CITY OF BURLINGAME
WATER SYSTEM
STANDARD SPECIFICATIONS
STANDARD DRAWINGS

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Standard Specifications

CITY OF BURLINGAME
WATER SYSTEM STANDARD SPECIFICATIONS

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SECTION 02302

EARTHWORK

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Perform all excavation, shoring, dewatering, backfilling, compaction and grading necessary or required for the construction of the work as covered by these Specifications and indicated on the Project Engineers' or City's Standard Drawings as submitted to and accepted by the City. The excavation shall include the removal and disposal of all materials of whatever nature encountered, including water and all other obstructions, that would interfere with the proper construction and completion of the required work.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM).

B. State of California, Department of Transportation, Standard Specifications - May 2006.

C. State of California, Department of Transportation, Manual of Test (California Test).

1.03 SUMITTALS

A. Submit the following under the Product Information category.
1. Sheeting and Shoring Plan: Refer to Paragraph 1.08 below.
2. Potholing Report as described in Paragraph 3.02.
3. Samples and Test Results: Furnish such quantities of import materials as may be required by the City for test purposes. Cooperate with the City and furnish necessary facilities for sampling and testing of all materials and workmanship. Submit test results for import materials. Tests shall be performed within 30 days of the submission. All material furnished and all work performed shall be subject to rigid inspection, and no material shall be delivered to the site until it has been favorably reviewed by the City.
4. Name and qualifications of independent testing laboratory.

1.04 QUALITY ASSURANCE

A. Source Quality Control: Test import materials proposed for use to demonstrate that the materials conform to the specified requirements. Tests shall be performed by an independent testing laboratory.

B. Field Quality Control:
1. The City will:
    a. Review materials proposed for use.
    b. Inspect foundations and site grading.
    c. Inspect placement and compaction of fill as follow:

i. The City requires one compaction test every 200 linear feet of pipeline installed. More frequent tests may be required if compaction test results do not meet the project requirements, in addition areas not meeting compaction requirements shall be recompacted and retested.

ii. Contractor will conduct field materials placement test (e.g. compaction) as directed by the City using an approved independent testing laboratory. Contractor shall be responsible for all associated costs.

C. Testing Methods:

1. Durability Index: Manual of Test, State of California, Department of Transportation.
2. Specific Gravity: ASTM D854.
3. Laboratory Compaction: ASTM D1557, Method A or C.
4. In-Place Density: ASTM D1556 or ASTM D2922.
5. Particle Size Analysis of Soils: ASTM D422.
6. Plastic Limit and Plasticity Index: ASTM D4318.
7. Soil Classification: ASTM D2487.
8. In-Place Moisture Content: ASTM D3017.

D. Definition:

1. Relative Compaction: In-place dry density divided by the maximum dry density laboratory compaction express as a percentage.

1.05 REFERENCE SPECIFICATIONS

A. Whenever the words "Standard Specifications" are referred to, the reference is to the State of California, Department of Transportation, Standard Specifications - May 2006 edition.

1.06 ADDITIONAL SAFETY RESPONSIBILITIES

A. The Contractor shall select, install and maintain shoring, sheeting, bracing, and sloping as necessary to maintain safe excavations. The Contractor shall be responsible for ensuring such measures: (1) comply fully with 29 CFR Part 1926 OSHA Subpart P Excavations and Trenches requirements, (2) provide necessary support to the sides of excavations, (3) provide safe access to the City for sampling and testing within the excavation, (4) provide safe access for backfill, compaction, and compaction testings, and (5) otherwise maintain excavations in a safe manner that shall not endanger property, life, health, or the project schedule. All earthwork shall be performed in strict accordance with applicable law, including local ordinances, applicable OSHA, CalOSHA, California Civil Code, and California Department of Industrial Safety requirements.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Crushed Rock: Class 2, 3/4-inch maximum aggregate base, Standard Specifications Section 26.

B. Bedding Materials:
1. Sand: Standard Specifications, Paragraph 19-3.025B.
2. Permeable Material: Standard Specifications, Paragraph 68-1.025 Class I, Type A.
3. Drain Rock: Standard Specifications, Paragraph 68-1.025, Class 2.

C. Controlled Density Fill (CDF): Shall consist of a ready-mix, controlled low-strength material with a strength between 100 and 300 psi, a unit weight of less than 75 lbs/cf when it has set up and shall be suitable for excavation by mechanical means after 30 days. CDF shall comply with the requirements at ACI 229, controlled low strength materials.

D. Import Backfill: Imported nonexpansive soil with liquid limit no greater than 40% and a plasticity index no greater than 15%, free from clods or rocks larger than 2 inches in greatest dimension, and free from organic material.

E. Native Backfill: Native soil prepared as necessary to be free from clods or rocks larger than 2 inches in greatest dimension, and free from organic material.

F. Impervious Material: Clay with a minimum percentage of material passing the No. 200 sieve of 50%. The material shall be free of organics, rocks, or clods greater than 2 inches in diameter.

G. Water: The water used shall be reasonably free of objectionable quantities of silt, oil, organic matter, alkali, salts and other impurities. Water quality must be acceptable to the City.

H Warning Tape: 3-inch-wide, inert, fade-resistant plastic film resistant to acids, alkalis, and other components likely to be encountered in soil. Tape shall be marked “Water”.

I. Tracing wire: #8 Copper, vinyl coated –blue.

J. Geotextile Fabric: Geotextile Fabric: Provide a pervious sheet of polyester, nylon, glass or polypropylene, ultraviolet resistant filaments woven, spun bonded, fused, or otherwise manufactured into a nonraveling fabric with uniform thickness and strength. Fabric shall have the following manufacturer certified minimum average roll properties as determined by ASTM D 4759:

1. Grab tensile strength (ASTM D 4632) machine and transverse direction — min. 200 lbs.

2. Grab elongation (ASTM D 4632) machine and transverse direction — min. 12 percent

3. Puncture resistance (ASTM D 4833) — min. 90 lbs.

4.	Mullen burst strength (ASTM D 3786)	min. 400 psi.
5.	Trapezoidal Tear (ASTM D 4533)	min. 75 lbs.
6.	Apparent Opening Size (ASTM D 4751)	30 - 70 (U.S. Std Sieve)
7.	Permittivity (ASTM D 4491)	0.03 1/second
8.	Ultraviolet Degradation (ASTM D 4355)	70 percent Strength retained at 150 hours

PART 3 - EXECUTION

3.01 CONTROL OF WATER

A. All excavations shall be kept free from water and all construction shall be in the dry.

1. It should be presumed that the presence of groundwater will require dewatering operations. Furnish, install, maintain, and operate all necessary pumping and other equipment for dewatering all excavations. At all times have on the project sufficient pumping equipment for immediate use, including standby pumps for use in case other pumps become inoperable.
2. Provide a sufficient number of pumps so as to hold the groundwater level at an elevation of not less than 1 foot below the lowest elevation of the pipe or other material to be placed.
3. Dispose of water in such a manner as to cause no injury or nuisance to public or private property, or be a menace to the public health.
4 The dewatering operation shall be continuous, so that the excavated areas shall be kept free from water during construction, while concrete is setting and achieves full strength, and until backfill has been placed to a sufficient height to anchor the work against possible flotation.
5. Continue dewatering during backfilling operations such that the groundwater is at least 1 foot below the level of the compaction effort at all times. No compaction of saturated materials will be allowed.
6. Dewatering devices must be adequately filtered to prevent the removal of fines from the soil.
7. The Contractor shall be responsible for any damage to the foundations or any other parts of existing structures or of the new work caused by failure of any part of the Contractor's protective works. After temporary protective works are no longer needed for dewatering purposes, they shall be removed by the Contractor.
8. If pumping is required on a 24-hour basis, requiring engine drives, then engines shall be equipped in a manner to keep noise to a minimum in accordance with Section 7 of the City of Burlingame, General Conditions, latest edition.
9. Prevent disposal of sediments from the soils to adjacent lands or waterways by employing whatever methods are necessary, including settling basins.

B. The Contractor shall be responsible for furnishing temporary drainage facilities to convey and dispose of surface water falling on or passing over the site.

C. These requirements are intended to be consistent with the Bay Area Air Quality District standard mitigation requirement, Federal Clean Water Act, the Porter-Cologne Water Quality Control Act, and the San Mateo County Stormwater Prevention Program. Notwithstanding any other provision of this Agreement, Contractor shall also comply with the General Construction Activity Permit.

1. The Contractor shall maximize the control of erosion and sediment by using the BMP's for erosion and sedimentation in the California Storm Water Best Management Practice Handbook-Construction Activity (published by the Storm Water Quality Task Force) or Manual of Standards for Erosion & Sediment Control Measures (published by the Association of Bay Area Governments (ABAG)).
2. The Contractor shall prepare a Storm Water Pollution Prevention Plan in conformance with the requirements of the State Water Resources Control Board (SWRCB). The Contractor shall file the required Notice of Intent (NOI) with the SWRCB.

3.02 EXISTING UTILITIES

A. General: The known existing utilities and pipelines shall be shown on the Drawings prepared by the Project Owner's Engineer. The Contractor shall exercise care in avoiding damage to all utilities as he/she will be held responsible for their repair if damaged.

1. Contact Underground Services, Alert (USA), (800) 642-2444 to mark utilities, 48 hours prior to excavating.

B. Check on Locations (Potholing):

1. Contact all affected utility owners and requests them to locate their respective utilities prior to the start of "potholing" procedures. The utility owner shall be given 7 days written notice prior to commencing potholing. If a utility owner is not equipped to locate its utility, the Contractor shall locate it.
2. Clearly paint the location of all affected utility underground pipes, conduits and other utilities on the pavement or identify the location with suitable markers if not on pavement. In addition to the location of metallic pipes and conduits, non-metallic pipe, ducts and conduits shall also be similarly located using surface indicators and detection tape, if present and shall then be similarly marked.
3. After the utility survey is completed, commence "potholing" to determine the actual location and elevation of all utilities where crossings, interferences, or connections to the new pipelines are as shown on the Project Engineer's Drawings, marked by the utility companies, or indicated by surface signs. Prior to the excavating for any new pipelines or structures, the Contractor shall locate and uncover these existing utilities including services and laterals to a point 1 foot below the utility. Submit a report identifying each underground utility and its depth and station. Any variation in the actual elevations and the indicated elevations shall be brought to the City's attention.
4. Excavations around underground electrical ducts and conduits shall be performed using extreme caution to prevent injury to workmen or damage to electrical ducts or conduits. Similar precautions shall be exercised around gas lines, telephone and television cables.

C. Interferences:

1. If interferences occur at locations other than shown on the Project Engineer's Drawings, the Contractor shall notify the City, and a method for correcting said interferences shall be supplied by the Project Owner's Engineer.
2. Any necessary relocations of utilities, whether shown on the Project Engineer's Drawings or not, shall be coordinated with the affected utility. The Contractor shall perform the relocation only if instructed to do so in writing from the City.

3.03 GENERAL CONSTRUCTION REQUIREMENTS

A. Site Access: Access to the site will be over public and private roads. Exercise care in the use of such roads and repair at own expense any damage thereto caused by Contractor's operations. Such repair shall be to the satisfaction of the owner or agency having jurisdiction over the road. Conform to Caltrans requirements relative to SWMPP Best Management Practice to prevent tracking of mud onto existing roads and keep roads free of debris.

B. Traffic Regulation: Provide such flagmen, patrols, pilot cars, drivers, lighted barricades, flares, lights, warning signs, and safety devices as may be required for control of traffic adjacent to all areas of work. A minimum of one lane of traffic shall be kept open at all times on public roads. Work shall comply with Section 10 of the City of Burlingame General Conditions, latest edition.

C. Barriers: Barriers shall be placed at each end of all excavations and at such places along excavations as may be necessary to warn all pedestrian and vehicular traffic of such excavations. Lights shall also be placed along excavations from sunset each day to sunrise of the next day until such excavation is entirely restored.

D. Access: Free access must be maintained to all fire hydrants, water valves and meters, and private driveways.

E. Open Trench Limitations: The City shall have the authority to limit the amount of trench to be opened or left open at any one time. In public roads, excavation and pipe laying shall be coordinated to the end that a minimum of interference with public traffic will result. In existing streets, no more than 200 feet of trench shall be open at any time on any single heading. An open trench in existing streets shall be defined as any trench which has not been completely backfilled, satisfactorily compacted, and capped with at least 1-inch of temporary paving (hot asphalt). Contractor may request use of cutback in place of hot asphalt. Approval is at City's discretion.

F. Demolition of Pavement: Where trenching or excavation occurs in paved areas, the pavement shall be saw-cut and removed ahead of the trenching or excavation operation. The extent of paving removed shall be limited to the minimum necessary for the excavation. See 3.08 for disposal of excavated materials.

G. Dust Control: Employ measures to prevent the creation of dust which may produce damage or nuisance to property or persons. Be responsible for all damage resulting from dust produced by construction operations. Periodically wet down unpaved areas where vehicles are operated.

1. When required by the City, the Contractor shall furnish and operate a self-leading motor sweeper with spray nozzles at least once each working day for the purpose of keeping paved areas acceptably clean wherever construction, including restoration, is incomplete.

H. Permits: Obtain all required permits and pay associated fees. See http:www.burlingame.org/Index.aspx?page=592

I. Storage of Materials: Excavated materials unsuitable for backfill shall not be stored on existing streets, and shall be disposed of immediately. Keep the materials shaped so as to cause the least possible interference with drainage or the normal use of adjacent properties, structures or roadways. Work shall comply with Section 6 of the City of Burlingame General Conditions, latest edition.

J. Temporary Pavement: Place temporary pavement on trenches in existing streets at the end of each day unless traffic plates are installed. Maintain temporary pavement until permanent pavement is to be placed. All temporary asphalt to be hot asphalt.

3.04 TRENCH EXCAVATION

A. Excavation for pipe shall be in open cut. The trench shall be as wide as necessary for sheeting and bracing and the proper performance of the work up to the maximum width permitted by the typical cross-sections shown on the City's Standard Drawing. The sides of the trenches shall be vertical in existing streets. The bottom of the trench shall be constructed to the grades and shapes indicated on the Project Engineer's Drawings. Should the Contractor desire to use other equivalent methods, he shall submit his method of construction to the City for favorable review prior to its use.

B. Take care not to overexcavate. Accurately grade the bottom of the trenches to provide uniform bearing and support for each section of the pipe at every point along its entire length, except for the portions of the pipe sections where it is necessary to excavate for bell holes and for the proper sealing of pipe joints, and as hereinafter specified. Dig bell holes and depressions for joints after the trench bottom has been graded, and, in order that the pipe rest on the bedding for as nearly its full length as practicable, bell holes and depressions shall be only of such length, depth and width as required for properly making the joint. Remove stones as necessary to avoid point bearing.

C. Backfill and compact overexcavations to 95% relative compaction with bedding material. Remove unsatisfactory material encountered below the grades shown as directed by the City and replace with bedding material.

D. Grade trenches so that they are uniformly sloped between the pipe elevations shown on the Project Engineer's Drawings. Comply with the minimum and maximum trench widths shown on the City's Standard Drawings. Notify the City if the trench width exceeds the maximum allowable width for any reason.

E. Contractor shall comply with California Occupational Safety and Health Regulations (Cal/OSHA) trenches and excavation requirements.

3.05 BACKFILL AND COMPACTION

A. Place bedding and backfill materials true to the lines, grades, and cross-sections indicated on the City's Standard Drawings and compacted to the degree specified on the City's Standard Drawings. Place bedding and backfill materials in horizontal lifts not to exceed 6 inches in thickness measured before compaction. The difference in level on either side of a pipe shall not to exceed 4 inches.

B. Backfill material shall not be placed over the pipe until after it has been inspected by the City. The inside of the pipe shall be maintained in a clean condition at all times; all exposed pipe ends shall be covered and sealed with plastic, and shall not be uncovered until just prior to completing the joint.

C. It shall be incumbent upon the Contractor to protect the pipe from damage during the construction period. It shall be his responsibility to repair all broken or damaged pipe. Tamping of backfill over the pipe shall be done with tampers, vibratory rollers and other machines that will not injure or disturb the pipe. Carefully place backfill around and over the pipe.

D. Do not allow construction traffic nor highway traffic over the pipe trench until the trench backfill has been brought back even with existing adjacent grade.

E. Add water to the backfill material or dry the material as necessary to obtain the optimum moisture content for the compaction shown on the City's Standard Drawings or specified. If the City determines that the nature of the ground in which the trench lies precludes compaction of the backfill to the specified density, the backfill shall be compacted to the maximum practicable density. Employ such means as may be necessary to secure a uniform moisture content throughout the material of each layer being compacted. After the material has been moisture conditioned, compact it with compaction equipment approved by the City to achieve specified compaction. The Contractor shall be responsible for obtaining the densities specified. Should he fail, through negligence or otherwise, to compact to specified density, or to backfill and compact to surface grade, thus permitting saturation of the backfill material from rains or from any other source, the faulty material shall be removed and replaced with approved material which shall be compacted to the specified density at optimum moisture content.

F. Compaction by flooding, ponding or jetting will not be permitted.

3.06 SUPPORT OF EXCAVATIONS

A. Adequately support excavation for trenches and structures to meet all applicable requirements in the current rules, orders and regulations. Excavation shall be adequately shored, braced and sheeted so that the earth will not slide or settle and so that all existing structures and all new pipe and structures will be fully protected from damage. Keep vehicles, equipment and materials far enough from the excavation to prevent instability.

B. Take all necessary measures to protect excavations and adjacent improvements from running, caving, boiling, settling, or sliding soil resulting from the high groundwater table and the nature of the soil excavated. Attention is directed to Section 832 of the Civil Code of the State of California relating to lateral and subjacent supports, and wherever structures or improvements adjacent to the excavation may be damaged by such excavation, the Contractor shall comply with this law.

C. The support for excavation shall remain in place until the pipeline, or structure has been completed. During the backfilling of the pipeline or structure, the shoring, sheeting and bracing shall be carefully removed so that there shall be no voids created and no caving, lateral movement or flowing of the subsoils.

3.07 FINISH GRADING

A. Except where shown otherwise in the Project Engineer's Drawings, restore the finish grade to the original contours and to the original drainage patterns. Grade surfaces to drain away from structures. The finished surfaces shall be smooth and compacted.

3.08 DISPOSAL OF EXCAVATED MATERIAL

A. Suitably dispose of unsuitable material or excavated material in excess of that needed for backfill offsite in accordance with all applicable laws and regulations.

B. The grinding may contain pavement fabric, engineered paving mat or other contaminated materials in some City streets. It is the Contractor's responsibility to dispose and remove of these materials along with the grinding. There will be no additional compensation allowed.

END OF SECTION

SECTION 02510

WATER SYSTEM PIPING AND ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Furnish and install all piping, including fittings, valves, and accessories as shown on the Project Engineer's Drawings, as shown on City's Standard Drawings and as described in the Specifications and as required to completely interconnect all piping for a complete and operable systems.

1.02 REFERENCES

A. American Association of State Highway and Transportation Officials (AASHTO)

B. American National Standards Institute (ANSI)

C. American Society of Mechanical Engineers (ASME)

D. American Society for Testing and Materials (ASTM)

E. American Water Works Association (AWWA)

1.03 SUBMITTALS

A. Shop Drawings:
1. Submit data to show that the following items conform to these Specification requirements:
    a. Pipe, fittings, and accessories.
    b. Flexible couplings and flanged coupling adapters.
    c. Restrained joints.
    d. Valves.
    e. Air release valves.
2. Disinfection schedule and procedures including:
    a. "Normal" disinfection procedure.
    b. Emergency disinfection procedure for mains and services which must be returned to service immediately.
    c. Disinfection schedule including number and type of services and length of disruption of service.
    d. Disinfecting agent(s).
    e. Method of disposal of chlorinated water.

B Publications: The Contractor shall furnish manufacturer's installation and operation manuals, bulletins, and spare parts lists for the following items:
1. All valves over 4-inch size.
2. Air release valves.

1.04 QUALITY ASSURANCE

A. All materials and equipment furnished under this Section shall: (1) be of an American manufacturer who has been regularly engaged in the design and manufacture of the materials and equipment and (2) be demonstrated to the satisfaction of the City that the quality is equal to the materials and equipment made by those manufacturers specifically named herein, if an alternate product manufacturer is proposed.

1.05 POTHOLING (CHECK ON LOCATIONS)

A. Do not begin any construction until all utilities in that section of pipeline have been exposed, as specified in paragraph 3.02 of Section 02302 and until such time as no interferences are found between said existing utilities and the proposed pipeline alignment. If interferences are found in any particular section of pipeline, do not begin construction for that particular section of pipeline until the pipeline alignment has been modified by the Project Owner's Engineer to eliminate all such interferences.

1.06 CONSTRUCTION SCHEDULING/SEQUENCING

A. Construction may involve expansion and/or modification of the existing water system which must continue to provide service to all customers during construction.

B. Connections and utilities changes must be programmed to provide the least possible interruptions of service. Prior to any shutdown all materials, fittings, supports, equipment and tools shall be on the site and all necessary labor scheduled prior to starting any connection work. The Contractor shall notify the City in writing at least 7 days in advance of any required shutdowns so that affected customers may be notified. In general, shutdowns shall not exceed four hours in duration unless specifically authorized or indicated in the suggested construction sequence.

C. All work shall be conducted in a manner which will minimize shutdowns, open roadways, or traffic obstructions caused by the construction. Shutdowns causing damage to adjacent public and private property shall not be permitted, and any damage resulting shall be the sole responsibility of the Contractor.

D. Planned water service shutdowns shall be accomplished during periods of minimum use. In some cases this will require night or weekend work. The Contractor shall program his work so that service will be restored in the minimum possible time, and shall cooperate with the City in reducing shutdowns of the water system to a minimum. No water interruption will be permitted without the prior approval of the City. The Contractor shall notify residents and businesses at least 48 hours in advance of any required shutdowns.

PART 2 - PRODUCTS

2.01 GENERAL

A. Pipe and valve sizes are nominal inside diameter unless otherwise noted.

B. All materials delivered to the job site shall be new, free from defects, and marked to identify the material, class, and other appropriate data such as thickness for piping.

C. Acceptance of materials shall be subject to strength and quality testing in addition to inspection of the completed product. Acceptance of installed piping systems shall be based on inspection and leakage and bacteriological tests as specified hereinafter.

D. Buried nuts and bolts for flanges and couplings shall be Type 316 stainless steel unless otherwise specifically specified herein.

E. Fusion Epoxy Coating: Materials and application shall be in accordance with AWWA C213, except application shall be by the fluid bed method only unless the greatest dimension of the article to be coated exceeds 10 feet, in which case electrostatic spray method may be used.

F. All brass components in contact with potable water shall be composed of either CDA/UNS Brass Alloys C89520 or C89833 with a maximum lead content of 0.25% by weight in accordance with ANSI/AWWA C-800. Brass alloys not listed in ANSI/AWWA C-800 Paragraph 4.1.2 are not approved. Brass saddles shall be composed of CDA/UNS C83600.

2.02 PIPING MATERIALS

A. Pipe Designation: New water transmission mains shall be either the ductile iron (DI) or polyvinyl chloride (PVC) pipe. Service connections shall be copper.
1. PVC to be used in all locations except creek crossings, high pressure locations, soils containing permeable chemicals that could leech through PVC pipe, or as directed by the City.

B. Ductile Iron (DI):
1. Pipe: Ductile iron, Pressure Class 250, AWWA C151.
2. Joints: Push-on, AWWA C111 as modified.
    a. Gaskets: Rubber.
    b. Restrained joints: Provide restrained joints capable of deflection after the restraint is installed. Joints shall not separate under an internal pressure of 200 psi. TR-FLEX by United States Pipe & Foundry Company; equivalent by American Cast Iron Pipe Company; or equal.
3. Fittings: See Section 2.03 of these standard specifications.
4. Lining: Standard thickness cement mortar lining per AWWA C104.
5. Field closure connections for restrained joints: Pipe cut in the field where necessary and when favorably reviewed by the Engineer shall be connected by one of the following methods:
    a. TR Flex Gripper Ring System by United States Pipe & Foundry Company; or equal.
    b. Series 800 Coverall retainer by EBAA Iron, Inc.; or equal.
6. Protection: Polyethylene encasement, AWWA C105, black. Single wrap pipe. Double wrap flanged fittings, mechanical joints, or other appurtenances with significantly different outside diameters from the pipe. Tape to seal seams and overlaps shall be plastic adhesive tape at least 4 mils thick and at least 2 inches wide.
    a. Provide on all Ductile Iron pipe, joints, and fittings.
    b. Provide external epoxy coating (12 mil thickness – minimum) at locations east of California Drive or as directed by the City.

C. Polyvinyl Chloride (PVC)
1. No fusible PVC pipe allowed.

2. Pipe: Polyvinyl chloride pressure pipe, cast iron pipe outside dimensions. Pipe shall be UL listed or Factory Mutual Approved.
    a. 4-inch through 12-inch: AWWA C900.
    b. 14-inch through 36-inch: AWWA C905.
3. Pressure Class 200.
4. Joints:
    a. Restrained joints: Bell and spigot (push-on) gasketed, or mechanical joints; both using ductile iron clamp-on restraining devices.
        1) Restraining devices: Ductile iron with ductile iron or cor-ten rods and bolts. Pressure rating of at least 200 psi. Series 1500 by EBAA Iron; equivalent by Uni-Flange; or equal for bell and spigot joints. Series 500 by EBAA Iron; equivalent by Uni-Flange; or equal for mechanical joints.
5. Gaskets: Styrene Butadiene Rubber (SBR). Submit two sample gaskets of each gasket type with an explanation of the markings.
6. Fittings: See Section 2.03 of these standard specifications.

D. Copper Pipe:
1. Pipe: Copper (Cu), ASTM B88, Type K.
2. Joints: Compression, Flared or Solder

2.03 PIPE COUPLINGS AND FITTING

A. General:
1. For typical pipe joints refer to pipe material specifications. Other joint devices shall be furnished where called for as specified below.
2. Handle fusion epoxy coated material with care. If material is damaged before installation, the Contractor shall repair or replace at the direction of the City Engineer.

B. Fittings:
1. Ductile Iron: Ductile iron or cast iron push-on joints, mechanical or flanged, AWWA C110.
    a. Provide external epoxy coating (12 mil thickness – minimum) and 316 stainless steel bolt up kits for all fittings located east of California Drive or as directed by the City.
    b. Protection: Polyethylene encasement, AWWA C105, black. Single wrap pipe. Double wrap flanged fittings, mechanical joints, or other appurtenances with significantly different outside diameters from the pipe. Tape to seal seams and overlaps shall be plastic adhesive tape at least 4 mils thick and at least 2 inches wide.

2. Polyvinyl Chloride: Push-on cast iron or mechanical joint, AWWA C110.
    a. Provide external epoxy coating (12 mil thickness – minimum) and 316 stainless steel bolt up kits for all fittings located east of California Drive or as directed by the City.

C. Flexible Couplings and Flange Coupling Adaptors:
1. Sleeve: Cast iron or fabricated steel.
2. Followers: Cast iron, ductile iron, or steel.
3. Sleeve bolts: ASTM A325, Type 3; 316 stainless steel; or equivalent.
4. Coating: Fusion epoxy line and coat sleeve and followers.
5. Pressure rating: 200 psi.

6. Buried flexible coupling sleeve: Long barrel
7. Manufacturers:
   a. Flexible couplings:
      1) Connecting pipe with identical outside diameters: Smith-Blair 411 or 431, Dresser Style 38 or 53, or equal.
      2) Connecting pipe with slightly different outside diameters: Smith-Blair 413 or R 441, Dresser Style 162, or equal.
   b. Flange coupling adaptors:
      1) Connecting new pipe or new pipe to existing non-ferrous pipe: Smith-Blair 912 or 913, Dresser Style 127 or 128, or equal.
      2) Connecting new pipe to existing ferrous pipe: Insulating flange coupling adaptor with insulating boot: Smith-Blair 932 or 933, or equal.
8. Gaskets: Oil and grease resistant; Smith-Blair Grade 60; or equal.
9. Joint restraint: Provide joint harnesses (tie rod lug or attachment plate assemblies) across flexible couplings and flange coupling adaptors where indicated on the Project Engineer's Drawings or City's Standard Drawings. For flanged coupling adaptors, anchor studs may be substituted for the harnesses on pipe up to 12-inch. Design restraint in accordance with AWWA M-11 for 200 psi if size of the rods are not indicated on the Drawings.

D. Tapping Sleeves and Tapping Valves:
1. All bolts must be tightened to the manufacture's specifications. All bolts, nuts, and washers shall be Type 316 stainless steel coated with anti-seize. Contractor shall present City with all tapping coupons upon completion of tap. Coupons are to be tagged or marked as to location, date of tap and pipe size.
2. Mueller tapping gate valves shall be as specified in section 2.04 Valves and Accessories – Gate Valves.
3. Valve box and riser pipe shall conform to Drawing No. W-1809

2.04 VALVES AND ACCESSORIES

A. General Requirements for Valves:
1. All valves of each type shall be the product of one manufacturer.
2. All valves shall be of an American manufacturer.
3. All valves shall be furnished with control assembly, operators, handwheels, levers, or other suitable type wrench including handles as specified herein or as shown on the Project Engineer's or City's Standard Drawings.
4. All threaded stem valves shall open by turning the valve stem counter-clockwise.
5. The exterior of all valves and valve operators shall be painted with two coats of Tape Coat Mastic; Protecto Wrap CA1180 Mastic; or equal, except where otherwise indicated.
6. Provide bronze operating nuts, external epoxy coating, and stainless steel bolt up kits for all valves located east of California Drive or as directed by the City.

B. Valves and Accessories:
1. Butterfly valves:
   a. Rating: 200 psi water. Leak tight in both directions.
   b. Type: Flanged body, or as shown on the Drawings, AWWA C504, geared operator, resilient seated, 90 degree seating.
   c. Connections: Flange or Mechanical joint, as shown on the Drawings.

d. Materials: Cast iron body; cast iron or ductile iron disc with Ni-Chrome or Type 316 stainless steel edge; Type 304 stainless steel shaft; disc to be secured to shaft with Type 304 stainless steel taper pins.
e. Operator: Traveling-nut type, 2-inch standard AWWA nut, designed for buried service, watertight to 10 psi with extension stem as detailed on the Drawings.
f. Valve seat: Buna-N seat shall be applied to the valve body.
g. Bearings: Self-lubricating and corrosion resistant.
h. Finish: Internal, epoxy in accordance with AWWA C504; external, factory applied epoxy.
i. Manufacturers: Pratt Groundhog, equivalent by DeZurik, or equal.
j. Use on lines 10 inches or greater.

2. Gate Valves:
   a. Rating: 200 psi water
   b. Type: Resilient seated, non-rising stem, AWWA C509, as modified herein
   c. Connection: Flanged or Mechanical joint.
   d. Materials: Ductile iron body
   e. Stem seal: O-ring
   f. Finish: Fusion epoxy coated
   g. Manufacturers: Mueller; City approved, or equal.
   h. Use on lines 8 inches or smaller.

3. Air release valves: Combination air release valves, APCO Model 140C, equivalent by ValMatic, or equal.
   a. Materials: Cast iron body, Buna-N seat, and stainless steel float.
   b. Operating pressure: 200 psi.
   c. Enclosure shall be Pipeline Products #VCDD-1624 or Febco # BFE-SS-51M as determined by City.

4. Valve boxes, adjustable screw type:
   a. See Standard Drawing W -1809.

2.05 FIRE HYDRANT ASSEMBLIES

A. Fire Hydrant assemblies shall use wet barrel type hydrants meeting AWWA C503 standards.

B. Hydrants shall be Clow/Rich No. MSG 76, Long Beach or City approved equal. Hydrant shall be supplied with (2) 2½ " and (1) 41/2" outlets. Outlets to have National Hose Threads.

C. Hydrant shall have a break off check valve as manufactured by Clow Valve, Model LBI 400A, or City approved equal.

D. Hydrant riser shall be flange by flange with integral snap-ring groove meeting, ANSI/AWWA C110/A21.10 and shall be 6 inches or longer in length to meet the 2 inch ground clearance.

E. Hydrant bury shall be Cast Iron and meet ANSI C110/A21.10 standards and joints shall be mechanical joint by flange conforming to ANSI/AWWA C111/A21.11-80

2.06 SERVICE CONNECTIONS

A. General: All corporation stops, service clamps or saddles, and service connection accessories shall be the product of one (1) manufacture. All components shall meet AWWA C800. See Drawing No. W-1779 for details.

B. Service Saddles:
   1. Rating = 200 psi water
   2. Type:
      a. For Ductile Iron pipe: Bronze, double strap, Mueller BR 2 B, retained o-ring gasket, rolled strap threads, and tapping boss with full length AWWA threads.
      b. For Polyvinyl Chloride pipe: Mueller series H-13000
      c. IPS threads are not permitted on 1 inch service.
   3. Manufacturer: Mueller Co. or City approved equal.

C. Corporation Stops:
   1. Rating: 300 psi water
   2. Type: AWWA thread inlet; compression connection outlet. IPS threads are not permitted on 1 inch service.
   3. Manufacturer: Mueller Co. or City approved equal.

D. Angle Stops:
   1. Rating: 300 psi water
   2. Type: Compression inlet; Meter connection outlet. IPS threads are not permitted.
   3. Manufacturer: Mueller Co. or City approved equal.

E. Meter Box
   1. 1 inch Service - Christy B-16 with Christy FL16P-F reading lid, or City approved equal.
   2. 2 inch Service – Christy B-36 with FL36P-F reading lid, or City approved equal, separate City approval required.
   3. Detection Check – Christy B-16 for meter only with FL16P-F lid, or City approved equal.

F. Water Meter Bypass Meter
   1. To be furnished by City at owner’s cost

2.07 APPURTENANCES

A. Provide all necessary assembly bolts, washers and nuts, thrust blocks, supports, gaskets, flanges, and all other appurtenant items shown on the Project Engineer’s or City’s Standard Drawings, specified or required for the proper installation and operation of the piping, and devices included in or on the piping, equipment, and piping accessories.

PART 3 - EXECUTION

3.01 PIPING INSTALLATION

A. General Handling and Placing:

1. Exercise great care to prevent injury to or scoring of the pipe lining and coating, as applicable, during handling, transportation or storage; 10% of pipe thickness maximum allowed. Handle fusion epoxy coated pipe in accordance with AWWA C213. Pipe shall not be stored on rough ground and rolling of the pipe on the coating will not be permitted. Contractor shall be responsible for the repair of any damaged pipe sections, specials, or fittings or replace at the direction of the City.
2. Inspect each pipe fitting, valve and accessories carefully before installation. Inspect the interior and exterior protective coatings and patch all damaged areas in the field or replaced at the direction of the City.
3. Place or erect all piping to accurate line and grade and backfill, support, hang, or brace against movement as specified or shown on the Project Engineer's and City's Standard Drawings, or as required for proper installation. Remove all dirt and foreign matter from the pipe interior prior to installation and thoroughly clean all joints before joining. All exposed pipe ends shall be covered and sealed with plastic, and shall not be uncovered until just prior to completing the joint.
4. Use reducing fittings where any change in pipe size occurs. Bushings shall not be used. Use eccentric reducing fittings wherever necessary to provide free drainage of lines.
5. Connections between ferrous and non-ferrous piping and accessories shall be made using a dielectric coupling, union, or flange.

B. General Buried Piping Installation:

1. Trenching, bedding, and backfill for buried piping shall be as shown on the Project Engineer's and City's Standard Drawings and as specified in Section 02302.
2. Where no grade elevations are shown on the Drawings, buried piping shall have at least 3 feet of cover.
3. Provide each pipe with a firm, uniform bearing for its full length in the trench except at field joints. Do not lay pipe in water or when trench conditions or weather are unsuitable for such work.
4. Protect buried piping against thrust by use of restrained joints and thrust blocks at all fittings and valves. Securely brace all exposed free pipe ends.
5. Do not pull bell and spigot, gasketed joints more than 75% of the maximum deflection permitted by the pipe manufacturer.
6. Service connections shall be installed by open trench method, or using trenchless technologies. This applies for service connections ONLY.

C. Water Main Installation:

1. DO NOT MAKE ANY CONNECTIONS BETWEEN THE NEW MAIN AND THE OLD MAIN UNTIL THE NEW MAIN HAS BEEN DISINFECTED AND TESTED AND THE CITY DIRECTS THAT CONNECTIONS CAN BE MADE. MAXIMUM LENGTH BETWEEN OLD AND NEW MAIN SHALL BE 20 FEET.
2. The Contractor is advised that precautions taken to keep the pipeline clean during construction will facilitate achieving the disinfection requirements of this project with a minimum of effort and expense. Compliance with these suggested minimum procedures will not relieve the Contractor of the disinfection requirements.
3. Prior to installation, thoroughly clean the interior of each length of pipe and each fitting or valve and inspect to ensure that no foreign material remains. All

exposed pipe ends shall be covered and sealed with plastic, and shall not be uncovered until just prior to completing the joint.

4. Pipe laying shall begin at the low end of the project and proceed uphill, unless authorized by the City. Pipe bells shall face uphill.
5. Whenever pipe laying is discontinued for short periods, or whenever work is stopped at the end of the day, close the open ends of the pipe with watertight plugs or bulkheads.
6. Provide adequate trench pumping to ensure against groundwater contacting the inside of the pipeline at any time. Do not lower any pipe or fitting into a trench where groundwater is present and may enter the pipe. When necessary, pump the water from trenches and keep the trench dry until the joints have been completed and the open ends of the pipe have been closed with a watertight plug. Do not remove the plug until the trench has again been pumped dry.
7. Keep new pipe sections clean and dry.
8. When making the connection between a new pipeline and an existing pipeline, or when repairing a damaged pipe, take the following extra precautions:
    a. Clean the exterior of the existing pipeline of all dirt and debris, and spray or swab with a standard 5.25% or stronger chlorine solution (as specified) in the immediate vicinity of the work. Clean equipment and materials, including new pipe and fittings, to be used in making these connections of all dirt and debris and disinfect them. Allow at least 30 minutes contact time for disinfection before the chlorine solution is diluted or rinsed off. Provide sufficient trench pumps to prevent flooding of the trench.
    b. When an old line is opened, either by accident or by design, the excavation may be wet or badly contaminated from groundwater. Apply liberal quantities of standard chlorine solution or tablets to the open trench areas to lessen the danger from such pollution. Tablets are recommended because they dissolve slowly and continue to release hypochlorite as water is pumped from the excavation. Scatter liberally around and locate the tablets so that flow entering the work site will contact the disinfecting agent. Trench application should be done very carefully to avoid contact by skin and clothing with chlorine solution.
9. Water Department personnel must be present during hot tap and inspection of materials and installation. The location of hot tap to be verified by the Contractor to insure a minimum of 2 feet is kept from tap location and a bell end or end of pipe on a dead end.

E. Installation Specifics:

1. Ductile Iron Pipe:
    a. Buried pipe shall be installed in accordance with AWWA C600.
    b. Where required by the City, wrap buried pipe with 8 mil polyethylene film in accordance with AWWA C105. Continuously seal seams and overlaps with tape. Seal circumferential overlaps with two turns of tape, half lapped. Gather excess polyethylene on top of pipe so as not to block backfill material from getting under bottom of pipe. Use caution so as not to rip or cut the polyethylene film. Seal any rips or cuts in the film with tape.
    c. Wherever the pipeline crosses over or under a sewer main or house service lateral, center a standard length pipe, 18-foot minimum, on said sewer main or

lateral so as to have the pipeline joints as far as possible away from the sewer. This may require field cutting of some pipe pieces.

d. Flanged Joints: Flanged joints shall be made up tight with care being taken to avoid undue strain in the flanges, fittings, and other accessories. Bolt holes shall be aligned for each flanged joint. Bolts shall be full size for bolt holes; use of undersize bolts to make up for misalignment of bolt holes or for any other purpose will not be permitted. Adjoining flange faces shall not be out of parallel to such a degree that the flanged joint cannot be made watertight without over-straining the flange. Replace any flanged pipe or fitting whose dimensions do not allow the making of a proper flanged joint as specified herein by one of proper dimensions. Clean flanges prior to making joints.

e. Restrained Joints: Install in accordance with manufacturer's instructions. Pull slack out of joint after makeup.

2. Polyvinyl Chloride Pipe: Installation shall conform to AWWA M23, Chapters 6 and 7.

3. Copper Pipe:
   a. Bends shall be made in a manner that does not crimp or flatten pipe.
   b. Dielectric unions shall be installed at connections with ferrous piping.
   c. Pipe shall have joints squarely cut clean, properly fluxed and heated before solder is placed in the joint. Joints must be driven up tight before solder is added. Compression and flared joints shall be made up in accordance with the manufacturer's instructions.

3.02 COUPLING INSTALLATION

A. Flexible Couplings and Flange Coupling Adaptors: Prior to installation, thoroughly clean oil, scale, rust, and dirt from the pipe to provide a clean seat for the gasket. Care shall be taken that the gaskets are wiped clean before they are installed. If necessary, flexible couplings and flanged coupling adapter gaskets may be lubricated with soapy water or manufacturer's standard lubricant before installation on the pipe ends. Install in accordance with the manufacturer's recommendations. Bolts shall be tightened progressively, drawing up bolt on opposite sides a little at a time until all bolts have a uniform tightness. Workers tightening bolts shall be equipped with torque-limiting wrenches or other favorably reviewed type. Anchor studs on restrained flanged coupling adapters shall be installed so as to lock into holes drilled through pipe wall in accordance with manufacturer's recommendation.

3.03 INSTALLATION OF VALVES AND ACCESSORIES

A. Wrap buried valve bodies as specified for flexible couplings and flanged coupling adapters.

C. Use reducing fittings where any change in pipe size occurs between valves or accessories and the attached pipeline. Bushings shall not be used, unless Use eccentric reducing fittings wherever necessary to provide free drainage of lines. Inspect each piece of pipe and each fitting carefully to see that there is no defective workmanship on pipe, or obstructions in pipes and fittings.

3.04 FIELD QUALITY CONTROL

A. Factory Quality Control: The Contractor shall test all products as required herein and by the reference specifications.

B. The Contractor shall:
   a. Perform leakage tests.
   b. Be responsible for the costs of additional inspection and retesting by the City resulting from non-compliance.
   c. Perform bacteriological analysis for pipelines to be disinfected.

3.05 CLEANING

A. Prior to testing, the inside of each completed pipeline shall be thoroughly cleaned of all dirt, loose scale, sand and other foreign material. Cleaning shall be by sweeping, flushing with water internal cleaning device or "pig" or blowing with compressed air, as appropriate for the size and type of pipe. Flushing shall achieve a velocity of at least 3 feet per second. The Contractor shall install temporary strainers, temporarily disconnect equipment or take other appropriate measures to protect equipment while cleaning piping. Cleaning shall be completed after any repairs.

B. The Contractor shall comply with the Municipal Regional Stormwater Permit (MRP) for discharge water.

3.06 FIELD TESTING

A. General: Perform leakage tests on all pipe installed in this project. Furnish all equipment, material, personnel, test media and supplies to perform the tests and make all taps and other necessary temporary connections. The test pressure, allowable leakage and test medium shall be as specified. Perform leakage tests on all piping at a time agreed upon and in the presence of the City.

B. Buried Piping: Perform the leakage test for buried piping after all pipe is installed and backfilled. However, preliminary tests may be conducted prior to backfill. If preliminary tests are conducted, provide any necessary temporary thrust restraint.

C. Accessories: It is the responsibility of the Contractor to block off or remove equipment, valves, gauges, etc., which are not designed to withstand the full test pressure.

D. Testing Apparatus: Provide pipe taps, nozzles and connections as necessary in piping to permit testing, addition of test media, and draining lines and disposal of water, as is necessary. Plug these openings in a manner favorably reviewed by the Engineer after use. Provide all required temporary bulkheads.

E. Correction of Defects: If leakage exceeds the allowable, repair or replace the installation and repeat leakage tests as necessary until conformance to the leakage test requirements specified herein have been fulfilled. All visible leaks shall be repaired even if the pipeline passes the allowable leakage test.

F. Reports: Keep records of each piping test, including:
   1. Description and identification of piping tested.

2. Test pressure.
3. Date of test.
4. Witnessing by Contractor and City.
5. Test evaluation.
6. Remarks, to include such items as:
    a. Leaks (type, location).
    b. Repairs made on leaks.
    c. Submit test reports to the City.

G. Venting: Where not shown on the Drawings, the Contractor may install corporation stops with saddles or "TEES" with shutoff valves at high points on piping to permit venting of air. Valves shall be capped after testing is completed.

H. Testing Specifics:
1. Water Transmission Mains:
    a. Method: AWWA C600, as modified herein.
    b. Duration: Two hours.
    c. Pressure: Hydrostatic test equal to 200 psi.
    d. Medium: Potable water.
    e. Allowable Leakage: Leakage shall be defined as the quantity of test medium that must be added to the section of pipeline being tested to maintain the specified test pressure for the specified test duration. Maximum allowable leakage shall be as specified in AWWA C600.

3.07 DISINFECTION OF POTABLE WATER SYSTEMS

A. Disinfect all water mains and interconnected piping after testing and before being placed into service to ensure their bacteriological safety. Disinfection shall be accomplished under the supervision of the Contractor by a person skilled and experienced in the operation of water systems. Following disinfection and flushing, the Contractor will take water samples for bacteriological analysis of the water. If the specified bacteriological requirements are not satisfied, the disinfection procedure must be repeated until the requirements are met.

B. Mains, Services, Hydrants, and related material:
1. Standard: AWWA C651 as amended herein.
2. Forms of Chlorine: Sodium hypochlorite or calcium hypochlorite.
3. Method: Continuous-Feed.

C. Chlorine Residual Testing: AWWA C651, Appendix A, DPD Drop Dilution Method, except where otherwise specified.

D. Bacteriological Analyses of Water: After the completion of disinfecting procedure, including the final flushing as described heretofore, the Engineer will obtain water samples from this system for bacteriological analyses. Requirements for satisfactory disinfection of water supply are that bacteriological analyses (Heterotrophic plate count) indicate that water samples are negative for coliformnerogenes organisms, and that total plate count is less than 100 bacteria per cubic centimeter. If bacteriological analyses do not satisfy the above requirements, then disinfection procedure must be repeated until these requirements are met.

E. Disposal of Disinfection Solution: Dechlorinate and dispose of disinfection solution in accordance with applicable regulations and Section 01140. Take special measures to prevent chlorinated water from entering the ground, surface water, or sanitary sewer and storm drainage systems. Dechlorinate chlorinated water prior to discharge.

3.08 ABANDONMENT OF EXISTING WATERLINES AND APPURTENANCES

A. Valves: Cut existing valves riser 12 inches (12”) below surface and fill riser with concrete. Repair surface. See plans for details.

B. Fire Hydrants: Remove hydrant and cut hydrant bury 12 inches (12”) below surface and fill bury with concrete. Install concrete plug. See plans for details.

END OF SECTION

SECTION 02511

FIRE SYSTEM PIPING AND ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Furnish and install all piping, including fittings, valves, and accessories as shown on the Project Engineer's and City's Standard Drawings, and as required to completely connect the structure's fire protection system with the City's water distribution system.

B. Includes work within the City's public right-of-way and on Project Owner's private property.

1.02 REFERENCES

A. Include those listed on Section 02510, Paragraph 1.02

1.03 SUBMITTALS

A. Include those listed in Section 02510, Paragraph 1.03.

B. Detector Check Valve

C. Double Detector Check Valve

D. Valve Vaults

1.04 OTHER

A. Section 02510, Paragraphs 1.04, 1.05 and 1.06 shall apply.

PART 2 - PRODUCTS

2.01 GENERAL

A. Include those listed in Section 02510, Paragraphs 2.01, 2.02, 2.03, 2.04, and 2.06.

B. All underground Ductile Iron material shall be fusion epoxy coated (12 mil thickness – minimum) and 316 stainless steel bolt up kits.

C. Tapping Sleeves and Tapping Valves:

1. Tapping sleeves shall be all stainless steel with Type 316 stainless steel body and bolts.
2. Tapping sleeves shall be Mueller tapping gate valves as specified in Section 02510 of these standard specifications.
3. Valve box and riser pipe shall conform to Drawing No. W-1809

C. Detector Check Valve.

1. Detector check will be positive sealing with no backflow allowed.
2. Detector check main valve seat must be bronze or stainless steel.
3. Detector clapper or flapper will be on bronze or stainless steel construction with neoprene rubber face. No metal-to-metal seating allowed.
4. Contact Water Department for City-approved units.
5. Shall be of American manufacturer.
6. Shall meet the requirements of the San Mateo County and State Health Department.
7. Shall be approved by the University of Southern California (USC).

PART 3 - EXECUTION

3.01 FIRE SYSTEM GENERAL

A. For commercial and retail areas:

1. All new installations are the responsibility of and shall be installed by private contractor and/or owner after plans have been approved by the Water Department.
2. All new installations shall be double detector check valve assemblies constructed above ground in accordance with Drawing No. W-2780 unless a variance is granted.
    a. Variances may be granted on a case-by-case basis
    b. If a variance is granted, the installation shall conform to Drawing No. W-2779 or W-2781.
3. The piping for sprinkler services shall be designed to connect at the main and extend to a point adjacent to two property lines. These locations will be as approved by the City.
4. No part of the fire system in the public right-of-way shall be placed above ground.
5. Sprinkler service piping shall be six inches (6”) minimum in diameter and shall meet Fire Department requirements to provide adequate fire sprinkler service for both properties. The sprinkler service piping shall consist of the connection at the main, the pipe run, and terminate in a tee fitting, complete with valve for the currently proposed fire service and having a blind flange for future connection.
6. Whether the fire system piping serves a single parcel or is somehow manifolded to serve two adjoining properties, the downstream flange of the gate valve just prior to the detector check valve is the limit of the City’s maintenance responsibility, except for the detector check meter and it’s trimming. The maintenance of the rest of the underground system, with the exception of the bypass meter and trim, is the responsibility of the private property owner. City maintenance shall begin at the end of the one-year warranty period.

B. For areas that are not commercial or retail areas:
   1. All new installations are responsibility of and shall be installed by private contractor and/or owner after plans have been approved by Water Department.
   2. All new installations shall be double detector check valve assemblies constructed above ground in accordance with Drawing No. W-2780

C. Construction of a fire service shall be installed by owner or owner's contractor upon obtaining a street encroachment permit and building permit. Water department does not install fire services. Water department to be contacted to arrange for service and for payment of fees.

D. Connections to existing water main shall be made by hot tap method.
   1. Water Department personnel must be present during hot tap and inspection of materials and installation. The location of hot tap to be verified by the Contractor to insure a minimum of 2 feet is kept from tap location and a bell end or end of pipe on a dead end.

   2. Any maintenance or repair work done on existing fire services shall meet Building and Water Department Specifications.

3.02 REQUIRED TYPES OF BACK FLOW PROTECTION DEVICES

A. A double detector check valve shall be used in fire sprinkler systems serving buildings unless approval for alternative system is granted by City.

B. A double-check detector check valve, reduced pressure principle device, or other backflow protection as approved by the University of Southern California shall be used in all fire sprinkler systems.

C. Except for commercial and retail areas, detector checks shall be epoxy coated (minimum 12 mil thickness) and placed above ground. Nuts and bolts that connect detector check to pipe run shall be stainless steel. Detector check body nuts and bolts do not have to be stainless steel. (For detector check requirements for Burlingame Avenue and Broadway Commercial and Retail areas see below.)

D. In retail and commercial areas, single check detector checks shall be epoxy coated (minimum 12 mil thickness) or stainless steel and shall be buried directly in ground after Water Department has installed bypass meter and trim. Contractor shall supply and set B-16 Box and FL16P-F Lid to finished grade after backfilling and compacting ground to City of Burlingame specifications. All nuts and bolts on detector check, including body bolts, shall be stainless steel. Any unused test plugs in detector check shall be changed to bronze plugs. Nuts and bolts that connect detector check to pipe run shall be 316 stainless steel.

3.03 INSTALLATION

1. All backflow prevention devices on fire system or domestic system will be installed as per City of Burlingame Engineering and/or Water Department requirements.
2. All devices shall be tested and approved by a San Mateo County Certified Device Tester before City approval of water system.
3. The Water Department shall inspect and approve all underground installations.
4. The type of pipe entering the building from underground shall meet all Building Department, Fire Department, and Water Department specification and cods as required.

END OF SECTION

SECTION 02705

PAVING AND RESURFACING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Furnishing all labor, material, equipment, tools and services required for the placing and compacting of asphalt concrete pavement and aggregate surfacing for roadways, parking lots and walkways to the lines and dimensions shown on the Drawings and as specified herein. Also included is the repair and resurfacing of existing roadway and area paving damaged or removed during construction.

B. Related Sections: Repair or replace concrete curbs, gutters and sidewalks damaged by the work in accordance with Section 02775. See 02302 Earthwork 3.08 for disposal of excavated materials.

1.02 REFERENCE SPECIFICATIONS

A. Whenever the words "Standard Specifications" are referred to, the reference is to the State of California, Department of Transportation, Standard Specifications – May 2006.

B. American Society for Testing and Materials (ASTM):
   1. D1556 Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
   2. D2922 Test Method for Density of Soil and Soil Aggregate in Place by Nuclear Method (Shallow Depth)

1.03 SUBMITTALS

A. Submit the following.
   1. Samples: Furnish, without additional cost to the Owner, such quantities of construction materials as may be required by the Engineer for test purposes. The Contractor shall cooperate with the Engineer and furnish necessary facilities for sampling and testing of all materials and workmanship. All materials furnished and all work performed shall be subject to rigid inspection, and no materials shall be used in the construction work until it has been inspected by the Engineer.
   2. Submit a signed verification from each source of supply for each construction material employed on this project indicating that the materials meet the Specification requirements.
   3. Mix design for asphalt concrete and test results of California Test 367.
   4. Submit manufacturer's certification of the actual volatile organic compounds (VOC) content for all pavement paints and bituminous pavement sealers proposed for use on this project. Submit certification of the actual VOC content for coatings manufactured after 1 September 1987. For coatings manufactured before 1 September 1987, submit VOC content and date of manufacture. VOC content shall be measured in grams per liter by weight of coating as applied excluding water and color added to the tint base.

5. Submit verification that bituminous pavement sealers and paint products furnished meet applicable regulations as to allowable VOC content for the time and place of application and use intended.

1.04 QUALITY ASSURANCE

A. Comply with appropriate sections of the Standard Specifications of State of California, Department of Transportation (CALTRANS).

1.05 REGULATORY REQUIREMENTS

A. All work, material, procedures and practices under this Section shall conform with requirements of the California Air Resources Board (CARB) and the Air Pollution Control District having jurisdiction.

PART 2 - PRODUCTS

2.01 PAVING MATERIALS

A. Aggregate Base: Standard Specifications, Section 26. Class and size as indicated on the Drawings; or if not indicated on the Drawings, use Class 2, 3/4-inch maximum.

B. Prime Coat: Liquid asphalt, Grade SC-70, Standard Specifications, Section 93.

C. Tack Coat and Seal Coat: Emulsified asphalt, Grade SS-1, Standard Specifications, Section 94.

D. Asphalt Concrete: Type A, 3/4-inch maximum, medium grading, Standard Specification Section 39. Bitumin ratio shall be selected by the supplier in accordance with paragraph 39-2.02 of the Standard Specifications.

2.02 PAVEMENT PAINT

A. Comply with Section 84-3.02 of the Standard Specifications.

PART 3 - EXECUTION

3.01 GENERAL

A. This Specification shall cover newly surfaced areas as well as restoration of existing surfacing.

B. Adjust existing and new manholes, meter boxes, cleanouts, etc. to match the new grade.

3.02 PAVEMENT CUTTING

A. After backfilling trenches and prior to paving, saw cut existing pavement parallel to the trench (using a concrete saw). The pavement shall be cut back 12 inches on

each side of the trench or excavation wall. Re-cut and restore any pavement damaged outside these lines at the expense of the Contractor. Should voids develop under the existing pavements during construction, those affected pavements shall be neatly saw cut in straight lines and replaced after the voids have been filled.

3.03 PLACEMENT OF AGGREGATE BASE

A. Subgrade Preparation: Water or dry subgrade as required to bring the soil to within 2% of the optimum moisture content for proper compacting. Compact to a relative compaction of not less than 95% in the upper 6 inches. When compaction of the subgrade areas on fill and embankments has been properly obtained, only such additional rolling will be required as necessary to obtain a thoroughly compacted subgrade immediately prior to placing the aggregate base thereon.

B. Aggregate Base Tolerance: Do not place the aggregate base before the subgrade is approved by the Engineer. The finished aggregate base shall not vary more than 0.05 foot above, nor 0.10 foot below, the planned grade.

C. Aggregate Base Placing: Spread the aggregate base material on the prepared subgrade by means of suitable spreading devices. The aggregate base material may be dumped in piles upon the subgrade and spread by bulldozing ahead from the dumped material. Each layer shall not exceed 0.50 feet. Segregation of large or fine particles of aggregate shall be avoided, and the material as spread shall be free from pockets of large and fine material.

D. Compaction: Compact each layer of aggregate base material to not less than 95% relative compaction as determined by Test Method Calif. No. 216 or ASTM D1556 (Sand Cone), or Calif. No. 231 or ASTM D2922 (Nuclear method when approved by the Engineer). Compaction shall be in accordance with Section 26-1.05 of the Standard Specifications. Water aggregate base after compaction as provided in Section 17 of the Standard Specifications. Paragraph 17-1.04 is not applicable.

3.04 ASPHALT CONCRETE INSTALLATION

A. Apply prime coat at a rate of 0.25-gallon per square yard or as determined by the Engineer. Blot any excess which has not penetrated the base with sand. Remove any loose sand.

B. Apply tack coat a rate of 0.05 to 0.10-gallon per square yard or as determined by the Engineer.

C. Spread and compact asphalt concrete in accordance with Standard Specifications Section 39 to the thickness shown on the Drawings.

D. Protect asphaltic concrete paving until surface has cooled sufficiently to permit traffic without damage.

E. Immediately remove spilled and splattered materials from adjacent surfaces.

3.05 PAVEMENT MARKINGS

A. Replace existing pavement markings that are removed or damaged by the construction.

B. Apply pavement markings in accordance with Section 84 of the Standard Specifications.

END OF SECTION

SECTION 02775

CONCRETE CURB, GUTTERS, AND SIDEWALKS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Furnish all labor, materials, methods or processes, implements, tools, machinery and equipment required to remove and replace existing concrete curb and gutter, sidewalks and driveways as required and as specified herein.

1.02 REFERENCE SPECIFICATIONS

A. Wherever the words "Standard Specifications" are referred to, the reference is to the State of California, Department of Transportation, Standard Specifications – May 2006.

1.03 SUBMITTALS

A. Submit certificate of compliance indicating that the concrete complies with the specifications as submittals.

1.04 QUALITY ASSURANCE

A. Removal of Existing Concrete:

1. The Contractor shall not remove more concrete than can be replaced within the week that work has begun. All sidewalks, etc., shall be in place with barricades removed and ready for public traffic by 5:00 p.m., Friday, of any working week. No sidewalks, etc., shall be left open over weekends or holidays, except with the Engineer's permission. All forms shall be stripped and driveways shall be opened by the above times.

2. Existing concrete curb, gutters, sidewalks and driveways shall be saw cut and then broken out to a straight joint as directed by the Engineer. The Contractor shall exercise care in removing the concrete so as not to damage adjoining areas which are to remain in place, and any damage so caused shall be repaired by the Contractor at his own expense.

3. The Contractor shall exercise care so as not to injure any tree. If encounter any tree roots more than 3” in diameter, the Contractor shall inform the Park Department Inspector for inspection. Concrete directly adjacent to tree trunks or large roots shall be carefully removed so that the bark of the tree is not damaged.

4. The Contractor shall remove and dispose of all excess material or debris off the job site by the end of each workday. The existing concrete to be removed shall be outlined by the scoring with a concrete saw to a uniform depth of not

less than four inches (4") to provide a break joint where a joint does not already exist.

5. All sod or turf removed in order to place forms shall either be removed in such a manner as to enable the Contractor to put it back into place in its original condition after stripping forms or replaced with backfill and seeded. In the event the turf is non-existent or in so poor condition that it cannot be replaced, the area concerned will be brought back to grade and compacted to 80% density with good quality top soil to conform with the surrounding area.

B. Planting Strip: Where materials, other than concrete (bricks, pavers, etc.), are encountered in areas to be removed and replaced with topsoil, the Contractor shall contact the homeowner to determine if the materials should be left on site or hauled off.

1.05 ADDITIONAL SAFETY RESPONSIBILITIES

A. Contractor shall be responsible for safety of the public, especially in sidewalk areas, during this project. Work sites shall be kept safe by placing adequate barricades, wood walks in commercial areas, eliminating tripping hazards, and other means as appropriate. Open excavation shall be covered when no work is being performed. Steel plating shall be installed until temporary surfacing can be constructed.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Portland Cement Concrete:
All concrete shall consist of 5-sacks of Portland Cement per cubic yard of concrete and have a 28-day compressive strength of 2500 psi. Aggregate shall conform to combined aggregate sizes designated as 3/4" maximum. The concrete shall have a slump not to exceed three inches (3") as determined by the conventional slump cone method. It is the Contractor's responsibility to protect the concrete finish until acceptance by the Engineer. The color and finish shall be as close as possible to that of the surrounding pavement, with preference to a light broom finish and darkened with one (1) pound dry lampblack conforming to ASTM D209 per cubic yard concrete. Concrete shall be scored to conform to the existing pattern. No concrete shall be poured until forms have been inspected and approved by the Engineer.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Forms shall be smooth on the side placed next to the concrete and shall have a true smooth upper edge and shall be rigid enough to withstand the pressure of fresh concrete without distortion. All forms shall be thoroughly cleaned and coated with form oil to prevent the concrete from adhering to them. The depth of forms shall be equal to the full depth of the concrete section being poured. Contractor shall exercise care not to injure any part of the tree in placing his forms. No cutting

away of any part of the trunk or main roots to accommodate forms will be permitted. Forms shall be bent around tree trunks to provide a minimum of two inches (2") clearance for the finished sidewalk.

B. Control joints shall be placed as required or as herein specified. Control joints shall be 1 ½" deep and shall be constructed with a special tool design for such joints. At least a control joint shall be placed in each pour of concrete over 10 feet in length and at 10-foot intervals thereafter.

A control joint shall be placed on each side of the tree, at a distance of no more than five feet (5') either side of the tree. No additional compensation will be allowed for placing of control joints.

C. Adjust structures such as valve boxes, manhole frames and covers, and electrical vaults to grade after the curb and gutter or sidewalk has been constructed for a reasonable distance on all sides of the structure.

3.02 CURING

A. All concrete shall be cured as provided in Section 90-7, "Curing Concrete," of the Standard Specifications for a period of 72 hours. The Contractor shall have the option of using the Water Method, the Pigmented Curing Compound Method or the Waterproof Membrane Method as described in Section 90-7.01A, 90-7.01B or 90-7.01C, respectively. No vehicular traffic shall be allowed on new concrete in less than 48 hours after it is poured.

3.03 CLEANUP

A. After removal of forms, the adjacent area shall be backfilled and graded to conform to the surrounding ground. Each site shall be left neat and orderly. All turf or sod shall be both replaced in its original condition or backfilled and seeded. In the event the turf is non-existent or in so poor condition that it cannot be replaced, the area concerned will be brought back to grade and compacted to 80% density with good quality topsoil. Surrounding area, other than landscaping, shall be restored in kind.

B. All work areas shall be left clean, neat and orderly with all concrete in place for the week's work by 5:00 p.m., Friday, per Section 4-1.02 of Standard Specifications. Whenever work areas are not left clean, neat and orderly, the City shall perform all necessary cleanup at the Contractor's expense and a deduction shall be made for such work on the next progress payment.

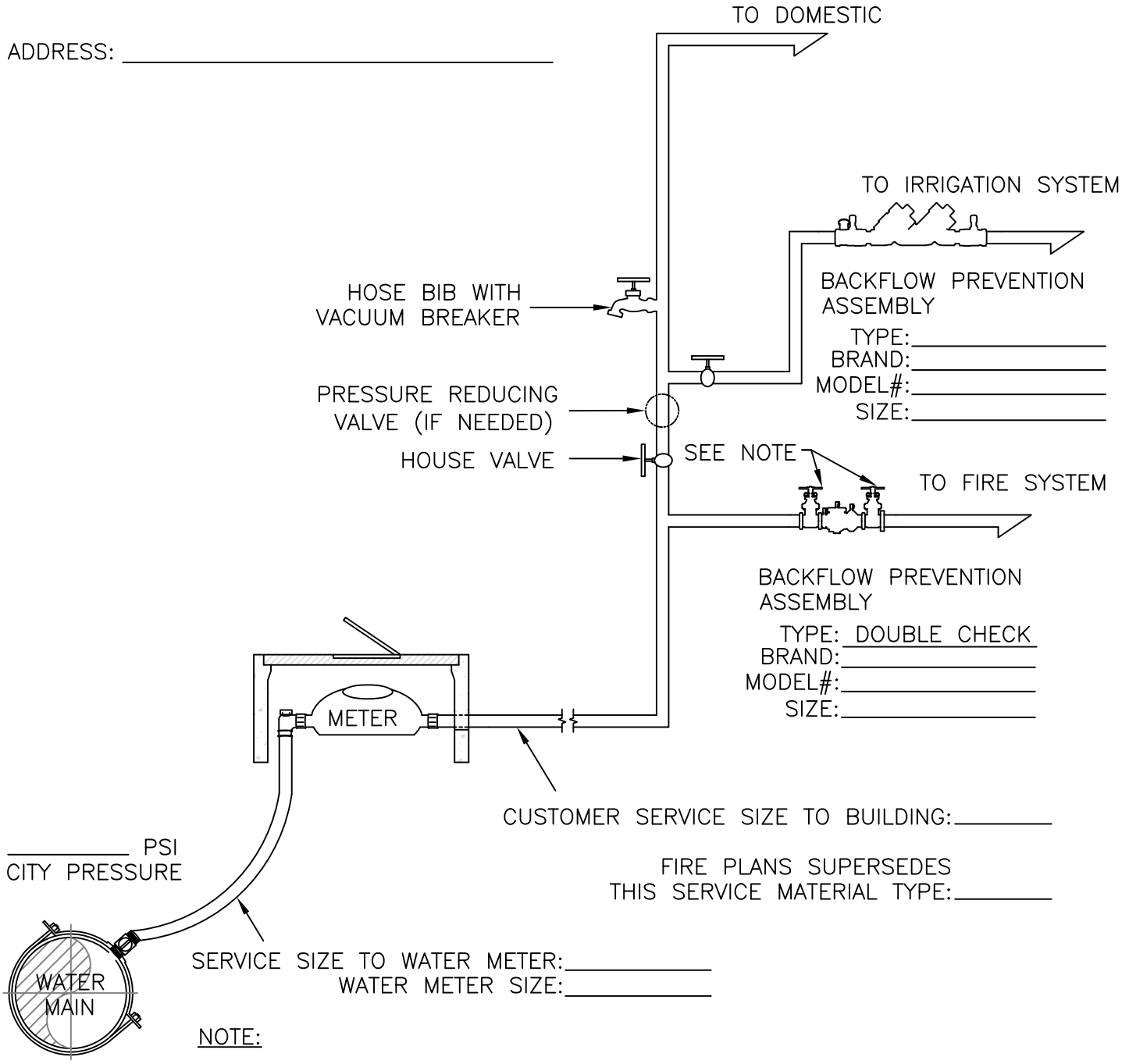
END OF SECTION

Standard Drawings

STANDARD DETAILS LIST
CITY OF BURLINGAME
PUBLIC WORKS WATER SYSTEM

Description	Drawing No.	Drawing Revised
Typical Residential Water Service Detail (with Fire Service)	W-1780	Jan 2013
Typical 1" Service Connection	W-1779	Jan 2013
Typical 1 ½" & 2" Service Connection	W-1770	Jan 2013
Thrust Blocks (Sheet 1 of 3	W-1810	Nov 2007
Thrust Blocks (Sheet 2 of 3)	W-1810	Nov 2007
Thrust Blocks (Sheet 3 of 3)	W-1810	Nov 2007
Typical Valve Box (Sheet 1 of 2)	W-1809	Nov 2007
Typical Valve Box (Sheet 2 of 2)	W-1809	Nov 2007
Typical Air Release and Vacuum Valve	W-2609	Nov 2007
Typical Fire Hydrant	W-2610	Nov 2007
Typical 1" Manual Air Relief Valve	W-2711	Nov 2007
Typical 2" Manual Air Relief Valve	W-1111	Nov 2007
2" Blow Off Assembly	W-1200	Nov 2007
Sewer Crossing Water	W-2655	Nov 2007
Single Fire System Connection (sheet 1 of 2)	W-2779	May 2016
Single Fire System Connection (sheet 2 of 2)	W-2779	May 2016
Double Check Detector (Above Grade) (Sheet 1 of 2)	W-2780	May 2016
Pumper Connection and System Drain (Sheet 2 of 2)	W-2780	May 2016
Alternate Fire System Connection (sheet 1 of 2)	W-2781	May 2016
Alternate Fire System Connection (Sheet 2 of 2)	W-2781	May 2016

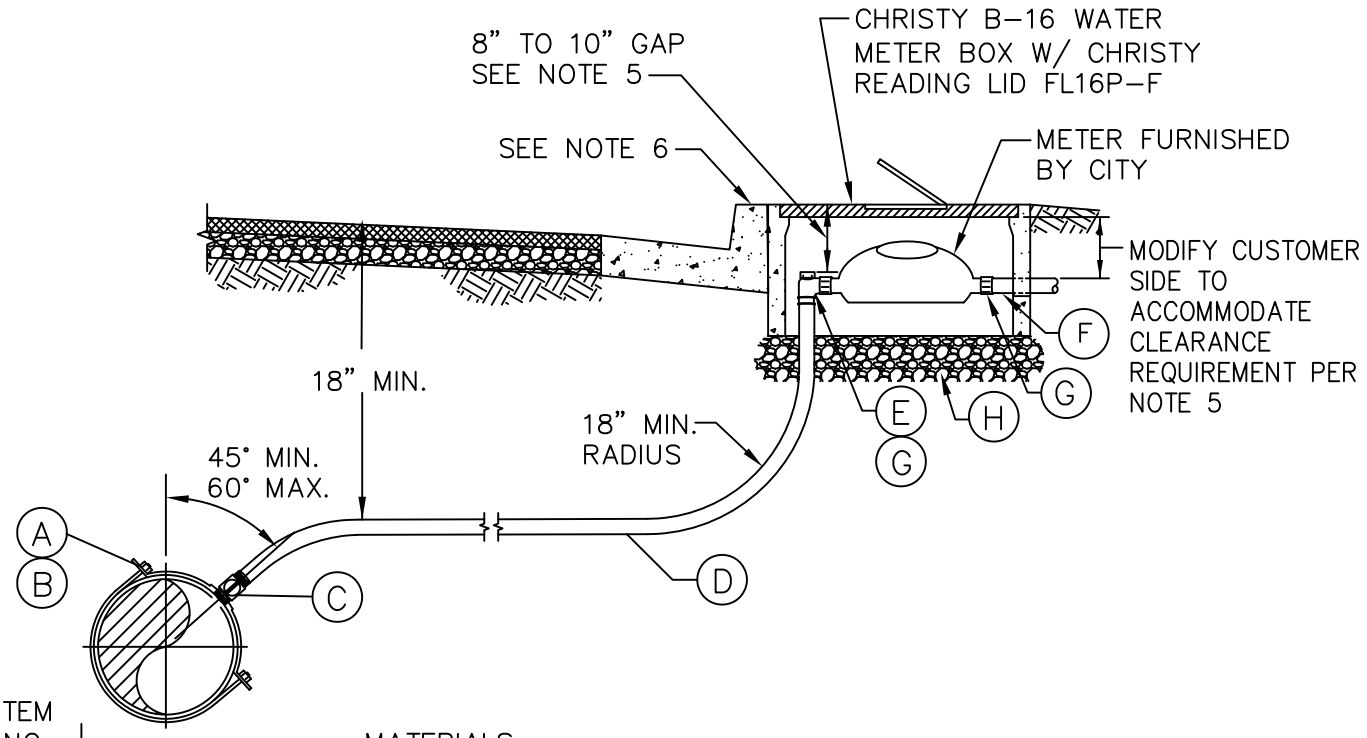
ALL BACKFLOW PREVENTION ASSEMBLIES MUST BE APPROVED BY THE UNIVERSITY OF SOUTHERN CALIFORNIA (USC) AND TESTED BY A SAN MATEO COUNTY CERTIFIED TESTER BEFORE APPROVAL OF THE WATER SYSTEM. SEE THE SAN MATEO COUNTY WEB SITE FOR APPROVED LIST OF CERTIFIED TESTER'S AT HTTP://SMCHEALTH.ORG/NODE/426. FOR ADDITIONAL INFORMATION ON USC APPROVED DEVICES PLEASE CALL THE WATER DIVISION AT (650) 558-7670. PLEASE COMPLETE THE "WATER DEMAND WORKSHEET" FOR DETERMINING THE WATER SERVICE AND METER SIZE. THE WORKSHEET IS AVAILABLE AT THE BUILDING DEPARTMENT OR ON THE CITY OF BURLINGAME WEB SITE AT HTTP://WWW.BURLINGAME.ORG/INDEX.ASPX?PAGE=125.



NOTE:

1. REMOVE DOUBLE CHECK VALVE HANDLES AND STORE IN SPARE HEAD BOX

	TYPICAL RESIDENTIAL WATER SERVICE DETAIL (WITH FIRE SYSTEM)				DATE	DRAWING NO.
	DEPARTMENT OF PUBLIC WORKS				NOV 2012	W-1780
				DRAWN BY: L.T.	SCALE:	SHEET
				CHECKED BY: K.O	NONE	1 OF 1
DATE	REVISION	BY	APPR.	APPROVED BY:		

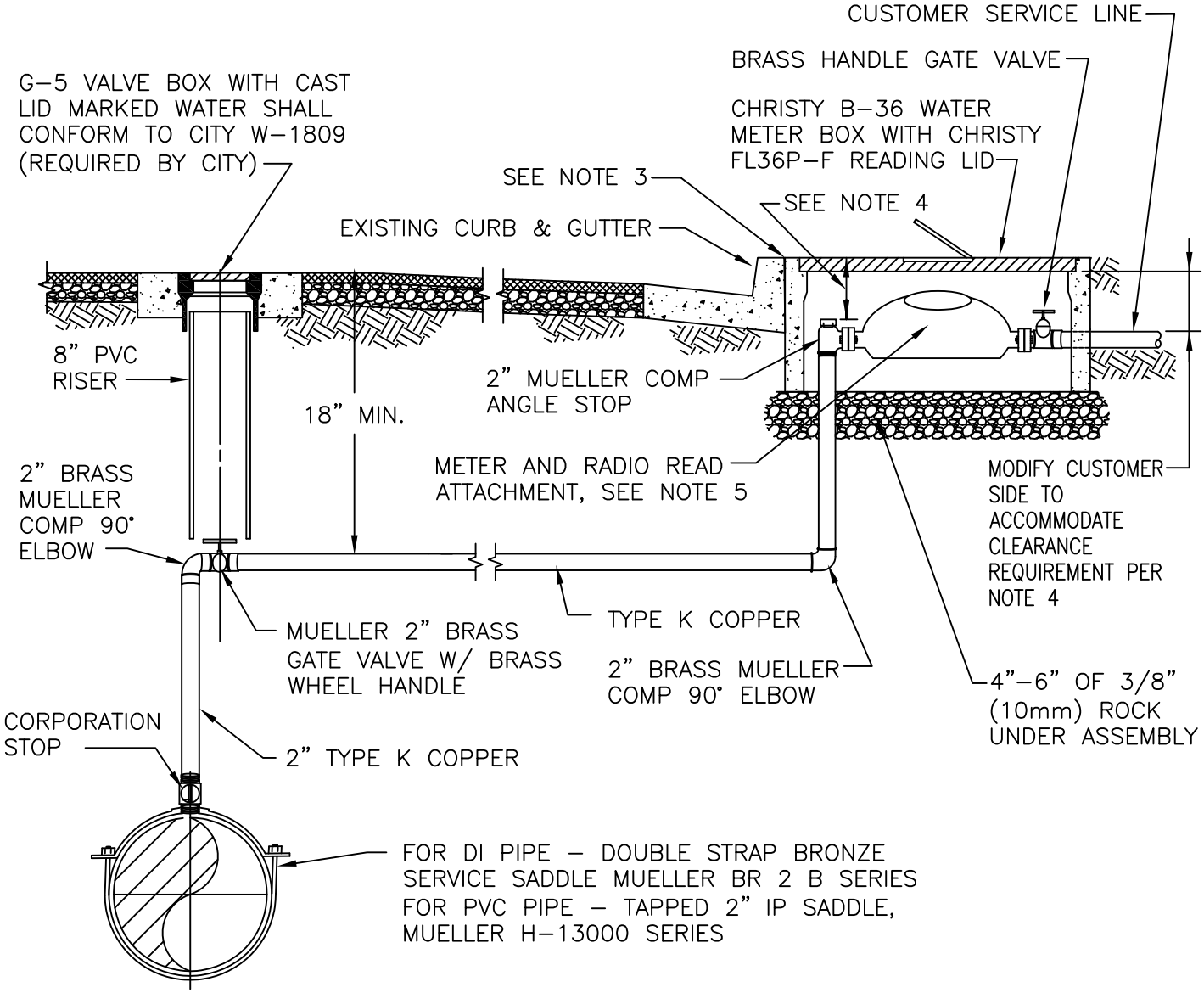


ITEM NO.	MATERIALS
(A)	FOR DUCTILE IRON PIPE – USE DOUBLE STRAP BRONZE SERVICE SADDLE, MUELLER BR 2 B;
(B)	FOR PVC PIPE – USE 1" CC THREAD SADDLE, MUELLER H-13000 SERIES.
(C)	1" CORPORATION STOP. MUELLER H-15008
(D)	1" COPPER TUBING. TYPE K, CONFORMING WITH ANSI H23.
(E)	1" ANGLE METER STOP. MUELLER H-14258.
(F)	METER COUPLINGS. MUELLER H-10871 (SPUD).
(G)	METER ADAPTORS FOR METER SIZES LESS THAN 1"-FORD-A24-NL.
(H)	4"-6" OF 3/8" (10mm) ROCK UNDER ASSEMBLY

NOTES:

1. ALL FITTINGS, TUBING, VALVES, ETC. ARE ONE INCH UNLESS OTHERWISE SHOWN.
2. OPEN TRENCHING IS NOT PERMITTED ON PRIVATE PROPERTY BY CITY CONTRACTORS, UNLESS SPECIFICALLY PERMITTED.
3. EXPOSED PIPING SHALL BE COPPER OR BRASS ONLY.
4. TWO METER ADAPTORS WILL BE REQUIRED ON 3/4" METERS TO PROVIDE FOR A 1" METER LAY LENGTH.
5. A MINIMUM GAP OF 8" TO A MAXIMUM GAP OF 10" MUST REMAIN BETWEEN THE TOP OF ANGLE STOP AND TOP OF METER BOX LID AT FINISH GRADE. MODIFY CUSTOMER SIDE TO ACCOMMODATE CLEARANCE REQUIREMENT.
6. FRONT EDGE OF METER BOX TO BE PLACED AGAINST REAR OF CURB UNLESS THERE IS SIDEWALK ADJACENT TO REAR OF CURB, THEN PLACE FRONT EDGE OF METER BOX AGAINST REAR OF SIDEWALK.

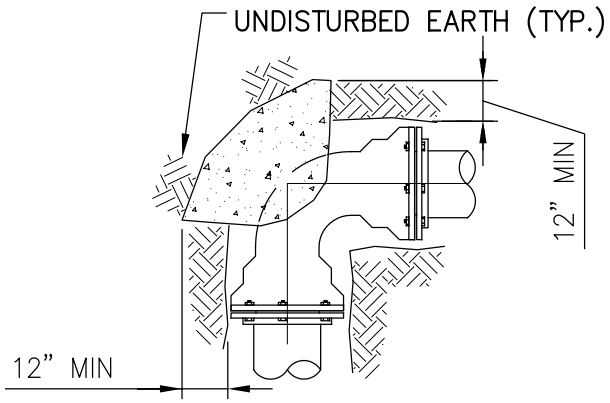
THE CITY OF BURLINGAME	**TYPICAL 1" SERVICE CONNECTION**	DATE	DRAWING NO.
	DEPARTMENT OF PUBLIC WORKS	JAN 2013	W-1779
		DRAWN BY: FNE	SCALE: NONE
		CHECKED BY: NEP	SHEET 1 OF 2
DATE	REVISION BY APPR.	APPROVED BY:	



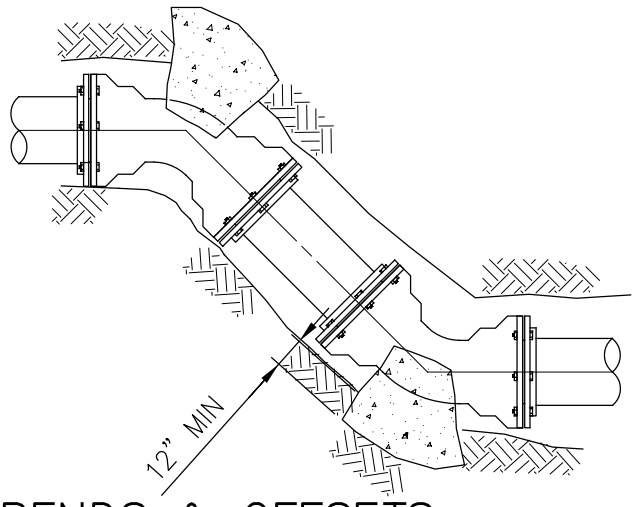
NOTE:

1. NO TRENCHING IS ALLOWED ON PRIVATE PROPERTY BY CITY CONTRACTOR, UNLESS SPECIFICALLY PERMITTED.
2. EXPOSED PIPING SHALL BE COPPER OR BRASS ONLY.
3. FRONT EDGE OF METER BOX TO BE PLACED AGAINST REAR OF CURB UNLESS THERE IS SIDEWALK ADJACENT TO REAR OF CURB, THEN PLACE FRONT EDGE OF METER BOX AGAINST REAR OF SIDEWALK.
4. A MINIMUM GAP OF 8" TO A MAXIMUM GAP OF 10" MUST REMAIN BETWEEN THE TOP OF ANGLE STOP AND TOP OF METER BOX LID AT FINISH GRADE, MODIFY CUSTOMER SIDE TO ACCOMMODATE CLEARANCE REQUIREMENT.
5. CONTRACTOR SHALL INSTALL CITY FURNISHED METER AND RADIO READ ATTACHMENT PER CITY STANDARD DETAIL.

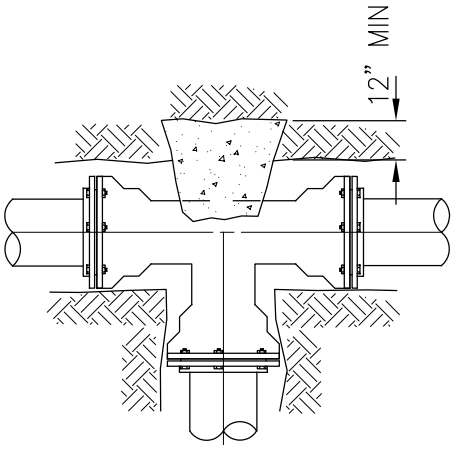
THE CITY OF BURLINGAME	**TYPICAL 1 1/2" and 2" SERVICE CONNECTION**				DATE	DRAWING NO.
	DEPARTMENT OF PUBLIC WORKS				JAN 2013	W–1779
				DRAWN BY: FNE	SCALE:	SHEET
				CHECKED BY: NEP	NONE	2 OF 2
DATE	REVISION	BY	APPR.	APPROVED BY:		



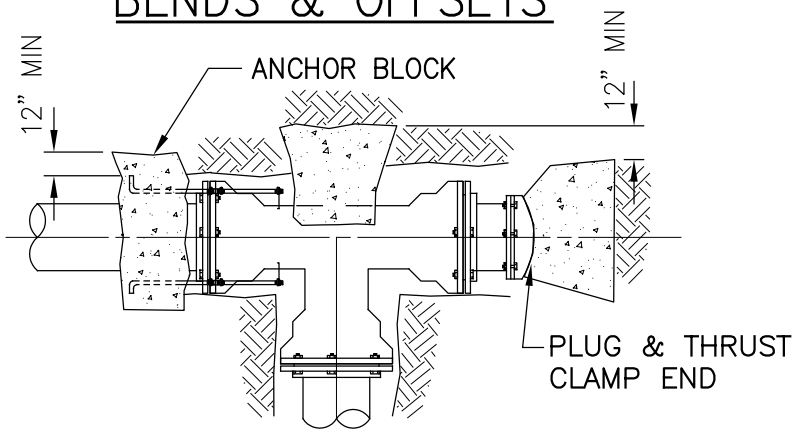
90° BEND



BENDS & OFFSETS



TEE



TEE (RUN PLUGGED)

NOTE:

1. THRUST BLOCKS SHALL BE CONSTRUCTED OF CONCRETE USING 5–SACK MIX, TYPE II CLASS B WITH 3/4" AGGREGATE.
2. THRUST BLOCK SHALL BE POURED AGAINST UNDISTURBED EARTH.
3. CONCRETE SHALL BE CONTAINED AWAY FROM PIPE JOINTED TO ALLOW CLEARANCE FOR ACCESS TO JOINTS AND BOLTS.
4. FOR REQUIRED THRUST BLOCK BEARING AREA, SEE CHART BELOW.
5. FOR VERTICAL BENDS, SEE SHEET 2 OF 3
6. FOR ANCHOR BLOCK, SEE SHEET 3 OF 3
7. NUTS, BOLTS AND FLANGES SHALL BE CLEAR OF CONCRETE.
8. RESTRAINED JOINTS REQUIRED IN ADDITION TO THRUST BLOCKS.

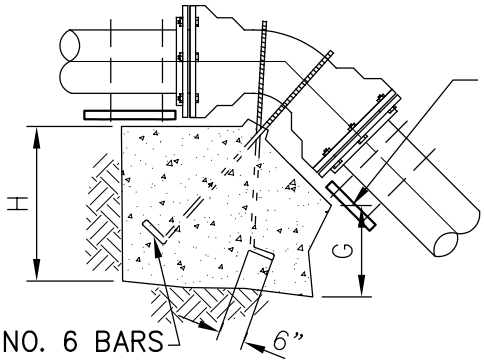
HORIZONTAL THRUST PER SQUARE FOOT
THRUST BLOCK DIMENSIONS

SOIL BEARING
1=1000 psf
2=1500 psf

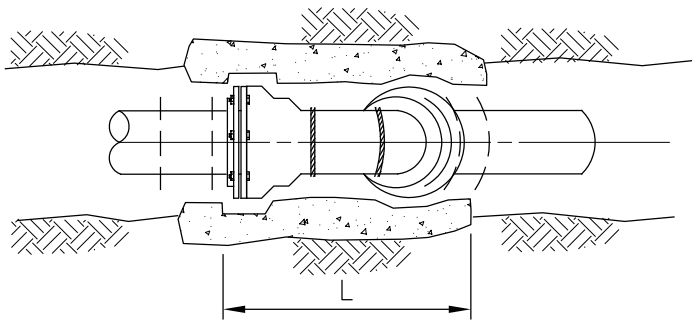
	90° BENDS		45° BENDS		TEE/PLUG BENDS	
O.D.	1	2	1	2	1	2
4	3.5	2.5	2	1.5	2.5	1.5
6	8	3	4.5	3	6	4
8	14	9.5	8	5.5	10	7
10	22.5	15	12.5	8	16	10.5
12	32	21	18	12	22.5	15

NOTE: ASSUME 1000 psf, UNLESS KNOWN.

	THRUST BLOCKS				DATE	DRAWING NO.
	DEPARTMENT OF PUBLIC WORKS				NOV 2007	**W-1810**
				DRAWN BY: FNE	SCALE:	SHEET
				CHECKED BY: NEP	NONE	1 OF 3
DATE	REVISION	BY	APPR.	APPROVED BY:		



ELEVATION

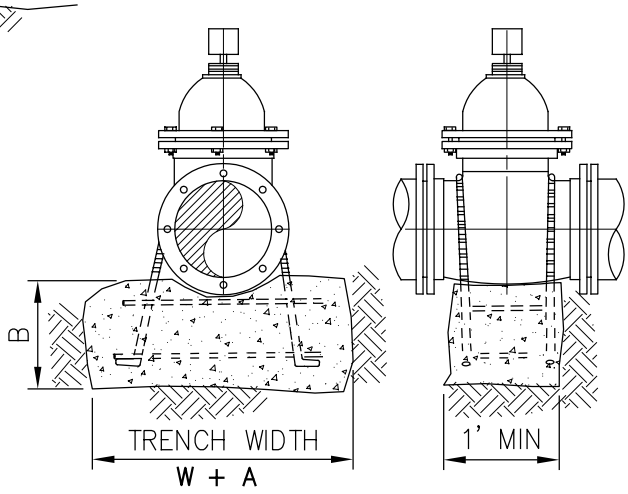


PLAN

UPWARD (VERTICAL) THRUST
THRUST BLOCK DIMENSIONS

	11 1/4° BENDS			22 1/2° BENDS			45° BENDS		
	L	H	G	L	H	G	L	H	G
4	2'	1'	0.5'	2'	1'	1'	2'	1'	0.5'
6	2'	1'	1'	2'	2'	1'	3'	2'	0.5'
8	2'	1'	1'	3'	2'	1'	4.5'	3'	0.5'
10	3.5'	2'	1.5'	5'	2'	1'	7'	4'	0.5'
12	4'	2'	1.5'	7'	2'	1'	9'	4'	0.5'

WIDTH IS EQUAL TO TRENCH WIDTH
3' FOR PIPE SIZES 4" THRU 8"
4' FOR PIPE SIZES 10" AND 12"



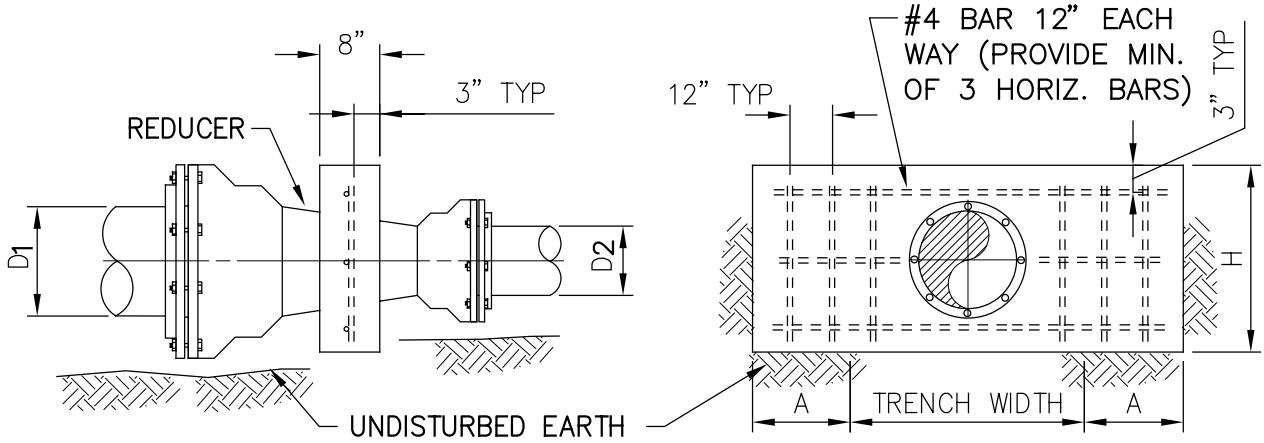
ANCHOR BLOCK
GATE VALVE

VALVE SIZE (IN INCH.)	ANCHOR BLOCK DIMENSIONS A	B
4	2'	1.5'
6	3'	1.5'
8	3'	1.5'
10	3'	2'
12	3.5'	2'

NOTE:

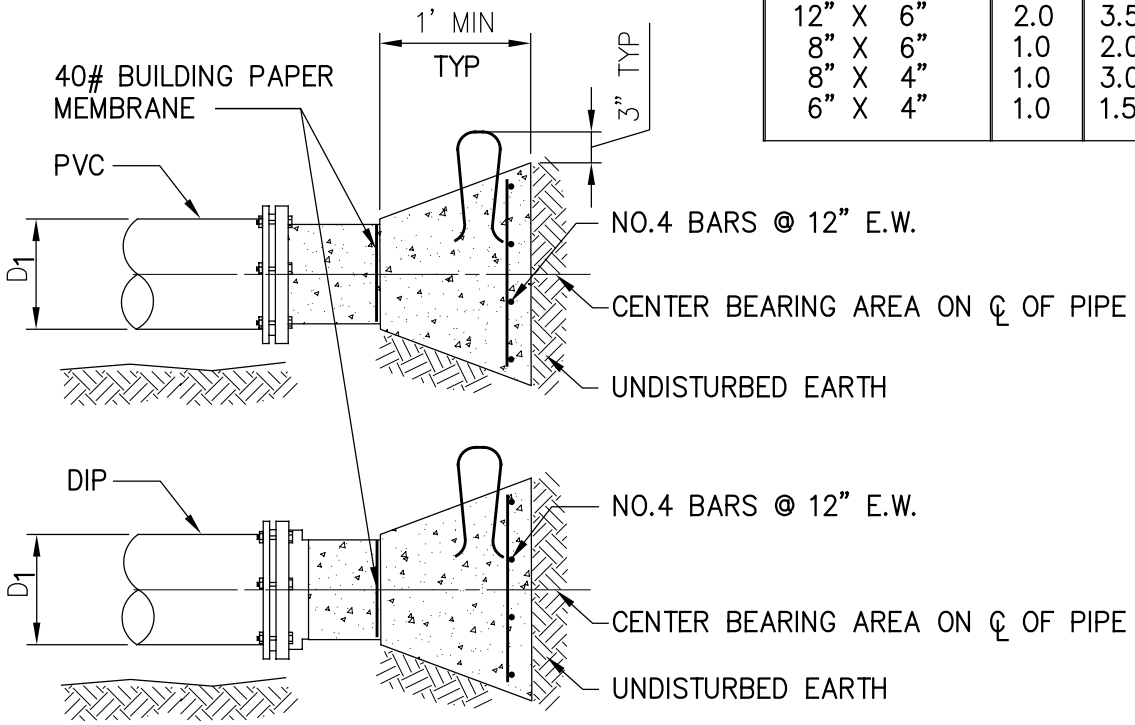
1. CONCRETE SHALL BE PLACED AGAINST UNDUSTURBED EARTH.
2. WRAP EXPOSED PORTION OF ALL REBAR WITH SCOTCHWRAP #51 (20 MIL). WRAP WITH 1/2 OVERLAP. EXTEND WRAP 2" (MAX.) INTO CONCRETE.
3. ANCHOR BLOCK FOR GATE VALVE ALSO APPLIES TO BUTTERFLY VALVES.
4. NUTS, BOLTS, FLANGES SHALL BE CLEAR OF CONCRETE.
5. FOR DUCTILE IRON PIPE USE FLANGED BY FLANGED JOINTS OR FLANGED FITTINGS WITH RESTRAINED FLANGED ADAPTERS ON VERTICAL BENDS.
6. RESTRAINED JOINTS REQUIRED IN ADDITION TO THRUST BLOCKS.

THE CITY OF BURLINGAME INCORPORATED 1908	**THRUST BLOCKS**				DATE	DRAWING NO.
	DEPARTMENT OF PUBLIC WORKS				NOV 2007	**W-1810**
				DRAWN BY: FNE	SCALE:	SHEET
				CHECKED BY: NEP	NONE	2 OF 3
DATE	REVISION	BY	APPR.	APPROVED BY:		



ANCHOR BLOCK FOR REDUCERS

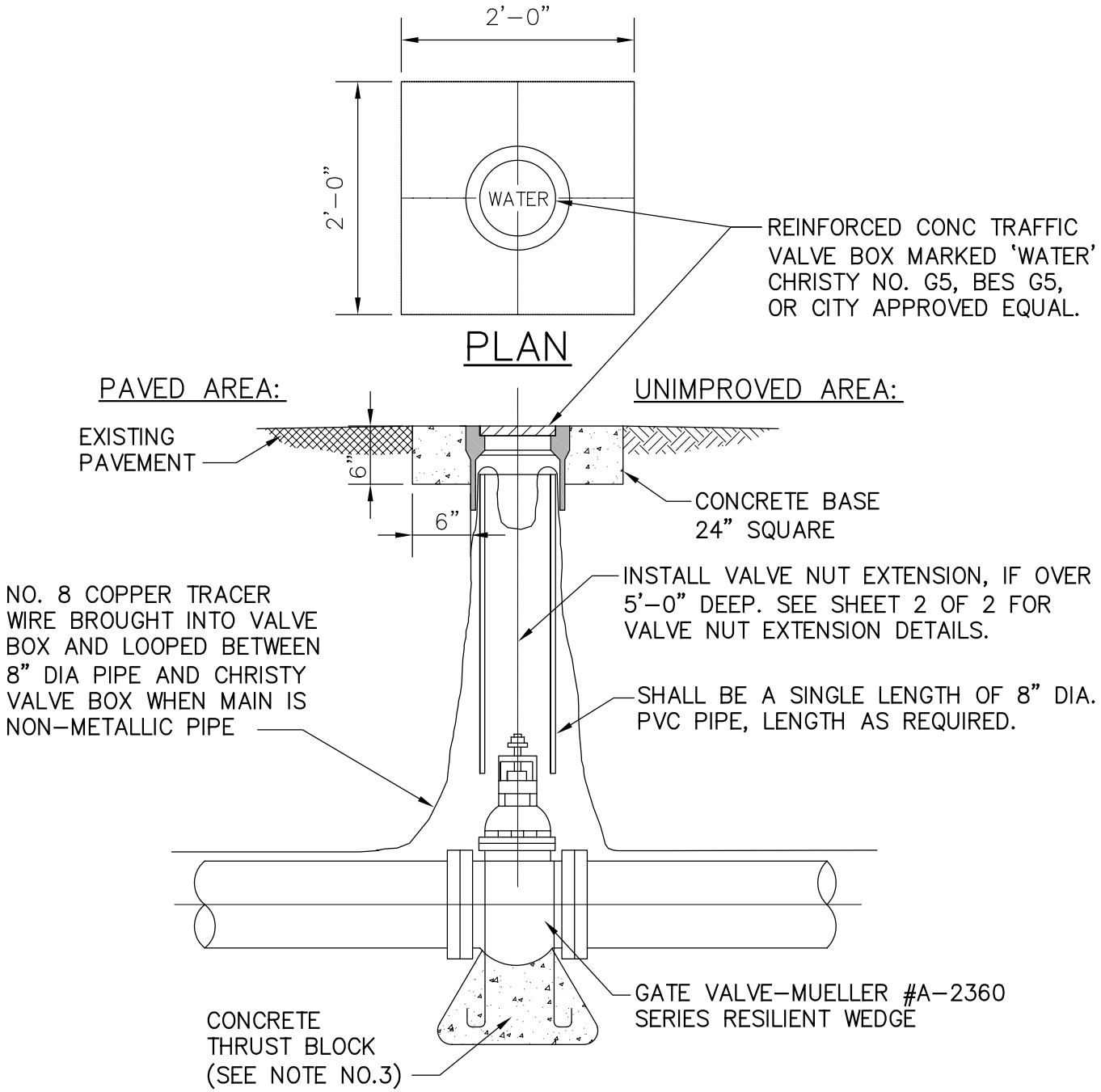
REDUCER SIZE D_1 X D_2	H (FT.)	A (FT.)
12" X 10"	1.5	2.0
12" X 8"	2.0	2.5
12" X 6"	2.0	3.5
8" X 6"	1.0	2.0
8" X 4"	1.0	3.0
6" X 4"	1.0	1.5



NOTE:

1. FOR PLUG BEARING AREA SEE SHEET 1 OF 3.
2. NUTS, BOLTS, AND FLANGES SHALL BE CLEAR OF CONCRETE.
3. RESTRAINED JOINTS REQUIRED IN ADDITION TO THRUST BLOCKS.

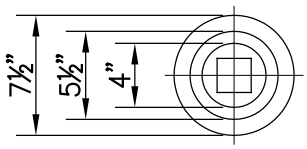
THE CITY OF BURLINGAME INCORPORATED 1908	**THRUST BLOCKS**				DATE	DRAWING NO.
	DEPARTMENT OF PUBLIC WORKS				NOV 2007	**W-1810**
				DRAWN BY: FNE	SCALE:	SHEET
				CHECKED BY: NEP	NONE	3 OF 3
DATE	REVISION	BY	APPR.	APPROVED BY:		



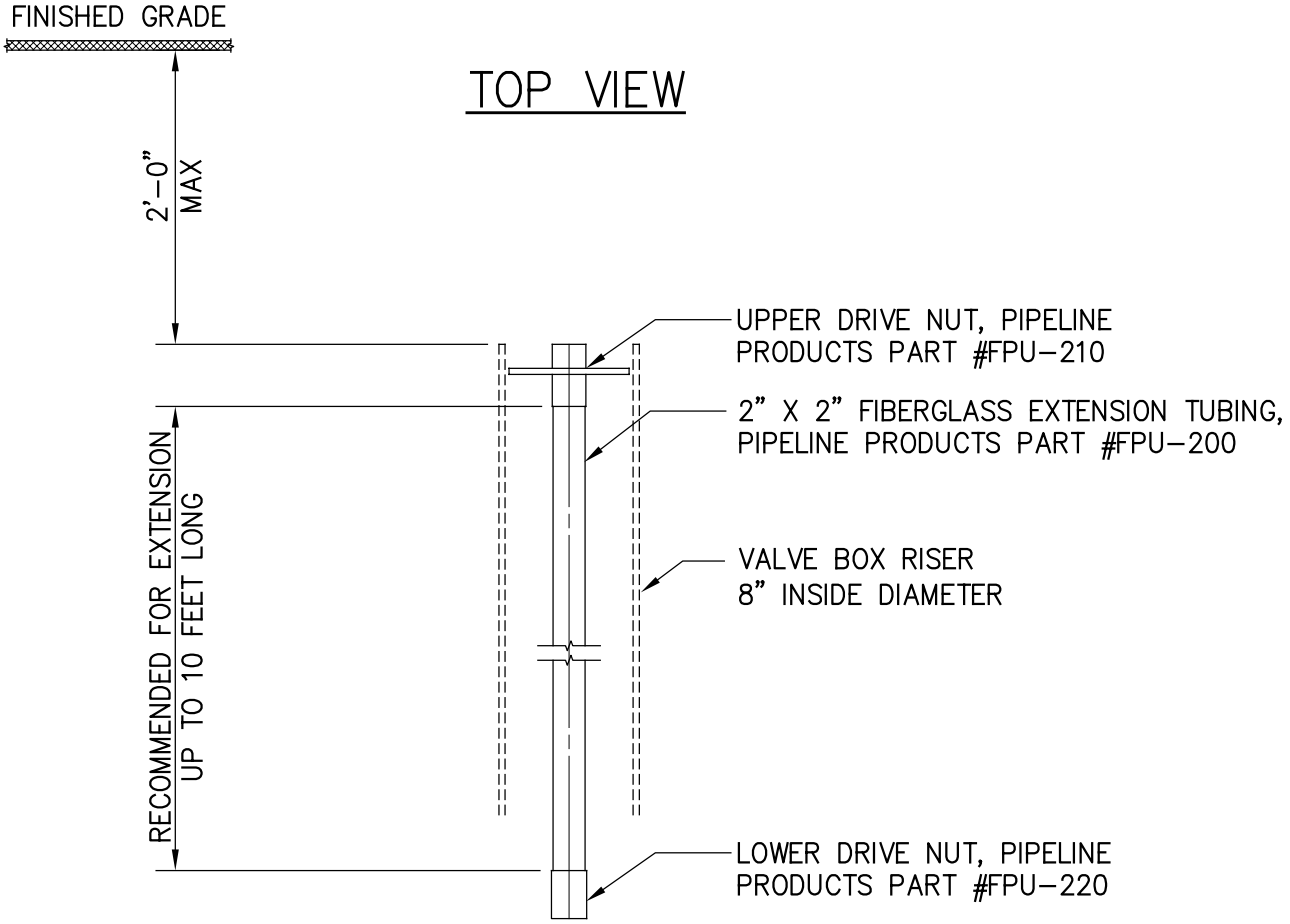
NOTE:

1. VALVE BOX EXTENSION SHALL BE A SINGLE SECTION OF 8" DIAMETER P.V.C.
2. AFTER PAVING, RAISE BOX TO PERMANENT GRADE, POUR THE CONCRETE COLLAR AND RESTORE PAVEMENT.
3. THRUST BLOCKS SHALL CONFORM TO W–1810.
4. CONCRETE SHALL CONTAIN 2 LBS PER CUBIC YARD LAMP BLACK.
5. VALVES MAY BE FLANGED (AS SHOWN) OR PUSH–ON MECHANICAL JOINT.

THE CITY OF BURLINGAME INCORPORATED 1908	**TYPICAL VALVE BOX**				DATE	DRAWING NO.
	DEPARTMENT OF PUBLIC WORKS				NOV 2007	**W-1809**
				DRAWN BY: FNE	SCALE:	SHEET
				CHECKED BY: NEP	NONE	1 OF 2
DATE	REVISION	BY	APPR.	APPROVED BY:		



TRIM UPPER DRIVE NUT TO FIT INSIDE VALVE BOX RISER IF NECESSARY.



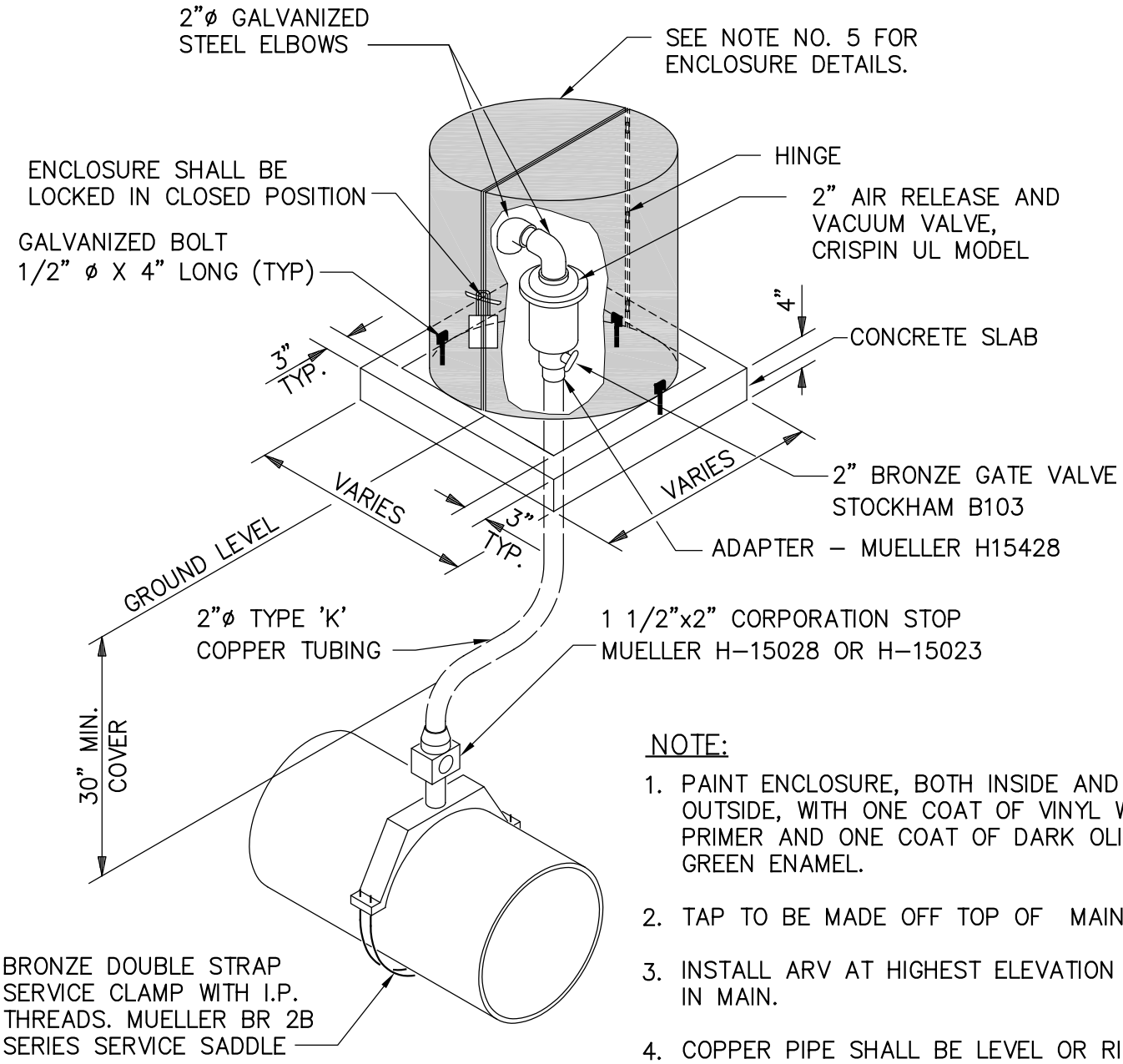
TOP VIEW

SIDE VIEW

NOTE:

1. EXTENSIONS ARE REQUIRED FOR VALVES MORE THAN 5 FEET BELOW THE FINISHED GRADE.
2. ASSEMBLE VALVE STEM EXTENSION ACCORDING TO MANUFACTURERS INSTRUCTIONS.

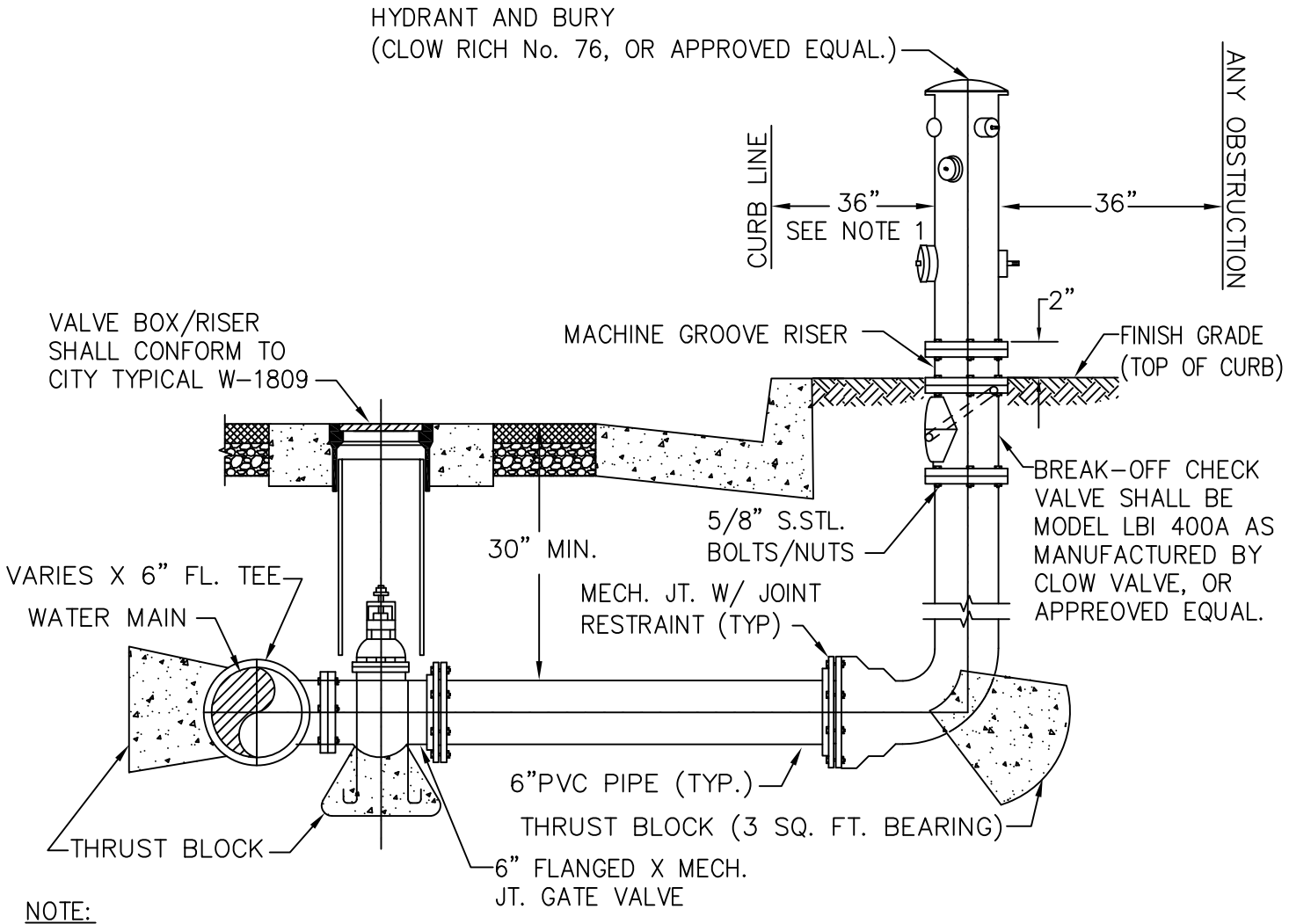
THE CITY OF BURLINGAME INCORPORATED 1908	**TYPICAL VALVE BOX**				DATE	DRAWING NO.
	DEPARTMENT OF PUBLIC WORKS				NOV 2007	**W-1809**
				DRAWN BY: FNE	SCALE:	SHEET
				CHECKED BY: NEP	NONE	2 OF 2
DATE	REVISION	BY	APPR.	APPROVED BY:		



NOTE:

1. PAINT ENCLOSURE, BOTH INSIDE AND OUTSIDE, WITH ONE COAT OF VINYL WASH PRIMER AND ONE COAT OF DARK OLIVE GREEN ENAMEL.
2. TAP TO BE MADE OFF TOP OF MAIN.
3. INSTALL ARV AT HIGHEST ELEVATION POINT IN MAIN.
4. COPPER PIPE SHALL BE LEVEL OR RISING SO NO AIR CAN BE TRAPPED IN PIPE.
5. ENCLOSURE SHALL BE PIPELINE PRODUCTS PART #VCDD–1624 OR FEBCO PART # BFE–SS–51M, TO BE DETERMINED BY THE CITY. CONCRETE PAD SHALL EXTEND A MINIMUM OF 3" BEYOND THE EDGES OF THE ENCLOSURE.

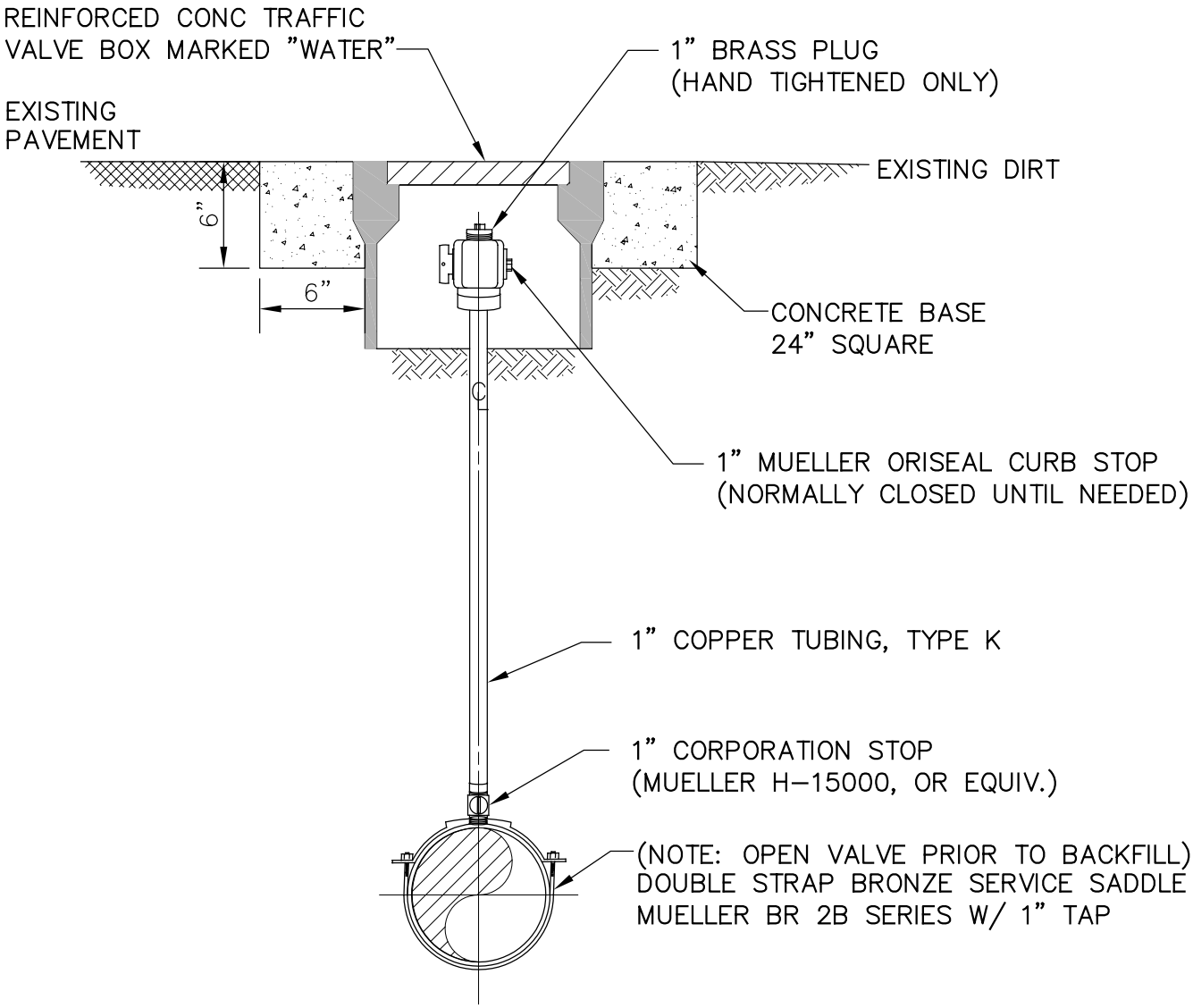
THE CITY OF BURLINGAME INCORPORATED 1908	**TYPICAL AIR RELEASE AND VACUUM VALVE**				DATE	DRAWING NO.
	DEPARTMENT OF PUBLIC WORKS				NOV 2007	**W-2609**
				DRAWN BY: FNE	SCALE:	SHEET
				CHECKED BY: NEP	NONE	1 OF 1
DATE	REVISION	BY	APPR.	APPROVED BY:		



NOTE:

1. IF THE SIDEWALK IS ADJACENT TO THE CURB, PLACE THE HYDRANT AT THE BACK EDGE OF THE SIDEWALK. THE MAXIMUM DISTANCE IS 10 FEET FROM THE CURB. NO OBSTRUCTIONS SHALL BE PLACED WITHIN A 3-FEET RADII OF ANY POINT OF THE HYDRANT BODY THAT COULD IMPEDE ACCESS TO ITS USE.
2. EXTEND THE LOCATOR TRACER WIRE INTO THE VALVE BOX AS SHOWN IN TYPICAL W-1809.
3. INSTALL A BLUE HYDRANT MARKER WITH EPOXY IN THE CENTER OF THE NEAREST ROADWAY MARKER PROVIDED BY CITY.
4. CONTRACTOR TO PAINT THE CURB, IN FRONT OF THE HYDRANT, RED FOR 10-FEET IN EACH DIRECTION.
5. SEE DETAIL W-1810 FOR THRUST BLOCK DETAILS.
6. FLANGE BOLTS AND NUTS SHALL BE KEEP CLEAR OF CONCRETE.

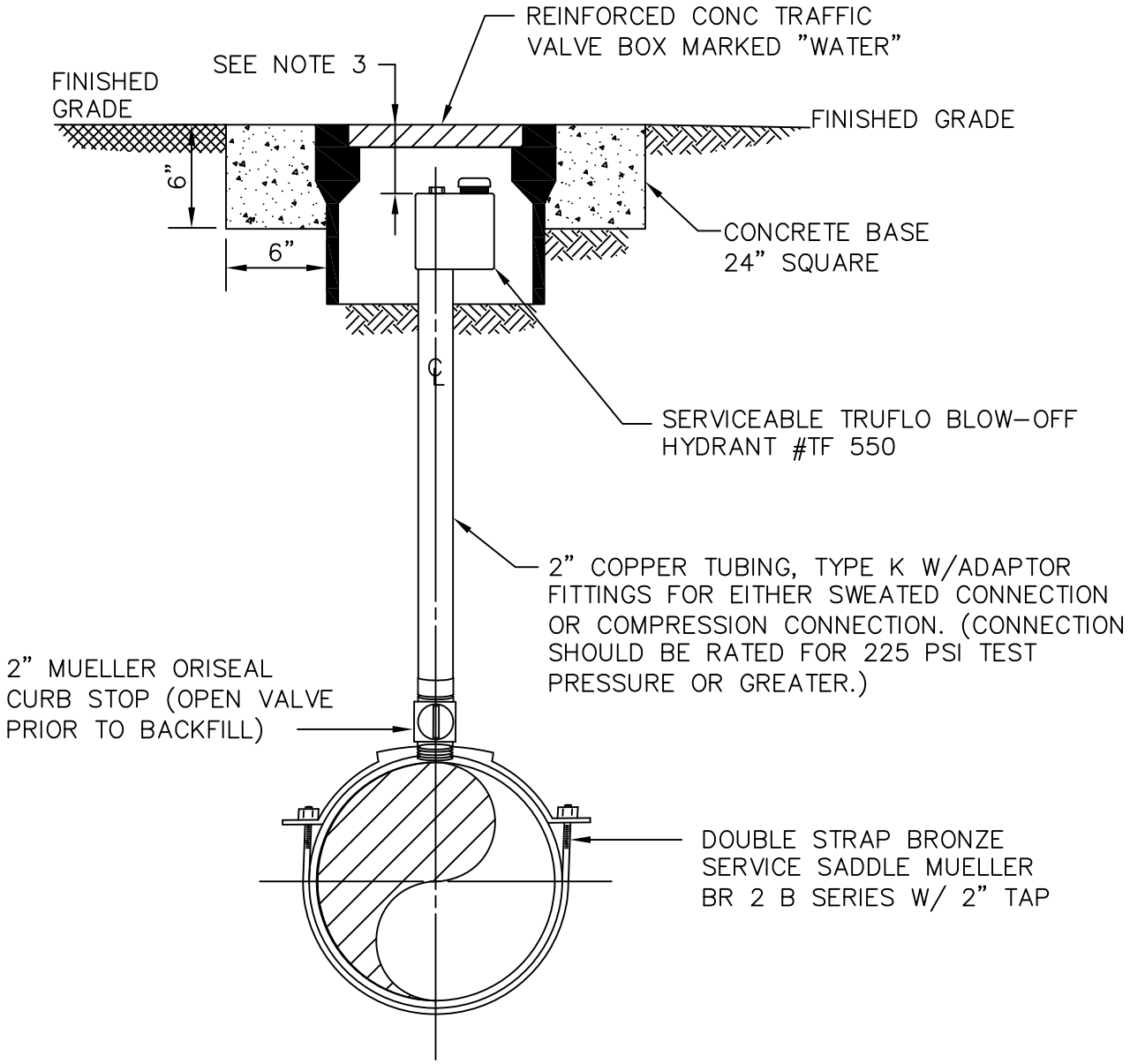
THE CITY OF BURLINGAME	**TYPICAL FIRE HYDRANT**				DATE	DRAWING NO.
	DEPARTMENT OF PUBLIC WORKS				NOV 2007	W-2610
				DRAWN BY: FNE	SCALE:	SHEET
				CHECKED BY: NEP	NONE	1 OF 1
DATE	REVISION	BY	APPR.	APPROVED BY:		



NOTE:

1. INSTALL SADDLE ON PIPE WITH TAP HOLE FACING STRAIGHT UP. WATER MAIN IS THEN TAPPED SIMILIAR TO NORMAL 1" DOMESTIC SERVICE TAP. COPPER PIPE AND UPPER SHUTOFF VALVE SHALL BE WITHIN 6" OF FINISHED GRADE.
2. SEE W-1809 FOR TYPICAL VALVE BOX DETAIL.

THE CITY OF BURLINGAME INCORPORATED 1908	**TYPICAL 1" MANUAL AIR RELIEF VALVE**				DATE	DRAWING NO.
	DEPARTMENT OF PUBLIC WORKS				NOV 2007	**W-2711**
				DRAWN BY: FNE	SCALE:	SHEET
				CHECKED BY: NEP	NONE	1 OF 1
DATE	REVISION	BY	APPR.	APPROVED BY:		



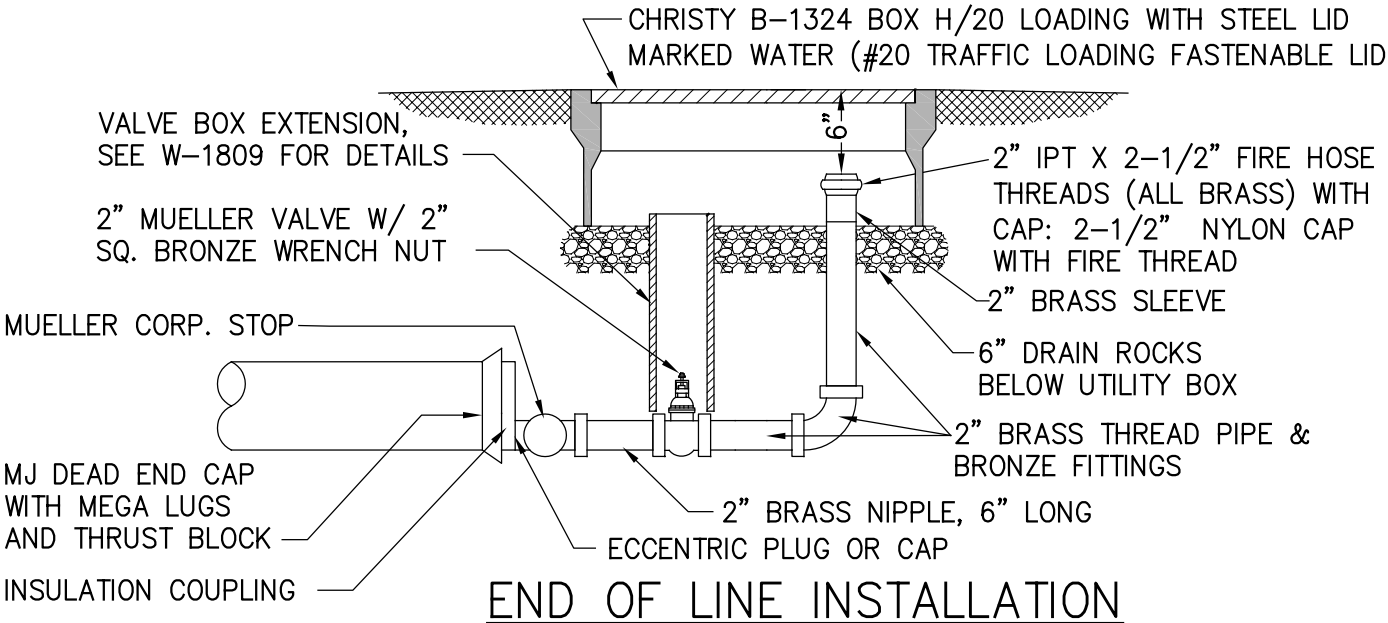
NOTE:

1. INSTALL SADDLE ON PIPE WITH TAP HOLE FACING STRAIGHT UP. WATER MAIN IS THEN TAPPED SIMILAR TO NORMAL 1" DOMESTIC SERVICE TAP. COPPER PIPE HYDRANT SHALL BE WITHIN 6" OF FINISHED GRADE.

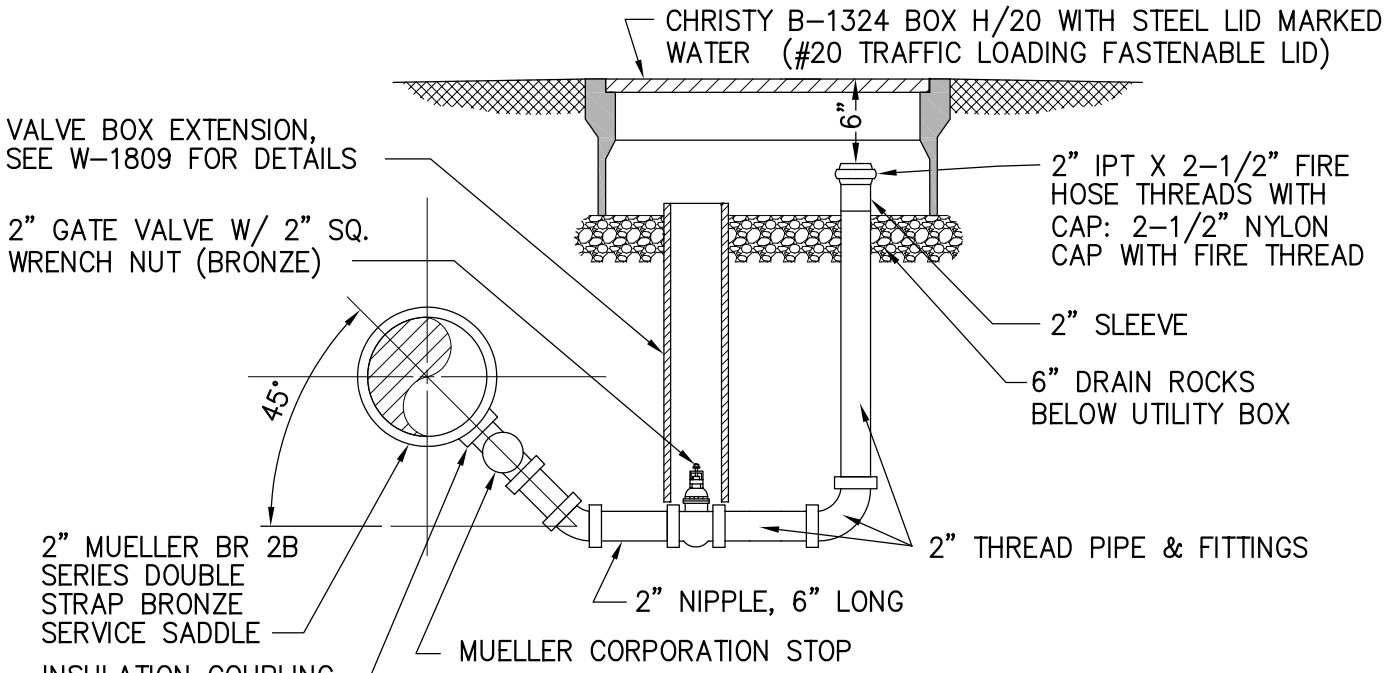
2. SEE W–1809 FOR TYPICAL VALVE BOX DETAIL. VALVE BOX EXTENSION NOT REQUIRED.

3. A MINIMUM GAP OF 3" TO A MAXIMUM GAP OF 6" MUST REMAIN BETWEEN THE TOP OF BLOW–OFF BODY AND THE TOP OF VALVE BOX LID.

THE CITY OF BURLINGAME	**TYPICAL 2" MANUAL AIR RELIEF VALVE**				DATE	DRAWING NO.
	DEPARTMENT OF PUBLIC WORKS				NOV 2007	W–1111
				DRAWN BY: FNE	SCALE:	SHEET
				CHECKED BY: NEP	NONE	1 OF 1
DATE	REVISION	BY	APPR.	APPROVED BY:		



END OF LINE INSTALLATION

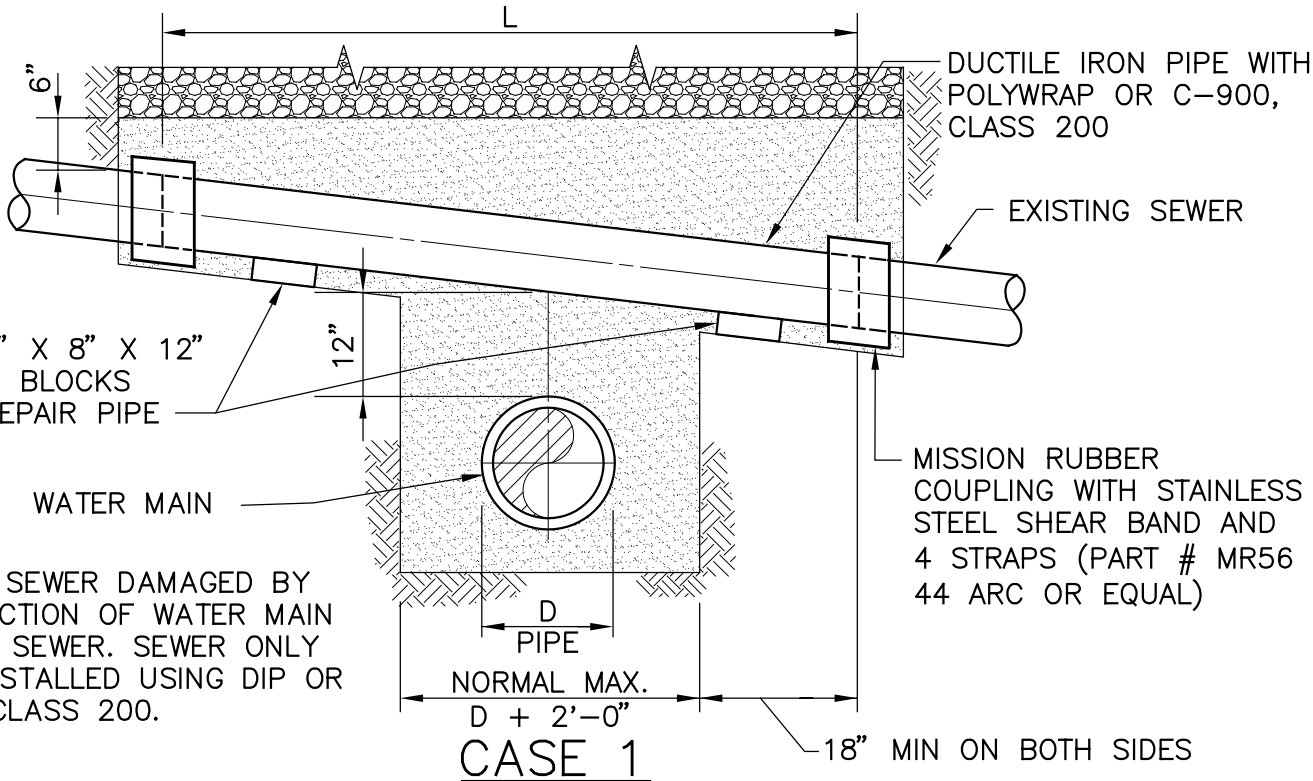


LOW POINT INSTALLATION

NOTE:

1. ALL BRASS PIPE, COPPER TUBS AND FITTINGS SHALL BE WRAPPED WITH WINMORE 10 MIL TAPE WITH 1/2" OVERLAP.
2. BRASS PIPE RISER TO BE SET PLUMB.
3. INSTALL CHRISTY B-1324 BOX H/20 LOADING BOX FLUSH WITH CONCRETE/ASPHALT OR INSTALL STANDARD FIBRELYTE 2" ABOVE GRADE IN LANDSCAPED AREAS.
4. USE 2" BLOW-OFF FOR 8" MAINS AND SMALLER.

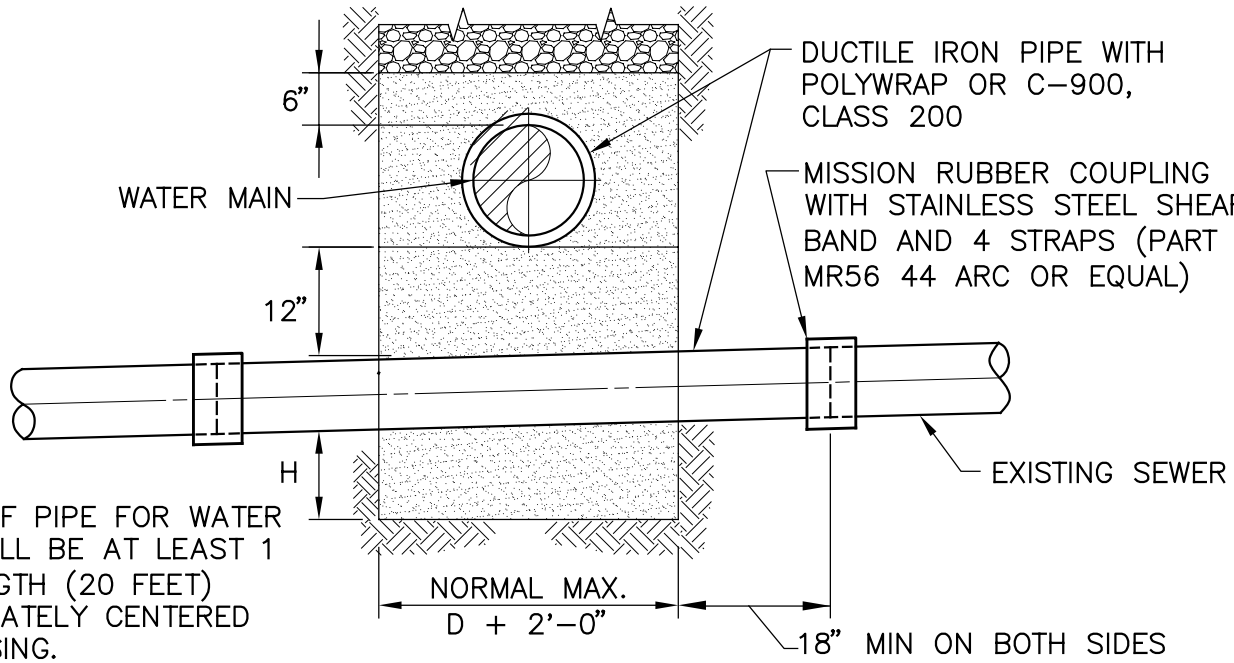
THE CITY OF BURLINGAME INCORPORATED 1908	**2" BLOW OFF ASSEMBLY**	DATE	DRAWING NO.
	DEPARTMENT OF PUBLIC WORKS	NOV 2007	**W-1200**
		DRAWN BY: FNE	SCALE: NONE
		CHECKED BY: NEP	SHEET 1 OF 1
DATE	REVISION / BY / APPR.	APPROVED BY:	



CASE 1:

EXISTING SEWER DAMAGED BY CONSTRUCTION OF WATER MAIN BENEATH SEWER. SEWER ONLY TO BE INSTALLED USING DIP OR C–900, CLASS 200.

CASE 1



CASE 2

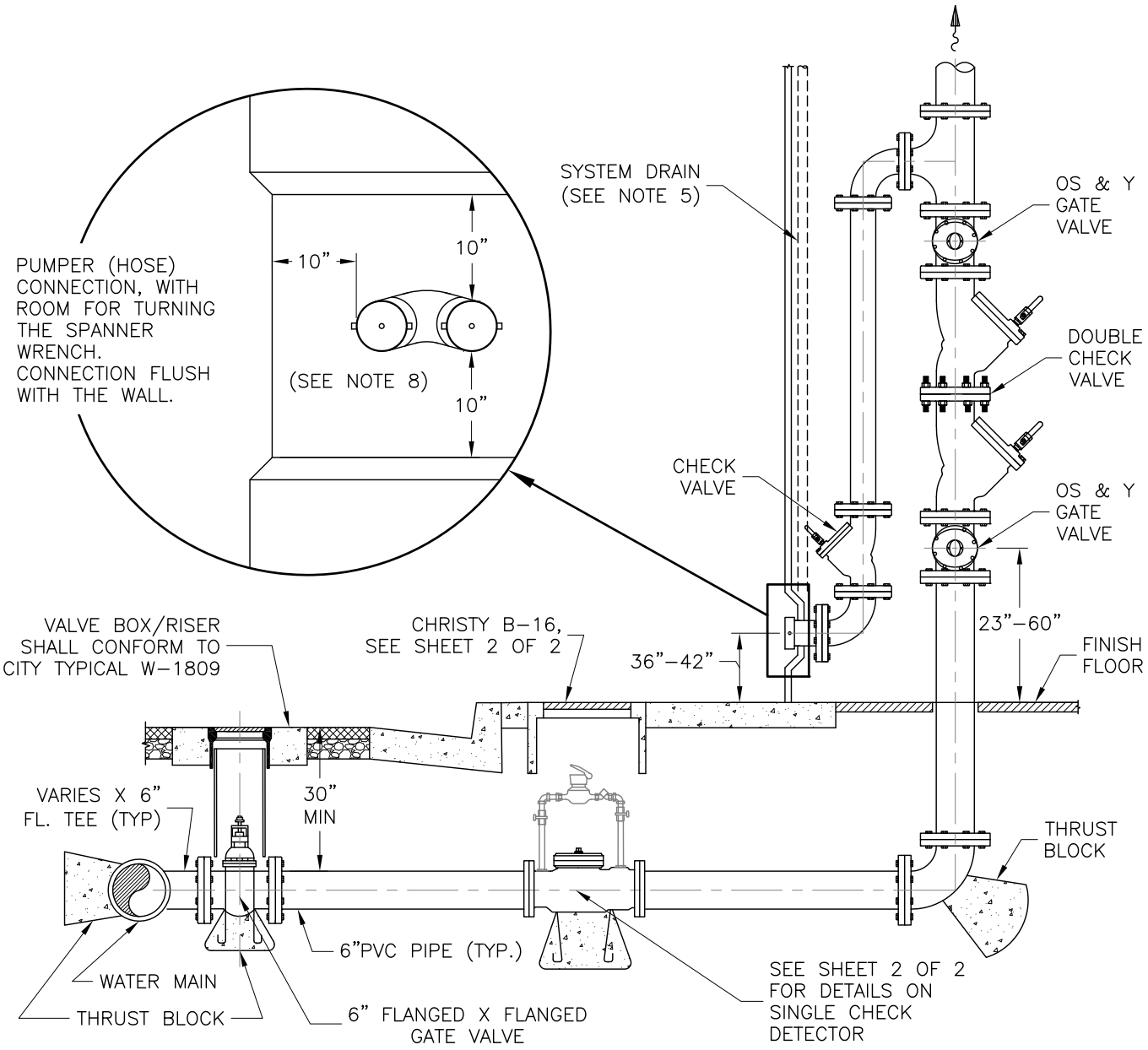
NOTE:

1. LENGTH OF PIPE FOR WATER MAIN SHALL BE AT LEAST 1 FULL LENGTH (20 FEET) APPROXIMATELY CENTERED AT CROSSING.
2. POLYWRAP SHALL BE 8 MIL. THICKNESS IN ACCORDANCE WITH AWWA C105.
3. ALL CROSSINGS TO BE INSPECTED BY CITY PRIOR TO BACKFILL.
4. ALL BACKFILL TO CONFORM TO CITY'S TYPICAL SEWER MAIN TRENCH SECTION SS–6.

CASE 1:

CLEARANCE BETWEEN WATER MAIN CROSSING OVER EXISTING SEWER IS 1 FOOT OR LESS. BOTH WATER MAIN AND SEWER ARE TO BE INSTALLED USING DIP OR C–900, CLASS 200

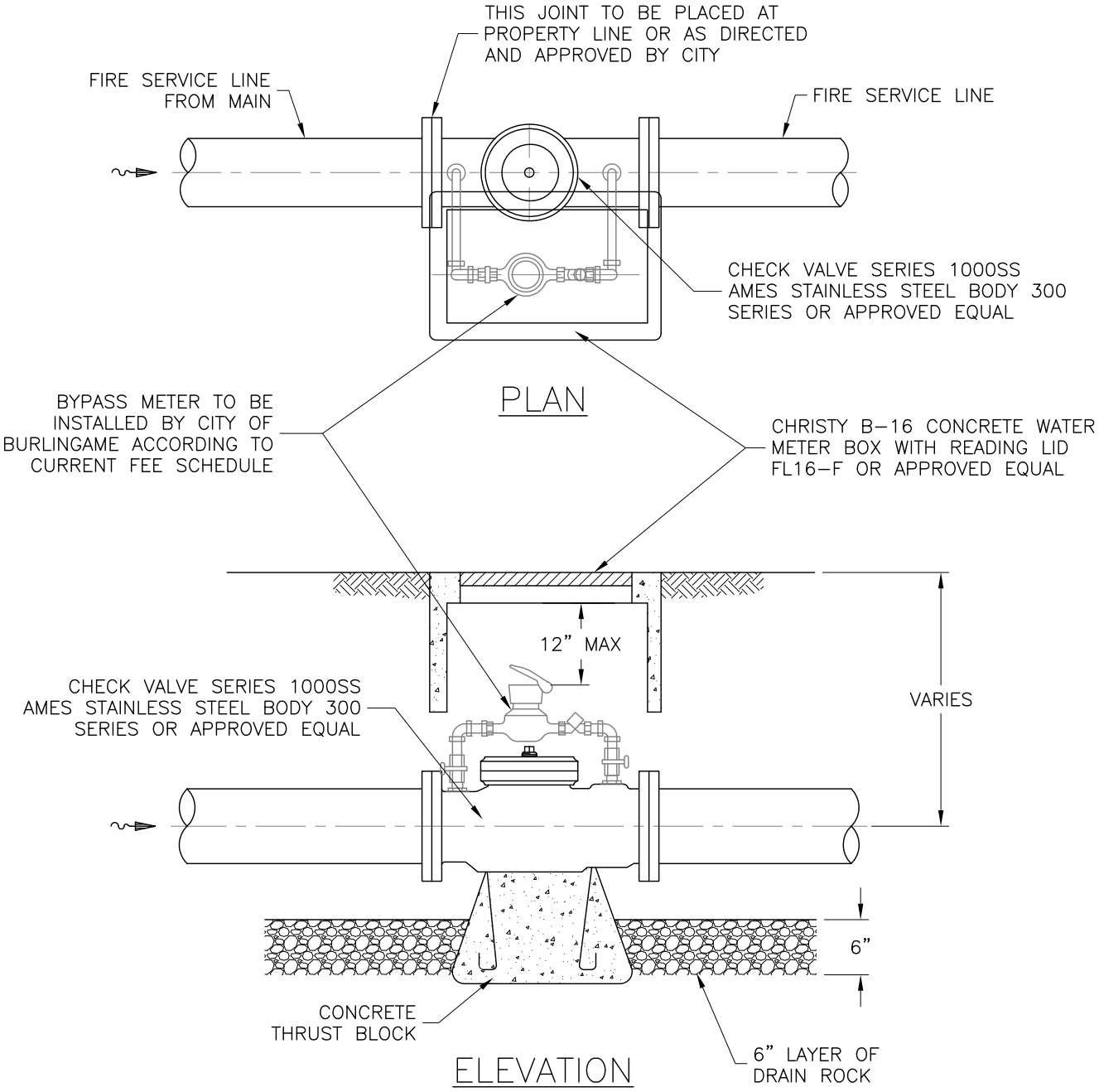
THE CITY OF BURLINGAME INCORPORATED 1908	**SEWER CROSSING WATER**	DATE: NOV 2007	DRAWING NO.: **W-2655**
	DEPARTMENT OF PUBLIC WORKS		
		DRAWN BY: FNE	SCALE: NONE
		CHECKED BY: NEP	SHEET: 1 OF 1
DATE	REVISION / BY / APPR.	APPROVED BY:	



NOTE:

1. LOCATION OF JOINT TEE SHALL BE APPROVED BY THE CITY ENGINEER.
2. MATERIALS USED IN THE CITY RIGHT–OF–WAY MUST BE APPROVED BY THE CITY.
3. DETECTOR CHECK METER IS TO BE INSTALLED BY THE CITY PRIOR TO BACKFILLING AROUND THE CHECK VALVE.
4. SEE WATER TYPICALS FOR TRENCH SECTION, MATERIALS, THRUST BLOCKS, VALVE INSTALLATION, ETC.
5. NON–STORM WATER FROM SYSTEM DRAIN PIPE SHALL BE DISCHARGED DIRECTLY INTO VEGETATED AREA, OR COLLECTED AND PROPERLY DISCHARGED INTO SANITARY SEWER. NO DIRECT CONNECTION SHALL BE MADE BETWEEN THE SYSTEM MAIN DRAIN AND THE SANITARY SEWER.
6. THRUST BLOCKS SHALL CONFORM TO W–1810.
7. VARIANCE REQUIRED FOR THIS INSTALLATION.
8. A MINIMUM OF 10 INCHES (10") CLEARANCE SHALL BE ON ALL SIDES OF FDC, MEASURED FROM EDGE OF OUTLETS.

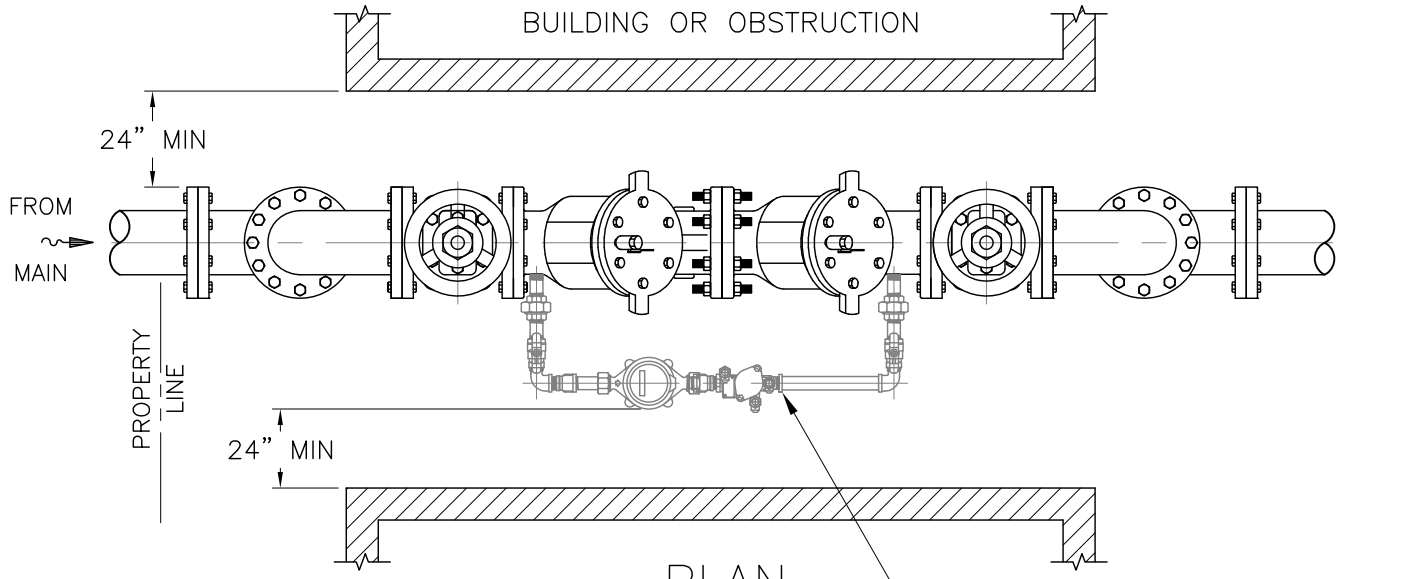
THE CITY OF BURLINGAME CALIFORNIA	**SINGLE FIRE SYSTEM CONNECTION**	APPROVED BY	DRAWING NO.
		DATE 05/18/2016	W-2779 (1 OF 2)
	DEPARTMENT OF PUBLIC WORKS		



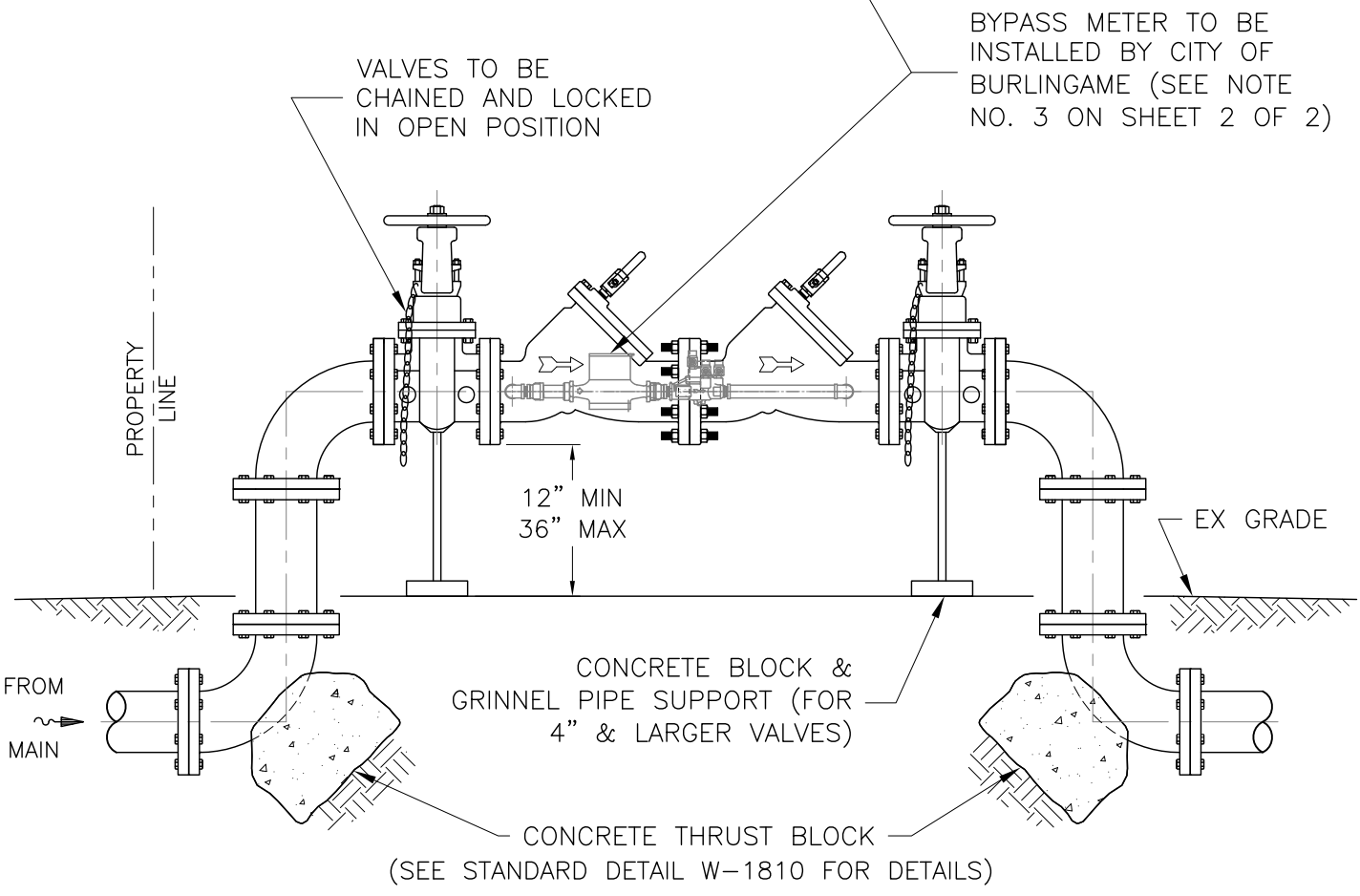
NOTE:

1. CITY TO FURNISH METER, COUPLINGS, AND 3/4" STRAIGHT CHECK VALVE.
2. DETECTOR CHECK VALVE SHALL BE INSTALLED ON THE OWNER'S PROPERTY.
3. INSPECTION BY UTILITY CROSS CONNECTION INSPECTOR IS REQUIRED.
4. THRUST BLOCKS SHALL CONFORM TO W-1810.
5. VARIANCE REQUIRED FOR THIS INSTALLATION.

THE CITY OF BURLINGAME CALIFORNIA	**SINGLE FIRE SYSTEM CONNECTION**	APPROVED BY	DRAWING NO.
		DATE 05/18/2016	W-2779 (2 OF 2)
	DEPARTMENT OF PUBLIC WORKS		

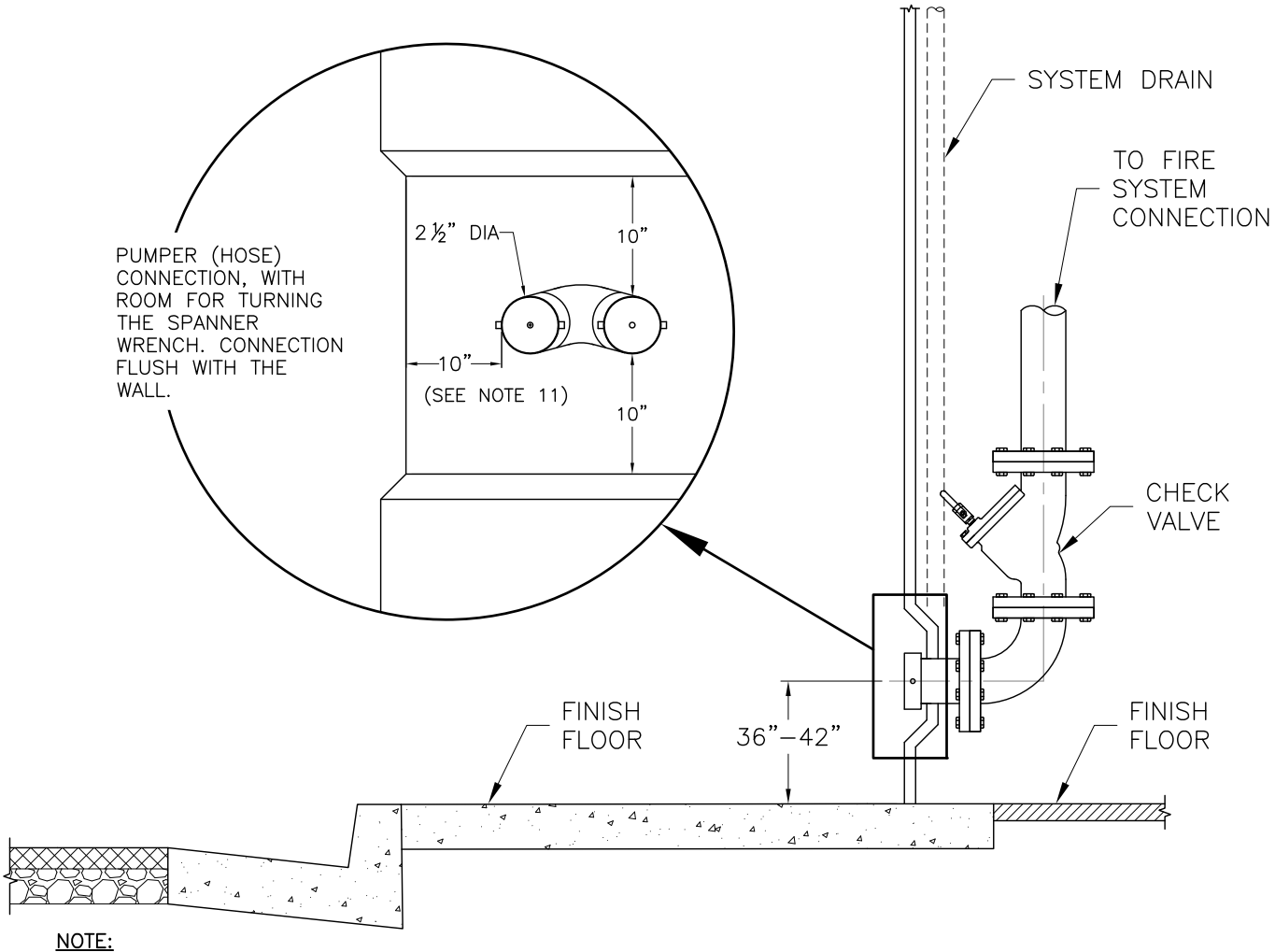


PLAN



ELEVATION

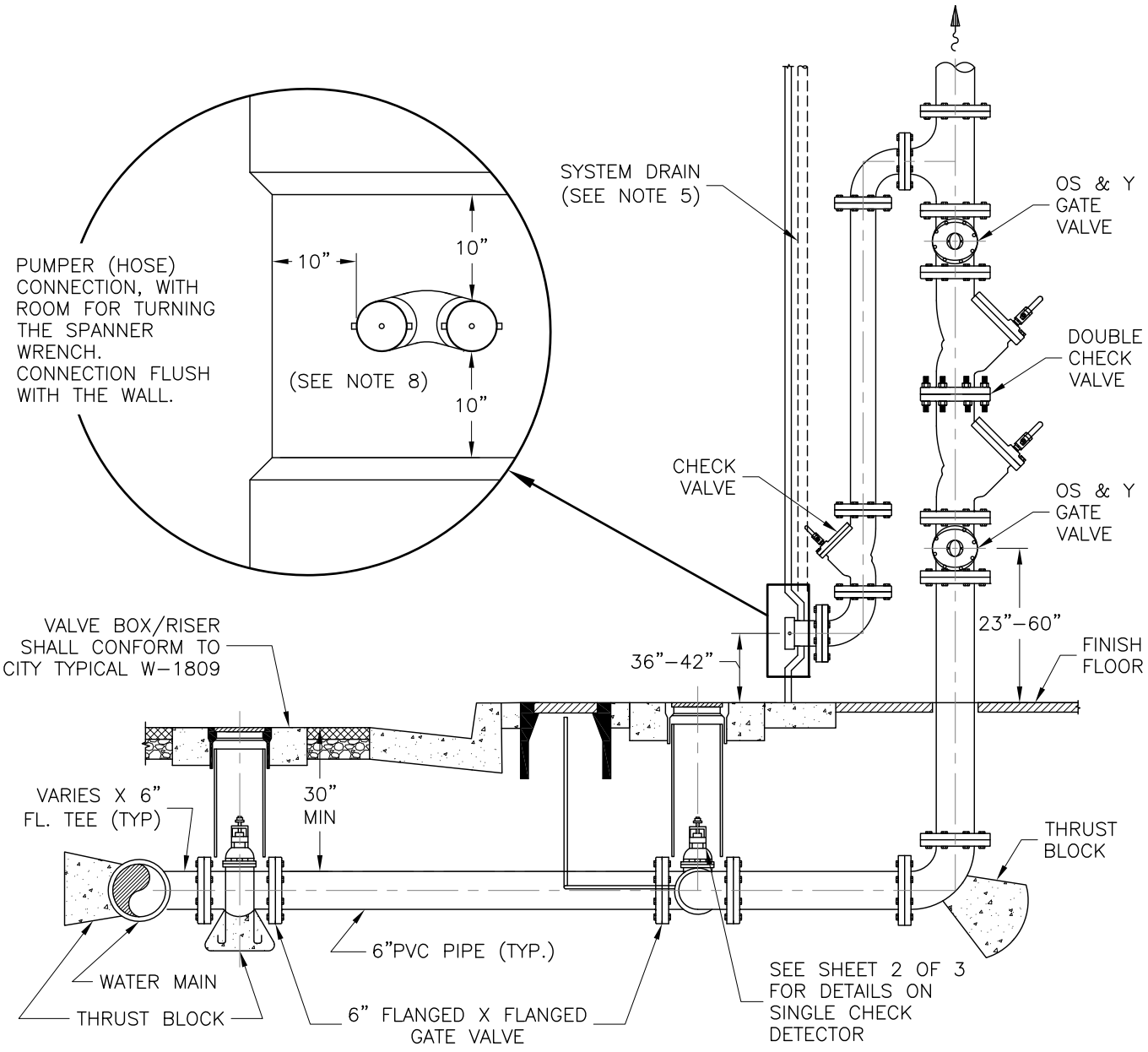
THE CITY OF BURLINGAME CALIFORNIA	**DOUBLE CHECK DETECTOR (ABOVE GRADE)**	APPROVED BY	DRAWING NO. W-2780 (1 of 2)
	DEPARTMENT OF PUBLIC WORKS	DATE 05/06/2016	



NOTE:

1. ALL DEVICES SHALL BE APPROVED BY USC.
2. THE DEVICE SHALL BE INSTALLED AT THE OWNER'S PROPERTY LINE AND ADJACENT TO THE METER. COORDINATE WITH BURLINGAME WATER ON LOCATION.
3. BYPASS METER TO BE SUPPLIED BY CITY ACCORDING TO CURRENT FEE SCHEDULE.
4. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR DOUBLE CHECK DETECTOR ASSEMBLY AND VAULT AS PART OF FIRE LINE PLANS FOR REVIEW AND APPROVAL BEFORE ACTUAL INSTALLATION.
5. A REDUCED PRESSURE DETECTOR ASSEMBLY MAY BE REQUIRED FOR HIGH HAZARD CONDITIONS ACCORDING TO PLUMBING CODE.
6. BEFORE PURCHASE OR INSTALLATION, CONTRACTOR TO CONTACT COUNTY HEALTH FOR THEIR LIST OF APPROVED DEVICES FOR BACKFLOW PREVENTION.
7. DEVICES MUST BE TESTED AND CERTIFIED BY CERTIFIED COUNTY TESTER. CONTACT COUNTY FOR APPROVED LIST OF TESTERS.
8. THRUST BLOCKS SHALL CONFORM TO W–1810.
9. PUMPER (HOSE) OUTLET SHALL NOT ENCROACH INTO PUBLIC RIGHT–OF–WAY.
10. FDC OUTLET SIZE MUST BE 2½" IN DIAMETER.
11. A MINIMUM OF 10 INCHES (10") CLEARANCE SHALL BE ON ALL SIDES OF FDC, MEASURED FROM EDGE OF OUTLETS.
12. BELOW–GRADE DOUBLE CHECK DETECTOR IS PROHIBITED.
13. NON–STORM WATER FROM SYSTEM DRAIN PIPE SHALL BE DISCHARGED DIRECTLY INTO VEGETATED AREA, OR COLLECTED AND PROPERLY DISCHARGED INTO SANITARY SEWER. NO DIRECT CONNECTION SHALL BE MADE BETWEEN THE SYSTEM MAIN DRAIN AND THE SANITARY SEWER.

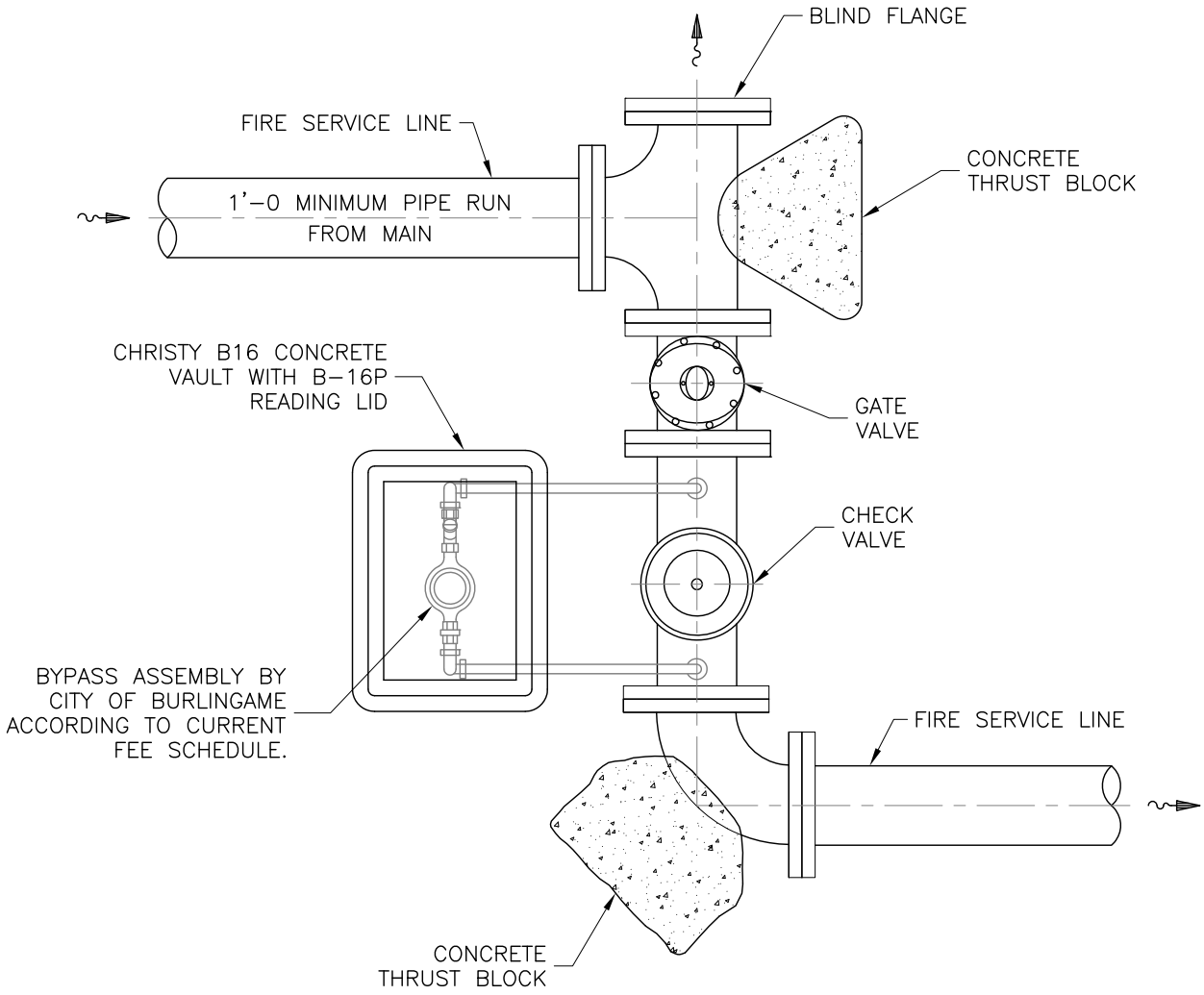
THE CITY OF BURLINGAME CALIFORNIA	**PUMPER CONNECTION AND SYSTEM DRAIN**	APPROVED BY	DRAWING NO.
		DATE 05/06/2016	W-2780 (2 of 2)
	DEPARTMENT OF PUBLIC WORKS		



NOTE:

1. LOCATION OF JOINT TEE SHALL BE APPROVED BY THE CITY ENGINEER.
2. MATERIALS USED IN THE CITY RIGHT–OF–WAY MUST BE APPROVED BY THE CITY.
3. DETECTOR CHECK METER IS TO BE INSTALLED BY THE CITY PRIOR TO BACKFILLING AROUND THE CHECK VALVE.
4. SEE WATER TYPICALS FOR TRENCH SECTION, MATERIALS, THRUST BLOCKS, VALVE INSTALLATION, ETC.
5. NON–STORM WATER FROM SYSTEM DRAIN PIPE SHALL BE DISCHARGED DIRECTLY INTO VEGETATED AREA, OR COLLECTED AND PROPERLY DISCHARGED INTO SANITARY SEWER. NO DIRECT CONNECTION SHALL BE MADE BETWEEN THE SYSTEM MAIN DRAIN AND THE SANITARY SEWER.
6. THRUST BLOCKS SHALL CONFORM TO W–1810.
7. VARIANCE REQUIRED FOR THIS INSTALLATION.
8. A MINIMUM OF 10 INCHES (10") CLEARANCE SHALL BE ON ALL SIDES OF FDC, MEASURED FROM EDGE OF OUTLETS.

THE CITY OF BURLINGAME CALIFORNIA	**ALTERNATE FIRE SYSTEM CONNECTION**	APPROVED BY	DRAWING NO.
		DATE 05/17/2016	W-2781 (1 OF 2)
	DEPARTMENT OF PUBLIC WORKS		



PLAN

NOTE:

1. CITY TO FURNISH METER, COUPLINGS, AND 3/4" STRAIGHT CHECK VALVE.
2. DETECTOR CHECK VALVE SHALL BE INSTALLED ON THE OWNER'S PROPERTY.
3. INSPECTION BY UTILITY CROSS CONNECTION INSPECTOR IS REQUIRED.
4. THRUST BLOCKS SHALL CONFORM TO W–1810.
5. VARIANCE REQUIRED FOR THIS INSTALLATION.

THE CITY OF BURLINGAME CALIFORNIA	**ALTERNATE FIRE SYSTEM CONNECTION**	APPROVED BY	DRAWING NO.
		DATE 05/17/2016	W-2781 (2 OF 2)
	DEPARTMENT OF PUBLIC WORKS		