

SECTION 03410

STRUCTURAL PRECAST CONCRETE

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Wall, Headwall, Kneewall, and Slab Panels.
- B. Grout Packing.

1.2 RELATED SECTIONS

- A. Section 03100 - Concrete Formwork.
- B. Section 03200 - Concrete Reinforcement.
- C. Section 03300 - Cast in Place Concrete.
- D. Section 03370 - Concrete Curing.

1.3 REFERENCES

- A. ACI 301 - Structural Concrete for Buildings.
- B. ACI 318 - Building Code Requirements for Reinforced Concrete.
- C. ASTM A615 - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- D. ASTM C150 - Portland Cement.
- E. PCI MNL-116 - Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products.
- F. PCI MNL-120 Design Handbook - Precast and Prestressed Concrete.
- G. PCI MNL-123 - Manual on Design of Connections for Precast Prestressed Concrete.
- H. PCI MNL-124 - PCI Design for Fire Resistance of Precast Prestressed Concrete.
- I. UL - Underwriter's Laboratories.

1.4 UNIT PRICE MEASUREMENT AND PAYMENT

- A. Upstream Precast Concrete Headworks:
 - 1. Basis of Measurement: At the unit price bid per lump sum as stated in the proposal.
 - 2. Basis of Payment: Includes all labor, material, equipment, and dewatering necessary to excavate and install the precast upstream concrete headworks. Includes the riprap, fabric, and seeding for restoration of the area contours as indicated in the plans. Includes precast segments, formwork, and all related material for the installation and construction of the headwall, wing wall, apron, and knee wall.

- B. Downstream Precast Concrete Headworks:
 - 1. Basis of Measurement: At the unit price bid per lump sum as stated in the proposal.
 - 2. Basis of Payment: Includes all labor, material, equipment, and dewatering necessary to excavate and install the precast downstream concrete headworks. Includes the riprap, fabric, and seeding for restoration of the area contours as indicated in the plans. Includes precast segments, formwork, and all related material for the installation and construction of the headwall, wing wall, apron, and knee wall.

1.5 DESIGN REQUIREMENTS

- A. Design members exposed to the weather to provide for movement of components without damage, failure of joint seals, undue stress on fasteners or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.
- B. Design system to accommodate construction tolerances, deflection of other building structural members, and clearances of intended openings.
- C. Calculate structural properties of framing members in accordance with ACI 301 and ACI 318.

1.6 SUBMITTALS

- A. Product Data: Three copies of manufacturer's specifications and descriptive literature.
- B. Drawings and Calculations:
 - 1. Design calculations and construction drawings shall be prepared by, or under direct supervision of, a licensed professional engineer in the State of Michigan. All drawings and calculations shall bear engineer's seal and signature.
 - 2. Indicate layout, standard component configurations, unit locations, fabrication details, unit identification marks, reinforcement, connection details, support items, dimensions, openings and relationship to adjacent materials.
 - 3. Indicate design loads, stresses, deflections, cambers, bearing requirements and special conditions.
- C. Submit fabricator's installation instructions and shop drawings under provisions of Section 01300 – Submittals.

1.7 QUALITY ASSURANCE

- A. Perform work in accordance with the requirements of PCI MNL-116, PCI MNL-120 and PCI MNL-123.
- B. All structural design Work under direct supervision of a licensed professional engineer in the State of Michigan, experienced in design of this work.
- C. Maintain plant records and quality control program during production of precast concrete. Make records available upon request.

1.8 REGULATORY REQUIREMENTS

- A. Conform to ACI 301, and ACI 318 and Uniform Building Code, current edition, for design load and construction requirements applicable to Work of this Section.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store and protect products under provisions of Section 01600 – Material and Equipment.
- B. Handle precast members in position consistent with their shape and design. Lift and support only from support points.
- C. Lifting or Handling Devices: Capable of supporting member in positions anticipated during manufacture, storage, transportation, and erection.
- D. Protect members to prevent staining, chipping, cracking, spalling, or other damage to concrete.
- E. Mark each member with date of production and final position in structure.

1.10 COORDINATION

- A. Coordinate work under provisions of Section 01039 – Coordination and Meetings.
- B. Coordinate the wall layout with slab construction joint layout.

2. PART 2 PRODUCTS

2.1 MATERIALS

- A. Cement: Grey Portland, conforming to ASTM C150, Type II.
- B. Aggregate, Sand, Water, Admixtures: Determined by precast fabricator as appropriate to design requirements and PCI MNL-116.

2.2 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615, 60 ksi yield grade; deformed steel bars.

2.3 ACCESSORIES

- A. Non-Shrink Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 7,000 psi in 28 days.

2.4 FABRICATION

- A. Fabrication procedure to conform to PCI MNL-116.
- B. Maintain plant records and quality control program during production of precast members. Make records available upon request.
- C. Ensure reinforcing steel, anchors, inserts, plates, angles, and other cast-in items are embedded and located as indicated on shop drawings.
- D. Provide required openings with a dimension larger than 8 inches and embed accessories provided by other Sections at indicated locations.

2.5 FINISHING

- A. Ensure exposed-to-view finish surfaces of precast concrete members are uniform in color and appearance.
- B. Cure members under identical conditions to develop required concrete quality, and minimize appearance blemishes such as non-uniformity, staining, or surface cracking.
- C. Finish members to PCI MNL-116 Standard grade.

2.6 TOLERANCES

- A. Conform to PCI MNL-116.
 - 1. Length: plus or minus 1/2 inch.
 - 2. Width (overall): plus or minus 1/4 inch.
 - 3. Depth: plus or minus 1/4 inch.
 - 4. Position of Voids in Hollow Core Products (vertical and horizontal): plus or minus 1/4 inch.
 - 5. Position of Blockouts: plus or minus 1/2 inch.
 - 6. Squareness of Ends (vertical and horizontal alignment): plus or minus 1/4 inch.
 - 7. Differential Camber Between Adjacent Members of the Same Design: 1/4 inch per 10 ft. but not greater than 1/2 inch.
 - 8. Position of Tendons: plus or minus 1/8 inch.
 - 9. Position of Weld Plates: plus or minus 1 inch.
 - 10. Immediate tendon slippage.

2.7 TESTS

- A. Test samples in accordance with applicable ASTM standard.

3. PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that site conditions are ready to receive work and field measurements are as shown on plans.
- B. Beginning of installation means installer accepts existing conditions.

3.2 PREPARATION

- A. Prepare support equipment for the erection procedure, temporary bracing, and induced loads during erection.

3.3 ERECTION

- A. Erect members without damage to structural capacity, shape, or finish. Replace or repair damaged members.
- B. Align and maintain uniform horizontal and vertical joints, as erection progresses.
- C. Maintain temporary bracing in place until final support is provided. Protect members from staining.

- D. Provide temporary lateral support to prevent bowing, twisting, or warping of members.
- E. Adjust differential camber between precast members to tolerance before final attachment.
- F. Level differential elevation of adjoining horizontal members with grout to maximum slope of 1:12.
- G. Set vertical units dry, without grout, attaining joint dimension with lead or plastic spacers.
- H. Grout bearing plates and joints between members at roof and floor locations.

3.4 ERECTION TOLERANCES

- A. Erect members level and plumb within allowable tolerances.
- B. Conform to PCI MNL-116.

3.5 PROTECTION

- A. Protect members from damage caused by field welding or erection operations.

3.6 CLEANING

- A. Clean dirt or blemishes from surface of exposed members.

END OF SECTION