SECTION 33 05 13

PRECAST CONCRETE MANHOLES AND UTILITY STRUCTURES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Modular precast concrete manholes and structures with tongue-and-groove joints and masonry transition to cover frame, covers, anchorage, and accessories.

B. Related Sections:
   1. CFPUA Material Specification Manual (MSM)
   2. Section 01 51 00 – Bypass Pumping.
   3. Section 03 05 00 – Concrete.
   4. Section 31 23 34.01 – Excavating, Trenching, Dewatering and Backfilling.
   5. Section 33 01 30.86 – Manhole Rim Adjustment.
   6. Section 33 14 22 – Testing of Sanitary Sewer Mains and Manholes.
   7. Section 33 31 11 – Sanitary Sewer Gravity Mains.
   8. Section 33 31 23 – Sanitary Sewer Force Mains, Valves and Appurtenances.

1.2 REFERENCE STANDARDS

A. American Association of State Highway Transportation Officials:
   1. AASHTO M91 – Standard Specification for Sewer and Manhole Brick (Made from Clay or Shale).
   2. AASHTO M306 – Standard Specification for Drainage, Sewer, Utility, and Related Castings.

B. American Concrete Institute:
   1. ACI 530 – Building Code Requirements and Specification for Masonry Structures.

C. ASTM International:
   1. ASTM A48 – Standard Specification for Gray Iron Castings.
   2. ASTM A123M – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
   3. ASTM C32 – Standard Specification for Sewer and Manhole Brick (Made from Clay or Shale).
   4. ASTM C478 – Standard Specification for Circular Precast Reinforced Concrete Manhole Sections.
   5. ASTM C497 – Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile.
   6. ASTM C877 – Standard Specification for External Sealing Bands for Concrete Pipe, Manholes, and Precast Box Sections.
   7. ASTM C913 – Standard Specification for Precast Concrete Water and Wastewater Structures.
   8. ASTM C990 – Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.

1.3 QUALITY ASSURANCE

A. Perform Work according to ASTM and AASHTO standards and manufacturer's instructions.

1.4 WARRANTY

A. Section 01 70 00 – Execution and Closeout Requirements.

B. Furnish a one-year manufacturer's warranty for concrete manholes and structures.

1.5 SUBMITTALS

A. Section 01 33 00 – Submittal Procedures.

B. Submittals:
   1. Section 01 70 00 – Execution and Closeout Requirements.
   2. Product Data: Submit manufacturer information for manhole covers, component construction, features, configuration, and dimensions.
   3. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.
   4. Shop Drawings:
      a. Indicate structure locations and elevations.
      b. Indicate sizes and elevations of piping, conduit, and penetrations.
   5. Source Quality-Control Submittals: Indicate results of factory tests and inspections.
   6. Qualifications Statement: Submit qualifications for manufacturer.
   7. Project Record Documents: Record actual locations of manholes and connections, and record invert elevations.

1.6 SITE CONDITIONS

A. DELIVERY, STORAGE, AND HANDLING
   1. Section 01 60 00 – Product Requirements.
   2. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
   3. Handling: Comply with precast concrete manufacturer instructions and ASTM C913 for unloading and moving precast manholes and drainage structures.
   4. Bent Reinforcing steel bars are not permitted for use as lifting devices.
   5. Lifting devices shall be evaluated and approved by the Engineer.
   6. Storage:
      a. Store materials according to manufacturer instructions.
      b. Store precast concrete manholes and drainage structures to prevent damage to Owner's property or other public or private property.
      c. Repair property damaged from materials storage.
   7. Protection:
      a. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
      b. Provide additional protection according to manufacturer instructions.

B. EXISTING CONDITIONS
   1. Field Measurements:
      a. Verify field measurements prior to fabrication.
      b. Indicate field measurements on Shop Drawings.

PART 2 PRODUCTS

2.1 MATERIAL SPECIFICATION MANUAL

A. Refer to CFPUA Material Specification Manual (MSM) for the following products:

MSM Section	Product
I	Castings and Access Covers
M	Coatings and Sealants
O	Structures

2.2 SOURCE QUALITY CONTROL

A. Section 01 40 00 – Quality Requirements: Requirements for testing, inspection, and analysis.

B. Provide shop inspection and testing of completed assembly.

C. Verify that items provided have met factory testing requirements and are inspected upon delivery.

D. Certificate of Compliance:
   1. If manufacturer is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at manufacturer's facility conforms to Contract Documents.

2.3 MATERIALS AND ACCESSORIES

A. Lining Systems
   1. MSM Section M – Coatings and Sealants

B. Grouts
   1. MSM Section N - Concrete
   2. Section 03 05 00 - Concrete

C. Sewer Guards
   1. Stainless steel straps, anchors and sewer guards required at all Manholes.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 70 00 – Execution and Closeout Requirements: Requirements for installation examination.

B. Verify that items provided by other Sections of Work are properly sized and located.

C. Verify that built-in items are in proper location and are ready for roughing into Work.

D. Verify that excavation base is ready to receive Work and excavation dimensions and elevations are as indicated on Drawings.

3.2 PREPARATION

A. Mark each precast structure by indentation or waterproof paint showing date of manufacture, manufacturer, and identifying symbols and numbers as indicated on Drawings to indicate its intended use.

B. Coordinate placement of inlet and outlet pipe or duct sleeves as required by other Sections.

C. Do not install manholes and structures where Site conditions induce loads exceeding structural capacity of manholes or structures.

D. Inspect precast concrete manholes and structures immediately prior to placement in excavation to verify that they are internally clean and free from damage; remove and replace damaged units.

3.3 INSTALLATION

A. Conduct operations not to interfere with, interrupt, damage, destroy, or endanger integrity of surface structures or utilities in immediate or adjacent areas.

B. Correct over-excavation with Class 1 aggregate.

C. Remove large stones or other hard matter impeding consistent backfilling or compaction.

D. Protect manhole and structures from damage or displacement while backfilling operation is in progress.

E. Excavating:
   1. As specified in Section 31 23 34.01 – Excavating, Trenching, Dewatering and Backfilling and in indicated locations and depths.
   2. Provide clearance around sidewalls of manhole or structure for construction operations.
   3. If ground water is encountered, prevent accumulation of water in excavations, place manhole or structure in dry trench.
   4. Where possibility exists of watertight manhole or structure becoming buoyant in flooded excavation, anchor manhole or structure to avoid flotation as approved by Engineer.

F. Base and Alignment:
   1. Install manholes and structures supported at proper grade and alignment on compacted crushed-stone bedding or piles as indicated on Drawings.
   2. Grout base of shaft sections to achieve slope to exit piping, trowel smooth, and contour to form continuous drainage channel.
   3. Form and place manhole or structure cylinders plumb and level, to correct dimensions and elevations.

G. Polymer Concrete / Coatings:
   1. Install polymer concrete manholes in applications involving force main discharges and in other designated locations as specified by CFPUA. These manholes shall come with a minimum warranty of 50 years. Grinder pump force mains and low-capacity force main discharge manholes may be coated with an approved lining system, contingent upon prior approval from CFPUA.
   2. Manholes 12-feet in depth and greater shall be polymer concrete.

H. Precast Concrete Manholes:
   1. Lift precast components at lifting points designated by manufacturer.
   2. When lowering manholes and structures into excavations and joining pipe to units, take precautions to ensure that interior of pipeline and structure remains clean.
   3. Assembly:
      a. Assemble multi-section manholes and structures by lowering each section into excavation.
      b. Install rubber gasket joints between precast sections according to manufacturer recommendations.
      c. Lower, set level, and firmly position base section before placing additional sections.
   4. Remove foreign materials from joint surfaces and verify that sealing materials are placed properly.
   5. Maintain alignment between sections by using guide devices affixed to lower section.
   6. Joint sealing materials may be installed on Site or at manufacturer's plant.
   7. Verify that installed manholes and structures meet required alignment and grade.
   8. Remove knockouts or cut structure to receive piping without creating openings larger than required to receive pipe; fill annular spaces with mortar.
   9. Cut pipe flush with interior of structure.
   10. Shape inverts through manhole and structures as indicated on Drawings.

I. Grouting:
   1. Section 03 05 00 – Concrete
   2. Verify all surfaces have been inspected and prepared for application. All surfaces shall be free of dirt, oil, grease, and other contaminants.
   3. Surface shall be clean, sound and roughened to ensure a sufficient bond.
   4. Surface shall be saturated up to 24 hours prior to application but free of standing water at the time of application.
   5. Provide sufficient support for items to be embedded into the work. Diagrams, templates, and other forms can be used to properly locate such items.
   6. Refer to Manufacturer’s instructions for proper grouting application and installation.
   7. Application shall be inspected immediately after and any defects repaired or removed for re-installation if directed by the Engineer.

J. Castings:
   1. Set frame and cover at finished grade for manholes and other structures with covers located within unpaved areas and graded away from cover.
   2. Set frames using mortar and masonry as indicated on Drawings.
   3. Lay concrete brick in full bed of mortar and completely fill joints.
   4. If more than one course of concrete brick is required, stagger vertical joints.

K. Backfilling: As specified in Section 31 23 34.01 – Excavating, Trenching, Dewatering and Backfilling.
   1. All structures shall be leak tested prior to backfilling.

3.4 FIELD QUALITY CONTROL

A. Section 01 40 00 – Quality Requirements.

B. Testing:
   1. Perform testing in accordance with ASTM C497.
   2. Concrete Manhole Sections: As specified in Section 33 14 22 – Testing of Sanitary Sewer Mains and Manholes.
   3. Conduct a visual inspection of concrete structures.
   4. Repair all visible and detectable leaks.
   5. Leakage testing for structures shall be performed prior to backfilling by the following procedure:
      a. Temporarily plug all wall sleeves, piping entrances and other openings during test period.
      b. Fill structure to overflow level.
      c. Allow to stand for a minimum of four (4) hours.
      d. Refill to overflow level.
      e. Allow to stand for 24 hours.
      f. Examine exterior surfaces and joints for leakage. Measure drop in surface water. Allowable leakage is a drop of ½ inch or less during the test period and no visible signs of leakage.
      g. Repair all visible and detectable leaks. If leakage exceeds allowable limit, the structure shall be repaired by approved method per Engineer.

C. Equipment Acceptance: Contractor shall adjust, repair, modify, or replace components failing to perform as specified and rerun tests at no cost to the Owner.

3.5 ADJUSTING

A. Section 01 70 00 – Execution and Closeout Requirements.

B. Vertical Adjustment of Existing Manholes and Structures:
   1. As specified in Section 33 01 30.86 – Manhole Rim Adjustment.

END OF SECTION