

**CITY OF COLUMBUS, OHIO**

**SUPPLEMENT 1073  
PRECAST CONCRETE CERTIFICATION PROGRAM**

**October 31, 2011**

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**Appendix A Concrete Mix Design Information**

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**1073.01 Program Overview.** This supplement outlines the minimum requirements for a Manufacturer to become certified to produce precast components for the City or for a Distributor to become certified to store, stock, and ship a certified Manufacturer’s precast concrete components to the City.

The table below lists precast concrete products that the City requires to be supplied by a certified Manufacturer. The City will accept precast concrete components not marked as “Manufacturer Only” from certified Distributors.

<b>Precast Concrete Product</b>	<b>Governing Specification</b>	<b>Manufacturer Only</b>
Box Culvert	CMS 706.05	Yes
Three-Sided Flat Topped Culvert	CMS 706.051	Yes
Arch Culvert	CMS 706.052, 706.053	Yes
Manhole Sections	CMS 706.13	N/A
Flat Slab Tops	CMS 706.13	N/A
Catch Basins & Inlet Tops	CMS 706.13	N/A
Portable Barriers	CMS 706.13	N/A
Outlets	CMS 706.15	N/A
Pull Boxes	CMS 725.08	N/A
Cellular Retaining Walls	CMS 610	Yes
Headwalls	CMS 602, Company Designed, City Approved	N/A
MSE Panels	Special Provisions, Plan Notes, SS 840	Yes
Lagging	Special Provisions, Plan Notes	Yes
Noise Wall Panels and Posts	City Plan Insert Sheet, Company Designed, City Approved	Yes

**A. Manufacturer Responsibilities.** Certified Manufacturers are responsible for the quality of precast products supplied to the City and shall ensure:

1. Component raw materials conform to applicable specifications.
2. Dimensional correctness of the precast products and any components incorporated into the product.
3. Concrete strength and air content requirements conform to specifications
4. Shipment of material by certified ODOT TE-24 to either a City project or a certified Distributor.

**B. Distributor Responsibilities.** Certified Distributors are responsible for:

1. Inventory and shipment of material by certified ODOT TE-24 to a City project only
2. Performing an initial inspection of the Certified Manufacturer's product, returning any unacceptable product, and notifying the Laboratory about the unacceptable product.
3. Marking the precast product with the Certified Distributor's name in addition to the Manufacturer's original markings.
4. Not shipping in-stock materials manufactured by a Manufacturer who has been removed from the certification program.

This supplement does not waive City or ASTM specification requirements for precast concrete products or the incorporated raw materials. The final product, all components, dimensions, and final validation testing shall conform to the applicable City specifications.

The City will perform periodic quality assurance (QA) inspections to evaluate Manufacturer and Distributor compliance with certification program requirements, City specifications, and receipt of quality products. A Manufacturer or Distributor shall provide QA inspectors access to all areas, facilities and to all records associated with a certified product. OMM will perform QA inspections.

At the jobsite, the Engineer may reject certified precast products delivered with defects or damage or products that do not meet specifications. The Engineer may request additional QA inspections.

The City will remove a Manufacturer or Distributor not conforming to this certification program for one year (1073.26). A Manufacturer who loses certification shall meet the requirements of 1073.25.

**1073.02 Qualification.** The qualification process for a manufacturer includes three phases.

Documentation Phase .....	1073.03.A
Mix Design Certification phase .....	1073.05
Site Certification Visit .....	1073.08

The qualification process for a Distributor includes two phases

Documentation Phase .....	1073.03.B
Site Certification Visit .....	1073.08

**1073.03 Documentation Phase.**

**A. Manufacturer.** Request certification by submitting documentation of QC procedures, capabilities, personnel and training to perform under this program.

Submit a letter to the Laboratory requesting inclusion into this program and signed by the manufacturer's representative with legal authority to bind the company to this supplement's requirements. Include the following information.

1. Location and address of each site to be qualified. (Manufacturers with multiple plants must qualify each plant individually.)
2. A copy of the Manufacturer's (plant specific) National Precast Concrete Association (NPCA) certification.
3. A list of products to be provided under certification (See 1073.01)
4. A written Quality Control Plan (QCP) covering all products to be produced under certification. Base the plan on the NPCA certification program manual revised to conform to City specifications and this supplement. The QCP shall include:
  - a. Specifics of who, what, where, when, how and how often the raw materials will be checked and verified for quality.
  - b. Specifics of who, what, where, when, how and how often materials and final product dimensions will be verified.
  - c. Specifics of who, what, where when, how and how often the final product will be tested for conformance to strength and air specifications.
  - d. All forms used to document QC, verification of materials, pre-pour and post-pour inspections, testing and compliance checks.
  - e. Documentation that all QC personnel have completed training and have demonstrated the capability to perform QC assignments. The Manufacturer shall assign at least one QC inspector (QCI) in each plant with the responsibility for all QC operations in the

plant. The QCI shall have passed the NPCA training program, Fundamentals of Quality Concrete for Precasters.

- f. The QCI shall be a certified ACI Concrete Field Testing Technician - Grade I for performing QC sampling of concrete. Assign an ACI technician to each shift where concrete is being sampled and tested.
  - g. The QCI shall be an ACI Strength Testing Technician for performing strength testing of QC acceptance cylinders. Assign an ACI technician to each shift where concrete cylinders are tested for acceptance. Conform to this certification requirement by March 1, 2007.
  - h. The methods for tracking all QC results to specific precast components for acceptance or to assure repairs, replacement, reevaluation and/or rejection of any specific precast product.
  - i. The method of record documentation. (See 1073.19) The City will reject a QCP not incorporating the minimum requirements of the NPCA certification program.
5. Provide certification/calibration records for the testing equipment used to perform all required tests on the concrete and component materials to verify conformance to the applicable Construction & Material Specifications and/or this program.

**B. Distributor.** Request certification by submitting:

1. An application for becoming an authorized precast concrete Distributor (see Appendix B)
2. Location and address of the Distributor's storage site.
3. Methods and location for properly storing materials
4. Have a designated quality control person as the City contact.

**1073.04 Documentation Phase - City Responsibilities.** The Laboratory will review the 1073.03.A or 1073.03.B submittals and notify the Manufacturer or Distributor within 15 days as follows:

- A. The Manufacturer's submittal is acceptable, proceed to 1073.05
- B. The Distributor's submittal is acceptable, proceed to 1073.08
- C. The submittal is not acceptable; additional information is required. The Manufacturer or Distributor has sixty days to revise and resubmit information.

**1073.05 Mix Design Certification Phase, Submittal.**

The Manufacturer shall supply proposed concrete mix designs for each product to be produced under this plan. Use the form in Appendix A to document each concrete mix. Provide 28-day compressive strength test results, conforming to ASTM C 39, for all submitted mixes.

The Manufacturer may make this submittal as part of 1073.03.A.

**1073.06 Mix Design Certification Phase, Acceptance Criteria.**

The City will base acceptance of the mix designs on:

- A. The component materials conforming to City specifications.
- B. The 28 day compressive strengths meeting ACI 301, table 4.2.3.3.b requirements. The Manufacturer may use a standard deviation (ACI 301, Section 4.2.3.2) in lieu of ACI

301table 4.2.3.3.b. If a standard deviation is used, the Manufacturer shall provide the actual test results that established the standard deviation for the concrete mix.

- C. The water/cement ratio conforms to specification limits, if any.
- D. The cement content conforms to specification requirements, if any

**1073.07 Mix Design Certification Phase - City Responsibilities.**

The Laboratory will review the 1073.05 information and notify the Manufacturer within 10 days if:

- A. The Concrete mix designs are acceptable and the Department will schedule a site certification visit.
- B. The concrete mix designs are unacceptable, provide additional information for acceptance. The Manufacturer has sixty days to revise and resubmit information.

**1073.08 Site Certification Visit.** The Manufacturer or Distributor shall provide a working demonstration of the QC procedures, the QCP, and their QC personnel's ability to produce a quality product.

During the visit, the Manufacturer's QCI or the Distributor QC personnel shall explain all quality control procedures in the plant's QCP and answer all questions of the inspection team. If additional personnel also perform QC responsibilities, they shall be present during the inspection and be able to answer questions about their QC responsibilities and demonstrate their ability to perform their QC assignments. The Laboratory will inspect a Distributor's storage facilities and methods of storage.

**1073.09 Site Certification Demonstration Visit - City Responsibilities.** The Laboratory will document that the Manufacturer's or Distributor's QCI and other QC personnel are familiar with the QCP and have the capability to ensure the QCP is followed.

Within ten working days after the inspection, the Laboratory will provide written notification to the Manufacturer or Distributor that their site is certified (1073.11) or not certified.

For sites that are not certified, the Laboratory will provide a list of issues that do not meet the program requirements. The Manufacturer or Distributor shall take actions to correct the listed issues and document those actions to the Laboratory before the Laboratory will schedule a re-inspection. The Manufacturer or Distributor has 60 days to make corrections and furnish that information to the Laboratory.

**1073.10 Qualification Limitations.** A Manufacturer or Distributor may not attempt to qualify more than three times for each phase.

If any phase is not completed within three attempts or the period between attempts exceeds the specified time period, the precast Manufacturer's plant or the Distributor will not be certified. A letter will be issued and no re-qualification attempts can be started in less than 270 days from the letter's date.

**1073.11 Final Approval.** Manufacturers may begin production after receiving the Laboratory's written notification of certification (1073.09).

The City will list accepted Manufacturer facilities or Distributor facilities on the City's Certified Precast Concrete Manufacturer and Distributor List.

**1073.12 Manufacturing Drawings.** Manufacturers shall have manufacturing drawings of record for all precast concrete product components. The drawings shall show dimensional requirements; material requirements; and any other specification requirements needed to construct the product (see section 1073.19). The manufacturer shall have the drawings available for the QCI and City's QA inspectors.

When the precast concrete product's specifications require a design submittal, make the submittal of the manufacturing drawings to the City office responsible for approval. The Manufacturer shall have record copies stamped approved by the responsible office available for the QCI and the City's QA inspectors.

**1073.13 Concrete Air Content Requirements.** Ensure the air content of the concrete conforms to specification requirements. Use the following method for controlling and testing air content.

- A. Perform plastic air tests (ASTM C 231) for at least every 50 cubic yards (38 cubic meters) of concrete or at least for every 4 hours of production, whichever requires the greater number of tests.
- B. Precast concrete requires a minimum hardened air content of 4%. The City has established that due to placing, consolidating, vibrating and finishing, 2% air is lost between plastic air tests and the final hardened air content. Based on the 2% loss, furnish concrete having a minimum 6% plastic air test result after any aggregate correction factor is applied.
- C. Do not retest concrete loads. If material does not meet specifications, do not use.
- D. A Manufacturer may lower the 6% minimum plastic air content if the plant establishes a loss of air value as follows:

Perform both hardened air tests (ASTM C 457) and plastic air tests (ASTM C231) on the same concrete batches to determine the correlation. Track the plastic air tested concrete batches through to the specific completed precast component. Obtain cores from that precast component at locations agreeable to both the City and the Manufacturer. Have hardened air tests (ASTM C457) run on the core(s) by a private laboratory. Repeat this procedure a minimum of 20 times. Calculate the means of the plastic air results and hardened air results and determine the difference between the means. The Laboratory may verify actual test results. The difference in means, whether greater or less than 2 %, will be added to 4 % to determine a new total percent plastic air content required for the Manufacturer.

- E. The City will periodically take core samples to test for hardened air content. The core location will match the location of plastic air tests. Cut and furnish cores from the selected locations and provide the cores before the inspector leaves the plant. If QA results show an adjustment is needed for the minimum plastic air content, the Manufacturer shall change their requirements.

**1073.14 Compressive Strength Testing.** The Manufacturer shall test cylinders for compressive strength. Use either 6-inch x 12-inch (150 mm x 300 mm) or 4-inch x 8-inch (100 mm x 200 mm) cylinders conforming to ASTM C 31. A written testing procedure shall be included in the QCP.

Perform compressive strength tests for each different concrete mix design used in each 8-hour shift. If the product's specification has a more stringent established frequency of testing for compressive strength follow that testing frequency. Cure cylinders with the product and test them in accordance with ASTM C 39.

**1073.15 Acceptable Compressive Strength.** Unless a higher minimum strength is required by specification or design, the minimum required design strength will be 4000 psi (27.6 MPa). Perform compression testing on or before 28 days. Test two cylinders and average the results to determine the strength. Meet at least one of the following compressive strength requirements before shipping any precast concrete item:

- A. Both cylinders meet or exceed the minimum required design strength
- B. The average strength result of the two cylinders meets or exceeds the minimum required design strength and no single cylinder is less than 5 % below the minimum required design strength (or 1/4 standard deviation if the concrete mix design was based on the Manufacturer's actual standard deviation values).

**1073.16 Unacceptable Compressive Strength.** The City will consider either of the following as unacceptable 28 day concrete test results:

- A. One of the two cylinder results is more than 5 % below the minimum required design strength (1/4 standard deviation if the concrete mix design was based on the Manufacturer's standard deviation values).
- B. The two cylinder results average less than the minimum design strength.

**1073.17 Compressive Strength Retests.** If any product's original test cylinders do not meet minimum compressive strength, test two additional cylinders, if available. For acceptance, the two additional cylinders, tested on the same day as the original failed test cylinders, shall be equal or greater than the design strength, and the average strength for all cylinders tested that same day shall be equal or greater than the design strength.

Additional cylinders, tested one day or more after the failed cylinder tests, shall conform to 1073.15.

**1073.18 Storage And Shipping Of Certified Precast Products.** Store all precast products according to CMS 106.05.

Ship certified products using ODOT's electronic TE-24 system. The Laboratory will provide instructions for completing the certified ODOT TE-24. Access the following website for written instructions.

<http://www.dot.state.oh.us/testlab/applists/vWarehouse/odotvw.htm>

**1073.19 Records Documentation Requirements.**

- A. **Manufacturer.** The Manufacturer shall retain all QC documentation for five (5) years from the date any certified product is shipped to the project site. Documentation shall include all materials certifications, materials tests, QC records, product test results and any other documentation associated to the specific product. The Laboratory will approve the

Manufacturer's file system during the qualification phases. File systems shall provide quick and convenient access to all documentation to show that a certified precast product met all specification and supplement requirements. Files shall be immediately available to any City representative when requested.

**B. Distributor** The Distributor shall retain records for five (5) years from the date any certified product is shipped to the project site. The documentation shall include the Manufacturer's certified ODOT TE- 24, the shipping certified ODOT TE-24, and producer inspection and quantity control records. Files shall be immediately available to any City representative when requested

**1073.20 QCP, Mix Design and QC Personnel Changes.** A Manufacturer may change concrete mix designs, quality control procedures, add new products, change QC personnel, or reassign QC duties if the changes are pre-approved by the Laboratory and documented.

The Manufacturer shall submit proposed changes to the Laboratory. The Laboratory may require additional information, demonstrations and/or plant inspections to ensure that the changes will provide the City a quality product. The Laboratory will not approve changes in conflict with City specifications or NPCA certification program requirements. The Manufacturer may change a plant's QCI only if the new QCI has passed the required NPCA course and ACI certifications.

A Distributor shall notify the Laboratory when there is a change in the quality control person.

**1073.21 Quality Assurance Inspections.** The Laboratory will perform random QA inspections at least every three months. The Manufacturer shall notify the Laboratory at least three (3) working days before starting production of certified products.

Manufacturers and Distributors shall grant the Laboratory QA inspector (QAI) access to all portions of the plant and/or storage area. The QAI will check compliance to this supplement and the Manufacturer's QCP, NPCA program requirements, and City specifications. The QAI will document any noncompliance items and report them to the Manufacturer or Distributor.

Non-compliance items include material control, quality control inspection, final product testing and records documentation that do not conform to the Manufacturer's QCP, NPCA program requirements, City specifications, or this supplement.

The City may also conduct QA Inspections at the project site.

**1073.22 QCP Revision Requirements.** After each 1073.21 QA inspection the Manufacturer or Distributor shall review the inspection information and make any necessary revisions to their QCP. Revise and submit QCP's no later than 30 days from receipt of the 1073.21 inspection. Revisions to the QCP shall conform to 1073.03.

**1073.23 Loss of Certification.** The Laboratory will evaluate all non-compliance items. The City may remove a Manufacturer or Distributor from the program for the following items:

**A. Manufacturer.**

1. Three (3) or more items of noncompliance in any single plant inspection.
2. Three (3) successive plant inspections with two (2) items of noncompliance.

3. Three (3) successive plant inspections with the same noncompliance item.
4. Inaccurate, incorrect or unperformed final component testing.
5. Material components not meeting specifications.
6. Certifying and shipping products that do not meet specifications.
7. Not submitting revised QCP according to 1073.22
8. Incomplete, incorrect or inaccurate records, section 1073.19.
9. Loss of certification from NPCA.
10. Loss of a qualified NPCA certified QCI.

**B. Distributor.**

1. Inaccurate inventory control
2. Two (2) non-compliances with storage of product
3. Any instance of a Distributor patching/repairing a certified product
4. Two (2) instances of not marking product with the Distributor's name
5. Incomplete, incorrect or inaccurate records, section 1073.19.

The Laboratory will issue a certified letter to the Manufacturer or Distributor that has been removed from the program. Upon receipt of the letter, the Manufacturer or Distributor shall immediately stop shipping certified products. The Manufacturer or Distributor may continue to produce or ship by conforming to 1073.25.

**1073.24 Appeals Process.** A Manufacturer or Distributor may request a hearing before an appeals board. Items 1073.23.A.1-9 and 1073.23.B.1-5 are subject to appeal. The Manufacturer or Distributor shall request the hearing within 15 days of receiving the notification of removal. The Manufacturer or Distributor shall make this request in writing; stating the reason for the appeal; and providing any supporting documentation.

The City will hold an appeals hearing within 30 days of receiving the request. The appeals board is composed of the Deputy Director of the Department of Public Service; the Administrator of the Department of Public Service, Division of Design and Construction; and the Construction Section Manager.

The appeal hearing will last one hour and include three 20-minute sessions. 20 minutes for the Manufacturer or Distributor to present; 20 minutes for QAI to present QA inspection data; and 20 minutes for questions by the appeal board members.

The City will issue the appeal board findings within 15 days of the hearing. A Manufacturer or Distributor may continue production if conforming to 1073.25.

**1073.25 Interim Certification Operation.**

**A. Manufacturers.** A Manufacturer in the appeals process, 1073.24; or a Manufacturer who has been removed from the certification program, but had been supplying product under contract before removal from the program, will:

Hire an independent inspection agency conforming to 1073.03 to inspect and ensure compliance to their approved QCP and the City specifications for both materials and product. The independent inspection agency shall be full time during production of City precast

products. Obtain written approval from the Laboratory for the inspection agency and the assigned personnel prior to the Manufacturer resuming production for the City.

**B. Distributors.** A Distributor may continue shipping after the Laboratory inspects the existing stock. The Distributor shall not add additional stock.

**1073.26 Loss of Certification - Minimum Time Period.** Any Manufacturer or Distributor losing certification may not re-apply within 1 year from the date of removal or 1 year from the time the Manufacturer's plant ceases supplying material under section 1073.25, whichever is later.

If the removal was for QCI qualification, an exception may be granted to the 1 year period. The Manufacturer may request reinstatement when a qualified QCI is on the plant's payroll and the Manufacturer has received written approval by the Laboratory.

**APPENDIX A**

**CONCRETE MIX DESIGN INFORMATION**

Company			
Location			
Concrete Mix Design for:			
	Quantity	type	Source
Cement			
Coarse Aggregate			
Fine Aggregate			
Fly Ash			
GGBF Slag			
Micro-silica			
Max W/C ratio			
Air Entraining Agent			
Superplasticizer			
Water Reducer			
Retarder			
Other			
Other			

**APPENDIX B**

**APPLICATION FOR AUTHORIZED PRECAST CONCRETE DISTRIBUTOR**

\_\_\_\_\_ requests acceptance by the City of Columbus, Ohio as an authorized Distributor of the following precast concrete items certified under the requirements of Supplement 1073:

Item	Spec	Certified Manufacturer(s)*
Box Culvert	706.05	
Three-Sided Flat Topped Culvert	706.051	
Arch Culvert	706.052 706.053	
Manhole Section	706.13	
Flat Slab Tops	706.13	
Catch Basins	706.13	
Inlet Tops	706.13	
Portable Barriers	706.13	
Outlets	706.15	
Pull Boxes	725.08	
Cellular Retaining Walls	610	
Headwalls	602	
MSE Panels	Various	
Lagging	Various	
Noise Wall Panels and Posts	Various	
Miscellaneous	Various	

As a Distributor of precast concrete materials this company understands and is responsible for:

1. Accepting only precast concrete components from certified Manufacturers.
2. Receiving and shipping products using the virtual warehouse plant sampling and testing program (TE-24 system)
3. Providing a paper copy of the TE-24 with every shipment

4. Providing a description of the item(s) shipped as required by the Laboratory.
5. Completing a TE-24 when making any non-state shipments
6. Performing an inspection of incoming products to assure they match the Manufacturer's TE-24 description, quantity and damage. Marking and returning any products not accepted for delivery to the Manufacturer and notifying the Laboratory of the products and the corrected inventory count.
7. Storing certified precast concrete products separately from non-certified products.
8. Marking the product with our Distributor's name to identify acceptance of the delivered product and for shipment to the project.
9. Maintain the identification of the Manufacturer's original markings.

I understand and agree to the above conditions.

TO BE NOTARIZED

Signature of Authorized Representative \_\_\_\_\_

Date \_\_\_\_\_

Company Name \_\_\_\_\_

Address \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Quality Control Rep. \_ Phone Number \_\_\_\_\_

Fax Number \_\_\_\_\_

E-mail Address \_\_\_\_\_