

# Precast Concrete Modular Wall and Fence System

## **PART 1 GENERAL**

### **1.01 WORK INCLUDED**

Work under this item shall consist of furnishing and erecting precast walls in accordance with the locations, dimensions, lines, grades, and design specified in the contract documents, approved drawings, and this written specification.

### **1.02 SYSTEM DESCRIPTION**

Precast Concrete Modular Wall and Fence System is a two-part product consisting of a horizontal slat infill and vertical structural support posts that could be constructed from similar precast concrete or structural steel. Entry points, access doors, and other technology products can be easily adapted to, mounted upon, or installed adjacent to these walls to form a complete perimeter security system. This specification covers the manufacture and installation of the wall portion only. Please refer to supplemental specifications for other products working in conjunction with these walls.

### **1.03 QUALITY ASSURANCE**

During Forming, Curing, and Palletization; each component is thoroughly inspected for specification compliance and consistent manufacture per American Concrete Institute guidelines. Once on site, the product Installers must have experience installing these products or similar products and provide similar inspection to ensure compliance with this specification.

### **1.04 STANDARDS AND REFERENCES (per most updated volume)**

- *ASTM A36 – Carbon Structural Steel*
- *ASTM D7803 – Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Powder Coating*
- *ASTM A500 – Steel Structural Tubing in Rounds and Squares*
- *ASTM F900 – Industrial and Commercial Steel Swing Gates*
- *ACI 533R – Guide for precast wall panels \*Per applicable sections\**
- *ACI ITG – Specification for tolerances for precast concrete \*Per applicable sections\**
- *ACI 201 – Guide for conducting a visual inspection of concrete in service \*Per applicable sections\**

### **1.05 SUBMITTALS**

- A. Preconstruction Submittals
  - a. Standard product drawings post and infill slat along with specification are readily available in various formats. Be sure to include all dimensions, details, and finishes. Drawings must include recommended post foundations as well.
  - b. Custom details are available upon design review and engineering input on special height, color, or configurations.
- B. Shop Drawings
  - a. Site specific drawings of a single unit are included along with detailed installation instructions.
  - b. Site layouts will vary based on actual site conditions and are often discouraged.
  - c. As-Built Drawings are recommended to show any field modifications or adjustments.
- C. Mix Design Data
  - Only upon request will mix design data be made available. Mix design is proprietary to the Manufacturer and will be share in the strictest confidence.
- D. Test Reports and Certificates
  - Available as required. Must be requested prior to bid and additional charges may apply depending on certification or stamp requirements.
- E. Samples (if required)

Before proceeding with production, a model precast modular unit shall be provided by the Manufacturer for the Engineer's approval to establish a guide and standard for the type of finish and color to be furnished. This model shall be kept at the Manufacturer's plant to be used for comparison purposes during production.

## **1.06 PRODUCT HANDLING AND STORAGE**

### **A. Handling**

Product is to be handled with care to avoid breakage or damage. Due to the weight of the units, always use a lift truck or other equipment capable of lifting the weight as prescribed on the unit or packaged products.

### **B. Storage**

Proper storage includes ventilation, drainage, as well as protection from weather, vandalism, theft, corrosive elements (salt, glycol, solvents, etc.) and any other mitigating factors present.

### **C. Delivery and Acceptance**

Delivery is to be done by an authorized hauler, who will transport a properly secured load. Upon receipt of material, a visual inspection must immediately be conducted to ensure no damage or defects.

## **1.07 WARRANTY**

Product includes a 5-year warranty with limitations as detailed in the manufacturer's warranty statement.

## **PART 2 PRODUCT AND MATERIALS**

### **2.01 MANUFACTURER**

Basis of Design and Known Manufacturer(s)

Dura-Crete Walls

info@duracretewalls.com

(586) 759-4286

Warren, MI

www.duracretewalls.com

### **2.02 MATERIAL COMPONENTS**

#### **A. Standard Precast Concrete Unit Design**

##### **a. Precast Panels**

- i. Dura-Crete Walls S-Series Concrete Panels shall have typical dimension of 115" long by 8" high and up to 5" thick with a minimal thickness of 2 1/8" at the panel/post interlocking assembly point.
- ii. Panels are to have decorative, textured patterns (Offset Block, Vertex, or Smooth) on both sides or as otherwise specified in the project submittals.

##### **b. Posts**

- i. Concrete Posts are set 10 feet apart maximum and have a minimum cross-sectional dimension of 5 5/8" x 7 7/8" and long enough to support the full height from grade along with a 36" of embedment in concrete. Walls taller than 6' high are recommend to use steel post assembly.
- ii. Steel Posts - Where steel posts are required, all welded attachments and posts shall be hot dip galvanized after fabrication in accordance with the requirements of ASTM A 123. All welds shall conform to AWS D1.1. Size and dimensioning of steel post vary and are subject to engineering requirements for height, wind load, and other performance requirements. See plan drawings for detail of posts and foundations required for this project.

#### **B. Concrete Mix Design**

Mix design used for the precast units shall be composed of Portland cement, fine and coarse aggregates, admixtures, and water. Concrete strength shall be as specified in the approved engineering drawings. The engineer on request shall be given the mix design. Exact ratios of all contents are considered proprietary and will be shared in the strictest confidence.

#### **C. Concrete Compressive Strength**

The nominal minimum 28-day compressive strength of the concrete in the panels shall be 3500-4000 PSI.

Minimum concrete cover over reinforcing steel to be in accordance with ACI 318 7.7.2(a).

#### **D. Air Entraining**

Air entraining is not required in dry mix concrete panels. In the event wet cast posts should be used standard air entrainment will be between 4% and 7%.

#### **E. Pigments**

Precast concrete panels will be pigmented throughout the concrete form. Standard finish is to be (Natural Gray, Coral Rose, or Mesa Buff). Specialty colors may be available upon request.

#### F. Epoxy Coated Reinforcement

All steel reinforcing shall conform to the requirements and grades shown on the approved drawings and shall be fabricated and placed in accordance with the drawings. All reinforcing steel shall be deformed bars conforming with ASTM AG15 Grade 60 Epoxy Coated Bars. Slat Panel reinforcement to be no less than #4 bar. Concrete post reinforcement and no less than 2 pcs. of #6 bar.

#### G. Forms

- a. Forms for the units shall be constructed of steel with dimensional tolerances that will assure the production of uniform units.
- b. The precast concrete panels should be manufactured on machinery suitable for producing compacted, vibrated, dry mix concrete.
- c. The concrete mix, as designed, shall be proportioned and mixed in a batch mixer to produce homogeneous concrete conforming to the requirements. The transporting, placement, and compaction of concrete shall be by methods that will prevent segregation of the concrete materials and the displacement of the reinforcing steel rebar from its proper position in the form. Concrete shall be mechanically placed in the forms and vibrated/compacted sufficiently to produce a surface free from imperfections such as honeycomb, segregation, or cracking that would impair the panels structural integrity.

#### H. Curing

Precast units shall be cured by a method or combination of methods that will give satisfactory results in accordance with accepted local practices and standards. When steam curing is used, it shall be done under a suitable enclosure to contain the live steam to minimize moisture and heat losses. The initial application of the steam shall be from two to four hours after the final placement of the concrete to allow the initial set of the concrete to take place. If retarders are used, the waiting period before application of the steam shall be increased from four to six hours.

### **2.03 PERFORMANCE CRITERIA / QUALITY CONTROL**

#### A. Testing

Precast Concrete Panels should be tested for compressive strength in the following manner:

- a. A panel or panels should be produced without steel reinforcing using the standard mix design.
- b. After 28 days, three sections of the panel should be cut for testing. The size of each test section should be 3" x 3" x panel thickness.
- c. The test sections should be loaded into a compressive strength testing device in the same direction as they were cast and should be tested in a dry condition.
- d. The average of the three test results should be used to determine the compressive strength.
- e. Panels shall have a minimum STC rating of 41.

#### B. Repairs at Plant

Before shipment, the surfaces of all precast units shall be examined. If the exposed face of a unit is below the standard of the approved model, then it shall be properly repaired to conform to the balance of the work with respect to appearance, strength and durability.

#### C. Inspection and Rejection

The quality of materials, the process of manufacture, and the finished units shall be subject to inspection by the Factory Foreman prior to shipment. Precast units may be subject to rejection on account of failure to conform to the specification requirements. Rejection includes

- a. Variations that substantially deviate from the approved model.
- b. Dimensions not conforming with tolerances of ACI guides
- c. Any Defects, which would affect the structural integrity of the unit.

#### D. Handling and Storage

Care shall be taken during storage, transporting, hoisting, and handling of all units to prevent cracking or damage. Units damaged by improper storing, transporting, or handling shall be replaced or repaired to the satisfaction of the Field Engineer.

#### E. Shipment

The precast units shall not be shipped before attaining two-thirds of the required 28-day concrete strength (fc').

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

Site grading and or berm preparation associated with the barrier installation shall be completed to within 1” below the barrier prior to constructing the barrier footings. Grading up to a depth of 3” shall be included as part of the wall construction. Materials excavated, if acceptable, shall be deposited on the adjacent terrain and spread in thin uniform layers. Surplus excavated material shall be disposed of off the contract site at the owner’s expense. There shall be no visible gaps between any barrier panels nor beneath the bottom panels after completion of the barrier. Tree pruning and/or removal, if required in the contract and approved by the owner, shall be kept to a minimum.

### **3.02 INSTALLATION AND SETUP**

- A. Concrete footings shall be cast entirely against undisturbed soil. In the event of unstable or loose soils and the footings need to be formed, the excavation shall be backfilled with granular materials and compacted to at least 95% Proctor density when tested in accordance with ASTM D 1557. For concrete posts, the concrete working slab below the construction joint in the footing shall be placed a minimum of 4 hours prior to the installation of the post. Where required, the tops of all footings shall be placed a minimum of 4 hours prior to the installation of the post. Where required, the tops of all footings are to be shaped to provide for full horizontal seating of panels, the remaining surface area is to be domed to shed water. Stepped footings are to be constructed to accommodate grade changes. The depth and diameter of the footings shall be constructed in accordance with the approved shop drawings. Concrete to be 3000-3500 PSI minimum 28-day compressive strength with 3-4” slump.
  - a. For surface mounted enclosure applications, concrete surface must be a minimum of 6 inches thick, unless otherwise specified in submittals or engineering review, and in structurally sound condition. Dura-Crete Walls should not be mounted to an asphalt surface. See approved submittals to confirm anchor rod depth requirements before drilling and setting.
- B. Tolerances
  - a. Vertical alignment for barriers and posts shall be: ½ inch for heights to 10 feet; 1 inch for heights to 20 feet; and 1-1/2 inches for heights to 30 feet.
  - b. Horizontal alignment for barriers shall be in reasonably close alignment to that shown on the plans.
  - c. Post spacings shall be set +\_ ½ inch of their intended location
  - d. Make sure the surfaces intended to have post installed upon them are clear from any obstacles, and grade is consistent, relative to post to post placement.

### **3.03 FIELD REPAIRS AND QUALITY CONTROL**

- A. FIELD REPAIRS
  - a. Cosmetic repairs can be made at the site using the following methods and materials
  - b. Featheredging of concrete repair materials shall be permitted.
  - c. An approved bonding agent shall be used on the existing concrete and in the repair mix.
  - d. The repair mix shall be prepared at the site using the same materials used in the original production.
  - e. When the original concrete is made from grey cement only, some white cement may be added to the mix to match the color.
  - f. Cracks may be repaired using epoxy injection methods or other proprietary products.
  - g. Structural repairs may not be done unless supervised by a Dura-Crete Inspector or approved via digital documentation.
    - i. The Dura-Crete Inspector will determine if the damage is structural or not.
      - 1. Reinforcement is exposed.
      - 2. Cracking occurs in a bearing area.
      - 3. Cracks extend from one face to the other.
      - 4. Cracks are larger than allowable per ACI guides

#### **B. FIELD QUALITY CONTROL**

The product Installers must have experience installing these products or similar products and provide similar inspection to ensure compliance with this specification.

### **3.03 CLEANING AND MAINTENANCE**

Precast Concrete Modular Wall and Fence Systems require minimal maintenance. Make sure product is free from external debris to ensure an extended life span, this includes animal droppings, tree sap, and other environmental factors. Also making sure and vegetation is not growing underneath, immediately adjacent to, or upon the concrete slat walls and posts. Make sure to clean up debris and remove from the site.

**END OF SECTION**