

STANDARD SPECIFICATIONS

SECTION 03461

PRECAST REINFORCED CONCRETE MANHOLES AND MANHOLE BASES**PART 1 - GENERAL**A. Description

This section includes materials, testing, and installation of precast concrete manholes, manhole bases, manhole frames and covers.

B. Related Work Specified Elsewhere

1.	Structure Earthwork:	02200
2.	Trenching, Backfilling, and Compacting:	02223
3.	Concrete:	03300
4.	Leakage and Infiltration Testing:	15043

C. Submittals

1. Submit manufacturer's catalog and test data on precast concrete manholes, frames, and covers along with installation recommendations for inlet and outlet seals and watertight caulking. Show dimensions and materials of construction by ASTM reference and grade. Show manhole cover lettering and pattern.

PART 2 - MATERIALSA. Precast Concrete Manholes

1. General: Precast reinforced concrete manholes shall comply with ASTM C 478, with a minimum wall thickness of 6-inches.
2. Design Load: Manhole components shall be designed for H-20 highway loads and site soil conditions.
3. Concrete: Precast reinforced concrete manhole risers and tops shall be constructed of Class A concrete with Type V cement per Section 03300, Concrete.
4. Manhole Section Configuration: Manholes shall be fabricated only from eccentric taper sections and standard cylinder units of the proper internal diameter.
5. Manhole Section Dimensions: Unless noted otherwise, minimum diameter and wall thickness of manholes and manhole sections shall be as follows:

Depth, feet	Manhole Diameter, in	Manhole Section Wall Thickness, inches
0 – 11.9	48	6
12 – 15.9	60	8
16 and greater	72	9

Depth of cover shall be measured from proposed finish surface elevation to the lowest pipe invert.

6. Steps: Manhole sections shall be cast without steps.
7. Drop Manholes: Drop manholes are not permitted.
8. Manufacturers: Precast reinforced concrete manholes shall be manufactured by Jensen Precast, Ameron, Southwest Concrete Products, Inland Concrete Products, Precon Products, or approved equal.

B. Manhole Frames and Covers

1. General Requirements: Manhole frames and covers shall be made of ductile iron conforming to ASTM A 536, Class 400, or cast iron conforming to ASTM A 48, Class 30. Casting shall be smooth, clean, and free from blisters, blowholes, and shrinkage. Frames and covers shall be of the traffic type, designed for H-20 loading.
2. Fit and Matchmarking: Each manhole cover shall be ground or otherwise finished so that it will fit in its frame without rocking. Frames and covers shall be matchmarked in sets before shipping to the site.
3. Cover Inscription: Covers shall have "MNWD" and the word "SEWER" cast thereon as shown in MNWD standard drawing No. S-3, No. S-4 or on the plans. No other lettering on the top side shall be permitted.
4. Inspection and Coating: Before leaving the foundry, castings shall be cleaned and subjected to a hammer inspection. Castings shall then be dipped twice in a preparation of asphalt or coal tar and oil applied at a temperature of not less than 290°F, not more than 310°F, and in such a manner as to form a firm and tenacious coating.
5. Manufacturers: Manhole frames and covers shall be manufactured by Neenah Foundry, Long Beach Iron Works, Alhambra Foundry, South Bay Foundry or approved equal.

C. Imported Sand

Imported sand shall comply with Section 02223, Trenching, Backfilling, and Compacting.

D. Crushed Rock

Crushed rock shall comply with Section 02223, Trenching, Backfilling, and Compacting. If crushed rock is not used for the pipe bedding, 3/4-inch crushed rock shall be used for the manhole. Crushed rock base material shall extend 1 foot beyond the outside edge of the concrete manhole base.

E. Manhole Bases

Concrete used in pouring the manhole base shall be Class A concrete, Type V cement per Section 03300, Concrete.

F. Cement-Mortar Grout

Grout for watertight joints between precast sections shall be composed of one part portland cement to two parts of clean well-graded sand of such size that all pass a No. 8 sieve. Cement, aggregate, and water for mortar shall conform to the applicable provisions of Section 03300, Concrete.

G. Epoxy Grout

Epoxy grout shall be used in repairing manhole and manhole base surfaces. Epoxy grout shall be made with epoxy and sand. The sand shall be clean, bagged, graded, and kiln dried silica sand. The prepared grout shall wet the contact surface and provide proper adhesion, or a coat of epoxy shall be applied prior to placing the epoxy grout. The epoxy bonding compound shall be as specified in Section 03300, Concrete.

H. Plastic Joint Sealing Compound

Preformed cold-applied ready-to-use plastic joint sealing compound shall be Quick-Seal as supplied by Utility Vault, Santa Ana, California, or approved equal.

PART 3 - EXECUTIONA. Work Within Existing Manholes

Any proposed work inside an existing manhole that is part of a sewerage system in service, shall not be undertaken until all the tests and safety provisions of Article 4, Section 1532 "Confined Spaces" State of California Construction Safety Orders have been made.

B. Excavation

Excavation for the precast concrete manhole shall be in accordance with Section 02223, Trenching, Backfilling, and Compacting.

C. Manhole Base

1. General: Manhole bases shall be poured in place against undisturbed soil with Class A concrete having 3/4-inch-maximum size aggregate and a slump of not greater than 2-inches. The manhole base shall be poured as one monolithic pour. Limitations for site-mixed and ready-mixed concrete set forth in Section 03300, Concrete, shall be observed. A 12-inch thick base of 3/4-inch crushed rock shall be placed prior to the placement of concrete for all installations.
2. Manhole Stub Placement: The manhole stubs and sewer main shall be set before the concrete is placed and shall be rechecked for alignment and grade before the concrete has set. The various sized inlets and outlets to the manhole shall be located as indicated on the plans and as detailed in the detail drawings.

3. Matching Pipe Crown Elevations: Invert elevations of connecting sewers many vary depending upon sizes. The crown elevation of all pipes shall be the same as the crown elevation of the largest pipe unless otherwise indicated on the plans.
4. Channel Configuration: The invert of the manhole base shall be formed so as to provide smooth channels conforming in size and shape to the lower portions of the inlet and outlet pipes. The channel shall vary uniformly in size and shape from inlet to outlet, and a shelf shall be constructed higher than the pipe as indicated on the drawings. The manhole base shall extend 12-inches below the bottom of the lowest pipe.
5. Transitions: All transitions shall be smooth and of the proper radius to give an uninterrupted transition of flow.
6. Finishing: The concrete base shall be shaped with a wood float and shall receive a hard steel trowel finish before the concrete sets.
7. Placement of Additional Mortar: In the event additional mortar is required after initial set has taken place, the surface to receive the mortar shall be primed, and the mortar mixed with "Willhold Concrete Adhesive" in the amounts and proportions recommended by the manufacturer and as directed by the District representative in order to secure as chip-proof a result as possible.
8. Curing Time Before Further Construction: Unless approved otherwise by the District, in advance, the bases shall set a minimum of 24 hours before the manhole construction is continued.

D. Installing Manholes

1. General: Manholes for sewers of diameter 10-inches or less shall be constructed as shown on MNWD standard drawings S-1 and S-2. Manholes for larger diameter sewers shall be constructed as shown on the project construction plans.
2. Joints: Precast concrete manhole units shall be set in a bed of grout to make a watertight joint at least 1/2 inch thick with the concrete base or with the preceding unit. Manhole sections shall be set perfectly plumb. Inside joints shall be pointed and the excess grout wiped off. Preformed, cold-applied, ready-to-use, plastic joint sealing compound may be substituted for grout between units and must be used when groundwater is encountered.
3. Finish Elevation of Manhole Covers: Precast sections shall be assembled so that the cover conforms to the elevation determined by the manhole location as follows, but limited to a maximum of 18-inches from the top of the manhole cone to the top of the ring and cover, unless otherwise instructed by the District representative.
 - a. In Paved Area: Top of cover shall be flush with the paving surface.
 - b. In Shoulder Areas: Top of cover shall be flush with existing surface where it is in traveled way or shoulder and 0.1 foot above existing surface where outside limits of traveled way but not in the existing roadside ditch.
 - c. In Roadside Ditch or Unpaved Open Areas: Top of cover shall be a minimum of 6-inches above the ground surface and surrounded with a concrete collar, per MNWD standard drawings. In special instances, as designated by the District representative or as shown on the plans, the top of the cover shall be flush with the surrounding ground surface and within a square concrete pad 2 feet larger than the manhole frame. Guard posts or paddle boards may be required adjacent to manholes in open areas.

4. Manhole Frame and Cover: The manhole frame shall be bolted to grade ring and secured with grout and cement mortar fillet. After the frames are securely set, the frames and the covers shall be cleaned and scraped free of foreign materials, and shall be ground or otherwise finished as needed so the cover fits in its frame without rocking.
5. Watertightness: It is the intent of these specifications that manholes and appurtenances be watertight and free from infiltration. All manholes are to be banded both inside and outside with cement-mortar grout. Where called for in the plans or supplemental specifications, manholes that are to be given a protective lining or coating shall be free of any seeping or surface moisture. The adequacy of manholes and appurtenances as to watertightness shall be determined by the District representative and shall be tested in accordance with Section 15043, Leakage and Infiltration Testing.
6. Stubs: Sewer pipe shall be furnished and installed in manholes at the locations shown and in conformance with the detail drawings and plans. All stubs shall be plugged with stoppers as shown on the plans for various sizes of pipe.
7. Sealing Before Completion: In order to prevent accidental use of the new sewer before completion and acceptance, the inlet to existing tie-in manholes shall be sealed with broken brick and mortar. Installation of these plugs shall be approved by the District representative. Plugs shall be removed at the time of final inspection or as directed by District representative.
8. Bulkheads: Brick and mortar bulkheads shall be installed at the downstream end of all unused stub channels over 5 feet long to prevent the creation of a septic condition resulting from ponding of sewage and debris in the unused channels, and until such time as the manhole stub is connected and normal sewage flow can occur. A plug shall be required for all downstream stubs.
9. New Connections to Existing Manholes: New connections to existing manholes wherein stubs have not been provided shall be made by core drilling through the base, as directed by the District representative.
10. Backfill: Backfill around the precast concrete manhole shall be imported sand, and shall be placed and compacted in accordance with Section 02223, Trenching, Backfilling, and Compacting.
11. Grade Rings: Class B concrete rings shall be cast around manhole frames that are flush with the surface. The ring shall be placed after final grading or paving together with final cleanup.
12. Pavement Replacement: Replacement of bituminous or concrete pavement shall be in accordance with the requirements of the governmental agency having jurisdiction.

E. Manhole and Manhole Base Repairs

Manhole sections and bases that exhibit defects in the concrete surface may be rejected. Defective concrete surfaces of manhole sections and bases not rejected shall be repaired by chipping away unsound or imperfect concrete. Edges shall be left sharp and square with the surface. Loose material and dust remaining after chipping shall be removed by means of an air jet. Epoxy grout shall be applied to the surface to be repaired in accordance with the manufacturer's instructions. The grout shall wet the contact surface and provide proper adhesion, or a coat of epoxy shall be applied prior to placing the epoxy grout.

END OF SECTION