

UPDATE LOG FOR TECHNICAL PROVISIONS – DIVISION 15		
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1/1/09	<p>TECHNICAL PROVISIONS DIVISION 15 – SEWER SPECIFICATIONS</p> <p>15.7 Manholes and Appurtenances</p> <p>15.7.3 Manhole Steps</p> <p>Manhole steps shall not be installed on new manhole installations or manhole extensions. be as detailed on the Standard Drawings, or as specified. All steps shall be made of fiberglass. Steps shall have a 14-inch minimum tread, spaced at 16 inches on center (maximum), and shall be placed in the walls of the manhole structure, as specified.</p>	15-6

Change Legend:

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DIVISION 15

SEWER SPECIFICATIONS

15.1 Scope

Contractor shall furnish all pipe and appurtenances together with all material, equipment, and labor to perform all operations necessary to construct sewer mains and appurtenances as specified herein, in applicable sections of the Standard Specifications for Public Works Construction, and as shown on the Drawings. References in the Standard Specifications to measurement and payment shall not apply.

15.2 Excavation

15.2.1 General

Excavation shall be in accordance with Section 306-1.1 of the Standard Specifications, as specified herein and as shown on the Drawings.

15.2.2 Trenches

Excavation for sewer lines and appurtenances shall be open trench to the depth and in the direction necessary for proper installation of same as shown on Construction Drawings or as otherwise directed by Owner. Excavation for trenches shall include the removal of all material of any nature for installation of the pipe or appurtenance and shall include either trench sloping or trench shoring as may be required. Trench excavation shall include removal of water (dewatering) as necessary for proper construction.

15.2.3 Limit of Excavation

Unless specified otherwise, trenches shall be excavated not more than 500 feet in advance of pipe laying. Trenches shall be adequately shored and braced so that the earth will not slide or settle, and so that all existing improvements of any kind will be fully protected from damage. Any damage resulting from lack of adequate shoring and bracing shall be the responsibility of Contractor. Contractor shall effect all necessary repairs or reconstruction at his own expense, as directed by Owner, and shall bear all other expense resulting from such damage.

15.2.4 Width of Trench

Unless otherwise shown, all pipeline trenches shall, wherever possible, have vertical sides and a maximum trench width at the top of the pipe equal to the outside diameter of the sewer plus two (2) feet. Sloping of trench walls will be permitted under certain conditions.

Whenever the maximum allowable width of trench is exceeded for any reason except as permitted by written direction of Owner, Owner may require at its discretion, that Contractor, at his expense,

provide construction in accordance with higher class bedding condition or cradle pipe in Class B concrete. The maximum allowable width of trench is shown on the Drawings.

15.2.5 Excavated Materials

All material excavated from the trench shall be so placed as to offer a minimum of obstruction to traffic. Gutters shall be kept clear or other provisions shall be made for handling street or road drainage. Excess material and material that is not approved by Owner for use as backfill shall be disposed of elsewhere by Contractor entirely at his own expense unless otherwise permitted by Owner.

If pipe or other material belonging to Owner is uncovered or removed from the excavation, all pipe or other material which is salvable in the opinion of the Owner shall be disposed of as directed by Owner. Material not considered to be salvable shall be disposed of with other excess excavated material.

15.2.6 Blasting

Blasting for excavation will be permitted only after securing approval of Owner and only when proper precautions are taken for the protection of persons and property. The hours of blasting will be fixed by Owner. Any damage caused by blasting shall be repaired by Contractor at his expense. Contractor's methods of blasting and procedure shall conform to State and local laws and municipal ordinances. Precautions shall be taken to post signs warning operators of radio equipment to stop transmitting in any area in which blasting operations are in progress.

15.3 Bedding

15.3.1 General

Bedding shall be in accordance with Sections 306-1.2.1 of the Standard Specifications, as specified herein and as shown on the Drawings. Bedding shall be suitable for the load factor condition specified.

15.3.2 Good Soil

Trench shall have a flat or semi-circular bottom conforming to the grade to which the pipe is to be laid. Bottom of trench shall be graded and prepared to provide firm and uniform bearing throughout the entire length of each joint of pipe. Sewer shall not be laid on earth mounds and bell holes shall be excavated in the sides and bottom of the trench at pipe joints, of such size that the process of making joints and inspection can be carried on satisfactorily, and so that the pipe barrel will bear evenly on the bottom of the trench.

15.3.3 Bedding in Poor Soil

All soft, spongy, or unstable material shall be removed from the bottom of the trench to a depth as determined in the field by Owner and shall be refilled to proper grade, at Contractor's expense, with

crushed rock or other special bedding material, as approved by Owner. Bedding material shall be tamped to 90 percent compaction, graded, and prepared to provide a firm and uniform trench bottom.

15.3.4 Bedding in Rock

Where rock is encountered, it shall be removed below grade and the trench backfilled with crushed rock or other suitable material as approved by Owner to provide a compacted earth cushion with a thickness under the pipe of not less than eight (8) inches. Bedding material shall be tamped to 90% compaction, graded, and prepared to provide a firm and uniform trench bottom.

15.3.5 Excess Excavation

Should the excavation for the sewer be carried below grade without instruction from Owner, it shall be refilled to proper grade, at Contractor's expense for all labor and material, with crushed rock tamped in place to 90 percent minimum compaction.

15.4 Bedding and Backfill

15.4.1 General

Bedding and backfill shall be in accordance with Sections 306-1.2.1 and 306-1.3 of the Standard Specifications, as specified herein and as shown on the Drawings, and in accordance with permits issued by agency having jurisdiction (State, County, City) over rights-of-way in which construction is taking place. Bedding and backfill shall not commence without prior approval of Owner or of other aforementioned agency.

15.4.2 Backfill (Bedding) Adjacent to Pipe

Initial backfill shall be performed as soon as possible after pipe has been laid. Selected backfill material shall be used and it shall be as specified in Section 306-1.2.1 of the Standard Specifications and shall be one (1) inch maximum in size. Crushed rock or concrete shall be used as required, in accordance with the Bedding Class and Load Factor shown on the Drawings.

15.4.3 Backfill Above the Pipe

Backfill shall be in accordance with Section 306-1.3 of the Standard Specifications. Unless specified otherwise, all backfill material shall be compacted to a minimum relative compaction of 90% as determined by field compaction tests, unless specified otherwise or permitted. Relative compaction shall be determined in accordance with ASTM D-1557 (modified to three-layer curve in lieu of five-layer curve), latest.

Sandy, granular soils may be compacted by means of water densification by jetting per Section 306-1.3.3 of the Standard Specifications (flooding is not allowed for water-densified backfill). Soils not having a sandy or granular nature shall be backfilled and compacted mechanically per

Section 306-1.3.2 of the Standard Specifications. On steep slopes and other locations where compaction by water densification is not practicable, backfill material shall be compacted mechanically.

15.4.4 Relative Compaction Testing

Owner shall perform compaction tests at various levels above the pipe and within the bedding at locations selected by the Owner. Relative compaction shall be determined in accordance with ASTM D-1557 (latest), modified to five-layer curve in lieu of three-layer curve.

Contractor shall provide excavation, shoring, and access adequate to permit said compaction tests by the Owner. If compaction is being performed mechanically, the Owner will perform compaction tests during the backfilling operation.

Where water densification is performed, Contractor shall excavate after compaction is completed to permit Owner to perform compaction tests.

If compaction tests fail, Contractor shall recompact failed areas and shall pay for all subsequent tests necessary to determine compliance with compaction requirements.

15.5 **Vitrified Clay Pipe (V.C.P.) Sewer Pipe**

15.5.1 General

Pipe materials to be furnished hereunder shall be extra-strength vitrified clay pipe (V.C.P.) in accordance with Section 207-8 and 208-2 of the Standard Specifications. VCP shall be manufactured by Pacific Clay Products, Incorporated, Interpace Corporation, or approved equal.

15.5.2 Data to be Submitted by Contractor

Contractor shall furnish six (6) copies of each of the following:

- a. Affidavit of compliance stating that all materials furnished comply with all applicable requirements of latest ASTM Specifications specified;
- b. Certified test reports containing results of all physical and chemical tests on pipe and fittings to be furnished, showing compliance with latest ASTM Specifications.

Each length of pipe and each fitting furnished under this specification shall be clearly marked with the following information:

- a. Manufacturer's name or initials and plant location
- b. Nominal pipe size
- c. The words "Extra Strength" or the symbol "ES"

15.5.3 Factory Inspection

Owner shall at all times have the right to inspect all work and materials in the course of manufacture as well as witness testing. Manufacturer shall furnish Owner reasonable notice for obtaining such information as he may desire regarding the progress and manner of the work and the character and quality of materials used. Manufacturer shall furnish, upon request, certified test reports on the manufacture of the pipe.

15.5.4 Loading and Transporting

Pipe shall be loaded on rubber-tired vehicles, adequately supported, and chocked to prevent any damage during transportation and delivered job site. During the unloading and stringing operations, the pipe shall be moved in such a manner, as to prevent injury to the pipe. Unloading shall be accomplished in a workmanlike manner as directed by the manufacturer. Under no circumstances are pipe sections to be dropped or bumped in handling.

15.5.5 Defective or Damaged Material

All pipe and fittings shall be carefully inspected for defects. Any pipe, fitting, or joint found to be defective in workmanship or material or so damaged as to make repair and use impossible, at the Owner's discretion, shall be rejected and removed from the job site.

15.6 Installation

15.6.1 General

All sewers shall be laid true to line and grade and at the locations as shown by Construction Drawings or as specified. Pipe shall be installed in accordance with the manufacturer's directions, applicable provisions of "Clay Pipe Engineering Manual," as published by the National Clay Pipe Institute, and in accordance with Section 306-1.2.2 of the Standard Specifications.

Before lowering and while suspended at trench side, the pipe shall be inspected for defects. Vitrified clay pipe (V.C.P.) shall be rung with a light hammer to detect cracks. Any defective material shall be rejected and removed from the site. Trench bottom shall be inspected and adjustments made in line and grade. All pipe shall be laid without break, upgrade from structure to structure, with the bell end of the pipe upgrade.

As the work progresses, the interior of the sewer pipe shall be cleaned of all dirt and superfluous materials with a procedure approved by Owner.

At the end of each day's work, all openings in the sewer pipe shall be plugged with water-tight expandable plugs or approved equal.

15.6.2 Field Jointing

After the pipe has been lowered into the trench it shall be jointed in accordance with Section 306-1.2.3 of the Standard Specifications.

15.6.3 Manufacturer's Observation

The pipe and fitting manufacturer shall have free access to the work during laying operations and testing. Any improper act on the part of Contractor which the manufacturer may observe shall be reported to Owner. Manufacturer shall be free to observe and check all tests.

15.6.4 Tolerances

Maximum departure from specified grade at invert of pipe shall be 0.02 feet. The return from said departure to grade shall not create high spots or low spots in the sewer invert. The fall through manholes shall be at the pipe grade specified unless shown otherwise on the Drawings.

15.7 Manholes and Appurtenances

15.7.1 Scope

Manholes shall be constructed of precast reinforced concrete in accordance with the requirements of ASTM C478, latest. Dimensions and details of manholes and appurtenances shall be as shown on Construction Drawings, Standard Drawings, or as specified.

15.7.2 Manhole Covers

Manhole covers and frames shall be furnished in accordance with the Construction Drawings, Section 206-3.3 of the Standard Specifications, and the Standard Drawings. Castings shall conform to ASTM, Class 35. The bearing surfaces of the frames and covers shall be machined and the cover shall seat firmly into the frame without rocking. The frame and cover shall be thoroughly cleaned and coated with commercial quality asphalt paint. The cover shall have a raised letter identification of "RCWD SEWER."

15.7.3 Manhole Steps

Manhole steps shall not be installed on new manhole installations or manhole extensions.

15.7.4 Concrete and Mortar for Manholes

Concrete shall be of the class specified on the Construction Drawings or Standard Drawings and shall be in accordance with the Basic Concrete Specifications herein.

Cement mortar shall consist of one (1) part portland cement and two and one half (2½) parts clean, well-graded sand of such size that all will pass a No. 8 sieve. Cement and sand shall first be combined in the proper proportions, and then thoroughly mixed with the quantity of water necessary to produce a mixture sufficiently workable for the purpose intended.

Mortar shall be used as soon as possible after mixing and shall show no visible signs of setting prior to use. Retempering of mortar will not be permitted.

15.7.5 Waterstop

All PVC sewer pipe manhole bases shall have a waterstop installed to prevent the infiltration of ground water into the manhole at the inlet and outlet piping.

15.7.6 Excavation and Backfill

Manhole bedding and excavation width – The following provisions shall supplement Sections 3.2 and 3.3 (“Excavation” and “Backfill”) of the Technical Provisions, Rancho California Water District Standard Specifications.

15.7.6.1 Backfill Under Manhole Base

Contractor shall excavate to a minimum 1.0 feet below bottom of manhole base. Bedding material below manhole base will be angular ¾ inch to 1-inch maximum graded stone.

15.7.6.2 Backfill Adjacent to Manhole

Contractor shall place selected backfill adjacent to manhole in accordance with Section 3.3.3.b of the Technical Provisions of the Specifications.

15.7.6.3 Compaction Testing Adjacent to Manhole

In addition to compaction testing along the length of the sewer pipe, a minimum of one (1) compaction test shall be taken within 2’ of each manhole to assure of adequate soil compaction adjacent to each manhole.

15.8 Laterals

15.8.1 Location and Size

Laterals shall be furnished in accordance with the Construction Drawings and the Standard Drawings. Laterals will not be permitted in driveway areas and shall be located a minimum of 10 feet from any potable water service.

15.9 Force Mains

Unless specified otherwise, force mains shall be constructed of polyvinyl chloride pipe, in

accordance with the pipeline specifications. Air and vacuum valves and plug valves shall be in accordance with the Valve Specifications.

15.10 Testing Sewer for Leakage and Visual Inspection

15.10.1 General

Contractor shall, upon completion of the sewer main and appurtenances including backfill (prior to paving), perform tests for leakage on the sewer main and laterals. Contractor shall furnish all labor and equipment to perform testing, including providing calibrated meters for measurement of the leakage, necessary bulkheads, piping, gages, pumps and power, and shall furnish to Owner copies of all tests performed.

Contractor, at his own expense, shall do all excavation necessary to locate and eliminate leaks or other defects which may develop under test, including removal of backfill and sewer line necessary to achieve the required water tightness. After repair the required test shall be repeated until the sewer main and appurtenances meet the requirements set forth herein. Refer to Section 15.12 herein for repair.

15.10.2 Leakage Test

The leakage test to be performed by the Contractor shall be either the water exfiltration test or the air pressure test in accordance with Section 306-1.4.1, 306-1.4.2, and 306-1.4.4 of the Standard Specifications. The water infiltration test, per Section 306-1.4.3 of the Standard Specifications, will be required only when specified in the Special Requirements, on the Drawings, or where groundwater is encountered.

15.10.3 Water Exfiltration Test

Test shall be in accordance with Section 306-1.4.2 of the Standard Specifications, as modified herein. The total leakage shall be the decrease in volume of water in the upper structure. The leakage shall not exceed 0.05 gallon per minute per inch of nominal diameter of pipe per 1,000 feet of sewer pipe being tested. The length of house connections shall not be used in computing the length of sewer main being tested. The minimum test duration period shall be two hours.

If groundwater is encountered and the Owner requires the infiltration test, the Contractor will be required to also perform the air pressure test, and the exfiltration test will not be required.

15.10.4 Air Pressure Test

The air pressure test shall be in accordance with Section 306-1.4.4 of the Standard Specifications.

15.11 Inspection of Pipeline Interior

Contractor shall provide closed circuit television inspection (CCTV) as a post-construction method to determine if the sewer line has been installed as required and all interior pipe joints are seated

properly, no cracks in the pipe are evident and no construction debris is left in the sewer line. Television inspection shall be performed after the air test has been accepted, all repairs made, cleaning of line and completion of base paving. CCTV system shall have a rotating lens camera with articulating head. Each joint will be scanned 360 degrees. The television camera shall be specifically designed and constructed for sewer and water pipe inspection. The camera shall be operative in 100% humidity conditions. Lighting for the camera shall minimize relative glare. Lighting and camera quality shall be suitable to provide a clear, in focus picture of the entire periphery of the pipe for all conditions encountered during the work. Focal distance shall be adjustable through a range from 6" to infinity. The remote reading footage counter shall be accurate to one percent (1%) over the length of the particular section being inspected. The camera, television monitor and other components of the color video system shall be capable of producing a minimum of 350 line resolution. Documentation consisting of a color video tape and a written report detailing the condition of the pipe and joints shall be submitted to the District for approval prior to testing.

Any defects in the pipe lining or joints shall be repaired and another video taken of the repaired section and submitted for approval by the District prior to testing. **For domestic water systems including the pump-to-waste pipeline, all video equipment must be certified for DOMESTIC WATER LINE INSPECTION ONLY, and NEVER to have been utilized in a non-potable system.**

15.12 Pipe Repair and Replacement

Where it is determined that the pipe must be replaced due to excessive leakage or damaged pipe, said replacement may be performed by installing new pipe and connecting to existing utilizing rubber Calder-type couplings with stainless steel bands. For pipe larger than 12-inch, said couplings shall be encased in concrete, as directed by the Owner.

The use of pressure-applied sealants may be permitted where approved by the Owner to repair joints where the structural integrity of the pipe remains. A multiple number of leaking joints evidencing material or installation defects shall require removal and replacement of pipe and repair with sealant will not be permitted.

15.13 Conductor Casings and Carrier Pipes

Wherever required, conductor casings shall be installed. Said casings shall be comprised of either welded steel pipe or reinforced concrete pipe, as shown on the drawings. Conductor casing shall be bored or jacked or bored and jacked into place unless open trench installation is permitted; it shall not be sluiced or jetted into place. Conductor casing shall be bored or jacked into place from one direction only. Boring and jacking shall be in accordance with Section 306-2 of the Standard Specifications.

Conductor casing shall be installed to permit installation of the carrier pipe to the lines, grades, and depths specified. Contractor will be permitted a tolerance from exact grade and alignment of 0.10 feet unless specified otherwise. Unless specified otherwise, the methods and equipment used shall be as selected by Contractor and as approved by Owner. Said approval shall not relieve the Contractor of any responsibility with regard to conductor casing construction. Conductor casing

shall have an inside diameter at least six (6) inches larger than the greatest outside diameter of carrier pipe. Prior to any boring or jacking or boring and jacking operations, Contractor shall submit to Owner a construction plan consisting of a schedule of operations, details of methods of construction, types of equipment to be used, details of boring or jacking pit including lengths, widths, and depths, and shoring and bracing required. Said construction plan shall be approved by Owner before any construction is commenced.

Contractor shall take all necessary precautions to prevent subsidence of or lifting of existing roadbeds, roadways, and pavements thereon. Material excavated during boring or jacking or boring and jacking operations shall be removed carefully so as to prevent caving. Voids created during construction shall be backpacked promptly to the extent practicable with soil cement or grout which shall consist of a slightly moistened mixture of one part cement to five parts granular material unless specified otherwise.

After conductor casing has been constructed, casing spacers shall be placed around the carrier pipe according to manufacturer's specifications and then installed in conductor casing in accordance with aforementioned construction plan, as approved by Owner. The annulus between conductor casing and carrier pipe shall not be filled with sand unless otherwise specified. Contractor shall install rubber end seals at each end of the conductor casing to prevent intrusion of water into the casing.

Contractor shall backfill boring or jacking pit with material specified for pipeline backfill. Said backfill material shall be compacted to the relative compaction specified which shall not be less than 90%. Contractor shall remove conductor casing and carrier pipe remnants, shoring materials, asphalt, concrete, and all other work-related debris. Contractor shall restore paved surfaces, unless directed otherwise.

15.14 Polyvinyl Chloride (PVC) Sewer Pipe

15.14.1 Scope

Contractor shall furnish and install all pipe and fittings together with all material, equipment, and labor and perform all operations necessary to construct sewer mains and appurtenances, as specified, unless otherwise indicated.

15.14.2 Materials - Polyvinyl Chloride (PVC) Sewer Pipe

15.14.2.1 General

Polyvinyl chloride (PVC) sewer pipe for sizes up to and including 15-inch diameter pipe. Color of PVC pipe shall be green.

15.14.2.2 Material

Pipe and fittings shall be made from PVC compound, as defined in ASTM D 1784. Pipe and fittings shall conform to Section 207-17, of the Standard Specifications for Public Works Construction, Latest Edition. Pipe and fittings shall meet the requirements of ASTM D 3034-81,

with the following exceptions:

15.14.2.2.1 Pipe and Fittings

All pipe shall be suitable for use as a gravity sewer conduit with provisions for expansion and contraction at each joint with a rubber ring or elastomeric gasket. The joint material shall be in accordance with the manufacturer's standard dimensions and tolerances, unless otherwise specified herein. The pipe shall be uniform in color, opacity, density, and other physical properties. Pipe shall be marked in accordance with ASTM D 3034-81 for gravity sewer. Only newly manufactured pipe and fittings will be allowed. Pipe and fittings must be installed within two years from the date of manufacture, which shall be stamped on each section of pipe or the material will be rejected.

A factory applied reference mark shall be provided on the spigot end to insure proper position at the adjoining bell.

Standard pipe lengths shall be twenty (20) feet maximum and twelve and one-half (12.5) feet minimum, At manufacturer's and/or the Contractor's option, random lengths of not more than fifteen percent (15%) of total footage may be shipped in lieu of standard lengths and as approved by the Engineer.

All fittings shall be as manufactured and supplied by the pipe manufacturer and have bell and/or spigot configurations compatible with that of the pipe. All joints shall be made with flexible elastomeric seals (gaskets) in accordance with ASTM D 3212-76 and shall be capable of passing all tests specified in said Standard and within these Specifications. Solvent weld joints are not allowed.

15.14.2.2.2 Sizes, Dimensions, and Tolerances

Polyvinyl chloride and sewer pipe shall be supplied in the sizes and with the dimensions and tolerances shown in ASTM D 3034-81, SDR 35, or latest revision.

15.14.2.2.3 Pipe Stiffness

Minimum "pipe stiffness" at five percent (5%) deflection shall be 46 for all sizes when tested in accordance with ASTM D 2412, External Loading Properties of Plastic Pipe by Parallel-Plate Loading.

15.14.2.3 Handling and Storage

Polyvinyl chloride pipe shall be delivered to the job site from the factory and stored at the job site in palletized units or bundles to prevent unnecessary deflection prior to installation.

Care shall be taken during the transporting of the pipe to ensure that the binding and tie-down methods do not damage or deflect the pipe in any manner. Pipe bent, deflected, or otherwise damaged during shipping shall be rejected.

Pipe stored on the job site shall be covered with canvas or other opaque material to protect it from the sun's rays and be well ventilated to prevent the build-up of heat.

Pipe that is discolored due to ultra-violet (UV) radiation will be rejected.

15.14.3 Excavation and Backfill

Pipe Bedding and Trench Width - The following provisions shall supplement Sections 3.2 and 3.3 ("Excavation" and "Backfill") of these Technical Provisions, Rancho California Water District Standard Specifications.

15.14.3.1 Backfill Adjacent to Pipe

All PVC sewer pipe shall be installed in accordance with ASTM D 2321 except that all bedding material will be Class I material with angular ¼-inch to ¾-inch maximum graded stone as listed in ASTM D 448, Size #67, and shall be placed a maximum of six (6) inches and a minimum of four (4) inches below the pipe to a minimum of 75% of the pipe diameter above the invert of the pipe, or one (1) foot minimum, whichever is greater.

Contractor shall place the bedding material under the haunches of the pipe and to the spring line by spading and rodding, taking care not to disturb the horizontal or vertical alignment of the pipe. After the Contractor has placed the bedding material to the top of the pipe, he shall carefully "walk-in" the haunching material around the pipe after which the remaining bedding shall be placed to four (4) inches above the top of pipe.

15.14.3.1.1 Unstable Trench Backfill

Where conditions such as unstable or flowing soil conditions (including regulations) require a supported trench, the minimum trench width shall be in accordance with Table 63 of the Uni-Bell Handbook of PVC Pipe, Second Edition, dated March 1982, as follows:

<u>Nominal Pipe Size (Inches)</u>	<u>Trench Width, Minimum Inches</u>
8	36
10	42
12	42
15	48

Timber sheeting, where used below the top of the pipe, should be driven approximately two (2) feet below the bottom of the pipe and be left in place approximately 1.5 feet above the top of pipe. In supported trenches, compaction of the foundation and embedment materials should extend to the trench wall or to the sheeting left in place.

If movable sheeting or boxes are used, these should be used in a manner not to disturb the embedment material within 2½-inch pipe diameters on each side of the installed pipe.

15.14.3.2 Backfill Above the Pipe

The remainder of the pipe zone, as shown on Page RW-25 of the Standard Drawings of the Rancho

California Water District, shall be backfilled in accordance with Section 3.3.3 b. of the Technical Provisions of the Specifications. The Contractor shall take due precautionary measures in order to prevent the "floating" of the pipe when applying water. Additional depth of backfill over the pipe may be necessary in larger size PVC pipe to prevent "floating."

15.14.4 Testing

15.14.4.1 Air Test

The Contractor shall perform an air pressure test in conformance with Section 306-1.4.4 of the Standard Specifications for Public Works Construction, latest edition.

15.14.4.2 Deflection Test (Mandrel Testing)

The Contractor will be required to test all PVC sewer pipes for deflection, as described in Section 306.1.2.12 of the Standard Specifications for Public Works Construction, latest edition, and the following specifications.

15.14.4.2.1

Not less than thirty (30) days after installation but after backfill has been placed and compacted and before air testing and cap paving, the Contractor shall pass a rigid mandrel through all sections of PVC pipe. The mandrel shall have diameters in accordance with Table "A" (shown below) for the various diameters of sewer pipe to be tested.

TABLE "A"
MANDREL SIZES FOR DEFLECTION TEST

Nominal Pipe Size	Base Inside Diameter (In Inches)	5% Deflection Mandrel Diameter (In Inches)
8-inch	7.900	7.524
10-inch	9.875	9.405
12-inch	11.751	11.191

Nominal Pipe Size	Base Inside Diameter (In Inches)	4% Deflection Mandrel Diameter (In Inches)
15-inch	14.403	13.849

The mandrel shall be a rigid, round device with circular cross sections, in accordance with the diameters shown in Table "A." The length of the circular portion of the mandrel (maximum diameter) shall be equal to the nominal diameter of the pipe and all mandrels shall be submitted to the Engineer for approval prior to testing and shall remain in engineer's care, custody, and control.

The testing device shall be pulled through the completed pipelines by hand. For acceptance, the device must pass through the entire section of line between structures in one pass without use of excessive force. If the device sticks in the pipe at any point, the pipe shall be replaced and retested by the Contractor.

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15.14.4.2.2

The cost for all mandrel testing, including cleaning sewer main prior to tests, repairs, and retesting, shall be included in the unit price bid for sewer pipe and no additional compensation will made, therefore.

15.15 Special rules and regulations applicable for certain sewer service connections

15.15.1 Traps

As a condition to District approval for a requested sewer service connection and/or sewer service, where applicable as determined by the District, grease, oil, and sand interceptor facilities, hereinafter referred to as "traps," shall be provided by the Applicant/Discharger at his expense (in addition to all other required sewer service connection and private sewer system [Building Sewer] facilities) for the proper handling of wastewater containing floatable grease, flammable wastes, sand, or other harmful ingredients, except that such traps shall not be required for private residential dwelling units. All traps shall be of a type and capacity approved by the District, and shall be installed in a location which is readily and easily accessible for cleaning and inspection purposes. In maintaining such traps, the Applicant (Discharger) shall be responsible for the proper removal and disposal, by appropriate lawful means, of the trapped or collected material and shall maintain records of the dates and means of disposal, which records shall be available for and subject to review by the District. Any removal or hauling of the trapped or collected materials not performed by the Applicant/Discharger must be performed by a currently licensed waste disposal firm. The minimum size for such traps shall be 750 gallons. All expenses, including construction, operation, and maintenance costs associated with such traps shall be borne solely by the Applicant/Discharger.