of the ***Specifications and Contract Documents***.
- (F) Advises the Plant to remove the acceptance stamps from the rejected Structures.
- (G) Visually inspects the repaired Structures and repair methods.
- (H) After each inspection, the Verification Inspector provides a list of deficiencies and discusses them with the Plant's quality control manager.

8.2.6.2.2.5 Acceptance Status of Quality Control Test Results

The Verification Inspector performs monthly inspection. The Verification inspector may observe quality control sampling and

testing or perform tests to verify the quality control testing. Perform Verification tests in accordance with the **Florida Department of Transportation Specifications, Section 346**. In case of observation, the Verification Inspector will visually inspect the testing procedures and results to ensure they are in compliance with specifications.

8.2.6.2.2.6 Close-out Meeting and Documentation

The following are the responsibilities of Verification Inspector upon completion of each inspection:

- (A) Meets with the quality control manager at the completion of each inspection. During the meetings, the Verification Inspector discusses the product deficiencies found during the inspections.
- (B) Documents the results of the inspections.
- (C) Maintains the documentation of the inspection activities in a notebook or any other format that reflects key inspection, sampling and testing activities (if performed) as well as discussions with the Plant personnel.
- (D) Maintains a record of the Verification testing and disposition of all material samples taken for testing.
- (E) For each component, the Verification Inspector assures that quality control manager maintains documents indicating compliance with requirements of the quality control plan.
- (F) Documents the deficiencies that have caused the suspension of the Plant's quality control Plan and maintains documentation of the Plant's corrective actions.

8.2.6.2.3 Independent Assurance Inspection and Testing

Independent Assurance sampling and testing are performed in accordance with **Materials Manual Section 5.5, Independent Assurance Program**.

8.2.6.2.4 Independent Verification

The Department may perform Independent Verification at any time by sampling and testing any Structure or its material ingredients. This is a checking function outside of the Verification program.

8.2.7 State Materials Office Responsibilities

The following are responsibilities of the State Materials Office:

- (A) Provides precast/prestressed concrete materials technical support for the Districts Materials and Construction personnel.
- (B) The State Materials Office may accompany District personnel during inspections, Independent Verifications.
- (C) The State Materials Office will serve as a member of a plant qualification review team.
- (D) Provides information regarding specification changes and inspection procedures to the District Materials Office.
- (E) The State Materials Office Precast/Prestressed Concrete Unit will coordinate with the Plant, District Materials Office personnel, and Construction Personnel to discuss the repeating deficiencies of the manufactured Structures.
- (F) The State Materials Office reviews the proposed training and qualification programs and issues the accreditation letters to the providers of the training program.

8.2.8 State Structures Design Office Responsibilities

The State Structures Design Office approves any changes to the standard structural drawings.

8.2.9 District Construction Office Responsibilities

The Construction Personnel at the project site accept only Structures that are properly marked by the Plant's approved quality control stamp. Project personnel do not accept any Structure that has been severely damaged during delivery or unloading.

The personnel at the project site shall make sure that a legible quality control stamp is affixed to each structure that is received at the job site.

Ensure that at the beginning of each project, the Plant provides a notarized statement to the Project Administrator from a responsible company designated representative certifying that the Plant will manufacture the products in accordance with the requirements set forth in the **Specifications and Contract Documents** and the Plant's approved quality control plan. The

sample certification statement may be viewed at the State Materials Office's web site.

Ensure that each delivery ticket of the shipped products includes information related to project number, manufacturing date, type and quantity of structures.

8.2.10 Training

8.2.10.1 General

Ensure that the Plant's quality control personnel and Department inspectors who are involved in the inspection and testing of the Structures have the required qualifications as specified in the ***Florida Department of Transportation Specifications, Section 105***.

Ensure the Plant's quality control plan include a copy of the certificates of their qualified quality control personnel.

The State Materials Office maintains the list of the accredited precast/prestressed concrete courses.

8.2.10.2 Department Verification Inspectors of Incidental Precast Concrete Structures

The Department Inspectors who are involved in the testing and inspection of Incidental precast/prestressed concrete structures shall be Level II Quality Control Inspectors.

8.2.11 Forms

There are no forms associated with this procedure.

Appendix A

QUALITY ASSURANCE REVIEW REPORT INCIDENTAL PRECAST CONCRETE PRODUCTS PLANT

Type of Inspection or Review:	Initial Qualification	Monthly	Quarterly	Annual Qualification	Follow up
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District No: _____ FDOT Plant Designation No: _____
Plant name: _____ Location: _____
FDOT Quality Assurance (QA) Inspectors: _____
Inspection Date: _____
Plant Quality Control Manager: _____
Plant Quality Control Inspectors: _____

General Notes: The inspection checklist items are a general guide. The inspection is performed by FDOT QA inspectors accompanied with Quality Control (QC) Manager and plant QC inspectors. The compliance status of the inspected items are marked in the provided space with the letter "Y" for compliance and letters "N-1", "N-2", "N-3", etc. for noncompliance. The details of each noncompliance is described in the remarks section of the report, unless noncompliance is self-explanatory. The non-applicable items will be marked with "NA".

APPLICABLE QC PERSONNEL QUALIFICATION CERTIFICATIONS

TYPE OF QUALIFICATION

Compliance Status

Q. C. Inspector Level I	_____
Q. C. Inspector Level II	_____
Q. C. Manager	_____
ACI Concrete Field Testing Technician – Grade I	_____
ACI Concrete Laboratory Testing Technician – Level I	_____
ACI Concrete Strength Testing Technician	_____
Concrete Batch Plant Operator	_____

PRE-POUR INSPECTION

Materials Certification	Compliance Status
Fine Aggregate	_____
Coarse Aggregate	_____
Cement	_____

Fly Ash

Slag

Remarks:

Storage and Stockpiling of Concrete Materials

Different grades of aggregates are stockpiled separately

Stockpiles are clearly labeled

Aggregate stockpile labels match certifications

Silos are clearly labeled

Different cementitious materials are stored separately

Cementitious materials stored labels match certifications

Reinforcement steel is stored above the surface of the ground

Heat identification tags are attached to reinforcement steel

Remarks: _____

Admixtures

Compliance Status

Admixtures meet the requirements of FDOT Specification Section 924

Remarks: _____

Reinforcing Steel

Compliance Status

Reinforcing steel meets the requirements of FDOT Specification Section 415

Manufactured in United States

Mill certifications are available

Remarks _____

Welded Wire Reinforcement	Compliance Status
Welded Wire Fabric meets the requirements of ASTM A 1064	_____
Manufactured in United States	_____
Mill certifications are available	_____

Remarks _____

Plastic Chairs and Bolsters	Compliance Status
Plastic Chairs and Bolsters meet the requirements of FDOT Specification Section 415.5.13.3	_____
Remarks	_____

Water: FDOT Specification 923

Water Source: City: _____ Well: _____ Other: _____

	Compliance Status
Water is sampled and tested per specification	_____
Results	_____
Remarks	_____

Structure Manufacturing	Compliance Status
Concrete forms are clean, rigid and dimensionally accurate	_____
Concrete forms are in accordance with FDOT Specification 400	_____
Steel reinforcement and prestressing steel properties meet design requirements	_____
Steel reinforcement and prestressing steel meet design positioning	_____
Steel reinforcement and prestressing steel meet design minimum cover	_____
Steel reinforcement and prestressing steel meet design steel area	_____
Steel reinforcement and prestressing steel meet FDOT Specifications requirements	_____
Remarks	_____

DURING POUR INSPECTION

Concrete Mix Design Compliance Status

Approved concrete mix designs are available

Delivery tickets meet the requirements of the Materials Manual Section 9.2 Volume II, Appendix A

Concrete Pour Inspection

Compliance Status

The water - to - cementitious materials ratio is per approved concrete mix design

Consolidation is performed per QCP requirements

Finishing is performed per QCP requirements

Curing is performed per QCP requirements

QC manager is present during concrete pour, placement and consolidation

POST POUR INSPECTION

Compliance Status

Repairs are completed in accordance with the QCP or specifications

Repair materials meet the requirements of QCP or on Approved Products List

Product Dimension Measurements

The dimensions of at least 20% of randomly selected units in each lot have been measured by QC personnel

Dimensional tolerances meet the applicable requirements of the specifications and design standards

Remarks: _____

TESTING, STRESSING AND CURING EQUIPMENT

Compliance Status

Certified laboratory are performing the concrete compressive strength tests

Concrete cylinder curing facility calibration are current

Compressive strength testing machine calibration are current

Stressing jacks calibration are current

QC RECORDS: Materials Manuals 8.2.8.8, Volume II

Verify that the plant has maintained the following QC records:

Compliance Status

Notarized certification statement delivered at the beginning of each project	_____
Daily log of production activities	_____
Copy of signed or stamped shipping tickets	_____
Inspection of concrete forms	_____
Lot identification sheet or tracking log	_____
QC records available for:	
Pre-pour inspection	_____
During pour inspection	_____
Post pour inspection	_____
All required material certifications	_____
Records are maintained for a minimum of three years	_____
Standard specifications, indexes, shop drawings, project plans, Materials Manual Volume II	_____
Latest two plant certification agency inspection reports, if available.	_____
Correction plan developed and included in QCP for repetitive nonconformance findings	_____
Remarks: _____	

CONDITION OF STAMPED UNITS WHILE IN STORAGE

Compliance Status

Storage methods for the units are properly performed to prevent damage	_____
Culling of failed materials or final products that do not meet the specification requirements	_____
Remarks: _____	

[illegible]

8-2-17