

Element 5 – Design and Construction Standards

SWB Requirements:

- a. *Design and construction standards and specifications for the installation of new sanitary sewer systems, pump stations and other appurtenances; and for the rehabilitation and repair of existing sanitary sewer systems; and*
- b. *Procedures and standards for inspecting and testing the installation of new sewers, pumps, and other appurtenances and for rehabilitation and repair projects.*

RWB Requirements:

Each wastewater collection system agency shall identify procedures and standards for inspecting and testing the installation of new sewers, pump stations, and other appurtenances; and for rehabilitation and repair projects.

5.1 Standards for Installation, Rehabilitation, and Repair

The City's Engineering Standards (Standards) are available to contractors on the City Standards portion of the City's website (<http://www.cityofpetaluma.net/pubworks/eng-city-standards.html>). Conformance to the Standards is required, and the criteria are considered a minimum. Those Standards pertinent to wastewater collection systems are included in the **Element 5 Appendix**.

5.2 Standards for Inspection and Testing of New Facilities

Sanitary sewer force mains require pressure testing for tightness after the completion of backfilling but prior to the request for final inspection. Sewer gravity lines are tested for water tightness, obstructions, and vertical deflection. Hydrostatic or air pressure methods, depending on the specific project, can be used to ensure test requirements are satisfied. Cases with geotechnical considerations require an internal television inspection to detect defects.

List of Documents in Element 5 Appendix (see separate tab):

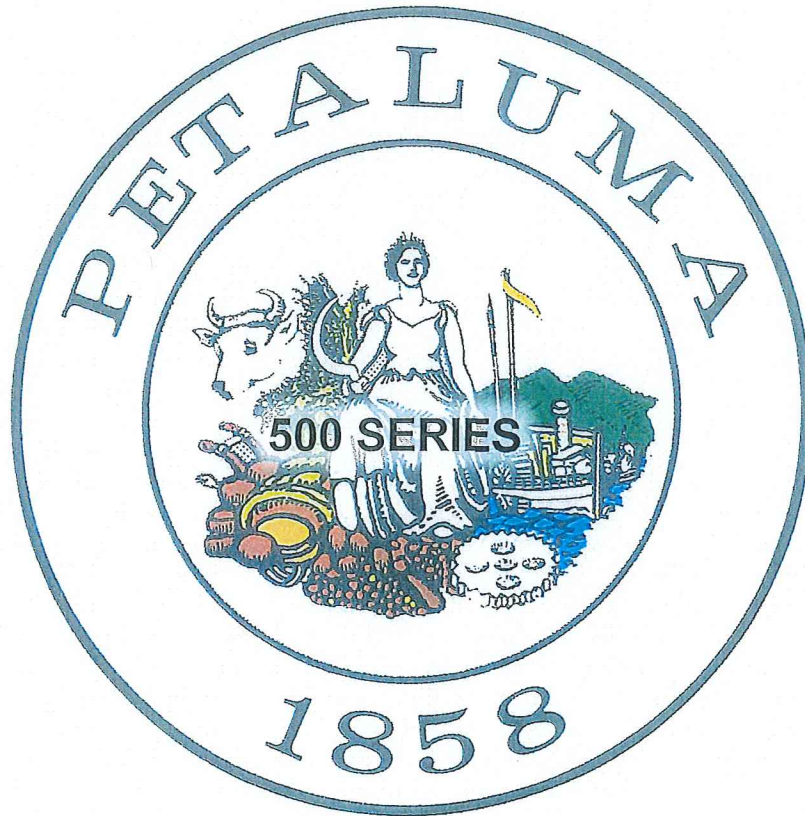
1. Collection System Engineering Standards – Updated January 2021

ELEMENT 5 APPENDIX

1. Collection System Engineering Standards


Sewer System

- Design and Construction Guidelines
- Construction Standards
- Approved Materials List



City of Petaluma - Sonoma County - California
Public Works & Utilities
202 North McDowell Boulevard
Petaluma, CA 94954

APPROVED BY:


Kent R. Carothers, P.E., Operations Manager


Date

Sewer System Construction Standards

Standards List

<u>Std. No.</u>	<u>Title</u>	<u>Date Approved</u>
500	Standard 48" Diameter precast Concentric Cone Concrete Manhole.....	January 2021
501	Standard 60" Diameter precast Eccentric Cone Concrete Manhole	January 2021
502	Standard Trench Details	January 2019
503	Inside Drop-in Sanitary Sewer Manhole.....	January 2021
504	Ductile Iron Fittings for Outside Drop Inlet Manhole.....	January 2021
505	Permanent Mainline Cleanout	January 2021
506	4" and 6" Service Lateral and Cleanout.....	January 2021
507	Abandoned Pipe Plug Detail.....	June 2016
508	Abandoned Manhole Detail	June 2016
509	Standard Precast Concrete Manhole reducer slab Sanitary Sewer.....	June 2016
510	Standard Manhole Frame and Cover	June 2016
511	Sewer Service Lateral.....	June 2016
512	Pipe-Pipe Crossing Details	January 2021
513	Pipe-Structure Crossing Detail	January 2021
514	Precast Grease Interceptor	June 2016
515	Sand and Grease Interceptor	January 2021
516	Sampling Manhole Exterior Use	January 2021
517	Standard Sampling Port Detail	June 2016
518	Sampling Box Building Interior	June 2016
519	Engineer's Approved List.....	June 2016
520	Deflection Mandrel for PVC Sewer Pipe.....	January 2021
	Detail Specification No. 21.....	October 1998

Sewer System Design and Construction Guidelines

A. PURPOSE

To provide guidelines for the design and construction of sanitary sewer utility projects and thereby reduce the time required for processing the plans. These guidelines do not include, but may reference, additional conditions, which may be promulgated by all other pertinent ordinances, codes, and official policy set forth by other departments of the City of Petaluma or other government agencies. These guidelines are intended to impose minimum acceptable design criteria. More stringent requirements may be imposed at the discretion of Public Works & Utilities (PW&U) based on specific project conditions. It is the responsibility of the design engineer to initiate written requests for approval of any design concepts contrary to these criteria, to verify additional requirements imposed, perform any necessary calculations or studies, and resolve specific design problems with the appropriate department or division.

B. SANITARY SEWER SYSTEM

1. Sanitary Sewer Main Materials

- a. Sanitary Sewer mains shall be Ductile Iron Pipe (DIP) or Polyvinyl Chloride (PVC) pipe.
- b. Ductile Iron Pipe (DIP) shall be class 50 and shall conform with the City of Petaluma Water System Design Guidelines except that six-inch (6") and eight-inch (8") DIP for sanitary sewers--in residential areas only--shall have an inside coating of type V cement mortar, a minimum of one-sixteenth inch (1/16") thick and a petroleum asphaltic material a minimum of three (3) mils thick over the cement mortar both conforming to the requirements of ANSI/AWWA C104/A21.4-80. Ten (10") inch and larger DIP and fittings used for sanitary sewer in any area and **all** other DIP and fittings regardless of size used in industrial areas shall have an inside coating of minimum 40-mil thick polyurethane.
- c. PVC gravity sewer pipe shall conform with ASTM D3034 SDR 26, domestically produced rigid polyvinyl chloride (PVC) compound, Type I Grade I, with a Cell Classification of 12454 or 13343 in accordance with, and certified by the National Sanitation Foundation (NSF) as defined in ASTM D1784 for pipe diameters from 4" through 15" and ASTM F 679 for pipe diameters from 18" through 48" with integral bell gasketed joints Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Gasketed Sewer Fittings, except that service bends shall be long radius sweeps. Bends shown on Table 3 "Laying Lengths of Long Bend Fittings (min)" of ASTM D3034 shall not be used for PVC service sweeps. PVC sweeps shall have a minimum radius of 36 inches. PVC shall have a uniform minimum "Pipe Stiffness" ($F/\Delta Y=46$ PSI) as defined in ASTM 2412. PVC pipe dimensions shall conform to ASTM D3034 Table 1.
- d. PVC gasketed sewer pipe and fittings shall have bell and spigot type joints with elastomeric sealing rings all in conformance with ASTM D3212 Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals. Rubber sealing gaskets shall meet the requirements of ASTM designation F 1336.

- e. PVC SDR 26 gasketed sewer pipe and fittings shall be “ring-tyte” as manufactured by J-M Pipe, “Fluid-Tite” as manufactured by Certainteed or approved equal.
- f. Minimum wall thickness for SDR 26 PVC shall be as follows:

Nominal Diameter	4"	6"	8"	10"	12"
Minimum Wall Thickness	0.173"	0.255"	0.332"	0.413"	0.490"

- g. Maximum allowable deflection for PVC sewer pipe shall be five (5%) percent of the average inside pipe diameter. Deflection shall be measured after trench backfill is in place and compacted and after aggregate subbase (if specified) but prior to installation of aggregate base and/or asphalt concrete.
- h. Installed PVC sewer pipe deflection shall be checked by means of the Mandrel Test in accordance with Section 6c of these Guidelines except that maximum allowable deflection shall be five (5%) percent in lieu of four (4%) percent and the Mandrel shall be ninety-five (95%) percent of the specified average inside pipe diameter in lieu of ninety-six (96%) percent.
- i. Select Backfill Material shall be Class 2 Aggregate Base, 3/4" maximum gradation. Select backfill material shall have a size and a gradation falling within the following limits:

<u>Sieve Size</u>	<u>% Passing Sieve</u>
1"	100
3/4"	90 to 100
No. 4	35 to 60
No. 30	10 to 30
No. 200	2 to 9

The material shall compact to a relative compaction of ninety (90%) percent. The relative compaction is that determined by Test Method No. California 216. The material shall have a minimum sand equivalent value of twenty-five (25) as determined by the test method currently in use by the California Division of Highways.

The in-place density and moisture of soils and aggregates may be determined using nuclear methods and the area concept as per Test Method No. California 231 with the following conditions. The test maximum density shall be determined as specified in Part II of test Method No. California 216. A minimum of one in-place density test using the sand volume method as prescribed in Part I of Test Method No California 216 shall be taken to standardize the nuclear gauge for each type of soil or aggregate. After correlation is assured and the equipment standardized, then the nuclear gauge may be used as directed by the Engineer.

- j. Optional backfill material may be Controlled Density Fill (CDF) Mix No. 1500 (95% relative compaction). CDF shall be a mixture of Portland cement, sand, and 1" maximum coarse aggregate, air entraining agent and water, batched by a ready-mixed concrete plant and delivered to the job site by means of transit mixing trucks.

CDF may also contain Class F Pozzolan (Fly Ash). CDF shall be free of asphaltic material.

Cement shall meet the standards as set forth in ASTM C-150, type II Cement. Fly ash shall meet the standards as set forth in ASTM C-618, for Class F Pozzolans. The fly ash shall not inhibit entrainment of air. Sand shall meet the standards as set forth in ASTM C33.

Mix proportions shall be determined by the producer of the control density fill to produce a flowable fill mixture which will not segregate. Each yard shall contain not less than 50 pounds of Portland cement and not less than a total of 100 pounds of cementitious material. The contractor shall supply a mix design two weeks prior to any use of control density fill. CDF shall have a compressive strength of 75-200 PSI at 28 days and a minimum slump of 6".

The consistency of CDF shall be such that all trench voids are filled with minimum rodding or vibrating, but not so wet as to cause excessive shrinkage.

2. Sanitary Sewer Manhole Materials

- a. Precast manhole sections shall conform with the plans and with ASTM C478-68 as amended to date. Manhole cones shall be the concentric type unless otherwise shown on the plans or required by the Technical Specifications. Manholes shall be constructed without steps. A minimum of nine inches (9") and a maximum of twenty-four inches (24") total depth of three-inch (3") and six-inch (6") grade rings, as shown on the standard drawings, shall be required on all manholes unless otherwise required by the Technical Specifications or contract plans.
- b. Casting for manhole ring, cover, and other purposes, shall conform accurately to the form and dimensions shown on the detailed drawings. Castings must have workmanlike finish, free from blow and sand holes or defects of any kind and shall be made from a superior quality of tough even-grained gray iron and shall possess a tensile strength of not less than twenty thousand (20,000) pounds per square inch.
- c. Before leaving the foundry, they shall be thoroughly cleaned and coated by dipping in asphalt applied at a temperature of three hundred degrees Fahrenheit (300°F) in such a manner as to provide a firm, durable, tenacious coating.
- d. Portland Cement shall conform to ASTM designation C150-67, Type II.
- e. Portland Cement Concrete for manhole bases shall conform to the requirements of Section 90, "Concrete," of the Standard Specifications current revision and as herein specified.
- f. The concrete shall be class "A" containing six (6) sacks of Portland Cement per cubic yard of concrete. The grading of the combined aggregate shall conform with the requirements for one and one-half (1 ½") inch maximum. The consistency of the fresh concrete shall be such that the slump does not exceed four inches (4") as determined by Test Method No, California 519A or 520. The test method used shall be determined by the Engineer.

- g. All mortar used in the construction of manholes shall consist of one (1) part Portland Cement and two (2) parts sand, and shall conform to Section 51-1.02F, "Mortar," of the Standard Specifications and as herein specified.

3. Sanitary Sewer Main Trench Excavation

- a. Alignment shall be in accordance with the provisions of the City Standard.
- b. Any existing pavement over the trench shall be cut, removed, and hauled away from the job. Pavement shall be cut as specified in Section 2103.9-C of these specifications. All sewer mains shall be laid in open trench or tunnels and open trench as indicated on the plans or as directed by the Engineer. Trenches having a depth greater than eight (8') feet shall be limited in width at the top of the pipe to the following:

<u>Pipe</u>	<u>Trench Width</u>
6"	24"
8"	27"
10"	30"
12"	33"
15"	36"

- c. Whenever the maximum allowable trench width is exceeded for any reason, the Contractor shall, at his expense, embed or cradle the pipe in concrete in a manner satisfactory to the Engineer. In no case shall the free working space on each side of the pipe be less than six (6") inches.
- d. The trench shall be excavated a minimum of four (4 ") inches below the grade of the bottom of the pipe and sufficient "Select Backfill Material" shall be placed in the trench and tamped to bring the trench bottom up to the grade of the bottom of the pipe. The relative compaction of the tamped material shall not be less than ninety (90%) percent as determined by Test Method No. California 216. It is the intention of these requirements to provide firm, uniform bearing for the pipe.
- e. At street crossings or where existing driveways occur on a street, the Contractor shall make provisions for trench crossings at these points, either by means of backfill or temporary bridges, as the Engineer may direct. Free access must be provided to all fire hydrants, water gate valves and private drives. Means shall be provided whereby all storm and wastewater can flow uninterrupted in the gutters or drainage channels.
- f. All trench excavation shall be properly braced and supported with shoring equipment, as set forth in the rules, orders and regulations of the State of California Division of Occupational Safety and Health (Cal/OSHA). Failure to comply with any of these rules, orders and regulations shall be sufficient cause for the Engineer to immediately suspend all work. Compensation for losses incurred by the Contractor by such an emergency suspension shall not be allowed. The Contractor shall backfill the ditch in a manner such that the removal of the shoring will not disturb the initial backfill.

- g. The Contractor shall, at all times, keep the streets sufficiently watered and swept of all loose material produced by the excavating operations in order that traffic and construction does not raise an objectionable amount of dust. When directed by the Engineer, the Contractor shall apply a suitable dust palliative to control dust.
- h. The Contractor shall furnish, install, and operate all necessary equipment to keep trenches reasonably free from water. All water removed from trenches or flushed from pipes shall be disposed of in a manner that will cause no injury to public or private property or cause no nuisance or menace to the public. Under no circumstances will the laying of pipe or the placing of concrete in water be permitted.

4. Sanitary Sewer Pipe Laying

- a. No pipe shall be laid until PW&U inspects and approves the condition of the bottom of the trench.
- b. Pipe laying shall proceed upgrade with the spigot ends of bell and spigot pipe pointing in the direction of flow. Each piece shall be laid true to line and grade and in such a manner as to form a close concentric joint with the adjoining pipe and to prevent sudden offsets in the flow line. As the work progresses, the interior of the sewer shall be cleaned of all dirt and debris of every description. Pipe shall not be laid when the condition of the trench or the weather is unsuitable. At times when work is not in progress, open ends of pipe and fittings shall be closed.
- c. Unless otherwise indicated on the drawings or directed by PW&U, pipe shall be placed on prepared subgrade of imported material at least four inches (4") deep below the barrel of the pipe. The imported material shall be Class 2 Aggregate Base, as specified in Section 1, "Sanitary Sewer Main Materials," of these specifications, and thoroughly compacted to obtain a final density of at least ninety percent (90%) of maximum at optimum moisture as determined by Test Method No. California 216.
- d. When additional gravel or crushed rock is required to stabilize a soft, wet, or spongy foundation caused by the operations of the Contractor in order to stabilize a trench bottom, such gravel or crushed rock shall be furnished at the Contractor's expense.

PW&U shall be the sole judge of the suitability of the trench bottom and as to the amount of gravel required to stabilize a soft foundation. The contractor shall remove any soft material and replace it with gravel or crushed rock when ordered to do so by the Engineer.

Gravel or crushed rock shall have a size and gradation falling within the following limits:

<u>Sieve Size</u>	<u>% Passing Sieve</u>
1 1/2"	100
1"	95-100
1/2"	0-30
No. 4	0-4

5. Excavation, Backfill, and Resurfacing

- a. All excavation, backfill, and resurfacing required for installation of sewer system facilities shall be as shown on City Standard Trench Details.
- b. Excess material from excavation shall become the property of the contractor and shall be disposed of to the satisfaction of PW&U and in accordance with all applicable waste-disposal regulations.
- c. The contractor shall not excavate within six feet (6') of any City Valve, tie-down, thrust block, or fire hydrant without prior approval of PW&U.

6. Sanitary Sewer Testing

Testing of all portions of the sewer including manholes is required, and it is the Contractor's responsibility to coordinate all testing and inspections with the Engineer.

The Contractor, at their option, may conduct testing at any time during construction, however, final inspection and testing for acceptance shall take place only after all sewer facilities have been installed and all trenches backfilled and compacted, including roadway base rock as specified elsewhere in these specifications.

Manholes, after all inlets and outlets have been plugged, shall be filled with water to the rim of the frame casting and shall lose no more than 2 inches over a period of 30 minutes.

Even though the test for leakage is within the prescribed limits, the Contractor shall repair any obvious leaks.

In lieu of the water test, testing of sewer manholes may be done by vacuum testing as specified herein. If the vacuum testing method is used, all manholes shall be tested for leakage in accordance with ASTM C 1244-93 as modified herein.

Vacuum testing shall not take place until all permanent paving is complete.

Installation and operation of vacuum equipment and indicating devices must be in accordance with manufacturer's recommendations and performance specifications, which must be provided by the manufacturer and approved by the Engineer. The equipment must be capable of testing the entire manhole, including the cast iron frame and grade adjustment rings.

All new or rehabilitated sanitary sewer manholes shall be tested unless otherwise directed by the Engineer. If the manhole fails the test, the manhole shall be repaired and retested at the Contractor's expense. If manhole joint sealants are compromised during the vacuum test, the manhole must be disassembled, and the joint sealants

replaced. If there is reason to believe that the manhole has been disturbed after the initial vacuum test, additional tests may be requested by the Engineer and performed at the Contractor's expense.

The Contractor may pre-test manholes at any time during construction. Any pre-test results are solely for the Contractor's use and shall not be accepted as the final test.

Testing shall be done in the following manner:

1. All lift holes and joints shall be grouted and the entire manhole, including grade rings, sealed prior to testing.
2. All pipes entering the manhole shall be temporarily plugged, taking care to securely brace the pipes and plugs to prevent them from being drawn into the manhole.
3. The test head shall be placed in accordance with the manufacturer's recommendations. The test unit shall be braced against the manhole frame and not the grade ring(s) or taper.
4. The vacuum gauge and test equipment used for this test shall be supplied by the Contractor and shall be operated per manufacturer's specifications by qualified personnel. Accuracy and calibration of the gauge shall be certified by a reliable testing firm at six-month intervals, or when requested by the Engineer.

A vacuum of 10 inches (4.91 PSI) of mercury (Hg) shall be drawn on the manhole, the valve on the vacuum line of the test head closed, and the vacuum pump shut off. The time it takes the indicator gauge to drop 10 inches Hg (4.91 PSI) to 9 inches Hg (4.4 PSI) shall be measured. The manhole will pass the vacuum test if the time is greater than shown in the following table:

Minimum Test Time Based on Manhole Diameter (seconds)

<u>Manhole Depth in Feet</u>	<u>Manhole Diameter in Inches</u>			Time in Seconds
	<u>48</u>	<u>60</u>	<u>72</u>	
0-4	10	13	16	
4-8	20	26	33	
8-12	30	39	49	
12-16	40	52	67	
16-20	50	65	81	
20-24	59	78	97	
24-30	74	98	121	

After the vacuum test, manholes shall be visually inspected for leaks and defects and repaired as required by the Engineer.

For either exfiltration or infiltration test on sewer lines, the maximum leakage shall not exceed 250 gallons per inch of pipe diameter per mile per 24 hours as measured over a period of 30 minutes minimum. Should the leakage exceed the maximum allowable rate, the contractor shall repair, overhaul, or rebuild the defective portion of

the sewer line to the satisfaction of the Engineer at no additional cost to the City. After repairs have been completed by the Contractor, the line shall be retested as specified above, all at no cost to the City.

If the exfiltration test prescribed above is impractical due to wet trench conditions, these portions of the sewer line where such conditions are encountered will be tested for infiltration. The Engineer shall determine whether the exfiltration or infiltration test will be used.

Low pressure air testing may be used on sewer lines in lieu of water testing at the option of the Contractor. Water testing may still be required by the Engineer for certain installations.

The following procedure shall be used for low pressure air testing:

1. Clean pipe to be tested by propelling a snug fitting inflated rubber ball through the pipe with water. Remove any debris.
2. Plug all pipe outlets with suitable test plugs. Brace each plug securely.
3. If the pipe to be tested is submerged in ground water, insert a pipe probe, by boring or jetting, into the backfill material adjacent to the center of the pipe, and determine the pressure in the probe when air passes slowly through it. This is the back pressure due to ground water submergence over the end of the probe. All gauge pressures in the test should be increased by this amount.
4. Add air slowly to the portion of the pipe installation under test until the internal pressure is raised to 5.0 psig (pounds per square inch gauge)
5. Check exposed pipe and plugs for abnormal leakage by coating with a soap solution. If any leakage is observed, bleed off air and make necessary repairs.
6. After an internal pressure of 5.0 psig is obtained, allow at least two minutes for air temperature to stabilize, adding only the amount of air required to maintain pressure.
7. After the two-minute period, disconnect the air supply and start stopwatch. The pressure of 5.0 psig shall be maintained for 5 minutes.
8. As an alternate, the contractor may request the air testing procedure as presented in Section 306-1.4.4 of the 2012 edition of the "Greenbook" Standard Specifications.

After pipe installation and placement and compaction of backfill, but prior to placement of pavement, all PVC pipe shall be cleaned and then mandrel tested for obstructions, such as, but not limited to, deflections, joint offsets and lateral pipe intrusions. A rigid mandrel, conforming to Standard 520 shall be pulled through the pipe by hand. The minimum length of the circular portion of the mandrel shall be equal to the nominal diameter of the pipe. All obstructions encountered by the mandrel shall be corrected by the Contractor. Obstructions due to deflection shall be corrected by replacement of the over-deflected pipe. Mechanical re-rounding is not permitted.

If a section of pipe fails to meet the mandrel test and is reinstalled and fails the second time, said section(s) of pipe shall be replaced with an approved rigid pipe material.

The contractor shall furnish a mandrel as shown on the City Standards.

The Contractor shall retest PVC pipe using a mandrel conforming to Standard 520 eleven (11) months after recordation of Notice of Completion of a Public Works Sewer Contract or after the acceptance by the City Council of a subdivision. Any pipe which fails to pass the mandrel test shall be replaced at the expense of the Contractor. The City reserves the right to determine the longitudinal limits of any pipe that is required to be replaced. Pipe replacements shall be guaranteed by the project maintenance bond.

7. Flushing and Cleaning Sewer Lines

- a. Two separate hydro flushings are required. The first hydro flushing occurs prior to video inspection and at finished rock grade of street section. The second is to be performed at the conclusion of final paving and iron raising. Debris flushed from the system must be captured and removed from the lowest manhole prior to entering an active sewer system maintained by the City. Care shall be exercised in order that all debris can be removed from each manhole.
- b. All new sanitary sewer mains shall be television (TV) inspected. Pipe joint separations, low or high spots, cracked or chipped pipe, deflection, improper lateral connections, infiltration, and all other pipe material and/or installation defects identified shall be corrected by the Contractor.

The TV inspection shall be conducted after all new main and lateral work, including backfill and pipe testing, is completed and all street structural section aggregate subbase is in place and compacted but prior to placement of aggregate base and A.C. paving.

The Contractor shall hire an independent television inspection service to perform a closed-circuit television inspection of all newly constructed sewers. A video of the television inspection shall be produced and delivered to the Engineer in digital (.wmv) format, together with a typed log of the inspection.

The following conditions shall exist prior to the television inspection.

- i. All sewer lines shall be installed, backfilled, and compacted.
- ii. All structures shall be in place, all channeling complete and all pipelines accessible from structures.
- iii. All other underground facilities, utility piping and conduit within two feet of the sewer main, shall be installed.
- iv. All compaction required shall be completed.
- v. Pipelines to be tested shall be flushed and mandrel tested.
- vi. The final air or water test shall have been completed.
- vii. Immediately before the television inspection, hydro flush all lines.

When the above work has been completed, the Contractor shall notify the Engineer 48 hours in advance of the date for television inspection. During this inspection, the Contractor or his authorized representative shall be present to observe the video pictures as provided by the television camera.

The following video observations shall be considered defects in the construction of the sewer pipelines and will require corrections prior to acceptance.

- i. Off grade – 1" or more deviation from grade
- ii. Joint separations – more than 3/4"
- iii. Offset joints
- iv. Chips in pipe ends – none more than 1/4" deep
- v. Cracked or damaged pipe or evidence of the presence of any external objects bearing upon the pipe (rocks, roots, etc.)
- vi. Infiltration
- vii. Debris or other foreign objects
- viii. Other obvious deficiencies when compared to Approved Plans and Specifications, and these Standards and Standard Drawings

The Contractor shall be notified in writing of any deficiencies revealed by the television inspection that will require repair, following which the Contractor shall excavate and make the necessary repairs and request a television re-inspection. Television re-inspection shall be at the Contractor's expense.

The City Engineer shall be given one-week written notice by the Contractor for TV inspection.

8. Sewer Laterals and Clean Outs

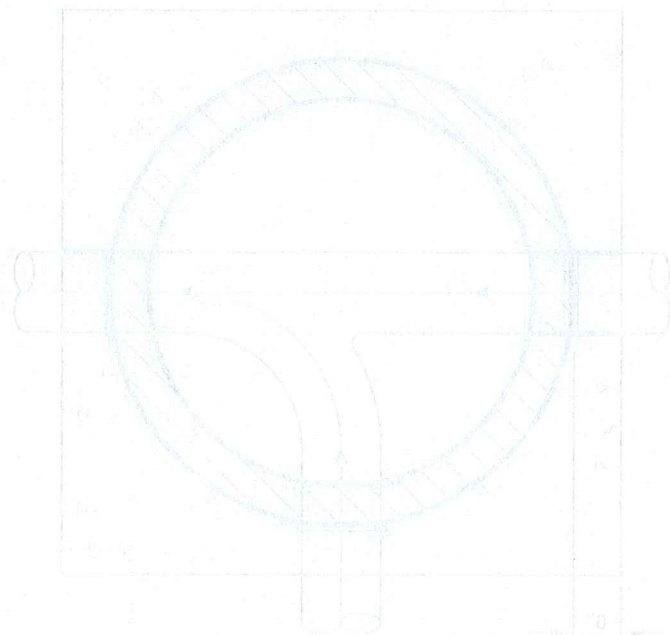
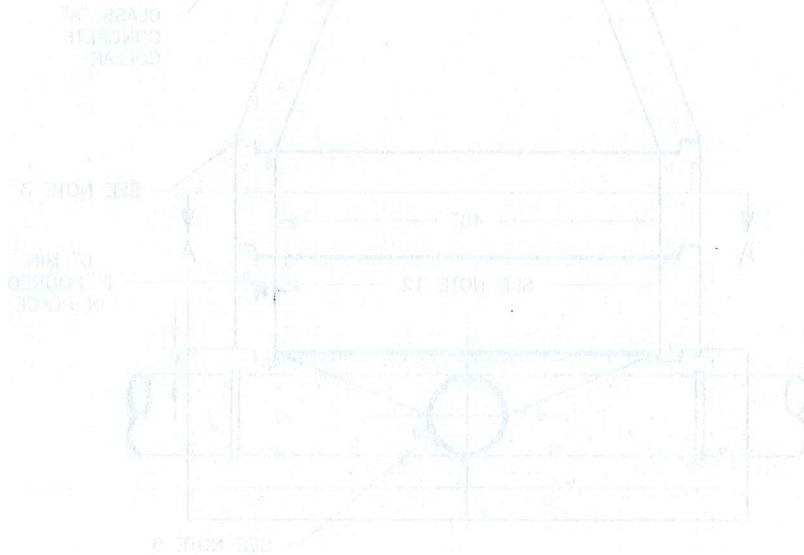
- a. Sewer service laterals shall be constructed at the locations and in accordance with the details shown on the plans and in accordance with these specifications. Four-inch (4") diameter sewer service laterals for single family residences and six-inch (6") sewer service laterals for multiple and commercial dwellings shall be PVC or Ductile Iron Pipe. All new sanitary sewer laterals shall connect to new sanitary sewer mains by means of 1/8 (22 1/2°), or forty-five-degree (45°) bends and wyes, or long radius sweeps, as approved by City engineer.
- b. PVC sewer laterals shall conform with the same specifications as the main PVC pipe as specified above. All PVC service bends shall be long radius sweeps (R-36" min).
- c. Ductile iron pipe shall conform to the same specifications as the main specified above.
- d. Sewer clean outs shall be constructed at the locations and in conformance to the details shown on the plan.

C. TRAFFIC CONTROL

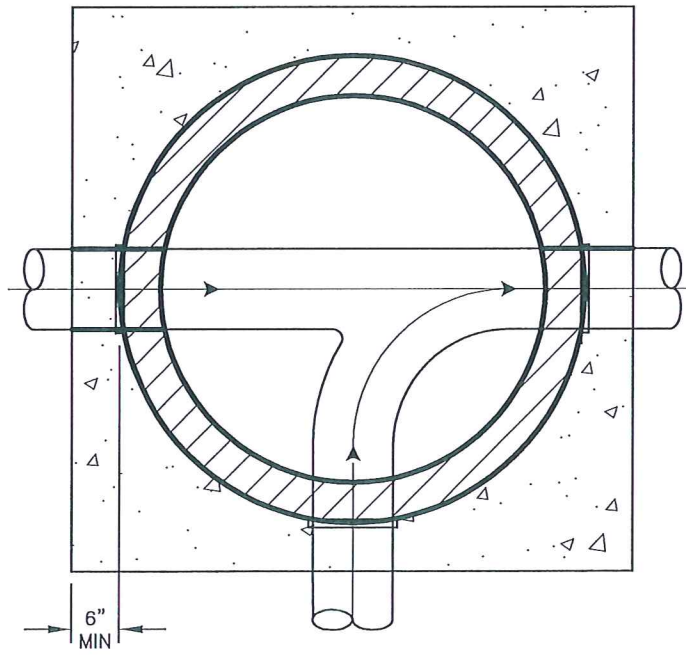
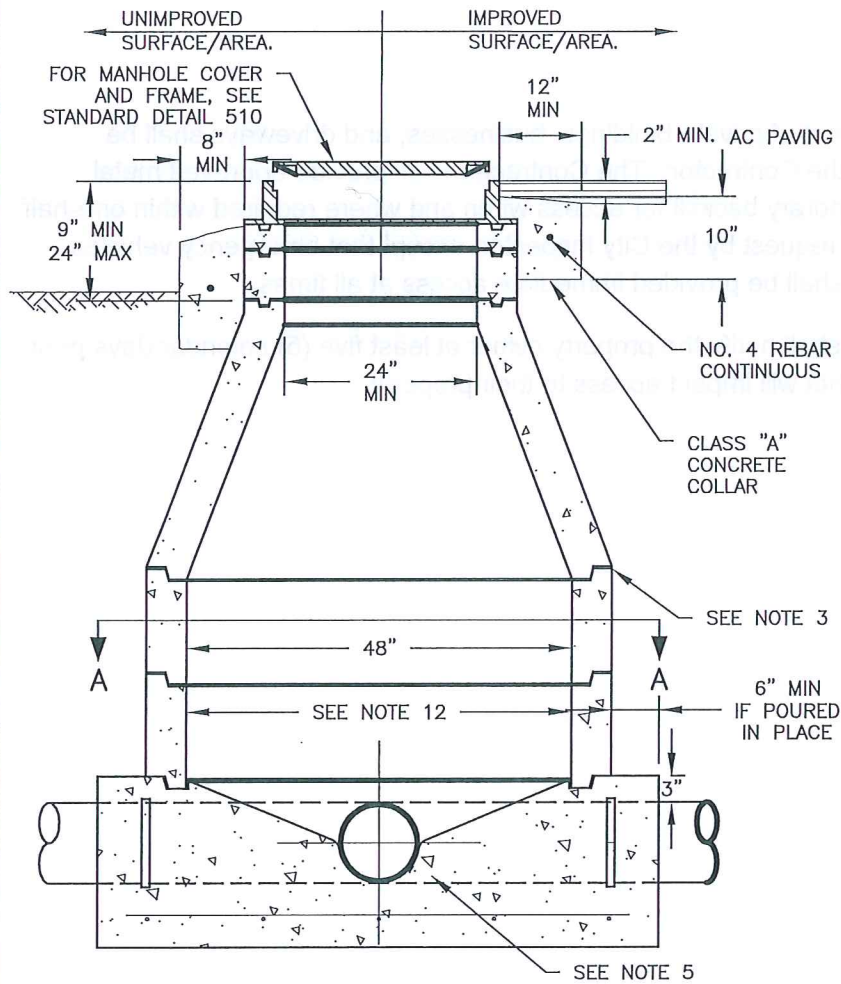
- a. Traffic control shall conform with Section 12 of the State of California 2018 Standard Specifications, shall meet the current edition of the Manual of Uniform Traffic Control Devices (MUTCD CA), and shall be approved by the City of Petaluma.

All costs including flagging shall be the responsibility of the Contractor. The Contractor shall provide safe passage for vehicular, bicycle and pedestrian traffic through the work at all times.

- b. Access to public and private buildings, businesses, and driveways shall be maintained by the Contractor. The Contractor shall provide approved metal "bridge" or temporary backfill for access when and where required within one-half (1/2) hour after request by the City Inspector, except that emergency vehicles and personnel shall be provided immediate access at all times.
- c. The contractor shall notify the property owner at least five (5) calendar days prior to any activity that will impact access to their property.



<p>STANDARD LETTER AND FOOTNOTES FOR THE CITY OF MEMPHIS</p>	<p>CITY OF MEMPHIS PUBLIC WORKS DEPARTMENT STANDARD LETTER AND FOOTNOTES FOR THE CITY OF MEMPHIS</p>	<p>CITY OF MEMPHIS PUBLIC WORKS DEPARTMENT STANDARD LETTER AND FOOTNOTES FOR THE CITY OF MEMPHIS</p>	
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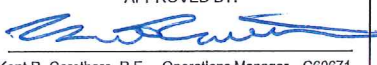
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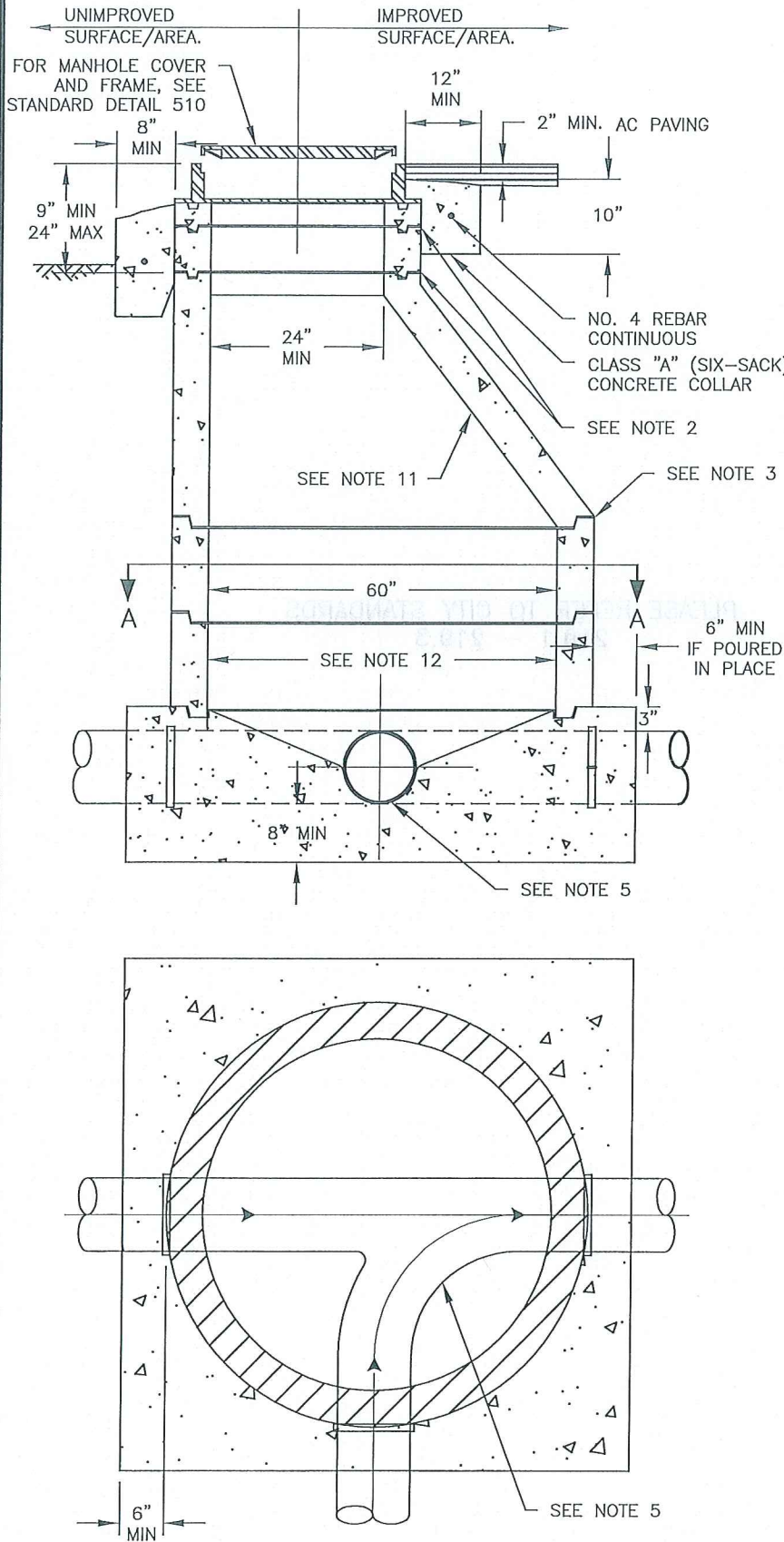
1. WHEN MANHOLES ARE INSTALLED IN UNIMPROVED AREAS, THE TOP OF THE COVER SHALL BE A MIN. OF (1) FOOT ABOVE ADJACENT FINISHED GRADE.
2. MINIMUM OF ONE 3" AND ONE 6" GRADE ADJUSTMENT RINGS. MAXIMUM HEIGHT OF GRADE ADJUSTMENT RINGS - 24". ALTERNATIVELY, CONTRACTOR MAY CAST GRADE RINGS IN PLACE, SET ALL BARREL SECTIONS AND TAPER SECTIONS IN APPROVED GASKET/SEALER. "RAM-NEK" OR APPROVED EQUAL. TYPICAL JOINT USES ONE (1) "RAM-NEK" SEAL OR TWO SEALS IN HIGH WATER TABLE AREAS.
3. CONE SECTION (TAPER) MUST BE CONCENTRIC FOR 48" MANHOLE UNLESS OTHERWISE SPECIFIED AND APPROVED BY THE DIRECTOR.
4. CONSTRUCT ALL FLOW CHANNELS OF PIPE WHERE POSSIBLE AFTER LOW RING SECTIONS IS SET, BREAK OUT OF TOP HALF OF PIPE FLUSH WITH INSIDE FACE OF MANHOLE WALL AND CONSTRUCT SHELF AND U-SHAPED CHANNEL. MAKE ELEVATION CHANGES GRADUALLY AND DIRECTIONAL CHANGES WITH SMOOTHED CURVES.
5. POURED-IN-PLACE BASE SHALL BE POURED FULL THICKNESS TO UNDISTURBED SIDES OF EXCAVATION OR SHALL BE FORMED. PRECAST BASES MAY BE USED ONLY WITH DIRECT APPROVAL OF THE DIRECTOR, AND SHALL BE PLACED ON 12" THICK 3/4" DRAIN ROCK SUB-BASE INSTALLED AGAINST UNDISTURBED EARTH.
6. CLASS "A" CONCRETE COLLAR SHALL BE 2" BELOW FINISHED GRADE.
7. THE GRADE RING, CONCENTRIC CONE, VERTICAL WALL SECTION, AND BASE SHALL HAVE MINIMUM WALL THICKNESS OF 5" AND SHALL BE PRECAST CONCRETE CONFORMING TO ASTM SPECIFICATION C478. THE BASE SHALL BE CAST IN PLACE IN LIEU OF PRECAST.
8. 48" I.D. MANHOLE TO BE USED FOR SEWER MAINS LESS THAN 18" ON CENTER AND LESS THAN 8- FEET DEEP FROM FINISHED GRADE.
9. MANHOLE REDUCER SLAB MAY BE USED WHERE PIPE IS TOO SHALLOW FOR TAPER SECTION.
10. WHEN DIMENSION FROM FINISHED GRADE TO SEWER FLOW LINE IS GREATER THAN 8'-0", THE BASE SHALL HAVE NO. 4 REINFORCING STEEL BARS AT 12" O.C. BOTH WAYS.
11. APPLY TWO (2) COATS OF THORO-SEAL OR XYPEX COATING OR APPROVED EQUAL.
12. GROUT EXTERIOR JOINTS OF BARREL SECTIONS.
13. SEE CITY OF PETALUMA SEWER SYSTEM DESIGN AND CONSTRUCTION GUIDELINES, PARAGRAPH B.2.d



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STANDARD DETAILS
 48"Ø PRECAST
 CONCENTRIC CONE
 CONCRETE MANHOLE

DATE: DECEMBER 2020	SCALE: N.T.S.
APPROVED BY: 	
Kent R. Carothers, P.E. Operations Manager C60671	
DRAWN BY: TM	NO. 500



NOTES:

1. WHEN MANHOLES ARE INSTALLED IN UNIMPROVED AREAS, THE TOP OF THE COVER SHALL BE A MIN. OF 1-FOOT ABOVE ADJACENT FINISHED GRADE.
2. MINIMUM OF ONE 3" AND ONE 6" GRADE ADJUSTMENT RINGS. MAXIMUM HEIGHT OF GRADE ADJUSTMENT RINGS - 24". ALTERNATIVELY, CONTRACTOR MAY CAST GRADE RINGS IN PLACE, SET ALL BARREL SECTIONS AND TAPER SECTIONS IN APPROVED GASKET/SEALER. "RAM-NEK" OR APPROVED EQUAL. TYPICAL JOINT USES ONE (1) "RAM-NEK" SEAL OR TWO (2) SEALS IN HIGH WATER TABLE AREAS.
3. CONE SECTION (TAPER) MUST BE ECCENTRIC FOR 60" MANHOLE UNLESS OTHERWISE SPECIFIED AND APPROVED BY THE DIRECTOR.
4. CONSTRUCT ALL FLOW CHANNELS OF PIPE WHERE POSSIBLE AFTER LOW RING SECTIONS IS SET, BREAK OUT OF TOP HALF OF PIPE FLUSH WITH INSIDE FACE OF MANHOLE WALL AND CONSTRUCT SHELF AND U-SHAPED CHANNEL. MAKE ELEVATION CHANGES GRADUALLY AND DIRECTIONAL CHANGES WITH SMOOTHED CURVES.
5. POURED-IN-PLACE BASE SHALL BE POURED FULL THICKNESS TO UNDISTURBED SIDES OF EXCAVATION OR SHALL BE FORMED. PRECAST BASES MAY BE USED ONLY WITH DIRECT APPROVAL OF THE DIRECTOR OF PUBLIC WORKS AND UTILITIES, AND SHALL BE PLACED ON 12" THICK 3/4" DRAIN ROCK SUB-BASE INSTALLED AGAINST UNDISTURBED EARTH.
6. CLASS "A" CONCRETE COLLAR SHALL BE 2" BELOW FINISHED GRADE.
7. THE GRADE RING, CONCENTRIC CONE, VERTICAL WALL SECTION, AND BASE SHALL HAVE MINIMUM WALL THICKNESS OF 5" AND SHALL BE PRECAST CONCRETE CONFORMING TO ASTM SPECIFICATION C478. THE BASE SHALL BE CAST IN PLACE IN LIEU OF PRECAST.
8. 48" I.D. MANHOLE TO BE USED FOR SEWER MAINS LESS THAN 18" ON CENTER AND LESS THAN 8- FEET DEEP FROM FINISHED GRADE.
9. MANHOLE REDUCER SLAB MAY BE USED WHERE PIPE IS TOO SHALLOW FOR TAPER SECTION.
10. MANHOLE TAPER SHALL BE IN DIRECTION OF FLOW.
11. WHEN DIMENSION FROM FINISHED GRADE TO THE SEWER FLOW LINE IS GREATER THAN 8'-0", THE BASE SHALL HAVE NO. 4 REINFORCING STEEL BARS @ 12" ON CENTER BOTH WAYS
12. APPLY TWO (2) COATS OF THORO-SEAL OR XYPEX COATING OR APPROVED EQUAL
13. SEE CITY OF PETALUMA SEWER SYSTEM DESIGN AND CONSTRUCTION GUIDELINES, PARAGRAPH B.2.a



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STANDARD DETAILS
60"Ø PRECAST
ECCENTRIC CONE
CONCRETE MANHOLE

DATE: DECEMBER 2020 SCALE: N.T.S.

APPROVED BY:

Kent R. Carothers, P.E. Operations Manager C60671

DRAWN BY: TM

NO. 501

PLEASE REFER TO CITY STANDARDS
219.1 - 219.3



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STANDARD TRENCH
DETAILS

DATE: JAN 3, 2019

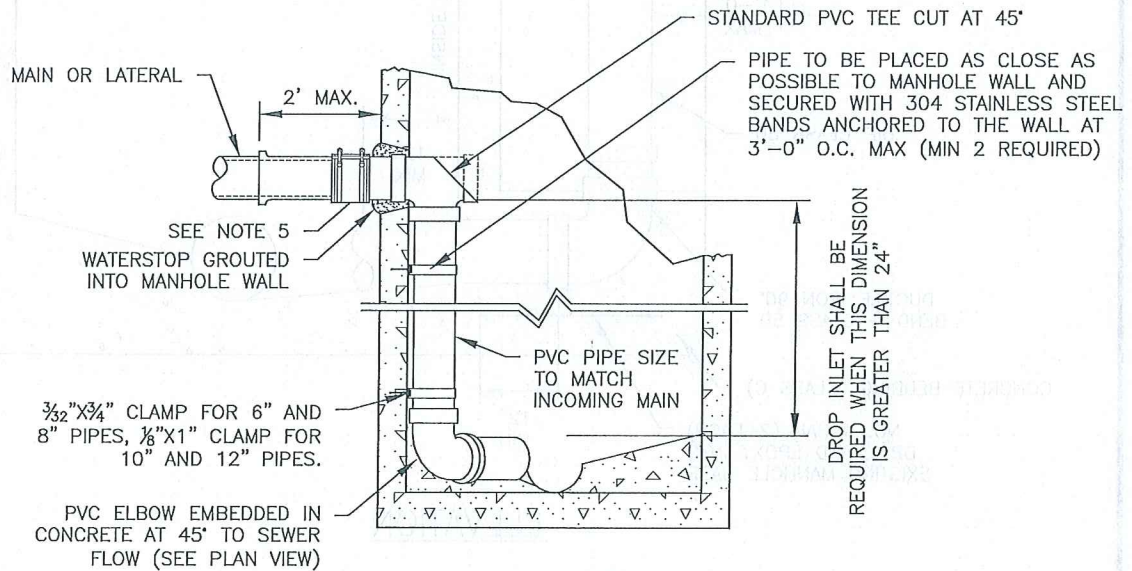
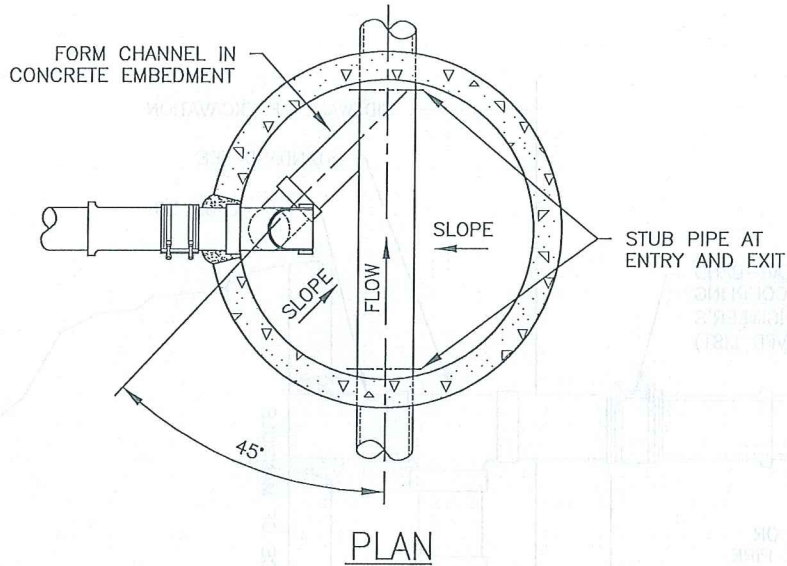
SCALE: N.T.S..

APPROVED BY:

Kent R. Carothers, P.E. Operations Manager C60671

DRAWN BY: TKM

NO. 502



NOTES:

1. INSTALL WATERSTOP IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS AS SHOWN.
2. NEW MANHOLES CONSTRUCTED USING THIS STANDARD SHALL BE 60 INCHES IN DIAMETER, AND INSTALLED IN CONFORMANCE WITH STANDARD 501.
3. SEE STANDARD 504 FOR STANDARD OUTSIDE DROP INSTALLATION.
4. ALL DROP PIPING AND FITTINGS TO BE PVC (SDR 26) REMOVE BELL.
5. FLEXIBLE RUBBER COUPLING WITH STAINLESS STEEL SHEAR BAND REQUIRED IF MAIN OR LATERAL IS NOT PVC MATERIAL.
6. INSTALL WATERSTOP IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS, AS SHOWN.



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STANDARD DETAILS
INSIDE DROP-IN
SANITARY SEWER
MANHOLE

DATE: DECEMBER 2020

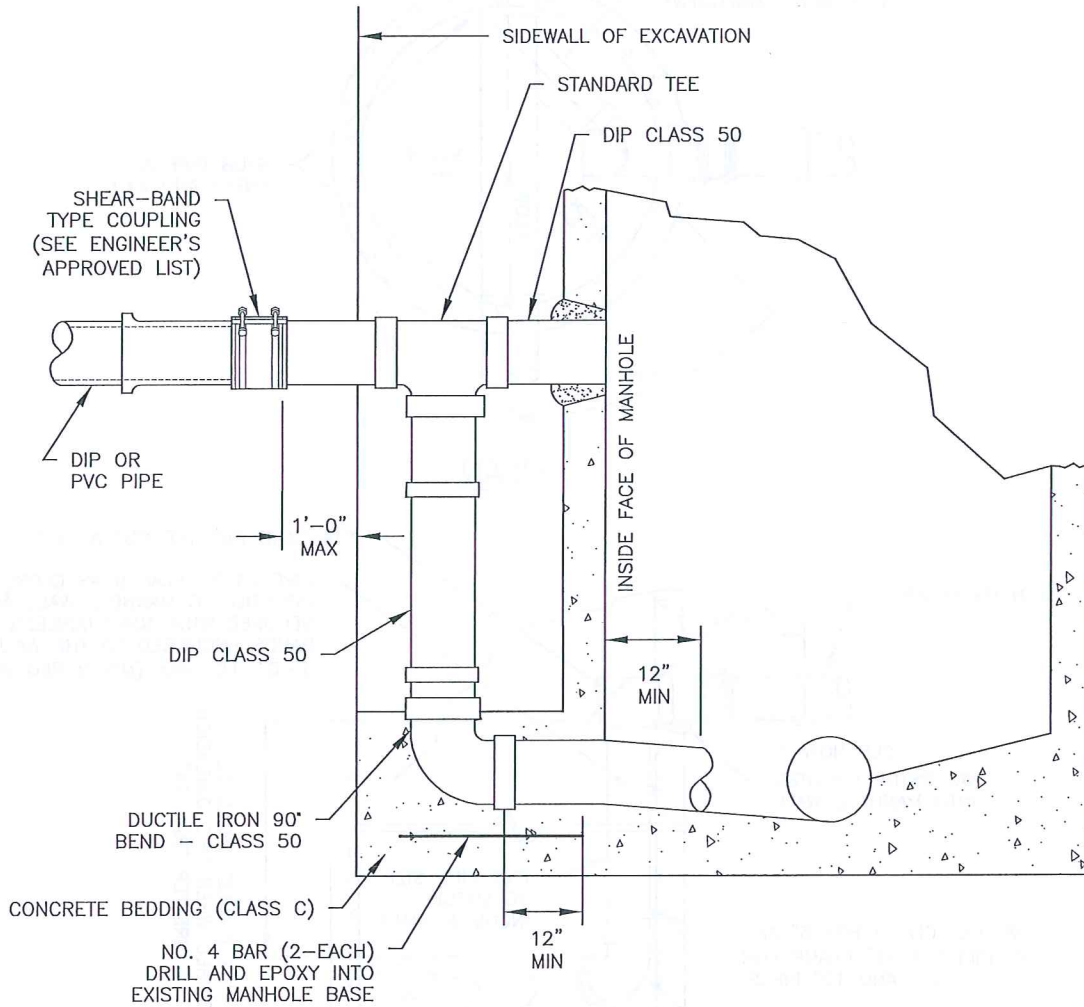
SCALE: N.T.S.

APPROVED BY:

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Kent R. Carothers, P.E. Operations Manager C60671

DRAWN BY: TM

NO. 503



ELEVATION

NOTES:

1. DUCTILE IRON PIPE (DIP) AND FITTINGS SHALL BE CLASS 50 CONFORMING TO THE REQUIREMENTS OF ANSI A21.51
2. PIPE AND FITTINGS SHALL BE FURNISHED WITH BELL AND SPIGOT ENDS, "TYTON JOINT" OR MECHANICAL JOINT.
3. TO BE INSTALLED AT EXISTING 48" MANHOLES OR WHERE SPECIFICALLY APPROVE BY THE DIRECTOR OF PUBLIC WORKS AND UTILITIES.
4. DROP INLET PIPE AND FITTINGS SHALL BE THE SAME SIZE AS THE INCOMING SEWER MAIN,
5. SEE STANDARD 503 FOR STANDARD INSIDE DROP INSTALLATION.
6. INSTALL WATERSTOP IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS, AS SHOWN.



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STANDARD DETAILS
OUTSIDE DROP IN
SANITARY SEWER
MANHOLE

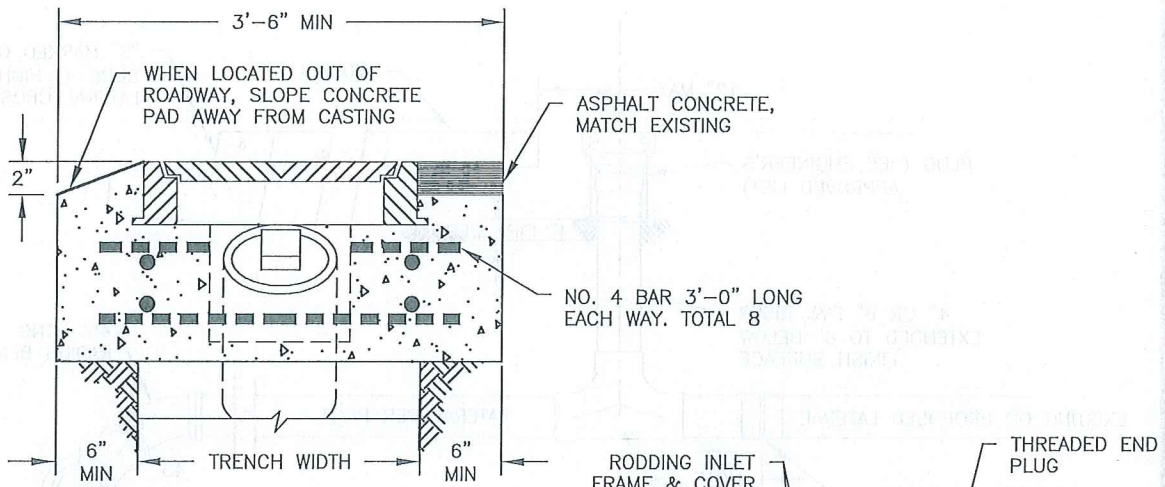
DATE: DECEMBER 2020 SCALE: N.T.S.

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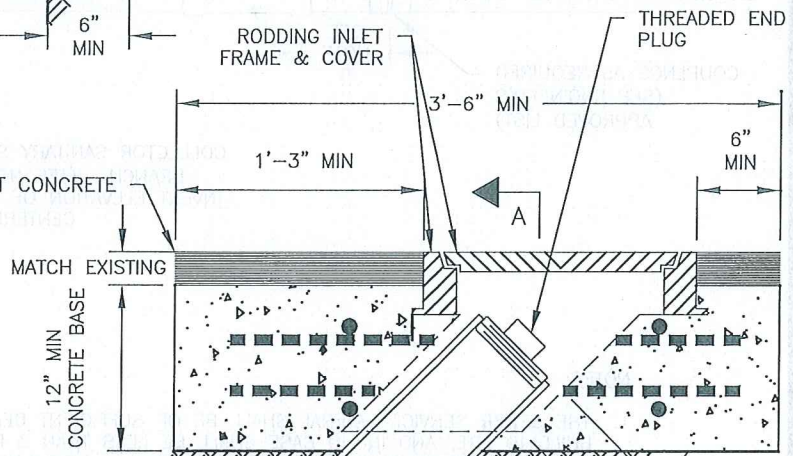
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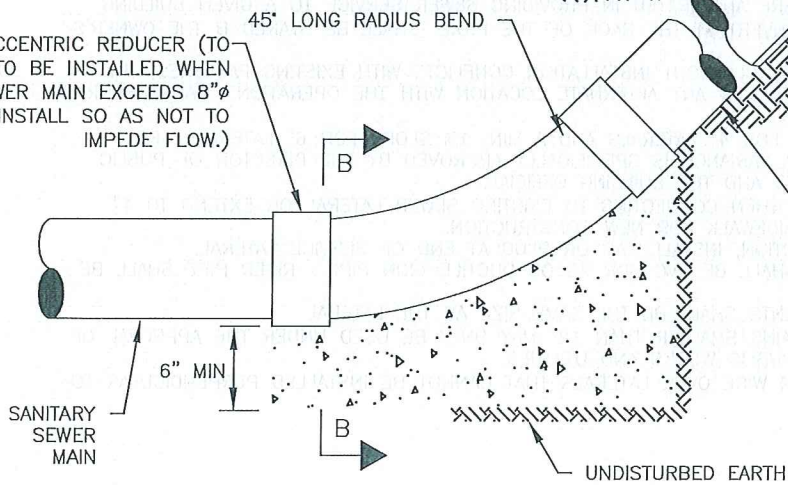
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SECTION A-A

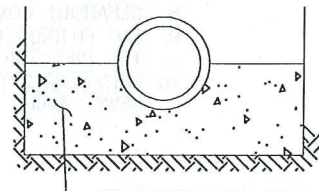


ECCENTRIC REDUCER (TO 8") TO BE INSTALLED WHEN SEWER MAIN EXCEEDS 8"Ø (INSTALL SO AS NOT TO IMPEDE FLOW.)



SANITARY SEWER RISER PIPE SHALL BE BEDDED ON UNDISTURBED EARTH OR ON CONCRETE BEDDING

SDR 26



CONCRETE BASE FULL WIDTH OF TRENCH WHEN PIPE IS NOT BEDDED ON ORIGINAL GROUND

SECTION B-B

- NOTES:
 1. TO BE USED ONLY WHEN SPECIFICALLY AUTHORIZED BY THE DIRECTOR OF PUBLIC WORKS AND UTILITIES



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STANDARD DETAILS
 PERMANENT MAINLINE
 CLEANOUT

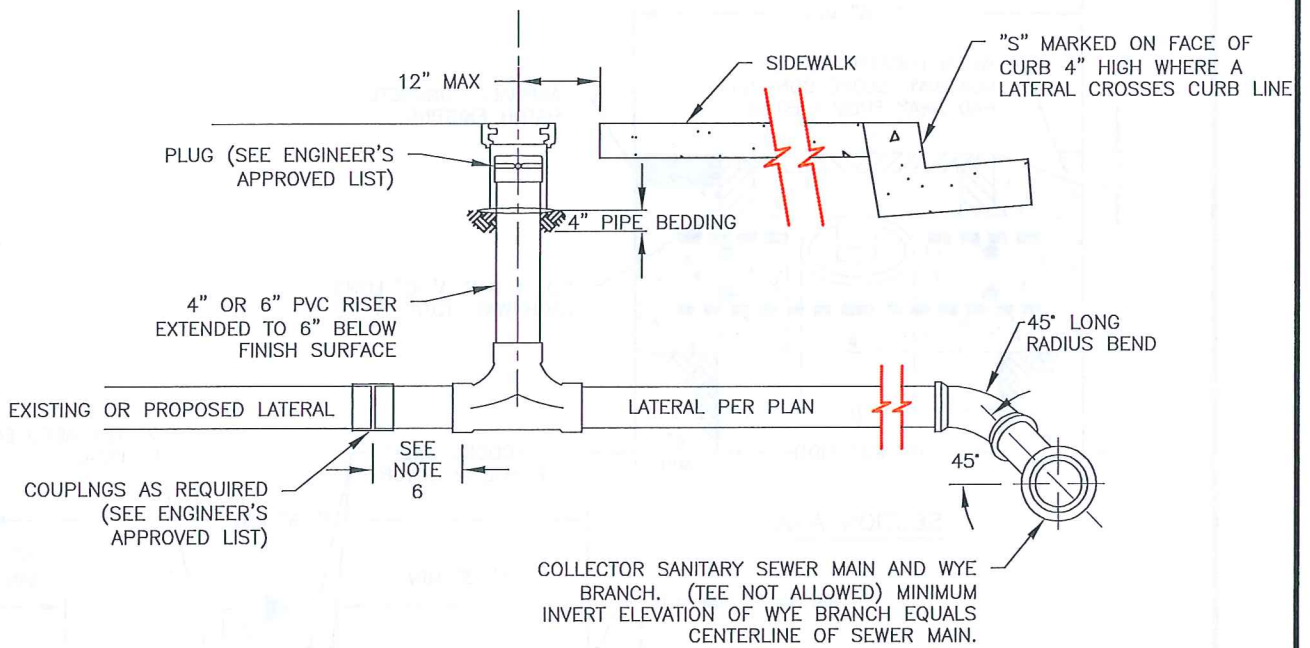
DATE: DECEMBER 2020 SCALE: N.T.S.

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NO. 505



NOTES:

1. THE SEWER SERVICE LATERAL SHALL BE OF SUFFICIENT DEPTH TO ADEQUATELY SERVE THE BUILDING SITE, AND IN NO CASE SHALL BE LESS THAN 3 FT DEEP AT THE BACK OF THE P.U.E. UNLESS MATCHING EXISTING CONDITIONS ON REHABILITATION PROJECTS OR AS OTHERWISE AUTHORIZED BY THE DIRECTOR OF PUBLIC WORKS AND UTILITIES.
2. WHERE PROBLEMS ARE ANTICIPATED IN PROVIDING SEWER SERVICE TO A GIVEN BUILDING SITE, THE LATERAL INVERT AT THE BACK OF THE P.U.E. SHALL BE STAKED BY THE OWNER'S ENGINEER.
3. IN CASES WHERE THE CLEANOUT INSTALLATION CONFLICTS WITH EXISTING FACILITIES, THE CONTRACTOR SHALL VERIFY ANY ALTERNATE LOCATION WITH THE OPERATIONS MANAGER PRIOR TO INSTALLATION.
4. MINIMUM 2% SLOPE FOR 4" LATERALS AND A MIN. 1% SLOPE FOR 6" LATERALS ARE REQUIRED UNLESS A VARIANCE IS SPECIFICALLY APPROVED BY THE DIRECTOR OF PUBLIC WORKS AND UTILITIES AND THE BUILDING OFFICIAL.
5. A MINIMUM OF 12" WHEN CONNECTING TO EXISTING SEWER LATERAL OR EXTEND TO 1" BEHIND P.U.E. OR SIDEWALK FOR NEW CONSTRUCTION.
6. FOR NEW CONSTRUCTION, INSTALL CAP OR PLUG AT END OF SERVICE LATERAL.
7. LATERAL MATERIAL SHALL BE PVC SDR 26 OR DUCTILE IRON PIPE. RISER PIPE SHALL BE SDR 26.
8. CLEANOUT COMPONENTS SHALL BE THE SAME SIZE AS THE LATERAL.
9. TAP FITTINGS ON MAINS SMALLER THAN 12" MAY ONLY BE USED UNDER THE APPROVAL OF THE DIRECTOR OF PUBLIC WORKS AND UTILITIES.
10. INSTALL #12 TRACER WIRE OVER LATERALS THAT CANNOT BE INSTALLED PERPENDICULAR TO SEWER MAIN.



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STANDARD DETAILS
4" AND 6" SERVICE
LATERAL AND
CLEANOUT

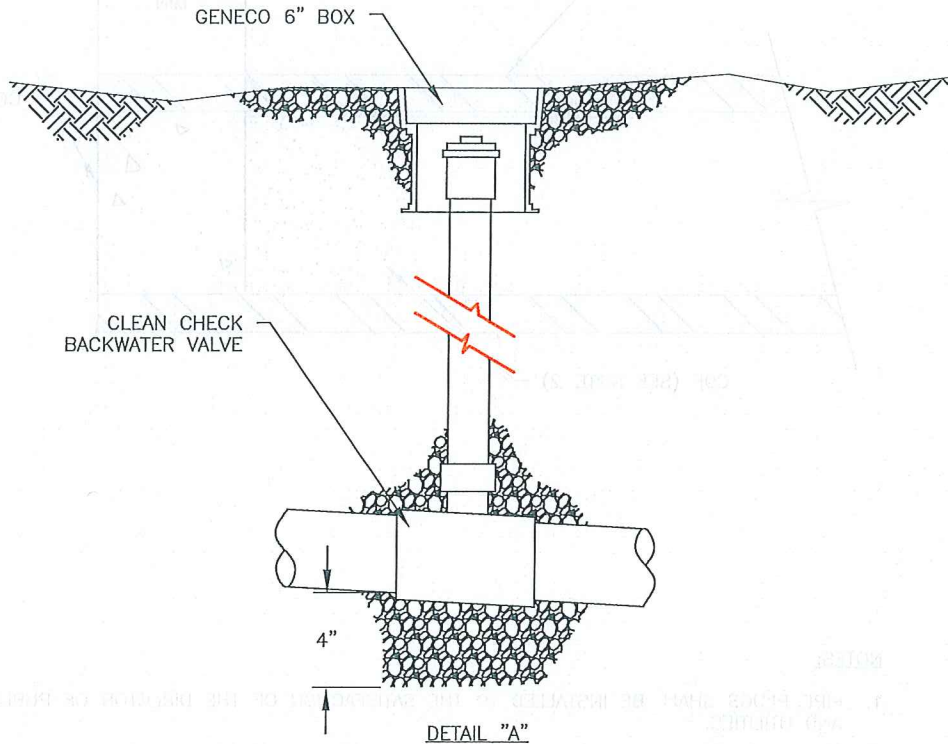
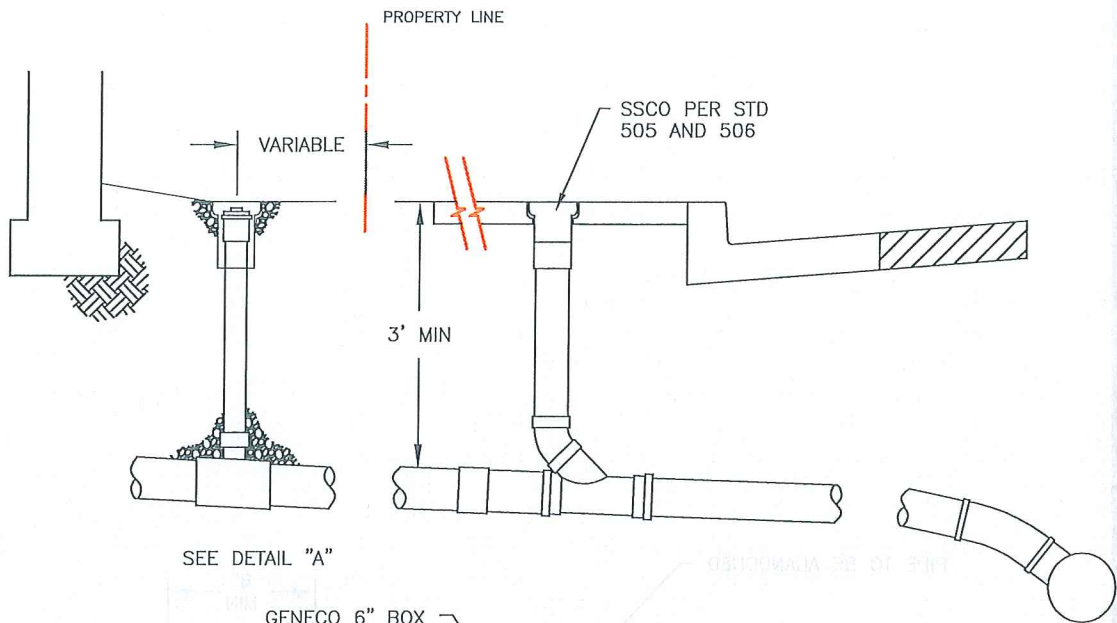
DATE: DECEMBER 2020 SCALE: N.T.S.

APPROVED BY:

Kent R. Carothers, P.E. Operations Manager C60671

DRAWN BY: TM

NO. 506



NOTES:

1. SEWAGE BACKWATER VALVE ASSEMBLY TO BE INSTALLED ON ALL LATERALS WHERE THE FINISH FLOOR ELEVATION IS LESS THAN ONE FOOT ABOVE THE FIRST UPSTREAM MANHOLE.
2. PROPERTY OWNER IS RESPONSIBLE FOR THE INSTALLATION AND MAINTENANCE OF THE SEWAGE BACKWATER VALVE ASSEMBLY
3. USE 4" EXTENDABLE BACKWATER VALVE IF DEPTH IS GREATER THAN 24".



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STANDARD DETAILS
SEWAGE BACKWATER
VALVE ASSEMBLY

DATE: JUNE 2016

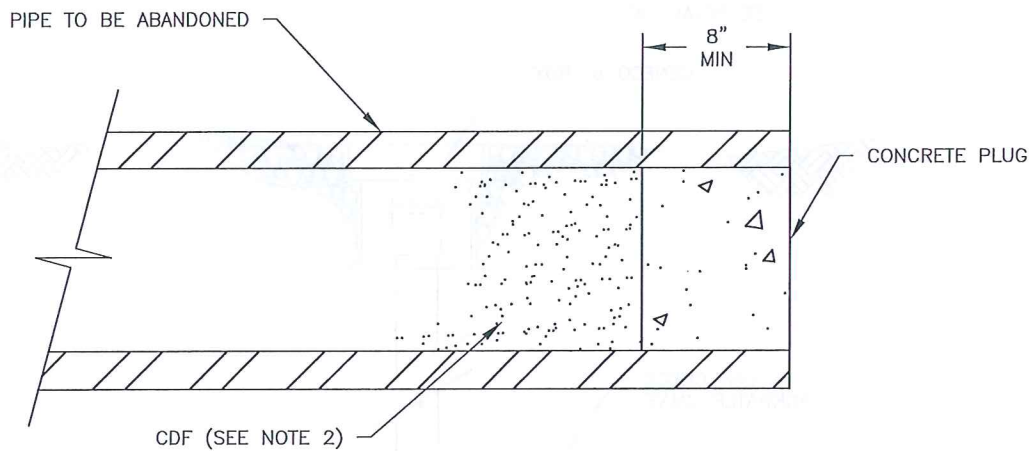
SCALE: N.T.S.

APPROVED BY:

Kent R. Carothers, P.E. Operations Manager C60671

DRAWN BY: TM

NO. 507



NOTES:

1. PIPE PLUGS SHALL BE INSTALLED TO THE SATISFACTION OF THE DIRECTOR OF PUBLIC WORKS AND UTILITIES.
2. ALL ABANDONED PIPES, 12" OR GREATER, SHALL BE BROKEN INTO EVERY 50'-0" AND SHALL BE FILLED COMPLETELY WITH CDF MIX NO. 1500 MANUFACTURED BY SHAMROCK MATERIALS INC.



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STANDARD DETAILS
ABANDONED
PIPE PLUG

DATE: JUNE 2016

SCALE: N.T.S.

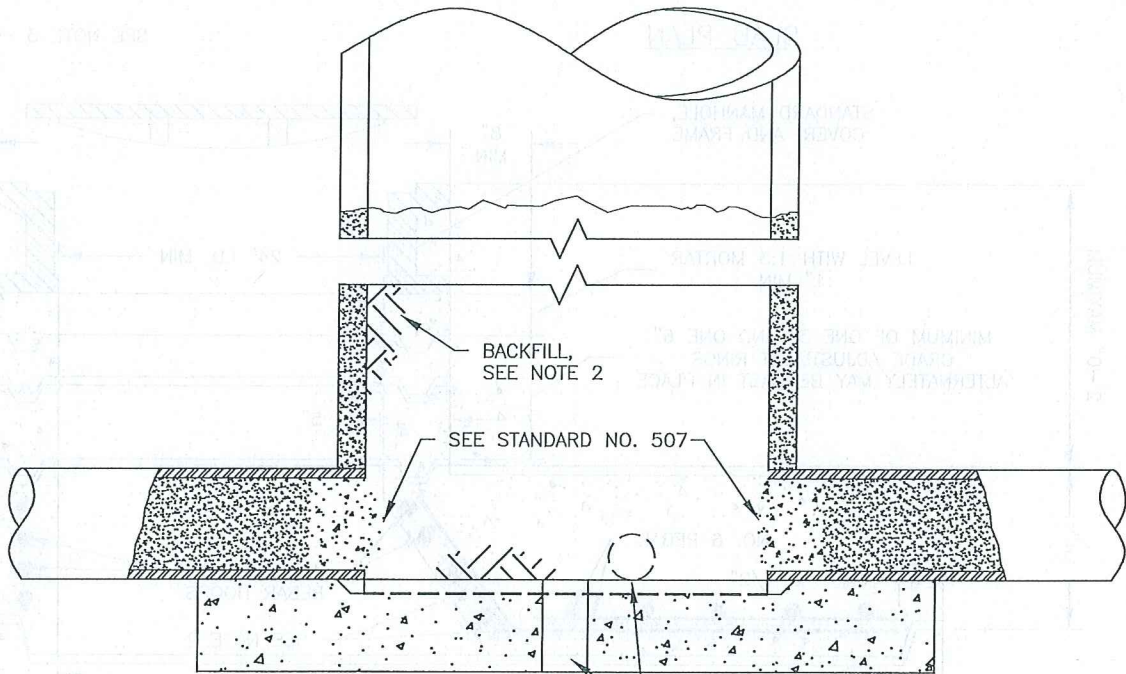
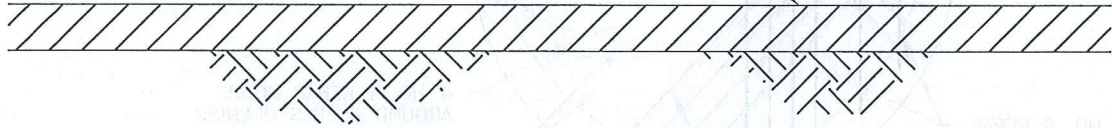
APPROVED BY:

Kent R. Carothers
 Kent R. Carothers, P.E. Operations Manager C60671

DRAWN BY: TM.

NO. 508

REPAIR OR REPLACE EXISTING GROUND OR PAVING, PER STANDARD DETAIL NO. 502



KNOCK HOLE, MIN 6" ϕ , IN BASE, IN BARREL ADJACENT TO BASE, OR AS DIRECTED BY THE DIRECTOR OF PUBLIC WORKS AND UTILITIES.

NOTES:

1. REMOVE FRAME, COVER, TAPER, AND BARREL SECTIONS.
2. AFTER PLUGGING ALL PIPES IN MANHOLE, THE REMAINING PORTION OF THE BARREL SECTION AND ALL VOIDS CREATED BY THE REMOVAL OF THE UPPER PORTIONS OF THE MANHOLE SHALL BE BACKFILLED AND COMPACTED TO 90% RELATIVE DENSITY. USE TRENCH BACKFILL OR PIPE BEDDING MATERIAL.



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STANDARD DETAILS
ABANDONED
MANHOLE

DATE: JUNE 2016

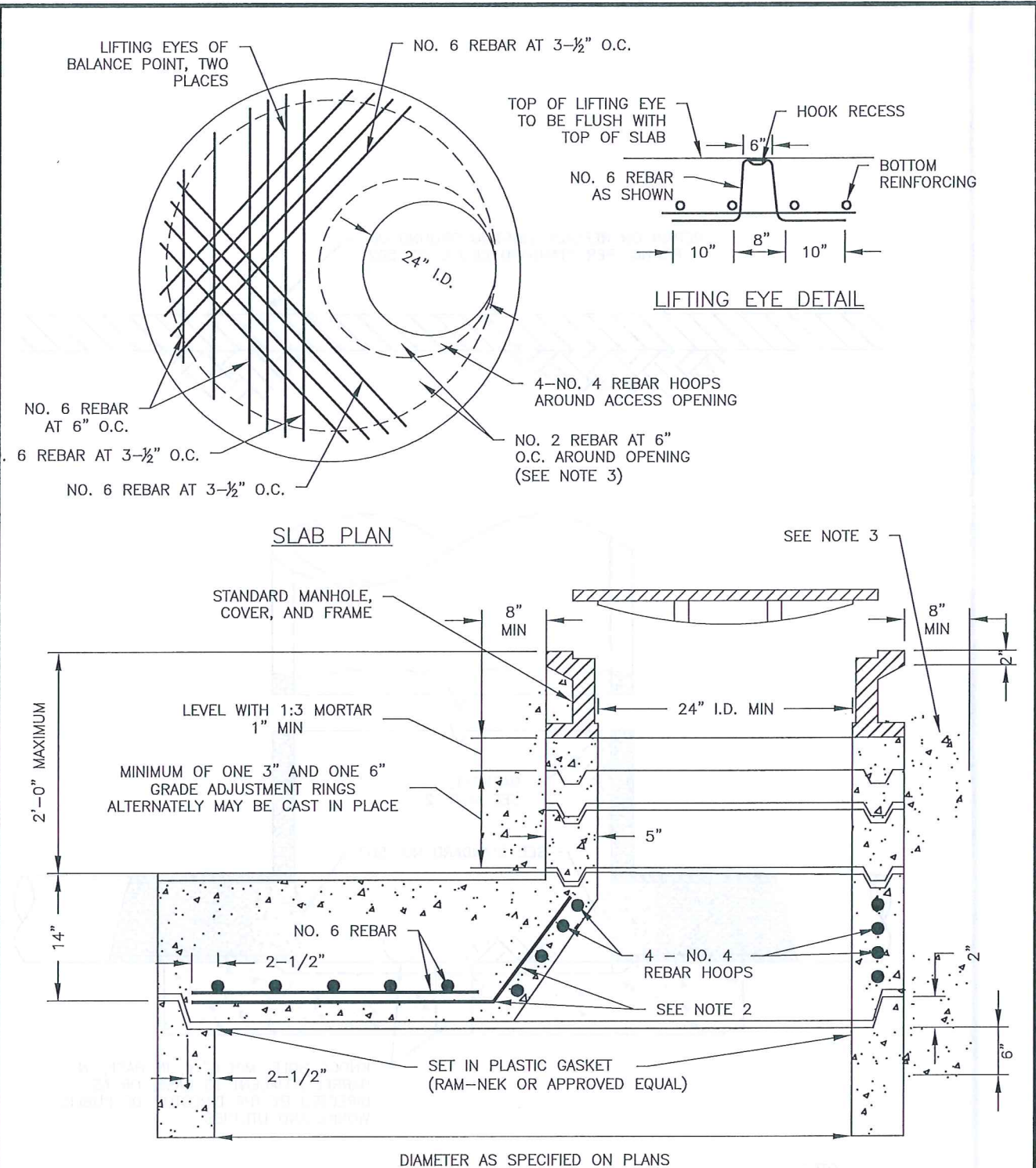
SCALE: N.T.S.

APPROVED BY:

Kent R. Carothers
Kent R. Carothers, P.E. Operations Manager C60671

DRAWN BY: TM

NO. 509



NOTES:

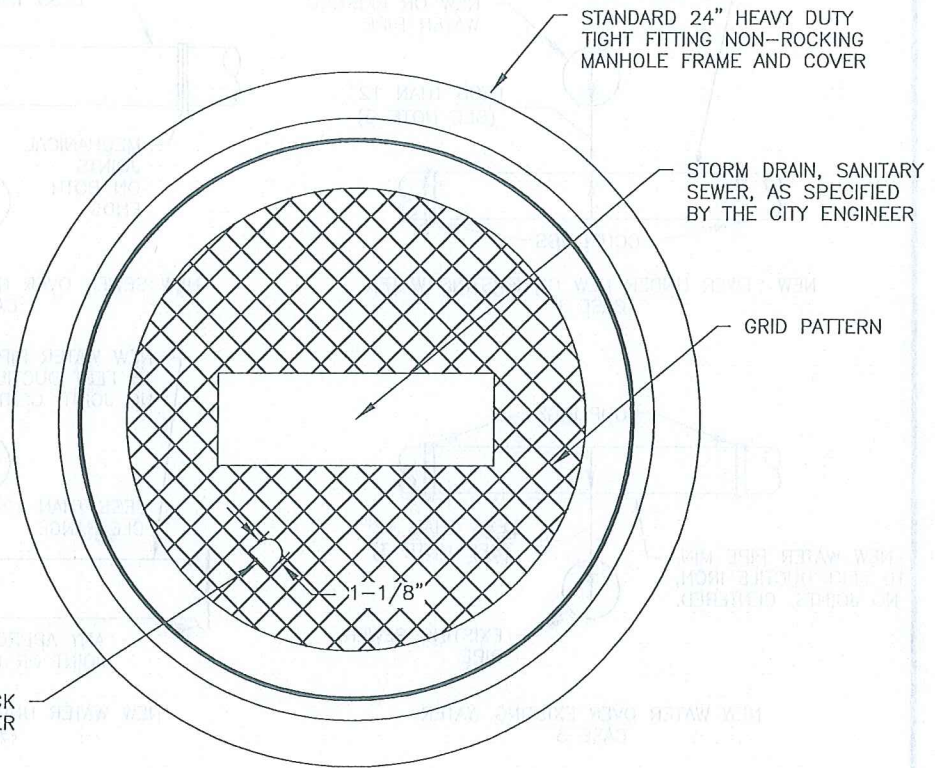
1. FOR DETAILS AND SPECIFICATIONS OF BASE AND BARREL SECTIONS, SEE CITY OF PETALUMA STANDARD DETAIL NO. 500 AND 501,
2. NO. 2 REBARS BENT UP AND SPACED 6" ON CENTER AROUND 24" OPENING. HORIZONTAL LEGS TO FAN OUT EQUALLY SPACED, 2-1/2" CLEAR AT EDGE OF SLAB.
3. CLASS "A" CONCRETE COLLAR TOP DOWN 2" FROM FINISHED GRADE. IN HIGH TRAFFIC AREAS - COLLAR 1" FROM FINISHED GRADE PER PUBLIC WORKS INSPECTOR.



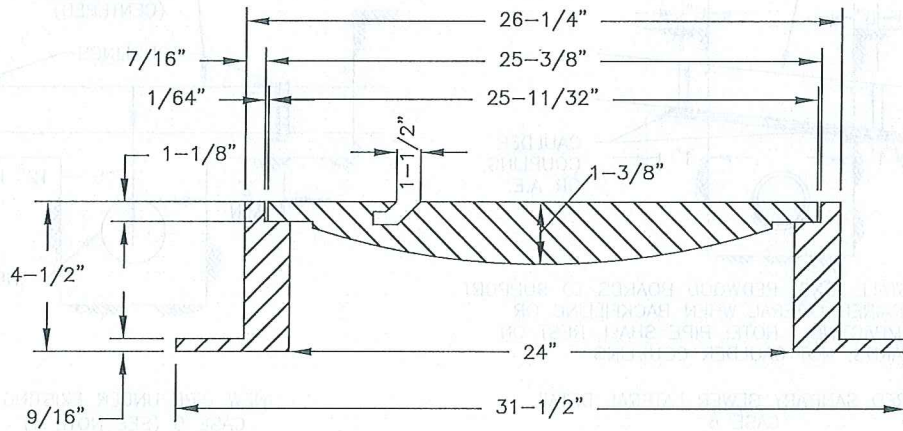
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STANDARD DETAILS
PRECAST CONCRETE
MANHOLE
REDUCE SLAB

DATE: JUNE 2016	SCALE: N.T.S.
APPROVED BY: <i>[Signature]</i>	
Kent R. Carothers, P.E. Operations Manager C60671	
DRAWN BY: TM	NO. 510



ONE OPEN PICK HOLE PER COVER



NOTES:

1. SPECIFY SANITARY SEWER OR STORM DRAIN WHEN ORDERING. ALL CASTING SHALL BE DIPPED IN APPROVED ASPHALT PAINT
2. ALL MATERIAL USED IN MANUFACTURING SHALL CONFORM IN A.S.T.M. DESIGNATION A-159-G3000, OR OF UNITED STATES GOVERNMENT SPECIFICATIONS QQ-652B.
3. MINIMUM WEIGHT COMPONENTS:

COVER	- 130 LBS.
FRAME	- 135 LBS.

APPROVED MANHOLE FRAME & COVER
 PHOENIX IRON WORKS-CAT NO. P-1090CPH D&L SUPPLY-CAT NO. A-1024 CPH
 SOUTH BAY FOUNDRY-CAT NO. SBF-1900CPH PINKERTON FOUNDRY-CAT NO. A-640



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STANDARD DETAILS
MANHOLE FRAME
AND COVER

DATE: JUNE 2016

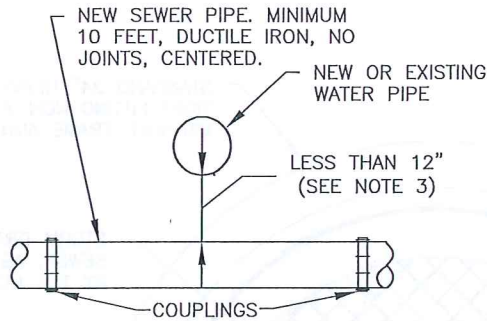
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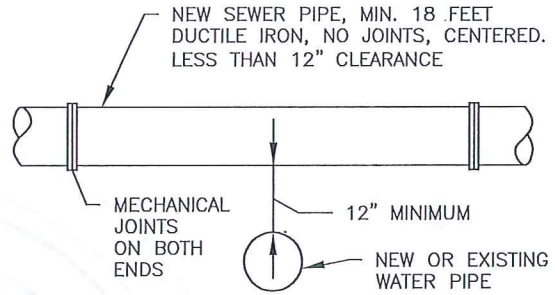
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 Kent R. Carothers, P.E. Operations Manager C60671

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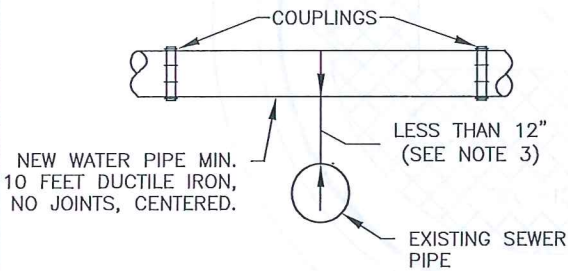
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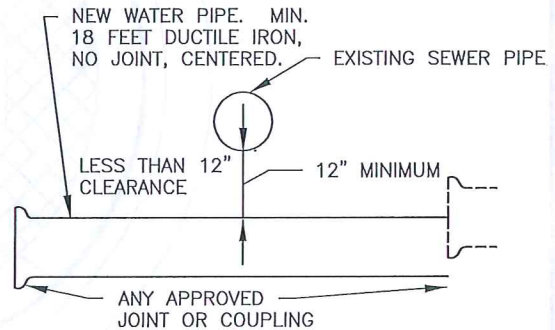
NEW SEWER UNDER NEW OR EXISTING WATER
CASE 1



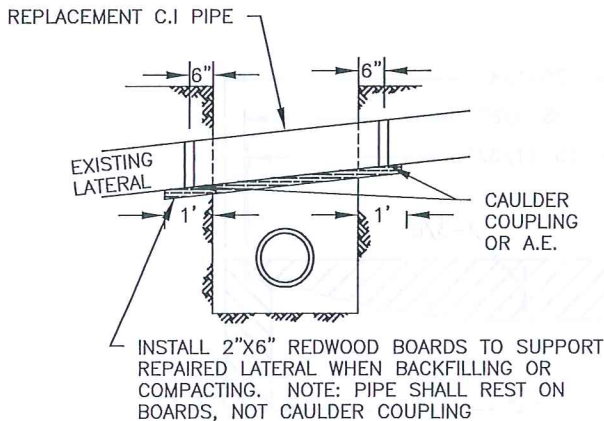
NEW SEWER OVER NEW OR EXISTING WATER
CASE 2



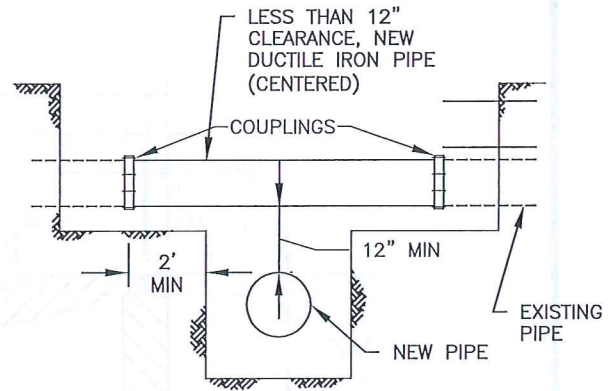
NEW WATER OVER EXISTING WATER
CASE 3



NEW WATER UNDER EXISTING SEWER
CASE 4



SEVERED SANITARY SEWER LATERAL DETAIL
CASE 6



NEW PIPE UNDER EXISTING
CASE 5 (SEE NOTE 4)

NOTES:

1. THIS STANDARD APPLIES TO PIPES UP TO AND INCLUDING 16" DIAMETER. ALL CROSSINGS OF LARGER DIAMETER SHALL BE APPROVED BY THE DIRECTOR OF PUBLIC WORKS AND UTILITIES
2. ALL NEW DUCTILE IRON SHALL BE WRAPPED IN POLYETHYLENE PER CITY OF PETALUMA STANDARD DETAILS.
3. WHERE SEWER CROSSES ABOVE OR BELOW A WATER MAIN WITH 1'-0" OR MORE VERTICAL CLEARANCE, NO SPECIAL INSTALLATION IS REQUIRED. IF SEWER LATERAL IS 12" OR MORE ABOVE WATER MAIN, DI IS NOT REQUIRED.
4. "NEW PIPE" UNDER EXISTING (CASE 5) SHALL BE USED WHEN THE EXISTING PIPE HAS A JOINT OVER OR WITHIN 2'-0" OF THE NEW TRENCH.
5. ANY PIPE-PIPE CROSSING WITH LESS THAN 6" VERTICAL CLEARANCE SHALL NOT BE INSTALLED WITHOUT APPROVAL OF THE DIRECTOR OF PUBLIC WORKS AND UTILITIES.
6. FOR WATER MAIN LOWERING DETAIL, SEE CITY WATER MAIN STANDARDS.
7. ALL CROSSINGS SHALL REFER TO DEPARTMENT OF HEALTH SERVICES REGULATIONS.



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STANDARD DETAILS
PIPE-PIPE
CROSSING

DATE: DECEMBER 2020 SCALE: N.T.S.

APPROVED BY:

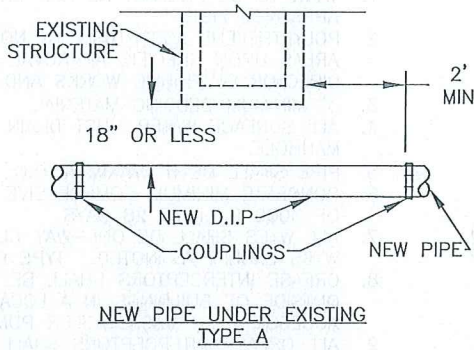
Kent R. Carothers
Kent R. Carothers, P.E. Operations Manager C60671

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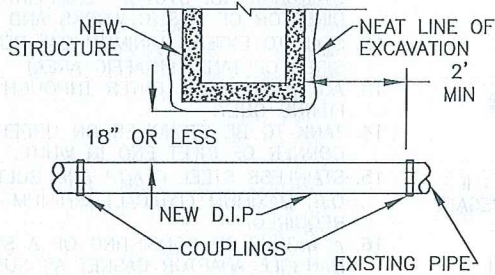
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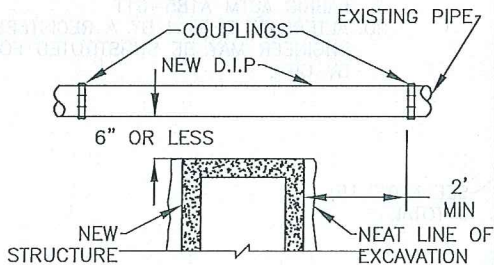
1. THIS STANDARD APPLIES TO PIPES UP TO AND INCLUDING 16" DIAMETER. ALL CROSSINGS INVOLVING PIPES OF LARGER DIAMETER SHALL BE AS APPROVED BY THE DIRECTOR OF PUBLIC WORKS AND UTILITIES.
2. WHEN PIPES CROSS WITHIN THE DIMENSIONS SHOWN, A NEW DUCTILE IRON PIPE SECTION SHALL BE INSTALLED AS DETAILED.
3. ALL DUCTILE IRON PIPE SHALL BE ENCASED IN POLYETHYLENE FILM IN TUBE FORM.
4. ANY TYPE "A" INSTALLATION REQUIRING MORE THAN ONE LENGTH OF PIPE SHALL BE ENCASED PER CITY REQUIREMENTS.



**NEW PIPE UNDER EXISTING
TYPE A**



**NEW STRUCTURE OVER EXISTING
TYPE B**



**NEW STRUCTURE UNDER EXISTING
TYPE C**

APPROVED COUPLINGS:

SEE ENGINEER'S APPROVED LIST



CITY OF PETALUMA

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UTILITIES DIVISION**

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**STANDARD DETAILS
PIPE STRUCTURE
CROSSING**

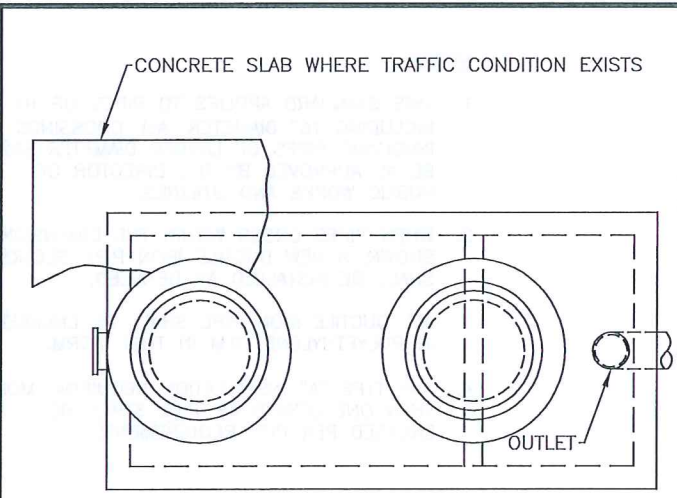
DATE: DECEMBER 2020 SCALE: N.T.S.

APPROVED BY:

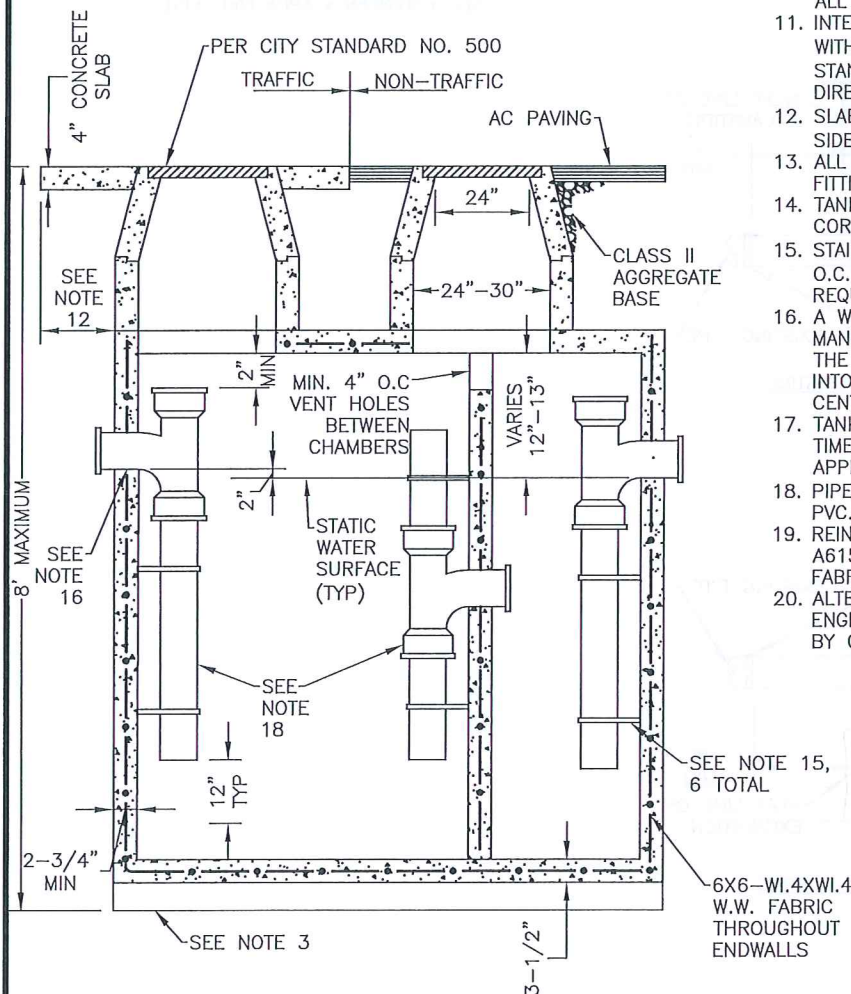
Kent R. Carothers
Kent R. Carothers, P.E. Operations Manager C60671

DRAWN BY: TM

NO. 513



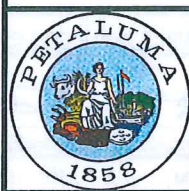
PLAN



SECTION

NOTES:

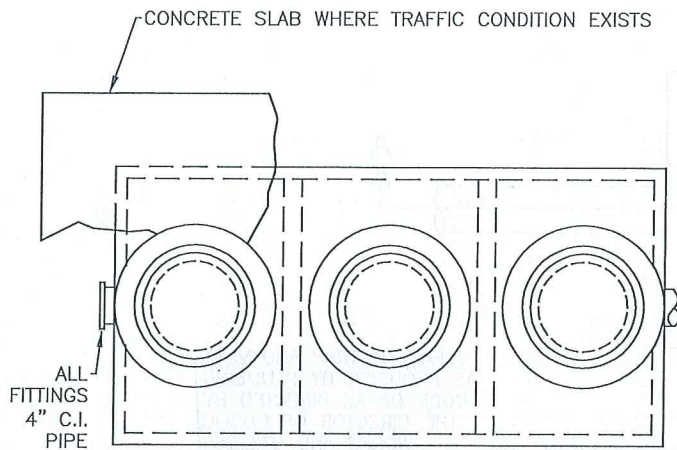
1. TANK TO BE PRECAST AS PER ENGINEER'S APPROVED LIST.
2. POLYETHELENE ACCEPTABLE IN NON TRAFFIC AREAS UPON SPECIFIC APPROVAL OF THE DIRECTOR OF PUBLIC WORKS AND UTILITIES.
3. 3" MINIMUM BEDDING MATERIAL
4. ALL SURFACE WATER MUST DRAIN AWAY FROM MANHOLE.
5. PIPE SHALL BE 6" MAXIMUM O.C. PER U.P.C.
6. CONCRETE MINIMUM COMPRESSIVE STRENGTH OF 3000 P.S.I. AT 28 DAYS
7. ALL WYES SHALL BE ONE-WAY CLEANOUT WYES EXCEPT AS NOTED. TYPE PER U.P.C.
8. GREASE INTERCEPTORS SHALL BE LOCATED OUTSIDE OF BUILDINGS IN A LOCATION ACCESSIBLE TO WASTEBAULER PUMPER.
9. ALL GREASE INTERCEPTORS SHALL BE LOCATED OUTSIDE PUBLIC RIGHT-OF-WAY EXCEPT WITH WRITTEN APPROVAL OF THE DIRECTOR OF PUBLIC WORKS AND UTILITIES.
10. EXCAVATIONS SHALL BE NEAT LINE TYPICALLY ALL SIDES.
11. INTERCEPTOR TO BE USED IN CONJUNCTION WITH "SAMPLING MANHOLE" PER CITY STANDARD NO. 516 OR "SAMPLING PORT" PER DIRECTOR OF PUBLIC WORKS AND UTILITIES.
12. SLAB TO EXTEND MINIMUM 24" BEYOND ALL SIDES OF TANK. (TRAFFIC AREA)
13. ALL WASTE MUST ENTER THROUGH INLET FITTING ONLY.
14. TANK TO BE STENCILED ON UPPER LEFT HAND CORNER OF INLET END IN WHITE.
15. STAINLESS STEEL CLAMP AND BOLTS 3'-0" O.C. MAXIMUM (TYPICAL) MINIMUM 2 REQUIRED.
16. A WATERSTOP CONSISTING OF A STANDARD MANHOLE ADAPTOR GASKET AS SUPPLIED BY THE PIPE MANUFACTURER SHALL BE GROUTED INTO THE INTERCEPTOR WALL NEAR THE CENTER OF THE WALL.
17. TANK CAPACITY TO BE DETERMINED AT THE TIME OF INDUSTRIAL WASTE PERMIT APPLICATION.
18. PIPE AND FITTINGS TO BE 4" CHEDULE 40 PVC.
19. REINFORCED BAR INTERMEDIATE GRADE ASTM A615-62T AND A305-56T REINFORCING WIRE FABRIC ASTM A185-61T
20. ALTERNATE DESIGN BY A REGISTERED ENGINEER MAY BE SUBSTITUTED FOR REVIEW BY CITY.



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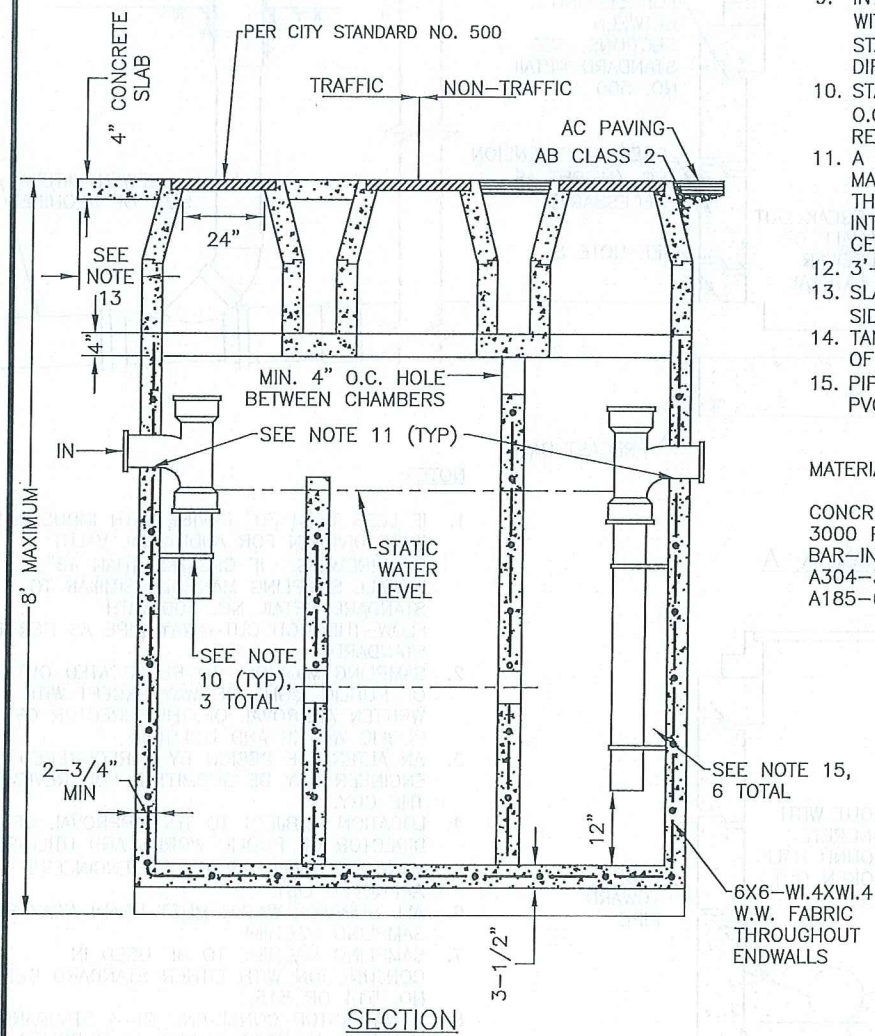
STANDARD DETAILS
 PRECAST GREASE
 INTERCEPTOR

DATE: JUNE 2016	SCALE: N.T.S.
APPROVED BY: <i>[Signature]</i>	
Kent R. Carothers, P.E. Operations Manager C60671	
DRAWN BY: TM	NO. 514



NOTE: ALL WASTE MUST ENTER THROUGH INLET FITTING ONLY.

PLAN



SECTION

NOTES:

1. TANK TO BE PRECAST AS PER ENGINEER'S APPROVED LIST.
2. ALL GREASE INTERCEPTORS SHALL BE LOCATED OUTSIDE PUBLIC RIGHT-OF-WAY EXCEPT WITH WRITTEN APPROVAL OF THE DIRECTOR OF PUBLIC WORKS AND UTILITIES.
3. GREASE INTERCEPTORS SHALL BE LOCATED OUTSIDE OF BUILDINGS IN A LOCATION ACCESSIBLE TO WASTEHAULER PUMPER. LOCATION SUBJECT TO APPROVAL OF DIRECTOR OF PUBLIC WORKS AND UTILITIES.
4. ALTERNATE DESIGN BY A REGISTERED ENGINEER MAY BE SUBSTITUTED FOR REVIEW BY THE CITY.
5. PIPE SHALL BE 6" MAXIMUM DIAMETER TYPE PER U.P.C.
6. EXCAVATION SHALL BE NEAT LINE TYPICALLY ALL SIDES.
7. HEIGHT OF TANK ABOVE FITTINGS VARIABLE ONE FEET SECTIONS MAY BE ADDED TO REQUIRED FINISH GRADE.
8. ALL WYES SHALL BE ONE-WAY CLEANOUT WYES EXCEPT AS NOTED. TYPE PER U.P.C.
9. INTERCEPTOR TO BE USED IN CONJUNCTION WITH "SAMPLING MANHOLE" PER CITY STANDARD NO. 516 OR "SAMPLING PORT" PER DIRECTOR OF PUBLIC WORKS AND UTILITIES.
10. STAINLESS STEEL CLAMP AND BOLTS 3'-0" O.C. MAXIMUM (TYPICAL) MINIMUM 2 REQUIRED.
11. A WATERSTOP CONSISTING OF A STANDARD MANHOLE ADAPTOR GASKET AS SUPPLIED BY THE PIPE MANUFACTURER SHALL BE GROUTED INTO THE INTERCEPTOR WALL NEAR THE CENTER OF THE WALL.
12. 3'-0" MINIMUM BEDDING MATERIAL.
13. SLAB TO EXTEND MINIMUM 24" BEYOND ALL SIDES OF TANK. (TRAFFIC AREA)
14. TANK CAPACITY TO BE DETERMINED AT TIME OF INDUSTRIAL WASTE PERMIT APPLICATION.
15. PIPE AND FITTINGS TO BE 4" SCHEDULE 40 PVC.

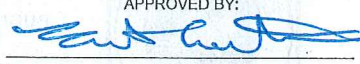
MATERIAL SPECIFICATIONS

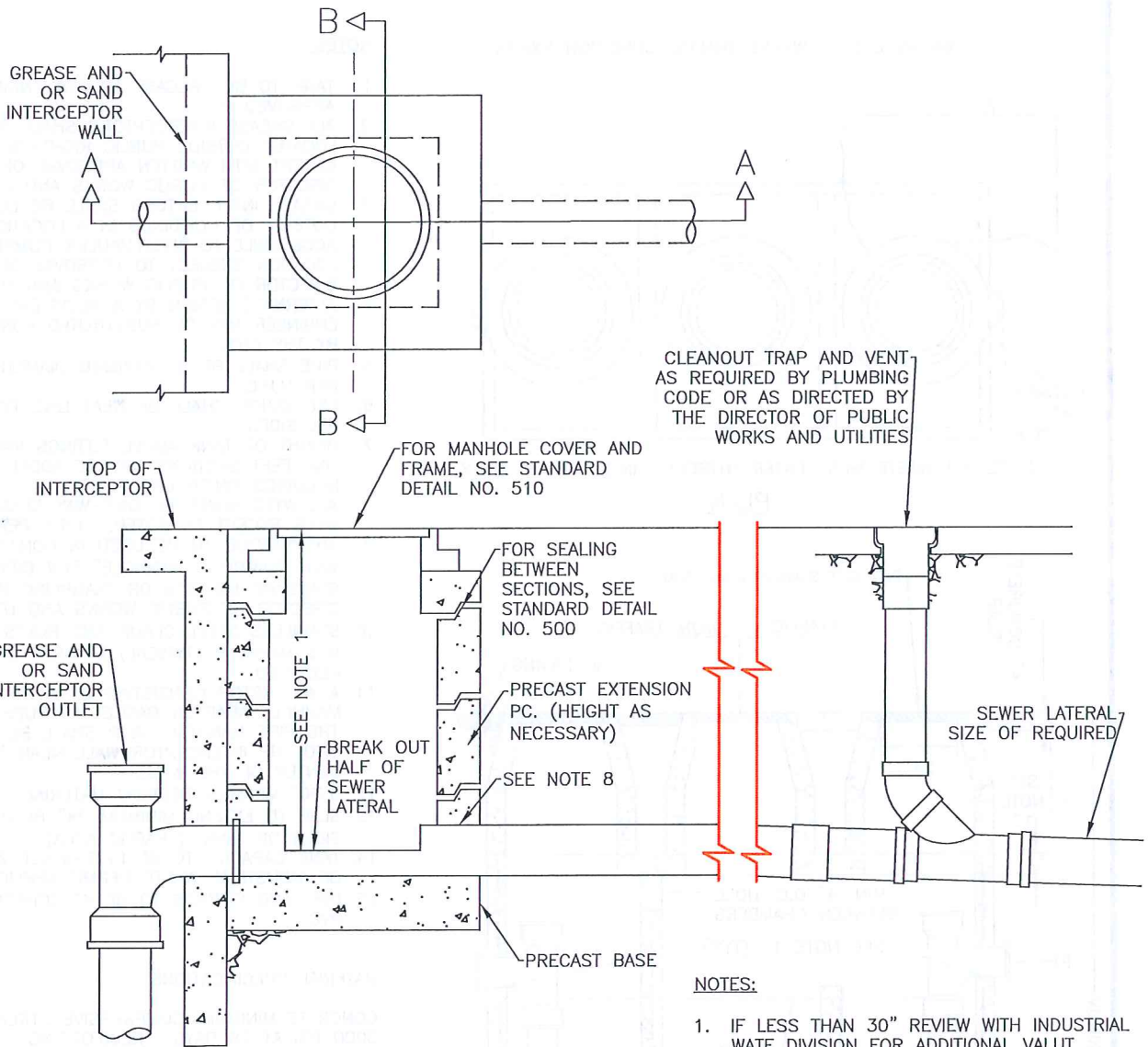
CONCRETE MINIMUM: COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS. REINFORCING BAR-INTERMEDIATE GRADE ASTM A615-62T AND A304-36T REINFORCING WIRE FABRIC ASTM A185-61T.



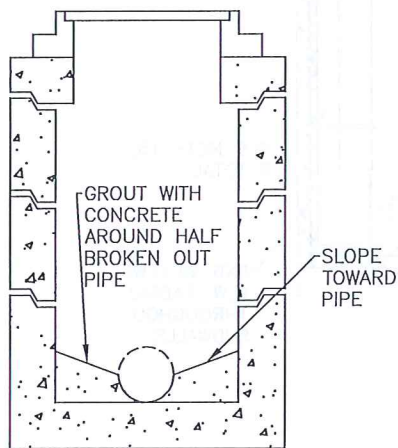
CITY OF PETALUMA
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STANDARD DETAILS
 SAND AND GREASE
 INTERCEPTOR

DATE: DECEMBER 2020	SCALE: N.T.S.
APPROVED BY: 	
Kent R. Carothers, P.E. Operations Manager C60671	
DRAWN BY: TM	NO. 515



SECTION A-A



SECTION B-B

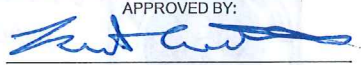
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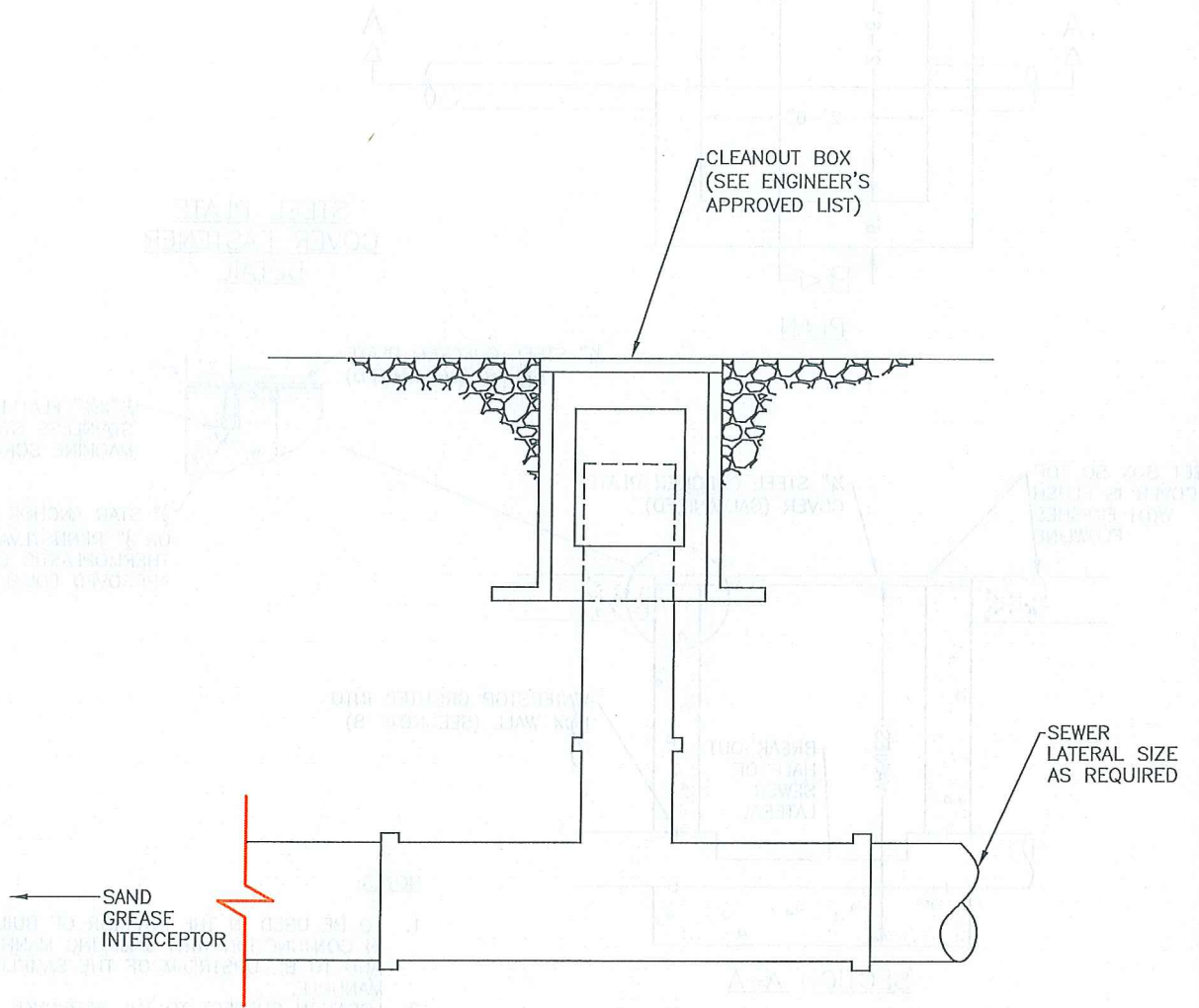
1. IF LESS THAN 30" REVIEW WITH INDUSTRIAL WASTE DIVISION FOR ADDITIONAL VALUT REQUIREMNTS. IF GREATER THAN 48", INSTALL SAMPLING MANHOLE SIMILAR TO STANDARD DETAIL NO. 500 WITH FLOW-THROUGH CUT-AWAY PIPE AS PER THE STANDARD.
2. SAMPLING MANHOLE TO BE LOCATED OUTSIDE OF PUBLIC RIGHT-OF-WAY EXCEPT WITH WRITTEN APPROVAL OF THE DIRECTOR OF PUBLIC WORKS AND UTILITIES.
3. AN ALTERNATE DESIGN BY A REGISTERED ENGINEER MAY BE SUBMITTED FOR REVIEW BY THE CITY.
4. LOCATION SUBJECT TO THE APPROVAL OF THE DIRECTOR OF PUBLIC WORKS AND UTILITIES
5. MANHOLE SHALL BE AS PER ENGINEER'S APPROVED LIST.
6. ALL SURFACE WATER MUST DRAIN AWAY FROM SAMPLING MACHINE
7. SAMPLING MACHINE TO BE USED IN CONJUNCTION WITH EITHER STANDARD DETAIL NO. 514 OR 515.
8. A WATERSTOP CONSISTING OF A STANDARD MANHOLE ADAPTOR GASKET AS SUPPLIED BY THE PIPE MANUFACTURER TO BE GRUOTED INTO THE BOX WALL NEAR THE CENTER OF THE WALL.



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STANDARD DETAILS
SAMPLING MANHOLE
(EXTERIOR USE)

DATE: DECEMBER 2020	SCALE: N.T.S.
APPROVED BY: 	
Kent R. Carothers, P.E. Operations Manager C60671	
DRAWN BY: TM	NO. 516



NOTES:

1. ALTERNATE TO STANDARD DETAIL NO. 516 – AS DIRECTED BY THE DIRECTOR OF PUBLIC WORKS AND UTILITIES



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STANDARD DETAILS
SAMPLING
PORT

DATE: JUNE 2016

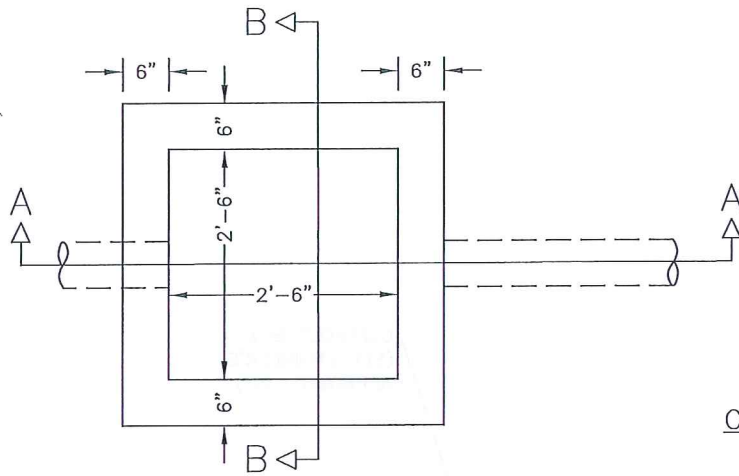
SCALE: N.T.S.

APPROVED BY:

[Signature]
Kent R. Carothers, P.E. Operations Manager C60671

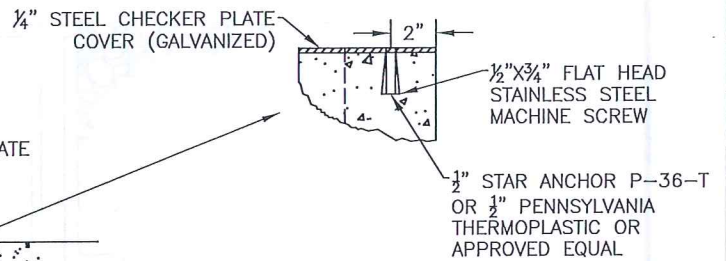
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NO. 517

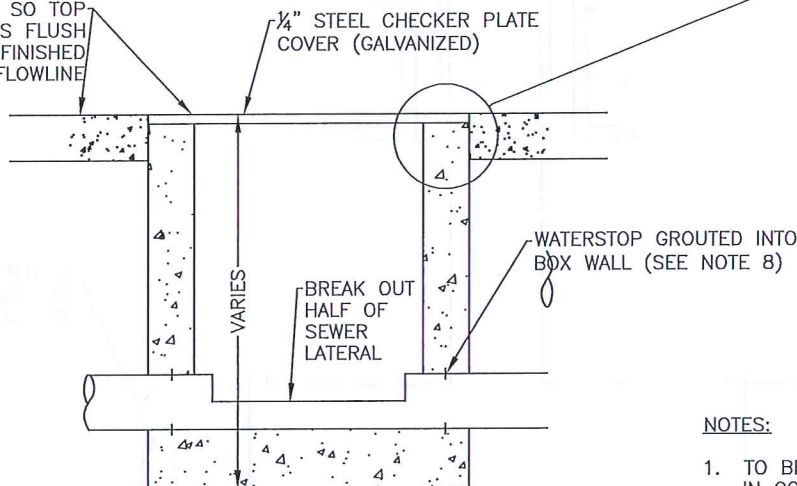


PLAN

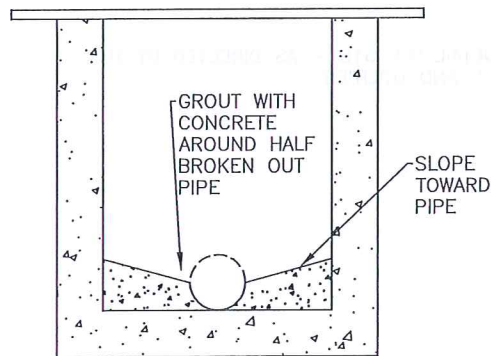
STEEL PLATE
COVER FASTENER
DETAIL



SET BOX SO TOP
COVER IS FLUSH
WITH FINISHED
FLOWLINE



SECTION A-A



SECTION B-B

NOTES:

1. TO BE USED IN THE INTERIOR OF BUILDINGS IN CONJUNCTION WITH SAMPLING MANHOLE AND TO BE UPSTREAM OF THE SAMPLING MANHOLE.
2. LOCATION SUBJECT TO THE APPROVAL OF THE DIRECTOR OF PUBLIC WORKS AND UTILITIES
3. TO BE USED ONLY WITH THE APPROVAL OF THE DIRECTOR OF PUBLIC WORKS AND UTILITIES.
4. ALTERNATE DESIGN BY A REGISTERED ENGINEER MAY BE SUBMITTED FOR REVIEW BY THE CITY OF PETALUMA.
5. BOX SHALL BE AS PER ENGINEER'S APPROVED LIST
6. ALL SURFACE WATER MUST DRAIN AWAY FROM SAMPLING BOX.
7. SAMPLING BOX TO BE USED IN CONJUNCTION WITH STANDARD DETAIL NO. 514 OR 515.
8. A WATERSTOP CONSISTING OF A STANDARD MANHOLE ADAPTOR GASKET AS SUPPLIED BY THE PIPE MANUFACTURER TO BE GROUDED INTO THE BOX WALL NEAR THE CENTER OF THE WALL.



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STANDARD DETAILS
SAMPLING BOX
BUILDING INTERIOR

DATE: JUNE 2016 SCALE: N.T.S.

APPROVED BY:

Kent R. Carothers, P.E. Operations Manager C60671

DRAWN BY: TM

NO. 518

CITY OF PETALUMA

ENGINEER'S LIST OF APPROVED ITEMS
FOR USE WITH SEWER SYSTEM CONSTRUCTION
STANDARDS APPROVED

STANDARD 504, 506, 512, 513

COUPLINGS

APAC
POWER SEAL
ROCKWELL
ROMAC

300 SERIES
3500 SERIES
441 SERIES
500 SERIES

STANDARD 505, 506

RIM AND COVER

SOUTH BAY FOUNDRY

SBF-1249

STANDARD 506

FLUSH MOUNT "T" CONE PLUG

ETCO

CO-402

STANDARD 512

MANHOLE FRAME AND COVER

PHOENIX IRON WORKS
D & L SUPPLY
SOUTH BAY FOUNDRY
PINKERTON FOUNDRY

P-1090CPH
A-1024CPH
SBF-1900CPH
A-640

STANDARD 514, 515

PRECAST TANK

M. C. NOTTINGHAM
PACIFIC CONCRETE PRODUCTS
SELVAGE CONCRETE PRODUCTS

STANDARD 516, 518

PRECAST INLET BOX

SANTA ROSA COST PRODUCTS

5K

STANDARD 516, 518

PRECAST MANHOLE TRANSITION

SANTA ROSA CAST PRODUCTS

5K W/5K X 24" TRANSITION SLAB

STANDARD 517

CLEANOUT BOX

GENECO

CC4 W/LID MARKED SEWER

RIM AND COVER

CHRISTY
BES

G5
M2



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ENGINEER'S
APPROVED
LIST

DATE: JUNE 2016

SCALE: N.T.S.

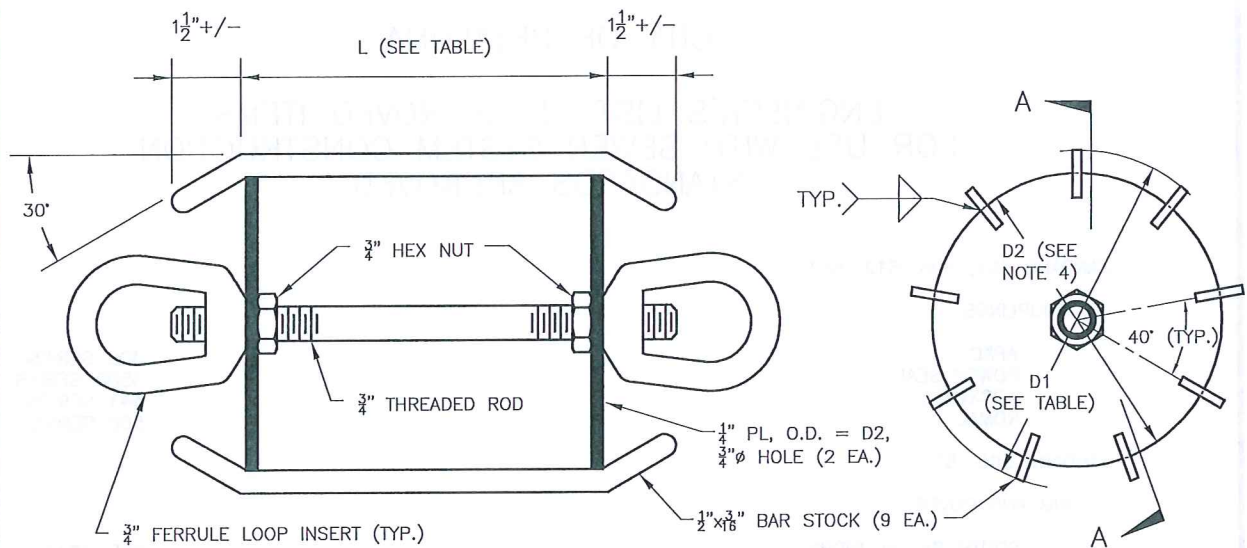
APPROVED BY:

Kent R. Carolers

Kent R. Carolers, P.E. Operations Manager C60671

DRAWN BY: TM

NO. 519



SECTION A-A

		MANDREL DIAMETER (D1) SEE NOTE 4	
		5% DEFLECTION	
NOM. PIPE DIA.	L	SDR 35	SDR 26
6	6"	5.619	5.503
8	8"	7.524	7.366
10	10"	9.405	9.207
12	12"	11.191	10.961
15	15"	13.849	13.559
>15	*	*	*

* REQUEST MANDREL DIMENSIONS FROM CITY.

NOTES:

1. MARK ALL MATERIALS WITH ASTM SPECIFICATION NUMBER, SDR NUMBER, AND DEFLECTION.
2. PLATE DIAMETER SHALL BE 1" LESS THAN THE MANDREL DIAMETER.
3. THE 1/2" BAR STOCK ON EDGE PROVIDES CLEARANCE TO PASS SMALL AMOUNTS OF SOIL WHICH MAY BE IN PIPE.
4. MANDREL DIAMETER HAS BEEN CALCULATED BASED ON SECTION 306-1.2.12 OF THE "GREENBOOK" STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION AND/OR DIMENSIONS GIVEN IN TABLE 1 OF ASTM STANDARD D3034.
5. ALTERNATIVE DESIGNS THAT MATCH THE DEFLECTION DIMENSIONS SHOWN MY BE SUBMITTED FOR REVIEW.



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DEFLECTION MANDREL
FOR PVC SEWER PIPE

DATE: DECEMBER 2020 SCALE: N.T.S.

APPROVED BY:

[Signature]
Kent Carothers, P.E.

DRAWN BY: ETL

NO. 520