

## **SECTION 034140 – PRECAST CONCRETE TUNNEL**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to this section.

#### **1.2 SUMMARY**

- A. This section includes the design, furnishing and installation of precast concrete tunnel.

#### **1.3 REFERENCES**

- A. Except as herein specified or as indicated on the Drawings, the work of this section shall comply with the following:
  - 1. AASHTO - American Association of State Highway & Transportation Officials: HS-20 - Highway Truck Loading.
  - 2. ACI - American Concrete Institute:
    - a. 304 - Recommend Practice for Measuring, Mixing, Transporting and Placing Concrete.
    - b. 318 - Building Code Requirements for Reinforced Concrete.
  - 3. ASTM - American Society for Testing and Materials:
    - a. A185 - Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
    - b. A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
    - c. C33 - Specification for Concrete Aggregates.
    - d. C150 - Specification for Portland Cement.
    - e. C857 - Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures.
  - 4. CRSI - Concrete Reinforcing Steel Institute: Manual of Standard Practice for Reinforced Concrete Construction.
  - 5. PCI - Prestressed Concrete Institute: MNL-116 - Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products.

#### **1.4 SYSTEM DESCRIPTION**

- A. General:

1. Precast concrete tunnel sections with integral base and separate cover.
2. Two piece construction, keyed to fit to each other as indicated on the Drawings.
3. Panelized, bolted, construction: Not allowed.
4. Sizes and inserts as indicated on the Drawings.

## 1.5 DESIGN AND PERFORMANCE REQUIREMENTS

### A. Tunnel:

1. Codes:
  - a. Design in accordance with ACI 318, ASTM C857, and local building codes.
  - b. Detail in accordance with ACI 318, CRSI Manual of Standard Practice for Reinforced Concrete Construction, and local building codes.
2. Loads:
  - a. Design for dead, live, and impact loads.
  - b. Design for AASHTO HS-20 wheel load at grade over top and adjacent to structure.
  - c. Lateral pressure coefficient for determining lateral soil pressure or lateral pressure due to wheel load shall be 0.25 minimum, 0.50 maximum.
  - d. Minimum soil unit weight: 120 pcf.
  - e. Minimum concrete unit weight: 150 pcf.
3. Detailing:
  - a. Provide ACI 318 Class B splices where splices are required.
  - b. Provide 1-1/4 inches minimum clear cover for reinforcing steel.

## 1.6 SUBMITTALS

### A. Shop Drawings for precast tunnels to include:

1. Dimensions.
2. Elevations.
3. Sections.
4. Joint details.
5. Reinforcing details.
6. Locations and sizes of cast in devices.

### B. Design calculations for precast tunnels upon request by Engineer to include:

1. Design loads.
2. Strength calculations.
3. Sizing of reinforcement.

## 1.7 QUALITY ASSURANCE

- A. Manufacturer's qualifications: Precast units shall be manufactured by a producer who has been in the precast business for not less than 5 years and is qualified to fabricate the type of work specified herein.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Receiving and storage:
  - 1. Handle units with caution to prevent damage during delivery or storage.
  - 2. Handle units in accordance with manufacturer's instructions.
- B. Rejected material and replacements:
  - 1. Reject damaged, deteriorated or contaminated material and immediately remove from the site.
  - 2. Replace rejected materials with new materials at no additional cost to Owner.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Advance Concrete Products, Highland, Michigan; or reviewed equal.

### 2.2 MATERIALS

- A. Concrete for precast tunnels:
  - 1. Cement: ASTM C150.
  - 2. Aggregates: ASTM C33.
  - 3. Air-entrainment: 5%  $\pm$  1-1/2%.
  - 4. Mixing water: Clean, potable.
  - 5. Minimum concrete strength:  $f'c = 4,500$  psi.
- B. Reinforcing steel:
  - 1. Wire mesh: ASTM A185,  $F_y = 65,000$  psi.
  - 2. Reinforcing bars: ASTM A615,  $F_y = 60,000$  psi.
- C. Joint materials: 1-inch x 1-inch butyl rope, or mastic sealant.

### 2.3 FABRICATION

- A. Concrete finish:
  - 1. As-cast, smooth form finish.
  - 2. Remove fins, patch tie holes, and imperfections.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install precast units in conformance with:
  - 1. The Shop Drawings reviewed by Engineer.
  - 2. The manufacturer's recommendations.
- B. Prepare subgrade below precast concrete tunnels in accordance the requirements of Division 31 Section "Earthwork."
- C. Set units so that keys match firmly, with no rocking or nonuniform bearing.
- D. Apply joint materials as indicated on the reviewed Shop Drawings.

#### 3.2 FIELD QUALITY CONTROL

- A. Installation tolerances:
  - 1. Precast units:
    - a. Elevation:  $\pm 1/2$ -inch.
    - b. Level:  $\pm 1/4$ -inch in 10 feet.

#### 3.3 CLEANING

- A. Prior to acceptance of the work of this section, thoroughly clean installed materials and related areas in accordance with Division 01 requirements.

END OF SECTION 034140