

VALLECITOS WATER DISTRICT
SECTION 03461 – PRECAST REINFORCED CONCRETE MANHOLES

PART 1 – GENERAL

1.1 DESCRIPTION

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

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. All related work specified elsewhere, or in other codes or standards, will be as last revised, unless a specific date of issuance is called out in opposition to later revision date(s).
- B. Other sections of the Standard Specifications, not referenced below, shall also apply to the extent required for proper performance of this Work.
 - 1. Section 02223 - Trenching, Backfilling, and Compacting
 - 2. Section 03300 – Concrete
 - 3. Section 09801 - Manhole Protective Lining
 - 4. Section 15042 - Leakage and Infiltration Testing

1.3 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. The following standards have been referenced in this Section:
 - 1. ASTM A48 Gray Iron Castings
 - 2. ASTM A536 Ductile Iron Casting
 - 3. ASTM C478 Precast Reinforced Concrete Manhole Sections

1.3 SUBMITTALS

- A. 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.

1.4 PROJECT CONDITIONS

- A. Any proposed work inside an existing manhole that is part of a sewage 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.

PART 2 – PRODUCTS

2.1 PRECAST CONCRETE MANHOLES

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- A. Precast reinforced concrete manholes shall comply with ASTM C478.
- B. Manhole components shall be designed for H-20 highway loads and site soil conditions.
- C. Precast reinforced concrete manhole risers and tops shall be constructed of Class C concrete with Type II and Type V cement per the Standard Specifications.
- D. Manholes shall be fabricated only from eccentric taper sections and standard cylinder units of the proper internal diameter.
- E. Unless noted otherwise, minimum diameter and minimum wall thickness of manholes and manhole sections shall be as follows:

Sewer Main Diameter, inches	<u>Min.</u> Manhole Diameter, inches	Manhole Section Wall Thickness, inches
8 – 12	48	5
15 – 24	60	6
Greater than 24	96	9

At the District’s discretion, manhole diameter may be increased due to excessive depth of cover, which shall be measured from surface elevation to the lowest pipe invert.

- F. Manhole sections shall be cast without steps.
- G. Precast reinforced concrete manholes shall be manufactured by Mar-Con Products, or approved equal.

2.2 MANHOLE FRAMES AND COVERS

- A. Manhole frames and covers shall be three-piece and shall be made of ductile iron conforming to ASTM A536, Class 400, or cast iron conforming to ASTM A48, 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.
- B. 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.
- C. Covers shall have the words: “VALLECITOS WATER DISTRICT” and “SEWER” cast thereon as shown on VWD Standard Drawings S-1, S-2, and S-3. No other lettering on the top side shall be permitted.
- D. 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.

2.3 BACKFILL MATERIAL

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- A. Crushed rock for manhole bedding, imported sand for backfill, and 2-sack slurry for backfill shall be in accordance with the Standard Specifications.

2.4 MANHOLE BASES

- A. Concrete used in pouring the manhole base shall be Class C concrete, Type V cement per the Standard Specifications.
- B. Sand collar water stop fitting shall be a watertight ring-type seal matching the material of the connecting pipe per the manufacturer's recommendations.

2.5 EPOXY MORTAR

- A. Epoxy grout shall be used in repairing existing manhole and manhole base surfaces per the Standard Specifications.

2.6 JOINT SEALING COMPOUND

- A. Joint sealing compound for manhole joints shall be a pre-formed, cold-applied, ready-to-use butyl sealant. Ez-Stik Premium, Pro-Stik, or approved equal.
- B. Where groundwater is present or possible under wet weather conditions, or as directed by the District Engineer or their designee, a hydrophilic waterstop shall be used for the joint sealing compound. Sika Swellstop Waterstop, or approved equal.

2.7 GROUT AND MORTAR

- A. Cement grout, non-shrink grout, and cement mortar for grade joints, patching the manhole interior, and setting manhole frames per the Standard Specifications.

2.8 PROTECTIVE LINING

- A. Protective lining shall be a 100% solid, non-solvented hydrid polyurethane coating per the Standard Specifications.

2.9 WATERPROOFING

- A. Waterproofing applied to the exterior of precast manhole sections prior to delivery to the jobsite shall be 16-24 mils of coal tar epoxy Tnemec 46H-413, Carboline Bitumastic No. 300M, or approved equal.
- B. Waterproofing applied to the exterior joints of precast manhole sections in the field shall be a two-layer joint shrink wrap sleeve. The first layer shall be an elastic adhesive liquid sealant covered by a heat shrink sleeve. The heat shrink is a thick-walled high density polyethylene membrane. Riser-Wrap by Pipeline Seal and Insulator or equal.

PART 3 – EXECUTION

3.1 MANHOLE BASE

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- A. Excavation for the manhole base shall be in accordance with the Standard Specifications.
- B. 3/4-inch crushed rock shall be used for the manhole bedding. Crushed rock shall extend a minimum 1-foot beyond the outside edge of the concrete manhole base. A 4 to 6-inch thick base of 3/4-inch crushed rock shall be placed prior to the placement of concrete for all installations.
- C. Manhole bases shall be poured in place against undisturbed soil with Class C 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 the Standard Specifications. Manhole base shall be poured under observation of the District Engineer or their designee.
- D. Invert elevations of connecting sewers may vary depending upon sizes. The crown elevation of all pipes shall be the same.
- E. 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 a minimum of 8-inches below the bottom of the lowest pipe.
- F. All transitions shall be smooth and of the proper radius to give an uninterrupted transition of flow.
- G. The concrete base shall be shaped with a wood float and shall receive a hard steel trowel finish before the concrete sets.
- H. A sand collar water stop fitting shall be cast into the concrete base where pipe connections are shown on the Approved Plans.
- I. Unless approved otherwise by the District Engineer or their designee in advance, the bases shall be set, with a minimum of 24-hours cure time, before the manhole construction is continued.
- J. Manhole bases that exhibit defects in the concrete surface shall be rejected.

3.2 INSTALLING MANHOLES

- A. Excavation for the precast concrete manhole shall be in accordance with the Standard Specifications.
- B. Manholes shall be constructed as shown on VWD Standard Drawings S-1, S-2, and S-3. Manholes for special cases shall be constructed as shown on the Approved Plans.
- C. Two passes of joint sealing compound will be required at each manhole joint to make a watertight seal between manhole units, including at the manhole base, but excluding grade rings. Excess joint sealant shall be trimmed flush with the interior of the manhole. Precast

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grade rings shall be set in a bed of mortar or grout at least 1/2-inch thick. Manhole sections shall be set perfectly plumb.

- D. Minor defects, precast manhole step holes, and joint gaps shall be patched with grout or mortar for a smooth finish.
- E. It is the intent of these specifications that manholes and appurtenances be watertight and free from infiltration. The adequacy of manholes and appurtenances as to watertightness shall be determined by the District Engineer or their designee and, if required, shall be tested in accordance with the Standard Specifications.
- F. Manhole sections that exhibit defects in the concrete surface shall be rejected.
- G. Finish Elevation of Manhole Covers
 - 1. 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 bottom of the ring and cover, unless otherwise instructed by the District Engineer or their designee.
 - a. In Paved Areas: 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 VWD Standard Drawings. In special instances, as designated by the District Engineer or their designee or as shown on the Approved Plans, the top of the cover shall be flush with the surrounding ground surface and within square concrete pad 2-feet larger than the manhole in open areas.
- H. 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 block and mortar or plugs approved by the District Engineer or their designee. Plugs shall be removed at the time of final inspection or as directed by District Engineer or their designee.
- I. Block 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.
- J. 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 Engineer or their designee.

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- K. Backfill around the precast concrete manhole shall be imported sand, and shall be placed and compacted in accordance with the Standard Specifications. A 2-sack sand-cement slurry is required around the manhole in existing street sections per governing agency.
- L. 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.
- M. Pavement Replacement shall be in accordance with the requirements of the governmental agency having jurisdiction.

3.3 MANHOLE FRAME AND COVER

- A. The manhole frame shall be secured to grade ring with grout or mortar and a cement mortar fillet. Where the frame sets directly on the grade ring, a butyl sealant shall be applied. 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.

3.4 PROTECTIVE LINING

- A. Unless otherwise directed by the District Engineer or their designee, the interior of all manholes 60-inches in diameter or larger shall be lined per the Standard Specifications. Manholes that are to be given a protective lining shall be free of any seeping or surface moisture.

3.5 WATERPROOFING

- A. Where groundwater is present or possible under wet weather conditions, or as directed by the District Engineer or their designee, all manhole precast sections shall be waterproofed. Exterior joints shall be patched with grout and made smooth and waterproofing shall be applied to the exterior walls and joints of buried precast manhole sections in accordance with the manufacturer's instructions. Protection shall be placed over the waterproofing to prevent damage. Repairs in the field shall be at the direction of the District Engineer or their designee.

3.6 EXISTING MANHOLE AND MANHOLE BASE REPAIRS

- A. Defective concrete surfaces in existing manhole sections and bases determined to be minor by the District Engineer or their designee, 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 mortar shall be applied to the surface to be repaired in accordance with the manufacturer's instructions. The prepared mortar shall wet the contact surface and provide adhesion, or a bonding agent shall be applied prior to placement.

****END OF SECTION****