

SECTION 03608 – CONCRETE VAULTS

PART 1 - GENERAL

1.01 SUMMARY

- A. This section provides for the installation of vaults to house water main appurtenances in locations shown on the drawings.
- B. This section includes Concrete Vaults, Lids and Frames, and Vault Configuration.

1.02 SPECIFICATION MODIFICATIONS

- A. It is understood that throughout this section these Specifications may be modified by appropriate items in Section 01015 – Specific Project Requirements, or as otherwise indicated on the Contract Drawings.

1.03 RELATED SECTIONS

- A. Section 01000 – General Project Requirements.
- B. Section 01015 – Specific Project Requirements.
- C. Section 01300 – Submittals.
- D. Section 02200 – Earthwork.
- E. Section 02250 – Trenching, Pipe Embedment and Backfill.
- F. Section 03000 – Miscellaneous Concrete.
- G. Section 05012 – Water Castings.

1.04 CODES AND STANDARDS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.
- B. American Society for Testing and Materials (ASTM):
 - ASTM C109 Standard Test Method for Compressive Strength of Hydraulic Cement Mortars.
 - ASTM C150 Standard Specification for Portland Cement.
 - ASTM C191 Standard Test Methods for Time of Setting of Hydraulic Cement by Vicat Needle.
 - ASTM C207 Standard Specification for Hydrated Lime for Masonry Purposes.
 - ASTM C478 Precast Reinforced Concrete Manhole Sections.
 - ASTM C827 Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures.
 - ASTM C990 Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.
 - ASTM C1170 Standard Test Method for Determining Consistency and Density of Roller-Compacted Concrete Using a Vibrating Table.
- C. International Masonry Industry All-Weather Council (IMIAC): Recommended Practices and Guide Specification for Cold Weather Masonry Construction.

1.05 DEFINITIONS

- A. Paved Areas: Areas for which the final surfacing will be street pavement, shoulders, driveways, parking lots, curbs, gutters, sidewalks, gravel roads, or other surface construction or structures.
- B. Unpaved Areas: Areas for which the final surfacing will be in a greenspace.

1.06 INFORMATION PROVIDED BY THE CITY

- A. As provided in the contract documents.

1.07 SUBMITTALS

- A. Submit as specified in Section 01300 – Submittals.
- B. Shop Drawings:
 - 1. Submit for approval general arrangement drawings showing vault size, height and location of access cover, steps, and all pipe penetrations.
 - 2. Submit for approval joint construction details.
 - 3. Submit for approval details on reinforcement if requested.
 - 4. Submit for approval detail on vault frame lid.
 - 5. Submit design calculations certifying load requirements specified herein.
- C. Product Data:
 - 1. Submit for review and approval manufacturer's catalogue/product data and installation instructions for the following:
 - (a) Adjustment rings.
 - (b) Joint sealant.
- D. Other Submittals:
 - 1. Precast concrete mix design.
 - 2. Compressive testing of cylinders (as specified).
 - 3. Compressive testing of cores (as specified).

1.08 QUALITY ASSURANCE

- A. The Contractor is responsible for the quality assurance and quality control of the Work.
- B. The manufacturer shall be a company specializing in manufacturing Products specified in this Section with a minimum of three years documented experience.
- C. Cold Weather Requirements: IMIAC - Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

1.09 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Follow the provisions for the delivery, storage and handling of products to and at site provided in Section 01000 – General Project Requirements.
- B. Cement, Aggregate, and Reinforcement shall be in accordance with Section 03000 – Miscellaneous Concrete.
- C. Handle materials and other accessories in such manner as to ensure delivery to the trench in sound undamaged condition.
- D. Non-shrink grout: Deliver Materials to project in Manufacturer's original, unopened packaging, with labels clearly identifying product name, Manufacturer, and expiration date. Store grout in a cool, dry place, out of the sun.
- E. Precast concrete sections shall not be delivered to the job until the concrete control cylinders have attained a strength of at least 80 percent of the specified minimum.

- F. Precast concrete sections shall be handled carefully and shall not be bumped or dropped. Hooks shall not be permitted to come in contact with joint sections.
- G. Precast concrete sections shall be inspected when delivered. All cracked, or otherwise visibly defective units will be rejected. City reserves the right to inspect the production of the units at the manufacturing plant.

1.10 VAULT CONFIGURATION

- A. Precast Concrete Vaults for potable water distribution systems shall conform to detail 03608-1 and shall meet the following requirements:
 - 1. Shaft Construction: Concentric with lipped male/female joints; sleeve to receive pipe.
 - 2. Shape: Cylindrical.
 - 3. Clear Inside Dimensions: 60-inch diameter, minimum
- B. Clear Lid Opening: 30 inches diameter, minimum.
- C. Pipe Entry: Provide openings as required.

1.11 VAULT LOADING REQUIREMENTS

- A. Precast concrete vaults shall be designed to withstand the wheel loading requirements of AASHTO HS25. The contractor may request a variance for HS20 loading if the vault is located in greenspace.

PART 2 - PRODUCTS

2.01 PRECAST CONCRETE

- A. Materials and Fabrication:
 - 1. Precast concrete shall conform to ASTM C478.
 - 2. Air entraining agents shall be added to the concrete to provide 4 to 6 percent entrained air.
 - 3. Submit for review and approval the precast concrete manufacture's mix design(s) for precast structures.
- B. Quality Control:
 - 1. If indicated in Section 01015 – Specific Project Requirements, provide compressive testing results prepared by the precast concrete manufacturer.
 - (a) Compressive Testing of Cylinders: Conduct in accordance with ASTM C478.
 - (b) Compression Testing of Cores: Conduct in accordance with ASTM C478. Mortar.
- C. Proportions by volume shall be one-part Portland cement, ASTM C150 Type I; two parts sand, ASTM C33; and 10 percent by volume of lime ASTM C207, Type S.

2.02 NON-SHRINK GROUT

- A. Non-shrink grout shall conform to ASTM C1107, Grades B and C.
- B. Non-shrink grout shall be in the plastic state and show no expansion after set as tested in accordance with ASTM C827 and shall develop compressive strength not less than three thousand (3,000) psi with a trowelable mix within twenty-four (24) hours per ASTM C109. The placement time shall be not less than forty-five (45) minutes based on initial set per ASTM C191.

- 2.03 **FRAMES AND COVERS FOR CONCRETE VAULTS**
 - A. Shall conform to Section 05012 – Water Castings.
- 2.04 **GRANULAR BEDDING MATERIAL**
 - A. Granular bedding material shall be as specified in Section 02250 – Trenching, Pipe Embedment and Backfill.
- 2.05 **JOINT SEALANT**
 - A. Joints shall be sealed using preformed flexible joint sealants conforming to ASTM C990. The minimum bead dimension shall be an inch.
 - B. Install in accordance with manufacturer’s recommendations.
- 2.06 **STEPS**
 - A. Steps shall not be installed.

PART 3 - EXECUTION

- 3.01 **EXCAVATION, BACKFILL AND COMPACTION**
 - A. Excavation, backfill and compaction for concrete vaults shall be in accordance with Section 02200 –Earthwork.
 - B. Excavation, backfill and compaction operations shall be achieved in a suitable and orderly manner providing a minimum disturbance to the general public.
 - C. Depth of excavation shall be to that required for proper installation of the concrete vault. Over-depth excavation may be required if the subgrade is unsuitable or unstable. Over-depth excavation due to unsuitable or unstable subgrades shall be backfilled as required by the City. Over-depth excavation occurring through an oversight by the Contractor shall be backfilled as required by the City’s Representative at no additional cost to the City.
 - D. Side clearance outside the manhole and/or structures shall be no greater than necessary to allow for forming, installation of piping, proper application of special coatings, and access for inspection.
- 3.02 **CONCRETE VAULT BASE**
 - A. The bottom precast wall section shall not be used for supporting or leveling the other wall sections prior to installing the base.
 - B. The subgrade materials shall be excavated to undisturbed earth and a uniform elevation to allow for a minimum of 6 inches and a maximum of 18 inches of granular bedding material. The surface of the granular material shall be carefully graded, and the base section accurately set so that pipes will be on proper line and grade. The elevation of the granular material shall be adjusted as required until proper grade and alignment of the concrete vault base has been attained.
 - C. No wedging or blocking under the precast reinforced concrete footers is permitted.
- 3.03 **RISER SECTIONS**
 - A. Circular precast sections shall be provided with a double bead of preformed flexible joint sealant as specified in paragraph JOINT SEALANT between precast sections.
 - B. All protruding flexible joint sealant shall be removed from inside of manhole and the joint shall be wiped with non-shrink grout.

- C. Internal or external manhole joint seals shall be installed per manufacturer's recommendation.
- D. Lifting notches in manhole walls shall be filled with non-shrink grout.

3.04 PIPE CONNECTIONS

A. Grouted Connections:

1. The space between connecting piping and the wall of the precast sections shall be completely filled with non-shrink grout.
2. The maximum allowable pipe opening on a horizontal axis shall be the outside diameter of the pipe plus twelve (12) inches.
3. The maximum allowable pipe opening on a vertical axis shall be the outside diameter plus 8 inches.
4. The minimum clearance between the outside surface of the installed pipe and the concrete of the manhole shall be two (2) inches.
5. The minimum distance between any two adjacent pipes shall be four (4) inches.
6. For field alternations approved by the City or City's Representative, walls shall be scored with a masonry saw to a depth sufficient to sever the reinforcing steel. A chipping hammer may then be used to remove the concrete.

3.05 CONCRETE VAULT TOP

A. The finished top elevation of casting shall conform to the following unless otherwise shown on the Drawings or directed by the City:

1. In paved areas, the top of the casting shall conform to the slope of the pavement and be 1/8 inch below the finished pavement elevation.
2. In non-pavement areas, the top of the casting shall be not more than one (1) inch above the surrounding ground.
3. In remote unpaved areas such as open fields or wooded areas, the top of the casting shall be no less than six (6) inches and no more than eighteen (18) inches above the surrounding soil surface. Place soil around the casting with a maximum slope of 2 feet vertical to 1 foot horizontal to protect the external manhole seal.

3.06 PREPARATION

- A. Coordinate placement of inlet and outlet pipe or sleeves required by other sections.

3.07 PLACING VAULT SECTIONS

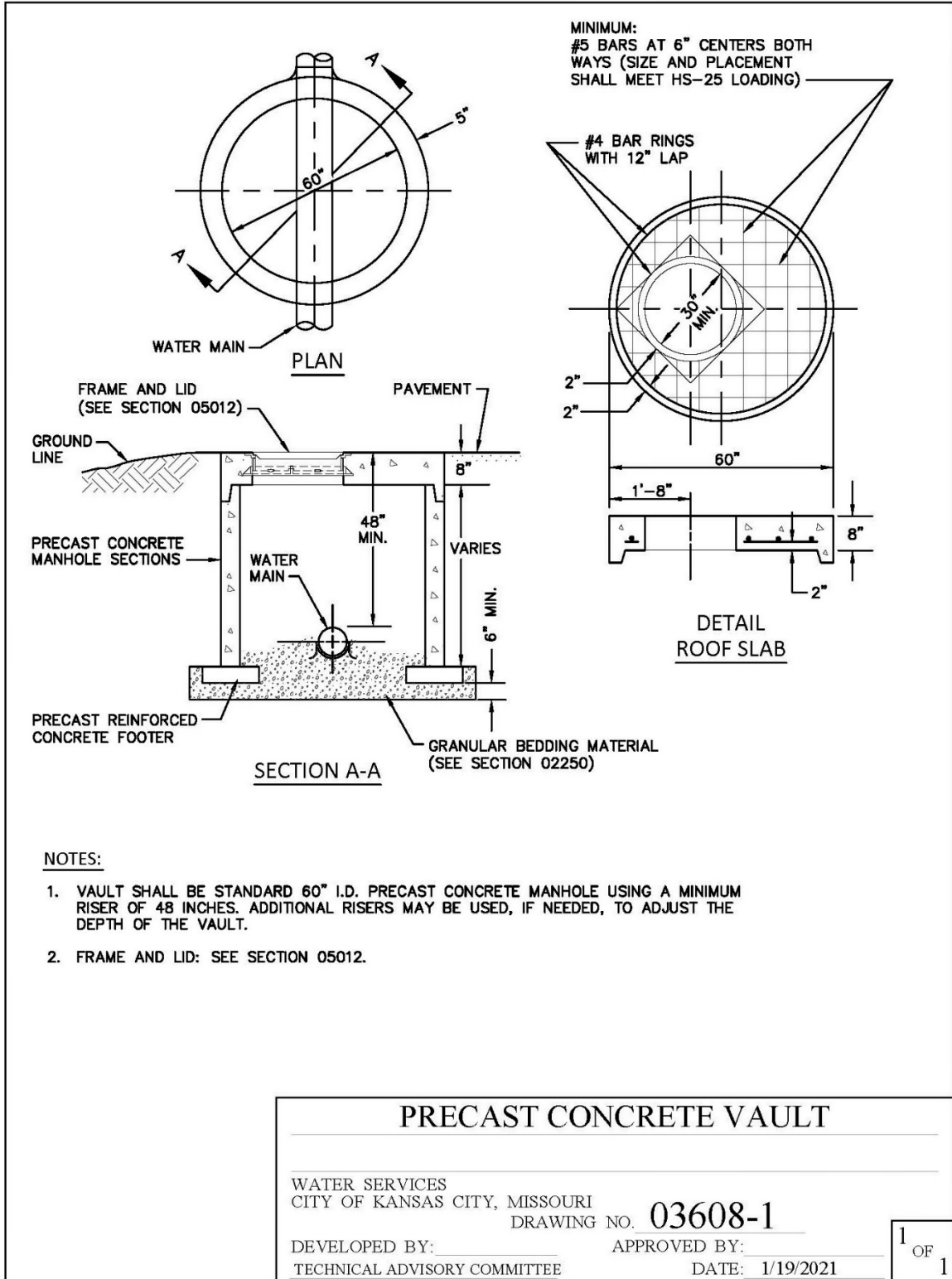
- A. Place precast reinforced concrete footers.
- B. Place vault sections plumb, level and at correct elevations.
- C. Set roof slab, adjust frame and cover level to final elevation.

3.08 CORROSION PROTECTION

- A. When specified, provide corrosion protection for the concrete and concrete reinforcement.
- B. Corrosion protection for concrete shall be required when the soil conditions indicate the need for sulfate resistant concrete and it is not available from the precast manufacturer.

DETAIL 03608-1 ON NEXT PAGE

DETAIL 03608-1



PRECAST CONCRETE VAULT

WATER SERVICES
CITY OF KANSAS CITY, MISSOURI

DRAWING NO. 03608-1

DEVELOPED BY:
TECHNICAL ADVISORY COMMITTEE

APPROVED BY:
DATE: 1/19/2021

1 OF 1

END OF SECTION