# SECTION 33 39 13

# PRECAST CONCRETE MANHOLES

## PART 1 – GENERAL

### 1.01 WORK INCLUDED

A. This section includes materials, testing, and installation of precast concrete manhole for sewer and appurtenances.

### 1.02 RELATED REQUIREMENTS AND SPECIFICATIONS

A. City Standard Detail Drawings.
B. **Specification Section 33 30 00**, Sanitary Sewerage Utilities
C. **Specification Section 31 23 33,** Trench Excavation and Backfill

### 1.03 REFERENCE STANDARDS

| | |
|---|---|
| ASTM A 48 | Gray Iron Castings |
| ASTM C 478 | Precast Reinforced Concrete Manhole Sections |
| ASTM C 923 | Resilient Connectors between Reinforced Concrete Manhole Structures and Pipes |
| ASTM C 990 | Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants |

### 1.04 QUALITY ASSURANCE

All materials furnished under this Section shall be:

A. From a manufacturer who has been regularly engaged in the design and manufacture of the materials for at least five (5) years; and

B. Approved by the engineer before installation. The Engineer shall verify that the product and quality is equal to the materials made by those manufacturers specifically named herein, or if an alternate product manufacturer is proposed.

### 1.05 SUBMITTALS

The Contractor shall submit for approval by the Engineer the following:

A. Manufacturer's literature on the materials identified on the City Standard Detail and this specification. Literature shall include recommended installation procedures.
B. Certification by the manufacturer that all precast sections furnished under this specification were manufactured, sampled, tested, and inspected in accordance with ASTM C 478 or ASTM C361.
C. Mix design of the concrete used for the manhole base.
D. Frame, grates, rings, and covers.
E. Material to be used for pipe connections at manhole walls.

## PART 2 – PRODUCTS

### 2.01 MANHOLES

A. Pre-Cast Concrete Manholes

1. All pre-cast concrete manhole sections shall conform to the details shown on the applicable City Standard Drawings for sewer manhole. Pre-cast manhole sections shall be manufactured in accordance with ASTM C 478, "Precast Reinforced Concrete Manhole Sections." Manholes shall be leak free structures. Structures constructed with precast sections shall be constructed using a single manufacturers products and/or with products recommended by the precast section manufacturer.

2. Manhole Sizes

| Pipe Diameter | Manhole Diameter | Cover Diameter |
|---|---|---|
| 21 inch and smaller | 48 inch | 24 inch |
| 24 inch and 27 inch | 60 inch | 24 inch |
| 30, 33 and 36 inch | 72 inch | 24 inch |

B. Manhole Cones

1. Manhole Cones shall be **CONCENTRIC.**

C. Manhole Bases

1. Manhole bases shall be cast-in-place in accordance with City Standard Drawing unless specified otherwise. Concrete for manhole base shall be 6-sack with a 4,000 psi rating. Top of base channel shall be six inches (6") above the crown of pipe.

D. Manhole Inlet

1. For manholes with more than one inlet, the invert of the smaller inlet shall be at or above the centerline of the larger pipe. Channel for the side entry shall be properly shaped to provide minimum turbulence in the manhole.

E. Ladder Rungs

1. Manhole ladder rungs shall be installed for all manholes deeper than four feet (4'). Rungs shall be made of one-half inch (½") diameter grade 60 steel with Copolymer Polypropylene coating. Steps are to be cast in place during manufacturing of pre-cast barrels and cones.

F. Joint Sealer

1. Joints in precast manhole sections shall be made of "Ram-Nek" preformed flexible plastic joint sealant or neoprene gaskets.

## 2.02 MANHOLE FRAMES AND COVERS

A. Manhole frames and covers shall conform to applicable City Standard Drawing. Non-pressure type manhole frames and covers shall be Phoenix Iron Works P-1090 or D&L Supply A-1024, or equal.

B. Pressure type manhole frames and covers shall be Phoenix Iron Works P-1002 (bolt-down), or equal. Both manhole frames and covers shall meet all requirements of ASTM A 159, "Automotive Gray Iron Castings."

C. Manhole covers shall be labeled “Sanitary Sewer”.

D. Manhole covers shall have at least one center pick hole and one edge pry hole.

E. Adjustment rings shall NOT be used on any sewer manhole. Frames must be raised.

F. Anchor bolts shall be fabricated as specified by the equipment manufacturer and, unless otherwise indicated, shall be stainless steel. Cone shall be drilled to accept three-fourths inch (¾”) stainless steel inserts. Manhole rim is to be bolted down prior to the pouring of the concrete cap

# PART 3 - EXECUTION

## 3.01 CONNECTIONS TO EXISTING MANHOLES

A. Pipe connections to existing manholes shall be done under the direction of the Engineer and other applicable requirements specified for new manholes, including all necessary concrete work, cutting, and shaping of channel.

B. All PVC and HDPE pipe entering or leaving a manhole shall have a rubber sealing gasket as supplied by the pipe manufacturer, firmly seated perpendicular to the pipe axis, around the pipe exterior and cast into the structure base or near the wall center as a water stop. Water stop may also consist of a manhole coupling with rubber sealing rings cast into the structure base.

C. Existing flow shall be maintained through a bypass. A bypass plan shall be submitted and the Contractor shall be solely responsible for maintaining the

bypass and shall be liable for any fines levied by any agency as a result of any spill or overflow.

## 3.02 ABANDONMENT OF EXISTING MANHOLES

A. Manholes to be abandoned shall have their cones removed, backfilled and compacted to ninety-five percent (95%) relative compaction. Frames and covers not to be reused shall be delivered to the City as directed by the Engineer.

## 3.03 MANHOLES

A. Manhole Bases

1. Manhole bases shall be **"Cast-In-Place"** unless specified otherwise. Manhole bases shall be poured against a minimum of twelve inches (12") of three-quarter inch (¾") drain rock, over undisturbed material, and excavated to the dimensions shown on the plans. The Contractor shall not deviate from plan dimensions, notwithstanding over-excavation or other detrimental field conditions, unless approved by the Engineer. A forming ring shall be used to form a level joint groove in fresh concrete of the manhole base to receive the precast barrel section of the manhole. The metal forming ring shall be removed after the concrete has sufficiently set to eliminate any slump in the joint groove.

2. Manhole bedding shall be twelve inches (12") of ¾-inch drain rock shall be placed under manhole base to be **cast-in-place** and shall be compacted to a relative compaction of ninety percent (90%) per ASTM D1557-78 and ASTM D2922-81.

3. Manhole Channels: Where sewer lines ingress and egress manholes, construction shall conform to the City Standard Drawings. Pipe shall be used to form the channel. After the base concrete has set, the channel shall be shaped to the final required configuration. Perpendicular channel sides shall not be allowed. All channels shall be approved by the Engineer.

4. All connections shall provide for a watertight seal between the pipe and the manhole. The connector shall be the sole element relied upon to assure a flexible water tight seal of the pipe to the manhole.

5. When connecting new pipe to existing manholes, a channel and bench walls shall be installed.

6. The pipe up to the structures shall not project beyond the inside wall of the structure and in no case shall the socket of a vitrified clay pipe be built into the wall of a structure.

7. Flexible connection at manhole tie-in shall be in accordance with applicable City Standard Drawings.

B. Joints in pre-cast manhole sections shall be filled using "Ram-Nek" or approved equal in the joint space between matching parts. After placement of the subsequent section, excess sealant squeezed from joint shall be removed and the joint area troweled smooth. Special precautions shall be taken to ensure that the entire joint space is filled with sealant. Apply mortar to all joints.

C. Apply concrete sealant “XYPEX Concentrate” 2 coats to manhole base and 1 coat to inside and outside of barrels.

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## 3.04 WORKING ON EXISTING MANHOLES

A. When work is to be performed above the flow channel of existing manholes, plywood shall be used to cover the entire channel and a drop cloth shall be used to cover the entire base and prevent any debris from entering the flow-channel. Noncompliance will result in the suspension of that portion of the Contractor’s work for the day until the precautionary measures are put in place. No contract time extensions will be granted due to said suspension of work. This precaution shall be taken to prevent debris from entering or obstructing the flow to the Collection System.

B. Sanitary sewer connections to existing manholes shall be core-drilled and made using a flexible rubber seal/waterstop. **Saw cutting and hammer through taps are prohibited.**

## 3.05 ADJUSTING EXISTING FRAMES AND COVERS TO GRADE

A. General

1. Before any work is performed on existing manholes, plywood shall be used to cover entire channel and a drop cloth be used to cover the entire base. This precaution shall be taken to prevent debris from entering the Collection System. Existing frames, covers, or adjustment rings removed during adjustments may be reinstalled only if the materials are undamaged and only if approved in advance by the Engineer.

2. All City manholes shall be raised to grade within ten (10) calendar days after street resurfacing.

3. Manholes shall be raised flush with the finished grade of the new road surface. The maximum allowable tolerance shall be one-fourth inch (¼”) measured with a straightedge.

4. Manhole frame and cover shall be shimmed. The void between the top of manhole cone or ring and the cover frame shall be filled with cement mortar.

5. No bricks, shims or any other device shall be left as part of final construction.

6. Manhole covers shall have no other holes, other than the center pick hole and side pry hole.

B. Downward Adjustments

Downward adjustments can be made by removal of grade rings, mortar, concrete or brick. At no time shall the cone be modified in any way.

C. Manhole Surface Block

Manhole surface blocks (collars) are required on all manholes. A block is to be poured around each adjusted frame. The block is to be eighteen inches (18") wide as measured from the outside edge of the cover and twelve inches (12") thick. Concrete is to be poured no more than two inches (2") from final grade and rough finished to accept asphalt overlay. Frame is then to be grouted to grade to grade rings and cone.

## 3.06 TESTING

A. The Contractor shall conduct an exfiltration test or vacuum test on each manhole constructed. The test shall be conducted by the Contractor in the presence of the Engineer.

B. Exfiltration tests shall consist of plugging incoming and outgoing sewer lines and filling the manhole with water up to the rim. After initial absorption (15 minutes), if the water loss exceeds one inch in depth in five minutes, the manhole shall have failed the test. Each manhole which fails the test shall be carefully inspected to determine the problem and then resealed and retested until the water loss is less than one inch in five minutes.

C. Vacuum tests shall consist of drawing a vacuum on a sealed manhole and measuring the time for the vacuum to drop to a predetermined level. The actual test procedure shall be provided by the manufacturer of the test equipment and approved by the Engineer. Each manhole which fails the test shall be carefully inspected to determine the problem and then resealed and retested until the manhole passes.

- END OF SECTION -