APPENDIX C

DOCUMENTS RELATED TO SECTION V

DESIGN AND PERFORMANCE PROVISIONS

1. Standard Design Criteria for Sanitary Sewers
2. Standard Provisions for Sanitary Sewers
3. Standard Details Sanitary Sewers

Standard Design Criteria for Sanitary Sewers

These design criteria apply to all new and rehabilitated sanitary sewer system facilities within the City of Mountain View. Any variations from these criteria require the prior approval of the Public Works Director. Requests for variations must be accompanied by information supporting the need for the variation, including an assessment of available alternatives and related drawings and calculations.

The following abbreviations are used: groundwater infiltration (GWI), base wastewater flow (BWF), rainfall derived inflow and infiltration (RDI/I), daily peaking factor (DPF), and depth to diameter ratio (d/D).

Sewer Mains

All sewer mains, whether intended for City maintenance or homeowner association maintenance, will be designed to these standards.

1. Materials for Construction
   a. Vitrified Clay Pipe (VCP), extra strength (ASTM C700) with elastomeric joints (ASTM C425); or
   b. Polyvinylchloride Pipe (PVC), SDR 26 (ASTM D3034 or F679)
      i. C900 PVC may be used in place of SDR 26 PVC.

2. Sewer Location and Alignment
   a. Locate sewer mains on street centerline.
   b. The minimum distance from underground utilities is:
      i. Domestic water main:
         (1) Sewer mains will not cross domestic water mains unless absolutely necessary.
         (2) When sewer mains cross domestic water mains, the minimum distances measured between the outside wall of the pipe at the closest location will be:
            (a) 10′ horizontally.
            (b) 1′ vertically with the sewer main located below the elevation of the domestic water main.
            (c) The sewer main joints will be located as far as possible on either side of the point of crossing.
      ii. Underground pipes, conduits, structures, or other utilities:
         (1) 5′ horizontally and 1′ vertically measured from the closest outside wall.
   c. Sewers with vertical or horizontal curves are not allowed.

3. Size
   a. The minimum size for sewer mains is 8″.

4. Depth
   a. The minimum depth from finished grade to sewer invert is 5′.
      i. The minimum depth for unfinished streets where street grades have not been set is 6′ from the existing grade.
   b. The maximum depth from finished grade to sewer invert is 22′.

5. Slope
   a. The minimum slope will be 0.004′/1′ (0.04 percent).
   b. The design slope shall provide a velocity of 2′/second when the sewer is flowing half full (d/D = 0.5) where d/D refers to the depth-to-diameter ratio.
      i. Wherever possible, the design slope will provide a velocity of 2′/second during peak daily dry weather flow.
   c. The maximum slope will be limited to a velocity of 10′/second during any flow condition.

6. Capacity
   a. The design flow will be calculated using the following criteria:
      i. Residential Design flow = GWI + BWF + RDI/I where:
         (1) GWI + RDI/I = 800 gallons per acre per day
            (a) This value is for use on sewers ≤ 10″ in diameter.
            (b) This factor will be established using actual flow data for all other cases.
         (2) BWF = Population Served x Daily Peaking Factor x 90 gallons per capita per day where:
            (a) Population Served = projected population at build-out.
      ii. Nonresidential Design Flow
         (1) Nonresidential sewage generation factors shall be:

(a)	Commercial	100 gpd/1,000 square feet
(b)	Office/R&D	150 gpd/1,000 square feet
(c)	Mixed Use	100 gpd/1,000 square feet
(d)	Industrial	60 gpd/1,000 square feet
(e)	Public	15 gpd/employee
(f)	Employment	15 gpd/employee
(g)	Restaurant	1,000 gpd/1,000 square feet

      iii. Daily Peaking Factor, DPF:

(1) 0 to 199 upstream connections, DPF = 2.5
(2) 200 to 1,000 upstream connections, DPF = 2.2
(3) > 1,000 upstream connections, DPF = 1.8

iv. Maximum Depth of Flow will be:
(1) Sewers ≤ 12" in diameter, d/D = 0.5
(2) Sewers > 12" in diameter, d/D = 0.75

b. The sewer capacity will be calculated using Manning's Equation with the friction factor, n = 0.013.

7. Manholes

a. Provide a 0.1' drop in flow line at all manholes.
b. Manholes will be installed:
i. At all changes in direction, slope, pipe size, and pipe material.
ii. At the intersection of all sewer mains.
iii. The soffit (or crown) elevation of smaller sewer mains shall match the soffit elevation of larger sewer mains.
iv. At the upstream end of all sewer mains.
(1) At the property line where a private sanitary sewer connects to the City-maintained sewer main.
v. Nominally every 300' along the sewer main with the maximum distance not to exceed 350'.
vi. At 8" or larger lateral connections
c. Drop manholes will be installed when the flow line of the sewer main entering the manhole is 30" or more above the manhole flow line.
d. End-of-line cleanouts are not allowed.
i. Cleanouts may be used at the temporary ends of sewer mains.

8. Siphons

a. Siphons will be avoided whenever possible.
b. The minimum flow line drop across siphons will be 2'.
c. Siphons will have a minimum of two barrels.
i. One barrel will be designed to provide a velocity of at least 2'/second during peak daily dry weather flows.
ii. The second barrel will be designed:
(1) Flow will enter the second barrel when the flow line is at or above the crown of the first barrel.
(2) The second barrel will be designed to accommodate peak wet weather flows.

iii. Additional barrels will be designed to accommodate intermediate flow conditions if warranted.

d. Siphon inlet and outlet structures will be designed:
   i. To provide for the installation of stop logs to direct flows.
   ii. To provide for adequate room to accommodate siphon cleaning equipment.

e. Siphon material will be ductile iron pipe (AWWA C111) with interior and exterior corrosion-protection and passive cathodic-protection system.

9. Pump Stations
   a. Public pump stations are not allowed.
   b. Private pump stations are not allowed.
   c. Individual pump stations serving a single dwelling unit are not allowed.

10. Rehabilitation
   a. Sewer main rehabilitation methods will include:
      i. Pipe bursting.
      ii. Open cut.
   b. Manholes will be replaced or rehabilitated when sewer mains are rehabilitated.
   c. Lower sewer service laterals between the sewer main and the property line will be replaced or rehabilitated when sewer mains are rehabilitated.
      i. Service lateral connections to the sewer main will be reinstated by excavating the lateral and installing a factory wye, tap, or watertight/ root-tight saddle.
      ii. In-situ or internal service lateral reinstatement is not allowed.

Sewer Service Laterals

All sewer service laterals will be designed to these standards.

1. Materials for Construction
   a. Polyvinylchloride Pipe (PVC), SDR 26.

2. Individual laterals will be installed from each dwelling unit to the sewer main.

3. Lateral Location and Alignment
   a. Laterals will be connected to manholes wherever possible.
      i. Laterals in cul-de-sacs will be connected to manholes. The invert of the lateral will be located at the flow line of the manhole (no drop will be allowed).
   b. Laterals will not be located:
      i. Under driveways.
      ii. Within 5' horizontally from domestic water service.

iii. Within 10′ horizontally from the drip line of any existing or planned street trees.

c. The location of laterals will be stationed on the design drawings.

d. Lateral alignment will be at right angle or radial to the street right-of-way.

e. Lateral alignment will be marked where it crosses under the curb with a 1″ high "S" stamped or ground into the concrete.

4. Size

a. The minimum size for detached, single-family dwellings is 4″.

b. The minimum size for all other connections is 6″ or larger if required to provide adequate capacity.

5. Depth

a. The minimum depth from finished grade to sewer invert is 4′ at the back of the sidewalk or property line for easement sewers.

b. Deep sewer risers are required where the depth of the sewer main is 10′ or greater.

6. Slope

a. The minimum slope will be 0.02′/foot (2 percent).

7. Cleanouts

a. All sewer service laterals will have cleanouts as shown on the Standard Details.

b. Cleanout size and type will be:

i. Single-family residential—4″, one-way.

ii. All others—full size, one-way.

c. Cleanouts in paved areas will have traffic-rated metal covers.

8. Backflow Prevention Valve

a. Any dwelling unit or other connection where the elevation of the lowest floor is less than 1′ above the elevation of the rim of the next downstream manhole must install a sewer backwater prevention valve.

b. The property owner is responsible for the proper installation and maintenance of the backflow prevention valve.

SECTION 32: SANITARY SEWER INSTALLATION

32-01 SCOPE. The Work shall consist of furnishing and installing sewer mains, manholes, laterals, cleanout fittings and appurtenances; and testing, flushing and cleaning the same in accordance with the Plans and these Standard Provisions.

32-02 MATERIALS.

32-02.01 Vitrified Clay Pipe. Vitrified clay pipe and fittings shall be bell and spigot, unglazed, extra strength, conforming to ASTM C700, as amended to date.

32-02.02 Polyvinylchloride Pipe. Polyvinylchloride pipe and fittings shall be bell and spigot, conforming to ASTM D3034 (SDR 26) for diameters from four inches (4") through fifteen inches (15") and ASTM F679 for diameters from eighteen inches (18") through twenty- four inches (24"), as amended to date.

32-02.03 Vitrified Clay Pipe Joints. Vitrified clay pipe joints shall be of the resilient preformed type conforming to ASTM C425, as amended to date, except that rubber sleeve (Band-Seal) couplings will not be allowed in new main or new lateral installation.

32-02.04 Polyvinylchloride Pipe Joints. Polyvinylchloride pipe joints shall be bell gasketed joints. Gaskets shall meet the requirements of ASTM F477. The joints shall meet the requirements of ASTM D3212.

32-02.05 Precast Manhole Sections and Castings. These items shall conform to Section 31, "Storm Drain Installation," of these Standard Provisions.

32-02.06 Standard Sewer Main Cleanouts. Standard sewer main cleanouts built in accordance with the Standard Details shall be installed where shown on the Plans.

32-02.07 Sewer Laterals and Cleanouts. Sewer laterals and cleanouts shall be constructed of materials specified in the Standard Details. Sewer lateral cleanouts shall be the same size as the sewer lateral.

32-02.08 Portland Cement, Portland Cement Concrete and Mortar. These items shall conform to Section 31, "Storm Drain Installation," of these Standard Provisions.

32-03 CONSTRUCTION METHODS.

32-03.01 Handling of Materials. Vitrified clay pipe, polyvinylchloride pipe, fittings, precast concrete manhole sections, and cast iron frames and manhole covers must be carefully handled at all times. Only suitable and proper equipment and appliances shall be used for the safe loading, hauling, unloading, handling and placing of all materials. Special care shall be exercised so that the preformed resilient joints on pipe and fittings will not be damaged. Any pipe or fitting with a joint damaged or flattened will be rejected.

32-03.02 Trenching. Trench excavation, shoring, grade control, backfill and resurfacing shall conform to Section 24, "Trench Excavation, Backfill and Resurfacing," of these Standard Provisions.

32-03.03 Pipe Laying. Pipe laying shall proceed upgrade with the spigot end of bell and spigot pipe pointing in the direction of flow. Each pipe 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. Pipe shall not be laid when the condition of the trench or the weather is unsuitable. When Work is not in progress, open ends of pipe and fittings shall be plugged. As pipe laying proceeds, bell holes shall then be excavated at each joint to facilitate the jointing operations and shall be only of sufficient size for that purpose.

32-03.04 Manholes. Manholes shall be located as shown on the Plans and installed in accordance with the Standard Details. When a manhole is constructed over an existing sewer main, City Inspector shall be present when the Contractor makes the cut into the existing main.

32-03.05 Cleanouts. Cleanouts on mains and laterals shall be installed in accordance with the Standard Details.

32-03.06 Sewer Laterals. Sewer laterals shall be installed in accordance with the Standard Details. All taps into existing sewer mains shall be made by machine taps ("Tap Tite"), or, for VCP only, utilize Mission Clay insertion wye with Band-Seal fittings. Stamp or grind an "S" on the curb face where a sewer lateral crosses under the curb if no "S" currently exists.

32-03.07 Testing Sewer Lines.

a. Exfiltration/Infiltration Testing. Sewer pipe joints and manholes shall be so watertight that leaking into the sewer by groundwater infiltration shall not exceed 0.039 gallons per minute, per inch diameter, per one thousand feet (1,000') of main line sewer and sewer laterals being tested. The measure of the infiltration shall be defined as the exfiltration out of the pipeline when the lower end is

plugged at the manhole and the upper end is filled at a manhole so as to create a hydrostatic head in the line of a minimum four feet (4') and a maximum five feet (5') above the invert at the upper end of the line. If groundwater is encountered, the head above the invert of the pipe at the upper end of the line shall be increased so that the net hydrostatic head shall be a minimum of four feet (4') and a maximum of five feet (5'). The amount of exfiltration in one (1) hour measured through a water meter or other convenient device by bringing the water level back up to the starting level at the upper manhole shall determine the rate of exfiltration. The Contractor shall furnish and install the necessary and required plugs for the tests. The length of the laterals entering the section of main line being tested shall be included.

b. Air Testing. Air testing of sewer mains may be allowed in lieu of exfiltration/infiltration testing.

Air testing of vitrified clay pipe shall be in accordance with ASTM C-828, "Standard Test Methods for Low-Pressure Air Test of Vitrified Clay Pipe Lines." Air testing of PVC pipe shall be in accordance with the requirements specified in the most current Uni-B-6 pamphlet, "Recommended Practice for Low-Pressure Air Testing of Installed Sewer Pipe" issued by the Uni-Bell PVC Pipe Association or as per the pipe manufacturer's specifications. At the approval of the Engineer, air testing of HDPE pipe installed by pipe-bursting method may be in accordance with the most current Installation Test Standard IS-16 issued by the International Association of Plumbing and Mechanical Officials.

c. Acceptance. During the testing and flushing operation, a wire screen with a one-quarter of an inch (1/4") mesh or smaller shall be placed over the downstream outlet of the lower manhole to prevent any debris from being washed into the existing sewer system.

In no case shall the Contractor place the newly constructed sewer in operation without the approval of the Engineer.

In the event that infiltration or leakage exceeds the limits indicated above, the Contractor shall, at his own expense, immediately proceed to make necessary repairs, and no further payment shall be allowed, nor shall the project be finally accepted, until the tests indicate that the entire project meets the above requirements.

The Contractor shall furnish the necessary pumps, water, labor, equipment and materials and shall assist the Engineer in making tests of the completed sewerage project before the system is placed in operation or connected to other lines.

The Engineer shall designate the length or section of the sewer to be tested and may approve portions or all of the project without testing.

32-03.08 Flushing and Cleaning Sewer Lines. After all backfilling and pavement restoring operations have been completed, the Contractor shall flush and clean all sanitary sewer lines in the following manner, under the supervision of the Engineer or Inspector:

A heavy rubber ball, such as "MacWane Ball," manufactured by Sidu Company, Long Beach, California, or approved equal, inflated with air, and having an outside diameter equal to the interior diameter of the pipe to be cleaned, shall be furnished by the Contractor. The ball shall be inflated so that it will fit snugly into the sewer line. The ball shall be placed in the last (upper) manhole on the line and water introduced into the manhole back of the ball. The ball shall pass through the pipe with only the pressure of the water behind it. The rate at which the ball is allowed to pass through the pipe shall be controlled by a rope at all times. Debris flushed ahead with the ball shall be removed at the lower manhole where its presence is evident. This cleaning shall be conducted on each section of pipe installed. Care shall be exercised not to feed the ball too rapidly in order that all debris can be removed at each manhole.

During the flushing and cleaning operation, a wire screen with a one-quarter of an inch (1/4") mesh or smaller shall be placed over the downstream outlet of the lower manhole to prevent any debris from being washed into the existing sewer system.

32-03.09 Television Inspection. After completion of the pipe installation, service connections, flushing and cleaning, the sewer line shall be televised with a color closed-circuit television with tilt-head camera recorded in VHS format. The original videotape and log sheets shall be provided to the Engineer.

32-03.10 Abandoning Existing Sewer Mains. The existing sewer main to be abandoned shall be cut a minimum of twelve inches (12") clear of the manhole and abandoned in place at the location shown on the Plans after the new sewer is installed. The main shall be filled with sand and ends plugged with a minimum of six inches (6") of Portland cement concrete at each required cut.

32-04 MEASUREMENT.

32-04.01 Sewers. Sewers shall be measured horizontally by the linear foot. The measured distance for payment shall be the total distance along the centerline of the pipe, including all connections, less the design distance between the ends of the pipe in manholes through which the pipe does not pass. Whenever split pipe is required through a manhole, such pipe shall be included in the measurement.

32-04.02 Sewer Lateral. Sewer laterals shall be measured horizontally by the linear foot from the centerline of the main sewer to the end of the lateral, and shall include all fittings and connections.

32-04.03 Manholes. Manholes shall be measured as one complete installed unit, including base, precast sections, frame and cover.

32-04.04 Standard Sewer Main Cleanout. Standard sewer main cleanout shall be measured as one complete installed unit, including frame, cover and pipe.

32-04.05 Sewer Lateral Cleanout. Sewer lateral cleanouts shall be measured as one complete unit, including fittings, cleanout plug, box, cover (including metal traffic cover where required on the Plans or in the Special Provisions) and pipe.

32-04.06 Trench Surfacing. Trench surfacing shall not be measured for payment and shall be considered paid for under various items of Work.

32-04.07 Rechanneling Manhole Bases. Rechanneling manhole bases and breaking into manholes shall not be measured for payment and shall be considered as paid for in the various items of Work.

32.04.08 Television Inspection. Television inspection shall not be measured for payment and shall be considered paid for in the various items of Work.

32.04.09 Abandoning Existing Sewer Mains. Existing sewer main pipelines to be abandoned shall be measured as one complete unit, including concrete for both ends.

32-05 PAYMENT.

32-05.01 Sewer Main. The price per linear foot of sewer main shall include all wye branches and connections shown on the drawings; all labor, materials and pipe necessary to excavate the trench, bed, place and joint the pipe; backfill the trench; flushing, cleaning, testing and televising; all other work necessary to produce a complete and finished job, as required in the Special Provisions, shown on the Plans and specified herein.

32-05.02 Sewer Lateral. The price per linear foot of sewer lateral shall include one-eighth (1/8) bends, pipe, connections to main line sewer and all labor and materials necessary to excavate the trench, bed, place and joint the pipe; backfill the trench; and all other work necessary to produce a complete and finished job as required in the Special Provisions, shown on the Plans and specified herein.

32-05.03 Manhole. The Contract unit price paid for each manhole shall include full compensation for all labor, materials, tools and equipment, and for doing all Work, including excavation, backfill, compaction and resurfacing, as required in the Special Provisions, shown on the Plans and specified herein.

32-05.04 Standard Sewer Main Cleanout. The Contract unit price per each "Standard Sewer Main Cleanout" shall include full compensation for all labor, materials, tools and equipment and for doing all Work necessary and incidental to furnishing and installing a cleanout complete as required in the Special Provisions, shown on the Plans and specified herein.

32-05.05 Sewer Lateral Cleanouts. The Contract unit price per each sewer lateral cleanout shall include full compensation for wye branch, one-eighth (1/8) bend, riser, iron body cleanout with plug, box and lid, connection to lateral, labor, materials, tools and equipment, excavation, backfilling and resurfacing, required in the Special Provisions, as shown on the Plans and specified herein.

32-05.06 Abandoning Existing Sewer Mains. The Contract unit price for each sewer main pipeline that is abandoned shall constitute full compensation for all Work and materials required to complete the abandonment of the sewer main as required in the Special Provisions, shown on the Plans and specified herein.

SECTION 31: STORM DRAIN INSTALLATION

31-01 SCOPE. This work shall consist of furnishing and installing reinforced pipe, storm drains, manholes, inlets, underdrains, fittings and all other materials and appurtenances in accordance with the Plans and these Standard Provisions.

31-02 MATERIALS.

31-02.01 Reinforced Concrete Pipe. Reinforced concrete pipe shall conform to the requirements of ASTM C76, as amended to date. The wall design shall be at the option of the manufacturer. The manufacturer shall furnish to the City certificates showing that the pipe conforms to the specified ASTM designation. All pipe shall be Class III unless otherwise shown on the Plans. Nonreinforced concrete pipe meeting all requirements of reinforced concrete pipe may be substituted for all sizes twenty-four inches (24") in diameter and smaller.

Pipe designated by D-Load shall be marked as described in the ASTM Specifications except that the D-Load shall be marked on the pipe. The D-Load shall be determined during tests as described in the ASTM Specifications.

31-02.02 Reinforced Concrete Pipe Joints. Pipe shall be constructed with self-centering joints.

31-02.03 Precast Manhole Sections. Precast manhole sections shall conform to size, shape and details shown on the Standard Details. Precast reinforced concrete manhole risers, cones and grade rings shall conform to ASTM Designation C478 as amended to date.

31-02.04 Castings. Castings for manhole rings, cover and other purposes shall conform accurately to the form and dimensions shown on the Standard Details. The surface of casting shall be reasonably smooth, free from defects of any kind and the castings shall conform to the requirements of ASTM A48, Class 30B as amended to date. Bottom rim of cover and seat of frames shall be machined to form a close fit free from wobble. The combined weight of cover and frame shall exceed two hundred sixty-five (265) pounds.

Before leaving the foundry, all castings shall be thoroughly cleaned and coated by dipping in asphalt applied at a temperature of three hundred degrees (300°) Fahrenheit in such a manner as to provide a firm, durable, tenacious coating.

31-02.05 Inlets. All inlets shall conform to size, shape and details as shown on the Standard Details. The type of inlet shall be as specified on the Plans or in the Special Provisions.

31-02.06 Inlet Grates and Grate Frames. Inlet grates and grate frames shall conform to size, shape and details as shown on the Standard Details or on the Plans. Rectangular frames shall be fabricated from structural steel conforming to the requirements of ASTM A36. The bar portion of the frames may be fabricated from special quality, hot rolled steel bars conforming to the American Iron and Steel Institute Designation No. C1021. Frames and grates shall be match marked in pairs before delivery to the job site and the grates shall fit into their frames without rocking.

31-02.07 Reinforcing Bars. Reinforcing bars shall be deformed billet steel bars conforming to the specifications of ASTM A615, Grade 60, including Supplementary Requirement S1 and shall be of the size shown on the Standard Details or on the Plans. Bars shall be of the round deformed type; free from injurious seams, flaws or cracks; and shall be cleaned of all rust, dirt, grease, loose scale and any other coating of any character that would destroy or reduce the bond.

31-02.08 Portland Cement Concrete. Portland cement concrete for manhole bases, inlets and other concrete structures shall conform to the requirements of Section 90, "Portland Cement Concrete," of the Standard Specifications and specified herein.

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 of one and one-half inch (1-1/2") 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 520. The concrete shall have a minimum compressive strength of 3,300 PSI after twenty-eight (28) days.

31-02.09 Mortar. Mortar shall conform to the requirements of Section 65, "Reinforced Concrete Pipe," of the Standard Specifications.

31-02.10 Underdrains. Underdrains shall conform to Section 68, "Subsurface Drains," of the Standard Specifications.

31-02.11 Underdrain Risers. Underdrain risers shall conform to Section 68, "Subsurface Drains," of the Standard Specifications.

31-02.12 Curb Drains. Curb drains shall conform to the Standard Details and shall be located where shown on the Plans.

Three-inch (3") ductile iron pipe for curb drains shall conform to ASTM designation.

31-03 CONSTRUCTION METHODS.

31-03.01 Trenching. Trench excavation, shoring, grade control, backfill and resurfacing shall conform to the requirements of Section 24, "Trench Excavation, Backfill and Resurfacing," of these Standard Provisions.

31-03.02 Handling of Material. Reinforced concrete pipe, precast concrete manhole sections, inlet frames, grates and fittings must be carefully handled at all times. Only suitable and proper equipment and appliances shall be used for the safe loading, hauling, unloading, handling and placing of materials. Any material which is checked, spalled, out of round or damaged shall not be installed and such material must be permanently removed from the job site within twenty-four (24) hours after notification.

31-03.03 Pipe Laying. No pipe shall be laid until the Engineer inspects and approves the condition of the bottom of the trench. Pipe laying shall proceed upgrade with the tongue section of tongue-and-groove pipe pointed in the direction of flow.

Split pipe shall be used through a manhole except for changes in pipe grade, size, type or direction.

Each section of pipe 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 storm drain shall be cleaned of all dirt and debris. Where clearing after laying is difficult because of small pipe size, a suitable swab or squeegee shall be kept in the pipe and pulled forward past every joint immediately after jointing has been completed. Pipe shall not be laid when the condition of the trench or the weather is unsuitable.

After the joint is assembled and if jetting is to be accomplished the same day as the pipe is installed, a moisture-resistant band of polyethylene, heavy-gauge sheeting, "Kordite" or approved equal, shall be placed around the outside of the pipe and centered over the joint to prevent damage to the joint and entry of water and dirt into the pipe.

Concrete pipe with elliptical reinforcement shall be laid with the minor axis of the reinforcement cage in a vertical position.

31-03.04 Joints. The joints shall be completely filled and compacted with mortar so as to make a strong joint. No mortar will be required in the outside joint recesses of self-centering pipe. Unless otherwise approved by the Engineer, all joints shall be finished smooth on the inside of pipe.

In pipe sizes twenty-one inches (21") and larger, inside joint recesses shall be hand-pointed. In pipe sizes eighteen inches (18") and smaller, inside joint recesses shall be buttered prior to closure. After the closure is made, the joint shall be pointed inside the pipe and excess mortar removed by means of a long-handled brush, an inflated swab or squeegee.

31-03.05 Manholes. Manholes shall be located as shown on the Plans and installed in accordance with the Standard Details.

31-03.06 Inlets. Inlets shall be located as shown on the Plans and installed in accordance with the Standard Details and the following specifications. All the inside and exposed surfaces of concrete shall be smooth and uniform when finished and the concrete shall be thoroughly compacted around all reinforcing bars. Inlets installed in curb returns shall have angle anchors curved to conform to the curb return radius. Precast inlets will be permitted when meeting the above requirements and when approved by the Engineer.

31-03.07 Television Inspection. After completion of the pipe installation and cleaning, the storm drain line shall be televised with a color closed-circuit television with tilt-head camera recorded in VHS format. The original video tape and log sheets shall be provided to the Engineer.

31-04 MEASUREMENT.

31-04.01 Reinforced Concrete Pipe. Reinforced concrete pipe shall be measured horizontally by the linear foot for the various strengths and sizes along the centerline of the pipe less the design distance between the ends of the pipe in manholes and inlets through which the pipe does not continuously pass. Whenever split pipe is required through a manhole, such pipe shall be included in the measurement.

31-04.02 Manholes. Manholes shall be measured as one complete installed unit, including base, precast sections, frame and cover.

31-04.03 Inlets. Inlets shall be measured as one complete installed unit, including grate and frame.

31-04.04 Underdrains. Underdrains shall be measured by the linear foot, including excavation, pipe, fittings, backfill material, building paper and appurtenances.

31-04.05 Underdrain Risers. Underdrain risers shall be measured as one complete installed unit, including pipe, ells, fittings, cover and cleanout box, if required.

31-04.06 Curb Drains. Curb drains shall be measured as one complete installed unit, including inlet box and frame and grate, installation of outlet through face of curb or connection to existing inlet, pipe and wire mesh or reinforcing bars.

31-04.07 Trench Surfacing. Trench surfacing shall not be measured for payment and shall be considered as paid for in the various items of work.

31-04.08 Rechanneling Manhole Bases. Rechanneling manhole bases and breaking into manholes shall not be measured for payment and shall be considered as paid for in the various items of work.

31.04.09 Television Inspection. Television inspection shall not be measured for payment and shall be considered paid for in the various items of work.

31-05 PAYMENT.

31-05.01 Reinforced Concrete Pipe. The Contract unit price per linear foot for reinforced concrete pipe shall constitute full compensation for furnishing all labor, materials, tools and equipment and for doing all Work, including excavation, backfill, compaction, resurfacing and televising required to install the reinforced concrete pipe complete as required in the Special Provisions, shown on the Plans and specified herein.

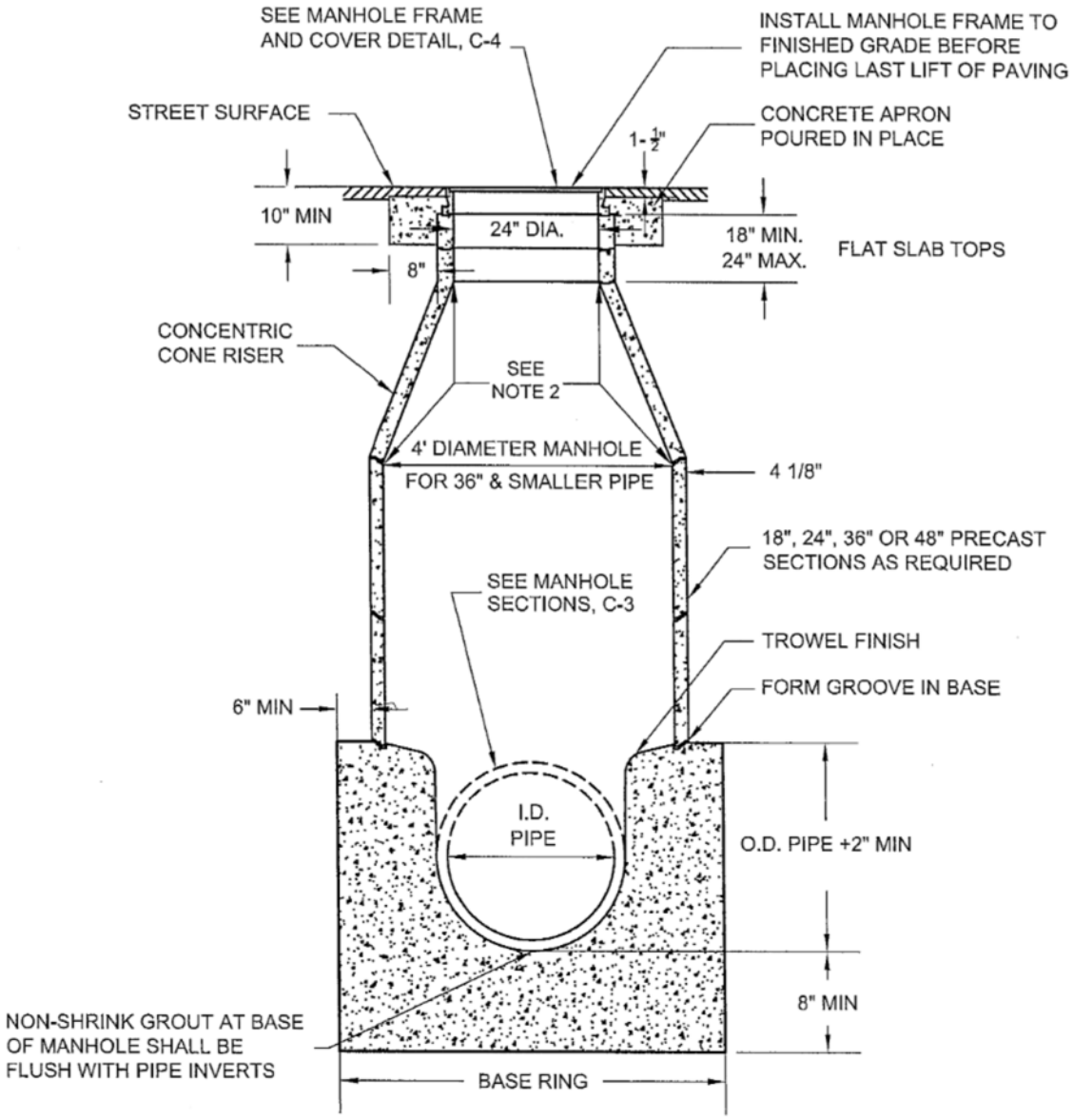
31-05.02 Manholes. The Contract unit price paid for each manhole shall include full compensation for all labor, materials, tools and equipment and for doing all Work, including excavation, backfill and compaction and resurfacing, all as required in the Special Provisions, shown on the Plans and specified herein.

31-05.03 Inlets. The Contract unit price for each inlet shall include full compensation for labor, materials, tools and equipment and for doing all Work, including excavation, backfill and compaction and resurfacing, all as required in the Special Provisions, shown on the Plans and specified herein.

31-05.04 Underdrains. The Contract unit price per linear foot for under-drains shall include full compensation for furnishing labor, materials, tools and equipment and for doing all Work, including excavation, permeable material backfill and compaction required to install the underdrain pipe complete as required in the Special Provisions, shown on the Plans and specified herein.

31-05.05 Underdrain Riser. The Contract unit price per each underdrain riser shall include full compensation for labor, materials, tools and equipment and for doing all Work, including pipe, ells, fittings, cover and cleanout box, if required, as required in the Special Provisions, shown on the Plans and specified herein.

NO STEP TO BE INSTALLED



NOTES:

1. LAY PIPE THRU BOTTOM OF MANHOLES. AFTER CONCRETE IN BASE HAS SET, REMOVE PORTION OF PIPE INDICATED WITH DASHED LINES.
2. INSTALL RAM-NEK JOINT TAPE OR EQUAL AT ALL JOINTS.
3. MORTAR ALL JOINTS WITH A SMOOTH FINISH.

Revision	Date	Approved
Drawn: QT	Date: 08-11-14	
Checked: LA	Scale: NTS	

APPROVED BY: REGISTERED PROFESSIONAL ENGINEER JACQUELINE ANDREWS No. 57093 CIVIL STATE OF CALIFORNIA

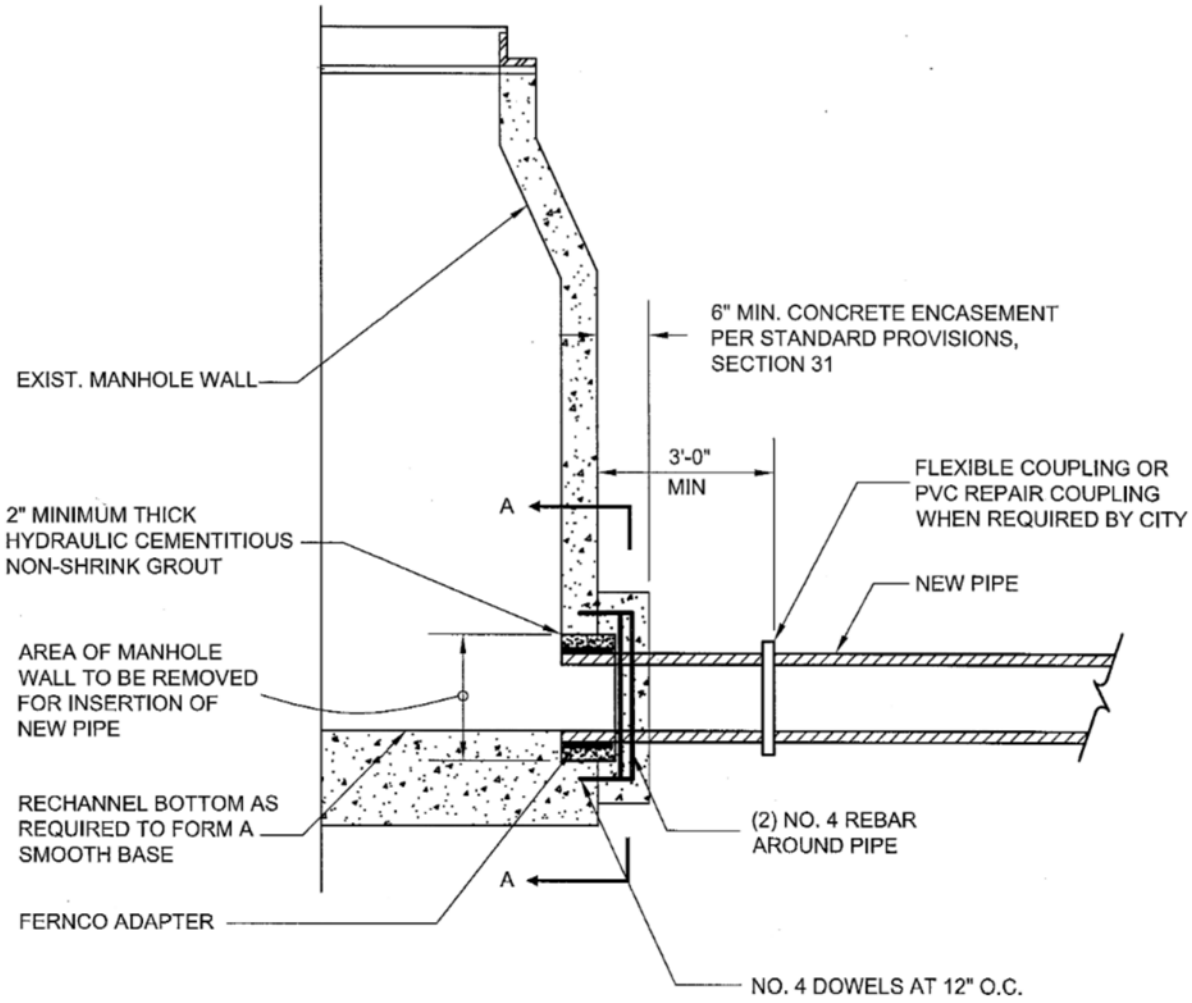
Jacqueline A. Solomon
ASSISTANT PUBLIC WORKS DIRECTOR

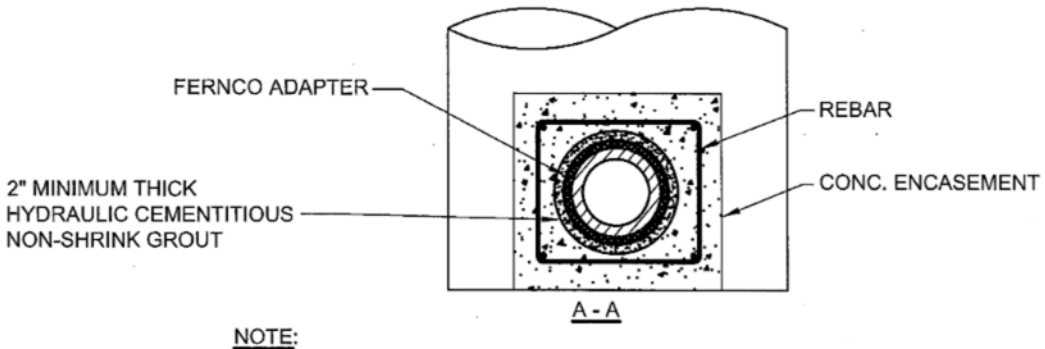
08-11-16 DATE | 12-31-17 EXP. | 57093 R.C.E. NO.

CITY OF MOUNTAIN VIEW
PUBLIC WORKS DEPARTMENT
STANDARD DETAIL

SANITARY SEWER MANHOLE
FOR 36" AND SMALLER DIAMETER PIPES

FILE NO. C-1





A - A

NOTE:

1. NEW PIPE INVERT SHALL BE FLUSHED WITH BASE OF MANHOLE.
2. MAKE SMOOTH GROUT FINISH AROUND PIPE END AND INTERIOR WALL. GROUT END OF DOWELS THAT PENETRATE MANHOLE INTERIOR.

Revision	Date	Approved
Drawn: HN	Date: 11-22-13	
Checked: LA	Scale: NTS	

REGISTERED PROFESSIONAL ENGINEER — JACQUELINE ANDREWS SOLOMON — No. 57093 — CIVIL — STATE OF CALIFORNIA

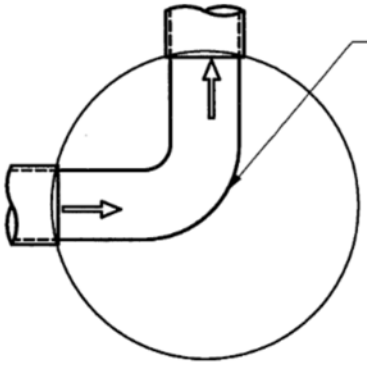
APPROVED BY: Jacqueline CA Solomon

01-08-14 DATE | 12-31-15 EXP. | 57093 R.C.E. NO.

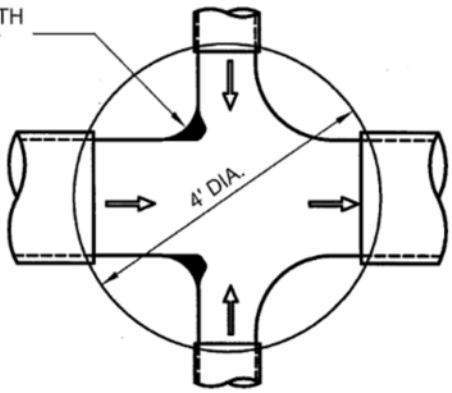
CITY OF MOUNTAIN VIEW
PUBLIC WORKS DEPARTMENT
STANDARD DETAIL

NEW PIPE CONNECTION TO EXISTING MANHOLE

FILE NO. C-2



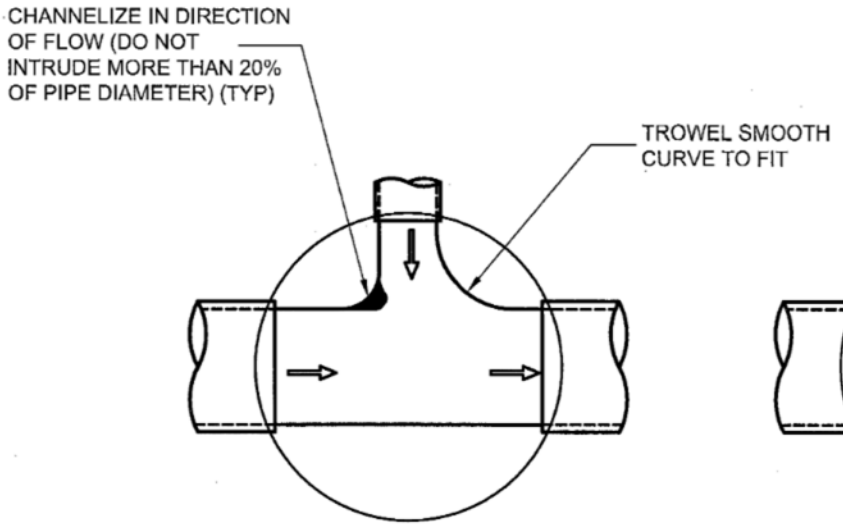
TYPICAL CURVED MANHOLE



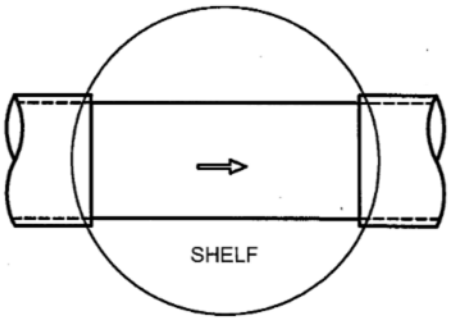
TYPICAL MANHOLE
WITH 2 BRANCHES

NOTE:

THE TOP HALF OF THE PIPE SHALL BE REMOVED TO THE CONTOUR OF THE INSIDE OF MANHOLE & THE BROKEN EDGES SHALL BE PLASTERED SMOOTH WITH CEMENT GROUT TYPICAL FOR ALL MANHOLE AS SPECIFIED.



TYPICAL MANHOLE
WITH 1 BRANCH



TYPICAL STRAIGHT
THROUGH MANHOLE

			CITY OF MOUNTAIN VIEW PUBLIC WORKS DEPARTMENT STANDARD DETAIL
Revision	Date	Approved	
Drawn: QT	Date: 11-22-13		
Checked: LA	Scale: NTS		SANITARY SEWER MANHOLE SECTIONS

APPROVED BY: Jacqueline CA Solomon
ASSISTANT PUBLIC WORKS DIRECTOR

01-08-14 DATE | 12-31-2015 EXP. | 57093 R.C.E. NO.

REGISTERED PROFESSIONAL ENGINEER JACQUELINE ANDREWS SOLOMON No. 57093 CIVIL STATE OF CALIFORNIA

FILE NO. C-3

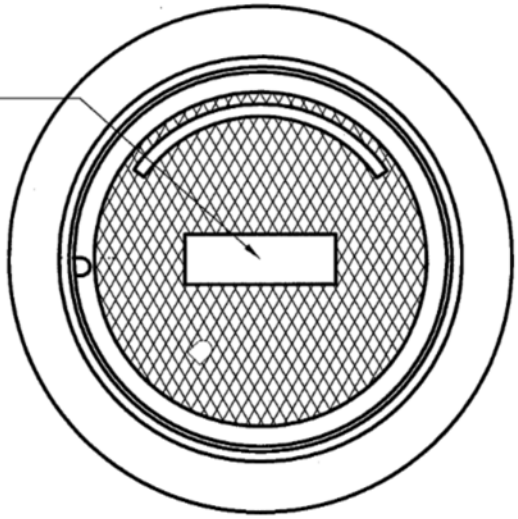
FOR MANHOLES IN PUBLIC RIGHT-OF-WAY
OR PUBLIC EASEMENT:

CITY OF
MOUNTAIN VIEW
SANITARY SEWER

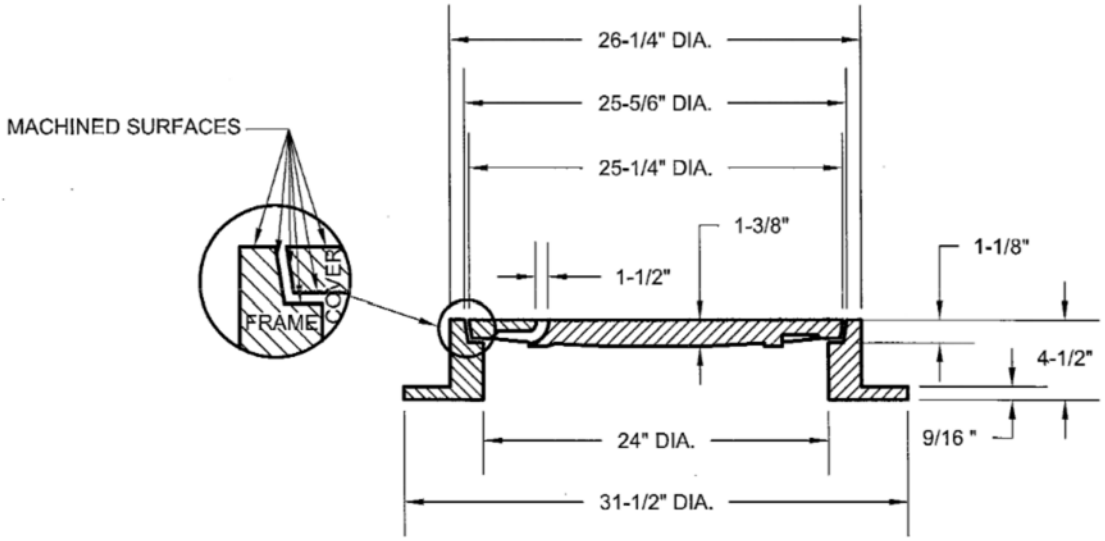
OR

FOR MANHOLES IN OTHER LOCATIONS:

SANITARY SEWER



PLAN - FRAME & COVER



SECTION - FRAME & COVER

NOTES:

1. WHEN THERE IS A NEED TO RAISE MANHOLE COVERS TO MEET NEW GRADE, ONLY ONE ADDITIONAL MANHOLE RING MAY BE ADDED.
2. FRAME AND COVER SHALL BE PHOENIX IRON WORKS #P-1090 OR APPROVED EQUAL.

Revision	Date	Approved
Drawn: QT	Date: 11-22-13	
Checked: LA	Scale: NTS	

REGISTERED PROFESSIONAL ENGINEER — JACQUELINE ANDREWS SOLOMON — No. 57093 — STATE OF CALIFORNIA — CIVIL

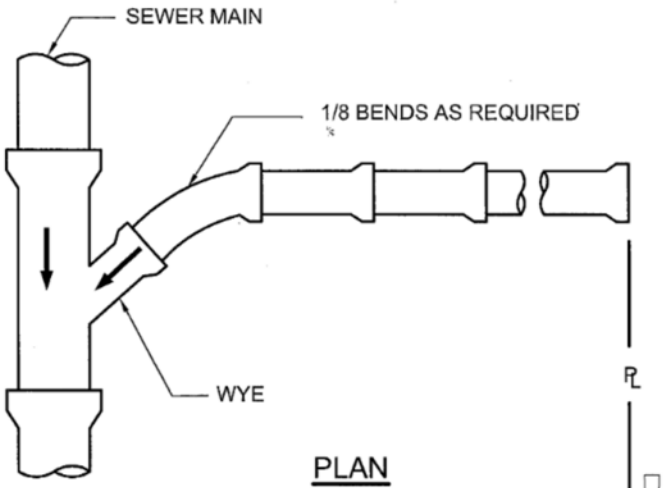
APPROVED BY: Jacqueline CA Solomon
ASSISTANT PUBLIC WORKS DIRECTOR

01-08-14	12-31-15	57093
DATE	EXP.	R.C.E. NO.

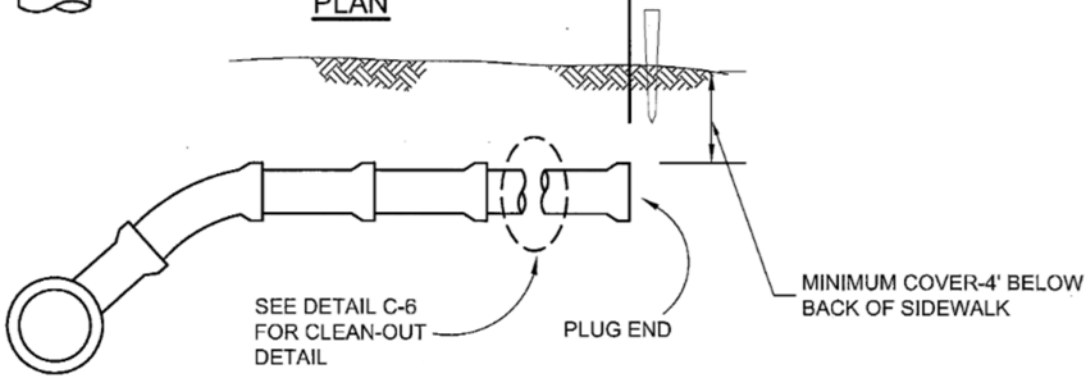
CITY OF MOUNTAIN VIEW
PUBLIC WORKS DEPARTMENT
STANDARD DETAIL

SANITARY SEWER MANHOLE
FRAME & COVER

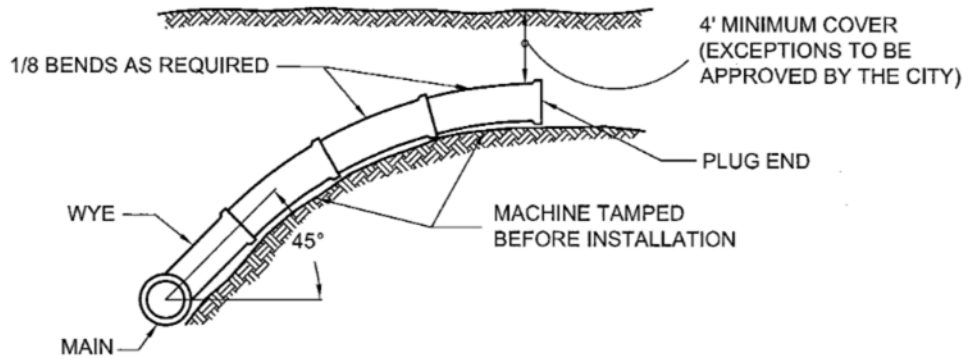
FILE NO. C-4



PLAN



ELEVATION



NOTES:

1. PVC (SDR 26), HDPE (SDR17), OR APPROVED EQUAL.
2. STAMP "S" IN CURB FACE TO SHOW LOCATION OF LATERAL.
   IN LOCATIONS WHERE THE CURB CAN NOT BE STAMPED, A 2" x 2" x 3' REDWOOD STAKE SHALL BE SET 6" ABOVE GROUND IF PROJECTION IS NOT DANGEROUS OR OBJECTIONABLE.
3. MINIMUM SLOPE OF LATERAL SHALL BE 1/4" PER 12" OR 2%.

DEEP SEWER RISER

DEEP SEWER RISER SHALL BE CONSTRUCTED WHEN DEPTH OR SEWER FLOW LINE EXCEEDS 10' BELOW CROWN OF STREET.

Revision	Date	Approved
Drawn: QT	Date: 05-22-14	
Checked: LA	Scale: NTS	

REGISTERED PROFESSIONAL ENGINEER — JACQUELINE ANDREWS SOLOMON — No. 57093 — CIVIL — STATE OF CALIFORNIA

APPROVED BY: Jacqueline CA Solomon
ASSISTANT PUBLIC WORKS DIRECTOR

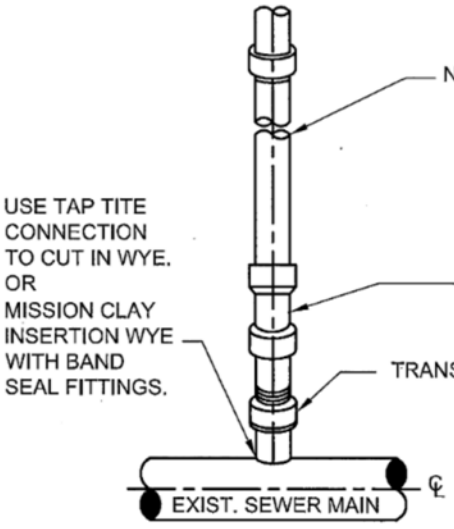
01-08-14 DATE | 12-31-15 EXP. | 57093 R.C.E. NO.

CITY OF MOUNTAIN VIEW
PUBLIC WORKS DEPARTMENT
STANDARD DETAIL

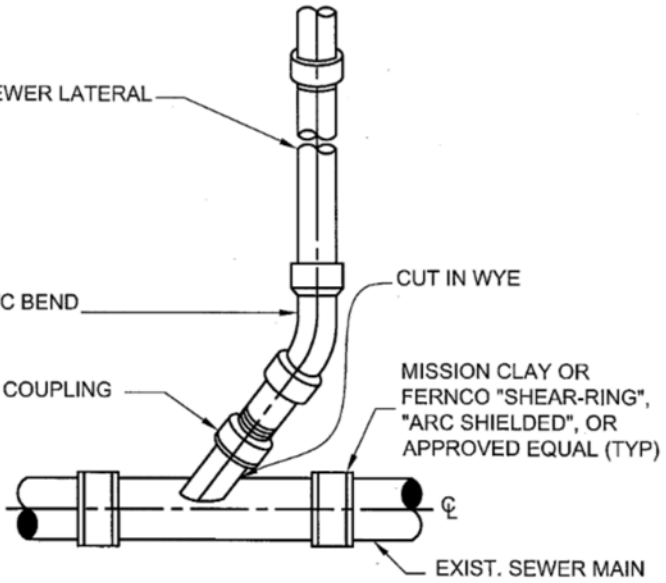
SEWER LATERAL AND

DEEP SEWER RISER

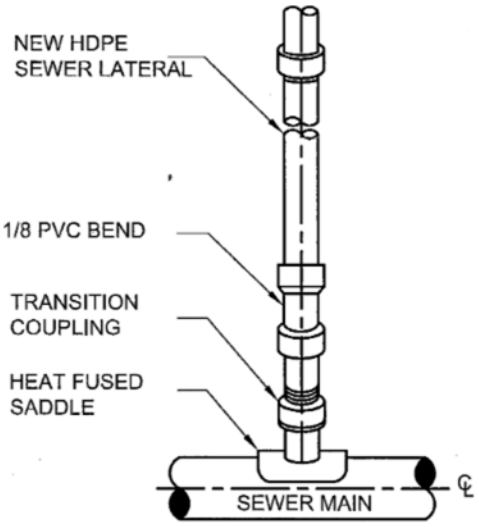
FILE NO. C-5



DETAIL A:
NEW LATERAL INTO EXIST. SEWER MAIN



DETAIL B:
NEW LATERAL INTO EXIST. SEWER MAIN



DETAIL C:
NEW HDPE LATERAL INTO HDPE SEWER MAIN

NOTES:

1. ONLY NEW HDPE LATERAL TO HDPE MAIN IS FUSED.
2. USE TAPTITE CONNECTIONS FOR NEW < 8" Ø LATERALS TO EXIST. MAIN.
3. WYE CONNECTION CAN BE USED FOR EXIST SEWER MAIN ≤ 15" Ø OR UPON ENGINEERS APPROVAL.

Revision	Date	Approved
Drawn: HN	Date: 11-22-13	
Checked: LA	Scale: NTS	

APPROVED BY: Jacqueline CA Solomon

REGISTERED PROFESSIONAL ENGINEER — JACQUELINE ANDREWS SOLOMON — No. 57093 — CIVIL — STATE OF CALIFORNIA

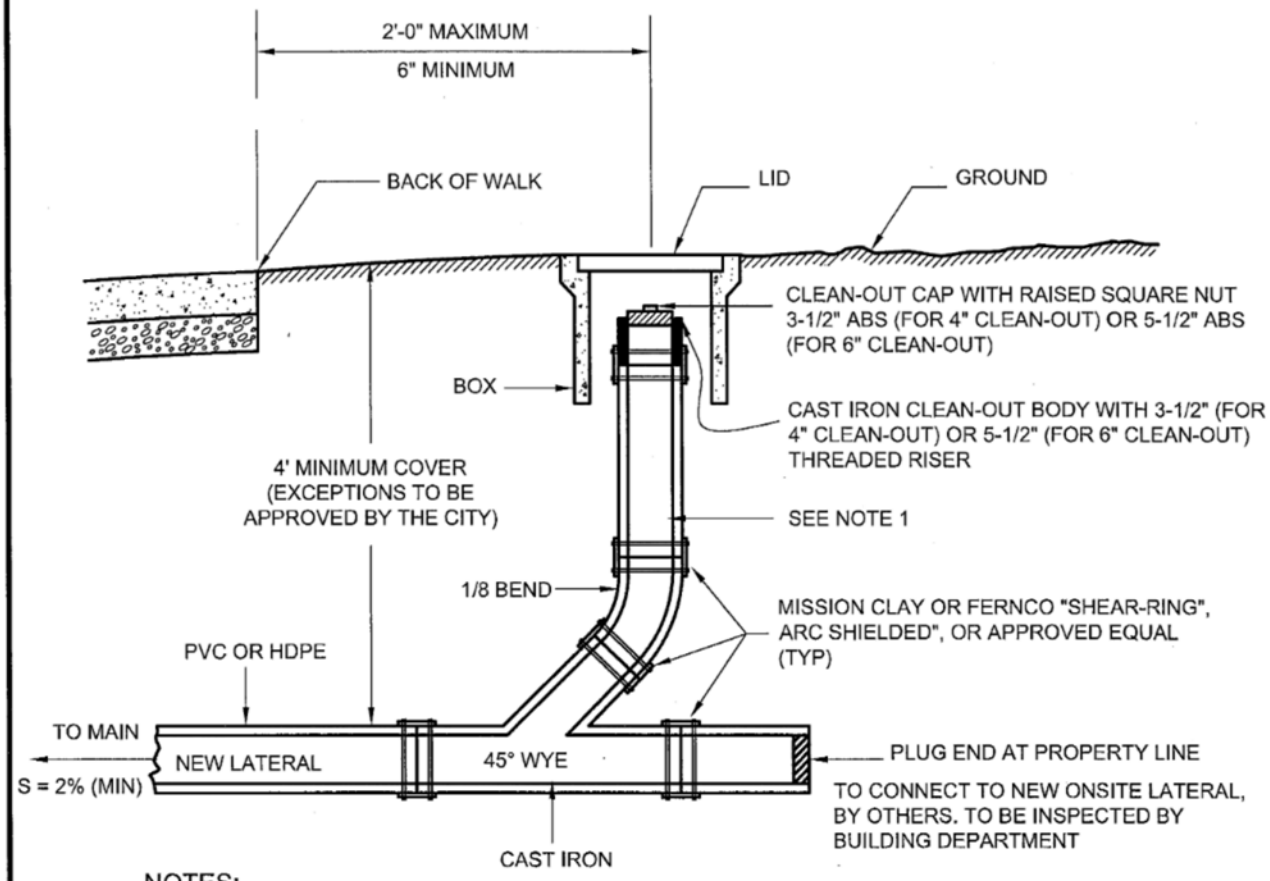
01-08-14 DATE | 12-31-15 EXP. | 57093 R.C.E. NO.

CITY OF MOUNTAIN VIEW
PUBLIC WORKS DEPARTMENT
STANDARD DETAIL

SEWER LATERAL CONNECTIONS

TO SEWER MAINS

FILE NO. C-6



NOTES:

1. ALL NEW PIPING SHALL BE PVC (SDR 26), HDPE (SDR 17), OR APPROVED EQUAL UNLESS OTHERWISE NOTED. PIPE TO BE SAME I.D. AND MATERIAL AS LATERAL.
2. WHERE THERE ARE NO FRONTAGE IMPROVEMENTS, INSTALL CLEAN-OUT AT PROPERTY LINE.
3. ALL CLEAN-OUT BOXES SHALL BE CHRISTY CONCRETE PRODUCTS MANUFACTURED BY OLDCASTLE PRECAST, INC. WITH THE FOLLOWING MODEL NUMBERS:

	4" RISER		6" RISER	
	NON-TRAFFIC	TRAFFIC	NON-TRAFFIC	TRAFFIC
BOX	F08	G05T	G05T	G05T
LID	F08C	G05C	G05C	G05C

4. LIDS SHALL BE MARKED "SEWER".
5. STAMP OR GRIND FACE OF CURB WITH "S" WHERE LATERAL PASSES UNDER CURB, IF NOT PRESENT.
6. PLUG END AT PROPERTY LINE IF THERE IS NO ON-SITE LATERAL.
7. 1/8 BEND MAY BE PART OF 45° WYE IF APPROVED BY CITY.

Revision	Date	Approved
Drawn: QT	Date: 08-25-14	
Checked: LA	Scale: NTS	

APPROVED BY: Jacqueline CA Solomon
ASSISTANT PUBLIC WORKS DIRECTOR

01-08-14 DATE | 12-31-15 EXP. | 57093 R.C.E. NO.

REGISTERED PROFESSIONAL ENGINEER ANDREWS No. 57093 CIVIL STATE OF CALIFORNIA

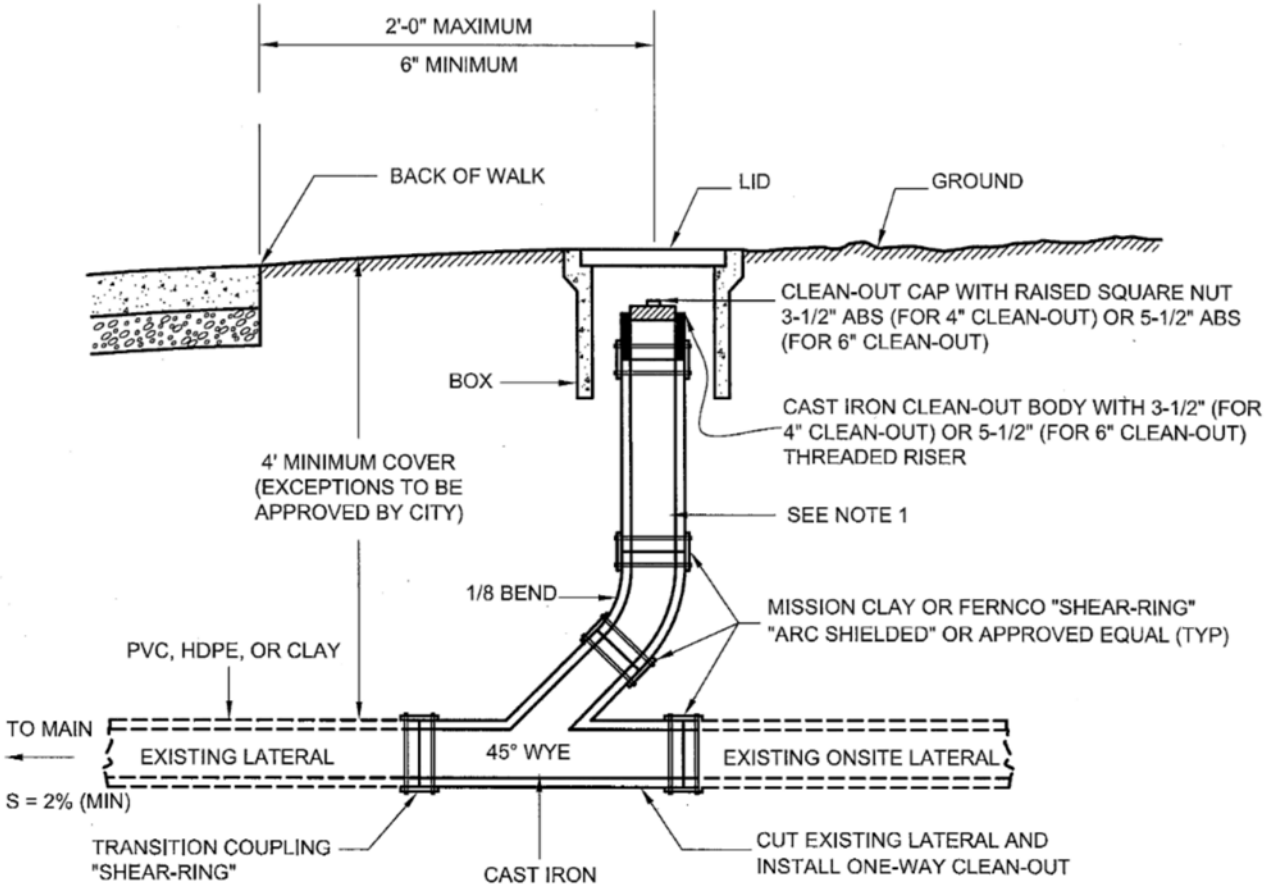
CITY OF MOUNTAIN VIEW
PUBLIC WORKS DEPARTMENT
STANDARD DETAIL

SEWER LATERAL CLEAN-OUT

NEW

4" AND 6" LATERALS

FILE NO. C-7



NOTES:

1. ALL NEW PIPING SHALL BE PVC (SDR 26), HDPE (SDR 17), OR APPROVED EQUAL UNLESS OTHERWISE NOTED. PIPE TO BE SAME I.D. AND MATERIAL AS LATERAL. CLEAN-OUT SIZE SHALL MATCH DOWN STREAM LATERAL.
2. WHERE THERE ARE NO FRONTAGE IMPROVEMENTS, INSTALL CLEAN-OUT AT PROPERTY LINE.
3. ALL CLEAN-OUT BOXES SHALL BE CHRISTY CONCRETE PRODUCTS MANUFACTURED BY OLDCASTLE PRECAST, INC. WITH THE FOLLOWING MODEL NUMBERS:

	4" RISER		6" RISER	
	NON-TRAFFIC	TRAFFIC	NON-TRAFFIC	TRAFFIC
BOX	F08	G05T	G05T	G05T
LID	F08C	G05C	G05C	G05C

4. LIDS SHALL BE MARKED "SEWER".
5. STAMP OR GRIND FACE OF CURB WITH "S" WHERE LATERAL PASSES UNDER CURB, IF NOT PRESENT.
6. 1/8 BEND MAY BE PART OF 45° WYE IF APPROVED BY CITY.

Revision	Date	Approved
Drawn: QT	Date: 12-23-14	
Checked: LA	Scale: NTS	

APPROVED BY: Jacqueline CA Solomon
ASSISTANT PUBLIC WORKS DIRECTOR

01-08-14 DATE | 12-31-15 EXP. | 57093 R.C.E. NO.

REGISTERED PROFESSIONAL ENGINEER JACQUELINE ANDREWS SOLOMON No. 57093 STATE OF CALIFORNIA

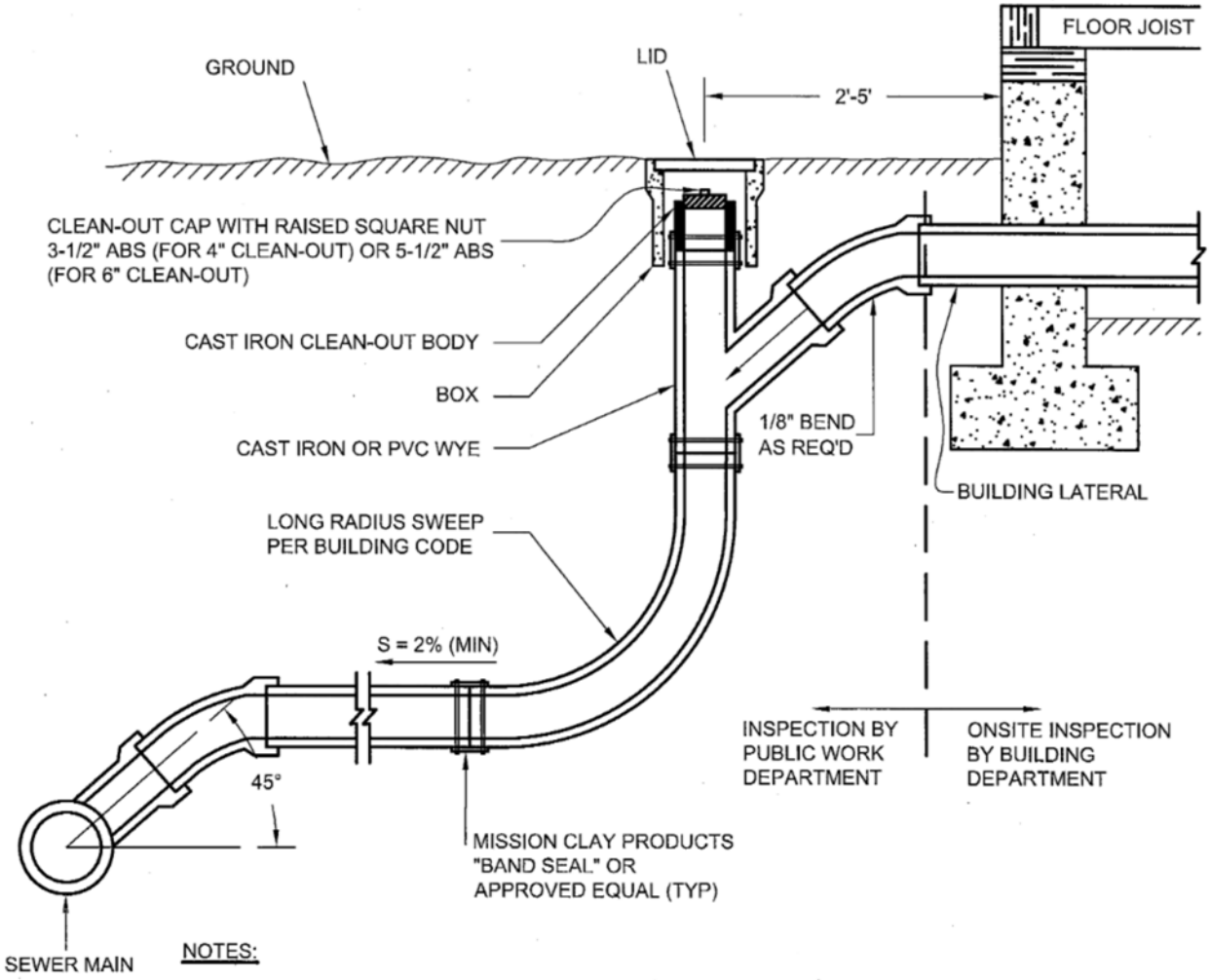
CITY OF MOUNTAIN VIEW
PUBLIC WORKS DEPARTMENT
STANDARD DETAIL

SEWER LATERAL CLEAN-OUT

EXISTING

4" AND 6" LATERALS

FILE NO. C-8



NOTES:

1. DETAIL APPLIES TO TOWNHOUSE TYPE CONDOMINIUMS AND COMMON GREEN DEVELOPMENTS WITH PRIVATE SEWERS.
2. ALL CLEAN-OUT BOXES SHALL BE CHRISTY CONCRETE PRODUCTS MANUFACTURED BY OLDCASTLE PRECAST, INC. WITH THE FOLLOWING MODEL NUMBERS:

	4" RISER		6" RISER	
	NON-TRAFFIC	TRAFFIC	NON-TRAFFIC	TRAFFIC
BOX	F08	G05T	G05T	G05T
LID	F08R	G05C	G05C	G05C

3. LIDS SHALL BE MARKED "SEWER"
4. STAMP OR GRIND FACE OR TOP OF CURB WITH "S" WHERE LATERAL PASSES UNDER CURB, IF NOT PRESENT.

Revision	Date	Approved

Drawn: HN Date: 08-25-14

Checked: LA Scale: NTS

APPROVED BY: Jacqueline CA Solomon
ASSISTANT PUBLIC WORKS DIRECTOR

01-08-14 DATE | 12-31-15 EXP. | 57093 R.C.E. NO.

REGISTERED PROFESSIONAL ENGINEER — JACQUELINE ANDREWS SOLOMON — No. 57093 — CIVIL — STATE OF CALIFORNIA

CITY OF MOUNTAIN VIEW
PUBLIC WORKS DEPARTMENT
STANDARD DETAIL

SEWER SERVICE CONNECTION
FOR COMMON GREEN DEVELOPMENTS
4" AND 6" LATERALS

FILE NO. C-9