

SECTION 714—PRECAST CONCRETE PRODUCTS

714.1 GENERAL REQUIREMENTS—As shown on the [Standard Drawings](#) and as follows:

(a) **Description.** Precast concrete units are those cast in other than their permanent location, by a manufacturer listed in [Bulletin 15](#).

(b) **Shop Drawings.** As approved. Standard precise elements may be fabricated as shown on the [Standard Drawings](#) without submitting shop drawings to the Bureau of Design for approval. For deviations or modifications of the standards, submit shop drawings for approval.

714.2 PRECAST CONCRETE UNITS—Approved plants may fabricate any of the following items:

- Concrete barrier
- Reinforced concrete manhole sections
- Inlets
- Junction boxes
- Median barrier
- Endwalls
- Sound barrier posts and panels

714.3 MATERIAL—

- Storage of Material—[Section 106.05](#)
- Cement Concrete—[Section 704](#), except [Sections 704.1\(d\)3](#), [704.1\(d\)4](#), and [704.2\(d\)](#). Requirements for remediation of a potential alkali-silica reaction do not apply for cement concrete used in the fabrication of precast concrete barrier that is to be used in temporary installations only, as specified in [Section 627](#), and indicated as such, as specified in [Section 714.6\(d\)](#).
- Coarse Aggregate, Type A, No. 8, No. 57, or No. 67—[Section 703.2](#)
- Fine Aggregate, Type A—[Section 703.1](#)
- Concrete Curing Material—[Sections 711.1](#) and [711.2\(a\)](#), Type 1-D, translucent with red fugitive dye.
- Reinforcement Steel—[Section 709](#). Epoxy coated or galvanized reinforcement bars or epoxy coated or galvanized welded wire fabric are not required. for the fabrication of precast concrete barrier that is to be used in temporary installations only, as specified in [Section 627](#), and indicated as such, as specified in [Section 714.6\(d\)](#).
- Steel Anchor Bolts—[Section 1105.2\(c\)](#)
- Metal Units—[Sections 605.2\(a\)](#) and [\(b\)](#)
- Manhole Steps—[Section 605.2\(c\)](#)

- Protective Coating (Boiled Linseed Oil)—[Section 503.2](#)

714.4 PLANT ACCEPTANCE—

(a) General. Do not begin fabrication before the Structural Materials Engineer's inspection and acceptance of the plant. Provide a permanent building offered for the Department's acceptance.

Material, equipment, test procedures, methods of fabrication, handling, storage, and transportation are subject to inspection.

Register and certify the plant under either the Prestressed Concrete Institute (PCI) or National Precast Concrete Association (NPCA) plant certification program. Submit an annual endorsed copy to the Structural Materials Engineer for continued qualification.

(b) QC.

1. General. Establish a level of QC based on uniform production practices. Submit the plant's QC Plan and mix design(s) to the Structural Materials Engineer, MTD, for review and approval. Include with the QC Plan a company organizational chart indicating a separate chain of command from the QC Manager to the Owner/Plant Manager independent of the Production Manager. Resubmit the QC Plan, mix design, and organizational chart, when required by the Structural Materials Engineer, due to changes in processes, materials, or personnel.

2. QC Manager. Provide a QC Manager who has overall responsibility for the adequacy of production facilities, QC, sampling and testing, and fabrication of the product, and who will ensure that items are fabricated as shown on the [Standard Drawings](#).

3. QC Personnel. Assign qualified personnel, with precast concrete experience, to be responsible for QC and sampling and testing during the complete fabrication process, storage, and shipment. Do not proceed with production until appropriate personnel are present. Technicians responsible for concrete sampling and testing must possess a current ACI Grade I Field Technician Certification or have approval from the Structural Materials Engineer as a technician in training.

714.5 PLANTS AND PLANT SITES—

(a) Description. Provide adequate and acceptable lighting for operations not completed in the daylight. Provide a drainage system as needed for the removal of rainfall and curing water. Provide a stabilized area for product storage.

Furnish necessary facilities for the inspection of material and workmanship. Allow Inspectors employed by the Department unrestricted access to the premises during plant working hours. The necessary facilities for inspection include a plant office conforming to the following minimum requirements:

Number of Each	Requirements
13.9 (150)	Floor space: m ² (square feet)
Yes	Air-conditioned/heated
1	Desk and chair
1	Plan rack
1	Work table
1	Two-drawer fire resistant (D-label) metal file cabinet
Adequate number	Chair and stools
1	Individual Access Phone line
1	Internet Service: For structural materials plants – A proprietary or mid-market internet service that provides for high-speed access via a Digital Subscriber Line (DSL). Cable or other Broadband connection. For plant mixed hot-mix asphalt and ready-mix concrete plants or where high speed access is not available, provide a ‘dial up’ internet service with access to the account by means of a local telephone number.
1	Telephone (business and emergency calls only) and answering

	machine or voice-mail
1	Sanitary electric water cooler
1	Fire extinguisher
Adequate number	Cupboards, closets, lockers
1	First-aid kit (OSHA 1926.50(d) and 1926.50 Appendix A compliant)

714.6 FABRICATION—

(a) General. Plants must produce a sample element to verify their competency before receiving approval to produce a new product type.

(b) Bars, Mesh Reinforcement, Inserts, and Chairs. Fabricate and place bar and mesh reinforcement, as indicated, within specified tolerances. Secure reinforcing in beds and forms using chairs or blocking so the reinforcing maintains its position during placement and vibration of concrete. Bars may be fabricated into cages by tying and tack welding. Do not tack weld epoxy coated, galvanized, or Grade 420 (Grade 60) reinforcement bars. Use acceptable chairs or ties for support.

When bar spacing is greater than or equal to 300 mm (12 inches), tie all intersections with annealed iron wire or metal clips. When bar spacing is less than 300 mm (12 inches), either tie all intersections or tie alternate intersections with annealed iron wire or metal clips in each direction to provide a [staggered tie layout](#) prohibit movement of reinforcement bars during manufacturing. For epoxy-coated reinforcement or galvanized reinforcement, provide plastic-coated tie wire, epoxy-coated tie wire, metal clips, or plastic clips.

(c) Beds and Forms. Support casting beds or forms on unyielding foundations. Use forms adequate for the manufacture of products within tolerances, according to approved drawings and specifications. Clean forms after each use to prevent accumulation of coatings.

(d) Marking. Mark the manufacturer's name or trademark and the date of manufacture on one side or end of each precast unit as soon as possible after stripping using permanent marking system. For inlets and junction boxes, also provide the type identification. Identify barrier meeting NCHRP 350 by indenting the top section of each barrier section with minimum 50 mm (2-inch) block lettering as follows: "T 350" for temporary barrier and "P 350" for permanent barrier.

714.7 CONCRETE—

(a) Testing. Verify the minimum curing strength and the 28-day minimum concrete strength, specified in [Section 704](#), for each lot. Select an appropriate slump value that will provide a workable mix for the precast concrete units. At no time is the slump upper limit to exceed 125 mm (5 inches) for mixes without water-reducing admixtures, 165 mm (6 1/2 inches) for mixes with water-reducing admixtures, and 200 mm (8 inches) for mixes with high range water-reducing admixtures (superplasticizers). If the upper limit is exceeded on any slump test, the plant's technician must reject the cement concrete. Maintain the cement concrete consistency within 40 mm (1 1/2 inches) on either side of the selected value.

For precast manhole sections, test for absorption according to AASHTO M 199M; except, test cores shall have a diameter of not less than 50 mm (2 inches).

(b) Mixture. Furnish Class AA Cement Concrete as specified in [Section 704](#), unless otherwise specified.

(c) Placing Concrete. Place concrete without segregation. Deposit concrete in its final position in each part of the form. Methods of placement are subject to acceptance. Do not work or flow concrete along the forms from the point of deposit. Work concrete under and around reinforcement.

Place concrete batches in form within one half hour of each other. Consolidate the plastic concrete by internal and/or external vibration.

Production will be restricted to periods where air temperatures within the work area are above 4 °C (40F).

(d) Lot Size. Lot size is one shift's production. Mold a minimum of four concrete test cylinders for each lot cast. Mold additional test cylinders for Department acceptance testing if directed.

Mold cylinders according to [PTM No. 631](#). Cure cylinders the same as the product. Test cylinders according to [PTM No. 604](#). Match-mark test cylinders with the lot represented. Record test results and give records to the Department representative.

(e) Finishing. Make concrete surfaces true and even, and free from rough, open, or honeycombed areas, depressions, or projections. Do not add water to the concrete to facilitate finishing.

(f) Patching. Patch and repair manufacturing defects and minor damage in accordance with [Publication 145](#). Submit repairs beyond the scope of [Publication 145](#) to the Chief Structural Materials Engineer for evaluation and disposition.

714.8 CURING AND PROTECTIVE COATING—

(a) Curing. Cure and protect concrete according to the approved QC Plan. Develop the QC Plan using ACI 308 as a guideline.

Set stripping time based on the inherent characteristics of the product.

Accomplish secondary curing by approved methods.

Maintain precast concrete units, after stripping and during secondary curing, in a minimum 10 °C (50F) environment until they have reached a compressive strength of 80% of the 28-day minimum comprehensive strength for the product as indicated on the shop drawing. Do not place units in an environment of less than 0 °C (32F) after the secondary cure, unless the differential between the units and the air temperature is less than 17 °C (30F).

Store units until the 28-day minimum compressive strength is obtained.

(b) Protective Coating. Apply protective coating to concrete barrier and inlet tops before shipment. Use boiled linseed oil and apply as specified in [Section 503.3\(b\)](#) or use a penetrating sealer from a manufacturer listed in [Bulletin 15](#) applied according to the manufacturer's specifications. Penetrating sealer must not discolor the concrete. If curing compound is used for secondary curing, wait 14 days before applying the protective coating. Barriers for temporary use need not receive a protective coating.

714.9 TOLERANCES—As shown on the [Standard Drawings](#) or according to ACI 117 Section 5 except as follows:

Length of Member—1 mm per meter (1/8 inch per 10 feet) with a minimum of 6.5 mm (1/4 inch) and a maximum of 20 mm (3/4 inch)

Cross-Sectional Dimensions— ≤ 914 mm (≤ 36 -inch)... ± 6.5 mm ($\pm 1/4$ -inch)
 > 914 mm (> 36 -inch)... ± 20 mm ($\pm 3/8$ -inch)

714.10 HANDLING AND STORAGE—Handle and move products to the storage yard when they have gained adequate strength to be moved without causing damage. Maintain adequate support when handling and storing the product. Store the product, until shipment, in areas accessible for inspection.

714.11 TRANSPORTATION—Provide 24-hour advance notice of loading and shipping schedule. Do not ship unapproved items. Include [Form CS-4171](#) with each shipment. Observe hauling restrictions. Ensure that supports, bracing, and shipping methods dampen vibration. Provide adequate padding material between the tie chains or cables to prevent concrete chipping.

714.12 DISPUTES—In matters of disputes over products, the Structural Materials Engineer, MTD, or the designated on-site representative have the final word on acceptability of the product.

714.13 CERTIFICATION—[Section 106.03\(b\)3](#), and as further directed by the Structural Materials Engineer, Materials and Testing Division.