# SECTION 034140 – PRECAST CONCRETE TUNNEL

1. GENERAL
	1. RELATED DOCUMENTS
		1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to this section.
	2. SUMMARY
		1. This section includes the design, furnishing and installation of precast concrete tunnel.
	3. REFERENCES
		1. 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:
				1. 304 - Recommend Practice for Measuring, Mixing, Transporting and Placing Concrete.
				2. 318 - Building Code Requirements for Reinforced Concrete.
			3. ASTM - American Society for Testing and Materials:
				1. A185 - Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
				2. A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
				3. C33 - Specification for Concrete Aggregates.
				4. C150 - Specification for Portland Cement.
				5. 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.
	4. SYSTEM DESCRIPTION
		1. 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.
	5. DESIGN AND PERFORMANCE REQUIREMENTS
		1. Tunnel:
			1. Codes:
				1. Design in accordance with ACI 318, ASTM C857, and local building codes.
				2. Detail in accordance with ACI 318, CRSI Manual of Standard Practice for Reinforced Concrete Construction, and local building codes.
			2. Loads:
				1. Design for dead, live, and impact loads.
				2. Design for AASHTO HS-20 wheel load at grade over top and adjacent to structure.
				3. Lateral pressure coefficient for determining lateral soil pressure or lateral pressure due to wheel load shall be 0.25 minimum, 0.50 maximum.
				4. Minimum soil unit weight: 120 pcf.
				5. Minimum concrete unit weight: 150 pcf.
			3. Detailing:
				1. Provide ACI 318 Class B splices where splices are required.
				2. Provide 1-1/4 inches minimum clear cover for reinforcing steel.
	6. SUBMITTALS
		1. 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.
		2. Design calculations for precast tunnels upon request by Engineer to include:
			1. Design loads.
			2. Strength calculations.
			3. Sizing of reinforcement.
	7. QUALITY ASSURANCE
		1. 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.
	8. DELIVERY, STORAGE, AND HANDLING
		1. Receiving and storage:
			1. Handle units with caution to prevent damage during delivery or storage.
			2. Handle units in accordance with manufacturer's instructions.
		2. 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.
2. PRODUCTS
	1. MANUFACTURERS
		1. Advance Concrete Products, Highland, Michigan; or reviewed equal.
	2. MATERIALS
		1. Concrete for precast tunnels:
			1. Cement: ASTM C150.
			2. Aggregates: ASTM C33.
			3. Air-entrainment: 5% ± 1-1/2%.
			4. Mixing water: Clean, potable.
			5. Minimum concrete strength: f'c = 4,500 psi.
		2. Reinforcing steel:
			1. Wire mesh: ASTM A185, Fy = 65,000 psi.
			2. Reinforcing bars: ASTM A615, Fy = 60,000 psi.
		3. Joint materials: 1-inch x 1-inch butyl rope, or mastic sealant.
	3. FABRICATION
		1. Concrete finish:
			1. As-cast, smooth form finish.
			2. Remove fins, patch tie holes, and imperfections.
3. EXECUTION
	1. INSTALLATION
		1. Install precast units in conformance with:
			1. The Shop Drawings reviewed by Engineer.
			2. The manufacturer's recommendations.
		2. Prepare subgrade below precast concrete tunnels in accordance the requirements of Division 31 Section “Earthwork.”
		3. Set units so that keys match firmly, with no rocking or nonuniform bearing.
		4. Apply joint materials as indicated on the reviewed Shop Drawings.
	2. FIELD QUALITY CONTROL
		1. Installation tolerances:
			1. Precast units:
				1. Elevation: ± 1/2-inch.
				2. Level: ± 1/4-inch in 10 feet.
	3. CLEANING
		1. 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