Section 8.2
Volume II

MANUFACTURED INCIDENTAL PRECAST/PRESTRESSED CONCRETE PRODUCTS

8.2.1 PURPOSE

The procedure provides guidance for the development and implementation of the inspection and testing programs for the manufacture, storage, and transportation of the Incidental Precast/Prestressed Concrete Products. The incidental precast concrete products 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

Code of Federal Regulations (CFR), Federal-Aid Policy Guide (FAPG), Subchapter G – Engineering and Traffic Operations, Part 637 – Construction Inspection and Approval, Subpart B – Quality Assurance Procedures for Construction Sections
334.044(2), 334.044(10)(a), and 334.048 Florida Statutes

8.2.3 REFERENCES

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

American Society for Testing and Materials (ASTM) 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 Product List (APL), Florida Department of Transportation

Field Sampling and Testing Manual, Florida Department of Transportation

8.2.4 SCOPE

This procedure is used by the Incidental Precast/Prestressed Concrete Structures Plants (Plants). These requirements and activities pertain to the inspections, measurements, and necessary tests to substantiate materials and Structures in conformity with the ***Specifications and Contract Documents***. The Plant's quality control plan is designed to provide guidelines that are used to produce Structures in conformance to the ***Specifications*** and ***Project Plans***.

8.2.5 GENERAL INFORMATION

The Plants are responsible for production, inspection, storage, and shipment of the Structures. The delivered Structures to the project site shall meet the requirements of the ***Specifications***, ***Plans***, and ***Contract Documents***.

8.2.6 PLANT QUALIFICATION PROCESS

8.2.6.1 General

Submit the proposed quality control plan in accordance with ***Specifications Section 105*** to the District Materials and Research Office (DMRO) for review and acceptance and make arrangement for qualification review of the Plant prior to commencement of any work for the Department projects. ***Materials Manual Section 5.6*** may be used as a guideline in preparing the QC Plan.

8.2.6.2 Review of Plant's Proposed Quality Control Plan

Submit the proposed quality control plan to the DMRO for the District in which the Plant is located. For out-of-state Plants, submit the quality control plan to the nearest DMRO. Upon the Plant's submittal of a quality control plan, the DMRO will review the proposed quality control plan and make necessary arrangements for the initial Plant qualification review in accordance with ***Materials Manual Section 8.2.6.3***.

In the quality control plan include the work experience, qualifications, and responsibilities of the Plant's production and quality control personnel. Identify the on-site production manager, Plant general manager, quality control inspectors/technicians, and quality control manager. Identify the key quality attributes in the quality control plan. Identify the responsibilities for monitoring key quality attributes and quality control data. Include the applicable information required in ***Specifications Sections 105, 400, 450, 521, 534, 548, 641, 700, 715, 785,*** the ***Design Standards and other Contract Documents.*** Include a management statement of dedication to quality. Include any available proposed repair methods for minor deficiencies as part of the quality control plan.

A copy of the Plant's proposed repair methods of the structural deficiencies shall be included as part of the quality control plan.

The Precast/Prestressed Concrete Institute (PCI) and the National Precast Concrete Association (NPCA) certified Plants may submit the documents entitled "Quality Systems Manual"(QSM) or "NPCA Quality Control Manual for Precast Plants (NPCA Manual)", respectively, as their quality control plan. In their submittal, the Manufacturers of the PCI or NPCA certified Plants shall mention that they will comply with the requirements of the QSM and NPCA Manual, respectively. The ***Specifications*** and ***Contract Documents*** will govern, when there is a discrepancy between the QSM and NPCA Manual and the ***Specifications***. Submit any additional information, which is required by this Section of the Materials Manual, but is not included as part of the QSM or NPCA Manuals. When requested by the Department Inspectors, the PCI or NPCA certified Plants are required to produce the two most recent PCI or NPCA inspection reports, and the responses/corrections taken by the producer, if applicable.

8.2.6.3 Plant Qualification Review

The Department will perform the initial Plant qualification review of the production facilities. An initial review includes an in-depth inspection by the Department of a Plant that submits its first quality control plan and Plants that have not produced Structures for the Department projects for more than a year. Upon the approval of the Plant's quality control plan, the Department will also perform routine, at least monthly, verification inspections, and Plant qualification reviews, at least annually, on all Plants that have continued to furnish Structures for the Department projects.

8.2.6.4 Maintenance of Plant Qualifications

Upon the Department's satisfactory review of the proposed quality control plan, in compliance with ***Materials Manual Section 5.6,*** and a satisfactory Plant qualification review, the DMRO will accept the proposed quality control plan and include the Plant on the Department's ***Production Facility Listing***. Immediately notify the DMRO in writing of any changes to the quality control plan. In case of change(s), revise the quality control plan annually in the form of addenda or complete revision of the entire document. Submit the revised quality control plan or its addenda to the DMRO annually.

Plants that are currently on the Department's ***Production Facility Listing*** will be subject to the Plant qualification review process at any time. The Plant qualification review team will perform at least one annual in-depth review of the Plant that is producing for the Department projects.

8.2.7 FUNCTION OF RESPONSIBILITIES OF INCIDENTAL PRECAST/PRESTRESSED CONCRETE PLANTS

8.2.7.1 General

The Plants are responsible for the quality of the finished Structures. Provide facilities and qualified quality control personnel to perform specified tests and maintain an acceptable quality control program in compliance with the requirements specified herein and the ***Specifications***.

8.2.7.2 Quality Control Manager

The Quality Control Manager shall ensure that the quality of the products at each Plant meets the quality requirements of the ***Specifications*** and ***Contract Documents*****.** The responsibilities of the Quality Control Manager include, but are not limited to the following:

(A) Maintains the quality control approval stamp and applies it to acceptable Structures or designates a technician who is working under the direct supervision of the quality control manager to apply the Plant approval stamp. The Plant approval stamp mark shall be legible and applied to each Structure before its shipment to the project site. The stamp shall include the Department's assigned Incidental Precast Concrete (IPC) plant number.

(B) Be present at all times during the production of the Structures that will be shipped to Department projects. During the temporary absence of the Quality Control Manager (QCM), a delegate meeting the same qualification requirements and identified in the Quality Control Plan, may perform the QCM duties.

(C) Performs and/or supervises the quality control testing and inspection.

(D) Ensures that the Plant has a sufficient number of quality control technician(s)/Inspector(s) to maintain adequate inspection and testing during the production of Structures for Department projects. In lieu of a permanent staff, the Plant may retain the services of an engineering consulting firm or qualified laboratory meeting the requirements of ***Specifications Section 105*** and quality control personnel qualification of this ***Section***.

(E) Ensures that testing equipment is properly maintained in

accordance with the applicable test methods and specifications. Makes readily available, the current certification on testing equipment that is requiring calibration.

(F) Visually inspects or ensures that a qualified quality control technician inspects each Structure before shipping to the project site.

(G) Ensures that all materials used to manufacture Structures are from a Department approved source.

(H) Maintains a daily production log of the manufactured Structures.

(I) Ensures that all Structures are properly stored and marked indelibly with Plant name, assigned plant number, Department project, date of manufacture, and any additional information required by the ***Specifications*** and ***Contract Documents***.

(J) Maintains the quality control files of material certifications, test data, and inspection results.

(K) Arranges monthly meetings with the Department's Verification Inspector and representatives of the Plant's production personnel to discuss any deficiencies and quality control issues.

When the Plant's assigned quality control manager discontinues his/her work without advanced notice, the Plant shall notify the District Materials Office within two-working days and employ reasonable efforts to seek a replacement. During such efforts to seek a replacement, the Plant engineer, technician, or other knowledgeable person designated in the Plant's quality control plan may perform the duties of the quality control manager for a period established by the District Materials Engineer. This is based on efforts employed by the Plant to seek a qualified replacement and/or by training another person leading up to the next available Department accredited training/certification programs.

8.2.7.3 Quality Control Inspectors

The quality control inspector may perform any or all of the inspections, sampling, or testing as directed by the quality control manager and may stamp the Plant's approved structures, when directed by the quality control manager. Quality control inspectors who perform sampling and testing of plastic concrete shall meet the requirements of the ***Specifications Section 105*.**

8.2.7.4 Quality Control of Certified Materials

8.2.7.4.1 General

Ensure that all materials used to manufacture Structures are from Department approved sources and comply with requirements as specified herein.

8.2.7.4.2 Reinforcing Steel, Welded Wire Reinforcement and Prestressing Steel

The Quality Control inspector shall obtain steel manufacturers' certifications for all welded wire reinforcement, reinforcing steel and prestressing steel that are used for the manufacture of Structures. These certifications shall indicate compliance with the appropriate ASTM or AASHTO standards for wire, wire reinforcement, and for steel bars. The Department Verification Inspectors will obtain samples of reinforcing steel, welded wire reinforcement and prestressing steel twice per year. Reinforcing steel and welded wire reinforcement shall meet the requirements of the ***Specifications Section 415.*** Prestressing steel shall meet the requirements of the ***Specifications Section 450.***

8.2.7.4.3 Patching Materials

All patching compounds shall comply with the applicable ***Specifications*** and ***Contract Documents.*** Pre-mixed packaged compounds may be used, when listed on the current ***APL***. Patch material shall be mixed, applied, and cured in accordance with the manufacturer's recommendations. The cosmetic defects may be repaired in accordance with ***Specifications Section*** **450,** if approved by District Materials Office and is included in the Plant's quality control plan.

8.2.7.5 Calibration of Equipment

Calibration and verification of stressing jacks shall be in accordance with the ***Specifications Section 450***.

Check or calibrate all quality control testing equipment such as the compressive strength testing machines, portable weighing scales, air meters, density buckets, and temperature recording devices for compliance with the applicable ASTM Specifications; and **Section 9.2 Materials Manual.**

8.2.7.6 Quality Control of Structure Manufacturing

The following are quality control inspections and testing, related to operations prior to, during, and after concrete placement.

8.2.7.6.1 Concrete

Unless otherwise shown in the Plans or required by the Specifications, the concrete produced for the manufacture of project Structures shall comply with the requirements specified in the ***Specifications Section 346.*** When the ***Specifications*** or drawings reference a class of concrete (Example: Class IV), the concrete shall meet all of the requirements for ***Specifications Section 346*** and ***Materials Manual Section 9.2 Volume II***. In accordance with ***Specifications Section 346***, each day's concrete production is comprised of one or more LOTs.

8.2.7.6.2 Reinforcing and Prestressing Steel

All Reinforcing Steel shall be stored according to ***Specifications Section 415***. Prestressing steel shall be stored in accordance with ***Specifications Section 450***.

8.2.7.6.3 Concrete Forms

Provide Concrete forms made of wood, metal, or other materials meeting the requirements of this Section and Specification Section 400.

Forms used in the manufacture of structures shall be sufficiently rigid and accurate to maintain the structures designed dimensions and avoid irregularities in the structure surface. Forms not meeting governing document requirements shall be repaired or removed from service.

Ensure that the condition of all forms be of a quality to produce acceptable Structures within the dimensional tolerances. The quality control inspector shall check cleanliness of the forms prior to each use. Check the form dimensions prior to its first use and at least annually for dimensional conformance.

8.2.7.6.3.1 Aluminum Concrete Forms

The Plant shall take the following actions when using aluminum forms for the first time:

(1) In the quality control plan include information regarding the

application of the protective barrier to minimize the natural reactivity between aluminum and fresh concrete. Also, include the name of the form release agent that will be used.

(2) Prior its first use, perform the field demonstration of the proposed aluminum form by casting a full scale mockup of the precast concrete product. Demonstrate that the use of aluminum form will not cause any adverse effect in the quality of the concrete products.

(3) Ensure that after stripping of the form, the product does not show any sign of bug hole, stain, spall, surface void, and streak in concrete.

(4) Ensure that the forms do not show any sign of concrete buildup and sticking on their surfaces and panel edges.

8.2.7.6.4 Reinforcing and Prestressing Steel Placement

Reinforcing and prestressing steel placement shall meet the requirements of ***Specifications Sections 415 and 450***. Quality control personnel shall check the fabrication, positioning, and minimum cover requirements of steel reinforcement and prestressing steel on all manufactured Structures. Quality control personnel shall verify that the steel reinforcement meets the ***Specification*** requirements. The minimum steel area requirements for Structures shall be checked according to the applicable ***Specifications***, ***Design Standards***, AASHTO requirements, ASTM requirements, or approved drawings.

8.2.7.6.5 Concrete Placement Operation

The placement method shall assure dense and consistent material meeting performance requirements and meet the requirements of ***Specifications Section 400***. Include placement methods as part of the quality control plan.

8.2.6.6.6 Concrete Curing

Cure Structures in accordance with the applicable curing methods in ***Specifications Sections 400 or 450***. Include curing methods as part of the quality control plan.

8.2.8 QUALITY CONTROL TESTING AND INSPECTION OF STRUCTURES

8.2.8.1 General

Perform quality control inspections and tests at frequencies specified herein along with ***Specifications Section 346***.

8.2.8.2 Acceptance of Structures

Each LOT of Structures is accepted when:

(A) The test results and inspections meet the requirements as specified herein and in the applicable ***Specifications***.

(B) The Plant has completed all patching and repair work.

(C) The Quality Control Manager or his/her designated inspector/technician has stamped the Structures.

(D) The list of the Structures is included with each shipment of the products to the project site.

8.2.8.3 Appearance and Inspection of Final Finished Structures

The Quality Control Manager or his/her designated quality control inspector performs final inspections of all finished Structures, before the application of the quality control approval stamp, to ensure that the Structures are free from deficiencies, and meet the specified dimensional tolerances. Structures may be repaired if necessitated by occasional imperfections in the manufacture or damage during handling, and will be considered acceptable if the repairs are sound and properly finished to conform to the dimensional tolerances of the ***Specifications***. Submit the proposed repair method for Department review and approval. Use the repair material from the Department's ***APL*** unless otherwise allowed by the ***Specifications***. Include all Department approved material and methods as part of the Plant's quality control plan. Dimensional tolerances shall comply with the applicable ***Specifications*** and ***Design Standards***.

The quality control inspectors shall perform visual inspection of all finished Structures, measure the dimensions of at least 20% of the randomly selected units in each LOT, and maintain a record of the inspections, including the deficiencies. Minor deficiencies may be repaired in accordance with the repair methods included as part of the quality control plan. The repair of major damage to a Structure requires engineering evaluation meeting the requirements of ***Specifications Section 450***. The Plant shall determine the cause of the repetitive nonconformance and develop a corrective action plan. Submit the revised quality control plan to address the type of deficiencies and corrective action taken to prevent or

minimize the deficiencies.

8.2.8.4 Repair of Precast Concrete Structures

The Plant's quality control manager shall examine and determine the magnitude of the deficiency. The quality control manager may authorize the immediate repair of minor deficiencies in accordance with the repair method that is included as part of the quality control plan. Perform the repair work under the observation of the quality control manager or under personnel working under his/her direct supervision. The Plant's quality control personnel shall document the type of deficiency and the repair method. Major repairs shall be processed in accordance with ***Specifications Section 450***.

8.2.8.5 Handling and Storage

Structures shall be handled and stored to prevent damage. Quality control inspectors shall inspect the handling operations and appropriate practices that will prevent damage. The inspectors shall monitor Structures in storage to ensure that they are stored in the correct stack and are not being damaged by point loading or stacking. Rejected Structures shall not be stored in the same area with the acceptable Structures.

8.2.8.6 Stamping

The Plant's quality control manager or his/her designee shall affix the Plant's quality control stamp to each Structure, indicating that the manufactured Structure meets the requirements of the ***Specifications*** and ***Contract Documents*** and Plant's quality control plan. The quality control stamp shall include the plant's assigned Incidental Precast Concrete number. The stamp configuration shall be included in the quality control plan. The quality control stamp shall be applied using waterproof paint or indelible ink.

In the QCP include a statement that the Plant's quality control stamp will be applied only on the products that are manufactured for **Department** projects or any other projects that require Department verification inspection.

8.2.8.7 Shipment

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

was fabricated in conformance with the Producer's quality control plan, ***Specifications*** and ***Contract Documents***. Ensure that each shipment of precast concrete products to the project site is accompanied with a signed or stamped delivery ticket providing the description and the list of the products.

Each delivery ticket shall include the list of products being shipped, be on the Plant's letterhead and include as a minimum the following information:

(A) Project identification number

(B) Date shipped

(C) Cast date

(D) Type of structure

(E) Quantity of structures

(F) Serial number

The quality control manager or quality control personnel working under the direct supervision of the quality control manager shall stamp each Structure prior to its shipment to the project site**.** The Plant shall address the shipping policy as part of the quality control plan.

8.2.8.8 Documentation

The Quality Control Manager shall maintain documentation files in each Plant. Documentation shall include the following items, as a minimum:

(A) Copy of the approved quality control plan and amendments

(B) Approved shop drawings (if applicable)

(C) Applicable ASTM and AASHTO Standards

(D) Applicable ***Specifications*** and ***Design Standards***

(E) Quality control personnel training and qualification records

(F) Materials certification records for reinforcing steel, welded wire reinforcement, prestressing steel or any other materials that are used in the manufacturing of the structures

(G) Concrete Mix designs

(H) Applicable equipment calibration/verifications, including stressing jacks, concrete compression testing machine, laboratory scales and plastic concrete test equipment

(I) Identification number and type of Structures

(J) Applicable test data

(K) Disposition of all manufactured Structures

(L) Record of the delivery tickets of each shipment of the products to the job site

(M) Inspections of forms, reinforcement, concrete placement, vibration, finishing and curing (Pre-pour inspection)

(N) Inspection of structures after concrete placement (Post-pour inspection)

(O) Record of all structural deficiencies found as a result of quality control inspection and testing or Verification inspection and testing and the corrective action taken. A copy of the deficiency reports shall also be maintained in the Plant's permanent file

(P) Record of minutes from monthly meetings with Verification inspector and representatives from the Plant's Quality Control and Production personnel.

8.2.9 TRAINING

8.2.9.1 General

The Plant's quality control personnel who are involved in the inspection and testing of Incidental Precast/Prestressed concrete structures shall have the required qualifications as specified in ***Specifications Section 105***.

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

8.2.10 FORMS

There are no forms associated with the procedure.