1 Introduction
1.1 The work under this Section consists of furnishing all labor, equipment, and materials required for mixing, transport, conveyance, placement, and finishing of all cast-in-place concrete as required by the Drawings and Specifications.

2 Quality Assurance
2.1 Concrete: Designed in accordance with the latest edition of ACI 301, ACI 318 and all other Codes and Standards as adopted by State of Indiana.
2.2 Reinforcement: Designed in accordance with ACI 315, ACI 318, CRSI manual of Standard Practice, and ACI "Manual of Standard Practice for Detailing Reinforced Concrete Structures" and all other Codes and Standards as adopted by State of Indiana.

3 Submittals
3.1 All submittals pertaining to this Section shall be delivered to the Structural Engineer of record for review with sufficient time for review.
3.2 Concrete Mix Designs: Submit a mix design for each class of concrete to be utilized on the project in accordance with Part 6 of this Section
3.3 Reinforcement: Submit shop drawings indicating bending diagrams, deformed bars, plain steel bars and wire, and welded wire fabric of the sizes shown or noted on the drawings.

4 Concrete Materials
4.1 Cement: Cement shall conform to the Specifications for Portland Cement (ASTM Designation: C150), Type I and Type IA or Type III and Type IIIA.
4.2 Water: Water shall be clear and free from injurious amounts of oil, acid, alkali, organic matter, or other deleterious substances.
4.3 Normal Weight Course Aggregate: Normal Weight Course Aggregate shall conform to ASTM C33 and Table 1 of this Section
4.4 Admixtures: The use of any material added to the concrete mix shall be approved by the Structural Engineer of Record
4.5 Synthetic Fiber Reinforcement: Synthetic Fiber reinforcement shall be 100% virgin polypropylene fibers. Fibers shall be added at the batch plant and shall be sized and proportioned in accordance with manufacturer’s instructions for proper workability and finish-ability. Fibers may be used to enhance concrete performance in regard to plastic shrinkage or settlement crack resistance, abrasion and impact resistance, and residual strength, but in no case shall fibers be used as a substitute for structural reinforcement.
4.6 Crystalline Waterproofing Admixture: Crystalline type that chemically controls and permanently fixes a non-soluble crystalline structure throughout the capillary voids of the concrete. Provide admixture in concrete Walls and Tops of tunnels, Manholes, Vaults, Pits or other concrete structures below grade subject to moisture infiltration.

5 Sampling & Testing:
5.1 Contractor shall furnish all material and shall provide such labor as may be required for sampling the concrete for test specimens.
5.2 Concrete materials and operations will be tested and inspected as the work progresses. Failure to detect any defective work or material shall not in any way prevent later rejection when such defect is discovered nor shall it obligate the Architect/Engineer for final acceptance.
5.3 Sampling procedures as outlined in ASTM Designation C 172, Sampling Fresh Concrete, shall be followed.
5.4 The procedures outlined in ASTM Designation C 31, Standard Method of Making and Curing Concrete Compressions and Flexural Test Specimens in the Field, shall be followed.
5.5 Every class of concrete shall be represented by a minimum of one test for slump, air content and compressive strength.
5.6 Tests may be made at any time during a pour and additional determinations of slump and air content shall be made whenever any change is observed in the consistency or workability of the concrete
5.7 One strength test shall consist of six (6) specimens tested in compression; two (2) at seven (7) days, two (2) at twenty-eight (28) days and one (2) spares. Test specimens shall be molded in plastic cylinders consistent with ASTM requirements.

6 Quality of Concrete:
6.1 Concrete for any portion of the structure or appurtenant construction shall be of the Class indicated on the plans or in Table 3. The general requirements for each class of concrete are shown on Table 1. Within these general guidelines and
ranges specified, the Contractor shall establish the:

A. Amount of fine aggregate to be used. The aggregates shall be proportioned to use the maximum amount of coarse aggregate that will produce a workable mix.

B. Slump (+/- 1”)

C. Quantity of mixing water to be used. This will be the minimum quantity of water consistent with the required workability.

D. Air content

E. Admixtures

6.2 These Guidelines indicate a minimum cement factor and a maximum permissible water content in addition to limitations on coarse aggregate size and grading, percentage of fine aggregate, etc.

6.3 In no case will concrete be acceptable in the structure if the 28 day compressive strength as determined by test cylinders is less than that stated in Table 1 of this Handbook or as specified by the Structural Engineer of Record.

6.4 All concrete shall be ready mixed and delivered to the project site. Site mixed concrete is strictly prohibited without the approval of the Structural Engineer of Record.